

## **SURVEYS OF THE FISH RESOURCES OF ANGOLA**

**Survey of the pelagic resources  
20 July - 17 August 2001**

**Institute of Marine Research  
IMR, Bergen  
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**Institute of Marine Research  
IIM, Luanda  
Angola**

CRUISE REPORTS "DR. FRIDTJOF NANSEN"

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20 July - 17 August 2001**

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## CHAPTER 1 INTRODUCTION

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### 1.1 Objectives

This survey is one of a series aimed at monitoring the pelagic fish resources of Angola, as agreed with the Instituto de Investigação Marinha (IIM), Luanda.

The main objectives of the survey were the following:

To estimate the abundance and map the distribution of the main commercially important pelagic and semi-pelagic fish species in Angolan waters, including the two sardinella species *Sardinella aurita* and *S. maderensis*, the Cunene horse mackerel *Trachurus trecae*, the Cape horse mackerel *T. capensis*, the pilchard *Sardinops ocellata* and other pelagic species, mainly carangids.

To study the biological condition of the main species, including length weight-relationships, reproductive stages and stomach fullness. The method for determination of gonad maturity stages in *T. trecae* was to be refined and validated using gonadosomatic indices and microscopic staging.

To collect gonads, stomachs and otoliths from both horse mackerel species for later studies and to collect depth stratified samples of zoo- and phytoplankton. Horse mackerel feeding biology will be investigated by relating the stomach contents to estimated zooplankton density. The distribution and aggregation patterns of sardinella will be correlated with phytoplankton densities and composition and hydrographical and meteorological parameters.

To map the general meteorological, hydrographical and biological conditions in the survey area by means of continuous recording of weather data, CTD-casts (Temperature, Salinity and Oxygen), ADCP measurements (Acoustic Doppler Current Profiler) and plankton sampling along acoustical and hydrographical transect lines. Higher sampling efforts will be allocated in the Benguela front area and in the main horse mackerel and sardinella distribution areas.

To train the Angolan participants on the main survey routines, including using the NAN-SIS database, scrutinizing acoustical data and producing acoustical biomass estimates. Dr. Isabel Afonso-Dias (University of Algarve/ CCMar) will instruct in techniques for preservation and staging of fish gonads. Dr. Marek Ostrowski (IMR) will instruct in database management and analysis of hydrographical data.

The aim of the time series that this survey is part of is to map fluctuations in stock levels in the main pelagic species and to improve the understanding of these fluctuations in terms of the biology of the main species in relation to the environment.

## **1.2 Participation**

The scientific staff consisted of:

From IMM, Luanda: Filomena VAZ-VELHO, Domingos AZEVEDO, Bomba BAZIK SANGOLOY, Paulo BRINCA, Francisco DE ALMEDA, Henriette LUTUBA-NSILULU, Filipe VIANDA.

From IMR, Bergen: Bjørn Erik AXELSEN (Cruise leader), Thor Egil JOHANSSON, Marek OSTROWSKI, Jan Frode WILHELMSEN, Diana ZAERA.

From University of Algarve: Isabel AFONSO-DIAS (20-29 July).

## **1.3 Narrative**

The vessel departed Luanda 20 July at 1000 local time and steamed northwards to Congo River at the Angolan-Zairian border, arriving 21 July at 0500. The sampling trawls, including the mid-sized (15 m vertical opening) pelagic trawl fitted with the codend multisampler, the smallest pelagic trawl (10 m) and the demersal trawl (5 m), were prepared en route and were ready for deployment at the time of arrival. All transducers were calibrated recently (18.04.01), and since there are no suitable calibration sites in this part of Angola, the survey grid was started without prior calibration. The 38 kHz transducer was calibrated 09 August in Baía dos Elefantes.

Throughout the time series of the pelagic survey of Angola, various survey strategies differing in terms of survey design, sampling intensity and coverage have been applied, depending among other things on available ship time and the level of knowledge of the spatial distribution pattern of the target species. For this years survey the ship time has been extended to accommodate a reasonable degree of coverage, establishing a new standard for the continuation of the time-series regarding acoustical and hydrographical sections. The new standard includes the positions of all acoustical and hydrographical sections, while CTD stations related to the fish distributions or biological investigations will continue to change from year to year.

The Congo River hydrographical section was started at the Congo River estuary at 6° 04' 80'' S 12° 09' 00'' E (at 31 m bottom depth), heading south-westwards (perpendicular to the shelf). A total of nine CTD (Conductivity Temperature Depth) casts were conducted, with 6.25 NM spacing between stations. This is an increase in sampling intensity as compared to earlier years. The last station was worked at 6° 16' 29'' S, 11° 19' 93'' E (500 m).

A systematic survey track with parallel longitudinal acoustic transect lines with 5 nautical miles (NM) spacing between the lines were followed throughout the survey for the acoustic recording. The first line commenced at 6° 10' 00'' S, 12° 19' 00'' E, 6 NM north of the endpoint of the hydrographical section, and headed eastwards. The acoustic transects covered a depth range of 20-500 m, but were sometimes extended to about 750 m depth to check for deeper distributions of horse mackerel. The shallowest part of the shelf between N'zeto and the Congo River is partly inaccessible for trawling due to oil platforms and wells, and has previously not been adequately covered. This year this region was covered acoustically, but relatively small amounts of fish were encountered during the survey.

CTD sections that have been covered routinely over the past few years are included in the new sampling design. Sections that have not been standardized before are now integrated the longitudinal transect lines wherever possible (except the Congo River and Lobito sections). ADCP (Acoustic Doppler Current Profiler) recordings were logged continuously along the entire survey track. Additional CTD and ADCP stations were added *ad hoc* in areas where horse mackerel and sardinella were abundant. In these areas, zoo- and phytoplankton samples were obtained using respectively Hydrobios multinet plankton sampler and Niskin water samplers. The survey track was disrupted 29 July at 1100 to disembark Dr. Isabel Afonso Dias. Dr. Dias was transferred to a shuttle vessel outside Luanda harbour at about 1400. The survey track was resumed at about 1700 the same day. The vessel reached the Cunene River August 16 at 0600 and docked in Walvis Bay 17 August at 1800.

Following established practice, the surveyed area was divided into three regions: The region limited by Cunene River and the parallel of 13 °S - ANGOLA SOUTH - was covered from 11 to 16 August. The region between 13 °S and 9 °S - ANGOLA CENTRAL - was surveyed from 31 July to 10 August. The region between north of Pta. das Palmerinhas (9 °S) and Congo River - ANGOLA NORTH - was covered from 21 to 30 July

#### **1.4 Survey effort**

Figure 1(a-c) show the cruise tracks with fishing and hydrographic stations for the northern, central and southern regions, respectively. Figure 2(a-c) show the plankton hauls in the same areas. Table 1 summarizes the survey effort by regions.

Table 1. Summary of survey effort by regions, including number of demersal (BT) and pelagic (PT) trawl hauls, CTD casts, water stations (2-4 phytoplankton samples per station), Multinet stations (2-5 zooplankton samples per station) and distance surveyed (log), disregarding the steaming from Luanda to Congo River (Log).

<b>Region</b>	<b>BT</b>	<b>PT</b>	<b>Total trawls</b>	<b>CTD casts</b>	<b>Water stations</b>	<b>Multinet stations</b>	<b>Log (NM)</b>
Pta. Palmerinhas -Congo River	9	26	35	61	23 (71)	6(22)	1835
Benguela -Pta. Palmerinhas	12	25	37	97	20(61)	10(38)	1750
Cunene River -Benguela	18	18*	36	47	21(60)	6(21)	1165
<b>Total</b>			<b>108</b>	<b>205</b>	<b>64(192)</b>	<b>22(81)</b>	<b>4750</b>

- One faulty haul





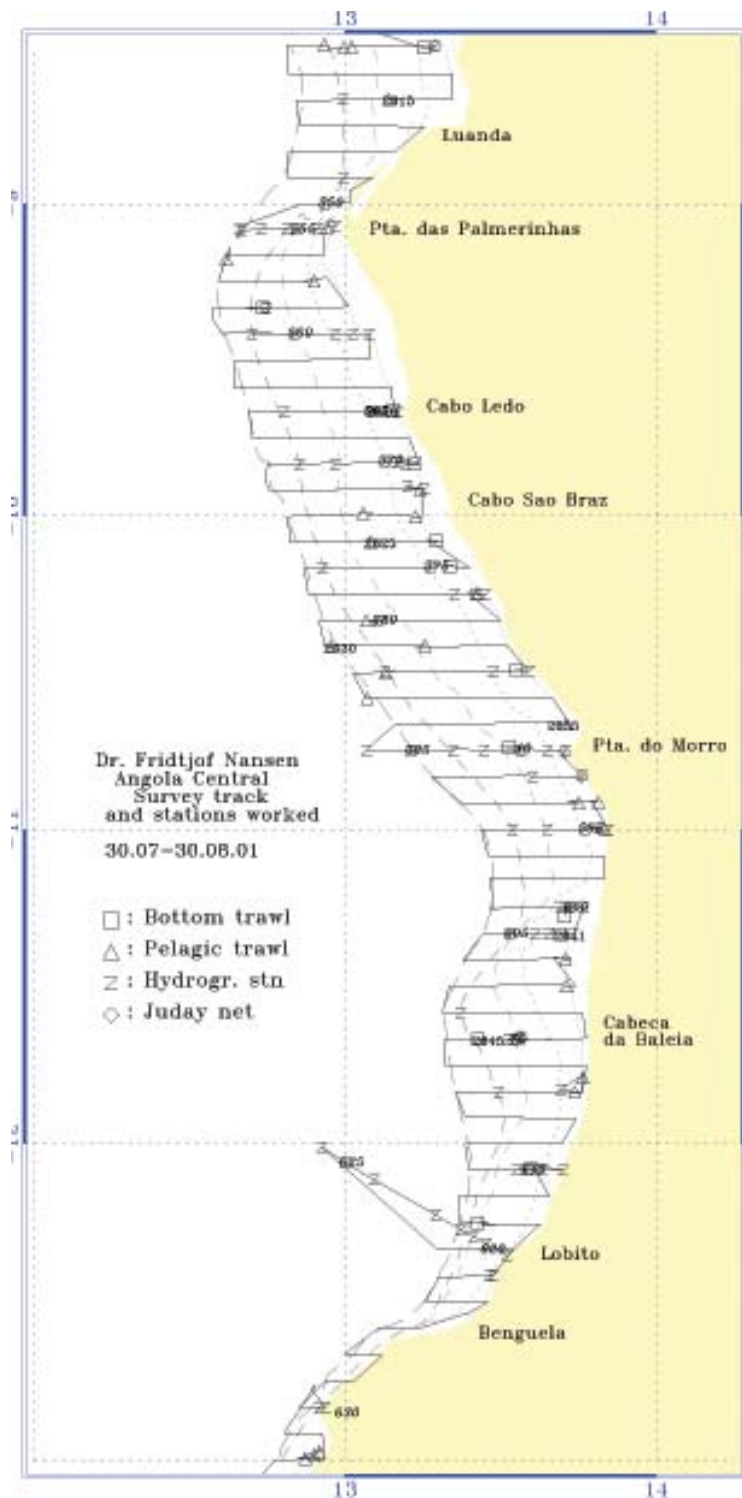


Figure 1b. Angola central. Course track with fishing, plankton and hydrographic stations, Benguela- Pta. das Palmerinhas. Depth contours as in Fig. 1a.

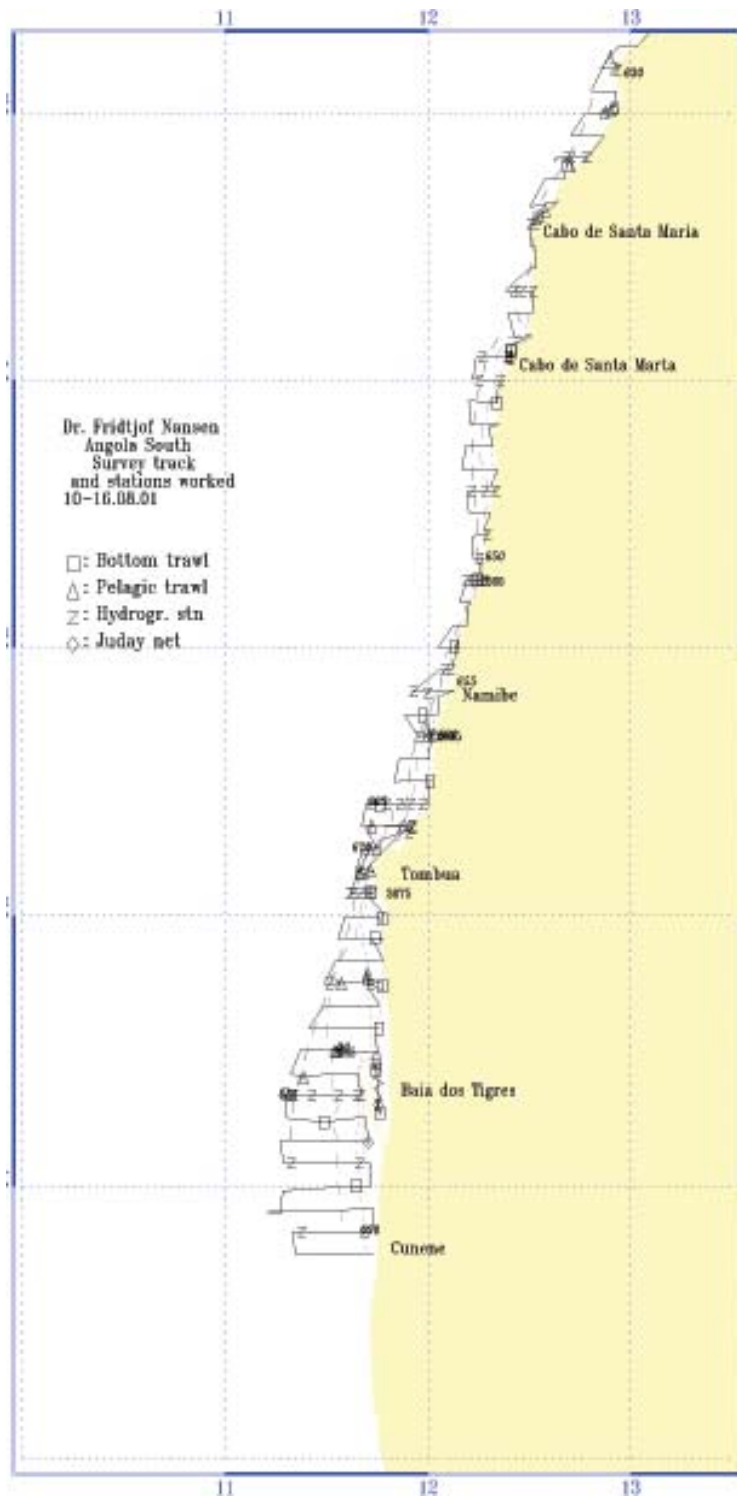


Figure 1c. Angola south. Course track with fishing, plankton and hydrographic stations, Cunene- Benguela. Depth at 20, 50,100 and 200 m are included -.

## CHAPTER 2 METHODS

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### 2.1 Hydrographic sampling

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 20 NM distance. 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 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 could not be measured, as the Guildline Portasal salinometer was out of order, but were sent to NatMIRC in Swakopmund, Namibia, for subsequent analysis there.

A total of 13 samples were accepted for oxygen calibration. A linear regression of the Winkler determinations on the CTD values produced the correction:

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

Where  $a=0.893$  and  $b=0.331$ . Current measurements were carried out continuously using the hull-borne Acoustic Doppler Profiler (ADCP). The ADCP was set to ping every 8 seconds, the depth bins were set to 8 m and the number of bins was 40. Data were averaged at 300 seconds intervals and stored on an IBM compatible PC using Transect v. 2.70 software.

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 Fish sampling

A brief description and illustrations of the sampling trawls are provided in Annex II. All trawl catches were sampled for species composition by weights and numbers. Records of catch rates are given in Annex I.

Biological samples were obtained for sardinella and horse mackerel. Total length and body weight were determined to the nearest 1 cm and 1 g below, respectively. Sex and reproductive stages were determined by means of macroscopic examination, scoring each fish according to a five-point classification scale (Table 2) (Holden and Raitt 1974).

Table 2. The five point maturity scale proposed by Holden and Raitt (1974) for partial spawners.

Stage	Maturity status	Description
I	Immature	Ovary and testis lengths about 1/rd of body cavity length. Ovaries pinkish, translucent; testis whitish. Ova not visible to the naked eye.
II	Maturing virgin and recovering spent	Ovary and testis about ½ length of body cavity length. Ovary pinkish, translucent; testis whitish, more or less symmetrical. Ova not visible to the naked eye.
III	Ripening	Ovary and testis about 2/3rds length of body cavity length. Ovary pinkish-yellow colour with granular appearance, testis whitish to creamy. No transparent ova visible.
IV	Ripe	Ovary and testis from 2/3rds to full length of body cavity. Ovary orange-pink in colour with conspicuous superficial blood vessels. Large transparent, ripe ova visible. Testis whitish to creamy, soft.
V	Spent	Ovary and testis shrunken to about ½ length of body cavity. Walls loose. Ovary may contain remnants of disintegrating opaque and ripe ova, darkened or translucent. Testis bloodshot and slack.

During the current survey a special study was conducted to investigate the applicability of this scale, and to validate the macroscopic scale using gonadosomatic indices and microscopic staging techniques (section 2.3 below). Stomach samples of sardinella and horse mackerel were collected for further analysis at IIM, Luanda. Feeding biology will be investigated in more detail at a later stage by relating the stomach contents to recorded availability of phytoplankton (sardinella) and horse mackerel (zooplankton). Gonads and otoliths were also collected for *ad-hoc* examination.

### **2.3 Consistency and validation of the Holden and Raitt five-point gonad maturity scale for Cunene horse mackerel (by Dr. Isabel Afonso Dias)**

#### *Objectives*

The study had two main objectives: The first objective was to verify the applicability of the five-point macroscopic maturity scale used in previous surveys to classify the maturity stage of Cunene horse mackerel gonads. The scale was suggested by Holden and Raitt (1974) for fish with asynchronous gonad development. The second objective was to validate the macroscopic scale using gonadosomatic indices and microscopic staging techniques. Data were collected in the northern region, in the area from 6° 10' S to 8° 40' S.

### *Macroscopic staging*

Although many species can usually be fitted into a five-stage scale, it is often convenient to adjust this generalized staging scheme to particular species to ease the proper identification of stages. Detailed information of the gonad development should, however, not justify the proliferation of staging schemes. The level of detail of the Holden and Raitt scale appears sufficient for mapping the state of gonad development in the fish, but some additional information should be included for better discrimination between the stages (Table 3). A comprehensive description of the stages, including the additional information in Table 3, is provided in Annex III.

Table 3. Suggested information additional to the Holden and Raitt maturity scale for improved identification of gonad maturity stage in Cunene horse mackerel (*Trachurus trecae*).

<b>Stage</b>	<b>Description</b>
I	Ovary and testis quite narrow and have a tubular shape.
II	Ovary more opaque; small specks make gonad appear more granular. Testes develop lobules, hence loosing the tubular shape. Some recovering spent ovaries have conspicuous blood vessels. Milt can be seen inside testes when cut. Ovaries granular due to the presence of opaque oocytes. First time spawners have very swollen gonads. Ovaries that have spawned once lose consistency, but maintain the external appearance typical for this stage.
III	Ovaries jelly-like due to the presence of translucent oocytes. Gonads extrude oocytes or milt when gently pressed.
IV	Testes may have sperm remaining in the seminal duct. Pinkish areas appear in the periphery of the testes.
V	Ovaries bloodshot and slack.

Horse mackerel mean gonadosomatic index estimated for females and males by maturity stage showed a consistent pattern (Figure 2).

### *Microscopic staging*

Samples of gonads were collected and preserved to obtain histological sections. This procedure aims to obtain thin sections of the gonads for microscopic staging and makes it possible to calibrate the five-point macroscopic scale used for staging of the gonads. The developmental stage of the gonads can be determined by microscopic examination of the oocytes, but like for any other biological continuum, it is difficult to classify transition stages consequently. Despite this, microscopic examination of the oocytes is the most accurate method for staging gonads (West 1990).

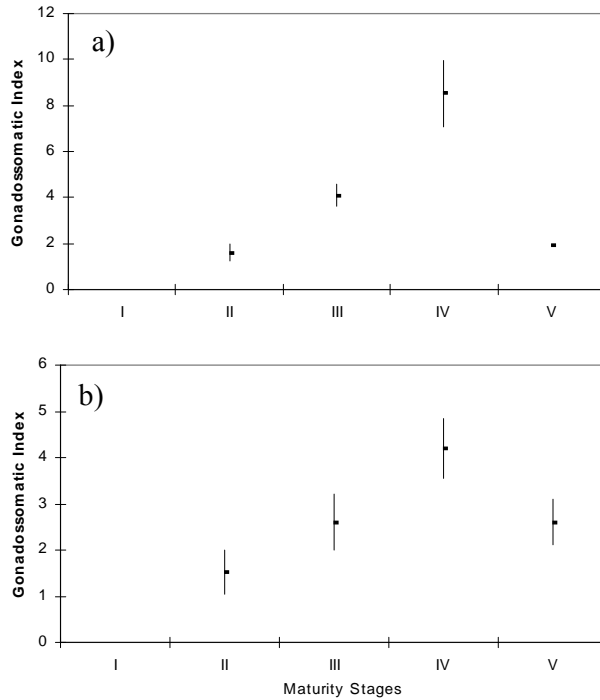


Figure 2 Horse mackerel mean gonadosomatic index estimated for females (a) and males (b), by maturity stage.

## **2.4 Plankton sampling**

### *Zooplankton*

The zooplankton communities in the main distribution area of horse mackerel and on selected localities within the sardinella core areas were sampled in order to map the prey availability. The sampling was conducted by means of HYDROBIOS multinet, enabling up to five depth-specific samples in one deployment. Each net (405  $\mu$ m) was fitted with a flow meter for estimation of sample volume. A SCANMAR depth sensor gave real-time information of the depth. Nets were opened and closed remotely from the bridge of the vessel.

### *Phytoplankton*

Phytoplankton samples were collected using Niskin water samplers mounted in a circular array on the CTD probe.

## 2.5 Acoustic sampling

### *Acoustic equipment*

The acoustic recordings were conducted using two Simrad EK 500 echo sounders (Bodholt *et al.* 1989) running keel mounted transducers at nominal operating frequencies of 38, 120, 18 (EK 1) and 200 kHz (EK 2). The technical specifications and operational settings of the echo sounders are given in Annex IV. Logging of acoustic raw data was done using both the Sun-Unix based Bergen Echo Integrator (BEI) (Knudsen 1996) and the Windows based SonarData\_Echolog.

There are very few locations along the Angolan coast that are favourable for transceiver calibration (essentially Baía dos Tigres and Baía dos Elephantes), and the survey was therefore started without *a priori* calibration. The 38 kHz transceiver was calibrated in Baía dos Elephantes 9 August. The sv transducer gain was recorded at 27.30 dB, compared to 27.37 dB on the last calibration, while the TS transducer gain was recorded at 27.47 dB, compared to 27.49 dB (Annex IV). Hence the drifts were then within a 0.1 dB range, and since this is compatible with the expected experimental error level; no ad-hoc re-computation of the data will be carried out. All four transceivers were calibrated 18 April 2001 (BENEFIT Cruise Report 2/2001).

### *Allocation of acoustic energy to target taxii*

The acoustic data were scrutinized using the post-processing module of the BEI software. Scatterers were displayed at 38 kHz, standardized to 5 NM echograms with 1 000 pings by 500 returns (vertical bins). The mean 5 NM area backscattering coefficients  $s_A$  ( $m^2/NM^2$ ) was allocated to a predefined set of taxii on the basis established echogram features. Acoustic groups and respective taxi are listed in Table 4. Ground truthing and estimation of mean length and weight were accomplished by means of targeted pelagic and demersal trawling.



Table 4. Allocation of acoustic densities to taxii. Note that for sardinellas, horse mackerels, big-eye grunt and pilchard, listed species are the only ones encountered in the region, while for the other groups, the listed species are examples.

<b>Group</b>	<b>Taxon</b>	<b>Species</b>	
Sardinella	<i>Sardinella</i> sp.	<i>S. aurita</i>	
		<i>S. madarensis</i>	
Horse mackerel	<i>Trachurus</i> sp.	<i>T. trecae</i>	
		<i>T. capensis</i>	
Pilchard	<i>Sardinops</i>	<i>S. ocellata</i>	
Big-eye grunt		<i>Brachydeuterus auritus</i>	
Pelagic species 1	Clupeiformes <sub>1</sub>	<i>Ilisha africana</i>	
		<i>Etrumeus whiteheadi</i>	
		<i>Engraulis encrasicolus</i>	
Pelagic species 2	Carangidae <sub>2</sub>	<i>Selene dorsalis</i>	
		<i>Chloroscombrus chrysurus</i>	
		<i>Decapterus rhonchus</i>	
		<i>Seriola carpenteri</i>	
		<i>Auxis thazard</i>	
	Scombridae	<i>Sarda sarda</i>	
		<i>Scomber japonicus</i>	
		<i>Sphyræna guachancho</i>	
	Sphyrænidae	<i>Trichiurus lepturus</i>	
		<i>Lepidopus caudatus</i>	
Other demersal species	Sparidae <sub>3</sub>	<i>Dentex angolensis</i>	
		<i>D. macropthalmus</i>	
		<i>D. congoensis</i>	
		<i>D. canariensis</i>	
		<i>D. barnardi</i>	
		<i>Pagellus bellottii</i>	
		<i>Sparus caeruleostictus</i>	
		<i>S. pagrus africanus</i>	
		Other taxii	<i>Saurida brasiliensis</i>
			<i>Arioma bondi</i>
	<i>Pomadasys incisus</i>		
	Mesopelagic species	Myctophidae <sub>3</sub>	<i>Diaphus dumerili</i>
			<i>Trachinocephalus myops</i>
Plankton	Calanoidae	<i>Calanus</i> sp.	
	Euphausiidae	<i>Meganyctiphanes</i> sp.	
	Other plankton		

<sub>1</sub>: other than *Sardinops* sp.; <sub>2</sub>: other than *Trachurus* sp.; <sub>3</sub>: main taxon in-group.

### *Estimation of biomass*

The target strength (TS) function used to convert mean area backscattering coefficient  $s_A$  ( $m^2/NM^2$ ) to number of fish corresponds to:

$$TS = 20 \log L - 72 \text{ (dB)} \quad (2)$$

or

$$C_F = \frac{10^{7.2}}{4\pi} \cdot L^{-2} \quad (3)$$

where  $C_F$  is the conversion factor from acoustic density to fish biomass and  $L$  is mean total fish length. This target strength function was originally established for North Sea herring, but has later been attributed to clupeids in general (Foote et al. 1986, Foote 1987). No specific target strength relations presently are available for the species at hand, and equation (3) has therefore been applied consequently for all targeted species in this time series. The biomass was calculated by multiplying the number of fish by the expected length at weight, estimated by regressing the log-length (total) against total weight. Separate length-weight relationships were worked for each region (north, central, south), pooling all data within each region.

The boundaries of encountered fish aggregations (strata) were determined *ad-hoc* by means of contouring within the inner and outer zero-value limits of the transect lines. The strata contours were digitised using a Callboard III digitising board/ Atlas Draw v. 2.03 PC based software. Distribution plots and aerial calculations on the strata were carried out using IDL 5.0 software on a SUN-UNIX workstation. Sub-stratification was used isolate areas of similar density, using the following pre-defined, standard categories: 1:  $s_A = 0-300$ ; 2:  $s_A = 300-1\ 000$ ; 3:  $s_A = 1\ 000-3\ 000$ ; 4:  $s_A > 3\ 000$ .

Mean 5-NM integrator values ( $s_A$ ) computed along the parallel transect lines were re-averaged for each stratum. The short spacing between the lines (5 NM) makes it impossible to exclude all between-transect values without removing some on-line contributions, particularly for sardinella on the inner shelf. The potential bias (positive) by of including between-line values is likely smaller than the bias (negative) that would have been introduced by excluding high on-line contributions and this bias is also counteracted by the shallow distribution pattern (partly above the integration limit) and vessel avoidance behaviour (Misund and Aglen 1992) of sardinella. All estimates should only be considered as relative indices of abundance.

The overall length frequency distributions within strata were estimated by weighting the sample-

distributions with the nearest valid 5 NM integrator value, or the average of two adjacent values, in order for the samples to affect the overall distribution according to the relative densities. Target species of the same genus, i.e. *S. aurita*/ *S. maderensis* and *T. trecae*/ *T. capensis*, are not acoustically distinguishable, and the  $s_A$  values were therefore split according to the relative distributions of the two species in each length group. The total number of fish in each length group  $\rho_i$  was estimated as:

$$\rho_i = \frac{r_i \cdot s_{i,j} \cdot \langle s_A \rangle \cdot A_s}{\sum_i \frac{p_i}{C_{Fi}}} = \frac{10^{7.2} \cdot r_i \cdot s_{i,j} \cdot \langle s_A \rangle \cdot A_s}{4\pi \sum_i p_i \cdot (l_i + 0.5)^2} \quad (4)$$

where:

- $l_i$  = length group i (nearest full cm below total length)
- $\rho_i$  = estimated number of fish in length group i
- $r_i$  = sample proportion of fish in length group i
- $s_{i,j}$  = sample proportion of species j in length group i
- $C_{Fi}$  = conversion factor for fish in length group i
- $\langle s_A \rangle$  = mean recorded area backscattering coefficient ( $m^2/NM^2$ )
- $A_s$  = horizontal area of stratum s
- $l_i+0.5$  = mid-length in group length group i.

## CHAPTER 3 OCEANOGRAPHIC CONDITIONS

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The observations made during current cruise indicate the presence of colder and less saline water masses on the Angolan shelf. However, the spatial distribution of temperature salinity and oxygen, as well as the vertical stratification follow more or less the pattern observed during winter on previous surveys with the “Dr. Fridtjof Nansen”.

### 3.1 Wind conditions

Calm wind conditions were observed in the northern and central survey region. In these areas, the wind direction varied throughout the day, predominantly between SW to E, but winds from the northern sectors were also observed. The top wind velocities in the northern and central regions rarely exceeded 8 knots (4.1 m/s). The map of wind velocities along the survey track in Figure 3 (a-c) for the northern region, central and southern regions, respectively. Southwards of the latitude 14 °S, the wind direction become progressively concentrated around S and SW and the recorded velocities increased. To the south of Tombua (15°45' S), the survey fell under the strong south to south-easterly trade wind with velocities reaching 30 knots (15.5 m/s). Summary statistics of the wind conditions in 2-degree latitudinal boxes along the Angolan coast are represented in Tables 5-6.

Table 5. Frequency of occurrence of wind for the principal directions for the 2-degree latitudinal sections along the Angolan coast, obtained from the data averaged over 1NM intervals along the survey track. The values are given as percentage of all observations.

Wind sector	Latitudinal range					
	6°S–8°S	8°S–10°S	10°S–12°S	12°–14°S	14°S–16°S	>16°S
N	1.5	1.3	3.0	1.7	0.0	0.0
NE	8.4	2.9	3.9	4.8	0.0	0.0
E	28.1	12.1	10.9	5.7	0.5	0.5
SE	27.8	26.3	18.3	5.9	2.3	5.9
S	17.2	28.8	33.9	27.7	53.0	66.2
SW	12.5	18.1	20.4	26.7	30.5	26.8
W	3.2	7.1	6.9	16.2	12.6	66.3
NW	1.3	3.3	2.8	11.3	1.1	26.9

Table 6. Average wind velocity for the principal wind directions for the 2-degree latitudinal sections along the Angolan coast, obtained from the data averaged over 1 NM intervals along the survey track. The values are given in knots.

