CRUISE REPORTS 'DR FRIDTJOF NANSEN'

SURVEY OF THE PELAGIC FISH RESOURCES OFF NORTH WEST AFRICA

Part I

SENEGAL - THE GAMBIA
30 October - 10 November 2003

by

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CHAPTER 1 INTRODUCTION

1.1 Objective of the cruise

The general objectives of the survey were to estimate 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 in the survey area over a period of 50 days, in November-December 2003. For Senegal and The Gambia the agreed objectives were as follows:

- To map the distribution and estimate the biomass for the main small pelagic fish using hydro-acoustic methods. The species of interest were: sardinellas, (*Sardinella aurita*) and (*Sardinella maderensis*), horse mackerels, (*Trachurus trecae*) and 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.

- Collect biological data and otoliths of the main target species, especially *S. aurita, S. maderensis* and *T. trecae.*

- To sample standard hydrographical transects for temperature, salinity and oxygen at every degree latitude, at about 12°40'N, 13°40'N, 14°50'N and 15°50'N and additionally at 50 m and 200 m depth every 20 NM.

- To train local participants in acoustic abundance estimation surveying including fish identification and sampling, acoustic survey methodology, scrutinizing of echograms, and hydrographic sampling.

The time allocated for this part of the survey, off Senegal and The Gambia, was 10 days.

1.2 Participation

Participating scientists were:

Centre de Recherches Océanographiques de Dakar-Thiaroye (CRODT), Senegal:
Abdoulaye SARRE (team leader), Mor SYLLA, Ibrahima SOW and Cheikh N'DOUR

Department of Fisheries (FD), The Gambia:
Ebou Mass MBYE, Solomon TAMOH and Juldah JALLOW,

Institut Mauritanien de Recherches Océanographiques et des Pêches (CNROP), Mauritania:
Nema O Cheikh Med ABDALLAHI

Institut National de Recherche Halieutique (INRH), Morocco:
Najib CHAROUKI

Centre National des Sciences Halieutique de Boussoura (CNSHB), Guinea:
Amadou I BAH

Institute of Marine Research (IMR), Norway:
Jens-Otto KRAKSTAD (Cruise leader), Magne OLSEN, Tore MØRK and Terje HOVLAND

1.3 Narrative

The vessel departed from Dakar 21:45 GMT on the 30/10 and steamed south to start the survey at the border between Guinea Bissau and Senegal. The survey started off St. Louis on 31st October at 11:10 GMT with systematic parallel course tracks spaced about 10 NM (nautical miles) apart, perpendicular to the depth isobaths. 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. Pelagic trawl with floats was often used to catch fish close to the surface. A smaller pelagic trawl or the bottom trawl with floats was used for sampling pelagic fish in very shallow waters (depth less than 25 m). The shelf was covered from Casamance to St Louis at the border to Mauritania. The vessel reached St. Louis and the end of the regular survey at 7th November 05:30 GMT in the morning. The course track and fishing stations are shown in Figure 1, while

Table 1 show survey effort during the survey, including number of trawl stations and CTD casts. Since some time was leftover for other activities it was decided to investigate possible concentrations of pelagic fish at the seamount 'Mont de Kayar' which is normally not surveyed during these surveys. We reached the seamount at 14:00 the same day and finished the mini survey at 18:00 GMT the same day. No fish pelagic fish where found at the seamount. The vessel then steamed towards Dakar to prepare for a calibration of the 38 kHz acoustic echosounder. The calibration started inside the bay south of Dakar at 14°34'8''N, 17°16'4''W, 32 m bottom depth at 10:30 GMT on the 8th November. The calibration of the 38 kHz transducer was completed successfully at 16:00 GMT and the vessel thereafter steamed to Dakar where the survey was completed on the 8th November at 18:00 GMT. All data collected during the survey were made available to the participants.

Four hydrographic profiles where carried out, at Casamance on the 1st November, off The Gambia on 3rd November, off Dakar on 5th November and off St. Louis on the 6th November.

Table 1 Summary of survey effort by regions, including number of demersal (BT) and pelagic (PT) trawl hauls, CTD casts, and distance surveyed (log), disregarding the steaming from Cape Vert to Casamance and from St. Louis to Dakar (log).

Area	BT	PT	Total trawls	CTD casts	Log (nm)
Casamance to St. Louis	11	17	28	58	1350

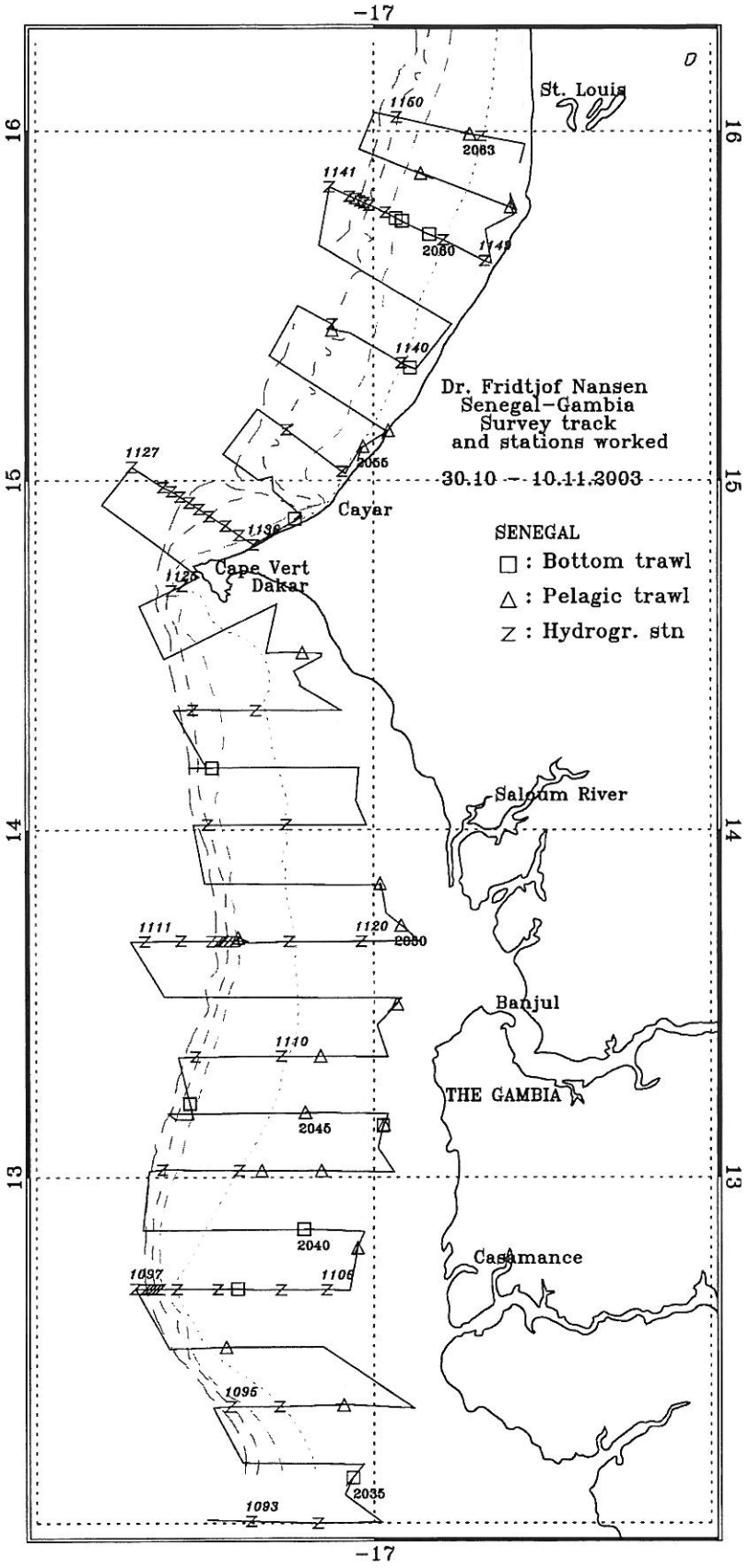


Figure 1 Course tracks with fishing and hydrographic stations; Casamance to St. Louis.

CHAPTER 2 METHODS

2.1 Environmental Data

A Seabird 911+ CTD probe was used to obtain vertical profiles of the temperature, salinity and oxygen. Real time logging was carried out using the PC based Seabird Seasave software. CTD casts were conducted along the cruise track in transects at about every one degree latitude and at fixed stations every 50 m and 200 m depth every 20 NM. The casts were stopped a few meters above the bottom, and at a maximum of 500 m depth. Two water samples, one near the surface and one near the bottom, were collected using *Niskin* bottles at stations corresponding to the standard profiles. The samples were analysed for dissolved oxygen using the Winkler method in order to calibrate the oxygen sensor. Salinity of water samples where used to calibrate the salinity sensor using the Guildline Portasal salinometer. The salinity sensor on the CTD was stable and it was not necessary to apply any correction factor.

A total of 10 samples were accepted for oxygen calibration on the 3 November 2003. A linear regression of the Winkler determinations on the CTD values produced the correction:

$$O_{2corrected} = a \cdot O_{2recorded} + b \qquad (1)$$

where a = 0.92 and b = -0.290

Meteorological data logged from the Aanderaa meteorological station included wind direction and speed, air temperature, incident solar intensity and sea surface temperature (SST). All data were averaged by unit distance sailed (1 NM).

2.2 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 I gives details of the individual trawl station, while 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:

$$\overline{w} = \frac{cond}{100} \cdot L^3$$

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. The target groups used for Senegal and The Gambia can be found in Table 2.

Table 2 Allocation of acoustic densities to taxii. Note that for the groups of sardinella, horse mackerel, and pilchard all encountered species are listed, while only examples are listed for the remaining groups.

Group	Taxon	Species
Sardinella	*Sardinella* sp.	*S. aurita*
		S. maderensis
Horse mackerel	*Trachurus* sp.	*T. trecae*
		T. trachurus
Sardine	Sardinops	*S. pilchardus*
Pelagic species 1	Clupeiformes$_1$	*Ilisha africana*
		Engraulis encrasicolus
Pelagic species 2	Carangidae$_2$	*Selene dorsalis*
		Chloroscombrus chrysurus
		Decapterus rhonchus
		Alectis alexandrinus
Little tuny	Scombridae	*Euthynnus alletteratus*
		Sarda sarda
		Scomber japonicus
	Sphyraenidae	*Sphyraena guachancho*
	Others	*Trichiurus lepturus*
		Zeus faber
Other demersal species	Sparidae$_3$	*Dentex angolensis*
		D. macrophthalmus
		D. congoensis
		D. canariensis
		D. barnardi
		Pagellus bellottii
		Sparus caeruleostictus
		S. pagrus africanus
	Other taxii	*Pseudupeneus prayensis*
Big-eye grunt		*Brachydeuterus auritus*
		Arioma bondi
		Pomadasys incisus
		Galeoides decadactylus
Mesopelagic species	Myctophidae$_3$	
	Other mesopelagic fish	
Plankton	Calanoidae	*Calanus* sp.
	Euphausiidae	*Meganyctiphanes* sp.
	Other plankton	

$_1$; other than *Sardinops* sp.; $_2$: other than *Trachurus* sp.; $_3$: main taxon in group.

2.3 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):

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

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:

$$\rho_i = s_A \cdot \frac{p_i}{\sum_{i=1}^{n} \frac{p_i}{C_{F_i}}}$$

where

ρ_i = density of fish in length group i

s_A = mean integrator value

p_i = proportion of fish in length group i

$\sum_{i=1}^{n} \frac{p_i}{C_{Fi}}$ = 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.

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_A-value for the region,
2) the surface (usually square nautical miles, NM^2), 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_A-value between species in a category of fish (e.g. *S. 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_A) 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 RV "Dr. Fridtjof Nansen", provided the data are punched in this sheet.

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 representing the region

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. The numbers are then converted to biomass using the estimated weight at length.

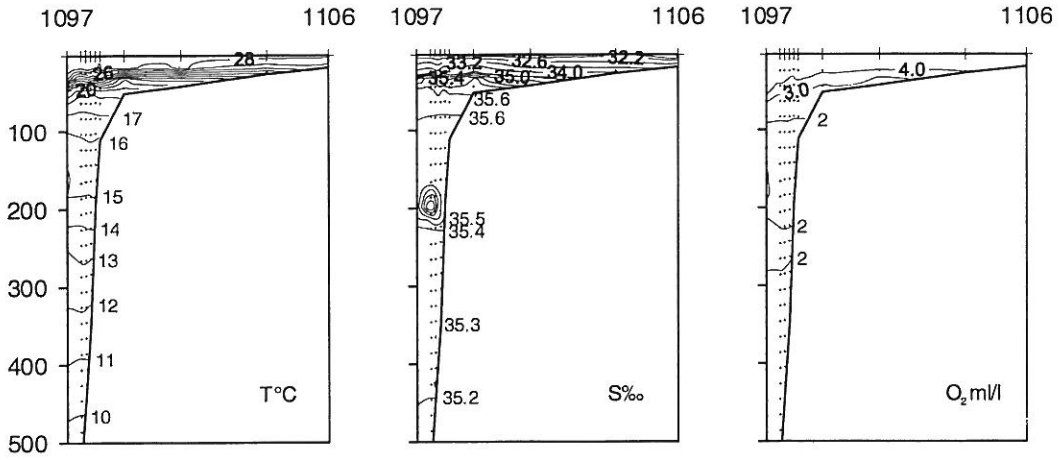
CHAPTER 3 SURVEY RESULTS

3.1 Hydrography

Hydrographical data was collected on fixed CTD stations to 500 m depth and from the Aanderaa weather station that continuously collect sea surface temperature, wind speed and direction, solar radiation etc. during the survey.

Cross shelf hydrographical profiles

Figure 2 shows the distribution of temperature, salinity and oxygen from the four hydrographical transects collected during the survey. The surface water temperature was around 28°C in the area south of Cape Vert, with a pronounced thermocline at approximately 30 m depth. The temperature was slightly lower north of Cape Vert and with a less pronounced thermocline. The salinity profiles show low salinity water from the coast and extending offshore, with salinity <32.2‰ S off Casamance and The Gambia and 'normal' concentrations further north. The water masses in the survey area was well oxygenated with oxygen concentrations in the surface layer >4 ml O_2/l.



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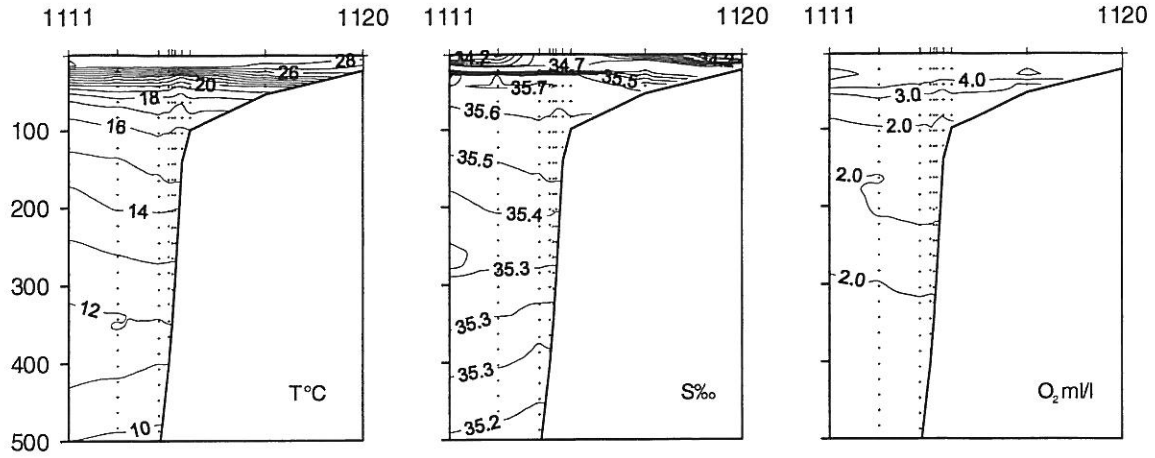

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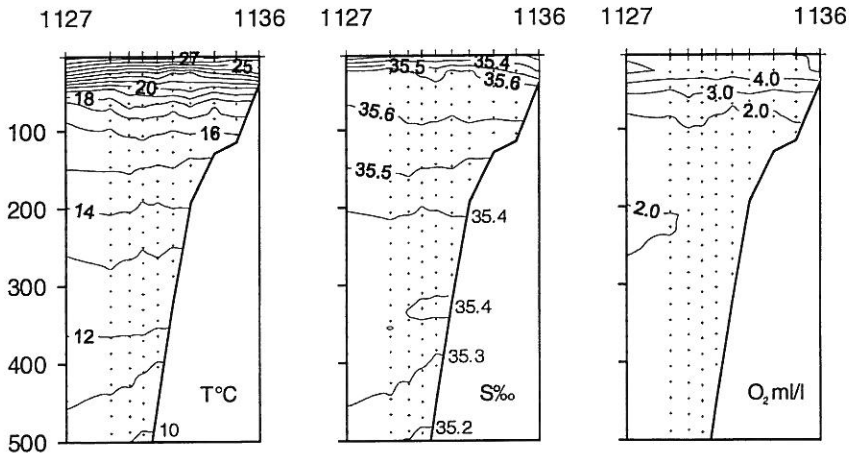

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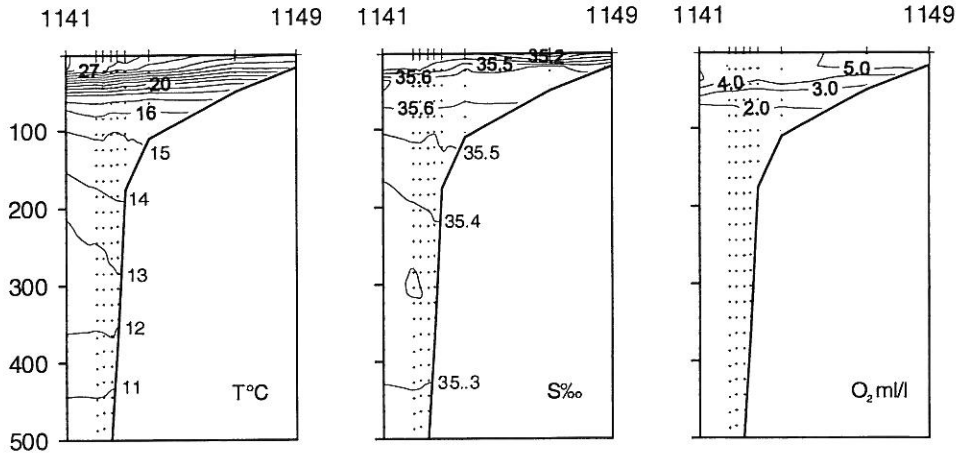

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Figure 2 Hydrographic profiles with distribution of temperature, salinity and oxygen off Casamance, 13°40'N - The Gambia, c) Cape Vert, St. Louis - South.

Alongshelf profiles

Alongshelf profiles of temperature, salinity and oxygen was created from the 200 m depth CTD stations collected during at every 20 NM during the survey. Only the temperature plots are shown in Figure 3. The Figure show a relatively large area of Casamance and The Gambia with low salinity surface water, and a salinocline can be seen all the way to Cape Vert at approximately 30 m depth. The low salinity area is probably created because of runoff from Casamance and Banjul rivers. The area North of Dakar to St. Louis shows more saline waters and a less pronounced salinocline.

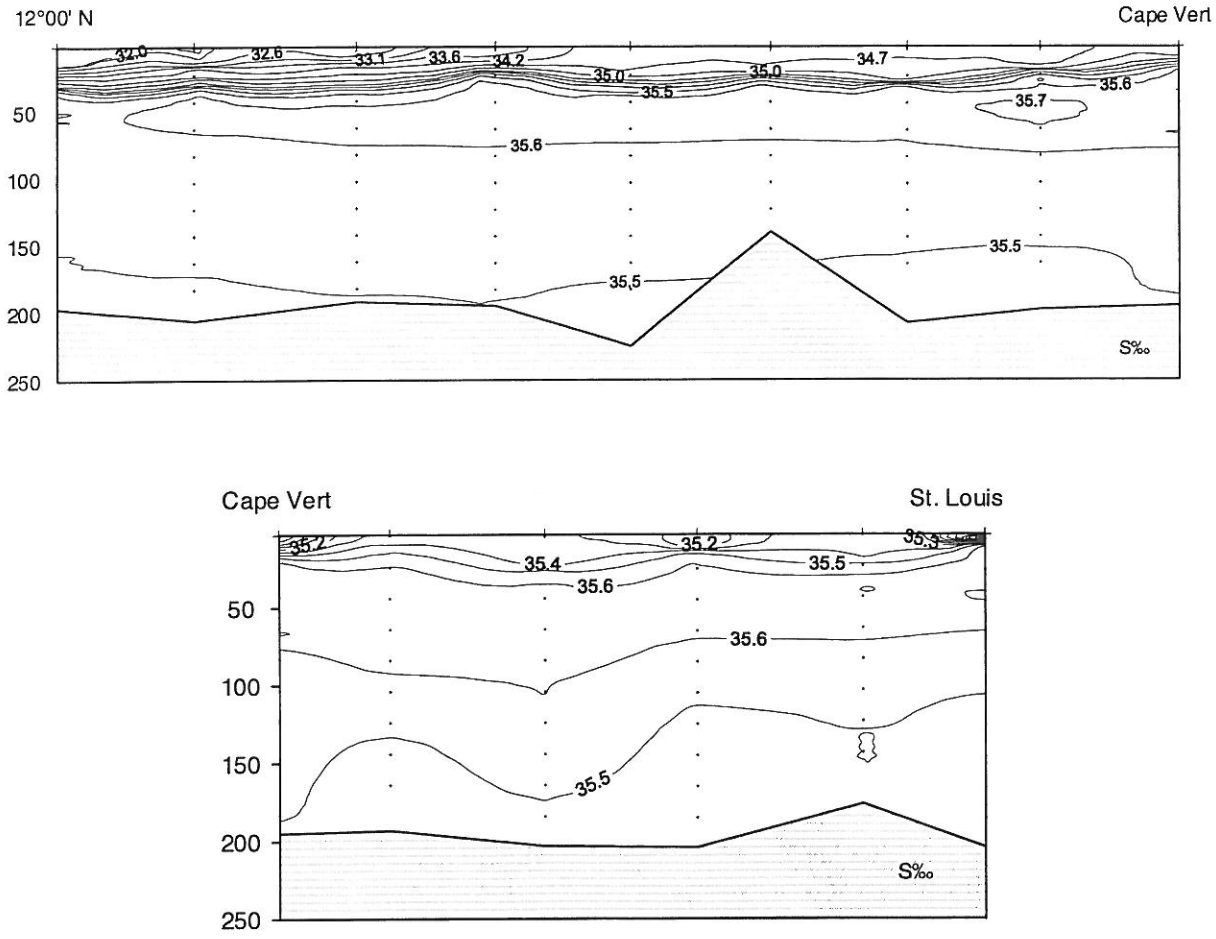


Figure 3. Alongshelf salinity at 200 m depth from a) Casamance to Cape Vert b) Cape Vert to St. Lois.

Sea surface temperature and wind direction

Figure 4 the sea surface temperature at 5 m of depth while Figure 5 show the wind direction and wind speed during the survey of Senegal and The Gambia. The surface waters in the south of the survey area was dominated by water higher than 28°C while north of Dakar the temperature dropped, especially along the coast. The dominant wind direction was from the north with favourable conditions for acoustic surveying throughout the survey.

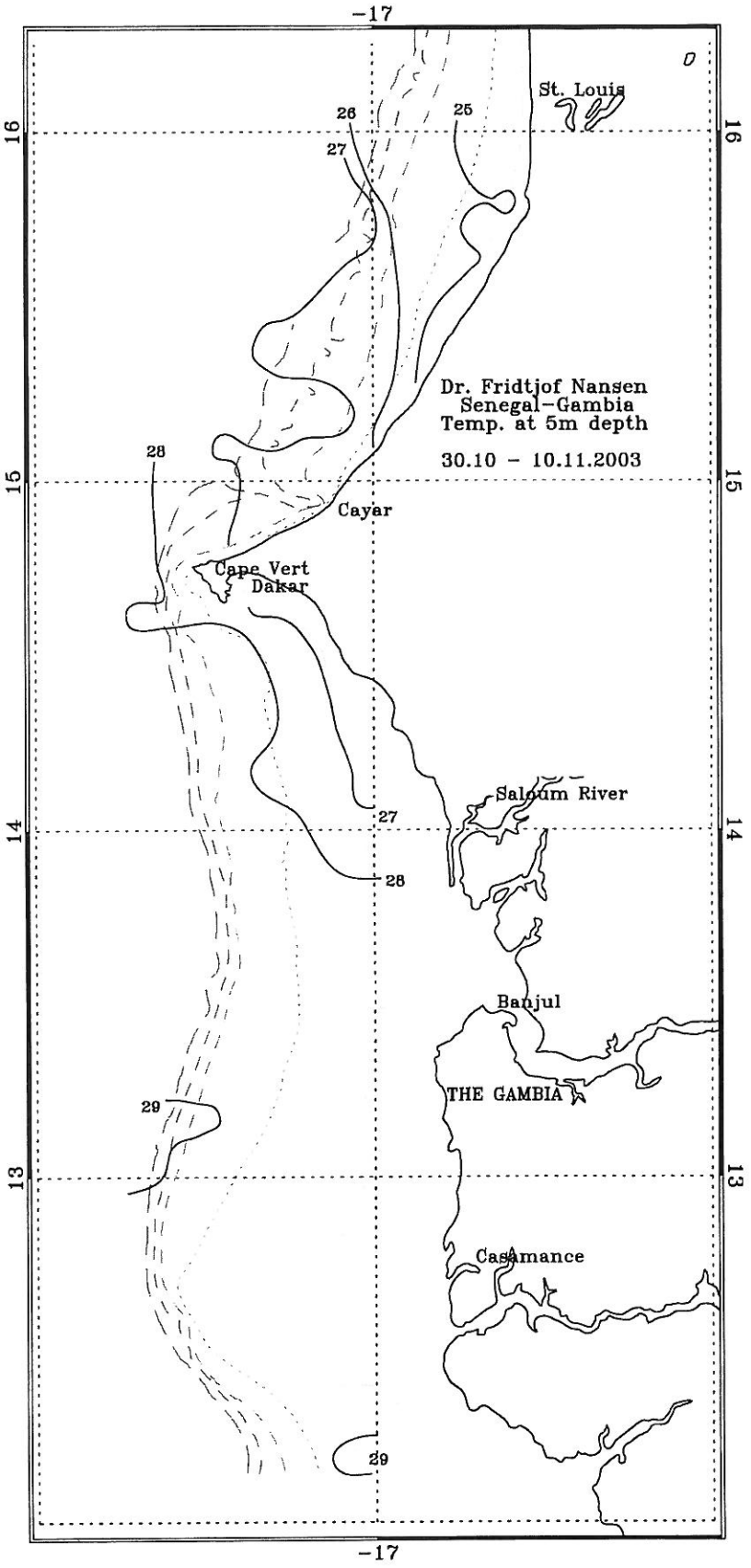


Figure 4 Sea surface temperature; Casamance to St. Louis.

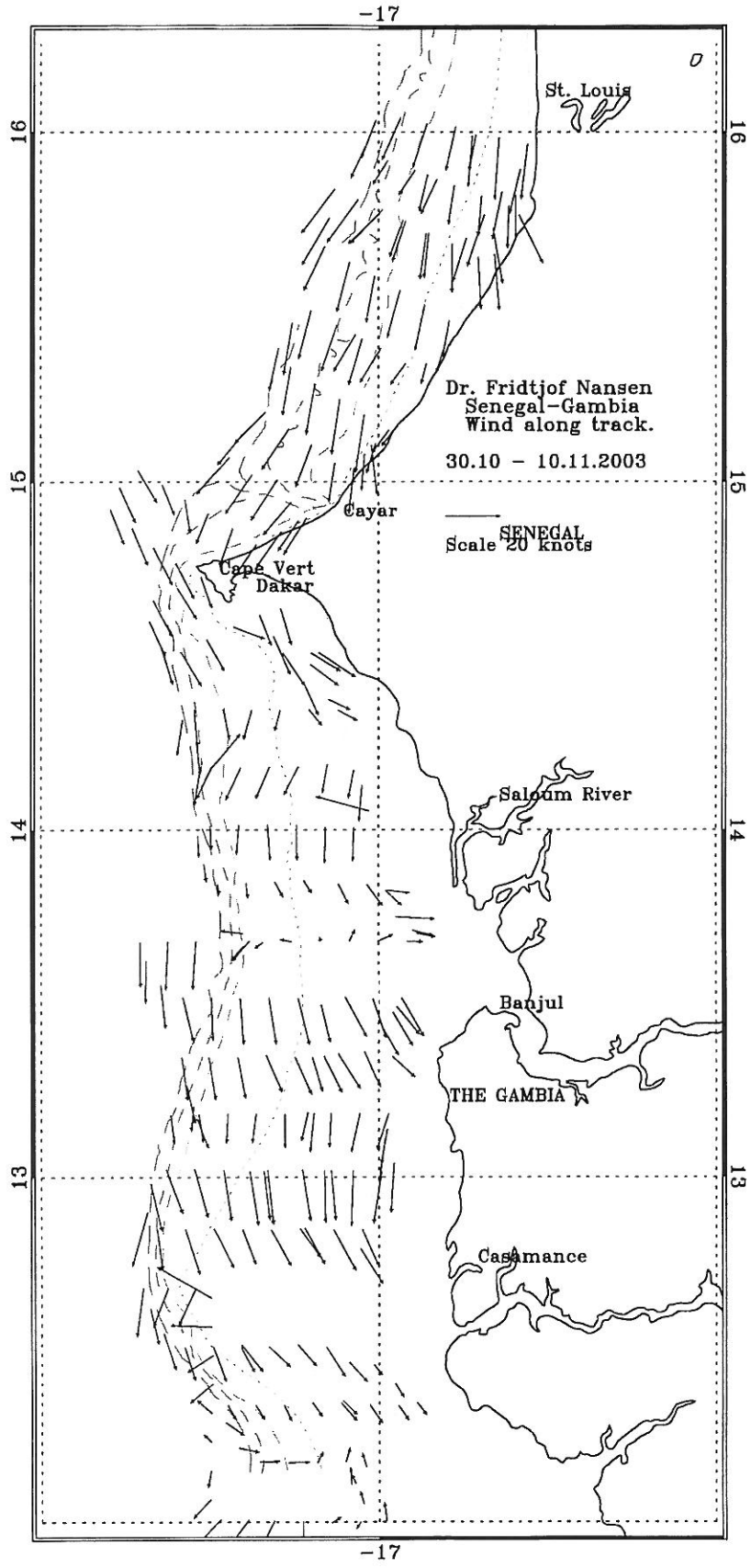


Figure 5. Wind speed and direction; Casamance to St. Louis.

3.2 The Casamance shelf

The main groups of pelagic fish for the shelf of Senegal and The Gambia illustrated with contoured acoustic densities are seen in Figure 6, Figure 7 and Figure 8.

Off the Casamance coast, sardinella was found in medium and high density in shallow waters, mostly inside the 50 m depth line, The main concentrations where found around the 20 m depth contour in a continues band into Gambian waters, Figure 6. Both species of sardinella where found in the area but trawl avoidance maid it difficult to get representative samples. In some cases sardinella was only identified on the surface while trawl catches yielded almost nothing. The division of biomass between the two species are dependent on representative trawl samples and some care should therefore be taken when interpreting the results. The modal size of *S. maderensis* in the area was 24 cm (total length) while the modal size of *S. aurita* was 25 cm. Estimated number and biomass by length-groups can be found in Annex IV. The total biomass of sardinellas in the area was estimated at 208 thousand tonnes, Table 3.

No Cunene horse mackerels (*T. trecae*) were found in the area.

Other pelagic fish were found over large parts of the shelf similar to the June 2003 survey. In general both carangids other than horse mackerel, scombrids, hairtails, barracudas where found in the area, Table 4. The catches where dominated by *Brachydeuterus auritus*, *Chloroscombrus chrysurus* and *Galeoides decadactylus*. The species where well mixed with the sardinellas where their distribution overlapped, Figure 8. The estimated biomass of this group of fish was 79 thousand tonnes.

Table 3. Casamance. Biomass estimates of pelagic fish, thousand tonnes.

Flat sardinella	Round sardinella	Horse mackerel	Carangids etc.
140	68	-	79

Table 4. Catch by stations sorted by groups (in kg/hour)

ST.NO.	DEP.	Clupeids	Carangids	Scombrids	Hairtails	Barracudas	Other
2035	17	62.0	184.6	3.1	14.6	14.4	275.7
2036	10	46.6	32.6	11.8	13.6	62.6	340.6
2037	18	1.4	133.5		0.5		15.1
2038	39	0.9	15.4		1.5		8.1
2039	1	258.4	217.8			2.3	19.6
2040	27	3.8	30.8				496.6
2041	20	692.0	162.5	5.5			4.6
2042	11	7800.0	21166.7				900.0

3.3 The Gambian shelf

The main distribution area of sardinellas found in the Casamance area continued throughout the Gambian waters with the main concentrations around 20 m depth. The distribution did not go beyond the 50 m isobath, Figure 4. Both species of sardinella was found in the area, but also here with a dominance of flat sardinella. The total estimate of sardinellas in the Gambian waters during this survey was 239 000 tons Table 5. This comprised of 203 000 tons of flat sardinella and 36 000 tons of round sardinella. The modal length of flat sardinella was 23 cm while round sardinella had a modal length of 25 cm. The estimated number and biomass by length-groups are in Annex IV.

Some Cunene horse mackerel was found in a thin band on the shelf break at around 100 m depth, extending in the north into a larger area south of Cape Vert, Figure 7. The densities were low with an estimated biomass of 6 thousand tonnes, Table 5. The biomass was estimated for *T. trecae* only since *Decapterus rhonchus* was caught in very small quantities. The size distribution of horse mackerel in the area consisted of two modal peaks, one at 13 cm and one at 19 cm.

Carangids and associated species were found in low to medium density widely distributed over the shelf, Figure 8. The catches of this group where dominated by *Brachydeuterus auritus*, *Chloroscombrus chrysurus* and *Galeoides decadactylus* as in the Casamance area. The biomass was estimated at 46 thousand tonnes.

Table 5. The Gambia. Biomass estimates of pelagic fish, thousand tonnes.

Flat sardinella	Round sardinella	Horse mackerels	Carangids etc.
203	36	6	46

Table 6. Catch by stations sorted by groups (in kg/hour)

ST.NO.	DEP.	Clupeids	Carangids	Scombrids	Hairtails	Barracudas	Other
2043	17	52.9	4.4				73.4
2044	5	187.8	9.8				662.4
2045	15	0.5	2.1				
2046	106						730.7
2047	10	19.4	578.6	69.8	26.9	27.0	719.4
2048	10	378.0	445.4			6.7	786.5

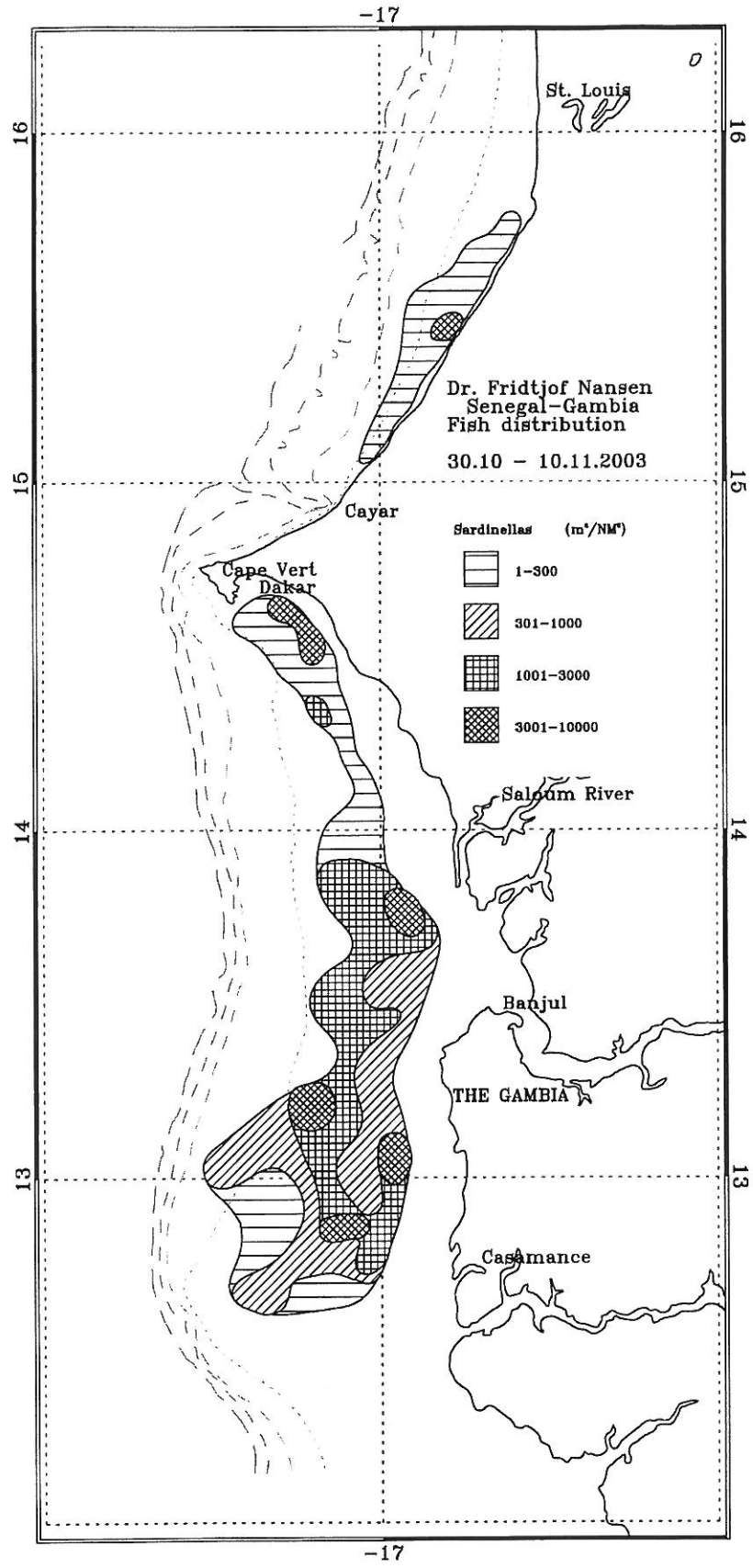


Figure 6. Distribution of sardinellas; Casamance to St. Louis.

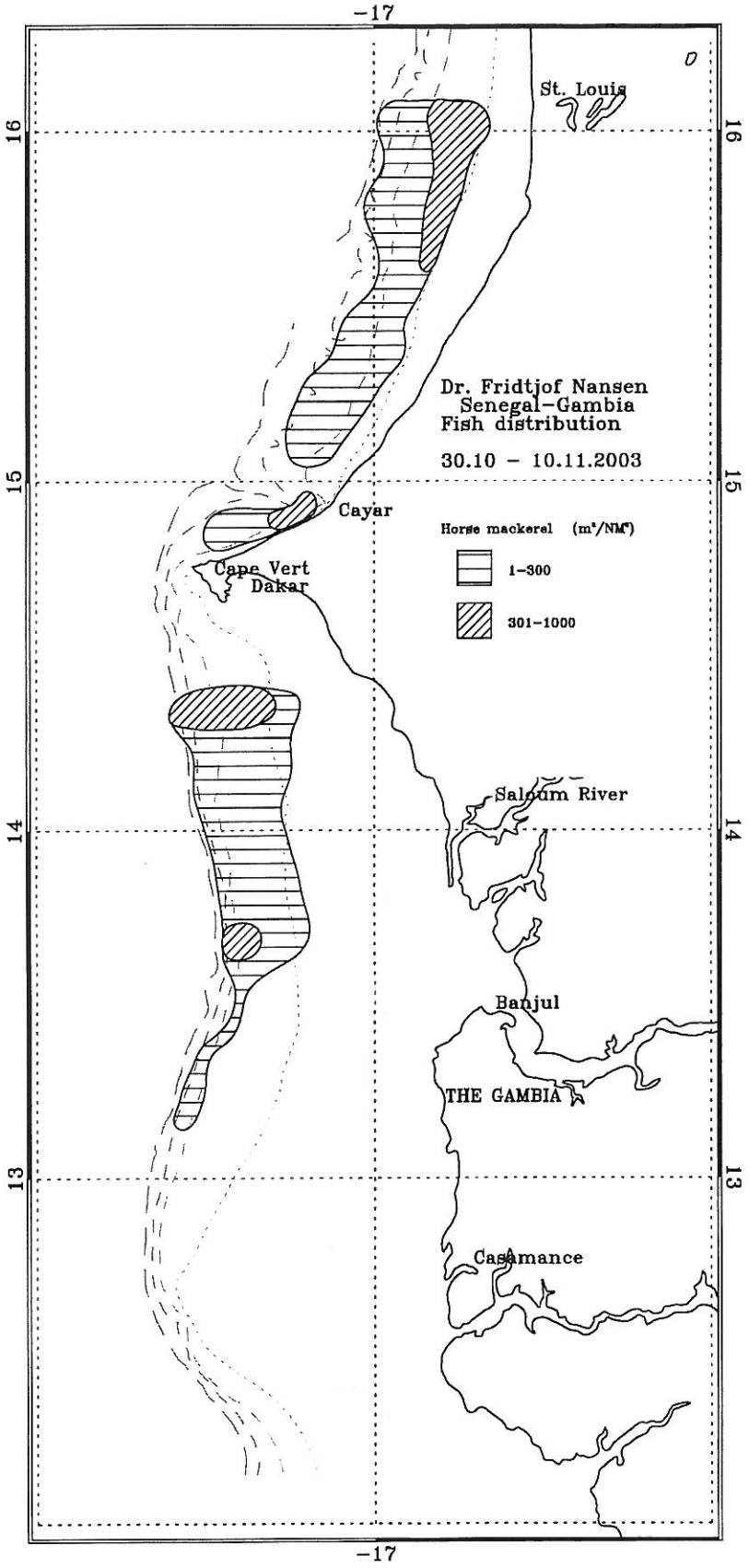


Figure 7. Horse mackerels; Casamance to St. Louis.

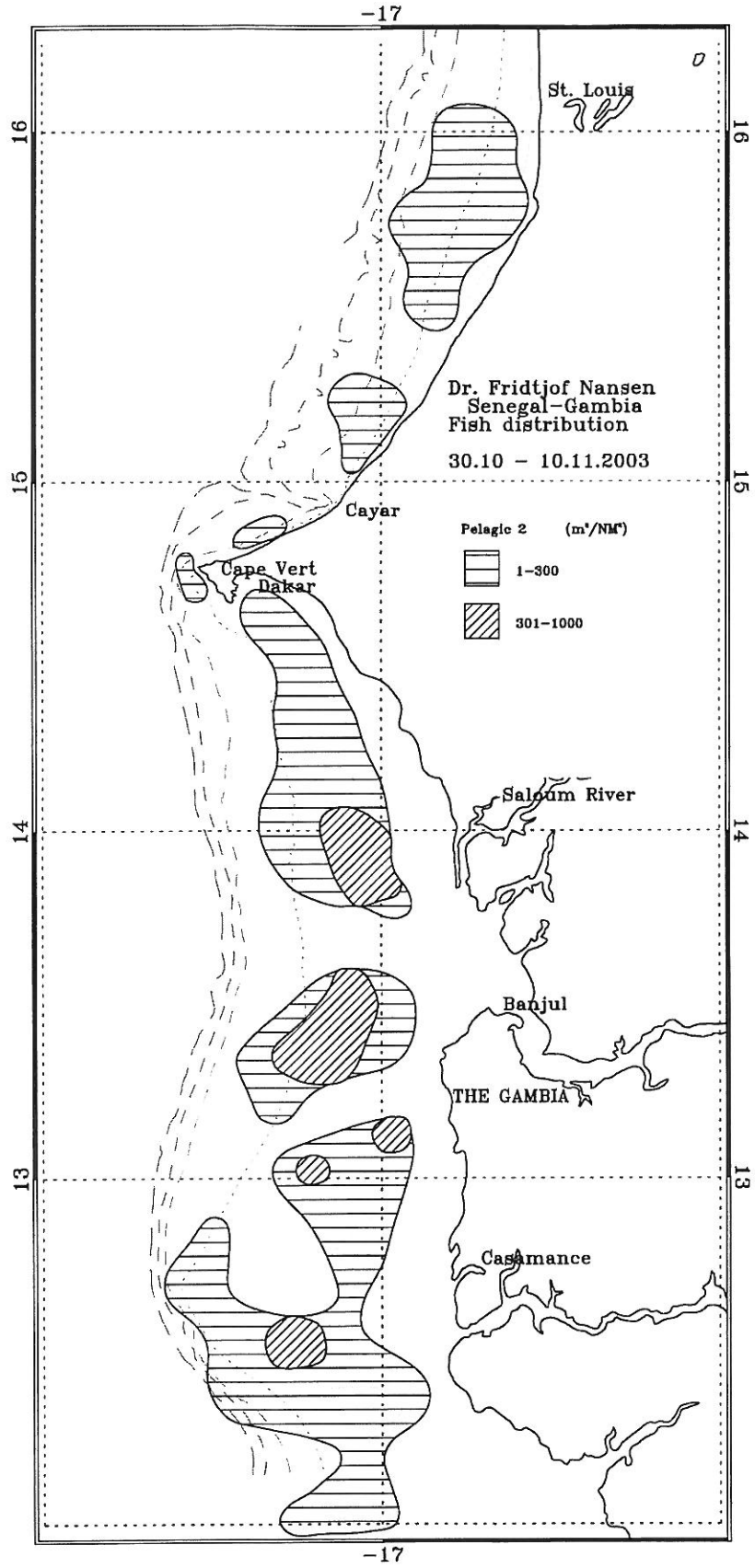


Figure 8. Carangids and associated species; Casamance to St. Louis

3.4 The Gambian border – Cape Vert

The distribution of Sardinellas continued from the Gambian border to Cape Vert, but with a more narrow distribution area than further south, Figure 6. Medium densities were found around the 20 m isobath with high density in a small area close to Dakar. Table 7 shows the biomass estimates for the two sardinella species, flat sardinella was estimated at 126 000 tons while, 16 000 tons of round sardinella was found. Pooled length compositions of samples showed a modal peak for flat sardinella at 24 cm. Round sardinella had a modal length at 15 cm, see Annex IV. Estimated number and biomass by length-groups are in Annex IV.

The horse mackerels in this area were distributed from the border to Gambia and further north to approximately 14°30'N. The distribution was continues along the shelf break around 100 m and continued inshore on the shelf to approximately the 50 m isobath, Figure 7. The total biomass was estimated at 74 thousand tons. Only small densities of *Decapterus rhonchus* where found and no separate estimate were calculated for this species. The *T. trecae* had two modal peaks in the area, one at 13 cm and one at 19 cm.

Also here, the carangids and associated pelagic fish were distributed over most of the area. The distribution was separated from the distribution off Gambia with a narrow band of very low acoustic density. The dominating species was however slightly different with higher concentrations of *Boops boops* than in the areas further south, in addition to the *Brachydeuterus auritus* who dominated in the whole region, Figure 6 and Table 8. The biomass of the carangids and associated pelagic fish was estimated at about 43 thousand tonnes, Table 7.

Table 7. The Gambia border to Dakar. Biomass estimates of pelagic fish, thousand tonnes.

Flat sardinella	Round sardinella	Horse mackerels	Carangids etc.
126	16	74	43

Table 8 Catch by stations sorted by groups (in kg/hour)

ST.NO.	DEP.	Clupeids	Carangids	Scombrids	Hairtails	Barracudas	Other
2049	80		171.9	0.9			1.9
2050	10	875.1	40.8	3.5		6.0	97.8
2051	10	854.0	622.8			20.6	381.2
2052	103	291.4	3748.6				393.9
2053	13	11.7	51.0	2.2			

3.5 Cape Vert - St. Louis

Sardinellas were found in a narrow band along the coast from to about 50 m depth. The distribution started north of Cayar and continued to approximately 15°45'N, see Figure 6. The area was dominated by juveniles <10 cm, and the modal length of round sardinella was 9 cm while flat sardinella had two modal peaks, one at 8 cm and one at 26 cm. The biomass estimate of round sardinella was 1 300 tons while flat sardinella was estimated at 6 000 tons, Table 9.

Cunene horse mackerel were found in two medium to low density areas, one small area just north of Cape Vert, and the other from Cayar canyon and northwards to the border from 200 mdepth to 50 m depth, Figure 7. The distribution was almost identical, but somewhat deeper, to the distribution of horse mackerel found during the June-July survey 2003. Only small densities of *Decapterus rhonchus* where found in the area and no separate estimate were calculated for this species. The biomass of Cunene horse mackerel was estimated at 54 thousand tonnes. The modal lengths of the Cunene horse mackerel in the area were 14, 19 and 24 cm, the two first roughly corresponding to one and two year old fish.

Three low density areas of Carangids and associated pelagic fish were found between Cape Vert and St. Louis, one on each side of the Cayar Canyon and one from approximately 15°30 N to the border with Senegal. The distribution was relatively wide, from 20 m depth and offshore, to more than 100 m some places, Figure 8. The dominant species in the catches where *Brachydeuterus auritus, Chloroscombrus chrysurus* and *Boops boops*, Table 10. The biomass estimate was 17 thousand tonnes, Table 9.

Table 9. Dakar to St. Louis. Biomass estimates of pelagic fish, thousand tonnes.

Flat sardinella	Round sardinella	Horse mackerels	Carangids etc.
6	1,3	54	17

Table 10. Catch by stations sorted by groups (in kg/hour)

ST.NO.	DEP.	Clupeids	Carangids	Scombrids	Hairtails	Barracudas	Other
2054	84		3281.7			6.9	924.6
2055	18	0.0	18.8			0.6	3.5
2056	10	326.9	157.0	12.9	13.6		159.0
2057	5	1.4	651.6	8.9	4.3	6.7	55.0
2058	44	0.3	0.7		5.1		191.6
2059	94	25.8	542.5		1.7	3.4	383.7
2060	66	36.8	1150.4			2.4	43.1
2061	10	34.1	64.6		22.0		70.4
2062	20	1.0	237.6	38.4	5.0	1.3	3.2
2063	35		179.2			1.2	13.0

3.6 Mont de Kayar

The seamount 'Mont de Kayar' has not been surveyed during the resent 'Dr. Fridtjof Nansen' surveys. However, time was available during this survey to check if any pelagic fish concentrations could be found at the seamount. No pelagic fish concentrations where found in this area.

CHAPTER 4 OVERVIEW AND SUMMARY OF RESULTS

The survey was conducted successfully from 30th October to 10th November, covering a course track of approximately 1 350 NM, excluding the steaming to, and from the survey area to Dakar. A total of 28 fishing stations and 58 CTD casts were established.

The hydrographical data showed a stable surface layer at approximately 30 m depth for the whole shelf south of Dakar. The surface water in Casamance area and The Gambia showed low salinity, probably due to runoff from the rivers in the area. The shelf from Dakar and north to St. Louis was cooler than in the south with lower temperatures along the coast than offshore. The shelf was well oxygenated in the whole survey area.

Sardinellas were found in one main area, between Casamance and Dakar, Figure 6. Both species of sardinella was mixed in the area but with flat sardinella dominating by 80%. North of Dakar only 6 000 tons of sardinella was found. Both species where mixed also in this area, with the same proportion of species as further south. The division of biomass between length and species are dependent on representative trawl samples. However, sardinella shows strong trawl avoidance and some care should therefore be taken when interpreting the results.

Horse mackerels were found in two main areas; one between The Gambia and Cape Vert and one between Cayar and the border to Mauritania, in addition to, one small distribution was found between Cayar and Cape Vert, Figure 7. The total estimate of Cunene horse mackerel was 134 thousand tonnes. No separate estimate was made for *Decapterus rhonchus* as they where only found in very small concentrations.

Other carangids and associated species were distributed over most of the shelf, mostly at <100 m water depth, at rather low densities, Figure 8. The main species in the catches of this group consisted of *Brachydeuterus auritus, Chloroscombrus chrysurus, Galeoides decadactylus* and *Boops boops*. The total biomass was estimated at approximately 184 thousand tonnes.

An overview of the acoustic estimates of biomass of the main groups of pelagic fish is shown in Table 11, and the geographical distribution and abundance of main species is in Figure 9. The total biomass of sardinellas was thus 597 thousand tonnes, horse mackerels 134 thousand tonnes and of carangids and associated species 185 thousand tonnes.

Table 11. Summary of biomass estimates of pelagic fish, Senegal and the Gambia. thousand tonnes.

	Flat sardinella	Round sardinella	Horse mackerel	Carangids etc.
St. Louis-Dakar	6	1,3	54	79
Dakar-the Gambia	126	16	73	46
The Gambia	203	36	6	43
Casamance	140	68	-	17
Total	475	122	134	185

Table 12 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. Compared with the November survey last year, which gave 910 thousand tons, this survey found less sardinella. The current survey estimate is also slightly lower than the June-July survey this year that gave 670 thousand tonnes of sardinellas. The estimate of Cunene horse mackerel from this year, 134 thousand tons, is slightly higher than the estimated 125 thousand tons of Cunene horse mackerel during the June-July survey and two times higher than the 62 000 tons found during the November 2002 survey. The total estimate of carangids and associated species (including the horse mackerel) was estimated at 319 thousand tons. This is very low compared to the 610 thousand tonnes found during the June-July survey this year, but higher than the estimated 260 000 tons in November 2002. The large fluctuations between these three estimates probably reflect seasonal variation in availability of the fish for the survey caused by changes in the distributional pattern of these species.

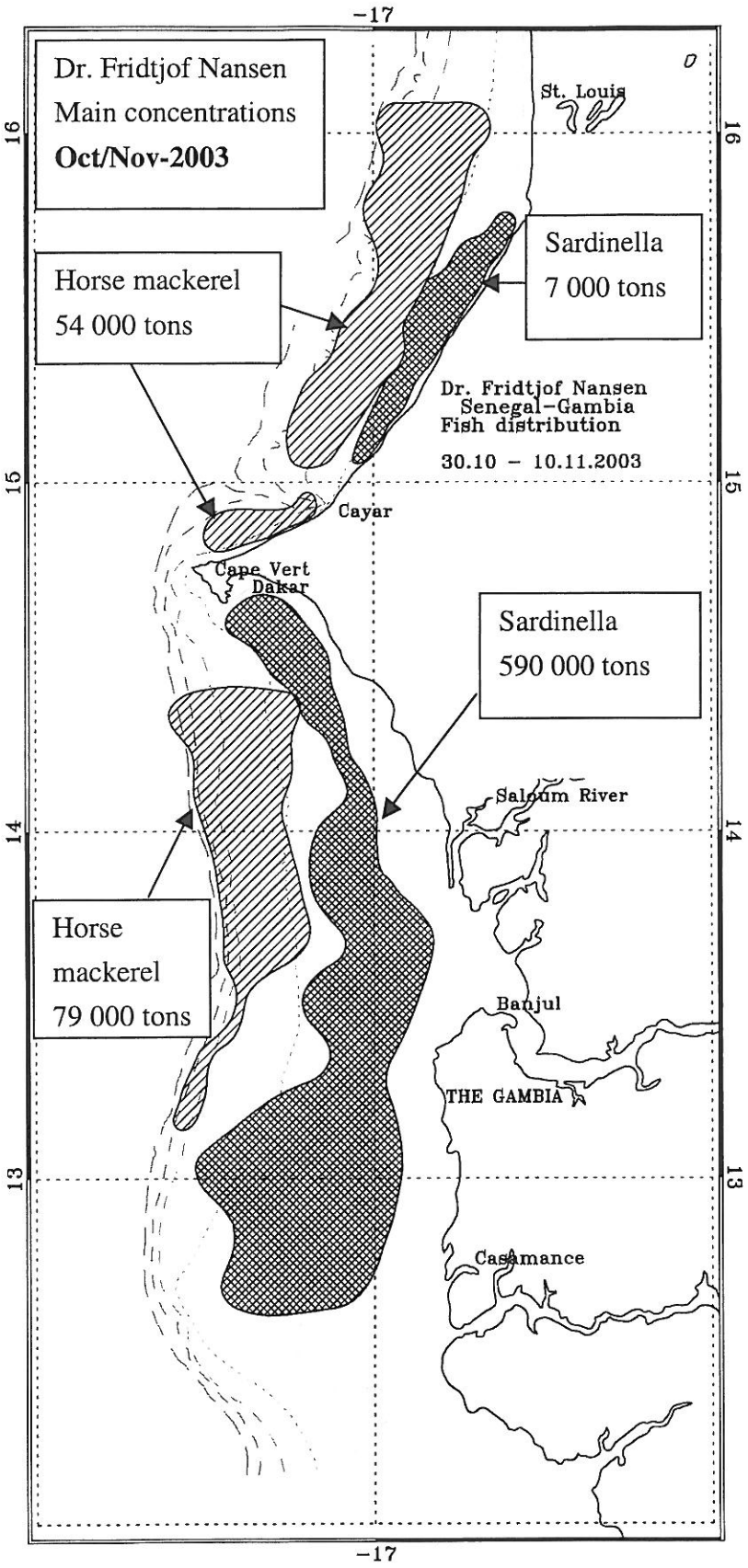


Figure 9. Major pelagic fish concentrations with estimated biomass (tonnes), Senegal and The Gambia.

Table 12. Biomass estimates from previous 'Dr Fridtjof Nansen' surveys of Senegal - The Gambia shelf in thousand 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	230	530
NovDec-97	300	250
NovDec-98	390	340
NovDec-99	1 390	470
NovDec-00	300	540
JunJul-01	410	230
NovDec-01	430	480
JunJul-02	600	430
NovDec-02	910	260
JunJul-03	670	610
NovDec-03	597	319

* Horse mackerels and other carangids

** 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.

RESUME

La campagne a été conduite avec succès durant la période du 30 octobre au 10 novembre selon un parcours d'une longueur approximative de 1350 milles nautiques. Au total, 28 stations de pêche de contrôle et 58 stations CTD ont été réalisées.

Les données hydrographiques révèlent une stabilité de la température des eaux de la surface à environ 30 m de profondeur pour toute la zone située au sud, de Dakar.tandis que la salinité des eaux de surface en Casamance et en Gambie est assez faible, du certainement a la proximité des fleuves du même nom. Les températures au nord de Dakar ont été plus faibles, celles ci diminuant du large vers la cote. Les eaux dans l'ensemble sont bien oxygènes sur tout le parcours effectué.

Les sardinelles ont été rencontrées principalement dans la zone s'étendant Dakar en Casamance. Les deux espèces de sardinelles étaient mélangées, avec une prédominance a 80 % de la sardinelle plate. Au nord de Dakar seule une faible concentration de 6 milles tonnes a été rencontrée. La répartition de la biomasse selon les tailles et les espèces est fonction de la représentativité des échantillons issus de la pêche et des précautions doivent être observées dans l'interprétation des résultats compte tenu du fort taux d'évitement des sardinelles.

Les chinchards ont été rencontrés essentiellement dans deux zones: la première entre Gambie Cap Vert et la seconde entre Cayar et StLouis, avec quelques traces entre Cayar et Dakar. La biomasse totale des chinchards noirs est évaluée à 134 milles tonnes, la proportion des chinchards jaunes n'étant pas estimée å cause de la valeur très faible des concentrations rencontrées pour cette espèce..

Les autres carangidés et espèces associées sont régulièrement distribués sur toute la côte avec de moindres densités. Les espèces principalement capturées ont été le *Brachydeuterus auritus, le Chloroscombrus chrysurus, Galeoides decadactylus* et le *le Boops boops*. La biomasse totale est estimée à 184 milles tonnes.

Le tableau 11 ci-dessous résume la biomasse pour chaque groupe de pélagiques ; la répartition géographique et l'abondance de ces espèces sont présentées en figure 9. Ainsi, la biomasse totale des sardinelles s'élève à 597 milles tonnes, celles de chinchards à134 milles tonnes et les carangidés et espèces associées sont estimées à 185 milles tonnes.

Le tableau 12 récapitule les biomasses totales estimées depuis 1981 par le N/O Dr Fridtjof Nansen; il s'agit de l'ensemble des sardinelles, chinchards, carangidés et associées sur les cotes sénégambiennes.

