

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

Part I SENEGAL - THE GAMBIA

28 June - 08 July 2001

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

**Department of Fisheries
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**Institute of Marine Research
Bergen, Norway**

CRUISE REPORTS 'DR FRIDTJOF NANSEN'

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

Part I

**SENEGAL - THE GAMBIA
28 June - 08 July 2001**

by

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CHAPTER 1 INTRODUCTION

1.1 Objective 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 June-July 2001. 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 were: sardinella *Sardinella aurita*, *Sardinella maderensis*, horse mackerel *Trachurus trachurus* and *T. trecae*, false scad *Decapterus rhonchus*, and anchovy *Engraulis encrasicolus*.
- To identify and describe the size distribution of the target fish populations by midwater and bottom trawl sampling and process the catches by recording weight and number by species.
- To sample 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:
Abdoulaye SARRE, Mor SYLLA, Mamadou SANE and Madiabel DIOP

Department of Fisheries, The Gambia:
Ousmann Mass JOBE, Solomon TAMOH and Juldah JALLOW,

Centre National de Recherches Océanographiques et des Pêches, Mauritania:
Ahmedou O. M. El MOUSTAPHA

Institute of Marine Research, Norway:

Reidar TORESEN, Magne OLSEN, Tore MØRK and Tore NILSEN

1.3 Narrative

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

The survey started off St Louis on June the 28 with systematic parallel course tracks spaced about 10 NM (nautical miles) apart. To cover the whole distribution area of pelagic fish, the shelf was covered from the 15 m isobath and offshore to the 500 m isobath. Trawling was done irregularly, either to identify echo registrations or to check 'blindly' 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. A smaller pelagic trawl or the bottom trawl with floats was used for sampling the pelagic fish in very shallow waters (depth less than 25 m). The shelf was covered down to Casamance. On the 7 July an intercalibration was carried out between R/V "Dr. Fridtjof Nansen" and the Senegalese research vessel N/O "Itaf Deme". The survey was finished in Dakar July 8.

The hydrographic profile off The Gambia was carried out on July 1 and that off Cape Vert on June 30.

1.4 Methods

Environmental Data

Surface temperature and meteorological data from a weather station 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.

Biological sampling

Biological sampling of the fish was carried out using trawls. A pelagic trawl with floats was often used. A smaller pelagic trawl or the bottom trawl with floats was used for sampling the pelagic fish in very shallow waters (depth less than 25 m). Annex II gives a description of the instruments and the fishing gear used. All catches were sampled for composition by weight and

numbers of each species caught. Species identification was based on the FAO Species Guides. Length frequency distributions, by total fish length in cm, of the selected target species were taken in all the stations where they were present. Individual weight measurements were taken regularly to estimate the condition factor in the length-weight relationship:

$$\bar{w} = \frac{cond}{100} \times L^3$$

The specific condition factors obtained from the samples and applied for this survey were: 0.96 for sardinellas and horse mackerels.

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 (to calculate the mean length of this length group) were applied.

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

The complete records of fishing stations are shown in Annex I.

The following target groups were used for Senegal:

- 1) sardinellas (flat sardinella *Sardinella maderensis* and round sardinella *S. aurita*),
- 2) horse mackerels (Cunene horse mackerel *Trachurus trecae*, round scad *Decapterus punctatus*, and false scad *Decapterus rhonchus*),
- 3) other pelagic carangids and associated species (Atlantic bumper *Chloroscombrus chrysurus*, African lookdown *Selene dorsalis*, chub mackerel *Scomber japonicus*, largehead hairtail, *Trichiurus lepturus*, and barracudas *Sphyraena* spp.),
- 4) other demersal species (such as bigeye grunt *Brachydeuterus auritus*, Sparidae and Haemulidae), and
- 5) other clupeids such as West African ilisha *Ilisha africana*.

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- 4) other demersal species (such as bigeye grunt *Brachydeuterus auritus*, Sparidae and Haemulidae), and
- 5) other clupeids such as West African ilisha *Ilisha africana*.

Acoustic sampling

A SIMRAD EK500 Echosounder was used with the settings as shown in Annex II. The Bergen Integrator (BEI) was used for analysis and allocation of the integrated s_A – values to the individual specified target groups by 5 NM intervals. The allocation of values to target groups was based on a combination of a visual scrutiny of the behaviour pattern as deduced from echo diagrams, the BEI analysis, and the catch compositions.

In cases where the target category of fish contains more than one species (sardinellas and horse mackerels), the mean s_A – value allocated to the category is divided between the species in the same ratio as their contribution to the mean back scattering strength in the length frequency samples.

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:

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

Which can be converted (see Toresen *et al.* 1998 for details) to the area form (scattering cross sections of acoustic targets):

$$C_{Fi} = 1.26 \cdot 10^6 \cdot L^3$$

where L is total length in 1 cm length group i and C_{Fi} (m^{-2}) is the reciprocal back scattering strength, or so-called fish conversion factor. In order to split and convert the allocated s_A – values (m^2/NM^2) to fish densities (numbers per length group per NM^2), the following formula was used:

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

where

ρ_i = density of fish in length group i

S_A = mean integrator value

P_i = proportion of fish in length group i

$$\sum_{i=1}^n \frac{P_i}{C_{Fi}} = \text{the relative back scattering cross section (m}^2\text{) of the length frequency}$$

sample of the target species, and

$$C_{fi} = \text{reciprocal back scattering cross section } (\sigma_{bs}^{-1}) \text{ of a fish in length group } i.$$

The integrator outputs were split in fish groups using a combination of behaviour pattern as deduced from echo diagrams, the BEI analysis and catch composition as described below. The following groups were used for Senegal: 1) sardinellas, 2) horse mackerels, 3) carangids and associated species, and 4) demersal fish.

The above equations show that the conversion from s_{λ} -values to number of fish is dependent on the length composition of the fish. It is therefore important to get representative length distributions from the stock in the whole distribution area.

When the size classes (of e.g. young fish and older fish) are well mixed, the various length distributions can be pooled together with equal importance. Otherwise, when the size classes are segregated, the total distribution area has to be post-stratified, according to the length distributions, and separate estimates are made for the regions containing fish with equal size.

For a region representing a distribution of a target-specie, the following basic data are needed for the estimation of abundance; 1) the average s_{λ} -value for the region, 2) the surface (usually square nautical miles, NM²), and 3) a representative length distribution of the fish in the region. If the targeted fish is a mixture of more than one species, for example sardinellas, a representative distribution of the two, within the region, as shown in the trawl catches, are used. A length distribution representing the number of the two species for each catch will have to be calculated. Thereafter, these distributions have to be normalized to a unit number (usually 100) so they are equally weighted.

A systematic approach to a) divide the s_{λ} -value between species in a category of fish (e.g. *Sardinella aurita* and *S. maderensis*) and b) produce pooled length distributions of a target species for use in the above equation and c) calculate the biomass estimates for a region, is obtained through the following procedure:

- The samples of the species in the category (e.g. sardinellas) are respectively pooled together with equal importance (normalized).

- The mean back scattering strength (ρ/s_λ) of each length frequency distribution of the target species is calculated and summed. This is automatically done in the Excel spread-sheet made available for acoustic abundance estimation onboard R/V “Dr. Fridtjof Nansen”, provided the data are punched in this sheet.
- The mean s_λ -value allocated to the category of fish in the region is divided between the species in the same ratio as their relative contribution to the mean back scattering strength of the length groups in the sample representing the region (also automatically done in the Excel spread-sheet given that the s_λ – value for the region is punched into the sheet).
- The pooled length distribution is used, together with the mean s_λ -value, to calculate the density (numbers per square NM) by length groups and species, using the above formula. The total number by length group in the area is obtained by multiplying each number by the area. (This is done in the Excel spread-sheet, given that the area of the region is punched into the sheet).
- The numbers are converted to biomass using the estimated weight at length. (Done in the Excel sheet if the condition factor is punched) .

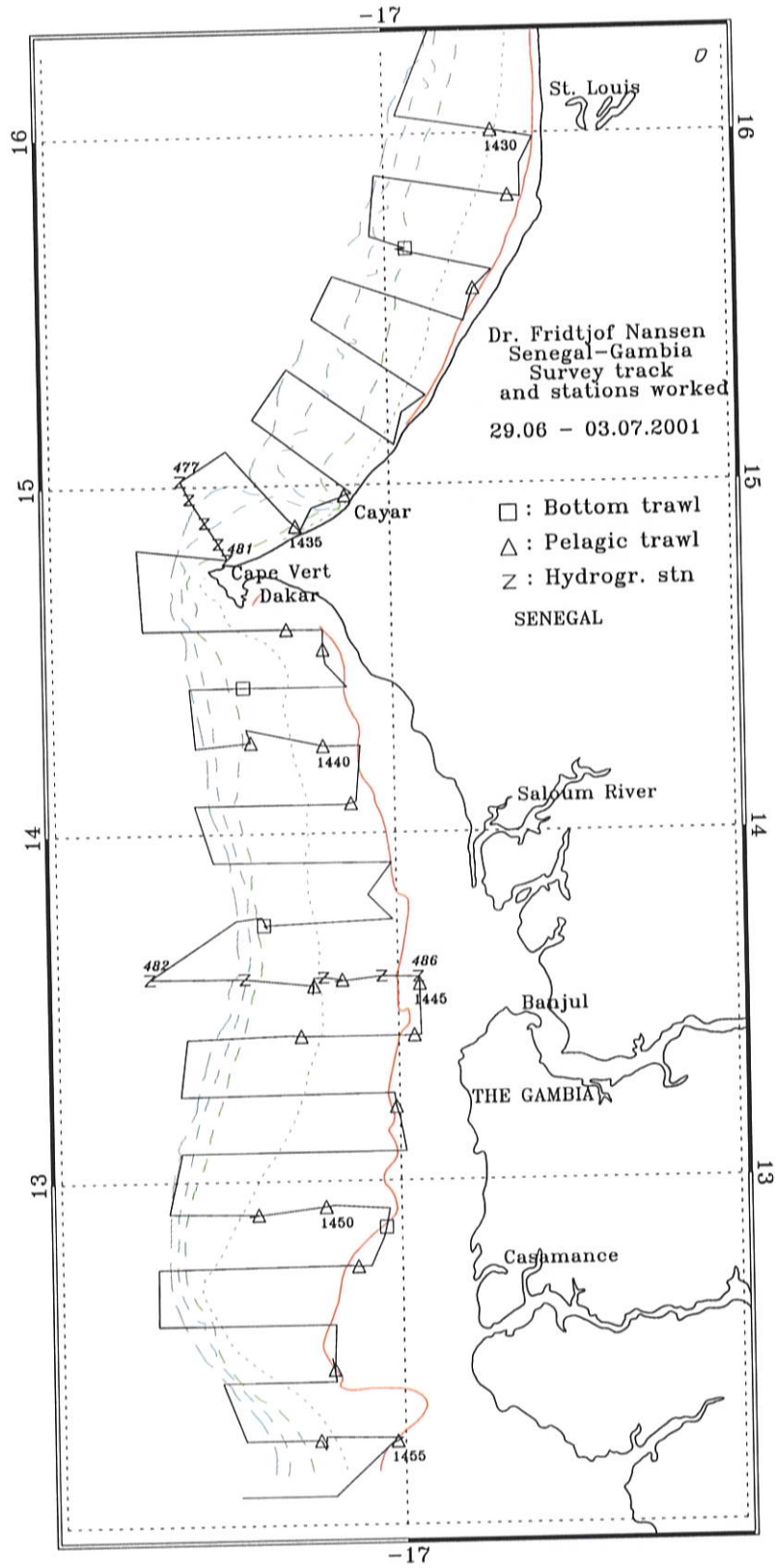


Figure 1 Course tracks with fishing and hydrographic stations; Casamance to St. Louis.

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.

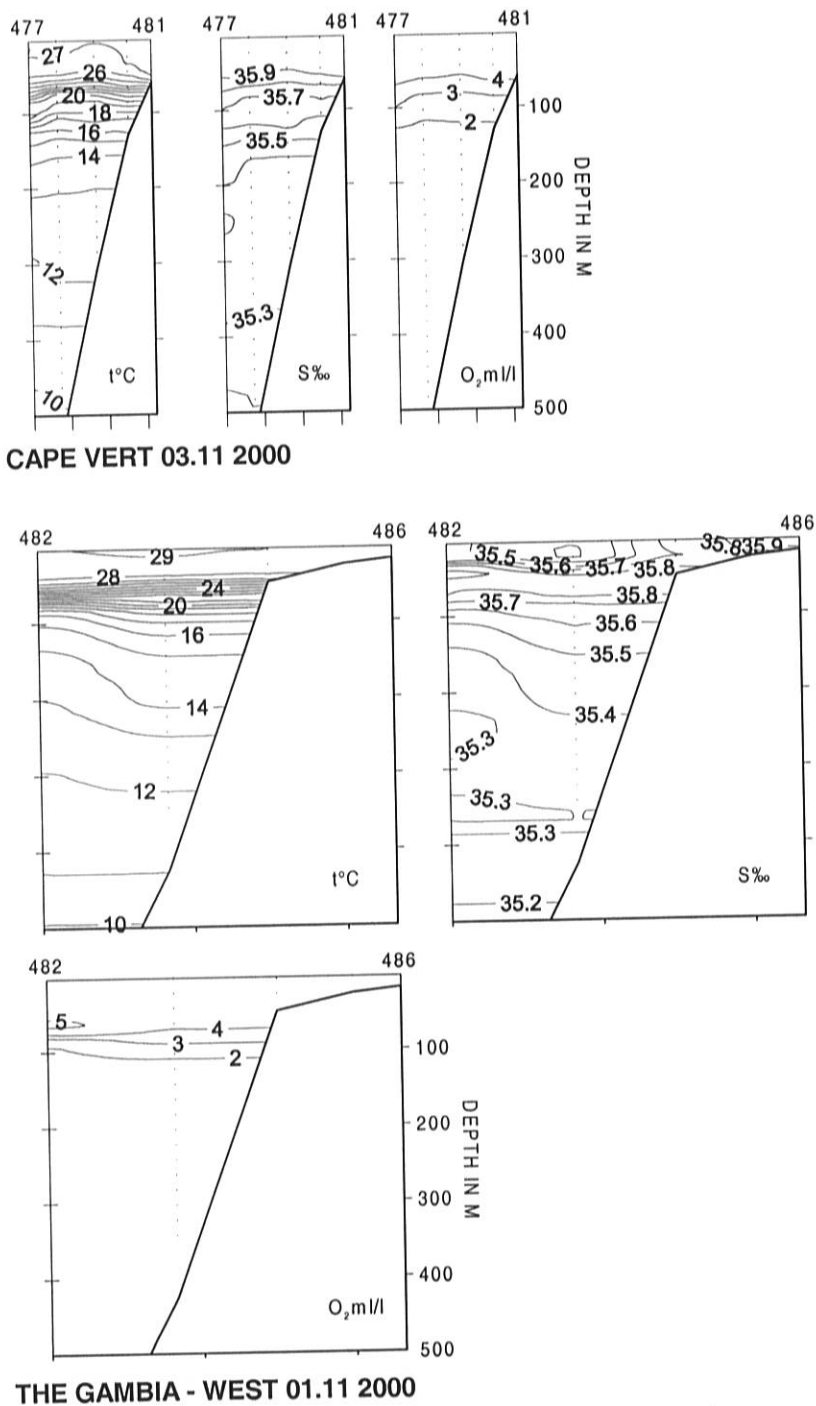


Figure 2 Hydrographic profiles with distribution of temperature, salinity and oxygen.

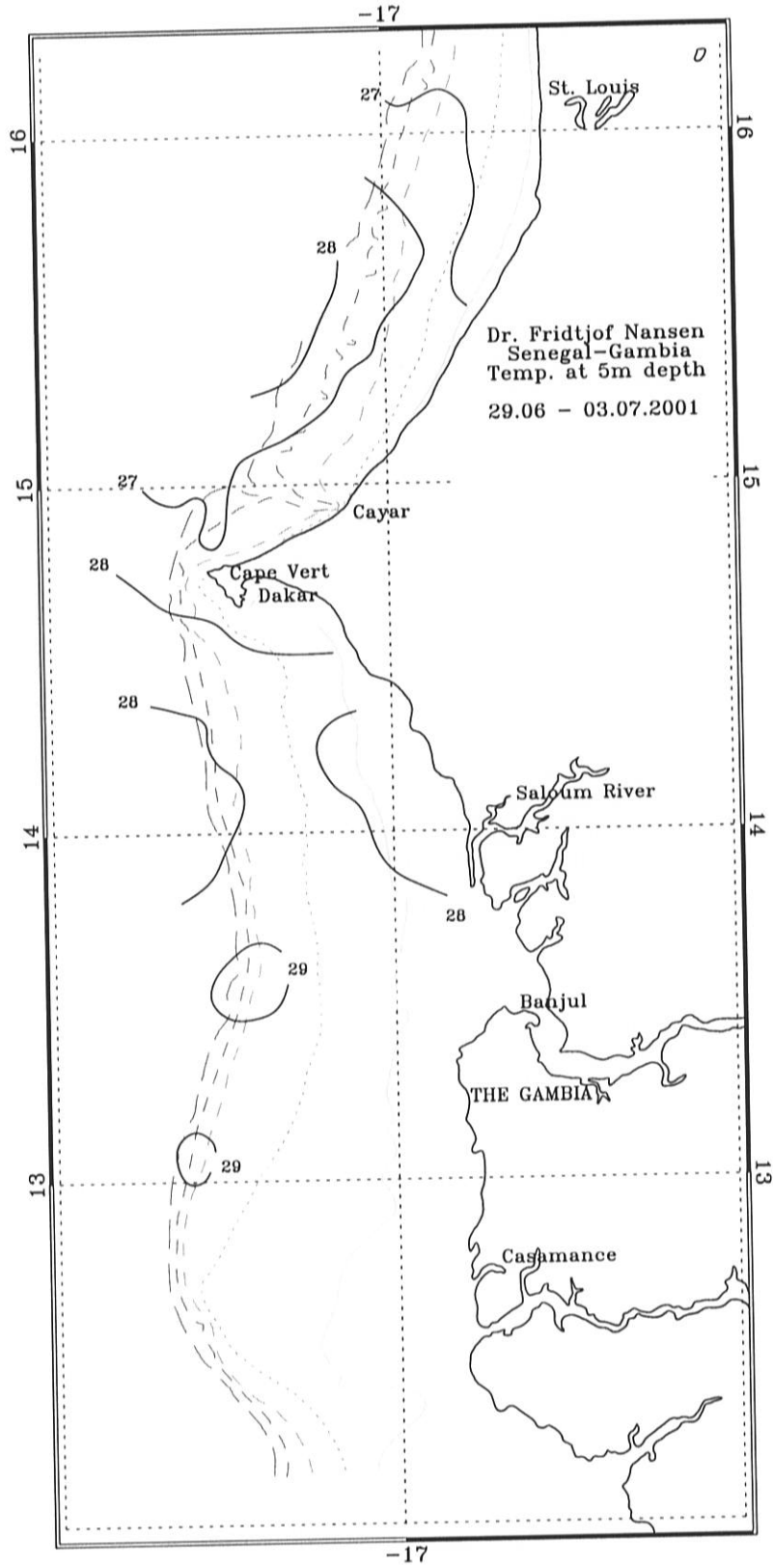


Figure 3 Sea surface temperature; Casamance to St. Louis.

The distribution of surface temperature and the profile The Gambia-West show that there was a stable surface layer with a temperature of 28-29°C over the whole shelf south of Dakar. North of Cape Vert there was a trend of decreasing temperature towards the shore, with a decline from 27°C over the entire shelf just north of Cape Vert to 26°C off St. Louis.

2.2 The Casamance shelf

Figures 4, 5 and 6 show the distributions 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 high density in shallow waters, mostly inside the 25 m depth line (Figure 4). The samples from this aggregation were predominantly (88%) *Sardinella maderensis*. The modal size was 9, 19, 22 and 29 cm (total length). The size composition is shown in Annex III and the stock length compositions by numbers and weight in Annex IV. The total biomass of sardinellas in the area was estimated at 127 000 tonnes (Table 1).

No horse mackerels were found at the Casamance shelf during this survey.

Other pelagic fish were found in rather low densities, but over a wider area than the sardinellas, see Figure 6. The trawl samples indicated that these consisted of bumper, lookdown, barracudas, two-colour jack and hairtails, with the bumper as the dominating species. The estimated biomass of this group of fish was 44 000 tonnes.

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

Flat sardinella 102	Round sardinella 25	Horse mackerels -	Carangids etc 44
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2.3 The Gambian shelf

The school area of sardinella found off Casamance continued northwards off The Gambia (Figure 4). The highest concentrations were recorded as a medium to high density area some 15 NM off the coast. The samples showed a 68% dominance of flat sardinella (*Sardinella maderensis*) with a smaller proportion of round sardinella (*S. aurita*). The pooled length composition of the flat sardinella had modes of 14 and 24 cm, see Annex III. The stock length compositions by numbers and weight are shown in Annex IV.

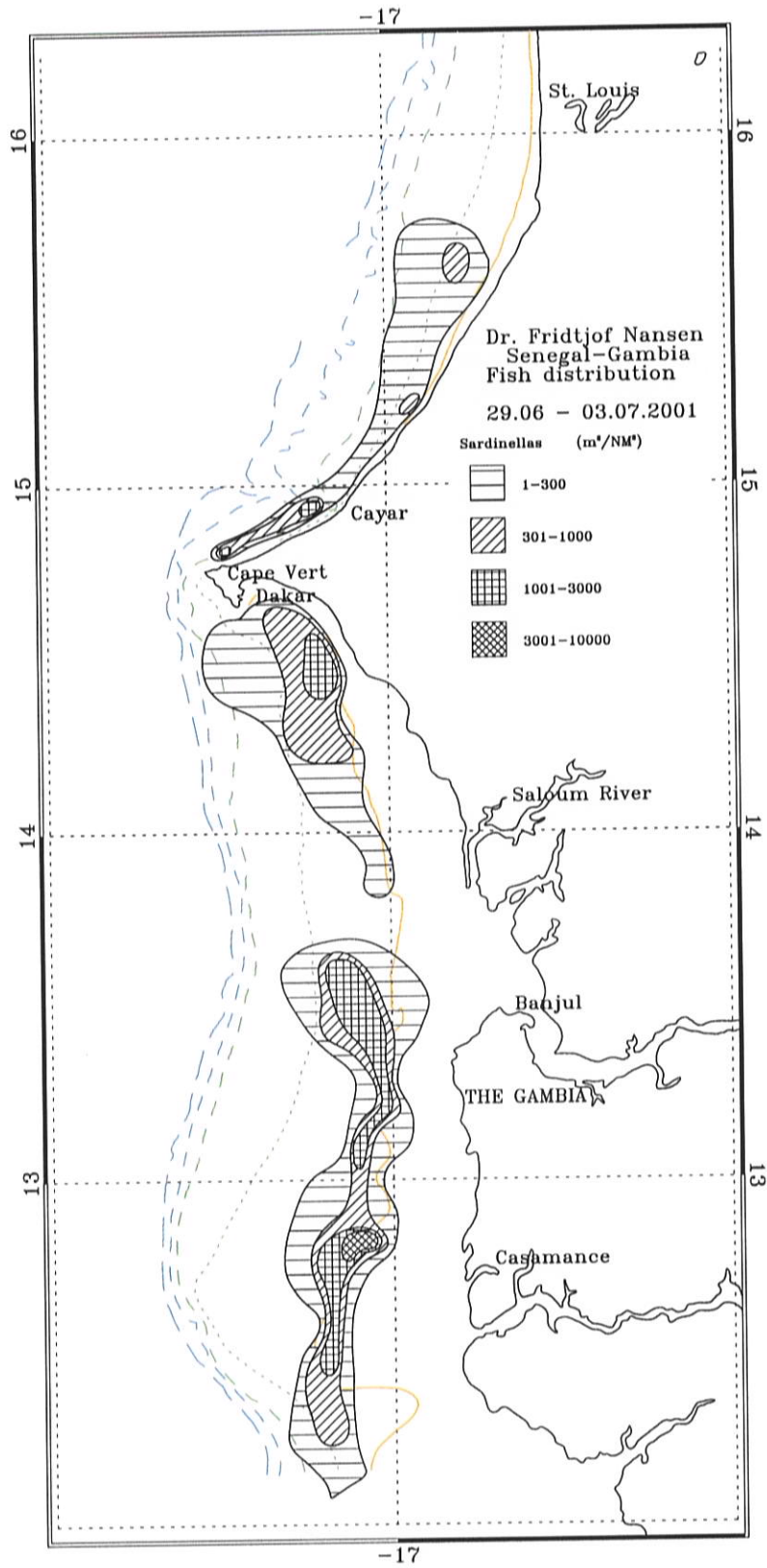


Figure 4 Distribution of sardinellas; Casamance to St. Louis.

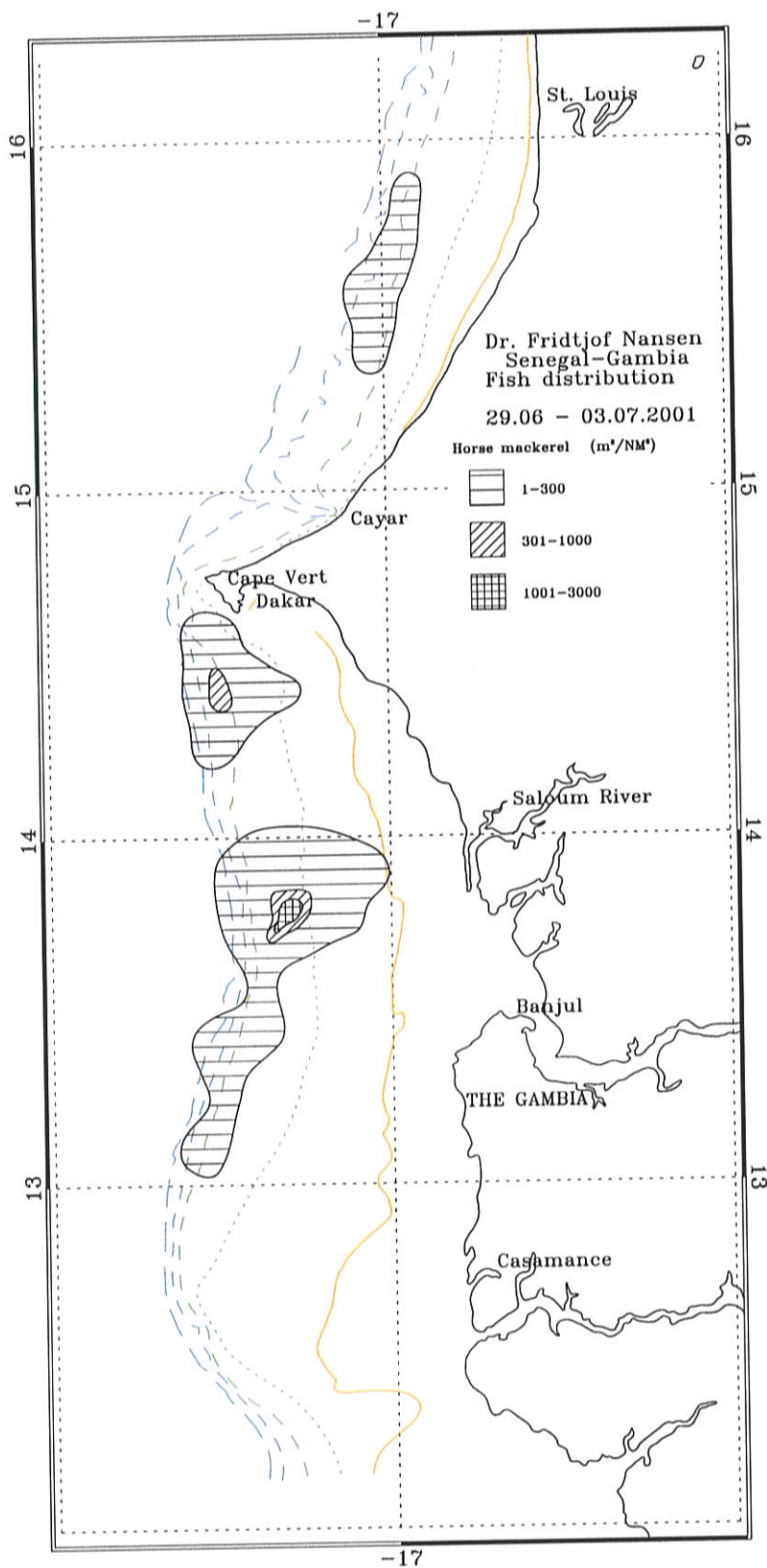


Figure 5 Horse mackerels; Casamance to St. Louis.

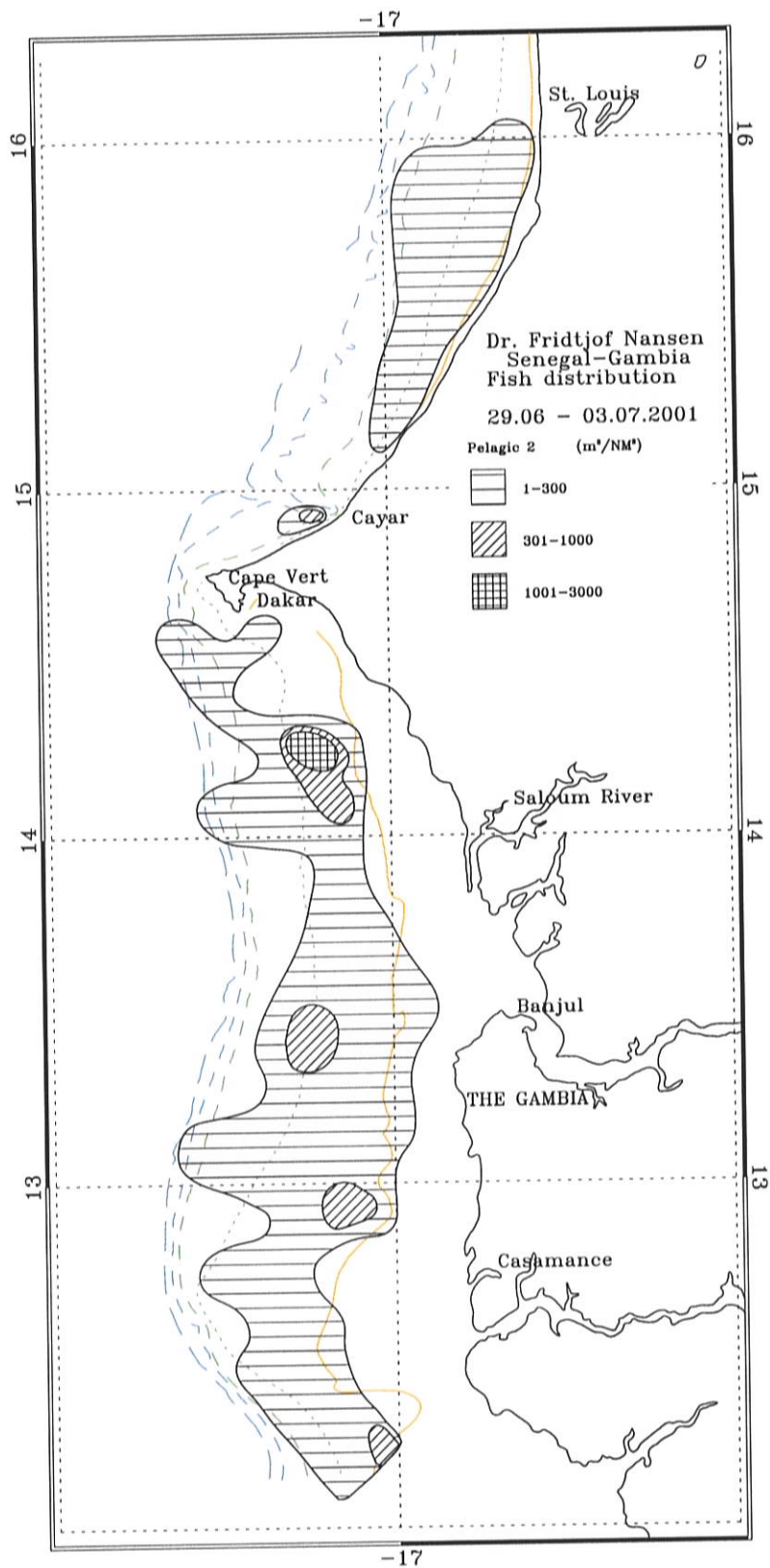


Figure 6. Carangids and associated species; Casamance to St. Louis

Table 2 shows that the biomass estimates of the sardinellas amounted to 172 000 tonnes, of which 117 000 tonnes were flat sardinella.

Horse mackerels were found mostly near the bottom at the edge of the shelf, some 40 NM from the coast (Figure 5). However, the densities were very low and the biomass estimated at 7 000 tonnes only. False scad dominated by 77%. It was predominately large scad of more than 26 cm that was found.

Carangids and associated species were found widely distributed over the inner shelf (Figure 6). Catches of this group consisted mainly of bumper, African lookdown and barracudas. The biomass was estimated at 140 000 tonnes.

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

Flat sardinella 117	Round sardinella 55	Horse mackerels 7	Carangids etc. 38
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2.4 The Gambian border - Cape Vert

Sardinellas were distributed from the outlet of the Saloum River to Dakar (Figure 4). The greatest densities were found some 15 NM south of Dakar. Table 3 shows the biomass estimates for the two sardinella species that summed up to 82 000 tonnes. Round sardinella dominated the estimated biomass in the area by 57%.

Pooled length compositions of samples showed that the flat sardinella had a modal length of 24 cm while the round sardinella had modal lengths of 12 and 19 cm, see Annex III. Stock size compositions by numbers and weight are shown in Annex IV.

The horse mackerels in this area were distribution in two main areas, one some 30 NM west of the outlet of the Saloum River and the other south of Cap Vert (Figure 5). The total biomass was estimated at some 61 000 tonnes of which 59% were scad (*Decapterus* sp.). The modal length of the scad in this area was 29 cm.

Also here, the carangids and associated pelagic fish, were distributed over most of the area with the highest concentrations between the Saloum River and Dakar, see Figure 5. Again, bumper

was caught in most of the trawl samples. The biomass of the carangids and associated pelagic fish was estimated at about 55 000 tonnes (Table 3).

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

Flat sardinella 35	Round sardinella 47	Horse mackerels 61	Carangids etc. 55
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2.5 Cape Vert - St. Louis

Sardinella were distributed inshore all along the coast between Cape Vert and St. Louis (Figure 4). The two species had wide length distributions and the modal lengths of flat sardinella were 10, 14, 27 and 31 cm while the round sardinella had modal lengths of 11, 19, 22 and 27 cm. The flat sardinella dominated the total biomass estimate of 30 000 tonnes by 57 %.

Horse mackerel were found at low densities, near bottom, at the edge of the shelf, in an area extending from about 50 NM north of Dakar to St. Louis (Figure 5). The total biomass was estimated at 7 000 tonnes, and the catches show that only *Cunene* horse mackerel were found. The modal length was 22 cm.

Carangids and associated pelagic fish were mainly found over the entire shelf, in a larger area, extending from about 10 NM north of Cayar to St Louis. A smaller aggregation was found off Cayar (Figure 6). The catches consisted also here of bumper, African lookdown and hairtails. The biomass estimate was 57 000 tonnes.

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

Flat sardinella 17	Round sardinella 13	Horse mackerels 7	Carangids etc. 17
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CHAPTER 3 OVERVIEW AND SUMMARY OF RESULTS

The survey was conducted successfully in the period June 28 to July 8 with a course track of about 1 500 NM and 25 fishing stations.

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 main areas; one off Casamance and The Gambia, another from Saloum River to Dakar, and the third between Cap vert and St Louis (Figure 4). High densities were found off Casamance and the Gambia and south of Dakar. Flat sardinella dominated in all areas, except south of Dakar.

Horse mackerels were also found in three main areas; one off The Gambia and Shaloum River, another south of cap vert and the third along the outer shelf south of St. Louis.(Figure 5).

South of Cape Vert, the carangids and associated species were distributed over most of the shelf at rather low densities (Figure 5). The catches of this group consisted of bumper, barracudas and hairtails. North of Cap Vert, the carangids were distributed over the shelf in the northernmost part of the region.

An overview of the acoustic estimates of biomass of the main groups of pelagic fish is shown in Table 5. The total biomass of sardinellas was thus 270 000 tonnes, horse mackerels – 51 000 tonnes and of carangids and associated species - 489 000 tonnes.

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

	Flat sardinella	Round sardinella	Horse mackerels	Carangids etc.
St. Louis-Cape Vert	17	13	7	17
Cape Vert-Gambia	35	47	61	55
Gambia	117	55	7	38
Casamance	102	25	-	44
Total	271	140	75	154

Table 6 lists biomass estimates of sardinellas and carangids (including the horse mackerels) and associated species from the '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 in the summer the sardinellas should be concentrated in Senegal for spawning.

However, acoustic surveys have not been carried out in July, in Senegal, before, and it is therefore not possible to compare these results with a “normal” situation. Compared with the April-May and September surveys in 1981 and February-March survey in 1982, the estimate of 411 000 tonnes of sardinellas from the current survey is higher. The carangid estimate of 229 000 tonnes is significantly lower than the April-May estimate in 1981, but higher than that of February-March in 1982.

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
NovDec-96	231	526
NovDec-97	295	254
NovDec-98	388	344
NovDec-99	1 385	467
NovDec-00	270	489
JunJul-01	411	229

* Horse mackerels and other carangids

** Not available

References

- Toresen, R., Gjørseter, H., and Barros, P. 1998. The acoustic method as used in the abundance estimation of capelin (*Mallotus villosus* Müller) and herring (*Clupea harengus* Linné) in the Barents Sea. Fisheries Research 34 (1998) 27-37.