Wind sector	Latitudinal range					
	6°S–8°S	8°S–10°S	10°S–12°S	12°–14°S	14°S–16°S	>16°S
N	2.7	1.8	3.1	2.8	0.0	0.0
NE	4.8	4.3	3.0	3.9	0.0	4.1
E	5.9	4.1	5.5	4.0	2.1	27.0
SE	7.3	6.2	5.8	3.2	5.0	23.1
S	6.1	6.2	7.1	8.3	10.6	16.0
SW	7.1	7.0	6.6	7.9	10.1	16.4
W	4.7	6.2	4.2	5.9	5.5	0.0
NW	3.7	4.8	2.4	6.5	4.5	0.0

### 3.2 Surface distribution

The sea surface temperature (5 m depth) is shown Figure 4 (a-c) for the northern, central and southern regions, respectively. The large-scale distribution was dominated by the usual at this time of the year steady decrease in temperature along the coast; from 20 to 23 °C in the tropical areas of the North to about 15 °C in the Benguela region of the south. On smaller scales, the isotherms were oriented alongshore, often revealing pools of the colder water confined to the inshore areas. In the northern and central regions, such pools have been found between N'zeto and Ambriz; off Luanda, Cabeça da Baleia and between Lobito and Cabo de Santa Maria (Figures 4a and 4b, respectively). In the southern region, the alongshore orientation of isotherms was found along the whole coastline.

Cold water pools observed inshore on the SST maps in the south coincided with the strong wind event oriented alongshore, and thus manifested the effect of the wind-driven coastal upwelling process. In the North, such association with a classical coastal upwelling was far less evident. All locations with low temperature inshore on the SST maps coincided with rather calm wind conditions, and there were not trace of stronger wind action prior to the survey. On the other hand, the vertical stratification of the water column along the shelf break in this region was characterized by a very thin (up to 20 m thick) layer of warm water ( $T > 20$  °C,  $S > 35.7$  psu) overlaying a colder water mass, with the TS characteristics related to Equatorial Under Current (see next section). It is possible, that due to the shallow pycnocline this underlying water mass can be brought to the surface under the moderate wind conditions, giving rise to appearance the cold-water signatures observed on the SST maps.

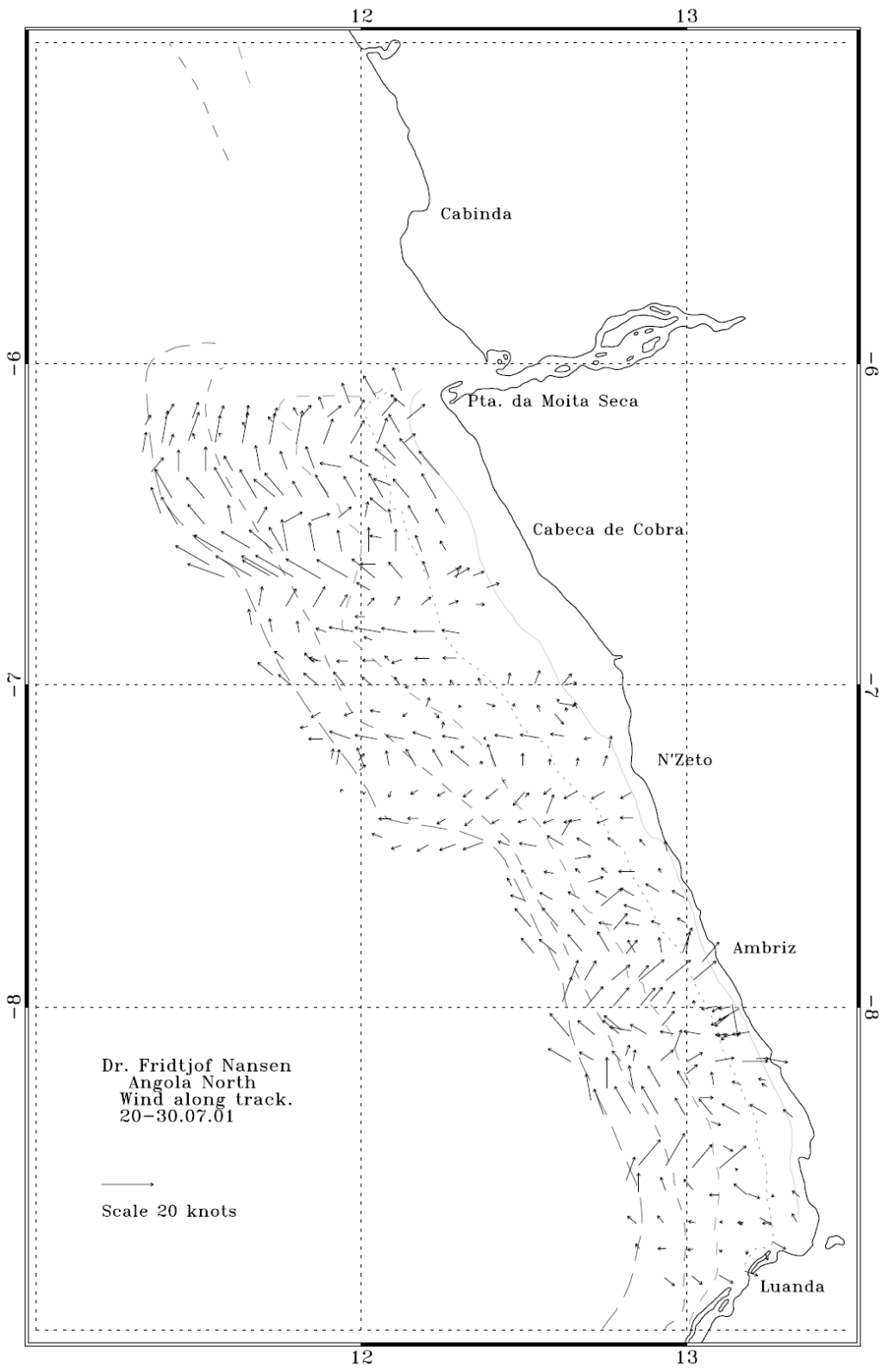


Figure 3.a Distribution of wind velocities along the survey track for the northern region. Depth contours as in Fig. 1.a.

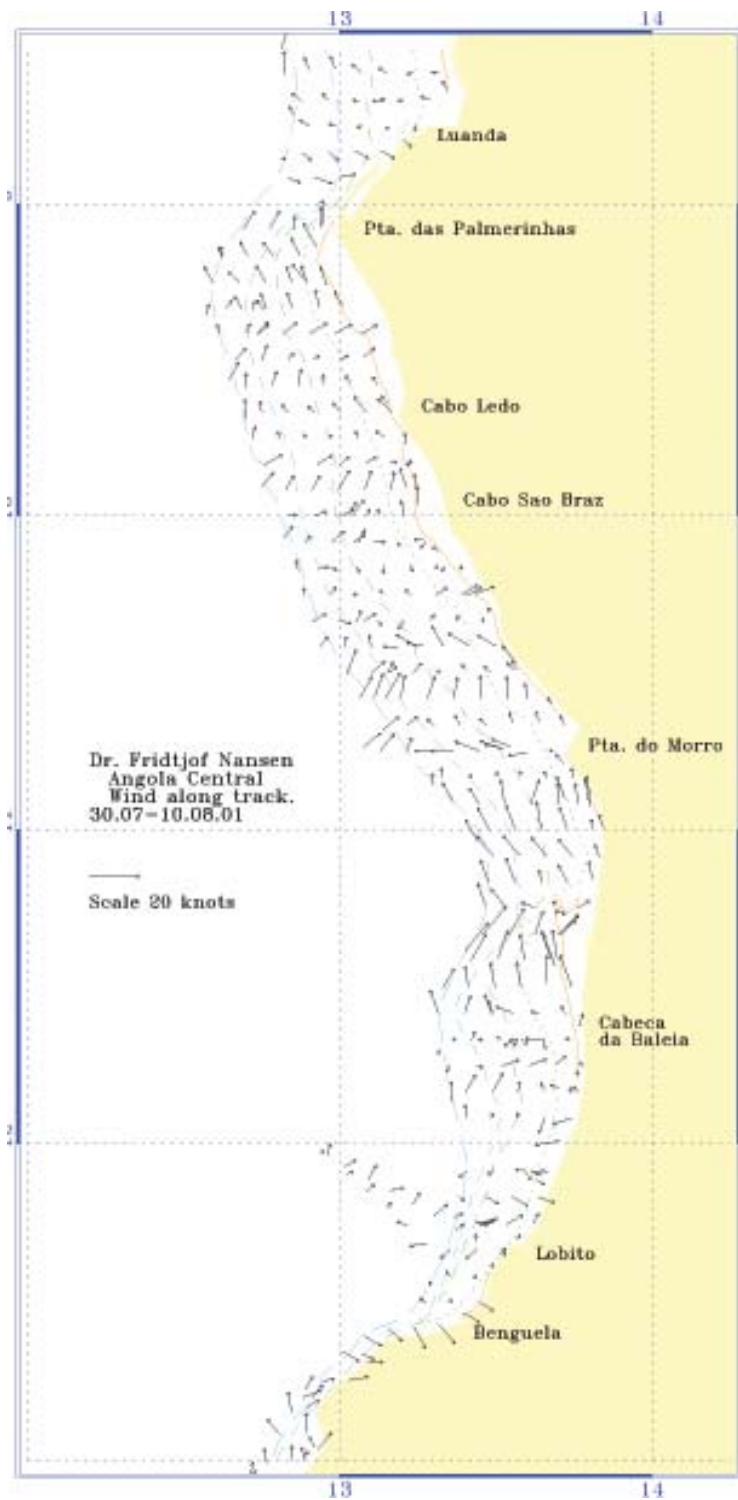


Figure 3.b Distribution of wind velocities along the survey track for the central region. Depth contours as in Fig. 1.a.

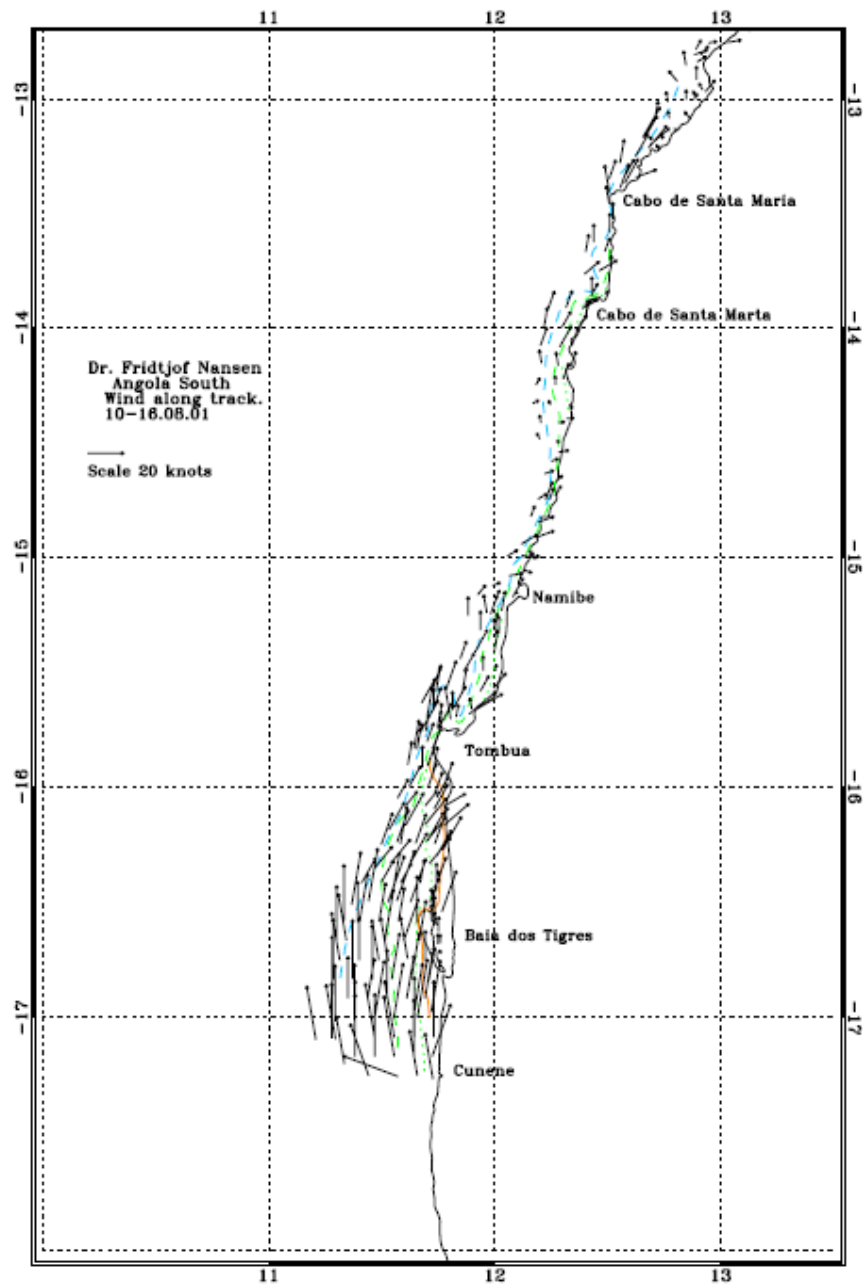


Figure 3.c Distribution of wind velocities along the survey track for the southern region. Depth contours as in Fig. 1.c.



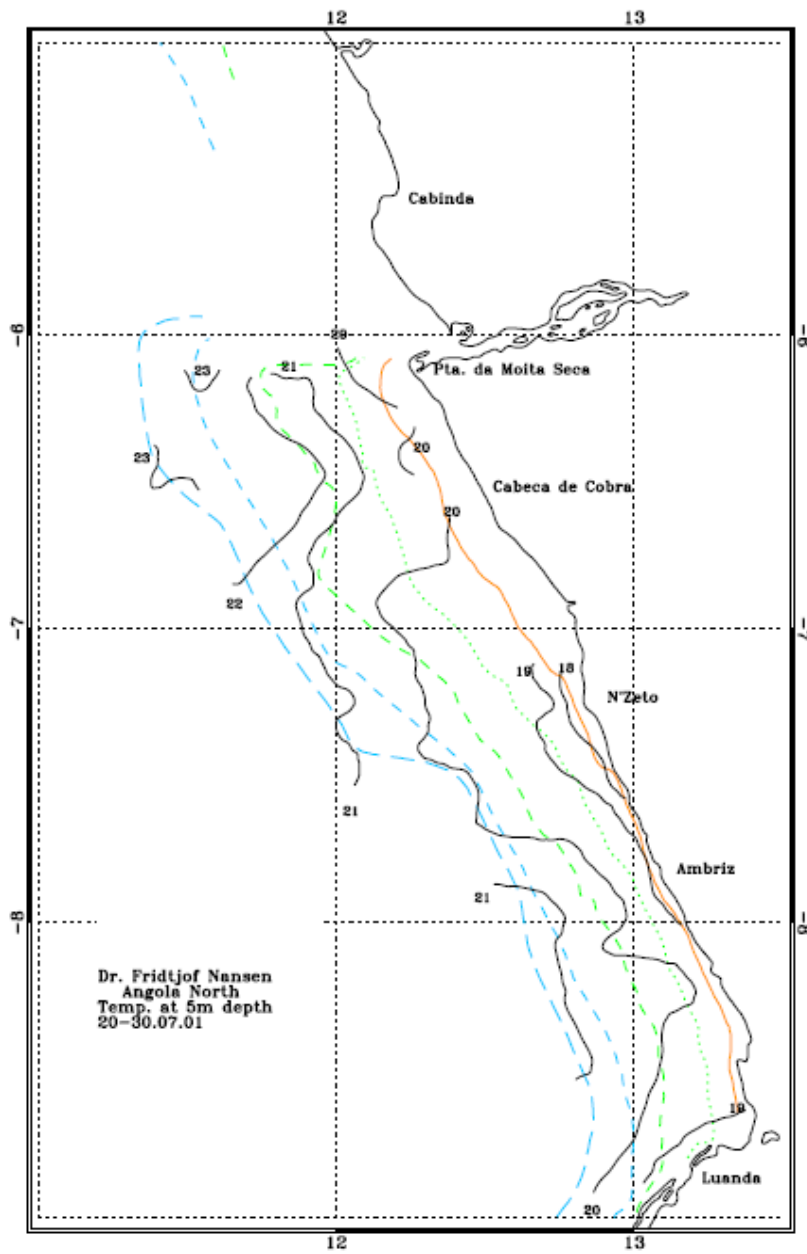


Figure 4a Distribution of water temperatures at 5m depth in the northern region. Depth contours as in Fig. 1.a.

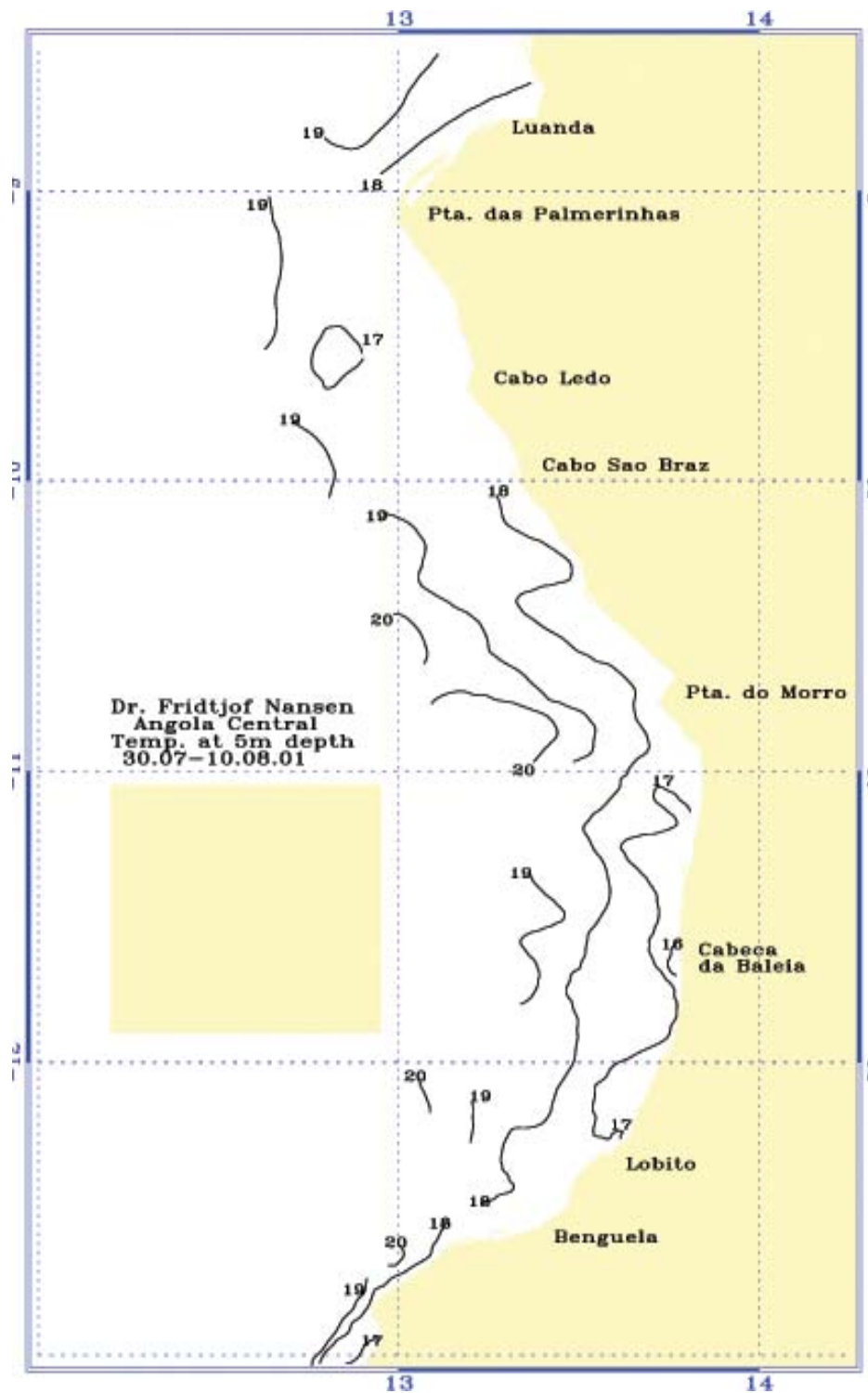


Figure 4b Distribution of water temperatures at 5m depth in the central region. Depth contours as in Fig. 1.a.

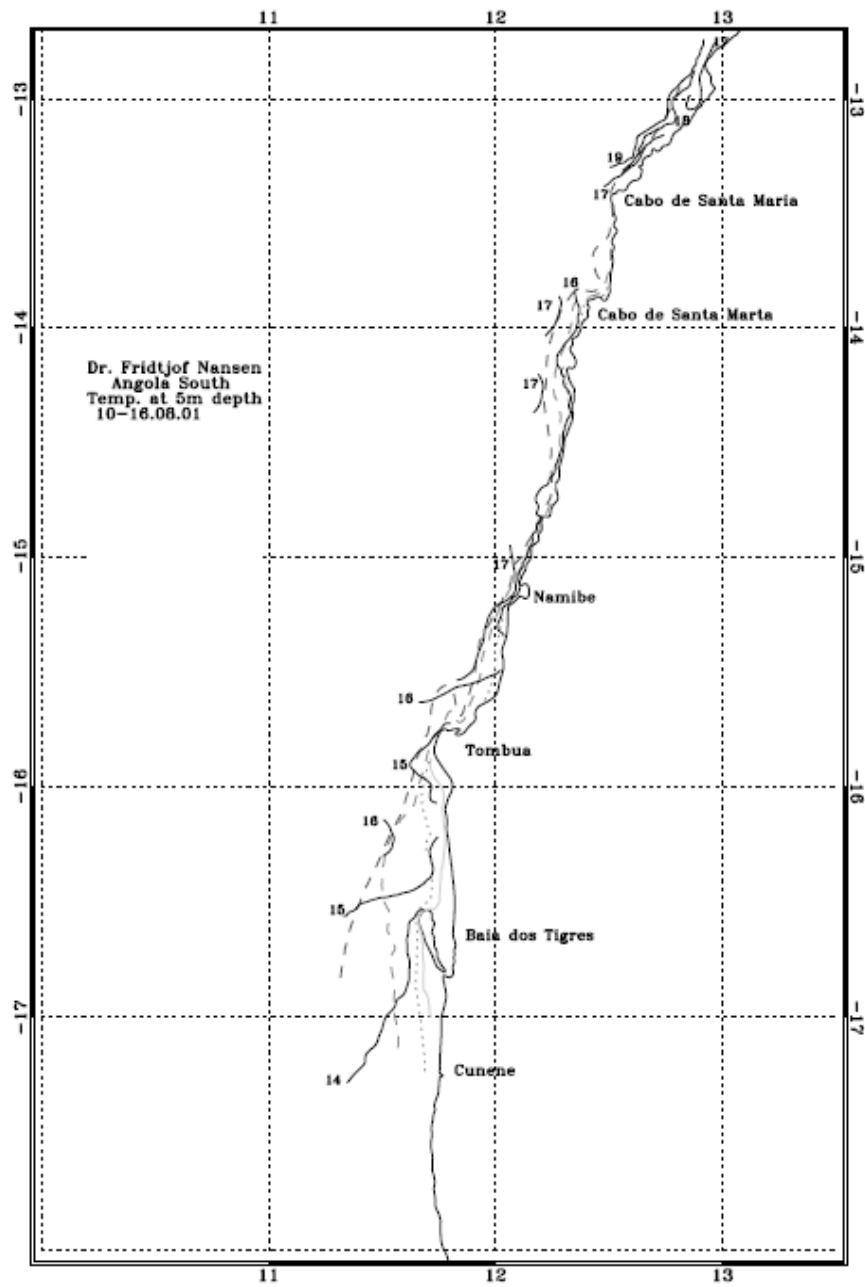


Figure 4c Distribution of water temperatures at 5m depth in the southern region. Depth contours as in Fig. 1.c.

### 3.3 Standard sections

The standard sections of temperature salinity and oxygen are demonstrated in Figure 5 (a-h). Due to vast variability of the width of the shelf zone along the Angolan coast, it was necessary, in order to reveal the hydrographical patterns observed, to represent each section using the same horizontal size for each figure. The reader is referred to the map of survey track (Figure 1a-c) to orientate on the proportions between the extents of the presented sections. Also, to facilitate such orientation, the distances sailed along each transect are described under the figure.

Section off Moita Seca, 6 °04.740' (Figure 5a). The section was located in the in the mouth of Congo River, along the southern edge of the deep underwater canyon. During the winter season, discharge of fresh water to the sea by the river is expected to be at its lowest, and indeed the salinity section demonstrates that the region of fresh, low salinity water of the terrestrial origin is confined to a 10 m-thick layer, extending only some 15-20 NM. offshore. The additional CTD stations made in the vicinity of the river mouth detected the Congo River plume to some 50 NM. to the south, but only on the inner side of the shelf.

Section off Ambriz, 07°49.960'S (Figure 5b). Distributions of sea properties were very similar to those observed along the Moita Seca section, except for the absence of the brackish Congo River plume. At the surface the temperature increased from 17.9 °C inshore to 20.4 °C offshore, while salinity remained nearly constant at 37.5 psu. The surface layer was separated from the deeper layers by a sharp pycnocline at 10 m depth, which coincided with the vertical salinity maximum, and marked the region where the temperature had become decreasing with depth. The observations also revealed an abrupt drop in oxygen values from 4 to 5 ml/l near the surface to less than 3 ml/l at 50 m depth. The pattern observed across this section was characteristic to all subsequent sections made during this survey along the coast in the northern and central regions of Angola. The seasonal intensification of Equatorial Under Current system, which brings into the inshore areas of Angola the nutrient-rich and oxygen-poor waters probably sustain it.

Section at Palmerinhas, 09°04.320'S (Figure 5c) is located south off Luanda, on a very steep part of the continental slope. The salinity distribution revealed the presence of a brackish water plume with salinity < 34.8 psu. While the observed plume was probably originated from the Cuanza River to the south of the section, its extent was probably exaggerated. The plume was observed only at two closely spaced CTD stations the vicinity of a narrow rift in the continental slope. The spatial extent that rift and associated brackish water has remained totally unresolved due to the wide the spacing of the remaining CTD stations along the transect.

Section off Pta do Morro, 10°44.800'S (Figure 5d) revealed the pattern similar to that observed off Ambriz: a thin surface layer of surface water with constant salinity at about 35.7 psu and temperature increasing offshore from 18° to 20.4°C, separated from the underlying oxygen-poor layers by a shallow pycnocline. One striking difference is the sharper decrease in the oxygen values with depth, which in the case of this section, dropped at 50 m below 2ml/l.

Section off Lobito, 12°21.170'S (Figure 5e) had on the inshore side the temperature, salinity and oxygen characteristics similar to that of the Pta do Morro section. The elevation of isolines of these properties near the coast indicated an ongoing upwelling. Very little is known what might have been the cause of this upwelling event, as the wind conditions encountered near Lobito were extremely calm. The event coincided with the observations of large number of the sardinella schools appearing at the sea surface off Lobito during the morning after the section was made. On the offshore side of the Lobito section, note the appearance the high salinity and temperature core of the surface water originating in the open regions of South Atlantic ( $T > 21.4$  °C,  $S > 35.8$  psu).

Sections at Flamengos, 15°34.880'S and Pta. Albina 15°54.890'S. (Figure 5f–g). Those two closely spaced sections, located in the southern region, appeared to delimit the position of the Angola-Benguela front along the coast during the survey. A drop in the surface temperature manifested the front by 0.15 °C and in salinity by 0.2 along 200 m depth contour over a distance of 20n.mi. South of the position of the Pta Albina section the waters with  $S > 35.7$  psu were no more observed during this survey.

Section off Baía dos Tigres, 16°39.900'S (Figure 5h). The section was located in the Benguela domain, in the region under an influence of strong southeasterly gale diving the coastal upwelling. The signature of the upwelling in terms of up sloping isolines of temperature, salinity and oxygen is clearly seen in Figure 2.3g.