Il est maintenant bien connu de l'existence dans la sous région de flux migratoires à grande échelle de poissons pélagiques entre le Sahara de l'Ouest et la Guinée Bissau, et le repli des sardinelles vers le Sénégal en période chaude pour assurer la reproduction. La biomasse de 702 milles tonnes de sardinelles estimées cette campagne est inferieure à celle trouvée l'année à la même période et qui etait de 910 . milles tonnes ..La biomasse des chinchards est legerement supérieure aux 125 milles tonnes trouves en juin et represente le double des 62 milles tonnes de novembre 2002. .Les carangidés et associés sont estimés à 319 miles tonnes, ce qui est faible par rapport aux 610 milles de la campagne de juin mais supérieure aux 260 milles tonnes de novembre 2002 Les fortes variations de ces estimations reflètent certainement des variations saisonnières dans la distribution de ces espèces

Annex I Records of fishing stations

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2035
DATE:31/10/03 GEAR TYPE: BT No: POSITION:Lat N 1208
start stop duration Long W 1704
TIME :16:00:10 16:30:04 30 (min) Purpose code: 1
LOG :5500.23 5502.02 1.78 Area code : 4
FDEPTH: 16 18 GearCond.code:
BDEPTH: 16 18 Validity code:
Towing dir: 214º Wire out: 100 m Speed: 32 kn*10

Sorted: 29 Kg Total catch: 277.19 CATCH/HOUR: 554.38

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Chloroscombrus chrysurus	135.20	1968	24.39	
Ilisha africana	60.00	2864	10.82	
Galeoides decadactylus	58.88	208	10.62	
Brachydeuterus auritus	44.00	384	7.94	
Arius heudeloti	43.04	96	7.76	
Pteroscion peli	41.28	416	7.45	
Hemicaranx bicolor	35.20	288	6.35	
Pseudotolithus senegalensis	26.70	64	4.82	
Stromateus fiatola	16.72	26	3.02	
Trichiurus lepturus	14.56	400	2.63	
Sphyraena guachancho	14.40	24	2.60	
Selene dorsalis	14.24	80	2.57	
Rhizoprionodon acutus	13.90	6	2.51	
Pentanemus quinquarius	6.56	32	1.18	
Parapandalus narval	6.40	1088	1.15	
Cynoglossus canariensis	6.30	20	1.14	
Sepiella ornata	5.12	32	0.92	
Scomberomorus tritor	3.08	4	0.56	
Portunus validus	2.68	12	0.48	
Cynoglossus monodi	2.54	6	0.46	
Elops lacerta	1.62	2	0.29	
Sardinella aurita	0.98	2	0.18	
Sardinella maderensis	0.98	2	0.18	
Total	554.38		100.02	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2036
DATE:31/10/03 GEAR TYPE: PT No: 3 POSITION:Lat N 1221
start stop duration Long W 1705
TIME :23:18:05 23:33:27 15 (min) Purpose code: 1
LOG :5564.73 5565.69 0.96 Area code : 4
FDEPTH: 10 10 GearCond.code:
BDEPTH: 26 26 Validity code:
Towing dir: 270º Wire out: 100 m Speed: 35 kn*10

Sorted: 50 Kg Total catch: 126.97 CATCH/HOUR: 507.88

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Brachydeuterus auritus	254.40	2656	50.09	
Sphyraena guachancho	62.60	152	12.33	
Ilisha africana	46.56	3488	9.17	
Selene dorsalis	30.08	224	5.92	
Galeoides decadactylus	25.44	80	5.01	
Brachydeuterus auritus Juv.	25.12	4400	4.95	
Arius parkii	16.00	32	3.15	
Trichiurus lepturus	13.60	1312	2.68	
Scomberomorus tritor	11.84	12	2.33	
Stromateus fiatola	7.12	8	1.40	
Albula vulpes	6.72	4	1.32	
Pomadasys jubelini	3.60	4	0.71	
Selene dorsalis, juveniles	2.56	592	0.50	
Penaeus sp.	1.92	800	0.38	
Loligo vulgaris	0.32	384	0.06	
Total	507.88		100.00	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2037
DATE: 1/11/03 GEAR TYPE: PT No: 1 POSITION:Lat N 1231
start stop duration Long W 1726
TIME :05:43:55 06:03:54 20 (min) Purpose code: 1
LOG :5619.98 5621.23 1.24 Area code : 4
FDEPTH: 20 15 GearCond.code: 1
BDEPTH: 39 33 Validity code: 1
Towing dir: 90º Wire out: 80 m Speed: 35 kn*10

Sorted: 50 Kg Total catch: 50.18 CATCH/HOUR: 150.54

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Alectis alexandrinus	101.40	237	67.36	
Caranx crysos	27.45	18	18.23	
Pomadasys peroteti	14.01	21	9.31	
Decapterus rhonchus	4.62	9	3.07	
Sardinella maderensis	1.44	6	0.96	
Loligo vulgaris	0.63	267	0.42	
Trichiurus lepturus	0.54	63	0.36	
Alloteuthis africana	0.21	21	0.14	
Sepia orbignyana	0.21	21	0.14	
Pagellus bellottii	0.03	21	0.02	
Total	150.54		100.01	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2038
DATE: 1/11/03 GEAR TYPE: BT No: 8 POSITION:Lat N 1241
start stop duration Long W 1724
TIME :13:01:11 13:31:23 30 (min) Purpose code: 1
LOG :5666.66 5668.19 1.53 Area code : 4
FDEPTH: 37 40 GearCond.code:
BDEPTH: 37 40 Validity code:
Towing dir: 270º Wire out: 160 m Speed: 30 kn*10

Sorted: 13 Kg Total catch: 12.93 CATCH/HOUR: 25.86

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Selene dorsalis	11.00	60	42.54	
Alloteuthis africana	5.94	2602	22.97	
Alectis alexandrinus	4.40	6	17.01	
Trichiurus lepturus	1.46	4	5.65	
Arius parkii	0.84	2	3.25	
Sardinella maderensis	0.82	4	3.17	
Fistularia petimba	0.46	4	1.78	
Penaeus sp.	0.38	3230	1.47	
Psettodes belcheri	0.30	2	1.16	
C R A B S	0.22	2	0.85	
Sardinella aurita	0.04	2	0.15	
Total	25.86		100.00	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2039
DATE: 1/11/03 GEAR TYPE: PT No: 1 POSITION:Lat N 1248
start stop duration Long W 1703
TIME :17:09:15 17:25:03 16 (min) Purpose code: 1
LOG :5698.98 5700.05 1.06 Area code : 4
FDEPTH: 1 1 GearCond.code:
BDEPTH: 17 17 Validity code:
Towing dir: 220º Wire out: 80 m Speed: 40 kn*10

Sorted: 133 Kg Total catch: 132.84 CATCH/HOUR: 498.15

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardinella maderensis	258.38	2085	51.87	3402
Chloroscombrus chrysurus	216.00	4436	43.36	
Sepia officinalis hierredda	16.39	26	3.29	
Brachydeuterus auritus	3.23	38	0.65	
Sphyraena guachancho	2.33	4	0.47	
Decapterus rhonchus	0.94	4	0.19	
Trachinotus ovatus	0.90	4	0.18	
Total	498.17		100.01	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2040
DATE: 1/11/03 GEAR TYPE: BT No: 8 POSITION:Lat N 1251
start stop duration Long W 1712
TIME :19:25:39 19:45:44 20 (min) Purpose code: 1
LOG :5717.73 5718.76 1.02 Area code : 4
FDEPTH: 27 26 GearCond.code:
BDEPTH: 27 26 Validity code:
Towing dir: 90º Wire out: 150 m Speed: 30 kn*10

Sorted: 42 Kg Total catch: 177.07 CATCH/HOUR: 531.21

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Brachydeuterus auritus	225.54	2610	42.46	
Galeoides decadactylus	115.20	522	21.69	
Eucinostomus melanopterus	66.06	684	12.44	
Pomadasys peroteti	19.29	42	3.63	
Arius parkii	15.48	18	2.91	
Cynoponticus ferox	14.40	72	2.71	
Alectis alexandrinus	10.86	6	2.04	
Decapterus rhonchus	9.90	234	1.86	
Pomadasys jubelini	6.84	72	1.29	
Balistes capriscus	6.75	6	1.27	
Sepia officinalis hierredda	5.07	9	0.95	
Pagellus bellottii	4.68	126	0.88	
Trachinotus ovatus	4.32	18	0.81	
Lutjanus dentatus	4.14	18	0.78	
Sardinella maderensis	3.78	216	0.71	
Decapterus punctatus	3.60	162	0.68	
Sparus caeruleostictus *	2.88	12	0.54	
Pseudupeneus prayensis	2.70	72	0.51	
Trachinocephalus myops	2.52	54	0.47	
Dicologoglossa cuneata	2.34	36	0.44	
Chloroscombrus chrysurus	2.16	24	0.41	
Syacium micrurum	1.26	36	0.24	
Penaeus kerathurus	0.90	72	0.17	
Parapenaeus longirostris	0.54	36	0.10	
Total	531.21		99.99	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2041
DATE: 2/11/03 GEAR TYPE: PT No: 1 POSITION:Lat N 1301
start stop duration Long W 1720
TIME :02:48:53 03:18:39 30 (min) Purpose code: 1
LOG :5781.60 5783.46 1.84 Area code : 4
FDEPTH: 20 20 GearCond.code:
BDEPTH: 43 46 Validity code:
Towing dir: 270º Wire out: 80 m Speed: 40 kn*10

Sorted: 67 Kg Total catch: 432.29 CATCH/HOUR: 864.58

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardinella aurita	542.00	3588	62.69	3403
Sardinella maderensis	150.00	1026	17.35	3404
Chloroscombrus chrysurus	134.00	1532	15.50	
Selene dorsalis	20.28	142	2.35	
Scomber japonicus	5.46	12	0.63	
Trachurus trecae	4.16	26	0.48	
Selar crumenophthalmus	3.64	12	0.42	
Brachydeuterus auritus	2.98	26	0.34	
Arius parkii	1.66	2	0.19	
Decapterus punctatus	0.38	12	0.04	
Total	864.56		99.99	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2042
DATE: 2/11/03 GEAR TYPE: PT No: 1 POSITION:Lat N 1301
start stop duration Long W 1709
TIME :05:20:11 05:28:58 9 (min) Purpose code: 1
LOG :5800.21 5800.84 0.62 Area code : 4
FDEPTH: 10 12 GearCond.code:
BDEPTH: 28 29 Validity code:
Towing dir: 270º Wire out: 80 m Speed: 40 kn*10

Sorted: 59 Kg Total catch: 4480.00 CATCH/HOUR: 29866.67

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Chloroscombrus chrysurus	21000.00	280127	70.31	
Sardinella maderensis	4800.00	57160	16.07	3406
Sardinella aurita	3000.00	20600	10.04	3405
Brachydeuterus auritus	900.00	9787	3.01	
Selar crumenophthalmus	133.33	513	0.45	
Decapterus rhonchus	33.33	513	0.11	
Total	29866.66		99.99	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2043
DATE: 2/11/03 GEAR TYPE: BT No: 8 POSITION:Lat N 1309
start stop duration Long W 1658
TIME :08:18:18 08:38:45 20 (min) Purpose code: 1
LOG :5826.63 5827.84 1.20 Area code : 5
FDEPTH: 17 17 GearCond.code:
BDEPTH: 17 17 Validity code:
Towing dir: 200º Wire out: 100 m Speed: 30 kn*10

Sorted: 44 Kg Total catch: 43.53 CATCH/HOUR: 130.59

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Brachydeuterus auritus	66.75	840	51.11	
Sardinella maderensis	43.20	414	33.08	3408
Sardinella aurita	9.66	63	7.40	3407
Ephippion guttifer	4.71	6	3.61	
Decapterus rhonchus	4.08	21	3.12	
Arius latiscutatus	1.14	3	0.87	
Galeoides decadactylus	0.75	6	0.57	
Chloroscombrus chrysurus	0.30	6	0.23	
Total	130.59		99.99	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2044
DATE: 2/11/03 GEAR TYPE: PT No: 3 POSITION:Lat N 1309
start stop duration Long W 1658
TIME :09:21:39 09:34:01 12 (min) Purpose code: 1
LOG :5832.18 5833.04 0.86 Area code : 5
FDEPTH: 5 5 GearCond.code:
BDEPTH: 17 17 Validity code:
Towing dir: 200º Wire out: 90 m Speed: 38 kn*10

Sorted: 34 Kg Total catch: 171.99 CATCH/HOUR: 859.95

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Galeoides decadactylus	654.00	4700	76.05	
Sardinella maderensis	137.25	1410	15.96	3410
Sardinella aurita	50.50	345	5.87	3409
Eucinostomus melanopterus	7.20	80	0.84	
Trachinotus ovatus	5.25	35	0.61	
Decapterus rhonchus	3.45	10	0.40	
Brachydeuterus auritus	1.20	20	0.14	
Chloroscombrus chrysurus	1.10	25	0.13	
Total	859.95		100.00	

DR . FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2045
DATE: 2/11/03 GEAR TYPE: PT No: 3 POSITION:Lat N 1311
start stop duration Long W 1712
TIME :11:56:47 12:26:29 30 (min) Purpose code: 1
LOG :5853.41 5855.42 1.99 Area code : 5
FDEPTH: 10 20 GearCond.code:
BDEPTH: 39 36 Validity code:
Towing dir: 90ø Wire out: 130 m Speed: 40 kn*10

Sorted: 1 Kg Total catch: 1.33 CATCH/HOUR: 2.66

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Chloroscombrus chrysurus	1.62	18	60.90	
Trachinotus ovatus	0.52	4	19.55	
Sardinella maderensis	0.52	6	19.55	
Total	2.66		100.00	

DR . FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2046
DATE: 2/11/03 GEAR TYPE: BT No: 8 POSITION:Lat N 1313
start stop duration Long W 1733
TIME :16:18:47 16:33:48 15 (min) Purpose code: 1
LOG :5892.54 5893.26 0.71 Area code : 5
FDEPTH: 109 103 GearCond.code:
BDEPTH: 109 103 Validity code:
Towing dir: 167ø Wire out: 330 m Speed: 30 kn*10

Sorted: 52 Kg Total catch: 182.67 CATCH/HOUR: 730.68

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Dentex angolensis	445.60	3428	60.98	
Spicara alta	200.00	1064	27.37	
Dentex congoensis	39.20	168	5.36	
Dentex macrophthalmus	20.80	96	2.85	
Antigonia capros	12.72	392	1.74	
Leptocharias smithii	5.04	4	0.69	
Fistularia petimba	3.24	8	0.44	
Umbrina canariensis	1.88	4	0.26	
Zeus faber	1.80	28	0.25	
Pagellus bellottii	0.40	28	0.05	
Total	730.68		99.99	

DR . FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2047
DATE: 2/11/03 GEAR TYPE: PT No: 2 POSITION:Lat N 1321
start stop duration Long W 1709
TIME :21:00:33 21:30:40 30 (min) Purpose code: 1
LOG :5930.70 5932.26 1.54 Area code : 5
FDEPTH: 10 10 GearCond.code:
BDEPTH: 38 40 Validity code:
Towing dir: 270ø Wire out: 100 m Speed: 35 kn*10

Sorted: 61 Kg Total catch: 720.53 CATCH/HOUR: 1441.06

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Chloroscombrus chrysurus	376.80	4368	26.15	
Brachydeuterus auritus	345.40	3200	23.97	
Istiophorus albicans	331.60	12	23.01	
Selene dorsalis	135.20	1360	9.38	
Selar crumenophthalmus	50.08	192	3.48	
Euthynnus alletteratus	38.70	4	2.69	
Scomberomorus tritor	31.12	16	2.16	
Sphyraena guachancho	27.04	80	1.88	
Trichiurus lepturus	26.88	64	1.87	
Pomadasys incisus	24.32	128	1.69	
Galeoides decadactylus	15.36	32	1.07	
Decapterus rhonchus	10.40	48	0.72	
Sardinella aurita	9.92	64	0.69	
Sardinella maderensis	9.44	80	0.66	
Trachinotus ovatus	6.08	32	0.42	
Pagellus bellottii	2.72	16	0.19	
Total	1441.06		100.03	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2048
DATE: 3/11/03 GEAR TYPE: PT No: 7 POSITION:Lat N 1330
start stop duration Long W 1656
TIME :00:51:49 01:21:46 30 (min) Purpose code: 1
LOG :5960.30 5962.16 1.82 Area code : 5
FDEPTH: 10 10 GearCond.code:
BDEPTH: 18 19 Validity code:
Towing dir: 240ø Wire out: 120 m Speed: 40 kn*10

Sorted: 35 Kg Total catch: 808.28 CATCH/HOUR: 1616.56

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Brachydeuterus auritus	769.40	9234	47.59	
Chloroscombrus chrysurus	445.40	9774	27.55	
Sardinella maderensis	313.20	3024	19.37	2411
Ilisha africana	52.92	2322	3.27	
Sardinella aurita	11.88	54	0.73	
Brachydeuterus auritus Juv.	11.34	3996	0.70	
Sphyraena guachancho	6.70	30	0.41	
Pomadasys incisus	1.62	6	0.10	
Arius parkii	1.54	8	0.10	
Arius heudeloti	1.20	2	0.07	
Priacanthus arenatus	0.78	2	0.05	
Galeoides decadactylus	0.54	54	0.03	
Penaeus notialis	0.04	4		
Total	1616.56		99.97	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2049
DATE: 3/11/03 GEAR TYPE: PT No: 1 POSITION:Lat N 1341
start stop duration Long W 1724
TIME :12:55:20 13:21:11 26 (min) Purpose code: 1
LOG :6051.44 6052.97 1.52 Area code : 4
FDEPTH: 80 80 GearCond.code:
BDEPTH: 94 95 Validity code:
Towing dir: 180ø Wire out: 260 m Speed: 40 kn*10

Sorted: 75 Kg Total catch: 75.71 CATCH/HOUR: 174.72

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Trachurus trecae	171.92	2472	98.40	3412
Boops boops	1.36	21	0.78	
Scomber japonicus	0.85	2	0.49	
Fistularia tabacaria	0.58	2	0.33	
Total	174.71		100.00	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2050
DATE: 3/11/03 GEAR TYPE: PT No: 7 POSITION:Lat N 1344
start stop duration Long W 1655
TIME :17:51:06 18:15:01 24 (min) Purpose code: 1
LOG :6091.54 6093.08 1.53 Area code : 4
FDEPTH: 10 10 GearCond.code:
BDEPTH: 18 16 Validity code:
Towing dir: 131ø Wire out: 140 m Speed: 36 kn*10

Sorted: 33 Kg Total catch: 409.24 CATCH/HOUR: 1023.10

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardinella maderensis	861.00	8100	84.16	3413
Brachydeuterus auritus	80.40	930	7.86	
Chloroscombrus chrysurus	24.60	510	2.40	
Sardinella aurita	14.10	90	1.38	
Alectis alexandrinus	13.55	10	1.32	
Pomadasys incisus	8.70	90	0.85	
Pomadasys rogeri	8.53	18	0.83	
Sphyraena guachancho	5.95	20	0.58	
Sarda sarda	3.45	3	0.34	
Decapterus rhonchus	2.40	30	0.23	
Trachinotus ovatus	0.28	3	0.03	
Echeneis naucrates	0.15	3	0.01	
Total	1023.11		99.99	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2051
DATE: 3/11/03 GEAR TYPE: PT No: 7 POSITION:Lat N 1351
start stop duration Long W 1659
TIME :20:05:16 20:24:17 19 (min) Purpose code: 1
LOG :6106.76 6107.74 0.98 Area code : 4
FDEPTH: 10 10 GearCond.code:
BDEPTH: 17 18 Validity code:
Towing dir: 175º Wire out: 120 m Speed: 33 kn*10

Sorted: 100 Kg Total catch: 594.97 CATCH/HOUR: 1878.85

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardinella maderensis	764.21	7219	40.67	3415
Chloroscombrus chrysurus	591.98	9780	31.51	
Brachydeuterus auritus	363.98	4301	19.37	
Sardinella aurita	89.81	452	4.78	3414
Decapterus rhonchus	22.39	439	1.19	
Sphyraena guachancho	20.62	54	1.10	
Pomadasys incisus	12.79	79	0.68	
Alectis alexandrinus	7.89	3	0.42	
Sparus caeruleostictus *	2.08	9	0.11	
Galeoides decadactylus	1.61	19	0.09	
Sepia officinalis hierredda	0.76	3	0.04	
Trachinotus ovatus	0.54	3	0.03	
Total	1878.66		99.99	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2052
DATE: 4/11/03 GEAR TYPE: BT No: 8 POSITION:Lat N 1411
start stop duration Long W 1729
TIME :08:48:09 09:04:41 17 (min) Purpose code: 1
LOG :6228.09 6228.93 0.83 Area code : 4
FDEPTH: 101 104 GearCond.code:
BDEPTH: 101 104 Validity code:
Towing dir: 270º Wire out: 300 m Speed: 20 kn*10

Sorted: 96 Kg Total catch: 1256.24 CATCH/HOUR: 4433.79

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Trachurus trecae	3748.59	186145	84.55	3418
Boops boops	271.16	6607	6.12	
Sardinella aurita	241.80	8305	5.45	3416
Dentex angolensis	106.91	780	2.41	
Sardina pilchardus	49.55	2386	1.12	3417
Scorpaena stephanica	4.52	7	0.10	
Pagrus africanus	3.78	11	0.09	
Loligo vulgaris	3.07	7	0.07	
Zeus faber	1.69	11	0.04	
Serranus scriba	1.06	7	0.02	
Todaropsis eblanae	0.64	7	0.01	
Fistularia petimba	0.60	4	0.01	
Anthias anthias	0.28	7	0.01	
Antigonia capros	0.14	4		
Total	4433.79		100.00	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2053
DATE: 4/11/03 GEAR TYPE: PT No: 1 POSITION:Lat N 1431
start stop duration Long W 1713
TIME :16:20:08 16:50:08 30 (min) Purpose code: 1
LOG :6294.70 6296.70 1.97 Area code : 4
FDEPTH: 10 15 GearCond.code:
BDEPTH: 31 35 Validity code:
Towing dir: 270º Wire out: 80 m Speed: 40 kn*10

Sorted: 32 Kg Total catch: 32.45 CATCH/HOUR: 64.90

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Chloroscombrus chrysurus	47.50	98	73.19	
Sardinella maderensis	11.68	94	18.00	3419
Trachinotus ovatus	3.54	12	5.45	
Sarda sarda	1.68	2	2.59	
Euthynnus alletteratus	0.50	2	0.77	
Total	64.90		100.00	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2054
DATE: 5/11/03 GEAR TYPE: BT No: 8 POSITION:Lat N 1453
start stop duration Long W 1714
TIME :08:56:23 09:12:37 16 (min) Purpose code: 1
LOG :6424.35 6425.24 0.88 Area code : 4
FDEPTH: 81 86 GearCond.code:
BDEPTH: 81 86 Validity code:
Towing dir: 45º Wire out: 250 m Speed: 30 kn*10

Sorted: 77 Kg Total catch: 1123.51 CATCH/HOUR: 4213.16

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Trachurus trecae	3223.50	82170	76.51	3420
Boops boops	498.11	11573	11.82	
Dentex congoensis	236.36	6188	5.61	
Decapterus rhonchus	58.16	394	1.38	3421
Priacanthus arenatus	48.90	124	1.16	
Pseudupeneus prayensis	42.71	371	1.01	
Raja miraletus	29.10	64	0.69	
Pagellus bellottii	16.09	64	0.38	
Squatina oculata	14.06	4	0.33	
Sphoeroides marmoratus	12.38	495	0.29	
Diodon sp.	10.54	64	0.25	
Sphyraena guachancho	6.86	23	0.16	
Loligo vulgaris	6.15	26	0.15	
Fistularia petimba	5.25	34	0.12	
Scorpaena stephanica	4.43	11	0.11	
Illex coindetii	0.45	4	0.01	
Todaropsis eblanae	0.11	4		
Total	4213.16		99.98	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2055
DATE: 5/11/03 GEAR TYPE: PT No: 2 POSITION:Lat N 1506
start stop duration Long W 1702
TIME :16:14:22 16:44:53 31 (min) Purpose code: 1
LOG :6483.65 6485.49 1.74 Area code : 4
FDEPTH: 15 20 GearCond.code:
BDEPTH: 43 37 Validity code:
Towing dir: 210º Wire out: 120 m Speed: 35 kn*10

Sorted: 12 Kg Total catch: 11.84 CATCH/HOUR: 22.92

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Chloroscombrus chrysurus	10.43	56	45.51	
Alectis alexandrinus	4.80	2	20.94	
Sphyrna lewini	3.50	2	15.27	
Selene dorsalis	2.59	25	11.30	
Trachinotus ovatus	0.95	4	4.14	
Sphyraena guachancho	0.60	2	2.62	
Sardinella aurita	0.04	2	0.17	
Total	22.91		99.95	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2056
DATE: 5/11/03 GEAR TYPE: PT No: 7 POSITION:Lat N 1509
start stop duration Long W 1657
TIME :18:11:00 18:41:21 30 (min) Purpose code: 1
LOG :6495.58 6497.09 1.51 Area code : 4
FDEPTH: 10 10 GearCond.code:
BDEPTH: 20 20 Validity code:
Towing dir: 210º Wire out: 120 m Speed: 30 kn*10

Sorted: 67 Kg Total catch: 334.65 CATCH/HOUR: 669.30

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardinella maderensis	168.50	920	25.18	3424
Selene dorsalis	148.00	2070	22.11	
Brachydeuterus auritus	120.50	970	18.00	
Sardinella maderensis - Juv.	71.20	14490	10.64	3423
Ilisha africana	45.40	670	6.78	
Sardinella aurita - Juveniles	41.80	6830	6.25	3422
Stromateus fiatola	21.60	50	3.23	
Trichiurus lepturus	13.60	270	2.03	
Scomberomorus tritor	12.90	40	1.93	
Pomadasys rogeri	10.40	40	1.55	
Chloroscombrus chrysurus	9.00	60	1.34	
Lithognathus mormyrus	3.20	10	0.48	
Ephippion guttifer	3.00	10	0.45	
Sepiella ornata	0.30	20	0.04	
Total	669.40		100.01	

DR . FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2057
DATE: 6/11/03 GEAR TYPE: ?T No: 2 POSITION:Lat N 1502
start stop duration Long W 1707
TIME :00:12:55 00:42:45 30 (min) Purpose code: 1
LOG :6547.00 6548.80 3.72 Area code : 4
FDEPTH: 0 10 GearCond.code:
BDEPTH: 204 135 Validity code:
Towing dir: 300º Wire out: 150 m Speed: 40 kn*10

Sorted: 37 Kg Total catch: 363.97 CATCH/HOUR: 727.94

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Trachurus trecae	651.60	22920	89.51	3425
Brachydeuterus auritus	39.84	264	5.47	
MYCTOPHIDAE	12.96	7176	1.78	
Euthynnus alletteratus	8.92	20	1.23	
Sphyraena guachancho	6.70	56	0.92	
Trichiurus lepturus	4.32	24	0.59	
Ariomma bondi	2.16	72	0.30	
Sardina pilchardus	1.44	48	0.20	
Total	727.94		100.00	

DR . FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2058
DATE: 6/11/03 GEAR TYPE: BT No: 8 POSITION:Lat N 1519
start stop duration Long W 1653
TIME :02:35:00 03:05:05 30 (min) Purpose code: 1
LOG :6563.29 6564.90 1.59 Area code : 4
FDEPTH: 37 50 GearCond.code:
BDEPTH: 37 50 Validity code:
Towing dir: 118º Wire out: 150 m Speed: 30 kn*10

Sorted: 20 Kg Total catch: 98.85 CATCH/HOUR: 197.70

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Pseudotolithus sp.	106.50	4080	53.87	
Parapenaeus longirostris	26.40	11760	13.35	
Brachydeuterus auritus	12.60	840	6.37	
Brotula barbata	7.90	130	4.00	
Galeoides decadactylus	6.90	40	3.49	
Zeus faber	6.20	30	3.14	
Trichiurus lepturus	5.10	70	2.58	
Pomadasys peroteti	4.60	20	2.33	
Pseudupeneus prayensis	3.70	60	1.87	
Pseudotolithus senegalensis	3.00	80	1.52	
Octopus vulgaris	2.60	10	1.32	
Stromateus fiatola	2.20	10	1.11	
Bembrops sp.	2.10	130	1.06	
Gobius sp	1.80	30	0.91	
Umbrina canariensis	1.70	20	0.86	
Lophius sp.	1.50	40	0.76	
Arnoglossus imperialis	0.70	20	0.35	
Selene dorsalis	0.70	60	0.35	
Dicologoglossa cuneata	0.50	10	0.25	
Cynoglossus monodi	0.40	2	0.20	
Uranoscopus cadenati	0.30	10	0.15	
Ilisha africana	0.30	70	0.15	
Total	197.70		99.99	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2059
DATE: 6/11/03 GEAR TYPE: BT No: 8 POSITION:Lat N 1545
start stop duration Long W 1655
TIME :12:40:51 12:48:06 7 (min) Purpose code: 1
LOG :6636.78 6637.10 0.30 Area code : 4
FDEPTH: 93 94 GearCond.code:
BDEPTH: 93 94 Validity code:
Towing dir: 295º Wire out: m Speed: kn*10

Sorted: 44 Kg Total catch: 111.60 CATCH/HOUR: 956.57

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Trachurus trecae	537.00	22166	56.14	3426
Boops boops	234.00	17014	24.46	
Merluccius senegalensis	76.20	454	7.97	
Zeus faber	26.23	94	2.74	
Sardina pilchardus	25.80	1586	2.70	
Illex coindetii	24.34	763	2.54	
Dentex macrophthalmus	6.26	120	0.65	
Sphoeroides pachgaster	6.17	34	0.65	
Decapterus rhonchus	5.49	9	0.57	
C R A B S	5.14	326	0.54	
Sphyraena guachancho	3.43	9	0.36	
Lagocephalus laevigatus	2.14	9	0.22	
Trichiurus lepturus	1.71	26	0.18	
Brachydeuterus auritus	1.63	9	0.17	
Pteroscion peli	1.54	60	0.16	
Total	957.08		100.05	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2060
DATE: 6/11/03 GEAR TYPE: BT No: 8 POSITION:Lat N 1542
start stop duration Long W 1650
TIME :14:50:00 15:19:55 30 (min) Purpose code: 1
LOG :6648.55 6649.55 1.00 Area code : 4
FDEPTH: 61 71 GearCond.code:
BDEPTH: 61 71 Validity code:
Towing dir: 295º Wire out: 220 m Speed: 30 kn*10

Sorted: 40 Kg Total catch: 616.00 CATCH/HOUR: 1232.00

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Trachurus trecae	982.00	15280	79.71	3427
Trachurus trecae, juvenile	148.00	11038	12.01	3428
Sardina pilchardus	36.80	2156	2.99	
Brachydeuterus auritus	19.60	1470	1.59	
Selene dorsalis	11.20	22	0.91	
Pagellus bellottii	9.80	196	0.80	
Decapterus rhonchus	7.80	48	0.63	
Boops boops	5.30	980	0.43	
Sphyraena guachancho	2.40	10	0.19	
Priacanthus arenatus	2.00	10	0.16	
Fistularia petimba	1.70	10	0.14	
Octopus vulgaris	1.66	8	0.13	
Merluccius senegalensis	1.50	4	0.12	
Fistularia tabacaria	1.50	16	0.12	
Alectis alexandrinus	1.44	2	0.12	
Total	1232.70		100.05	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2061
DATE: 6/11/03 GEAR TYPE: PT No: 7 POSITION:Lat N 1547
start stop duration Long W 1636
TIME :18:41:43 19:11:40 30 (min) Purpose code: 1
LOG :6676.71 6678.73 2.01 Area code : 4
FDEPTH: 10 10 GearCond.code:
BDEPTH: 18 19 Validity code:
Towing dir: 355º Wire out: 150 m Speed: 40 kn*10

Sorted: 24 Kg Total catch: 95.52 CATCH/HOUR: 191.04

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Chloroscombrus chrysurus	58.80	510	30.78	
Pomadasys peroteti	28.80	112	15.08	
Trichiurus lepturus	22.00	472	11.52	
Ilisha africana	17.52	302	9.17	
Galeoides decadactylus	17.04	96	8.92	
Sardinella maderensis - Juv.	12.88	1872	6.74	3430
Brachydeuterus auritus	10.96	120	5.74	
Selene dorsalis	5.76	112	3.02	
Pentanemus quinquarius	4.40	26	2.30	
Lagocephalus laevigatus	2.56	8	1.34	
Sardinella aurita - Juveniles	2.48	424	1.30	3429
Pseudotolithus typus	1.60	8	0.84	
Arius parkii	1.52	32	0.80	
Parapandalus narval	1.36	1016	0.71	
Pteroscion peli	1.28	24	0.67	
Engraulis encrasicolus	1.20	264	0.63	
SOLEIDAE	0.48	72	0.25	
Parapenaeus longirostris	0.16	544	0.08	
Sepiella ornata	0.16	32	0.08	
Alloteuthis africana	0.08	56	0.04	
Total	191.04		100.01	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2062
DATE: 6/11/03 GEAR TYPE: PT No: 1 POSITION:Lat N 1553
start stop duration Long W 1652
TIME :21:51:13 22:21:27 30 (min) Purpose code: 1
LOG :6702.79 6704.60 1.79 Area code : 4
FDEPTH: 20 20 GearCond.code:
BDEPTH: 90 84 Validity code:
Towing dir: 110º Wire out: 120 m Speed: 36 kn*10

Sorted: 31 Kg Total catch: 143.47 CATCH/HOUR: 286.94

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Trachurus trecae	234.40	4840	81.69	3431
Auxis thazard	30.80	132	10.73	
Euthynnus alletteratus	5.48	18	1.91	
Trichiurus lepturus	5.04	88	1.76	
Pomadasys jubelini	3.20	24	1.12	
Decapterus rhonchus	2.80	8	0.98	
Scomber japonicus	2.16	12	0.75	
Sphyraena guachancho	1.34	4	0.47	
Sardinella aurita	0.80	8	0.28	
Trachinotus ovatus	0.44	2	0.15	
Sardina pilchardus	0.16	8	0.06	
Total	286.62		99.90	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2063
DATE: 7/11/03 GEAR TYPE: PT No: 2 POSITION:Lat N 1600
start stop duration Long W 1643
TIME :03:06:20 03:31:25 25 (min) Purpose code: 1
LOG :6745.33 6746.90 1.53 Area code : 4
FDEPTH: 40 30 GearCond.code:
BDEPTH: 62 71 Validity code:
Towing dir: 281º Wire out: 150 m Speed: 35 kn*10

Sorted: 80 Kg Total catch: 80.56 CATCH/HOUR: 193.34

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Trachurus trecae	179.16	1440	92.67	3432
Brachydeuterus auritus	12.74	70	6.59	
Sphyraena guachancho	1.22	2	0.63	
Anthias anthias	0.22	346	0.11	
Total	193.34		100.00	

Annex II Instruments and fishing gear used

The Simrad EK-500, 38kHz scientific echosounder was used for abundance estimation during the survey, in addition data from the 18 kHz, 120 kHz and 200 kHz transducers where logged for possible future multifreqvency target estimation.. The Bergen Echo Integrator system (BEI) were logging the echogram raw data from the sounder and used to scrutinize the acoustic records, and to allocate integrator data to fish species. All raw data were stored to tape, and a backup of the database of scrutinized data, stored. The details of the settings of the echosounders were as follows:

Transceiver 1 menu

Transducer depth	5.5 m
Absorption coeff.	10 dB/km
Pulse length	medium (1ms)
Bandwidth	wide
Max power	2000 Watt
2-way beam angle	-21.0 dB
SV transducer gain	27.19 dB
TS transducer gain	27.22 dB
Angle sensitivity	21.9
3 dB beamwidth along.	6.9°
3 dB beamwidth athw.	6.8°
Alongship offset	-0.01°
Athwardship offset	0.03°

Transceiver 2 menu

Transducer depth	5.5 m
Absorption coeff.	38 dB/km
Pulse length	long (1ms)
Bandwidth	narrow
Max power	1000 Watt
2-way beam angle	-20.6 dB
SV transducer gain	25.74 dB
TS transducer gain	25.96 dB
Angle sensitivity	21.0
3 dB beamwidth along.	7.2°
3 dB beamwidth athw.	7.3°
Alongship offset	-0.07°
Athwardship offset	0.22°

Transceiver 3 menu

Transducer depth	5.5 m
Absorption coeff.	3 dB/km
Pulse length	short (0.7ms)
Bandwidth	wide
Max power	2000 Watt
2-way beam angle	-17.2 dB
SV transducer gain	23.73 dB
TS transducer gain	23.45 dB
Angle sensitivity	13.9
3 dB beamwidth along.	11.1°
3 dB beamwidth athw.	11.0°
Alongship offset	-0.21°
Athwardship offset	0.09°

Transceiver 4 menu

Transducer depth	5.5 m
Absorption coeff.	53 dB/km
Pulse length	long (0.6ms)
Bandwidth	narrow
Max power	1000 Watt
2-way beam angle	-20.5 dB
SV transducer gain	24.08 dB
TS transducer gain	24.08 dB
Angle sensitivity	0.0
3 dB beamwidth along.	0.0°
3 dB beamwidth athw.	0.0°
Alongship offset -	0.00°
Athwardship offset	0.00°

Display menu

Echogram	1
Bottom range	10 m
Bottom range start	10 m
TVG	20 log R
Sv colour min -	65 dB
TS Colour minimum	-65 dB

Printer- menu

Range	0-50, 0-100, 0-150, 0-250 or 0-500 m
TVG	20 log R
Sv colour min	-67 dB

Bottom detection menu

Minimum level	-40 dB

Calibration

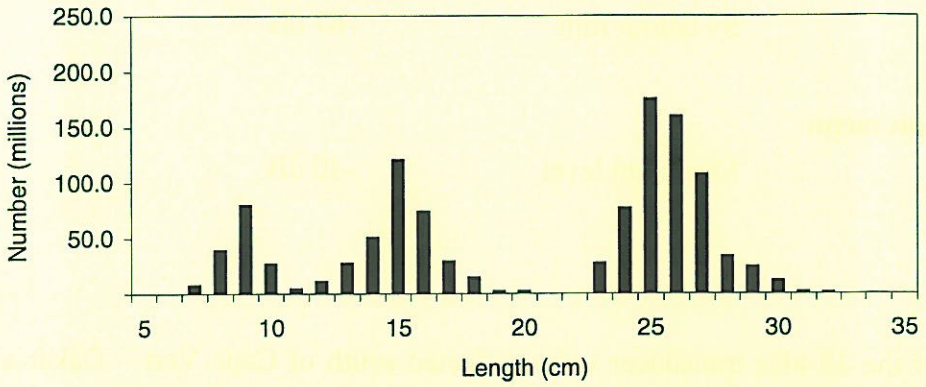
A calibration of the 38 kHz transducer was conducted south of Cape Vert – Dakar at the 8 November. The calibration was successful, and the new integration values will be set after the survey ends in Las Palmas in December. No correction was done to the current estimate as the SV transducer gain was <0.3 db different from the previous value.

Fishing gear

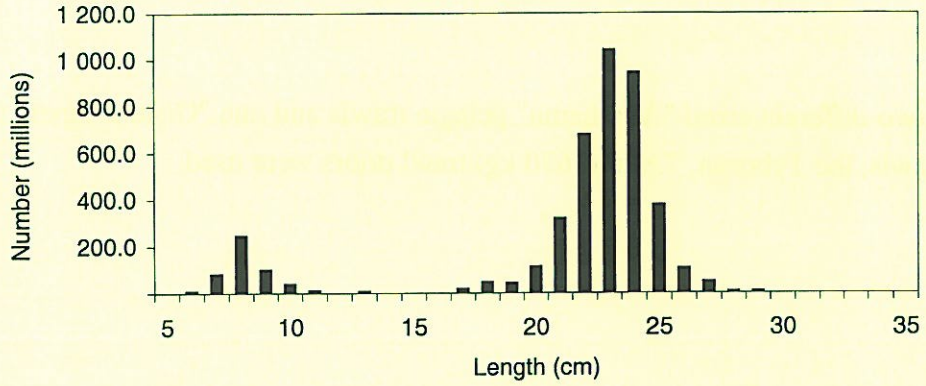
The vessel has two different sized "Åkrahamn" pelagic trawls and one "Gisund super" bottom trawl. For all trawls, the Tyborøn, 7.8m² (1670 kg) trawl doors were used.

Annex III Pooled length distributions by species and region

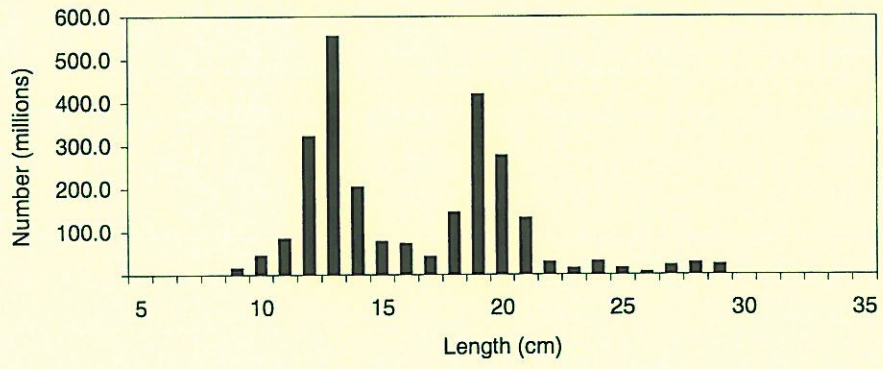
Round sardinella (Sardinella aurita): October-November 2003



Flat sardinella (Sardinella maderensis): October-November 2003



Cunene horse mackerel (Trachurus trecae): October-November 2003



Annex IV Estimated number and biomass by length group and sectors

Round sardinella *(Sardinella aurita)*: October-November 2003

Numbers in millions

Length cm	St. Louis-C. Vert	C. Vert-Gambia	The Gambia	Casa-mance	TOTAL
5					
6					
7	7.2				7.2
8	38.8				38.8
9	79.4				79.4
10	26.2				26.2
11	4.1				4.1
12	1.6	9.0			10.6
13		26.9			26.9
14		50.1			50.1
15		120.0			120.0
16		73.4			73.4
17		28.7			28.7
18		12.5	0.9	0.8	14.2
19		1.8			1.8
20		1.8			1.8
21					
22					
23			10.6	16.2	26.8
24		0.6	30.7	45.0	76.2
25		0.3	53.5	120.7	174.5
26		2.5	44.1	112.4	159.0
27		4.0	33.9	69.0	106.9
28		4.3	13.7	15.2	33.2
29		5.2	11.0	7.6	23.8
30		0.6	4.6	5.9	11.1
31			1.2		1.2
32		0.3	0.3		0.6
33					
34					
35					
36					
37					
38					
39					
40					
41					
42					
43					
44					
45					
46					
47					
48					
49					
50					
Total	157.3	342.0	204.5	392.8	1 096.5

Biomass in tonnes

Length cm	St. Louis-C. Vert	C. Vert-Gambia	The Gambia	Casa-mance	TOTAL
5					
6					
7	28				28
8	224				224
9	640				640
10	285				285
11	58				58
12	30	168			198
13		634			634
14		1 467			1 467
15		4 289			4 289
16		3 166			3 166
17		1 474			1 474
18		762	54	50	866
19		127			127
20		148			148
21					
22					
23			1 319	2 022	3 341
24		87	4 330	6 348	10 765
25		49	8 515	19 211	27 775
26		440	7 883	20 081	28 403
27		799	6 773	13 768	21 341
28		958	3 034	3 382	7 375
29		1 291	2 711	1 876	5 877
30		168	1 264	1 602	3 034
31			357		357
32		102	98		200
33					
34					
35					
36					
37					
38					
39					
40					
41					
42					
43					
44					
45					
46					
47					
48					
49					
50					
Total	1 265	16 131	36 339	68 339	122 074

Flat sardinella *(Sardinella maderensis)*: October-November 2003

Numbers in millions

Length cm	St. Louis-C. Vert	C. Vert-Gambia	The Gambia	Casa-mance	TOTAL
5					
6	5.4				5.4
7	78.8				78.8
8	244.0				244.0
9	97.5				97.5
10	35.7				35.7
11	7.7				7.7
12					
13			5.6		5.6
14					
15					
16					
17		7.9	7.7		15.6
18		22.7	20.9		43.7
19		15.8	19.9	4.2	40.0
20		23.8	61.1	25.0	109.8
21		17.4	187.3	111.5	316.1
22		84.2	361.4	229.4	675.0
23		268.0	525.1	245.3	1 038.5
24	1.2	330.9	360.9	247.8	940.7
25	2.4	150.6	83.2	137.5	373.7
26	3.7	24.0	27.0	49.4	104.1
27	3.2	7.9	13.0	22.0	46.0
28	1.7			2.4	4.1
29	0.7		2.7	2.8	6.2
30	0.3				0.3
31					
32					
33					
34					
35					
36					
37					
38					
39					
40					
41					
42					
43					
44					
45					
46					
47					
48					
49					
50					
Total	482.4	953.3	1 675.8	1 077.2	4 188.7

Biomass in tonnes

Length cm	St. Louis-C. Vert	C. Vert-Gambia	The Gambia	Casa-mance	TOTAL
5					
6	14				14
7	323				323
8	1 454				1 454
9	811				811
10	401				401
11	113				113
12					
13			132		132
14					
15					
16					
17		408	394		802
18		1 382	1 271		2 654
19		1 128	1 419	300	2 848
20		1 966	5 051	2 064	9 081
21		1 656	17 867	10 640	30 163
22		9 208	39 517	25 083	73 808
23		33 395	65 425	30 563	129 383
24	164	46 713	50 955	34 981	132 814
25	393	23 969	13 252	21 882	59 496
26	675	4 289	4 817	8 828	18 609
27	638	1 582	2 594	4 385	9 200
28	388			538	925
29	179		657	692	1 528
30	79				79
31					
32					
33					
34					
35					
36					
37					
38					
39					
40					
41					
42					
43					
44					
45					
46					
47					
48					
49					
50					
Total	5 632	125 695	203 352	139 957	474 636

Cunene horse mackerel *(Trachurus trecae)*: October-November 2003

Numbers in millions

Length cm	St. Louis-C. Vert	C. Vert-Gambia	The Gambia	Casa-mance	TOTAL
5					
6					
7					
8					
9	13.6				13.6
10	42.4				42.4
11	44.7	34.3	2.7		81.6
12	82.9	219.4	17.0		319.4
13	86.9	431.9	33.5		552.3
14	116.7	79.2	6.1		202.1
15	67.4	6.9	0.5		74.8
16	69.7				69.7
17	39.4				39.4
18	39.1	96.5	7.5		143.0
19	58.3	333.2	25.9		417.4
20	48.5	210.5	16.3		275.3
21	25.4	96.5	7.5		129.4
22	26.6				26.6
23	11.7				11.7
24	28.2				28.2
25	12.7				12.7
26	3.8				3.8
27	18.7				18.7
28	25.5				25.5
29	20.9				20.9
30					
31					
32					
33					
34					
35					
36					
37					
38					
39					
40					
41					
42					
43					
44					
45					
46					
47					
48					
49					
50					
Total	883.3	1 508.3	117.0		2 508.6

Biomass in tonnes

Length cm	St. Louis-C. Vert	C. Vert-Gambia	The Gambia	Casa-mance	TOTAL
5					
6					
7					
8					
9	112				112
10	472				472
11	652	500	39		1 192
12	1 555	4 114	319		5 988
13	2 052	10 202	792		13 045
14	3 415	2 319	180		5 914
15	2 411	245	19		2 675
16	3 006				3 006
17	2 028				2 028
18	2 377	5 863	455		8 695
19	4 152	23 720	1 841		29 713
20	4 014	17 406	1 351		22 771
21	2 425	9 203	714		12 342
22	2 912				2 912
23	1 459				1 459
24	3 982				3 982
25	2 025				2 025
26	678				678
27	3 739				3 739
28	5 665				5 665
29	5 143				5 143
30					
31					
32					
33					
34					
35					
36					
37					
38					
39					
40					
41					
42					
43					
44					
45					
46					
47					
48					
49					
50					
Total	54 272	73 573	5 709		133 555

Annex V Regional estimates, October-December 2003

Sardine (*Sardina pilchardus*), number in millions

Length cm	C. Cantin-C. Juby	C. Juby-C. Blanc	C. Blanc-C. Timiris	C. Timiris-St. Louis	St. Louis-C. Vert	C. Vert-Casamance	TOTAL
5							
6							
7							
8	3,6						3,6
9	45,5	41,1					86,6
10	172,0	31,2					203,2
11	290,5	102,2					392,6
12	450,8	462,6					913,4
13	1 460,6	890,7	2,2				2 353,4
14	2 180,6	2 360,7	59,6				4 600,9
15	2 445,9	2 711,8	188,3				5 346,0
16	4 516,3	2 375,9	341,8				7 234,1
17	3 420,8	1 625,3	383,5				5 429,6
18	1 308,4	859,2	244,5				2 412,1
19	735,8	728,5	41,6				1 506,0
20	472,8	2 186,6	8,0				2 667,5
21	177,9	11 609,4					11 787,3
22	77,8	13 139,5					13 217,2
23	35,6	8 012,3	22,0				8 069,8
24	11,6	5 634,0	87,3	33,6			5 766,4
25	1,9	2 861,7	160,4	286,1			3 310,2
26		443,0	95,7	452,9			991,6
27		16,3	12,1	189,3			217,7
28				34,4			34,4
29							
30							
Total	17 808,3	56 091,9	1 647,0	996,4			76 543,6

Sardine (*Sardina pilchardus*), biomass in tonnes

Length cm	C. Cantin-C. Juby	C. Juby-C. Blanc	C. Blanc-C. Timiris	C. Timiris-St. Louis	St. Louis-C. Vert	C. Vert-Casamance	TOTAL
5							
6							
7							
8	18						18
9	320	289					609
10	1 633	296					1 929
11	3 623	1 274					4 897
12	7 220	7 410					14 629
13	29 467	17 970	44				47 481
14	54 513	59 013	1 491				115 017
15	74 686	82 807	5 751				163 244
16	166 361	87 518	12 591				266 470
17	150 332	71 428	16 854				238 614
18	67 930	44 611	12 694				125 235
19	44 740	44 296	2 530				91 565
20	33 400	154 473	568				188 441
21	14 499	946 102					960 601
22	7 262	1 227 268					1 234 530
23	3 787	852 654	2 339				858 780
24	1 397	679 399	10 527	4 052			695 375
25	262	389 101	21 811	38 906			450 080
26		67 603	14 600	69 117			151 320
27		2 778	2 061	32 281			37 121
28				6 527			6 527
29							
30							
Total	661 449	4 736 289	103 859	150 884			5 652 481

Annex V continued

Round sardinella (*Sardinella aurita*), number in millions

Length cm	C. Cantin-C. Juby	C. Juby-C. Blanc	C. Blanc-C. Timiris	C. Timiris-St. Louis	St. Louis-C. Vert	C. Vert-Casamance	TOTAL
5							
6							
7					7,2		7,2
8					38,8		38,8
9				2,6	79,4		82,0
10				3,7	26,2		29,9
11				3,0	4,1		7,1
12				10,0	1,6	9,0	20,6
13				21,0		26,9	47,8
14			81,7	6,4		50,1	138,3
15			161,2	4,0		120,0	285,2
16			306,0	6,2		73,4	385,6
17			23,0	1,2		28,7	52,9
18				0,4		14,2	14,6
19				0,2		1,8	2,0
20				4,8		1,8	6,6
21				19,2			19,2
22				26,4			26,4
23				10,2		26,8	37,1
24				20,8		76,2	97,1
25				9,5		174,5	184,0
26				8,8		159,0	167,8
27		28,8		70,7		106,9	206,4
28		211,1		189,1		33,2	433,5
29		632,2	12,6	115,5		23,8	784,2
30		817,0		75,7		11,1	903,8
31		336,0		35,5		1,2	372,7
32		164,7		24,9		0,6	190,2
33		216,1		21,8			237,9
34		216,6		17,2			233,7
35		197,8	12,6	10,9			221,3
36		161,0	25,2				186,3
37		37,1		5,6			42,7
38		18,0					18,0
39		14,5	12,6				27,1
40							
41							
42							
43							
44							
45							
46							
47							
48							
49							
50							
Total		3 050,9	635,0	725,3	157,3	939,2	5 507,8

Annex V continued

Round sardinella (*Sardinella aurita*), biomass in tonnes

Length cm	C. Cantin-C. Juby	C. Juby-C. Blanc	C. Blanc-C. Timiris	C. Timiris-St. Louis	St. Louis-C. Vert	C. Vert-Casamance	TOTAL
5							
6							
7					28		28
8					224		224
9				21	640		661
10				41	285		326
11				44	58		102
12				188	30	168	386
13				495		634	1 130
14			2 391	189		1 467	4 047
15			5 763	144		4 289	10 196
16			13 196	268		3 166	16 630
17			1 185	63		1 474	2 722
18				22		866	888
19				14		127	141
20				400		148	548
21				1 831			1 831
22				2 886			2 886
23				1 276		3 341	4 616
24				2 939		10 765	13 703
25				1 510		27 775	29 285
26				1 566		28 403	29 969
27		5 632		14 118		21 341	41 091
28		45 943		42 035		7 375	95 353
29		152 573	3 110	28 454		5 877	190 014
30		217 888		20 623		3 034	241 545
31		98 730		10 640		357	109 727
32		53 136		8 204		200	61 539
33		76 365		7 856			84 221
34		83 590		6 770			90 359
35		83 176	5 420	4 674			93 270
36		73 604	11 782				85 386
37		18 397		2 841			21 237
38		9 649					9 649
39		8 410	7 466				15 876
40							
41							
42							
43							
44							
45							
46							
47							
48							
49							
50							
Total		927 094	50 312	160 110	1 265	120 808	1 259 590

Annex V continued

Flat sardinella (*Sardinella maderensis*), numbers in millions

Length cm	C. Cantin-C. Juby	C. Juby-C. Blanc	C. Blanc-C. Timiris	C. Timiris-St. Louis	St. Louis-C. Vert	C. Vert-Casamance	TOTAL
5							
6					5,4		5,4
7					78,8		78,8
8					244,0		244,0
9					97,5		97,5
10				0,9	35,7		36,6
11				5,0	7,7		12,7
12				12,1			12,1
13				36,3		5,6	41,9
14				23,0			23,0
15				68,3			68,3
16				63,7			63,7
17				41,2		15,6	56,8
18				21,5		43,7	65,2
19				7,0		40,0	47,0
20				9,2		109,8	119,0
21		6,9		37,2		316,1	360,3
22			3,6	45,7		675,0	724,3
23		6,9	3,6	38,1		1 038,5	1 087,1
24		35,1	34,3	53,1	1,2	939,6	1 063,2
25		157,9	107,5	189,6	2,4	371,3	828,7
26		264,3	156,1	258,8	3,7	100,4	783,3
27		207,5	150,9	254,8	3,2	42,9	659,3
28		181,7	66,5	287,8	1,7	2,4	540,1
29		129,5	17,9	207,2	0,7	5,5	360,8
30		43,6	80,2	252,3	0,3		376,4
31		22,7	127,9	154,9			305,5
32		12,8	159,2	289,6			461,6
33			202,2	246,2			448,4
34			55,8	179,5			235,3
35			103,4	101,3			204,7
36			30,2	37,5			67,8
37				10,0			10,0
38							
39							
40							
41							
42							
43							
44							
45							
46							
47							
48							
49							
50							
Total		1 069,1	1 299,3	2 932,0	482,4	3 706,3	9 489,1

AnnexV continued

Flat sardinella (*Sardinella maderensis*), biomass in tonnes

Length cm	C. Cantin-C. Juby	C. Juby-C. Blanc	C. Blanc-C. Timiris	C. Timiris-St. Louis	St. Louis-C. Vert	C. Vert-Casamance	TOTAL
5							
6					14		14
7					323		323
8					1 454		1 454
9					811		811
10				10	401		411
11				73	113		186
12				227			227
13				857		132	989
14				673			673
15				2 443			2 443
16				2 749			2 749
17				2 122		802	2 924
18				1 309		2 654	3 963
19				501		2 848	3 348
20				763		9 081	9 844
21		669		3 548		30 163	34 380
22			392	5 000		73 808	79 200
23		874	446	4 742		129 383	135 445
24		5 007	4 838	7 496	164	132 650	150 154
25		25 398	17 106	30 185	393	59 103	132 186
26		47 717	27 881	46 231	675	17 934	140 437
27		41 859	30 133	50 877	638	8 561	132 069
28		40 791	14 780	63 957	388	538	120 453
29		32 258	4 414	51 064	179	1 349	89 265
30		11 986	21 854	68 730	79		102 650
31		6 891	38 380	46 466			91 737
32		4 275	52 473	95 429			152 177
33			72 986	88 860			161 846
34			21 987	70 760			92 747
35			44 431	43 491			87 922
36			14 109	17 524			31 633
37				5 072			5 072
38							
39							
40							
41							
42							
43							
44							
45							
46							
47							
48							
49							
50							
Total		217 727	366 210	711 159	5 632	469 004	1 769 732

AnnexV continued

Anchovy (*Engraulis encrasicolus*), numbers in millions

Length cm	C. Cantin-C. Juby	C. Juby-C. Blanc	C. Blanc-C. Timiris	C. Timiris-St. Louis	St. Louis-C. Vert	C. Vert-Casamance	TOTAL
5	0,9						0,9
6	4,5						4,5
7	5,6	12,7					18,3
8	16,4	62,8					79,2
9	44,2	138,2					182,4
10	80,4	640,6					721,0
11	97,0	1 073,6					1 170,7
12	256,3	671,1					927,4
13	189,5	40,6					230,1
14	46,6						46,6
15	25,8						25,8
16	4,3						4,3
17							
18							
19							
20							
Total	771,5	2 639,7					3 411,2

Anchovy (*Engraulis encrasicolus*), biomass in tonnes

Length cm	C. Cantin-C. Juby	C. Juby-C. Blanc	C. Blanc-C. Timiris	C. Timiris-St. Louis	St. Louis-C. Vert	C. Vert-Casamance	TOTAL
5	1						1
6	7						7
7	13	29					42
8	54	208					263
9	205	640					845
10	502	4 005					4 507
11	797	8 817					9 614
12	2 703	7 078					9 781
13	2 518	540					3 058
14	767						767
15	518						518
16	103						103
17							
18							
19							
20							
Total	8 189	21 317					29 506

Annex V continued

Atlantic horse mackerel (*Trachurus trachurus*), numbers in millions

Length cm	C. Cantin-C. Juby	C. Juby-C. Blanc	C. Blanc-C. Timiris	C. Timiris-St. Louis	St. Louis-C. Vert	C. Vert-Casamance	TOTAL
5							
6							
7	1,6						1,6
8							
9							
10			0,8				0,8
11		26,3	10,9				37,3
12		285,1	10,9				296,1
13	0,2	722,0	40,8				763,0
14	6,2	642,3	18,7				667,2
15	20,6	451,4	8,8				480,8
16	51,7	172,7	8,8				233,2
17	57,6	232,2					289,8
18	19,6	289,8	0,4				309,9
19	22,8	543,1					565,9
20	40,1	717,5					757,6
21	17,0	507,3	4,4				528,6
22	7,0	170,9					178,0
23	0,4	77,0					77,4
24	1,0	67,9					68,9
25	2,5	86,2					88,8
26	0,5	85,6					86,1
27	0,7	63,1					63,8
28	1,5	61,1					62,6
29	0,5	21,4					22,0
30	1,0	4,6					5,6
31		2,9					2,9
32							
33							
34	0,6						0,6
35	1,2						1,2
36	1,0						1,0
37	0,8						0,8
38	2,0						2,0
39	0,6						0,6
40	1,1						1,1
41							
42							
43							
44							
45							
46							
47							
48							
49							
50	0,5						0,5
Total	260,4	5 230,4	104,7				5 595,5

AnnexV continued

Atlantic horse mackerel (*Trachurus trachurus*), biomass in tonnes

Length cm	C. Cantin-C. Juby	C. Juby-C. Blanc	C. Blanc-C. Timiris	C. Timiris-St. Louis	St. Louis-C. Vert	C. Vert-Casamance	TOTAL
5							
6							
7	6						6
8							
9							
10			9				9
11		336	160				496
12		4 678	205				4 883
13	4	14 921	963				15 888
14	158	16 449	547				17 155
15	645	14 119	315				15 080
16	1 952	6 516	380				8 848
17	2 594	10 452					13 046
18	1 044	15 414	26				16 484
19	1 418	33 827					35 245
20	2 904	51 922					54 826
21	1 416	42 347	421				44 184
22	674	16 356					17 031
23	43	8 396					8 439
24	125	8 390					8 515
25	352	12 011					12 363
26	79	13 378					13 457
27	123	11 026					11 149
28	295	11 877					12 172
29	109	4 626					4 735
30	241	1 095					1 336
31		754					754
32							
33							
34	194						194
35	455						455
36	403						403
37	375						375
38	946						946
39	292						292
40	629						629
41							
42							
43							
44							
45							
46							
47							
48							
49							
50	547						547
Total	18 023	298 889	3 028				319 940

Annex V continued

Cunene horse mackerel (*Trachurus trecae*), numbers in millions

Length cm	C. Cantin-C. Juby	C. Juby-C. Blanc	C. Blanc-C. Timiris	C. Timiris-St. Louis	St. Louis-C. Vert	C. Vert-Casamance	TOTAL
5							
6							
7							
8							
9					13,6		13,6
10				14,2	42,4		56,6
11		2,8	8,9	71,0	44,7	36,9	164,3
12		129,5	265,2	119,7	82,9	236,4	833,8
13		349,5	1 078,8	187,1	86,9	465,4	2 167,8
14		719,7	835,2	139,9	116,7	85,4	1 896,9
15		2 389,0	371,4	84,3	67,4	7,4	2 919,5
16		3 006,9	238,4	95,0	69,7		3 410,0
17		2 223,1	188,0	145,8	39,4		2 596,4
18		1 387,5	134,4	193,1	39,1	103,9	1 858,1
19		1 121,1	13,2	164,4	58,3	359,1	1 716,1
20		512,1	5,9	95,7	48,5	226,8	889,0
21		338,4	14,9	54,7	25,4	103,9	537,5
22		174,2		34,6	26,6		235,5
23		83,3	4,5	19,9	11,7		119,4
24		201,3		16,8	28,2		246,3
25		135,0		3,7	12,7		151,4
26		534,3		5,6	3,8		543,7
27		301,7		4,1	18,7		324,5
28		235,9		12,9	25,5		274,3
29		68,1		16,0	20,9		105,0
30		63,5		10,9			74,5
31		44,5		21,8			66,3
32		58,2		33,2			91,4
33		20,4		37,5			57,9
34		7,4	3,6	29,0			40,0
35		10,2		8,6			18,8
36		7,4		8,2			15,7
37				16,8			16,8
38				4,3			4,3
39							
40				4,3			4,3
41				8,6			8,6
42							
43							
44							
45							
46							
47							
48							
49							
50							
Total		14 125,0	3 162,6	1 661,8	883,3	1 625,4	21 458,0

Annex V continued

Cunene horse mackerel (*Trachurus trecae*), biomass in tonnes

Length cm	C. Cantin-C. Juby	C. Juby-C. Blanc	C. Blanc-C. Timiris	C. Timiris-St. Louis	St. Louis-C. Vert	C. Vert-Casamance	TOTAL
5							
6							
7							
8							
9					112		112
10				157	472		629
11		35	130	1 037	652	539	2 394
12		2 125	4 973	2 245	1 555	4 433	15 330
13		7 222	25 482	4 420	2 052	10 994	50 170
14		18 430	24 445	4 095	3 415	2 499	52 884
15		74 730	13 276	3 013	2 411	264	93 695
16		113 461	10 282	4 096	3 006		130 845
17		100 080	9 673	7 504	2 028		119 286
18		73 797	8 171	11 735	2 377	6 318	102 397
19		69 825	942	11 705	4 152	25 561	112 185
20		37 060	485	7 914	4 014	18 757	68 230
21		28 253	1 425	5 222	2 425	9 917	47 242
22		16 667		3 788	2 912		23 367
23		9 080	559	2 480	1 459		13 578
24		24 865		2 367	3 982		31 214
25		18 809		582	2 025		21 416
26		83 520		1 001	678		85 199
27		52 702		813	3 739		57 254
28		45 878		2 862	5 665		54 404
29		14 677		3 953	5 143		23 773
30		15 139		2 981			18 120
31		11 687		6 548			18 235
32		16 782		10 956			27 737
33		6 427		13 547			19 974
34		2 564	1 423	11 414			15 401
35		3 831		3 685			7 516
36		3 037		3 838			6 875
37				8 506			8 506
38				2 350			2 350
39							
40				2 736			2 736
41				5 887			5 887
42							
43							
44							
45							
46							
47							
48							
49							
50							
Total		850 686	101 265	153 435	54 272	79 283	1 238 940

Annex V continued

False scad (*Caranx rhonchus*), numbers in millions

Length cm	C. Cantin-C. Juby	C. Juby-C. Blanc	C. Blanc-C. Timiris	C. Timiris-St. Louis	St. Louis-C. Vert	C. Vert-Casamance	TOTAL
5							
6							
7							
8							
9							
10							
11							
12							
13				20,4			20,4
14				38,8			38,8
15				80,8			80,8
16				35,0			35,0
17				11,9			11,9
18				5,6			5,6
19				3,2			3,2
20							
21				1,7			1,7
22				26,4			26,4
23				41,0	0,0		41,1
24				55,9	0,1		56,0
25				59,0	0,1		59,1
26				49,0	0,1		49,1
27				24,6	0,1		24,6
28				27,5	0,0		27,5
29				19,2	0,0		19,2
30				22,1			22,1
31				5,0			5,0
32				5,4			5,4
33				7,8			7,8
34				3,7			3,7
35				2,1			2,1
36				0,6			0,6
37				1,1			1,1
38				0,9			0,9
39				0,8			0,8
40				0,0			0,0
41				0,0			0,0
42				0,0			0,0
43				0,0			0,0
44							
45							
46							
47							
48							
49							
50							
Total				549,4	0,4		549,8

Annex V continued

False scad (*Caranx rhonchus*), biomass in tonnes

Length cm	C. Cantin-C. Juby	C. Juby-C. Blanc	C. Blanc-C. Timiris	C. Timiris-St. Louis	St. Louis-C. Vert	C. Vert-Casamance	TOTAL
5							
6							
7							
8							
9							
10							
11							
12							
13				482			482
14				1 136			1 136
15				2 889			2 889
16				1 510			1 510
17				612			612
18				340			340
19				230			230
20							
21				159			159
22				2 884			2 884
23				5 110	4		5 115
24				7 885	14		7 899
25				9 386	18		9 405
26				8 750	15		8 766
27				4 904	10		4 914
28				6 114	5		6 120
29				4 731	1		4 733
30				6 013			6 013
31				1 500			1 500
32				1 778			1 778
33				2 797			2 797
34				1 475			1 475
35				897			897
36				257			257
37				560			560
38				511			511
39				468			468
40				7			7
41				7			7
42				5			5
43				3			3
44							
45							
46							
47							
48							
49							
50							
Total				73 403	69		73 471

Annex V continued

Chub mackerel (*Scomber japonicus*), numbers in millions

Length cm	C. Cantin-C. Juby	C. Juby-C. Blanc	C. Blanc-C. Timiris	C. Timiris-St. Louis	St. Louis-C. Vert	C. Vert-Casamance	TOTAL
5							
6							
7							
8							
9		0,7					0,7
10		0,7					0,7
11							
12	8,2	16,1					24,2
13	64,7	75,7					140,4
14	266,0	139,2					405,2
15	646,4	144,7					791,1
16	662,1	349,1					1 011,1
17	541,8	407,3					949,1
18	343,6	259,7					603,2
19	89,2	162,6					251,8
20	32,8	180,9					213,7
21	55,5	253,2					308,6
22	83,0	192,0					275,0
23	51,7	93,3					145,0
24	42,6	78,7					121,3
25	39,9	46,9					86,8
26	51,4	75,3					126,6
27	61,4	179,8					241,3
28	87,7	277,7					365,4
29	38,6	118,2					156,8
30	34,0	61,2					95,2
31	27,3	23,6					50,9
32	18,1	13,3					31,4
33	15,7	26,2					41,9
34	6,7	30,7					37,5
35	12,6	5,7					18,4
36	2,6	11,5					14,1
37	0,9	19,0					19,9
38		5,7					5,7
39	0,9	5,6					6,5
40							
41		1,9					1,9
42		1,9					1,9
43		1,9					1,9
44							
45							
46							
47							
48							
49							
50							
Total	3 285,1	3 260,3					6 545,4

Annex V continued

Chub mackerel (*Scomber japonicus*), biomass in tonnes

Length cm	C. Cantin-C. Juby	C. Juby-C. Blanc	C. Blanc-C. Timiris	C. Timiris-St. Louis	St. Louis-C. Vert	C. Vert-Casamance	TOTAL
5							
6							
7							
8							
9		5					5
10		7					7
11							
12	134	263					397
13	1 338	1 565					2 902
14	6 812	3 566					10 377
15	20 220	4 526					24 746
16	24 982	13 172					38 154
17	24 391	18 335					42 726
18	18 274	13 810					32 083
19	5 557	10 127					15 684
20	2 371	13 094					15 466
21	4 632	21 134					25 766
22	7 939	18 373					26 312
23	5 636	10 169					15 805
24	5 258	9 726					14 984
25	5 564	6 530					12 094
26	8 029	11 767					19 796
27	10 730	31 418					42 148
28	17 050	54 007					71 056
29	8 328	25 497					33 824
30	8 102	14 582					22 684
31	7 161	6 204					13 365
32	5 216	3 834					9 050
33	4 957	8 270					13 227
34	2 324	10 605					12 928
35	4 742	2 160					6 902
36	1 048	4 695					5 743
37	379	8 435					8 814
38		2 755					2 755
39	443	2 916					3 358
40							
41		1 150					1 150
42		1 235					1 235
43		1 325					1 325
44							
45							
46							
47							
48							
49							
50							
Total	211 615	335 256					546 872

CRUISE REPORTS 'DR FRIDTJOF NANSEN'

SURVEY OF THE PELAGIC FISH RESOURCES OFF NORTH WEST AFRICA

Part II

MAURITANIA
11 November - 20 November 2003

by

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Bergen, 2004

CHAPTER 1 INTRODUCTION

1.1 Objective of the cruise

The general objectives of the survey was to estimate the biomass and map the distribution of the small pelagic fish stocks off NW Africa (Morocco, Mauritania, Senegal and The Gambia) by hydro-acoustic methods and describe the hydrographic conditions in the survey area over a period of 50 days, in November-December 2003. For Mauritania the agreed objectives were as follows:

- To map the distribution and estimate the biomass for the main small pelagic fish using hydro-acoustic methods. The species of interest were: sardinellas (*Sardinella aurita*) and (*Sardinella maderensis*), sardine (*Sardina pilchardus*) horse mackerels (*Trachurus trachurus*) and (*T. trecae*), false scad (*Decapterus rhonchus*), and anchovy (*Engraulis encrasicolus*) and chub mackerel (*Scomber japonicus*).