Annex I Records of fishing stations

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:1430
 DATE:29/ 6/01 GEAR TYPE: PT No:6 POSITION:Lat N 1601
 start stop duration Long W 1641
 TIME :01:38:58 02:09:56 31 (min) Purpose code: 1
 LOG :6310.52 6312.51 1.94 Area code : 4
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 54 44 Validity code:
 Towing dir: 100e Wire out: 170 m Speed: 40 kn*10

Sorted: 130 Kg Total catch: 130.29 CATCH/HOUR: 252.17

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardinella maderensis	82.55	424	32.74	2472
Sphyræna guachancho	56.32	83	22.33	
Sardinella aurita	47.42	364	18.80	2473
Chloroscombrus chrysurus	39.68	259	15.74	
Selene dorsalis	9.77	77	3.87	
Mustelus mustelus	3.97	2	1.57	
Stromateus fiatola	3.14	4	1.25	
Ilisha africana	2.44	27	0.97	
Arius latiscutatus	2.32	2	0.92	
Arius laticutatus	1.94	19	0.77	1
Brachydeuterus auritus	1.18	190	0.47	
Engraulis encrasicolus	0.87	2	0.35	
Caranx senegallus	0.87	2	0.35	
Trichiurus lepturus	0.27	8	0.11	
Lolliguncula mercatoris	0.12	52	0.05	
Trachurus trecae	0.10	31	0.04	
Echeneis naucrates	0.10	2	0.04	
Total	252.19		100.02	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:1431
 DATE:29/ 6/01 GEAR TYPE: PT No:1 POSITION:Lat N 1549
 start stop duration Long W 1638
 TIME :04:15:31 04:45:32 30 (min) Purpose code: 1
 LOG :6330.81 6332.61 1.79 Area code : 4
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 28 34 Validity code:
 Towing dir: 280e Wire out: 170 m Speed: 40 kn*10

Sorted: 69 Kg Total catch: 189.95 CATCH/HOUR: 379.90

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Pomadasys jubelini	132.90	390	34.98	
Chloroscombrus chrysurus	69.90	456	18.40	
Ilisha africana	57.60	642	15.16	
Eucinostomus melanopterus	20.22	240	5.32	
Stromateus fiatola	17.52	42	4.63	
Arius laticutatus	14.12	14	3.72	
Sardinella maderensis	11.58	60	3.05	
Sphyræna guachancho	9.24	6	2.43	
Trichiurus lepturus	9.18	204	2.42	
Sardinella aurita	6.36	54	1.67	
Brachydeuterus auritus	6.12	120	1.61	
Galeoides decadactylus	4.80	30	1.26	
Engraulis encrasicolus	4.20	924	1.11	
Penaeus notialis	3.80	264	1.00	
Sparus caeruleostictus *	3.66	12	0.96	
Selene dorsalis	2.88	246	0.76	
Drepane africana	2.76	6	0.73	
Pseudotolithus typus	0.84	12	0.22	
Pseudotolithus elongatus	0.84	60	0.22	
Loligo vulgaris	0.18	42	0.05	
Total	378.70		99.68	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:1432
 DATE:29/ 6/01 GEAR TYPE: BT No:7 POSITION:Lat N 1541
 start stop duration Long W 1656
 TIME :08:48:11 09:17:24 29 (min) Purpose code: 1
 LOG :6373.26 6374.94 1.69 Area code : 4
 FDEPTH: 98 108 GearCond.code:
 BDEPTH: 98 108 Validity code:
 Towing dir: 280e Wire out: 350 m Speed: 33 kn*10

Sorted: 41 Kg Total catch: 156.72 CATCH/HOUR: 324.25

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardinella aurita	178.76	1769	55.13	2474
Trachurus trecae	49.03	410	15.12	2475
Brachydeuterus auritus	30.91	168	9.53	
Decapterus rhonchus	26.26	74	8.10	2476
Octopus vulgaris	12.10	19	3.73	
Trichiurus lepturus	7.90	33	2.44	
Illex coindetii	5.71	66	1.76	
Dentex angolensis	4.99	81	1.54	
Boops boops	4.28	27	1.32	
Sphoeroides pachgaster	1.30	4	0.40	
Pomadasys jubelini	1.14	2	0.35	
Pagellus bellottii	0.41	2	0.13	
Fistularia petimba	0.29	2	0.09	
Umbrina canariensis	0.29	2	0.09	
Total	323.37		99.73	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:1433
 DATE:29/ 6/01 GEAR TYPE: PT No:7 POSITION:Lat N 1534
 start stop duration Long W 1645
 TIME :11:41:44 12:10:02 28 (min) Purpose code: 1
 LOG :6397.52 6399.24 1.73 Area code : 4
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 24 23 Validity code:
 Towing dir: 200e Wire out: 170 m Speed: 350 kn*10

Sorted: 46 Kg Total catch: 46.26 CATCH/HOUR: 99.13

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Chloroscombrus chrysurus	27.00	189	27.24	
Pomadasys peroteti	24.54	81	24.76	
Lagocephalus laevigatus	15.41	19	15.55	
Sardinella maderensis	12.00	49	12.11	2477
Sphyræna guachancho	5.98	9	6.03	
Stromateus fiatola	3.81	4	3.84	
Caranx senegallus	2.55	9	2.57	
Trachinotus ovatus	2.40	13	2.42	
Selene dorsalis	2.19	6	2.21	
Sardinella aurita	1.33	19	1.34	
Sparus caeruleostictus *	0.81	2	0.82	
Decapterus rhonchus	0.64	2	0.65	
Brachydeuterus auritus	0.39	2	0.39	
Engraulis encrasicolus	0.04	21	0.04	
Todarodes agittatus	0.02	9	0.02	
Alloteuthis africana	0.02	4	0.02	
Total	99.13		100.01	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:1434
 DATE:30/ 6/01 GEAR TYPE: PT No:7 POSITION:Lat N 1458
 start stop duration Long W 1708
 TIME :00:10:41 00:30:22 20 (min) Purpose code: 1
 LOG :6526.04 6527.07 1.01 Area code : 4
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 49 78 Validity code:
 Towing dir: 250e Wire out: 170 m Speed: 30 kn*10

Sorted: 4 Kg Total catch: 4.18 CATCH/HOUR: 12.54

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardinella aurita	12.54	213	100.00	2478
Total	12.54		100.00	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:1435
 DATE:30/ 6/01 GEAR TYPE: PT No:6 POSITION:Lat N 1453
 start stop duration Long W 1717
 TIME :01:51:45 02:22:09 30 (min) Purpose code: 1
 LOG :6537.90 6539.71 1.80 Area code : 4
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 97 114 Validity code:
 Towing dir: 310e Wire out: 37 m Speed: 37 kn*10

Sorted: 14 Kg Total catch: 42.18 CATCH/HOUR: 84.36

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardinella aurita	59.40	732	70.41	2480
Sphyræna guachancho	7.44	30	8.82	
Sardinella maderensis	5.94	264	7.04	2479
Lagocephalus laevigatus	4.20	12	4.98	
Trachurus trecae	3.18	66	3.77	
Brachydeuterus auritus	2.58	18	3.06	
Scomber japonicus	1.24	12	1.47	
Engraulis encrasicolus	0.36	228	0.43	
Total	84.34		99.98	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:1436
 DATE:30/ 6/01 GEAR TYPE: PT No:3 POSITION:Lat N 1435
 start stop duration Long W 1719
 TIME :13:20:37 13:45:08 25 (min) Purpose code: 1
 LOG :6639.50 6641.16 1.67 Area code : 4
 FDEPTH: 20 20 GearCond.code:
 BDEPTH: 34 36 Validity code:
 Towing dir: 270e Wire out: 150 m Speed: 40 kn*10

Sorted: Kg Total catch: 0.07 CATCH/HOUR: 0.17

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Echeneis naucrates	0.17	5	100.00	
Total	0.17		100.00	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:1437
 DATE:30/ 6/01 GEAR TYPE: PT No:6 POSITION:Lat N 1432 Long W 1712
 start stop duration
 TIME :15:21:13 15:54:16 33 (min) Purpose code: 1
 LOG :6654.76 6657.35 2.51 Area code : 4
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 30 31 Validity code:
 Towing dir: 175e Wire out: 170 m Speed: 45 kn*10
 Sorted: 67 Kg Total catch: 66.76 CATCH/HOUR: 121.38

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Sardinella maderensis	113.09	773	93.17	2482
Sardinella aurita	6.82	82	5.62	2481
Euthynnus alletteratus	0.85	2	0.70	
Decapterus rhonchus	0.49	2	0.40	
Sepiella ornata	0.11	35	0.09	
Lagocephalus laevigatus	0.02	4	0.02	
Total	121.38		100.00	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:1438
 DATE:30/ 6/01 GEAR TYPE: BT No:7 POSITION:Lat N 1425 Long W 1726
 start stop duration
 TIME :18:56:57 19:26:46 30 (min) Purpose code: 1
 LOG :6685.41 6686.95 1.54 Area code : 4
 FDEPTH: 89 81 GearCond.code:
 BDEPTH: 89 81 Validity code:
 Towing dir: 90e Wire out: 300 m Speed: 31 kn*10
 Sorted: 61 Kg Total catch: 307.00 CATCH/HOUR: 614.00

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Sardinella aurita	205.00	3452	33.39	2483
Trachurus trecae	203.00	3300	33.06	2485
Boops boops	185.00	3720	30.13	
Scomber japonicus	16.90	200	2.75	2484
Dactylopterus volitans	3.10	10	0.50	
Lagocephalus laevigatus	0.60	20	0.10	
Todarodes sagittatus	0.20	10	0.03	
Alloteuthis africana	0.10	10	0.02	
Total	613.90		99.98	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:1439
 DATE:30/ 6/01 GEAR TYPE: PT No:1 POSITION:Lat N 1416 Long W 1725
 start stop duration
 TIME :23:05:37 23:37:31 32 (min) Purpose code: 1
 LOG :6722.56 6724.96 2.40 Area code : 4
 FDEPTH: 35 30 GearCond.code:
 BDEPTH: 92 97 Validity code:
 Towing dir: 340e Wire out: 170 m Speed: 45 kn*10
 Sorted: 42 Kg Total catch: 284.90 CATCH/HOUR: 534.19

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Sardinella aurita	508.50	6045	95.19	2486
Scomber japonicus	11.85	195	2.22	
Euthynnus alletteratus	9.00	38	1.68	
Sphyræna sphyraena	4.61	13	0.86	
Engraulis encrasicolus	0.23	56	0.04	
Total	534.19		99.99	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:1440
 DATE:1/ 7/01 GEAR TYPE: PT No:6 POSITION:Lat N 1415 Long W 1713
 start stop duration
 TIME :01:28:55 02:01:56 33 (min) Purpose code: 1
 LOG :6740.79 6742.93 2.09 Area code : 4
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 35 32 Validity code:
 Towing dir: 90e Wire out: 170 m Speed: 40 kn*10
 Sorted: 63 Kg Total catch: 797.29 CATCH/HOUR: 1449.62

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Chloroscombrus chrysurus	928.42	10591	64.05	
Sardinella aurita	361.60	4751	24.94	2487
Sardinella maderensis	120.45	909	8.31	2489
Eucinostomus melanopterus	17.51	182	1.21	
Pomadasys jubelini	12.18	11	0.84	
Trachurus trecae	5.00	909	0.34	2488
Sphyræna guanchancho	3.91	7	0.27	
Pomadasys peroteti	0.55	2	0.04	
Total	1449.62		100.00	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:1441
 DATE:1/ 7/01 GEAR TYPE: PT No:6 POSITION:Lat N 1405 Long W 1708
 start stop duration
 TIME :03:56:33 04:16:48 20 (min) Purpose code: 1
 LOG :6759.41 6760.59 1.15 Area code : 4
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 29 32 Validity code:
 Towing dir: 270e Wire out: 170 m Speed: 35 kn*10
 Sorted: 60 Kg Total catch: 755.01 CATCH/HOUR: 2265.03

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Chloroscombrus chrysurus	1826.25	22500	80.63	
Eucinostomus melanopterus	305.58	3414	13.49	
Sparus caeruleostictus *	40.50	150	1.79	
Sardinella aurita	31.14	525	1.37	
Pomadasys jubelini	15.39	39	0.68	
Trachurus trecae	14.64	2850	0.65	2490
Sardinella maderensis	12.75	114	0.56	
Pseudupeneus prayensis	9.39	114	0.41	
Plectrohinchus mediterraneus	8.64	39	0.38	
Penaeus notialis	0.75	39	0.03	
Total	2265.03		99.99	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:1442
 DATE:1/ 7/01 GEAR TYPE: BT No:7 POSITION:Lat N 1344 Long W 1724
 start stop duration
 TIME :14:23:32 15:12:18 49 (min) Purpose code: 1
 LOG :6865.03 6866.20 0.70 Area code : 4
 FDEPTH: 93 91 GearCond.code:
 BDEPTH: 93 91 Validity code:
 Towing dir: 155e Wire out: 400 m Speed: 30 kn*10
 Sorted: Kg Total catch: CATCH/HOUR:

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Total	0.00			

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:1443
 DATE:1/ 7/01 GEAR TYPE: PT No:3 POSITION:Lat N 1334 Long W 1715
 start stop duration
 TIME :21:18:16 21:38:35 20 (min) Purpose code: 1
 LOG :6921.63 6923.08 1.45 Area code : 5
 FDEPTH: 40 40 GearCond.code:
 BDEPTH: 56 56 Validity code:
 Towing dir: 185e Wire out: 200 m Speed: 42 kn*10
 Sorted: 64 Kg Total catch: 231.78 CATCH/HOUR: 695.34

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Brachydeuterus auritus	560.40	6300	80.59	
Sardinella aurita	73.80	744	10.61	2491
Sardinella maderensis	20.16	120	2.90	2493
Decapterus rhonchus	13.80	66	1.98	2492
Selene dorsalis	11.55	69	1.66	
Chloroscombrus chrysurus	10.80	96	1.55	
Boops boops	3.00	672	0.43	
Pomadasys incisus	1.35	9	0.19	
Trachurus trecae, juvenile	0.24	84	0.03	
Todarodes sagittatus	0.13	60	0.02	
Penaeus notialis	0.12	12	0.02	
Total	695.35		99.98	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:1444
 DATE:1/ 7/01 GEAR TYPE: PT No:3 POSITION:Lat N 1335 Long W 1710
 start stop duration
 TIME :23:14:25 23:32:43 18 (min) Purpose code: 1
 LOG :6934.78 6936.12 1.30 Area code : 5
 FDEPTH: 30 30 GearCond.code:
 BDEPTH: 39 42 Validity code:
 Towing dir: 270e Wire out: 150 m Speed: 40 kn*10
 Sorted: 70 Kg Total catch: 281.96 CATCH/HOUR: 939.87

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Sardinella maderensis	608.00	5587	64.69	2495
Sardinella aurita	234.00	3933	24.90	2494
Selene dorsalis	30.80	240	3.28	
Caranx crysos	30.27	67	3.22	
Chloroscombrus chrysurus	17.33	133	1.84	
Sphyræna guanchancho	10.13	27	1.08	
Pomadasys incisus	4.80	27	0.51	
Eucinostomus melanopterus	1.73	13	0.18	
Trachurus trecae	1.47	147	0.16	
Brachydeuterus auritus	1.33	13	0.14	
Total	939.86		100.00	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:1445
 DATE:2/ 7/01 GEAR TYPE: PT No:7 POSITION:Lat N 1334 Long W 1656
 start stop duration
 TIME :01:52:41 02:22:57 30 (min) Purpose code: 1
 LOG :6953.52 6955.29 1.75 Area code : 5
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 19 20 Validity code:
 Towing dir: 180e Wire out: 150 m Speed: 35 kn*10
 Sorted: 58 Kg Total catch: 233.24 CATCH/HOUR: 466.48

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Ethmalosa fimbriata	284.00	1728	60.88	2497
Brachydeuterus auritus	96.00	1104	20.58	
Trichinurus lepturus	20.64	64	4.42	
Sardinella maderensis	20.48	336	4.39	2496
Stromateus fiatola	14.48	16	3.10	
Ilisha africana	12.16	512	2.61	
Chloroscombrus chrysurus	9.60	680	2.06	
Sardinella aurita	3.76	24	0.81	
Sepia officinalis hierredda	3.28	232	0.70	
Penaeus notialis	0.88	104	0.19	
Galeoides decadactylus	0.40	80	0.09	
Selene dorsalis	0.32	8	0.07	
Engraulis encrasicolus	0.24	72	0.05	
Decapterus rhonchus	0.16	8	0.03	
C R A B S	0.08	8	0.02	
Total	466.48		100.00	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:1446
 DATE: 2/ 7/01 GEAR TYPE: PT No:7 POSITION:Lat N 1325
 start stop duration Long W 1657
 TIME :03:27:00 03:57:22 30 (min) Purpose code: 1
 LOG :6963.47 6965.18 1.69 Area code : 5
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 18 19 Validity code:
 Towing dir: 270e Wire out: 150 m Speed: 34 kn*10
 Sorted: 71 Kg Total catch: 212.95 CATCH/HOUR: 425.90

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	214.20	4942	50.29	
Sardinella maderensis	54.10	518	12.70	2498
Ethmaloma fimbriata	46.90	246	11.01	2499
Chloroscombrus chrysurus	44.94	686	10.55	
Ilisha africana	42.70	1324	10.03	
Pomadasya jubelini	7.90	14	1.85	
Trichiurus lepturus	6.02	42	1.41	
Sepia officinalis hierredda	3.08	154	0.72	
Galeoides decadactylus	1.42	3290	0.33	
Alectis alexandrinus	0.98	8	0.23	
Engraulis encrasicolus	0.84	266	0.20	
Penaeus notialis	0.70	84	0.16	
Penaeus kerathurus	0.62	70	0.15	
Decapterus rhonchus	0.56	22	0.13	
Decapterus rhonchus	0.56	22	0.13	
Pseudotolithus elongatus	0.48	112	0.11	
Sardinella aurita	0.48	8	0.11	
Total	426.48		100.11	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:1447
 DATE: 2/ 7/01 GEAR TYPE: PT No:6 POSITION:Lat N 1325
 start stop duration Long W 1717
 TIME :06:12:22 06:43:21 31 (min) Purpose code: 1
 LOG :6983.31 6985.09 1.77 Area code : 5
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 58 67 Validity code:
 Towing dir: 270e Wire out: 170 m Speed: 34 kn*10
 Sorted: 1 Kg Total catch: 0.78 CATCH/HOUR: 1.51

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Echeneis naucrates	0.89	2	58.94	
Trachinotus ovatus	0.60	2	39.74	
Selene dorsalis	0.02	2	1.32	
Total	1.51		100.00	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:1448
 DATE: 2/ 7/01 GEAR TYPE: PT No:7 POSITION:Lat N 1313
 start stop duration Long W 1701
 TIME :13:27:07 14:05:24 38 (min) Purpose code: 1
 LOG :7052.94 7055.12 2.16 Area code : 5
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 18 18 Validity code:
 Towing dir: 164e Wire out: 170 m Speed: 34 kn*10
 Sorted: 109 Kg Total catch: 109.12 CATCH/HOUR: 172.29

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardinella maderensis	90.63	774	52.60	2501
Sardinella aurita	47.05	379	27.31	2500
Chloroscombrus chrysurus	16.11	256	9.35	
Scomberomorus tritor	12.16	9	7.06	
Decapterus rhonchus	2.68	6	1.56	
Arius heudeloti	1.97	2	1.14	
Arius heudeloti	1.11	2	0.64	
Sphyræna guanchancho	0.43	2	0.25	
Pomadasya peroteti	0.16	2	0.09	
Selene dorsalis	0.16	2	0.09	
Total	172.30		100.00	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:1449
 DATE: 2/ 7/01 GEAR TYPE: PT No:6 POSITION:Lat N 1254
 start stop duration Long W 1725
 TIME :21:10:30 21:49:28 31 (min) Purpose code: 1
 LOG :7127.73 7129.38 1.63 Area code : 4
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 46 49 Validity code:
 Towing dir: 270e Wire out: 170 m Speed: 32 kn*10
 Sorted: 28 Kg Total catch: 27.53 CATCH/HOUR: 53.20

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Chloroscombrus chrysurus	24.48	147	45.95	
Decapterus rhonchus	9.48	356	17.79	2504
Caranx crysos	8.55	4	16.05	
Sardinella aurita	4.94	56	9.27	2502
Sphyræna guanchancho	1.94	2	3.64	
Trachinotus ovatus	1.84	4	3.45	
Sardinella maderensis	1.39	23	2.61	2503
Selene dorsalis	0.48	4	0.90	
Fistularia petimba	0.10	2	0.19	
Pagellus bellottii	0.04	2	0.08	
Todarodes sagittatus	0.02	43	0.04	
Pseudupeneus prayensis	0.02	2	0.04	
Total	53.28		100.01	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:1450
 DATE: 2/ 7/01 GEAR TYPE: PT No:7 POSITION:Lat N 1256
 start stop duration Long W 1713
 TIME :23:30:39 23:59:24 29 (min) Purpose code: 1
 LOG :7143.95 7145.47 1.50 Area code : 4
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 31 29 Validity code:
 Towing dir: 90e Wire out: 170 m Speed: 32 kn*10
 Sorted: 8 Kg Total catch: 8.06 CATCH/HOUR: 16.60

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardinella maderensis	5.57	182	33.39	2505
Scomberomorus tritor	3.64	2	21.82	
Sardinella aurita	2.86	31	17.15	
Arius heudeloti	1.70	2	10.19	
Sphyræna guanchancho	1.37	2	8.21	
Decapterus rhonchus	0.83	83	4.98	
Mugil capurrii	0.33	2	1.98	
Hemiramphus brasiliensis	0.31	2	1.86	
Sepia officinalis hierredda	0.08	37	0.48	
Total	16.69		100.06	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:1451
 DATE: 3/ 7/01 GEAR TYPE: BT No:7 POSITION:Lat N 1252
 start stop duration Long W 1703
 TIME :01:31:51 02:07:26 36 (min) Purpose code: 1
 LOG :7158.66 7160.42 1.75 Area code : 4
 FDEPTH: 19 18 GearCond.code:
 BDEPTH: 19 18 Validity code:
 Towing dir: 195e Wire out: 170 m Speed: 30 kn*10
 Sorted: 117 Kg Total catch: 395.54 CATCH/HOUR: 659.23

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	151.00	13073	23.03	
Sardinella maderensis	130.20	978	19.75	2506
Arius heudeloti	72.00	367	10.92	
Pomadasya jubelini	50.70	138	7.69	
Chloroscombrus chrysurus	50.10	642	7.60	
Galeoides decadactylus	46.50	2418	7.05	
Drepane africana	26.10	60	3.96	
Mustelus mustelus	20.70	30	3.14	
Scomberomorus tritor	17.40	12	2.64	
Elops lacerta	15.60	37	2.37	
Sepia officinalis hierredda	15.60	203	2.37	
Cynoglossus senegalensis	14.33	3	2.17	
Sardinella aurita	11.93	37	1.81	
Alectis alexandrinus	9.42	7	1.43	
Eucinostomus melanopterus	9.30	192	1.41	
Sphyræna guanchancho	7.80	18	1.18	
Lagocephalus lagocephalus	4.50	7	0.68	
Pagellus bellottii	2.33	293	0.35	
Ilisha africana	2.03	48	0.31	
Penaeus kerathurus	1.92	113	0.29	
Penaeus notialis	0.72	270	0.11	
Arnoglossus sp.	0.67	30	0.10	
GOBIDAE	0.42	7	0.06	
Total	662.07		100.42	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:1452
 DATE: 3/ 7/01 GEAR TYPE: PT No:7 POSITION:Lat N 1245
 start stop duration Long W 1708
 TIME :03:06:26 03:28:31 22 (min) Purpose code: 1
 LOG :7168.23 7169.37 1.08 Area code : 4
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 19 19 Validity code:
 Towing dir: 270e Wire out: 170 m Speed: 35 kn*10
 Sorted: 58 Kg Total catch: 262.22 CATCH/HOUR: 715.15

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	287.81	4015	40.24	
Sardinella maderensis	194.54	1756	27.20	2507
Arius heudeloti	57.68	259	8.07	
Ilisha africana	44.81	810	6.27	
Mustelus mustelus	24.44	63	3.42	
Sardinella aurita	14.86	185	2.08	
Galeoides decadactylus	13.99	1448	1.96	
Eucinostomus melanopterus	12.16	161	1.70	
Elops lacerta	11.43	25	1.60	
Pomadasya jubelini	11.18	25	1.56	
Chloroscombrus chrysurus	9.08	136	1.27	
Sphyræna guanchancho	8.59	38	1.20	
Trichiurus lepturus	7.36	147	1.03	
Penaeus kerathurus	5.89	295	0.82	
Pagellus bellottii	5.40	736	0.76	
Sepia officinalis hierredda	3.57	14	0.50	
Scomberomorus tritor	2.45	14	0.34	
Total	715.24		100.02	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:1453
 DATE: 3/ 7/01 GEAR TYPE: PT No:7 POSITION:Lat N 1227
 start stop duration Long W 1712
 TIME :10:00:30 11:41:12 37 (min) Purpose code: 1
 LOG :7252.96 7254.88 1.92 Area code : 4
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 19 19 Validity code:
 Towing dir: 360e Wire out: 170 m Speed: 30 kn*10
 Sorted: Kg Total catch: 189.42 CATCH/HOUR: 307.17

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sphyræna guanchancho	103.78	201	33.79	
Chloroscombrus chrysurus	87.21	4714	28.39	
Brachydeuterus auritus	32.11	459	10.45	
Elops lacerta	31.02	8	10.10	
Sardinella maderensis	19.49	193	6.35	2508
Alectis alexandrinus	9.71	15	3.16	
Scomberomorus tritor	8.94	11	2.91	
Arius heudeloti	5.04	5	1.64	
Arius parkii	3.79	5	1.23	
Galeoides decadactylus	1.61	8	0.52	
Trichiurus lepturus	1.43	5	0.47	
Sardinella aurita	1.35	18	0.44	
Arius laticaudatus	1.23	5	0.07	
Total	305.71		99.52	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:1454
 DATE: 3/ 7/01 GEAR TYPE: PT No:1 POSITION:Lat N 1215
 start stop duration Long W 1715
 TIME :17:13:37 17:40:06 26 (min) Purpose code: 1
 LOG :7306.99 7308.80 1.81 Area code : 4
 FDEPTH: 40 40 GearCond.code:
 BDEPTH: 64 64 Validity code:
 Towing dir: 180e Wire out: 170 m Speed: 40 kn*10
 Sorted: 48 Kg Total catch: 207.31 CATCH/HOUR: 478.41

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardinella maderensis	281.08	6155	58.75	2510
Sardinella aurita	148.62	1712	31.07	2509
Sarda sarda	17.70	9	3.70	
Sphyræna guanchancho	17.54	25	3.67	
Euthynnus alletteratus	6.72	12	1.40	
Alectis alexandrinus	2.82	5	0.59	
Trachinotus ovatus	1.75	5	0.37	
Caranx crysos	1.50	2	0.31	
Remora remora	0.69	9	0.24	
Total	478.42		100.00	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:1455
 DATE: 3/ 7/01 GEAR TYPE: PT No:7 POSITION:Lat N 1215
 start stop duration Long W 1701
 TIME :19:33:08 19:54:53 22 (min) Purpose code: 1
 LOC :7326.43 7327.58 1.14 Area code : 4
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 19 21 Validity code:
 Towing dir: 259e Wire out: 170 m Speed: 30 kn*10
 Sorted: 278 Kg Total catch: 131.64 CATCH/HOUR: 359.02

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
<i>Ilisha africana</i>	104.73	2978	29.17	
<i>Brachydeuterus auritus</i>	98.73	1538	27.50	
<i>Trichiurus lepturus</i>	55.64	851	15.50	
<i>Chloroscombrus chrysurus</i>	32.18	524	8.96	
<i>Mustelus mustelus</i>	29.73	33	8.28	
<i>Arius heudeloti</i>	12.52	25	3.49	
<i>Stromateus fiatola</i>	6.33	22	1.76	
<i>Sphyrna zygaena</i>	4.01	8	1.12	
<i>Galeoides decadactylus</i>	3.27	11	0.91	
<i>Scomberomorus tritor</i>	3.14	5	0.87	
<i>Sphyrna guachancho</i>	3.11	5	0.87	
<i>Elops lacerta</i>	2.32	5	0.65	
<i>Hemicaranx bicolor</i>	2.18	11	0.61	
<i>Mugil sp.</i>	0.60	3	0.17	
<i>Pentanemus quinquarius</i>	0.55	11	0.15	
Total	359.04		100.01	

Annex II Instruments and fishing gear used

The Simrad EK-500, 38kHz echo scientific sounder was used during the survey for fish abundance estimation. The Bergen Echo Integrator system (BEI) logging the echogram raw data from the sounder, was used to scrutinize the acoustic records, and to allocate integrator data to fish species. All raw data was stored to tape, and a backup of the database of scrutinized data, stored. The details of the settings of the 38kHz where as follows:

Transceiver-1 menu	Transducer depth	5.5 - 7.5 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	27.45 dB
	TS transducer gain	27.65 dB
	Angle sensitivity	21.9
	3 dB beamwidth	6.8°
	Alongship offset	-0.03°
Athwardship offset	0.06°	
Display menu	Echogram	1
	Bottom range	10 m
	Bottom range start	10 m
	TVG	20 log R
	Sv colour min	-67 dB
	TS Colour minimum	-60 dB
	Printer- menu	Range
TVG		20 log R
Sv colour min		-63 dB
Bottom detection menu	Minimum level	-40 dB

A calibration experiment using a standard copper sphere, performed off Langstrand, Walvis Bay 19 April 2001 gave the following results:

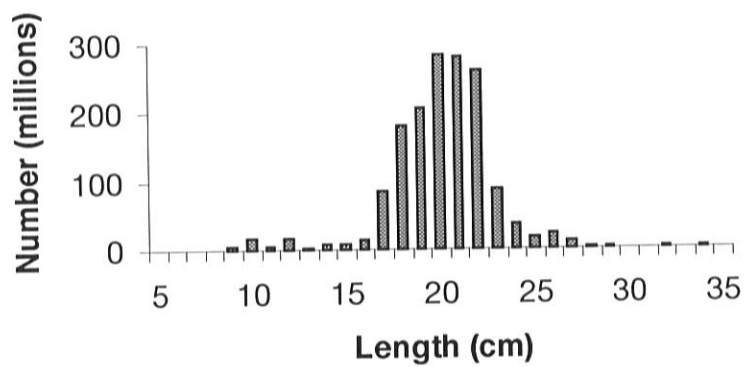
Sv Transducer gain 27.37 dB
Ts Transducer gain 27.49 dB

Fishing gear

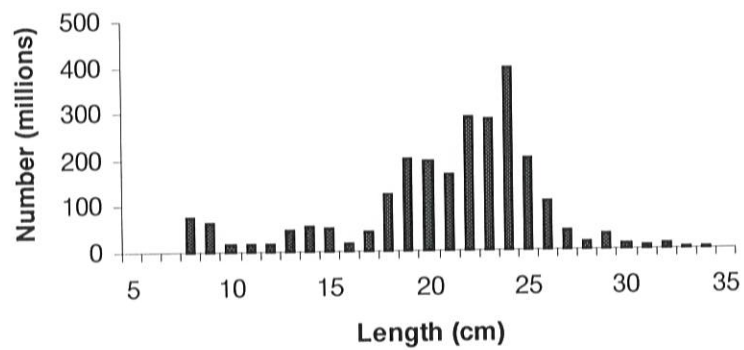
The vessel has two different sized "Åkrahamn" pelagic trawls and one "Gisund super" bottom trawl. For all trawls, the Tyborøn, 7.8m² (1670 kg) trawl doors were used. Complete drawings of the trawls used are included.

Annex III Pooled length distribution by species and regions

Casamance - Cap Vert
Sardinella aurita

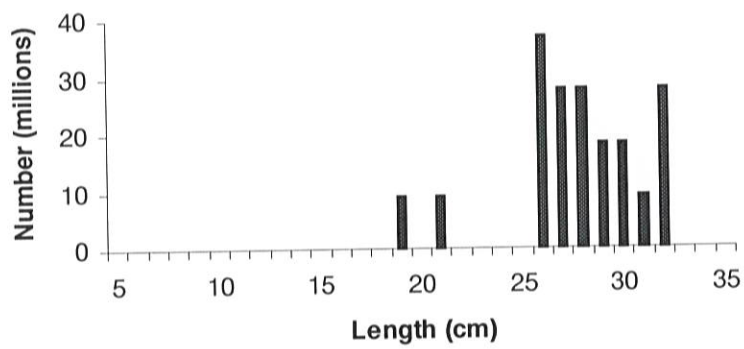


Casamance - Cap Vert
Sardinella maderensis

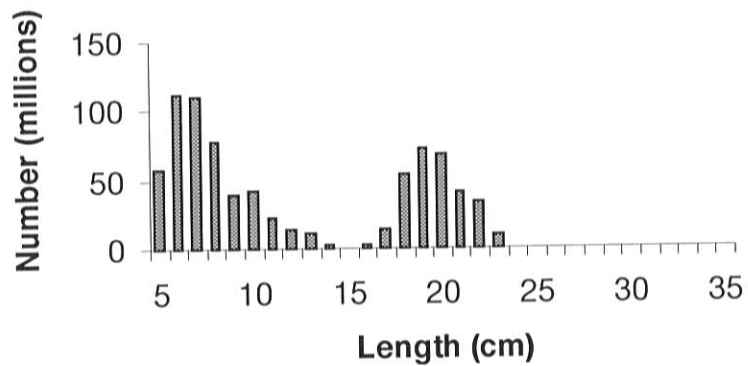


Annex III continued

Casamance - Cap Vert *Decapterus sp.*



Casamance - Cap Vert *Trachurus trecae*



Annex IV Stock length distribution by numbers and weight

Sardinella aurita

Length cm	N (millions)					Biomass (tonnes)				
	St. Louis- Cape Vert	Cape Vert- Gambia	Gambia	Casa- mance	TOTAL	St. Louis- Cape Vert	Cape Vert- Gambia	Gambia	Casa- mance	TOTAL
5										
6										
7										
8										
9			4 563		4 563			38		38
10	1 147			16 432	17 579	13			183	195
11	4 500	1 760			6 261	66	26			91
12	3 440	9 305	4 563		17 308	64	174	86		325
13	2 697				2 697	64				64
14	1 214	7 055			8 269	36	206			242
15	421	8 815			9 236	15	315			330
16		15 089			15 089		651			651
17	5 736	58 064	21 317		85 118	295	2 987	1 097		4 379
18	14 640	116 148	51 265		182 053	890	7 060	3 116		11 066
19	22 820	134 307	31 245	18 253	206 624	1 624	9 560	2 224	1 299	14 708
20	10 270	127 623	73 241	72 987	284 120	849	10 555	6 057	6 036	23 498
21	19 207	79 953	83 376	96 725	279 260	1 832	7 628	7 955	9 228	26 644
22	32 689	47 995	132 770	46 542	259 996	3 575	5 248	14 518	5 089	28 431
23	12 737	7 941	42 430	23 283	86 391	1 587	989	5 286	2 901	10 763
24	3 396	449	34 352		38 198	479	63	4 850		5 393
25	628	1 396	16 099		18 124	100	222	2 563		2 885
26	628	3 691	18 877		23 196	112	659	3 372		4 144
27	1 728		8 390		10 118	345		1 675		2 020
28	1 257	449	2 097		3 804	279	100	466		845
29	471		1 049		1 520	116		258		375
30	314		1 049		1 363	86		286		371
31	314				314	94				94
32		3 107			3 107		1 024			1 024
33										
34			3 319		3 319			1 308		1 308
35										
TOTAL	140 256	623 147	530 001	274 221	1 567 625	12 522	47 470	55 155	24 737	139 884

Annex IV Continued

Sardinella maderensis

Length cm	N (millions)					Biomass (tonnes)				
	St. Louis- Cape Vert	Cape Vert- Gambia	Gambia	Casa- mance	TOTAL	St. Louis- Cape Vert	Cape Vert- Gambia	Gambia	Casa- mance	TOTAL
5										
6										
7										
8				76 983	76 983				454	454
9				64 152	64 152				528	528
10	2 379		7 823	7 698	17 900	26		87	86	199
11	1 321		15 645		16 967	19		228		248
12	793		15 645		16 438	15		293		308
13	1 850		45 043		46 893	44		1 064		1 108
14	2 379		52 866		55 245	70		1 547		1 617
15	1 057		49 483		50 540	38		1 769		1 807
16	793		16 702		17 495	34		720		754
17	529		26 015	17 649	44 193	27		1 338	908	2 274
18	264		47 873	75 488	123 625	16		2 910	4 588	7 514
19		3 217	49 796	147 781	200 794		229	3 545	10 519	14 293
20	264	4 847	50 886	138 719	194 717	22	401	4 209	11 473	16 104
21		7 711	66 859	92 563	167 133		736	6 379	8 831	15 946
22	209	969	165 186	121 748	288 112	23	106	18 063	13 313	31 505
23	836	46 885	130 713	103 366	281 800	104	5 841	16 285	12 878	35 109
24	3 552	82 225	208 353	100 464	394 594	501	11 608	29 415	14 183	55 708
25	4 919	22 209	97 431	75 658	200 217	783	3 535	15 509	12 043	31 871
26	7 749	34 062	34 646	30 112	106 570	1 384	6 085	6 190	5 380	19 039
27	10 370	4 186	19 929	6 742	41 227	2 070	836	3 979	1 346	8 231
28	4 083	2 247	10 617	1 234	18 181	907	499	2 359	274	4 040
29	8 699	6 742	4 563	12 249	32 253	2 144	1 662	1 125	3 019	7 949
30	5 242	5 156		2 566	12 964	1 428	1 404		699	3 531
31	8 813				8 813	2 644				2 644
32	6 818	2 247		5 508	14 573	2 247	741		1 815	4 803
33	4 197				4 197	1 515				1 515
34		2 247			2 247		886			886
35	1 994				1 994	857				857
TOTAL	79 109	224 952	1 116 076	1 080 679	2 500 816	16 919	34 570	117 015	102 338	270 841

Annex IV Continued

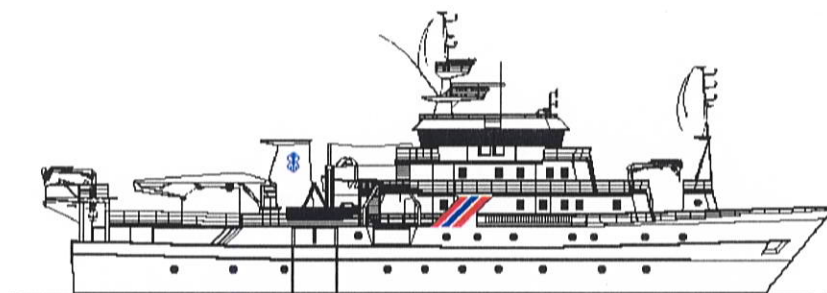
Trachurus trecae

Length cm	N (millions)					Biomass (tonnes)				
	St. Louis- Cape Vert	Cape Vert- Gambia	Gambia	Casa- mance	TOTAL	St. Louis- Cape Vert	Cape Vert- Gambia	Gambia	Casa- mance	TOTAL
		1 378	349		1 727		1	0		2
5		53 830	3 834		57 664		86	6		92
6		103 957	7 319		111 276		274	19		293
7		104 406	6 622		111 028		423	27		450
8		73 005	5 392		78 397		430	32		462
9		36 306	2 678		38 984		299	22		321
10		38 476	3 375		41 850		428	38		465
11		20 260	1 907		22 166		296	28		324
12		13 245	1 246		14 491		248	23		272
13		9 934	935		10 869		235	22		257
14		2 619			2 619		77			77
15										
16		2 619			2 619		113			113
17		13 245	1 246		14 491		681	64		746
18		49 669	4 674		54 343		3 019	284		3 303
19		66 225	6 232		72 457		4 714	444		5 158
20	2 698	59 602	5 609		67 909	223	5 153	464		5 840
21	22 255	16 556	1 558		40 370	2 123	3 703	149		5 975
22	34 394				34 394	3 761	3 761			7 522
23	10 116				10 116	1 260	1 260			2 521
24	674				674	95	95			190
25										
26										
27										
28										
29										
30										
31										
32										
33										
34										
35										
TOTAL	70 138	663 953	52 628		786 718	7 463	25 295	1 621		34 379

Annex IV Continued

Decapterus sp.

Length cm	N (millions)					Biomass (tonnes)				
	St. Louis- Cape Vert	Cape Vert- Gambia	Gambia	Casa- mance	TOTAL	St. Louis- Cape Vert	Cape Vert- Gambia	Gambia	Casa- mance	TOTAL
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19		8 032	1 204		9 236		572	86		657
20										
21		8 032	1 204		9 236		766	115		881
22										
23										
24										
25										
26		32 129	4 816		36 945		5 740	860		6 600
27		24 097	3 612		27 709		4 811	721		5 532
28		24 097	3 612		27 709		5 355	803		6 158
29		16 064	2 408		18 472		3 959	593		4 553
30		16 064	2 408		18 472		4 376	656		5 031
31		8 032	1 204		9 236		2 410	361		2 771
32		24 097	3 612		27 709		7 941	1 190		9 131
33										
34										
35										
36										
38										
TOTAL		160 644	24 080		184 724		35 930	5 386		41 316



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

Part II MAURITANIA

17 - 26 June 2001

CRUISE REPORTS 'DR FRIDTJOF NANSEN'

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

Part II

MAURITANIA

17 - 26 June 2001

by

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Bergen, 2001**

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CHAPTER 1 INTRODUCTION

1.1 Objective 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 June-July 2001. 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 mackerels *Trachurus trachurus* and *Trachurus trecae*, false scad *Decapterus rhonchus*, and anchovy *Engraulis encrasicolus*.
- To identify and describe the size distribution of the target fish populations by midwater and bottom trawl sampling and process the catches by recording weight and number by species.
- To sample standard hydrographical transects for temperature, salinity and oxygen at about 16°40' N, 18°00' N, 19°00' N, 20°00' N and off Cape Blanc.

The time allocated for this part of the survey, off Mauritania, was 10 days.

1.2 Participation

Members of the scientific teams were:

Centre National de Recherches Océanographiques et des Pêches, Mauritania:
Bambaye O. HAMADI, Diallo IBRA and Ahmedou O. M. EL MOUSTAPHA

Centre de Recherches Océanographiques de Dakar-Thiaroy, Senegal:
Abdoulaye SARRE

Department of Fisheries, The Gambia:

Juldah JALLOW

Institut National de Recherches Halieutiques, Morocco:

Hassan MOUSTAHD

Institute of Marine Research, Norway:

Reidar TORESEN, Magne OLSEN, Tore MØRK and Tore NILSEN

1.3 Narrative

After embarking of scientists from Mauritania, Senegal and The Gambia, the survey of the Mauritanian shelf started on June the 17, at Cap Blanc, with systematic parallel course tracks spaced about 10 NM (nautical miles) apart. To cover the whole distribution area of pelagic fish, the shelf was covered from the 15 m isobath and offshore to the 500 m isobath. Trawling was done irregularly, either to identify echo registrations or to check 'blindly' 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. A smaller pelagic trawl or the bottom trawl with floats was used for sampling the pelagic fish in very shallow waters (depth less than 25 m). The shelf was covered south to St. Louis before a call was made in Nouakchott on June 26, to let participants from Morocco, and Mauritania disembark and scientists from Senegal and The Gambia come onboard.

The hydrographic profile at 16°40' N was sampled on 23 June, at 18°00' N on 21 at 19°00' N on 20 at 20°00' N on 19 and off Cape Blanc on 15 June (on the part of the survey covering Morocco).

The survey was terminated in Nouakchott on 26 June.

1.4 Methods

Environmental Data

Surface temperature and meteorological data from a weather station 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.

Biological sampling

Biological sampling of the fish was carried out using trawls. A pelagic trawl with floats was often used. A smaller pelagic trawl or the bottom trawl with floats was used for sampling the pelagic fish in very shallow waters (depth less than 25 m). Annex III gives a description of the instruments and the fishing gear used. All catches were sampled for composition by weight and numbers of each species caught. Species identification was based on the FAO Species Guides. Length frequency distributions, by total fish length in cm, of the selected target species were taken in all the stations where they were present. Individual weight measurements were taken regularly to estimate the condition factor in the length-weight relationship:

$$\bar{w} = \frac{cond}{100} \times L^3$$

The specific condition factors obtained from the samples and applied for this survey were: 0.96 for sardinellas and horse mackerels, and 1.0 for pilchard.

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 (to calculate the mean length of this length group) were applied.

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

The complete records of fishing stations are shown in Annex II.