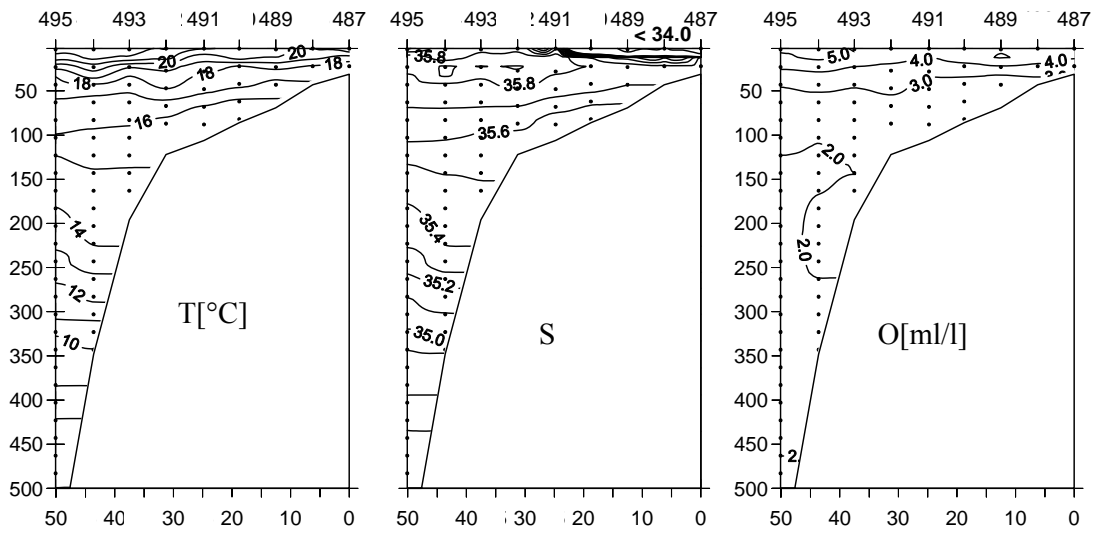


Figure 5a Vertical sections of temperature salinity and oxygen off Moita Seca

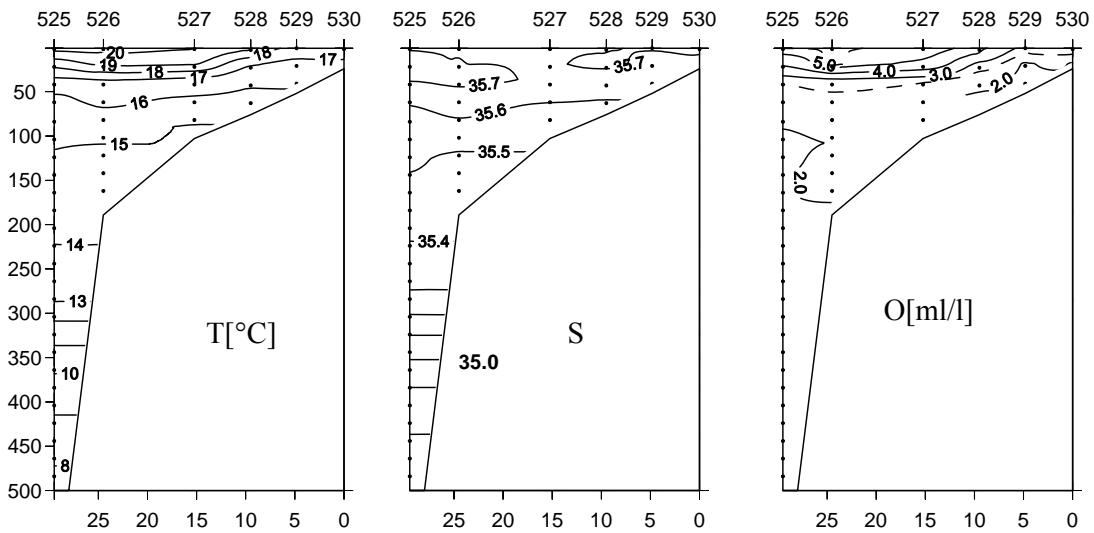


Figure 5b Vertical sections of temperature salinity and oxygen off Ambriz

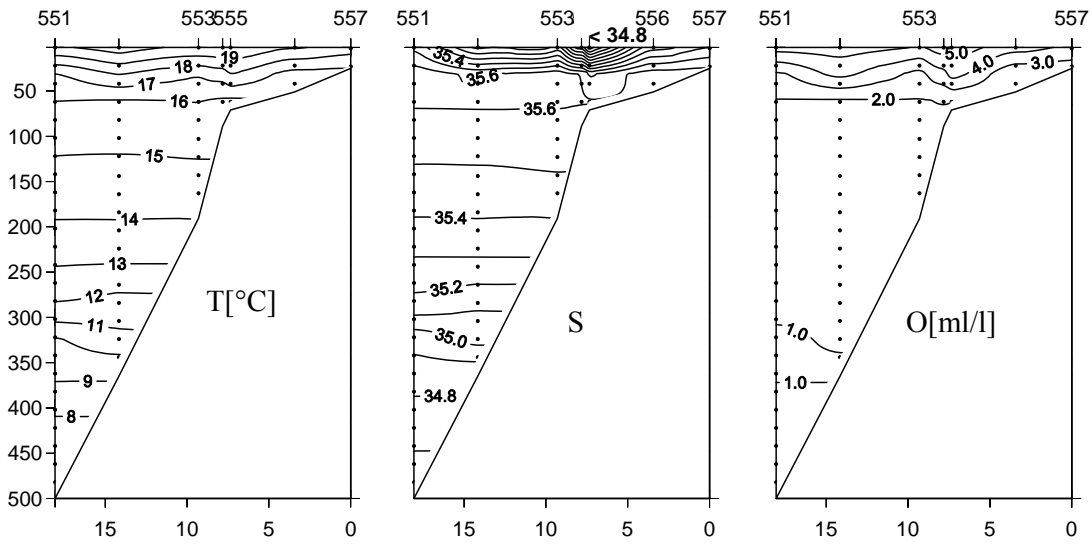


Figure 5c Vertical sections of temperature salinity and oxygen off Palmerinhas

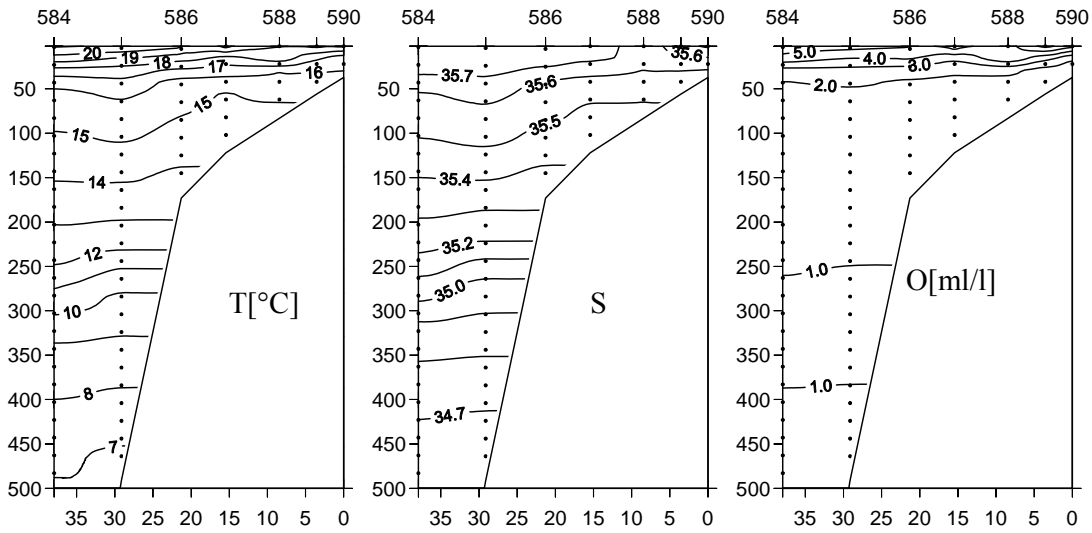


Figure 5d Vertical sections of temperature salinity and oxygen off Pta do Morro

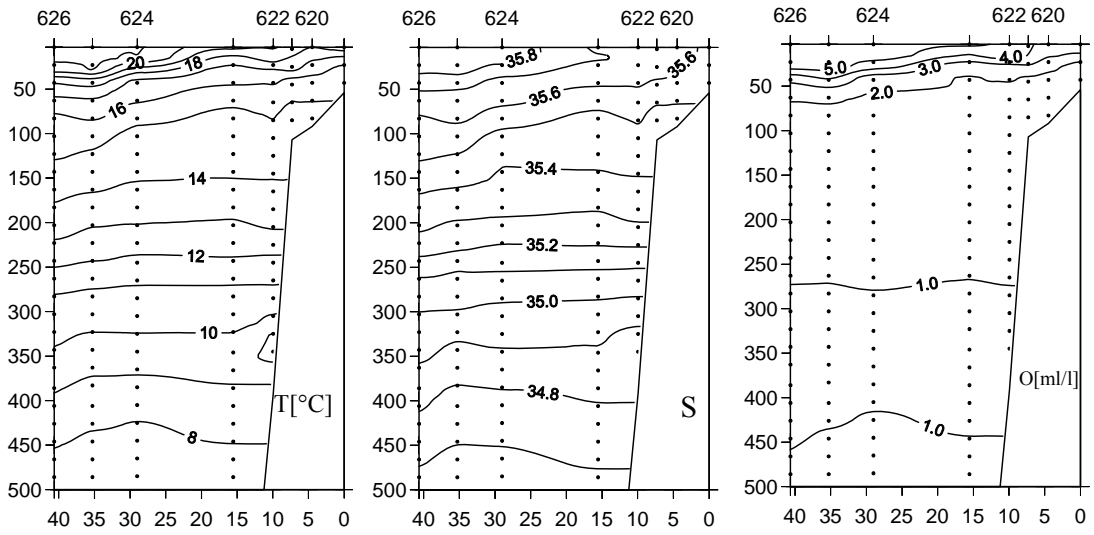


Figure 5e Vertical sections of temperature salinity and oxygen off Lobito.

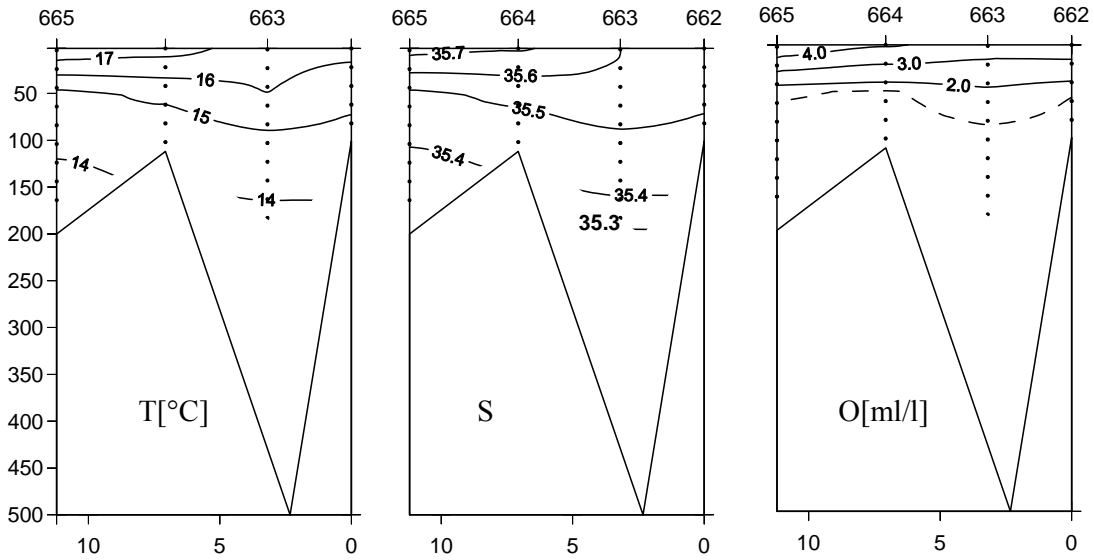


Figure 5f Vertical sections of temperature salinity and oxygen off Flamengos



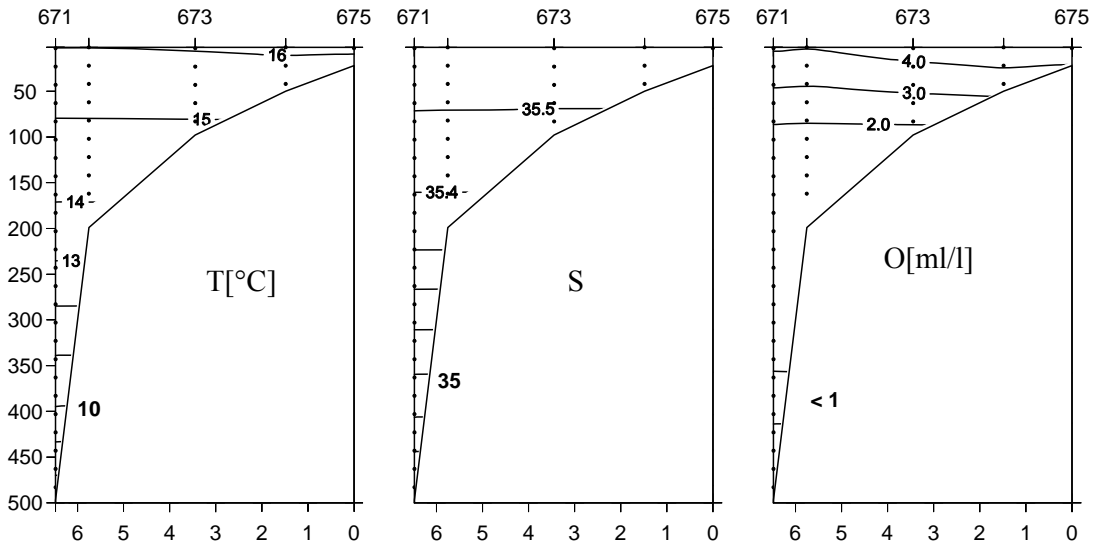


Figure 5g Vertical sections of temperature salinity and oxygen off Pta Albina

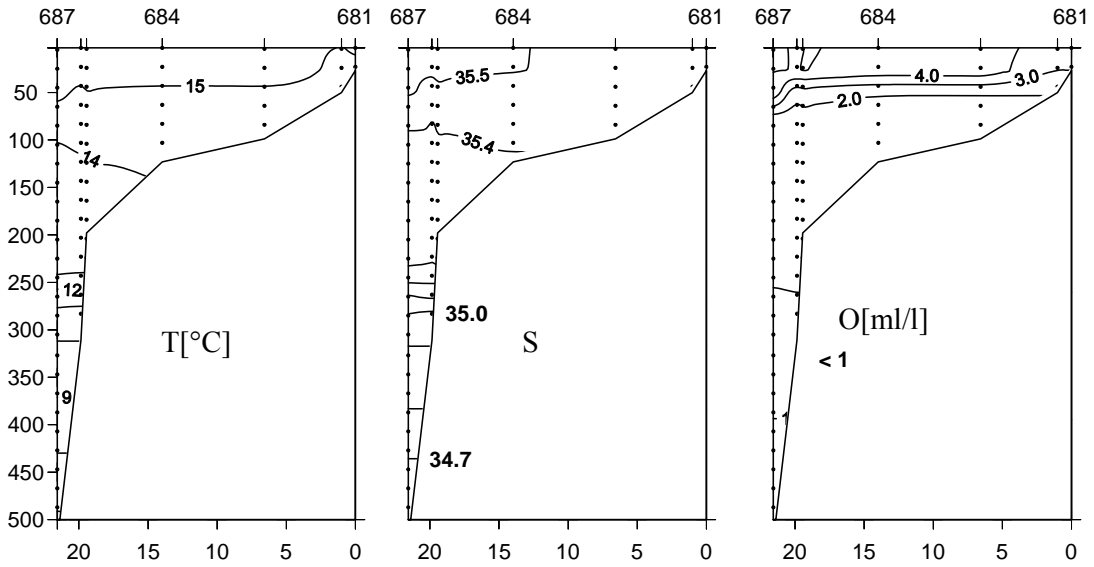


Figure 5h Vertical sections of temperature salinity and oxygen off Baía dos Tigres

## CHAPTER 4 DISTRIBUTION, SIZE COMPOSITION AND BIOMASS ESTIMATES

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### 4.1 Pta das Palmerinhas -Congo River

#### *Sardinella*

Both sardinella species *Sardinella maderensis* and *S. aurita* were found in three different areas in the northern region, mainly inshore (Figure 6). In the northernmost of these (Cabeça de Cobra), only *S. aurita* was found. In the central part (N'zeto) both species were mixed, while the southern distribution area consisted only of *S. maderensis*. Last year, the distribution pattern was patchy, covering a smaller total area. Like last year, acoustic densities in this region were generally low, with high-density spots inshore. The sardinella was usually schooling near the surface during daytime, often visible from very long distances (several kilometres). Contrasting last year, when the sardinella usually formed loose aggregations at night, dense schools or shoals were frequently formed at night during this year's survey. During dense schooling, the sardinella was very hard to sample. Most samples this year are therefore, like in previous years, obtained from loose aggregations at nighttime.

Figure 7 shows the length frequency distribution of *S. maderensis* and *S. aurita*. The *S. maderensis* ranged from 23 cm to 33 cm total length, with a clear modal length around 26 cm. The *S. aurita* ranged from 14 to 34 cm with no apparent modal lengths.

The biomass of sardinella was estimated at 177 000 tons, which very close to last year's estimate (173 000 tons). Of this, about 140 000 tons was *S. maderensis*, compared to 88 000 tons last year, while 37 000 tons was *S. aurita* (estimated at 86 000 tons last year). The splitting between species is, however, very sensitive to sampling intensity in the overlapping zone, while the total estimate should be more robust. Figure 8 shows the cumulative distribution of the biomass for both species. For *S. maderensis*, the bulk of the biomass (90 %) consisted of individuals > 29 cm (2000: 32 cm), while most of the *S. aurita* was > 31 cm (35 cm last year).

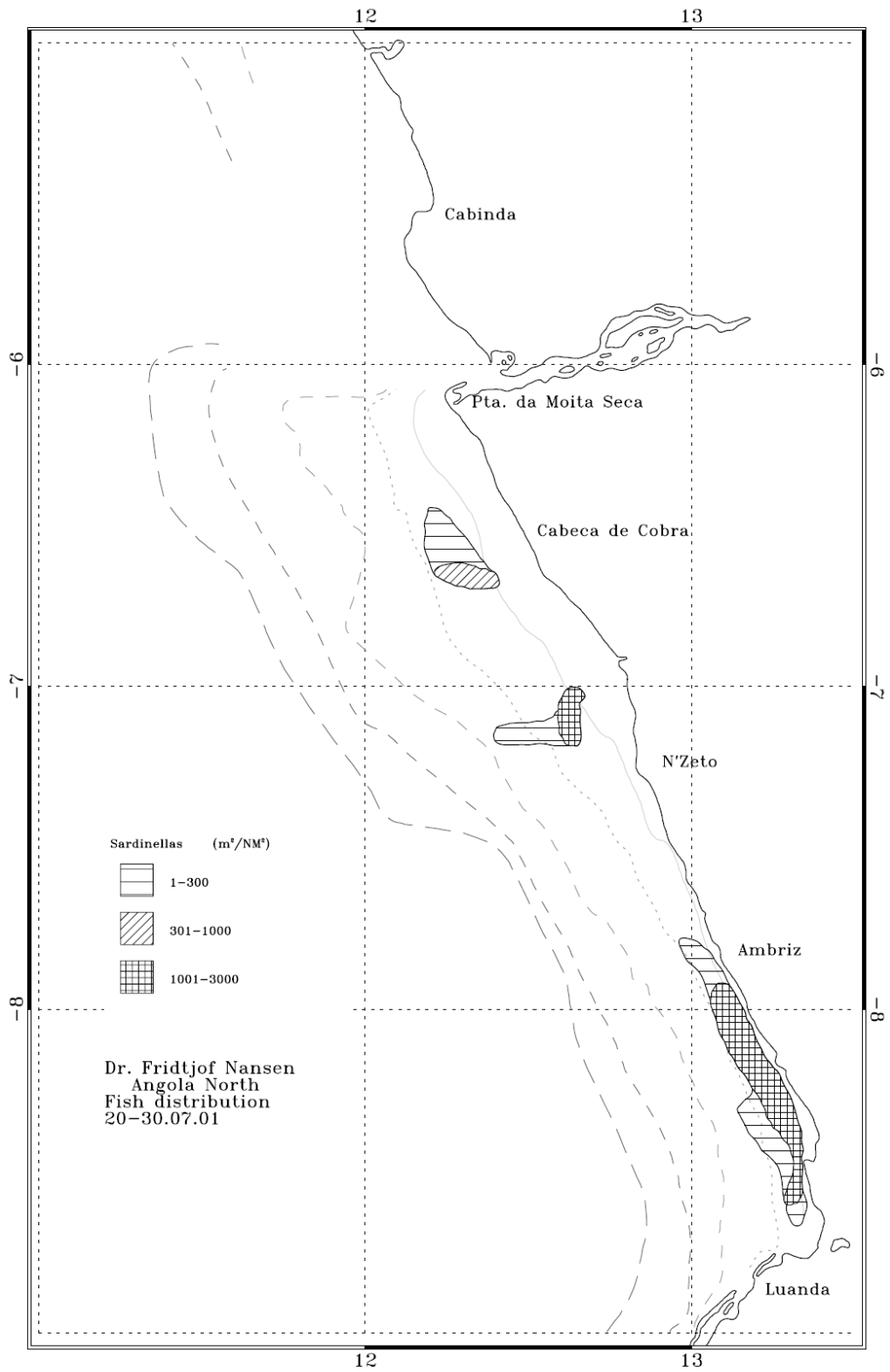
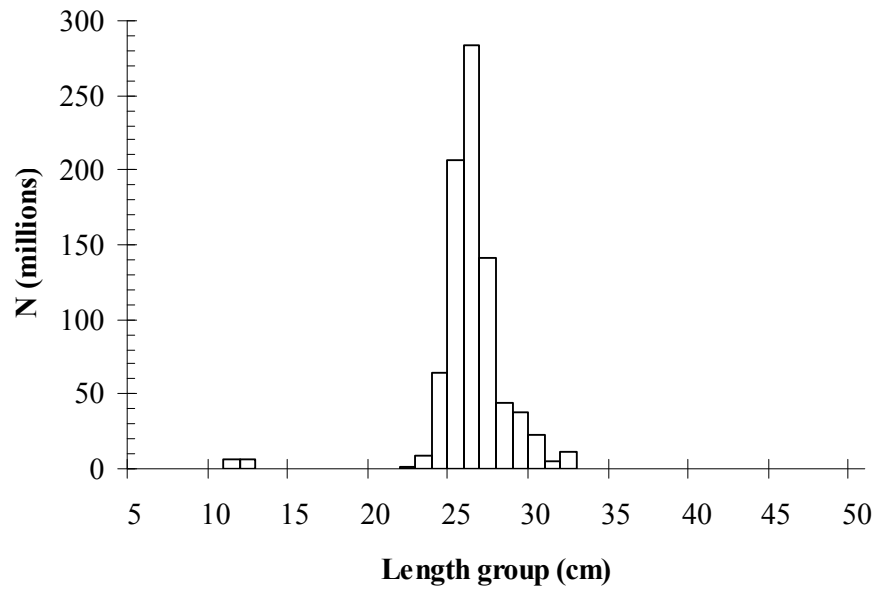
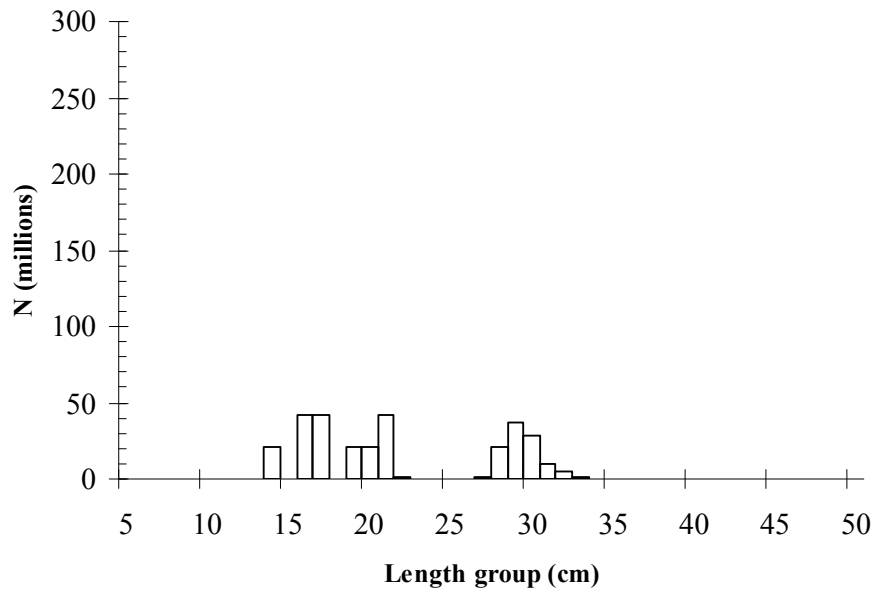


Figure 6. Angola north. Distribution of *Sardinella* spp. Pta das Palmerinhas -Congo River. Depth contours as in Fig. 1a.

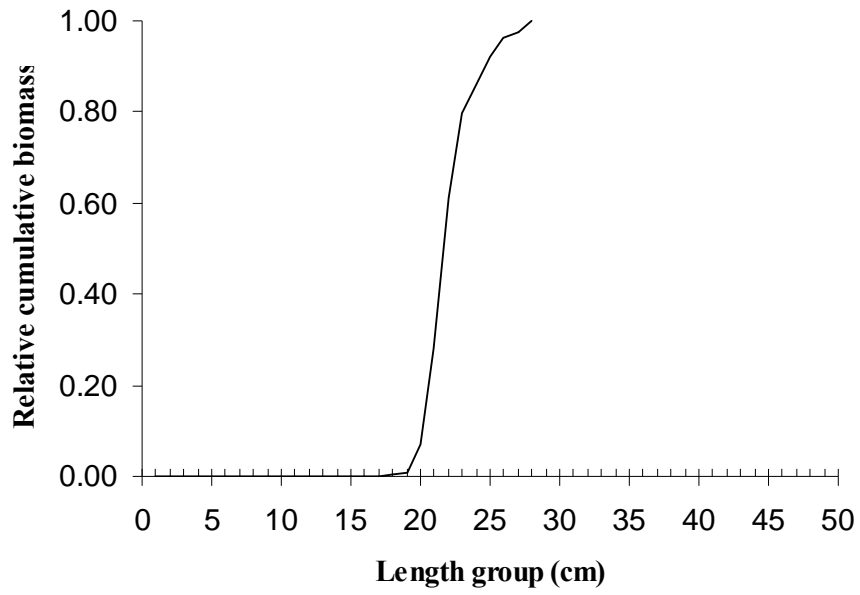


a) *Sardinella maderensis*

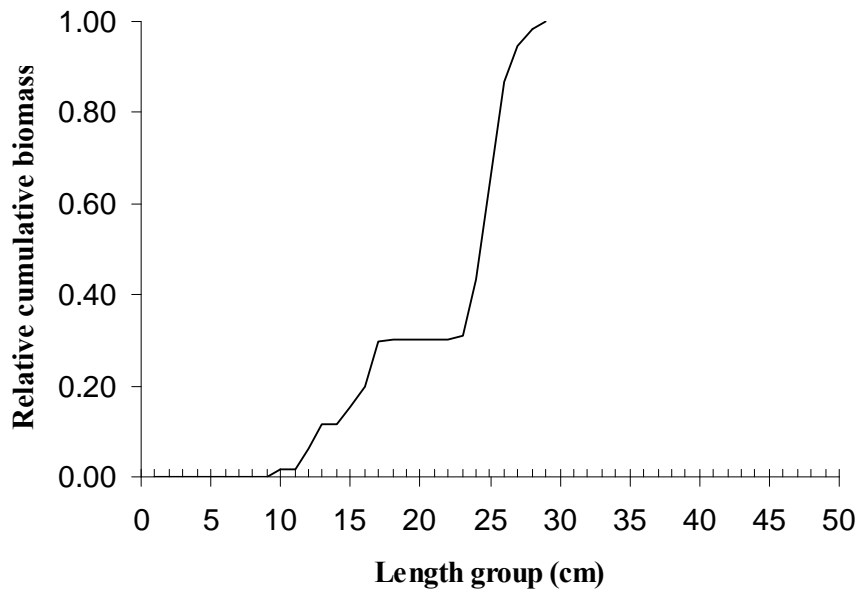


b) *Sardinella aurita*

Figure 7 Total length distribution of *Sardinella maderensis* (a) and *S. aurita* (b), Pta. das Palmerinhas -Congo River.



a) *Sardinella madarensis*



b) *Sardinella aurita*

Fig 8. Relative cumulative biomass *Sardinella maderensis* (a) and *S. aurita* (b), Pta das Palmerinhas-Congo River

*Cunene horse mackerel*

Like in previous years, only *T. trecae* was found in this region. The horse mackerel was located in six relatively small, low density ( $s_A < 300$ ) areas (Figure 9).

Figure 10 shows the length frequency distribution of horse mackerel for the region. The size distribution was polymodal, with the primary mode around 14 cm and secondary modes at about 18 and 28 cm.

The estimated biomass of *T. trecae* was 3 000 tons (63 000 tons last year). Most of the biomass (90 %) was comprised of fish < 33 cm total length (35 cm in 2000) (Figure 11).

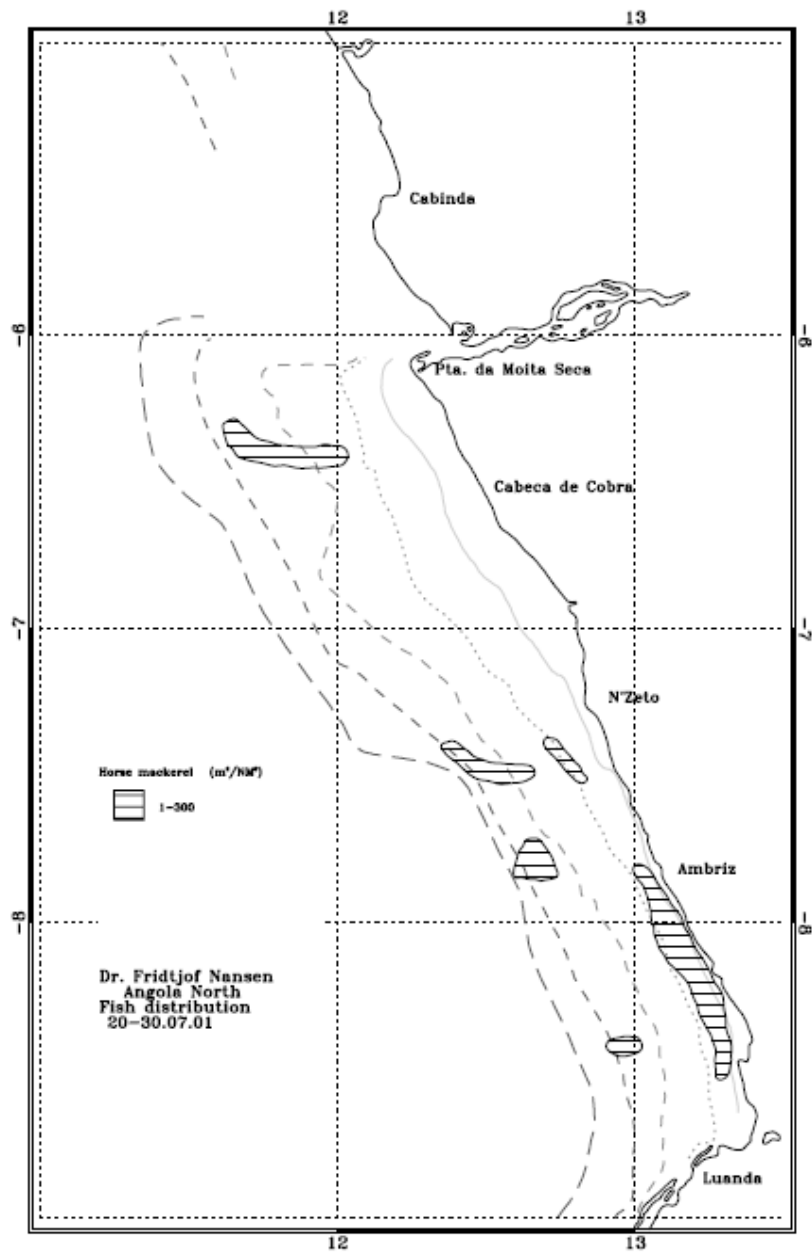


Figure 9 Angola north. Distribution of Cunene horse mackerel (*Trachurus trecae*), Pta das Palmerinhas -Congo River. Depth contours as in Fig. 1a

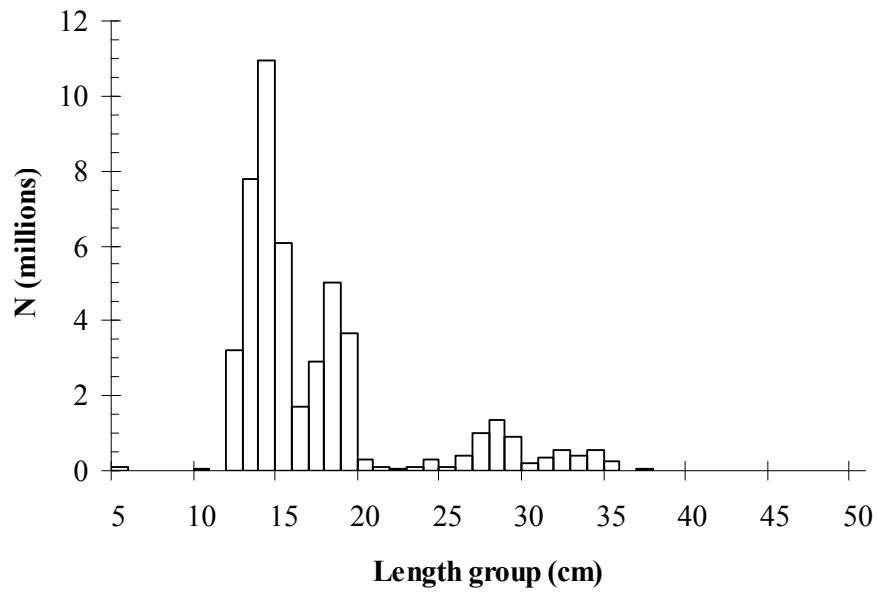


Figure 10 Total length distributions of Cunene horse mackerel (*Trachurus trecae*), Pta das Palmerinhas-Congo River.

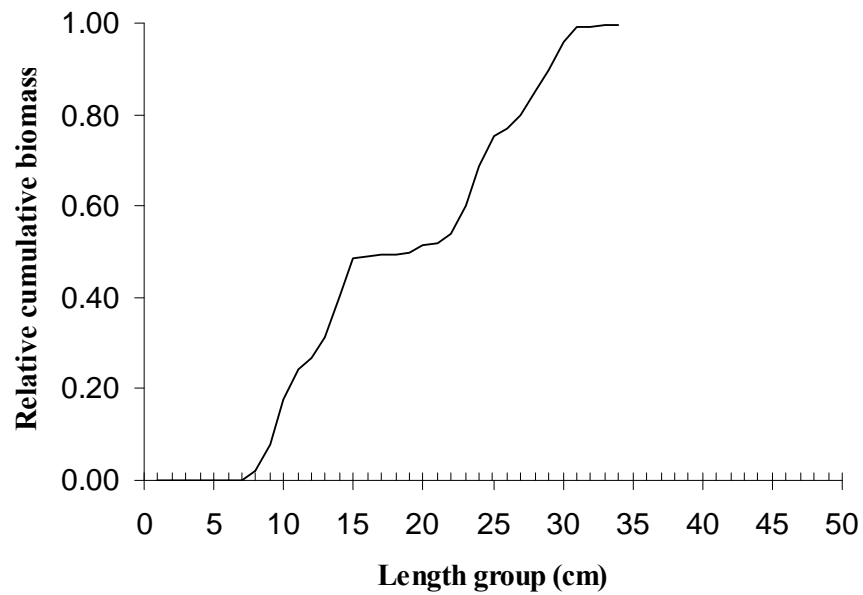


Figure 11 Cumulative percentage biomass by length group, *Trachurus trecae*. Pta das Palmerinhas-Congo River



### *Other pelagic species*

Only one species in the other pelagic species group 1, *Ilisha africana*, was caught in the northern region. This group was found in two main areas, one close to the Congo River and one south of Ambriz (Figure 12). The biomass estimate, based on an average length of 30 cm and a condition factor equal to 0.01, was about 3 000 tons.

Group 2. This category, which includes members of the family Carangidae (other than *Trachurus* sp.), Scombridae, Sphyraenidae and *Trichiurus lepturus*, was found in four main areas throughout the region (Figure 13). The scombrids was the dominant species group, followed by hairtail (*Trichiurus lepturus*) (Table 7). One of the most common carangid species, *Chloroscombrus chrysurus*, was absent from the catches.

The biomass estimate, based on an average length of 30 cm and a condition factor equal to 0.01, was 45 000 tons, compared to 68 000 tons last year.