- 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.

- Collect biological data and otoliths of the main target species, especially *Sardina pilchardus, Sardinella aurita, S. maderensis* and *T. trecae*.

- To sample standard hydrographical transects for temperature, salinity and oxygen at every degree latitude, at about 16°40'N, 18°00'N, 19°00'N, 20°00'N and off Cape Blanc.

- To train local participants in acoustic abundance estimation surveying including fish identification and sampling, acoustic survey methodology, scrutinizing of echograms, and hydrographic sampling.

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

1.2 Participation

Participating scientists were:
Institut Mauritanien de Recherches Océanographiques et des Pêches (CNROP), Mauritania:
Ebaye O SIDINA (local teamleader), Sidiyahya O CHEIKHNA, Ball Abou CIRÉ, Ahmed DIAGNE, Mohammed Ahmed Ould TALEB, Nema O Cheikh Med ABDALLAHI

Centre de Recherches Océanographiques de Dakar-Thiaroye (CRODT), Senegal:
Abdoulaye SARRE

Department of Fisheries (FD), The Gambia:
Juldah JALLOW

Institut National de Recherche Halieutique (INRH), Morocco:
Najib CHAROUKI

Institute of Marine Research (IMR), Norway:
Jens-Otto KRAKSTAD (Cruise leader), Magne OLSEN, Tore MØRK and Terje HOVLAND

1.3 Narrative

The vessel departed from Dakar 13:30 GMT on the 11/11 and steamed north to start the survey at the border between Senegal and Mauritania at St. Louis (16°00'N). The survey started off St. Louis at 23:45GMT the same day, with systematic parallel course tracks spaced about 10 NM (nautical miles) apart, perpendicular to the depth isobaths. 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. Pelagic trawl with floats was often used to catch fish close to the surface. A smaller pelagic trawl or the bottom trawl with floats was used for sampling pelagic fish in very shallow waters (depth less than 25 m). The shelf was covered from St. Louis at the border between Senegal and Mauritania to Cape Blanc. The vessel reached Cape Blanc and the end of the regular survey at 19th November 07:00 GMT in the morning. The course track and fishing stations are shown in Figure 1, while Table 1 show survey effort during the survey, including number of trawl stations and CTD casts. The vessel then steamed to Nouakchott where the

survey was completed on the 20th November at 08:00 GMT. All data collected during the survey were made available to the participants.

Five hydrographic profiles where carried out, at 16°40' N on the 12th November, 18°00'N, Nouvakchott, on the 14th November, 19°00' N, south of Cape Timiris, on the 16th November at 20°00'N on the 17th November and at 20°50' N on the 18th November..

Table 1. Summary of survey effort by regions, including number of demersal (BT) and pelagic (PT) trawl hauls, CTD casts, and distance surveyed (log), disregarding the steaming from Cape Vert to St. Louis and from Cape Blanc to Nouakchott (log).

Area	BT	PT	Total trawls	CTD casts	Log (nm)
St. Louis to Cape Blanc	18	27	45	70	1420

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:

$$\overline{w} = \frac{cond}{100} \cdot L^3$$

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. The target groups used for Mauritania can be found in Table 2.

Table 2. Allocation of acoustic densities to taxii. Note that for the groups of sardinella, horse mackerel, and pilchard all encountered species are listed, while only examples are listed for the remaining groups.

Group	Taxon	Species
Sardinella	*Sardinella* sp.	*S. aurita*
		S. maderensis
Horse mackerel	*Trachurus* sp.	*T. trecae*
		T. trachurus
Sardine	Sardinops	*S. pilchardus*
Pelagic species 1	Clupeiformes$_1$	*Ilisha africana*
		Engraulis encrasicolus
Pelagic species 2	Carangidae$_2$	*Selene dorsalis*
		Chloroscombrus chrysurus
		Decapterus rhonchus
		Alectis alexandrinus
Little tuny	Scombridae	*Euthynnus alletteratus*
		Sarda sarda
		Scomber japonicus
	Sphyraenidae	*Sphyraena guachancho*
	Others	*Trichiurus lepturus*
		Zeus faber
Other demersal species	Sparidae$_3$	*Dentex angolensis*
		D. macrophthalmus
		D. congoensis
		D. canariensis
		D. barnardi
		Pagellus bellottii
		Sparus caeruleostictus
		S. pagrus africanus
	Other taxii	*Pseudupeneus prayensis*
Big-eye grunt		*Brachydeuterus auritus*
		Arioma bondi
		Pomadasys incisus
		Galeoides decadactylus
Mesopelagic species	Myctophidae$_3$	
	Other mesopelagic fish	
Plankton	Calanoidae	*Calanus* sp.
	Euphausiidae	*Meganyctiphanes* sp.
	Other plankton	

$_1$: other than *Sardinops* sp.; $_2$: other than *Trachurus* sp.; $_3$: main taxon in group.

2.3 Acoustic sampling

A SIMRAD EK500 Echosounder was used with the settings as shown in Annex II. All four frequencies 18 kHz, 38 kHz, 120 kHz and 200 kHz where logged. All abundance estimation was based on data from the 38 kHz transducer. 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):

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

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:

$$\rho_i = s_A \cdot \frac{p_i}{\sum_{i=1}^{n} \frac{p_i}{C_{F_i}}}$$

where

ρ_i = density of fish in length group i

s_A = mean integrator value

p_i = proportion of fish in length group i

$\sum_{i=1}^{n} \frac{p_i}{C_{Fi}}$ = 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.

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_A-value for the region,
2) the surface (usually square nautical miles, NM^2), 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_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).

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 in the Excel spread-sheet made available for acoustic abundance estimation onboard RV "Dr. Fridtjof Nansen", provided the data are punched in this sheet.

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 representing the region

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. The numbers are then converted to biomass using the estimated weight at length.

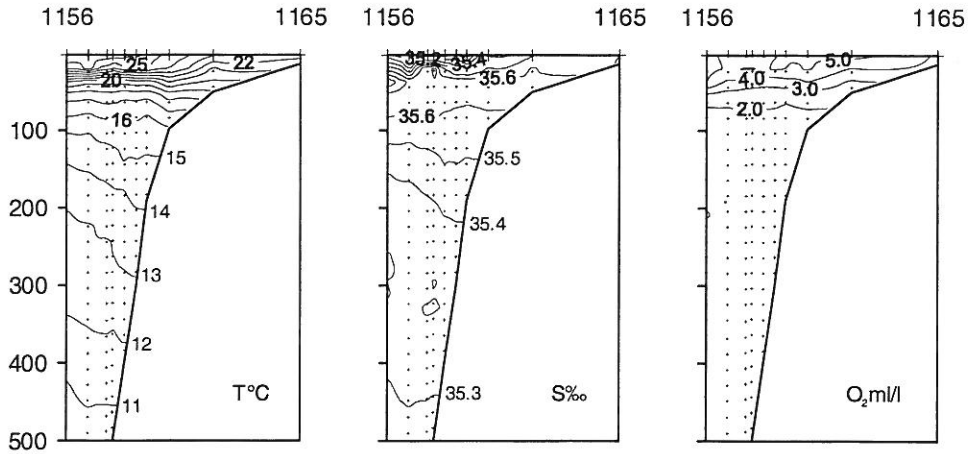
CHAPTER 3 SURVEY RESULTS

3.1 Hydrography

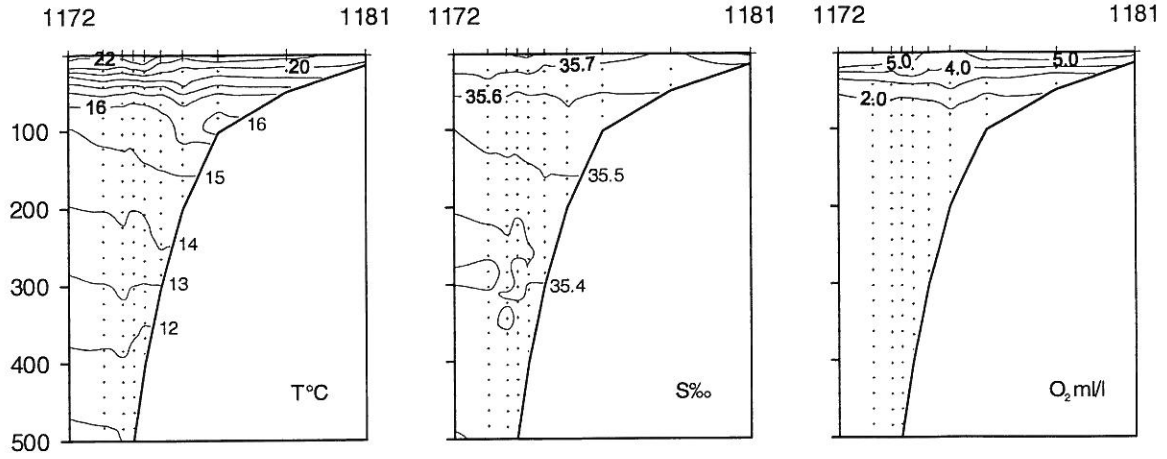
Hydrographical data was collected on fixed CTD stations to 500 m depth and from the Aanderaa weather station that continuously collect sea surface temperature, wind speed and direction, solar radiation etc. during the survey.

Cross shelf hydrographical profiles

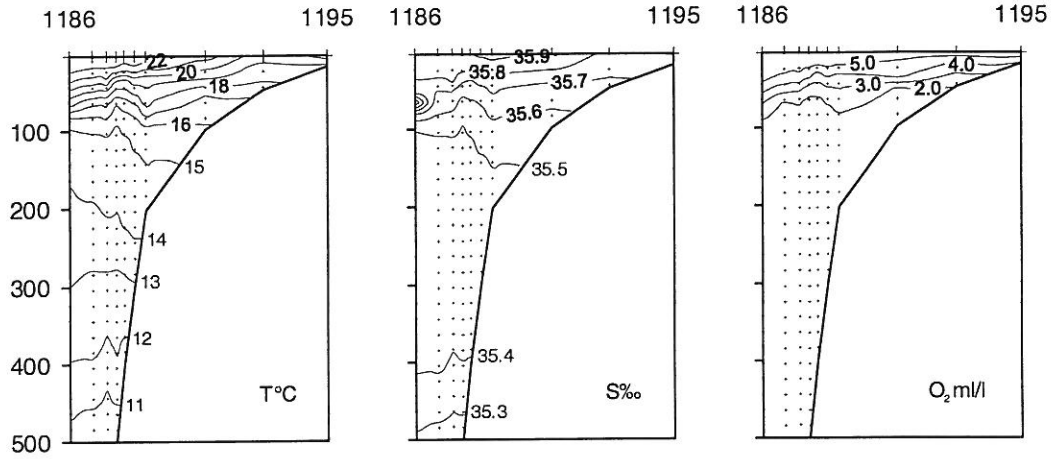
Figure 2 shows the distribution of temperature, salinity and oxygen from the five hydrographical transects collected during the survey. A strong thermocline can be seen at 16°40'S in the upper 30 m with a increase in water temperature from the coast and offshore. The water masses becomes colder and more mixed with a less defined thermocline further north. The surface waters show relatively high salinity with increasing salinity northwards. All the CTD transects show well oxygenated waters, with approximately 5 ml/l O_2 in the surface water, declining to 2 ml/l O_2 at approximately 70 m depth.



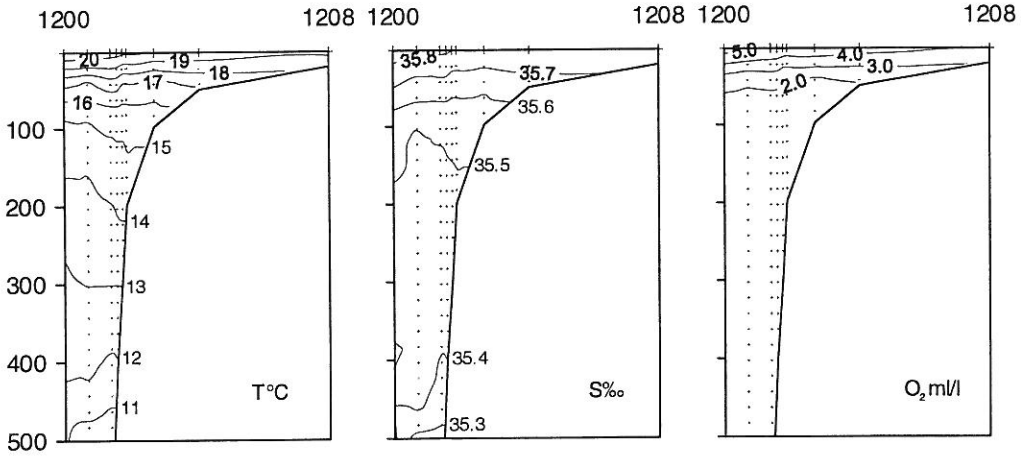
16°40'N **12.11.2003**



18°00'N **14.11.2003**



19°00'N **16.11.2003**



20°00'N **17.11.2003**

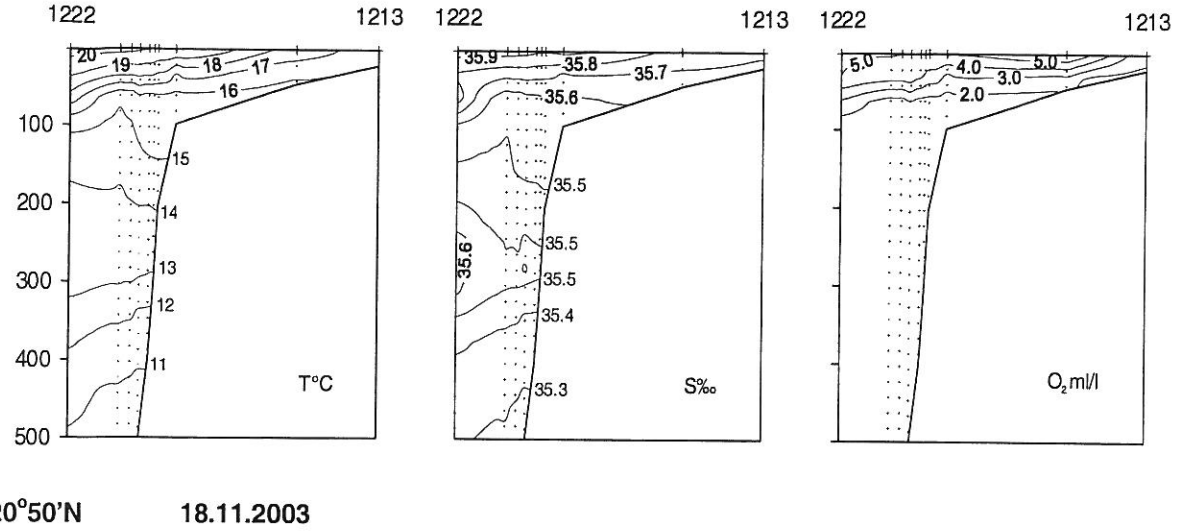


Figure 2 Hydrographic profiles with distribution of temperature, salinity and oxygen

Sea surface temperature and wind direction

Figure 3 the sea surface temperature at 5 m of depth while Figure 4 show the wind direction and wind speed during the survey of Mauritania. The surface waters in the south of Senegal was dominated inshore by a cold intrusion of cooler waters from the north with water temperature as low as <22°C the intrusion could be observed past border to Senegal, to Cayar, gradually becoming warmer. A strong temperature gradient can be seen between the inshore and offshore waters. An area with much cooler water can be seen at 18°30' N. North of Cape Timiris the surface water was gradually becoming colder with water temperatures <19°C, and with a less pronounced difference between the inshore and offshore water masses.

Very little wind was observed south of Cape Timiris, but increased northwards towards cape Blanc. The dominant wind direction was from the north with hot winds from the desert in the afternoons in central and southern Mauritania. The conditions where favourable for acoustic surveying throughout the survey.

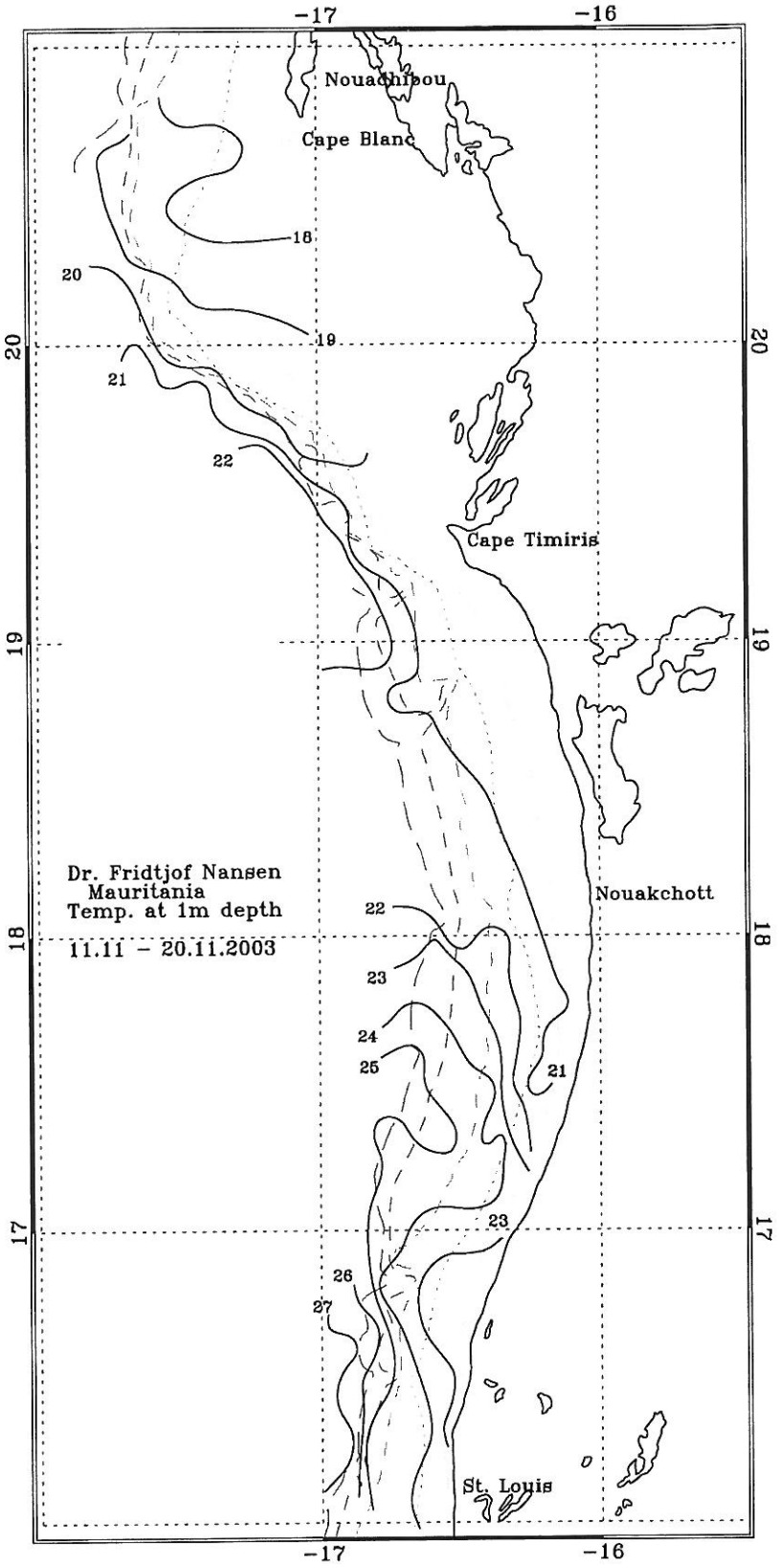


Figure 3 Sea surface temperature; St. Louis to Cape Blanc

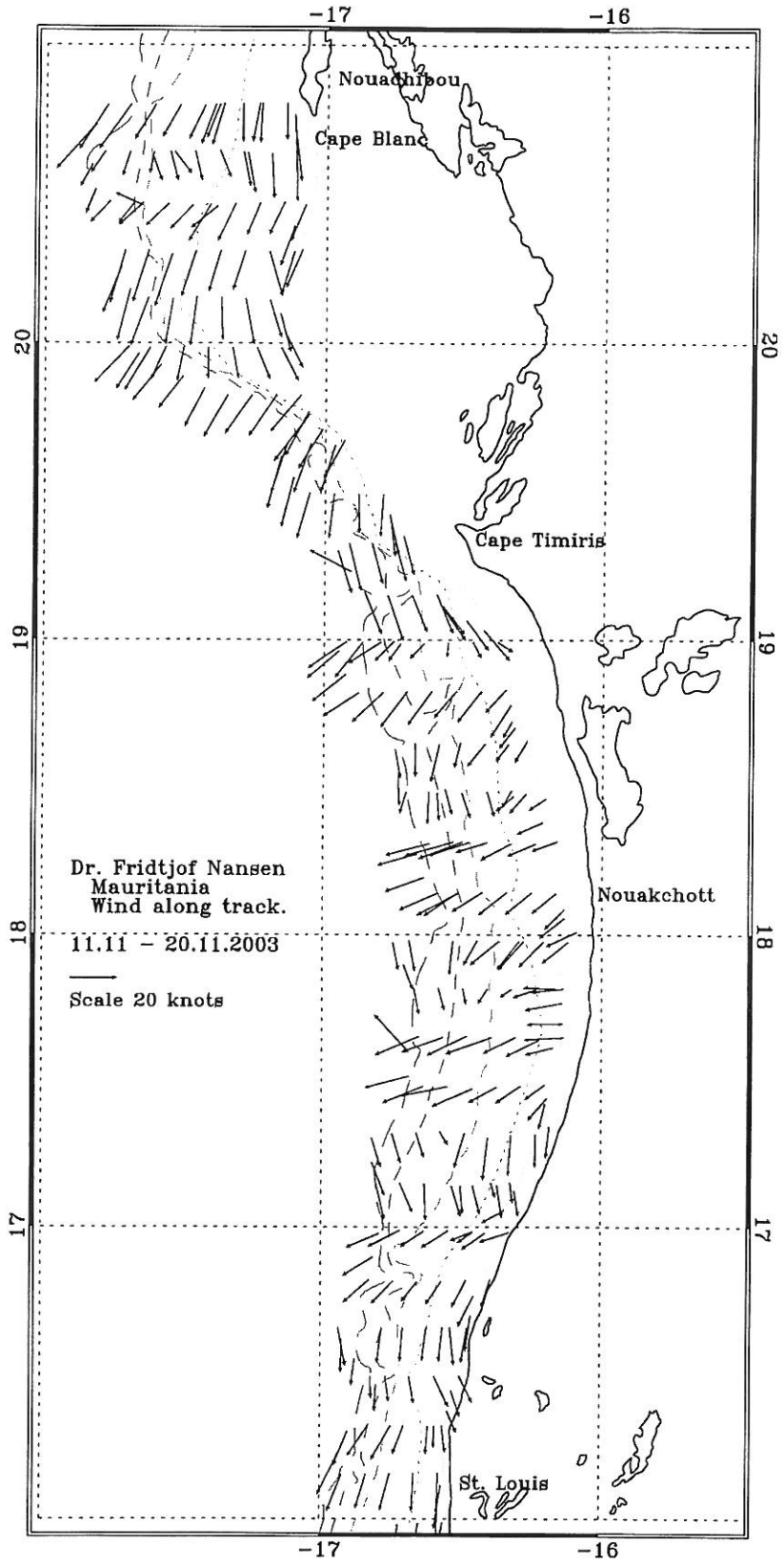


Figure 4. Wind speed and direction; St. Louis to Cape Blanc

3.2 St. Louis to Cape Timiris

The main groups of pelagic fish for the shelf of Mauritania illustrated with contoured acoustic densities are seen in Figure 5 to Figure 8.

Sardinella was found in medium and high density in shallow waters, mostly inside the 50 m depth line between St. Louis to Cape Timiris. The main concentrations where found around 20 - 30 m depth in an almost continues band, but with reduced density around 17°30'N, halfway between St. Lois and Nouakchott, and only two small patches just north of Nouakchott, Figure 5. Both species of sardinella where found in the area. The biomass of *S aurita* was estimated to be 160 000 tons, or 18% of the biomass, while the biomass of *S. maderensis* was estimated at 711 000 tons.

The biomass of *S. maderensis* had one modal peak at 15 cm total length while the majority of the biomass was between 25 and 35 cm, the modal size groups of *S aurita* was 13 cm, 22 cm and 28 cm. Estimated number and biomass by length-groups can be found in Annex IV. The total biomass of sardinellas in the area was estimated at 871 thousand tonnes, Table 3.

Trachurus trecae were found in a low-density layer throughout the area, with higher concentrations in a smaller area south of Cape Timiris, Figure 6. The distribution was almost continues from 20 m depth until approximately 100 m bottom depth, but with a lower density area midway on the shelf around 50 m depth. *Decapterus rhonchus* was occasionally found mixed with the Cunene horse mackerel inshore, north of 18° N. Both species where very dispersed and mixed with plankton and other pelagic species which made species identification difficult. The biomass of *T. trecae* in the area was 153 000 tons while false scad gave a biomass of 73 000 tons. Altogether 226 000 tons of horse mackerels where found. The *T. trecae* showed two modal peaks, at 13 cm and 18 cm roughly corresponding to one and two year old fish. While the *D. rhonchus* showed one modal peak at 15 cm and another at 25 cm. No *T. trachurus* where found in the area.

A school group of Sardine (*Sardina pilchardus*) where found in shallow waters between Cape Timiris and Nouakchott, Figure 7. The density was variable but with the highest density in the southern part of the area. The estimated biomass of sardine was 150 000 tons, Table 3. The school group consisted of adult individuals from 24 – 28 cm, with a modal peak at 26 cm. The area was abundant with artisanal fishermen, which made trawling operation difficult.

Anchovy (*Engraulis encrasicolus*) where found in a few schools in an area south of Nouakchott, but the abundance were so low that to attempt to calculate a separate biomass estimate was done. Anchovy where caught in several trawl samples in this area but they always yielded < 0.5 % of the total trawl catch by weight.

Other pelagic fish were found in low concentrations over large parts of the shelf. The main concentrations where usually found inshore in shallow waters <30 m depth, but with distribution sometimes as deep as 200 m. In general both carangids other than horse mackerel, scombrids, hairtails and barracudas where found in the area, Table 4. The catches where dominated by *Trichiurus lepturus*, *Chloroscombrus chrysurus, Selene dorsalis* and *Brachydeuterus auritus*. The species where well mixed with the sardinellas and horse mackerel in the areas where their distribution overlapped, Figure 8. The estimated biomass of this group of fish was 51 thousand tonnes.

Table 3. St.Louis – Cape Timiris. Biomass estimates of pelagic fish, thousand tonnes.

Flat sardinella	Round sardinella	Sardine	Horse mackerel	Carangids etc.
711	160	150	226	51

Table 4. Catch by stations sorted by groups (in kg/hour) St. Louis – Cape Blanc

ST.NO.	DEP.	Clupeids	Carangids	Scombrids	Hairtails	Barracudas	Other
2064	20	256.7	518.9		3.8		62.9
2065	39	0.1	9.7		12.4		7.7
2066	10	51.0	76.4		1.6	0.3	33.1
2067	32	17.2	110.8		38.1		735.5
2068	198				7.8		1070.7
2069	0	12.9	671.2	1.4	15.1	0.9	24.7
2070	36	18.0	8.6		11.8		794.2
2071	0	136.0	7.8				103.4
2072	40	0.3	102.6		2.7		210.5
2073	80	91.8	3036.7		109.0		30.0
2074	15		2896.0	0.3	2.2		16.3
2075	10	1272.0	156.2		2.9	1.8	9.6
2076	0	2.4	173.0		28.2		1.5
2077	0	71.0	25.4	2.4			6.9
2078	5	1191.0	265.5				381.2
2079	31	45.5	150.2		24.0		952.8
2080	0	0.2	29.1		85.2		91.3
2081	10	534.1	66.9		50.7		12.7
2082	18	1562.1	223.9		31.5	6.4	315.2
2083	18	3.5	16.9	6.7	25.7		84.1
2084	0	5.5	4.3				
2085	15	551.3	5.4	97.6	4.7		
2086	40	3.0	796.1	11.5			152.6
2087	152	0.0	7.6		31.2		59.7
2088	5	172.3	8.8		132.4		32.3
2089	0	1802.7	427.9	100.1	5.5	3.3	23.1
2090	23	3011.9	50.4	51.4	21.3		27.5
2091	161		11.6				574.4
2092	17						
2093	63	165.6	2316.8	13.6			110.1
2094	16	3.7	93.4				112.4
2095	20	79.9	57.3		8.8		473.6
2096	20				42.2		
2097	21	34.4	492.4		27.3		180.9
2098	5	11.7	55.6	7.8	5.8		155.5
2099	5	13.4	15.4		6.2		18.1
2100	20	3634.2	210.6				237.6
2101	10	4.5	67.8		2.5		25.4
2102	105		73.6	3.0			148.6
2103	96						
2104	75	0.26	123.8				0.5
2105	28	95.63	2979.0				824.6
2106	10	1153.80	77.4				113.0
2107	18	166.54	29.5		7.8		1.0
2108	19	23.74	47.3	3.0	1.7		1.4
2109	18	109.20	40.1	0.2			1.5
MEAN		354.54	359.5	6.5	16.3	0.3	178.7

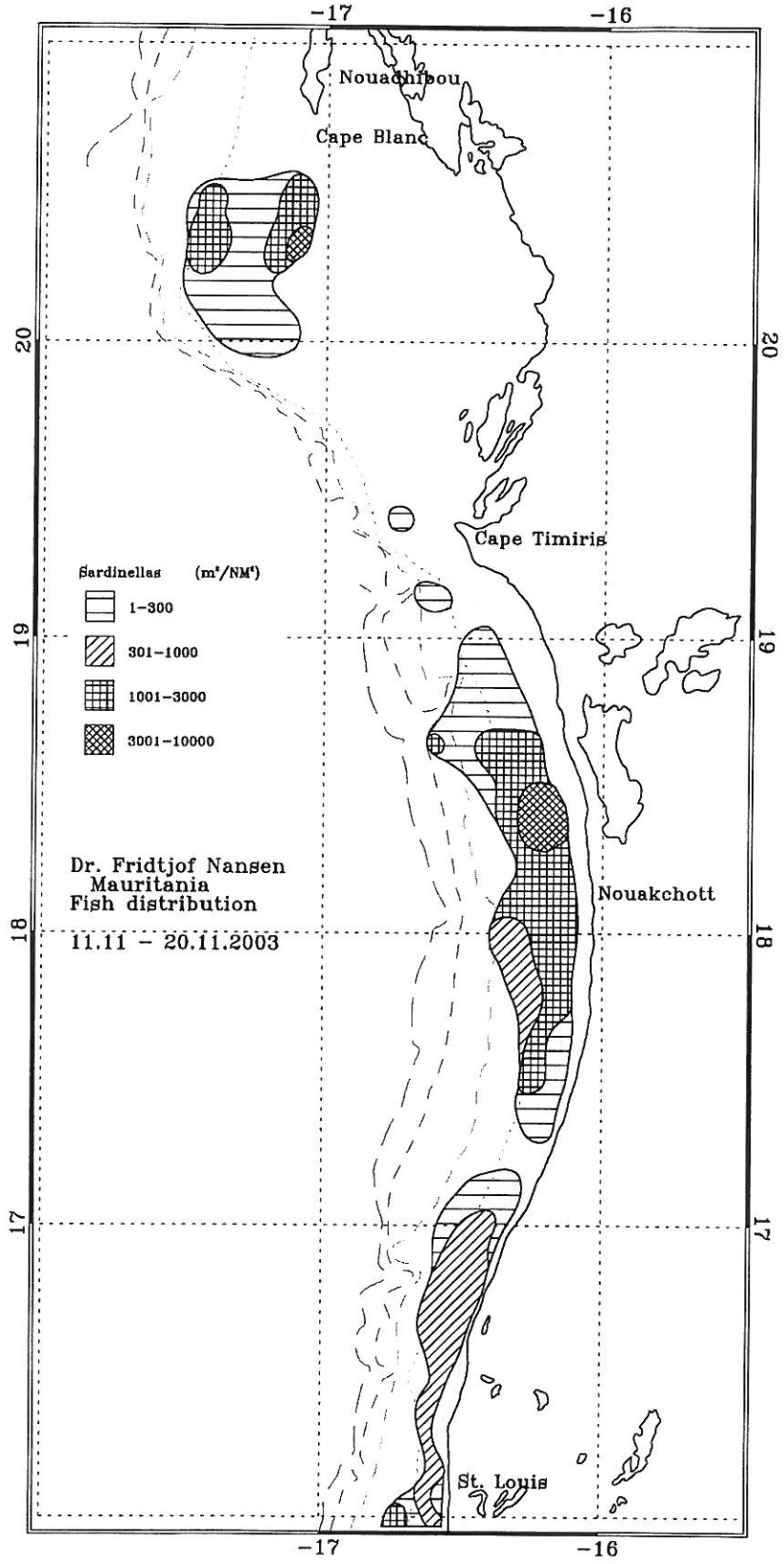


Figure 5. Distribution of sardinellas; St. Louis to Cape Blanc

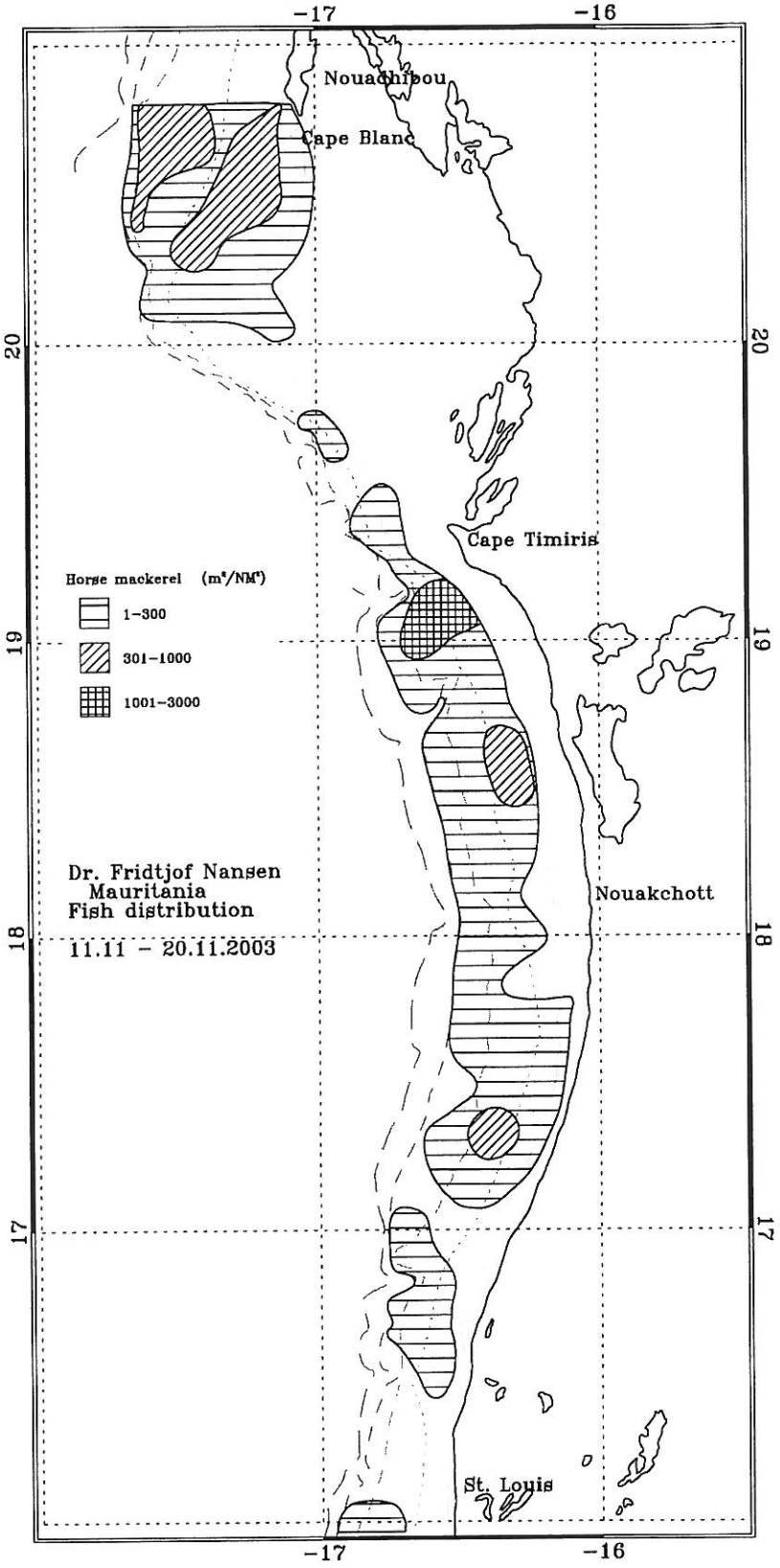


Figure 6. Horse mackerels; St. Louis to Cape Blanc

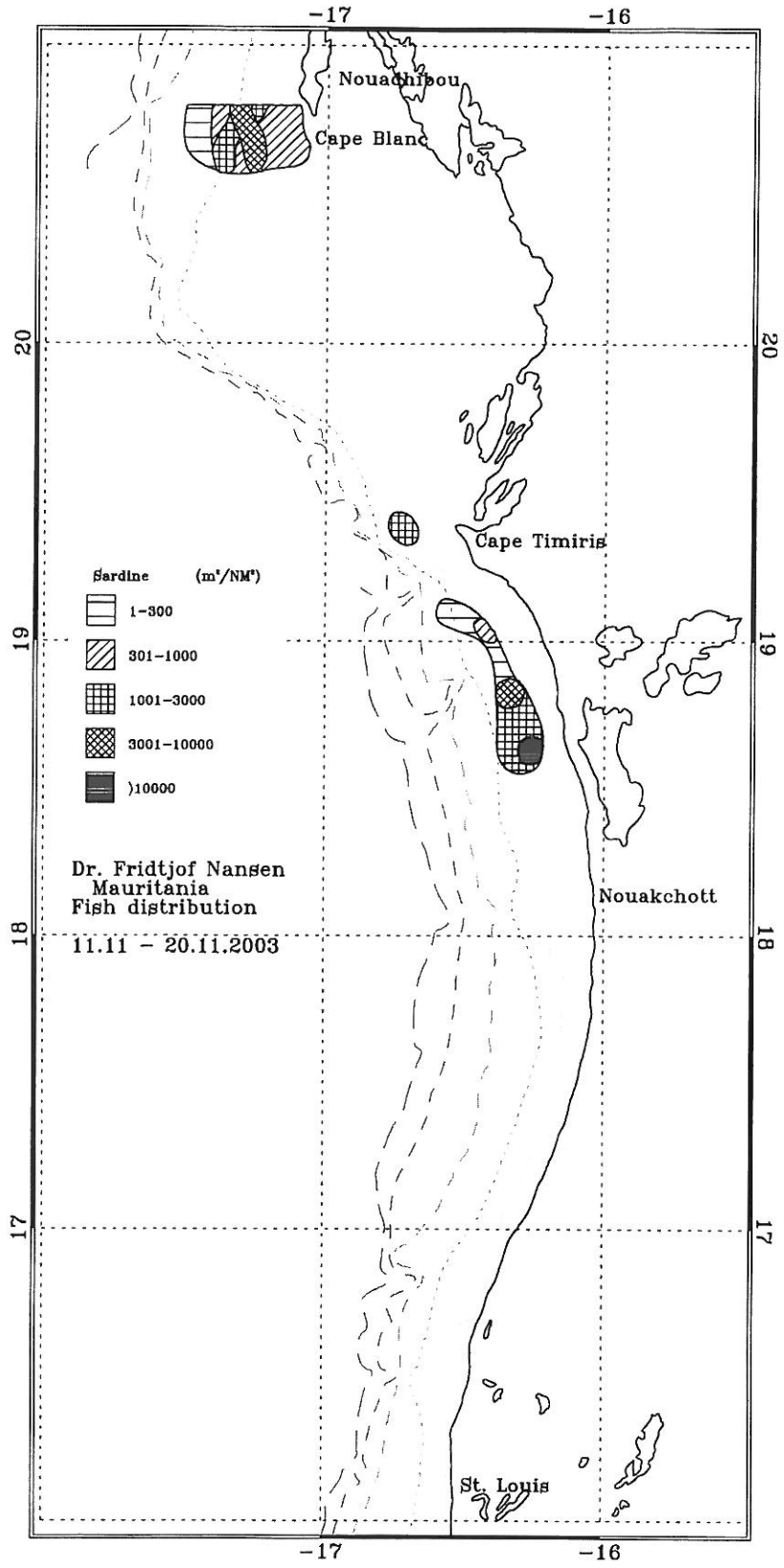


Figure 7. Sardine, St. Louis to Cape Blanc

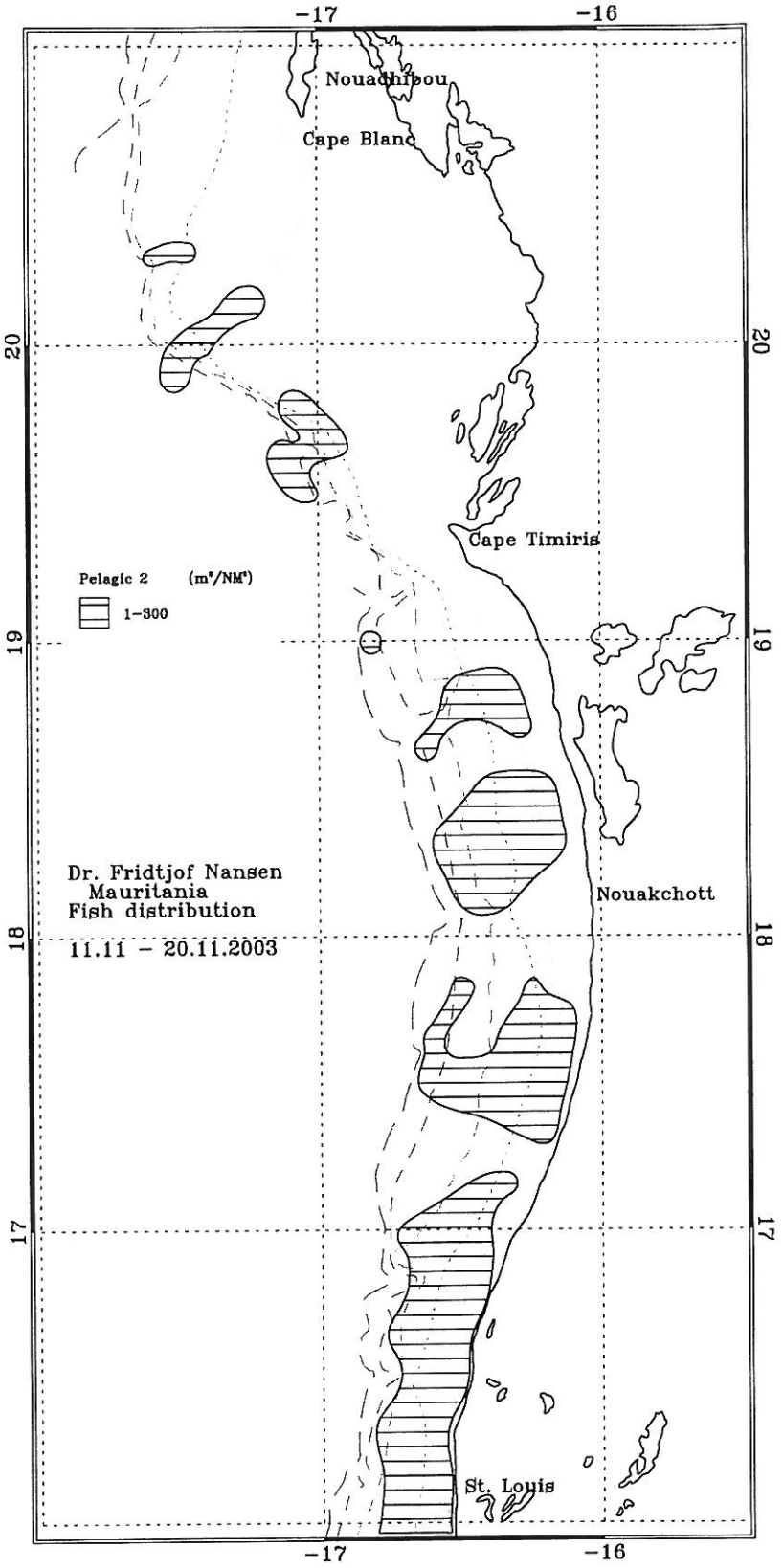


Figure 8. Carangids and associated species; St. Louis to Cape Blanc

3.3 Cape Timiris – Cape Blanc

Sardinellas where found in a relatively wide area on the shelf south of Cape Blanc from less than 20 m depth to deeper than the 50 m isobath, Figure 5. Some sardinella was probably inshore of the survey area in the wide shelf area shallower than 15 m depth, as the concentrations were highest in the inner part of the shelf. Both species of sardinella was found in the area, but also here with a dominance of flat sardinella. The total estimate of sardinellas between Cape Timiris and Cape Blanc during this survey was 416 000 tons Table 5. This comprised of 366 000 tons of flat sardinella and 50 000 tons of round sardinella. Only adults of flat sardinella where found, the length distribution showed two modal peaks, at 26 cm and 33 cm. The round sardinella in the area was mainly smaller in size, with a modal peak around 16 cm. The estimated number and biomass by length-groups are in Annex IV.

Sardine (*Sardina pilchardus*) where found in high concentrations from Cape Blanc and offshore to 100 m depth, extending from the border and 10 NM into Mauritania. The main concentration area was found just inshore of the 50 m isobath, Figure 7. The biomass of sardine in this area was estimated to be 104 000 tons, Table 5. This consisted of two cohorts, with a modal peak at 17 cm and 25 cm.

Anchovy (*Engraulis encrasicolus*) where found in two surface trawl samples at night north of the 20° N line between 50 and 100 m depth. No attempt where made to estimate the biomass as the abundance where very low, < 0.5 % of the total trawl catch by weight.

Cunene horse mackerel was found in a wide area from Cape Blanc and southwards on the shelf to 20° N. The distribution extended inshore from shallower than 15 m bottom depth and offshore, deeper than 100 m. A small proportion of the Atlantic horse mackerel, *Trachurus trachurus*, where mixed with the Cunene horse mackerel in the deep, Figure 6. No *Decapterus rhonchus* where found in the area. The estimated biomass of horse mackerels in the area where 104 thousand tonnes, Table 5. The biomass estimate comprised of 101 000 tons of *Trachurus trecae* and 3 000 tons of *T. trachurus*. The biomass of *T. trecae* consisted mainly of juveniles, with a modal peak of 13 cm, *T. trachurus* where of the same size, also with a modal peak at 13 cm. The estimated number and biomass by length-groups can be found in Annex IV.

Carangids and associated species were found in low density in three separate areas in the southern part of the area between Cape Timiris and Cape Blanc, Figure 8. The group differed from in the southern part of Mauritania to Cape Timiris. Catches where dominated by

Hairtails, *Trichiurus lepturus*, only, while other species of this group where caught infrequently. The biomass estimate of this group was 18 000 tons, Table 5.

Table 5. Cape Timeris – Cape Blanc. Biomass estimates of pelagic fish, thousand tonnes.

Flat sardinella	Round sardinella	Sardine	Horse mackerels	Carangids etc.
366	50	104	104	18

CHAPTER 4 OVERVIEW AND SUMMARY OF RESULTS

The survey was conducted successfully from 11th November to 20th November, covering a course track of approximately 1 420 NM. A total of 45 fishing stations and 70 CTD casts were established.

The hydrographical data showed a stable surface layer at approximately 30 m in the south of Mauritania. A clear frontal zone can be seen south of Nouakchott, Figure 3. More well-mixed conditions prevailed north of this, with increasingly colder surface waters especially between Cape Blanc and Cape Timiris. The shelf was well oxygenated in the whole survey area.

Sardinellas were found in two main areas off Mauritania, at the inner shelf between Cape Timiris and St. Louis, 871 thousand tonnes, and south of Cape Blank, 416 thousand tonnes, Figure 5. Both species of sardinella was mixed, with flat sardinella dominating by 84 %. However, sardinella shows strong trawl avoidance and some care should therefore be taken when interpreting the results.

Sardine where found inshore in shallow waters between Cape Timiris and Nouakchott and in a small area offshore from Cape Blanc extending northwards across the border. The total biomass in Mauritanian waters where estimated to be 255 thousand tons.

Cunene horse mackerel and false scad where found mixed between St. Louis and Cape Timiris. False scad was scarce North of this. Small concentrations of Atlantic horse mackerel started to mix with the Cunene horse mackerel, mainly on the outer part of the shelf, Figure 6. The total abundance estimate of Cunene horse mackerel was 255 thousand tonnes, while the abundance estimate of False scad and Atlantic horse mackerel were 73 thousand and 3 thousand tons respectively.

Other carangids and associated species were distributed over most of the shelf at rather low densities along the whole coast, The main concentrations where found south of Cape Timiris, and only hairtail where abundant north of this. The main groups of species in the catches were *Brachydeuterus auritus*, *Chloroscombrus chrysurus*, *Boops boops*, and *Galeoides decadactylus*. The total biomass was estimated at approximately 69 thousand tonnes, of this 51 thousand tons where found south of Cape Timiris.

An overview of the acoustic estimates of biomass of the main groups of pelagic fish is shown in Table 6, and the geographical distribution and abundance of the main species can be found in Figure 9. The total biomass of sardinellas was thus 1 022 thousand tonnes, sardine was 254 thousand tonnes, horse mackerel was 331 thousand tonnes and carangids and associated species 69 thousand tonnes.

Table 6. Summary of biomass estimates of pelagic fish, Mauritania. thousand tonnes.

	Flat sardinella	Round sardinella	Sardine	Horse mackerel	Carangids etc.
Total	1077	210	254	331	69

Table 7 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. The November survey last year, only gave 310 thousand tons, and the results from this survey does not compare with this. However the survey results compare well with the results from the June surveys in 2002 and 2001. It is expected that changes in distributional pattern between areas accounts for most of this variability.

The total estimate of carangids and associated species (including horse mackerels) was estimated at 400 thousand tons. This is low compared to the 610 thousand tonnes found during the June-July survey this year, but compares well with the estimated 440 000 tons in November 2002. The large fluctuations between these three estimates probably reflect some sort of seasonal variation in their distribution.

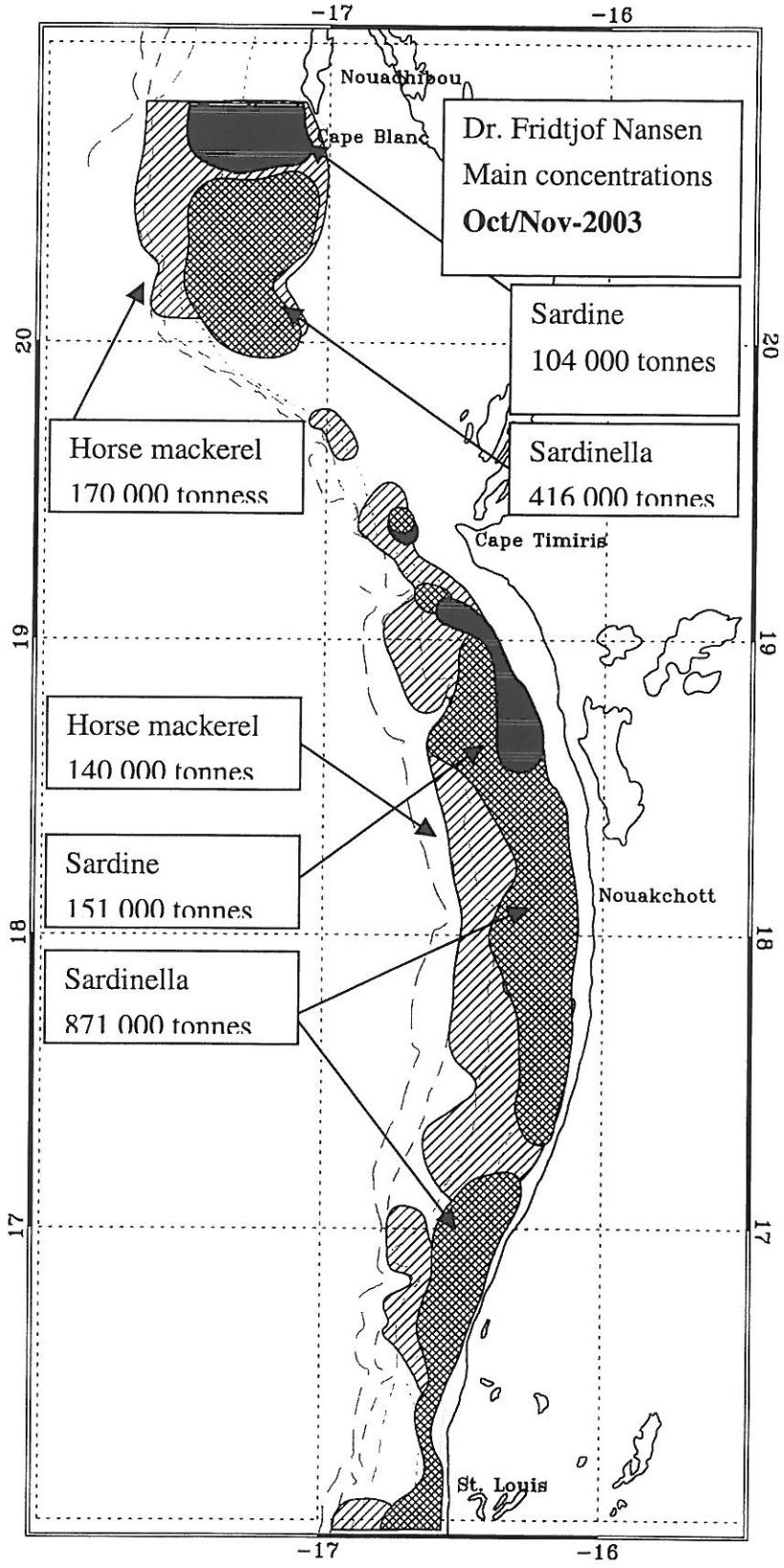


Figure 9. Major pelagic fish concentrations with estimated biomass (tonnes), Mauritania.

Table 7. 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	1 970	190
NovDec-95	1 780	190
NovDec-96	1 400	400
NovDec-97	1 200	660
NovDec-98	1 130	280
NovDec-99	740	560
NovDec-00	930	1 040
June -01	570	670
NovDec-01	230	370
June -02	930	1 130
NovDec-02	320	440
June -03	890	620
NovDec-03	1 287	400

* 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.

RESUME

La campagne a été conduite avec succès durant la période du 11 au 20 novembre selon un parcours d'une longueur approximative de 1420 milles nautiques. Au total, 45 stations de pêche de contrôle et 70 stations CTD ont été réalisées.

Les données hydrographiques révèlent une stabilité de la température des eaux de la surface au sud de la Mauritanie. Un front thermique très net est visible au sud de Nouakchott. Des conditions beaucoup plus homogènes sont constatées au nord de cette zone avec des températures de surface diminuant progressivement, particulièrement entre Cap Blanc et Cap Timiris. Les eaux dans l'ensemble sont bien oxygènes sur tout le parcours effectué.

Les sardinelles ont été rencontrées principalement dans deux zones, d'abord entre le Cap Timiris et St. Louis, 871 thousand tonnes, ensuite au sud du Cap Blanc, 416 thousand tonnes. Les deux espèces de sardinelles étaient mélangées, avec une prédominance a 84 % de la sardinelle plate. Toutefois, des précautions doivent être observées dans l'interprétation des résultats compte tenu du fort taux d'évitement des sardinelles.

Les sardines ont été rencontrées sur la cote dans les petits fonds entre Cap Timiris et Nouakchott et dans une petite poche au large de Cap Blanc, s'étandant au nord à travers la cote.Le total de la biomasse en Mauritanie est estimée à 255 milles tonnes.

Le chinchard noir et le chinchard jaune sont trouvés mélangés entre St. Louis et Cap Timiris. Le chinchard jaune s'esr rarefié au dela de cette zonetandis que les deux chinchards noirs (*Trachurus Tracae* et *Trachurus Trachurus*) ont commencé à se mélanger, essentiellement au delà de la cote.. La biomasse totale des chinchards noirs est évaluée à 255 milles tonnes, tandis que celle des chinchards jaunes et des *Trachurus Trachurus* sont estimées respectivement à 73 milles et 3 milles tonnes.

Les autres carangidés et espèces associées sont régulièrement distribués sur toute la côte avec de moindres densités. Les principales concentrations ont été trouvées au sud de Cap Timiris, et seules les ceintures ont été abondantes au nord de cette zone. Les espèces principalement capturées ont été le *Brachydeuterus auritus, le Chloroscombrus chrysurus,le Boops boop* et le *Galeoides decadactylus*. La biomasse totale est estimée approximativement à 69 milles tonnes , dont 51 milles tonnes au sud de Cap Timiris.

Le tableau 6 ci-dessous résume la biomasse pour chaque groupe de pélagiques ; la répartition géographique et l'abondance de ces espèces sont présentées en figure 9. Ainsi, la biomasse totale des sardinelles s'élève à 1022 milles tonnes, celle des sardines à 254 milles tonnes,

celles de chinchards à 331 milles tonnes et les carangidés et espèces associées sont estimées à 69 milles tonnes.

Le tableau 7 récapitule les biomasses totales estimées depuis 1981 par le N/O Dr Fridtjof Nansen; il s'agit de l'ensemble des sardinelles, chinchards, carangidés et associées sur les cotes sénégambiennes.

Il est maintenant bien connu de l'existence dans la sous région de flux migratoires à grande échelle de poissons pélagiques entre le Sahara de l'Ouest et la Guinée Bissau, et le repli des sardinelles vers le Sénégal en période chaude pour assurer la reproduction.

Durant la derniére campagne de novembre, seules 310 milles tonnes ont été trouvées et ce resultat n'est pas pas comparable à celui obtenu cette année. Cepandant, les resultats sont trés similaires à ceux obtenus en juin 2002 et 2001. Les changements observés au niveau des schémas de distribution entre les zones seraient pour beaucoup dans cette variabilité.