The following target groups were used for Mauritania:

- 1) sardinellas (flat sardinella *Sardinella maderensis* and round sardinella *S. aurita*),
- 2) horse mackerels (Atlantic horse mackerel *Trachurus trachurus*, Cunene horse mackerel *Trachurus trecae*, and false scad *Decapterus rhonchus*),
- 3) Chub mackerel *Scomber japonicus*

- 4) Other pelagic carangids and associated species (Atlantic bumper *Chloroscombrus chrysurus*, African lookdown *Selene dorsalis*, , largehead hairtail *Trichiurus lepturus*, and barracudas *Sphyraena* spp.),
- 5) other demersal species (such as bigeye grunt *Brachydeuterus auritus*, Sparidae and Haemulidae), and
- 6) other clupeids such as West African ilisha *Ilisha africana*.

Acoustic sampling

A SIMRAD EK500 Echo-sounder was used with the settings as shown in Annex III. The Bergen Integrator (BEI) was used for analysis and allocation of the integrated s_A – values to the individual specified target groups by 5 NM intervals. The allocation of values to target groups was based on a combination of a visual scrutiny of the behaviour pattern as deduced from echo diagrams, the BEI analysis, and the catch compositions.

In cases where the target category of fish contains more than one species (sardinellas and horse mackerels), the mean s_A – value allocated to the category is divided between the species in the same ratio as their contribution to the mean back scattering strength in the length frequency samples.

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:

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

Which can be converted (see Toresen *et al.* 1998 for details) to the area form (scattering cross sections of acoustic targets):

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

where L is total length in 1 cm length group *i* and C_{Fi} (m^{-2}) is the reciprocal back scattering strength, or so-called fish conversion factor.

In order to split and convert the allocated s_A – values (m^2/NM^2) to fish densities (numbers per length group per NM^2), the following formula was used:

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

where

Δ_i = density of fish in length group i

S_A = mean integrator value

p_i = proportion of fish in length group i

$\sum_{i=1}^n \frac{P_i}{C_{Fi}}$ = the relative back scattering cross section (m^2) of the length frequency

sample of the target species, and

C_{Fi} = reciprocal back scattering cross section (σ_{bs}^{-1}) of a fish in length group i .

The integrator outputs were split in fish groups using a combination of behaviour pattern as deduced from echo diagrams, the BEI analysis and catch composition as described below. The following groups were used for Senegal: 1) sardinellas, 2) horse mackerels, 3) carangids and associated species, and 4) demersal fish.

The above equations show that the conversion from s_A -values to number of fish is dependent on the length composition of the fish. It is therefore important to get representative length distributions from the stock in the whole distribution area.

When the size classes (of e.g. young fish and older fish) are well mixed, the various length distributions can be pooled together with equal importance. Otherwise, when the size classes are segregated, the total distribution area has to be post-stratified, according to the length distributions, and separate estimates are made for the regions containing fish with equal size.

A systematic approach to a) divide the s_A -value between species in a category of fish (e.g. *Sardinella aurita* and *S. maderensis*) and b) produce pooled length distributions of a target species for use in the above equation and c) calculate the biomass estimates for a region, is obtained through the following procedure:

- The samples of the species in the category (e.g. sardinellas) are respectively pooled together with equal importance (normalized). A sample of 60 flat sardinella in one sample will have equal importance to 30 fish in another sample and not the double weight in accordance with the number of fish in the sample.

- The mean back scattering strength (ρ/s_A) of each length frequency distribution of the target species is calculated and summed. This is automatically done if the length distributions are punched into an Excel spread-sheet prepared for the estimation of the abundance of fish (made available onboard “Dr. Fridtjof Nansen”).
- The mean s_A -value allocated to the category of fish in the region is divided between the species in the same ratio as their relative contribution to the mean back scattering strength of the length groups in the sample (also automatically done in the Excel spread-sheet given that the s_A – value for the region is punched into the sheet).
- The pooled length distribution is used, together with the mean s_A -value, to calculate the density (numbers per square NM) by length groups and species, using the above formula. The total number by length group in the area is obtained by multiplying each number by the area. (This is done in the Excel spread-sheet, given that the area of the region is punched into the sheet).
- The numbers are converted to biomass using the estimated weight at length. (Done in the Excel sheet if the condition factor is punched).

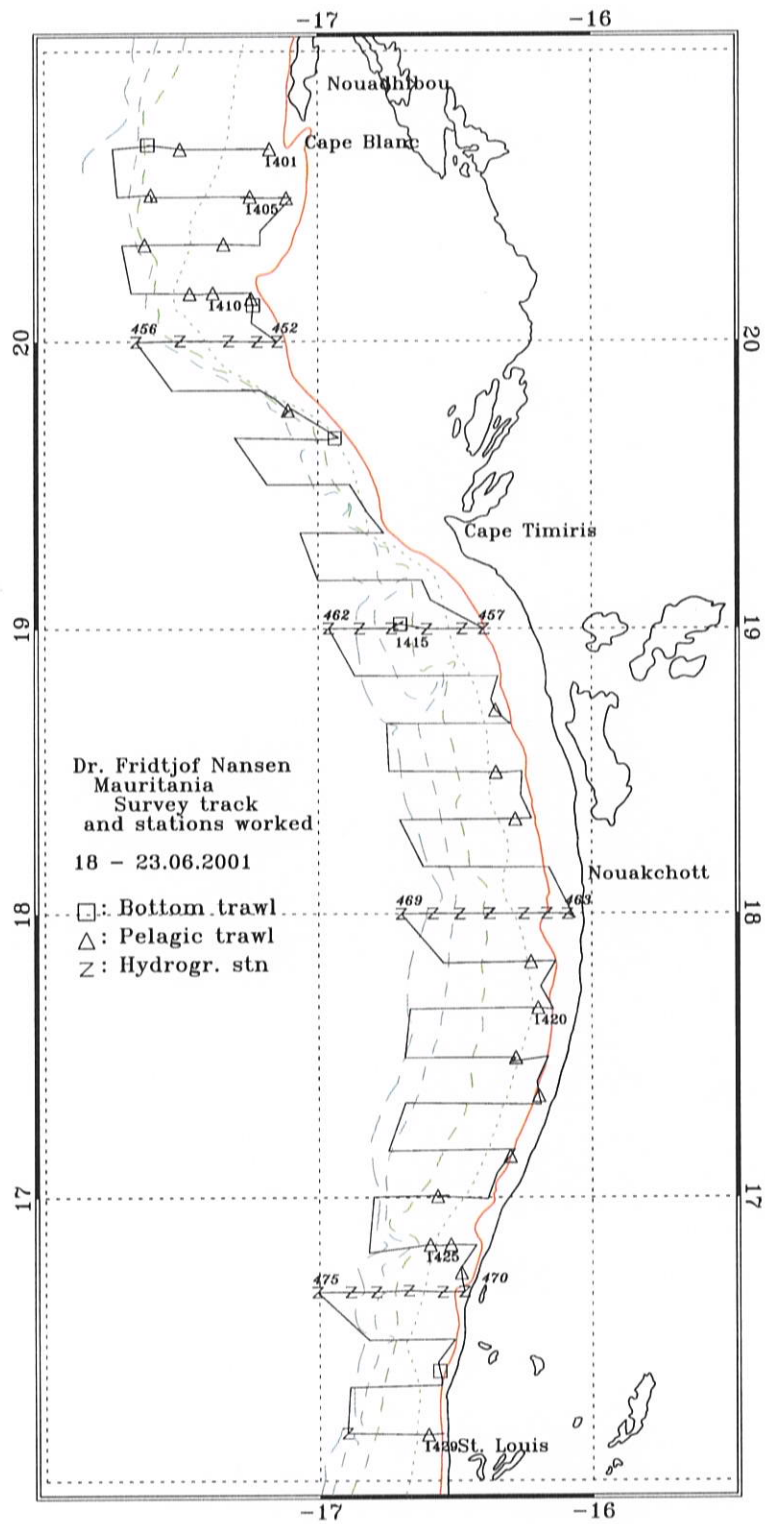


Figure 1 Course track and fishing and hydrographic stations

CHAPTER 2 SURVEY RESULTS

2.1 Weather conditions and hydrography

Wind conditions

Distribution of wind speed and direction recorded along the survey track is presented in Figure 2. In the region between Nouakchott and Cape Blanc, the predominant wind direction was from northeast. The wind velocities were uniform along this whole coastline region with average speed 11 m/s.

South of Nouakchott, the wind speed and direction changed from strong to calm and to slightly westerly direction.

Hydrography

The Figure 3 shows the distribution of sea surface temperature along the survey track. The characteristic feature of the sea surface temperature to the south of Cape Timiris is a predominance of tropical warm surface water $>23^{\circ}\text{C}$ as a seasonal effect.

North of Cape Timiris to Cape Blanc, the distribution of sea surface temperature is affected by the persistence of the upwelling waters from the north with temperatures $<19^{\circ}\text{C}$. The thermal front was located between 19°N and 20°N . this is further south than normal ($20\text{-}21^{\circ}\text{N}$).

Figure 4 shows the distribution of temperature, salinity and oxygen in the five profiles.

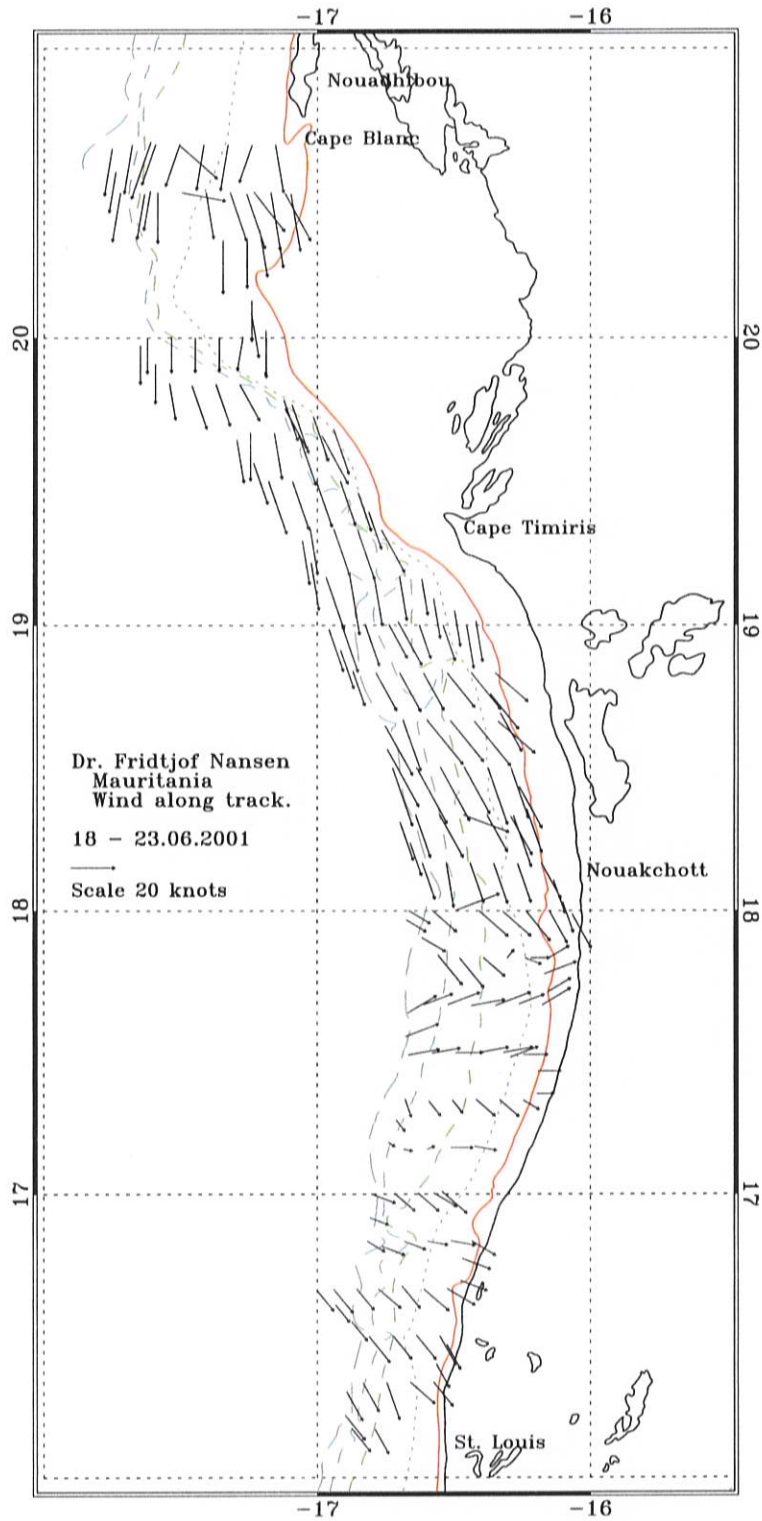


Figure 2 Wind conditions along the survey track.

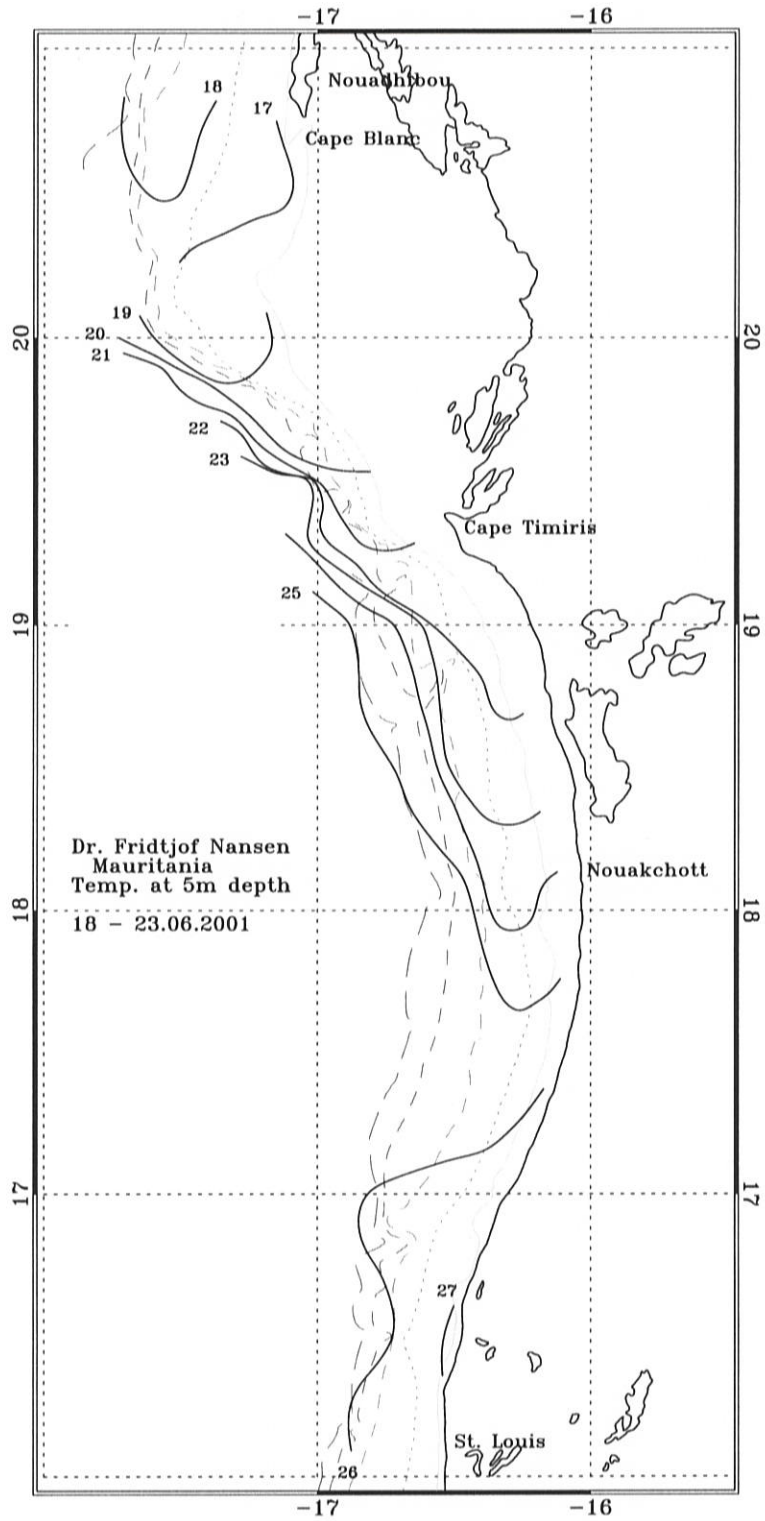
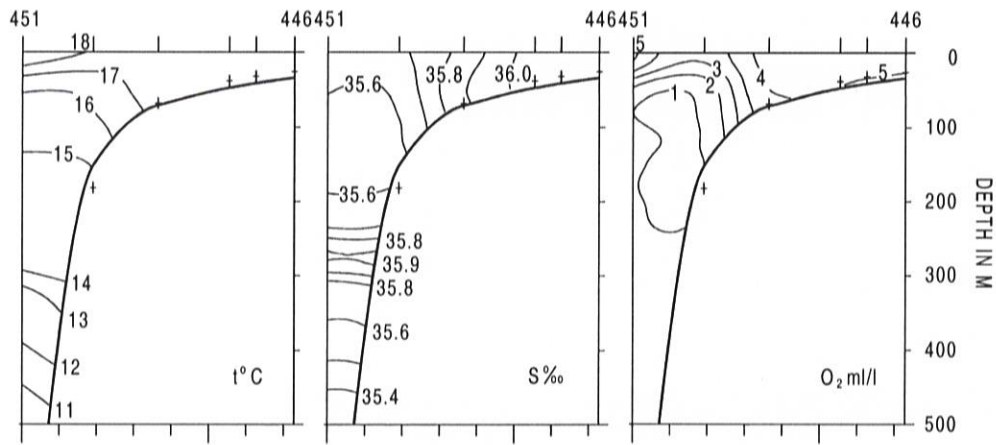
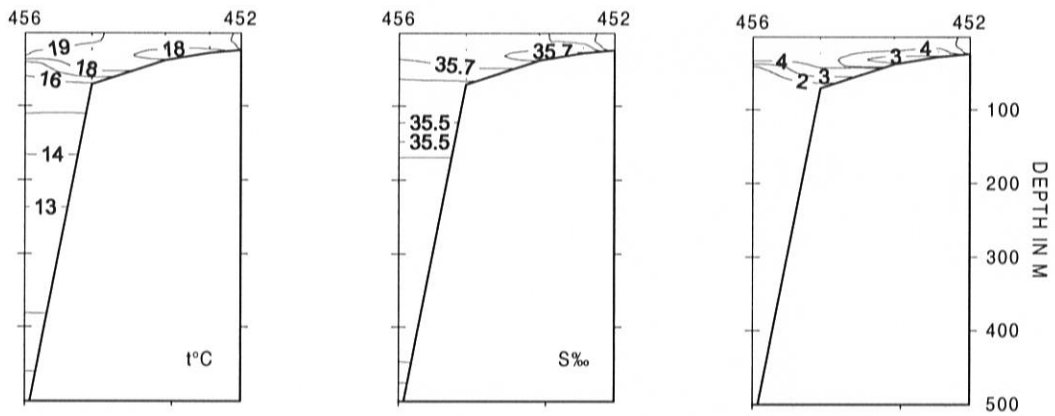


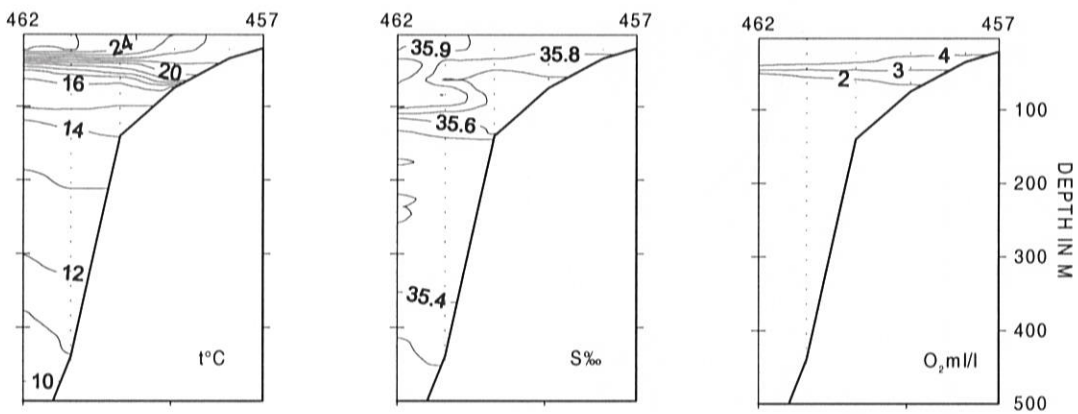
Figure 3 Sea surface temperature.



CAPE BLANC 16.11 2000



20°00 N 15.11 2000



19°00 N 14.11 2000

Figure 4. Hydrographic profiles with distribution of temperature, salinity and oxygen

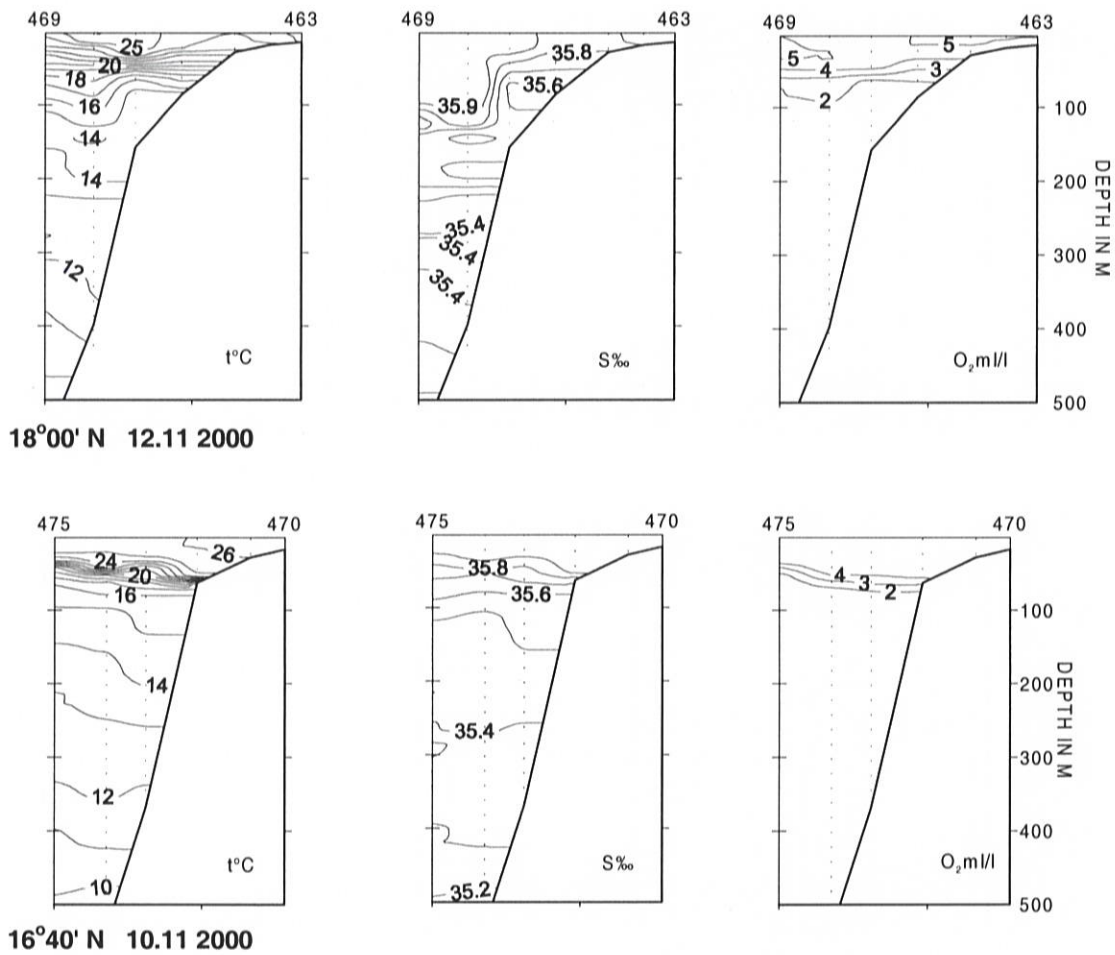


Figure 4. continued.

2.2 Pelagic fish on the shelf from St. Louis to Cape Timiris

Figure 5 shows the distribution of sardinellas on the shelf of Mauritania.

Sardinellas were found over the inner shelf in a nearly continuous belt along the coast from about 16°50'N to about 18°30'N, see Figure 5. Particularly dense school areas were located between about 17°30'N and 17°10' N, from Nouakchott and some 30 NM southwards.

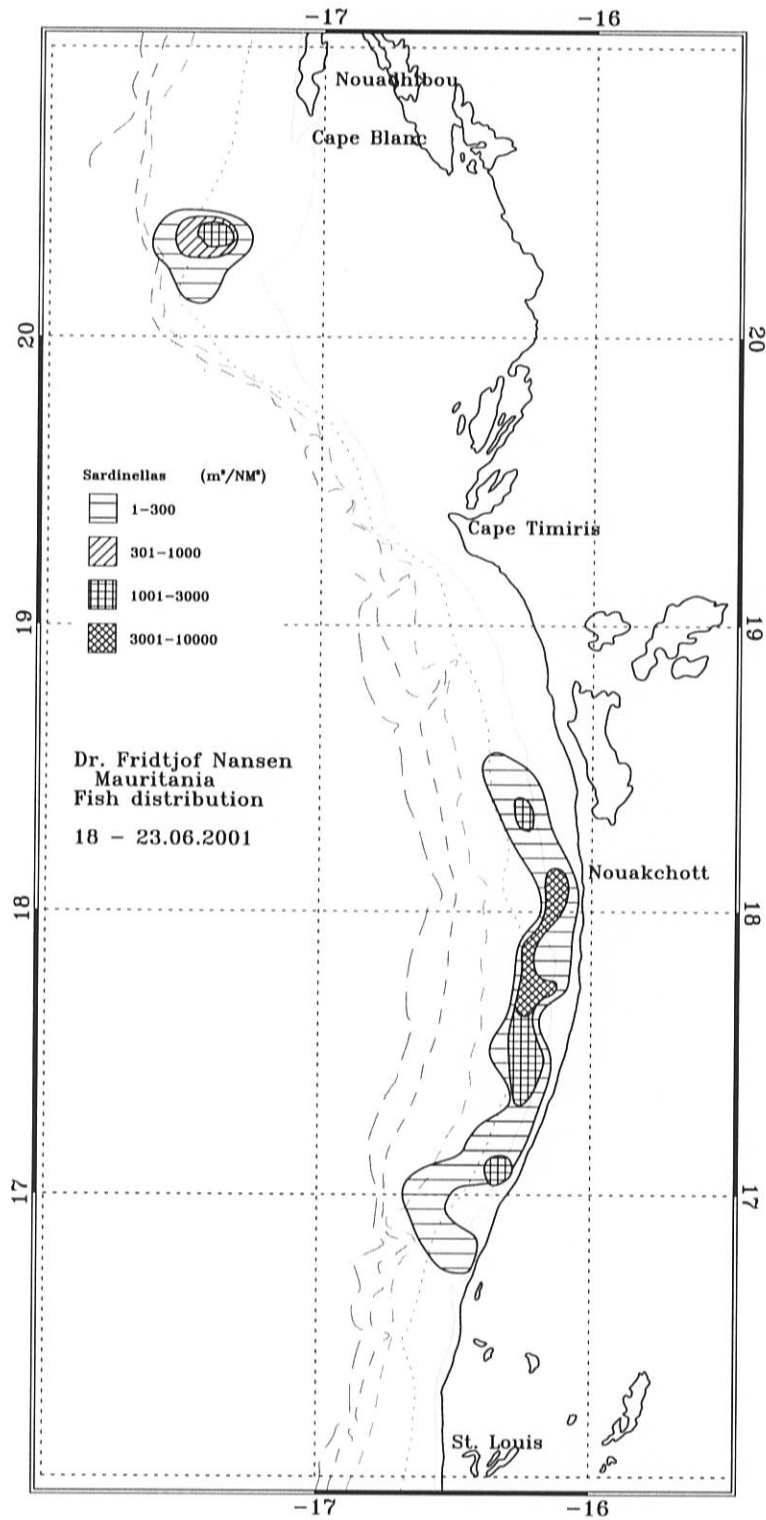


Figure 5 Distribution of sardinellas.

The samples showed sardinellas of varying size, - the round sardinella south of Cape Timiris with modal lengths of 8, 21 and 34 cm, while the flat sardinella had modal lengths of 11, 16 and 31 cm, see Annex I. The stock length compositions by numbers and weight are shown in Annex I.

The total length distribution for Round and Flat sardinella are shown in Figures 6 and 7.

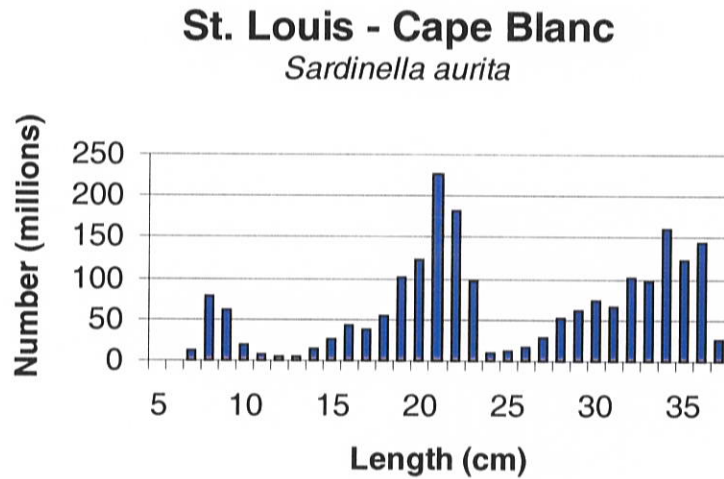


Figure 6. Length distribution of round sardinella, *Sardinella aurita*. St.Louis – Cape Blanc.

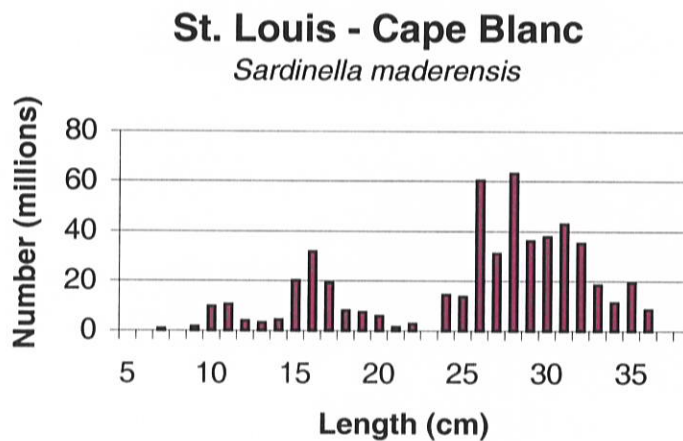


Figure 7. Length distribution of flat sardinella, *Sardinella maderensis*. St.Louis – Cape Blanc.

Table 1 gives the biomass estimates of sardinellas based on their size composition in the area of sampling. The total estimate was 512 000 tonnes of which 79% was round- and 21% flat sardinella.

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

Flat sardinella	Round sardinella	Horse mackerels	Other Carangids etc.
107	405	319	221

The distribution of horse mackerels is shown in Figure 8. Horse mackerels occurred in two main concentrations; one between 17°00'N - 17°30'N, and another one between 17°50'N and 19°25'N. The densest concentrations in these aggregations were found at about 17°30'N, 18°20'N and at 19°00'N. The main aggregations were found at the edge of the shelf, and at daytime the fish were found close to the bottom at depths around 50-120 m. The biomass was estimated at 319 000 tonnes. The horse mackerels were mostly *Trachurus trecae*, which dominated the biomass estimate (54%).

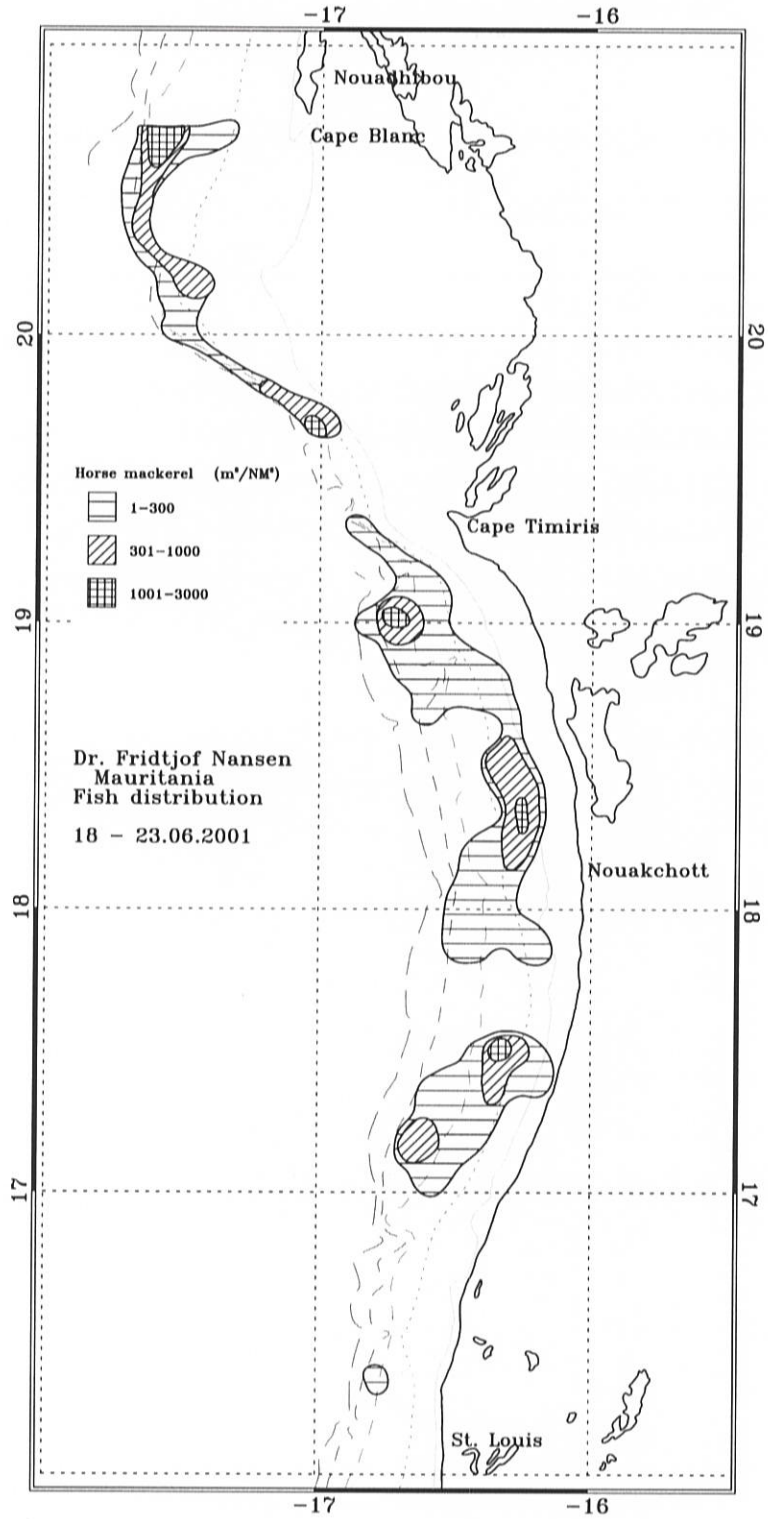


Figure 8 Distribution of horse mackerels.

Five modal lengths were observed in the total length distribution of *Trachurus trecae*, namely 8, 13, 25, 32 and 38 cm. False scad (*Decapterus ronchus*) were the second most numerous of the horse mackerels, mostly in the near shore concentrations, and had modal lengths of 28 and 35 cm. No *Trachurus trachurus* were observed in this region. Figure 9, 10 and 11 show the length distribution of *Trachurus trachurus*, *Trachurus trecae* and *Decapterus* sp. Respectively.

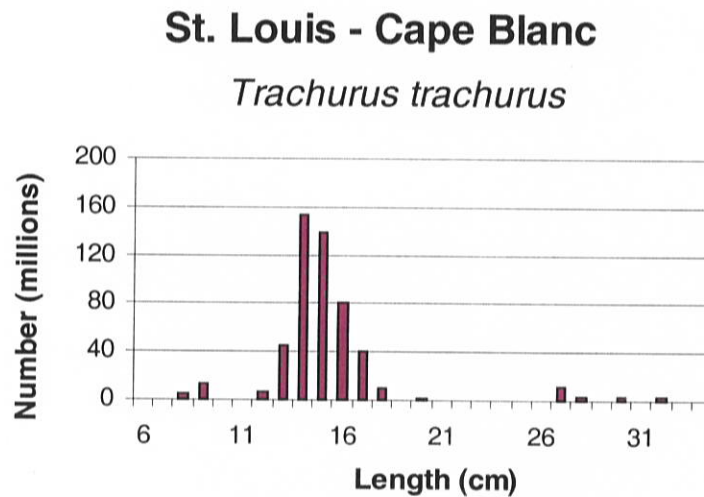


Figure 9 Length distribution of *Trachurus trachurus*. St Louis – Cape Blanc.

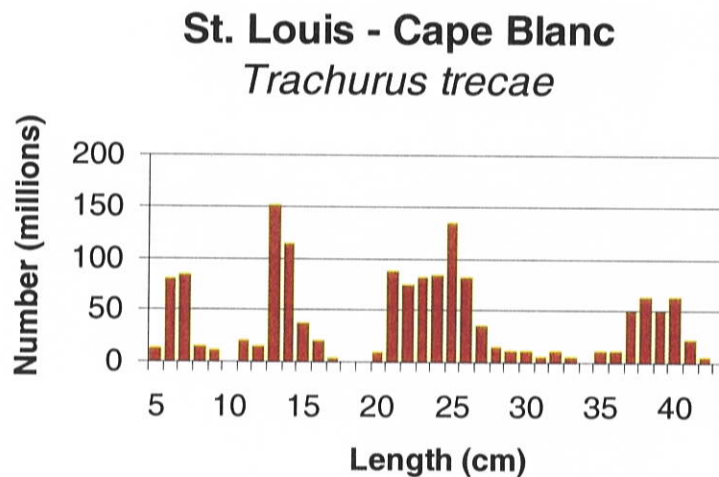


Figure 10 Length distribution of *Trachurus trecae*. St Louis – Cape Blanc.

St. Louis - Cape Blanc
Decapterus sp.

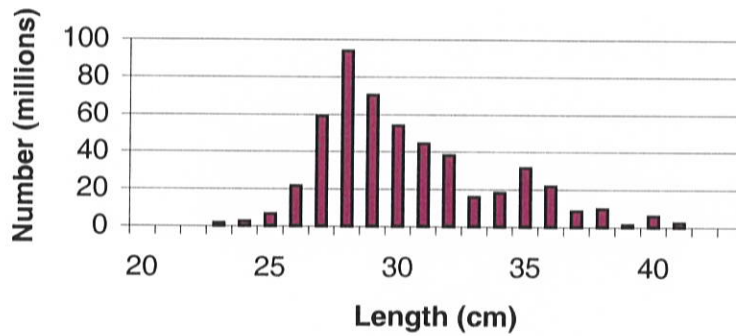


Figure 11 Length distribution of *Decapterus sp.*. St Louis – Cape Blanc.

Figure 12 shows the distribution of the other carangids and associated species, which took the form of a continuous belt of various densities on the entire shelf. The total biomass was estimated at 221 000 tonnes. The samples from the distributional areas consisted of bumper, West African Spanish mackerel, Atlantic bonito, pompano with small amounts of barracudas.

2.3 Pelagic fish on the shelf from Cape Timiris to Cape Blanc

There are often aggregations of juvenile fish in the area between Cape Timiris and Cape Blanc, and this year, small pilchard, sardinella and horse mackerels were found.

Between Cape Timiris and Cape Blanc, a large aggregation with rather high densities of pilchard was recorded (Figure 13). The aggregation was estimated at 1.1 million tonnes.

The samples showed (Figure 14) that to the west of Cape Blanc, adult pilchard dominated, while south of this area, the concentrations consisted of small pilchard. Separate estimates were made of the two sub-areas, and show that there were a large number of small pilchard in the area (less than 15 cm estimated at some 25 billion individuals). However, the estimate of small fish in the area must be regarded as uncertain and low because the area, Banc d'Arguin cannot be covered by the vessel. It is believed that a lot of juvenile fish is distributed there. The modal lengths of pilchard in the samples of the catches were 7, 10, 14, 17 and 21 cm.