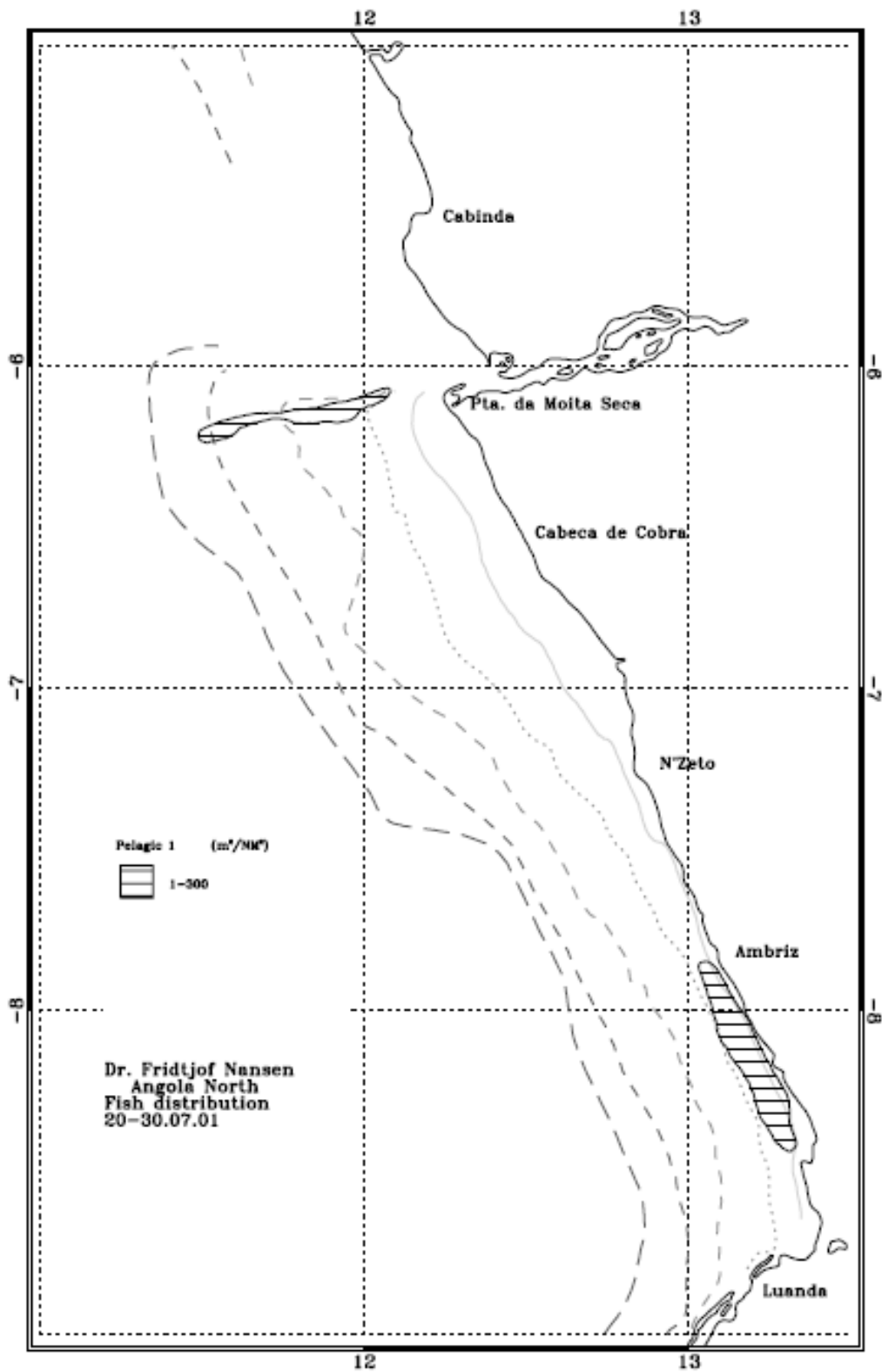


Figure 12 Angola north. Distribution of other pelagic species, group 1, -Pta. das Palmerinhas-Congo River. Depth contours as in Fig. 1a.

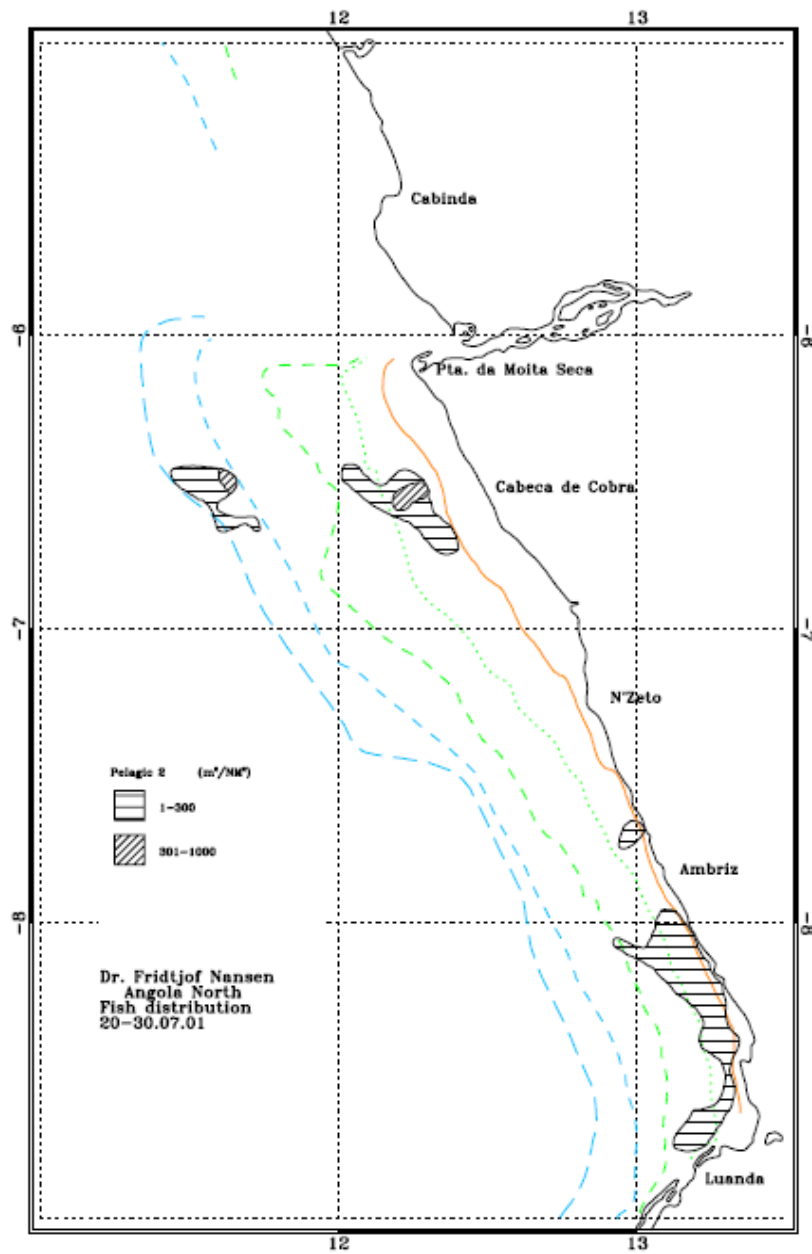


Figure 13 Angola north. Distribution of other pelagic species, group 2. Pta. das Palmerinhas-Congo River. Depth contours as in Fig. 1a.

Table 7 Catch rates (kg/h) of the main groups of pelagic fish, Pta das Palmerinhas-Congo River.

Station	<i>Ilisha</i> sp.	Carangids	Barracudas	Scombrids	Hairtail	Other
2580					52.8	8.4
2581					0.4	395.7
2583				47.6	0.2	114.1
2586		4.8	2.2	2.7	87.1	115.1
2587		0.1	2.5	2.0	53.6	49.5
2588				20.3	9.0	235.2
2591		6.7			3.1	738.4
2599					0.2	80.9
2600					0.03	2.4
2601		0.05				0.4
2602		0.2			10.3	95.0
2603					2.0	1687.0
2604	2.3		0.2		5.3	70.4
2605	10.5	15.0			3.0	633.5
2607				5.4	1.3	95.0
2608				4.0	1.5	98.0
2609	62.9	1.0	1.5		17.9	685.3
2610					1.7	474.6
2611					157.2	608.7
2615					2.0	2.1
MEAN	2.1	0.7	0.1	2.2	11.3	251.0

## 4.2 Benguela -Pta das Palmerinhas

### *Sardinella*

*Sardinella* was found throughout the region, primarily on the inner part of the continental shelf. The distribution was continuous, except in certain areas off Pta. do Morro and Lobito (Figure 14). High density areas ( $1000 > s_A < 3000$ ) were found south off Cabo São Braz and Pta. do Morro. *S. maderensis* dominated the two species also in this area. *S. aurita* was caught in one of the hauls only (PT 2623).

The length distribution for sardinella is presented in Figure 15 (a and 15b) for *S. maderensis* and *S. aurita*, respectively. The size distributions of *S. maderensis* showed a dominating distributional mode at 25-35 cm total length, peaking at 28 cm. A juvenile cohort with modal length around 8 cm was recorded south of Cabo São Braz (10 °S) in shallow waters (PT 2628). *S. aurita* ranged from 28-31 cm. Individuals <32 cm comprised most of the total biomass (90 %) in *S. maderensis* (Figure 16).

The biomass for sardinella was estimated at a total of 257 000 tons, 191 000 tons for *S. maderensis* and 66 000 tons for *S. aurita*, compared to a total of 179 000 tons last year.

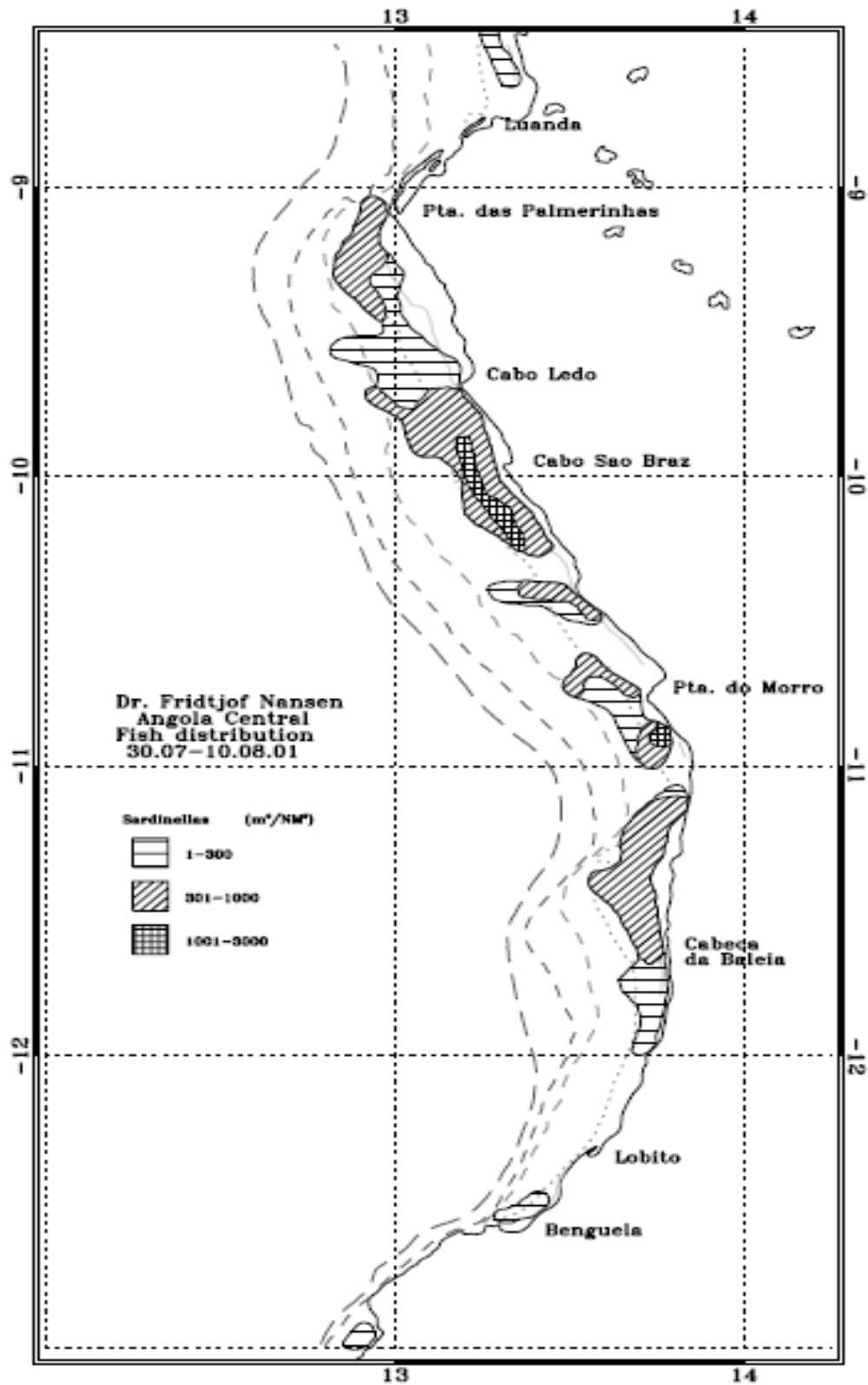
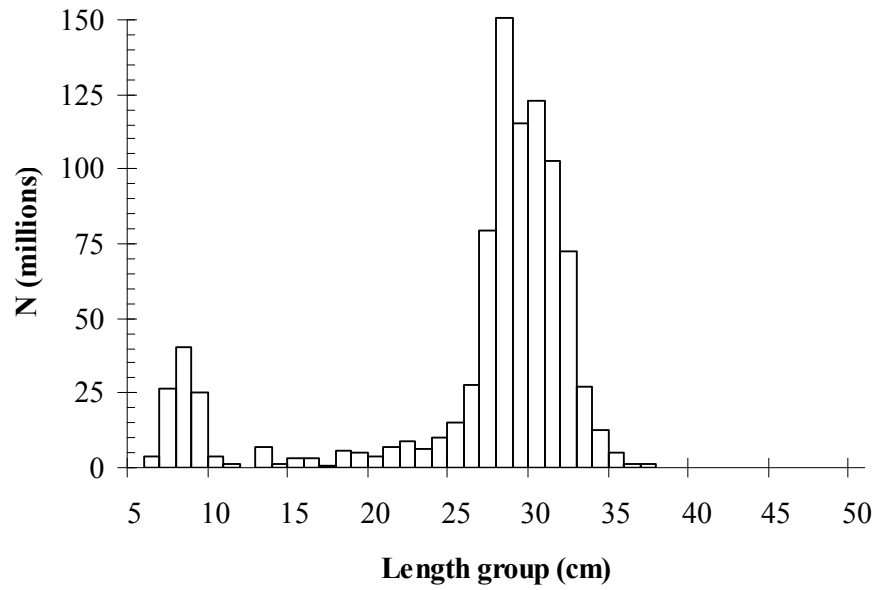
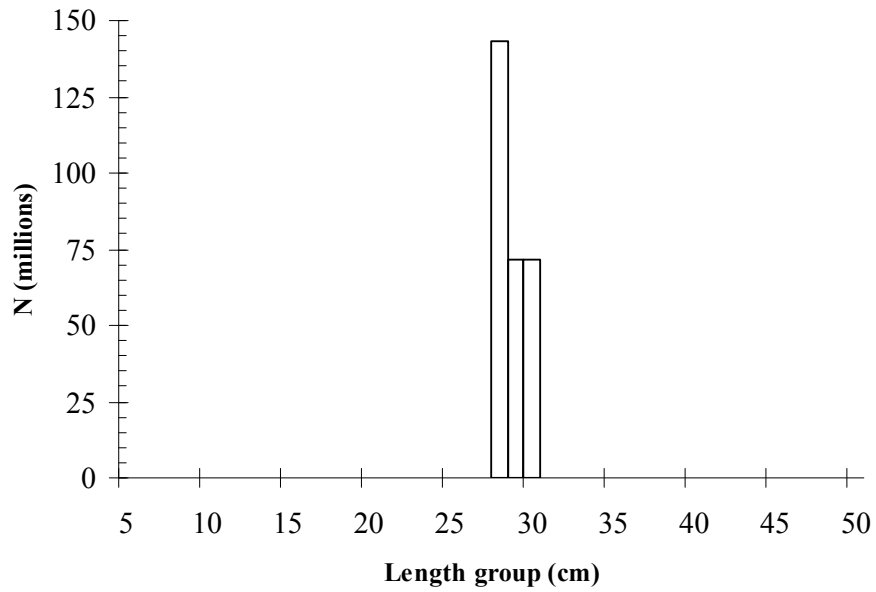


Figure 14 Angola central. Distribution of *Sardinella* spp. Benguela-Pta. das Palmerinhas. Depth contours as in Fig. 1a.

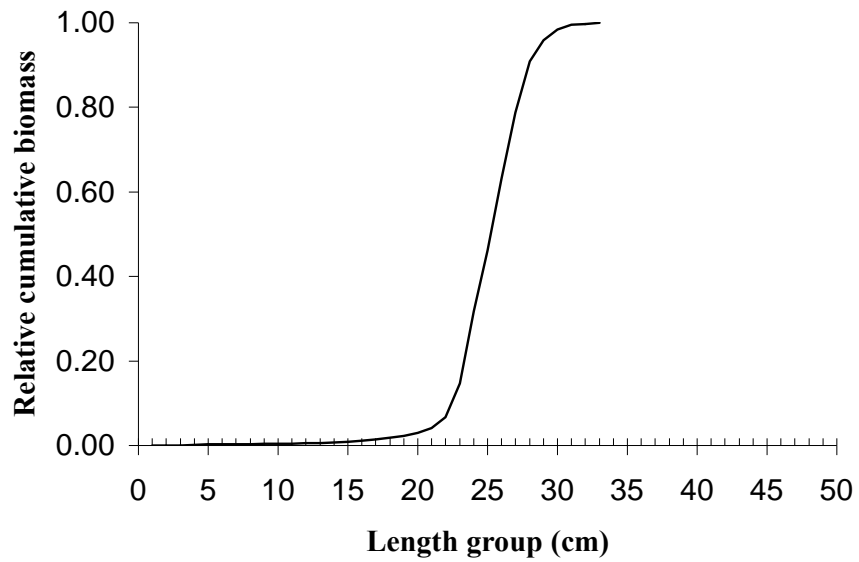


a) *Sardinella maderensis*

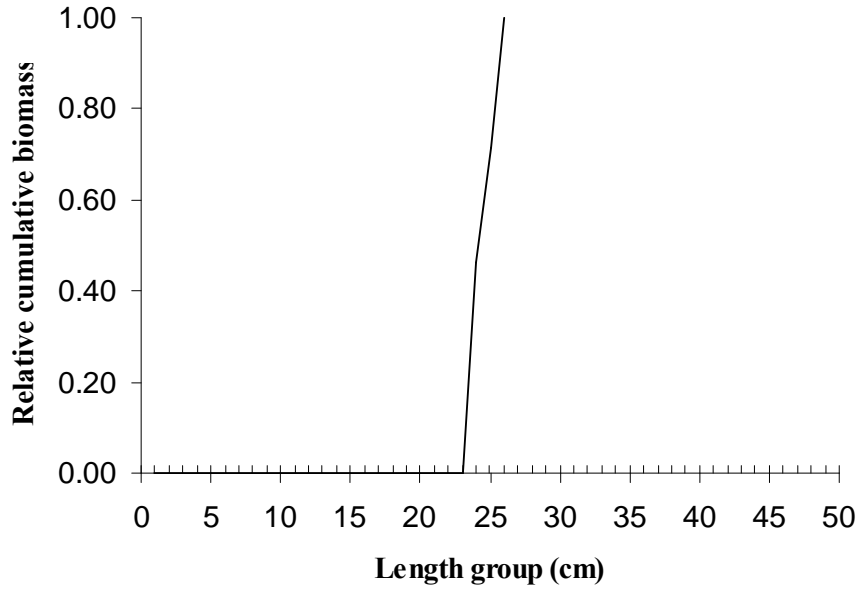


b) *Sardinella aurita*

Figure 15 Total length distribution of *Sardinella maderensis* (a) and *S. aurita* (b). Benguela-Pta. das Palmerinhas



a) *Sardinella maderensis*



a) *Sardinella aurita*

Figure 16. Relative cumulative biomass *Sardinella maderensis* (a) and *S. aurita* (b). Benguela-Pta. das Palmerinhas.



### *Horse mackerel*

Only *T. trecae* was encountered in this region. The distribution was patchy, with relatively low densities ( $1 > s_A < 300 \text{ m}^2 / \text{NM}^2$ ). A small area with medium densities ( $301 < s_A < 1000 \text{ m}^2 / \text{NM}^2$ ) was found inshore north of Lobito (Figure 17).

Figure 18 shows the total length distribution of this species. The total length ranged from 10 to 42 cm, with two modes around 16 and 25 cm.

The biomass of Cunene horse mackerel was estimated at 22 000 tons. This is the lowest estimate in this area during the time series. The bulk of the biomass (~90 %) consisted of individuals <38 cm (Figure 19), but due to the high number of juveniles in the estimate, this corresponds to 97% of the population in numbers. Equivalently, 90 % of the population in numbers were <33 cm.

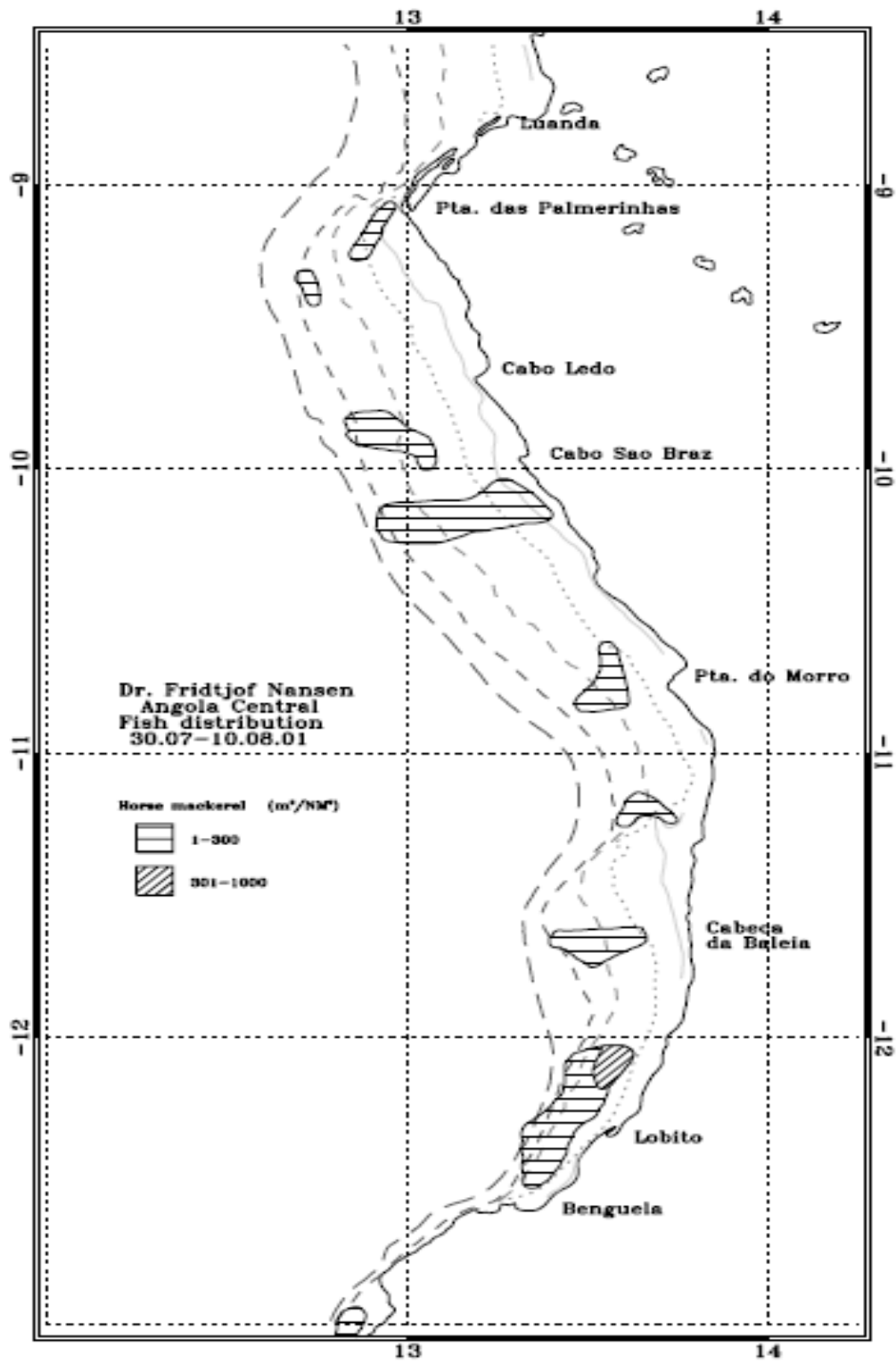


Figure 17. Angola central. Distribution of horse mackerel (*Trachurus trecae*), Benguela-Pta das Palmerinhas. Depth contours as in Fig. 1a.

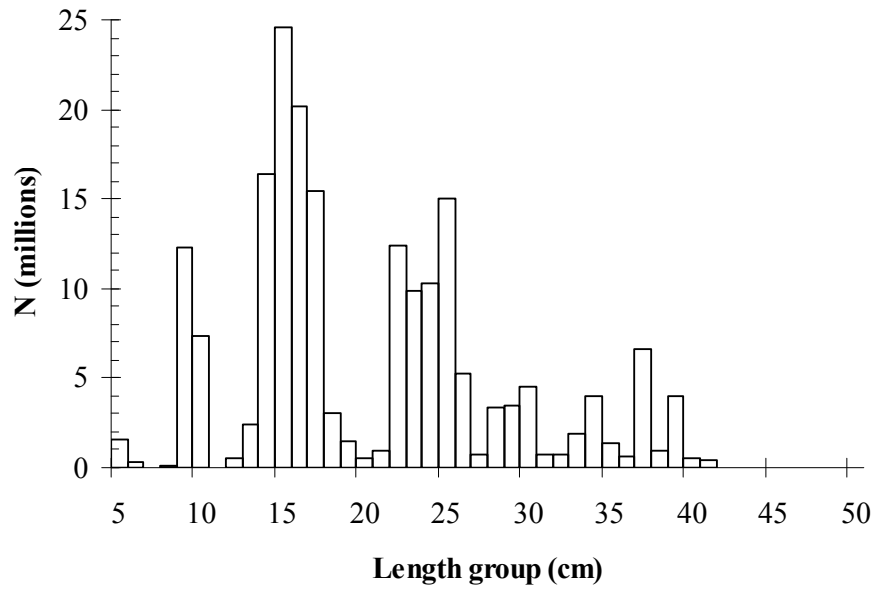


Figure 18 Total length distributions of horse mackerel (*Trachurus trecae*), Benguela-Pta. das Palmerinhas.

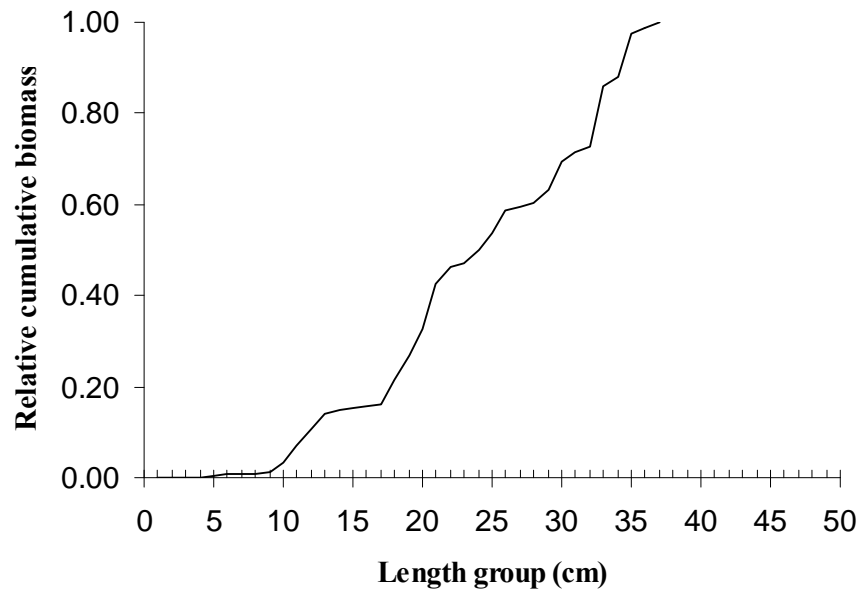


Figure 19 Relative cumulative biomass of horse mackerel (*Trachurus trecae*), Benguela-Pta. das Palmerinhas.

### *Other pelagic species*

No fish in pelagic species, group 1, were encountered in the region.

Pelagic fish group 2 was encountered in a continuous, low-density ( $0 > s_A < 300$ ), aggregation ranging from Benguela to south off Pta. das Palmerinhas, and in three smaller, intermediate density ( $300 > s_A < 1000$ ) aggregations between Cabo São Braz and Luanda (Figure 20). The most common species was hairtail (*Trichiurus lepturus*). Other species included *Sarda sarda* and *Scomber japonicus*.

The biomass estimate, based on an average length of 30 cm and a condition factor equal to 0.01, was 46 000 tons, compared to 35 000 tons last year.

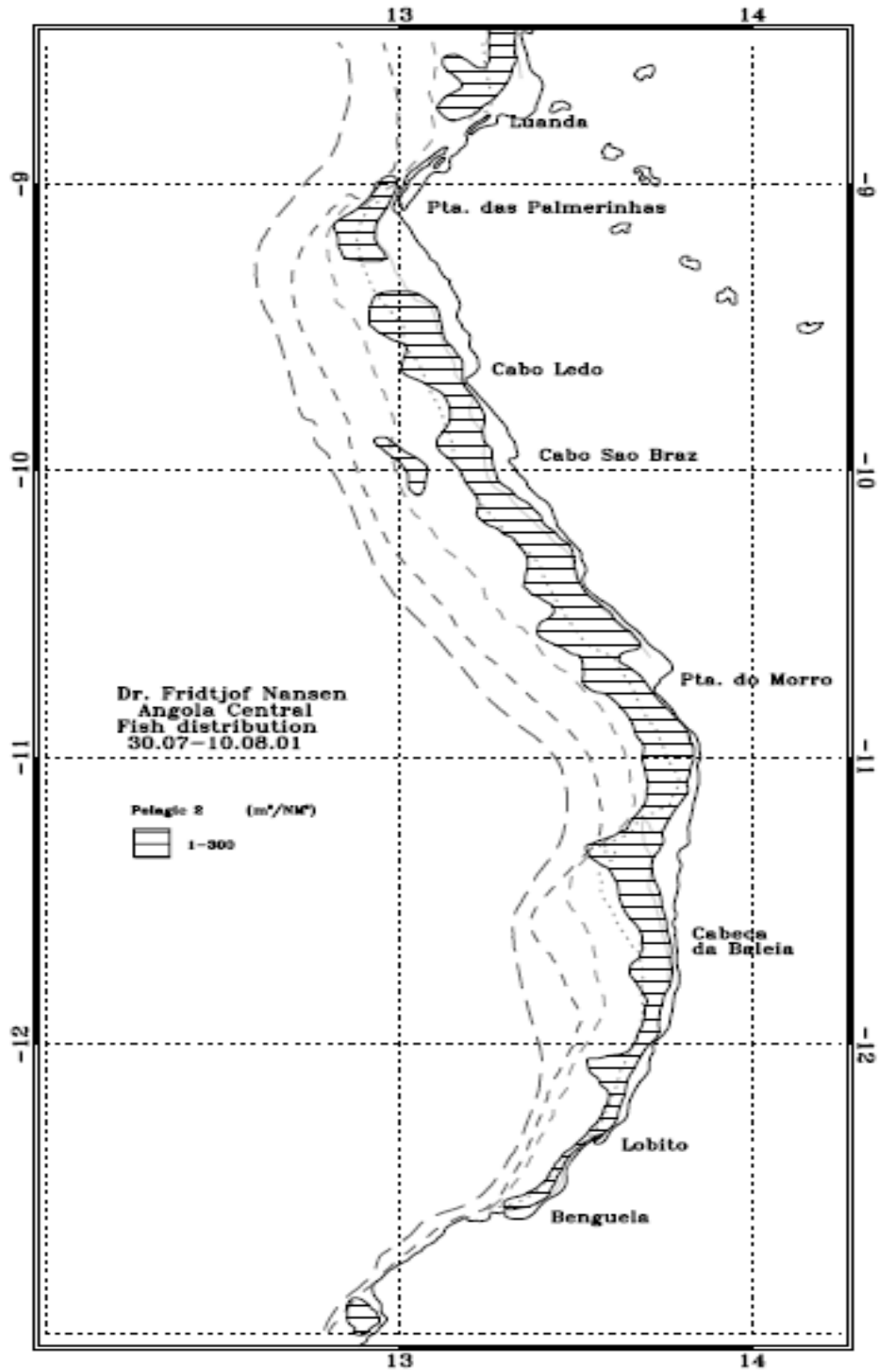


Figure 20. Angola central. Distribution of other pelagic species, group 2. Benguela –Pta. das Palmerinhas. Depth contours as in Fig. 1a

### 4.3. Cunene -Benguela

#### *Sardinella*

No sardinella was recorded in this region.