Les carangidés et associés sont estimés à 400 miles tonnes, ce qui est faible comparé aux 610 milles tonnes trouvées en juin-juillet cette année, et très comparable aux 440 milles de novembre 2002. Les fortes variations de ces estimations reflètent certainement des variations saisonnières dans la distribution de ces espèces

Annex I Records of fishing stations

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2064
DATE:12/11/03 GEAR TYPE: PT No: 1 POSITION:Lat N 1559
start stop duration Long W 1641
TIME :02:42:00 03:05:00 23 (min) Purpose code: 1
LOG :7131.40 7133.00 1.60 Area code : 3
FDEPTH: 20 20 GearCond.code: 1
BDEPTH: 50 55 Validity code:
Towing dir: 270º Wire out: 110 m Speed: 40 kn*10

Sorted: 32 Kg Total catch: 322.87 CATCH/HOUR: 842.27

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Trachurus trecae	507.39	5009	60.24	3433
Sardinella maderensis	202.17	4591	24.00	3434
Sardinella aurita	52.17	574	6.19	3435
Brachydeuterus auritus	47.48	339	5.64	
Stromateus fiatola	6.63	8	0.79	
Selene dorsalis	6.26	52	0.74	
Sphyrna lewini	5.48	3	0.65	
Chloroscombrus chrysurus	4.43	26	0.53	
Trichiurus lepturus	3.81	23	0.45	
Ilisha africana	2.35	26	0.28	
Sphoeroides marmoratus	2.22	5	0.26	
Sepia orbignyana	1.04	3	0.12	
Campogramma glaycos	0.83	3	0.10	
Total	842.26		99.99	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2065
DATE:12/11/03 GEAR TYPE: PT No: 2 POSITION:Lat N 1619
start stop duration Long W 1641
TIME :10:53:09 11:26:42 34 (min) Purpose code: 1
LOG :7206.83 7208.85 2.01 Area code : 4
FDEPTH: 0 78 GearCond.code:
BDEPTH: 69 86 Validity code:
Towing dir: 270º Wire out: 225 m Speed: 35 kn*10

Sorted: Kg Total catch: 16.92 CATCH/HOUR: 29.86

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Trichiurus lepturus	12.35	302	41.36	
Brachydeuterus auritus	7.32	46	24.51	
Selene dorsalis	6.65	35	22.27	
Decapterus rhonchus	3.05	9	10.21	
Lagocephalus laevigatus	0.37	4	1.24	
Sardina pilchardus	0.11	7	0.37	
Total	29.85		99.96	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2066
DATE:12/11/03 GEAR TYPE: PT No: 7 POSITION:Lat N 1619
start stop duration Long W 1635
TIME :12:59:37 13:30:07 31 (min) Purpose code: 1
LOG :7220.07 7222.00 1.91 Area code : 3
FDEPTH: 10 10 GearCond.code:
BDEPTH: 23 34 Validity code:
Towing dir: 270º Wire out: 110 m Speed: 36 kn*10

Sorted: 84 Kg Total catch: 83.95 CATCH/HOUR: 162.48

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Chloroscombrus chrysurus	65.81	639	40.50	
Sardinella maderensis - Juv.	30.29	1252	18.64	3436
Sphyrna lewini	17.61	10	10.84	
Sardinella aurita - Juveniles	13.55	656	8.34	3438
Rhizoprionodon acutus	7.65	8	4.71	
Sardinella maderensis	7.16	45	4.41	3437
Sphoeroides marmoratus	5.79	21	3.56	
Campogramma glaycos	5.03	10	3.10	
Alectis alexandrinus	2.50	4	1.54	
Trichiurus lepturus	1.63	6	1.00	
Trachinotus ovatus	1.49	8	0.92	
Stromateus fiatola	0.97	4	0.60	
Selene dorsalis, juveniles	0.70	6	0.43	
Echeneis naucrates	0.62	2	0.38	
Pomadasys peroteti	0.48	2	0.30	
Caranx crysos	0.43	4	0.26	
Caranx senegallus	0.39	2	0.24	
Sphyraena guachancho	0.27	2	0.17	
Total	162.37		99.94	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2067
DATE:12/11/03 GEAR TYPE: BT No: 8 POSITION:Lat N 1629
start stop duration Long W 1637
TIME :16:27:46 16:41:16 14 (min) Purpose code: 1
LOG :7250.00 7250.79 0.77 Area code : 3
FDEPTH: 32 32 GearCond.code:
BDEPTH: 32 32 Validity code:
Towing dir: 100º Wire out: 170 m Speed: 35 kn*10

Sorted: 46 Kg Total catch: 210.38 CATCH/HOUR: 901.63

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Brachydeuterus auritus	276.43	2683	30.66	
Arius parkii	85.50	330	9.48	
Pomadasys incisus	72.00	570	7.99	
Galeoides decadactylus	57.00	463	6.32	
Eucinostomus melanopterus	57.00	1170	6.32	
Pomadasys peroteti	52.03	223	5.77	
Trachurus trecae	45.43	394	5.04	3439
Trichiurus lepturus	38.10	600	4.23	
Sparus caeruleostictus *	35.36	107	3.92	
Rhizoprionodon acutus	31.29	13	3.47	
Decapterus rhonchus	29.57	124	3.28	3441
Lithognathus mormyrus	22.50	51	2.50	
Chloroscombrus chrysurus	20.10	150	2.23	
Sardinella maderensis	17.23	103	1.91	3440
Pseudotolithus typus	13.63	73	1.51	
Selene dorsalis	13.03	390	1.45	
Stromateus fiatola	11.79	17	1.31	
Pagellus bellottii	9.90	51	1.10	
Umbrina canariensis	6.00	30	0.67	
Alectis alexandrinus	2.70	30	0.30	
Dicologoglossa cuneata	2.01	21	0.22	
Penaeus notialis	1.59	73	0.18	
Pseudupeneus prayensis	0.90	17	0.10	
Dentex gibbosus	0.56	9	0.06	
Total	901.65		100.02	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2068
DATE:12/11/03 GEAR TYPE: BT No: 8 POSITION:Lat N 1628
start stop duration Long W 1648
TIME :18:34:35 18:57:55 23 (min) Purpose code: 1
LOG :7267.54 7268.74 1.18 Area code : 3
FDEPTH: 179 217 GearCond.code:
BDEPTH: 179 217 Validity code:
Towing dir: 5º Wire out: 540 m Speed: 30 kn*10

Sorted: 62 Kg Total catch: 412.43 CATCH/HOUR: 1075.90

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Merluccius senegalensis	639.13	4492	59.40	3442
Synagrops microlepis	276.52	30112	25.70	
Pterothrissus belloci	56.06	1077	5.21	
Pontinus kuhlii	18.81	219	1.75	
Helicolenus dactylopterus	16.43	37	1.53	
Brotula barbata	13.88	55	1.29	
MYCTOPHIDAE	12.05	3227	1.12	
Trichiurus lepturus	7.83	16	0.73	
Zeus faber	6.76	37	0.63	
Uranoscopus sp.	6.57	18	0.61	
Sepia officinalis hierredda	4.38	438	0.41	
Penaeus notialis	4.38	438	0.41	
Illex coindetii	3.65	37	0.34	
Todarodes sagittatus	3.10	18	0.29	
Synchiropus phaeton	1.46	55	0.14	
Bembrops heterurus	1.46	5	0.14	
Brachydeuterus auritus	1.28	18	0.12	
Nezumia aequalis	1.28	18	0.12	
Coelorinchus coelorhincus	1.10	37	0.10	
OMMASTREPHIDAE	0.73	365	0.07	
Scyllarides sp.	0.55	18	0.05	
Bothus podas africanus	0.55	18	0.05	
CAPROIDAE	0.37	55	0.03	
Scyliorhinus canicula	0.18	18	0.02	
Total	1078.51		100.26	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2069
DATE:13/11/03 GEAR TYPE: PT No: 1 POSITION:Lat N 1639
start stop duration Long W 1643
TIME :00:22:55 00:50:06 27 (min) Purpose code: 1
LOG :7300.65 7302.45 1.79 Area code : 3
FDEPTH: 0 0 GearCond.code:
BDEPTH: 72 59 Validity code:
Towing dir: 90º Wire out: 160 m Speed: 38 kn*10

Sorted: 32 Kg Total catch: 326.76 CATCH/HOUR: 726.13

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Trachurus trecae	668.89	21867	92.12	3445
Sphoeroides marmoratus	17.78	100	2.45	
Trichiurus lepturus	15.11	133	2.08	
Rhizoprionodon acutus	6.49	4	0.89	
Sardinella aurita	6.38	64	0.88	3444
Sardinella maderensis	6.33	53	0.87	3443
Selene dorsalis	1.78	9	0.25	
Scomber japonicus	1.36	11	0.19	
Sphyraena guachancho	0.91	7	0.13	
Decapterus rhonchus	0.56	2	0.08	
Loligo vulgaris	0.40	4	0.06	
Sardina pilchardus	0.16	4	0.02	
Total	726.15		100.02	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2070
DATE:13/11/03 GEAR TYPE: BT No: 8 POSITION:Lat N 1639
start stop duration Long W 1633
TIME :02:12:55 02:41:50 29 (min) Purpose code: 1
LOG :7311.91 7313.69 1.76 Area code : 3
FDEPTH: 31 41 GearCond.code:
BDEPTH: 31 41 Validity code:
Towing dir: 270º Wire out: 150 m Speed: 35 kn*10

Sorted: 29 Kg Total catch: 402.37 CATCH/HOUR: 832.49

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Brachydeuterus auritus	645.52	10812	77.54	
Pomadasys peroteti	50.57	188	6.07	
Galeoides decadactylus	48.41	1157	5.82	
Pagellus bellottii	24.00	149	2.88	
Trichiurus lepturus	11.83	323	1.42	
Eucinostomus melanopterus	10.22	188	1.23	
Sardinella maderensis	7.97	56	0.96	3446
Decapterus rhonchus	6.19	27	0.74	
Sardinella aurita	5.96	29	0.72	3447
Ilisha africana	4.03	914	0.48	
Rhizoprionodon acutus	3.46	4	0.42	
Pomadasys incisus	3.23	27	0.39	
Selene dorsalis, juveniles	2.15	134	0.26	
Pseudupeneus prayensis	1.88	54	0.23	
Sepia orbignyana	1.53	2	0.18	
Penaeus notialis	1.10	54	0.13	
Loligo vulgaris	0.97	2	0.12	
Argyrosomus regius	0.72	2	0.09	
Illex coindetii	0.58	4	0.07	
Fistularia petimba	0.58	6	0.07	
Stromateus fiatola	0.56	2	0.07	
Zeus faber	0.50	4	0.06	
Chilomycterus spinosus mauret.	0.33	4	0.04	
Trachurus trecae	0.21	54	0.03	
Total	832.50		100.02	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2071
DATE:13/11/03 GEAR TYPE: PT No: 6 POSITION:Lat N 1659
start stop duration Long W 1626
TIME :10:56:14 11:26:05 30 (min) Purpose code: 1
LOG :7394.68 7396.52 1.81 Area code : 3
FDEPTH: 0 0 GearCond.code:
BDEPTH: 27 44 Validity code:
Towing dir: 270º Wire out: 130 m Speed: 36 kn*10

Sorted: 123 Kg Total catch: 123.63 CATCH/HOUR: 247.26

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Sardinella aurita	114.40	530	46.27	3448
Acanthurus monroviae	94.00	114	38.02	
Sardinella maderensis	21.60	166	8.74	3449
Diplodus puntazzo	9.42	8	3.81	
Chloroscombrus chrysurus	2.86	16	1.16	
Campogramma glaycos	2.68	8	1.08	
Selene dorsalis	1.68	4	0.68	
Decapterus rhonchus	0.62	4	0.25	
Total	247.26		100.01	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2072
DATE:13/11/03 GEAR TYPE: BT No: 8 POSITION:Lat N 1709
start stop duration Long W 1623
TIME :14:26:25 15:07:59 42 (min) Purpose code: 1
LOG :7426.20 7428.67 2.47 Area code : 3
FDEPTH: 48 32 GearCond.code:
BDEPTH: 48 32 Validity code:
Towing dir: 90º Wire out: 170 m Speed: 35 kn*10

Sorted: 31 Kg Total catch: 221.26 CATCH/HOUR: 316.09

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Pomadasys incisus	74.57	506	23.59	
Brachydeuterus auritus	66.86	26	21.15	
Galeoides decadactylus	35.57	360	11.25	
Alectis alexandrinus	26.31	34	8.32	
Decapterus rhonchus	25.86	116	8.18	3450
Chloroscombrus chrysurus	17.74	120	5.61	
Trachurus trecae	16.36	261	5.18	3451
Selene dorsalis	13.46	197	4.26	
Loligo vulgaris	8.06	17	2.55	
Pagellus bellottii	6.86	43	2.17	
Lagocephalus lagocephalus	5.49	17	1.74	
Pomadasys peroteti	5.23	17	1.65	
Zanobatus shoenleinii	3.30	3	1.04	
Arius parkii	3.26	17	1.03	
Campogramma glaycos	2.86	6	0.90	
Trichiurus lepturus	2.66	26	0.84	
Dasyatis marmorata	0.87	1	0.28	
Pagrus caeruleostictus	0.47	1	0.15	
Sardinella aurita - Juveniles	0.30	24	0.09	
Decapterus punctatus	0.01	1		
Total	316.10		99.98	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2073
DATE:13/11/03 GEAR TYPE: BT No: 8 POSITION:Lat N 1708
start stop duration Long W 1630
TIME :16:26:14 16:53:39 27 (min) Purpose code: 1
LOG :7440.75 7442.32 1.58 Area code : 3
FDEPTH: 84 75 GearCond.code:
BDEPTH: 84 75 Validity code:
Towing dir: 90º Wire out: 300 m Speed: 35 kn*10

Sorted: 100 Kg Total catch: 1470.38 CATCH/HOUR: 3267.51

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Trachurus trecae, juvenile	3036.67	120140	92.94	3453
Trichiurus lepturus	109.00	1849	3.34	
Sardina pilchardus	90.84	3113	2.78	3452
Arius parkii	16.53	96	0.51	
Merluccius senegalensis	10.69	64	0.33	
Boops boops	0.98	64	0.03	
Priacanthus arenatus	0.98	31	0.03	
Sardinella aurita - Juveniles	0.98	31	0.03	
Loligo vulgaris	0.84	4	0.03	
Total	3267.51		100.02	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2074
DATE:18/11/02 GEAR TYPE: PT No: 4 POSITION:Lat N 1719
start stop duration Long W 1619
TIME :21:55:15 22:25:37 30 (min) Purpose code: 1
LOG :7493.10 7494.90 1.80 Area code : 3
FDEPTH: 15 15 GearCond.code:
BDEPTH: 95 78 Validity code:
Towing dir: 90º Wire out: 110 m Speed: 40 kn*10

Sorted: 45 Kg Total catch: 1457.70 CATCH/HOUR: 2915.40

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Trachurus trecae	2896.00	140696	99.33	3454
Arius heudeloti	16.20	4	0.56	
Trichiurus lepturus	2.24	4	0.08	
Scomber japonicus	0.30	2	0.01	
Lagocephalus lagocephalus	0.06	2		
Total	2914.80		99.98	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2075
DATE:14/11/03 GEAR TYPE: PT No: 7 POSITION:Lat N 1726
start stop duration Long W 1612
TIME :01:01:06 01:06:54 6 (min) Purpose code: 1
LOG :7518.47 7518.82 0.35 Area code : 3
FDEPTH: 10 10 GearCond.code:
BDEPTH: 24 24 Validity code:
Towing dir: 200º Wire out: 80 m Speed: 35 kn*10

Sorted: 36 Kg Total catch: 144.25 CATCH/HOUR: 1442.50

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardinella maderensis	1038.40	6520	71.99	3456
Sardinella aurita	231.20	1080	16.03	3455
Chloroscombrus chrysurus	80.40	840	5.57	
Selene dorsalis	33.20	760	2.30	
Decapterus rhonchus	33.20	720	2.30	3457
Brachydeuterus auritus	7.20	200	0.50	
Caranx senegallus	5.70	10	0.40	
Campogramma glaycos	3.70	20	0.26	
Trichiurus lepturus	2.90	30	0.20	
Engraulis encrasicolus	2.40	200	0.17	
Galeoides decadactylus	2.40	40	0.17	
Sphyraena guachancho	1.80	20	0.12	
Total	1442.50		100.01	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2076
DATE:14/11/03 GEAR TYPE: PT No: 1 POSITION:Lat N 1729
start stop duration Long W 1625
TIME :03:13:08 03:42:06 29 (min) Purpose code: 1
LOG :7538.73 7540.58 1.85 Area code : 3
FDEPTH: 0 0 GearCond.code:
BDEPTH: 97 105 Validity code:
Towing dir: 270º Wire out: 125 m Speed: 39 kn*10

Sorted: 14 Kg Total catch: 99.11 CATCH/HOUR: 205.06

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Trachurus trecae, juvenile	147.41	6869	71.89	3458
Trichiurus lepturus	28.24	39	13.77	
Trachinotus ovatus	25.55	54	12.46	
Sardinella maderensis	2.40	14	1.17	
Echeneis naucrates	1.45	2	0.71	
Total	205.05		100.00	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2077
DATE:14/11/03 GEAR TYPE: PT No: 6 POSITION:Lat N 1739
start stop duration Long W 1616
TIME :08:36:48 09:06:49 30 (min) Purpose code: 1
LOG :7588.55 7590.36 1.72 Area code : 3
FDEPTH: 0 0 GearCond.code:
BDEPTH: 59 54 Validity code:
Towing dir: 90º Wire out: 140 m Speed: 35 kn*10

Sorted: Kg Total catch: 52.78 CATCH/HOUR: 105.56

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardinella aurita	65.80	314	62.33	3459
Chloroscombrus chrysurus	12.82	24	12.14	
Lagocephalus lagocephalus	6.84	6	6.48	
Chloroscombrus chrysurus	6.60	32	6.25	
Sardinella maderensis	5.18	32	4.91	3460
Trachinotus ovatus	3.66	24	3.47	
Sarda sarda	2.36	2	2.24	
Selene dorsalis	2.30	24	2.18	
Total	105.56		100.00	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2078
DATE:14/11/03 GEAR TYPE: PT No: 6 POSITION:Lat N 1737
start stop duration Long W 1611
TIME :10:18:50 10:38:24 20 (min) Purpose code: 1
LOG :7597.01 7598.24 1.22 Area code : 3
FDEPTH: 5 5 GearCond.code:
BDEPTH: 31 30 Validity code:
Towing dir: 10º Wire out: 125 m Speed: 36 kn*10

Sorted: 64 Kg Total catch: 612.54 CATCH/HOUR: 1837.62

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardinella maderensis	1149.00	5970	62.53	3461
Brachydeuterus auritus	238.50	3060	12.98	
Chloroscombrus chrysurus	109.50	930	5.96	
Pomadasys jubelini	85.20	240	4.64	
Trachurus trecae	60.60	330	3.30	
Alectis alexandrinus	49.80	30	2.71	
Selene dorsalis	33.00	720	1.80	
Mugil cephalus	29.10	30	1.58	
Ilisha africana	26.10	300	1.42	
Lagocephalus lagocephalus	19.20	30	1.04	
Engraulis encrasicolus	15.90	2520	0.87	
Campogramma glaycos	12.60	30	0.69	
Dasyatis marmorata	7.08	21	0.39	
Loligo vulgaris	2.04	3	0.11	
Total	1837.62		100.02	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2079
DATE:14/11/03 GEAR TYPE: BT No: 8 POSITION:Lat N 1749
start stop duration Long W 1611
TIME :13:01:38 13:18:21 17 (min) Purpose code: 1
LOG :7620.17 7621.16 0.99 Area code : 3
FDEPTH: 35 27 GearCond.code:
BDEPTH: 35 27 Validity code:
Towing dir: 90º Wire out: 170 m Speed: 35 kn*10

Sorted: 31 Kg Total catch: 332.19 CATCH/HOUR: 1172.44

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Brachydeuterus auritus	361.76	3776	30.86	
Pomadasys incisus	206.47	1694	17.61	
Arius parkii	98.82	388	8.43	
Drepane africana	83.65	71	7.13	
Galeoides decadactylus	73.06	918	6.23	
Decapterus rhonchus	52.24	399	4.46	3463
Chloroscombrus chrysurus	48.00	494	4.09	
Pagellus bellottii	38.82	247	3.31	
Ilisha africana	37.06	353	3.16	
Selene dorsalis	34.59	882	2.95	
Pomadasys peroteti	30.00	35	2.56	
Dasyatis marmorata	24.00	35	2.05	
Trichiurus lepturus	24.00	388	2.05	
Eucinostomus melanopterus	18.35	176	1.57	
Trachurus trecae	12.92	233	1.10	3462
Sardinella maderensis	8.22	39	0.70	
Octopus vulgaris	6.21	4	0.53	
Sparus caeruleostictus *	5.65	21	0.48	
Campogramma glaycos	2.47	4	0.21	
Dentex gibbosus	2.12	35	0.18	
Pseudupeneus prayensis	1.80	21	0.15	
Penaeus notialis	1.16	35	0.10	
Boops boops	0.71	35	0.06	
Engraulis encrasicolus	0.18	32	0.02	
Dicologoglossa cuneata	0.14	4	0.01	
Sardinella aurita - Juveniles	0.04	4		
Total	1172.44		100.00	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2080
DATE:14/11/03 GEAR TYPE: PT No: 6 POSITION:Lat N 1759
start stop duration Long W 1629
TIME :20:33:16 21:03:06 30 (min) Purpose code: 1
LOG :7678.83 7680.70 1.80 Area code : 3
FDEPTH: 0 0 GearCond.code:
BDEPTH: 166 118 Validity code:
Towing dir: 90º Wire out: 125 m Speed: 35 kn*10

Sorted: 61 Kg Total catch: 102.89 CATCH/HOUR: 205.78

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Trichiurus lepturus	85.20	126	41.40	
MYCTOPHIDAE	81.36	40344	39.54	
Trachurus trecae	19.76	360	9.60	3464
Synagrops microlepis	9.92	1016	4.82	
Trachinotus ovatus	9.38	30	4.56	
Engraulis encrasicolus	0.16	8	0.08	
Total	205.78		100.00	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2081
DATE:14/11/03 GEAR TYPE: PT No: 5 POSITION:Lat N 1759
start stop duration Long W 1617
TIME :22:47:42 23:09:37 22 (min) Purpose code: 1
LOG :7692.35 7693.71 1.35 Area code : 3
FDEPTH: 10 10 GearCond.code:
BDEPTH: 67 73 Validity code:
Towing dir: 270º Wire out: 132 m Speed: 38 kn*10

Sorted: 63 Kg Total catch: 243.62 CATCH/HOUR: 664.42

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardinella maderensis	490.91	2555	73.89	3465
Trachurus trecae	66.00	4418	9.93	3467
Trichiurus lepturus	50.73	338	7.64	
Sardinella aurita	42.98	142	6.47	3466
Lagocephalus lagocephalus	8.67	5	1.30	
Sepia bertheloti	3.82	11	0.57	
Selene dorsalis	0.87	11	0.13	
Priacanthus arenatus	0.22	22	0.03	
Engraulis encrasicolus	0.22	33	0.03	
Total	664.42		99.99	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2082
DATE:15/11/03 GEAR TYPE: BT No: 8 POSITION:Lat N 1803
start stop duration Long W 1608
TIME :01:55:58 02:06:20 10 (min) Purpose code: 1
LOG :7716.41 7717.05 0.63 Area code : 3
FDEPTH: 18 18 GearCond.code:
BDEPTH: 18 18 Validity code:
Towing dir: 180º Wire out: 100 m Speed: 35 kn*10

Sorted: 75 Kg Total catch: 356.76 CATCH/HOUR: 2140.56

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardinella maderensis	1525.50	7170	71.27	3470
Decapterus rhonchus	184.80	1260	8.63	3469
Brachydeuterus auritus	168.30	5790	7.86	
Pomadasys peroteti	56.70	210	2.65	
Chloroscombrus chrysurus	38.70	420	1.81	
Trichiurus lepturus	31.50	150	1.47	
Sardinella aurita	24.00	210	1.12	
Galeoides decadactylus	22.20	240	1.04	
Diplodus puntazzo	18.60	30	0.87	
Lagocephalus laevigatus	15.60	30	0.73	
Arius parkii	13.80	60	0.64	
Engraulis encrasicolus	9.00	1710	0.42	3468
Pagellus bellottii	8.10	90	0.38	
Sphyraena barracuda	6.42	12	0.30	
Rhizoprionodon acutus	5.88	6	0.27	
Sepia orbignyana	4.92	60	0.23	
Ilisha africana	3.60	30	0.17	
Penaeus kerathurus	0.72	30	0.03	
Trachurus trecae	0.42	6	0.02	
Penaeus notialis	0.42	42	0.02	
Total	2139.18		99.93	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2083
DATE:15/11/03 GEAR TYPE: PT No: 1 POSITION:Lat N 1809
start stop duration Long W 1632
TIME :05:21:56 05:36:24 14 (min) Purpose code: 1
LOG :7749.73 7750.70 0.96 Area code : 3
FDEPTH: 20 15 GearCond.code:
BDEPTH: 247 200 Validity code:
Towing dir: 90º Wire out: 90 m Speed: 40 kn*10

Sorted: 32 Kg Total catch: 31.95 CATCH/HOUR: 136.93

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
MYCTOPHIDAE	84.00	71567	61.35	
Trichiurus lepturus	25.71	86	18.78	
Trachurus trecae	15.17	43	11.08	
Sarda sarda	6.69	4	4.89	
Sardinella maderensis	3.34	17	2.44	
Trachurus trecae, juvenile	1.71	111	1.25	
Engraulis encrasicolus	0.17	17	0.12	
Synagrops microlepis	0.09	17	0.07	
Selene dorsalis, juveniles	0.04	13	0.03	
Total	136.92		100.01	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2084
DATE:15/11/03 GEAR TYPE: PT No: 5 POSITION:Lat N 1819
start stop duration Long W 1629
TIME :09:20:00 09:40:07 20 (min) Purpose code: 1
LOG :7781.95 7783.24 1.22 Area code : 3
FDEPTH: 0 0 GearCond.code:
BDEPTH: 117 144 Validity code:
Towing dir: 270º Wire out: 130 m Speed: 38 kn*10

Sorted: Kg Total catch: 3.24 CATCH/HOUR: 9.72

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardinella maderensis	5.46	15	56.17	
Trachinotus ovatus	4.26	15	43.83	
Total	9.72		100.00	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2085
DATE:15/11/03 GEAR TYPE: PT No: 1 POSITION:Lat N 1828
start stop duration Long W 1619
TIME :14:31:09 14:46:32 15 (min) Purpose code: 1
LOG :7826.24 7827.24 1.00 Area code : 3
FDEPTH: 15 15 GearCond.code:
BDEPTH: 39 39 Validity code:
Towing dir: 180º Wire out: 80 m Speed: 40 kn*10

Sorted: 82 Kg Total catch: 164.74 CATCH/HOUR: 658.96

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardinella maderensis	529.60	1048	80.37	3472
Scomber japonicus	97.60	456	14.81	3471
Sardinella aurita	21.68	64	3.29	
Chloroscombrus chrysurus	5.36	24	0.81	
Trichiurus lepturus	4.72	8	0.72	
Total	658.96		100.00	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2086
DATE:15/11/03 GEAR TYPE: BT No: 8 POSITION:Lat N 1827
start stop duration Long W 1619
TIME :15:13:56 15:38:30 25 (min) Purpose code: 1
LOG :7828.71 7830.22 1.51 Area code : 3
FDEPTH: 40 40 GearCond.code:
BDEPTH: 40 40 Validity code:
Towing dir: ø Wire out: 170 m Speed: 36 kn*10

Sorted: 64 Kg Total catch: 401.35 CATCH/HOUR: 963.24

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Trachurus trecae	748.80	19411	77.74	3474
Pagellus bellottii	57.60	634	5.98	
Arius parkii	41.18	43	4.28	
Decapterus rhonchus	37.44	130	3.89	
Pomadasys incisus	17.71	72	1.84	
Loligo vulgaris	14.66	41	1.52	
Scomber japonicus	11.45	24	1.19	3473
Dentex canariensis	7.63	29	0.79	
Alectis alexandrinus	7.20	14	0.75	
Sparus caeruleostictus *	4.94	12	0.51	
Argyrosomus regius	2.90	2	0.30	
Campogramma glaycos	2.69	2	0.28	
Zeus faber	1.63	2	0.17	
Sardinella aurita - Juveniles	1.58	29	0.16	
Engraulis encrasicolus	1.44	29	0.15	
Aspitrigla obscura	1.30	14	0.13	
Priacanthus arenatus	1.15	29	0.12	
Boops boops	1.01	58	0.10	
Fistularia petimba	0.91	5	0.09	
Total	963.22		99.99	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2087
DATE:15/11/03 GEAR TYPE: PT No: 2 POSITION:Lat N 1829
start stop duration Long W 1636
TIME :17:51:14 18:21:56 31 (min) Purpose code: 1
LOG :7849.32 7851.16 1.82 Area code : 3
FDEPTH: 167 136 GearCond.code:
BDEPTH: 197 166 Validity code:
Towing dir: 90ø Wire out: 510 m Speed: 35 kn*10

Sorted: Kg Total catch: 50.24 CATCH/HOUR: 97.24

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Synagrops microlepis	46.16	7316	47.47	
Trichiurus lepturus	31.16	54	32.04	
Trachurus trecae	7.57	23	7.78	3475
MYCTOPHIDAE	6.08	2954	6.25	
Brama brama	4.70	4	4.83	
Todaropsis eblanae	2.61	2	2.68	
Illex coindetii	0.15	2	0.15	
Engraulis encrasicolus	0.04	2	0.04	
Selene dorsalis	0.02	2	0.02	
Total	98.49		101.26	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2088
DATE:15/11/03 GEAR TYPE: PT No: 6 POSITION:Lat N 1839
start stop duration Long W 1634
TIME :22:15:47 22:43:29 28 (min) Purpose code: 1
LOG :7882.61 7884.29 1.61 Area code : 3
FDEPTH: 5 5 GearCond.code:
BDEPTH: 141 99 Validity code:
Towing dir: 90ø Wire out: 140 m Speed: 36 kn*10

Sorted: 56 Kg Total catch: 161.37 CATCH/HOUR: 345.79

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardinella maderensis	172.29	508	49.83	3476
Trichiurus lepturus	132.43	276	38.30	
Synagrops microlepis	26.04	4918	7.53	
Trachurus trecae	8.29	244	2.40	3477
Mugil capurrii	5.44	4	1.57	
MYCTOPHIDAE	0.84	341	0.24	
Campogramma glaycos	0.47	2	0.14	
Total	345.80		100.01	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2089
DATE:16/11/03 GEAR TYPE: PT No: 1 POSITION:Lat N 1839
start stop duration Long W 1621
TIME :00:18:46 00:48:19 30 (min) Purpose code: 1
LOG :7895.33 7897.20 1.87 Area code : 3
FDEPTH: 0 0 GearCond.code:
BDEPTH: 40 30 Validity code:
Towing dir: 90ø Wire out: 120 m Speed: 39 kn*10

Sorted: 107 Kg Total catch: 1181.31 CATCH/HOUR: 2362.62

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardina pilchardus	1717.10	8426	72.68	3481
Trachurus trecae	427.90	7436	18.11	3478
Scomber japonicus	100.10	280	4.24	3479
Sardinella maderensis	82.28	234	3.48	3480
Arius parkii	18.92	22	0.80	
Trichiurus lepturus	5.50	22	0.23	
Sphyraena guachancho	3.30	22	0.14	
Engraulis encrasicolus	2.42	176	0.10	
Lagocephalus laevigatus	2.24	2	0.09	
Boops boops	1.98	22	0.08	
Sardinella aurita - Juveniles	0.88	88	0.04	
Total	2362.62		99.99	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2090
DATE:16/11/03 GEAR TYPE: BT No: 8 POSITION:Lat N 1842
start stop duration Long W 1619
TIME :02:02:46 02:29:00 26 (min) Purpose code: 1
LOG :7907.00 7908.62 1.60 Area code : 3
FDEPTH: 25 20 GearCond.code:
BDEPTH: 25 20 Validity code:
Towing dir: 140ø Wire out: 110 m Speed: 37 kn*10

Sorted: 65 Kg Total catch: 1370.41 CATCH/HOUR: 3162.48

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardina pilchardus	2457.00	12406	77.69	3484
Sardinella maderensis	302.40	967	9.56	3483
Sardinella aurita	252.48	743	7.98	3482
Scomber japonicus	51.37	217	1.62	3485
Chloroscombrus chrysurus	26.17	145	0.83	
Trichiurus lepturus	21.32	48	0.67	
Decapterus rhonchus	16.48	138	0.52	3487
Brachydeuterus auritus	15.02	145	0.47	
Trachurus trecae	7.75	104	0.25	3486
Pomadasys incisus	6.78	48	0.21	
Diplodus sargus *	3.55	5	0.11	
Rhizoprionodon acutus	2.15	2	0.07	
Total	3162.47		99.98	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2091
DATE:16/11/03 GEAR TYPE: BT No: 8 POSITION:Lat N 1859
start stop duration Long W 1646
TIME :11:37:23 12:17:03 40 (min) Purpose code: 1
LOG :7981.49 7983.98 0.67 Area code : 3
FDEPTH: 165 157 GearCond.code:
BDEPTH: 165 157 Validity code:
Towing dir: 270ø Wire out: 530 m Speed: 35 kn*10

Sorted: 38 Kg Total catch: 390.60 CATCH/HOUR: 585.90

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Synagrops microlepis	325.50	46965	55.56	
Helicolenus dactylopterus	76.20	1575	13.01	
Merluccius senegalensis	72.00	375	12.29	
Chlorophthalmus atlanticus	68.55	7530	11.70	
Trachurus trecae	11.55	35	1.97	3488
Zeus faber	9.30	15	1.59	
Capros aper	7.95	735	1.36	
Zenopsis conchifer	7.65	60	1.31	
Pontinus kuhlii	3.00	30	0.51	
Todaropsis eblanae	2.55	15	0.44	
Malacocephalus laevis	1.35	30	0.23	
Parapenaeus longirostris	0.15	30	0.03	
GALATHEIDAE	0.15	15	0.03	
Total	585.90		100.03	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2092
DATE:16/11/03 GEAR TYPE: PT No: 1 POSITION:Lat N 1908
start stop duration Long W 1635
TIME :16:36:12 16:55:37 19 (min) Purpose code: 1
LOG :8023.99 8025.27 1.27 Area code : 3
FDEPTH: 17 17 GearCond.code:
BDEPTH: 62 61 Validity code:
Towing dir: 165º Wire out: 80 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				

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2093
DATE:16/11/03 GEAR TYPE: BT No: 8 POSITION:Lat N 1907
start stop duration Long W 1635
TIME :17:19:24 17:49:09 30 (min) Purpose code: 1
LOG :8026.62 8028.34 1.72 Area code : 3
FDEPTH: 62 63 GearCond.code:
BDEPTH: 62 63 Validity code:
Towing dir: 345º Wire out: 220 m Speed: 35 kn*10

Sorted: 32 Kg Total catch: 1303.01 CATCH/HOUR: 2606.02

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Trachurus trecae	2300.00	55840	88.26	3489
Sardinella aurita	165.60	4240	6.35	3491
Pagellus bellottii	102.40	720	3.93	
Decapterus rhonchus	16.78	26	0.64	3490
Scomber japonicus	13.60	80	0.52	
Sphoeroides spengleri	3.20	160	0.12	
Epinephelus aeneus	3.14	2	0.12	
Scorpaena elongata	0.98	2	0.04	
Scorpaena stephanica	0.32	2	0.01	
Total	2606.02		99.99	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2094
DATE:16/11/03 GEAR TYPE: BT No: 8 POSITION:Lat N 1920
start stop duration Long W 1642
TIME :22:31:17 23:01:23 30 (min) Purpose code: 1
LOG :8073.78 8075.35 1.57 Area code : 3
FDEPTH: 16 16 GearCond.code:
BDEPTH: 16 16 Validity code:
Towing dir: 320º Wire out: 120 m Speed: 30 kn*10

Sorted: Kg Total catch: 104.78 CATCH/HOUR: 209.56

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Trachurus trecae	57.20	1072	27.30	3492
Brachydeuterus auritus	44.08	7112	21.03	
Decapterus rhonchus	36.24	352	17.29	3493
Penaeus notialis	19.68	1728	9.39	
Rhizoprionodon acutus	15.40	6	7.35	
Pomadasys incisus	8.88	112	4.24	
Penaeus kerathurus	6.16	304	2.94	
Pagellus bellottii	4.32	32	2.06	
Arius parkii	3.92	8	1.87	
Argyrosomus regius	3.92	8	1.87	
Sardinella maderensis	3.68	16	1.76	
Dicologoglossa cuneata	2.24	32	1.07	
Mustelus mustelus	2.00	4	0.95	
Galeoides decadactylus	1.76	64	0.84	
Total	209.48		99.96	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2095
DATE:17/11/03 GEAR TYPE: BT No: 8 POSITION:Lat N 1925
start stop duration Long W 1646
TIME :23:56:15 00:15:16 19 (min) Purpose code: 1
LOG :8082.10 8083.17 1.06 Area code : 3
FDEPTH: 20 19 GearCond.code:
BDEPTH: 20 19 Validity code:
Towing dir: 174º Wire out: 120 m Speed: 35 kn*10

Sorted: 61 Kg Total catch: 196.22 CATCH/HOUR: 619.64

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Pomadasys incisus	178.11	3155	28.74	
Pagellus bellottii	113.68	947	18.35	
Sardinella maderensis	64.23	1288	10.37	3496
Galeoides decadactylus	43.77	843	7.06	
Decapterus rhonchus	37.52	445	6.06	3495
Plectorhinchus mediterraneus	29.84	815	4.82	
Rhizoprionodon acutus	19.58	13	3.16	
Trachurus trecae	16.48	322	2.66	3494
Sardinella aurita	15.63	294	2.52	3497
Sparus caeruleostictus *	11.37	246	1.83	
Sepia orbignyana	10.42	66	1.68	
Dentex canariensis	10.23	171	1.65	
Trichiurus lepturus	8.81	142	1.42	
Brachydeuterus auritus	7.39	995	1.19	
Argyrosomus regius	5.68	9	0.92	
Pseudupeneus prayensis	5.68	171	0.92	
Penaeus notialis	5.68	287	0.92	
Leptocharias smithii	5.59	6	0.90	
Epinephelus aeneus	4.89	3	0.79	
Diplodus bellottii	4.64	180	0.75	
Aluterus punctata	3.82	6	0.62	
Campogramma glaycos	3.32	9	0.54	
Spondyliosoma cantharus	2.56	9	0.41	
Penaeus kerathurus	2.21	155	0.36	
Scarus hoefleri	2.18	19	0.35	
Sphoeroides spengleri	1.71	76	0.28	
Umbrina canariensis	1.71	9	0.28	
Serranus scriba	1.42	9	0.23	
Sparus auriga *	0.82	6	0.13	
Bothus podas africanus	0.66	19	0.11	
Total	619.63		100.02	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2096
DATE:17/11/03 GEAR TYPE: PT No: 3 POSITION:Lat N 1945
start stop duration Long W 1703
TIME :06:47:39 07:07:23 20 (min) Purpose code: 1
LOG :8146.13 8147.38 1.25 Area code : 3
FDEPTH: 20 20 GearCond.code:
BDEPTH: 70 86 Validity code:
Towing dir: 171º Wire out: 90 m Speed: 38 kn*10

Sorted: 14 Kg Total catch: 14.05 CATCH/HOUR: 42.15

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Trichiurus lepturus	42.15	1227	100.00	
Total	42.15		100.00	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2097
DATE:17/11/03 GEAR TYPE: BT No: 8 POSITION:Lat N 2009
start stop duration Long W 1711
TIME :18:13:59 18:32:48 19 (min) Purpose code: 1
LOG :8244.07 8245.07 0.99 Area code : 3
FDEPTH: 21 21 GearCond.code:
BDEPTH: 21 21 Validity code:
Towing dir: 270º Wire out: 130 m Speed: 32 kn*10

Sorted: 29 Kg Total catch: 232.72 CATCH/HOUR: 734.91

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Trachurus trecae	372.63	6799	50.70	3498
Decapterus rhonchus	119.75	682	16.29	
Pomadasys incisus	74.02	328	10.07	
Brachydeuterus auritus	72.25	682	9.83	
Trichiurus lepturus	27.28	960	3.71	
Sardinella aurita	23.49	303	3.20	
Argyrosomus sp.	17.94	51	2.44	
Sardinella maderensis	10.86	51	1.48	
Arius heudeloti	9.85	25	1.34	
Diplodus sargus *	4.29	25	0.58	
Pteroscion peli	1.52	25	0.21	
Sciaena umbra	1.01	25	0.14	
Total	734.89		99.99	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2098
DATE:17/11/03 GEAR TYPE: PT No: 6 POSITION:Lat N 2009
start stop duration Long W 1734
TIME :20:46:10 21:16:09 30 (min) Purpose code: 1
LOG :8266.16 8268.07 1.90 Area code : 3
FDEPTH: 5 5 GearCond.code:
BDEPTH: 77 107 Validity code:
Towing dir: 270ø Wire out: 130 m Speed: 38 kn*10

Sorted: 31 Kg Total catch: 118.16 CATCH/HOUR: 236.32

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
MYCTOPHIDAE	144.00	5400	60.93	
Trachurus trecae	55.60	1400	23.53	3501
Engraulis encrasicolus	11.68	848	4.94	3500
Synagrops microlepis	10.40	240	4.40	
Scomber japonicus	7.76	42	3.28	3499
Trichiurus lepturus	5.80	10	2.45	
Lagocephalus laevigatus	1.08	4	0.46	
Total	236.32		99.99	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2099
DATE:18/11/03 GEAR TYPE: PT No: 6 POSITION:Lat N 2019
start stop duration Long W 1736
TIME :00:01:36 00:26:17 25 (min) Purpose code: 1
LOG :8292.07 8293.63 1.53 Area code : 3
FDEPTH: 5 5 GearCond.code:
BDEPTH: 84 74 Validity code:
Towing dir: 90ø Wire out: 130 m Speed: 38 kn*10

Sorted: 22 Kg Total catch: 22.08 CATCH/HOUR: 52.99

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Trachurus trecae	15.36	276	28.99	3503
Sardinella maderensis	13.30	38	25.10	3502
Mugil cephalus	10.87	5	20.51	
MYCTOPHIDAE	6.29	1862	11.87	
Trichiurus lepturus	6.22	7	11.74	
Lagocephalus laevigatus	0.82	2	1.55	
Synagrops microlepis	0.07	10	0.13	
Engraulis encrasicolus	0.07	2	0.13	
Total	53.00		100.02	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2100
DATE:18/11/03 GEAR TYPE: BT No: 8 POSITION:Lat N 2018
start stop duration Long W 1707
TIME :03:25:07 03:32:55 8 (min) Purpose code: 1
LOG :8321.41 8321.86 0.46 Area code : 3
FDEPTH: 20 20 GearCond.code:
BDEPTH: 20 20 Validity code:
Towing dir: 270ø Wire out: 120 m Speed: 35 kn*10

Sorted: 76 Kg Total catch: 544.32 CATCH/HOUR: 4082.40

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardinella maderensis	3597.00	19140	88.11	3505
Decapterus rhonchus	184.20	1515	4.51	3504
Diplodus bellottii	135.60	1860	3.32	
Pomadasys incisus	49.80	300	1.22	
Sardinella aurita	37.20	180	0.91	
Pagellus bellottii	30.60	600	0.75	
Trachurus trecae	16.80	240	0.41	
Spondyliosoma cantharus	13.80	60	0.34	
Chloroscombrus chrysurus	9.60	60	0.24	
Galeoides decadactylus	4.20	120	0.10	
Penaeus kerathurus	3.60	60	0.09	
Total	4082.40		100.00	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2101
DATE:18/11/03 GEAR TYPE: PT No: 6 POSITION:Lat N 2028
start stop duration Long W 1726
TIME :07:14:20 07:44:24 30 (min) Purpose code: 1
LOG :8357.49 8359.18 1.66 Area code : 3
FDEPTH: 10 10 GearCond.code:
BDEPTH: 49 46 Validity code:
Towing dir: 90ø Wire out: 130 m Speed: 33 kn*10

Sorted: 18 Kg Total catch: 50.12 CATCH/HOUR: 100.24

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Trachurus trecae	67.80	1820	67.64	3506
Lagocephalus lagocephalus	25.40	100	25.34	
Sardinella aurita	2.72	8	2.71	
Trichiurus lepturus	2.52	4	2.51	
Sardinella aurita	1.08	24	1.08	
Sardina pilchardus	0.72	16	0.72	
Total	100.24		100.00	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2102
DATE:18/11/03 GEAR TYPE: BT No: 8 POSITION:Lat N 2029
start stop duration Long W 1740
TIME :10:04:12 10:42:59 39 (min) Purpose code: 1
LOG :8379.16 8381.27 2.11 Area code : 3
FDEPTH: 107 102 GearCond.code:
BDEPTH: 107 102 Validity code:
Towing dir: 175ø Wire out: 320 m Speed: 33 kn*10

Sorted: 39 Kg Total catch: 145.95 CATCH/HOUR: 224.54

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Parapenaeus longirostris	70.62	31505	31.45	
Trachurus trecae	61.38	126	27.34	3507
Chlorophthalmus atlanticus	25.62	3554	11.41	
Helicolenus dactylopterus	24.92	4985	11.10	
Trachurus trachurus	12.23	485	5.45	3508
Zenopsis conchifer	9.92	46	4.42	
Zeus faber	6.46	6	2.88	
Capros aper	5.77	1038	2.57	
Synagrops microlepis	3.69	369	1.64	
Scomber japonicus	3.00	6	1.34	
GALATHEIDAE *	0.69	69	0.31	
Loligo vulgaris	0.46	23	0.20	
SOLEIDAE	0.23	23	0.10	
Serranus scriba	0.23	23	0.10	
Total	225.22		100.31	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2103
DATE:18/11/03 GEAR TYPE: BT No: 8 POSITION:Lat N 2038
start stop duration Long W 1737
TIME :14:20:35 14:52:26 32 (min) Purpose code: 1
LOG :8415.82 8417.62 1.87 Area code : 3
FDEPTH: 95 97 GearCond.code:
BDEPTH: 95 97 Validity code:
Towing dir: 180ø Wire out: 320 m Speed: 35 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				

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2104
DATE:18/11/03 GEAR TYPE: BT No: 8 POSITION:Lat N 2038
start stop duration Long W 1732
TIME :16:06:58 16:36:44 30 (min) Purpose code: 1
LOG :8427.92 8429.58 1.65 Area code : 3
FDEPTH: 74 75 GearCond.code:
BDEPTH: 74 75 Validity code:
Towing dir: 270ø Wire out: 300 m Speed: 35 kn*10

Sorted: 62 Kg Total catch: 62.24 CATCH/HOUR: 124.48

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Trachurus trecae	121.50	4300	97.61	3510
Trachurus trachurus	2.26	114	1.82	3509
Sardinella aurita - Juveniles	0.26	8	0.21	
Illex coindetii	0.20	2	0.16	
Penaeus notialis	0.10	2	0.08	
Pagellus bellottii	0.10	8	0.08	
GOBIIDAE	0.04	4	0.03	
Capros aper	0.02	4	0.02	
Total	124.48		100.01	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2105
DATE:18/11/03 GEAR TYPE: PT No: 1 POSITION:Lat N 2038
start stop duration Long W 1718
TIME :18:35:51 18:43:44 8 (min) Purpose code: 1
LOG :8446.46 8446.97 0.50 Area code : 3
FDEPTH: 25 30 GearCond.code:
BDEPTH: 46 47 Validity code:
Towing dir: 270ø Wire out: 110 m Speed: 39 kn*10

Sorted: 35 Kg Total catch: 519.90 CATCH/HOUR: 3899.25

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Trachurus trecae	2958.75	111263	75.88	3511
Pomadasys incisus	436.50	450	11.19	
Pagellus bellottii	274.50	1913	7.04	
Sardina pilchardus	95.63	2025	2.45	3512
Pagellus acarne	51.75	113	1.33	
Sepia officinalis hierredda	48.38	113	1.24	
Decapterus rhonchus	20.25	113	0.52	
Loligo vulgaris	12.38	113	0.32	
Boops boops	1.13	113	0.03	
Total	3899.27		100.00	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2106
DATE:18/11/03 GEAR TYPE: PT No: 6 POSITION:Lat N 2039
start stop duration Long W 1715
TIME :19:29:00 19:33:38 5 (min) Purpose code: 1
LOG :8451.77 8452.06 0.28 Area code : 3
FDEPTH: 10 10 GearCond.code:
BDEPTH: 42 42 Validity code:
Towing dir: 90ø Wire out: 120 m Speed: 35 kn*10

Sorted: 37 Kg Total catch: 112.02 CATCH/HOUR: 1344.24

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Sardina pilchardus	1153.80	18936	85.83	3513
Octopus vulgaris	106.56	36	7.93	
Trachurus trecae	58.32	2556	4.34	3514
Decapterus rhonchus	19.08	72	1.42	
Sepia bertheloti	6.48	72	0.48	
Total	1344.24		100.00	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2107
DATE:18/11/03 GEAR TYPE: PT No: 1 POSITION:Lat N 2048
start stop duration Long W 1716
TIME :22:58:15 23:21:40 23 (min) Purpose code: 1
LOG :8483.56 8485.10 1.54 Area code : 3
FDEPTH: 18 18 GearCond.code:
BDEPTH: 44 44 Validity code:
Towing dir: 90ø Wire out: 90 m Speed: 39 kn*10

Sorted: 79 Kg Total catch: 78.78 CATCH/HOUR: 205.51

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Sardina pilchardus	143.74	970	69.94	3517
Trachurus trecae	27.60	908	13.43	3516
Sardinella maderensis	18.00	68	8.76	3515
Trichiurus lepturus	7.83	18	3.81	
Sardinella aurita	4.80	31	2.34	3518
Decapterus rhonchus	1.93	10	0.94	
Sepia bertheloti	0.94	57	0.46	
Pagellus bellottii	0.08	23	0.04	
Total	204.92		99.72	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2108
DATE:19/11/03 GEAR TYPE: PT No: 1 POSITION:Lat N 2048
start stop duration Long W 1722
TIME :00:49:09 01:05:28 16 (min) Purpose code: 1
LOG :8495.31 8496.43 1.12 Area code : 3
FDEPTH: 20 18 GearCond.code:
BDEPTH: 60 60 Validity code:
Towing dir: 90ø Wire out: 90 m Speed: 40 kn*10

Sorted: 20 Kg Total catch: 20.56 CATCH/HOUR: 77.10

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Trachurus trecae	46.69	2010	60.56	3520
Sardina pilchardus	23.36	570	30.30	3519
Scomber japonicus	3.00	19	3.89	
Trichiurus lepturus	1.65	4	2.14	
Octopus vulgaris	0.94	4	1.22	
Decapterus rhonchus	0.60	4	0.78	
Sardinella aurita - Juveniles	0.38	11	0.49	
Penaeus notialis	0.30	4	0.39	
Loligo vulgaris	0.19	11	0.25	
Total	77.11		100.02	

DR. FRIDTJOF NANSEN PROJECT:W3 PROJECT STATION:2109
DATE:19/11/03 GEAR TYPE: PT No: 1 POSITION:Lat N 2048
start stop duration Long W 1725
TIME :02:05:28 02:30:47 25 (min) Purpose code: 1
LOG :8503.92 8505.71 1.78 Area code : 3
FDEPTH: 18 17 GearCond.code:
BDEPTH: 62 58 Validity code:
Towing dir: 90ø Wire out: 80 m Speed: 42 kn*10

Sorted: 31 Kg Total catch: 62.91 CATCH/HOUR: 150.98

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Sardina pilchardus	107.52	2347	71.21	3523
Trachurus trecae	40.08	1853	26.55	3522
Sardinella aurita	1.68	50	1.11	3521
Lagocephalus laevigatus	0.65	5	0.43	
Sepia orbignyana	0.50	5	0.33	
Scomber japonicus	0.24	2	0.16	
Dicologoglossa cuneata	0.17	2	0.11	
Loligo vulgaris	0.12	7	0.08	
Arnoglossus imperialis	0.02	2	0.01	
Total	150.98		99.99	

Annex II Instruments and fishing gear used

The Simrad EK-500, 38kHz scientific echosounder was used for abundance estimation during the survey, in adition data from the 18 kHz, 120 kHz and 200 kHz transducers where logged for possible future multifreqvency target estimation.. The Bergen Echo Integrator system (BEI) were logging the echogram raw data from the sounder and used to scrutinize the acoustic records, and to allocate integrator data to fish species. All raw data were stored to tape, and a backup of the database of scrutinized data, stored. The details of the settings of the echosounders were as follows:

Transceiver 1 menu

Transducer depth	5.5 m
Absorption coeff.	10 dB/km
Pulse length	medium (1ms)
Bandwidth	wide
Max power	2000 Watt
2-way beam angle	-21.0 dB
SV transducer gain	27.19 dB
TS transducer gain	27.22 dB
Angle sensitivity	21.9
3 dB beamwidth along.	6.9°
3 dB beamwidth athw.	6.8°
Alongship offset	-0.01°
Athwardship offset	0.03°

Transceiver 2 menu

Transducer depth	5.5 m
Absorption coeff.	38 dB/km
Pulse length	long (1ms)
Bandwidth	narrow
Max power	1000 Watt
2-way beam angle	-20.6 dB
SV transducer gain	25.74 dB
TS transducer gain	25.96 dB
Angle sensitivity	21.0
3 dB beamwidth along.	7.2°
3 dB beamwidth athw.	7.3°
Alongship offset	-0.07°
Athwardship offset	0.22°

Transceiver 3 menu

Transducer depth	5.5 m
Absorption coeff.	3 dB/km
Pulse length	short (0.7ms)
Bandwidth	wide
Max power	2000 Watt
2-way beam angle	-17.2 dB
SV transducer gain	23.73 dB
TS transducer gain	23.45 dB
Angle sensitivity	13.9
3 dB beamwidth along.	11.1°
3 dB beamwidth athw.	11.0°
Alongship offset	-0.21°
Athwardship offset	0.09°

Transceiver 4 menu

Transducer depth	5.5 m
Absorption coeff.	53 dB/km
Pulse length	long (0.6ms)
Bandwidth	narrow
Max power	1000 Watt
2-way beam angle	-20.5 dB
SV transducer gain	24.08 dB
TS transducer gain	24.08 dB
Angle sensitivity	0.0
3 dB beamwidth along.	0.0°
3 dB beamwidth athw.	0.0°
Alongship offset -	0.00°
Athwardship offset	0.00°

Display menu

Echogram	1
Bottom range	10 m
Bottom range start	10 m
TVG	20 log R
Sv colour min -	65 dB
TS Colour minimum	-65 dB

Printer- menu

Range	0-50, 0-100, 0-150, 0-250 or 0-500 m
TVG	20 log R
Sv colour min	-67 dB

Bottom detection menu

Minimum level	-40 dB

Calibration

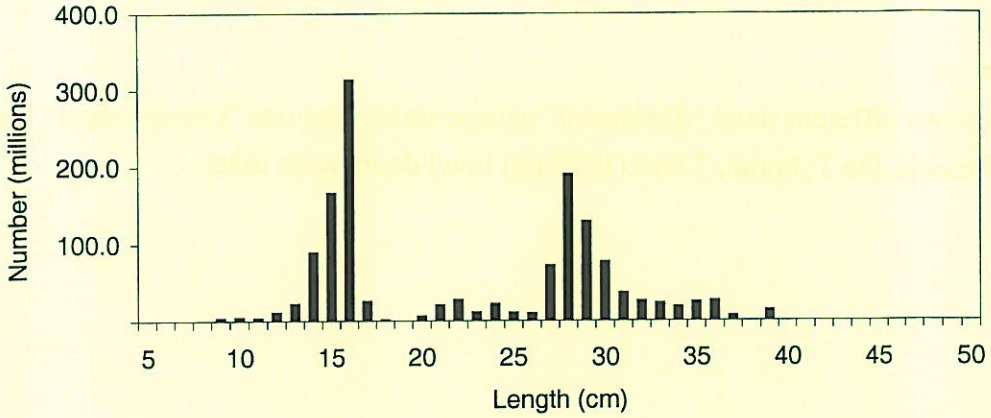
A calibration of the 38 kHz transducer was conducted south of Cape Vert – Dakar at the 8 November. The calibration was successful, and the new integration values will be set after the survey ends in Las Palmas in December. No correction was done to the current estimate as the SV transducer gain was <0.3 db different from the previous value.

Fishing gear

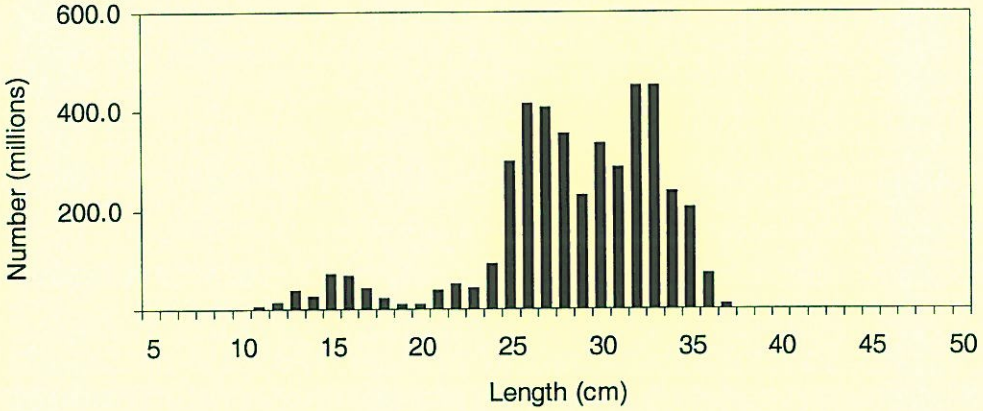
The vessel has two different sized "Åkrahamn" pelagic trawls and one "Gisund super" bottom trawl. For all trawls, the Tyborøn, 7.8m² (1670 kg) trawl doors were used.

Annex III Pooled length distributions by species and region

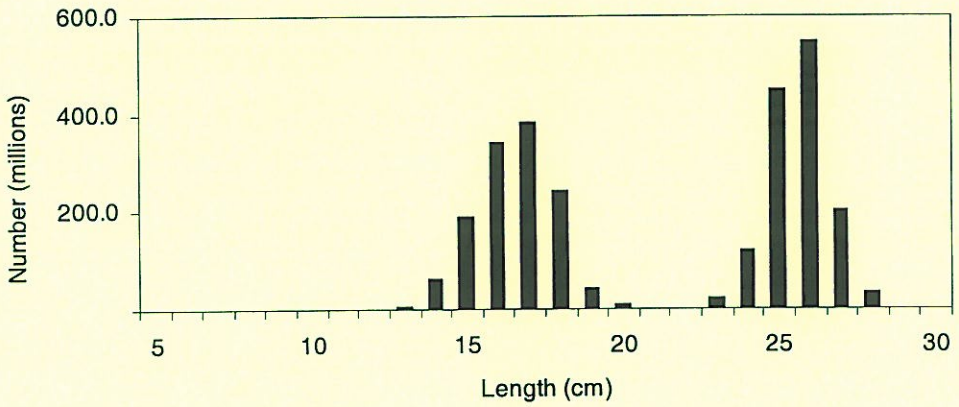
Round sardinella (Sardinella aurita): November 2003



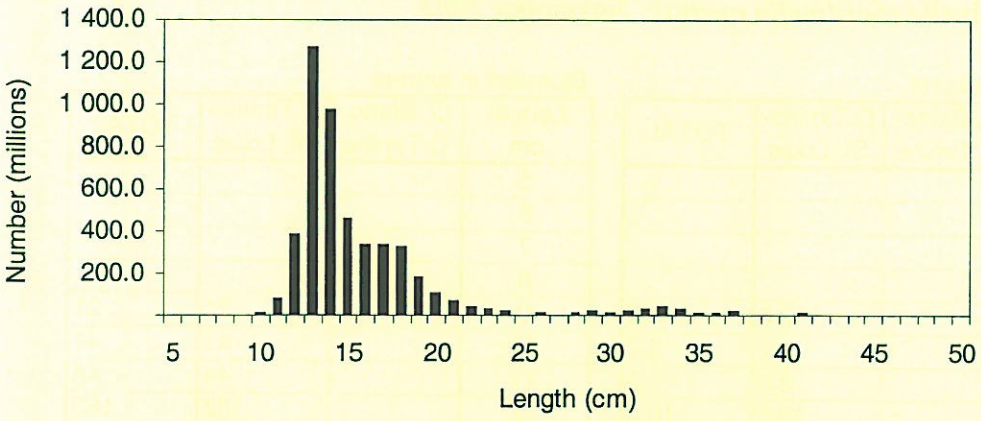
Flat sardinella (Sardinella maderensis): November 2003



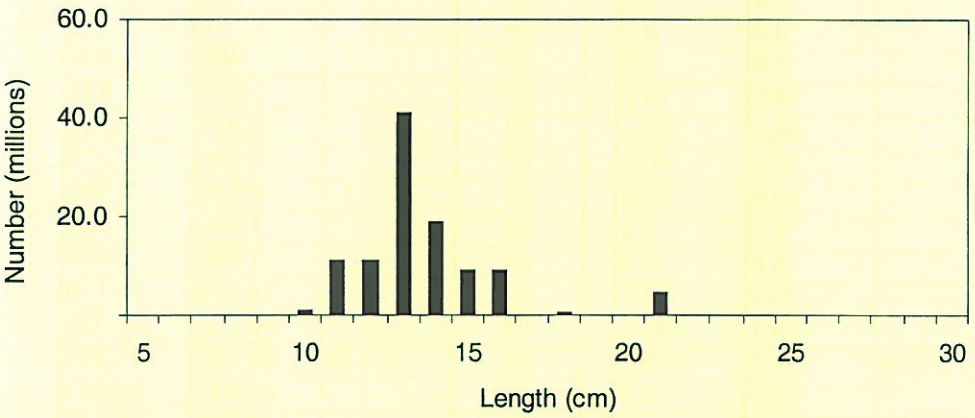
Sardine (Sardina pilchardus): November 2003



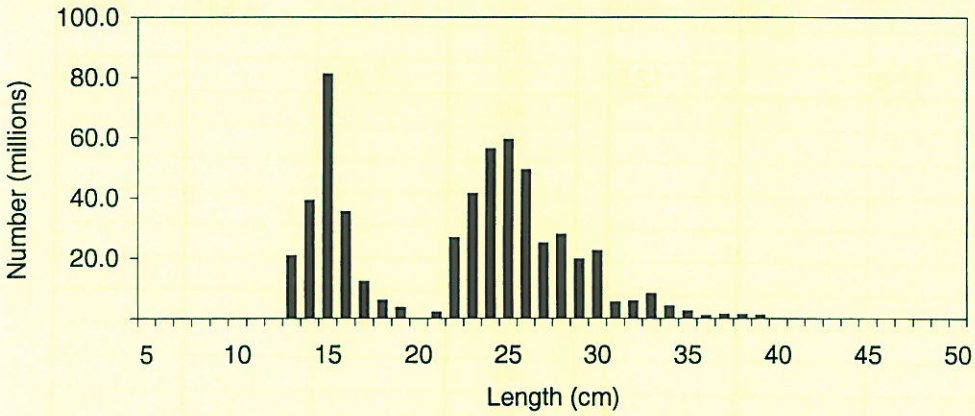
Cunene horse mackerel (Trachurus trecae): November 2003



Atlantic horse mackerel (Trachurus trachurus): November 2003



False scad (Caranx rhonchus): November 2003



Annex IV Estimated number and biomass by length group and sectors

Round sardinella *(Sardinella aurita)*: November 2003

Numbers in millions

Length cm	C. Blanc-C.Timiris	C.Timiris-St. Louis	TOTAL
5			
6			
7			
8			
9		2.6	2.6
10		3.7	3.7
11		3.0	3.0
12		10.0	10.0
13		21.0	21.0
14	81.7	6.4	88.2
15	161.2	4.0	165.2
16	306.0	6.2	312.2
17	23.0	1.2	24.3
18		0.4	0.4
19		0.2	0.2
20		4.8	4.8
21		19.2	19.2
22		26.4	26.4
23		10.2	10.2
24		20.8	20.8
25		9.5	9.5
26		8.8	8.8
27		70.7	70.7
28		189.1	189.1
29	12.6	115.5	128.1
30		75.7	75.7
31		35.5	35.5
32		24.9	24.9
33		21.8	21.8
34		17.2	17.2
35	12.6	10.9	23.5
36	25.2		25.2
37		5.6	5.6
38			
39	12.6		12.6
40			
41			
42			
43			
44			
45			
46			
47			
48			
49			
50			
Total	635.0	725.3	1 360.3

Biomass in tonnes

Length cm	C. Blanc-C.Timiris	C.Timiris-St. Louis	TOTAL
5			
6			
7			
8			
9		21	21
10		41	41
11		44	44
12		188	188
13		495	495
14	2 391	189	2 580
15	5 763	144	5 906
16	13 196	268	13 464
17	1 185	63	1 248
18		22	22
19		14	14
20		400	400
21		1 831	1 831
22		2 886	2 886
23		1 276	1 276
24		2 939	2 939
25		1 510	1 510
26		1 566	1 566
27		14 118	14 118
28		42 035	42 035
29	3 110	28 454	31 564
30		20 623	20 623
31		10 640	10 640
32		8 204	8 204
33		7 856	7 856
34		6 770	6 770
35	5 420	4 674	10 094
36	11 782		11 782
37		2 841	2 841
38			
39	7 466		7 466
40			
41			
42			
43			
44			
45			
46			
47			
48			
49			
50			
Total	50 312	160 110	210 422

Flat sardinella *(Sardinella maderensis)*: November 2003

Numbers in millions

Length cm	C. Blanc-C.Timiris	C.Timiris-St. Louis	TOTAL
5			
6			
7			
8			
9			
10		0.9	0.9
11		5.0	5.0
12		12.1	12.1
13		36.3	36.3
14		23.0	23.0
15		68.3	68.3
16		63.7	63.7
17		41.2	41.2
18		21.5	21.5
19		7.0	7.0
20		9.2	9.2
21		37.2	37.2
22	3.6	45.7	49.3
23	3.6	38.1	41.6
24	34.3	53.1	87.4
25	107.5	189.6	297.1
26	156.1	258.8	414.8
27	150.9	254.8	405.8
28	66.5	287.8	354.3
29	17.9	207.2	225.1
30	80.2	252.3	332.6
31	127.9	154.9	282.8
32	159.2	289.6	448.8
33	202.2	246.2	448.4
34	55.8	179.5	235.3
35	103.4	101.3	204.7
36	30.2	37.5	67.8
37		10.0	10.0
38			
39			
40			
41			
42			
43			
44			
45			
46			
47			
48			
49			
50			
Total	1 299.3	2 932.0	4 231.4

Biomass in tonnes

Length cm	C. Blanc-C.Timiris	C.Timiris-St. Louis	TOTAL
5			
6			
7			
8			
9			
10		10	10
11		73	73
12		227	227
13		857	857
14		673	673
15		2 443	2 443
16		2 749	2 749
17		2 122	2 122
18		1 309	1 309
19		501	501
20		763	763
21		3 548	3 548
22	392	5 000	5 392
23	446	4 742	5 189
24	4 838	7 496	12 334
25	17 106	30 185	47 291
26	27 881	46 231	74 112
27	30 133	50 877	81 010
28	14 780	63 957	78 737
29	4 414	51 064	55 478
30	21 854	68 730	90 584
31	38 380	46 466	84 846
32	52 473	95 429	147 902
33	72 986	88 860	161 846
34	21 987	70 760	92 747
35	44 431	43 491	87 922
36	14 109	17 524	31 633
37		5 072	5 072
38			
39			
40			
41			
42			
43			
44			
45			
46			
47			
48			
49			
50			
Total	366 210	711 159	1 077 369

Sardine *(Sardina pilchardus)*: November 2003

Numbers in millions

Length cm	C. Blanc-C.Timiris	C.Timiris-St. Louis	TOTAL
5			
6			
7			
8			
9			
10			
11			
12			
13	2.2		2.2
14	59.6		59.6
15	188.3		188.3
16	341.8		341.8
17	383.5		383.5
18	244.5		244.5
19	41.6		41.6
20	8.0		8.0
21			
22			
23	22.0		22.0
24	87.3	33.6	120.9
25	160.4	286.1	446.6
26	95.7	452.9	548.6
27	12.1	189.3	201.4
28		34.4	34.4
29			
30			
Total	1 647.0	996.4	2 643.4

Biomass in tonnes

Length cm	C. Blanc-C.Timiris	C.Timiris-St. Louis	TOTAL
5			
6			
7			
8			
9			
10			
11			
12			
13	44		44
14	1 491		1 491
15	5 751		5 751
16	12 591		12 591
17	16 854		16 854
18	12 694		12 694
19	2 530		2 530
20	568		568
21			
22			
23	2 339		2 339
24	10 527	4 052	14 579
25	21 811	38 906	60 717
26	14 600	69 117	83 717
27	2 061	32 281	34 343
28		6 527	6 527
29			
30			
Total	103 859	150 884	254 743

Cunene horse mackerel *(Trachurus trecae)*: November 2003

Numbers in millions

Length cm	C. Blanc-C.Timiris	C.Timiris-St. Louis	TOTAL
5			
6			
7			
8			
9			
10		14.2	14.2
11	8.9	71.0	79.9
12	265.2	119.7	384.9
13	1 078.8	187.1	1 266.0
14	835.2	139.9	975.2
15	371.4	84.3	455.7
16	238.4	95.0	333.4
17	188.0	145.8	333.9
18	134.4	193.1	327.5
19	13.2	164.4	177.7
20	5.9	95.7	101.6
21	14.9	54.7	69.7
22		34.6	34.6
23	4.5	19.9	24.4
24		16.8	16.8
25		3.7	3.7
26		5.6	5.6
27		4.1	4.1
28		12.9	12.9
29		16.0	16.0
30		10.9	10.9
31		21.8	21.8
32		33.2	33.2
33		37.5	37.5
34	3.6	29.0	32.6
35		8.6	8.6
36		8.2	8.2
37		16.8	16.8
38		4.3	4.3
39			
40		4.3	4.3
41		8.6	8.6
42			
43			
44			
45			
46			
47			
48			
49			
50			
Total	3 162.6	1 661.8	4 824.4

Biomass in tonnes

Length cm	C. Blanc-C.Timiris	C.Timiris-St. Louis	TOTAL
5			
6			
7			
8			
9			
10		157	157
11	130	1 037	1 167
12	4 973	2 245	7 218
13	25 482	4 420	29 902
14	24 445	4 095	28 540
15	13 276	3 013	16 290
16	10 282	4 096	14 378
17	9 673	7 504	17 177
18	8 171	11 735	19 905
19	942	11 705	12 647
20	485	7 914	8 399
21	1 425	5 222	6 647
22		3 788	3 788
23	559	2 480	3 039
24		2 367	2 367
25		582	582
26		1 001	1 001
27		813	813
28		2 862	2 862
29		3 953	3 953
30		2 981	2 981
31		6 548	6 548
32		10 956	10 956
33		13 547	13 547
34	1 423	11 414	12 837
35		3 685	3 685
36		3 838	3 838
37		8 506	8 506
38		2 350	2 350
39			
40		2 736	2 736
41		5 887	5 887
42			
43			
44			
45			
46			
47			
48			
49			
50			
Total	101 265	153 435	254 699