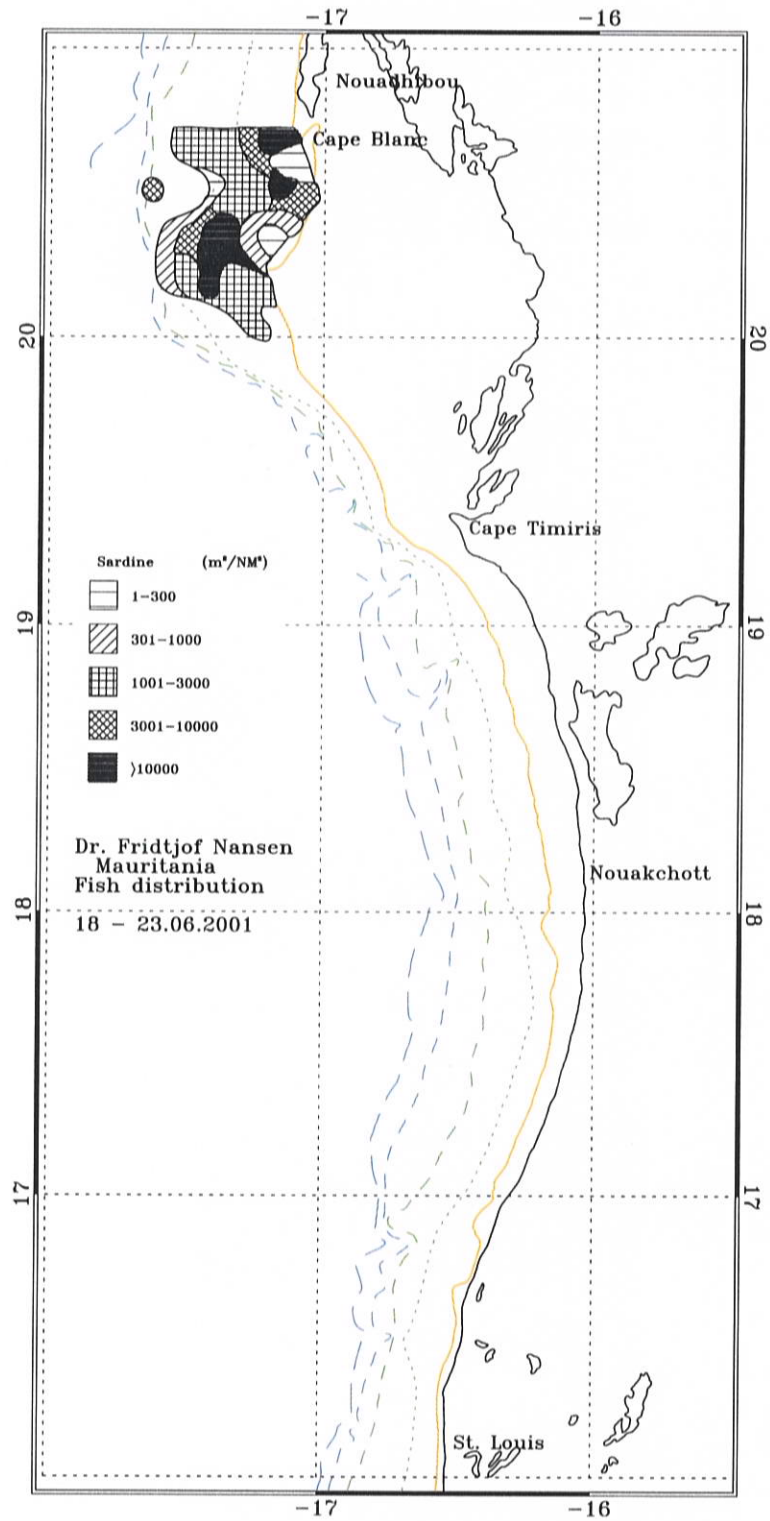


Figure 13. Distribution of pilchard. Cape Timiris – Cape Blanc.

Cape Timiris - Cape Blanc *Sardina pilchardus*

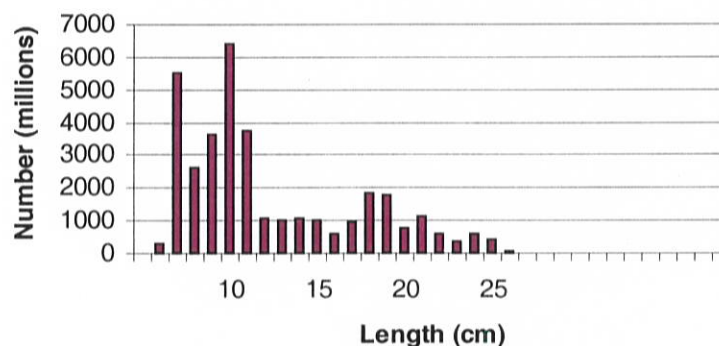


Figure 14. Length distribution of pilchard. Cape Timiris – Cape Blanc.

Round sardinella were found in an aggregation of schools between 20°05'N and 20°30'N (Figure 5). The concentrations were not very dense and the estimate was thus, only some 38 000 tonnes. The modal lengths of the sardinella were 16, 21 and 34 cm.

Horse mackerel were recorded continuously along the shelf edge (Figure 8). The aggregations consisted of both *Trachurus trachurus* and *Trachurus trecae*, estimated at 21 and 86 thousand tonnes respectively. The modal lengths of *Trachurus trachurus* were 9, 15 and 27 cm with the smaller once dominating, while the medium size of the *Trachurus trecae* were 7, 13 and 25 cm.

A limited number of anchovy were present in the catches on the inner parts of the shelf. And a few anchovy schools could be identified on the echograms. These were estimated at a biomass less than 1 thousand tonnes. However, it is believed that the coverage of anchovy is not complete as there may be fish in the Banc d'Arguin.

The carangids and associated species were found along the outer shelf area of low-density shoals all the way to Cape Blanc (Figure 12). The concentrations were very scattered and the biomass was estimated at 19 000 tonnes. The catches of this group consisted mainly of *Trichiurus lepturus*, *Scomberomorus tritor*, and bluefish (*Pomatomus saltatrix*).

CHAPTER 3 OVERVIEW AND SUMMARY OF RESULTS

The survey was conducted successfully in the period 17 to 26 June with a course track of 2 200 NM and 29 fishing stations (Figure 1).

The hydrographical data show that the temperature is lower than the long-term mean. The thermal front was found further south than normal.

Mainly adult sardinella were found between St. Louis and Cape Timiris (Figure 5). Horse mackerels were found in medium densities in three main areas; the largest one extending from about 17°50'N to about 19°20'N (Figure 8). Carangids (not including horse mackerel) and associated species occurred in low densities all along the shelf, with patches of high density areas (Figure 12).

Pilchard were found in the area south of Cape Blanc (Figure 13) and were estimated at 1.1 million tonnes. Significant amounts of juvenile pilchard were observed.

The total biomass of sardinella was estimated at 572 000 tonnes (19% flat and 81% round sardinella), that of horse mackerels at 425 000 tonnes and that of the carangids and associated species at 240 000 tonnes, see Table 2.

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

	Flat sardinella	Round sardinella	Horse mackerel	Carangids etc.
St. Louis-Cape Timiris	107	405	319	221
Cape Timiris-Cape Blanc		60	106	19
Total	107	465	425	240

Table 3 lists biomass estimates of sardinella and carangids and associated species from previous 'Dr Fridtjof Nansen' surveys of this shelf region. Compared with a survey from the same season in April-May 1981 the estimate of 572 000 tonnes of sardinella from the current survey is very high. The carangid estimate (including horse mackerels) of 665 000 tonnes is also high compared with the 1981 survey.

Table 3 Biomass estimates from 'Dr Fridtjof Nansen' surveys of the Mauritanian shelf, thousand 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	178	190
NovDec-96	1405	400
NovDec-97	1200	660
NovDec-98	1125	284
NovDec-99	742	559
NovDec-00	920	1038
June -01	572	665

* Not available

References:

- Toresen, R., Gjøsæter, H., and Barros P. 1998. The acoustic method as used in the abundance estimation of capelin (*Mallotus villosus* Müller) and herring (*Clupea harengus* Linné) in the Barents Sea. *Fisheries Research* 34 (1998) 27-37.

Annex I Estimates of numbers and weight by length.

Mauritania 06-2001

Sardinella aurita

Length cm	N (thousands)			Biomass (tonnes)		
	St.Louis- Cape Timiris	Cape Timiris- Cape Blanc	TOTAL	St.Louis- Cape Timiris	Cape Timiris- Cape Blanc	TOTAL
5						
6						
7	10 646		10 646	43		43
8	78 430		78 430	462		462
9	61 981		61 981	510		510
10	18 570		18 570	206		206
11	5 990		5 990	87		87
12	4 957		4 957	93		93
13	5 360		5 360	127		127
14	1 746	12 771	14 518	51	374	425
15	1 314	25 543	26 857	47	913	960
16	12 455	29 800	42 255	537	1 285	1 822
17	24 574	12 771	37 345	1 264	657	1 921
18	44 878	8 514	53 393	2 728	518	3 245
19	101 850		101 850	7 250		7 250
20	117 944	4 257	122 201	9 755	352	10 107
21	213 203	12 771	225 975	20 341	1 219	21 560
22	182 330		182 330	19 938		19 938
23	96 665		96 665	12 043		12 043
24	8 820		8 820	1 245		1 245
25	11 554		11 554	1 839		1 839
26	17 024		17 024	3 041		3 041
27	28 541		28 541	5 698		5 698
28	51 752		51 752	11 501		11 501
29	61 555		61 555	15 171		15 171
30	67 965	4 768	72 733	18 512	1 299	19 811
31	67 203		67 203	20 165		20 165
32	82 473	19 072	101 545	27 179	6 285	33 464
33	77 831	19 072	96 903	28 091	6 883	34 974
34	135 702	23 840	159 542	53 495	9 398	62 893
35	99 650	22 307	121 958	42 799	9 581	52 380
36	119 112	23 840	142 952	55 604	11 129	66 733
37	20 007	4 768	24 775	10 128	2 414	12 542
38	40 984	9 536	50 520	22 453	5 224	27 677
39	20 978	4 768		12 411	2 821	15 232
TOTAL	1 692 967	195 488	1 888 455	404 817	60 351	465 168

Annex I continued

Mauritania 06-2001

Sardinella maderensis

Length cm	N (thousands)			Biomass (tonnes)		
	St. Louis- Cape Timiris	Cape Timiris- Cape Blanc	TOTAL	St. Louis- Cape Timiris	Cape Timiris Cape Blanc	TOTAL
5						
6						
7	732		732	3		3
8						
9	1 465		1 465	12		12
10	9 520		9 520	106		106
11	10 252		10 252	150		150
12	3 661		3 661	69		69
13	2 929		2 929	69		69
14	4 208		4 208	123		123
15	19 916		19 916	712		712
16	31 715		31 715	1 368		1 368
17	19 008		19 008	978		978
18	7 859		7 859	478		478
19	7 220		7 220	514		514
20	5 738		5 738	475		475
21	1 372		1 372	131		131
22	2 633		2 633	288		288
23						
24	14 203		14 203	2 005		2 005
25	13 544		13 544	2 156		2 156
26	60 197		60 197	10 754		10 754
27	31 036		31 036	6 196		6 196
28	63 052		63 052	14 012		14 012
29	36 041		36 041	8 883		8 883
30	37 692		37 692	10 266		10 266
31	42 747		42 747	12 827		12 827
32	35 239		35 239	11 613		11 613
33	18 316		18 316	6 610		6 610
34	11 142		11 142	4 392		4 392
35	19 164		19 164	8 231		8 231
36	8 484		8 484	3 960		3 960
37						
38						
39						
40						
TOTAL	510 601		510 601	107 380		103 420

Annex I continued

Mauritania 06-2000

Sardina pilchardus

Length cm	N (thousands)		Biomass (tonnes)	
	Cape Timiris- Cape Blanc	TOTAL	Cape Timiris- Cape Blanc	TOTAL
5				
6	290 350	290 350	797	797
7	5 545 059	5 545 059	23 393	23 393
8	2 595 540	2 595 540	15 940	15 940
9	3 628 932	3 628 932	31 114	31 114
10	6 394 142	6 394 142	74 020	74 020
11	3 721 171	3 721 171	56 594	56 594
12	1 058 815	1 058 815	20 680	20 680
13	1 026 899	1 026 899	25 266	25 266
14	1 077 228	1 077 228	32 841	32 841
15	1 014 300	1 014 300	37 771	37 771
16	577 968	577 968	25 963	25 963
17	958 403	958 403	51 364	51 364
18	1 858 278	1 858 278	117 659	117 659
19	1 801 466	1 801 466	133 576	133 576
20	784 443	784 443	67 581	67 581
21	1 115 765	1 115 765	110 889	110 889
22	589 345	589 345	67 130	67 130
23	330 055	330 055	42 834	42 834
24	589 285	589 285	86 661	86 661
25	433 006	433 006	71 798	71 798
26	57 544	57 544	10 709	10 709
27				
TOTAL	35 447 995	35 447 995	1 104 581	1 104 581

Annex I continued

Mauritania 06-2001

Trachurus trachurus

Length cm	N (thousands)			Biomass (tonnes)		
	St. Louis- Cape Timiris	Cape Timiris- Cape Blanc	TOTAL	St. Louis- Cape Timiris	Cape Timiris- Cape Blanc	TOTAL
5						
6						
7						
8		4 547	4 547		27	27
9		13 641	13 641		112	112
10						
11						
12		6 803	6 803		128	128
13		45 581	45 581		1 077	1 077
14		154 021	154 021		4 508	4 508
15		139 102	139 102		4 973	4 973
16		81 079	81 079		3 497	3 497
17		39 726	39 726		2 044	2 044
18		9 446	9 446		574	574
19						
20		2 362	2 362		195	195
21						
22						
23						
24						
25						
26						
27		11 191	11 191		2 234	2 234
28		2 798	2 798		622	622
29						
30		2 798	2 798		762	762
31						
32		2 798	2 798		922	922
33						
34						
35						
TOTAL		513 094	513 094		20 752	21 674

Annex I continued

Mauritania 2001

Trachurus trecae

Length cm	N (thousands)			Biomass (tonnes)		
	St. Louis- Cape Timiris	Cape Timiris- Cape Blanc	TOTAL	St. Louis- Cape Timiris	Cape Timiris- Cape Blanc	TOTAL
5	7 976	2 844	10 820	13	5	17
6	1 595	76 795	78 390	4	202	207
7	3 190	79 639	82 830	13	323	335
8	9 571	4 266	13 837	56	25	82
9	3 190	5 689	8 879	26	47	73
10						
11	7 596	10 516	18 112	111	154	264
12	12 381		12 381	232		232
13	25 978	122 765	148 742	614	2 900	3 513
14	18 002	94 476	112 478	527	2 765	3 292
15	16 863	18 154	35 016	603	649	1 252
16	5 621	13 573	19 194	242	585	828
17		2 257	2 257		116	116
18						
19						
20		6 803	6 803		563	563
21	5 057	81 109	86 166	482	7 739	8 221
22	2 810	69 999	72 809	307	7 654	7 962
23	2 246	78 518	80 764	280	9 782	10 062
24	6 739	76 228	82 967	951	10 762	11 713
25	15 608	117 986	133 594	2 485	18 781	21 266
26	8 927	71 035	79 963	1 595	12 691	14 286
27		33 572	33 572		6 703	6 703
28	4 434	8 393	12 827	985	1 865	2 851
29	6 681	2 798	9 479	1 647	689	2 336
30	6 681	2 798	9 479	1 820	762	2 582
31	4 434		4 434	1 331		1 331
32	8 869		8 869	2 923		2 923
33	4 434		4 434	1 600		1 600
34						
35	8 869		8 869	3 809		3 809
36	8 869		8 869	4 140		4 140
37	48 778		48 778	24 694		24 694
38	62 082		62 082	34 011		34 011
39	48 778		48 778	28 860		28 860
40	62 082		62 082	39 591		39 591
41	19 984		19 984	13 712		13 712
42	4 434		4 434	3 268		3 268
43						
TOTAL	452 761	980 212	1 155 793	170 932	85 761	256 693

Annex I continued

Mauritania 06-2001

Decapterus sp.

Length cm	N (thousands)			Biomass (tonnes)		
	St. Louis- Cape Timiris	Cape Timiris- Cape Blanc	TOTAL	St. Louis- Cape Timiris	Cape Timiris- Cape Blanc	TOTAL
20						
21						
22						
23	1 595		1 595	199		199
24	2 511		2 511	355		355
25	6 475		6 475	1 031		1 031
26	21 461		21 461	3 834		3 834
27	59 124		59 124	11 804		11 804
28	93 752		93 752	20 835		20 835
29	70 469		70 469	17 367		17 367
30	53 960		53 960	14 697		14 697
31	44 393		44 393	13 320		13 320
32	38 117		38 117	12 561		12 561
33	15 753		15 753	5 685		5 685
34	18 024		18 024	7 105		7 105
35	31 449		31 449	13 507		13 507
36	21 670		21 670	10 116		10 116
37	8 449		8 449	4 278		4 278
38	9 634		9 634	5 278		5 278
39	1 408		1 408	833		833
40	6 057		6 057	3 863		3 863
41	2 324		2 324	1 595		1 595
42						
TOTAL	457 083		457 083	148 263		148 263

Annex II Records of fishing stations

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:1401
 DATE:18/ 6/01 GEAR TYPE: PT No:6 POSITION:Lat N 2040
 start stop duration Long W 1711
 TIME :05:44:41 06:15:32 31 (min) Purpose code: 1
 LOG :4837.31 4839.18 1.85 Area code : 1
 FDEPTH: 0 0 GearCond.code:
 BDEPTH: 35 40 Validity code:
 Towing dir: 270ø Wire out: 170 m Speed: 35 kn*10

Sorted: 35 Kg Total catch: 6999.99 CATCH/HOUR: 13548.37

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardina pilchardus	1344.51	94525	99.21	2409
Sardinella maderensis	106.86	381	0.79	
Total	13548.37		100.00	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:1402
 DATE:18/ 6/01 GEAR TYPE: PT No:1 POSITION:Lat N 2040
 start stop duration Long W 1730
 TIME :08:39:17 08:50:52 12 (min) Purpose code: 1
 LOG :4858.26 4859.07 0.78 Area code : 1
 FDEPTH: 30 20 GearCond.code:
 BDEPTH: 70 67 Validity code:
 Towing dir: 90ø Wire out: 150 m Speed: 35 kn*10

Sorted: 34 Kg Total catch: 4002.80 CATCH/HOUR: 20014.00

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardina pilchardus	20000.00	206000	99.93	2410
Sarda sarda	10.50	20	0.05	
Sardinella aurita	2.50	5	0.01	
Scomber japonicus	1.00	5		
Total	20014.00		99.99	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:1403
 DATE:18/ 6/01 GEAR TYPE: PT No:7 POSITION:Lat N 2041
 start stop duration Long W 1737
 TIME :10:11:54 10:28:28 17 (min) Purpose code: 1
 LOG :4869.52 4870.35 0.81 Area code : 1
 FDEPTH: 95 90 GearCond.code:
 BDEPTH: 95 90 Validity code:
 Towing dir: 90ø Wire out: 320 m Speed: 30 kn*10

Sorted: 34 Kg Total catch: 183.92 CATCH/HOUR: 649.13

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trachurus	591.35	17485	91.10	2411
Zeus faber	27.18	39	4.19	
Merluccius merluccius	14.47	60	2.23	
Trachurus trecae	14.29	476	2.20	2412
Belone belone gracilis	1.76	11	0.27	
Liocarcinus corrugatus	0.07	7	0.01	
Total	649.12		100.00	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:1404
 DATE:18/ 6/01 GEAR TYPE: PT No:6 POSITION:Lat N 2030
 start stop duration Long W 1737
 TIME :13:53:29 14:15:54 22 (min) Purpose code: 1
 LOG :4900.86 4902.43 1.51 Area code : 3
 FDEPTH: 40 40 GearCond.code:
 BDEPTH: 91 90 Validity code:
 Towing dir: 180ø Wire out: 250 m Speed: 40 kn*10

Sorted: 37 Kg Total catch: 3002.35 CATCH/HOUR: 8188.23

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardina pilchardus	7445.46	54104	90.93	2413
Engraulis encrasicolus	459.14	29782	5.61	2414
Brama brama	283.64	218	3.46	
Total	8188.24		100.00	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:1405
 DATE:18/ 6/01 GEAR TYPE: PT No:6 POSITION:Lat N 2030
 start stop duration Long W 1715
 TIME :16:59:14 17:29:22 30 (min) Purpose code: 1
 LOG :4926.85 4928.72 1.86 Area code : 1
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 39 39 Validity code:
 Towing dir: 270ø Wire out: 170 m Speed: 40 kn*10

Sorted: Kg Total catch: 0.80 CATCH/HOUR: 1.60

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardina pilchardus	0.90	8	56.25	
Scomber japonicus	0.30	4	18.75	
Sarda sarda	0.28	2	17.50	
Sepiella ornata	0.06	2	3.75	
Engraulis encrasicolus	0.06	4	3.75	
Total	1.60		100.00	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:1406
 DATE:18/ 6/01 GEAR TYPE: PT No:7 POSITION:Lat N 2030
 start stop duration Long W 1707
 TIME :10:55:24 19:28:12 33 (min) Purpose code: 1
 LOG :4940.84 4942.46 1.60 Area code : 1
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 27 30 Validity code:
 Towing dir: 270ø Wire out: 170 m Speed: 30 kn*10

Sorted: 38 Kg Total catch: 1530.99 CATCH/HOUR: 2783.62

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardina pilchardus	2375.62	339065	85.34	2415
Engraulis encrasicolus	331.75	44969	11.92	2416
Scomber japonicus	29.73	273	1.07	2417
Orcynopsis unicolor	25.64	2	0.92	
Sardinella aurita	19.89	142	0.71	
Decapterus rhonchus	1.00	4	0.04	
Total	2783.63		100.00	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:1407
 DATE:18/ 6/01 GEAR TYPE: PT No:6 POSITION:Lat N 2020
 start stop duration Long W 1721
 TIME :22:09:49 22:12:22 3 (min) Purpose code: 1
 LOG :4967.96 4968.12 0.14 Area code : 1
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 31 33 Validity code:
 Towing dir: 90ø Wire out: 150 m Speed: 35 kn*10

Sorted: 37 Kg Total catch: 1999.98 CATCH/HOUR: 39999.60

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardina pilchardus	28765.80	2021740	71.92	2418
Sardinella aurita	11127.60	29720	27.82	2419
Trachurus trecae	85.00	1060	0.21	
Engraulis encrasicolus	21.20	3180	0.05	
Total	39999.60		100.00	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:1408
 DATE:19/ 6/01 GEAR TYPE: PT No:6 POSITION:Lat N 2020
 start stop duration Long W 1738
 TIME :00:19:53 00:39:24 20 (min) Purpose code: 1
 LOG :4985.89 4987.21 1.30 Area code : 3
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 97 144 Validity code:
 Towing dir: 270ø Wire out: 160 m Speed: 40 kn*10

Sorted: 35 Kg Total catch: 77.00 CATCH/HOUR: 231.00

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trachurus	168.30	5049	72.86	2421
Scomber japonicus	23.70	12	10.26	
Trachurus trecae	21.60	216	9.35	2422
Engraulis encrasicolus	9.90	648	4.29	2420
Sardinella aurita	4.20	15	1.82	2423
Sardinella maderensis	3.30	9	1.43	2424
Total	231.00		100.01	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:1409
 DATE:19/ 6/01 GEAR TYPE: PT No:6 POSITION:Lat N 2010
 start stop duration Long W 1728
 TIME :03:29:57 04:00:26 30 (min) Purpose code: 1
 LOG :5013.04 5015.06 2.00 Area code : 3
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 44 41 Validity code:
 Towing dir: 90ø Wire out: 160 m Speed: 40 kn*10

Sorted: 48 Kg Total catch: 154.77 CATCH/HOUR: 309.54

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardina pilchardus	242.40	35648	78.31	2425
Trachurus trecae	33.60	432	10.85	2428
Sardinella aurita	19.60	50	6.33	2427
Engraulis encrasicolus	3.20	208	1.03	
Scomber japonicus	2.80	24	0.90	
Trachurus trachurus	2.56	104	0.83	2426
Raja undulata	2.30	2	0.74	
Loligo vulgaris	1.20	16	0.39	
Ophisurus serpens	1.00	2	0.32	
Sardinella maderensis	0.80	2	0.26	
Illex coindetii	0.08	28	0.03	
Total	309.54		99.99	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:1410
 DATE:19/ 6/01 GEAR TYPE: PT No:6 POSITION:Lat N 2010
 start stop duration Long W 1723
 TIME :04:51:52 04:56:18 4 (min) Purpose code: 1
 LOG :5019.51 5019.77 0.25 Area code : 1
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 33 34 Validity code:
 Towing dir: 270e Wire out: 150 m Speed: 40 kn*10
 Sorted: 45 Kg Total catch: 7928.00 CATCH/HOUR: 118932.00

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Sardina pilchardus	98472.00	11077440	82.80 2429
Scomber japonicus	9768.00	63360	8.21
Trachurus trecae	4752.00	36960	4.00 2430
Engraulis encrasicolus	2904.00	425040	2.44 2431
Pomadourus incisus	1980.00	5280	1.66
Sardinella maderensis	924.00	2640	0.78
Pagellus bellottii	132.00	2640	0.11
Total	118932.00	100.00	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:1411
 DATE:19/ 6/01 GEAR TYPE: PT No:7 POSITION:Lat N 2009
 start stop duration Long W 1715
 TIME :06:33:22 07:03:38 30 (min) Purpose code: 1
 LOG :5029.73 5031.22 1.50 Area code : 1
 FDEPTH: 0 0 GearCond.code:
 BDEPTH: 25 24 Validity code:
 Towing dir: 180e Wire out: 150 m Speed: 30 kn*10
 Sorted: Kg Total catch: 0.14 CATCH/HOUR: 0.28

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Sepiella ornata	0.28	12	100.00
Total	0.28	100.00	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:1412
 DATE:19/ 6/01 GEAR TYPE: BT No:7 POSITION:Lat N 2007
 start stop duration Long W 1714
 TIME :07:26:13 07:29:17 3 (min) Purpose code: 1
 LOG :5032.39 5032.54 0.15 Area code : 1
 FDEPTH: 25 25 GearCond.code:
 BDEPTH: 25 25 Validity code:
 Towing dir: e Wire out: 150 m Speed: 30 kn*10
 Sorted: 35 Kg Total catch: 576.05 CATCH/HOUR: 11521.00

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Sardina pilchardus	10500.00	1320460	91.14 2432
Scomberomorus tritor	502.00	100	4.36
Pomatomus saltatrix	379.00	160	3.29
Orcynopsis unicolor	137.00	20	1.19
Loligo vulgaris	3.00	40	0.03
Total	11521.00	100.01	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:1413
 DATE:19/ 6/01 GEAR TYPE: PT No:1 POSITION:Lat N 1946
 start stop duration Long W 1707
 TIME :16:42:32 17:08:04 26 (min) Purpose code: 1
 LOG :5115.21 5116.81 1.61 Area code : 1
 FDEPTH: 75 100 GearCond.code:
 BDEPTH: 349 451 Validity code:
 Towing dir: 221e Wire out: 350 m Speed: 40 kn*10
 Sorted: 35 Kg Total catch: 320.35 CATCH/HOUR: 739.27

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Trachurus trecae	541.04	2783	73.19 2434
MYCTOPHIDAE	106.96	49472	14.47
Trichurus lepturus	35.31	208	4.78
Trachurus trachurus	30.12	145	4.07 2432
Scomber japonicus	18.69	104	2.53 2433
Brama brama	6.12	5	0.83
Zenopsis conchifer	1.04	21	0.14
Total	739.28	100.01	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:1414
 DATE:19/ 6/01 GEAR TYPE: BT No:7 POSITION:Lat N 1940
 start stop duration Long W 1656
 TIME :19:00:38 19:30:19 30 (min) Purpose code: 1
 LOG :5133.30 5134.82 1.53 Area code : 3
 FDEPTH: 48 65 GearCond.code:
 BDEPTH: 48 65 Validity code:
 Towing dir: 270e Wire out: 250 m Speed: 30 kn*10
 Sorted: 34 Kg Total catch: 435.28 CATCH/HOUR: 870.56

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Trichurus lepturus	475.20	701394	54.59
Trachurus trecae, juvenile	324.96	82968	37.33 2435
Engraulis encrasicolus	33.60	5402	3.86 2436
Loligo vulgaris	23.70	712	2.72
Stromateus fiatola	2.90	2	0.33
GOBIIDAE	2.88	528	0.33
Penaeus notialis	2.30	74	0.26
Trachurus trecae	2.20	2	0.25
Trachurus trachurus	2.16	120	0.25
Zeus faber	0.56	2	0.06
Cepola macrophthalma	0.10	2	0.01
Total	870.56	99.99	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:1415
 DATE:20/ 6/01 GEAR TYPE: BT No:7 POSITION:Lat N 1901
 start stop duration Long W 1642
 TIME :10:25:18 10:41:39 16 (min) Purpose code: 1
 LOG :5282.31 5283.16 0.84 Area code : 3
 FDEPTH: 123 119 GearCond.code:
 BDEPTH: 123 119 Validity code:
 Towing dir: 38e Wire out: 400 m Speed: 30 kn*10
 Sorted: 35 Kg Total catch: 1774.32 CATCH/HOUR: 6653.70

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Trachurus trecae	6637.50	13294	99.76 2437
Octopus vulgaris	3.71	4	0.06
Lagocephalus sp.	3.53	4	0.05
Todaropsis eblanae	2.74	19	0.04
Scorpaena scrofa	2.70	8	0.04
Dentex macrophthalmus	2.33	8	0.04
Merluccius merluccius	1.20	23	0.02
Total	6653.71	100.01	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:1416
 DATE:20/ 6/01 GEAR TYPE: PT No:7 POSITION:Lat N 1843
 start stop duration Long W 1621
 TIME :18:00:58 18:33:01 32 (min) Purpose code: 1
 LOG :5350.07 5351.90 1.82 Area code : 3
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 33 29 Validity code:
 Towing dir: 128e Wire out: 170 m Speed: 33 kn*10
 Sorted: Kg Total catch: 0.11 CATCH/HOUR: 0.21

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Sepiella ornata	0.11	11	52.38
Trachurus trecae, juvenile	0.08	69	38.10
Lagocephalus sp.	0.02	2	9.52
Total	0.21	100.00	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:1417
 DATE:21/ 6/01 GEAR TYPE: PT No:6 POSITION:Lat N 1810
 start stop duration Long W 1621
 TIME :00:53:37 01:16:20 23 (min) Purpose code: 1
 LOG :5413.42 5414.69 1.25 Area code : 3
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 43 40 Validity code:
 Towing dir: 90e Wire out: 170 m Speed: 40 kn*10
 Sorted: 65 Kg Total catch: 222.38 CATCH/HOUR: 580.12

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Decapterus rhonchus	200.43	822	34.55 2439
J E L Y F I S H	144.73	24470	24.95
Sphyræna guachancho	73.04	219	12.59
Sardinella aurita	68.03	978	11.73 2438
Scomber japonicus	63.47	895	10.94 2440
Pagellus bellottii	8.22	128	1.42
Trachurus trecae	5.95	164	1.03 2441
Loligo vulgaris	5.48	219	0.94
Trichurus lepturus	4.70	3	0.81
Boops boops	2.74	10	0.47
Liocarcinus corrugatus	1.83	18	0.32
Sardinella maderensis	1.04	3	0.18
Trachinus draco	0.29	10	0.05
Sepia bertheloti	0.18	18	0.03
Total	580.13	100.01	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:1418
 DATE:21/ 6/01 GEAR TYPE: PT No:7 POSITION:Lat N 1820
 start stop duration Long W 1617
 TIME :03:34:36 03:55:32 21 (min) Purpose code: 1
 LOG :5434.26 5435.46 1.18 Area code : 3
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 31 27 Validity code:
 Towing dir: 90e Wire out: 170 m Speed: 35 kn*10
 Sorted: 248 Kg Total catch: 247.69 CATCH/HOUR: 707.69

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Mola mola	571.43	3	80.75
Decapterus rhonchus	47.43	197	6.70 2445
Sardinella aurita	30.29	329	4.28 2444
Sphyræna lewini	14.29	3	2.02
Trichurus lepturus	10.43	11	1.47
Scomberomorus tritor	9.71	3	1.37
Scomber japonicus	6.14	94	0.87 2442
Sphyræna guachancho	6.14	14	0.87
Pagellus bellottii	2.29	137	0.32
Sepia elegans	2.14	34	0.30
Trachurus trecae, juvenile	1.86	120	0.26 2443
Loligo vulgaris	1.71	94	0.24
Echeneis naucrates	1.14	3	0.16
Sarda sarda	1.14	6	0.16
Sepia officinalis hierredda	0.86	6	0.12
Brachydeuterus auritus	0.43	6	0.06
Trachinus draco	0.14	9	0.02
Sepiella ornata	0.11	11	0.02
Total	707.68	99.99	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:1427
 DATE:23/ 6/01 GEAR TYPE: PT No:7 POSITION:Lat N 1644
 start stop duration Long W 1629
 TIME :04:08:57 04:36:40 28 (min) Purpose code: 1
 LOG :5848.58 5850.24 1.62 Area code : 3
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 21 21 Validity code:
 Towing dir: 170ø Wire out: 170 m Speed: 35 kn*10
 Sorted: 22 Kg Total catch: 21.96 CATCH/HOUR: 47.06

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Decapterus rhonchus	23.55	255	50.04	2467
Sardinella aurita	7.63	255	16.21	2465
Sardinella maderensis	5.04	144	10.71	2466
Chloroscombrus chrysurus	3.81	24	8.10	
Pomadasys rogeri	3.06	4	6.50	
Sphyræna guachancho	2.57	13	5.46	
Brachydeuterus auritus	0.54	4	1.15	
Scomber japonicus	0.51	6	1.08	
Pomadasys incisus	0.21	2	0.45	
Pagellus bellottii	0.04	4	0.08	
Boops boops	0.04	4	0.08	
Trachinus draco	0.02	2	0.04	
Sphaeroides marmoratus	0.02	6	0.04	
Total	47.04	99.94		

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:1428
 DATE:23/ 6/01 GEAR TYPE: BT No: POSITION:Lat N 1623
 start stop duration Long W 1634
 TIME :13:42:39 14:12:55 30 (min) Purpose code: 1
 LOG :5926.77 5928.29 1.51 Area code : 3
 FDEPTH: 24 20 GearCond.code:
 BDEPTH: 24 20 Validity code:
 Towing dir: 170ø Wire out: 170 m Speed: 30 kn*10
 Sorted: 106 Kg Total catch: 293.84 CATCH/HOUR: 587.68

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Pseudotolithus typus	285.00	414	48.50	
Pteroncion peli	73.20	1290	12.46	
Drepane africana	35.40	30	6.02	
Trichurus lepturus	29.40	1494	5.00	
Sparus caeruleostictus *	19.20	18	3.27	
Arius heudeloti	18.30	78	3.11	
Galeoides decadactylus	17.40	48	2.96	
Ilisha africana	17.10	450	2.91	
Diodon sp.	15.50	4	2.64	
Pomadasys rogeri	15.30	18	2.60	
Pomadasys jubelini	13.80	24	2.35	
Pseudupeneus prayensis	6.30	42	1.07	
Plectrochinchus mediterraneus	6.30	18	1.07	
Laquecephalus laevisgatus	4.50	6	0.77	
Balistea punctatus	4.18	2	0.70	
Caranx senegallus	3.00	6	0.51	
Diplodus bellottii	2.40	12	0.41	
Acanthurus monroviae	2.40	6	0.41	
Lithognathus mormyrus	2.40	6	0.41	
Dasyatis marmorata	2.30	2	0.39	
Selene dorsalis	2.10	78	0.36	
Rhinoptera marginata	2.00	2	0.34	
PLATYRHINIDAE	1.90	2	0.32	
Pomadasys incisus	1.80	24	0.31	
Brachydeuterus auritus	1.50	30	0.26	
Chaetodon hoefleri	1.20	12	0.20	
Spicara alta	0.90	6	0.15	
Penaeus kerathurus	0.90	24	0.15	
Penaeus notialis	0.78	24	0.13	
Myrichthys perdalis	0.76	2	0.13	
Sepiella ornata	0.36	18	0.06	
Cynoglossus brosmi	0.12	6	0.02	
Umbrina canariensis	0.06	6	0.01	
Total	587.68	100.00		

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:1429
 DATE:23/ 6/01 GEAR TYPE: PT No:6 POSITION:Lat N 1610
 start stop duration Long W 1636
 TIME :19:36:02 19:56:17 20 (min) Purpose code: 1
 LOG :5976.78 5977.90 1.10 Area code : 3
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 36 29 Validity code:
 Towing dir: 90ø Wire out: 170 m Speed: 37 kn*10
 Sorted: 30 Kg Total catch: 119.30 CATCH/HOUR: 357.90

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Chloroscombrus chrysurus	140.40	1071	39.23	
Stromateus fiatola	90.45	135	25.27	
Sardinella maderensis	29.70	111	8.30	2470
Sphyræna sphyraena	25.50	84	7.12	
Engraulis encrasicolus	20.43	7338	5.71	2468
Trichurus lepturus	14.70	93	4.11	
Decapterus rhonchus	10.50	33	2.93	2471
Caranx senegallus	8.73	27	2.44	
Brachydeuterus auritus	3.06	27	0.85	
Galeoides decadactylus	2.97	9	0.83	
Sardina pilchardus	2.61	153	0.73	2469
Selene dorsalis	2.61	27	0.73	
Scomberomorus tritor	2.31	3	0.65	
Ilisha africana	2.19	27	0.61	
Mugil capurrii	0.90	3	0.25	
Sardinella aurita	0.84	3	0.23	
Total	357.90	99.99		

Annex III Instruments and fishing gear used

The Simrad EK-500, 38kHz echo scientific sounder was used during the survey for fish abundance estimation. The Bergen Echo Integrator system (BEI) logging the echogram raw data from the sounder, was used to scrutinize the acoustic records, and to allocate integrator data to fish species. All raw data was stored to tape, and a backup of the database of scrutinized data, stored. The details of the settings of the 38kHz where as follows:

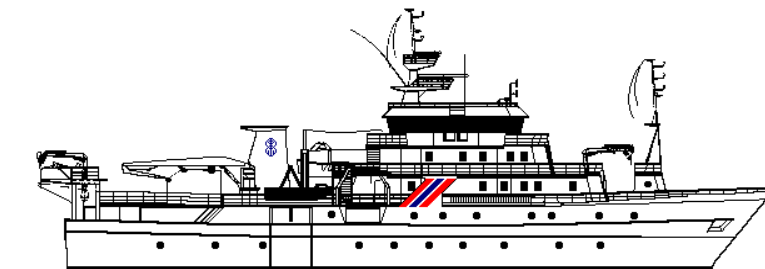
Transceiver-1 menu	Transducer depth	5.5 - 7.5 m
	Absorbtion coeff.	10 dB/km
	Pulse length	medium (1ms)
	Bandwidth	wide
	Max power	2000 Watt
	2-way beam angle	-21.0 dB
	SV transducer gain	27.45 dB
	TS transducer gain	27.65 dB
	Angle sensitivity	21.9
	3 dB beamwidth	6.8°
	Alongship offset	-0.03°
Athwardship offset	0.06°	
Display menu	Echogram	1
	Bottom range	10 m
	Bottom range start	10 m
	TVG	20 log R
	Sv colour min	-67 dB
	TS Colour minimum	-60 dB
Printer- menu	Range	0 - 50 or 0 -100 m and 100 - 350m
	TVG	20 log R
	Sv colour min	-63 dB
Bottom detection menu	Minimum level	-40 dB

A calibration experiment using a standard copper sphere, performed off Langstrand, Walvis Bay 19 April 2001 gave the following results:

Sv Transducer gain 27.37 dB
Ts Transducer gain 27.49 dB

Fishing gear

The vessel has two different sized "Åkrahamn" pelagic trawls and one "Gisund super" bottom trawl. For all trawls, the Tyborøn, 7.8m² (1670 kg) trawl doors were used. Complete drawings of the trawls used are included.



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

Part III

MOROCCO

18 May – 16 June 2001

CRUISE REPORT "DR FRIDTJOF NANSEN"

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

Part III

MOROCCO

18 May – 16 June 2001

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Casablanca, Morocco

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CHAPTER 1 INTRODUCTION

1.1 Survey objectives

The specific objectives for the survey in Morocco were:

- To map the distribution and estimate the biomass of the main small pelagic fish species using hydroacoustic methods. The species of interest were: sardine *Sardina pilchardus*, sardinellas *Sardinella aurita*, *S. maderensis*, chub mackerel *Scomber japonicus*, horse mackerel *Trachurus trachurus*, *T. trecae*, 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 are taken to describe the size distribution.
- As a pilot project: to collect otoliths of sardine and try to read these during the survey.
- To sample standard hydrographical transects for temperature, salinity and oxygen off Cape Blanc, Dakhla, Cape Bojador, Cape Juby, Cape Dra and Cape Ghir.

The time allocated for this part of the survey was 25 working days.

1.2 Participation

Members of the scientific teams were:

Institut National de Recherche Halieutique, Morocco:

Hassan MOUSTAHDID (team leader), Hamid CHFIRI, Mohamed ARAABAB, AbdelAziz CHAGHIF, and Ahmed YOUSOUFI

Institut Mauritanien de Recherches Océanographiques et des Pêches, Mauritania:

Ahmedou O. M. El MOUSTAPHA.

Institute of Marine Research (IMR), Norway:

Oddgeir ALVHEIM (cruise leader 18-31 May), Tore STRØMME (cruise leader 1-16 June), Marek OSTROWSKI (1-16 June), Diana ZAERA, Tore MØRK, and Tore NILSEN.