#### *Horse mackerel*

Like in previous years, both species of horse mackerel were found in the southern region. The fish occurred in a continuous layer between Namibe (15°00 S) and Cunene (17°15 S) (Figure 21). The density varied throughout the area, with the highest recordings ( $1000 < s_A < 3000 \text{ m}^2/\text{NM}^2$ ) between Cunene and south of Tombua, including Baía dos Tigres.

Figure 22 shows the size distributions of horse mackerels. Juveniles (6-15 cm total length) dominated in both species, with modal peak around 11cm. For *T. trecae* an additional mode could be seen around 20 cm. The presence of *T. capensis* in this region is related to the intrusion of colder water from the Benguela current that usually reaches it's northernmost extension in this area during this time of the year.

The estimated biomass for horse mackerels in the southern region was 250 000 tons, 64 000 tons for *T. trecae* and 187 000 tons for *T. capensis*, compared to a total of 335 000 tons last year. The biomass of fish inside Baía dos Tigres (9 000 tons, 5 000 tons of *T. trecae* and 4 000 tons for *T. capensis*) was estimated separately.

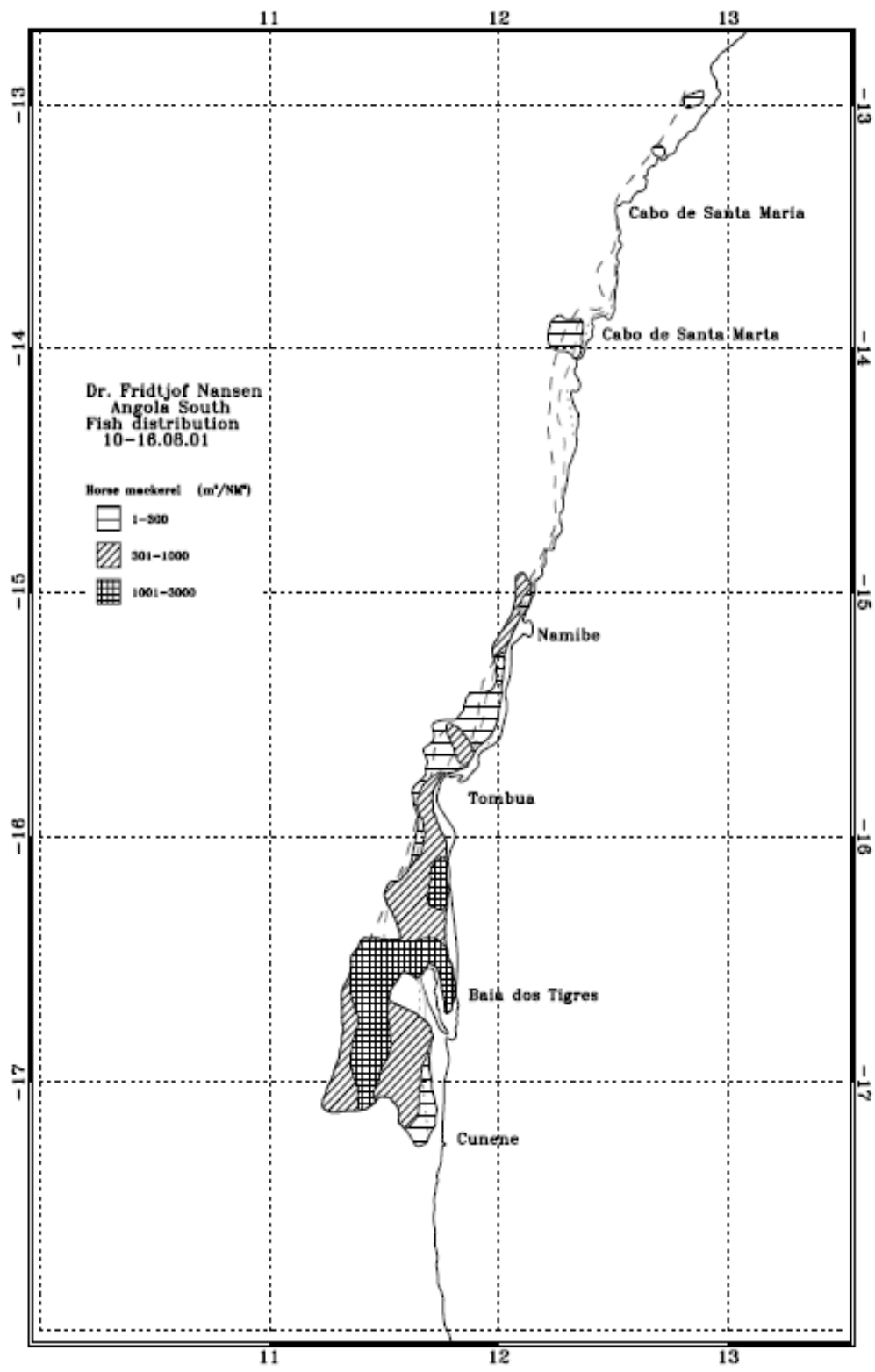
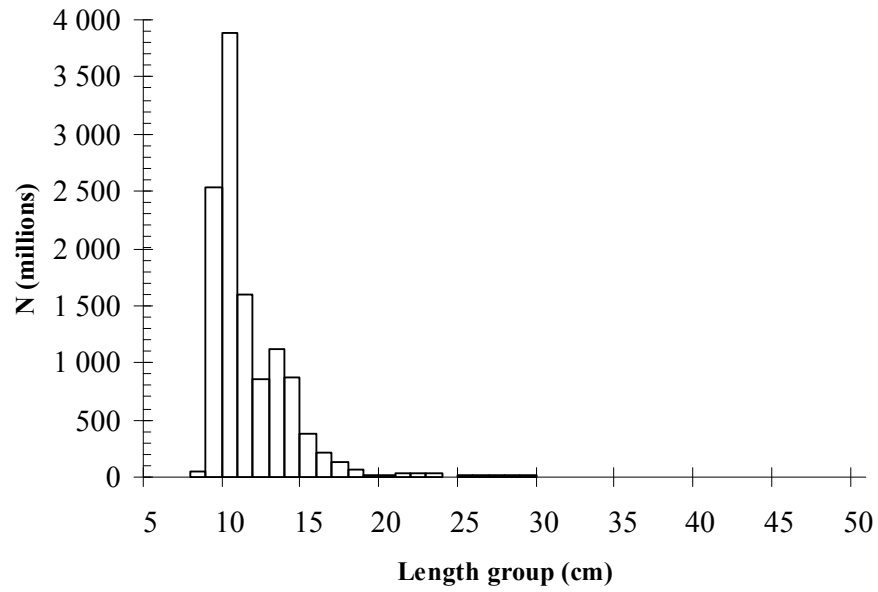
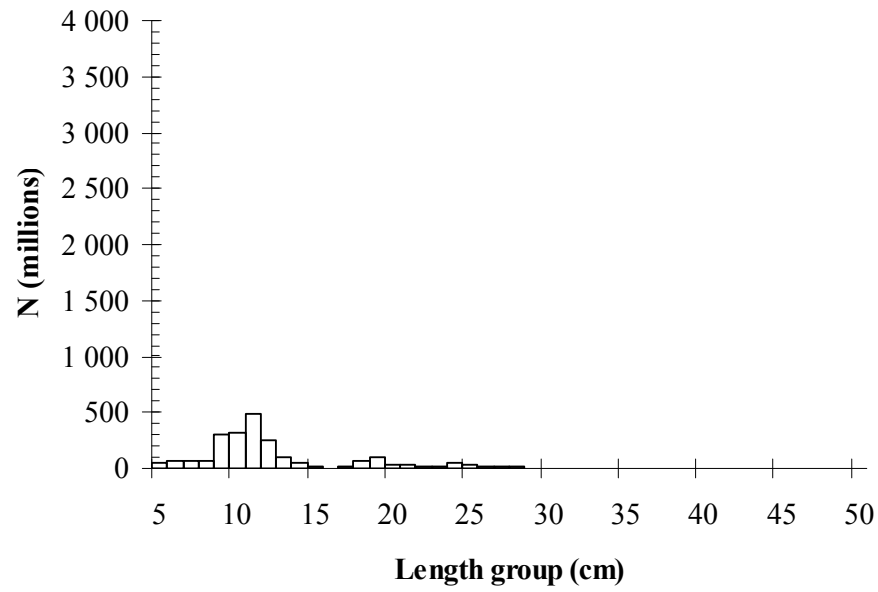


Figure 21. Angola south. Distribution of horse mackerel. Cunene -Benguela Depth contours as in Fig. 1c.



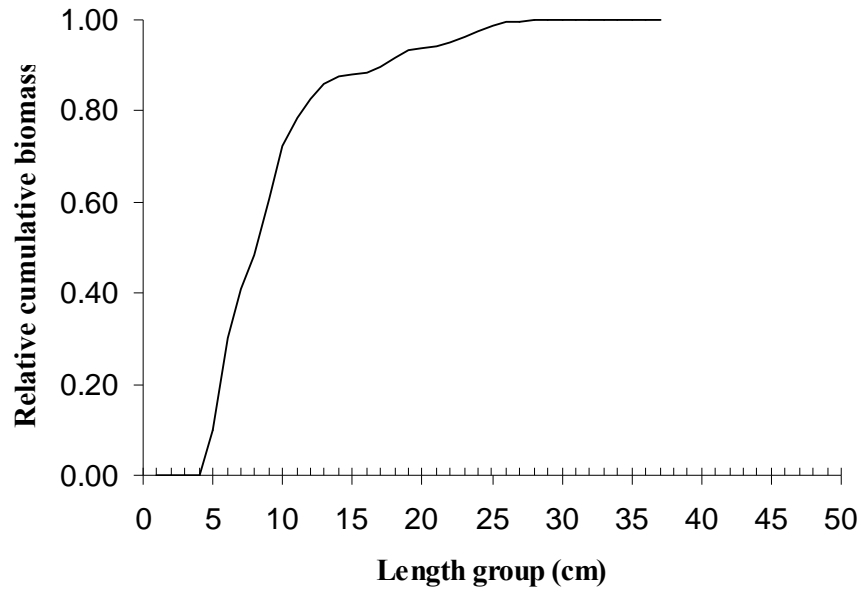
a) *Trachurus capensis*



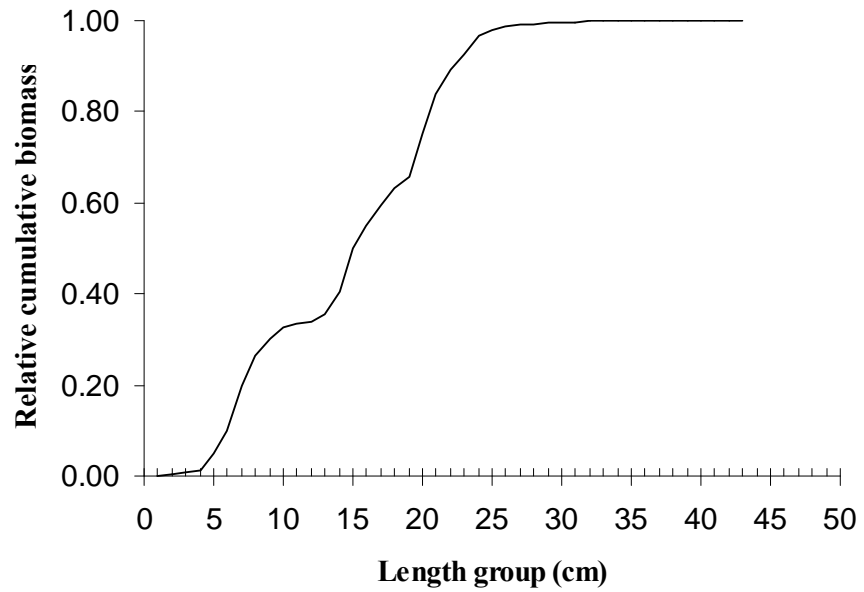
b) *Trachurus trecae*

Figure 22 Total length distributions of *Trachurus capensis* (a) and *T. trecae* (b), -Tombua-Benguela.





a) *Trachurus capensis*



b) *Trachurus trecae*

Figure 23. Relative cumulative biomass of *T. capensis* (a) and *T. trecae* (b).

### *Other pelagic species*

An overview of the main groups of other pelagic fish in the southern region is given in Table 9.

Pelagic fish, group 1, was found in three aggregations, extending from south of Tombua (16° 00' S) to south of Baía dos Tigres (16° 50' S) and south of Tombua (Figure 24). The acoustic densities were low ( $s_A > 300$ ) to intermediate ( $300 < s_A < 1000$ ). Round herring (*Etrumeus whiteheadi*) dominated the catches (see table 4).

Based on an average length of 30 cm and a condition factor equal to 0.01, the biomass estimate was estimated at 36 000 tons, compared to 130 000 tons last year.

Pelagic fish, group 2, was found in two small aggregations around Cabo de Santa Maria (13° 00' S - 14° 00' S) (Figure 25). The acoustic densities were low ( $s_A < 300$ ). Round herring (*Etrumeus whiteheadi*) dominated the catches (see Table 9).

Based on an average length of 30 cm and a condition factor equal to 0.01, the biomass estimate was estimated at 3 000 tons, compared to 8 000 tons last year.

Table 9. Catch rates (kg/h) of the main groups of pelagic fish. Cunene river -Benguela.

Station	<i>Engraulis</i> sp.	<i>Etrumeus</i> sp.	Hairtail	Other
MEAN	84.27	675.12	1.86	1832.30

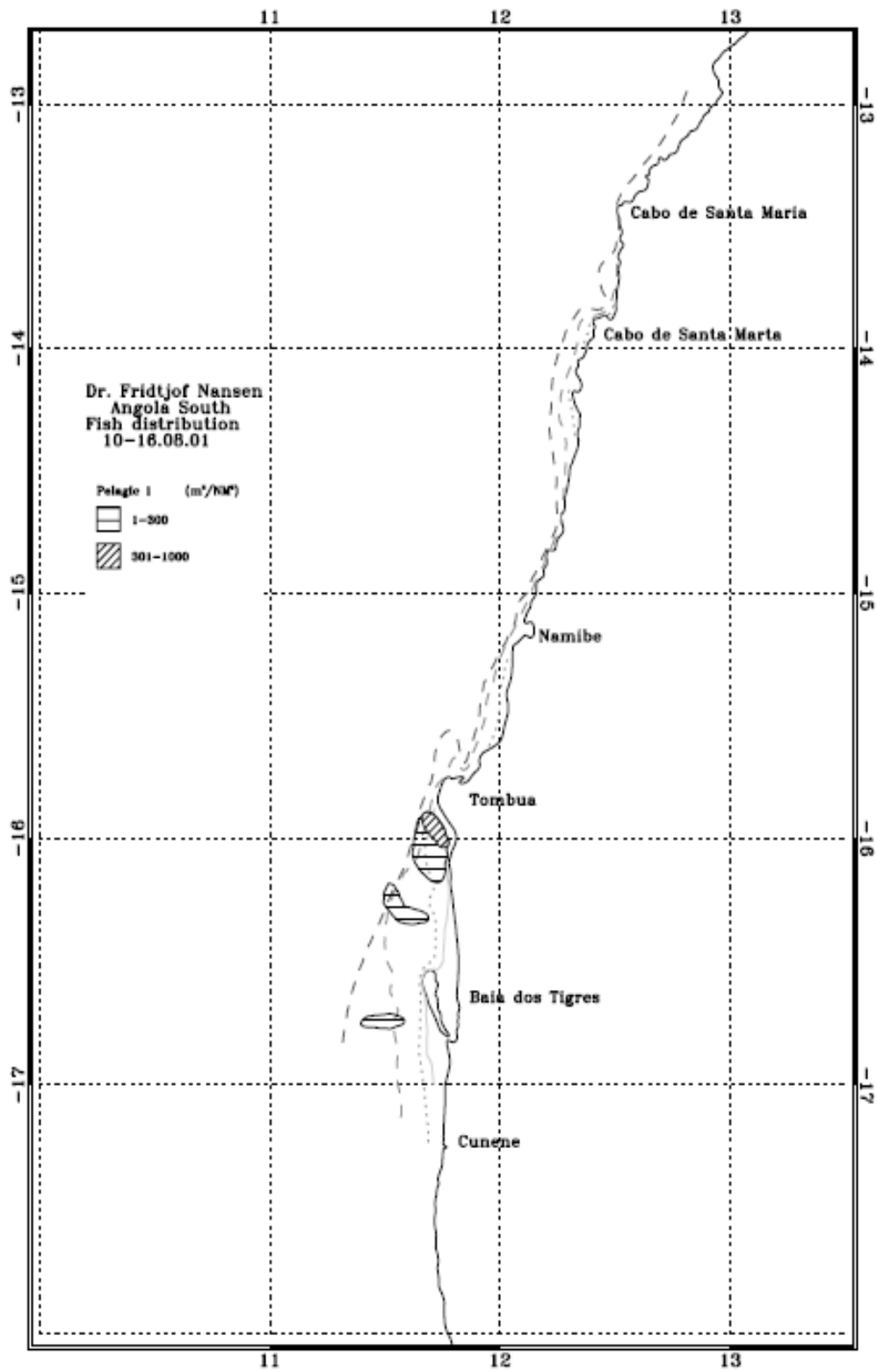


Figure 24. Angola south. Distribution of other pelagic species, group 1. Benguela -Pta .das Palmerinhas Depth contours as in Fig. 1c.

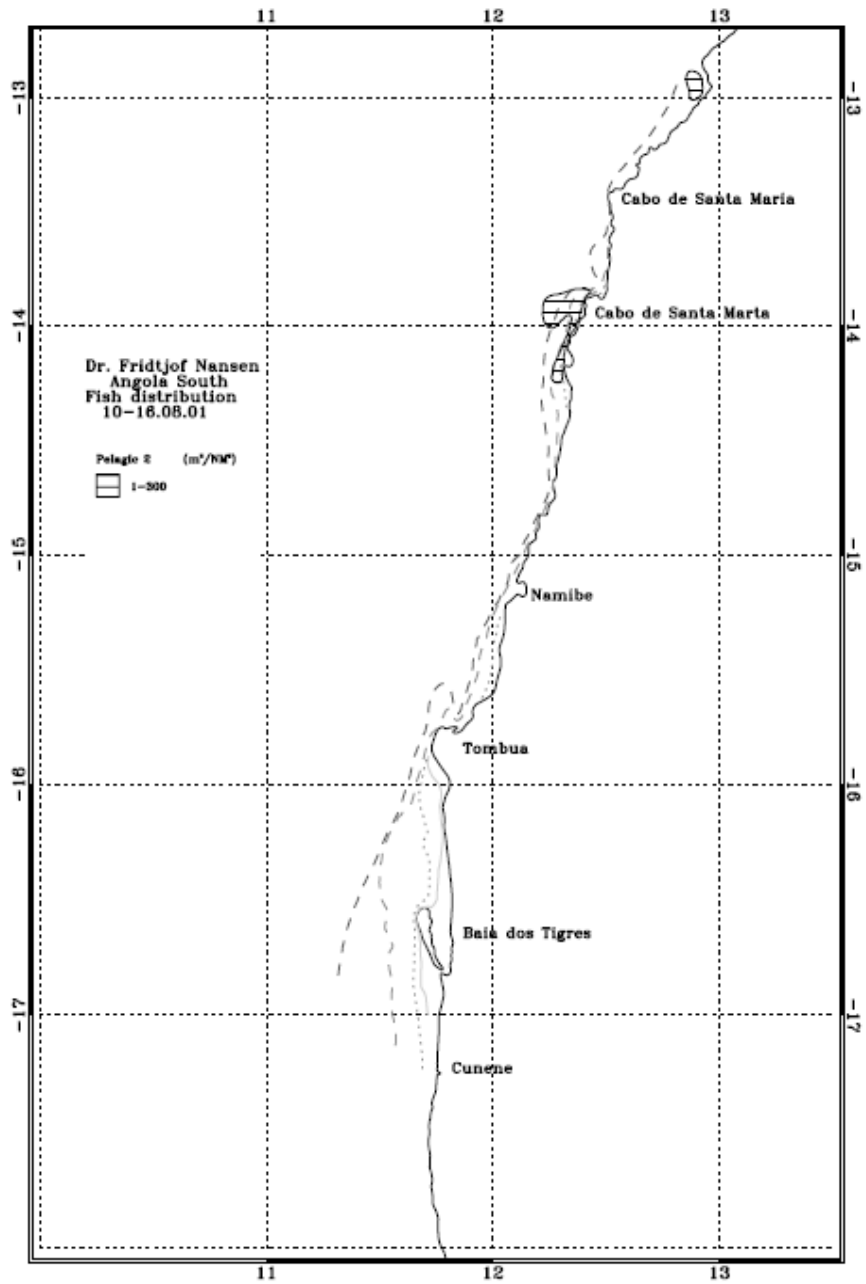


Figure 25. Angola south. Distribution of other pelagic species, group 2. Benguela-Pta. das Palmerinhas. Depth contours as in Fig 1c.

## CHAPTER 5 SUMMARY OF SURVEY RESULTS

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### 5.1 Sardinella

The total biomass estimate for sardinellas (434 000 tons) is higher than last year (353 000 tons). Figure 26 shows the overall length frequency distribution of *S. maderensis* recorded during the survey. It shows that most of the biomass (98%) is  $\geq 24$  cm total length. However, the population of juvenile fish may be underestimated as a result of the inshore distribution of fish and the presence of juveniles north of the Congo River.

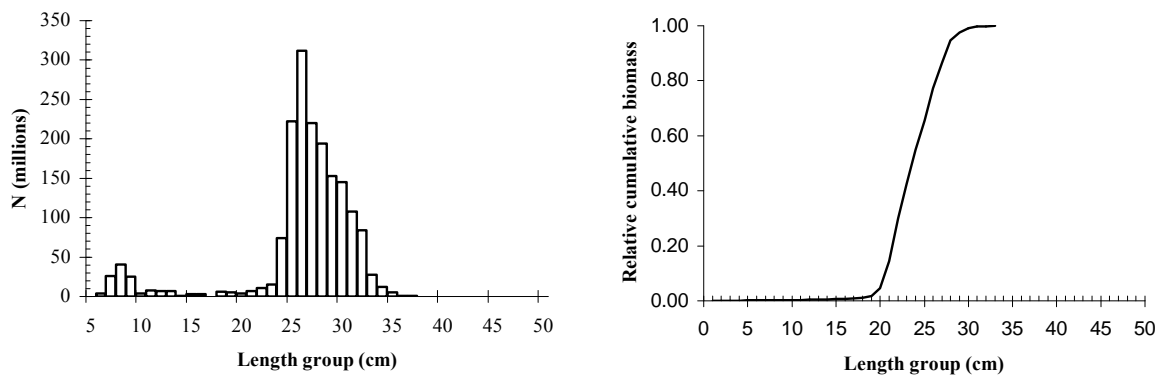


Figure 26 Overall length distribution (a) and relative cumulative biomass (b) of *S. maderensis*.

It should be noted that sardinella biomass estimates are particularly susceptible to bias due to the behaviour of the fish. This is especially so regarding the horizontal and vertical migratory patterns, and gear and vessel avoidance by this species can affect the recorded densities. Therefore, care should be taken when interpreting the results. Their behavioural patterns largely depend on the prevailing environmental conditions, such as intrusion of freshwater from the Congo River and other rivers into coastal waters. Also, inter-annual variation in the environment may affect estimates differently between years.

Table 10 shows the time-series of biomass estimates for sardinellas. Except for last year, there has been a gradual decrease in biomass over the last 5 years. Therefore, last year's increase should be re-evaluated during the coming years before drawing any conclusions on the stock level. The strong

reduction of *S. aurita* during the last decade continued this year (102 000 tons, or 24% of the total biomass). However, it should be noted that the proportion allocated to each species is determined by the relative catch rates, and very few samples of *S. aurita* were obtained during the present survey. But this will not affect the total biomass estimate.

Table 10. Biomass estimates of sardinellas by regions and surveys (1 000 tons).

Survey	Cunene-Benguela	Benguela-Pta Palmerinhas	Pta Palmerinhas-Cabinda.	Benguela-Cabinda	Cunene-Cabinda
1/85	25	220	80	300	325
2/85	110	190	180	370	480
3/85	0	70	190	260	260
4/85	0	200	110	310	310
1/86	10	140	110	250	260
2/86	10	130	130	260	270
1/89	40	200	60	260	300
2/89	20	40	130	170	190
3/89	40	100	60	160	200
1/91	?	180	120	300	300
2/91	?	68	154	222	222
1/92	?	119	161	280	280
1/94	*	410	100	510	
2/94	*	245	290	535	
1/95	*	140	24	164	
2/95	?	277	297	574	574
1/96	49	175	70	245	294
2/96	0	130	233	363	363
1/97	0	195	300†	495	495
1/98	75	389	79†	468	543
3/98	0	233	159†	392	392
2/99	0	228	135†	363	363
2/2000	0	179	174†	353	353
2/2001	0	257	177†	434	434

\* Not surveyed

† Surveyed from Pta. das Palmerinhas- Congo River.

## 5.2 Cunene horse mackerel

The total biomass estimate for *T. trecae* (89 000 tons) decreased drastically from last year (333 000 tons). It is evident from Figure 27 that juveniles (<21 cm) comprise the majority of the stock, both by weight (45%) and particularly by number (89%).

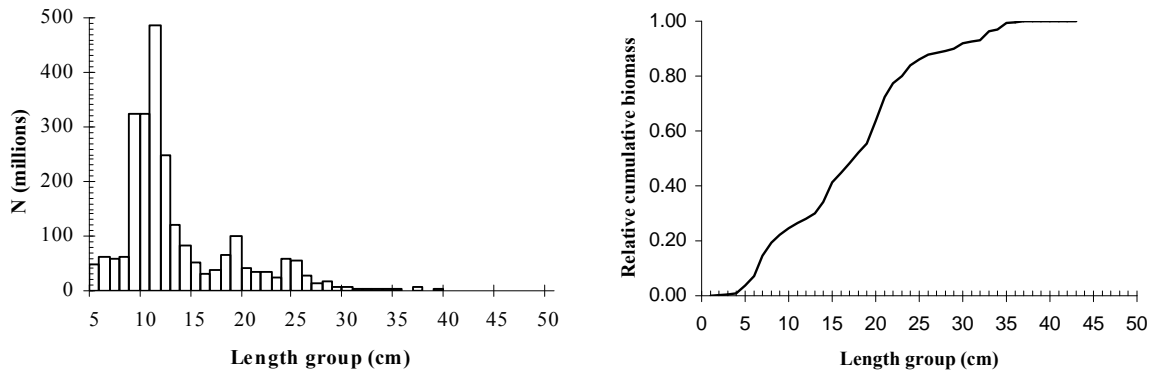


Figure 27 Overall length distribution (a) and relative cumulative biomass (b) of *T. trecae*.

Table 11 shows that the biomass estimate for *T. trecae* is by far the lowest in the time-series, being less than 18 % of the estimated stock level in the 1996 summer survey and less than 50 % of the historically lowest level (180 000 tons) in 1985.



Table 11 Biomass estimates of Cunene horse mackerel by regions and surveys (1 000 tons)

Survey	Cunene-Benguela	Benguela-Pta. Palmerinhas	Pta Palmerinhas-Cabinda	Benguela-Cabinda	Cunene-Cabinda
1/85	30	195	40	235	265
3/85	50	90	40	130	180
4/85/86	100	125	20	145	245
1/89	35	55	40	95	130
3/89	170	40	35	75	245
1/91	100	80	20	100	200
2/91	100	70	30	100	200
1/92	98	86	80	166	264
1/94	*	238	1	239	
2/94	*	130	120	250	
1/95	*	?	84	84	
2/95	70	160	110	270	340
1/96	286	214	6	220	506
2/96	140	157	63	220	360
1/97	234	55	138†	193	427
1/98	163	58	18†	76	239
3/98	118	112	37†	149	267
2/99	124	129	68†	197	321
2/2000	92	178	63†	241	333
2/2001	64	22	3†	25	89

\* Not surveyed

† Surveyed from Pta. das Palmerinhas- Congo River.

## 5.2 Conclusions

The present biomass of sardinellas is relatively high. However, the increase observed this year needs to be validated over the next 2-3 years before any sound conclusions can be made on the biomass of the stock. It should be emphasized that the biomass estimates of sardinellas may only be considered as relative indices rather than absolute estimates. Therefore, it is extremely important that urgent steps are taken to evaluate present survey methods in order to improve the accuracy of the estimates.

The present biomass of *T. trecae* is the lowest ever recorded, and the population consists almost entirely of juvenile fish. Therefore, in order to ensure recovery of the adult stock, it is imperative to take precautionary measures to prevent exploitation of the juvenile stock. Furthermore, to improve recruitment necessary to rebuild the stock, it is vital that the adult population is also protected from fishing.