Atlantic horse mackerel *(Trachurus trachurus)*: November 2003

Numbers in millions

Length cm	C. Blanc-C.Timiris	C.Timiris-St. Louis	TOTAL
5			
6			
7			
8			
9			
10	0.8		0.8
11	10.9		10.9
12	10.9		10.9
13	40.8		40.8
14	18.7		18.7
15	8.8		8.8
16	8.8		8.8
17			
18	0.4		0.4
19			
20			
21	4.4		4.4
22			
23			
24			
25			
26			
27			
28			
29			
30			
31			
32			
33			
34			
35			
36			
37			
38			
39			
40			
41			
42			
43			
44			
45			
46			
47			
48			
49			
50			
Total	104.7		104.7

Biomass in tonnes

Length cm	C. Blanc-C.Timiris	C.Timiris-St. Louis	TOTAL
5			
6			
7			
8			
9			
10	9		9
11	160		160
12	205		205
13	963		963
14	547		547
15	315		315
16	380		380
17			
18	26		26
19			
20			
21	421		421
22			
23			
24			
25			
26			
27			
28			
29			
30			
31			
32			
33			
34			
35			
36			
37			
38			
39			
40			
41			
42			
43			
44			
45			
46			
47			
48			
49			
50			
Total	3 028		3 028

False scad *(Caranx rhonchus)*: November 2003

Numbers in millions

Length cm	C. Blanc-C.Timiris	C.Timiris-St. Louis	TOTAL
5			
6			
7			
8			
9			
10			
11			
12			
13		20.4	20.4
14		38.8	38.8
15		80.8	80.8
16		35.0	35.0
17		11.9	11.9
18		5.6	5.6
19		3.2	3.2
20			
21		1.7	1.7
22		26.4	26.4
23		41.0	41.0
24		55.9	55.9
25		59.0	59.0
26		49.0	49.0
27		24.6	24.6
28		27.5	27.5
29		19.2	19.2
30		22.1	22.1
31		5.0	5.0
32		5.4	5.4
33		7.8	7.8
34		3.7	3.7
35		2.1	2.1
36		0.6	0.6
37		1.1	1.1
38		0.9	0.9
39		0.8	0.8
40		0.0	0.0
41		0.0	0.0
42		0.0	0.0
43		0.0	0.0
44			
45			
46			
47			
48			
49			
50			
Total		549.4	549.4

Biomass in tonnes

Length cm	C. Blanc-C.Timiris	C.Timiris-St. Louis	TOTAL
5			
6			
7			
8			
9			
10			
11			
12			
13		482	482
14		1 136	1 136
15		2 889	2 889
16		1 510	1 510
17		612	612
18		340	340
19		230	230
20			
21		159	159
22		2 884	2 884
23		5 110	5 110
24		7 885	7 885
25		9 386	9 386
26		8 750	8 750
27		4 904	4 904
28		6 114	6 114
29		4 731	4 731
30		6 013	6 013
31		1 500	1 500
32		1 778	1 778
33		2 797	2 797
34		1 475	1 475
35		897	897
36		257	257
37		560	560
38		511	511
39		468	468
40		7	7
41		7	7
42		5	5
43		3	3
44			
45			
46			
47			
48			
49			
50			
Total		73 403	73 403

Annex V Regional estimates, October-December 2003

Sardine (*Sardina pilchardus*), number in millions

Length cm	C. Cantin-C. Juby	C. Juby-C. Blanc	C. Blanc-C. Timiris	C. Timiris-St. Louis	St. Louis-C. Vert	C. Vert-Casamance	TOTAL
5							
6							
7							
8	3,6						3,6
9	45,5	41,1					86,6
10	172,0	31,2					203,2
11	290,5	102,2					392,6
12	450,8	462,6					913,4
13	1 460,6	890,7	2,2				2 353,4
14	2 180,6	2 360,7	59,6				4 600,9
15	2 445,9	2 711,8	188,3				5 346,0
16	4 516,3	2 375,9	341,8				7 234,1
17	3 420,8	1 625,3	383,5				5 429,6
18	1 308,4	859,2	244,5				2 412,1
19	735,8	728,5	41,6				1 506,0
20	472,8	2 186,6	8,0				2 667,5
21	177,9	11 609,4					11 787,3
22	77,8	13 139,5					13 217,2
23	35,6	8 012,3	22,0				8 069,8
24	11,6	5 634,0	87,3	33,6			5 766,4
25	1,9	2 861,7	160,4	286,1			3 310,2
26		443,0	95,7	452,9			991,6
27		16,3	12,1	189,3			217,7
28				34,4			34,4
29							
30							
Total	17 808,3	56 091,9	1 647,0	996,4			76 543,6

Sardine (*Sardina pilchardus*), biomass in tonnes

Length cm	C. Cantin-C. Juby	C. Juby-C. Blanc	C. Blanc-C. Timiris	C. Timiris-St. Louis	St. Louis-C. Vert	C. Vert-Casamance	TOTAL
5							
6							
7							
8	18						18
9	320	289					609
10	1 633	296					1 929
11	3 623	1 274					4 897
12	7 220	7 410					14 629
13	29 467	17 970	44				47 481
14	54 513	59 013	1 491				115 017
15	74 686	82 807	5 751				163 244
16	166 361	87 518	12 591				266 470
17	150 332	71 428	16 854				238 614
18	67 930	44 611	12 694				125 235
19	44 740	44 296	2 530				91 565
20	33 400	154 473	568				188 441
21	14 499	946 102					960 601
22	7 262	1 227 268					1 234 530
23	3 787	852 654	2 339				858 780
24	1 397	679 399	10 527	4 052			695 375
25	262	389 101	21 811	38 906			450 080
26		67 603	14 600	69 117			151 320
27		2 778	2 061	32 281			37 121
28				6 527			6 527
29							
30							
Total	661 449	4 736 289	103 859	150 884			5 652 481

Annex V continued

Round sardinella (*Sardinella aurita*), number in millions

Length cm	C. Cantin-C. Juby	C. Juby-C. Blanc	C. Blanc-C. Timiris	C. Timiris-St. Louis	St. Louis-C. Vert	C. Vert-Casamance	TOTAL
5							
6							
7					7,2		7,2
8					38,8		38,8
9				2,6	79,4		82,0
10				3,7	26,2		29,9
11				3,0	4,1		7,1
12				10,0	1,6	9,0	20,6
13				21,0		26,9	47,8
14			81,7	6,4		50,1	138,3
15			161,2	4,0		120,0	285,2
16			306,0	6,2		73,4	385,6
17			23,0	1,2		28,7	52,9
18				0,4		14,2	14,6
19				0,2		1,8	2,0
20				4,8		1,8	6,6
21				19,2			19,2
22				26,4			26,4
23				10,2		26,8	37,1
24				20,8		76,2	97,1
25				9,5		174,5	184,0
26				8,8		159,0	167,8
27		28,8		70,7		106,9	206,4
28		211,1		189,1		33,2	433,5
29		632,2	12,6	115,5		23,8	784,2
30		817,0		75,7		11,1	903,8
31		336,0		35,5		1,2	372,7
32		164,7		24,9		0,6	190,2
33		216,1		21,8			237,9
34		216,6		17,2			233,7
35		197,8	12,6	10,9			221,3
36		161,0	25,2				186,3
37		37,1		5,6			42,7
38		18,0					18,0
39		14,5	12,6				27,1
40							
41							
42							
43							
44							
45							
46							
47							
48							
49							
50							
Total		3 050,9	635,0	725,3	157,3	939,2	5 507,8

Annex V continued

Round sardinella (*Sardinella aurita*), biomass in tonnes

Length cm	C. Cantin-C. Juby	C. Juby-C. Blanc	C. Blanc-C. Timiris	C. Timiris-St. Louis	St. Louis-C. Vert	C. Vert-Casamance	TOTAL
5							
6							
7					28		28
8					224		224
9				21	640		661
10				41	285		326
11				44	58		102
12				188	30	168	386
13				495		634	1 130
14			2 391	189		1 467	4 047
15			5 763	144		4 289	10 196
16			13 196	268		3 166	16 630
17			1 185	63		1 474	2 722
18				22		866	888
19				14		127	141
20				400		148	548
21				1 831			1 831
22				2 886			2 886
23				1 276		3 341	4 616
24				2 939		10 765	13 703
25				1 510		27 775	29 285
26				1 566		28 403	29 969
27		5 632		14 118		21 341	41 091
28		45 943		42 035		7 375	95 353
29		152 573	3 110	28 454		5 877	190 014
30		217 888		20 623		3 034	241 545
31		98 730		10 640		357	109 727
32		53 136		8 204		200	61 539
33		76 365		7 856			84 221
34		83 590		6 770			90 359
35		83 176	5 420	4 674			93 270
36		73 604	11 782				85 386
37		18 397		2 841			21 237
38		9 649					9 649
39		8 410	7 466				15 876
40							
41							
42							
43							
44							
45							
46							
47							
48							
49							
50							
Total		927 094	50 312	160 110	1 265	120 808	1 259 590

Annex V continued

Flat sardinella (*Sardinella maderensis*), numbers in millions

Length cm	C. Cantin-C. Juby	C. Juby-C. Blanc	C. Blanc-C. Timiris	C. Timiris-St. Louis	St. Louis-C. Vert	C. Vert-Casamance	TOTAL
5							
6					5,4		5,4
7					78,8		78,8
8					244,0		244,0
9					97,5		97,5
10				0,9	35,7		36,6
11				5,0	7,7		12,7
12				12,1			12,1
13				36,3		5,6	41,9
14				23,0			23,0
15				68,3			68,3
16				63,7			63,7
17				41,2		15,6	56,8
18				21,5		43,7	65,2
19				7,0		40,0	47,0
20				9,2		109,8	119,0
21		6,9		37,2		316,1	360,3
22			3,6	45,7		675,0	724,3
23		6,9	3,6	38,1		1 038,5	1 087,1
24		35,1	34,3	53,1	1,2	939,6	1 063,2
25		157,9	107,5	189,6	2,4	371,3	828,7
26		264,3	156,1	258,8	3,7	100,4	783,3
27		207,5	150,9	254,8	3,2	42,9	659,3
28		181,7	66,5	287,8	1,7	2,4	540,1
29		129,5	17,9	207,2	0,7	5,5	360,8
30		43,6	80,2	252,3	0,3		376,4
31		22,7	127,9	154,9			305,5
32		12,8	159,2	289,6			461,6
33			202,2	246,2			448,4
34			55,8	179,5			235,3
35			103,4	101,3			204,7
36			30,2	37,5			67,8
37				10,0			10,0
38							
39							
40							
41							
42							
43							
44							
45							
46							
47							
48							
49							
50							
Total		1 069,1	1 299,3	2 932,0	482,4	3 706,3	9 489,1

AnnexV continued

Flat sardinella (*Sardinella maderensis*), biomass in tonnes

Length cm	C. Cantin-C. Juby	C. Juby-C. Blanc	C. Blanc-C. Timiris	C. Timiris-St. Louis	St. Louis-C. Vert	C. Vert-Casamance	TOTAL
5							
6					14		14
7					323		323
8					1 454		1 454
9					811		811
10				10	401		411
11				73	113		186
12				227			227
13				857		132	989
14				673			673
15				2 443			2 443
16				2 749			2 749
17				2 122		802	2 924
18				1 309		2 654	3 963
19				501		2 848	3 348
20				763		9 081	9 844
21		669		3 548		30 163	34 380
22			392	5 000		73 808	79 200
23		874	446	4 742		129 383	135 445
24		5 007	4 838	7 496	164	132 650	150 154
25		25 398	17 106	30 185	393	59 103	132 186
26		47 717	27 881	46 231	675	17 934	140 437
27		41 859	30 133	50 877	638	8 561	132 069
28		40 791	14 780	63 957	388	538	120 453
29		32 258	4 414	51 064	179	1 349	89 265
30		11 986	21 854	68 730	79		102 650
31		6 891	38 380	46 466			91 737
32		4 275	52 473	95 429			152 177
33			72 986	88 860			161 846
34			21 987	70 760			92 747
35			44 431	43 491			87 922
36			14 109	17 524			31 633
37				5 072			5 072
38							
39							
40							
41							
42							
43							
44							
45							
46							
47							
48							
49							
50							
Total		217 727	366 210	711 159	5 632	469 004	1 769 732

AnnexV continued

Anchovy (*Engraulis encrasicolus*), numbers in millions

Length cm	C. Cantin-C. Juby	C. Juby-C. Blanc	C. Blanc-C. Timiris	C. Timiris-St. Louis	St. Louis-C. Vert	C. Vert-Casamance	TOTAL
5	0,9						0,9
6	4,5						4,5
7	5,6	12,7					18,3
8	16,4	62,8					79,2
9	44,2	138,2					182,4
10	80,4	640,6					721,0
11	97,0	1 073,6					1 170,7
12	256,3	671,1					927,4
13	189,5	40,6					230,1
14	46,6						46,6
15	25,8						25,8
16	4,3						4,3
17							
18							
19							
20							
Total	771,5	2 639,7					3 411,2

Anchovy (*Engraulis encrasicolus*), biomass in tonnes

Length cm	C. Cantin-C. Juby	C. Juby-C. Blanc	C. Blanc-C. Timiris	C. Timiris-St. Louis	St. Louis-C. Vert	C. Vert-Casamance	TOTAL
5	1						1
6	7						7
7	13	29					42
8	54	208					263
9	205	640					845
10	502	4 005					4 507
11	797	8 817					9 614
12	2 703	7 078					9 781
13	2 518	540					3 058
14	767						767
15	518						518
16	103						103
17							
18							
19							
20							
Total	8 189	21 317					29 506

Annex V continued

Atlantic horse mackerel (*Trachurus trachurus*), numbers in millions

Length cm	C. Cantin-C. Juby	C. Juby-C. Blanc	C. Blanc-C. Timiris	C. Timiris-St. Louis	St. Louis-C. Vert	C. Vert-Casamance	TOTAL
5							
6							
7	1,6						1,6
8							
9							
10			0,8				0,8
11		26,3	10,9				37,3
12		285,1	10,9				296,1
13	0,2	722,0	40,8				763,0
14	6,2	642,3	18,7				667,2
15	20,6	451,4	8,8				480,8
16	51,7	172,7	8,8				233,2
17	57,6	232,2					289,8
18	19,6	289,8	0,4				309,9
19	22,8	543,1					565,9
20	40,1	717,5					757,6
21	17,0	507,3	4,4				528,6
22	7,0	170,9					178,0
23	0,4	77,0					77,4
24	1,0	67,9					68,9
25	2,5	86,2					88,8
26	0,5	85,6					86,1
27	0,7	63,1					63,8
28	1,5	61,1					62,6
29	0,5	21,4					22,0
30	1,0	4,6					5,6
31		2,9					2,9
32							
33							
34	0,6						0,6
35	1,2						1,2
36	1,0						1,0
37	0,8						0,8
38	2,0						2,0
39	0,6						0,6
40	1,1						1,1
41							
42							
43							
44							
45							
46							
47							
48							
49							
50	0,5						0,5
Total	260,4	5 230,4	104,7				5 595,5

AnnexV continued

Atlantic horse mackerel (*Trachurus trachurus*), biomass in tonnes

Length cm	C. Cantin-C. Juby	C. Juby-C. Blanc	C. Blanc-C. Timiris	C. Timiris-St. Louis	St. Louis-C. Vert	C. Vert-Casamance	TOTAL
5							
6							
7	6						6
8							
9							
10			9				9
11		336	160				496
12		4 678	205				4 883
13	4	14 921	963				15 888
14	158	16 449	547				17 155
15	645	14 119	315				15 080
16	1 952	6 516	380				8 848
17	2 594	10 452					13 046
18	1 044	15 414	26				16 484
19	1 418	33 827					35 245
20	2 904	51 922					54 826
21	1 416	42 347	421				44 184
22	674	16 356					17 031
23	43	8 396					8 439
24	125	8 390					8 515
25	352	12 011					12 363
26	79	13 378					13 457
27	123	11 026					11 149
28	295	11 877					12 172
29	109	4 626					4 735
30	241	1 095					1 336
31		754					754
32							
33							
34	194						194
35	455						455
36	403						403
37	375						375
38	946						946
39	292						292
40	629						629
41							
42							
43							
44							
45							
46							
47							
48							
49							
50	547						547
Total	18 023	298 889	3 028				319 940

Annex V continued

Cunene horse mackerel (*Trachurus trecae*), numbers in millions

Length cm	C. Cantin-C. Juby	C. Juby-C. Blanc	C. Blanc-C. Timiris	C. Timiris-St. Louis	St. Louis-C. Vert	C. Vert-Casamance	TOTAL
5							
6							
7							
8							
9					13,6		13,6
10				14,2	42,4		56,6
11		2,8	8,9	71,0	44,7	36,9	164,3
12		129,5	265,2	119,7	82,9	236,4	833,8
13		349,5	1 078,8	187,1	86,9	465,4	2 167,8
14		719,7	835,2	139,9	116,7	85,4	1 896,9
15		2 389,0	371,4	84,3	67,4	7,4	2 919,5
16		3 006,9	238,4	95,0	69,7		3 410,0
17		2 223,1	188,0	145,8	39,4		2 596,4
18		1 387,5	134,4	193,1	39,1	103,9	1 858,1
19		1 121,1	13,2	164,4	58,3	359,1	1 716,1
20		512,1	5,9	95,7	48,5	226,8	889,0
21		338,4	14,9	54,7	25,4	103,9	537,5
22		174,2		34,6	26,6		235,5
23		83,3	4,5	19,9	11,7		119,4
24		201,3		16,8	28,2		246,3
25		135,0		3,7	12,7		151,4
26		534,3		5,6	3,8		543,7
27		301,7		4,1	18,7		324,5
28		235,9		12,9	25,5		274,3
29		68,1		16,0	20,9		105,0
30		63,5		10,9			74,5
31		44,5		21,8			66,3
32		58,2		33,2			91,4
33		20,4		37,5			57,9
34		7,4	3,6	29,0			40,0
35		10,2		8,6			18,8
36		7,4		8,2			15,7
37				16,8			16,8
38				4,3			4,3
39							
40				4,3			4,3
41				8,6			8,6
42							
43							
44							
45							
46							
47							
48							
49							
50							
Total		14 125,0	3 162,6	1 661,8	883,3	1 625,4	21 458,0

Annex V continued

Cunene horse mackerel (*Trachurus trecae*), biomass in tonnes

Length cm	C. Cantin-C. Juby	C. Juby-C. Blanc	C. Blanc-C. Timiris	C. Timiris-St. Louis	St. Louis-C. Vert	C. Vert-Casamance	TOTAL
5							
6							
7							
8							
9					112		112
10				157	472		629
11		35	130	1 037	652	539	2 394
12		2 125	4 973	2 245	1 555	4 433	15 330
13		7 222	25 482	4 420	2 052	10 994	50 170
14		18 430	24 445	4 095	3 415	2 499	52 884
15		74 730	13 276	3 013	2 411	264	93 695
16		113 461	10 282	4 096	3 006		130 845
17		100 080	9 673	7 504	2 028		119 286
18		73 797	8 171	11 735	2 377	6 318	102 397
19		69 825	942	11 705	4 152	25 561	112 185
20		37 060	485	7 914	4 014	18 757	68 230
21		28 253	1 425	5 222	2 425	9 917	47 242
22		16 667		3 788	2 912		23 367
23		9 080	559	2 480	1 459		13 578
24		24 865		2 367	3 982		31 214
25		18 809		582	2 025		21 416
26		83 520		1 001	678		85 199
27		52 702		813	3 739		57 254
28		45 878		2 862	5 665		54 404
29		14 677		3 953	5 143		23 773
30		15 139		2 981			18 120
31		11 687		6 548			18 235
32		16 782		10 956			27 737
33		6 427		13 547			19 974
34		2 564	1 423	11 414			15 401
35		3 831		3 685			7 516
36		3 037		3 838			6 875
37				8 506			8 506
38				2 350			2 350
39							
40				2 736			2 736
41				5 887			5 887
42							
43							
44							
45							
46							
47							
48							
49							
50							
Total		850 686	101 265	153 435	54 272	79 283	1 238 940

Annex V continued

False scad (*Caranx rhonchus*), numbers in millions

Length cm	C. Cantin-C. Juby	C. Juby-C. Blanc	C. Blanc-C. Timiris	C. Timiris-St. Louis	St. Louis-C. Vert	C. Vert-Casamance	TOTAL
5							
6							
7							
8							
9							
10							
11							
12							
13				20,4			20,4
14				38,8			38,8
15				80,8			80,8
16				35,0			35,0
17				11,9			11,9
18				5,6			5,6
19				3,2			3,2
20							
21				1,7			1,7
22				26,4			26,4
23				41,0	0,0		41,1
24				55,9	0,1		56,0
25				59,0	0,1		59,1
26				49,0	0,1		49,1
27				24,6	0,1		24,6
28				27,5	0,0		27,5
29				19,2	0,0		19,2
30				22,1			22,1
31				5,0			5,0
32				5,4			5,4
33				7,8			7,8
34				3,7			3,7
35				2,1			2,1
36				0,6			0,6
37				1,1			1,1
38				0,9			0,9
39				0,8			0,8
40				0,0			0,0
41				0,0			0,0
42				0,0			0,0
43				0,0			0,0
44							
45							
46							
47							
48							
49							
50							
Total				549,4	0,4		549,8

Annex V continued

False scad (*Caranx rhonchus*), biomass in tonnes

Length cm	C. Cantin-C. Juby	C. Juby-C. Blanc	C. Blanc-C. Timiris	C. Timiris-St. Louis	St. Louis-C. Vert	C. Vert-Casamance	TOTAL
5							
6							
7							
8							
9							
10							
11							
12							
13				482			482
14				1 136			1 136
15				2 889			2 889
16				1 510			1 510
17				612			612
18				340			340
19				230			230
20							
21				159			159
22				2 884			2 884
23				5 110	4		5 115
24				7 885	14		7 899
25				9 386	18		9 405
26				8 750	15		8 766
27				4 904	10		4 914
28				6 114	5		6 120
29				4 731	1		4 733
30				6 013			6 013
31				1 500			1 500
32				1 778			1 778
33				2 797			2 797
34				1 475			1 475
35				897			897
36				257			257
37				560			560
38				511			511
39				468			468
40				7			7
41				7			7
42				5			5
43				3			3
44							
45							
46							
47							
48							
49							
50							
Total				73 403	69		73 471

Annex V continued

Chub mackerel (*Scomber japonicus*), numbers in millions

Length cm	C. Cantin-C. Juby	C. Juby-C. Blanc	C. Blanc-C. Timiris	C. Timiris-St. Louis	St. Louis-C. Vert	C. Vert-Casamance	TOTAL
5							
6							
7							
8							
9		0,7					0,7
10		0,7					0,7
11							
12	8,2	16,1					24,2
13	64,7	75,7					140,4
14	266,0	139,2					405,2
15	646,4	144,7					791,1
16	662,1	349,1					1 011,1
17	541,8	407,3					949,1
18	343,6	259,7					603,2
19	89,2	162,6					251,8
20	32,8	180,9					213,7
21	55,5	253,2					308,6
22	83,0	192,0					275,0
23	51,7	93,3					145,0
24	42,6	78,7					121,3
25	39,9	46,9					86,8
26	51,4	75,3					126,6
27	61,4	179,8					241,3
28	87,7	277,7					365,4
29	38,6	118,2					156,8
30	34,0	61,2					95,2
31	27,3	23,6					50,9
32	18,1	13,3					31,4
33	15,7	26,2					41,9
34	6,7	30,7					37,5
35	12,6	5,7					18,4
36	2,6	11,5					14,1
37	0,9	19,0					19,9
38		5,7					5,7
39	0,9	5,6					6,5
40							
41		1,9					1,9
42		1,9					1,9
43		1,9					1,9
44							
45							
46							
47							
48							
49							
50							
Total	3 285,1	3 260,3					6 545,4

Annex V continued

Chub mackerel (*Scomber japonicus*), biomass in tonnes

Length cm	C. Cantin-C. Juby	C. Juby-C. Blanc	C. Blanc-C. Timiris	C. Timiris-St. Louis	St. Louis-C. Vert	C. Vert-Casamance	TOTAL
5							
6							
7							
8							
9		5					5
10		7					7
11							
12	134	263					397
13	1 338	1 565					2 902
14	6 812	3 566					10 377
15	20 220	4 526					24 746
16	24 982	13 172					38 154
17	24 391	18 335					42 726
18	18 274	13 810					32 083
19	5 557	10 127					15 684
20	2 371	13 094					15 466
21	4 632	21 134					25 766
22	7 939	18 373					26 312
23	5 636	10 169					15 805
24	5 258	9 726					14 984
25	5 564	6 530					12 094
26	8 029	11 767					19 796
27	10 730	31 418					42 148
28	17 050	54 007					71 056
29	8 328	25 497					33 824
30	8 102	14 582					22 684
31	7 161	6 204					13 365
32	5 216	3 834					9 050
33	4 957	8 270					13 227
34	2 324	10 605					12 928
35	4 742	2 160					6 902
36	1 048	4 695					5 743
37	379	8 435					8 814
38		2 755					2 755
39	443	2 916					3 358
40							
41		1 150					1 150
42		1 235					1 235
43		1 325					1 325
44							
45							
46							
47							
48							
49							
50							
Total	211 615	335 256					546 872

CRUISE REPORT "DR FRIDTJOF NANSEN"

SURVEY OF THE PELAGIC FISH RESOURCES NORTH WEST AFRICA

Part III

MOROCCO

19 November - 19 December 2003

by

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CHAPTER 1 INTRODUCTION

1.1 Survey objectives

The specific objectives for the survey in Morocco were, as for the previous surveys:

- 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.
- To collect otoliths of sardine.
- To sample standard hydrographical transects for temperature, salinity and oxygen off Cape Blanc, Dakhla, Cape Bojador, Cape Juby, Cape Dra and Cape Ghir.

In addition:

- To intercalibrate with R/V Al Amir Moulay Abdallah between Cape Juby and Agadir.

The time allocated for this part of the survey was 26 working days.

1.2 Participation

Members of the scientific teams were:

Institut National de Recherche Halieutique, Morocco:

Mostafa CHBANI (team leader), Lahcen ABOUABDELLAH, Najib CHAROUKI, Salaheddine EL AYOUBI and Mustafa YOUSRA

Centre de Recherches Océanographiques de Dakar-Thiaroye (CRODT), Senegal:

Abdoulaye SARRE

From NatMIRC, Namibia:

Martha UUMATI

Institute of Marine Research, Norway (IMR):

Oddgeir ALVHEIM (cruise leader), Marek OSTROWSKI (from 3 December), Tore STRØMME (from 16 December), Tore MØRK and Thor Egil JOHANSSON

1.3 Narrative

Figures 1a-b show the cruise track and the stations worked during the survey. The vessel departed from Nouakchott on November 20, starting the sampling work 10 nautical miles (nm) north off Cape Blanc. The hydrographic transect off Cape Blanc was worked on 18-19 November in the Mauritanian part of the survey. The survey proceeded northwards to about 30 nm northeast off Cape Bojador with an acoustic sampling grid with a transect distance 10 NM apart, covering the shelf and slope down until about 200 m bottom depth (Figure1a). The sampling continued northwards in a zigzag pattern towards Laayoune where the survey was interrupted with a call at Las Palmas 2-4 December for refuelling. The survey resumed south off Laayoune on the morning of 5 December. Northwards from Cape Juby the inner shelf between Cape Juby and 30°N was covered with a zigzag pattern, while the outer shelf was covered with a more open grid, (Figure1b).

At Cape Juby, the vessel met the Moroccan research vessel '*Al Amir Moulay Abdallah*' for intercalibration work. The two vessels worked in tandem from Cape Juby to Agadir. Off Agadir there was a stop for exchange of data from the calibration. From South off Agadir the survey proceeded northwards with a survey track perpendicular to the coast, transecting the whole shelf. In contrast to earlier surveys, absence of fishing vessels in the region made possible surveying the inshore areas during nighttime when registrations were more scattered than during the day. The northern limit of the survey, off Cape Cantin, was reached on 14 December. The vessel called on Agadir on 15 and 16 December for disembarking local scientists and change of crew. The vessel then steamed south to Las Palmas where she arrived on the 18 December.

Standard hydrographical sections were sampled at Cape Blanc, Cape Barbas, off Dakhla, at Cape Bojador, Cape Juby, Cape Dra and Cape Ghir.

Except for one day of rough weather during the intercalibration with '*Al Amir Moulay Abdallah*' between Cape Dra and Sidi Ifni, the weather was favourable and put no constraints on the sampling work.

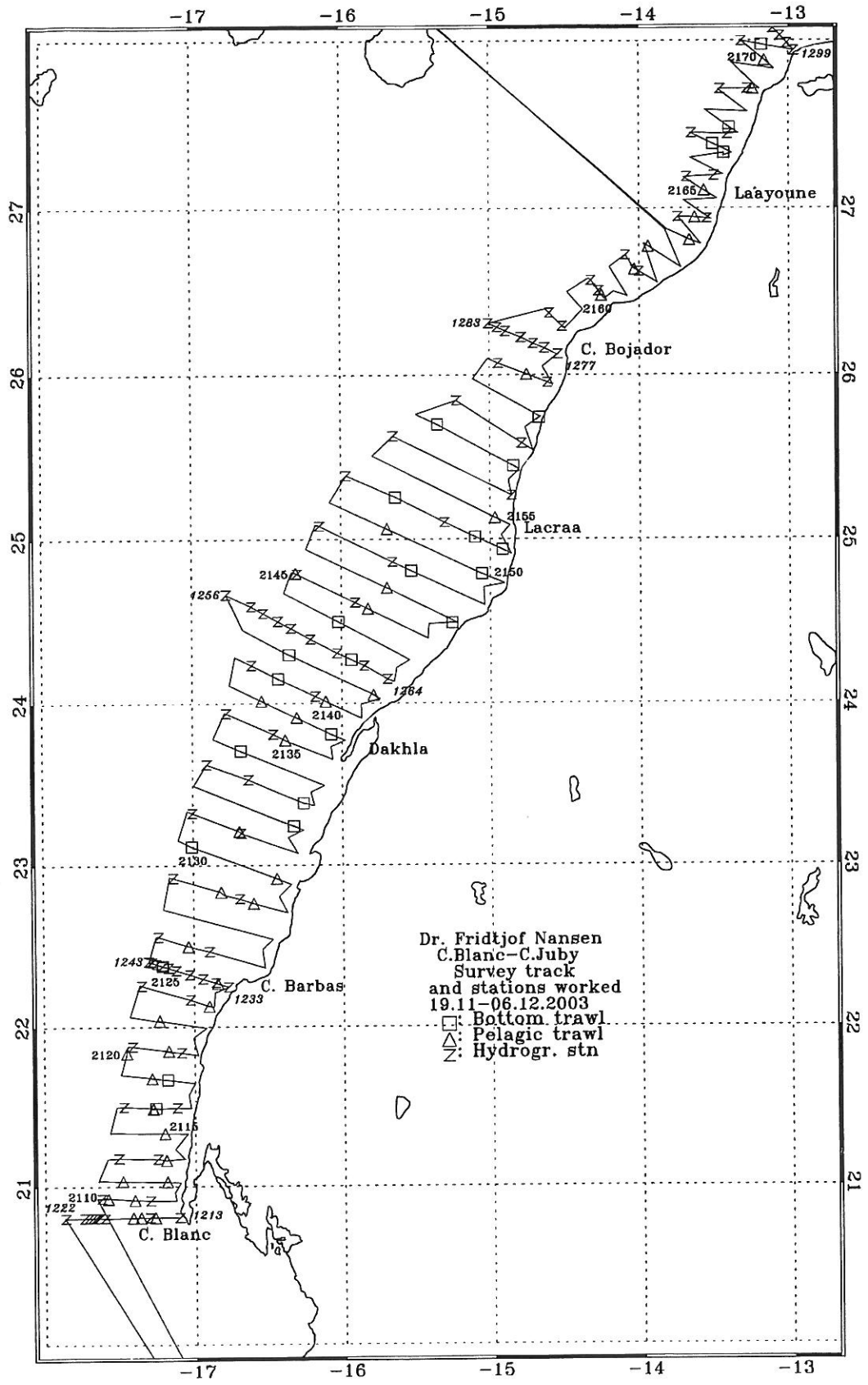


Figure 1a. Course track with fishing and hydrographic stations, Cape Blanc to Cape Juby. Depth contours at 20 m, 50 m, 100 m, 200 m and 500 m are indicated.

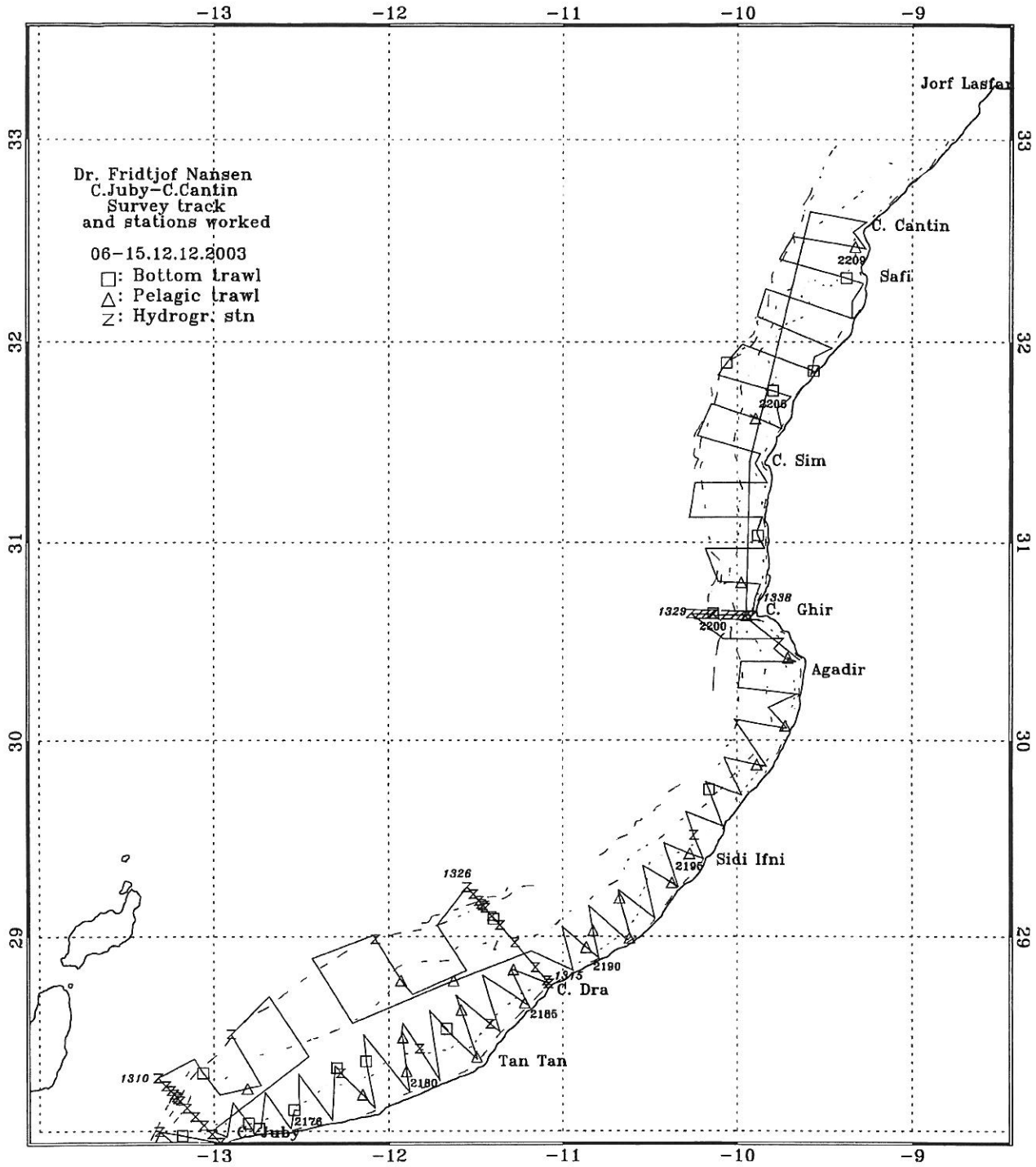


Figure 1b. Course track with fishing and hydrographic stations, Cape Juby to Cape Cantin. Depth contours as in Fig. 1a.

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, solar 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 mod. 8410.

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. The complete records of fishing stations are shown in Annex I. Sardine otoliths were collected and preserved for later reading ashore. Some readings of the otoliths were carried out 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 *Caranx 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, usually by 5 NM intervals. Where bottom detection was poor and where fish schools were located very close to the bottom, the bottom echo was sealed off from the fish registrations by manual contouring. 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= 20log L- be 72 the formula can further simplified into:

$$\rho_i = 1261217 \cdot \frac{\bar{s}_A \, n_i}{\sum_{i=\min}^{\max} n_i l_i^2} \qquad (4)$$

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 was converted to biomass by length group using the estimated weight at length from the length-weight relationship:

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

The specific condition factors obtained from the samples and applied for this survey were: 0.82 for sardine, 0.94 for *S. aurita*, 0.97 for *S. maderensis*, 0.54 for *Engraulis encrasicolus* and 0.84 for horse mackerel and chub mackerel.

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 homogenously 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

Wind conditions and sea surface temperature.

The wind conditions exhibited a clear regional pattern with a transition zone between the windy and calm weather occurring off Cape Bojador (Figure 2a). To the south, the northeasterly trade wind dominated over the survey area. The strongest winds, of the order of 10 m/s were recorded between Dakhla and Cape Bojador. South of Dakhla, between 23°30' and 21° 30' N, a condition of wind relaxation was observed along the survey track. Further south, the wind was stronger, reaching 7 m/s at Cape Blanc.

The sea surface temperature distribution off Sahara (Figure 3a) exhibits the usual features for this time of the year. To the north of Dakhla, there is a pool of the warm oceanic water along the shelf edge that overflows into the coastal area in the narrowing part of the shelf and there is an upwelling cell located inshore off Lacraa. To the south, there is a pool of colder water between Cape Blanc and Cape Barbas, manifesting a cross-shelf front between the tropical and subtropical waters.

To the north of Cape Bojador, and in the northern part of the survey area (Figure 2b) the winds were variable and predominantly calm. One strong wind event was recorded on 11 December when the northwesterly gale hit the vessel surveying in the region between Cape Dra and Sidi Ifni. The average wind speed was 10 m/s exceeding 15 m/s during gusts. Associated with the onshore wind direction, were strong waves causing a considerable pitch of the ship when surveying in the offshore direction. Except of this event, the wind was weak, in the range 1-3 m/s. In the vicinity of Agadir and Cape Ghir, the wind direction was distinctively altered to easterly. This is a common pattern observed this time of the year, related the local atmospheric pressure over the nearby Atlas Mountains.

The distribution of sea surface temperature for the northern leg of the survey is illustrated in Figure 3b. There is a considerable drop in inshore temperature below 17 °C, manifested northwards of Cape Dra and extending to the northern end of the survey area.

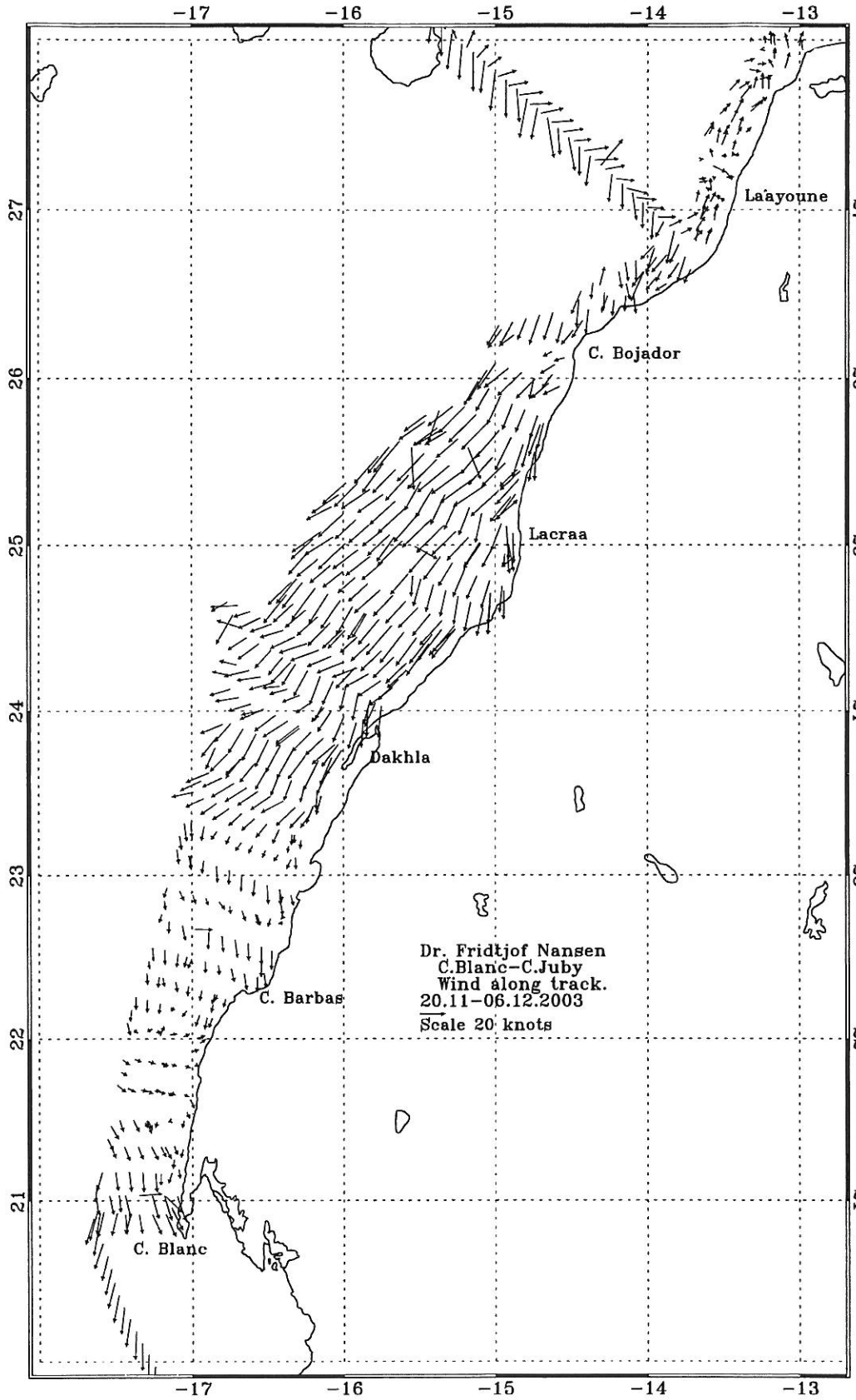


Figure 2a. Wind conditions along the survey, Cape Blanc to Cape Juby. Depth contours as in Fig. 1a.

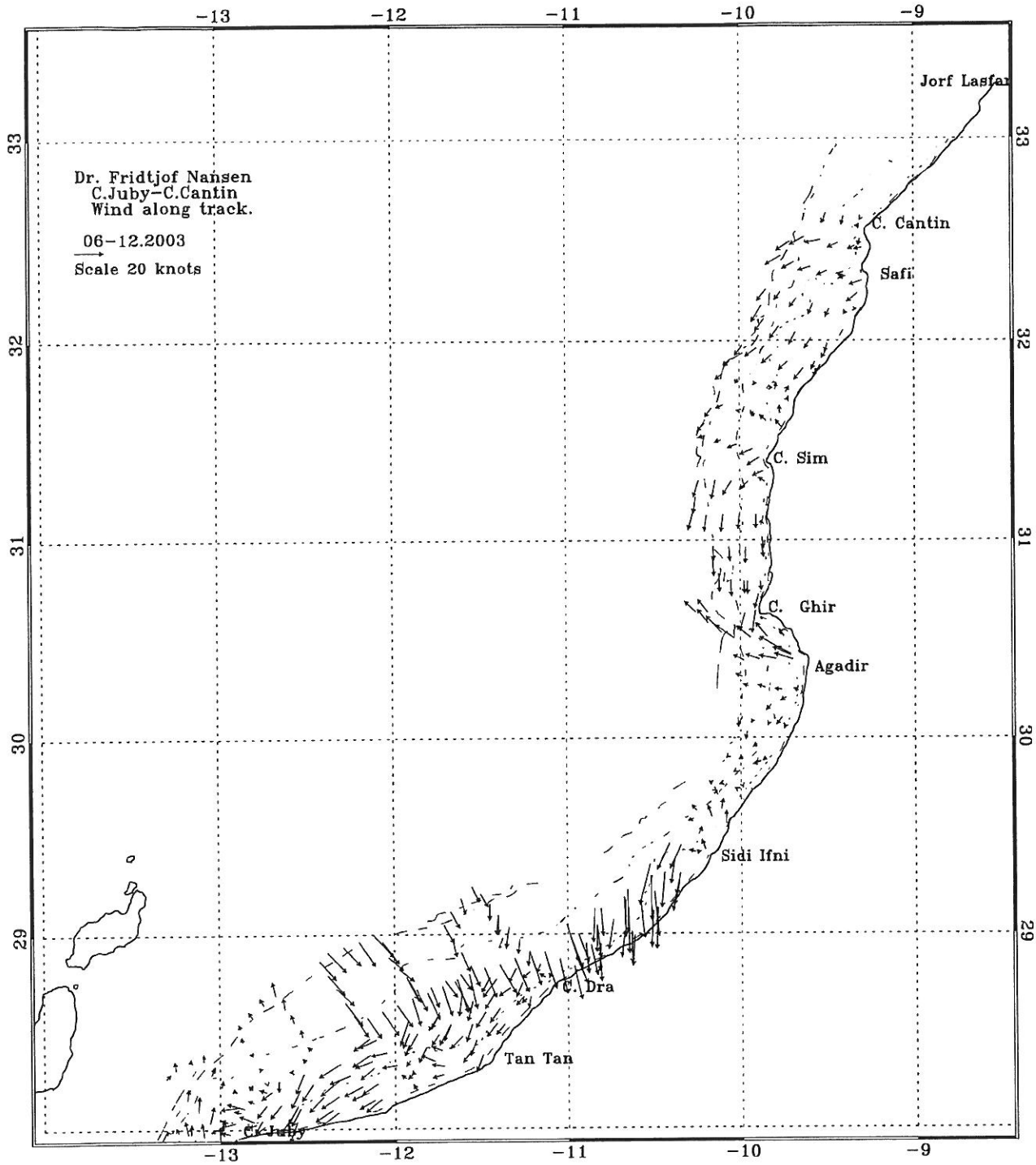


Figure 2b. Wind conditions along the survey, Cape Juby to Cape Cantin. Depth contours as in Fig. 1a.

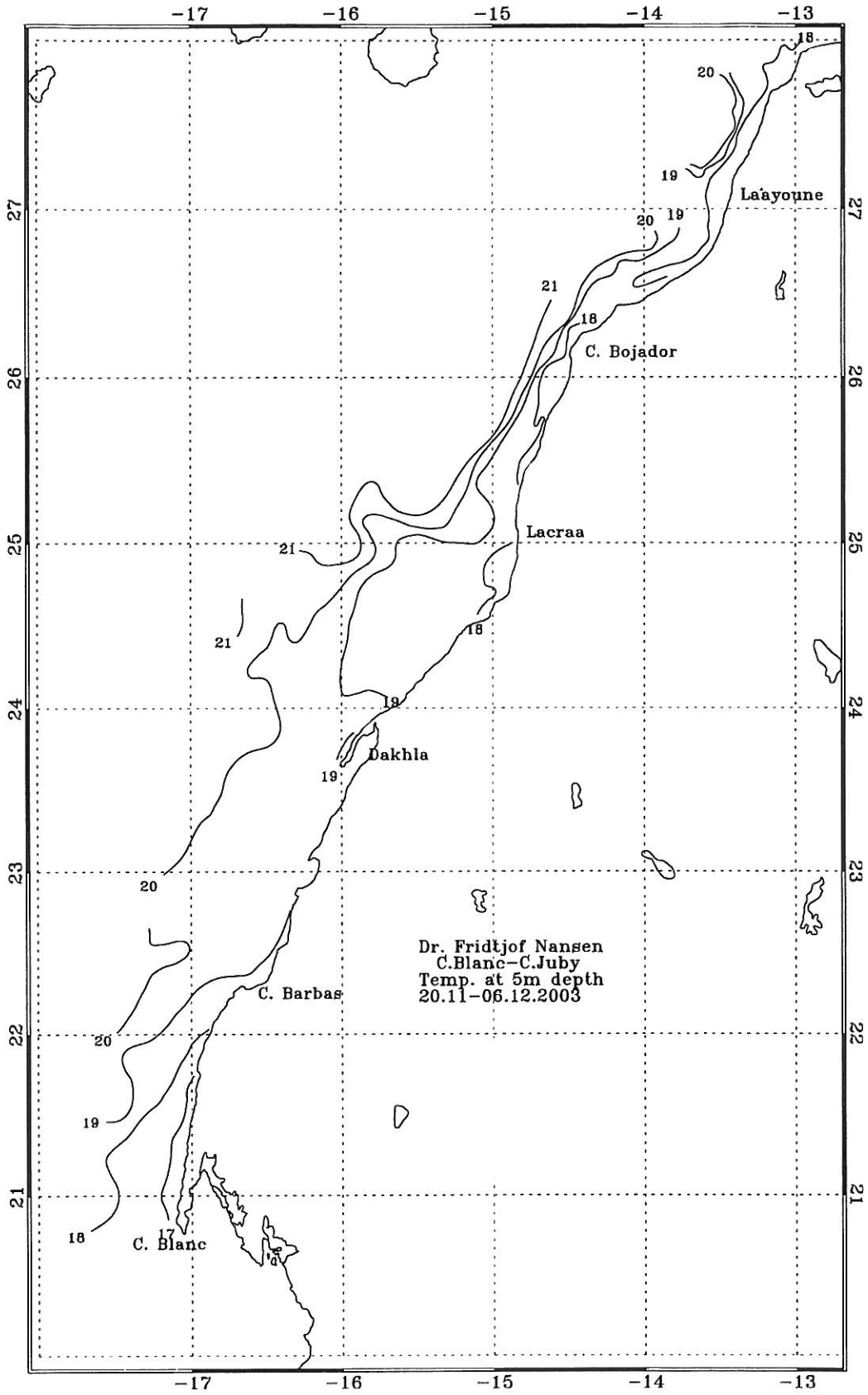


Figure 3a Sea surface temperature (at 5 m depth), Cape Blanc to Cape Juby. Depth contours as in Fig. 1a.

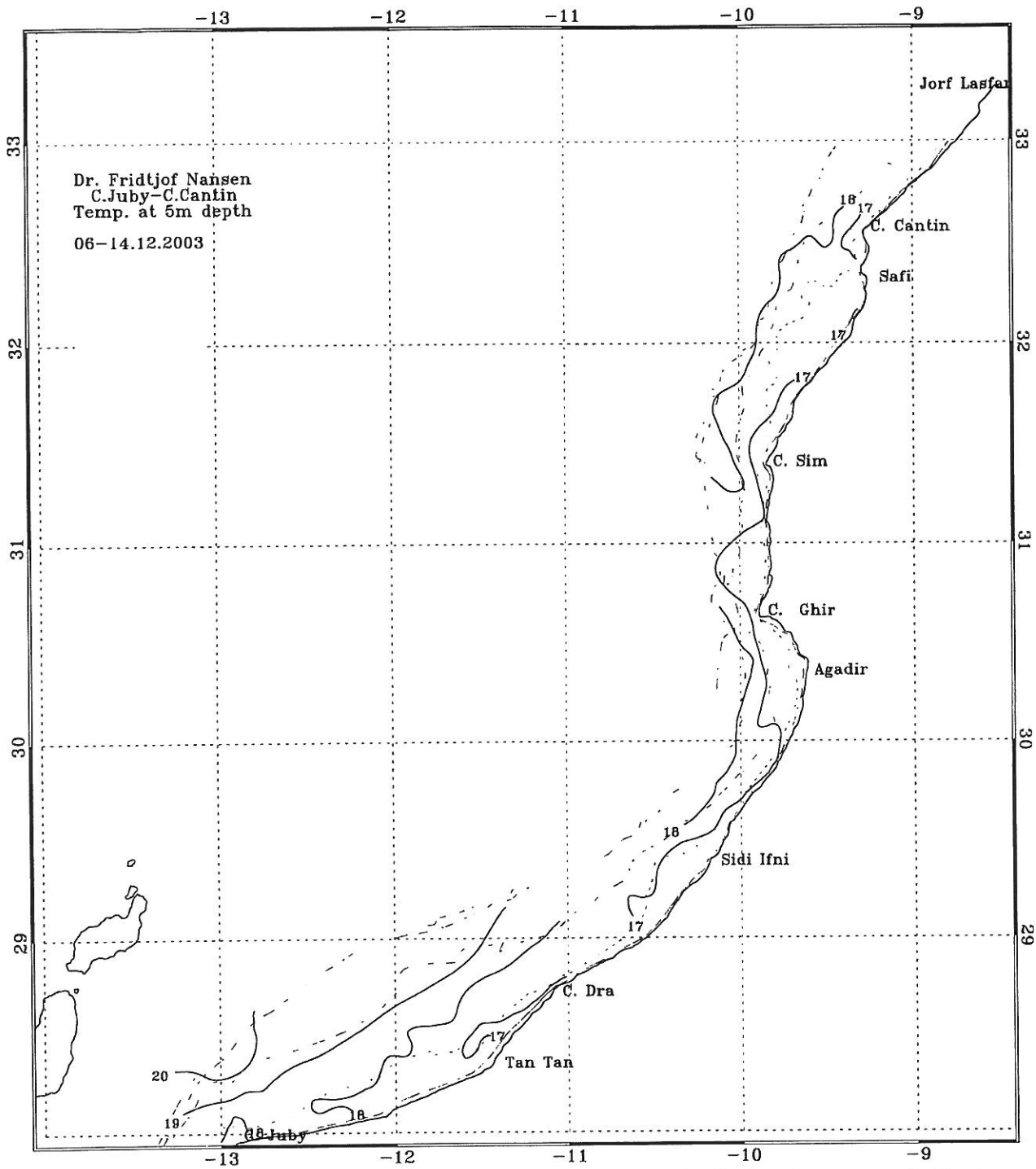
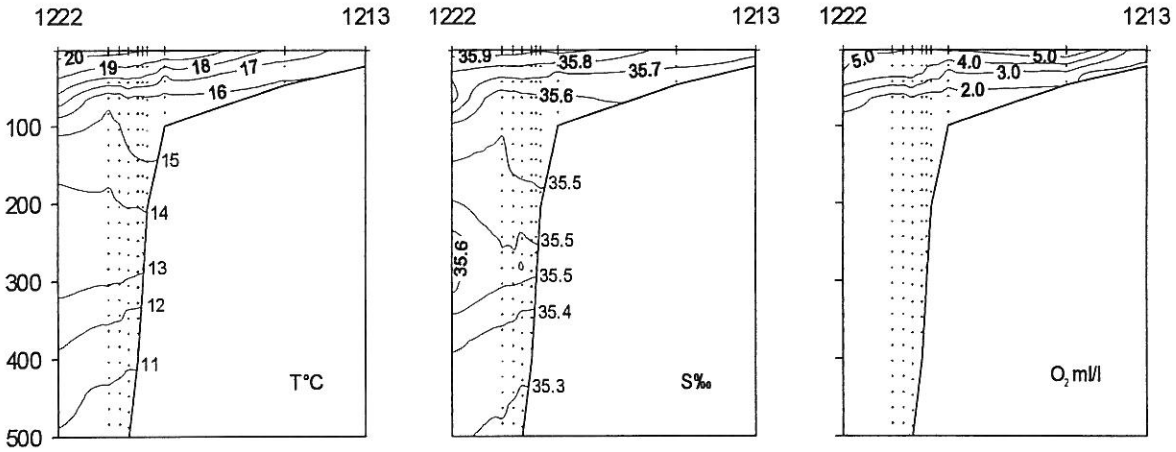


Figure 3b. Sea surface temperature (at 5 m depth), Cape Juby to Cape Cantin. Depth contours as in Fig. 1a.

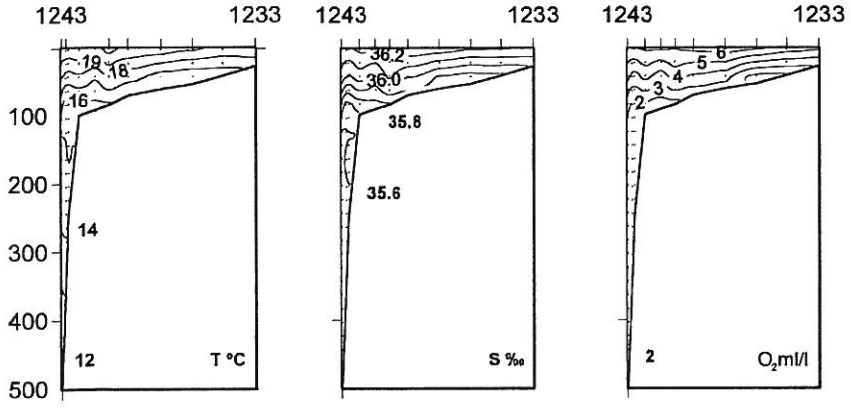
Hydrography

The coastal ocean off Sahara is the place of a major front separating the tropical and subtropical water masses. Below a thin layer of the warm surface water responding to seasonal changes in solar radiation, the water mass structure consists of the high salinity, warm and saturated in oxygen subtropical water in the north and the lower salinity, colder and low-oxygen water originated in the tropics to the south. The transition process between these two major water masses is clearly manifested in the hydrographic sections (Figure 4, C. Blanc to C. Barbas) and in the alongshore distributions (Figure 5). The shelf break area off Cape Blanc is dominated by the tropical subsurface

water with temperature less than 17 °C and salinity below 35.9. From the alongshore distribution at 50 m depth, it is clear that the northward extent of this water on the shelf reaches the latitude of Cape Barbas, where it forms a cross-shelf front with the subtropical waters, dominating on the Dakhla shelf. It is interesting to note that this front appears to form a boundary of the pelagic populations, with the tropical sardinellas occurring to south of the front and the subtropical sardines to the north (Figure 6 and 7). The tropical water mass as descends below the subtropical ones at the shelf break and continue to propagate as a subsurface layer, reaching the latitude 24°N (Figure 5, the 200 m depth alongshore distribution). Off Dakhla the subsurface core of the topical water detaches from the continental slope and forms a subsurface core between 100 and 200 m, centred at station 1257. To the north, the narrow coastal area off Cape Bojador is entirely dominated by the subtropical water with the temperature higher than 19 °C salinity above 36.5. Further north, the subsurface temperature and salinity drop down, but the oxygen concentration in the subsurface water mass remains high (Figure 5). A more or less the same water mass structure is observed at the shelf break in the northernmost hydrographic sections off Cape Dra and Cape Ghir.

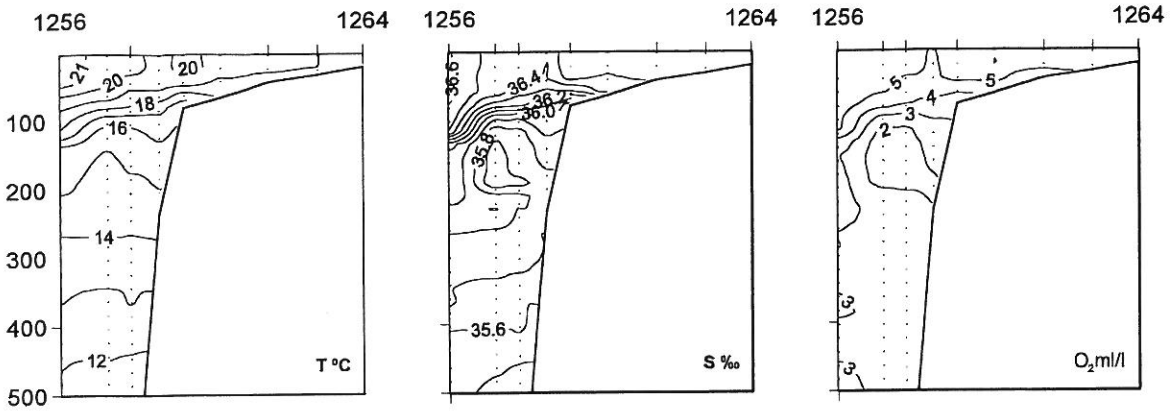


a) Cape Blanc – 18-19.11.2003

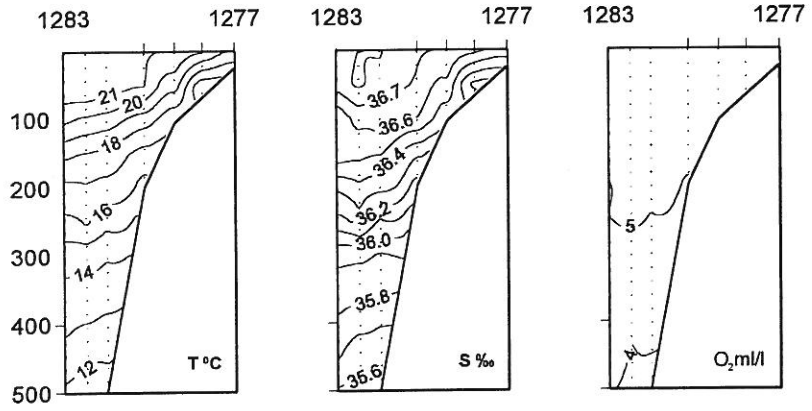


b) Cape Barbas – 23.11.2003

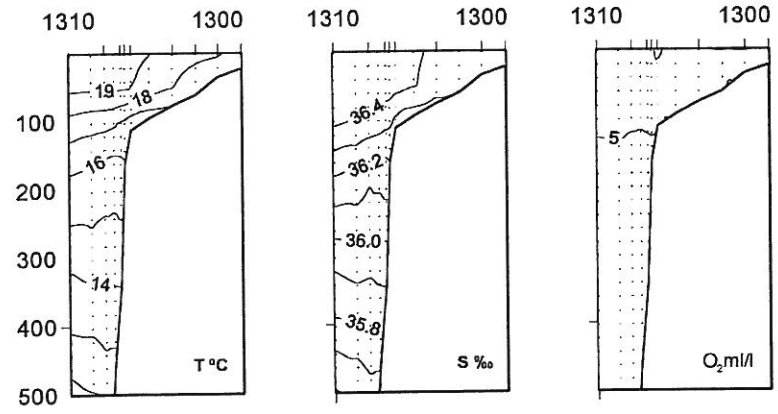
Figure 4. Hydrographic sections with distribution of temperature, salinity and oxygen.



c) Dakhla – 27.11.2003

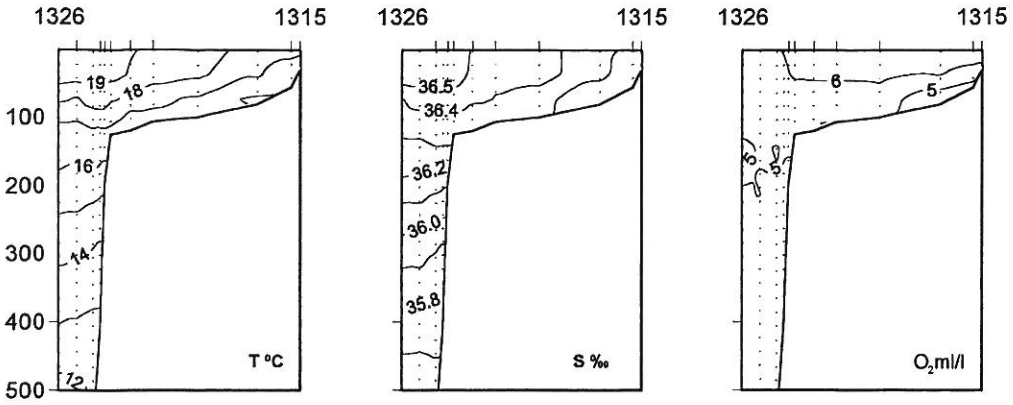


d) Cape Bojador – 01.12.2003

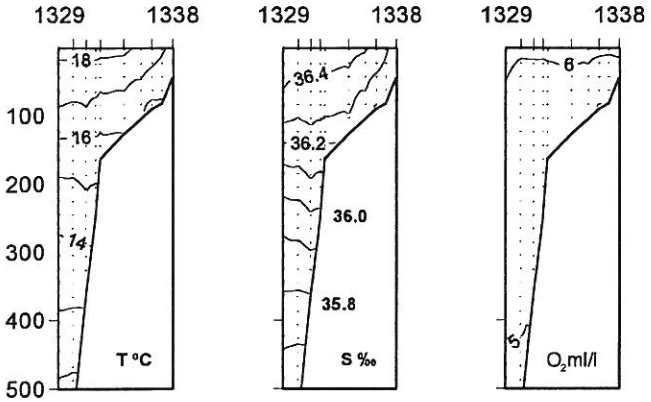


e) Cape Juby – 06.12.2003

Figure 4. (continued)



f) Cape Dra – 08.12.2002



g) Cape Ghir – 13.12.2002

Figure 4. (continued)

The inshore water masses, where the shelf is broad (Dakhla, Cape Dra), are well mixed and exhibit a frontal feature at the shelf-break. These observed where shelf is narrow, (Cape Bojador and Cape Ghir), exhibit considerable inshore-offshore gradients and well-developed vertical stratification.