1.3 Narrative

Figure 1 shows the cruise track and the stations worked during the survey. The vessel departed

from Casablanca on May 18, steaming south to Jorf Lasfar from where the sampling work started. The survey proceeded southwards with an acoustic sampling grid with a transect distance 10 NM apart, covering the shelf and slope down until about 200 m bottom depth. Between Sidi Ifni and Cape Juby the outer shelf was not covered due to time constraints. From previous surveys it is known that the outer shelf here holds few pelagic resources and no sardine. The survey continued to south of Cape Bojador when sampling was interrupted with a call at Las Palmas 1-2 June for refuelling and change of crew. The survey proceeded southwards covering the wide shelf between Cape Bojador and Cape Barbas with transects. Dense concentrations of sardine were registered in shallow waters between 25 and 23°N. This area was resurveyed in the period 9-11 June with a zigzag pattern. Cape Blanc was reached on 15 June, where the survey was completed with a hydrographic section. On way southwards to Nouakchott open legs across the shelf between Cape Blanc and Cape Timiris were laid out to roughly map pelagic resources as a pilot investigation for the following survey. The vessel arrived Nouakchott on 16 June. The weather was somewhat rougher than during normal December surveys, but did not constrain the survey work.

1.4 Methods

The cruise followed the standard methods established for the regional surveys:

Environmental Data

Meteorological observations including wind direction and speed, air temperature, global radiation and sea surface temperature (SST) were automatically logged and recorded with position and bottom depth every nautical mile sailed using an Aanderaa meteorological station. CTD-stations were recorded at the standard hydrographic transects. A Seabird 911+ CTD probe was used to obtain vertical profiles of temperature, salinity and oxygen. Real time plotting and logging was done using the customised Seabird Seasave software installed on a PC. The profiles were in general taken down to a few meters above the bottom. In deep stations, however, data logging was interrupted at 500 m. Niskin bottles were triggered for water samples, one near the surface and one near the bottom, in order to calibrate the oxygen and salinity sensors. The water samples were analysed for dissolved oxygen using the Winkler method, and for salinity using a Guildline Portasal salinometer model 8410.

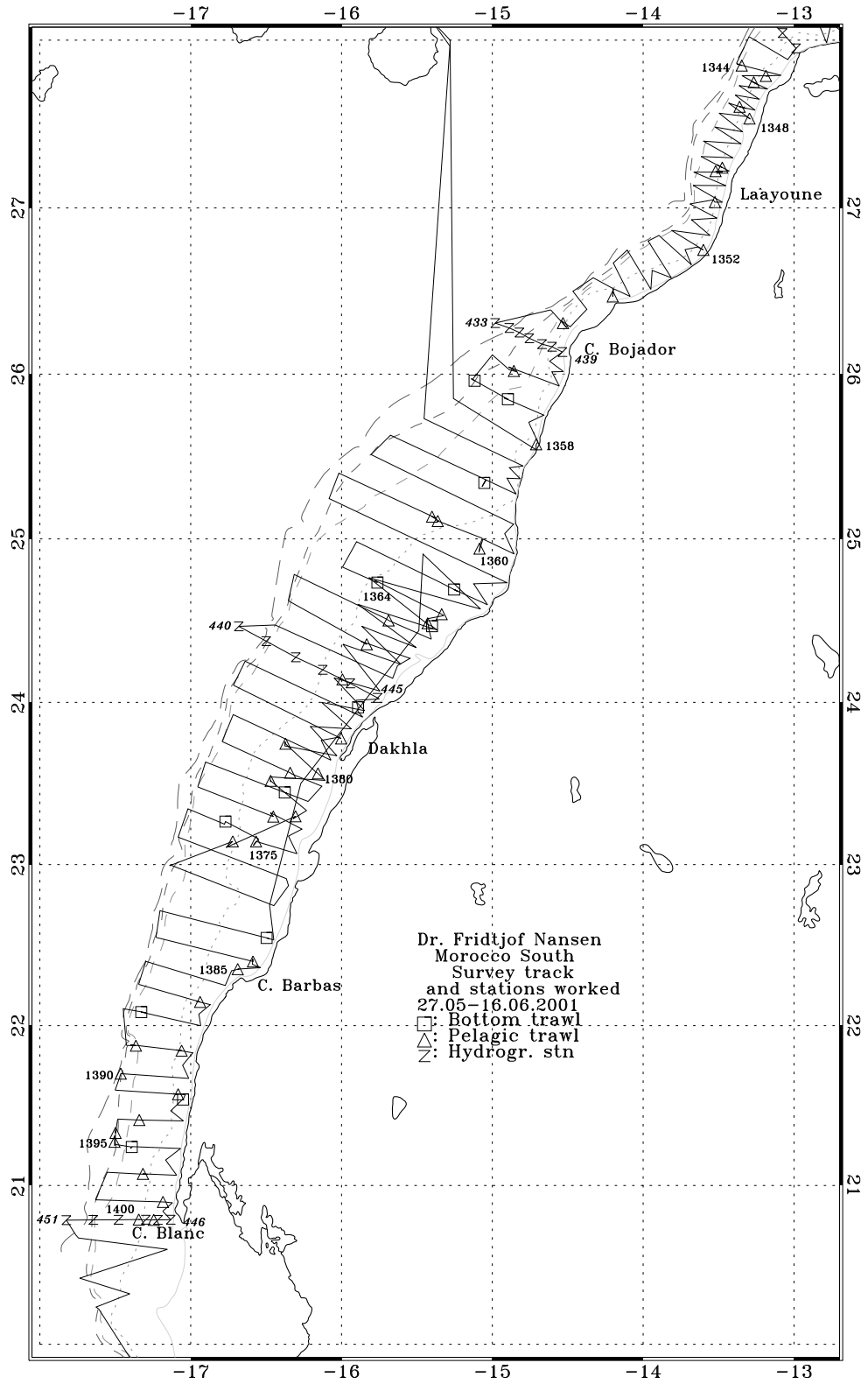


Figure 1a Course track with fishing and hydrographic stations, Cape Blanc to Cape Juby. Depth contours at 20 m, 50 m, 100 m, 200 m and 500 m are indicated.

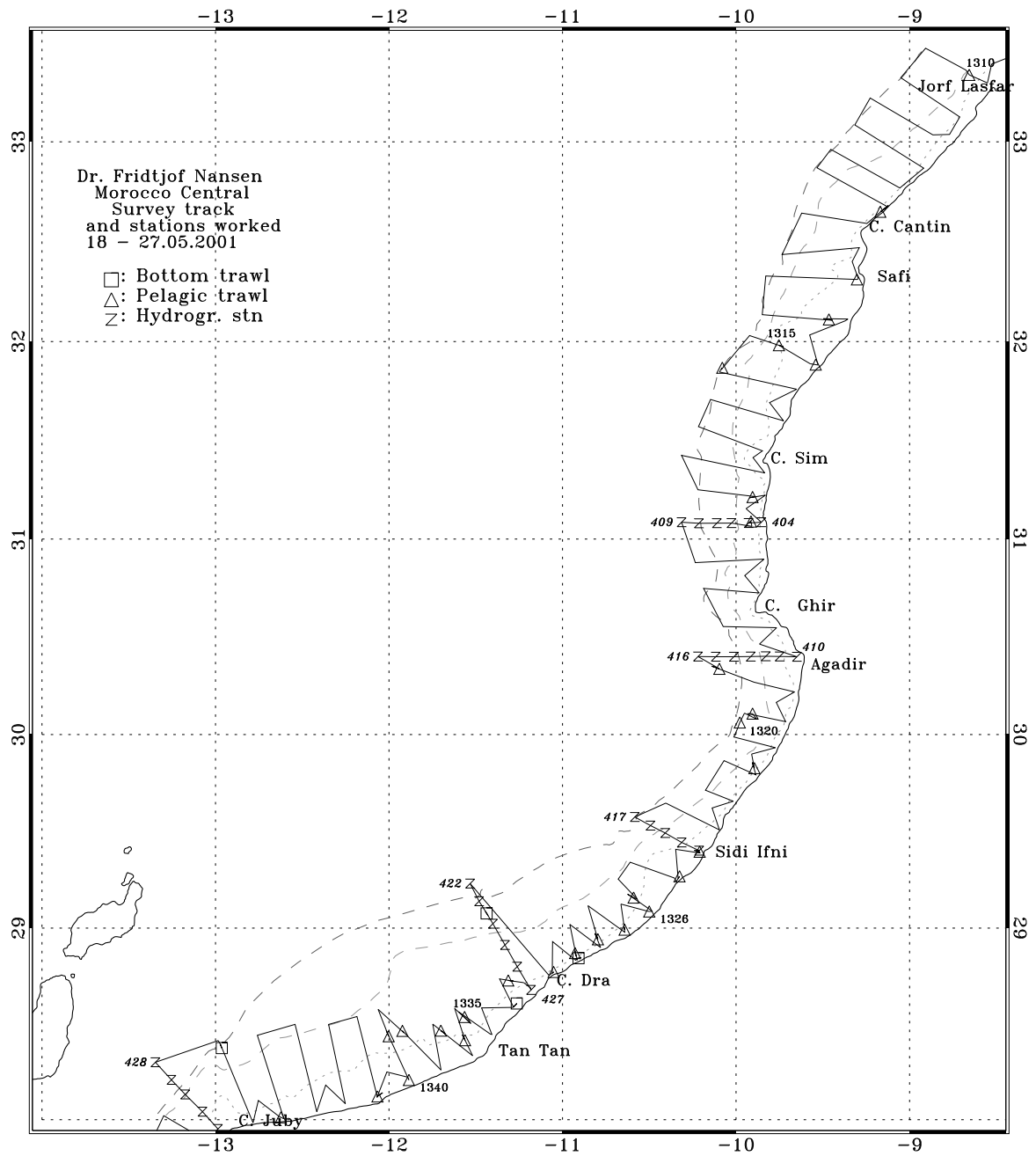


Figure 1b Course track with fishing and hydrographic stations, Cape Juby to Cape Cantin. Depth contours as in Fig. 1a.

Biological Sampling

Biological sampling of the fish was carried out using trawls. A pelagic trawl with floats was often used. A smaller pelagic trawl or the bottom trawl with floats was used for sampling the pelagic fish in very shallow waters (depth less than 25 m). Annex III gives a description of the instruments and the fishing gear used. All catches were sampled for composition by weight and numbers of each species caught. Species identification was based on the FAO Species Guides. Length frequency distributions, by total fish length in cm, of the selected target species were taken in all the stations where they were present. The complete records of fishing stations are shown in Annex I. As a pilot study for a forthcoming regional project on aging sardine and sardinella, sardine otoliths were collected, preserved and read during the survey.

The following target groups were used for Morocco:

- 1) Sardine (European pilchard *Sardina pilchardus*),
- 2) Sardinellas (flat sardinella *Sardinella maderensis* and round sardinella *S. aurita*),
- 3) Anchovy (European anchovy *Engraulis encrasicolus*),
- 4) Horse mackerels (Atlantic horse mackerel *Trachurus trachurus*, Cunene horse mackerel *T. trecae* and also including false scad *Decapterus rhonchus*),
- 5) Mackerels (chub mackerel *Scomber japonicus*)
- 6) Other pelagic scombrids, carangids and associated species (such as *Auxis* sp., *Caranx* sp. and largehead hairtail *Trichiurus lepturus*), BEI group PEL2
- 7) Other demersal species (such as Sparidae, Haemulidae and Merluccidae).

Acoustic Sampling

A SIMRAD EK500 Echosounder was used and the echograms were stored on both paper and files. The acoustic biomass estimates were based on the integration technique. The Bergen Integrator (BEI) was used for analysis and allocation of the integrated s_A -values (average area back scattering coefficient in m^2/NM) to the individual specified target groups by 5 NM intervals. The BEI system has improved capabilities in discriminating dense fish aggregations close to the bottom as compared to the inbuilt integrator in EK500, which was used in the surveys prior to 1995. The splitting and allocation of the integrator outputs (s_A -values) was based on a combination of a visual scrutiny of species characteristics as deduced from echo diagrams, the BEI analysis, and the catch compositions.

In cases where the target category of fish contains more than one species (sardinellas and horse mackerels), the mean s_A -value allocated to the category is divided between the species in the same ratio as their relative contribution to the mean back scattering strength in the length frequency samples.

The following target strength (TS) function was applied to convert allocated s_A -values (average integrator value, or area back scattering coefficient for a given species or group of species in a specified area) to number of fish:

$$TS = 20 \log L - 72 \text{ dB} \quad (1)$$

which can be converted (see Toresen *et al.* 1998 for details) to the area form (scattering cross sections of acoustic targets):

$$C_{Fi} = 1.26 \cdot 10^6 \cdot L_i^{-2} \quad (2)$$

where L_i is total length in 1 cm length group i and C_{Fi} (m^{-2}) is the reciprocal back scattering cross section, or so-called fish conversion factor. In order to split and convert the allocated s_A -values (m^2/NM^2) to fish densities (numbers per length group per NM^2), the following formula was used:

$$\rho_i = s_A \cdot \frac{P_i}{\sum_{i=1}^n \frac{P_i}{C_{Fi}}} \quad (3)$$

where

- ρ_i = density (n/NM^2) of fish in length group i
- s_A = mean integrator value (m^2/NM^2)
- p_i = proportion of fish in length group i
- $\sum_{i=1}^n \frac{P_i}{C_{Fi}}$ = the relative back scattering cross section (m^2) of the length frequency sample of the target species, and
- C_{Fi} = reciprocal back scattering cross section (σ_{bs}^{-1}) of a fish in length group i

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

$$\rho_i = 1261217 \cdot \frac{n_i}{s_A \sum_{i=\min}^{\max} n_i l_i^2} \quad (4)$$

where s_A = mean integrator value of a species within an aggregation area, in m^2/NM^2
 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 offset constant -72 in equation (1). For other TS relationships the equation constant becomes as in box. The table is presented to facilitate a recalculation in case more accurate TS measurements are provided in the future:

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

Using equation (4), the pooled length distribution is used together with the mean s_A -value to calculate the density by length groups for each observed area with fish aggregations. The total number, by length groups, in an area is obtained by multiplying the densities with the distribution area. Areas were calculated on the maps by using a digital planimeter (Tamaya Planix 7).

The number of fish were converted to biomass by length group using the estimated weight at length from the length-weight relationship:

$$\bar{w} = \frac{cond}{100} * L^3 \quad (3)$$

The specific condition factors obtained from the samples and applied for this survey were: 0.82 for sardine, 0.84 for sardinellas and horse mackerel and 0.54 for the anchovies.

Finally the total biomass estimate is obtained by summing the biomass by length group and areas within each sector of the survey.

Equations (1), (2) and (3) show that the conversion from s_A -value to number of fish is dependent on the length composition of the fish. In general there are many problems associated with getting representative length distributions when the various size classes mix with varying proportions between neighbouring stations. When the size classes are well and homogeneously mixed in an area, the various length distributions are pooled together with equal importance. In areas where fish size-groups are well segregated, separate estimates are made for each group. Otherwise, when the size distribution varies from sample to sample, 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.

For the estimation of the biomass of target group 3) carangids and associated species, an overall average length of 23 cm and a condition factor of 0.88 (to calculate mean weight of this length group) were applied.

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 a fish in 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 formula (4) above. Numbers are converted to weight using the condition factor of the species. This can be calculated from the length samples where the total weight of the sample is recorded, or from individual biological samples.
- 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 spreadsheets after the scientist has completed the two first steps in the above list manually.

All data on fishing stations and fish length sampling were made available to the participants from the local research institutes on diskettes.

CHAPTER 2 SURVEY RESULTS

2.1 Hydrographic conditions

An overview of dominant hydrographic patterns.

A dominant feature along the Moroccan coast is coastal upwelling of cool, nutrient-rich water, which causes the high biological productivity on the shelf. The upwelling events are being observed throughout the year along the whole coastline, but the frequencies of occurrence and duration of the events vary greatly depending on location and season. The dominant factors influencing the upwelling intensity at a given location are: (1) the seasonal position of the north-easterly trade wind system of the northern hemisphere, (2) direction of the coastline with respect to the prevailing winds, (3) sheltering effect of the topographic features in the coastal region bordering the shelf and (4) the large-scale atmospheric and hydrographic processes occurring in the central and tropical Atlantic.

During June the centre of the anticyclonic wind system extends to its northernmost position, at about 30-35°N, reaching the regions to the north of Agadir, Figure 1. During this period, the vigorous trades blowing from northeast induct a strong seasonal upwelling along the northern Morocco, observed everywhere with the exclusion of the region off Agadir. This area remains relatively calm even during the strong pulses of the trades due to the sheltering effect of the nearby Atlas Mountains. Towards the south, in the region between Cape Dra and Cape Juby, the coastline turns almost towards east-west and the predominant north-easterly winds become directed on-shore. This specific configuration between the coastline and the dominant wind pattern brings to the shelf zone transient mesoscale two-dimensional circulation events, rather than classical upwelling. A strong equatorialward winds blow steadily along the coastline in the southern region between Cape Juby and Cape Blanc. While the wind-coast configuration is in this region upwelling favourable all the year round, the actual observed upwelling intensity undergoes a visible seasonal cycle, caused the large-scale processes in the central and tropical Atlantic. In the north, the trade winds force the development of the Canary Current transporting water masses southwards. In the south, the equatorial current system pushes the tropical water masses along the African coast in the opposite direction. The two opposing water flows clash with each other in the region of Cape Blanc forming a broad frontal region, which affects the hydrographic along the shelf between Dakhla and Cape Blanc.

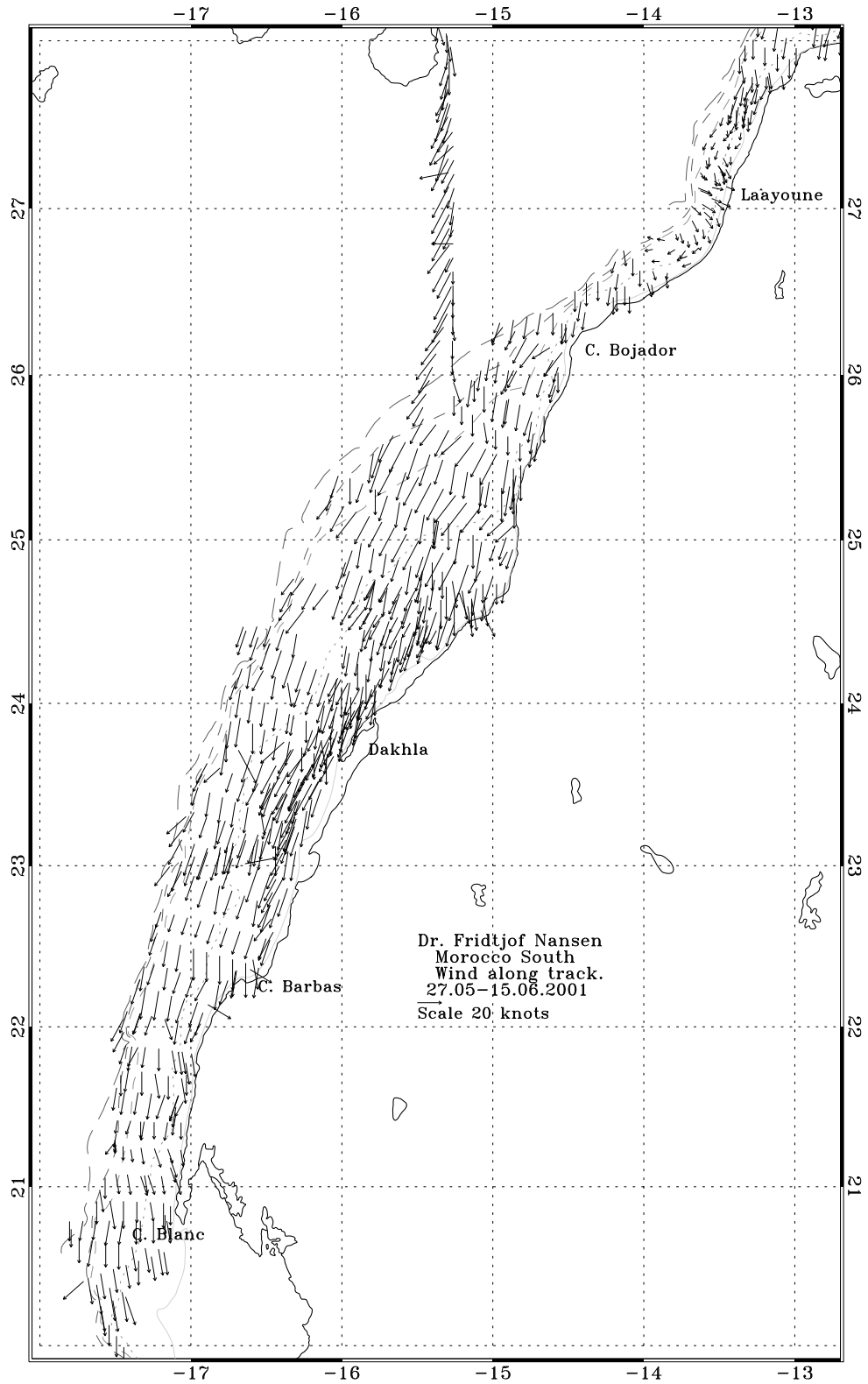


Figure 2a Wind conditions along the survey, Cape Blanc to Cape Juby. Depth contours as in Fig. 1a.

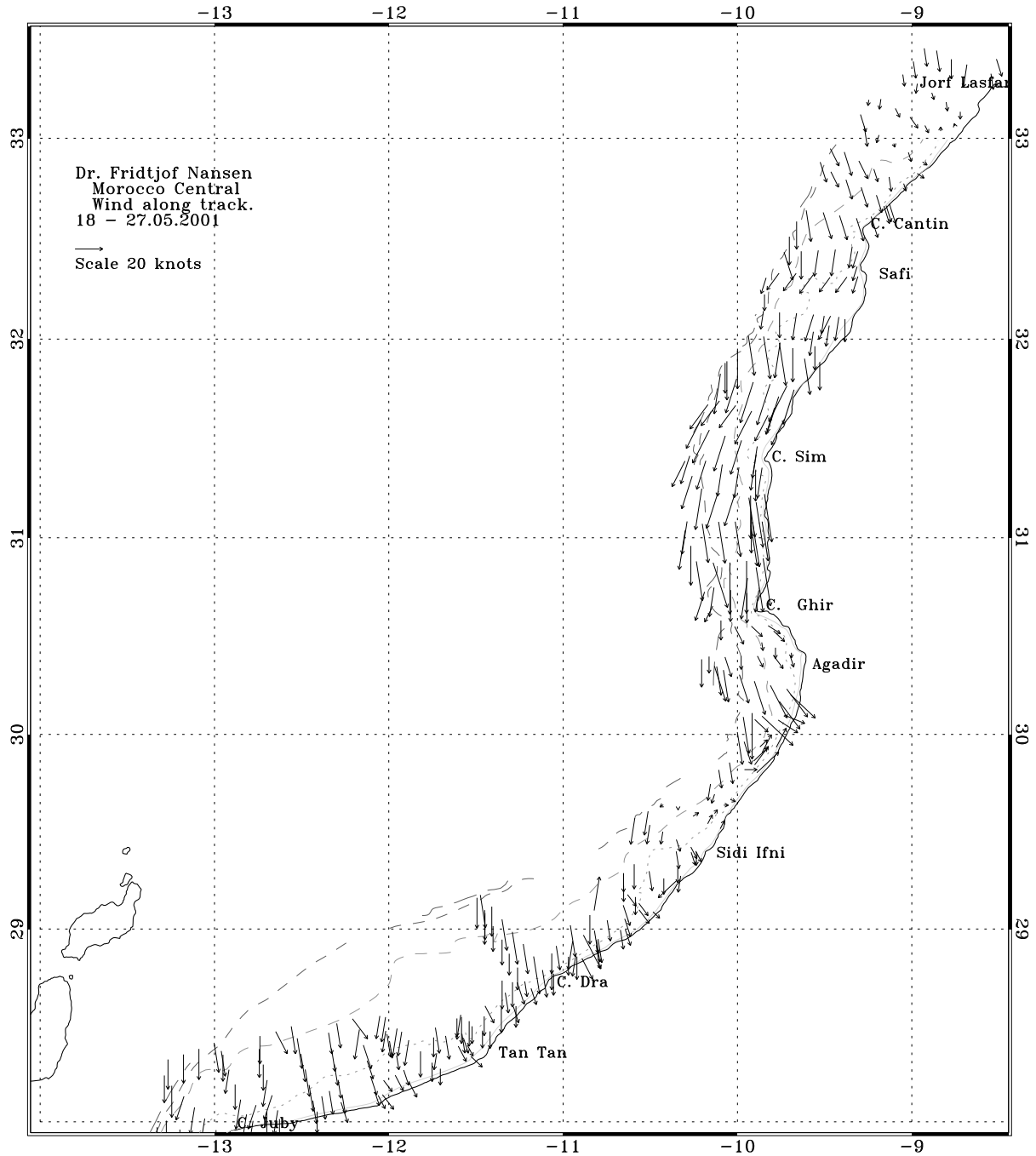


Figure 2b Wind conditions along the survey, Cape Juby to Cape Cantin. Depth contours as in Fig. 1a.

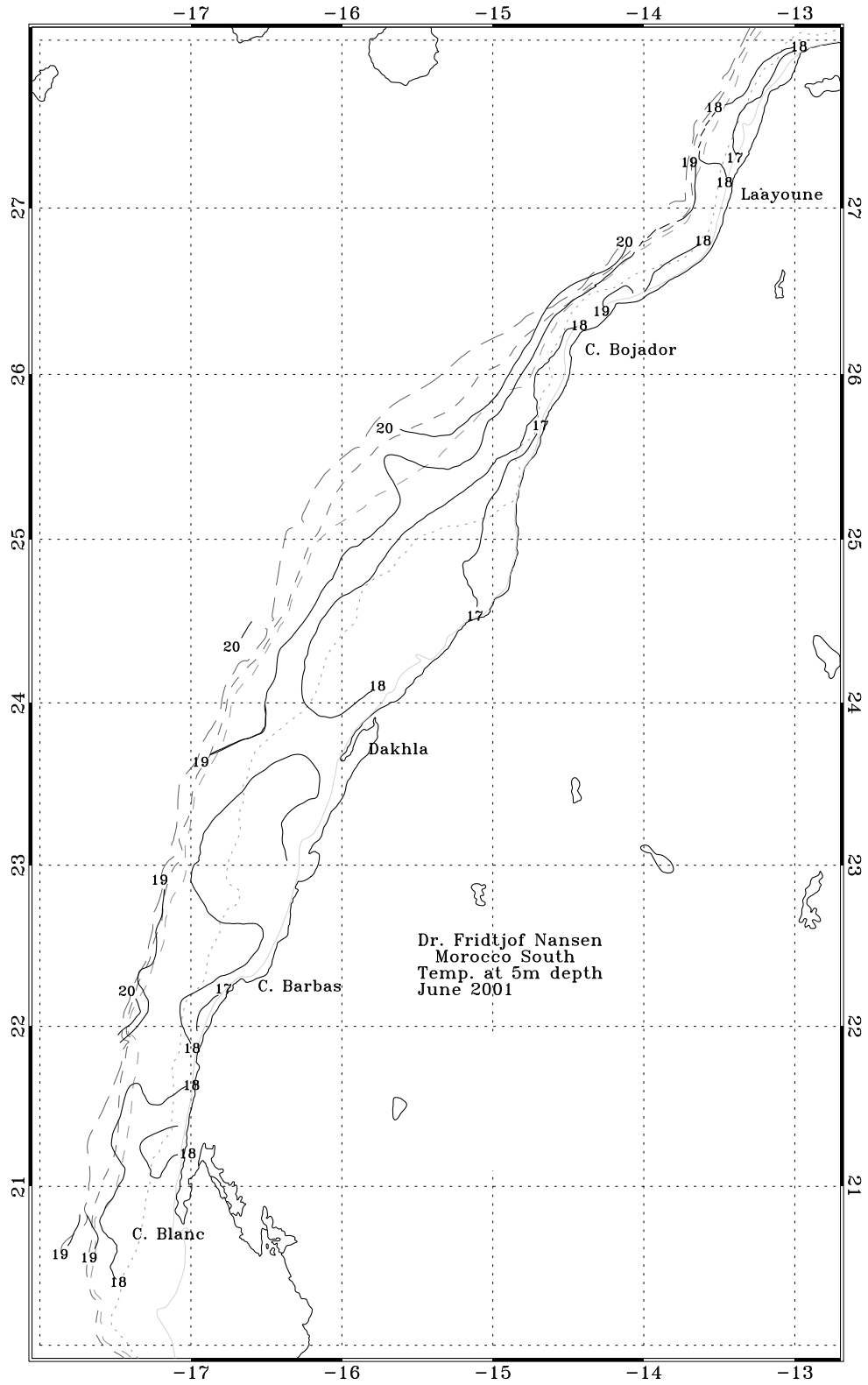


Figure 3a Sea surface temperature (at 5m depth), Cape Blanc to Cape Juby. Depth contours as in Fig. 1a.

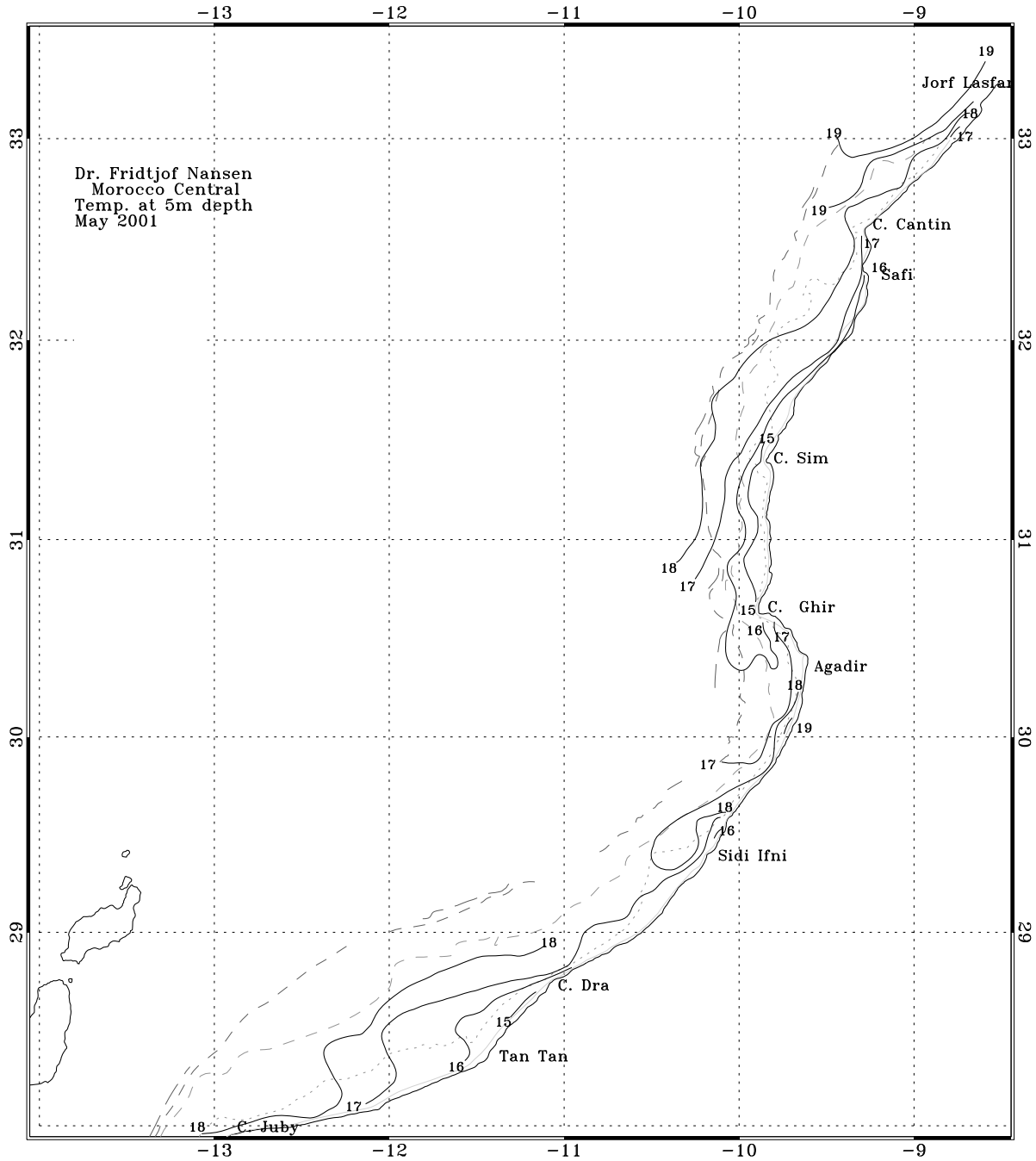
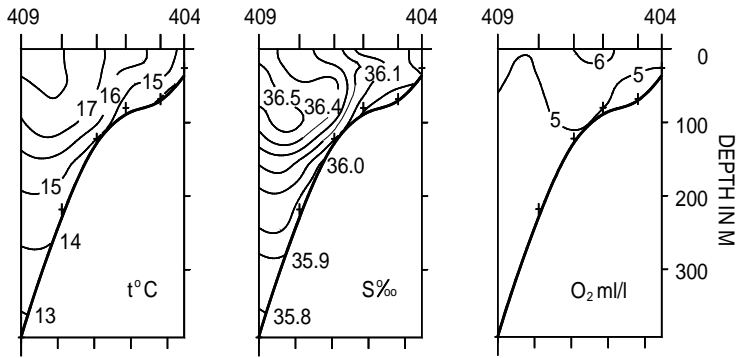


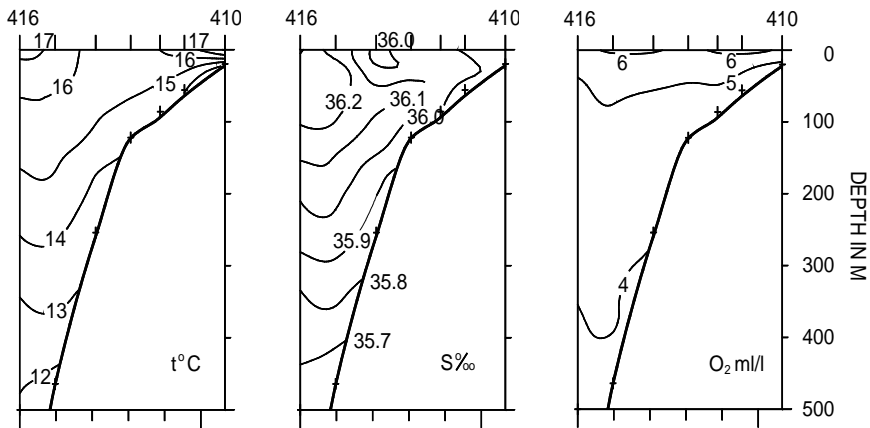
Figure 3b Sea surface temperature (at 5m depth), Cape Juby to Cape Cantin. Depth contours as in Fig. 1a.

Vertical structure of temperature, salinity and oxygen

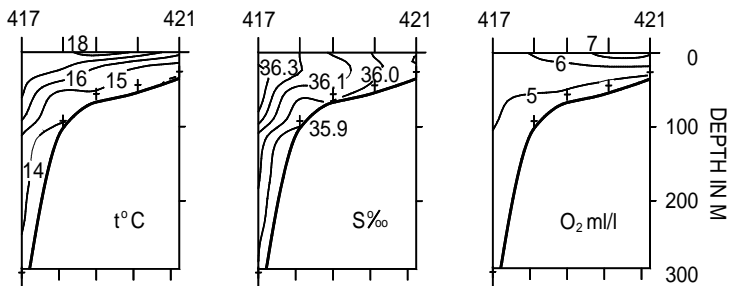
Vertical sections of temperature, salinity and oxygen are shown in Figure 4. The locations of the CTD stations from southern Morocco are given in Figure 1a and those from central Morocco in Figure 1b, respectively.



South off CAPE SIM – 21.05.2001

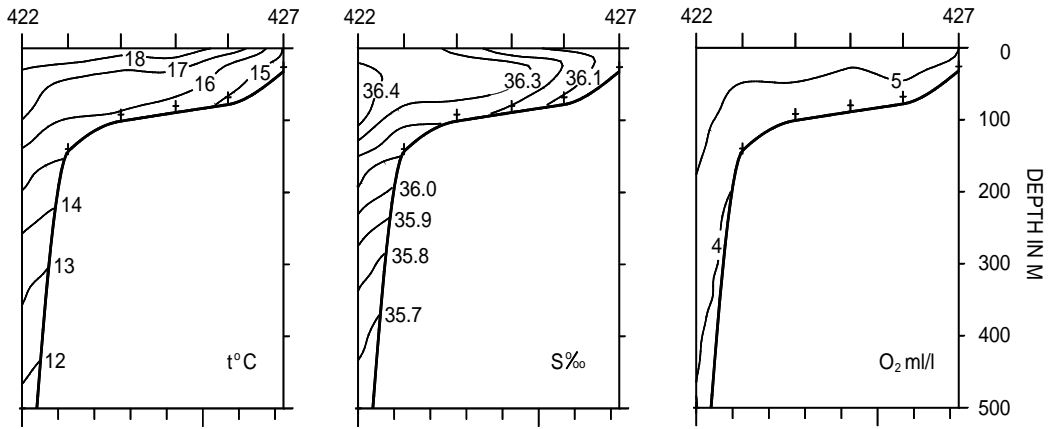


AGADIR – 22.05.2001

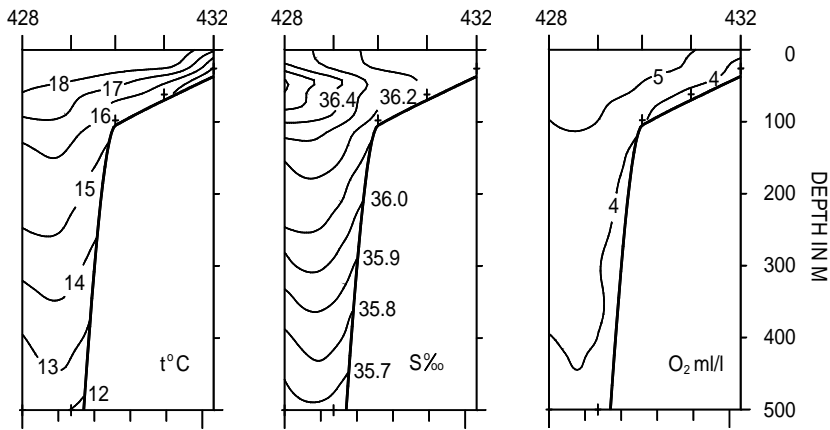


SIDI IFNI – 23.05.2001

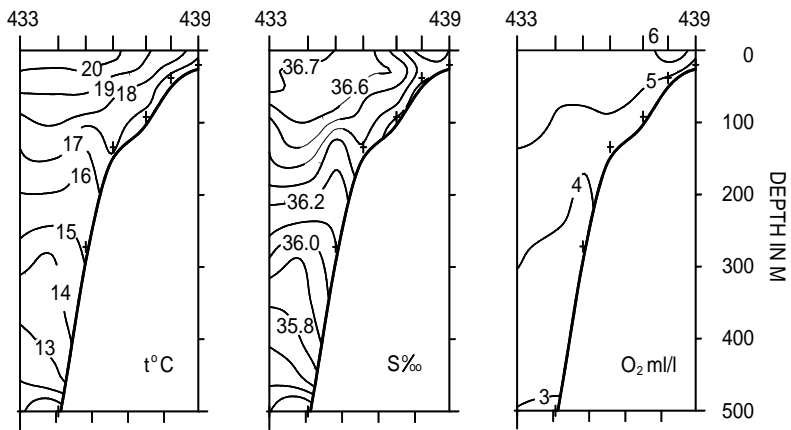
Figure 4 Hydrographic sections with distribution of temperature, salinity and oxygen.



CAPE DRA – 24-25.05.2001

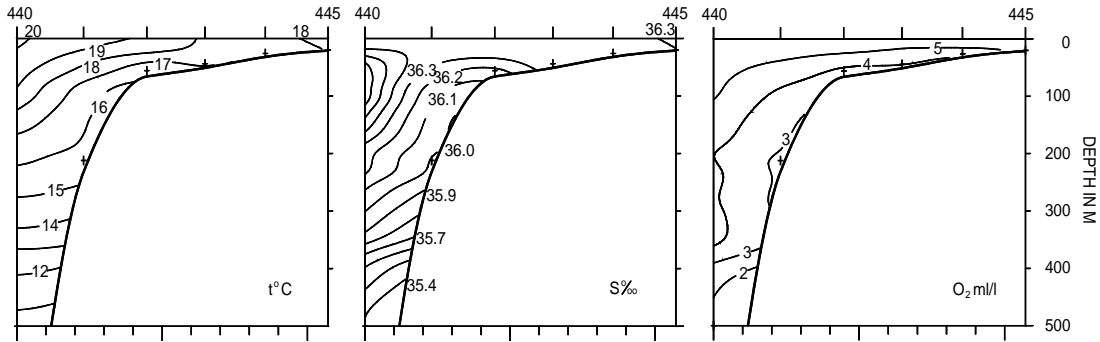


CAPE JUBY – 27.05.2001

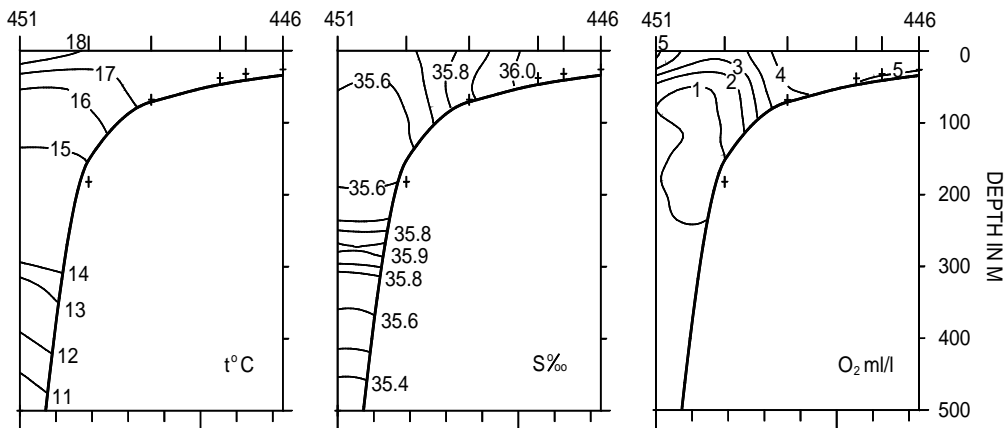


CAPE BOJADOR – 30.05.2001

Figure 4 continued



DAKHLA – 06-07.06.2001



CAPE BLANC – 15.06.2001

Figure 4 continued

2.2 Distribution of pelagic fish on the shelf from Cape Blanc to Cape Juby

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

Sardine, *Sardina pilchardus*, Figure 5, was found in the shallow waters along most of the coast. South of Cape Barbas there was a predominance of juveniles with a mean length 11cm, Figure 9. High concentrations of adult sardine occurred from Cape Barbas north to 24°30'N and between Cape Bojador and Cape Juby. These aggregations consisted mostly of fish in the range 18-24 cm

Sardinellas, *Sardinella aurita* and *Sardinella maderensis*, were only found in the southernmost part of the region, south of 21°30'N, in two aggregations, Figure 6. The fish distribution extends southwards into Mauritania.