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# Annex I Records of fishing stations

PROJECT STATION:2580  
 DATE:21/ 7/01 GEAR TYPE: PT No:6 POSITION:Lat S 614  
 start stop duration Long E 1205  
 TIME :20:49:00 21:20:00 31 (min) Purpose code: 1  
 LOG : 361.93 363.64 1.71 Area code : 3  
 FDEPTH: 5 5 GearCond.code: 1  
 BDEPTH: 45 50 Validity code: 3  
 Towing dir: 270ø Wire out: 140 m Speed: 3 kn\*10  
 Sorted: 31 Kg Total catch: 31.65 CATCH/HOUR: 61.26

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichiurus lepturus	52.80	108	86.19	
Sepia officinalis hierredda	4.16	54	6.79	
Alloteuthis africana	2.25	1374	3.67	
Saurida brasiliensis	1.66	1585	2.71	
Bregmaceros sp.	0.39	482	0.64	
Total	61.26		100.00	

PROJECT STATION:2581  
 DATE:22/ 7/01 GEAR TYPE: PT No:6 POSITION:Lat S 614  
 start stop duration Long E 1127  
 TIME :01:35:45 02:05:29 30 (min) Purpose code: 1  
 LOG : 399.38 401.10 1.72 Area code : 3  
 FDEPTH: 5 5 GearCond.code: 1  
 BDEPTH: 302 349 Validity code: 3  
 Towing dir: 270ø Wire out: m Speed: kn\*10  
 Sorted: 28 Kg Total catch: 198.10 CATCH/HOUR: 396.20

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
MYCTOPHIDAE	380.80	28490	96.11	
Ariomma bondi	6.58	182	1.66	
Lepidopus caudatus	4.20	728	1.06	
Synagrops microlepis	3.64	252	0.92	
PARALEPIDIDAE	0.56	28	0.14	
Trichiurus lepturus	0.42	28	0.11	
Selene dorsalis, juveniles	0.00	28		
Alloteuthis africana	0.00	14		
Saurida brasiliensis	0.00	14		
Total	396.20		100.00	

PROJECT STATION:2582  
 DATE:22/ 7/01 GEAR TYPE: No: POSITION:Lat S 625  
 start stop duration Long E 1144  
 TIME :13:58:10 14:32:39 34 (min) Purpose code: 1  
 LOG : 506.58 508.38 1.80 Area code : 3  
 FDEPTH: 123 120 GearCond.code: 1  
 BDEPTH: 123 120 Validity code: 1  
 Towing dir: 270ø Wire out: 390 m Speed: 3 kn\*10  
 Sorted: 86 Kg Total catch: 571.88 CATCH/HOUR: 1009.20

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Dentex congoensis	732.02	7011	72.53	
Trachurus trecae	201.49	6656	19.97	5731
Dentex angolensis	45.65	245	4.52	
Ariomma bondi	28.76	1188	2.85	
Loligo vulgaris	1.27	58	0.13	
Total	1009.19		100.00	

PROJECT STATION:2583  
 DATE:22/ 7/01 GEAR TYPE: PT No:6 POSITION:Lat S 630  
 start stop duration Long E 1136  
 TIME :19:14:13 19:44:58 31 (min) Purpose code: 1  
 LOG : 549.85 551.49 1.63 Area code : 3  
 FDEPTH: 5 5 GearCond.code: 1  
 BDEPTH: 309 257 Validity code: 3  
 Towing dir: 90ø Wire out: 140 m Speed: 30 kn\*10  
 Sorted: Kg Total catch: 83.69 CATCH/HOUR: 161.98

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
MYCTOPHIDAE	105.29	79897	65.00	
Auxis thazard	47.61	157	29.39	
Synagrops microlepis	6.19	412	3.82	
Macroparalepis macrogeneion	1.65	205	1.02	
Ariomma bondi	1.03	103	0.64	
Trichiurus lepturus	0.21	21	0.13	
Total	161.98		100.00	

PROJECT STATION:2584  
 DATE:23/ 7/01 GEAR TYPE: PT No:6 POSITION:Lat S 635  
 start stop duration Long E 1144  
 TIME :05:00:55 05:31:06 30 (min) Purpose code: 1  
 LOG : 628.66 630.61 1.93 Area code : 3  
 FDEPTH: 5 5 GearCond.code: 1  
 BDEPTH: 186 153 Validity code: 3  
 Towing dir: 90ø Wire out: 160 m Speed: 30 kn\*10  
 Sorted: Kg Total catch: 50.00 CATCH/HOUR: 100.00

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Myliobatis aquila	100.00	2	100.00	
Total	100.00		100.00	

PROJECT STATION:2585  
 DATE:23/ 7/01 GEAR TYPE: BT No:7 POSITION:Lat S 640  
 start stop duration Long E 1145  
 TIME :10:04:48 10:34:27 30 (min) Purpose code: 1  
 LOG : 667.99 669.49 1.48 Area code : 3  
 FDEPTH: 227 264 GearCond.code: 1  
 BDEPTH: 227 264 Validity code: 1  
 Towing dir: 270ø Wire out: 650 m Speed: 30 kn\*10  
 Sorted: 23 Kg Total catch: 90.64 CATCH/HOUR: 181.28

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Synagrops microlepis	56.80	7952	31.33	
Dentex angolensis	31.68	88	17.48	
Todaropsis eblanae	28.24	288	15.58	
MYCTOPHIDAE	23.60	20976	13.02	
Zenopsis conchifer	17.76	48	9.80	
Merluccius polli	11.28	120	6.22	
Chlorophthalmus atlanticus	5.60	376	3.09	
Loligo vulgaris	3.68	72	2.03	
Pterothrissus belloci	1.04	8	0.57	
Parapeneus longirostris	0.88	144	0.49	
Ariomma bondi	0.64	24	0.35	
Dicologlossa cuneata	0.08	16	0.04	
Total	181.28		100.00	

PROJECT STATION:2586  
 DATE:23/ 7/01 GEAR TYPE: BT No:7 POSITION:Lat S 640  
 start stop duration Long E 1217  
 TIME :14:56:16 15:26:56 31 (min) Purpose code: 1  
 LOG : 705.84 707.48 1.63 Area code : 3  
 FDEPTH: 38 46 GearCond.code: 1  
 BDEPTH: 38 46 Validity code: 1  
 Towing dir: 270ø Wire out: 250 m Speed: 30 kn\*10  
 Sorted: 33 Kg Total catch: 109.55 CATCH/HOUR: 212.03

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichiurus lepturus	87.10	225	41.08	
Pomadourus incisus	44.13	263	20.81	
Argyrosomus hololepidotus	27.10	8	12.78	
Pagrus caeruleostictus	15.79	39	7.45	5732
Trachurus trecae	15.77	292	7.44	
Dentex canariensis	9.21	23	4.34	
Seriola carpenteri	2.94	8	1.39	
Scomber japonicus	2.71	15	1.28	
Sphyraena guachancho	2.25	8	1.06	
Decapterus rhonchus	1.86	15	0.88	
Zeus faber	1.47	8	0.69	
Sardinella aurita	0.91	17	0.43	5733
Stromateus fiatola	0.79	8	0.37	
Total	212.03		100.00	

PROJECT STATION:2587  
 DATE:23/ 7/01 GEAR TYPE: PT No:6 POSITION:Lat S 639  
 start stop duration Long E 1216  
 TIME :17:24:31 17:56:21 32 (min) Purpose code: 1  
 LOG : 715.51 716.86 1.32 Area code : 3  
 FDEPTH: 5 5 GearCond.code: 1  
 BDEPTH: 41 37 Validity code: 3  
 Towing dir: 90ø Wire out: 160 m Speed: 30 kn\*10  
 Sorted: Kg Total catch: 57.53 CATCH/HOUR: 107.87

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichiurus lepturus	53.63	159	49.72	
Trachurus trecae	48.84	195	45.28	5734
Sphyraena guachancho	2.57	4	2.38	
Scomber japonicus	1.99	9	1.84	
Brachydeuterus auritus	0.53	4	0.49	
Decapterus rhonchus	0.17	2	0.16	
Naucratus ductor	0.15	2	0.14	
Total	107.88		100.01	

PROJECT STATION:2588  
 DATE:24/ 7/01 GEAR TYPE: PT No:4 POSITION:Lat S 650  
 start stop duration Long E 1150  
 TIME :01:19:27 01:49:20 30 (min) Purpose code: 1  
 LOG : 786.39 788.28 1.88 Area code : 3  
 FDEPTH: 1 1 GearCond.code: 1  
 BDEPTH: 250 186 Validity code: 3  
 Towing dir: 90ø Wire out: 160 m Speed: 36 kn\*10  
 Sorted: 29 Kg Total catch: 132.25 CATCH/HOUR: 264.50

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
MYCTOPHIDAE	235.20	254800	88.92	
Auxis thazard	20.30	46	7.67	
Trichiurus lepturus	9.00	14	3.40	
Total	264.50		99.99	

PROJECT STATION:2589  
 DATE:24/ 7/01 GEAR TYPE: BT No:7 POSITION:Lat S 655  
 start stop duration Long E 1152  
 TIME :08:23:58 08:55:15 31 (min) Purpose code: 1  
 LOG : 849.60 851.39 1.77 Area code : 3  
 FDEPTH: 286 189 GearCond.code: 1  
 BDEPTH: 286 189 Validity code: 3  
 Towing dir: 90ø Wire out: 900 m Speed: 30 kn\*10  
 Sorted: Kg Total catch: 227.30 CATCH/HOUR: 439.94

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
MYCTOPHIDAE	86.17	20106	19.59	
Zeus faber	83.73	108	19.03	
Synagrops microlepis	79.94	4200	18.17	
Merluccius polli	76.41	583	17.37	
Torpedo marmorata	29.13	14	6.62	
Chlorophthalmus atlanticus	28.32	1084	6.44	
Carcharhinus signatus	15.10	4	3.43	
Brotula barbata	9.08	27	2.06	
Dentex congoensis	6.04	31	1.37	
Todaropsis eblanae	5.57	81	1.27	
Parapenaeus longirostris	5.42	664	1.23	
Zenopsis conchifer	3.93	68	0.89	
Spicara alta	2.44	14	0.55	
Pomadourys incisus	2.30	2	0.52	
Coelorrhinus coelorrhinus	1.63	27	0.37	
Scorpaena normani	1.49	54	0.34	
Pterothrissus belloci	1.49	14	0.34	
Ariomma bondi	1.35	54	0.31	
Sepiella ornata	0.41	27	0.09	
Total	439.95		99.99	

PROJECT STATION:2590  
 DATE:24/ 7/01 GEAR TYPE: PT No:7 POSITION:Lat S 700  
 start stop duration Long E 1239  
 TIME :16:56:33 17:28:07 32 (min) Purpose code: 1  
 LOG : 923.39 925.71 2.29 Area code : 3  
 FDEPTH: 5 5 GearCond.code: 1  
 BDEPTH: 21 27 Validity code: 1  
 Towing dir: 270ø Wire out: 160 m Speed: 30 kn\*10  
 Sorted: 71 Kg Total catch: 285.44 CATCH/HOUR: 535.20

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardinella maderensis	497.33	2638	92.92	5738
Sardinella aurita	27.53	113	5.14	5737
Zenopsis conchifer	10.35	8	1.93	
Total	535.21		99.99	

PROJECT STATION:2591  
 DATE:24/ 7/01 GEAR TYPE: PT No:7 POSITION:Lat S 704  
 start stop duration Long E 1236  
 TIME :18:51:01 19:19:37 29 (min) Purpose code: 1  
 LOG : 936.77 938.47 1.72 Area code : 3  
 FDEPTH: 5 5 GearCond.code: 1  
 BDEPTH: 36 34 Validity code: 3  
 Towing dir: 360ø Wire out: 160 m Speed: 30 kn\*10  
 Sorted: 86 Kg Total catch: 361.69 CATCH/HOUR: 748.32

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardinella maderensis	449.26	2197	60.04	5739
Sardinella aurita	140.34	565	18.75	5740
Trachurus trecae	67.78	443	9.06	5741
Brachydeuterus auritus	67.78	842	9.06	
Sepia orbignyana	9.64	8	1.29	
Decapterus rhonchus	6.79	79	0.91	
Atractoscion aequidens	3.62	2	0.48	
Trichiurus lepturus	3.12	17	0.42	
Total	748.33		100.01	

PROJECT STATION:2592  
 DATE:25/ 7/01 GEAR TYPE: PT No:1 POSITION:Lat S 705  
 start stop duration Long E 1212  
 TIME :23:34:19 00:04:18 30 (min) Purpose code: 1  
 LOG : 976.17 978.20 2.01 Area code : 3  
 FDEPTH: 20 20 GearCond.code: 1  
 BDEPTH: 112 116 Validity code: 3  
 Towing dir: 270ø Wire out: 80 m Speed: 40 kn\*10  
 Sorted: 1 Kg Total catch: 1.66 CATCH/HOUR: 3.32

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sepia orbignyana	2.58	2	77.71	
Saurida brasiliensis	0.42	88	12.65	
Trachurus trecae	0.30	10	9.04	5742
Loligo vulgaris	0.02	2	0.60	
Selene dorsalis, juveniles	0.00	10		
Total	3.32		100.00	

PROJECT STATION:2593  
 DATE:25/ 7/01 GEAR TYPE: PT No:1 POSITION:Lat S 715  
 start stop duration Long E 1156  
 TIME :16:14:12 16:24:25 10 (min) Purpose code: 1  
 LOG :1115.11 1115.66 0.54 Area code : 3  
 FDEPTH: 370 370 GearCond.code: 1  
 BDEPTH: 565 594 Validity code: 1  
 Towing dir: 270ø Wire out: m Speed: kn\*10  
 Sorted: Kg Total catch: 1.03 CATCH/HOUR: 6.18

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Triplophos sp.	3.60	264	58.25	
CRANGONIDAE	0.84	1008	13.59	
Gonostoma sp.	0.72	24	11.65	
MYCTOPHIDAE	0.42	180	6.80	
Argyroleucus sp.	0.36	18	5.83	
Diplophos sp.	0.24	6	3.88	
Total	6.18		100.00	

PROJECT STATION:2594  
 DATE:25/ 7/01 GEAR TYPE: PT No:1 POSITION:Lat S 715  
 start stop duration Long E 1155  
 TIME :16:32:35 16:45:10 13 (min) Purpose code: 1  
 LOG :1116.08 1116.80 0.72 Area code : 3  
 FDEPTH: 270 270 GearCond.code: 1  
 BDEPTH: 612 647 Validity code: 1  
 Towing dir: 270ø Wire out: 750 m Speed: 40 kn\*10  
 Sorted: Kg Total catch: 0.17 CATCH/HOUR: 0.78

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Triplophos sp.	0.32	5	41.03	
CRANGONIDAE	0.23	18	29.49	
MYCTOPHIDAE	0.23	254	29.49	
Total	0.78		100.01	

PROJECT STATION:2595  
 DATE:25/ 7/01 GEAR TYPE: PT No:1 POSITION:Lat S 715  
 start stop duration Long E 1154  
 TIME :17:01:29 17:15:50 14 (min) Purpose code: 1  
 LOG :1117.51 1118.33 0.79 Area code : 3  
 FDEPTH: 20 25 GearCond.code: 1  
 BDEPTH: 673 702 Validity code: 1  
 Towing dir: 270ø Wire out: 75 m Speed: 30 kn\*10  
 Sorted: Kg Total catch: 8.50 CATCH/HOUR: 36.43

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
MYCTOPHIDAE	36.43	30540	100.00	
Total	36.43		100.00	

PROJECT STATION:2596  
 DATE:25/ 7/01 GEAR TYPE: PT No:1 POSITION:Lat S 714  
 start stop duration Long E 1157  
 TIME :19:07:32 19:22:50 15 (min) Purpose code: 1  
 LOG :1123.25 1124.03 0.77 Area code : 3  
 FDEPTH: 350 358 GearCond.code: 1  
 BDEPTH: 517 489 Validity code: 3  
 Towing dir: 90ø Wire out: 950 m Speed: 30 kn\*10  
 Sorted: 2 Kg Total catch: 2.18 CATCH/HOUR: 8.72

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Shrimps, small, non comm.	4.12	1924	47.25	
Melanostomias sp.	2.28	56	26.15	
Triplophos sp.	1.04	168	11.93	
Nematocarcinus africanus	0.32	120	3.67	
Scorpaena elongata	0.24	4	2.75	
Gonostoma sp.	0.24	20	2.75	
Borostomias sp.	0.20	4	2.29	
Lamprogrammus exutus	0.16	8	1.83	
Dibranchius atlanticus	0.08	4	0.92	
Diplophos sp.	0.04	12	0.46	
Total	8.72		100.00	

PROJECT STATION:2597  
 DATE:25/ 7/01 GEAR TYPE: PT No:1 POSITION:Lat S 714  
 start stop duration Long E 1158  
 TIME :19:41:22 19:57:00 16 (min) Purpose code: 1  
 LOG :1124.72 1125.64 0.91 Area code : 3  
 FDEPTH: 40 40 GearCond.code: 1  
 BDEPTH: 463 439 Validity code: 1  
 Towing dir: 90ø Wire out: 105 m Speed: 30 kn\*10  
 Sorted: 1 Kg Total catch: 5.39 CATCH/HOUR: 20.21

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachipterus sp.	15.83	19	78.33	
Shrimps, small, non comm.	1.91	4703	9.45	
MYCTOPHIDAE	1.80	1605	8.91	
Melanostomias sp.	0.45	19	2.23	
Nematocarcinus africanus	0.08	53	0.40	
Yarella blackfordi	0.08	26	0.40	
Gonostoma sp.	0.08	8	0.40	
Total	20.23		100.12	

PROJECT STATION:2598  
 DATE:25/ 7/01 GEAR TYPE: PT No:1 POSITION:Lat S 714  
 start stop duration Long E 1200  
 TIME :20:04:34 20:20:03 15 (min) Purpose code: 1  
 LOG :1126.09 1127.05 0.49 Area code : 3  
 FDEPTH: 25 25 GearCond.code: 1  
 BDEPTH: 426 401 Validity code: 3  
 Towing dir: 90ø Wire out: 75 m Speed: 30 kn\*10  
 Sorted: 1 Kg Total catch: 53.60 CATCH/HOUR: 214.40

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Mola mola	200.00	4	93.28	
MYCTOPHIDAE	9.96	2900	4.65	
Shrimps, small, non comm.	2.76	2992	1.29	
Trachipterus sp.	1.68	36	0.78	
Total	214.40		100.00	

PROJECT STATION:2599  
 DATE:26/ 7/01 GEAR TYPE: PT No:1 POSITION:Lat S 730 Long E 1220  
 start stop duration  
 TIME :09:47:32 10:03:21 16 (min) Purpose code: 1  
 LOG :1263.90 1264.71 0.80 Area code : 3  
 FDEPTH: 350 348 GearCond.code: 1  
 BDEPTH: 573 550 Validity code: 3  
 Towing dir: 90ø Wire out: 950 m Speed: 30 kn\*10

Sorted: Kg Total catch: 21.63 CATCH/HOUR: 81.11

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
STOMIIDAE	49.50	1114	61.03	
MELANOSTOMIATIDAE	7.80	596	9.62	
Yarella blackfordi	7.76	889	9.57	
Diplophos sp.	3.49	206	4.30	
Gonostoma sp.	2.74	146	3.38	
PENAEIDAE	2.63	1399	3.24	
MELANONIDAE	1.39	83	1.71	
Plesionika martia	1.16	960	1.43	
Xenodermichthys copei	0.90	64	1.11	
OCTOPODIDAE	0.64	4	0.79	
Dibranchus sp.	0.64	686	0.79	
Scorpaena sp.	0.56	11	0.69	
Trachipterus sp.	0.49	8	0.60	
C E F H A L O P O D A	0.38	41	0.47	
Trichiurus lepturus	0.19	4	0.23	
Loligo vulgaris	0.15	8	0.18	
Solenocera africana	0.08	45	0.10	
Alloteuthis africana	0.08	23	0.10	
Nematocarcinus africanus	0.08	4	0.10	
Lamprogrammus exutus	0.08	11	0.10	
Dibranchus atlanticus	0.08	4	0.10	
MYCTOPHIDAE	0.08	60	0.10	
Saurida brasiliensis	0.08	38	0.10	
Serrivomeridae	0.04	4	0.05	
Argyropelecus sp.	0.04	8	0.05	
MURAENIDAE	0.04	4	0.05	
Nemichthys scolopaceus	0.04	4	0.05	
PANDALIDAE	0.04	8	0.05	
Total	81.18		100.09	

PROJECT STATION:2600  
 DATE:26/ 7/01 GEAR TYPE: PT No:1 POSITION:Lat S 729 Long E 1222  
 start stop duration  
 TIME :10:17:10 10:37:32 20 (min) Purpose code: 1  
 LOG :1265.46 1266.57 1.10 Area code : 3  
 FDEPTH: 348 490 GearCond.code: 1  
 BDEPTH: 532 516 Validity code: 3  
 Towing dir: 90ø Wire out:1250 m Speed: 30 kn\*10

Sorted: Kg Total catch: 0.82 CATCH/HOUR: 2.46

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Nematocarcinus africanus	1.44	1392	58.54	
STOMIIDAE	0.33	6	13.41	
Yarella blackfordi	0.24	51	9.76	
MYCTOPHIDAE	0.24	174	9.76	
Parapenaeus longirostris	0.09	72	3.66	
CONGRIDAE	0.06	3	2.44	
GONOSTOMATIDAE	0.03	3	1.22	
Trichiurus lepturus	0.03	3	1.22	
Total	2.46		100.01	

PROJECT STATION:2601  
 DATE:26/ 7/01 GEAR TYPE: PT No:1 POSITION:Lat S 729 Long E 1225  
 start stop duration  
 TIME :11:15:07 11:26:05 11 (min) Purpose code: 1  
 LOG :1268.49 1269.14 0.65 Area code : 3  
 FDEPTH: 30 30 GearCond.code: 1  
 BDEPTH: 408 356 Validity code: 3  
 Towing dir: 90ø Wire out: 90 m Speed: 40 kn\*10

Sorted: Kg Total catch: 0.10 CATCH/HOUR: 0.55

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Alloteuthis africana	0.22	93	40.00	
Yarella blackfordi	0.11	5	20.00	
Lamprogrammus exutus	0.05	5	9.09	
Selene dorsalis	0.05	5	9.09	
Nematocarcinus africanus	0.05	33	9.09	
MYCTOPHIDAE	0.05	33	9.09	
Total	0.53		96.36	

PROJECT STATION:2602  
 DATE:27/ 7/01 GEAR TYPE: BT No:7 POSITION:Lat S 750 Long E 1301  
 start stop duration  
 TIME :12:55:21 13:25:15 30 (min) Purpose code: 1  
 LOG :1453.70 1455.45 1.26 Area code : 3  
 FDEPTH: 40 49 GearCond.code: 1  
 BDEPTH: 40 49 Validity code: 1  
 Towing dir: 270ø Wire out: 150 m Speed: 30 kn\*10

Sorted: 53 Kg Total catch: 52.83 CATCH/HOUR: 105.66

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	27.68	996	26.12	5743
Dentex canariensis	27.80	78	21.58	
Pomadasy incisus	15.80	72	14.95	
Pagellus bellottii	12.50	72	11.83	
Trichiurus lepturus	10.30	18	9.75	
Epinephelus aeneus	4.00	2	3.79	
Zeus faber	2.40	6	2.27	
Umbrina canariensis	2.30	4	2.18	
Pseudolithus senegalensis	2.20	2	2.08	
Lolligoncula mercatoris	1.88	1462	1.78	
Dentex barnardii	1.80	4	1.70	
Plectrohinchus mediterraneus	1.70	2	1.61	
Decapterus rhonchus	0.28	2	0.27	
Alloteuthis africana	0.04	6	0.04	
Sardinella maderensis	0.02	4	0.02	5744
Penaeus notialis	0.02	2	0.02	
Total	105.64		99.99	

PROJECT STATION:2603  
 DATE:27/ 7/01 GEAR TYPE: PT No:7 POSITION:Lat S 800 Long E 1308  
 start stop duration  
 TIME :21:08:02 21:38:13 30 (min) Purpose code: 1  
 LOG :1532.14 1533.91 1.74 Area code : 3  
 FDEPTH: 5 5 GearCond.code: 1  
 BDEPTH: 29 38 Validity code: 3  
 Towing dir: 270ø Wire out: 160 m Speed: 30 kn\*10

Sorted: 90 Kg Total catch: 844.55 CATCH/HOUR: 1689.10

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	1669.40	1680	98.83	
Pomadasy jubelini	13.20	20	0.78	
Trachurus trecae	2.78	112	0.16	5735
Trichiurus lepturus	2.04	60	0.12	
Pentheroscion mbizi	1.68	20	0.10	
Total	1689.10		99.99	

PROJECT STATION:2604  
 DATE:27/ 7/01 GEAR TYPE: PT No:7 POSITION:Lat S 759 Long E 1308  
 start stop duration  
 TIME :22:24:05 23:32:28 68 (min) Purpose code: 1  
 LOG :1538.21 1541.67 1.64 Area code : 3  
 FDEPTH: 5 5 GearCond.code: 1  
 BDEPTH: 28 31 Validity code: 3  
 Towing dir: 300ø Wire out: 190 m Speed: 35 kn\*10

Sorted: 88 Kg Total catch: 88.81 CATCH/HOUR: 78.36

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	50.21	681	64.08	
Sardinella maderensis	17.12	101	21.85	5745
Trichiurus lepturus	5.32	199	6.79	
Ilisha africana	2.34	30	2.99	
Brachydeuterus auritus Juv.	1.13	80	1.44	
Pteroscion peli	0.53	6	0.68	
Stromateus fiatola	0.48	1	0.61	
Remora sp.	0.42	1	0.54	
Trachurus trecae	0.41	10	0.52	5746
Sphyræna guachancho	0.23	1	0.29	
Sepiella ornata	0.17	14	0.22	
Chilomycterus sp.	0.02	1	0.03	
Penaeus notialis	0.00	1		
Total	78.38		100.04	

PROJECT STATION:2605  
 DATE:28/ 7/01 GEAR TYPE: PT No:7 POSITION:Lat S 805 Long E 1310  
 start stop duration  
 TIME :02:25:01 03:12:26 47 (min) Purpose code: 1  
 LOG :1561.33 1564.35 3.01 Area code : 3  
 FDEPTH: 5 5 GearCond.code: 1  
 BDEPTH: 32 28 Validity code: 3  
 Towing dir: 160ø Wire out: 160 m Speed: 40 kn\*10

Sorted: 61 Kg Total catch: 518.84 CATCH/HOUR: 662.35

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	345.57	6017	52.17	
Sardinella maderensis	219.19	1292	35.09	5749
Trachurus trecae	68.81	369	10.39	5748
Selene dorsalis	12.80	87	1.93	
Ilisha africana	10.52	120	1.59	
Trichiurus lepturus	3.04	1085	0.46	
Chloroscombrus chrysurus	2.27	22	0.34	
Total	662.20		99.97	

PROJECT STATION:2606  
 DATE:28/ 7/01 GEAR TYPE: BT No:7 POSITION:Lat S 805 Long E 1247  
 start stop duration  
 TIME :08:34:53 08:48:45 14 (min) Purpose code: 1  
 LOG :1609.11 1609.65 0.50 Area code : 3  
 FDEPTH: 124 122 GearCond.code: 1  
 BDEPTH: 124 122 Validity code: 3  
 Towing dir: 90ø Wire out: 380 m Speed: 30 kn\*10

Sorted: 61 Kg Total catch: 61.70 CATCH/HOUR: 264.43

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Dentex congoensis	124.93	1011	47.25	
Squatina oculata	36.43	4	13.78	
Dentex angolensis	31.07	154	11.75	
Erythrocles monodi	29.57	51	11.18	
Zeus faber	11.23	9	4.25	
Argyrosomus hololepidotus	8.27	4	3.13	
Pseudogeneus prayensis	8.01	407	3.03	
Zenopsis conchifer	4.03	26	1.52	
Dentex canariensis	3.64	9	1.38	
Pagrus pagrus	2.19	4	0.83	
Scorpaena angolensis	1.54	4	0.58	
Chaetodon hoefleri	1.29	9	0.49	
Illex sp.	1.29	4	0.49	
Trigla lyra	0.47	4	0.18	
Pagellus bellottii	0.47	4	0.18	
Total	264.43		100.02	

PROJECT STATION:2607  
 DATE:28/ 7/01 GEAR TYPE: BT No:7 POSITION:Lat S 804  
 start stop duration Long E 1251  
 TIME :09:40:00 10:10:00 30 (min) Purpose code: 1  
 LOG :1614.40 1616.04 1.63 Area code : 3  
 FDEPTH: 118 119 GearCond.code: 1  
 BDEPTH: 118 119 Validity code: 3  
 Towing dir: 270ø Wire out: 340 m Speed: 30 kn\*10  
 Sorted: 50 Kg Total catch: 50.90 CATCH/HOUR: 101.80

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Dentex angolensis	54.10	282	53.14	
Argyrosomus hololepidotus	11.20	4	11.00	
Dentex congoensis	9.80	94	9.63	
Branchiostegus semifasciatus	6.80	6	6.68	
Scomber japonicus	5.40	56	5.30	
Trigla lyra	4.20	32	4.13	
Zeus faber	2.40	10	2.36	
Todaropsis eblanae	1.98	64	1.94	
Scorpaena angolensis	1.44	2	1.41	
Trichiurus lepturus	1.38	2	1.36	
Dentex canariensis	1.06	2	1.04	
Trachurus trecae	0.98	10	0.96	
Chaetodon hoefleri	0.58	4	0.57	
Pagellus bellottii	0.44	6	0.43	
Arionna bondi	0.04	2	0.04	
Total	101.80		99.99	

PROJECT STATION:2608  
 DATE:28/ 7/01 GEAR TYPE: BT No:7 POSITION:Lat S 810  
 start stop duration Long E 1250  
 TIME :14:19:44 14:49:30 30 (min) Purpose code: 1  
 LOG :1645.93 1647.62 1.67 Area code : 3  
 FDEPTH: 123 136 GearCond.code: 1  
 BDEPTH: 123 136 Validity code: 3  
 Towing dir: 280ø Wire out: 400 m Speed: 30 kn\*10  
 Sorted: 51 Kg Total catch: 51.75 CATCH/HOUR: 103.50

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Dentex macrophthalmus	26.90	96	25.99	
Loligo vulgaris	18.90	452	18.26	
Dentex congoensis	17.30	228	16.71	
Dentex angolensis	13.20	64	12.75	
Spicara alta	7.50	58	7.25	
Zenopsis conchifer	4.10	4	3.96	
Sparus pagrus africanus *	4.10	8	3.96	
Sarda sarda	4.00	2	3.86	
Zeus faber	2.80	4	2.71	
Branchiostegus semifasciatus	2.70	2	2.61	
Trichiurus lepturus	1.50	2	1.45	
Chaetodon hoefleri	0.26	2	0.25	
Taractichthys longipinnis	0.24	2	0.23	
Total	103.50		99.99	

PROJECT STATION:2609  
 DATE:28/ 7/01 GEAR TYPE: PT No:7 POSITION:Lat S 808  
 start stop duration Long E 1312  
 TIME :18:40:00 19:52:31 73 (min) Purpose code: 1  
 LOG :1680.80 1684.03 3.29 Area code : 3  
 FDEPTH: 5 5 GearCond.code: 1  
 BDEPTH: 26 31 Validity code: 3  
 Towing dir: 165ø Wire out: 180 m Speed: 30 kn\*10  
 Sorted: 121 Kg Total catch: 935.30 CATCH/HOUR: 768.74

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	624.96	14739	81.30	
Ilisha africana	62.91	196	8.18	
Trachurus trecae	37.02	253	4.82	5747
Trichiurus lepturus	17.91	297	2.33	
Sardinella maderensis	17.40	101	2.26	5736
Stromateus fiatola	4.05	7	0.53	
Sphyraena guachancho	1.59	7	0.21	
Pentheroscion mbizi	1.20	12	0.16	
Galeoides decadactylus	0.70	7	0.09	
Chloroscombus chrysurus	0.63	7	0.08	
Selene dorsalis	0.38	7	0.05	
Total	768.75		100.01	

PROJECT STATION:2610  
 DATE:29/ 7/01 GEAR TYPE: BT No:7 POSITION:Lat S 826  
 start stop duration Long E 1300  
 TIME :08:03:40 08:33:19 30 (min) Purpose code: 1  
 LOG :1794.60 1796.19 1.52 Area code : 3  
 FDEPTH: 115 114 GearCond.code: 1  
 BDEPTH: 115 114 Validity code: 3  
 Towing dir: 90ø Wire out: 350 m Speed: 30 kn\*10  
 Sorted: 238 Kg Total catch: 238.20 CATCH/HOUR: 476.40

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Umbrina canariensis	182.90	672	38.39	
Dentex congoensis	76.20	512	15.99	
Dentex macrophthalmus	62.00	192	13.01	
Dentex angolensis	55.60	272	11.67	
Trachurus trecae	42.50	1206	8.92	5750
Sphyrna lewini	30.00	2	6.30	
Anthias anthias	6.62	30	1.39	
Erythrocles monodi	4.78	8	1.00	
Epinephelus gorensis	2.40	2	0.50	
Dentex canariensis	1.88	6	0.39	
Raja miraletus	1.86	2	0.39	
Trigla lyra	1.78	12	0.37	
Trichiurus lepturus	1.74	2	0.37	
Scorpaena stephanica	1.22	4	0.26	
Pagellus bellottii	1.14	8	0.24	1
Chaetodon hoefleri	1.04	8	0.22	
Todarodes sp.	0.84	46	0.18	
Pagrus pagrus	0.72	2	0.15	
Zenopsis conchifer	0.62	4	0.13	
Illex coindetii	0.32	12	0.07	
Boops boops	0.14	6	0.03	
Citharus linguatula	0.08	2	0.02	
Total	476.38		99.99	

PROJECT STATION:2611  
 DATE:29/ 7/01 GEAR TYPE: BT No:7 POSITION:Lat S 830  
 start stop duration Long E 1315  
 TIME :15:56:02 16:26:09 30 (min) Purpose code: 1  
 LOG :1868.63 1870.43 1.79 Area code : 3  
 FDEPTH: 48 37 GearCond.code: 1  
 BDEPTH: 48 37 Validity code: 3  
 Towing dir: 90ø Wire out: 160 m Speed: 32 kn\*10  
 Sorted: 95 Kg Total catch: 382.96 CATCH/HOUR: 765.92

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	347.52	2176	45.37	
Trichiurus lepturus	157.20	3880	20.52	
Trachurus trecae	112.80	288	14.73	5751
Dentex canariensis	44.72	32	5.84	
Epinephelus aeneus	31.20	8	4.07	
Plectorhinchus macrolepis	20.40	8	2.66	
Pagrus pagrus	16.48	40	2.15	
Raja miraletus	6.80	8	0.89	
Stromateus fiatola	6.32	16	0.83	
Umbrina canariensis	5.36	8	0.70	
Trachurus trecae, juvenile	5.28	160	0.69	5752
Pomadasyss jubelini	4.32	8	0.56	
Pomadasyss incisus	2.72	8	0.36	
Pagellus bellottii	2.40	16	0.31	
Penaeus notialis	1.52	72	0.20	
Chaetodon hoefleri	0.64	8	0.08	
Pseudolithus senegalensis	0.24	8	0.03	
Total	765.92		99.99	