Summary

In spite of considerable calmer wind conditions in comparison to the previous winter surveys, no major changes in the hydrography of the surveyed region were observed. A strong connection between the position of the tropical front off Cape Barbas and the separation of stocks of sardines and sardinellas, observed during the previous year, has been confirmed in this year's data.

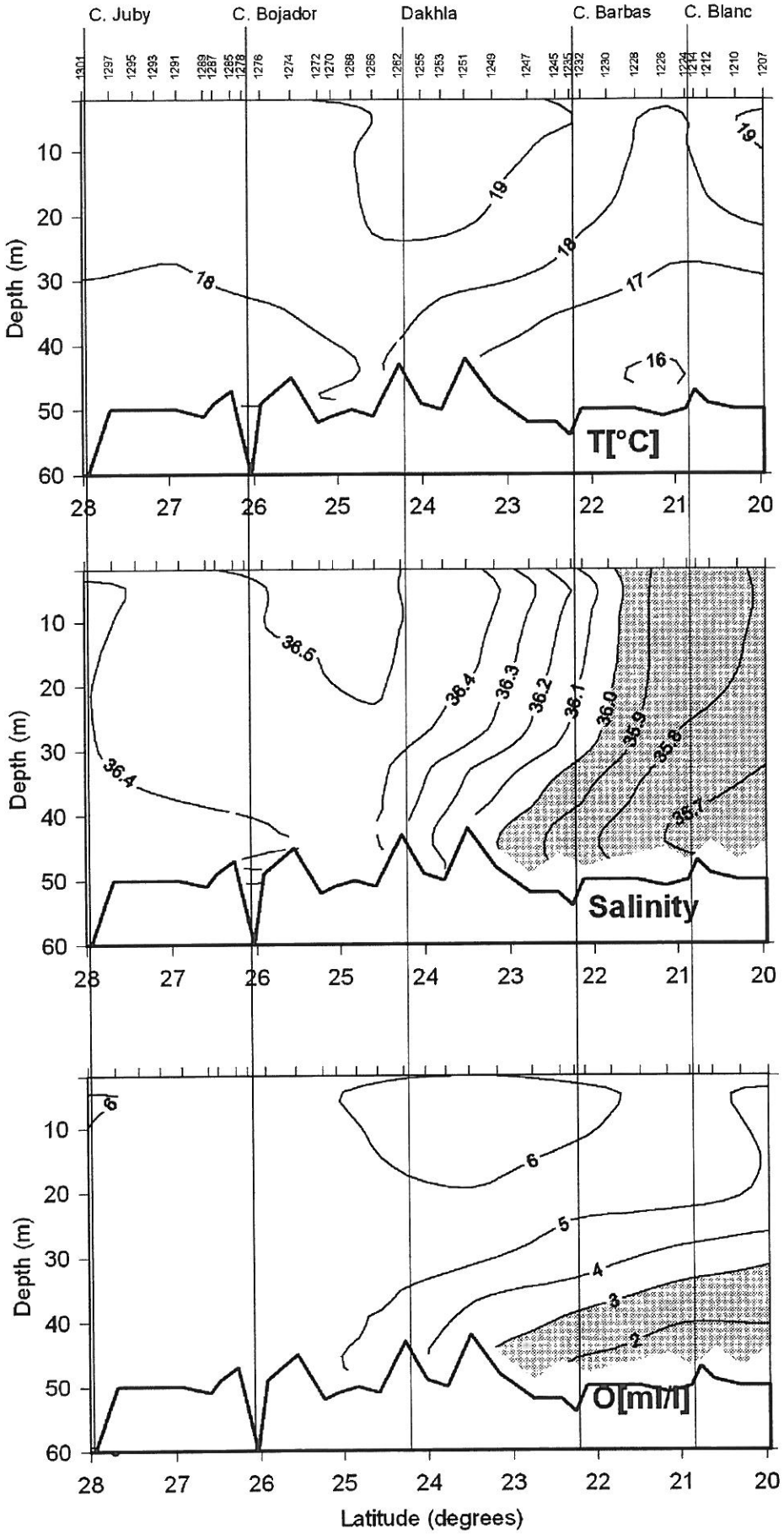


Figure 5a. Distribution of temperature, salinity and oxygen along 50 m isobath.

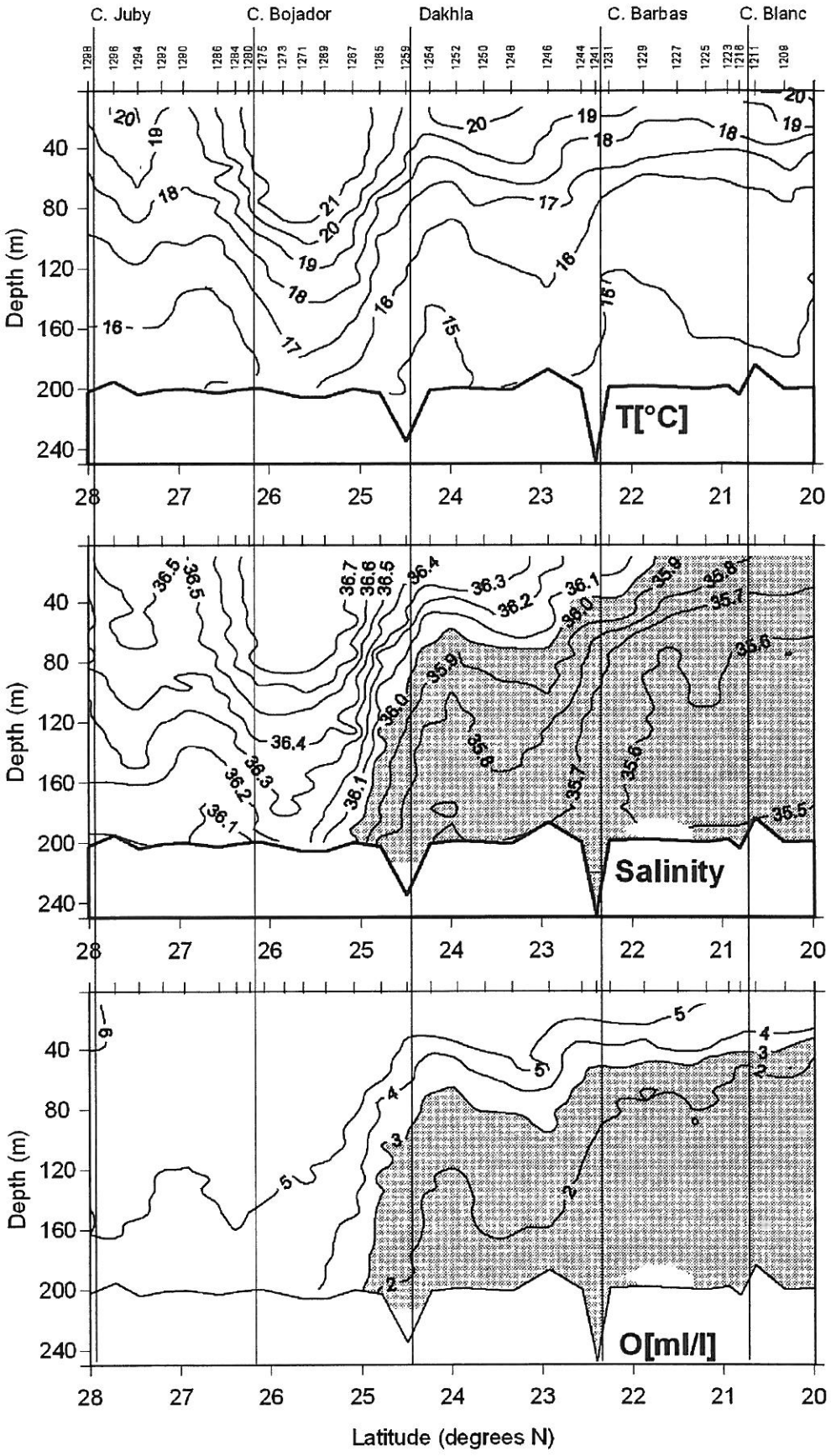


Figure 5b. Distribution of temperature, salinity and oxygen along 200 m isobath.

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

Figures 6 to 10 show the distribution of the main groups of pelagic fish by contoured acoustic densities.

Sardine, *Sardina pilchardus*, was found almost without interruption between Cape Blanc and 25 °N, Figure 6. The aggregations between Cape Blanc and Cape Barbas were less dense compared to previous year and consisted of both young and adult fish. Further north, the aggregation between Cape Barbas and to north of Dakhla is mainly of adult year-classes. In general, presence of juvenile sardine is at low levels south off Cape Bojador, Figure 11a. Between Cape Bojador and Cape Juby sardine was recorded in high abundance in several patches close to the shore. These aggregations consist of a mixture of young and old fish, Figure 11b.

Sardinellas (Sar*dinella aurita* and *S. maderensis*) formed a major aggregation between Cape Blanc and Cape Barbas. North off Cape Barbas only a few scattered recordings of sardinella were observed, Figure 7. The abundance seems to be at about the same level as last year.

Anchovies (*Engraulis encrasicolus*) were only found off Cape Blanc, near Cape Barbas and between Laayoune and Cape Juby, Figure 8.

Horse mackerels (*Trachurus trachurus* and *T. trecae*) were common between Cape Blanc and Cape Barbas, with high densities on the shelf north of Cape Blanc, Figure 9. These aggregations were mainly consisting of *T. trecae.* Further north, between Dakhla and Cape Bojador, the horse mackerel was found on the outer shelf and were mainly made up of *T. trachurus*. Horse mackerel were recorded further north to Cape Bojador and between Laayoune and Cape Juby, but only at low densities, Figure 9.

Chub mackerel (*Scomber japonicus*) was recorded almost continuously from Cape Blanc to Cape Juby and was mainly hit at lower densities, Figure 10. A few denser registrations were found off Lacraa.

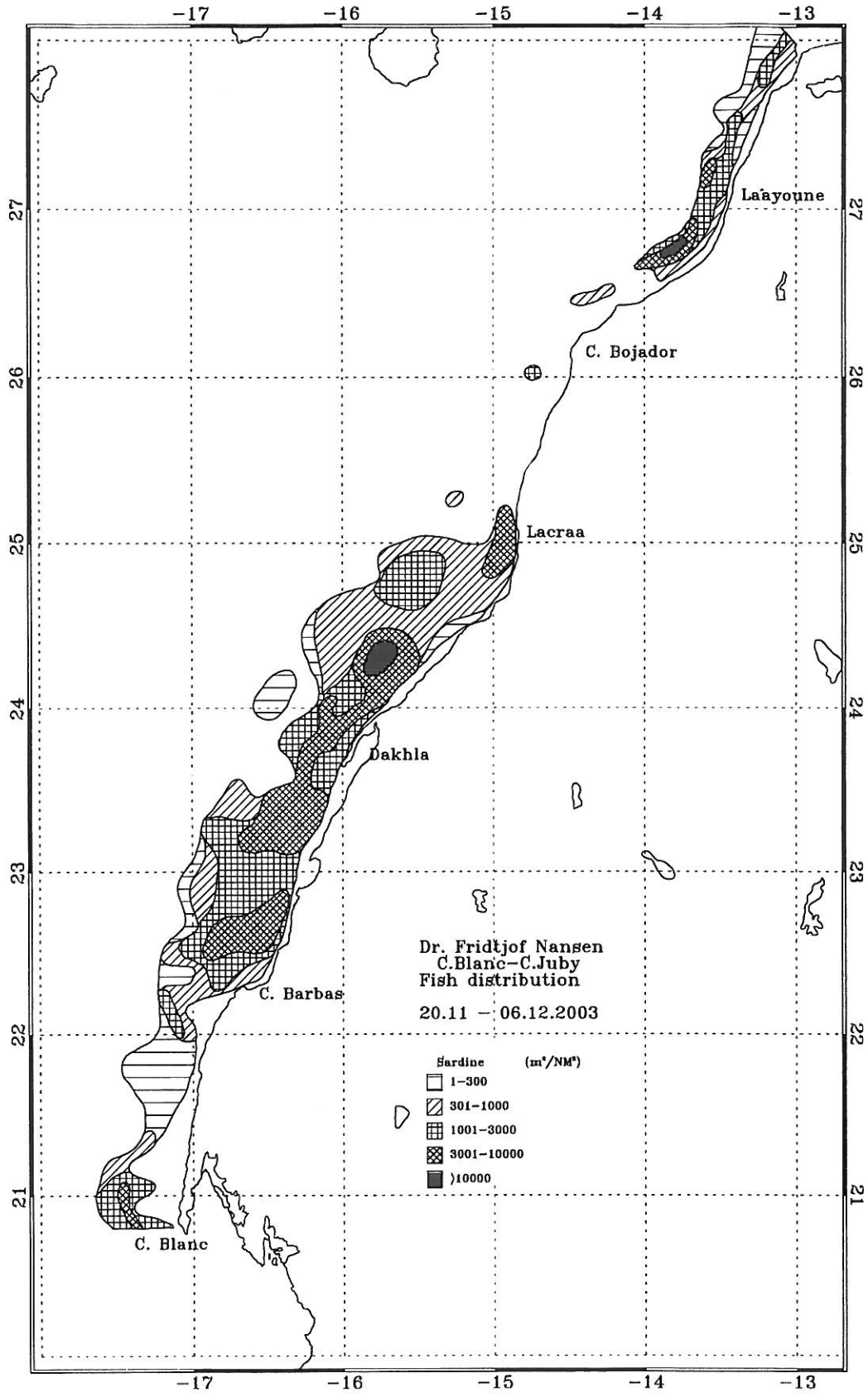


Figure 6. Distribution of sardine, Cape Blanc to Cape Juby. Depth contours as in Fig. 1a.

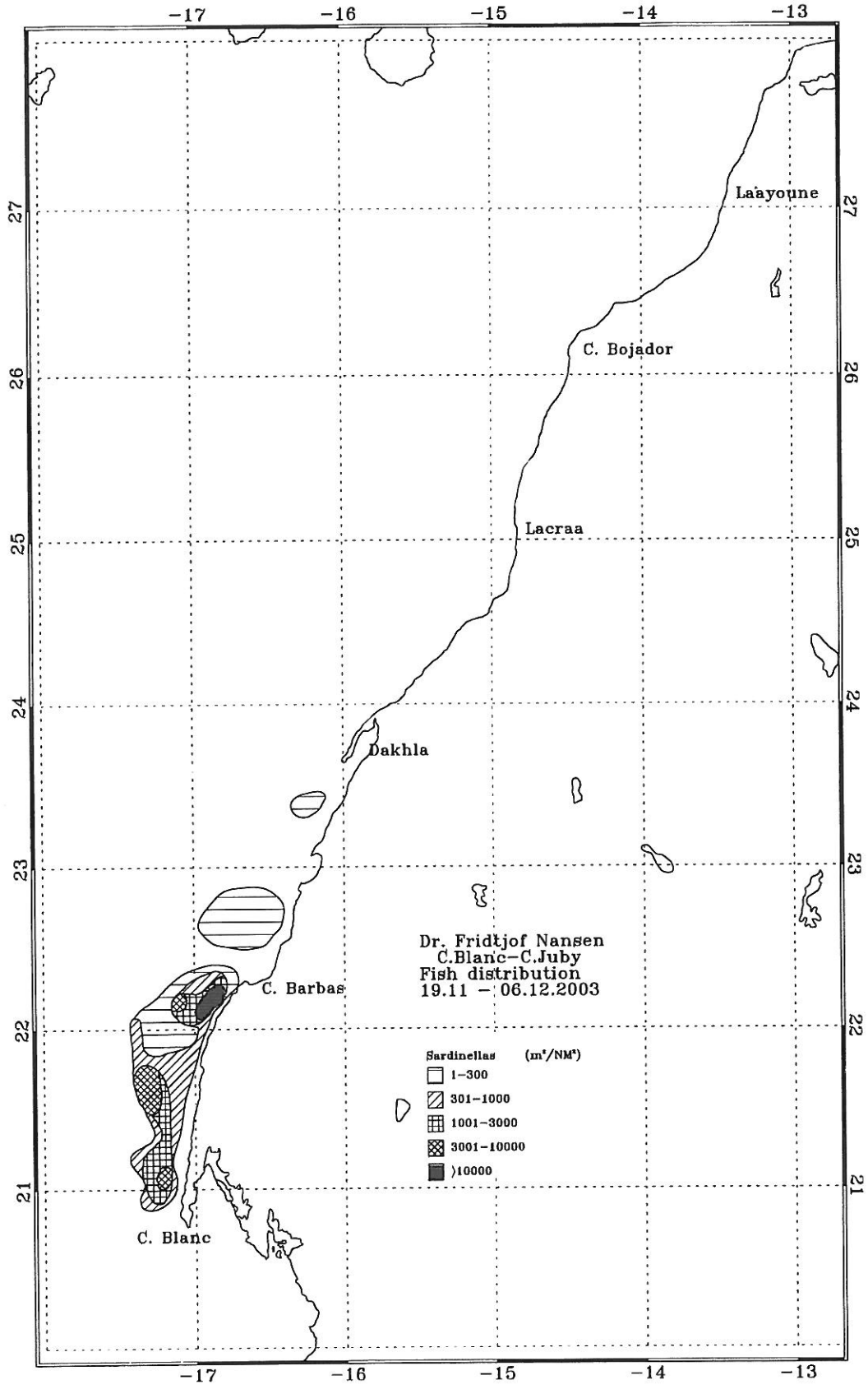


Figure 7. Distribution of sardinella, Cape Blanc to Cape Juby. Depth contours as in Fig. 1a.

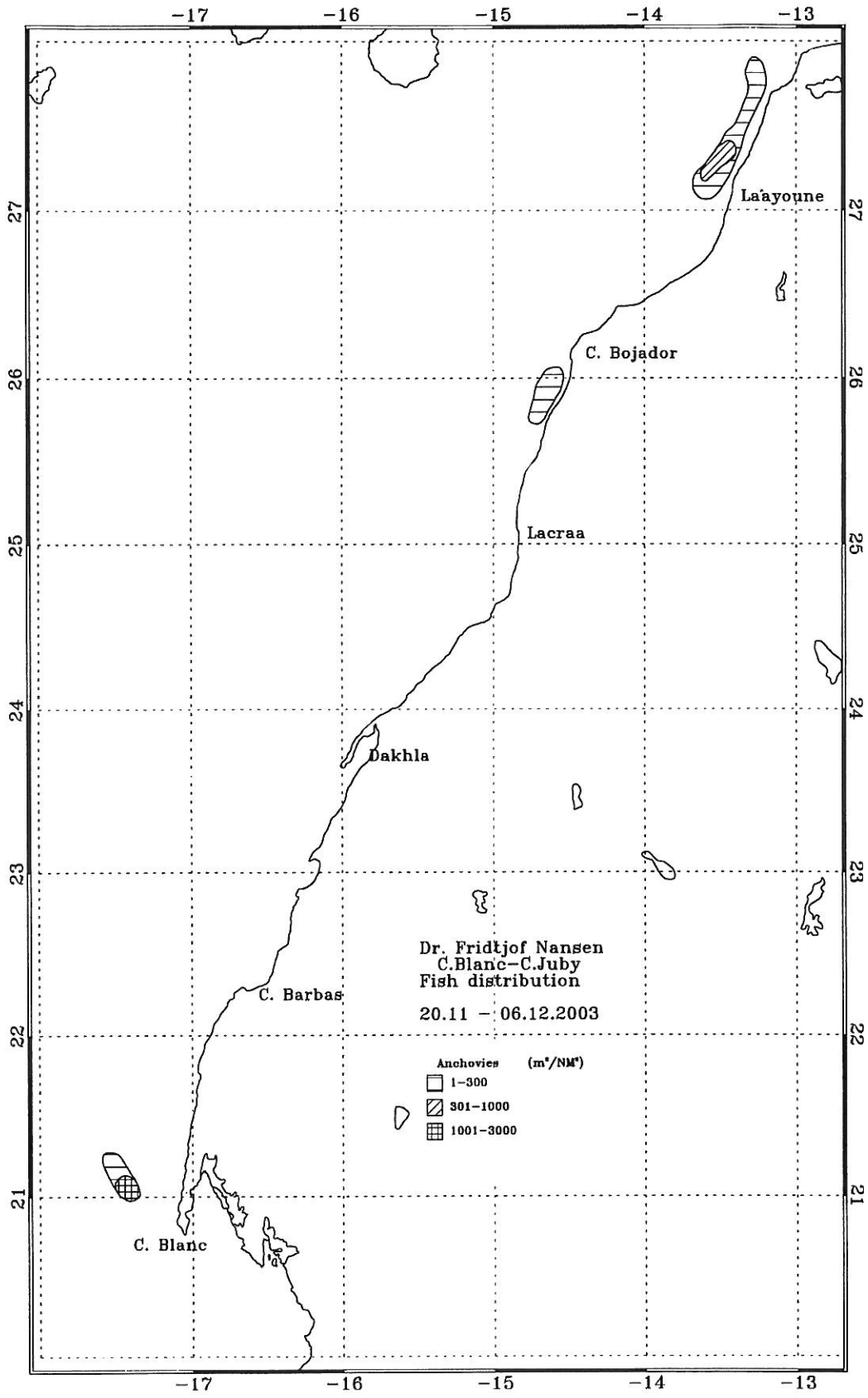


Figure 8. Distribution of anchovy, Cape Blanc to Cape Juby. Depth contours as in Fig. 1a.

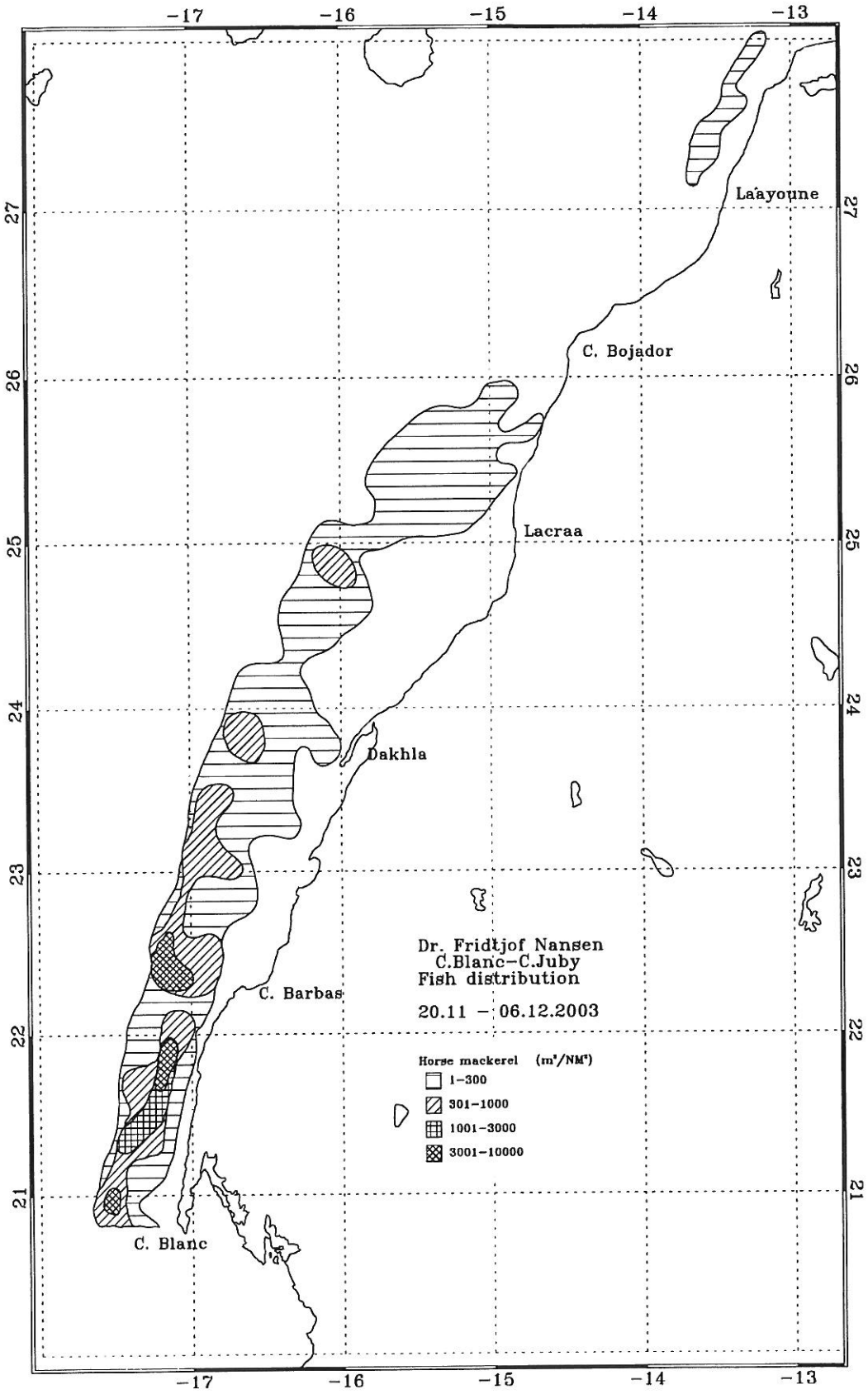


Figure 9. Distribution of horse mackerel, Cape Blanc to Cape Juby. Depth contours as in Fig. 1a.

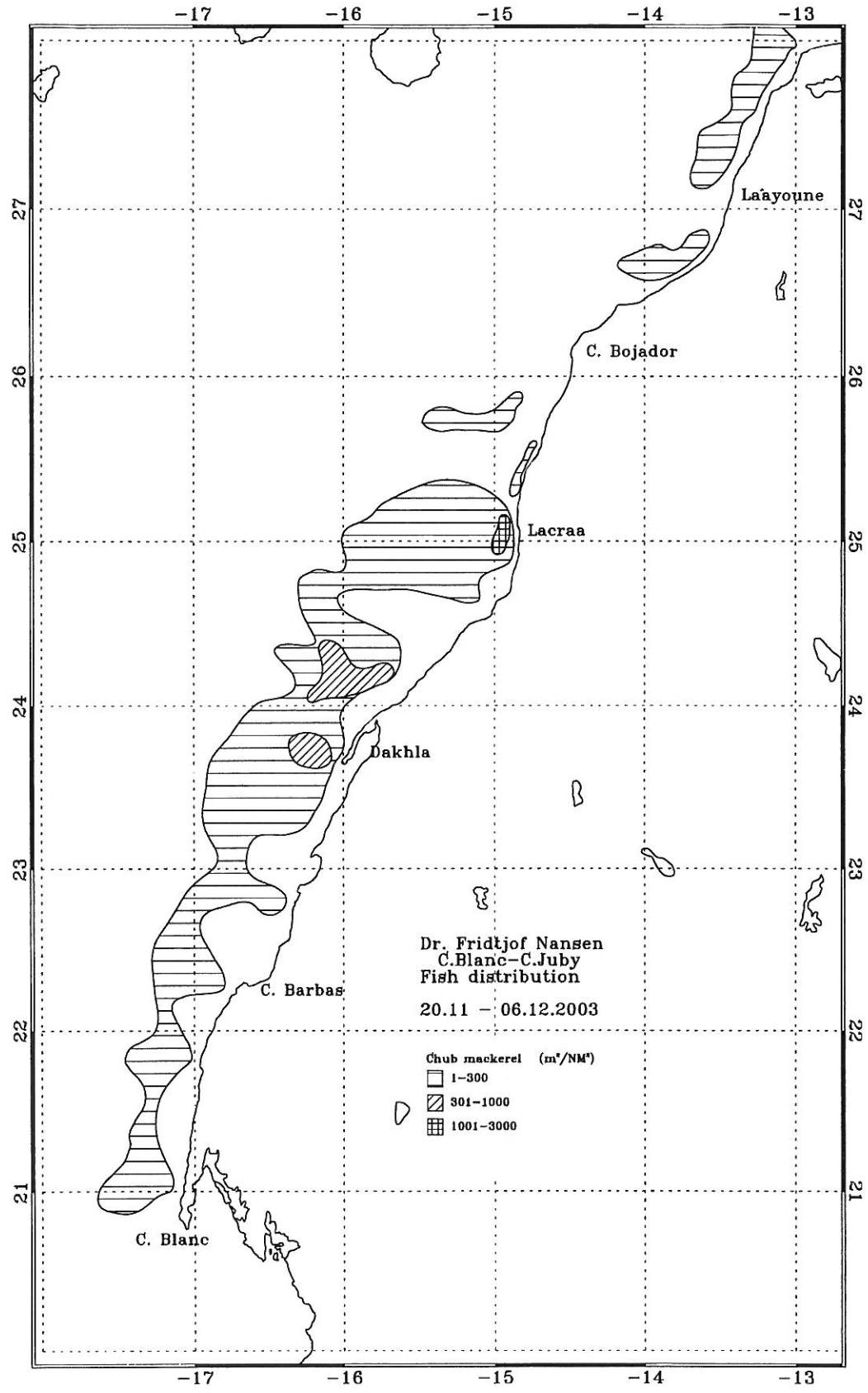


Figure 10. Distribution of chub mackerel, Cape Blanc to Cape Juby. Depth contours as in Fig. 1a.

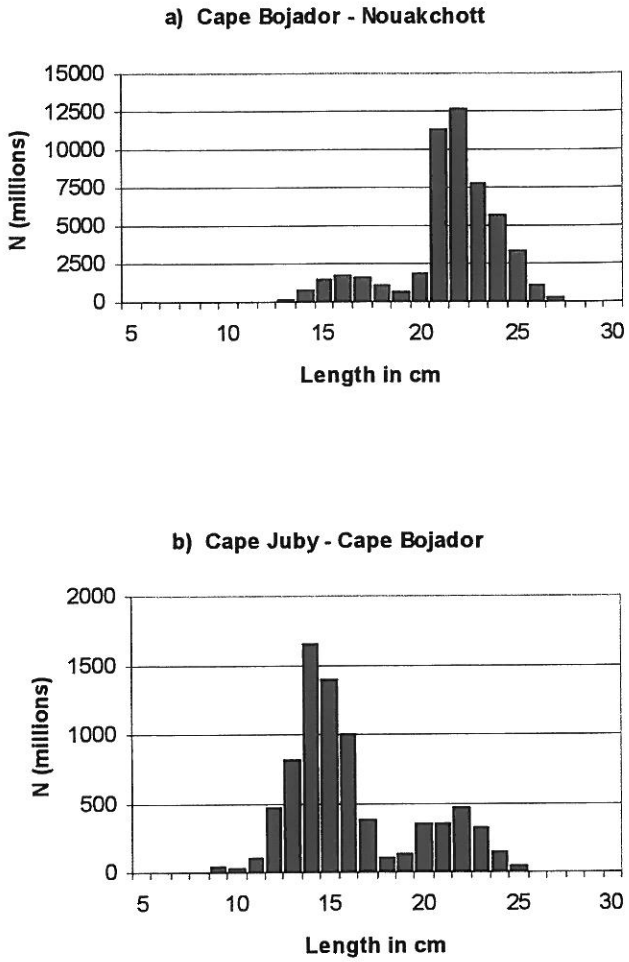


Figure 11. Length frequency distributions sardine Cape Timiris to Cape Juby.

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

Sardine was common in the coastal area from Cape Juby to Cape Cantin, Figure 12. Several patches with relatively high densities were recorded along the coast. The aggregations consist mainly of one young cohort with a mode around 16 cm, Figure 15.

Anchovy was only found in a few low-level patches, Figure 13.

Chub mackerel was found all along the coast from Cape Juby to Cape Cantin, generally in low densities, Figure 14. Three denser patches were found, between Cape Juby and Tan Tan, near Sidi Ifni and on the outer shelf between Cape Sim and Safi.

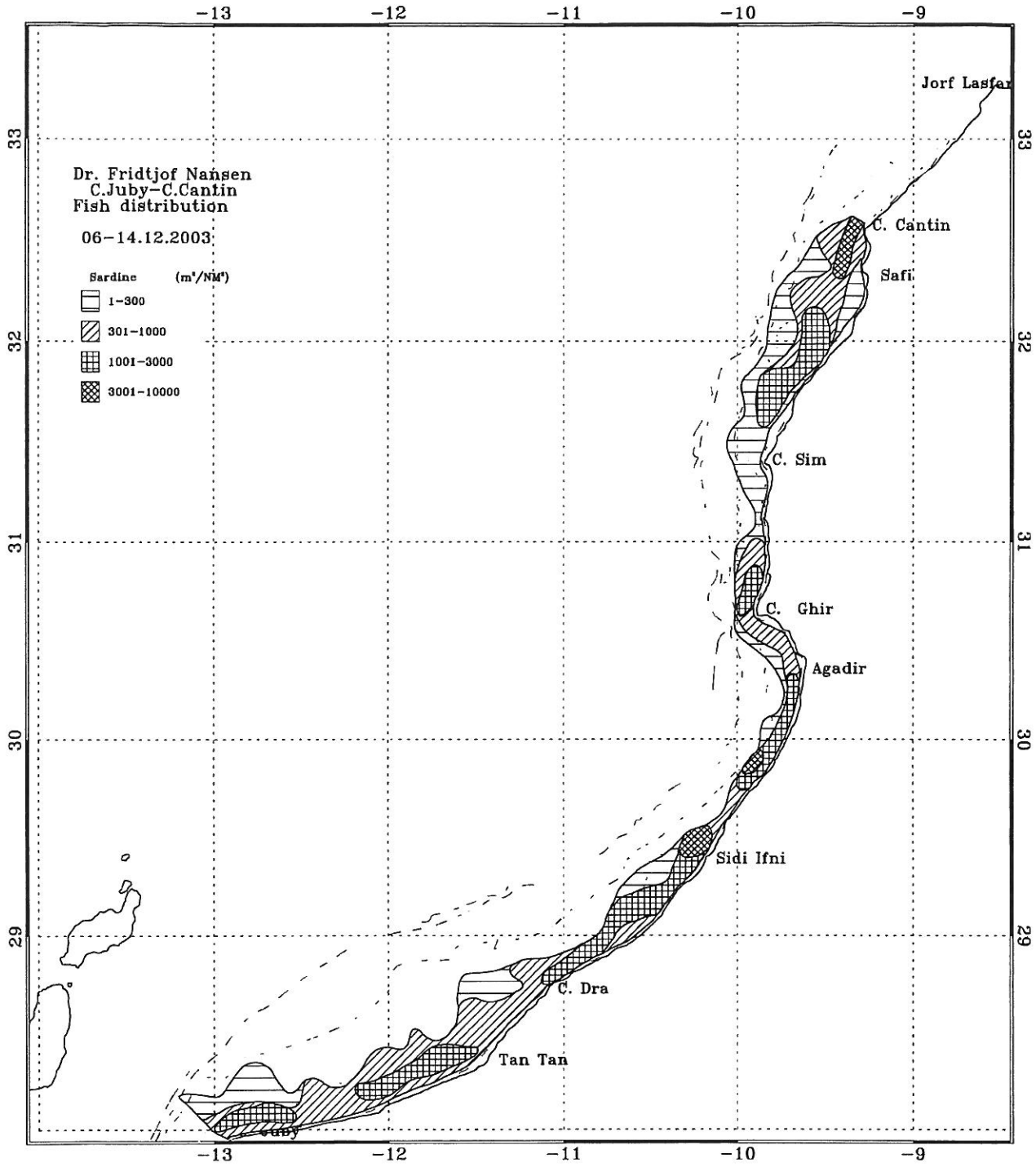


Figure 12. Distribution of sardine, Cape Juby to Cape Cantin. Depth contours as in Fig. 1a.

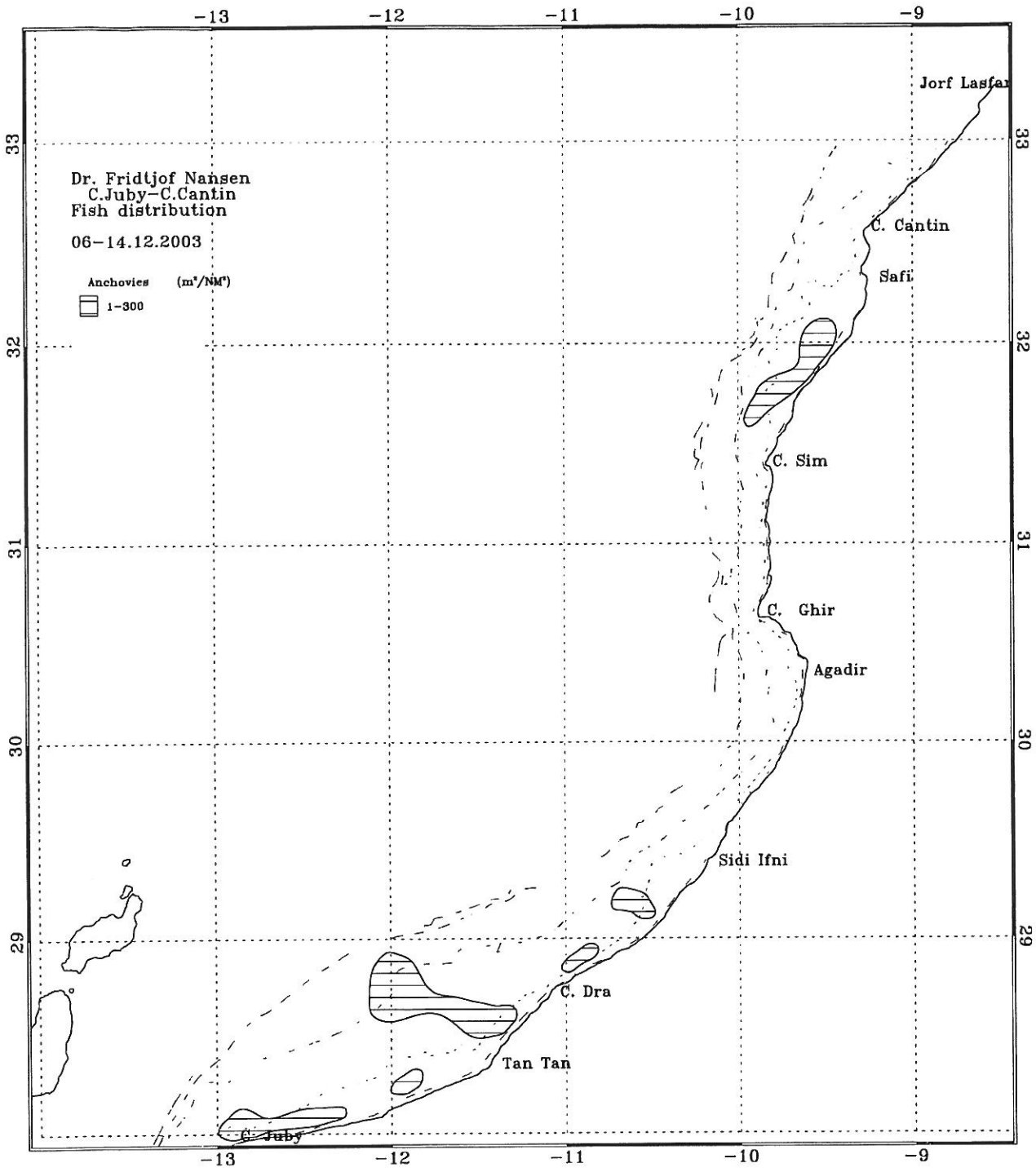


Figure 13. Distribution of anchovy, Cape Juby to Cape Cantin. Depth contours as in Fig. 1a.

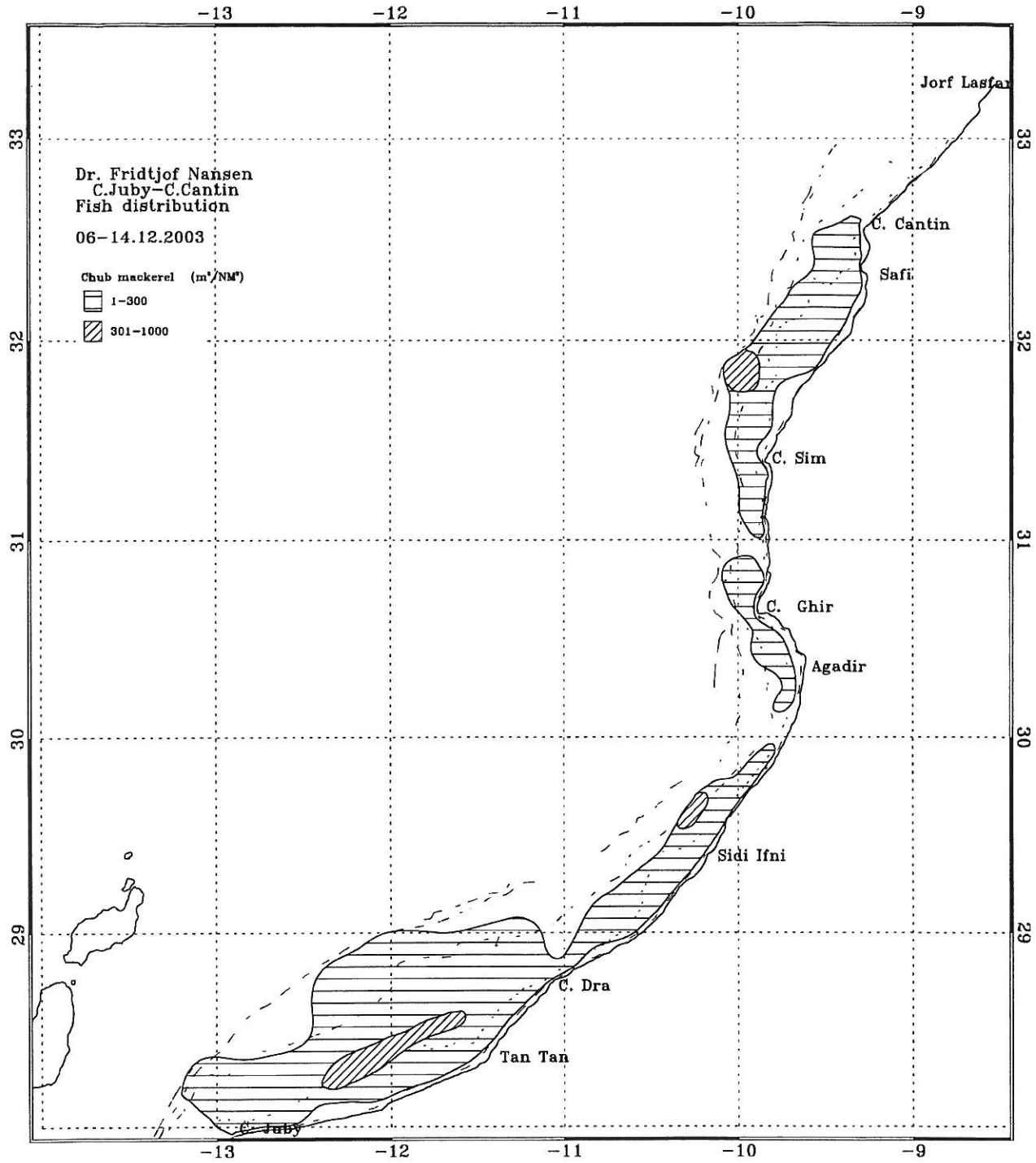


Figure 14. Distribution of chub mackerel, Cape Juby to Cape Cantin. Depth contours as in Fig. 1a.

Recordings of **horse mackerel** were very few and scattered.

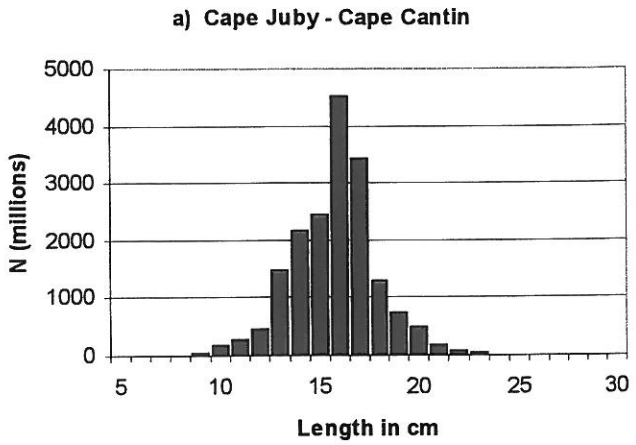


Figure 15. Length frequency distribution of sardine Cape Juby to Cape Cantin.

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 4.4 million tonnes (Annex I), which is the same level as one year earlier, but 22% less than the 5.7 million estimated in June. If the sardine in Mauritania in November is included, the biomass of the southern stock is estimated to 4.7 million tonnes. The length distribution is earlier shown in Figure 11. The major share of the fish in terms of biomass consists of older fish. Compared with earlier years, the development in the "adult" part of the stock (i.e. fish >19cm) is:

Survey	Thousand tonnes	Million fish
November-December 1996	4 600	47 400
November-December 1997	240	2 900
November-December 1998	340	3 400
November-December 1999	1 000	11 500
November-December 2000	1 260	13 200
May-June 2001*	1 975	22 500
November-December 2001	3 200	32 000
May-June 2002*	2 100	21 400
November-December 2002	3 700	35 500
June 2003*	5 580	59 300
November-December 2003*	4 370	43 600

* Including sardine in Mauritania

The strong increase in the adult stock, which has been observed during the later years, seems now to have come to a halt. This may be an indication that the adult stock is close to the carrying capacity of the ecosystem. At present, the recruitment to the stock appears very low. The young fish (<20cm), including the fish in Mauritanian waters, constitute now only of about 7 billion fish, compared to 37 billion the previous year.

Sardinella was estimated to roughly 1.1 million tonnes of which 0.9 and 0.2 million are round and flat sardinella respectively, Annex I. The main part of the fish is located between Cape Blanc and Cape Barbas and seems to constitute most of the regional stock of round sardinella, but only a fraction of the flat variety. In the preceding survey in Senegal and Mauritania 1.9 million tonnes of sardinella were estimated south of Cape Blanc, see Annex IV.

The two species of **horse mackerel** combined was estimated to 1.14 million tonnes (Annex I), of which roughly 290 thousand tonnes and 850 thousand tonnes were Atlantic and Cunene horse mackerel respectively. The corresponding figures last year were 210 and 350 thousand tonnes respectively. Young fish of Cunene horse mackerel (11-22 cm) are estimated to about 500 thousand tonnes and gives a high growth potential to the stock. The species is also distributed south of Cape Blanc into Mauritania and Senegal, Annex IV.

Cape Bojador – Cape Juby

Estimated **sardine** in this region is 330 thousand tonnes compared to 220 thousand tonnes last year, 330 thousand tonnes in 2001 and 600 thousand tonnes in 2000.

Cape Juby – Cape Cantin

The **sardine** is estimated to 660 thousand tonnes, about 240 thousand tonnes lower than the estimate one year earlier. The abundance in numbers is also declining, from 36 billion in 2002 to 18 billion in 2003. The main part of the biomass (91%) is made up of young fish less than 19 cm length, Annex I.

Anchovies were estimated to only 8 thousand tonnes, a considerable decrease from the 35 thousand estimated a year earlier. In May 2003 the estimate was 44 thousand tonnes.

Chub mackerel estimates has been increasing from 20 thousand tonnes one year ago, to 55 thousand in June this year and now to 210 thousand tonnes. One should take note that these estimates should be treated as relative figures. The chub mackerel is probably considerable under-estimated due to the low and uncertain target strength of the species.

Table 1 Morocco. Summary of biomass estimates of pelagic fish, thousand tonnes.

Region	Sardines	Round sardinella	Flat sardinella	Atlantic horse mackerel	Cunene horse mackerel	Chub mackerel	Anchovy
Cape Blanc-Cape Bojador	4 400	930	220	290	850	320	18
Cape Bojador-Cape Juby	330	-	-	5	-	15	4
Cape Juby-Cape Cantin	660	-	-	20	-	210	8
Totals	5 400	930	220	315	850	545	30

CHAPTER 3 CONCLUDING REMARKS

In spite of considerable higher air temperatures and calmer wind conditions in comparison to the previous winter surveys, no major changes in the hydrography of the surveyed region were observed. Based on the collected data, it is not possible to conclude whether the observed warming has a synoptic character or indicates a beginning of a climatic change. A strong connection between the position of the tropical front off Cape Barbas and the separation of stocks of sardines and sardinellas, observed during the previous year, has been confirmed in this year's data.

Figure 16 gives a general overview on the major aggregations of pelagic fish with rounded biomass figures. The biomass estimates are also summarised in Table 1.

The **sardine** in the southern region has normal distribution pattern with the adults off Dakhla and the juveniles and adults south of Cape Barbas. The biomass of sardine between Cape Blanc and Cape Bojador seems to have stabilised on about 4-5 million tonnes, from 4.6 million tonnes in November 2002 to 4.4 million during the last survey. 240 thousand tonnes of the present stock is juvenile fish. In addition 255 thousand tonnes of sardine is found in Mauritanian waters (one patch south off Cape Blanc and one between CapeTimiris and Nouakchott), of which 50 thousand tonnes young, just south of Cape Blanc. Young sardines in the south are relatively few compared to earlier surveys. Sardine in the region Cape Bojador-Cape Juby is estimated to 330 thousands tonnes, roughly 50% more than one year earlier. Further north, the stock between Cape Juby and Cape Cantin is estimated to 660 thousands tonnes, about 25% lower than last year. The stock is distributed in along the entire region. Recruitment seems to be normal. Most of the fish is of young size with good growth potential.

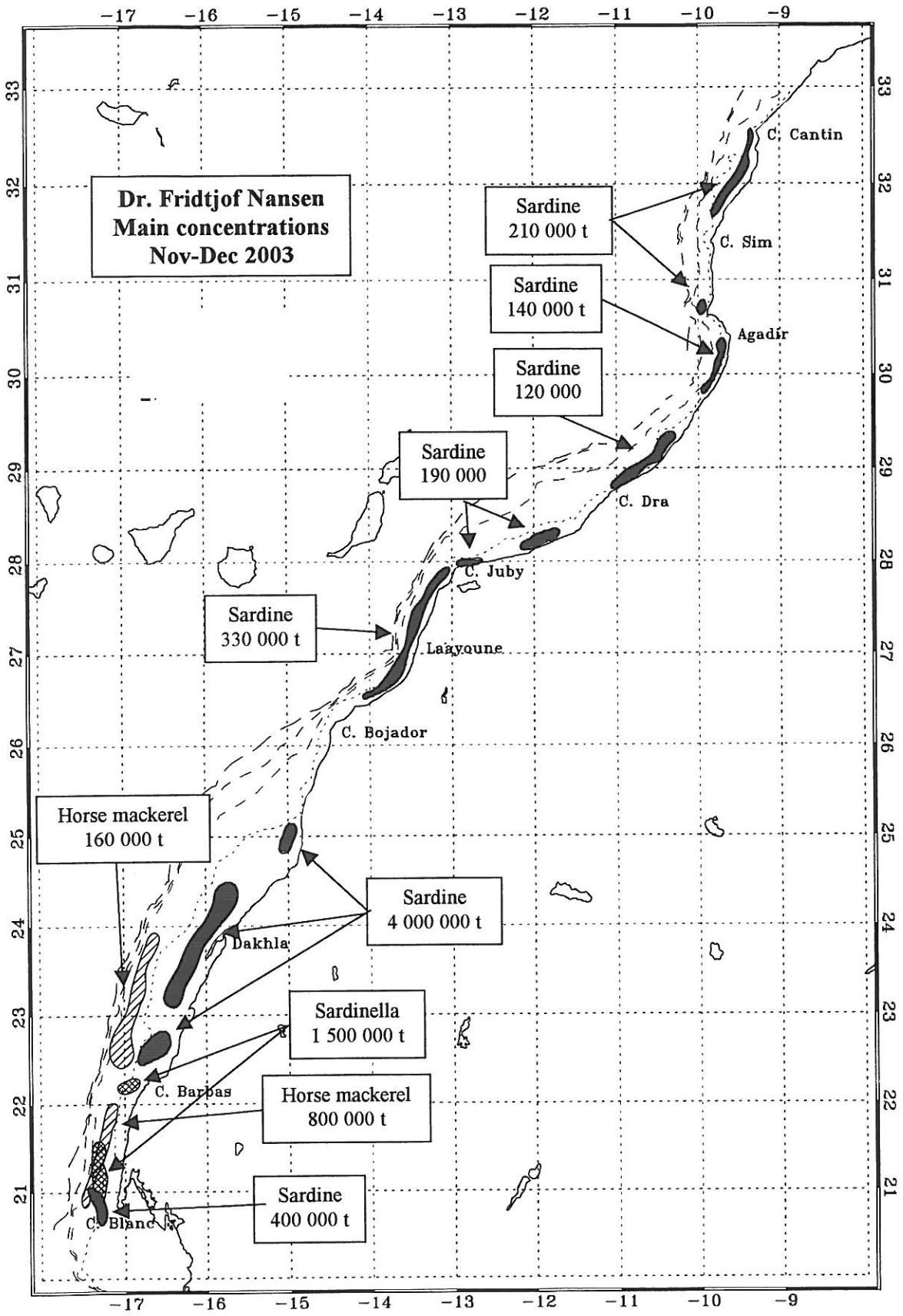


Figure 16. Map of the major pelagic fish concentrations with estimated abundance (tonnes), Cape Blanc to Cape Cantin.

Sardinellas were recorded between Cape Blanc and Dakhla. The biomass was estimated to 1.1 million tonnes, approximately 35% of the entire regional stock.

Anchovies were only estimated to 30 thousand tonnes between Cape Blanc and Cape Cantin, and seem to be on a very low level.

Horse mackerels were forming aggregations between Cape Blanc and Cape Barbas and were else found in scattered patches in the whole survey area. The combined estimate of the two species of horse mackerel is 1 140 thousand tonnes of which 850 thousand tonnes is Cunene horse mackerel south of Cape Barbas. There is a high presence of juvenile fish. The Cunene horse mackerel seems to be growing in abundance lately.

The increasing trend of the **chub mackerel** stock is confirmed by this survey. The biomass index is 210 thousand between Cape Blanc and Cape Juby, and 340 thousand between Cape Juby and Cape Cantin. The increase is significant, especially in the north.

Trends 1995-2003, sardine

Figure 17 shows the biomass estimates of sardine compared with results from previous "Dr. Fridtjof Nansen" surveys. Figure 18 shows the biomass figures 1995-2003 by length classes. Both figures display that the stock between Cape Blanc and Cape Juby has now fully recovered from its sudden collapse in 1997. It is reasonable to include the recordings south of Cape Blanc as they belong to the same unit stock and most of the year stays north of Cape Blanc. The stock seems recently to fluctuate around 5 million tonnes, a figure also close to the maximum of the pre-1997 years. This level seems close to the carrying capacity of the system. The abundance of juveniles in the size range 13-18 cm is remarkably low in the last survey, in contrast to one year earlier. The high mortality among juveniles from June to November seems even stronger in 2003 compared to 2002. This could be a sign of serious growth overfishing on the juveniles and should be analysed more in depth.

Small fish, less than 20 cm, continue to dominate the central stock between Cape Juby and Safi. The level of the stock is slightly below the situation in November 2002. The recent reduction is due to absence of very young fish in the size range 8-12 cm, which was abundant one year earlier. This could be an early sign of a low recruitment to the 13-18 cm cohort, to arrive in 2004.

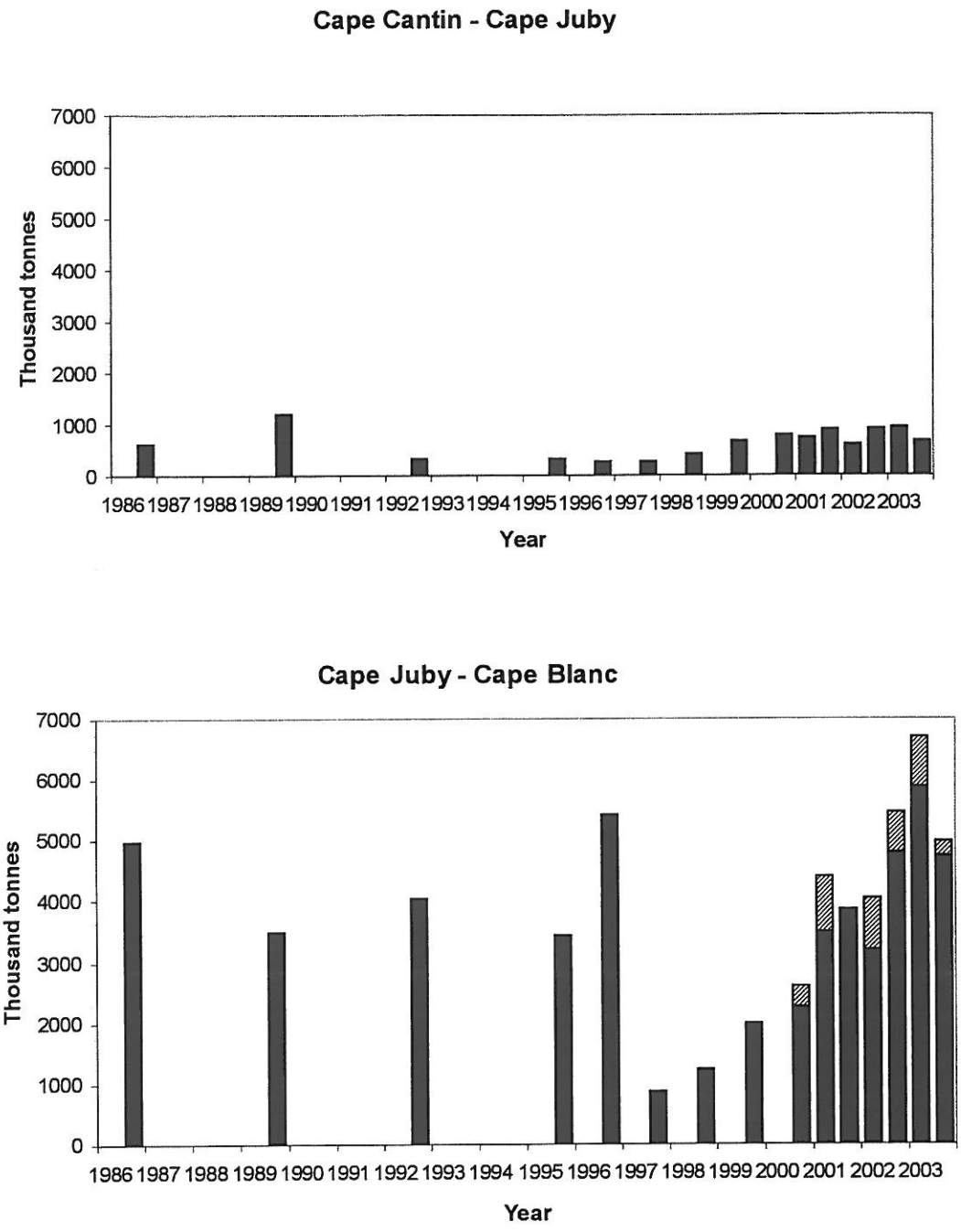


Figure 17. Sardine biomass estimates Cape Cantin-Cape Juby and Cape Juby-Cape Blanc. Sardine south off Cape Blanc hatched. Dr. Fridtjof Nansen 1986-2003.

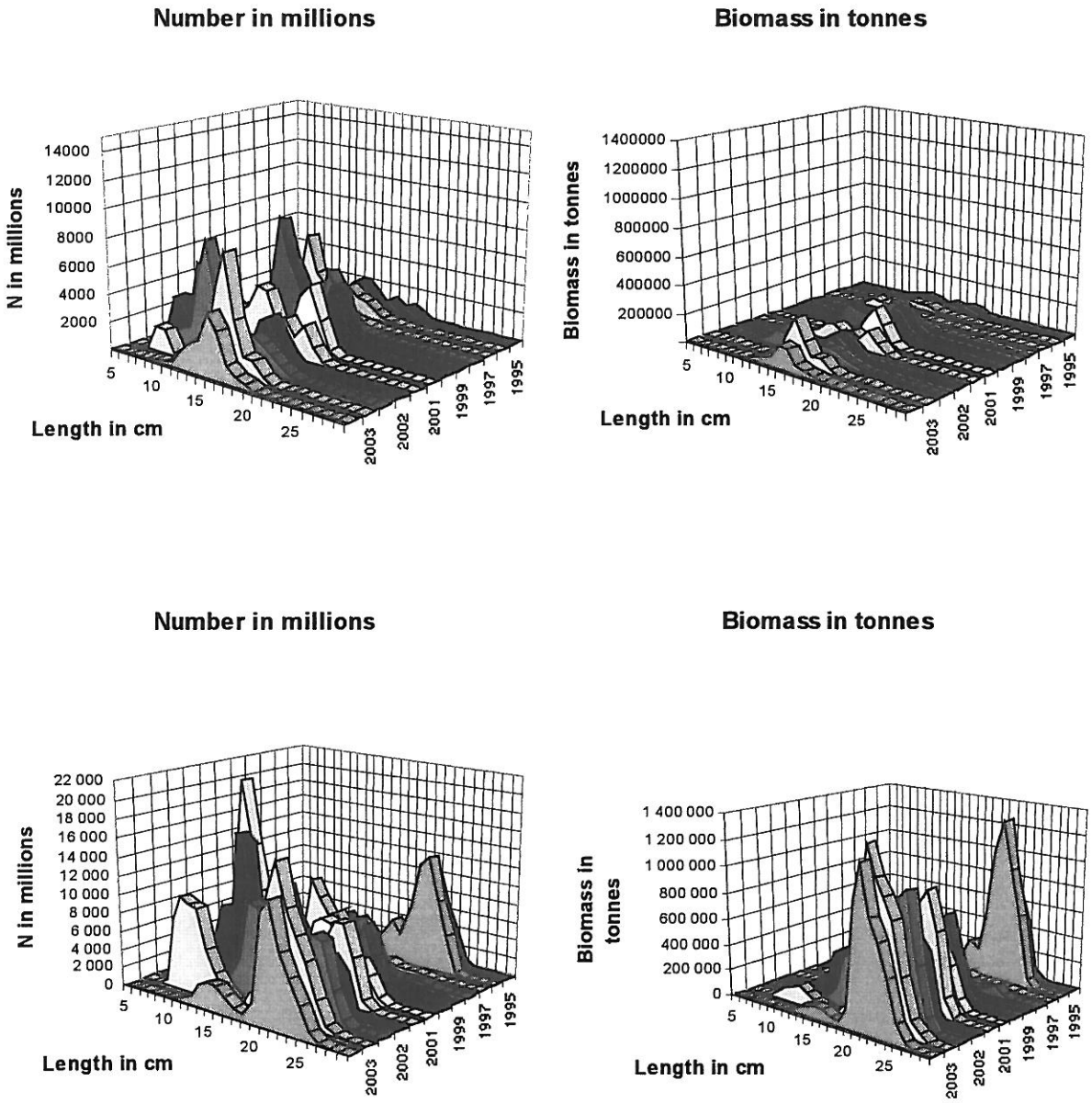


Figure 18. Numbers and biomass by length class, 1995-2003. Cape Juby - Cape Cantin (top) and Cape Blanc - Cape Juby (bottom).

RESUME

La campagne a été conduite avec succès durant la période du 20 novembre au 16 décembre 2003, elle a couvert la région entre Cap Blanc et Cap Cantin suivant un schéma de prospection acoustique de 5100 miles nautiques et 100 stations de pêche de contrôle des bancs (en surface ou près du fond). Les aires de distribution des bancs de sardinelles (*S. aurita* et *S. maderensis*), de sardine, d'anchois, des chinchard (*T. trachurus* et *T. trecae*) et des maquereaux (*S. japonicus* et *S. scombrus*) ont été déterminés et délimités et leurs principales détections échantillonnées.

Une prospection parallèle a été réalisée avec le navire 'Al Amir Moulay Abdallah' entre cap Juby et Cap Ghir, une étude préliminaire des données du navire 'Al Amir Moulay Abdallah' a été effectuée à bord du NANSEN. D'autres analyses supplémentaires sont encore nécessaires pour calculer la corrélation les deux navires.

Des conditions climatiques, généralement bonnes (sauf du 9 au 10 décembre) ont prévalu durant la période de prospection. Les observations météorologiques conduites durant cette prospection indiquent la présence d'upwelling dans les zones usuelles le long de la côte. Le réseau de mesures hydrographiques CTD a été renforcé. Les mesures de la température de surface des eaux côtières indiquent des remontées d'eaux froides habituellement rencontrées dans cette région. Bien que la température de l'air soit élevée et les vents plus faibles durant cette campagne, il ne semble pas qu'ils ont un eu un impact sur l'hydrographie. La liaison entre la position du front thermique du Cap Barbas et la séparation des stocks de sardine et de sardinelle observé durant les précédentes campagnes a été confirmé par les données de cette campagne

Des exercices sur le traitement des données satellites ont été effectués par les chercheurs des différents pays intéressés par les ressources pélagiques dans la région West Afrique (Le représentant de la Mauritanie n'a pu joindre le cours). Un manuel de traitement des données SST a été également préparé dans le cadre des activités du projet Nat-fish.

La série temporelle de **1990 à 2000** des données de la température de surface (SST) le long de la côte ouest africaine a été étudiée. Les résultats préliminaires permettent l'analyse des anomalies de températures par rapport à la moyenne de la série ainsi que le calcul d'indices d'upwelling pendant cette décennie. La situation pendant la période de prospection a été constituée à partir des données collectées par le navire et utilisées pour des besoins de comparaison.