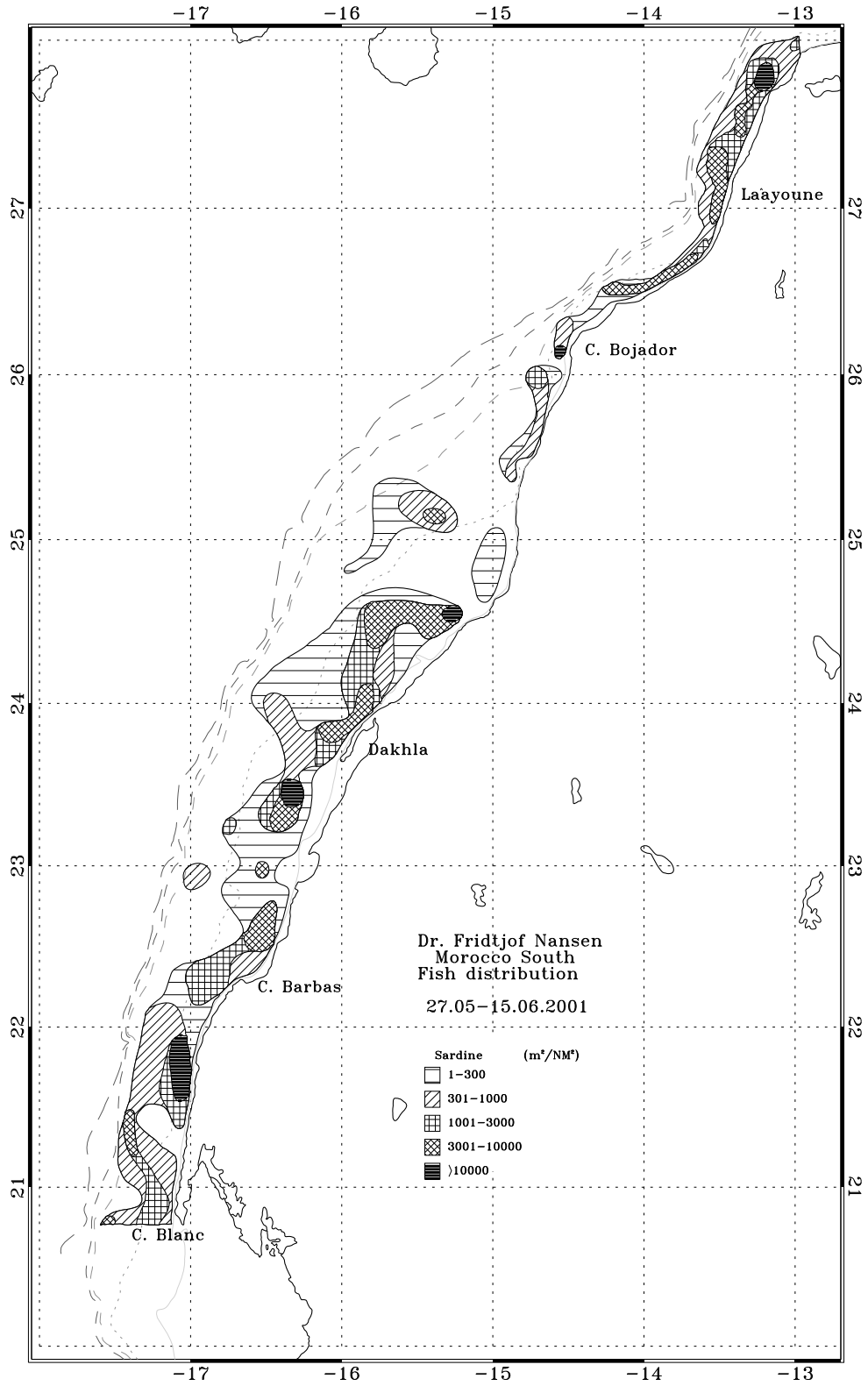


Figure 5 Distribution of sardine, Cape Blanc to Cape Juby. Depth contours as in Fig. 1a.

Horse mackerels, *Trachurus trachurus* and *T. trecae*, were common from Cape Blanc to Cape Bojador, mostly at low densities at the outer shelf, Figure 7. Only one dense patch was recorded, about 15 NM north of Cape Blanc.

Anchovy, *Engraulis encrasicolus*, were encountered in three patches from 30 NM south of Cape Bojador to Cape Juby, Figure 8.

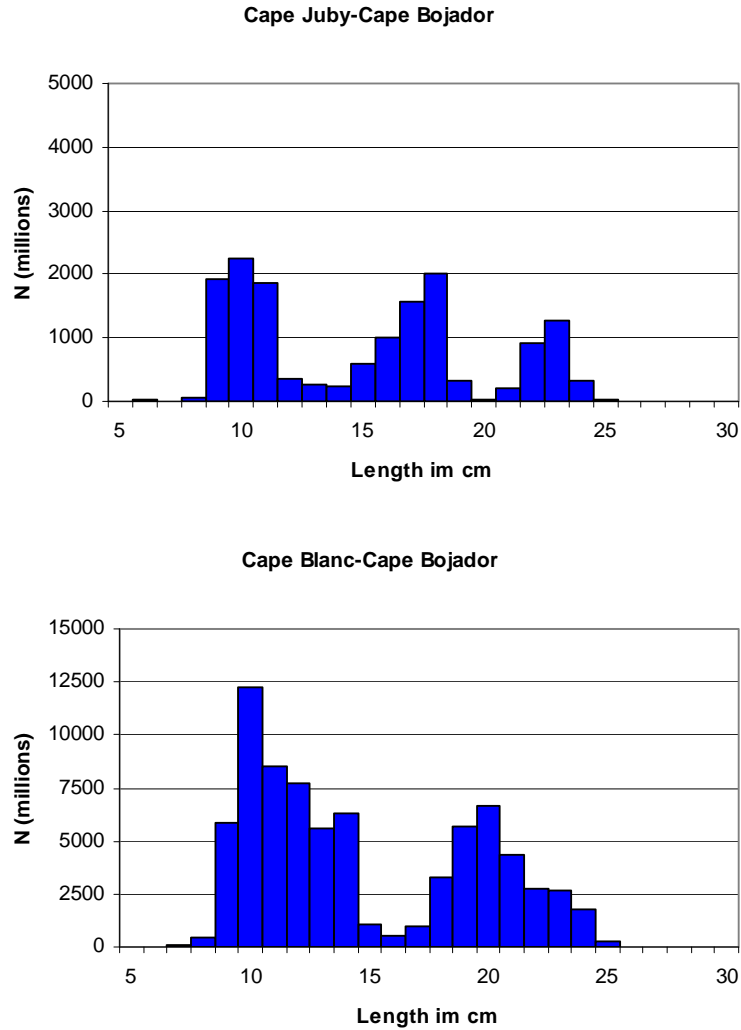


Figure 9 Length frequency distributions sardine Cape Blanc to Cape Juby.

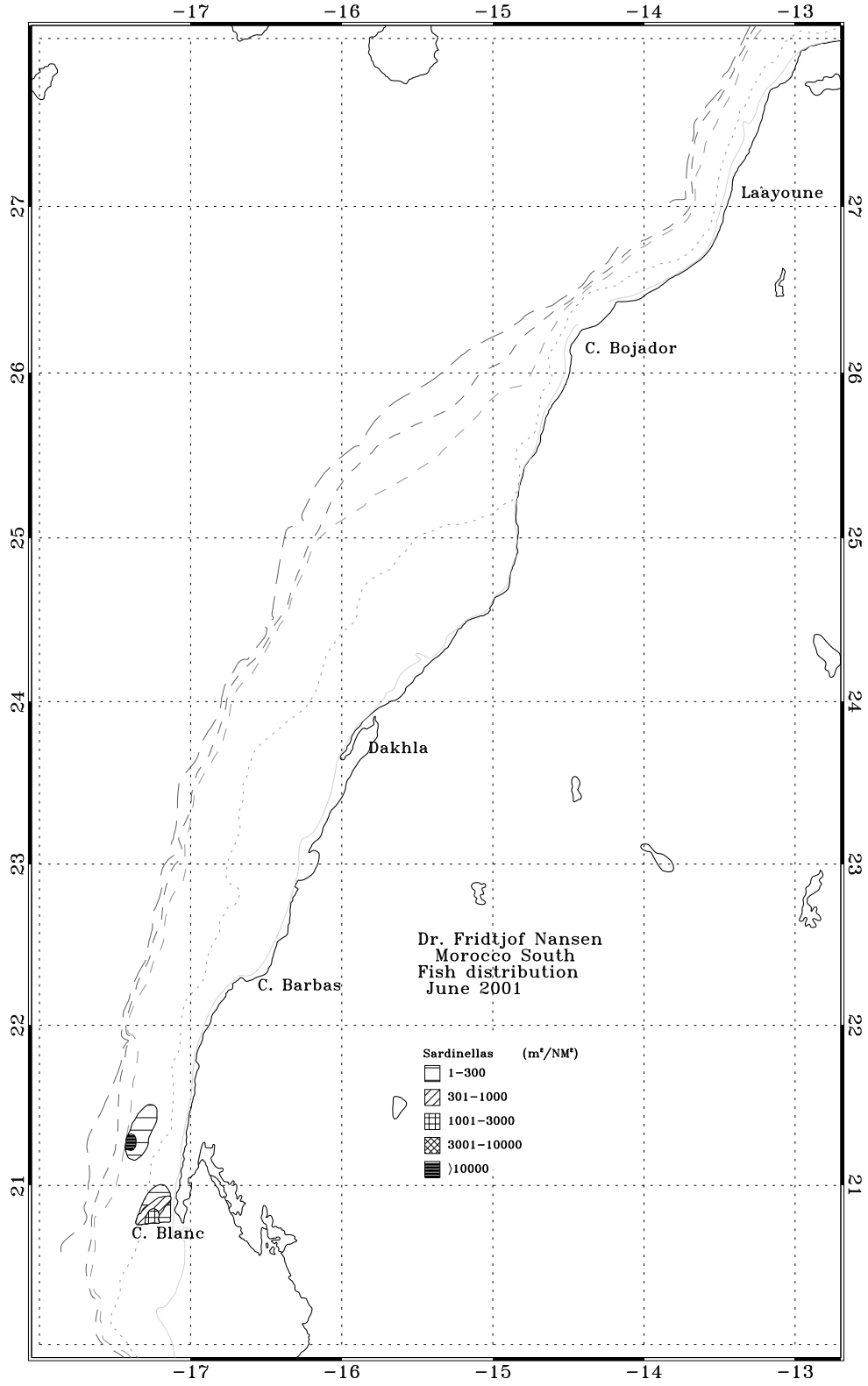


Figure 6 Distribution of sardinella, Cape Blanc to Cape Juby. Depth contours as in Fig. 1a.

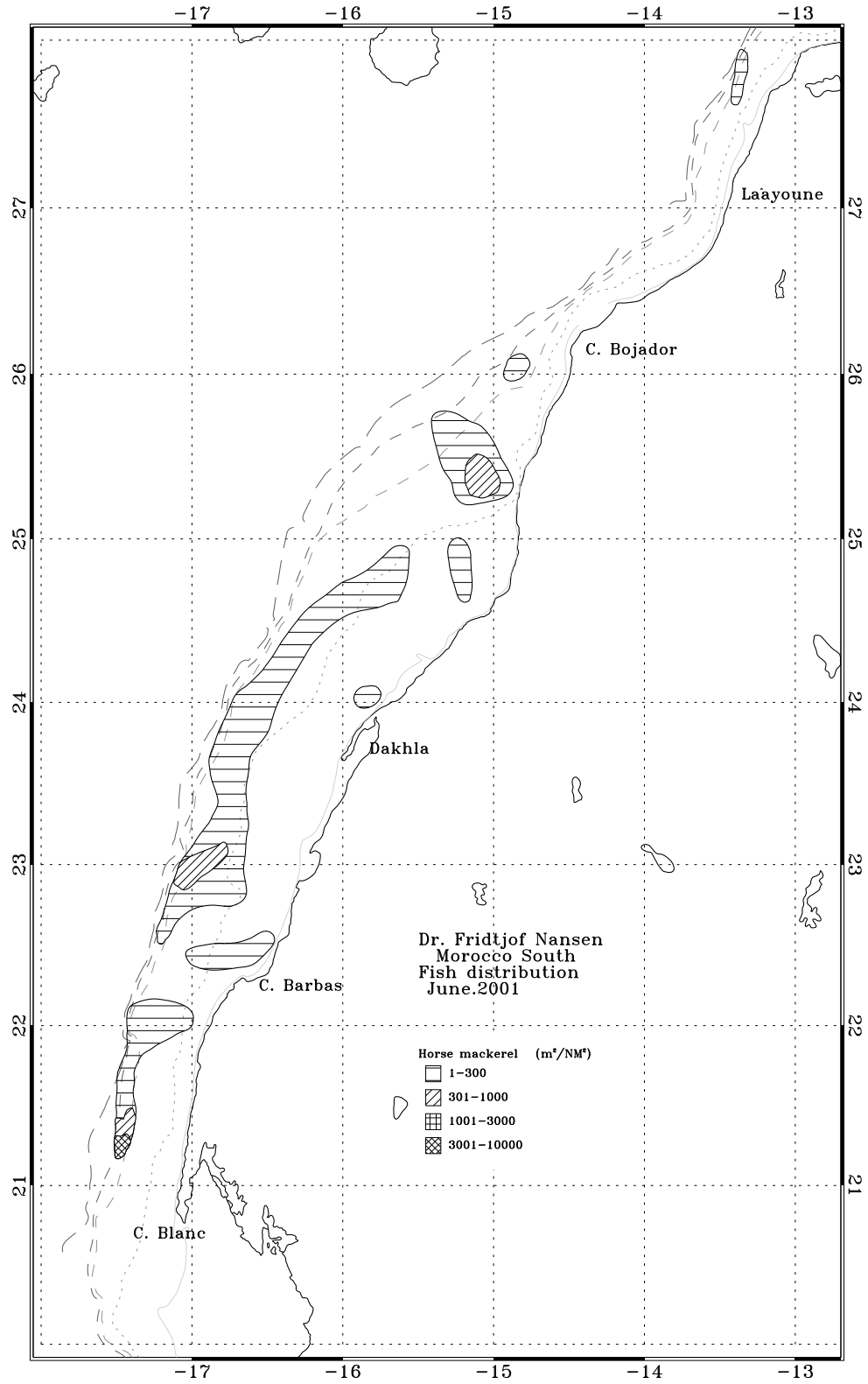


Figure 7 Distribution of horse mackerel, Cape Blanc to Cape Juby. Depth contours as in Fig. 1a.

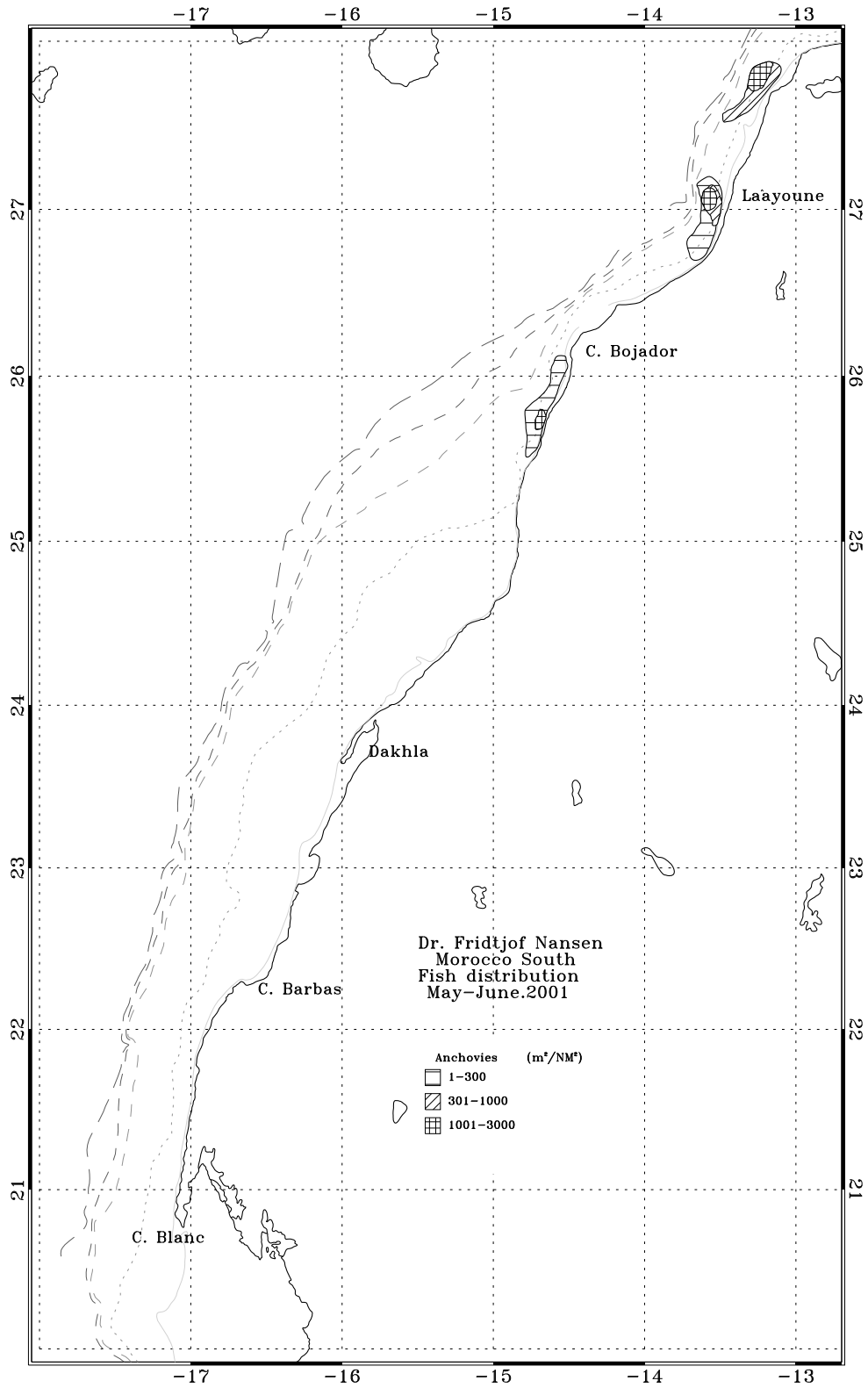


Figure 8 Distribution of anchovy, Cape Blanc to Cape Juby. Depth contours as in Fig. 1a.

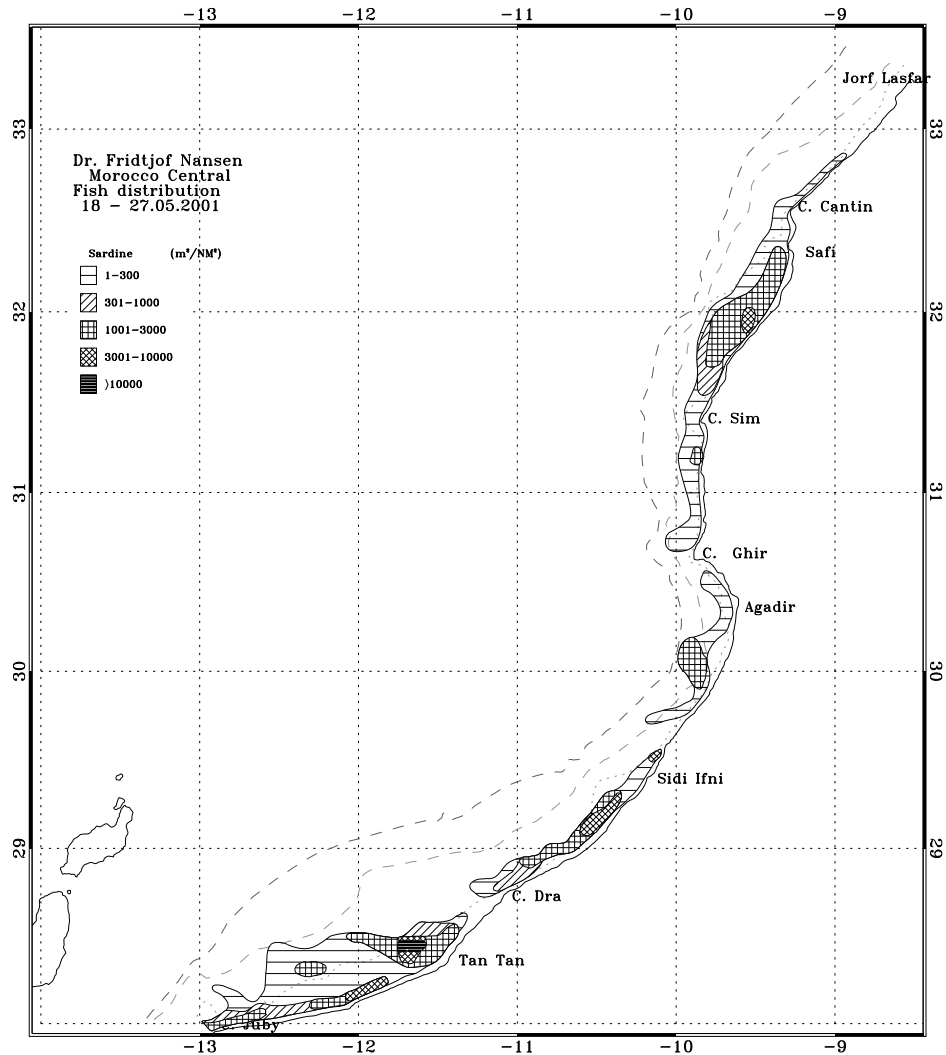


Figure 10 Distribution of sardine, Cape Juby to Cape Cantin. Depth contours as in Fig. 1a.

2.3 Distribution of pelagic fish on the shelf from Cape Juby to Cape Cantin.

Sardine, Figure 10, was registered along the entire coast. Highest densities were recorded off Tan Tan and well-defined patches were found off Agadir and in the sub regions Cape Dra-Sidi Ifni and Cape Sim-Safi. In general the picture has much resemblance with the distribution pattern in December 2000. The pooled length distributions on sardine, Figure 12, show that the main part of the sardine is made up by a cohort with mode around 17-18 cm. This is the same cohort that was registered in December last year, but which has now increased about 4 cm in its mode.

Anchovy was few and far between during this survey, Figure 11, in contrast to the preceding surveys. This could be a seasonal feature as the standard survey has been carried out in December. No notable aggregations that could support a fishery were recorded.

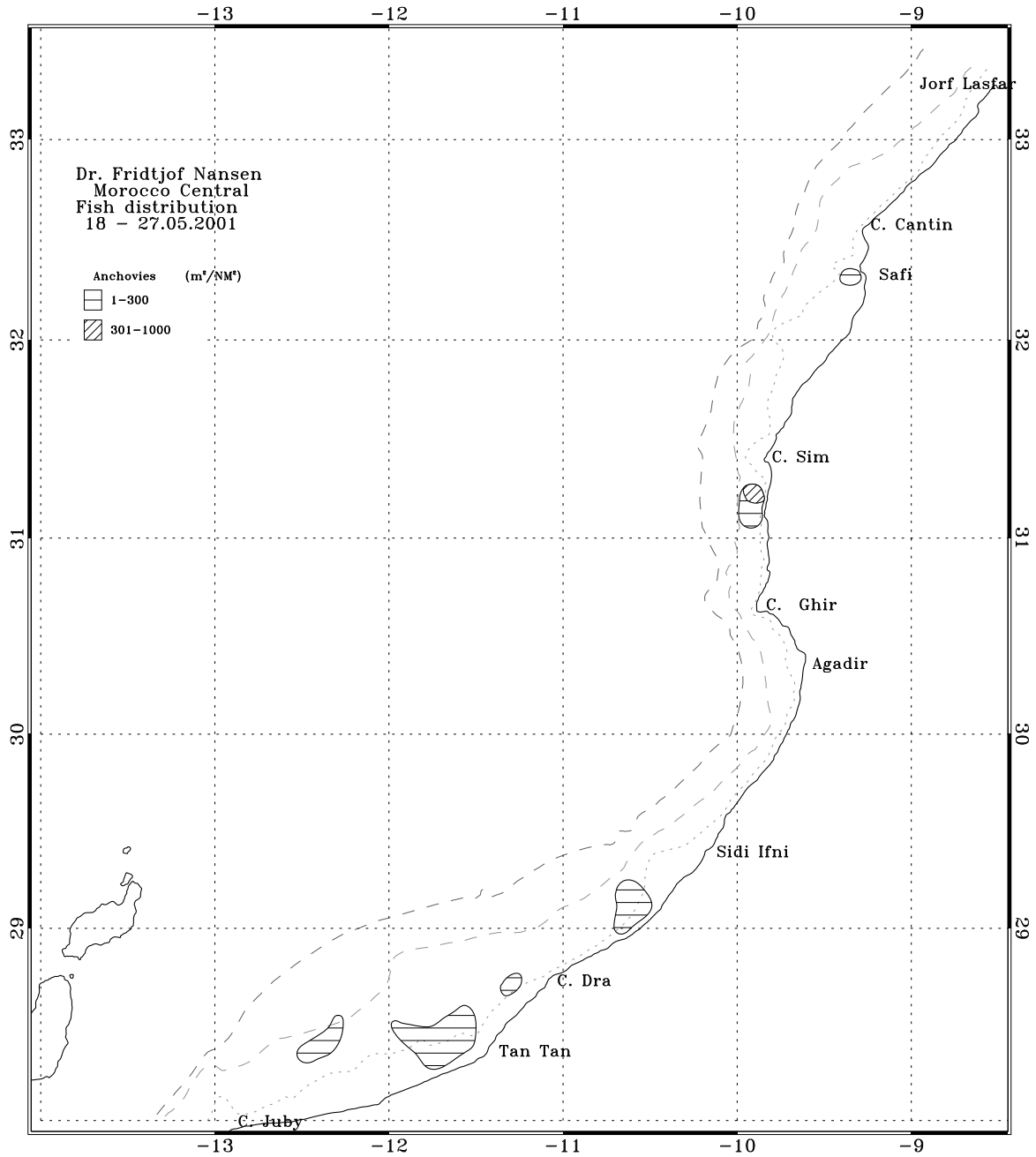


Figure 11 Distribution of anchovy, Cape Juby to Cape Cantin. Depth contours as in Fig. 1a.

Recordings of **horse mackerel** and **chub mackerel** were very few. Some low-density patches could have been lost as the outer shelf Cape Juby-Cape Dra was not covered this time. During previous surveys in the region the registrations of these two species have also been limited.

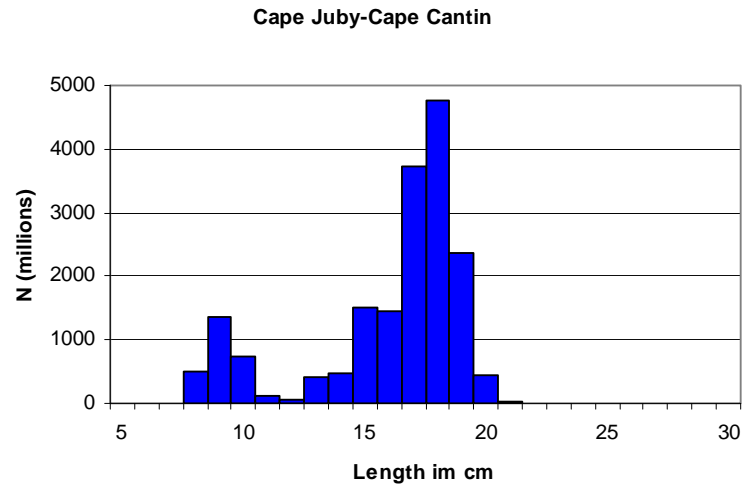


Figure 12 Length frequency distribution of sardine Cape Juby to Cape Cantin.

2.4 Biomass estimates

A summary on biomass estimates is given in Table 1 below. More detailed biomass estimates in number and weight by length groups are shown in Annex I.

Cape Blanc - Cape Bojador

The **sardine** was estimated to 2.90 million tonnes. The length distribution is earlier shown in Figure 9. Most of the fish in terms of biomass consist of older fish. Compared with earlier years, the development in the “adult” part of the stock (i.e. fish > 19 cm) is:

1996:	4 600 000 tonnes	47 400 mill fish
1997:	240 000 tonnes	2 900 mill fish
1998:	340 000 tonnes	3 400 mill fish
1999:	1 000 000 tonnes	13 700 mill fish
2000:	1 260 000 tonnes	13 200 mill fish
June 2001*:	2 000 000 tonnes	22 500 mill fish

* Including sardine in Mauritania

This confirms that the adult stock continues to gradually rebuild after its sudden collapse during 1997. Further growth is expected towards the end of the year. In addition there is a very strong year-class with recruits entering. This has a mode around 11 cm and is estimated to 48 billion fish with a biomass of 780 000 tonnes. This is also expected to grow substantially in weight during 2001.

Sardinella was estimated to 345 000 tonnes consisting only of round sardinella, located immediately north of Cape Blanc. This estimate is a considerable reduction from the 1 540 000 tonnes estimated 6 months earlier. This is assumed to be more the feature of a seasonal fluctuation as most sardinella is assumed to be south of the front between the Canary Current and the tropical waters.

The two species of **horse mackerel** combined was estimated 175 000 tonnes, of which about roughly 125 000 and 50 000 were Atlantic and Cunene horse mackerel respectively. The Cunene horse mackerel forms a minor part of the stock distributed mainly south of Cape Blanc.

Cape Bojador - Cape Juby

Sardine was estimated to 600 000 tonnes, slightly less than as 5 months earlier. The abundance in number remains constant, but there is a shift in the length distributions, with more recruits (<15 cm) and less fish bigger than 20 cm compared to December 2000.

Anchovy was estimated to 16 000 tonnes only.

Cape Juby-Cape Cantin

The **sardine** is estimated to 730 000 tonnes, fairly in line with the 840 000 tonnes of December 2000. The numbers have decreased from 29 to 18 billions, but this is well compensated by more than 100% growth in individual body size as the main cohort has increased from 13.5 to 17.5 cm in modal length, Annex 1.

Anchovies were estimated to only 7 000 tonnes a drastic reduction from the 100 000 tonnes estimated five months earlier. The main part of the population belongs to a cohort with mode around 17 cm, the same fish as found in December but which has now grown about 5 cm and drastically reduced in numbers from 11 billion to 250 million.

Table 1 Morocco. Summary of biomass estimates of pelagic fish, 1000 tonnes.							
Region	Sardines	Round sardinella	Flat sardinella	Atlantic horse mackerel	Cunene horse mackerel	Chub mackerel	Anchovy
Cape Blanc-Cape Bojador	2 900	345	0	125	50	0	0
Cape Bojador-Cape Juby	600	0	0	0	0	0	16
Cape Juby-Cape Cantin	730	0	0	na	0	0	7
Totals	4 230	345	0	125	50	0	23

CHAPTER 3 CONCLUDING REMARKS

The survey was conducted successfully in the period 18th May to 16th June with an acoustic course track of 5050 NM and 91 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. The weather conditions did not put any constraints on the survey work.

The hydrographical data show the upwelling occurring in the usual locations along the coast. Distribution of temperature and salinity indicate a slightly colder coastal climate than expected from the long termed seasonal mean.

Figure 13 gives a general overview on the major aggregations of pelagic fish with rounded biomass figures. The biomass estimates are also summarised in Table 1.

Generally the sardine has a distribution pattern as normal for the season: with juveniles south of Cape Barbas and the main part of the adult southern stock between Cape Barbas and 24°30'N. The biomass of sardine between Cape Blanc and Cape Bojador has increased from 2.15 million tonnes in November 2000 to 2.90 million during the last survey. 780 000 tonnes of this is juvenile fish with a considerable growth potential. There is also expected further growth in the adult stock during 2001. Sardine in the region Cape Bojador-Cape Juby is estimated to 600 000 tonnes. Also this area holds considerable juveniles that will grow during 2001. Further north, the stock between Cape Juby and Cape Cantin is estimated to 730 000 tonnes, much in correspondence with the 840 000 tonnes estimated 5 months earlier. The relative number of recruits is less in this region as compared to the southern regions. This could indicate that recruitment to the northern part of the central stock will be poor in 2001.

Two small concentrations of round sardinella were found north of Cape Blanc. These were estimated to contain about 345 000 tonnes. The fish recordings extends southwards into Mauritania, which probably holds the main part of the stock during this season.

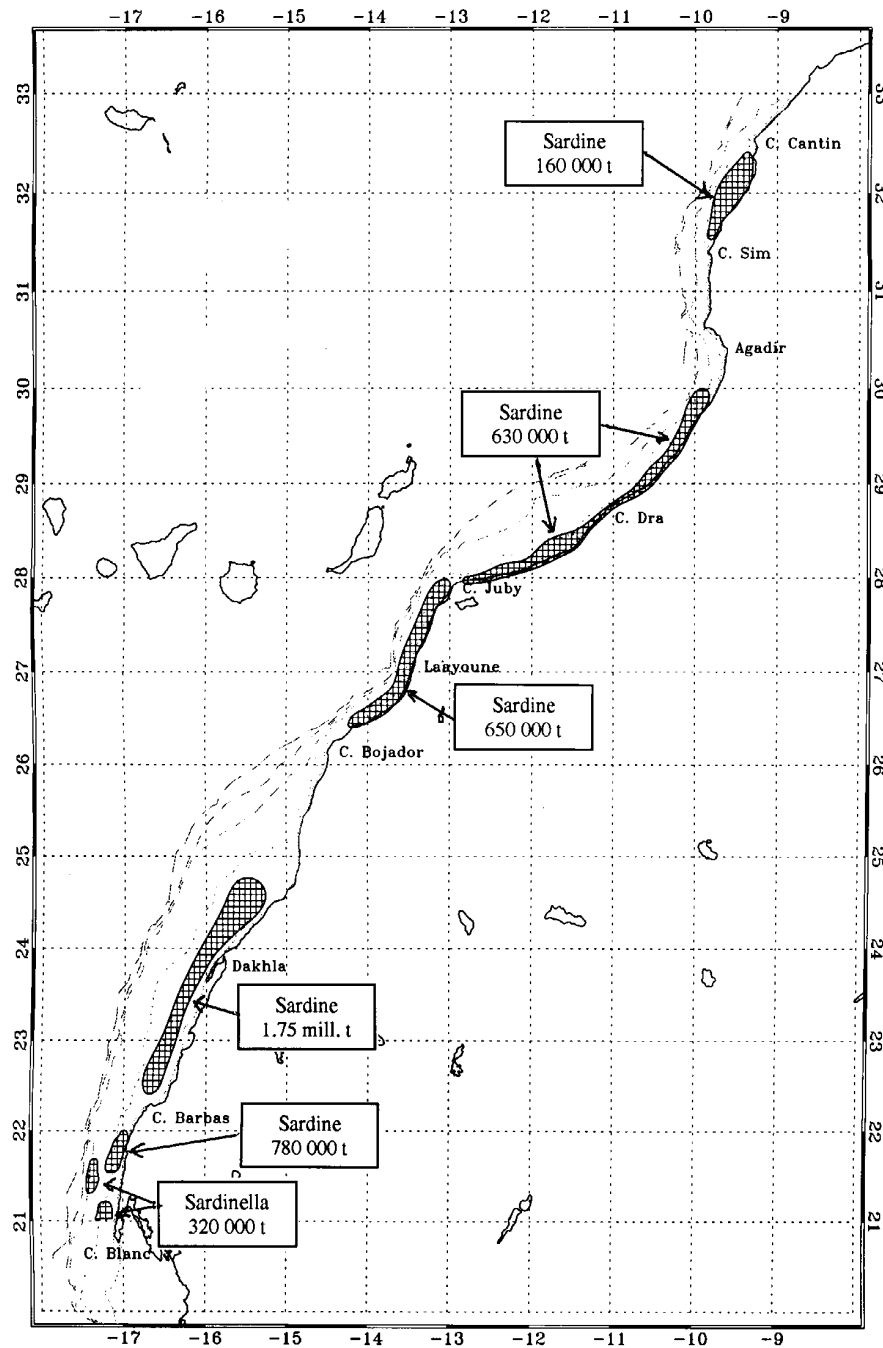


Figure 13. Map of the major pelagic fish concentrations with estimated abundance (thousand tonnes), Cape Blanc to Cape Cantin.

Horse mackerel was mainly found scattered between Cape Blanc and Cape Bojador. The estimate is only 175 000 tonnes, a significant reduction from the 1.2 million tonnes estimated 6 months earlier. The main part of the horse mackerel is assumed to be located south of Cape Blanc and should show up in the succeeding survey.

Anchovy registrations were poor, only 23 000 tonnes. The sub-stock earlier recorded off Agadir was not found at all. It is uncertain if the decline in anchovy could be a seasonal pattern.

Trends 1995-2000, sardine

Figure 14 shows the biomass estimates of sardine compared with results from previous “Dr. Fridtjof Nansen” surveys. Fig. 15 shows the biomass figures 1995-2001 by length classes. Both figures show that the southern stock, including the sardine between Cape Bojador and Cape Juby, is gradually recovering from the drastic decline observed at the end of 1997. The last estimate holds a considerable amount of juveniles and, given normal growth conditions, it is expected further increase in the stock during 2001. In the report from the survey in 2000 it was suggested that within a year the southern stock could possibly approach the long-term mean of the period 1986-96. The recent findings confirm this.

The central stock between Cape Juby and Safi seems to be in a good condition and has been on a growing trend during the last 6 years. However, there seems to be poor recruitment to this region during 2001, and given the relative high fishing pressure in the region, it could be that the adult standing stock biomass will decline during 2001. The present high fishing effort seems to be dependent of regular and strong recruitment. If there is migration between this region and the sub-stock Cape Juby-Cape Bojador, the effect from reduced recruitment could be less marked.

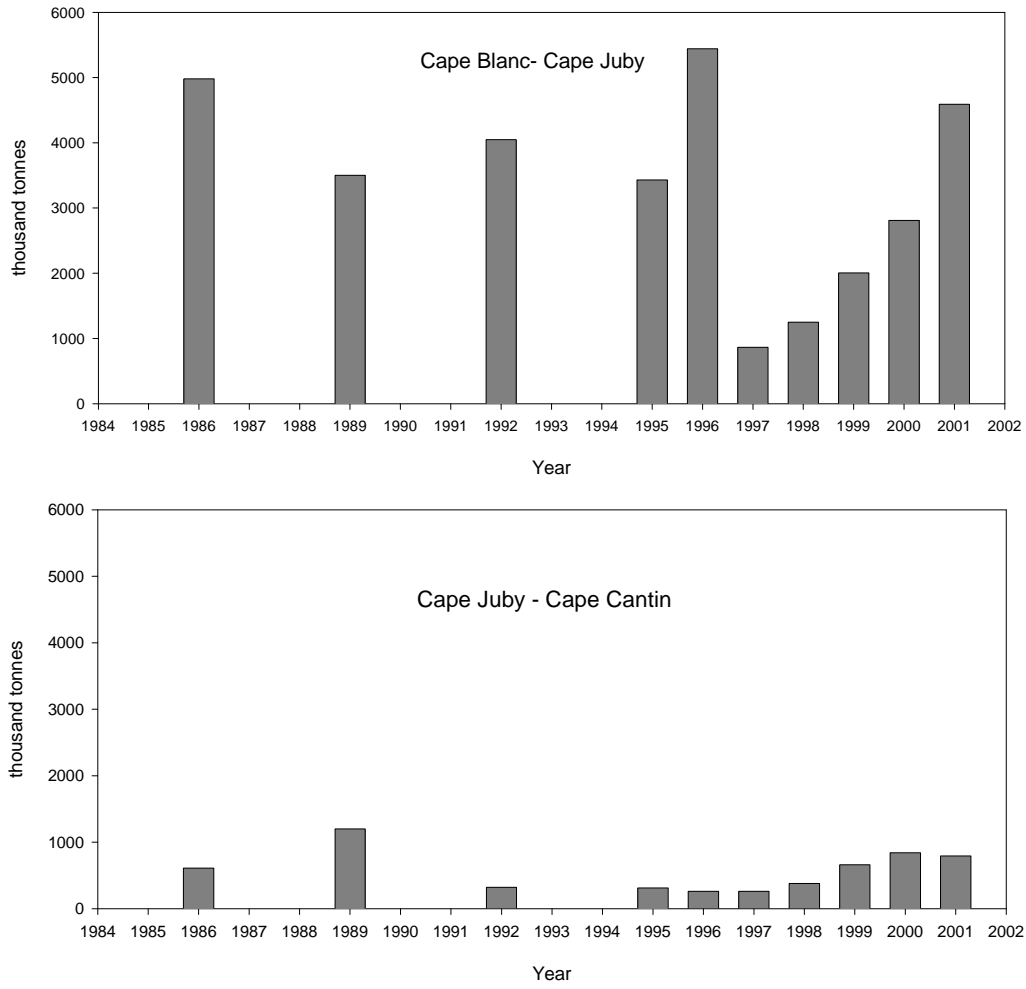


Figure 15. Sardine biomass estimates Cape Blanc-Cape Juby and Cape Juby- Cape Cantin, Dr. Fridtjof Nansen 1986-2001.