PROJECT STATION:2612  
 DATE:29/ 7/01 GEAR TYPE: PT No:1 POSITION:Lat S 830  
 start stop duration Long E 1301  
 TIME :19:01:03 19:16:08 15 (min) Purpose code: 1  
 LOG :1888.78 1889.70 0.90 Area code : 3  
 FDEPTH: 45 30 GearCond.code: 1  
 BDEPTH: 124 136 Validity code: 3  
 Towing dir: 270ø Wire out: 90 m Speed: 30 kn\*10  
 Sorted: 1 Kg Total catch: 0.88 CATCH/HOUR: 3.52

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
MYCTOPHIDAE	2.76	2040	78.41	
Synagrops microlepis	0.56	920	15.91	
Todaropsis eblanae	0.12	12	3.41	
Trachurus trecae	0.08	8	2.27	
Total	3.52		100.00	

PROJECT STATION:2613  
 DATE:29/ 7/01 GEAR TYPE: PT No:1 POSITION:Lat S 830  
 start stop duration Long E 1300  
 TIME :19:24:21 19:41:08 17 (min) Purpose code: 1  
 LOG :1890.21 1891.13 1.05 Area code : 3  
 FDEPTH: 85 84 GearCond.code: 1  
 BDEPTH: 147 163 Validity code: 3  
 Towing dir: 270ø Wire out: 200 m Speed: 30 kn\*10  
 Sorted: 1 Kg Total catch: 1.65 CATCH/HOUR: 5.82

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
MYCTOPHIDAE	4.52	3642	77.66	
Synagrops microlepis	0.81	60	13.92	
Illex coindetii	0.49	11	8.42	
Total	5.82		100.00	

PROJECT STATION:2614  
 DATE:29/ 7/01 GEAR TYPE: PT No:1 POSITION:Lat S 830  
 start stop duration Long E 1256  
 TIME :19:54:40 20:09:10 15 (min) Purpose code: 1  
 LOG :1891.80 1892.80 1.00 Area code : 3  
 FDEPTH: 25 27 GearCond.code: 1  
 BDEPTH: 179 198 Validity code: 3  
 Towing dir: 270ø Wire out: 90 m Speed: 30 kn\*10  
 Sorted: 4 Kg Total catch: 4.10 CATCH/HOUR: 16.40

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
MYCTOPHIDAE	16.12	9872	98.29	
Synagrops microlepis	0.28	40	1.71	
Total	16.40		100.00	

PROJECT STATION:2615  
 DATE:30/ 7/01 GEAR TYPE: PT No:1 POSITION:Lat S 840  
 start stop duration Long E 1308  
 TIME :02:44:09 03:14:20 30 (min) Purpose code: 1  
 LOG :1956.98 1958.99 1.99 Area code : 3  
 FDEPTH: 35 35 GearCond.code: 1  
 BDEPTH: 90 79 Validity code: 1  
 Towing dir: 90ø Wire out: 120 m Speed: 38 kn\*10  
 Sorted: 2 Kg Total catch: 2.10 CATCH/HOUR: 4.20

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichiurus lepturus	2.04	4	48.57	
Sepia officinalis hierredda	0.88	2	20.95	
Saurida brasiliensis	0.60	180	14.29	
GOBIIDAE	0.34	824	8.10	
Loligo vulgaris	0.12	8	2.86	
Merluccius polli, juveniles	0.10	60	2.38	
Branchiostegus semifasciatus	0.04	8	0.95	
Trachurus trecae, juvenile	0.04	50	0.95	5753
Bregmaceros sp.	0.02	4	0.48	
CONGRIDAE	0.02	8	0.48	
Total	4.20		100.01	

PROJECT STATION:2616  
 DATE:30/ 7/01 GEAR TYPE: PT No:7 POSITION:Lat S 905 Long E 1257  
 start stop duration  
 TIME :20:01:29 21:40:37 39 (min) Purpose code: 1  
 LOG :2111.74 2113.54 1.79 Area code : 2  
 FDEPTH: 10 10 GearCond.code: 3  
 BDEPTH: 38 31 Validity code: 1  
 Towing dir: 200ø Wire out: 160 m Speed: 30 kn\*10  
 Sorted: 43 Kg Total catch: 43.33 CATCH/HOUR: 66.66

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	52.62	331	78.94	
Sardinella maderensis	7.54	26	11.31	5758
Trachurus trecae	2.12	58	3.18	5754
Raja miraletus	1.69	2	2.54	
Trichiurus lepturus	1.23	32	1.85	
MYCTOPHIDAE	0.51	200	0.77	
Sphyræna guachancho	0.46	2	0.69	
Alloteuthis africana	0.14	85	0.21	
Sepiella ornata	0.14	3	0.21	
Saurida brasiliensis	0.14	26	0.21	
Trachurus trecae, juvenile	0.08	55	0.12	5755
Total	66.67		100.03	

PROJECT STATION:2620  
 DATE:31/ 7/01 GEAR TYPE: BT No:7 POSITION:Lat S 940 Long E 1309  
 start stop duration  
 TIME :23:29:44 23:59:26 30 (min) Purpose code: 1  
 LOG :2335.34 2336.90 1.55 Area code : 2  
 FDEPTH: 26 28 GearCond.code: 3  
 BDEPTH: 26 28 Validity code: 1  
 Towing dir: 170ø Wire out: 90 m Speed: 32 kn\*10  
 Sorted: 27 Kg Total catch: 136.50 CATCH/HOUR: 273.00

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Pteroscion peli	104.00	1600	38.10	
Sepia officinalis hierredra	42.90	40	15.71	
Pagellus bellottii	27.00	180	9.89	
Pomadasy jubelini	26.00	30	9.52	
Pomadasy incisus	13.00	130	4.76	
Galeoides decadactylus	13.00	170	4.76	
Pseudolithus senegalensis	13.00	40	4.76	
Brachydeuterus auritus	5.30	60	1.94	
Brachydeuterus auritus	5.00	1198	1.83	
Penaeus notialis	3.90	920	1.43	
Cynoglossus canariensis	3.10	10	1.14	
Sphyræna guachancho	3.10	10	1.14	
Boops boops	2.90	60	1.06	
Trichiurus lepturus	2.50	110	0.92	
Lithognathus mormyrus	2.40	10	0.88	
Syacium micrum	1.60	10	0.59	
Anthias anthias	1.20	20	0.44	
Trachinocephalus myops	1.00	30	0.37	
Penaeus kerathurus	0.70	20	0.26	
Trachurus trecae	0.60	30	0.22	
Epinephelus alexandrinus *	0.60	10	0.22	
Pteroscion peli	0.20	120	0.07	
SCORPAENIDAE	0.00	230		
CONGRIDAE	0.00	20		
Total	273.00		100.01	

PROJECT STATION:2617  
 DATE:31/ 7/01 GEAR TYPE: PT No:1 POSITION:Lat S 911 Long E 1237  
 start stop duration  
 TIME :00:53:34 01:31:59 38 (min) Purpose code: 1  
 LOG :2138.29 2140.73 2.43 Area code : 2  
 FDEPTH: 50 50 GearCond.code: 1  
 BDEPTH: 512 505 Validity code: 3  
 Towing dir: 20ø Wire out: 160 m Speed: 40 kn\*10  
 Sorted: 2 Kg Total catch: 10.35 CATCH/HOUR: 16.34

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
MYCTOPHIDAE	4.11	2053	25.15	
MELANOSTOMIATIDAE	3.85	297	23.56	
SEPIOLIDAE	3.35	19	20.50	
TRACHIPTERIDAE	2.64	82	16.16	
Loligo sp.	0.69	88	4.22	
CONGRIDAE	0.32	284	1.96	
Gonostoma sp.	0.32	6	1.96	
Yarrella blackfordi	0.25	69	1.53	
Shrimps, small, non comm.	0.19	227	1.16	
Hemiramphus balao	0.19	25	1.16	
EPHIPPIIDAE	0.13	19	0.80	
STOMIDAE	0.13	44	0.80	
Loligo vulgaris	0.13	19	0.80	
JUVENILE FISHES	0.06	13	0.37	
Total	16.36		100.13	

PROJECT STATION:2621  
 DATE: 1/ 8/01 GEAR TYPE: BT No:7 POSITION:Lat S 950 Long E 1313  
 start stop duration  
 TIME :08:45:37 09:15:40 30 (min) Purpose code: 1  
 LOG :2415.24 2416.69 1.43 Area code : 2  
 FDEPTH: 20 23 GearCond.code: 2  
 BDEPTH: 20 23 Validity code: 3  
 Towing dir: 270ø Wire out: 100 m Speed: 30 kn\*10  
 Sorted: 41 Kg Total catch: 160.03 CATCH/HOUR: 320.06

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	274.92	62130	85.90	
Pteroscion peli	8.28	148	2.59	
Pagellus bellottii	6.14	52	1.92	
Ephippion guttifer	5.94	2	1.86	
Pseudolithus typus	4.72	2	1.47	
Galeoides decadactylus	3.56	82	1.11	
Pomadasy peroteti	3.16	4	0.99	
Arius parkii	3.04	4	0.95	
Eucinostomus melanopterus	2.66	44	0.83	
Sphyræna guachancho	2.30	8	0.72	
Selene dorsalis	1.26	38	0.39	
Pomadasy incisus	1.26	38	0.39	
Decapterus rhonchus	1.12	22	0.35	
Trichiurus lepturus	0.60	38	0.19	
Trachurus trecae	0.60	22	0.19	
Cynoglossus browni	0.54	2	0.17	
Total	320.10		100.02	

PROJECT STATION:2618  
 DATE:31/ 7/01 GEAR TYPE: PT No:1 POSITION:Lat S 915 Long E 1254  
 start stop duration  
 TIME :04:37:41 05:08:15 31 (min) Purpose code: 1  
 LOG :2168.67 2170.67 1.99 Area code : 2  
 FDEPTH: 20 20 GearCond.code: 1  
 BDEPTH: 43 66 Validity code: 3  
 Towing dir: 270ø Wire out: 80 m Speed: 30 kn\*10  
 Sorted: Kg Total catch: 82.78 CATCH/HOUR: 160.22

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	45.87	335	28.63	
Sardinella maderensis	35.87	182	23.01	5757
Trichiurus lepturus	28.84	110	18.00	
Trachurus trecae	21.87	85	13.65	5756
Decapterus rhonchus	17.90	25	11.17	
Seriola carpenteri	6.77	6	4.23	
Selene dorsalis	1.66	4	1.04	
Sardinella aurita	0.43	2	0.27	
Total	160.21		100.00	

PROJECT STATION:2622  
 DATE: 1/ 8/01 GEAR TYPE: PT No:7 POSITION:Lat S 955 Long E 1314  
 start stop duration  
 TIME :17:24:10 17:55:08 31 (min) Purpose code: 1  
 LOG :2480.23 2482.20 1.94 Area code : 2  
 FDEPTH: 10 10 GearCond.code: 2  
 BDEPTH: 22 28 Validity code: 3  
 Towing dir: 270ø Wire out: 180 m Speed: 30 kn\*10  
 Sorted: 64 Kg Total catch: 1018.56 CATCH/HOUR: 1971.41

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	1867.35	24898	94.72	
Ephippion guttifer	50.17	31	2.54	
Galeoides decadactylus	32.83	93	1.67	
Trichiurus lepturus	9.60	248	0.49	
Pomadasy incisus	8.05	31	0.41	
Trachurus trecae	3.41	124	0.17	
Total	1971.41		100.00	

PROJECT STATION:2619  
 DATE:31/ 7/01 GEAR TYPE: BT No:7 POSITION:Lat S 920 Long E 1244  
 start stop duration  
 TIME :08:53:41 09:23:25 30 (min) Purpose code: 1  
 LOG :2207.73 2209.16 1.37 Area code : 2  
 FDEPTH: 128 131 GearCond.code: 3  
 BDEPTH: 128 131 Validity code: 3  
 Towing dir: 90ø Wire out: 420 m Speed: 30 kn\*10  
 Sorted: 34 Kg Total catch: 204.06 CATCH/HOUR: 408.12

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Dentex macrophthalmus	165.60	688	40.58	
Spicara alta	76.20	108	18.67	
Anthias anthias	71.04	624	17.41	
Dentex angolensis	36.00	216	8.82	
Umbrina canariensis	24.60	60	6.03	
Dentex congoensis	15.60	216	3.82	
Scorpaena angolensis	5.28	12	1.29	
Fagrus pagrus	5.28	12	1.29	
Scorpaena stephanica	1.68	12	0.41	
Erythrocles monodi	1.68	12	0.41	
Chaetodon hoefleri	1.68	12	0.41	
Boops boops	1.56	24	0.38	
Ariomma bondi	0.84	12	0.21	
Illex coindetii	0.60	12	0.15	
Todarodes sagittatus	0.48	12	0.12	
Total	408.12		100.00	

PROJECT STATION:2623  
 DATE: 1/ 8/01 GEAR TYPE: PT No:7 POSITION:Lat S 1000 Long E 1314  
 start stop duration  
 TIME :19:34:02 20:04:47 31 (min) Purpose code: 1  
 LOG :2492.76 2494.60 1.78 Area code : 2  
 FDEPTH: 10 10 GearCond.code: 1  
 BDEPTH: 30 43 Validity code: 3  
 Towing dir: 270ø Wire out: 180 m Speed: 30 kn\*10  
 Sorted: 69 Kg Total catch: 658.55 CATCH/HOUR: 1274.61

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardinella maderensis	1015.34	4891	79.66	5759
Brachydeuterus auritus	144.35	1490	11.33	
Sardinella aurita	57.56	221	4.52	5760
Trichiurus lepturus	57.37	294	4.50	
Total	1274.62		100.01	

PROJECT STATION:2624  
 DATE: 1/ 8/01 GEAR TYPE: PT No:3 POSITION:Lat S 1000 Long E 1304  
 start stop duration  
 TIME :22:20:56 22:50:27 30 (min) Purpose code: 1  
 LOG :2510.64 2512.47 1.88 Area code : 2  
 FDEPTH: 20 20 GearCond.code: 1  
 BDEPTH: 86 82 Validity code: 1  
 Towing dir: 90ø Wire out: 85 m Speed: 30 kn\*10  
 Sorted: 15 Kg Total catch: 14.96 CATCH/HOUR: 29.92

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	19.20	74	64.17	5761
Trichiurus lepturus	9.70	28	32.42	
Scomber japonicus	0.70	2	2.34	
ENGRAULIDIDAE	0.18	238	0.60	
Loligo vulgaris	0.10	16	0.33	
Allotheuthis africana	0.04	8	0.13	
Total	29.92		99.99	

PROJECT STATION:2625  
 DATE: 2/ 8/01 GEAR TYPE: PT No:1 POSITION:Lat S 1005 Long E 1305  
 start stop duration  
 TIME :03:06:46 03:38:24 32 (min) Purpose code: 1  
 LOG :2551.75 2553.92 2.14 Area code : 2  
 FDEPTH: 30 30 GearCond.code: 1  
 BDEPTH: 91 97 Validity code: 1  
 Towing dir: 270ø Wire out: 120 m Speed: 40 kn\*10  
 Sorted: 1 Kg Total catch: 0.12 CATCH/HOUR: 0.23

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
ENGRAULIDIDAE	0.15	56	65.22	
Trachurus trecae, juvenile	0.08	28	34.78	5762
Total	0.23		100.00	

PROJECT STATION:2626  
 DATE: 2/ 8/01 GEAR TYPE: BT No:7 POSITION:Lat S 1005 Long E 1318  
 start stop duration  
 TIME :05:57:59 06:28:09 30 (min) Purpose code: 1  
 LOG :2572.36 2574.08 1.69 Area code : 2  
 FDEPTH: 23 29 GearCond.code: 1  
 BDEPTH: 23 29 Validity code: 1  
 Towing dir: 270ø Wire out: 100 m Speed: 30 kn\*10  
 Sorted: 372 Kg Total catch: 10610.81 CATCH/HOUR: 21221.62

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	18280.46	348498	86.14	
Trachurus trecae	1248.30	21574	5.88	5763
Chloroscombrus chrysurus	772.34	10766	3.64	
Galeoides decadactylus	498.74	3192	2.35	
Selene dorsalis	185.24	2908	0.87	
Pomadasy inciscus	156.74	1368	0.74	
Trichiurus lepturus	45.60	970	0.21	
Pteroscion pelli	28.50	570	0.13	
Ilisha africana	5.70	58	0.03	
Total	21221.62		99.99	

PROJECT STATION:2627  
 DATE: 2/ 8/01 GEAR TYPE: BT No:7 POSITION:Lat S 1010 Long E 1320  
 start stop duration  
 TIME :08:21:40 08:35:55 14 (min) Purpose code: 1  
 LOG :2590.20 2590.92 0.70 Area code : 2  
 FDEPTH: 30 29 GearCond.code: 1  
 BDEPTH: 30 29 Validity code: 1  
 Towing dir: 90ø Wire out: 110 m Speed: 30 kn\*10  
 Sorted: 95 Kg Total catch: 699.04 CATCH/HOUR: 2995.89

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	2263.54	34894	75.55	
Trachurus trecae	281.19	6214	9.39	5764
Trichiurus lepturus	184.84	4663	6.17	
Galeoides decadactylus	77.66	591	2.59	
Pteroscion pelli	62.14	64	2.07	
Pomadasy inciscus	51.26	437	1.71	
Miracorvina angolensis	33.56	64	1.12	
Ilisha africana	15.81	154	0.53	
Sepia officinalis hierredda	14.74	17	0.49	
Pagellus bellottii	7.76	30	0.26	
Selene dorsalis	3.39	94	0.11	
Total	2995.89		99.99	

PROJECT STATION:2628  
 DATE: 2/ 8/01 GEAR TYPE: PT No:7 POSITION:Lat S 1015 Long E 1325  
 start stop duration  
 TIME :17:40:27 18:10:05 30 (min) Purpose code: 1  
 LOG :2664.52 2666.37 1.82 Area code : 2  
 FDEPTH: 10 10 GearCond.code: 1  
 BDEPTH: 28 32 Validity code: 1  
 Towing dir: 270ø Wire out: 180 m Speed: 30 kn\*10  
 Sorted: 62 Kg Total catch: 191.27 CATCH/HOUR: 382.54

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardinella maderensis	288.24	1368	75.35	5765
Brachydeuterus auritus	61.20	792	16.00	
Trichiurus lepturus	15.60	594	4.08	
Trachurus trecae	10.00	114	2.61	5766
Sardinella maderensis - Juv.	4.20	618	1.10	5767
Sphyrna guachancho	3.30	6	0.86	
Total	382.54		100.00	

PROJECT STATION:2629  
 DATE: 2/ 8/01 GEAR TYPE: PT No:6 POSITION:Lat S 1020 Long E 1304  
 start stop duration  
 TIME :22:09:55 22:54:08 44 (min) Purpose code: 1  
 LOG :2704.78 2706.76 1.93 Area code : 2  
 FDEPTH: 5 5 GearCond.code: 1  
 BDEPTH: 118 113 Validity code: 1  
 Towing dir: 90ø Wire out: 160 m Speed: 30 kn\*10  
 Sorted: 47 Kg Total catch: 46.65 CATCH/HOUR: 63.61

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
MYCTOPHIDAE	38.52	24454	60.56	
Trichiurus lepturus	19.91	29	31.30	
Sarda sarda	5.18	4	8.14	
Total	63.61		100.00	

PROJECT STATION:2630  
 DATE: 3/ 8/01 GEAR TYPE: PT No:1 POSITION:Lat S 1025 Long E 1257  
 start stop duration  
 TIME :01:25:25 01:55:13 30 (min) Purpose code: 1  
 LOG :2725.04 2726.99 1.93 Area code : 2  
 FDEPTH: 45 40 GearCond.code: 1  
 BDEPTH: 524 449 Validity code: 1  
 Towing dir: 90ø Wire out: 160 m Speed: 40 kn\*10  
 Sorted: 8 Kg Total catch: 7.67 CATCH/HOUR: 15.34

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
MYCTOPHIDAE	9.76	4270	63.62	
Sarda sarda	2.84	2	18.51	
Trachipterus sp.	1.38	2	9.00	
Trichiurus lepturus	1.28	2	8.34	
Loligo vulgaris	0.08	6	0.52	
Cynoglossus canariensis	0.00	18		
CONGRIDAE	0.00	2		
Total	15.34		99.99	

PROJECT STATION:2631  
 DATE: 3/ 8/01 GEAR TYPE: PT No:1 POSITION:Lat S 1025 Long E 1315  
 start stop duration  
 TIME :04:04:52 04:34:40 30 (min) Purpose code: 1  
 LOG :2744.56 2746.44 1.85 Area code : 2  
 FDEPTH: 25 25 GearCond.code: 1  
 BDEPTH: 99 106 Validity code: 1  
 Towing dir: 270ø Wire out: 120 m Speed: 40 kn\*10  
 Sorted: Kg Total catch: 3.22 CATCH/HOUR: 6.44

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichiurus lepturus	4.80	10	74.53	
MYCTOPHIDAE	0.60	144	9.32	
Loligo vulgaris	0.56	44	8.70	
Saurida brasiliensis	0.22	70	3.42	
Selene dorsalis, juveniles	0.12	6	1.86	
Sepiella ornata	0.08	2	1.24	
ENGRAULIDIDAE	0.06	92	0.93	
Total	6.44		100.00	

PROJECT STATION:2632  
 DATE: 3/ 8/01 GEAR TYPE: BT No:7 POSITION:Lat S 1030 Long E 1333  
 start stop duration  
 TIME :08:20:16 08:20:25 30 (min) Purpose code: 1  
 LOG :2776.28 2777.87 1.58 Area code : 2  
 FDEPTH: 29 23 GearCond.code: 1  
 BDEPTH: 29 23 Validity code: 1  
 Towing dir: 90ø Wire out: 120 m Speed: 30 kn\*10  
 Sorted: 59 Kg Total catch: 185.05 CATCH/HOUR: 370.10

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Galeoides decadactylus	154.50	2682	41.75	
Pteroscion pelli	65.40	2316	17.67	
Brachydeuterus auritus	42.30	558	11.43	
Ehippion guttifer	25.50	24	6.89	
Pomadasy inciscus	19.80	288	5.35	
Trichiurus lepturus	14.10	510	3.81	
Sepia officinalis hierredda	13.70	20	3.70	
Arius parkii	12.30	12	3.32	
Pagellus bellottii	12.06	42	3.26	
Miracorvina angolensis	8.16	54	2.20	
Parapenaeus longirostris	1.20	408	0.32	
Sepiella ornata	0.84	42	0.23	
Penaeus notialis	0.18	6	0.05	
Selene dorsalis	0.06	60	0.02	
Total	370.10		100.00	

PROJECT STATION:2633  
 DATE: 3/ 8/01 GEAR TYPE: PT No:1 POSITION:Lat S 1030 Long E 1308  
 start stop duration  
 TIME :12:45:53 13:18:53 33 (min) Purpose code: 1  
 LOG :2807.07 2808.87 1.78 Area code : 2  
 FDEPTH: 130 130 GearCond.code: 1  
 BDEPTH: 193 144 Validity code: 1  
 Towing dir: 90ø Wire out: 320 m Speed: 35 kn\*10  
 Sorted: 7 Kg Total catch: 6.99 CATCH/HOUR: 12.71

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
UNIDENTIFIED FISH	4.07	3847	32.02	
Dentex angolensis	2.91	11	22.90	
Brotula barbata	2.33	2	18.33	
Loligo vulgaris	1.35	47	10.62	
Zeus faber	0.78	2	6.14	
Sepia orbignyana	0.42	4	3.30	
Syacium micrurum	0.25	4	1.97	
Grammolites gruvelli	0.25	5	1.97	
Shrimps, small, non comm.	0.16	344	1.26	
Dentex macrophthalmus	0.09	2	0.71	
Ariomma bondi	0.09	2	0.71	
Total	12.70		99.93	



PROJECT STATION:2634  
 DATE:30/ 8/01 GEAR TYPE: PT No:1 POSITION:Lat S 1035 Long E 1360  
 start stop duration Purpose code: 1  
 TIME :15:01:20 15:01:20 30 (min) Area code : 2  
 LOG :2830.00 2831.80 1.70 GearCond.code: 1  
 FDEPTH: 388 486 Validity code: 1  
 BDEPTH: 530  
 Towing dir: 270° Wire out:1100 m Speed: 30 kn\*10  
 Sorted: 37 Kg Total catch: 186.96 CATCH/HOUR: 373.92

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Dibranchius atlanticus	283.90	433960	75.93	
MYCTOPHIDAE	76.40	78690	20.43	
Peristedion cataphractum	10.92	270	2.92	
Tripliphos sp.	2.70	270	0.72	
Total	373.92		100.00	

PROJECT STATION:2635  
 DATE: 3/ 8/01 GEAR TYPE: PT No:7 POSITION:Lat S 1040 Long E 1343  
 start stop duration Purpose code: 1  
 TIME :20:00:03 21:40:06 30 (min) Area code : 2  
 LOG :2873.65 2875.48 1.81 GearCond.code: 1  
 FDEPTH: 10 10 Validity code: 1  
 BDEPTH: 25 31  
 Towing dir: 270° Wire out: 180 m Speed: 30 kn\*10  
 Sorted: 31 Kg Total catch: 31.15 CATCH/HOUR: 62.30

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	18.40	426	29.53	
Sphyræna guanchancho	13.00	22	20.87	
Trachurus trecae	8.60	180	13.80	5768
Trichiurus lepturus	8.40	462	13.48	
Pomadasy jubelini	6.80	12	10.91	
Galeoides decadactylus	4.20	16	6.74	
Balistes vetula	1.50	2	2.41	
Pteroscion pelli	0.90	18	1.44	
Pomadasy incisus	0.50	4	0.80	
Total	62.30		99.98	

PROJECT STATION:2636  
 DATE: 4/ 8/01 GEAR TYPE: BT No:7 POSITION:Lat S 1044 Long E 1332  
 start stop duration Purpose code: 1  
 TIME :07:19:16 07:49:23 30 (min) Area code : 2  
 LOG :2949.11 2950.78 1.66 GearCond.code: 1  
 FDEPTH: 92 100 Validity code: 1  
 BDEPTH: 92 100  
 Towing dir: 270° Wire out: 280 m Speed: 30 kn\*10  
 Sorted: 50 Kg Total catch: 50.43 CATCH/HOUR: 100.86

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	39.00	244	38.67	5769
Dentex macrophthalmus	31.90	174	31.63	
Argyrosomus hololepidotus	8.10	4	8.03	
Dentex canariensis	4.48	10	4.44	
Umbrina canariensis	3.60	8	3.57	
Trichiurus lepturus	3.06	10	3.03	
Dentex angolensis	2.96	18	2.93	
Sphyræna guanchancho	2.06	4	2.04	
Pagellus bellottii	1.96	12	1.94	
Alloteuthis africana	1.56	336	1.55	
Brotula barbata	0.74	2	0.73	
Boops boops	0.54	8	0.54	
Pterothrissus belloci	0.36	2	0.36	
Uranoscopus polli	0.32	2	0.32	
Chaetodon hoefleri	0.22	2	0.22	
Total	100.86		100.00	

PROJECT STATION:2637  
 DATE: 4/ 8/01 GEAR TYPE: PT No:1 POSITION:Lat S 1055 Long E 1345  
 start stop duration Purpose code: 1  
 TIME :18:06:37 18:36:23 30 (min) Area code : 2  
 LOG :3033.80 3035.96 2.13 GearCond.code: 1  
 FDEPTH: 20 17 Validity code: 3  
 BDEPTH: 45 54  
 Towing dir: 270° Wire out: 80 m Speed: 35 kn\*10  
 Sorted: Kg Total catch: 36.72 CATCH/HOUR: 73.44

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	42.70	378	58.14	
Sardinella maderensis	19.50	66	26.55	5770
Trichiurus lepturus	8.80	62	11.98	
Sphyræna guanchancho	1.60	2	2.18	
Trachurus trecae	0.84	4	1.14	
Total	73.44		99.99	

PROJECT STATION:2638  
 DATE: 4/ 8/01 GEAR TYPE: PT No:7 POSITION:Lat S 1055 Long E 1349  
 start stop duration Purpose code: 1  
 TIME :19:52:06 20:18:10 26 (min) Area code : 2  
 LOG :3044.69 3046.07 1.36 GearCond.code: 1  
 FDEPTH: 10 10 Validity code: 4  
 BDEPTH: 23 33  
 Towing dir: 280° Wire out: 180 m Speed: 30 kn\*10  
 Sorted: 33 Kg Total catch: 165.20 CATCH/HOUR: 381.23

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	223.27	10731	58.57	
Galeoides decadactylus	77.31	1119	20.28	
Pomadasy jubelini	19.62	23	5.15	
Trachurus trecae	16.15	58	4.24	
Pomadasy incisus	16.15	196	4.24	
Arius parkii	14.42	23	3.78	
Trichiurus lepturus	9.23	185	2.42	
Miracorvina angolensis	4.62	12	1.21	
Squilla mantis	0.46	46	0.12	
Total	381.23		100.01	

PROJECT STATION:2639  
 DATE: 4/ 8/01 GEAR TYPE: PT No:7 POSITION:Lat S 1100 Long E 1350  
 start stop duration Purpose code: 1  
 TIME :21:37:13 22:06:39 29 (min) Area code : 2  
 LOG :3054.11 3055.85 1.72 GearCond.code: 1  
 FDEPTH: 10 10 Validity code: 1  
 BDEPTH: 27 39  
 Towing dir: 270° Wire out: 180 m Speed: 30 kn\*10  
 Sorted: 31 Kg Total catch: 83.34 CATCH/HOUR: 172.43

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	88.20	3596	51.15	
Pomadasy jubelini	21.72	31	12.60	
Sphyræna guanchancho	17.34	27	10.06	
Trachurus trecae	13.55	197	7.86	5771
Sardinella maderensis	10.61	68	6.15	5772
Stromateus fiatola	8.03	10	4.29	
Trichiurus lepturus	6.48	93	3.76	
Arius parkii	3.37	10	1.95	
Pomadasy incisus	2.34	10	1.36	
Galeoides decadactylus	0.79		0.46	
Total	172.43		100.01	

PROJECT STATION:2640  
 DATE: 5/ 8/01 GEAR TYPE: BT No:7 POSITION:Lat S 1117 Long E 1342  
 start stop duration Purpose code: 1  
 TIME :09:09:36 09:40:25 31 (min) Area code : 2  
 LOG :3157.34 3159.13 1.78 GearCond.code: 1  
 FDEPTH: 20 21 Validity code: 1  
 BDEPTH: 20 21  
 Towing dir: 15° Wire out: 100 m Speed: 30 kn\*10  
 Sorted: 87 Kg Total catch: 366.45 CATCH/HOUR: 709.26

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	282.58	5294	39.84	
Pseudotolithus typus	125.42	132	17.68	
Chloroscombrus chrysurus	105.68	747	14.90	
Galeoides decadactylus	37.55	286	5.29	
Selene dorsalis	24.00	77	3.38	
Pagellus bellottii	24.00	132	3.38	
Sardinella maderensis	17.90	60	2.52	5773
Balistes caprisicus	17.34	39	2.44	
Pteroscion pelli	14.32	147	2.02	
Trichiurus lepturus	14.09	155	1.99	
Lithognathus mormyrus	9.06	23	1.28	
Trachurus trecae	6.06	70	0.85	5774
Pomadasy incisus	5.57	46	0.79	
Ilisha africana	5.42	70	0.76	
Sepia officinalis hierredda	5.23	4	0.74	
Lagocephalus laevigatus	4.34	8	0.61	
Octopus vulgaris	2.32	2	0.33	
Decapterus rhonchus	1.80	12	0.25	
Balistes punctatus	1.63	8	0.23	
Umbrina canariensis	1.55	8	0.22	
Alectis alexandrinus	1.08	8	0.15	
Pseudupeneus prayensis	1.01	8	0.14	
Grammolites gruvelli	0.77	8	0.11	
Epinephelus sp.	0.54	8	0.08	
Total	709.26		99.98	