L'analyse des SST moyennes mensuelles de la côte marocaine montre l'absence de températures inférieures à 16 °C entre 1996 et 1998, dans pratiquement toute la zone ente côtière entre Cap Barbas et Sidi Ifni. Des températures supérieures à 21 °C sont apparues aussi bien en juin (où les eaux sont les plus froides) et novembre 1997 (où les eaux sont les plus chaudes). Ce phénomène correspond à l'année où le stock sardinier a été à son niveau le plus bas.

Une vision générale des majeures concentrations des poissons pélagiques, avec des valeurs de biomasses arrondies, est présentée dans la figure 16. Les estimations d'abondance sont résumées sur le tableau 1et détaillées par classe de taille en Annexe I. Les positions et compositions des stations de pêche en Annexe II. La fréquence de travail su sondeur 38 KHz a été utilisée pour les évaluations d'abondance et ses réglages sont présentés ainsi que les engins de pêche utilisées en Annexe III. Les estimations régionales sont présentées en Annexe IV. Les données du 18, 120, et 200 KHz ont été également enregistrées et sauvegardées pour une éventuelle estimation multi fréquence.

Le stock sardinier a été estimé a 4.4 millions de tonnes entre Cap Blanc et Cap Bojador, en diminution de près d'un million de tonnes par rapport à juin, (retournant au niveau de 4.5 millions de tonnes de l'année dernière), une biomasse de prés de 250 mille tonnes a été estimée au sud du Cap Blanc (les détections s'étendent jusqu'à Nouakchott). 300 milles tonnes ont été estimées entre Cap Bojador et Cap Juby (environ 100 mille tonnes de plus que l'année dernière) et 660 mille tonnes en Cap Juby et Cap Cantin (240 mille tonnes en moins que l'année dernière).

Les juvéniles ont été enregistres abondamment dans la région du Cap Blanc, l'histogramme des fréquences de taille montre deux pics distincts à 16 et 22 cm, avec une forte proportion d'adultes, (le pic à 22cm est plus important que celui à 16cm.). Les juvéniles étaient mélangés aux adultes dans la région de Dakhla et constituent la majeure partie dans la région de Laayoune, où leur proportion était supérieure à celle des adultes (le pic à 16cm plus important que celui à 22cm.).

Le stock central, zone de pêche traditionnelle entre Tan Tan et Safi est essentiellement composé de poisson de classe de taille de 13 à 18 cm. L'histogramme des fréquences de tailles est unimodal avec un pic à 16 cm. Les tailles entre 18 et 24 cm. semblent être fortement exploitées par l'activité de la pêche.

Les sardinelles (*S. aurita* et *S. maderensis*) ont été rencontrées principalement entre Cap Blanc et Cap Barbas, de faibles détections ont été enregistrées au sud de Dakhla et quelques individus ont été pêchés entre Tan Tan et Sidi Ifni. L'évaluation de leur biomasse présente le même niveau que celui de l'année dernière. La biomasse est estimée à 1.2 millions de tonnes, dont 80 % de sardinelle ronde. Elle présente plus du tiers de l'ensemble du stocks des sardinelles estimé dans la sous région.

Les chinchards, *T. trachurus* (atlantique) et *T. trecae* (cunène) ont été rencontrés principalement en concentrations agrégées. Ils forment des bancs comparables à ceux du maquereau Leur biomasse a augmenté de 565 milles tonnes en 2002 à 1.2 millions de tonnes, dont 75 % de chinchard cunène dans la région au sud du Cap Bojador.

Les maquereaux (mélange de *S. japonicus* et *S. scombrus*) sont généralement enregistrés en faibles densités, du fait de leur faible puissance de réflexion acoustique (TS). La biomasse (probablement *sous-estimée) est évaluée à 545 mille tonnes, en augmentation par rapport aux 290*

milles tonnes enregistrées une année auparavant. Cette augmentation est principalement enregistrée dans la région Layoune-Safi, où elle est passée de 20 à 225 mille tonnes depuis l'année dernière.

Les anchois ont été détectés de manière dispersée dans la région centrale entre Safi et Laayoune. La biomasse, estimée à 30 mille tonnes, provient en majeur partie (60%) d'une concentration détectée prés du Cap Blanc. L'anchois présente dans la région entre Layoune et Safi estimée à 44 mille tonnes en Juin dernier et 35 mille tonnes en décembre dernier n'est plus qu'à 12 mille tonnes, soit une chute des deux tiers par rapport à l'année dernière.

Tendances du stock sardinier pendant la période 1995-2003

La figure 17 montre les estimations de la biomasse de la sardine, comparées avec les précédentes évaluations effectuées lors des campagnes à bord du 'Dr. Fridtjof Nansen', les évaluations de la biomasse entre 1995 et 2003 sont présentées par classe de taille sur la figure 18.

Les deux figures montrent que le stock entre Cap Blanc et Cap Juby présente une remarquable reconstitution progressive depuis sa chute observée à la fin de 1997 et a continué sa croissance jusqu'en 2002, où il semble se stabiliser aux environs du niveau de 5 millions de tonnes de sardines, valeur proche de la 'capacité de production maximale' de l'eco-système pélagique.

Les jeunes individus de taille inférieure à 20 cm. restent dominants dans la composition du stock central. Une légère diminution de ce stock a été enregistrée par rapport à l'année précédente, elle est due à l'absence des juvéniles de 8-12 cm. plus abondants une année auparavant et peut présager un signe de faible recrutement de la cohorte 13-18 cm. qui arrivera en 2004.

Annex I Biomass and number by fish length class

Sardine (*Sardina pilchardus*), November - December 2003

Numbers in millions

Length cm	C. Cantin-C. Juby	C. Juby-C. Bojador	C. Bojador-C. Blanc	TOTAL
5				
6				
7				
8	4			4
9	45	41		87
10	172	31		203
11	290	102		393
12	451	463		913
13	1 461	808	82	2 351
14	2 181	1 656	705	4 541
15	2 446	1 392	1 319	5 158
16	4 516	1 005	1 370	6 892
17	3 421	382	1 243	5 046
18	1 308	99	760	2 168
19	736	137	591	1 464
20	473	352	1 835	2 659
21	178	355	11 255	11 787
22	78	467	12 672	13 217
23	36	317	7 696	8 048
24	12	147	5 487	5 646
25	2	45	2 817	2 864
26			443	443
27			16	16
28				
29				
30				
Total	17 808	7 799	48 293	73 900

Biomass in tonnes

Length cm	C. Cantin-C. Juby	C. Juby-C. Bojador	C. Bojador-C. Blanc	TOTAL
5				
6				
7				
8	18			18
9	320	289		609
10	1 633	296		1 929
11	3 623	1 274		4 897
12	7 220	7 410		14 629
13	29 467	16 309	1 660	47 437
14	54 513	41 393	17 620	113 526
15	74 686	42 519	40 288	157 493
16	166 361	37 038	50 480	253 879
17	150 332	16 782	54 646	221 760
18	67 930	5 141	39 470	112 541
19	44 740	8 344	35 952	89 036
20	33 400	24 877	129 597	187 873
21	14 499	28 907	917 195	960 601
22	7 262	43 632	1 183 636	1 234 530
23	3 787	33 690	818 964	856 441
24	1 397	17 713	661 686	680 796
25	262	6 067	383 034	389 363
26			67 603	67 603
27			2 778	2 778
28				
29				
30				
Total	661 449	331 680	4 404 609	5 397 738

Annex I continued

Round sardinella (*Sardinella aurita*), November - December 2003

Numbers in millions

Length cm	C. Cantin-C. Juby	C. Juby-C. Bojador	C. Bojador-C. Blanc	TOTAL
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27			28.8	28.8
28			211.1	211.1
29			632.2	632.2
30			817.0	817.0
31			336.0	336.0
32			164.7	164.7
33			216.1	216.1
34			216.6	216.6
35			197.8	197.8
36			161.0	161.0
37			37.1	37.1
38			18.0	18.0
39			14.5	14.5
40				
41				
42				
43				
44				
45				
46				
47				
48				
49				
50				
Total			3 050.9	3 050.9

Biomass in tonnes

Length cm	C. Cantin-C. Juby	C. Juby-C. Bojador	C. Bojador-C. Blanc	TOTAL
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27			5 632	5 632
28			45 943	45 943
29			152 573	152 573
30			217 888	217 888
31			98 730	98 730
32			53 136	53 136
33			76 365	76 365
34			83 590	83 590
35			83 176	83 176
36			73 604	73 604
37			18 397	18 397
38			9 649	9 649
39			8 410	8 410
40				
41				
42				
43				
44				
45				
46				
47				
48				
49				
50				
Total			927 094	927 094

Annex I continued

Flat sardinella (*Sardinella maderensis*), November - December 2003

Numbers in millions

Length cm	C. Cantin-C. Juby	C. Juby-C. Bojador	C. Bojador-C. Blanc	TOTAL
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21			6.9	6.9
22				
23			6.9	6.9
24			35.1	35.1
25			157.9	157.9
26			264.3	264.3
27			207.5	207.5
28			181.7	181.7
29			129.5	129.5
30			43.6	43.6
31			22.7	22.7
32			12.8	12.8
33				
34				
35				
36				
37				
38				
39				
40				
41				
42				
43				
44				
45				
46				
47				
48				
49				
50				
Total			1 069.1	1 069.1

Biomass in tonnes

Length cm	C. Cantin-C. Juby	C. Juby-C. Bojador	C. Bojador-C. Blanc	TOTAL
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21			669	669
22				
23			874	874
24			5 007	5 007
25			25 398	25 398
26			47 717	47 717
27			41 859	41 859
28			40 791	40 791
29			32 258	32 258
30			11 986	11 986
31			6 891	6 891
32			4 275	4 275
33				
34				
35				
36				
37				
38				
39				
40				
41				
42				
43				
44				
45				
46				
47				
48				
49				
50				
Total			217 727	217 727

Annex I continued

Anchovy (*Engraulis encrasicolus*), November - December 2003

Numbers in millions

Length cm	C. Cantin-C. Juby	C. Juby-C. Bojador	C. Bojador-C. Blanc	TOTAL
5	0.9			0.9
6	4.5			4.5
7	5.6	12.7		18.3
8	16.4	58.8	4.0	79.2
9	44.2	119.0	19.2	182.4
10	80.4	154.0	486.6	721.0
11	97.0	129.3	944.3	1 170.7
12	256.3	95.6	575.5	927.4
13	189.5		40.6	230.1
14	46.6			46.6
15	25.8			25.8
16	4.3			4.3
17				
18				
19				
20				
Total	771.5	569.4	2 070.3	3 411.2

Biomass in tonnes

Length cm	C. Cantin-C. Juby	C. Juby-C. Bojador	C. Bojador-C. Blanc	TOTAL
5	1			1
6	7			7
7	13	29		42
8	54	195	13	263
9	205	551	89	845
10	502	963	3 042	4 507
11	797	1 062	7 755	9 614
12	2 703	1 008	6 070	9 781
13	2 518		540	3 058
14	767			767
15	518			518
16	103			103
17				
18				
19				
20				
Total	8 189	3 808	17 509	29 506

Annex I continued

Atlantic horse mackerel (*Trachurus trachurus*), November - December 2003

Numbers in millions

Length cm	C. Cantin-C. Juby	C. Juby-C. Bojador	C. Bojador-C. Blanc	TOTAL
5				
6				
7	1.6			1.6
8				
9				
10				
11			26.3	26.3
12			285.1	285.1
13	0.2		722.0	722.2
14	6.2	2.2	640.1	648.5
15	20.6	9.5	441.8	472.0
16	51.7	9.5	163.1	224.4
17	57.6	1.1	231.0	289.8
18	19.6	1.1	288.7	309.4
19	22.8	1.3	541.8	565.9
20	40.1	19.2	698.3	757.6
21	17.0	25.8	481.5	524.2
22	7.0	4.6	166.4	178.0
23	0.4	3.5	73.5	77.4
24	1.0	0.6	67.4	68.9
25	2.5		86.2	88.8
26	0.5		85.6	86.1
27	0.7		63.1	63.8
28	1.5		61.1	62.6
29	0.5		21.4	22.0
30	1.0		4.6	5.6
31			2.9	2.9
32				
33				
34	0.6			0.6
35	1.2			1.2
36	1.0			1.0
37	0.8			0.8
38	2.0			2.0
39	0.6			0.6
40	1.1			1.1
41				
42				
43				
44				
45				
46				
47				
48				
49				
50	0.5			0.5
Total	260.4	78.5	5 151.9	5 490.9

Biomass in tonnes

Length cm	C. Cantin-C. Juby	C. Juby-C. Bojador	C. Bojador-C. Blanc	TOTAL
5				
6				
7	6			6
8				
9				
10				
11			336	336
12			4 678	4 678
13	4		14 921	14 925
14	158	57	16 392	16 607
15	645	298	13 821	14 764
16	1 952	360	6 156	8 468
17	2 594	51	10 402	13 046
18	1 044	60	15 354	16 458
19	1 418	80	33 747	35 245
20	2 904	1 389	50 532	54 826
21	1 416	2 155	40 193	43 763
22	674	439	15 917	17 031
23	43	385	8 011	8 439
24	125	69	8 320	8 515
25	352		12 011	12 363
26	79		13 378	13 457
27	123		11 026	11 149
28	295		11 877	12 172
29	109		4 626	4 735
30	241		1 095	1 336
31			754	754
32				
33				
34	194			194
35	455			455
36	403			403
37	375			375
38	946			946
39	292			292
40	629			629
41				
42				
43				
44				
45				
46				
47				
48				
49				
50	547			547
Total	18 023	5 344	293 545	316 912

Annex I continued

Cunene horse mackerel (*Trachurus trecae*), November - December 2003

Numbers in millions

Length cm	C. Cantin-C. Juby	C. Juby-C. Bojador	C. Bojador-C. Blanc	TOTAL
5				
6				
7				
8				
9				
10				
11			2.8	2.8
12			129.5	129.5
13			349.5	349.5
14			719.7	719.7
15			2 389.0	2 389.0
16			3 006.9	3 006.9
17			2 223.1	2 223.1
18			1 387.5	1 387.5
19			1 121.1	1 121.1
20			512.1	512.1
21			338.4	338.4
22			174.2	174.2
23			83.3	83.3
24			201.3	201.3
25			135.0	135.0
26			534.3	534.3
27			301.7	301.7
28			235.9	235.9
29			68.1	68.1
30			63.5	63.5
31			44.5	44.5
32			58.2	58.2
33			20.4	20.4
34			7.4	7.4
35			10.2	10.2
36			7.4	7.4
37				
38				
39				
40				
41				
42				
43				
44				
45				
46				
47				
48				
49				
50				
Total			14 125.0	14 125.0

Biomass in tonnes

Length cm	C. Cantin-C. Juby	C. Juby-C. Bojador	C. Bojador-C. Blanc	TOTAL
5				
6				
7				
8				
9				
10				
11			35	35
12			2 125	2 125
13			7 222	7 222
14			18 430	18 430
15			74 730	74 730
16			113 461	113 461
17			100 080	100 080
18			73 797	73 797
19			69 825	69 825
20			37 060	37 060
21			28 253	28 253
22			16 667	16 667
23			9 080	9 080
24			24 865	24 865
25			18 809	18 809
26			83 520	83 520
27			52 702	52 702
28			45 878	45 878
29			14 677	14 677
30			15 139	15 139
31			11 687	11 687
32			16 782	16 782
33			6 427	6 427
34			2 564	2 564
35			3 831	3 831
36			3 037	3 037
37				
38				
39				
40				
41				
42				
43				
44				
45				
46				
47				
48				
49				
50				
Total			850 686	850 686

Annex I continued

Chub mackerel (*Scomber japonicus*), November - December 2003

Numbers in millions

Length cm	C. Cantin-C. Juby	C. Juby-C. Bojador	C. Bojador-C. Blanc	TOTAL
5				
6				
7				
8				
9		0.7		0.7
10		0.7		0.7
11				
12	8.2	9.4	6.7	24.2
13	64.7	70.7	5.0	140.4
14	266.0	73.6	65.6	405.2
15	646.4	49.8	94.9	791.1
16	662.1	48.5	300.5	1 011.1
17	541.8	30.6	376.6	949.1
18	343.6	18.7	241.0	603.2
19	89.2	12.5	150.1	251.8
20	32.8	3.8	177.1	213.7
21	55.5	7.3	245.9	308.6
22	83.0	7.5	184.5	275.0
23	51.7	4.7	88.5	145.0
24	42.6	4.0	74.7	121.3
25	39.9	2.8	44.1	86.8
26	51.4	0.7	74.6	126.6
27	61.4	1.2	178.6	241.3
28	87.7		277.7	365.4
29	38.6	0.7	117.5	156.8
30	34.0	1.4	59.8	95.2
31	27.3	1.4	22.2	50.9
32	18.1		13.3	31.4
33	15.7		26.2	41.9
34	6.7		30.7	37.5
35	12.6		5.7	18.4
36	2.6		11.5	14.1
37	0.9		19.0	19.9
38			5.7	5.7
39	0.9		5.6	6.5
40				
41			1.9	1.9
42			1.9	1.9
43			1.9	1.9
44				
45				
46				
47				
48				
49				
50				
Total	3 285.1	350.7	2 909.5	6 545.4

Biomass in tonnes

Length cm	C. Cantin-C. Juby	C. Juby-C. Bojador	C. Bojador-C. Blanc	TOTAL
5				
6				
7				
8				
9		5		5
10		7		7
11				
12	134	154	109	397
13	1 338	1 461	104	2 902
14	6 812	1 885	1 681	10 377
15	20 220	1 557	2 969	24 746
16	24 982	1 832	11 340	38 154
17	24 391	1 380	16 955	42 726
18	18 274	992	12 817	32 083
19	5 557	776	9 351	15 684
20	2 371	277	12 818	15 466
21	4 632	605	20 529	25 766
22	7 939	718	17 655	26 312
23	5 636	517	9 652	15 805
24	5 258	497	9 228	14 984
25	5 564	391	6 139	12 094
26	8 029	109	11 659	19 796
27	10 730	213	31 205	42 148
28	17 050		54 007	71 056
29	8 328	150	25 347	33 824
30	8 102	332	14 250	22 684
31	7 161	365	5 839	13 365
32	5 216		3 834	9 050
33	4 957		8 270	13 227
34	2 324		10 605	12 928
35	4 742		2 160	6 902
36	1 048		4 695	5 743
37	379		8 435	8 814
38			2 755	2 755
39	443		2 916	3 358
40				
41			1 150	1 150
42			1 235	1 235
43			1 325	1 325
44				
45				
46				
47				
48				
49				
50				
Total	211 615	14 224	321 032	546 872

Annex II Records of fishing stations

PROJECT STATION: 2110

DATE: 21/11/03 GEAR TYPE: PT No: 1 POSITION: Lat N 2055
start stop duration Long W 1735
TIME :10:14:49 10:52:17 37 (min) Purpose code: 1
LOG :8949.90 8952.17 2.23 Area code : 2
FDEPTH: 30 80 GearCond.code:
BDEPTH: 105 172 Validity code:
Towing dir: 270º Wire out: 270 m Speed: 35 kn*10

Sorted: 30 Kg Total catch: 159.81 CATCH/HOUR: 259.15

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Trachurus trecae	218.92	5416	84.48	3525
Scomber japonicus	34.30	83	13.24	3524
Myliobatis aquila	3.41	2	1.32	
Trachurus trachurus	1.70	24	0.66	
Zenopsis conchifer	0.86	3	0.33	
Total	259.19		100.03	

PROJECT STATION: 2111

DATE: 21/11/03 GEAR TYPE: PT No: 2 POSITION: Lat N 2055
start stop duration Long W 1724
TIME :12:50:42 13:05:01 14 (min) Purpose code: 1
LOG :8968.59 8969.58 0.97 Area code : 2
FDEPTH: 22 22 GearCond.code:
BDEPTH: 64 72 Validity code:
Towing dir: 270º Wire out: 100 m Speed: 41 kn*10

Sorted: 35 Kg Total catch: 104.55 CATCH/HOUR: 448.07

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Sardina pilchardus	448.07	3369	100.00	3526
Total	448.07		100.00	

PROJECT STATION: 2112

DATE: 21/11/03 GEAR TYPE: PT No: 1 POSITION: Lat N 2102
start stop duration Long W 1711
TIME :16:44:41 16:59:47 15 (min) Purpose code: 1
LOG :9003.26 9004.25 0.97 Area code : 2
FDEPTH: 10 10 GearCond.code:
BDEPTH: 42 42 Validity code:
Towing dir: 90º Wire out: 110 m Speed: 40 kn*10

Sorted: 57 Kg Total catch: 56.85 CATCH/HOUR: 227.40

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Sardinella aurita	203.60	568	89.53	3527
Sarda sarda	11.36	4	5.00	
Sardinella maderensis	7.36	36	3.24	
Loligo vulgaris	2.72	4	1.20	
Pagellus bellottii	1.24	4	0.55	
Chloroscombrus chrysurus	0.64	4	0.28	
Dicologoglossa cuneata	0.48	4	0.21	
Total	227.40		100.01	

PROJECT STATION: 2113

DATE: 21/11/03 GEAR TYPE: PT No: 1 POSITION: Lat N 2102
start stop duration Long W 1729
TIME :19:17:07 19:22:12 5 (min) Purpose code: 1
LOG :9025.57 9025.95 0.38 Area code : 2
FDEPTH: 20 20 GearCond.code:
BDEPTH: 103 102 Validity code:
Towing dir: 90º Wire out: 100 m Speed: 45 kn*10

Sorted: 39 Kg Total catch: 788.00 CATCH/HOUR: 9456.00

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Sardina pilchardus	4932.00	73008	52.16	3528
Engraulis encrasicolus	3000.00	333600	31.73	3529
Trachurus trecae	1524.00	46800	16.12	3530
Scomber japonicus	16.32	240	0.17	
Total	9472.32		100.18	

PROJECT STATION: 2114

DATE: 22/11/03 GEAR TYPE: PT No: 6 POSITION: Lat N 2110
start stop duration Long W 1712
TIME :23:58:16 00:06:32 8 (min) Purpose code: 1
LOG :9070.24 9070.78 0.53 Area code : 2
FDEPTH: 10 10 GearCond.code:
BDEPTH: 47 47 Validity code:
Towing dir: 270º Wire out: 120 m Speed: 39 kn*10

Sorted: 66 Kg Total catch: 240.31 CATCH/HOUR: 1802.33

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Sardinella aurita	1283.63	3465	71.22	3532
Sardinella maderensis	359.63	1733	19.95	3531
Trachurus trecae	87.90	1103	4.88	3533
Mugil cephalus	67.50	68	3.75	
Diplodus bellottii	3.68	23	0.20	
Total	1802.34		100.00	

PROJECT STATION: 2116

DATE: 22/11/03 GEAR TYPE: BT No: 8 POSITION: Lat N 2130
start stop duration Long W 1716
TIME :08:41:11 09:11:27 30 (min) Purpose code: 1
LOG :9154.51 9156.16 8.75 Area code : 2
FDEPTH: 65 65 GearCond.code:
BDEPTH: 65 65 Validity code:
Towing dir: 270º Wire out: 240 m Speed: 33 kn*10

Sorted: 37 Kg Total catch: 2564.80 CATCH/HOUR: 5129.60

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Trachurus trecae	3458.00	49700	67.41	3535
Trachurus trachurus	1076.60	34580	20.99	3536
Pagellus bellottii	165.20	700	3.22	
Zeus faber	117.60	140	2.29	
Scomber japonicus	70.00	280	1.36	
Aphanopus sp.	61.60	140	1.20	
Trichiurus lepturus	50.40	140	0.98	
Pomadasys incisus	46.20	140	0.90	
Loligo vulgaris	43.40	140	0.85	
Boops boops	40.60	420	0.79	
Total	5129.60		99.99	

PROJECT STATION: 2117

DATE: 22/11/03 GEAR TYPE: PT No: 4 POSITION: Lat N 2129
start stop duration Long W 1717
TIME :09:49:57 10:09:55 20 (min) Purpose code: 1
LOG :9159.30 9160.62 1.24 Area code : 2
FDEPTH: 10 10 GearCond.code:
BDEPTH: 65 72 Validity code:
Towing dir: 270º Wire out: 150 m Speed: 40 kn*10

Sorted: 64 Kg Total catch: 5086.40 CATCH/HOUR: 15259.20

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Sardinella aurita	14640.00	56160	95.94	3537
Sardina pilchardus	619.20	4560	4.06	3538
Total	15259.20		100.00	

PROJECT STATION: 2118

DATE: 22/11/03 GEAR TYPE: BT No: 8 POSITION: Lat N 2140
start stop duration Long W 1711
TIME :14:19:12 14:47:37 28 (min) Purpose code: 1
LOG :9199.75 9201.46 1.70 Area code : 2
FDEPTH: 62 55 GearCond.code:
BDEPTH: 62 55 Validity code:
Towing dir: 95º Wire out: 250 m Speed: 35 kn*10

Sorted: 99 Kg Total catch: 3286.07 CATCH/HOUR: 7041.58

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Trachurus trecae	4533.43	76018	64.38	3539
Plectorhinchus mediterraneus	1806.00	1935	25.65	
Pagrus caeruleostictus	267.21	461	3.79	
Dentex canariensis	164.01	553	2.33	
Pagellus bellottii	106.89	461	1.52	
Spondyliosoma cantharus	60.81	92	0.86	
Epinephelus aeneus	39.64	6	0.56	
Decapterus rhonchus	35.01	184	0.50	
Scomber japonicus	18.43	92	0.26	
Pagrus auriga	6.34	6	0.09	
Umbrina canariensis	1.97	2	0.03	
Zeus faber	1.82	2	0.03	
Total	7041.56		100.00	

PROJECT STATION: 2119

DATE: 22/11/03 GEAR TYPE: PT No: 2 POSITION: Lat N 2141
start stop duration Long W 1717
TIME :16:07:50 16:35:53 28 (min) Purpose code: 1
LOG :9212.16 9214.12 1.91 Area code : 2
FDEPTH: 10 10 GearCond.code:
BDEPTH: 69 67 Validity code:
Towing dir: 90º Wire out: 150 m Speed: 42 kn*10

Sorted: 66 Kg Total catch: 3280.00 CATCH/HOUR: 7028.57

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Sardinella aurita	6905.36	25071	98.25	3540
Sardinella maderensis	76.07	321	1.08	
Scomber japonicus	32.14	214	0.46	
Sardina pilchardus	15.00	107	0.21	
Total	7028.57		100.00	

PROJECT STATION: 2120

DATE: 22/11/03 GEAR TYPE: PT No: 1 POSITION: Lat N 2150
start stop duration Long W 1727
TIME :19:20:29 19:40:32 20 (min) Purpose code: 1
LOG :9238.58 9240.00 1.38 Area code : 2
FDEPTH: 20 24 GearCond.code:
BDEPTH: 446 599 Validity code:
Towing dir: 13º Wire out: 140 m Speed: 43 kn*10

Sorted: 65 Kg Total catch: 817.10 CATCH/HOUR: 2451.30

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Sardina pilchardus	1387.50	12036	56.60	3541
Trachurus trecae	532.50	3411	21.72	3542
Trachurus trachurus	330.00	4461	13.46	3543
Scomber japonicus	185.25	2400	7.56	3544
Loligo vulgaris	12.30	15	0.50	
MYCTOPHIDAE	3.75	1650	0.15	
Total	2451.30		99.99	

PROJECT STATION:2121

DATE:22/11/03 GEAR TYPE: PT No: 3 POSITION:Lat N 2151
start stop duration Long W 1710
TIME :22:00:04 22:20:20 20 (min) Purpose code: 1
LOG :9259.40 9260.70 1.26 Area code : 2
FDEPTH: 20 35 GearCond.code:
BDEPTH: 59 65 Validity code:
Towing dir: 277º Wire out: 160 m Speed: 40 kn*10

Sorted: 32 Kg Total catch: 63.22 CATCH/HOUR: 189.66

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Trachurus trecae	97.80	1338	51.57	3545
Pagellus bellottii	58.20	210	30.69	
Sardinella maderensis	7.20	36	3.80	
Scomber japonicus	6.42	36	3.39	
Trachurus trachurus	6.00	102	3.16	
Spondyliosoma cantharus	5.46	12	2.88	
Pomadasys incisus	3.24	18	1.71	
Sardina pilchardus	3.18	54	1.68	
Sardinella aurita	1.56	6	0.82	
Sepia orbignyana	0.48	12	0.25	
Aspitrigla obscura	0.06	6	0.03	
Loligo vulgaris	0.06	6	0.03	
Total	189.66		100.01	

PROJECT STATION:2122

DATE:23/11/03 GEAR TYPE: PT No: 2 POSITION:Lat N 2202
start stop duration Long W 1714
TIME :03:04:26 03:25:33 21 (min) Purpose code: 1
LOG :9308.38 9309.79 1.33 Area code : 2
FDEPTH: 10 10 GearCond.code:
BDEPTH: 62 58 Validity code:
Towing dir: 95º Wire out: 150 m Speed: 41 kn*10

Sorted: 35 Kg Total catch: 2842.94 CATCH/HOUR: 8122.69

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardina pilchardus	6208.57	100743	76.43	3546
Trachurus trecae	1506.46	46623	18.55	3547
Sardinella aurita	330.34	937	4.07	
Trachurus trachurus	46.86	1406	0.58	
Scomber japonicus	30.46	234	0.37	
Total	8122.69		100.00	

PROJECT STATION:2123

DATE:23/11/03 GEAR TYPE: PT No: 6 POSITION:Lat N 2208
start stop duration Long W 1654
TIME :09:04:21 09:16:56 13 (min) Purpose code: 1
LOG :9365.80 9366.64 0.80 Area code : 2
FDEPTH: 5 5 GearCond.code:
BDEPTH: 34 40 Validity code:
Towing dir: 285º Wire out: 135 m Speed: 40 kn*10

Sorted: 52 Kg Total catch: 4000.04 CATCH/HOUR: 18461.72

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardinella aurita	12485.17	49302	67.63	3548
Sardinella maderensis	5976.55	33342	32.37	3549
Total	18461.72		100.00	

PROJECT STATION:2124

DATE:23/11/03 GEAR TYPE: PT No: 6 POSITION:Lat N 2216
start stop duration Long W 1650
TIME :11:54:15 12:00:28 6 (min) Purpose code: 1
LOG :9388.10 9388.51 0.39 Area code : 2
FDEPTH: 5 5 GearCond.code:
BDEPTH: 41 39 Validity code:
Towing dir: 107º Wire out: 130 m Speed: 40 kn*10

Sorted: 36 Kg Total catch: 72.81 CATCH/HOUR: 728.10

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardinella maderensis	323.00	1900	44.36	3552
Sardina pilchardus	277.00	2300	38.04	3550
Sardinella aurita	123.00	420	16.89	3551
Scomber japonicus	5.10	20	0.70	
Total	728.10		99.99	

PROJECT STATION:2125

DATE:22/11/03 GEAR TYPE: BT No: 8 POSITION:Lat N 2223
start stop duration Long W 1713
TIME :15:04:46 15:14:56 10 (min) Purpose code: 1
LOG :9413.74 9414.32 0.59 Area code : 2
FDEPTH: 90 89 GearCond.code:
BDEPTH: 90 89 Validity code:
Towing dir: 110º Wire out: 350 m Speed: 35 kn*10

Sorted: 34 Kg Total catch: 1095.69 CATCH/HOUR: 6574.14

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Trachurus trachurus	3686.40	147648	56.07	3554
Trachurus trecae	2736.00	44928	41.62	3553
Zenopsis conchifer	47.40	66	0.72	
Scomber japonicus	44.16	192	0.67	
Sardina pilchardus	44.16	1344	0.67	
Merluccius merluccius	12.36	12	0.19	
Pagellus acarne	2.76	6	0.04	
Loligo vulgaris	0.90	6	0.01	
Total	6574.14		99.99	

PROJECT STATION:2126

DATE:23/11/03 GEAR TYPE: PT No: 4 POSITION:Lat N 2230
start stop duration Long W 1702
TIME :19:33:36 19:48:37 15 (min) Purpose code: 1
LOG :9446.10 9447.07 0.92 Area code : 2
FDEPTH: 10 10 GearCond.code:
BDEPTH: 56 59 Validity code:
Towing dir: 285º Wire out: 130 m Speed: 39 kn*10

Sorted: 58 Kg Total catch: 1449.25 CATCH/HOUR: 5797.00

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardina pilchardus	4630.00	41100	79.87	3555
Trachurus trecae	940.00	24800	16.22	3556
Scomber japonicus	117.00	600	2.02	
Trachurus trachurus	110.00	4800	1.90	
Total	5797.00		100.01	

PROJECT STATION:2127

DATE:24/11/03 GEAR TYPE: PT No: 4 POSITION:Lat N 2250
start stop duration Long W 1649
TIME :06:56:30 07:20:03 24 (min) Purpose code: 1
LOG :9566.46 9568.08 4.17 Area code : 2
FDEPTH: 10 10 GearCond.code:
BDEPTH: 57 57 Validity code:
Towing dir: 107º Wire out: 140 m Speed: 41 kn*10

Sorted: 65 Kg Total catch: 324.85 CATCH/HOUR: 812.13

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardina pilchardus	631.88	6100	77.81	3557
Trachurus trecae	66.50	1563	8.19	3558
Scomber japonicus	48.50	363	5.97	
Sardinella maderensis	27.88	100	3.43	
Sardinella aurita	15.88	50	1.96	
Trachurus trachurus	15.75	450	1.94	
Pagellus bellottii	3.63	13	0.45	
Loligo vulgaris	2.13	13	0.26	
Total	812.15		100.01	

PROJECT STATION:2128

DATE:24/11/03 GEAR TYPE: PT No: 3 POSITION:Lat N 2246
start stop duration Long W 1636
TIME :09:15:41 09:21:05 5 (min) Purpose code: 1
LOG :9582.30 9582.65 0.35 Area code : 2
FDEPTH: 20 25 GearCond.code:
BDEPTH: 43 44 Validity code:
Towing dir: 287º Wire out: 130 m Speed: 38 kn*10

Sorted: 67 Kg Total catch: 1003.95 CATCH/HOUR: 12047.40

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardina pilchardus	11097.00	107280	92.11	3559
Sardinella aurita	873.00	3420	7.25	
Scomber japonicus	77.40	360	0.64	
Total	12047.40		100.00	

PROJECT STATION:2129

DATE:24/11/03 GEAR TYPE: PT No: 1 POSITION:Lat N 2255
start stop duration Long W 1626
TIME :12:59:16 13:07:34 8 (min) Purpose code: 1
LOG :9619.38 9619.92 0.53 Area code : 2
FDEPTH: 5 5 GearCond.code:
BDEPTH: 33 35 Validity code:
Towing dir: 110º Wire out: 130 m Speed: 40 kn*10

Sorted: 35 Kg Total catch: 3365.90 CATCH/HOUR: 25244.25

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardina pilchardus	25244.25	215340	100.00	3560
Total	25244.25		100.00	

PROJECT STATION:2130

DATE:24/11/03 GEAR TYPE: BT No: 8 POSITION:Lat N 2307
start stop duration Long W 1700
TIME :17:03:21 17:13:00 10 (min) Purpose code: 1
LOG :9658.19 9658.76 0.52 Area code : 2
FDEPTH: 88 86 GearCond.code:
BDEPTH: 88 86 Validity code:
Towing dir: 115º Wire out: 350 m Speed: 35 kn*10

Sorted: 30 Kg Total catch: 954.42 CATCH/HOUR: 5726.52

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Trachurus trachurus	4346.88	136128	75.91	3561
Pagellus acarne	606.72	1920	10.59	
Dentex macrophthalmus	491.52	4032	8.58	
Trachurus trecae	259.20	4992	4.53	
Zeus faber	11.40	12	0.20	
Uranoscopus polli	5.40	6	0.09	
Raja miraletus	2.70	6	0.05	
Sphoeroides pachgaster	2.70	6	0.05	
Total	5726.52		100.00	

PROJECT STATION:2131

DATE:24/11/03 GEAR TYPE: PT No: 6 POSITION:Lat N 2313
start stop duration Long W 1641
TIME :21:28:02 21:38:07 10 (min) Purpose code: 1
LOG :9699.69 9700.38 0.68 Area code : 2
FDEPTH: 10 10 GearCond.code:
BDEPTH: 52 49 Validity code:
Towing dir: 111º Wire out: 120 m Speed: 40 kn*10

Sorted: 68 Kg Total catch: 340.55 CATCH/HOUR: 2043.30

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardina pilchardus	1908.00	20520	93.38	3562
Trachurus trecae	108.00	2460	5.29	3563
Scomber japonicus	24.00	150	1.17	
Trachurus trachurus	3.30	90	0.16	
Total	2043.30		100.00	

PROJECT STATION: 2132

DATE: 25/11/03 GEAR TYPE: PT No: 7 POSITION: Lat N 2315
start stop duration Long W 1619
TIME : 01:45:09 02:02:53 18 (min) Purpose code: 1
LOG : 9742.31 9743.34 1.01 Area code : 2
FDEPTH: 10 10 GearCond.code:
BDEPTH: 26 26 Validity code:
Towing dir: 110º Wire out: 120 m Speed: 35 kn*10

Sorted: 37 Kg Total catch: 487.50 CATCH/HOUR: 1625.00

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardina pilchardus	1464.67	13000	90.13	3564
Trachurus trecae	76.70	1213	4.72	3565
Scomber japonicus	64.13	390	3.95	
Decapterus rhonchus	12.13	130	0.75	
Sardinella aurita	7.37	43	0.45	
Total	1625.00		100.00	

PROJECT STATION: 2133

DATE: 25/11/03 GEAR TYPE: BT No: 8 POSITION: Lat N 2323
start stop duration Long W 1615
TIME : 10:47:33 11:00:39 13 (min) Purpose code: 1
LOG : 9836.16 9836.88 0.72 Area code : 2
FDEPTH: 27 28 GearCond.code:
BDEPTH: 27 28 Validity code:
Towing dir: 291º Wire out: 150 m Speed: 33 kn*10

Sorted: 70 Kg Total catch: 4000.00 CATCH/HOUR: 18461.54

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardina pilchardus	16549.43	176174	89.64	3566
Sardinella aurita	814.94	3692	4.41	
Pomadasys incisus	522.18	2705	2.83	
Pagellus bellottii	469.43	2372	2.54	
Scomber japonicus	92.26	526	0.50	
Decapterus rhonchus	21.09	263	0.11	
Total	18469.33		100.03	

PROJECT STATION: 2134

DATE: 25/11/03 GEAR TYPE: BT No: 8 POSITION: Lat N 2342
start stop duration Long W 1641
TIME : 15:48:05 16:09:42 22 (min) Purpose code: 1
LOG : 9888.65 9889.88 1.23 Area code : 2
FDEPTH: 68 63 GearCond.code:
BDEPTH: 68 63 Validity code:
Towing dir: 110º Wire out: 270 m Speed: 35 kn*10

Sorted: 16 Kg Total catch: 16.02 CATCH/HOUR: 43.69

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Scomber japonicus	31.23	824	71.48	3567
Sardina pilchardus	4.04	98	9.25	3569
Trachurus trachurus	3.68	85	8.42	3568
Dentex macrophthalmus	3.49	38	7.99	
Spondyliosoma cantharus	1.12	5	2.56	
Aspitrigla obscura	0.14	3	0.32	
Total	43.70		100.02	

PROJECT STATION: 2135

DATE: 25/11/03 GEAR TYPE: PT No: 3 POSITION: Lat N 2346
start stop duration Long W 1623
TIME : 21:16:22 21:27:16 11 (min) Purpose code: 1
LOG : 9939.27 9940.04 0.75 Area code : 2
FDEPTH: 20 20 GearCond.code:
BDEPTH: 44 44 Validity code:
Towing dir: 113º Wire out: 120 m Speed: 40 kn*10

Sorted: 63 Kg Total catch: 190.17 CATCH/HOUR: 1037.29

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardina pilchardus	860.73	9409	82.98	3570
Scomber japonicus	160.04	1620	15.43	3571
Trachurus trecae	10.96	229	1.06	
Trachurus trachurus	5.56	147	0.54	
Total	1037.29		100.01	

PROJECT STATION: 2136

DATE: 26/11/03 GEAR TYPE: BT No: 8 POSITION: Lat N 2349
start stop duration Long W 1604
TIME : 01:01:22 01:16:47 15 (min) Purpose code: 1
LOG : 9975.63 9976.57 0.92 Area code : 2
FDEPTH: 33 32 GearCond.code:
BDEPTH: 33 32 Validity code:
Towing dir: 110º Wire out: 150 m Speed: 35 kn*10

Sorted: 68 Kg Total catch: 509.89 CATCH/HOUR: 2039.56

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Plectorhinchus mediterraneus	556.48	688	27.28	
Diplodus bellottii	528.00	5968	25.89	
Pomadasys incisus	194.40	1200	9.53	
Sardina pilchardus	163.80	1740	8.03	3572
Trachurus trachurus	138.60	1980	6.80	3574
Scomber japonicus	113.40	688	5.56	3573
Decapterus rhonchus	88.80	600	4.35	
Pagellus bellottii	81.28	448	3.99	
Argyrosomus regius	75.88	120	3.72	
Spondyliosoma cantharus	40.20	448	1.97	
Trachurus trecae	20.08	240	0.98	
Diplodus vulgaris	15.60	88	0.76	
Boops boops	11.68	148	0.57	
Loligo vulgaris	9.88	60	0.48	
Aspitrigla obscura	1.48	28	0.07	
Total	2039.56		99.98	

PROJECT STATION: 2137

DATE: 26/11/03 GEAR TYPE: PT No: 1 POSITION: Lat N 2355
start stop duration Long W 1618
TIME : 03:14:02 03:32:42 19 (min) Purpose code: 1
LOG : 9994.46 9995.70 1.23 Area code : 2
FDEPTH: 23 25 GearCond.code:
BDEPTH: 49 48 Validity code:
Towing dir: 110º Wire out: 150 m Speed: 39 kn*10

Sorted: 35 Kg Total catch: 383.24 CATCH/HOUR: 1210.23

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Scomber japonicus	963.95	11672	79.65	3576
Sardina pilchardus	240.38	2675	19.86	3575
Trachurus trachurus	5.91	208	0.49	
Total	1210.24		100.00	

PROJECT STATION: 2138

DATE: 26/11/03 GEAR TYPE: PT No: 2 POSITION: Lat N 2401
start stop duration Long W 1632
TIME : 05:34:44 05:48:19 14 (min) Purpose code: 1
LOG : 14.24 15.13 0.88 Area code : 2
FDEPTH: 20 20 GearCond.code:
BDEPTH: 68 68 Validity code:
Towing dir: 110º Wire out: 100 m Speed: 40 kn*10

Sorted: 34 Kg Total catch: 340.90 CATCH/HOUR: 1461.00

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardina pilchardus	762.86	25629	52.21	3577
Scomber japonicus	651.43	13543	44.59	3578
Trachurus trecae	44.14	857	3.02	
Trachurus trachurus	2.57	129	0.18	
Total	1461.00		100.00	

PROJECT STATION: 2139

DATE: 26/11/03 GEAR TYPE: BT No: 8 POSITION: Lat N 2409
start stop duration Long W 1625
TIME : 10:49:51 10:57:47 8 (min) Purpose code: 1
LOG : 62.29 62.72 0.42 Area code : 2
FDEPTH: 68 70 GearCond.code:
BDEPTH: 68 70 Validity code:
Towing dir: 285º Wire out: 230 m Speed: 32 kn*10

Sorted: 34 Kg Total catch: 168.75 CATCH/HOUR: 1265.63

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardina pilchardus	1100.63	39338	86.96	3579
Trachurus trachurus	105.00	3188	8.30	3580
Zeus faber	34.88	38	2.76	
Scomber japonicus	9.75	263	0.77	
Pagellus acarne	7.88	38	0.62	
Boops boops	4.88	75	0.39	
Aspitrigla obscura	2.63	38	0.21	
Total	1265.65		100.01	

PROJECT STATION: 2140

DATE: 26/11/03 GEAR TYPE: PT No: 1 POSITION: Lat N 2401
start stop duration Long W 1606
TIME : 13:28:16 13:59:23 31 (min) Purpose code:
LOG : 84.96 87.02 2.04 Area code :
FDEPTH: 18 18 GearCond.code:
BDEPTH: 36 43 Validity code:
Towing dir: 300º Wire out: 80 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			

PROJECT STATION: 2141

DATE: 26/11/03 GEAR TYPE: PT No: 7 POSITION: Lat N 2403
start stop duration Long W 1547
TIME : 17:34:44 17:53:38 19 (min) Purpose code: 1
LOG : 121.84 122.93 1.06 Area code : 2
FDEPTH: 10 10 GearCond.code:
BDEPTH: 24 23 Validity code:
Towing dir: 110º Wire out: 120 m Speed: 35 kn*10

Sorted: 33 Kg Total catch: 2500.00 CATCH/HOUR: 7894.74

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardina pilchardus	7894.74	75856	100.00	3581
Total	7894.74		100.00	

PROJECT STATION: 2142

DATE: 26/11/03 GEAR TYPE: BT No: 8 POSITION: Lat N 2418
start stop duration Long W 1621
TIME : 21:47:12 21:59:18 12 (min) Purpose code: 1
LOG : 161.73 162.40 0.65 Area code : 2
FDEPTH: 69 68 GearCond.code:
BDEPTH: 69 68 Validity code:
Towing dir: 115º Wire out: 230 m Speed: 31 kn*10

Sorted: 26 Kg Total catch: 79.38 CATCH/HOUR: 396.90

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Trachurus trachurus	366.75	8325	92.40	3582
Trachurus trecae	10.50	105	2.65	
Aspitrigla obscura	6.90	75	1.74	
Scomber japonicus	6.00	150	1.51	
Pagellus acarne	5.55	30	1.40	
Boops boops	1.20	15	0.30	
Total	396.90		100.00	

PROJECT STATION: 2143

DATE: 27/11/03 GEAR TYPE: BT No: 8 POSITION: Lat N 2416
start stop duration Long W 1556
TIME : 08:16:55 08:36:59 20 (min) Purpose code: 1
LOG : 252.88 253.94 1.04 Area code : 2
FDEPTH: 36 37 GearCond.code:
BDEPTH: 36 37 Validity code:
Towing dir: 305º Wire out: 150 m Speed: 30 kn*10

Sorted: 63 Kg Total catch: 307.87 CATCH/HOUR: 923.61

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Scomber japonicus	606.00	3705	65.61	3583
Pomadasys incisus	121.50	615	13.15	
Sardina pilchardus	121.05	1500	13.11	3584
Zeus faber	16.50	15	1.79	
Loligo vulgaris	15.15	30	1.64	
Pagellus bellottii	12.15	60	1.32	
Trachurus trachurus	11.70	210	1.27	1
Pagellus erythrinus	6.90	30	0.75	
Spondyliosoma cantharus	6.15	90	0.67	
Diplodus puntazzo	5.31	3	0.57	
Trachurus trecae	1.20	15	0.13	
Total	923.61		100.01	

PROJECT STATION: 2144

DATE: 27/11/03 GEAR TYPE: BT No: 8 POSITION: Lat N 2430
start stop duration Long W 1601
TIME : 14:38:57 14:51:19 12 (min) Purpose code: 1
LOG : 315.63 316.37 0.74 Area code : 2
FDEPTH: 56 55 GearCond.code:
BDEPTH: 56 55 Validity code:
Towing dir: 110º Wire out: 250 m Speed: 3 kn*10

Sorted: 36 Kg Total catch: 464.14 CATCH/HOUR: 2320.70

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Scomber japonicus	1192.75	22620	51.40	3586
Sardina pilchardus	962.00	18785	41.45	3585
Trachurus trachurus	165.10	3185	7.11	3587
Pagellus bellottii	0.85	5	0.04	
Total	2320.70		100.00	

PROJECT STATION: 2145

DATE: 27/11/03 GEAR TYPE: PT No: 1 POSITION: Lat N 2448
start stop duration Long W 1618
TIME : 18:30:22 18:41:27 11 (min) Purpose code: 1
LOG : 351.68 352.44 0.74 Area code : 2
FDEPTH: 30 35 GearCond.code:
BDEPTH: 224 242 Validity code:
Towing dir: 296º Wire out: 155 m Speed: 40 kn*10

Sorted: 16 Kg Total catch: 15.66 CATCH/HOUR: 85.42

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Maurolicus muelleri	75.82	78093	88.76	
Mola mola	9.60	5	11.24	
Total	85.42		100.00	

PROJECT STATION: 2146

DATE: 27/11/03 GEAR TYPE: PT No: 1 POSITION: Lat N 2435
start stop duration Long W 1550
TIME : 22:25:28 22:35:20 10 (min) Purpose code: 1
LOG : 385.58 386.27 0.67 Area code : 2
FDEPTH: 18 11 GearCond.code:
BDEPTH: 40 42 Validity code:
Towing dir: 296º Wire out: 110 m Speed: 41 kn*10

Sorted: 32 Kg Total catch: 2500.00 CATCH/HOUR: 15000.00

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardina pilchardus	14898.00	171558	99.32	3588
Scomber japonicus	102.00	42	0.68	
Total	15000.00		100.00	

PROJECT STATION: 2147

DATE: 28/11/03 GEAR TYPE: PT No: 7 POSITION: Lat N 2429
start stop duration Long W 1516
TIME : 03:04:02 03:17:34 14 (min) Purpose code: 1
LOG : 429.41 430.22 0.77 Area code : 2
FDEPTH: 10 10 GearCond.code:
BDEPTH: 23 23 Validity code:
Towing dir: 270º Wire out: 110 m Speed: 35 kn*10

Sorted: 37 Kg Total catch: 1266.48 CATCH/HOUR: 5427.77

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardina pilchardus	5406.00	49710	99.60	3589
Scomber japonicus	20.40	146	0.38	
Diplodus bellottii	0.69	9	0.01	
Loligo vulgaris	0.69	4	0.01	
Total	5427.78		100.00	

PROJECT STATION: 2148

DATE: 28/11/03 GEAR TYPE: PT No: 3 POSITION: Lat N 2442
start stop duration Long W 1542
TIME : 06:40:49 06:45:20 5 (min) Purpose code: 1
LOG : 463.33 463.67 0.35 Area code : 2
FDEPTH: 20 23 GearCond.code:
BDEPTH: 42 43 Validity code:
Towing dir: 298º Wire out: 110 m Speed: 43 kn*10

Sorted: 34 Kg Total catch: 861.25 CATCH/HOUR: 10335.00

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardina pilchardus	10275.00	113100	99.42	3590
Scomber japonicus	60.00	300	0.58	
Total	10335.00		100.00	

PROJECT STATION: 2149

DATE: 28/11/03 GEAR TYPE: BT No: 8 POSITION: Lat N 2449
start stop duration Long W 1532
TIME : 14:43:22 15:03:10 20 (min) Purpose code: 1
LOG : 546.27 547.44 1.15 Area code : 2
FDEPTH: 41 42 GearCond.code:
BDEPTH: 41 42 Validity code:
Towing dir: 300º Wire out: 200 m Speed: 35 kn*10

Sorted: 32 Kg Total catch: 324.90 CATCH/HOUR: 974.70

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardina pilchardus	451.50	4680	46.32	3591
Scomber japonicus	385.50	3000	39.55	3592
Pomadasys incisus	71.70	360	7.36	
Spondyliosoma cantharus	15.60	60	1.60	
Trachurus trachurus	15.00	180	1.54	
Zeus faber	12.90	60	1.32	
Trichiurus lepturus	9.60	3	0.98	
Pagellus bellottii	5.10	30	0.52	
Diplodus bellottii	3.90	30	0.40	
Boops boops	3.90	30	0.40	
Total	974.70		99.99	

PROJECT STATION: 2150

DATE: 28/11/03 GEAR TYPE: BT No: 8 POSITION: Lat N 2447
start stop duration Long W 1503
TIME : 20:23:58 20:31:53 8 (min) Purpose code: 1
LOG : 603.06 603.52 0.45 Area code : 2
FDEPTH: 30 31 GearCond.code:
BDEPTH: 30 31 Validity code:
Towing dir: 295º Wire out: 120 m Speed: 33 kn*10

Sorted: 16 Kg Total catch: 77.60 CATCH/HOUR: 582.00

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Plectorhinchus mediterraneus	232.13	338	39.88	
Sardina pilchardus	210.00	1950	36.08	3593
Diplodus puntazzo	47.25	38	8.12	
Scomber japonicus	31.50	188	5.41	
Pagellus acarne	18.75	150	3.22	
Pagellus bellottii	14.63	113	2.51	
Trachurus trachurus	14.63	338	2.51	
Trachinus draco	7.50	113	1.29	
Pomadasys incisus	5.63	38	0.97	
Total	582.02		99.99	

PROJECT STATION: 2151

DATE: 29/11/03 GEAR TYPE: PT No: 2 POSITION: Lat N 2504
start stop duration Long W 1542
TIME : 00:17:58 00:48:28 31 (min) Purpose code: 1
LOG : 643.59 645.59 1.99 Area code : 2
FDEPTH: 25 30 GearCond.code:
BDEPTH: 70 68 Validity code:
Towing dir: 110º Wire out: 210 m Speed: 39 kn*10

Sorted: 16 Kg Total catch: 16.05 CATCH/HOUR: 31.06

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Trichiurus lepturus	27.68	15	89.12	
Scomber japonicus	2.65	83	8.53	3594
Rossia macrosomia	0.39	101	1.26	
Sardina pilchardus	0.21	10	0.68	
GOBIIDAE	0.08	58	0.26	
Engraulis encrasicolus	0.06	4	0.19	
Total	31.07		100.04	

PROJECT STATION: 2152

DATE: 29/11/03 GEAR TYPE: BT No: 8 POSITION: Lat N 2515
start stop duration Long W 1538
TIME : 06:14:27 07:15:57 20 (min) Purpose code: 1
LOG : 703.26 704.26 0.99 Area code : 2
FDEPTH: 93 90 GearCond.code:
BDEPTH: 93 90 Validity code:
Towing dir: 115º Wire out: 330 m Speed: 30 kn*10

Sorted: 71 Kg Total catch: 70.68 CATCH/HOUR: 212.04

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Pagellus bellottii	74.67	882	35.22	
Scomber japonicus	65.55	1755	30.91	3595
Trachurus trachurus	38.55	510	18.18	3596
Pagellus acarne	17.76	66	8.38	
Spondyliosoma cantharus	5.34	24	2.52	
Plectorhinchus mediterraneus	4.80	6	2.26	
Loligo vulgaris	2.94	12	1.39	
Diplodus bellottii	1.08	12	0.51	
Aspitrigla obscura	0.81	9	0.38	
Decapterus rhonchus	0.54	3	0.25	
Total	212.04		100.00	

PROJECT STATION: 2153

DATE: 29/11/03 GEAR TYPE: BT No: 8 POSITION: Lat N 2501
start stop duration Long W 1506
TIME : 11:06:47 11:36:47 30 (min) Purpose code: 1
LOG : 737.95 739.62 1.66 Area code : 2
FDEPTH: 42 42 GearCond.code:
BDEPTH: 42 42 Validity code:
Towing dir: 295º Wire out: 170 m Speed: 31 kn*10

Sorted: 44 Kg Total catch: 44.41 CATCH/HOUR: 88.82

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Scomber japonicus	46.60	380	52.47	3598
Seriola dumerili	16.02	2	18.04	
Sardina pilchardus	15.30	152	17.23	3597
Zeus faber	8.06	6	9.07	
Spondyliosoma cantharus	1.50	8	1.69	
Trachurus trachurus	0.80	10	0.90	
Dentex macrophthalmus	0.44	6	0.50	
Trachinus draco	0.10	2	0.11	
Total	88.82		100.01	

PROJECT STATION: 2154

DATE: 29/11/03 GEAR TYPE: BT No: 8 POSITION: Lat N 2456
start stop duration Long W 1455
TIME :13:14:51 13:31:08 16 (min) Purpose code: 1
LOG : 754.38 755.29 0.90 Area code : 2
FDEPTH: 33 34 GearCond.code:
BDEPTH: 33 34 Validity code:
Towing dir: 300º Wire out: 150 m Speed: 33 kn*10

Sorted: 34 Kg Total catch: 202.39 CATCH/HOUR: 758.96

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Scomber japonicus	288.00	1350	37.95	3601
Diplodus fasciatus	195.75	2295	25.79	
Sardina pilchardus	150.08	1350	19.77	3599
Scomber scombrus	51.75	90	6.82	
Trachurus trachurus	51.30	923	6.76	3600
Pagellus acarne	13.73	45	1.81	
Zeus faber	3.86	4	0.51	
Pagellus bellottii	2.25	23	0.30	
Spondyliosoma cantharus	2.25	23	0.30	
Total	758.97		100.01	

PROJECT STATION: 2155

DATE: 29/11/03 GEAR TYPE: PT No: 1 POSITION: Lat N 2508
start stop duration Long W 1458
TIME :16:21:11 16:34:12 13 (min) Purpose code: 1
LOG : 781.46 782.36 0.89 Area code : 2
FDEPTH: 25 25 GearCond.code:
BDEPTH: 43 45 Validity code:
Towing dir: 100º Wire out: 130 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			

PROJECT STATION: 2156

DATE: 30/11/03 GEAR TYPE: BT No: 8 POSITION: Lat N 2527
start stop duration Long W 1451
TIME :05:01:34 05:17:22 16 (min) Purpose code: 1
LOG : 909.84 910.76 0.91 Area code : 2
FDEPTH: 56 37 GearCond.code:
BDEPTH: 56 37 Validity code:
Towing dir: 115º Wire out: 230 m Speed: 33 kn*10

Sorted: 36 Kg Total catch: 252.81 CATCH/HOUR: 948.04

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Pomadasys incisus	175.35	1313	18.50	
Trachurus trachurus	174.56	1181	18.41	3602
Diplodus vulgaris	126.26	473	13.32	
Lithognathus mormyrus	121.54	315	12.82	
Pagellus bellottii	74.55	525	7.86	
Spondyliosoma cantharus	55.91	289	5.90	
Plectorhinchus mediterraneus	48.83	79	5.15	
Scomber japonicus	47.78	131	5.04	
Pagellus acarne	35.44	131	3.74	
Scomber scombrus	25.99	26	2.74	
Trachinus draco	20.48	210	2.16	
Diplodus bellottii	16.54	79	1.74	
Loligo vulgaris	13.13	26	1.38	
Aspitrigla obscura	9.19	26	0.97	
Raja undulata	2.51	4	0.26	
Total	948.06		99.99	

PROJECT STATION: 2157

DATE: 30/11/03 GEAR TYPE: BT No: 8 POSITION: Lat N 2542
start stop duration Long W 1521
TIME :09:20:06 09:49:00 29 (min) Purpose code: 1
LOG : 947.55 949.07 1.50 Area code : 2
FDEPTH: 177 177 GearCond.code:
BDEPTH: 177 177 Validity code:
Towing dir: 298º Wire out: 620 m Speed: 30 kn*10

Sorted: 40 Kg Total catch: 149.35 CATCH/HOUR: 309.00

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Scomber japonicus	65.67	1589	21.25	3603
Trachurus trachurus	54.00	658	17.48	3604
Dentex macrophthalmus	39.35	596	12.73	
Capros aper	39.23	1105	12.70	
Macrorhamphosus scolopax	36.00	1626	11.65	
Dentex maroccanus	34.39	596	11.13	
Zeus faber	20.17	21	6.53	
Sphoeroides pachgaster	6.83	6	2.21	
Lepidopus caudatus	4.24	4	1.37	
Merluccius merluccius	3.52	4	1.14	
Illex coindetii	2.61	25	0.84	
Zenopsis conchifer	1.76	2	0.57	
Trachinus draco	0.87	12	0.28	
Anthias anthias	0.37	12	0.12	
Zenopsis conchifer	0.00			
Total	309.01		100.00	

PROJECT STATION: 2158

DATE: 30/11/03 GEAR TYPE: BT No: 8 POSITION: Lat N 2545
start stop duration Long W 1440
TIME :17:36:42 17:48:16 12 (min) Purpose code: 1
LOG :1026.70 1027.38 0.67 Area code : 2
FDEPTH: 23 26 GearCond.code:
BDEPTH: 23 26 Validity code:
Towing dir: 235º Wire out: 120 m Speed: 35 kn*10

Sorted: 32 Kg Total catch: 387.80 CATCH/HOUR: 1939.00

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Trachurus trachurus	558.00	4320	28.78	3605
Diplodus bellottii	477.00	9060	24.60	
Lithognathus mormyrus	414.00	1020	21.35	
Pomadasys incisus	240.60	2100	12.41	
Trigla lyra	63.60	180	3.28	
Diplodus sargus *	54.00	60	2.78	
Umbrina canariensis	46.80	360	2.41	
Engraulis encrasicolus	20.40	2340	1.05	
Diplodus sp.	19.20	180	0.99	
Merluccius merluccius	17.45	40	0.90	
Loligo vulgaris	14.75	25	0.76	
Macrorhamphosus scolopax	5.40	360	0.28	
Alloteuthis subulata	4.80	240	0.25	
Capros aper	3.00	120	0.15	
Total	1939.00		99.99	

PROJECT STATION: 2159

DATE: 30/11/03 GEAR TYPE: PT No: 1 POSITION: Lat N 2600
start stop duration Long W 1445
TIME :23:19:06 23:36:44 18 (min) Purpose code: 1
LOG :1083.63 1084.66 1.02 Area code : 2
FDEPTH: 15 30 GearCond.code:
BDEPTH: 104 103 Validity code:
Towing dir: 298º Wire out: 180 m Speed: 30 kn*10

Sorted: 63 Kg Total catch: 5966.00 CATCH/HOUR: 19886.66

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardina pilchardus	19886.66	201717	100.00	3606
Sardina pilchardus	19886.66	201717	100.00	3606
Total	39773.32		200.00	

PROJECT STATION: 2160

DATE: 1/12/03 GEAR TYPE: PT No: 1 POSITION: Lat N 2629
start stop duration Long W 1415
TIME :13:32:19 13:56:15 24 (min) Purpose code: 1
LOG :1210.15 1211.72 1.56 Area code : 2
FDEPTH: 20 20 GearCond.code:
BDEPTH: 38 42 Validity code:
Towing dir: 300º Wire out: 100 m Speed: 40 kn*10

Sorted: 31 Kg Total catch: 153.25 CATCH/HOUR: 383.13

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Spondyliosoma cantharus	383.13	2425	100.00	
Total	383.13		100.00	

PROJECT STATION: 2161

DATE: 1/12/03 GEAR TYPE: PT No: 1 POSITION: Lat N 2638
start stop duration Long W 1402
TIME :18:17:41 18:35:05 17 (min) Purpose code: 1
LOG :1253.90 1255.15 1.23 Area code : 2
FDEPTH: 15 20 GearCond.code:
BDEPTH: 57 63 Validity code:
Towing dir: 300º Wire out: 140 m Speed: 42 kn*10

Sorted: 29 Kg Total catch: 29.36 CATCH/HOUR: 103.62

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardina pilchardus	95.47	2181	92.13	3607
Spondyliosoma cantharus	4.13	21	3.99	
Scomber japonicus	2.65	113	2.56	
Sardinella maderensis	1.38	4	1.33	
Total	103.63		100.01	

PROJECT STATION: 2162

DATE: 1/12/03 GEAR TYPE: PT No: 1 POSITION: Lat N 2646
start stop duration Long W 1356
TIME :21:51:48 21:57:53 6 (min) Purpose code: 1
LOG :1286.62 1287.01 0.38 Area code : 2
FDEPTH: 40 40 GearCond.code:
BDEPTH: 88 86 Validity code:
Towing dir: 320º Wire out: 200 m Speed: 37 kn*10

Sorted: 32 Kg Total catch: 194.70 CATCH/HOUR: 1947.00

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardina pilchardus	1890.00	19080	97.07	3608
Scomber japonicus	43.20	2100	2.22	
Ceratoscopelus sp.	13.80	2940	0.71	
Total	1947.00		100.00	

PROJECT STATION: 2163

DATE: 5/12/03 GEAR TYPE: PT No: 1 POSITION: Lat N 2649
start stop duration Long W 1340
TIME :00:21:59 00:35:48 14 (min) Purpose code: 1
LOG :1561.83 1562.74 0.92 Area code : 2
FDEPTH: 35 48 GearCond.code:
BDEPTH: 62 67 Validity code:
Towing dir: 300º Wire out: 200 m Speed: 40 kn*10

Sorted: 33 Kg Total catch: 133.56 CATCH/HOUR: 572.40

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardina pilchardus	551.14	8057	96.29	3609
Scomber japonicus	19.89	754	3.47	
Engraulis encrasicolus	1.37	103	0.24	
Total	572.40		100.00	

PROJECT STATION: 2164

DATE: 5/12/03 GEAR TYPE: PT No: 2 POSITION: Lat N 2657
start stop duration Long W 1338
TIME :03:48:05 03:59:48 12 (min) Purpose code: 1
LOG :1591.32 1592.09 0.77 Area code : 2
FDEPTH: 18 20 GearCond.code:
BDEPTH: 80 87 Validity code:
Towing dir: 270º Wire out: 100 m Speed: 40 kn*10