Annex I Biomass and number by length

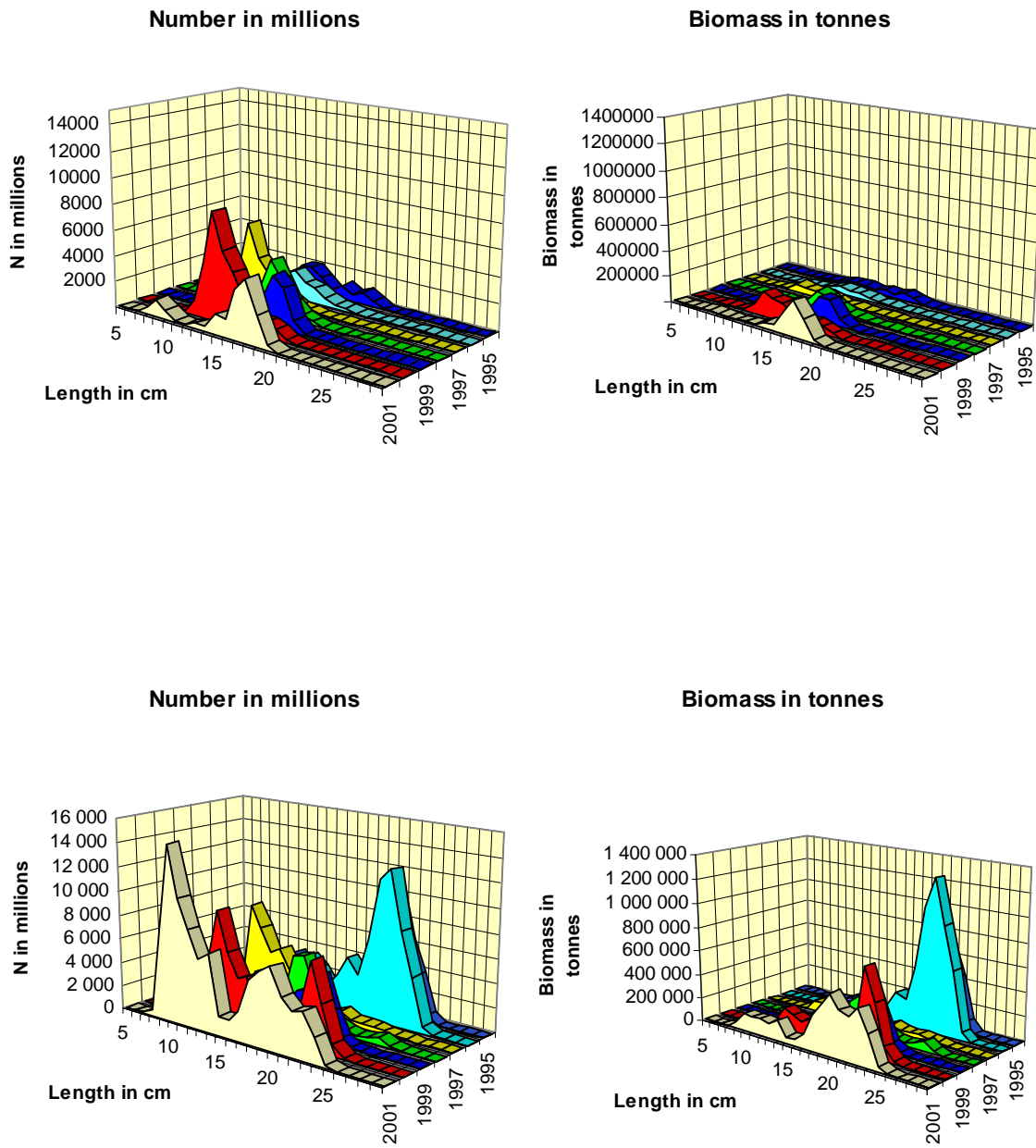


Figure 15. Numbers and biomass by length class, 1995-2001. Cape Juby - Cape Cantin (top) and Cape Blanc - Cape Juby (bottom).

Annex II Instruments and fishing gear used

The Simrad EK-500, 38kHz echo scientific sounder was used during the survey for fish abundance estimation. The Bergen Echo Integrator system (BEI) logging the echogram raw data from the sounder, was used to scrutinize the acoustic records, and to allocate integrator data to fish species. All raw data was stored to tape, and a backup of the database of scrutinized data, stored. The details of the settings of the 38kHz where as follows:

Transceiver-1 menu	Transducer depth	5.5 - 7.5 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	27.45 dB
	TS transducer gain	27.65 dB
	Angle sensitivity	21.9
	3 dB beamwidth	6.8°
	Alongship offset	-0.03°
	Athwardship offset	0.06°
Display menu	Echogram	1
	Bottom range	10 m
	Bottom range start	10 m
	TVG	20 log R
	Sv colour min	-67 dB
	TS Colour minimum	-60 dB
Printer- menu	Range	0 - 50 or 0 -100 m and 100 - 350m
	TVG	20 log R
	Sv colour min	-63 dB
Bottom detection menu	Minimum level	-40 dB

A calibration experiment using a standard copper sphere, performed off Langstrand, Walvis Bay 19 April 2001 gave the following results:

Sv Transducer gain 27.37 dB
Ts Transducer gain 27.49 dB

Fishing gear

The vessel has two different sized "Åkrahamn" pelagic trawls and one "Gisund super" bottom trawl. For all trawls, the Tyborøn, 7.8m² (1670 kg) trawl doors were used. Complete drawings of the trawls used are included.

Annex III Records of fishing stations

PROJECT STATION:1310
 DATE:18/ 5/01 GEAR TYPE: PT No:4 POSITION:Lat N 3320 Long W 839
 start stop duration
 TIME :21:41:24 22:15:12 34 (min) Purpose code: 1
 LOG :8985.51 8987.26 1.71 Area code : 1
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 97 111 Validity code:
 Towing dir: 300ø Wire out: 140 m Speed: 30 kn*10
 Sorted: 10 Kg Total catch: 10.50 CATCH/HOUR: 18.53

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Liocarcinus sp	18.00	1262	97.14	
Allotheutis subulata	0.32	222	1.73	
Sepioloa rondeleti	0.16	111	0.86	
Engraulis encrasicolus	0.04	2	0.22	
Trachurus trachurus, juveniles	0.02	81	0.11	
Total	18.54	100.06		

PROJECT STATION:1316
 DATE:20/ 5/01 GEAR TYPE: PT No:2 POSITION:Lat N 3152 Long W 1005
 start stop duration
 TIME :17:06:36 17:22:41 16 (min) Purpose code: 1
 LOG :9388.87 9389.84 0.97 Area code : 1
 FDEPTH: 110 120 GearCond.code:
 BDEPTH: 134 140 Validity code:
 Towing dir: 215ø Wire out: 350 m Speed: 35 kn*10
 Sorted: 29 Kg Total catch: 28.70 CATCH/HOUR: 107.63

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trachurus	92.81	484	86.23	2389
Trachurus picturatus	12.00	30	11.15	
Scomber japonicus	2.81	11	2.61	
Total	107.62	99.99		

PROJECT STATION:1311
 DATE:19/ 5/01 GEAR TYPE: PT No:7 POSITION:Lat N 3239 Long W 910
 start stop duration
 TIME :16:16:15 16:57:13 41 (min) Purpose code: 1
 LOG :9166.59 9169.64 3.05 Area code : 1
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 39 34 Validity code:
 Towing dir: 50ø Wire out: 120 m Speed: 40 kn*10
 Sorted: Kg Total catch: 0.62 CATCH/HOUR: 0.91

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Liocarcinus sp	0.82	57	90.11	
Sardina pilchardus	0.09	1	9.89	
Total	0.91	100.00		

PROJECT STATION:1317
 DATE:21/ 5/01 GEAR TYPE: PT No:3 POSITION:Lat N 3113 Long W 954
 start stop duration
 TIME :10:16:26 10:31:16 15 (min) Purpose code: 1
 LOG :9551.27 9552.26 0.99 Area code : 1
 FDEPTH: 25 30 GearCond.code:
 BDEPTH: 75 81 Validity code:
 Towing dir: 264ø Wire out: 120 m Speed: 35 kn*10
 Sorted: 70 Kg Total catch: 3000.00 CATCH/HOUR: 12000.00

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Engraulis encrasicolus	6521.60	339120	54.35	2390
Sardina pilchardus	5478.40	116668	45.65	2391
Total	12000.00	100.00		

PROJECT STATION:1312
 DATE:20/ 5/01 GEAR TYPE: PT No:4 POSITION:Lat N 3219 Long W 918
 start stop duration
 TIME :01:01:33 01:32:07 31 (min) Purpose code: 1
 LOG :9249.45 9251.45 1.97 Area code : 1
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 40 47 Validity code:
 Towing dir: 270ø Wire out: 120 m Speed: 40 kn*10
 Sorted: 38 Kg Total catch: 189.66 CATCH/HOUR: 367.08

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardina pilchardus	303.68	5319	82.73	2384
Engraulis encrasicolus	47.03	2985	12.81	2386
Lepidopus caudatus	15.21	14	4.14	2385
Scomber japonicus	1.16	23	0.32	
Total	367.08	100.00		

PROJECT STATION:1318
 DATE:21/ 5/01 GEAR TYPE: PT No:1 POSITION:Lat N 3105 Long W 955
 start stop duration
 TIME :14:18:54 14:42:24 24 (min) Purpose code: 1
 LOG :9580.19 9581.68 1.48 Area code : 1
 FDEPTH: 45 45 GearCond.code:
 BDEPTH: 77 68 Validity code:
 Towing dir: 170ø Wire out: 180 m Speed: 40 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:1313
 DATE:20/ 5/01 GEAR TYPE: PT No:1 POSITION:Lat N 3207 Long W 928
 start stop duration
 TIME :07:42:31 08:06:11 24 (min) Purpose code: 1
 LOG :9311.05 9312.69 1.63 Area code : 1
 FDEPTH: 20 22 GearCond.code:
 BDEPTH: 37 41 Validity code:
 Towing dir: 280ø Wire out: 90 m Speed: 35 kn*10
 Sorted: 49 Kg Total catch: 95.90 CATCH/HOUR: 239.75

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardina pilchardus	193.75	3403	80.81	2387
Scomber japonicus	46.00	385	19.19	2388
Total	239.75	100.00		

PROJECT STATION:1319
 DATE:22/ 5/01 GEAR TYPE: PT No:1 POSITION:Lat N 3020 Long W 1006
 start stop duration
 TIME :12:30:14 13:07:55 38 (min) Purpose code: 1
 LOG :9761.03 9763.42 2.39 Area code : 1
 FDEPTH: 75 75 GearCond.code:
 BDEPTH: 426 504 Validity code:
 Towing dir: 292ø Wire out: 260 m Speed: 40 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:1314
 DATE:20/ 5/01 GEAR TYPE: PT No:7 POSITION:Lat N 3153 Long W 932
 start stop duration
 TIME :11:14:59 11:45:47 31 (min) Purpose code: 1
 LOG :9343.93 9345.61 1.66 Area code : 1
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 24 33 Validity code:
 Towing dir: 294ø Wire out: 200 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:1320
 DATE:22/ 5/01 GEAR TYPE: PT No:1 POSITION:Lat N 3006 Long W 954
 start stop duration
 TIME :19:12:18 19:48:02 36 (min) Purpose code: 1
 LOG :9817.61 9819.81 2.12 Area code : 1
 FDEPTH: 90 110 GearCond.code:
 BDEPTH: 127 120 Validity code:
 Towing dir: 100ø Wire out: 360 m Speed: 30 kn*10
 Sorted: 33 Kg Total catch: 33.40 CATCH/HOUR: 55.67

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trachurus	47.42	135	85.18	2392
Lepidopus caudatus	8.25	5	14.82	
Total	55.67	100.00		

PROJECT STATION:1315
 DATE:20/ 5/01 GEAR TYPE: PT No:1 POSITION:Lat N 3159 Long W 945
 start stop duration
 TIME :13:21:28 13:44:56 23 (min) Purpose code: 1
 LOG :9358.11 9359.60 1.47 Area code : 1
 FDEPTH: 20 25 GearCond.code:
 BDEPTH: 49 45 Validity code:
 Towing dir: 116ø Wire out: 120 m Speed: 40 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:1321
 DATE:22/ 5/01 GEAR TYPE: PT No:4 POSITION:Lat N 3004 Long W 959
 start stop duration
 TIME :21:23:32 21:54:04 31 (min) Purpose code: 1
 LOG :9828.74 9830.81 2.24 Area code : 1
 FDEPTH: 0 0 GearCond.code:
 BDEPTH: 143 140 Validity code:
 Towing dir: 204ø Wire out: 140 m Speed: 30 kn*10
 Sorted: 68 Kg Total catch: 1059.72 CATCH/HOUR: 2051.07

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trachurus	1469.23	4008	71.63	2394
Scomber japonicus	438.00	5414	21.35	2395
Sardina pilchardus	139.49	2460	6.80	2393
Lepidopus caudatus	4.35	4	0.21	
Total	2051.07	99.99		

PROJECT STATION:1322
 DATE:23/ 5/01 GEAR TYPE: PT No:4 POSITION:Lat N 2950
 start stop duration Long W 954
 TIME :01:19:38 01:49:15 30 (min) Purpose code: 1
 LOG :9860.91 9862.77 1.86 Area code : 1
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 58 77 Validity code:
 Towing dir: 350ø Wire out: 150 m Speed: 40 kn*10
 Sorted: 6 Kg Total catch: 6.16 CATCH/HOUR: 12.32

SPECIES	CATCH/HOUR weight numbers	% OF TOT. C	SAMP
Lepidopus caudatus	6.40 4	51.95	
Diplodus puntazzo	3.00 2	24.35	
Liocarcinus sp	1.12 98	9.09	
Illex coindetii	0.70 2	5.68	
Sardina pilchardus	0.50 10	4.06	
Trachurus trachurus	0.18 4	1.46	
Scomber japonicus	0.14 2	1.14	
Allotheutis subulata	0.14 46	1.14	
Engraulis encrasicolus	0.10 18	0.81	
Rossia macrosomia	0.04 48	0.32	
Engraulis encrasicolus	0.00 16		
Total	12.32	100.00	

PROJECT STATION:1323
 DATE:23/ 5/01 GEAR TYPE: PT No:7 POSITION:Lat N 2924
 start stop duration Long W 1013
 TIME :13:49:50 14:04:25 15 (min) Purpose code: 1
 LOG :9969.92 9971.02 1.09 Area code : 1
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 27 37 Validity code:
 Towing dir: ø Wire out: 120 m Speed: 40 kn*10
 Sorted: Kg Total catch: CATCH/HOUR:

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

PROJECT STATION:1324
 DATE:23/ 5/01 GEAR TYPE: PT No:7 POSITION:Lat N 2916
 start stop duration Long W 1020
 TIME :17:15:49 17:37:14 21 (min) Purpose code: 1
 LOG :9994.62 9996.05 1.42 Area code : 1
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 28 23 Validity code:
 Towing dir: 210ø Wire out: 160 m Speed: 40 kn*10
 Sorted: 34 Kg Total catch: 136.25 CATCH/HOUR: 389.29

SPECIES	CATCH/HOUR weight numbers	% OF TOT. C	SAMP
Sardina pilchardus	385.71 9191	99.08	2396
Scomber japonicus	2.57 6	0.66	
Loligo vulgaris	1.00 3	0.26	
Total	389.28	100.00	

PROJECT STATION:1325
 DATE:23/ 5/01 GEAR TYPE: PT No:3 POSITION:Lat N 2910
 start stop duration Long W 1035
 TIME :21:32:55 22:03:26 31 (min) Purpose code: 1
 LOG : 29.55 31.66 2.09 Area code : 1
 FDEPTH: 20 17 GearCond.code:
 BDEPTH: 49 66 Validity code:
 Towing dir: 310ø Wire out: 70 m Speed: 30 kn*10
 Sorted: 38 Kg Total catch: 499.05 CATCH/HOUR: 965.90

SPECIES	CATCH/HOUR weight numbers	% OF TOT. C	SAMP
Engraulis encrasicolus	947.32 53359	98.08	2397
Sardina pilchardus	10.06 252	1.04	
Lepidopus caudatus	5.71 4	0.59	
Trachurus trachurus	1.65 2	0.17	
Scomber japonicus	1.16 2	0.12	
Total	965.90	100.00	

PROJECT STATION:1326
 DATE:23/ 5/01 GEAR TYPE: PT No:7 POSITION:Lat N 2905
 start stop duration Long W 1030
 TIME :23:44:02 23:52:13 8 (min) Purpose code: 1
 LOG : 43.42 43.89 0.47 Area code : 1
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 30 32 Validity code:
 Towing dir: 284ø Wire out: 150 m Speed: 30 kn*10
 Sorted: 16 Kg Total catch: 16.46 CATCH/HOUR: 123.45

SPECIES	CATCH/HOUR weight numbers	% OF TOT. C	SAMP
Sardina pilchardus	106.13 2588	85.97	2398
Engraulis encrasicolus	10.50 870	8.51	2400
Sardina pilchardus	5.25 548	4.25	2399
Scomber japonicus	1.05 8	0.85	
Liocarcinus sp	0.38 38	0.31	
Allotheutis subulata	0.15 98	0.12	
Rossia macrosomia	0.00 23		
Total	123.46	100.01	

PROJECT STATION:1327
 DATE:24/ 5/01 GEAR TYPE: PT No:4 POSITION:Lat N 2900
 start stop duration Long W 1039
 TIME :02:03:52 02:14:59 11 (min) Purpose code: 1
 LOG : 61.70 62.39 0.18 Area code : 1
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 37 42 Validity code:
 Towing dir: 350ø Wire out: 160 m Speed: 36 kn*10
 Sorted: 7 Kg Total catch: 7.87 CATCH/HOUR: 42.93

SPECIES	CATCH/HOUR weight numbers	% OF TOT. C	SAMP
Lepidopus caudatus	23.78 11	55.39	
Engraulis encrasicolus	7.42 971	17.28	2401
Sardina pilchardus	3.87 333	9.01	2402
Spondyllosoma cantharus	2.89 5	6.73	
Diplodus bellottii	2.07 55	4.82	
Trachinus draco	1.09 16	2.54	
Pomadasyus incisus	0.65 5	1.51	
Pagellus acarne	0.60 16	1.40	
Allotheutis subulata	0.55 229	1.28	
Total	42.92	99.96	

PROJECT STATION:1328
 DATE:24/ 5/01 GEAR TYPE: PT No:1 POSITION:Lat N 2857
 start stop duration Long W 1048
 TIME :05:44:43 06:15:16 31 (min) Purpose code: 1
 LOG : 91.59 93.70 2.08 Area code : 1
 FDEPTH: 30 22 GearCond.code:
 BDEPTH: 54 56 Validity code:
 Towing dir: 345ø Wire out: 100 m Speed: 30 kn*10
 Sorted: Kg Total catch: CATCH/HOUR:

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

PROJECT STATION:1329
 DATE:24/ 5/01 GEAR TYPE: PT No:3 POSITION:Lat N 2852
 start stop duration Long W 1056
 TIME :09:46:49 09:57:56 11 (min) Purpose code: 1
 LOG : 123.54 124.24 0.71 Area code : 1
 FDEPTH: 22 32 GearCond.code:
 BDEPTH: 56 61 Validity code:
 Towing dir: 345ø Wire out: 100 m Speed: 30 kn*10
 Sorted: Kg Total catch: 0.21 CATCH/HOUR: 1.15

SPECIES	CATCH/HOUR weight numbers	% OF TOT. C	SAMP
Scomber japonicus	1.15 5	100.00	
Total	1.15	100.00	

PROJECT STATION:1330
 DATE:24/ 5/01 GEAR TYPE: BT No:7 POSITION:Lat N 2851
 start stop duration Long W 1054
 TIME :11:14:57 11:34:33 20 (min) Purpose code: 1
 LOG : 132.88 133.99 1.08 Area code : 1
 FDEPTH: 26 25 GearCond.code:
 BDEPTH: 26 25 Validity code:
 Towing dir: 252ø Wire out: 120 m Speed: 30 kn*10
 Sorted: 36 Kg Total catch: 1200.12 CATCH/HOUR: 3600.36

SPECIES	CATCH/HOUR weight numbers	% OF TOT. C	SAMP
Engraulis encrasicolus	2403.24 131049	66.75	2405
Sardina pilchardus	922.05 24915	25.61	2403
Sardina pilchardus	264.84 54927	7.36	2404
Scomber japonicus	9.78 390	0.27	
Total	3599.91	99.99	

PROJECT STATION:1331
 DATE:24/ 5/01 GEAR TYPE: PT No:7 POSITION:Lat N 2846
 start stop duration Long W 1103
 TIME :14:10:21 14:36:11 26 (min) Purpose code: 1
 LOG : 156.76 158.53 1.76 Area code : 1
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 28 22 Validity code:
 Towing dir: 230ø Wire out: 160 m Speed: 35 kn*10
 Sorted: 74 Kg Total catch: 74.45 CATCH/HOUR: 171.81

SPECIES	CATCH/HOUR weight numbers	% OF TOT. C	SAMP
Sardina pilchardus	171.81 5559	100.00	2406
Total	171.81	100.00	

PROJECT STATION:1332
 DATE:24/ 5/01 GEAR TYPE: BT No:7 POSITION:Lat N 2905
 start stop duration Long W 1126
 TIME :20:49:17 21:05:50 17 (min) Purpose code: 1
 LOG : 210.30 211.04 0.73 Area code : 1
 FDEPTH: 115 116 GearCond.code:
 BDEPTH: 115 116 Validity code:
 Towing dir: 330ø Wire out: 330 m Speed: 30 kn*10
 Sorted: 26 Kg Total catch: 245.05 CATCH/HOUR: 864.88

SPECIES	CATCH/HOUR weight numbers	% OF TOT. C	SAMP
Dentex macrophthalmus	759.18 6431	87.78	
Pagellus acarne	30.18 127	3.49	
Scorpaena scrofa	26.29 14	3.04	
Zeus faber	14.65 14	1.69	
Lepidotrigla sp.	14.29 64	1.65	
Mullus surmuletus	7.94 32	0.92	
Raja montagui	3.18 4	0.37	
Trachurus trachurus	2.82 28	0.33	
Dentex gibbosus	2.65 4	0.31	
Macrorhamphosus scolopax	1.59 191	0.18	
Raja miraletus	0.88 4	0.10	
Illex coindetii	0.88 4	0.10	
Scomber japonicus	0.35 4	0.04	
Total	864.88	100.00	

PROJECT STATION:1333
 DATE:25/ 5/01 GEAR TYPE: PT No:4 POSITION:Lat N 2844
 start stop duration Long W 1119
 TIME :02:23:25 02:53:10 30 (min) Purpose code: 1
 LOG : 250.79 252.38 1.57 Area code : 1
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 76 69 Validity code:
 Towing dir: 100ø Wire out: 150 m Speed: 40 kn*10

Sorted: Kg Total catch: 0.55 CATCH/HOUR: 1.10

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Engraulis encrasicolus	0.80	40	72.73	
Sardina pilchardus	0.20	2	18.18	
Allotheutis subulata	0.10	62	9.09	
Total	1.10		100.00	

PROJECT STATION:1339
 DATE:26/ 5/01 GEAR TYPE: PT No:1 POSITION:Lat N 2826
 start stop duration Long W 1200
 TIME :00:23:48 00:53:22 30 (min) Purpose code: 1
 LOG : 421.76 423.74 1.97 Area code : 1
 FDEPTH: 15 15 GearCond.code:
 BDEPTH: 56 57 Validity code:
 Towing dir: 338ø Wire out: 80 m Speed: 40 kn*10

Sorted: 43 Kg Total catch: 43.40 CATCH/HOUR: 86.80

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardina pilchardus	86.80	1450	100.00	2415
Total	86.80		100.00	

PROJECT STATION:1334
 DATE:25/ 5/01 GEAR TYPE: BT No:7 POSITION:Lat N 2836
 start stop duration Long W 1116
 TIME :05:16:44 05:46:34 30 (min) Purpose code: 1
 LOG : 271.45 273.16 1.69 Area code : 1
 FDEPTH: 29 27 GearCond.code:
 BDEPTH: 29 27 Validity code:
 Towing dir: 220ø Wire out: 120 m Speed: 35 kn*10

Sorted: 24 Kg Total catch: 107.65 CATCH/HOUR: 215.30

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Diplodus bellottii	131.40	1938	61.03	
Scomber japonicus	50.10	496	23.27	2407
Sardina pilchardus	6.00	218	2.79	2408
Torpedo torpedo	5.50	2	2.55	
Liocarcinus sp	4.50	854	2.09	
Allotheutis subulata	4.20	1512	1.95	
Loligo vulgaris	4.00	6	1.86	
Diplodus vulgaris	3.30	18	1.53	
Octopus vulgaris	3.00	2	1.39	
Fomadasys incisus	1.20	18	0.56	
Merluccius merluccius	1.10	24	0.51	
Trachurus trachurus	0.50	18	0.23	
Engraulis encrasicolus	0.40	30	0.19	
Trachurus trachurus, juveniles	0.10	18	0.05	
Total	215.30		100.00	

PROJECT STATION:1340
 DATE:26/ 5/01 GEAR TYPE: PT No:1 POSITION:Lat N 2812
 start stop duration Long W 1153
 TIME :03:24:38 03:37:38 13 (min) Purpose code: 1
 LOG : 442.94 443.90 0.94 Area code : 1
 FDEPTH: 15 15 GearCond.code:
 BDEPTH: 30 34 Validity code:
 Towing dir: 338ø Wire out: 80 m Speed: 40 kn*10

Sorted: 57 Kg Total catch: 207.96 CATCH/HOUR: 959.82

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardina pilchardus	830.77	16255	86.55	2416
Trichurus lepturus	123.00	51	12.81	
GADTR30	1.38	138	0.14	
Pomadasy incisus	1.38	28	0.14	
Engraulis encrasicolus	1.38	194	0.14	
Merluccius sp.	1.11	28	0.12	
Scomber japonicus	0.55	83	0.06	
Penaeus kerathurus	0.23	28	0.02	
Liocarcinus sp	0.00	28		
Allotheutis subulata	0.00	55		
Total	959.80		99.98	

PROJECT STATION:1341
 DATE:26/ 5/01 GEAR TYPE: PT No:7 POSITION:Lat N 2807
 start stop duration Long W 1204
 TIME :05:40:32 06:10:15 30 (min) Purpose code: 1
 LOG : 461.00 462.99 1.96 Area code : 1
 FDEPTH: 10 15 GearCond.code:
 BDEPTH: 26 28 Validity code:
 Towing dir: 80ø Wire out: 120 m Speed: 40 kn*10

Sorted: 33 Kg Total catch: 132.90 CATCH/HOUR: 265.80

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardina pilchardus	248.00	23410	93.30	2417
Engraulis encrasicolus	10.40	1536	3.91	2418
Trachurus trachurus	3.60	256	1.35	2419
Allotheutis subulata	2.00	472	0.75	
Scomber japonicus	1.60	80	0.60	2420
Lepidopus caudatus	0.20	2	0.08	
Total	265.80		99.99	

PROJECT STATION:1335
 DATE:25/ 5/01 GEAR TYPE: PT No:1 POSITION:Lat N 2832
 start stop duration Long W 1134
 TIME :09:55:32 10:40:55 45 (min) Purpose code: 1
 LOG : 308.67 311.46 2.77 Area code : 1
 FDEPTH: 40 40 GearCond.code:
 BDEPTH: 57 56 Validity code:
 Towing dir: 128ø Wire out: 105 m Speed: 35 kn*10

Sorted: 35 Kg Total catch: 562.40 CATCH/HOUR: 749.87

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardina pilchardus	547.20	11141	72.97	2409
Engraulis encrasicolus	202.67	21500	27.03	2410
Total	749.87		100.00	

PROJECT STATION:1342
 DATE:26/ 5/01 GEAR TYPE: PT No:7 POSITION:Lat N 2801
 start stop duration Long W 1237
 TIME :21:09:21 21:19:29 10 (min) Purpose code: 1
 LOG : 612.76 613.38 0.61 Area code : 1
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 25 29 Validity code:
 Towing dir: 310ø Wire out: 150 m Speed: 30 kn*10

Sorted: 33 Kg Total catch: 168.00 CATCH/HOUR: 1008.00

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardina pilchardus	915.00	17490	90.77	2421
Diplodus bellottii	84.00	3918	8.33	
Trachurus trachurus, juveniles	3.00	300	0.30	
Merluccius merluccius	2.10	30	0.21	
Engraulis encrasicolus	1.80	270	0.18	
Allotheutis subulata	1.20	210	0.12	
Scomber japonicus	0.90	30	0.09	
Total	1008.00		100.00	

PROJECT STATION:1336
 DATE:25/ 5/01 GEAR TYPE: PT No:4 POSITION:Lat N 2825
 start stop duration Long W 1134
 TIME :13:08:04 13:39:29 31 (min) Purpose code: 1
 LOG : 331.72 333.63 1.89 Area code : 1
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 45 48 Validity code:
 Towing dir: 340ø Wire out: 160 m Speed: 40 kn*10

Sorted: 17 Kg Total catch: 17.17 CATCH/HOUR: 33.23

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardina pilchardus	32.90	724	99.01	2411
Engraulis encrasicolus	0.33	19	0.99	
Total	33.23		100.00	

PROJECT STATION:1337
 DATE:25/ 5/01 GEAR TYPE: PT No:1 POSITION:Lat N 2828
 start stop duration Long W 1142
 TIME :16:22:24 16:50:06 28 (min) Purpose code: 1
 LOG : 356.13 357.86 1.72 Area code : 1
 FDEPTH: 25 30 GearCond.code:
 BDEPTH: 56 53 Validity code:
 Towing dir: 130ø Wire out: 100 m Speed: 35 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:1343
 DATE:27/ 5/01 GEAR TYPE: BT No:7 POSITION:Lat N 2823
 start stop duration Long W 1258
 TIME :02:28:34 02:58:23 30 (min) Purpose code: 1
 LOG : 659.06 660.54 1.46 Area code : 1
 FDEPTH: 105 108 GearCond.code:
 BDEPTH: 105 108 Validity code:
 Towing dir: 340ø Wire out: 360 m Speed: 31 kn*10

Sorted: 32 Kg Total catch: 120.43 CATCH/HOUR: 240.86

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Dentex macrophthalmus	90.00	1176	37.37	
Scomber japonicus	43.60	864	18.10	2422
Trachurus trachurus	43.20	552	17.94	2423
Trachinus draco	24.88	936	10.33	
Trigla lyra	10.08	736	4.19	
Pagellus acarne	9.84	56	4.09	
Macrorhamphosus scolopax	9.04	776	3.75	
Zeus faber	4.30	2	1.79	
Citharus linguatula	2.08	192	0.86	
Lagocephalus laevisgatus	1.20	2	0.50	
OPHICHTHIDAE	1.12	40	0.47	
Mullus surmuletus	0.64	8	0.27	
MYCTOPHIDAE	0.56	80	0.23	
Microchirus variegatus	0.32	64	0.13	
Sepia orbignyana	0.00	8		
Conger conger	0.00	8		
Total	240.86		100.02	

PROJECT STATION:1338
 DATE:25/ 5/01 GEAR TYPE: PT No:4 POSITION:Lat N 2828
 start stop duration Long W 1155
 TIME :21:27:30 21:40:44 13 (min) Purpose code: 1
 LOG : 398.25 399.01 0.75 Area code : 1
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 54 54 Validity code:
 Towing dir: 136ø Wire out: 150 m Speed: 35 kn*10

Sorted: 32 Kg Total catch: 197.40 CATCH/HOUR: 911.08

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardina pilchardus	886.15	16892	97.26	2412
Engraulis encrasicolus	18.00	1052	1.98	2413
Scomber japonicus	6.92	125	0.76	2414
Total	911.07		100.00	

PROJECT STATION:1344
 DATE:27/ 5/01 GEAR TYPE: PT No:1 POSITION:Lat N 2751
 start stop duration Long W 1321
 TIME :12:57:03 13:28:41 32 (min) Purpose code: 1
 LOG : 748.51 750.29 1.75 Area code : 2
 FDEPTH: 50 80 GearCond.code:
 BDEPTH: 97 107 Validity code:
 Towing dir: 285ø Wire out: 200 m Speed: 38 kn*10

Sorted: Kg Total catch: 0.98 CATCH/HOUR: 1.84

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Engraulis encrasicolus	1.58	98	85.87	2424
PORTUNIDAE	0.19	24	10.33	
Scomber japonicus	0.08	4	4.35	
Total	1.85		100.55	

PROJECT STATION:1350
 DATE:28/ 5/01 GEAR TYPE: PT No:1 POSITION:Lat N 2713
 start stop duration Long W 1331
 TIME :14:55:23 15:29:00 34 (min) Purpose code: 1
 LOG : 975.75 978.31 2.50 Area code : 2
 FDEPTH: 10 25 GearCond.code:
 BDEPTH: 68 37 Validity code:
 Towing dir: 90ø Wire out: 100 m Speed: 40 kn*10

Sorted: 37 Kg Total catch: 883.95 CATCH/HOUR: 1559.91

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardina pilchardus	1542.71	14614	98.90	2430
Scomber japonicus	17.21	118	1.10	2431
Total	1559.92		100.00	

PROJECT STATION:1345
 DATE:27/ 5/01 GEAR TYPE: PT No:1 POSITION:Lat N 2747
 start stop duration Long W 1311
 TIME :16:14:52 16:29:37 15 (min) Purpose code: 1
 LOG : 774.43 775.63 1.21 Area code : 2
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 45 46 Validity code:
 Towing dir: 90ø Wire out: 80 m Speed: 40 kn*10

Sorted: 35 Kg Total catch: 3119.45 CATCH/HOUR: 12477.80

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardina pilchardus	1246.00	281596	99.86	2425
Engraulis encrasicolus	17.80	3916	0.14	
Total	12477.80		100.00	

PROJECT STATION:1351
 DATE:28/ 5/01 GEAR TYPE: PT No:3 POSITION:Lat N 2702
 start stop duration Long W 1331
 TIME :20:52:23 21:08:55 17 (min) Purpose code: 1
 LOG :1030.40 1031.48 1.00 Area code : 2
 FDEPTH: 15 15 GearCond.code:
 BDEPTH: 51 59 Validity code:
 Towing dir: 310ø Wire out: 60 m Speed: 40 kn*10

Sorted: 44 Kg Total catch: 44.21 CATCH/HOUR: 156.04

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Engraulis encrasicolus	133.06	28045	85.27	2433
Sardina pilchardus	21.53	1486	13.80	2432
Merluccius senegalensis	0.88	7	0.56	
Scomber japonicus	0.53	32	0.34	
Trachurus trachurus	0.04	7	0.03	
Total	156.04		100.00	

PROJECT STATION:1346
 DATE:27/ 5/01 GEAR TYPE: PT No:3 POSITION:Lat N 2745
 start stop duration Long W 1316
 TIME :18:43:43 19:00:31 17 (min) Purpose code: 1
 LOG : 794.58 795.72 1.14 Area code : 2
 FDEPTH: 25 44 GearCond.code:
 BDEPTH: 55 67 Validity code:
 Towing dir: 300ø Wire out: 120 m Speed: 30 kn*10

Sorted: 35 Kg Total catch: 4000.00 CATCH/HOUR: 14117.65

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardina pilchardus	11748.25	236859	83.22	2426
Engraulis encrasicolus	2369.40	132469	16.78	2427
Total	14117.65		100.00	

PROJECT STATION:1352
 DATE:29/ 5/01 GEAR TYPE: PT No:1 POSITION:Lat N 2645
 start stop duration Long W 1336
 TIME :04:22:11 04:52:07 30 (min) Purpose code: 1
 LOG :1100.84 1103.20 2.37 Area code : 2
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 34 47 Validity code:
 Towing dir: 300ø Wire out: 80 m Speed: 42 kn*10

Sorted: 34 Kg Total catch: 204.84 CATCH/HOUR: 409.68

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardina pilchardus	400.80	28708	97.83	2434
Engraulis encrasicolus	7.68	2048	1.87	2435
Merluccius senegalensis	1.20	12	0.29	
Total	409.68		99.99	

PROJECT STATION:1347
 DATE:28/ 5/01 GEAR TYPE: PT No:1 POSITION:Lat N 2736
 start stop duration Long W 1322
 TIME :00:30:32 01:04:29 34 (min) Purpose code: 1
 LOG : 848.74 851.05 2.29 Area code : 2
 FDEPTH: 44 35 GearCond.code:
 BDEPTH: 59 43 Validity code:
 Towing dir: 105ø Wire out: 140 m Speed: 40 kn*10

Sorted: 6 Kg Total catch: 6.23 CATCH/HOUR: 10.99

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Diplodus vulgaris	4.76	28	43.31	
Pagellus acarne	3.21	14	29.21	
Pomadasys incisus	1.55	18	14.10	
Allotheutis subulata	0.78	267	7.10	
Solenocera membranacea	0.51	274	4.64	
Scorpaena scrofa	0.18	2	1.64	
Total	10.99		100.00	

PROJECT STATION:1353
 DATE:29/ 5/01 GEAR TYPE: PT No:7 POSITION:Lat N 2628
 start stop duration Long W 1412
 TIME :15:55:09 16:41:53 47 (min) Purpose code: 1
 LOG :1213.03 1215.88 2.85 Area code : 2
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 31 50 Validity code:
 Towing dir: 360ø Wire out: 150 m Speed: 40 kn*10

Sorted: 42 Kg Total catch: 1120.80 CATCH/HOUR: 1430.81

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardina pilchardus	1428.00	115628	99.80	2436
Pomatomus saltatrix	2.04	1	0.14	
Scomber japonicus	0.77	19	0.05	2437
Total	1430.81		99.99	

PROJECT STATION:1348
 DATE:28/ 5/01 GEAR TYPE: PT No:7 POSITION:Lat N 2732
 start stop duration Long W 1318
 TIME :03:35:02 03:55:10 20 (min) Purpose code: 1
 LOG : 869.81 871.07 1.25 Area code : 2
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 24 26 Validity code:
 Towing dir: 303ø Wire out: 100 m Speed: 40 kn*10

Sorted: 34 Kg Total catch: 69.70 CATCH/HOUR: 209.10

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardina pilchardus	198.00	5142	94.69	2428
Scomber japonicus	7.50	90	3.59	2429
Diplodus bellottii	2.70	54	1.29	
Belone belone gracilis	0.66	6	0.32	
Trachinus draco	0.24	6	0.11	
Microchirus sp.	0.00	12		
PORTUNIDAE	0.00	24		
Total	209.10		100.00	

PROJECT STATION:1354
 DATE:29/ 5/01 GEAR TYPE: PT No:3 POSITION:Lat N 2618
 start stop duration Long W 1432
 TIME :21:23:52 21:52:45 29 (min) Purpose code: 1
 LOG :1256.17 1258.31 2.14 Area code : 2
 FDEPTH: 20 15 GearCond.code:
 BDEPTH: 66 39 Validity code:
 Towing dir: 128ø Wire out: 75 m Speed: 35 kn*10

Sorted: 38 Kg Total catch: 469.21 CATCH/HOUR: 970.78

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardina pilchardus	723.72	13117	74.55	2438
Engraulis encrasicolus	228.41	24364	23.53	2439
Trachurus lepturus	14.17	8	1.46	
Loligo vulgaris	2.90	2	0.30	
Trachurus trachurus	0.93	4	0.10	
Scomber japonicus	0.64	50	0.07	
Total	970.77		100.01	

PROJECT STATION:1349
 DATE:28/ 5/01 GEAR TYPE: PT No:1 POSITION:Lat N 2714
 start stop duration Long W 1329
 TIME :12:44:33 13:14:15 30 (min) Purpose code: 1
 LOG : 960.95 963.18 2.21 Area code : 2
 FDEPTH: 15 10 GearCond.code:
 BDEPTH: 41 70 Validity code:
 Towing dir: 295ø Wire out: 100 m Speed: 40 kn*10

Sorted: 1 Kg Total catch: 1.30 CATCH/HOUR: 2.60

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
PORTUNIDAE	2.60	160	100.00	
Total	2.60		100.00	

PROJECT STATION:1355
 DATE:30/ 5/01 GEAR TYPE: PT No:1 POSITION:Lat N 2601
 start stop duration Long W 1451
 TIME :10:51:26 11:23:11 32 (min) Purpose code: 1
 LOG :1365.82 1367.56 1.75 Area code : 2
 FDEPTH: 75 125 GearCond.code:
 BDEPTH: 105 141 Validity code:
 Towing dir: 310ø Wire out: 310 m Speed: 35 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:1356
 DATE:30/ 5/01 GEAR TYPE: BT No:7 POSITION:Lat N 2558 Long W 1507
 start stop duration
 TIME :13:58:51 14:28:33 30 (min) Purpose code: 1
 LOG :1390.38 1391.86 1.48 Area code : 2
 FDEPTH: 198 219 GearCond.code:
 BDEPTH: 198 219 Validity code:
 Towing dir: 298ø Wire out: 660 m Speed: 32 kn*10

Sorted: 32 Kg Total catch: 392.05 CATCH/HOUR: 784.10

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Lepidopus caudatus	330.00	4136	42.09	
Dentex macrophthalmus	220.00	6248	28.06	
Trachurus trachurus	50.60	374	6.45	2441
Macrorhamphosus scolopax	46.20	3476	5.89	
Merluccius merluccius	42.00	104	5.36	
Lagocephalus laevis	26.50	18	3.38	
Mullus surmuletus	19.80	88	2.53	
Zeus faber	18.90	14	2.41	
Illex coindetii	10.56	66	1.35	
Anthias anthias	7.48	242	0.95	
Scomber japonicus	5.06	22	0.65	
Capros aper	4.40	88	0.56	
Zenopsis conchifer	1.76	22	0.22	
Umbrina canariensis	0.84	2	0.11	
Total	784.10		100.01	

PROJECT STATION:1357
 DATE:30/ 5/01 GEAR TYPE: BT No:7 POSITION:Lat N 2551 Long W 1454
 start stop duration
 TIME :16:40:47 17:10:51 30 (min) Purpose code: 1
 LOG :1409.68 1411.19 1.48 Area code : 2
 FDEPTH: 98 100 GearCond.code:
 BDEPTH: 98 100 Validity code:
 Towing dir: 298ø Wire out: 350 m Speed: 30 kn*10

Sorted: 3 Kg Total catch: 3.13 CATCH/HOUR: 6.26

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Pagellus bellottii	2.82	16	45.05	
Zeus faber	2.46	2	39.30	
Loligo vulgaris	0.98	2	15.65	
Aspitrigla obscura	0.00	2		
Illex coindetii	0.00	4		
PORTUNIDAE	0.00	6		
Capros aper	0.00	2		
Total	6.26		100.00	

PROJECT STATION:1358
 DATE:30/ 5/01 GEAR TYPE: PT No:7 POSITION:Lat N 2535 Long W 1443
 start stop duration
 TIME :20:40:36 21:15:18 35 (min) Purpose code: 1
 LOG :1443.81 1445.90 1.99 Area code : 2
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 37 28 Validity code:
 Towing dir: 190ø Wire out: 150 m Speed: 30 kn*10

Sorted: 36 Kg Total catch: 117.95 CATCH/HOUR: 202.20

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Engraulis encrasicolus	117.51	25267	58.12	2443
Sardina pilchardus	66.09	10867	32.69	2442
Trachurus trachurus	12.00	51	5.93	2444
Trichiurus lepturus	3.60	2	1.78	
Scomber japonicus	1.54	3	0.76	
Loligo vulgaris	0.94	3	0.46	
Pagellus bellottii	0.34	2	0.17	
Solea vulgaris	0.09	2	0.04	
Aspitrigla obscura	0.09	2	0.04	
Total	202.20		99.99	

PROJECT STATION:1359
 DATE: 3/ 6/01 GEAR TYPE: BT No:7 POSITION:Lat N 2520 Long W 1503
 start stop duration
 TIME :16:24:41 16:54:38 30 (min) Purpose code: 1
 LOG :1851.28 1852.81 1.53 Area code : 2
 FDEPTH: 66 65 GearCond.code:
 BDEPTH: 66 65 Validity code:
 Towing dir: 214ø Wire out: 250 m Speed: 30 kn*10

Sorted: 4 Kg Total catch: 4.90 CATCH/HOUR: 9.80

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trachurus	7.30	50	74.49	2445
Boops boops	1.10	12	11.22	
Trachinus draco	0.60	6	6.12	
Pagellus bellottii	0.50	4	5.10	
Mullus surmuletus	0.20	2	2.04	
Loligo vulgaris	0.10	2	1.02	
Total	9.80		99.99	

PROJECT STATION:1360
 DATE: 4/ 6/01 GEAR TYPE: PT No:3 POSITION:Lat N 2456 Long W 1505
 start stop duration
 TIME :15:17:14 15:47:02 30 (min) Purpose code: 1
 LOG :1996.16 1998.11 1.95 Area code : 2
 FDEPTH: 15 15 GearCond.code:
 BDEPTH: 38 36 Validity code:
 Towing dir: 14ø Wire out: 220 m Speed: 40 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:1361
 DATE: 4/ 6/01 GEAR TYPE: PT No:3 POSITION:Lat N 2507 Long W 1522
 start stop duration
 TIME :18:26:54 18:58:25 32 (min) Purpose code: 1
 LOG :2019.31 2021.30 0.38 Area code : 2
 FDEPTH: 30 30 GearCond.code:
 BDEPTH: 56 55 Validity code:
 Towing dir: 200ø Wire out: 120 m Speed: 40 kn*10

Sorted: Kg Total catch: 2.85 CATCH/HOUR: 5.34

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardina pilchardus	5.16	45	96.63	2446
Liocarcinus sp	0.19	19	3.56	
Total	5.35		100.19	

PROJECT STATION:1362
 DATE: 4/ 6/01 GEAR TYPE: PT No:4 POSITION:Lat N 2508 Long W 1524
 start stop duration
 TIME :19:54:25 20:30:26 36 (min) Purpose code: 1
 LOG :2026.28 2028.06 1.74 Area code : 2
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 64 61 Validity code:
 Towing dir: 111ø Wire out: 150 m Speed: 30 kn*10

Sorted: 35 Kg Total catch: 277.50 CATCH/HOUR: 462.50

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardina pilchardus	252.00	2942	54.49	2447
Scomber japonicus	156.33	898	33.80	2448
Trichiurus lepturus	54.17	23	11.71	
Total	462.50		100.00	

PROJECT STATION:1363
 DATE: 5/ 6/01 GEAR TYPE: BT No: POSITION:Lat N 2441 Long W 1515
 start stop duration
 TIME :12:07:48 12:36:37 29 (min) Purpose code: 1
 LOG :2187.13 2188.54 1.39 Area code : 2
 FDEPTH: 32 30 GearCond.code:
 BDEPTH: 32 30 Validity code:
 Towing dir: 115ø Wire out: 200 m Speed: 30 kn*10

Sorted: 4 Kg Total catch: 13.87 CATCH/HOUR: 28.70

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Spondyliosoma cantharus	9.10	46	31.71	
Pagellus acarne	6.83	58	23.80	
Diplodus bellottii	5.69	91	19.83	
Plectorhynchus mediterraneus	2.90	2	10.10	
Lithognathus mormyrus	1.55	4	5.40	
Trachurus trachurus	1.18	10	4.11	
Pagellus bellottii	1.14	12	3.97	
Aspitrigla obscura	0.31	2	1.08	
Total	28.70		100.00	

PROJECT STATION:1364
 DATE: 5/ 6/01 GEAR TYPE: BT No:7 POSITION:Lat N 2444 Long W 1546
 start stop duration
 TIME :19:21:59 19:49:01 27 (min) Purpose code: 1
 LOG :2256.97 2258.41 1.37 Area code : 2
 FDEPTH: 44 46 GearCond.code:
 BDEPTH: 44 46 Validity code:
 Towing dir: 316ø Wire out: 200 m Speed: 31 kn*10

Sorted: 29 Kg Total catch: 225.98 CATCH/HOUR: 502.18

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Boops boops	76.00	1213	15.13	
Pagellus acarne	71.33	587	14.20	
Argyrosomus regius	67.33	4	13.41	
Spondyliosoma cantharus	64.00	1133	12.74	
Pomadasys incisus	51.33	347	10.22	
Pagellus bellottii	51.33	373	10.22	
Loligo vulgaris	25.22	60	5.02	
Dentex canariensis	22.67	107	4.51	
Trachurus trachurus	19.33	173	3.85	2449
Diplodus vulgaris	14.67	67	2.92	
Pagellus erythrinus	11.33	40	2.26	
Pagrus auriga	7.11	13	1.42	
Conger conger	4.89	2	0.97	
Scorpaena scrofa	4.00	13	0.80	
Umbrina canariensis	4.00	13	0.80	
Lepidopus caudatus	3.67	2	0.73	
Scomber japonicus	2.62	20	0.52	
Aspitrigla obscura	1.33	13	0.26	
Total	502.16		99.98	

PROJECT STATION:1365
 DATE: 5/ 6/01 GEAR TYPE: PT No:6 POSITION:Lat N 2432 Long W 1520
 start stop duration
 TIME :22:45:14 23:00:56 16 (min) Purpose code: 1
 LOG :2286.35 2287.27 0.92 Area code : 2
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 27 25 Validity code:
 Towing dir: 116ø Wire out: 150 m Speed: 31 kn*10

Sorted: 76 Kg Total catch: 3564.50 CATCH/HOUR: 13366.88

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardina pilchardus	1234.38	436643	92.20	2451
Diplodus bellottii	679.88	13598	5.09	
Scomber japonicus	182.25	645	1.36	2450
Aspitrigla obscura	75.64	1136	0.57	
Trichiurus lepturus	55.69	19	0.42	
Pagellus acarne	37.80	379	0.28	
Loligo vulgaris	11.25	23	0.08	
Total	13366.89		100.00	

PROJECT STATION:1366
 DATE: 6/ 6/01 GEAR TYPE: BT No:7 POSITION:Lat N 2429 Long W 1525
 start stop duration
 TIME :01:03:06 01:27:46 24 (min) Purpose code: 1
 LOG :2305.68 2307.02 1.34 Area code : 2
 FDEPTH: 0 0 GearCond.code:
 BDEPTH: 26 26 Validity code:
 Towing dir: 165ø Wire out: 170 m Speed: 30 kn*10

Sorted: 31 Kg Total catch: 211.00 CATCH/HOUR: 527.50

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardina pilchardus	525.00	6338	99.53	2452
Pagellus bellottii	0.75	5	0.14	
Diplodus bellottii	0.63	8	0.12	
Loligo vulgaris	0.50	5	0.09	
Boops boops	0.50	8	0.09	
Spondyliosoma cantharus	0.13	3	0.02	
Engraulis encrasicolus	0.00	18		
Total	527.51		99.99	

PROJECT STATION:1367
 DATE: 6/ 6/01 GEAR TYPE: PT No:6 POSITION:Lat N 2430 Long W 1541
 start stop duration
 TIME :04:07:42 04:21:00 13 (min) Purpose code: 1
 LOG :2329.03 2329.89 0.86 Area code : 2
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 33 34 Validity code:
 Towing dir: 320ø Wire out: 170 m Speed: 40 kn*10

Sorted: 31 Kg Total catch: 1596.30 CATCH/HOUR: 7367.54

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardina pilchardus	7038.00	87803	95.53	2453
Scomber japonicus	329.54	1177	4.47	
Total	7367.54		100.00	

PROJECT STATION:1368
 DATE: 6/ 6/01 GEAR TYPE: PT No:3 POSITION:Lat N 2421 Long W 1550
 start stop duration
 TIME :12:38:07 13:11:20 33 (min) Purpose code: 1
 LOG :2413.43 2415.83 2.34 Area code : 2
 FDEPTH: 15 15 GearCond.code:
 BDEPTH: 37 38 Validity code:
 Towing dir: 300ø Wire out: 170 m Speed: 40 kn*10

Sorted: 34 Kg Total catch: 1926.40 CATCH/HOUR: 3502.55

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardina pilchardus	3502.55	47627	100.00	2454
Total	3502.55		100.00	

PROJECT STATION:1369
 DATE: 7/ 6/01 GEAR TYPE: PT No:3 POSITION:Lat N 2408 Long W 1600
 start stop duration
 TIME :03:40:28 04:02:20 22 (min) Purpose code: 1
 LOG :2554.00 2555.79 1.47 Area code : 2
 FDEPTH: 15 15 GearCond.code:
 BDEPTH: 36 36 Validity code:
 Towing dir: 305ø Wire out: 150 m Speed: 45 kn*10

Sorted: 6 Kg Total catch: 6.90 CATCH/HOUR: 18.82

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Scomber japonicus	14.18	82	75.35	2455
Sardina pilchardus	4.64	139	24.65	2456
Total	18.82		100.00	

PROJECT STATION:1370
 DATE: 7/ 6/01 GEAR TYPE: BT No:7 POSITION:Lat N 2358 Long W 1553
 start stop duration
 TIME :07:33:20 07:55:09 22 (min) Purpose code: 1
 LOG :2586.02 2587.49 1.47 Area code : 2
 FDEPTH: 26 24 GearCond.code:
 BDEPTH: 26 24 Validity code:
 Towing dir: 180ø Wire out: 200 m Speed: 30 kn*10

Sorted: 36 Kg Total catch: 2543.85 CATCH/HOUR: 6937.77

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Diplodus bellottii	4486.36	89155	64.67	
Trachurus trachurus	782.73	24436	11.28	2457
Pagellus acarne	439.09	17236	6.33	
Pagellus bellottii	372.27	3245	5.37	
Plectorhynchus mediterraneus	372.27	764	5.37	
Pomadasy incisus	276.82	1718	3.99	
Mustelus mustelus	67.91	68	0.98	
Spondyliosoma cantharus	57.27	1145	0.83	
Loligo vulgaris	40.91	161	0.59	
Trachurus trecae	28.64	191	0.41	
Zeus faber	5.45	3	0.08	
Scomber japonicus	4.23	19	0.06	
Sarda sarda	3.82	3	0.06	
Total	6937.77		100.02	

PROJECT STATION:1371
 DATE: 7/ 6/01 GEAR TYPE: PT No:6 POSITION:Lat N 2347 Long W 1600
 start stop duration
 TIME :19:26:12 19:47:42 22 (min) Purpose code: 1
 LOG :2698.19 2699.41 1.21 Area code : 2
 FDEPTH: 0 0 GearCond.code:
 BDEPTH: 27 26 Validity code:
 Towing dir: 310ø Wire out: 150 m Speed: 33 kn*10

Sorted: Kg Total catch: 20000.00 CATCH/HOUR: 54545.46

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardina pilchardus	54545.46	406355	100.00	2458
Total	54545.46		100.00	

PROJECT STATION:1372
 DATE: 8/ 6/01 GEAR TYPE: PT No:6 POSITION:Lat N 2334 Long W 1620
 start stop duration
 TIME :05:36:03 05:49:14 13 (min) Purpose code: 1
 LOG :2792.09 2792.97 0.87 Area code : 2
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 35 33 Validity code:
 Towing dir: 115ø Wire out: 150 m Speed: 40 kn*10

Sorted: Kg Total catch: 0.22 CATCH/HOUR: 1.02

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Scomber japonicus	0.97	5	95.10	
Engraulis encrasicolus	0.05	5	4.90	
Total	1.02		100.00	

PROJECT STATION:1373
 DATE: 8/ 6/01 GEAR TYPE: BT No:7 POSITION:Lat N 2327 Long W 1623
 start stop duration
 TIME :09:11:03 09:24:16 13 (min) Purpose code: 1
 LOG :2823.35 2824.02 0.66 Area code : 2
 FDEPTH: 32 32 GearCond.code:
 BDEPTH: 32 32 Validity code:
 Towing dir: 100ø Wire out: 200 m Speed: 31 kn*10

Sorted: 35 Kg Total catch: 225.60 CATCH/HOUR: 1041.23

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardina pilchardus	401.54	6591	38.56	2459
Scomber japonicus	261.69	1495	25.13	2460
Diplodus bellottii	160.62	3725	15.43	
Trachurus trecae	69.23	526	6.65	2462
Sepia officinalis hierredda	41.31	14	3.97	
Dentex macrophthalmus	31.85	886	3.06	
Spondyliosoma cantharus	16.62	166	1.60	
Pagellus bellottii	15.23	83	1.46	
Trachurus trachurus	11.08	369	1.06	2461
Loligo vulgaris	9.92	37	0.95	
Boops boops	9.69	249	0.93	
Octopus vulgaris	8.31	5	0.80	
Pagellus acarne	4.15	83	0.40	
Total	1041.24		100.00	

PROJECT STATION:1374
 DATE: 8/ 6/01 GEAR TYPE: PT No:6 POSITION:Lat N 2318 Long W 1627
 start stop duration
 TIME :16:57:48 17:26:32 29 (min) Purpose code: 1
 LOG :2898.25 2900.20 1.76 Area code : 2
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 32 31 Validity code:
 Towing dir: 300ø Wire out: 150 m Speed: 40 kn*10

Sorted: 37 Kg Total catch: 407.00 CATCH/HOUR: 842.07

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardina pilchardus	842.07	9763	100.00	2463
Total	842.07		100.00	

PROJECT STATION:1375
 DATE: 8/ 6/01 GEAR TYPE: PT No:6 POSITION:Lat N 2309 Long W 1634
 start stop duration
 TIME :22:05:43 22:33:27 28 (min) Purpose code: 1
 LOG :2944.38 2946.25 1.86 Area code : 2
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 33 36 Validity code:
 Towing dir: 220ø Wire out: 150 m Speed: 30 kn*10

Sorted: 37 Kg Total catch: 635.80 CATCH/HOUR: 1362.43

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardina pilchardus	1347.86	15478	98.93	2464
Scomber japonicus	10.61	62	0.78	2465
Trachurus trachurus	1.61	26	0.12	2466
Pomadasy incisus	1.18	4	0.09	
Trachurus trecae	1.18	13	0.09	
Total	1362.44		100.01	

PROJECT STATION:1376
 DATE: 9/ 6/01 GEAR TYPE: BT No:7 POSITION:Lat N 2316 Long W 1646
 start stop duration
 TIME :00:57:55 01:17:43 20 (min) Purpose code: 1
 LOG :2967.25 2968.27 1.01 Area code : 2
 FDEPTH: 60 61 GearCond.code:
 BDEPTH: 60 61 Validity code:
 Towing dir: 190ø Wire out: 300 m Speed: 30 kn*10

Sorted: 45 Kg Total catch: 287.70 CATCH/HOUR: 863.10

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trachurus	531.90	13956	61.63	2468
Trachurus trecae	149.85	1701	17.36	2469
Pagellus bellottii	47.25	702	5.47	
Dentex gibbosus	36.45	108	4.22	
Raja clavata	16.50	6	1.91	
Pagellus acarne	14.85	135	1.72	
Zeus faber	12.30	15	1.43	
Dentex macrophthalmus	8.10	162	0.94	
Trachinus draco	8.10	162	0.94	
Aspitrigla obscura	8.10	162	0.94	
Scylliorhinus canicula	6.30	12	0.73	
Scomber japonicus	5.40	108	0.63	
Lepidopus caudatus	3.75	3	0.43	
Uranoscopus scaber	3.00	6	0.35	
Spondyliosoma cantharus	2.70	54	0.31	
Symphurus sp.	2.70	378	0.31	
Pagrus auriga	2.40	3	0.28	
OPHICHTHIDAE	2.10	6	0.24	
Microchirus variegatus	1.35	27	0.16	
Citharus linguatula	0.00	27		
Dicologlossa sp.	0.00	27		
Total	863.10		100.00	

PROJECT STATION:1377
 DATE: 9/ 6/01 GEAR TYPE: PT No:4 POSITION:Lat N 2309 Long W 1643
 start stop duration
 TIME :16:54:31 17:33:57 39 (min) Purpose code: 1
 LOG :3118.37 3121.82 3.37 Area code : 2
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 52 54 Validity code:
 Towing dir: 255ø Wire out: 170 m Speed: 50 kn*10
 Sorted: 35 Kg Total catch: 3525.00 CATCH/HOUR: 5423.08

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardina pilchardus	5423.08	84151	100.00	2470
Total	5423.08		100.00	

PROJECT STATION:1378
 DATE: 9/ 6/01 GEAR TYPE: PT No:7 POSITION:Lat N 2318 Long W 1618
 start stop duration
 TIME :21:09:00 21:28:58 20 (min) Purpose code: 1
 LOG :3152.69 3153.89 1.19 Area code : 2
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 24 25 Validity code:
 Towing dir: 240ø Wire out: 150 m Speed: 32 kn*10
 Sorted: 35 Kg Total catch: 956.55 CATCH/HOUR: 2869.65

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardina pilchardus	2863.35	37659	99.78	2471
Scomber japonicus	5.70	21	0.20	
Trachurus trecae	0.60	3	0.02	
Total	2869.65		100.00	

PROJECT STATION:1379
 DATE:10/ 6/01 GEAR TYPE: PT No:6 POSITION:Lat N 2331 Long W 1628
 start stop duration
 TIME :00:28:58 00:34:50 6 (min) Purpose code: 1
 LOG :3180.15 3180.56 0.39 Area code : 2
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 39 38 Validity code:
 Towing dir: 170ø Wire out: 150 m Speed: 40 kn*10
 Sorted: 35 Kg Total catch: 2106.00 CATCH/HOUR: 21060.00

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardina pilchardus	20760.00	269050	98.58	2472
Scomber japonicus	300.00	1800	1.42	
Total	21060.00		100.00	

PROJECT STATION:1380
 DATE:10/ 6/01 GEAR TYPE: PT No:7 POSITION:Lat N 2334 Long W 1609
 start stop duration
 TIME :03:49:09 04:08:28 19 (min) Purpose code: 1
 LOG :3208.47 3209.49 1.02 Area code : 2
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 27 28 Validity code:
 Towing dir: 312ø Wire out: 170 m Speed: 35 kn*10
 Sorted: 37 Kg Total catch: 386.45 CATCH/HOUR: 1220.37

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardina pilchardus	1210.58	11116	99.20	2473
Pomadasys incisus	9.00	6	0.74	
Trachurus trecae	0.47	3	0.04	
Spondyliosoma cantharus	0.32	3	0.03	
Total	1220.37		100.01	

PROJECT STATION:1381
 DATE:10/ 6/01 GEAR TYPE: PT No:3 POSITION:Lat N 2345 Long W 1622
 start stop duration
 TIME :05:57:53 06:13:01 15 (min) Purpose code: 1
 LOG :3224.94 3225.71 0.76 Area code : 2
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 43 44 Validity code:
 Towing dir: 10ø Wire out: 150 m Speed: 31 kn*10
 Sorted: 13 Kg Total catch: 5000.00 CATCH/HOUR: 20000.00

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardina pilchardus	20000.00	171852	100.00	2474
Total	20000.00		100.00	

PROJECT STATION:1382
 DATE:11/ 6/01 GEAR TYPE: BT No:7 POSITION:Lat N 2428 Long W 1524
 start stop duration
 TIME :09:09:41 09:39:20 30 (min) Purpose code: 1
 LOG :3490.26 3491.85 1.58 Area code : 2
 FDEPTH: 24 25 GearCond.code:
 BDEPTH: 24 25 Validity code:
 Towing dir: 318ø Wire out: 200 m Speed: 31 kn*10
 Sorted: 29 Kg Total catch: 191.58 CATCH/HOUR: 383.16

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardina pilchardus	168.50	1572	43.98	2475
Diplodus bellottii	91.00	1212	23.75	
Scomber japonicus	67.50	168	17.62	2476
Pomadasys incisus	19.50	100	5.09	
Trichiurus lepturus	9.70	4	2.53	
Raja sp.	8.20	2	2.14	
Plectorhynchus mediterraneus	7.50	10	1.96	
Pagellus bellottii	4.50	20	1.17	
Loligo vulgaris	4.10	24	1.07	
Spondyliosoma cantharus	2.00	40	0.52	
Trachurus trachurus	0.66	2	0.17	
Total	383.16		100.00	

PROJECT STATION:1383
 DATE:12/ 6/01 GEAR TYPE: BT No:7 POSITION:Lat N 2233 Long W 1630
 start stop duration
 TIME :09:52:36 10:09:49 17 (min) Purpose code: 1
 LOG :3754.40 3755.23 0.82 Area code : 2
 FDEPTH: 31 31 GearCond.code:
 BDEPTH: 31 31 Validity code:
 Towing dir: 90ø Wire out: 150 m Speed: 30 kn*10
 Sorted: 35 Kg Total catch: 551.20 CATCH/HOUR: 1945.41

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	569.12	4447	29.25	2477
Pomadasys incisus	296.47	1376	15.24	
Spondyliosoma cantharus	214.41	3176	11.02	
Pagellus bellottii	190.59	1059	9.80	
Loligo vulgaris	174.71	1376	8.98	
Diplodus vulgaris	121.76	1588	6.26	
Diplodus bellottii	121.76	1165	6.26	
Dentex canariensis	114.88	371	5.91	
Argyrosomus regius	42.88	21	2.20	
Mullus surmuletus	29.12	159	1.50	
Umbrina canariensis	18.53	53	0.95	
Zeus faber	10.24	11	0.53	
Diplodus cervinus cervinus	9.53	4	0.49	
Diplodus puntazzo	8.12	7	0.42	
Trachurus picturatus	6.88	53	0.35	
Trachurus trachurus	6.88	106	0.35	
Scorpaena scrofa	5.29	53	0.27	
Allotheutis subulata	2.12	688	0.11	
Sepia officinalis hierredda	1.41	4	0.07	
Scomber japonicus	0.71	7	0.04	
Total	1945.41		100.00	

PROJECT STATION:1384
 DATE:12/ 6/01 GEAR TYPE: PT No:6 POSITION:Lat N 2224 Long W 1635
 start stop duration
 TIME :19:03:54 19:22:09 18 (min) Purpose code: 1
 LOG :3845.88 3846.89 1.01 Area code : 2
 FDEPTH: 0 0 GearCond.code:
 BDEPTH: 31 32 Validity code:
 Towing dir: 360ø Wire out: 150 m Speed: 34 kn*10
 Sorted: 48 Kg Total catch: 48.90 CATCH/HOUR: 163.00

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardina pilchardus	159.00	6783	97.55	2478
Scomber japonicus	4.00	13	2.45	
Total	163.00		100.00	

PROJECT STATION:1385
 DATE:12/ 6/01 GEAR TYPE: PT No:3 POSITION:Lat N 2221 Long W 1641
 start stop duration
 TIME :21:18:33 21:28:17 10 (min) Purpose code: 1
 LOG :3863.57 3864.16 0.58 Area code : 2
 FDEPTH: 20 20 GearCond.code:
 BDEPTH: 37 35 Validity code:
 Towing dir: 90ø Wire out: 150 m Speed: 30 kn*10
 Sorted: 32 Kg Total catch: 3507.48 CATCH/HOUR: 21044.88

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardina pilchardus	21000.00	1277742	99.79	2479
Trachurus trecae	24.30	60	0.12	2480
Scomber japonicus	18.30	48	0.09	
Merluccius senegalensis	1.26	6	0.01	
Trachurus trachurus	0.54	18		
Decapterus rhonchus	0.48	6		
Total	21044.88		100.01	

PROJECT STATION:1386
 DATE:13/ 6/01 GEAR TYPE: PT No:3 POSITION:Lat N 2209 Long W 1656
 start stop duration
 TIME :05:14:53 05:31:51 17 (min) Purpose code: 1
 LOG :3939.97 3941.31 1.34 Area code : 2
 FDEPTH: 20 15 GearCond.code:
 BDEPTH: 42 42 Validity code:
 Towing dir: 290ø Wire out: 150 m Speed: 40 kn*10
 Sorted: 37 Kg Total catch: 118.65 CATCH/HOUR: 418.76

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardina pilchardus	389.12	22235	92.92	2481
Loligo vulgaris	12.71	11	3.04	
Argyrosomus regius	8.65	4	2.07	
Trichiurus lepturus	7.76	4	1.85	
Engraulis encrasicolus	0.32	32	0.08	
Total	418.56		99.96	

PROJECT STATION:1387
 DATE:13/ 6/01 GEAR TYPE: BT No:7 POSITION:Lat N 2205 Long W 1720
 start stop duration
 TIME :09:34:37 10:04:41 30 (min) Purpose code: 1
 LOG :3982.44 3984.07 1.62 Area code : 2
 FDEPTH: 80 77 GearCond.code:
 BDEPTH: 80 77 Validity code:
 Towing dir: 90ø Wire out: 350 m Speed: 30 kn*10
 Sorted: 9 Kg Total catch: 9.14 CATCH/HOUR: 18.28

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Octopus vulgaris	4.80	6	26.26	
Trachurus trachurus	4.60	180	25.16	2482
Zeus faber	3.50	4	19.15	
Scomber japonicus	3.50	72	19.15	2483
Capros aper	1.20	528	6.56	
Loligo vulgaris	0.40	2	2.19	
Citharus linguatula	0.14	6	0.77	
Dentex macropthalmus	0.14	4	0.77	
Total	18.28		100.01	

PROJECT STATION:1388
 DATE:13/ 6/01 GEAR TYPE: PT No:3 POSITION:Lat N 2152
 start stop duration Long W 1722
 TIME :13:11:10 13:40:26 29 (min) Purpose code: 1
 LOG :4012.77 4014.88 2.10 Area code : 2
 FDEPTH: 30 30 GearCond.code:
 BDEPTH: 105 125 Validity code:
 Towing dir: 290ø Wire out: 200 m Speed: 40 kn*10
 Sorted: 29 Kg Total catch: 146.50 CATCH/HOUR: 303.10

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichiurus lepturus	303.10	1593	100.00	
Total	303.10		100.00	

PROJECT STATION:1393
 DATE:14/ 6/01 GEAR TYPE: PT No:4 POSITION:Lat N 2125
 start stop duration Long W 1720
 TIME :06:06:29 06:36:44 30 (min) Purpose code: 1
 LOG :4159.61 4161.29 1.63 Area code : 2
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 76 70 Validity code:
 Towing dir: 90ø Wire out: 170 m Speed: 34 kn*10
 Sorted: 72 Kg Total catch: 1081.70 CATCH/HOUR: 2163.40

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardinella aurita	1236.00	3600	57.13	2492
Sardina pilchardus	924.00	10740	42.71	2491
Trichiurus lepturus	3.40	2	0.16	
Total	2163.40		100.00	

PROJECT STATION:1389
 DATE:13/ 6/01 GEAR TYPE: PT No:6 POSITION:Lat N 2151
 start stop duration Long W 1704
 TIME :16:03:35 16:33:02 29 (min) Purpose code: 1
 LOG :4037.10 4039.20 2.04 Area code : 2
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 45 53 Validity code:
 Towing dir: 300ø Wire out: 200 m Speed: 40 kn*10
 Sorted: 37 Kg Total catch: 10000.00 CATCH/HOUR: 20689.66

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardina pilchardus	20689.66	156178	100.00	2484
Total	20689.66		100.00	

PROJECT STATION:1394
 DATE:14/ 6/01 GEAR TYPE: PT No:1 POSITION:Lat N 2120
 start stop duration Long W 1730
 TIME :08:53:02 09:23:57 31 (min) Purpose code: 1
 LOG :4180.25 4181.97 1.71 Area code : 2
 FDEPTH: 164 158 GearCond.code:
 BDEPTH: 259 262 Validity code:
 Towing dir: 5ø Wire out: 450 m Speed: 33 kn*10
 Sorted: 2 Kg Total catch: 2.62 CATCH/HOUR: 5.07

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trachurus	1.74	14	34.32	
Scomber japonicus	1.45	8	28.60	
MYCTOPHIDAE	1.45	515	28.60	
Trachurus trecae	0.43	4	8.48	
Total	5.07		100.00	

PROJECT STATION:1390
 DATE:13/ 6/01 GEAR TYPE: PT No:1 POSITION:Lat N 2142
 start stop duration Long W 1728
 TIME :21:58:09 22:29:28 31 (min) Purpose code: 1
 LOG :4086.90 4088.78 1.86 Area code : 1
 FDEPTH: 100 100 GearCond.code:
 BDEPTH: 235 265 Validity code:
 Towing dir: 200ø Wire out: 300 m Speed: 34 kn*10
 Sorted: 40 Kg Total catch: 208.29 CATCH/HOUR: 403.14

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
MYCTOPHIDAE	277.26	143249	68.78	
Trachurus trecae	110.32	1084	27.37	2485
Todarodes sagittatus	5.03	54	1.25	
Trachurus trachurus	3.87	39	0.96	
Scomber japonicus	3.29	19	0.82	2486
Merluccius senegalensis	2.59	2	0.64	
Belone belone gracilis	0.27	4	0.07	
Total	402.63		99.89	

PROJECT STATION:1395
 DATE:14/ 6/01 GEAR TYPE: PT No:1 POSITION:Lat N 2116
 start stop duration Long W 1730
 TIME :10:53:40 11:35:09 41 (min) Purpose code: 1
 LOG :4191.92 4194.24 2.32 Area code : 2
 FDEPTH: 160 240 GearCond.code:
 BDEPTH: 246 262 Validity code:
 Towing dir: ø Wire out: 550 m Speed: 33 kn*10
 Sorted: 6 Kg Total catch: 6.25 CATCH/HOUR: 9.15

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brama brama	6.66	6	72.79	
Merluccius senegalensis	1.24	6	13.55	
Todaropsis eblanae	1.10	6	12.02	
Zenopsis conchifer	0.10	1	1.09	
Lepidopus caudatus	0.04	3	0.44	
Total	9.14		99.89	

PROJECT STATION:1391
 DATE:14/ 6/01 GEAR TYPE: PT No:7 POSITION:Lat N 2134
 start stop duration Long W 1705
 TIME :01:33:37 01:56:26 23 (min) Purpose code: 1
 LOG :4118.34 4119.72 1.35 Area code : 1
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 40 45 Validity code:
 Towing dir: 280ø Wire out: 170 m Speed: 35 kn*10
 Sorted: 52 Kg Total catch: 52.95 CATCH/HOUR: 138.13

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardina pilchardus	123.52	10320	89.42	2487
Camprogamma glaycos	7.04	8	5.10	
Trachurus trecae	3.39	10	2.45	
Loligo vulgaris	3.13	8	2.27	
Scomber japonicus	0.78	5	0.56	
Belone belone gracilis	0.26	3	0.19	
Total	138.12		99.99	

PROJECT STATION:1396
 DATE:14/ 6/01 GEAR TYPE: BT No:7 POSITION:Lat N 2114
 start stop duration Long W 1723
 TIME :13:05:17 13:21:05 16 (min) Purpose code: 1
 LOG :4206.32 4207.08 0.75 Area code : 1
 FDEPTH: 91 93 GearCond.code:
 BDEPTH: 91 93 Validity code:
 Towing dir: 220ø Wire out: 370 m Speed: 30 kn*10
 Sorted: 54 Kg Total catch: 122.00 CATCH/HOUR: 457.50

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Engraulis encrasicolus	109.13	13973	23.95	2493
GOMIIDAE	93.38	15064	20.41	
Sardina pilchardus	61.31	6053	13.40	2494
Trachurus trecae	50.63	698	11.07	2496
Trachurus trachurus	45.00	1508	9.84	2495
Octopus vulgaris	30.56	30	6.68	
Plectorhynchus mediterraneus	16.88	11	3.69	
Merluccius senegalensis	9.00	38	1.97	
Loligo vulgaris	7.13	49	1.56	
Capros aper	6.19	1474	1.35	
Zeus faber	4.31	4	0.94	
Plesionika heterocarpus	2.81		0.61	
Raja miraletus	2.81	4	0.61	
Dicologlossa cuneata	2.25	574	0.49	
Citharus linguatula	2.25	146	0.49	
Allotheutis subulata	2.25	664	0.49	
Diplodus vulgaris	2.25	4	0.49	
Lilocarcinus corrugatus	1.69	146	0.37	
Arnoglossus imperialis	1.69	124	0.37	
Arnoglossus thori	1.69	90	0.37	
Lepidopus caudatus	1.31	4	0.29	
GALATHEIDAE	1.13	214	0.25	
Trichiurus lepturus	0.75	4	0.16	
Dentex maroccanus	0.56	34	0.12	
Sepia orbignyana	0.56	68	0.12	
ARGENTINIDAE	0.00	34		
Helicolenus dactylopterus	0.00	23		
Total	457.52		99.99	

PROJECT STATION:1392
 DATE:14/ 6/01 GEAR TYPE: BT No:7 POSITION:Lat N 2132
 start stop duration Long W 1703
 TIME :02:52:22 02:57:33 5 (min) Purpose code: 1
 LOG :4127.44 4127.68 0.24 Area code : 1
 FDEPTH: 33 33 GearCond.code:
 BDEPTH: 33 33 Validity code:
 Towing dir: 11ø Wire out: 170 m Speed: 30 kn*10
 Sorted: 50 Kg Total catch: 219.27 CATCH/HOUR: 2631.24

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Diplodus bellottii	655.20	7560	24.90	
Diplodus vulgaris	525.60	1296	19.98	
Sardina pilchardus	482.40	92088	18.33	2488
Pomadourys incisus	219.60	1296	8.35	
Sparus caeruleostictus *	180.00	216	6.84	
Epinephelus aeneus	132.00	36	5.02	
Argyrosomus regius	75.00	36	2.85	
Trachurus trachurus	68.40	2736	2.60	2489
Loligo vulgaris	57.60	216	2.19	
Spondyliosoma cantharus	46.80	72	1.78	
Sepia officinalis hierredda	36.72	72	1.40	
Dentex canariensis	34.56	72	1.31	
Pagellus bellottii	34.56	288	1.31	
Dentex macrophthalmus	32.40	72	1.23	
Dentex gibbosus	32.40	72	1.23	
Engraulis encrasicolus	14.40	1584	0.55	2490
Scorpaena scrofa	3.60	72	0.14	
Total	2631.24		100.01	

PROJECT STATION:1397
 DATE:14/ 6/01 GEAR TYPE: PT No:4 POSITION:Lat N 2104
 start stop duration Long W 1719
 TIME :18:17:32 18:49:41 32 (min) Purpose code: 1
 LOG :4256.41 4258.24 1.80 Area code : 1
 FDEPTH: 100 10 GearCond.code:
 BDEPTH: 61 54 Validity code:
 Towing dir: 90ø Wire out: 170 m Speed: 33 kn*10
 Sorted: 38 Kg Total catch: 322.77 CATCH/HOUR: 605.19

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardina pilchardus	564.60	78375	93.29	2497
Sarda sarda	18.38	99	3.04	
Engraulis encrasicolus	11.40	1307	1.88	2498
Sardinella maderensis	10.69	30	1.77	2499
Sepia bertheloti	0.09	2	0.01	
Sepiella ornata	0.04	2	0.01	
Total	605.20		100.00	

PROJECT STATION:1398
 DATE:15/ 6/01 GEAR TYPE: PT No:7 POSITION:Lat N 2054
 start stop duration Long W 1711
 TIME :00:17:54 00:32:05 14 (min) Purpose code: 1
 LOG :4311.85 4312.74 0.87 Area code : 1
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 38 35 Validity code:
 Towing dir: 90ø Wire out: 170 m Speed: 37 kn*10
 Sorted: 49 Kg Total catch: 82.18 CATCH/HOUR: 352.20

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardina pilchardus	278.57	24334	79.09	2504
Sardinella aurita	27.86	81	7.91	2502
Decapterus rhonchus	15.43	227	4.38	2500
Merluccius senegalensis	13.07	107	3.71	
Trachurus trecae	8.79	77	2.50	2503
Seriola dumerili	4.93	39	1.40	
Loligo vulgaris	1.50	9	0.43	
Trachurus trachurus	1.07	56	0.30	2501
Trichiurus lepturus	0.56	4	0.16	
Scomber japonicus	0.43	4	0.12	
Total	352.21		100.00	

PROJECT STATION:1399
 DATE:15/ 6/01 GEAR TYPE: PT No:7 POSITION:Lat N 2047
 start stop duration Long W 1715
 TIME :02:47:12 02:59:45 13 (min) Purpose code: 1
 LOG :4331.85 4332.59 0.73 Area code : 2
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 44 44 Validity code:
 Towing dir: 270ø Wire out: 170 m Speed: 35 kn*10
 Sorted: 76 Kg Total catch: 1230.40 CATCH/HOUR: 5678.77

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardina pilchardus	4918.15	342572	86.61	2505
Sardinella aurita	760.62	2068	13.39	2506
Total	5678.77		100.00	

PROJECT STATION:1400
 DATE:15/ 6/01 GEAR TYPE: PT No:6 POSITION:Lat N 2047
 start stop duration Long W 1721
 TIME :04:03:15 04:07:59 5 (min) Purpose code: 1
 LOG :4339.36 4339.67 0.31 Area code : 1
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 58 58 Validity code:
 Towing dir: 90ø Wire out: 170 m Speed: 40 kn*10
 Sorted: 68 Kg Total catch: 1100.70 CATCH/HOUR: 13208.40

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardina pilchardus	12307.20	159936	93.18	2508
Sardinella aurita	768.00	2112	5.81	2507
Sardinella maderensis	76.80	192	0.58	
Sarda sarda	38.40	384	0.29	
Scomber japonicus	18.00	192	0.14	
Total	13208.40		100.00	