Sorted: 36 Kg Total catch: 145.80 CATCH/HOUR: 729.00

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardina pilchardus	724.00	18990	99.31	3610
Engraulis encrasicolus	2.60	200	0.36	
Scomber japonicus	2.40	140	0.33	
Total	729.00		100.00	

PROJECT STATION: 2165

DATE: 5/12/03 GEAR TYPE: PT No: 1 POSITION: Lat N 2706
start stop duration Long W 1334
TIME :08:32:40 08:51:39 19 (min) Purpose code: 1
LOG :1636.80 1637.98 1.16 Area code : 2
FDEPTH: 40 52 GearCond.code:
BDEPTH: 71 74 Validity code:
Towing dir: 300º Wire out: 230 m Speed: 38 kn*10

Sorted: 36 Kg Total catch: 434.33 CATCH/HOUR: 1371.57

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardina pilchardus	1350.95	44299	98.50	3611
Engraulis encrasicolus	15.16	1402	1.11	3612
Scomber japonicus	4.17	114	0.30	
Pagellus acarne	1.29	3	0.09	
Total	1371.57		100.00	

PROJECT STATION: 2166

DATE: 5/12/03 GEAR TYPE: BT No: 8 POSITION: Lat N 2720
start stop duration Long W 1326
TIME :13:57:57 14:16:02 18 (min) Purpose code: 1
LOG :1688.35 1689.37 1.02 Area code : 2
FDEPTH: 35 32 GearCond.code:
BDEPTH: 35 32 Validity code:
Towing dir: 180º Wire out: 170 m Speed: 35 kn*10

Sorted: 33 Kg Total catch: 566.65 CATCH/HOUR: 1888.83

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardina pilchardus	1685.83	76330	89.25	3613
Engraulis encrasicolus	96.90	12750	5.13	3614
Scomber japonicus	61.77	1310	3.27	3615
Mugil cephalus	9.33	13	0.49	
Diplodus vulgaris	9.07	57	0.48	
Diplodus bellottii	7.93	340	0.42	
Loligo vulgaris	7.37	57	0.39	
Diplodus sargus *	3.97	3	0.21	
Alloteuthis subulata	2.83	623	0.15	
Merluccius merluccius	1.77	7	0.09	
Spondyliosoma cantharus	1.33	3	0.07	
Pagellus bellottii	0.53	3	0.03	
Scorpaena scrofa	0.10	3	0.01	
Aspitrigla obscura	0.10	3	0.01	
Total	1888.83		100.00	

PROJECT STATION: 2167

DATE: 5/12/03 GEAR TYPE: BT No: 2 POSITION: Lat N 2723
start stop duration Long W 1330
TIME :15:47:56 15:58:59 11 (min) Purpose code: 1
LOG :1703.28 1703.92 0.64 Area code : 2
FDEPTH: 75 75 GearCond.code:
BDEPTH: 75 75 Validity code:
Towing dir: 100º Wire out: 350 m Speed: 35 kn*10

Sorted: 32 Kg Total catch: 950.10 CATCH/HOUR: 5182.36

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardina pilchardus	3861.82	131891	74.52	3616
Scomber japonicus	1207.64	45655	23.30	3617
Trachurus trachurus	112.91	1473	2.18	
Total	5182.37		100.00	

PROJECT STATION: 2168

DATE: 5/12/03 GEAR TYPE: BT No: 2 POSITION: Lat N 2729
start stop duration Long W 1324
TIME :19:38:39 19:46:24 8 (min) Purpose code: 1
LOG :1738.08 1738.49 0.41 Area code : 2
FDEPTH: 50 50 GearCond.code:
BDEPTH: 50 50 Validity code:
Towing dir: 125º Wire out: 200 m Speed: 32 kn*10

Sorted: 25 Kg Total catch: 149.40 CATCH/HOUR: 1120.50

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardina pilchardus	243.00	10890	21.69	3619
Pagellus acarne	175.95	1080	15.70	
Trachurus trachurus	160.20	3150	14.30	3618
Diplodus vulgaris	155.25	945	13.86	
Pomadasys incisus	122.85	1305	10.96	
Boops boops	63.45	1080	5.66	
Merluccius senegalensis	58.50	270	5.22	
Dentex macrophthalmus	43.65	810	3.90	
Pagellus bellottii	41.40	270	3.69	
Spondyliosoma cantharus	24.75	135	2.21	
Scomber japonicus	16.20	855	1.45	
Trisopterus luscus	7.65	90	0.68	
Citharus linguatula	3.15	135	0.28	
Scorpaena sp.	1.80	45	0.16	
Scorpaena scrofa	1.80	45	0.16	
Aspitrigla obscura	0.90	45	0.08	
Total	1120.50		100.00	

PROJECT STATION: 2169

DATE: 6/12/03 GEAR TYPE: PT No: 1 POSITION: Lat N 2743
start stop duration Long W 1314
TIME :01:00:35 01:13:56 13 (min) Purpose code: 1
LOG :1792.86 1793.77 0.90 Area code : 2
FDEPTH: 15 20 GearCond.code:
BDEPTH: 40 41 Validity code:
Towing dir: 270º Wire out: 120 m Speed: 40 kn*10

Sorted: 30 Kg Total catch: 75.07 CATCH/HOUR: 346.48

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardina pilchardus	258.46	7108	74.60	3621
Scomber japonicus	84.46	2285	24.38	3622
Engraulis encrasicolus	3.09	692	0.89	3620
Trachurus trachurus	0.32	9	0.09	
Alloteuthis subulata	0.09	23	0.03	
Total	346.42		99.99	

PROJECT STATION: 2170

DATE: 6/12/03 GEAR TYPE: PT No: 1 POSITION: Lat N 2753
start stop duration Long W 1310
TIME :05:06:52 05:23:00 16 (min) Purpose code: 1
LOG :1833.71 1834.84 1.12 Area code : 2
FDEPTH: 15 12 GearCond.code:
BDEPTH: 55 49 Validity code:
Towing dir: 130º Wire out: 80 m Speed: 42 kn*10

Sorted: 30 Kg Total catch: 105.10 CATCH/HOUR: 394.13

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardina pilchardus	389.81	18690	98.90	3623
Scomber japonicus	3.94	195	1.00	
Engraulis encrasicolus	0.38	53	0.10	
Total	394.13		100.00	

PROJECT STATION: 2171

DATE: 6/12/03 GEAR TYPE: BT No: 2 POSITION: Lat N 2759
start stop duration Long W 1311
TIME :07:58:03 08:23:58 26 (min) Purpose code: 1
LOG :1857.52 1858.84 1.30 Area code : 2
FDEPTH: 75 85 GearCond.code:
BDEPTH: 75 85 Validity code:
Towing dir: 310º Wire out: 300 m Speed: 31 kn*10

Sorted: 36 Kg Total catch: 427.08 CATCH/HOUR: 985.57

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Scomber japonicus	414.00	18858	42.01	3626
Sardina pilchardus	395.72	16726	40.15	3624
Trachurus trachurus	113.54	1495	11.52	3625
Pagellus acarne	28.52	138	2.89	
Diplodus vulgaris	24.37	138	2.47	
Dentex macrophthalmus	9.14	194	0.93	
Alloteuthis subulata	0.28	83	0.03	
Total	985.57		100.00	

PROJECT STATION: 2172

DATE: 6/12/03 GEAR TYPE: BT No: 2 POSITION: Lat N 2818
start stop duration Long W 1304
TIME :17:15:44 17:30:35 15 (min) Purpose code: 1
LOG :1922.95 1923.83 0.87 Area code : 1
FDEPTH: 110 105 GearCond.code:
BDEPTH: 110 105 Validity code:
Towing dir: 330º Wire out: 450 m Speed: 35 kn*10

Sorted: 35 Kg Total catch: 1491.43 CATCH/HOUR: 5965.72

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Scomber japonicus	5693.20	282768	95.43	3627
Dentex macrophthalmus	158.12	2580	2.65	
Spondyliosoma cantharus	48.16	172	0.81	
Pagellus acarne	30.96	172	0.52	
Trachurus trachurus	22.36	344	0.37	
Zeus faber	12.92	8	0.22	
Total	5965.72		100.00	

PROJECT STATION: 2173

DATE: 6/12/03 GEAR TYPE: PT No: 1 POSITION: Lat N 2813
start stop duration Long W 1249
TIME :19:49:01 20:01:33 13 (min) Purpose code: 1
LOG :1944.77 1945.63 0.85 Area code : 1
FDEPTH: 12 32 GearCond.code:
BDEPTH: 78 78 Validity code:
Towing dir: 258º Wire out: 200 m Speed: 40 kn*10

Sorted: 34 Kg Total catch: 202.14 CATCH/HOUR: 932.95

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardina pilchardus	909.69	10662	97.51	3628
Scomber japonicus	23.26	609	2.49	
Total	932.95		100.00	

PROJECT STATION: 2174

DATE: 7/12/03 GEAR TYPE: BT No: 2 POSITION: Lat N 2802
start stop duration Long W 1248
TIME :10:26:50 10:41:07 14 (min) Purpose code: 1
LOG :2073.88 2074.62 0.73 Area code : 1
FDEPTH: 51 53 GearCond.code:
BDEPTH: 51 53 Validity code:
Towing dir: 326º Wire out: 200 m Speed: 30 kn*10

Sorted: 30 Kg Total catch: 123.34 CATCH/HOUR: 528.60

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Trachurus trachurus	350.57	6480	66.32	3631
Engraulis encrasicolus	41.83	6343	7.91	3630
Pagellus acarne	32.40	137	6.13	
Scomber japonicus	30.00	360	5.68	
Sardina pilchardus	22.11	1954	4.18	3629
Diplodus bellottii	14.06	326	2.66	
Pagellus bellottii	12.51	69	2.37	
Merluccius senegalensis	11.74	56	2.22	
Aspitrigla obscura	6.51	34	1.23	
Diplodus vulgaris	2.40	17	0.45	
Pomadasys incisus	2.40	51	0.45	
Umbrina canariensis	1.71	17	0.32	
Alloteuthis subulata	0.34	171	0.06	
Total	528.58		99.98	

PROJECT STATION: 2175

DATE: 7/12/03 GEAR TYPE: BT No: 2 POSITION: Lat N 2801
start stop duration Long W 1245
TIME :12:12:35 12:22:52 10 (min) Purpose code: 1
LOG :2082.03 2082.63 0.59 Area code : 1
FDEPTH: 36 37 GearCond.code:
BDEPTH: 36 37 Validity code:
Towing dir: 65ø Wire out: 160 m Speed: 35 kn*10

Sorted: 35 Kg Total catch: 1268.28 CATCH/HOUR: 7609.68

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardina pilchardus	6901.20	404568	90.69	3632
Pagellus acarne	196.56	648	2.58	
Diplodus bellottii	138.24	2592	1.82	
Trachurus trachurus	110.16	2376	1.45	
Engraulis encrasicolus	101.52	16848	1.33	3633
Scomber japonicus	69.12	1944	0.91	
Merluccius merluccius	45.36	216	0.60	
GOBIIDAE	21.60	2592	0.28	
Diplodus vulgaris	17.28	216	0.23	
Trachurus trachurus, juveniles	6.48	1944	0.09	
Alloteuthis subulata	2.16	216	0.03	
Total	7609.68		100.01	

PROJECT STATION: 2176

DATE: 7/12/03 GEAR TYPE: BT No: 2 POSITION: Lat N 2807
start stop duration Long W 1233
TIME :15:59:07 16:24:52 26 (min) Purpose code: 1
LOG :2116.79 2118.29 1.50 Area code : 1
FDEPTH: 48 46 GearCond.code:
BDEPTH: 48 46 Validity code:
Towing dir: 90ø Wire out: 250 m Speed: 35 kn*10

Sorted: 34 Kg Total catch: 470.26 CATCH/HOUR: 1085.22

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardina pilchardus	880.38	37251	81.12	3634
Engraulis encrasicolus	82.06	9014	7.56	3635
Scomber japonicus	47.17	1195	4.35	3636
Pagellus acarne	23.58	97	2.17	
Mugil cephalus	19.71	32	1.82	
Diplodus bellottii	14.86	258	1.37	
Trachurus trachurus	12.28	194	1.13	
Diplodus vulgaris	3.23	32	0.30	
Pomadasys incisus	1.94	32	0.18	
Total	1085.21		100.00	

PROJECT STATION: 2177

DATE: 7/12/03 GEAR TYPE: BT No: 2 POSITION: Lat N 2820
start stop duration Long W 1218
TIME :21:39:40 21:56:34 17 (min) Purpose code: 1
LOG :2168.08 2168.98 0.89 Area code : 1
FDEPTH: 54 54 GearCond.code:
BDEPTH: 54 54 Validity code:
Towing dir: 137ø Wire out: 240 m Speed: 33 kn*10

Sorted: 31 Kg Total catch: 220.87 CATCH/HOUR: 779.54

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Scomber japonicus	408.88	2446	52.45	3637
Diplodus vulgaris	116.61	716	14.96	
Pagellus acarne	110.68	642	14.20	
Pagellus bellottii	36.56	173	4.69	
Trachurus trachurus	30.14	346	3.87	
Spondyliosoma cantharus	30.14	198	3.87	
Loligo vulgaris	11.58	35	1.49	
Chelidonichthys lucerna	8.89	99	1.14	
Boops boops	8.65	49	1.11	
Pomadasys incisus	7.41	49	0.95	
Mullus surmuletus	4.91	18	0.63	
Zeus faber	4.55	4	0.58	
Sardina pilchardus	0.74	25	0.09	
Total	779.74		100.03	

PROJECT STATION: 2178

DATE: 7/12/03 GEAR TYPE: PT No: 3 POSITION: Lat N 2811
start stop duration Long W 1209
TIME :23:45:33 23:49:43 4 (min) Purpose code: 1
LOG :2181.94 2182.21 0.27 Area code : 1
FDEPTH: 20 20 GearCond.code:
BDEPTH: 44 44 Validity code:
Towing dir: 317ø Wire out: 120 m Speed: 39 kn*10

Sorted: 36 Kg Total catch: 289.68 CATCH/HOUR: 4345.20

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardina pilchardus	3270.00	117120	75.26	3638
Scomber japonicus	1050.00	11640	24.16	3639
Trachurus trachurus	15.60	240	0.36	
Engraulis encrasicolus	9.60	1200	0.22	
Total	4345.20		100.00	

PROJECT STATION: 2179

DATE: 8/12/03 GEAR TYPE: BT No: 2 POSITION: Lat N 2822
start stop duration Long W 1208
TIME :02:24:01 02:48:14 24 (min) Purpose code: 1
LOG :2206.36 2207.86 1.49 Area code : 1
FDEPTH: 53 53 GearCond.code:
BDEPTH: 53 53 Validity code:
Towing dir: 170ø Wire out: 250 m Speed: 37 kn*10

Sorted: 33 Kg Total catch: 163.45 CATCH/HOUR: 408.63

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Scomber japonicus	179.38	3850	43.90	3641
Diplodus vulgaris	80.63	475	19.73	
Sardina pilchardus	73.75	1250	18.05	3640
Trachurus trachurus	23.13	263	5.66	
Pagellus acarne	17.50	113	4.28	
Plectorhinchus mediterraneus	11.38	25	2.78	
Spondyliosoma cantharus	11.25	30	2.75	
Pomadasys incisus	2.88	13	0.70	
Dentex maroccanus	2.88	13	0.70	
Loligo vulgaris	2.75	13	0.67	
Trisopterus luscus	2.00	13	0.49	
Boops boops	1.13	13	0.28	
Total	408.66		99.99	

PROJECT STATION: 2180

DATE: 8/12/03 GEAR TYPE: PT No: 3 POSITION: Lat N 2818
start stop duration Long W 1154
TIME :07:12:22 07:30:01 18 (min) Purpose code: 1
LOG :2250.22 2251.40 1.17 Area code : 1
FDEPTH: 20 32 GearCond.code:
BDEPTH: 44 42 Validity code:
Towing dir: 173ø Wire out: 120 m Speed: 39 kn*10

Sorted: 38 Kg Total catch: 233.16 CATCH/HOUR: 777.20

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardina pilchardus	512.00	10280	65.88	3643
Engraulis encrasicolus	125.00	9220	16.08	3642
Scomber japonicus	74.80	640	9.62	3645
Scomber scombrus	57.40	1480	7.39	3644
Pagellus acarne	6.07	23	0.78	
Pagellus bellottii	1.13	3	0.15	
Trachurus trachurus	0.80	20	0.10	
Total	777.20		100.00	

PROJECT STATION: 2181

DATE: 8/12/03 GEAR TYPE: PT No: 4 POSITION: Lat N 2829
start stop duration Long W 1155
TIME :09:09:47 09:56:33 47 (min) Purpose code: 1
LOG :2264.72 2268.07 1.25 Area code : 1
FDEPTH: 0 0 GearCond.code:
BDEPTH: 57 59 Validity code:
Towing dir: 353ø Wire out: 160 m Speed: 43 kn*10

Sorted: 36 Kg Total catch: 430.20 CATCH/HOUR: 549.19

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Scomber japonicus	549.19	12991	100.00	3646
Total	549.19		100.00	

PROJECT STATION: 2182

DATE: 8/12/03 GEAR TYPE: BT No: 2 POSITION: Lat N 2832
start stop duration Long W 1140
TIME :15:53:32 16:17:55 24 (min) Purpose code: 1
LOG :2324.13 2325.53 1.39 Area code : 1
FDEPTH: 58 59 GearCond.code:
BDEPTH: 58 59 Validity code:
Towing dir: 300ø Wire out: 290 m Speed: 35 kn*10

Sorted: 34 Kg Total catch: 308.37 CATCH/HOUR: 770.93

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Scomber japonicus	677.25	29408	87.85	3647
Mugil cephalus	26.78	45	3.47	
Sardina pilchardus	20.25	428	2.63	
Trachurus trachurus	13.50	158	1.75	
Trachinus draco	12.60	158	1.63	
Pagellus acarne	6.30	45	0.82	
Dentex macrophthalmus	5.63	45	0.73	
Merluccius merluccius	4.95	23	0.64	
Boops boops	2.25	23	0.29	
Loligo vulgaris	1.43	5	0.19	
Total	770.94		100.00	

PROJECT STATION: 2183

DATE: 8/12/03 GEAR TYPE: PT No: 6 POSITION: Lat N 2823
start stop duration Long W 1130
TIME :18:17:17 18:29:33 12 (min) Purpose code: 1
LOG :2342.02 2342.86 0.82 Area code : 1
FDEPTH: 5 5 GearCond.code:
BDEPTH: 29 34 Validity code:
Towing dir: 344ø Wire out: 120 m Speed: 38 kn*10

Sorted: 34 Kg Total catch: 511.05 CATCH/HOUR: 2555.25

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardina pilchardus	2448.75	80925	95.83	3648
Scomber japonicus	44.25	675	1.73	
Scomber scombrus	32.25	150	1.26	
Trachurus trachurus	17.25	450	0.68	
Diplodus bellottii	6.75	150	0.26	
Alloteuthis subulata	3.75	825	0.15	
Engraulis encrasicolus	1.50	150	0.06	
Merluccius merluccius	0.75	150	0.03	
Total	2555.25		100.00	

PROJECT STATION: 2184

DATE: 8/12/03 GEAR TYPE: PT No: 4 POSITION: Lat N 2837
start stop duration Long W 1135
TIME :20:23:57 20:37:40 14 (min) Purpose code: 1
LOG :2357.41 2358.28 0.86 Area code : 1
FDEPTH: 10 10 GearCond.code:
BDEPTH: 63 63 Validity code:
Towing dir: 344ø Wire out: 130 m Speed: 38 kn*10

Sorted: 37 Kg Total catch: 294.16 CATCH/HOUR: 1260.69

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardina pilchardus	1083.43	20949	85.94	3650
Scomber japonicus	157.03	5040	12.46	3651
Engraulis encrasicolus	20.23	1783	1.60	3649
Total	1260.69		100.00	

PROJECT STATION: 2185

DATE: 9/12/03 GEAR TYPE: PT No: 1 POSITION: Lat N 2840
start stop duration Long W 1113
TIME :02:42:26 02:51:16 9 (min) Purpose code: 1
LOG :2415.87 2416.49 0.61 Area code : 1
FDEPTH: 15 15 GearCond.code:
BDEPTH: 36 39 Validity code:
Towing dir: 300º Wire out: 90 m Speed: 42 kn*10

Sorted: 32 Kg Total catch: 127.04 CATCH/HOUR: 846.93

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardina pilchardus	598.67	12393	70.69	3652
Scomber japonicus	212.00	6053	25.03	3653
Trachurus trachurus	33.87	907	4.00	3654
Engraulis encrasicolus	2.40	160	0.28	
Total	846.94		100.00	

PROJECT STATION: 2186

DATE: 9/12/03 GEAR TYPE: PT No: 2 POSITION: Lat N 2850
start stop duration Long W 1117
TIME :04:13:26 04:13:59 14 (min) Purpose code: 1
LOG :2433.27 2434.18 0.90 Area code : 1
FDEPTH: 15 15 GearCond.code:
BDEPTH: 85 85 Validity code:
Towing dir: 110º Wire out: 100 m Speed: 40 kn*10

Sorted: 38 Kg Total catch: 225.12 CATCH/HOUR: 964.80

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardina pilchardus	757.29	13551	78.49	3655
Scomber japonicus	207.51	6660	21.51	3656
Total	964.80		100.00	

PROJECT STATION: 2187

DATE: 9/12/03 GEAR TYPE: BT No: 2 POSITION: Lat N 2905
start stop duration Long W 1124
TIME :10:00:40 10:20:57 20 (min) Purpose code: 1
LOG :2474.03 2475.13 1.08 Area code : 1
FDEPTH: 116 112 GearCond.code:
BDEPTH: 116 112 Validity code:
Towing dir: 140º Wire out: 450 m Speed: 31 kn*10

Sorted: 34 Kg Total catch: 403.35 CATCH/HOUR: 1210.05

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Dentex macrophthalmus	930.00	7740	76.86	
Zeus faber	95.70	66	7.91	
Umbrina canariensis	49.65	123	4.10	
Dentex gibbosus	22.80	9	1.88	
Sphoeroides pachgaster	22.80	30	1.88	
Anthias anthias	18.90	780	1.56	
Loligo vulgaris	16.50	60	1.36	
Trachurus trachurus	15.30	180	1.26	
Pagellus bellottii	12.30	30	1.02	
Macrorhamphosus scolopax	7.50	330	0.62	
Mullus surmuletus	6.93	21	0.57	
Pagellus acarne	4.80	30	0.40	
Raja montagui	3.75	3	0.31	
Scyliorhinus canicula	1.59	3	0.13	
Raja miraletus	0.93	3	0.08	
Alloteuthis subulata	0.60	120	0.05	
Total	1210.05		99.99	

PROJECT STATION: 2188

DATE: 9/12/03 GEAR TYPE: PT No: 1 POSITION: Lat N 2847
start stop duration Long W 1156
TIME :19:26:07 19:48:02 22 (min) Purpose code: 1
LOG :2548.65 2550.29 1.63 Area code : 1
FDEPTH: 15 12 GearCond.code:
BDEPTH: 101 94 Validity code:
Towing dir: 147º Wire out: 123 m Speed: 46 kn*10

Sorted: 35 Kg Total catch: 602.31 CATCH/HOUR: 1642.66

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Scomber japonicus	1509.14	55034	91.87	3657
Engraulis encrasicolus	133.53	7882	8.13	3658
Total	1642.67		100.00	

PROJECT STATION: 2189

DATE: 10/12/03 GEAR TYPE: PT No: 2 POSITION: Lat N 2846
start stop duration Long W 1138
TIME :05:52:20 06:11:14 19 (min) Purpose code: 1
LOG :2649.21 2650.57 1.36 Area code : 1
FDEPTH: 12 12 GearCond.code:
BDEPTH: 79 78 Validity code:
Towing dir: 250º Wire out: 110 m Speed: 45 kn*10

Sorted: 35 Kg Total catch: 525.45 CATCH/HOUR: 1659.32

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Scomber japonicus	1646.05	51158	99.20	3659
Sardina pilchardus	13.26	284	0.80	
Total	1659.31		100.00	

PROJECT STATION: 2190

DATE: 10/12/03 GEAR TYPE: PT No: 2 POSITION: Lat N 2857
start stop duration Long W 1052
TIME :13:11:46 13:36:49 25 (min) Purpose code: 1
LOG :2718.67 2720.34 1.65 Area code : 1
FDEPTH: 40 50 GearCond.code:
BDEPTH: 66 74 Validity code:
Towing dir: 310º Wire out: 270 m Speed: 40 kn*10

Sorted: 37 Kg Total catch: 709.27 CATCH/HOUR: 1702.25

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Engraulis encrasicolus	1516.20	113726	89.07	3660
Sardina pilchardus	116.28	4788	6.83	3661
Trachurus trecae	22.34	91	1.31	
Scomber japonicus	22.34	365	1.31	
Pagellus acarne	21.43	46	1.26	
Chelidonichthys lucerna	3.65	46	0.21	
Total	1702.24		99.99	

PROJECT STATION: 2191

DATE: 10/12/03 GEAR TYPE: PT No: 1 POSITION: Lat N 2902
start stop duration Long W 1050
TIME :15:52:21 16:01:44 9 (min) Purpose code: 1
LOG :2738.47 2739.11 0.65 Area code : 1
FDEPTH: 18 20 GearCond.code:
BDEPTH: 48 44 Validity code:
Towing dir: 170º Wire out: 110 m Speed: 40 kn*10

Sorted: 32 Kg Total catch: 886.96 CATCH/HOUR: 5913.07

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Scomber japonicus	5768.00	23333	97.55	3663
Sardinella aurita	104.00	287	1.76	3662
Spondyliosoma cantharus	41.07	187	0.69	
Total	5913.07		100.00	

PROJECT STATION: 2192

DATE: 10/12/03 GEAR TYPE: PT No: 3 POSITION: Lat N 2859
start stop duration Long W 1037
TIME :19:17:31 19:24:57 7 (min) Purpose code: 1
LOG :2766.97 2767.44 0.63 Area code : 1
FDEPTH: 5 5 GearCond.code:
BDEPTH: 28 27 Validity code:
Towing dir: 55º Wire out: 90 m Speed: 37 kn*10

Sorted: 34 Kg Total catch: 670.20 CATCH/HOUR: 5744.57

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardina pilchardus	4928.57	170571	85.80	3665
Scomber japonicus	411.43	12171	7.16	3664
Trachurus trachurus	145.71	4114	2.54	
Merluccius merluccius	114.86	1029	2.00	
Diplodus bellottii	65.14	857	1.13	
Engraulis encrasicolus	41.14	3429	0.72	
Pomadasys incisus	24.00	343	0.42	
Pagellus acarne	12.00	171	0.21	
Alloteuthis subulata	1.71	514	0.03	
Total	5744.56		100.01	

PROJECT STATION: 2193

DATE: 10/12/03 GEAR TYPE: PT No: 1 POSITION: Lat N 2912
start stop duration Long W 1041
TIME :21:37:23 21:44:33 7 (min) Purpose code: 1
LOG :2785.12 2785.61 0.49 Area code : 1
FDEPTH: 15 10 GearCond.code:
BDEPTH: 77 72 Validity code:
Towing dir: 170º Wire out: 120 m Speed: 42 kn*10

Sorted: 35 Kg Total catch: 353.80 CATCH/HOUR: 3032.57

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardina pilchardus	2558.57	57943	84.37	3666
Engraulis encrasicolus	405.43	33600	13.37	3667
Scomber japonicus	68.57	1886	2.26	
Total	3032.57		100.00	

PROJECT STATION: 2194

DATE: 11/12/03 GEAR TYPE: PT No: 1 POSITION: Lat N 2917
start stop duration Long W 1023
TIME :03:11:00 03:24:01 13 (min) Purpose code: 1
LOG :2832.97 2833.84 0.85 Area code : 1
FDEPTH: 20 24 GearCond.code:
BDEPTH: 42 44 Validity code:
Towing dir: 300º Wire out: 100 m Speed: 40 kn*10

Sorted: 37 Kg Total catch: 554.55 CATCH/HOUR: 2559.46

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardina pilchardus	2516.54	65908	98.32	3668
Scomber japonicus	26.31	831	1.03	
Trachurus trachurus	13.15	346	0.51	
Engraulis encrasicolus	3.46	346	0.14	
Total	2559.46		100.00	

PROJECT STATION: 2195

DATE: 11/12/03 GEAR TYPE: PT No: 3 POSITION: Lat N 2925
start stop duration Long W 1017
TIME :06:56:02 06:59:10 3 (min) Purpose code: 1
LOG :2863.51 2863.72 0.21 Area code : 1
FDEPTH: 20 20 GearCond.code:
BDEPTH: 46 47 Validity code:
Towing dir: 295º Wire out: 120 m Speed: 38 kn*10

Sorted: 35 Kg Total catch: 519.45 CATCH/HOUR: 10389.00

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardina pilchardus	10155.00	286800	97.75	3669
Scomber japonicus	234.00	6600	2.25	
Total	10389.00		100.00	

PROJECT STATION: 2196

DATE: 11/12/03 GEAR TYPE: BT No: 2 POSITION: Lat N 2945
start stop duration Long W 1010
TIME :12:19:36 12:42:50 23 (min) Purpose code: 1
LOG :2911.06 2912.37 1.30 Area code : 1
FDEPTH: 114 108 GearCond.code:
BDEPTH: 114 108 Validity code:
Towing dir: 160º Wire out: 450 m Speed: 34 kn*10

Sorted: 34 Kg Total catch: 1011.85 CATCH/HOUR: 2639.61

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Lepidopus caudatus	1940.87	1487	73.53	
Dentex macrophthalmus	212.87	1409	8.06	
Pagrus pagrus	187.83	78	7.12	
Scomber japonicus	100.96	2504	3.82	3670
Trachurus trecae	68.87	235	2.61	
Pagellus acarne	58.70	157	2.22	
Anthias anthias	21.91	1487	0.83	
Trisopterus luscus	13.30	313	0.50	
Zeus faber	12.39	8	0.47	
Mullus surmuletus	10.17	78	0.39	
Alloteuthis subulata	9.39	2661	0.36	
Macrorhamphosus scolopax	2.35	157	0.09	
Total	2639.61		100.00	

PROJECT STATION: 2197

DATE: 11/12/03 GEAR TYPE: PT No: 1 POSITION: Lat N 2953
start stop duration Long W 953
TIME :17:11:21 17:19:27 8 (min) Purpose code: 1
LOG :2954.46 2955.01 0.54 Area code : 1
FDEPTH: 60 60 GearCond.code:
BDEPTH: 76 80 Validity code:
Towing dir: 290º Wire out: 250 m Speed: 40 kn*10

Sorted: 38 Kg Total catch: 531.58 CATCH/HOUR: 3986.85

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardina pilchardus	3979.50	90720	99.82	3671
Scomber japonicus	7.35	105	0.18	
Total	3986.85		100.00	

PROJECT STATION: 2198

DATE: 11/12/03 GEAR TYPE: PT No: 6 POSITION: Lat N 3004
start stop duration Long W 944
TIME :21:34:22 21:39:09 5 (min) Purpose code: 1
LOG :2994.38 2994.68 0.29 Area code : 1
FDEPTH: 10 10 GearCond.code:
BDEPTH: 45 53 Validity code:
Towing dir: 321º Wire out: 120 m Speed: 38 kn*10

Sorted: 33 Kg Total catch: 98.05 CATCH/HOUR: 1176.60

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardina pilchardus	1162.80	32868	98.83	3672
Scomber japonicus	6.84	216	0.58	
Sarpa salpa	4.08	12	0.35	
Alloteuthis subulata	1.44	648	0.12	
Engraulis encrasicolus	1.44	288	0.12	
Total	1176.60		100.00	

PROJECT STATION: 2199

DATE: 12/12/03 GEAR TYPE: PT No: 1 POSITION: Lat N 3025
start stop duration Long W 943
TIME :04:06:59 04:26:41 20 (min) Purpose code: 1
LOG :3058.16 3059.49 1.32 Area code : 1
FDEPTH: 15 14 GearCond.code:
BDEPTH: 40 32 Validity code:
Towing dir: 140º Wire out: 70 m Speed: 40 kn*10

Sorted: 35 Kg Total catch: 138.76 CATCH/HOUR: 416.28

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Scomber japonicus	267.60	7356	64.28	3673
Sardina pilchardus	147.72	4020	35.49	3674
Trachurus trachurus	0.60	12	0.14	
Alloteuthis subulata	0.36	96	0.09	
Total	416.28		100.00	

PROJECT STATION: 2200

DATE: 12/12/03 GEAR TYPE: BT No: 2 POSITION: Lat N 3038
start stop duration Long W 1008
TIME :11:43:31 12:01:45 18 (min) Purpose code: 1
LOG :3113.04 3113.98 0.92 Area code : 1
FDEPTH: 157 236 GearCond.code:
BDEPTH: 157 236 Validity code:
Towing dir: 160º Wire out: 650 m Speed: 33 kn*10

Sorted: 21 Kg Total catch: 63.30 CATCH/HOUR: 211.00

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Lepidopus caudatus	180.50	150	85.55	
Zeus faber	9.50	10	4.50	
Trachurus trachurus	7.00	30	3.32	
Merluccius merluccius	5.50	40	2.61	
Macrorhamphosus scolopax	4.70	260	2.23	
Dentex macrophthalmus	3.70	30	1.75	
Alloteuthis subulata	0.10	30	0.05	
Total	211.00		100.01	

PROJECT STATION: 2201

DATE: 12/12/03 GEAR TYPE: PT No: 2 POSITION: Lat N 3038
start stop duration Long W 957
TIME :14:02:06 14:20:35 18 (min) Purpose code: 1
LOG :3125.64 3126.89 1.25 Area code : 1
FDEPTH: 50 60 GearCond.code:
BDEPTH: 81 88 Validity code:
Towing dir: 270º Wire out: 270 m Speed: 40 kn*10

Sorted: 37 Kg Total catch: 487.26 CATCH/HOUR: 1624.20

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardina pilchardus	1553.50	39347	95.65	3675
Scomber japonicus	37.70	780	2.32	
Xiphias gladius	33.00	3	2.03	
Total	1624.20		100.00	

PROJECT STATION: 2202

DATE: 12/12/03 GEAR TYPE: PT No: 2 POSITION: Lat N 3048
start stop duration Long W 959
TIME :16:53:51 17:19:09 25 (min) Purpose code: 1
LOG :3148.23 3149.99 1.76 Area code : 1
FDEPTH: 20 15 GearCond.code:
BDEPTH: 76 75 Validity code:
Towing dir: 90º Wire out: 110 m Speed: 42 kn*10

Sorted: 30 Kg Total catch: 150.40 CATCH/HOUR: 360.96

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardina pilchardus	318.60	8424	88.26	3676
Scomber japonicus	42.36	1188	11.74	3677
Total	360.96		100.00	

PROJECT STATION: 2203

DATE: 12/12/03 GEAR TYPE: PT No: 7 POSITION: Lat N 3102
start stop duration Long W 953
TIME :21:40:49 22:01:33 21 (min) Purpose code: 1
LOG :3193.29 3194.56 1.22 Area code : 1
FDEPTH: 0 0 GearCond.code:
BDEPTH: 61 63 Validity code:
Towing dir: 332º Wire out: 120 m Speed: 37 kn*10

Sorted: 66 Kg Total catch: 66.32 CATCH/HOUR: 189.49

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Scomber japonicus	71.43	2186	37.70	3678
Trachurus trachurus	59.43	137	31.36	3679
Sardina pilchardus	32.86	926	17.34	3680
Engraulis encrasicolus	10.89	817	5.75	3681
Lepidopus caudatus	10.00	6	5.28	
Merluccius merluccius	3.86	111	2.04	
Alloteuthis subulata	0.74	286	0.39	
Sepiola rondeleti	0.29	189	0.15	
Total	189.50		100.01	

PROJECT STATION: 2204

DATE: 13/12/03 GEAR TYPE: PT No: 1 POSITION: Lat N 3137
start stop duration Long W 954
TIME :08:19:26 08:41:55 22 (min) Purpose code: 1
LOG :3309.66 3311.16 1.49 Area code : 1
FDEPTH: 52 52 GearCond.code:
BDEPTH: 77 84 Validity code:
Towing dir: 311º Wire out: 280 m Speed: 42 kn*10

Sorted: 36 Kg Total catch: 1449.02 CATCH/HOUR: 3951.87

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardina pilchardus	1952.73	72436	49.41	3682
Engraulis encrasicolus	1729.09	80836	43.75	3683
Scomber japonicus	268.36	8618	6.79	3684
Trachurus trachurus	1.69	3	0.04	
Total	3951.87		99.99	

PROJECT STATION: 2205

DATE: 13/12/03 GEAR TYPE: BT No: 2 POSITION: Lat N 3145
start stop duration Long W 948
TIME :11:47:02 12:06:24 19 (min) Purpose code: 1
LOG :3341.82 3342.91 1.09 Area code : 1
FDEPTH: 40 37 GearCond.code:
BDEPTH: 40 37 Validity code:
Towing dir: 106º Wire out: 180 m Speed: 35 kn*10

Sorted: 39 Kg Total catch: 212.23 CATCH/HOUR: 670.20

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardina pilchardus	549.88	17021	82.05	3686
Engraulis encrasicolus	42.03	3543	6.27	3685
Trachurus trachurus	24.32	433	3.63	
Alloteuthis subulata	11.27	3335	1.68	
Merluccius merluccius	11.12	328	1.66	
Scomber japonicus	6.41	193	0.96	
Parapenaeus longirostris	5.72	521	0.85	
Trisopterus luscus	5.56	193	0.83	
Pagellus acarne	4.52	35	0.67	
Boops boops	3.28	35	0.49	
Umbrina cirrosa	2.78	19	0.41	
Engraulis encrasicolus	1.89	1146	0.28	
Capros aper	1.20	69	0.18	
Total	669.98		99.96	

PROJECT STATION: 2206

DATE: 13/12/03 GEAR TYPE: BT No: 2 POSITION: Lat N 3154
start stop duration Long W 1004
TIME :14:48:22 14:57:59 10 (min) Purpose code: 1
LOG :3369.01 3369.54 0.54 Area code : 1
FDEPTH: 133 136 GearCond.code:
BDEPTH: 133 136 Validity code:
Towing dir: 220º Wire out: 530 m Speed: 35 kn*10

Sorted: 32 Kg Total catch: 481.60 CATCH/HOUR: 2889.60

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Scomber japonicus	2628.00	33120	90.95	3688
Sardina pilchardus	165.60	3330	5.73	3687
Trachurus trachurus	88.20	1260	3.05	
Lepidopus caudatus	7.80	12	0.27	
Total	2889.60		100.00	

PROJECT STATION: 2207

DATE: 13/12/03 GEAR TYPE: PT No: 7 POSITION: Lat N 3151
start stop duration Long W 934
TIME :18:22:27 18:36:57 15 (min) Purpose code: 1
LOG :3402.33 3403.23 0.89 Area code : 1
FDEPTH: 14 16 GearCond.code:
BDEPTH: 23 24 Validity code:
Towing dir: 220º Wire out: 120 m Speed: 35 kn*10

Sorted: 30 Kg Total catch: 124.89 CATCH/HOUR: 499.56

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardina pilchardus	481.60	19392	96.40	3689
Scomber japonicus	11.00	88	2.20	
Merluccius merluccius	3.12	60	0.62	
Trachurus trachurus	1.44	48	0.29	
Engraulis encrasicolus	1.28	96	0.26	
Trisopterus luscus	0.48	16	0.10	
Alloteuthis subulata	0.32	48	0.06	
Dicologoglossa cuneata	0.32	4	0.06	
Total	499.56		99.99	

PROJECT STATION:2208

DATE:14/12/03 GEAR TYPE: BT No: 2 POSITION:Lat N 3219

	start	stop	duration			Long W 923
TIME	:02:46:13	03:01:06	15 (min)	Purpose code:	1	
LOG	:3493.15	3494.09	0.93	Area code :	1	
FDEPTH:	50	49		GearCond.code:		
BDEPTH:	50	49		Validity code:		

Towing dir: 110ø Wire out: 230 m Speed: 37 kn*10

Sorted: 29 Kg Total catch: 59.10 CATCH/HOUR: 236.40

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sardina pilchardus	77.60	1528	32.83	3690
Trachurus trachurus	67.60	1480	28.60	3692
Scomber japonicus	52.48	1320	22.20	3691
Pagellus acarne	10.08	48	4.26	
Spondyliosoma cantharus	5.92	16	2.50	
Zeus faber	5.60	4	2.37	
Diplodus bellottii	4.88	72	2.06	
Trisopterus luscus	3.36	48	1.42	
Trachinus draco	3.20	72	1.35	
Diplodus vulgaris	2.80	16	1.18	
Boops boops	2.08	16	0.88	
Scorpaena notata	0.80	8	0.34	
Total	236.40		99.99	

PROJECT STATION:2209

DATE:14/12/03 GEAR TYPE: BT No: 2 POSITION:Lat N 3228

	start	stop	duration			Long W 920
TIME	:07:58:13	08:13:38	15 (min)	Purpose code:	1	
LOG	:3544.01	3544.82	0.80	Area code :	1	
FDEPTH:	47	47		GearCond.code:		
BDEPTH:	47	47		Validity code:		

Towing dir: 280ø Wire out: 200 m Speed: 31 kn*10

Sorted: 29 Kg Total catch: 175.38 CATCH/HOUR: 701.52

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Trachurus trachurus	155.52	1572	22.17	3694
Sardina pilchardus	134.88	3288	19.23	3695
Diplodus vulgaris	113.04	288	16.11	
Scomber japonicus	93.60	3432	13.34	3693
Pagellus acarne	78.96	528	11.26	
Diplodus bellottii	46.56	912	6.64	
Pagellus bellottii	45.12	48	6.43	
Spondyliosoma cantharus	18.96	72	2.70	
Alloteuthis subulata	7.68	2328	1.09	
Boops boops	7.20	48	1.03	
Total	701.52		100.00	

Annex III Instruments and fishing gear used

The Simrad EK-500, 38 kHz echo scientific sounder was used during the survey for fish abundance estimation, in addition data from the 18 kHz, 120 kHz and the 200 kHz transducers were logged for possible future multi frequency target 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 were stored to tape, and a backup of the database of scrutinized data. The details of the settings of the 38 kHz were as follows:

Transceiver-1 menu	Transducer depth	5.5 m
	Absorption coeff.	10 dB/km
	Pulse length	medium (1ms)
	Bandwidth	wide
	Max power	2000 Watt
	2-way beam angle	-21.0 dB
	SV transducer gain	27.19 dB
	TS transducer gain	27.22 dB
	Angle sensitivity	21.9
	3 dB beamwidth along.	6.9°
	3 dB beamwidth athw.	6.8°
	Alongship offset	-0.01°
	Athwardship offset	0.03°
Display menu	Echogram	1
	Bottom range	10 m
	Bottom range start	9 m
	TVG	20 log R
	Sv colour min	-67 dB
	TS Colour minimum	-60 dB
Printer- menu	Range	0-50, 0-100, 0-150, 0-250 or 0-500m
	TVG	20 log R
	Sv colour min	-60 dB
Bottom detection menu	Minimum level	-40 dB

A calibration experiment using a standard copper sphere was performed in Langstrand, Namibia 17 August 2003. These settings used during the survey. Another successful calibration was performed near Dakar, Senegal on 8 November 2003. The settings will be changed according to this calibration after this survey.

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.

Annex IV Regional estimates, October-December 2003

Sardine (*Sardina pilchardus*), number in millions

Length cm	C. Cantin-C. Juby	C. Juby-C. Blanc	C. Blanc-C. Timiris	C. Timiris-St. Louis	St. Louis-C. Vert	C. Vert-Casamance	TOTAL
5							
6							
7							
8	3.6						3.6
9	45.5	41.1					86.6
10	172.0	31.2					203.2
11	290.5	102.2					392.6
12	450.8	462.6					913.4
13	1 460.6	890.7	2.2				2 353.4
14	2 180.6	2 360.7	59.6				4 600.9
15	2 445.9	2 711.8	188.3				5 346.0
16	4 516.3	2 375.9	341.8				7 234.1
17	3 420.8	1 625.3	383.5				5 429.6
18	1 308.4	859.2	244.5				2 412.1
19	735.8	728.5	41.6				1 506.0
20	472.8	2 186.6	8.0				2 667.5
21	177.9	11 609.4					11 787.3
22	77.8	13 139.5					13 217.2
23	35.6	8 012.3	22.0				8 069.8
24	11.6	5 634.0	87.3	33.6			5 766.4
25	1.9	2 861.7	160.4	286.1			3 310.2
26		443.0	95.7	452.9			991.6
27		16.3	12.1	189.3			217.7
28				34.4			34.4
29							
30							
Total	17 808.3	56 091.9	1 647.0	996.4			76 543.6

Sardine (*Sardina pilchardus*), biomass in tonnes

Length cm	C. Cantin-C. Juby	C. Juby-C. Blanc	C. Blanc-C. Timiris	C. Timiris-St. Louis	St. Louis-C. Vert	C. Vert-Casamance	TOTAL
5							
6							
7							
8	18						18
9	320	289					609
10	1 633	296					1 929
11	3 623	1 274					4 897
12	7 220	7 410					14 629
13	29 467	17 970	44				47 481
14	54 513	59 013	1 491				115 017
15	74 686	82 807	5 751				163 244
16	166 361	87 518	12 591				266 470
17	150 332	71 428	16 854				238 614
18	67 930	44 611	12 694				125 235
19	44 740	44 296	2 530				91 565
20	33 400	154 473	568				188 441
21	14 499	946 102					960 601
22	7 262	1 227 268					1 234 530
23	3 787	852 654	2 339				858 780
24	1 397	679 399	10 527	4 052			695 375
25	262	389 101	21 811	38 906			450 080
26		67 603	14 600	69 117			151 320
27		2 778	2 061	32 281			37 121
28				6 527			6 527
29							
30							
Total	661 449	4 736 289	103 859	150 884			5 652 481

Annex IV continued

Round sardinella (*Sardinella aurita*), number in millions

Length cm	C. Cantin-C. Juby	C. Juby-C. Blanc	C. Blanc-C. Timiris	C. Timiris-St. Louis	St. Louis-C. Vert	C. Vert-Casamance	TOTAL
5							
6							
7					7.2		7.2
8					38.8		38.8
9				2.6	79.4		82.0
10				3.7	26.2		29.9
11				3.0	4.1		7.1
12				10.0	1.6	9.0	20.6
13				21.0		26.9	47.8
14			81.7	6.4		50.1	138.3
15			161.2	4.0		120.0	285.2
16			306.0	6.2		73.4	385.6
17			23.0	1.2		28.7	52.9
18				0.4		14.2	14.6
19				0.2		1.8	2.0
20				4.8		1.8	6.6
21				19.2			19.2
22				26.4			26.4
23				10.2		26.8	37.1
24				20.8		76.2	97.1
25				9.5		174.5	184.0
26				8.8		159.0	167.8
27		28.8		70.7		106.9	206.4
28		211.1		189.1		33.2	433.5
29		632.2	12.6	115.5		23.8	784.2
30		817.0		75.7		11.1	903.8
31		336.0		35.5		1.2	372.7
32		164.7		24.9		0.6	190.2
33		216.1		21.8			237.9
34		216.6		17.2			233.7
35		197.8	12.6	10.9			221.3
36		161.0	25.2				186.3
37		37.1		5.6			42.7
38		18.0					18.0
39		14.5	12.6				27.1
40							
41							
42							
43							
44							
45							
46							
47							
48							
49							
50							
Total		3 050.9	635.0	725.3	157.3	939.2	5 507.8

Annex IV continued

Round sardinella (*Sardinella aurita*), biomass in tonnes

Length cm	C. Cantin-C. Juby	C. Juby-C. Blanc	C. Blanc-C. Timiris	C. Timiris-St. Louis	St. Louis-C. Vert	C. Vert-Casamance	TOTAL
5							
6							
7					28		28
8					224		224
9				21	640		661
10				41	285		326
11				44	58		102
12				188	30	168	386
13				495		634	1 130
14			2 391	189		1 467	4 047
15			5 763	144		4 289	10 196
16			13 196	268		3 166	16 630
17			1 185	63		1 474	2 722
18				22		866	888
19				14		127	141
20				400		148	548
21				1 831			1 831
22				2 886			2 886
23				1 276		3 341	4 616
24				2 939		10 765	13 703
25				1 510		27 775	29 285
26				1 566		28 403	29 969
27		5 632		14 118		21 341	41 091
28		45 943		42 035		7 375	95 353
29		152 573	3 110	28 454		5 877	190 014
30		217 888		20 623		3 034	241 545
31		98 730		10 640		357	109 727
32		53 136		8 204		200	61 539
33		76 365		7 856			84 221
34		83 590		6 770			90 359
35		83 176	5 420	4 674			93 270
36		73 604	11 782				85 386
37		18 397		2 841			21 237
38		9 649					9 649
39		8 410	7 466				15 876
40							
41							
42							
43							
44							
45							
46							
47							
48							
49							
50							
Total		927 094	50 312	160 110	1 265	120 808	1 259 590

Annex IV continued

Flat sardinella (*Sardinella maderensis*), numbers in millions

Length cm	C. Cantin-C. Juby	C. Juby-C. Blanc	C. Blanc-C. Timiris	C. Timiris-St. Louis	St. Louis-C. Vert	C. Vert-Casamance	TOTAL
5							
6					5.4		5.4
7					78.8		78.8
8					244.0		244.0
9					97.5		97.5
10				0.9	35.7		36.6
11				5.0	7.7		12.7
12				12.1			12.1
13				36.3		5.6	41.9
14				23.0			23.0
15				68.3			68.3
16				63.7			63.7
17				41.2		15.6	56.8
18				21.5		43.7	65.2
19				7.0		40.0	47.0
20				9.2		109.8	119.0
21		6.9		37.2		316.1	360.3
22			3.6	45.7		675.0	724.3
23		6.9	3.6	38.1		1 038.5	1 087.1
24		35.1	34.3	53.1	1.2	939.6	1 063.2
25		157.9	107.5	189.6	2.4	371.3	828.7
26		264.3	156.1	258.8	3.7	100.4	783.3
27		207.5	150.9	254.8	3.2	42.9	659.3
28		181.7	66.5	287.8	1.7	2.4	540.1
29		129.5	17.9	207.2	0.7	5.5	360.8
30		43.6	80.2	252.3	0.3		376.4
31		22.7	127.9	154.9			305.5
32		12.8	159.2	289.6			461.6
33			202.2	246.2			448.4
34			55.8	179.5			235.3
35			103.4	101.3			204.7
36			30.2	37.5			67.8
37				10.0			10.0
38							
39							
40							
41							
42							
43							
44							
45							
46							
47							
48							
49							
50							
Total		1 069.1	1 299.3	2 932.0	482.4	3 706.3	9 489.1

Annex IV continued

Flat sardinella (*Sardinella maderensis*), biomass in tonnes

Length cm	C. Cantin-C. Juby	C. Juby-C. Blanc	C. Blanc-C. Timiris	C. Timiris-St. Louis	St. Louis-C. Vert	C. Vert-Casamance	TOTAL
5							
6					14		14
7					323		323
8					1 454		1 454
9					811		811
10				10	401		411
11				73	113		186
12				227			227
13				857		132	989
14				673			673
15				2 443			2 443
16				2 749			2 749
17				2 122		802	2 924
18				1 309		2 654	3 963
19				501		2 848	3 348
20				763		9 081	9 844
21		669		3 548		30 163	34 380
22			392	5 000		73 808	79 200
23		874	446	4 742		129 383	135 445
24		5 007	4 838	7 496	164	132 650	150 154
25		25 398	17 106	30 185	393	59 103	132 186
26		47 717	27 881	46 231	675	17 934	140 437
27		41 859	30 133	50 877	638	8 561	132 069
28		40 791	14 780	63 957	388	538	120 453
29		32 258	4 414	51 064	179	1 349	89 265
30		11 986	21 854	68 730	79		102 650
31		6 891	38 380	46 466			91 737
32		4 275	52 473	95 429			152 177
33			72 986	88 860			161 846
34			21 987	70 760			92 747
35			44 431	43 491			87 922
36			14 109	17 524			31 633
37				5 072			5 072
38							
39							
40							
41							
42							
43							
44							
45							
46							
47							
48							
49							
50							
Total		217 727	366 210	711 159	5 632	469 004	1 769 732

Annex IV continued

Anchovy (*Engraulis encrasicolus*), numbers in millions

Length cm	C. Cantin-C. Juby	C. Juby-C. Blanc	C. Blanc-C. Timiris	C. Timiris-St. Louis	St. Louis-C. Vert	C. Vert-Casamance	TOTAL
5	0.9						0.9
6	4.5						4.5
7	5.6	12.7					18.3
8	16.4	62.8					79.2
9	44.2	138.2					182.4
10	80.4	640.6					721.0
11	97.0	1 073.6					1 170.7
12	256.3	671.1					927.4
13	189.5	40.6					230.1
14	46.6						46.6
15	25.8						25.8
16	4.3						4.3
17							
18							
19							
20							
Total	771.5	2 639.7					3 411.2

Anchovy (*Engraulis encrasicolus*), biomass in tonnes

Length cm	C. Cantin-C. Juby	C. Juby-C. Blanc	C. Blanc-C. Timiris	C. Timiris-St. Louis	St. Louis-C. Vert	C. Vert-Casamance	TOTAL
5	1						1
6	7						7
7	13	29					42
8	54	208					263
9	205	640					845
10	502	4 005					4 507
11	797	8 817					9 614
12	2 703	7 078					9 781
13	2 518	540					3 058
14	767						767
15	518						518
16	103						103
17							
18							
19							
20							
Total	8 189	21 317					29 506

Annex IV continued

Atlantic horse mackerel (*Trachurus trachurus*), numbers in millions

Length cm	C. Cantin-C. Juby	C. Juby-C. Blanc	C. Blanc-C. Timiris	C. Timiris-St. Louis	St. Louis-C. Vert	C. Vert-Casamance	TOTAL
5							
6							
7	1.6						1.6
8							
9							
10			0.8				0.8
11		26.3	10.9				37.3
12		285.1	10.9				296.1
13	0.2	722.0	40.8				763.0
14	6.2	642.3	18.7				667.2
15	20.6	451.4	8.8				480.8
16	51.7	172.7	8.8				233.2
17	57.6	232.2					289.8
18	19.6	289.8	0.4				309.9
19	22.8	543.1					565.9
20	40.1	717.5					757.6
21	17.0	507.3	4.4				528.6
22	7.0	170.9					178.0
23	0.4	77.0					77.4
24	1.0	67.9					68.9
25	2.5	86.2					88.8
26	0.5	85.6					86.1
27	0.7	63.1					63.8
28	1.5	61.1					62.6
29	0.5	21.4					22.0
30	1.0	4.6					5.6
31		2.9					2.9
32							
33							
34	0.6						0.6
35	1.2						1.2
36	1.0						1.0
37	0.8						0.8
38	2.0						2.0
39	0.6						0.6
40	1.1						1.1
41							
42							
43							
44							
45							
46							
47							
48							
49							
50	0.5						0.5
Total	260.4	5 230.4	104.7				5 595.5

Annex IV continued

Atlantic horse mackerel (*Trachurus trachurus*), biomass in tonnes

Length cm	C. Cantin-C. Juby	C. Juby-C. Blanc	C. Blanc-C. Timiris	C. Timiris-St. Louis	St. Louis-C. Vert	C. Vert-Casamance	TOTAL
5							
6							
7	6						6
8							
9							
10			9				9
11		336	160				496
12		4 678	205				4 883
13	4	14 921	963				15 888
14	158	16 449	547				17 155
15	645	14 119	315				15 080
16	1 952	6 516	380				8 848
17	2 594	10 452					13 046
18	1 044	15 414	26				16 484
19	1 418	33 827					35 245
20	2 904	51 922					54 826
21	1 416	42 347	421				44 184
22	674	16 356					17 031
23	43	8 396					8 439
24	125	8 390					8 515
25	352	12 011					12 363
26	79	13 378					13 457
27	123	11 026					11 149
28	295	11 877					12 172
29	109	4 626					4 735
30	241	1 095					1 336
31		754					754
32							
33							
34	194						194
35	455						455
36	403						403
37	375						375
38	946						946
39	292						292
40	629						629
41							
42							
43							
44							
45							
46							
47							
48							
49							
50	547						547
Total	18 023	298 889	3 028				319 940

Annex IV continued

Cunene horse mackerel (*Trachurus trecae*), numbers in millions

Length cm	C. Cantin-C. Juby	C. Juby-C. Blanc	C. Blanc-C. Timiris	C. Timiris-St. Louis	St. Louis-C. Vert	C. Vert-Casamance	TOTAL
5							
6							
7							
8							
9					13.6		13.6
10				14.2	42.4		56.6
11		2.8	8.9	71.0	44.7	36.9	164.3
12		129.5	265.2	119.7	82.9	236.4	833.8
13		349.5	1 078.8	187.1	86.9	465.4	2 167.8
14		719.7	835.2	139.9	116.7	85.4	1 896.9
15		2 389.0	371.4	84.3	67.4	7.4	2 919.5
16		3 006.9	238.4	95.0	69.7		3 410.0
17		2 223.1	188.0	145.8	39.4		2 596.4
18		1 387.5	134.4	193.1	39.1	103.9	1 858.1
19		1 121.1	13.2	164.4	58.3	359.1	1 716.1
20		512.1	5.9	95.7	48.5	226.8	889.0
21		338.4	14.9	54.7	25.4	103.9	537.5
22		174.2		34.6	26.6		235.5
23		83.3	4.5	19.9	11.7		119.4
24		201.3		16.8	28.2		246.3
25		135.0		3.7	12.7		151.4
26		534.3		5.6	3.8		543.7
27		301.7		4.1	18.7		324.5
28		235.9		12.9	25.5		274.3
29		68.1		16.0	20.9		105.0
30		63.5		10.9			74.5
31		44.5		21.8			66.3
32		58.2		33.2			91.4
33		20.4		37.5			57.9
34		7.4	3.6	29.0			40.0
35		10.2		8.6			18.8
36		7.4		8.2			15.7
37				16.8			16.8
38				4.3			4.3
39							
40				4.3			4.3
41				8.6			8.6
42							
43							
44							
45							
46							
47							
48							
49							
50							
Total		14 125.0	3 162.6	1 661.8	883.3	1 625.4	21 458.0

Annex IV continued

Cunene horse mackerel (*Trachurus trecae*), biomass in tonnes

Length cm	C. Cantin-C. Juby	C. Juby-C. Blanc	C. Blanc-C. Timiris	C. Timiris-St. Louis	St. Louis-C. Vert	C. Vert-Casamance	TOTAL
5							
6							
7							
8							
9					112		112
10				157	472		629
11		35	130	1 037	652	539	2 394
12		2 125	4 973	2 245	1 555	4 433	15 330
13		7 222	25 482	4 420	2 052	10 994	50 170
14		18 430	24 445	4 095	3 415	2 499	52 884
15		74 730	13 276	3 013	2 411	264	93 695
16		113 461	10 282	4 096	3 006		130 845
17		100 080	9 673	7 504	2 028		119 286
18		73 797	8 171	11 735	2 377	6 318	102 397
19		69 825	942	11 705	4 152	25 561	112 185
20		37 060	485	7 914	4 014	18 757	68 230
21		28 253	1 425	5 222	2 425	9 917	47 242
22		16 667		3 788	2 912		23 367
23		9 080	559	2 480	1 459		13 578
24		24 865		2 367	3 982		31 214
25		18 809		582	2 025		21 416
26		83 520		1 001	678		85 199
27		52 702		813	3 739		57 254
28		45 878		2 862	5 665		54 404
29		14 677		3 953	5 143		23 773
30		15 139		2 981			18 120
31		11 687		6 548			18 235
32		16 782		10 956			27 737
33		6 427		13 547			19 974
34		2 564	1 423	11 414			15 401
35		3 831		3 685			7 516
36		3 037		3 838			6 875
37				8 506			8 506
38				2 350			2 350
39							
40				2 736			2 736
41				5 887			5 887
42							
43							
44							
45							
46							
47							
48							
49							
50							
Total		850 686	101 265	153 435	54 272	79 283	1 238 940

Annex IV continued

False scad (*Caranx rhonchus*), numbers in millions

Length cm	C. Cantin-C. Juby	C. Juby-C. Blanc	C. Blanc-C. Timiris	C. Timiris-St. Louis	St. Louis-C. Vert	C. Vert-Casamance	TOTAL
5							
6							
7							
8							
9							
10							
11							
12							
13				20.4			20.4
14				38.8			38.8
15				80.8			80.8
16				35.0			35.0
17				11.9			11.9
18				5.6			5.6
19				3.2			3.2
20							
21				1.7			1.7
22				26.4			26.4
23				41.0	0.0		41.1
24				55.9	0.1		56.0
25				59.0	0.1		59.1
26				49.0	0.1		49.1
27				24.6	0.1		24.6
28				27.5	0.0		27.5
29				19.2	0.0		19.2
30				22.1			22.1
31				5.0			5.0
32				5.4			5.4
33				7.8			7.8
34				3.7			3.7
35				2.1			2.1
36				0.6			0.6
37				1.1			1.1
38				0.9			0.9
39				0.8			0.8
40				0.0			0.0
41				0.0			0.0
42				0.0			0.0
43				0.0			0.0
44							
45							
46							
47							
48							
49							
50							
Total				549.4	0.4		549.8

Annex IV continued

False scad (*Caranx rhonchus*), biomass in tonnes

Length cm	C. Cantin-C. Juby	C. Juby-C. Blanc	C. Blanc-C. Timiris	C. Timiris-St. Louis	St. Louis-C. Vert	C. Vert-Casamance	TOTAL
5							
6							
7							
8							
9							
10							
11							
12							
13				482			482
14				1 136			1 136
15				2 889			2 889
16				1 510			1 510
17				612			612
18				340			340
19				230			230
20							
21				159			159
22				2 884			2 884
23				5 110	4		5 115
24				7 885	14		7 899
25				9 386	18		9 405
26				8 750	15		8 766
27				4 904	10		4 914
28				6 114	5		6 120
29				4 731	1		4 733
30				6 013			6 013
31				1 500			1 500
32				1 778			1 778
33				2 797			2 797
34				1 475			1 475
35				897			897
36				257			257
37				560			560
38				511			511
39				468			468
40				7			7
41				7			7
42				5			5
43				3			3
44							
45							
46							
47							
48							
49							
50							
Total				73 403	69		73 471

Annex IV continued

Chub mackerel (*Scomber japonicus*), biomass in tonnes

Length cm	C. Cantin-C. Juby	C. Juby-C. Blanc	C. Blanc-C. Timiris	C. Timiris-St. Louis	St. Louis-C. Vert	C. Vert-Casamance	TOTAL
5							
6							
7							
8							
9		5					5
10		7					7
11							
12	134	263					397
13	1 338	1 565					2 902
14	6 812	3 566					10 377
15	20 220	4 526					24 746
16	24 982	13 172					38 154
17	24 391	18 335					42 726
18	18 274	13 810					32 083
19	5 557	10 127					15 684
20	2 371	13 094					15 466
21	4 632	21 134					25 766
22	7 939	18 373					26 312
23	5 636	10 169					15 805
24	5 258	9 726					14 984
25	5 564	6 530					12 094
26	8 029	11 767					19 796
27	10 730	31 418					42 148
28	17 050	54 007					71 056
29	8 328	25 497					33 824
30	8 102	14 582					22 684
31	7 161	6 204					13 365
32	5 216	3 834					9 050
33	4 957	8 270					13 227
34	2 324	10 605					12 928
35	4 742	2 160					6 902
36	1 048	4 695					5 743
37	379	8 435					8 814
38		2 755					2 755
39	443	2 916					3 358
40							
41		1 150					1 150
42		1 235					1 235
43		1 325					1 325
44							
45							
46							
47							
48							
49							
50							
Total	211 615	335 256					546 872

Annex IV continued

Chub mackerel (*Scomber japonicus*), numbers in millions

Length cm	C. Cantin-C. Juby	C. Juby-C. Blanc	C. Blanc-C. Timiris	C. Timiris-St. Louis	St. Louis-C. Vert	C. Vert-Casamance	TOTAL
5							
6							
7							
8							
9		0.7					0.7
10		0.7					0.7
11							
12	8.2	16.1					24.2
13	64.7	75.7					140.4
14	266.0	139.2					405.2
15	646.4	144.7					791.1
16	662.1	349.1					1 011.1
17	541.8	407.3					949.1
18	343.6	259.7					603.2
19	89.2	162.6					251.8
20	32.8	180.9					213.7
21	55.5	253.2					308.6
22	83.0	192.0					275.0
23	51.7	93.3					145.0
24	42.6	78.7					121.3
25	39.9	46.9					86.8
26	51.4	75.3					126.6
27	61.4	179.8					241.3
28	87.7	277.7					365.4
29	38.6	118.2					156.8
30	34.0	61.2					95.2
31	27.3	23.6					50.9
32	18.1	13.3					31.4
33	15.7	26.2					41.9
34	6.7	30.7					37.5
35	12.6	5.7					18.4
36	2.6	11.5					14.1
37	0.9	19.0					19.9
38		5.7					5.7
39	0.9	5.6					6.5
40							
41		1.9					1.9
42		1.9					1.9
43		1.9					1.9
44							
45							
46							
47							
48							
49							
50							
Total	3 285.1	3 260.3					6 545.4