PROJECT STATION:2641  
 DATE: 5/ 8/01 GEAR TYPE: BT No:7 POSITION:Lat S 1120 Long E 1341  
 start stop duration Purpose code: 1  
 TIME :13:02:23 13:35:37 33 (min) Area code : 2  
 LOG :3179.38 3181.15 1.74 GearCond.code: 1  
 FDEPTH: 27 23 Validity code: 1  
 BDEPTH: 27 23  
 Towing dir: 90° Wire out: 100 m Speed: 30 kn\*10  
 Sorted: 17 Kg Total catch: 326.71 CATCH/HOUR: 594.02

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Pseudotolithus senegalensis	232.91	56	39.21	
Brachydeuterus auritus	64.00	698	10.77	
Galeoides decadactylus	56.00	320	9.43	
Pomadasy incisus	42.18	247	7.10	
Sepia officinalis hierredda	41.36	31	6.96	
Pteroscion pelli	34.04	480	5.73	
Epinephelus aeneus	27.73	13	4.67	
Epinephelus alexandrinus *	20.09	13	3.38	
Trichiurus lepturus	18.18	218	3.06	
Dentex canariensis	17.75	58	2.99	
Argyrosomus hololepidotus	14.82	5	2.49	
Pagellus bellottii	7.13	29	1.20	
Sardinella maderensis	4.60	18	0.77	5775
Pentanemus quinquarius	3.49	29	0.59	
Trachurus trecae	3.18	45	0.54	5776
Penaeus notialis	2.91	509	0.49	
Ilisha africana	1.60	15	0.27	
Epinephelus sp.	1.16	15	0.20	
Octopus vulgaris	0.45	2	0.08	
Trachinocephalus myops	0.44	15	0.07	
Total	594.02		100.00	

PROJECT STATION:2642  
 DATE: 5/ 8/01 GEAR TYPE: PT No:7 POSITION:Lat S 1125 Long E 1342  
 start stop duration Purpose code: 1  
 TIME :19:18:30 19:51:43 33 (min) Area code : 2  
 LOG :3227.40 3229.74 2.32 GearCond.code: 1  
 FDEPTH: 10 10 Validity code: 3  
 BDEPTH: 25 33  
 Towing dir: 270° Wire out: 180 m Speed: 30 kn\*10  
 Sorted: 108 Kg Total catch: 108.50 CATCH/HOUR: 197.27

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardinella maderensis	129.18	575	65.48	5777
Brachydeuterus auritus	38.55	378	19.54	
Trichiurus lepturus	9.55	60	4.84	
Trachurus trecae	6.27	85	3.18	5778
Raja miraletus	5.09	2	2.58	
Sphyræna guanchancho	4.27	16	2.16	
Sepia officinalis hierredda	1.91	2	0.97	
Pomatomus saltatrix	0.91	2	0.46	
Ilisha africana	0.64	7	0.32	
Parapenaeus longirostris	0.45	40	0.23	
Pomadasy incisus	0.45	2	0.23	
Total	197.27		99.9	

PROJECT STATION:2643  
 DATE: 5/ 8/01 GEAR TYPE: PT No:7 POSITION:Lat S 1130  
 start stop duration Long E 1343  
 TIME :21:22:13 21:53:49 32 (min) Purpose code: 1  
 LOG :3240.04 3241.91 1.85 Area code : 2  
 FDEPTH: 10 10 GearCond.code: 1  
 BDEPTH: 27 34 Validity code: 1  
 Towing dir: 270° Wire out: 180 m Speed: 30 kn\*10  
 Sorted: 32 Kg Total catch: 118.69 CATCH/HOUR: 222.54

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardinella maderensis	114.84	683	51.60	5780
Brachydeuterus auritus	95.16	4219	42.76	
Trichiurus lepturus	4.59	73	2.06	
Sphyræna sphyræna	3.60	34	1.62	
Trachurus trecae	3.38	92	1.52	5779
Sardinella aurita	0.98	8	0.44	
Total	222.55		100.00	

PROJECT STATION:2644  
 DATE: 6/ 8/01 GEAR TYPE: PT No:1 POSITION:Lat S 1135  
 start stop duration Long E 1331  
 TIME :02:23:27 02:53:27 30 (min) Purpose code: 1  
 LOG :3281.23 3283.06 1.81 Area code : 2  
 FDEPTH: 20 20 GearCond.code: 1  
 BDEPTH: 106 112 Validity code: 1  
 Towing dir: 270° Wire out: 80 m Speed: 40 kn\*10  
 Sorted: 29 Kg Total catch: 29.00 CATCH/HOUR: 58.00

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Pteroscion peli	31.28	2546	53.93	
Sarda sarda	20.20	14	34.83	
Trichiurus lepturus	6.52	8	11.24	
Trachurus trecae	0.00	8		
Total	58.00		100.00	

PROJECT STATION:2645  
 DATE: 6/ 8/01 GEAR TYPE: BT No:7 POSITION:Lat S 1140  
 start stop duration Long E 1326  
 TIME :13:00:25 13:30:14 30 (min) Purpose code: 1  
 LOG :3350.31 3352.02 1.69 Area code : 2  
 FDEPTH: 168 132 GearCond.code: 1  
 BDEPTH: 168 132 Validity code: 1  
 Towing dir: 90° Wire out: 600 m Speed: 30 kn\*10  
 Sorted: 41 Kg Total catch: 492.89 CATCH/HOUR: 985.78

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Synagrops microlepis	664.50	7788	67.41	
Dentex macrophthalmus	105.00	930	10.65	
Merluccius polli	69.00	480	7.00	
Brotula barbata	40.50	30	4.11	
Zeus faber	36.00	240	3.65	
Todaropsis eblanae	26.40	570	2.68	
Dentex angolensis	11.70	30	1.19	
Trachurus trecae	11.20	18	1.14	5781
Pterochisus belloci	6.90	60	0.70	
Pseudolithus senegalensis	5.10	2	0.52	
Chlorophthalmus atlanticus	4.80	870	0.49	
Illex coindetii	1.80	30	0.18	
Cynoglossus canariensis	1.50	60	0.15	
Octopus vulgaris	1.38	2	0.14	
Total	985.78		100.01	

PROJECT STATION:2646  
 DATE: 6/ 8/01 GEAR TYPE: PT No:7 POSITION:Lat S 1150  
 start stop duration Long E 1344  
 TIME :18:58:29 19:37:36 39 (min) Purpose code: 1  
 LOG :3399.49 3401.36 1.85 Area code : 2  
 FDEPTH: 10 10 GearCond.code: 1  
 BDEPTH: 32 42 Validity code: 3  
 Towing dir: 270° Wire out: 180 m Speed: 30 kn\*10  
 Sorted: 12 Kg Total catch: 12.60 CATCH/HOUR: 19.38

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	6.05	222	31.22	5783
Sardinella maderensis	5.42	20	27.97	5782
Trichiurus lepturus	3.34	45	17.23	
Todaropsis eblanae	1.35	34	6.97	
Sepia officinalis hierredda	0.71	2	3.66	
Sphyræna guachancho	0.62	2	3.20	
Synagrops microlepis	0.57	62	2.94	
Sepia orbignyana	0.57	62	2.94	
Pomadasy incisus	0.42	2	2.17	
Brachydeuterus auritus	0.28	31	1.44	
Lagocephalus sp.	0.09	2	0.46	
Total	19.42		100.20	

PROJECT STATION:2647  
 DATE: 6/ 8/01 GEAR TYPE: PT No:7 POSITION:Lat S 1147  
 start stop duration Long E 1346  
 TIME :20:56:05 21:52:28 56 (min) Purpose code: 1  
 LOG :3408.38 3411.24 2.79 Area code : 2  
 FDEPTH: 10 10 GearCond.code: 1  
 BDEPTH: 24 24 Validity code: 3  
 Towing dir: 180° Wire out: 180 m Speed: 30 kn\*10  
 Sorted: 65 Kg Total catch: 65.04 CATCH/HOUR: 69.69

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	16.39	1239	23.52	
Pomadasy incisus	14.04	109	20.15	
Pomadasy jubelini	7.71	13	11.06	
Sardinella maderensis	7.67	32	11.01	5784
Trichiurus lepturus	6.75	366	9.69	
Sepia officinalis hierredda	3.72	4	5.34	
Galeoides decadactylus	2.95	35	4.23	
Trachurus trecae	2.64	36	3.79	5785
Lithognathus mormyrus	2.25	6	3.23	
Pagellus bellottii	1.23	4	1.76	
Parapenaeus longirostris	1.18	785	1.69	
Epinephelus aeneus	0.78	1	1.12	
Torpedo marmorata	0.65	1	0.93	
Sepia orbignyana	0.49	5	0.70	
Ilisha africana	0.49	27	0.70	
Sphyræna guachancho	0.41	1	0.59	
Penaeus notialis	0.21	12	0.30	
Pteroscion peli	0.12	4	0.17	
Total	69.68		99.98	

PROJECT STATION:2648  
 DATE: 7/ 8/01 GEAR TYPE: BT No:7 POSITION:Lat S 1205  
 start stop duration Long E 1336  
 TIME :10:15:33 10:48:40 33 (min) Purpose code: 1  
 LOG :3520.02 3521.77 1.66 Area code : 2  
 FDEPTH: 74 62 GearCond.code: 1  
 BDEPTH: 74 62 Validity code: 3  
 Towing dir: 160° Wire out: 2230 m Speed: 30 kn\*10  
 Sorted: 35 Kg Total catch: 35.59 CATCH/HOUR: 64.71

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Pagellus bellottii	30.82	347	47.63	
Dentex barnardi	10.18	135	15.73	
Trachurus trecae	9.45	55	14.60	5786
Alloteuthis africana	3.78	1107	5.84	
Scomber japonicus	2.49	7	3.85	
Argyrosomus hololepidotus	2.36	4	3.65	
Pseudupeneus prayensis	1.31	11	2.02	
Chelidonichthys gabonensis	0.87	7	1.24	
Dentex macrophthalmus	0.85	5	1.31	
Dentex angolensis	0.78	9	1.21	
Zeus faber	0.69	4	1.07	
Pomadasy incisus	0.49	4	0.76	
Chaetodon hoefleri	0.29	2	0.45	
Citharus linguatula	0.18	4	0.28	
Sepia orbignyana	0.13	4	0.20	
Saurida brasiliensis	0.02	5	0.03	
Total	64.69		99.97	

PROJECT STATION:2649  
 DATE: 7/ 8/01 GEAR TYPE: BT No:7 POSITION:Lat S 1215  
 start stop duration Long E 1326  
 TIME :15:14:52 15:47:06 32 (min) Purpose code: 1  
 LOG :3562.07 3563.90 1.83 Area code : 2  
 FDEPTH: 107 99 GearCond.code: 1  
 BDEPTH: 107 99 Validity code: 3  
 Towing dir: 90° Wire out: 340 m Speed: 30 kn\*10  
 Sorted: 26 Kg Total catch: 273.02 CATCH/HOUR: 511.91

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Dentex macrophthalmus	345.94	2188	67.58	
Pagrus pagrus	62.44	34	12.20	
Trachurus trecae	58.31	92	11.39	5787
Umbrina canariensis	35.44	169	6.92	
Dentex angolensis	9.79	68	1.91	
Total	511.92		100.00	

PROJECT STATION:2650  
 DATE: 8/ 8/01 GEAR TYPE: PT No:1 POSITION:Lat S 1300  
 start stop duration Long E 1252  
 TIME :21:27:43 21:48:01 20 (min) Purpose code: 1  
 LOG :3807.02 3808.33 1.38 Area code : 2  
 FDEPTH: 22 21 GearCond.code: 1  
 BDEPTH: 82 65 Validity code: 3  
 Towing dir: 90° Wire out: 90 m Speed: 30 kn\*10  
 Sorted: 75 Kg Total catch: 75.02 CATCH/HOUR: 225.06

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	197.25	837	87.64	5788
Scomber japonicus	26.75	9	11.89	
Trichiurus lepturus	0.90	18	0.40	
Lagocephalus laevis	0.15	3	0.07	
Total	225.06		100.00	

PROJECT STATION:2651  
 DATE: 8/ 8/01 GEAR TYPE: PT No:1 POSITION:Lat S 1259 Long E 1254  
 start stop duration  
 TIME :21:55:40 22:11:58 16 (min) Purpose code: 1  
 LOG :3808.83 3809.89 1.04 Area code : 2  
 FDEPTH: 38 36 GearCond.code: 1  
 BDEPTH: 59 45 Validity code: 3  
 Towing dir: 90ø Wire out: 135 m Speed: 30 kn\*10  
 Sorted: 21 Kg Total catch: 21.57 CATCH/HOUR: 80.89

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	75.38	334	93.19	5789
Trichiurus lepturus	1.91	23	2.36	
Boops boops	1.35	8	1.67	
Shrimps, small, non comm.	1.24	1249	1.53	
Bregmaceros sp.	0.75	536	0.93	
Saurida brasiliensis	0.15	4	0.19	
Alloteuthis africana	0.11	53	0.14	
Total	80.89		100.01	

PROJECT STATION:2656  
 DATE: 9/ 8/01 GEAR TYPE: PT No:1 POSITION:Lat S 1324 Long E 1232  
 start stop duration  
 TIME :22:56:00 23:15:26 19 (min) Purpose code: 1  
 LOG :3917.90 3919.17 1.27 Area code : 1  
 FDEPTH: 25 25 GearCond.code: 1  
 BDEPTH: 116 132 Validity code: 3  
 Towing dir: 230ø Wire out: 100 m Speed: 40 kn\*10  
 Sorted: 2 Kg Total catch: 2.33 CATCH/HOUR: 7.36

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Ommastrephes pteropus	5.18	13	70.38	
MYCTOPHIDAE	1.61	1288	21.88	
Shrimps, small, non comm.	0.57	1453	7.74	
Alloteuthis africana	0.00	6		
Total	7.36		100.00	

PROJECT STATION:2652  
 DATE: 8/ 8/01 GEAR TYPE: PT No:1 POSITION:Lat S 1258 Long E 1255  
 start stop duration  
 TIME :22:13:31 22:24:45 11 (min) Purpose code: 1  
 LOG :3810.00 3810.80 0.79 Area code : 2  
 FDEPTH: 24 22 GearCond.code: 1  
 BDEPTH: 44 35 Validity code: 3  
 Towing dir: 90ø Wire out: 120 m Speed: 30 kn\*10  
 Sorted: 98 Kg Total catch: 98.41 CATCH/HOUR: 536.78

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardinella maderensis	484.36	1315	90.23	5790
Trachurus trecae	44.45	164	8.28	5791
Trichiurus lepturus	7.96	44	1.48	
Total	536.77		99.99	

PROJECT STATION:2657  
 DATE:10/ 8/01 GEAR TYPE: BT No:7 POSITION:Lat S 1353 Long E 1225  
 start stop duration  
 TIME :08:10:03 08:40:03 30 (min) Purpose code: 1  
 LOG :3989.13 3990.73 1.60 Area code : 1  
 FDEPTH: 31 26 GearCond.code: 2  
 BDEPTH: 31 26 Validity code: 3  
 Towing dir: 185ø Wire out: 110 m Speed: 30 kn\*10  
 Sorted: 103 Kg Total catch: 646.50 CATCH/HOUR: 1293.00

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Pagellus bellottii	611.40	6384	47.29	
Decapterus rhonchus	532.80	3912	41.21	
Sepia officinalis hierredda	48.00	20	3.71	
Lithognathus mormyrus	32.28	132	2.50	
Lagocephalus laevigatus	29.40	36	2.27	
Sphyræna guachancho	13.68	72	1.06	
Pomadasyus incisus	10.32	48	0.80	
Diplodus cervinus cervinus	6.60	12	0.51	
Trachurus trecae	3.48	12	0.27	
Carcharhinus falciformis	3.00	2	0.23	
Sardinella aurita	1.08	12	0.08	
Boops boops	0.96	12	0.07	
Total	1293.00		100.00	

PROJECT STATION:2653  
 DATE: 9/ 8/01 GEAR TYPE: BT No:7 POSITION:Lat S 1312 Long E 1241  
 start stop duration  
 TIME :17:06:48 17:35:50 29 (min) Purpose code: 1  
 LOG :3875.13 3876.65 1.50 Area code : 1  
 FDEPTH: 110 138 GearCond.code: 1  
 BDEPTH: 110 138 Validity code: 3  
 Towing dir: 5ø Wire out: 340 m Speed: 30 kn\*10  
 Sorted: 34 Kg Total catch: 585.34 CATCH/HOUR: 1211.05

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Synagrops microlepis	626.07	91800	51.70	
Dentex macrophthalmus	290.17	2392	23.96	
Raja alba	109.03	35	9.00	
Umbriina canariensis	89.69	422	7.41	
Trichiurus lepturus	33.06	106	2.73	
Trachurus capensis	18.31	35	1.51	5792
Zeus faber	16.18	35	1.34	
Trachurus trecae	13.76	137	1.14	5793
Scorpaena normani	7.39	35	0.61	
Scomber japonicus	5.28	35	0.44	
Chelidonichthys capensis	2.11	35	0.17	
Total	1211.05		100.01	

PROJECT STATION:2658  
 DATE:10/ 8/01 GEAR TYPE: BT No:7 POSITION:Lat S 1354 Long E 1224  
 start stop duration  
 TIME :10:28:59 10:58:50 30 (min) Purpose code: 1  
 LOG :3997.36 3998.91 1.48 Area code : 1  
 FDEPTH: 50 35 GearCond.code: 1  
 BDEPTH: 50 35 Validity code: 3  
 Towing dir: 180ø Wire out: 150 m Speed: 30 kn\*10  
 Sorted: 105 Kg Total catch: 277.56 CATCH/HOUR: 555.12

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Pagellus bellottii	388.76	3586	70.03	
Lithognathus mormyrus	49.50	210	8.92	
Trachurus trecae	23.50	108	4.23	5794
Dentex barnardi	18.00	56	3.24	
Sepia orbignyana	10.96	16	1.97	
Fistularia petimba	10.50	56	1.89	
Loligo vulgaris	8.16	30	1.47	
Boops boops	7.36	70	1.33	
Rhinobatos albomaculatus	7.00	6	1.26	
Zeus faber	6.70	10	1.21	
Decapterus rhonchus	6.00	22	1.08	
Diplodus cervinus cervinus	5.06	10	0.91	
Epinephelus guaza ?	4.80	6	0.86	
Sphyræna guachancho	4.70	10	0.85	
Scomber japonicus	2.66	10	0.48	
Trigla lyra	1.46	10	0.26	
Total	555.12		99.99	

PROJECT STATION:2654  
 DATE: 9/ 8/01 GEAR TYPE: PT No:1 POSITION:Lat S 1322 Long E 1235  
 start stop duration  
 TIME :22:06:12 22:25:56 20 (min) Purpose code: 1  
 LOG :3914.82 3916.07 1.24 Area code : 1  
 FDEPTH: 68 75 GearCond.code: 1  
 BDEPTH: 113 116 Validity code: 3  
 Towing dir: 230ø Wire out: 240 m Speed: 30 kn\*10  
 Sorted: 4 Kg Total catch: 4.10 CATCH/HOUR: 12.30

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Dentex macrophthalmus	12.30	69	100.00	
Sepia orbignyana	0.00	3		
Total	12.30		100.00	

PROJECT STATION:2659  
 DATE:10/ 8/01 GEAR TYPE: BT No:7 POSITION:Lat S 1405 Long E 1220  
 start stop duration  
 TIME :15:49:19 16:19:15 30 (min) Purpose code: 1  
 LOG :4032.03 4033.74 1.71 Area code : 1  
 FDEPTH: 33 30 GearCond.code: 1  
 BDEPTH: 33 30 Validity code: 3  
 Towing dir: 5ø Wire out: 120 m Speed: 32 kn\*10  
 Sorted: 156 Kg Total catch: 2173.00 CATCH/HOUR: 4346.00

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Pomatomus saltatrix	2698.00	1162	62.08	
Pagellus bellottii	1168.40	12960	26.88	
Decapterus rhonchus	202.60	486	4.66	
Trachurus trecae	132.30	474	3.04	5795
OMMASTREPHIDAE	38.60	190	0.89	
Sparus auriga *	29.20	28	0.67	
Dentex canariensis	18.60	28	0.43	
Lithognathus mormyrus	17.20	54	0.40	
Diplodus cervinus cervinus	17.00	54	0.39	
Zenopsis conchifer	11.40	28	0.26	
Boops boops	5.40	28	0.12	
Pomadasyus incisus	2.70	28	0.06	
Chaetodon hoefleri	2.44	28	0.06	
Fistularia petimba	2.16	28	0.05	
Total	4346.00		99.99	

PROJECT STATION:2655  
 DATE: 9/ 8/01 GEAR TYPE: PT No:1 POSITION:Lat S 1323 Long E 1233  
 start stop duration  
 TIME :22:38:59 22:50:30 12 (min) Purpose code: 1  
 LOG :3916.85 3917.59 0.73 Area code : 1  
 FDEPTH: 38 38 GearCond.code: 1  
 BDEPTH: 120 117 Validity code: 3  
 Towing dir: 230ø Wire out: 120 m Speed: 30 kn\*10  
 Sorted: Kg Total catch: 0.11 CATCH/HOUR: 0.55

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
MYCTOPHIDAE	0.55	220	100.00	
Merluccius sp.	0.00	5		
Total	0.55		100.00	

PROJECT STATION:2660  
 DATE:11/ 8/01 GEAR TYPE: BT No:7 POSITION:Lat S 1445 Long E 1215  
 start stop duration  
 TIME :06:14:59 06:45:07 30 (min) Purpose code: 1  
 LOG :4145.08 4146.59 1.50 Area code : 1  
 FDEPTH: 111 80 GearCond.code: 1  
 BDEPTH: 111 80 Validity code: 3  
 Towing dir: 90° Wire out: 300 m Speed: 30 kn\*10  
 Sorted: 83 Kg Total catch: 465.58 CATCH/HOUR: 931.16

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	330.06	2868	35.45	5796
Dentex macrophthalmus	280.00	1792	30.07	
Argyrosomus hololepidotus	81.76	78	8.78	
Trachurus capensis	71.12	268	7.64	5797
Umbrina canariensis	42.22	202	4.53	
Dentex angolensis	33.60	44	3.61	
Rhinoptera marginata	31.58	22	3.39	
Dentex canariensis	19.60	56	2.10	
Pagellus bellottii	11.76	100	1.26	
Zeus faber	10.08	12	1.08	
Dentex gibbosus	6.50	12	0.70	
Trichiurus lepturus	5.48	14	0.59	
Boops boops	4.26	34	0.46	
Chelidonichthys capensis	3.14	34	0.34	
Total	931.16		100.00	

PROJECT STATION:2661  
 DATE:11/ 8/01 GEAR TYPE: BT No:7 POSITION:Lat S 1500 Long E 1208  
 start stop duration  
 TIME :12:57:41 13:27:21 30 (min) Purpose code: 1  
 LOG :4192.71 4194.35 1.63 Area code : 1  
 FDEPTH: 108 93 GearCond.code: 1  
 BDEPTH: 108 93 Validity code: 3  
 Towing dir: 20° Wire out: 330 m Speed: 30 kn\*10  
 Sorted: 127 Kg Total catch: 383.37 CATCH/HOUR: 766.74

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Dentex macrophthalmus	255.60	1326	33.34	
Trachurus capensis	189.00	902	24.65	5799
Pseudotolithus senegalensis	96.90	90	12.64	
Trachurus trecae	84.30	402	10.99	5798
Dentex angolensis	56.70	234	7.39	
Dentex canariensis	51.00	150	6.65	
Pagrus auriga	19.68	12	2.57	
Zeus faber	6.24	12	0.81	
Pagellus bellottii	3.42	30	0.45	
Sarpa salpa	2.82	6	0.37	
Chelidonichthys capensis	1.02	12	0.13	
Total	766.68		99.99	

PROJECT STATION:2662  
 DATE:11/ 8/01 GEAR TYPE: BT No:7 POSITION:Lat S 1515 Long E 1159  
 start stop duration  
 TIME :20:12:59 20:27:25 14 (min) Purpose code: 1  
 LOG :4242.38 4242.87 0.36 Area code : 1  
 FDEPTH: 118 111 GearCond.code: 1  
 BDEPTH: 118 111 Validity code: 3  
 Towing dir: 90° Wire out: 320 m Speed: 30 kn\*10  
 Sorted: 34 Kg Total catch: 237.67 CATCH/HOUR: 1018.59

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Pagellus bellottii	563.14	4783	55.29	
Dentex macrophthalmus	149.14	1029	14.64	
Epinephelus guaza ?	121.71	30	11.95	
Argyrosomus hololepidotus	55.29	26	5.43	
Squatina oculata	46.29	51	4.54	
Umbrina canariensis	35.49	180	3.48	
Sarpa salpa	13.89	26	1.36	
Gephyroberyx darwini	7.93	4	0.78	
Trigla lyra	5.66	56	0.56	
Trachurus capensis	5.40	17	0.53	
Dentex canariensis	5.14	26	0.50	
Anthias anthias	3.34	26	0.33	
Uranoscopus polli	3.09	26	0.30	
Dentex angolensis	3.09	26	0.30	
Total	1018.60		99.99	

PROJECT STATION:2663  
 DATE:12/ 8/01 GEAR TYPE: PT No:7 POSITION:Lat S 1517 Long E 1202  
 start stop duration  
 TIME :00:15:27 00:45:00 398 (min) Purpose code: 1  
 LOG :4263.60 4265.19 1.59 Area code : 1  
 FDEPTH: 10 10 GearCond.code: 1  
 BDEPTH: 35 35 Validity code: 3  
 Towing dir: 185° Wire out: 150 m Speed: 40 kn\*10  
 Sorted: Kg Total catch: CATCH/HOUR:

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

PROJECT STATION:2664  
 DATE:12/ 8/01 GEAR TYPE: PT No:1 POSITION:Lat S 1518 Long E 1200  
 start stop duration  
 TIME :01:53:53 02:13:19 19 (min) Purpose code: 1  
 LOG :4270.94 4272.17 1.21 Area code : 1  
 FDEPTH: 50 50 GearCond.code: 1  
 BDEPTH: 73 69 Validity code: 3  
 Towing dir: 170° Wire out: m Speed: kn\*10  
 Sorted: 63 Kg Total catch: 127.18 CATCH/HOUR: 401.62

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Pagellus bellottii	145.89	651	36.33	
Trachurus trecae	142.11	745	35.38	5800
Trichiurus lepturus	43.89	76	10.93	
Sarpa salpa	28.99	76	7.22	
Lithognathus mormyrus	20.91	63	5.21	
Pseudotolithus elongatus	8.08	13	2.01	
Decapterus rhonchus	5.43	13	1.35	
Pomatomus saltatrix	4.86	6	1.21	
Boops boops	1.20	6	0.30	
Sepiella ornata	0.25	6	0.06	
Total	401.61		100.00	

PROJECT STATION:2665  
 DATE:12/ 8/01 GEAR TYPE: PT No:1 POSITION:Lat S 1520 Long E 1200  
 start stop duration  
 TIME :02:16:26 02:36:03 20 (min) Purpose code: 1  
 LOG :4272.35 4273.55 1.11 Area code : 1  
 FDEPTH: 40 40 GearCond.code: 1  
 BDEPTH: 71 80 Validity code: 3  
 Towing dir: 190° Wire out: 120 m Speed: 40 kn\*10  
 Sorted: 43 Kg Total catch: 43.56 CATCH/HOUR: 130.68

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	109.50	633	83.79	5801
Trichiurus lepturus	13.65	21	10.45	
Pagellus bellottii	5.10	24	3.90	
Boops boops	1.44	6	1.10	
Loligo vulgaris	0.60	3	0.46	
Shrimps, small, non comm.	0.27	378	0.21	
Alloteuthis africana	0.12	6	0.09	
Total	130.68		100.00	

PROJECT STATION:2666  
 DATE:12/ 8/01 GEAR TYPE: BT No:7 POSITION:Lat S 1530 Long E 1201  
 start stop duration  
 TIME :06:07:10 06:17:34 10 (min) Purpose code: 1  
 LOG :4303.56 4304.03 0.44 Area code : 1  
 FDEPTH: 31 37 GearCond.code: 1  
 BDEPTH: 31 37 Validity code: 3  
 Towing dir: 270° Wire out: 110 m Speed: 30 kn\*10  
 Sorted: 49 Kg Total catch: 86.89 CATCH/HOUR: 521.34

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Dentex canariensis	81.48	522	15.63	
Diplodus sargus *	79.68	612	15.28	
Sarpa salpa	58.98	378	11.31	
Boops boops	46.80	534	8.98	
SPA0B01	46.38	174	8.90	
Diplodus cervinus cervinus	42.78	216	8.21	
Pagrus pagrus	32.70	6	6.27	
Pagellus bellottii	28.80	318	5.52	
Lithognathus mormyrus	19.56	120	3.75	
Sepia officinalis hierredda	18.90	6	3.63	
OMMASTREPHIDAE	17.82	108	3.42	
Dentex gibbosus	15.60	6	2.99	
Trachurus trecae	9.00	60	1.73	5802
Pomadasys incisus	8.76	126	1.68	
Umbrina canariensis	7.68	30	1.47	
Pseudupeneus prayensis	3.18	18	0.61	
Pomatomus saltatrix	2.16	12	0.41	
Chaetodon hoefleri	1.08	18	0.21	
Total	521.34		100.00	

PROJECT STATION:2667  
 DATE:12/ 8/01 GEAR TYPE: BT No:7 POSITION:Lat S 1535 Long E 1146  
 start stop duration  
 TIME :10:00:09 10:00:38 22 (min) Purpose code: 1  
 LOG :4331.55 4332.59 1.04 Area code : 1  
 FDEPTH: 117 120 GearCond.code: 1  
 BDEPTH: 117 120 Validity code: 3  
 Towing dir: 270° Wire out: 350 m Speed: 30 kn\*10  
 Sorted: 58 Kg Total catch: 368.14 CATCH/HOUR: 1004.02

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Anthias anthias	370.50		36.90	
Dentex macrophthalmus	172.50	900	17.18	
Trachurus trecae	136.23	805	13.57	5803
Centrophorus uyato	133.50	180	13.30	
Umbrina canariensis	51.60	180	5.14	
Dentex angolensis	37.20	120	3.71	
Zeus faber	36.00	30	3.59	
Trachurus capensis	22.09	117	2.20	5804
Dentex canariensis	13.80	60	1.37	
Zenopsis conchifer	12.30	30	1.23	
Pagellus bellottii	9.30	90	0.93	
Dentex gibbosus	9.00	30	0.90	
Total	1004.02		100.02	

PROJECT STATION:2668  
DATE:12/ 8/01 GEAR TYPE: PT No:1 POSITION:Lat S 1550  
start stop duration Long E 1140  
TIME :16:40:51 16:41:15 7 (min) Purpose code: 1  
LOG :4384.50 4384.92 0.42 Area code : 1  
FDEPTH: 34 34 GearCond.code: 1  
BDEPTH: 144 267 Validity code: 3  
Towing dir: 270ø Wire out: 110 m Speed: 30 kn\*10

Sorted: Kg Total catch: 5.42 CATCH/HOUR: 46.46

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus capensis	20.66	643	44.47	5806
Scomber japonicus	7.29	43	15.69	
MYCTOPHIDAE	7.29	4029	15.69	
Trachurus trecae	5.91	86	12.72	5805
Merluccius polli	2.83	34	6.09	
Dentex macrophthalmus	2.31	17	4.97	
Shrimps, small, non comm.	0.17	266	0.37	
Total	46.46		100.00	

PROJECT STATION:2673  
DATE:13/ 8/01 GEAR TYPE: PT No:1 POSITION:Lat S 1540  
start stop duration Long E 1143  
TIME :00:08:02 00:38:32 31 (min) Purpose code: 1  
LOG :4420.38 4422.45 2.05 Area code : 1  
FDEPTH: 10 10 GearCond.code: 1  
BDEPTH: 126 490 Validity code: 3  
Towing dir: 270ø Wire out: 150 m Speed: 40 kn\*10

Sorted: 63 Kg Total catch: 223.90 CATCH/HOUR: 433.35

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Etrumeus whiteheadi	184.26	3463	42.52	
MYCTOPHIDAE	172.74	49519	39.86	
Trachurus trecae	51.48	677	11.88	5815
Scomber japonicus	21.68	379	5.00	
Trachurus capensis	2.57	35	0.59	5816
Trichiurus lepturus	0.62	14	0.14	
Total	433.35		99.99	

PROJECT STATION:2669  
DATE:12/ 8/01 GEAR TYPE: PT No:1 POSITION:Lat S 1550  
start stop duration Long E 1140  
TIME :16:41:12 18:20:20 11 (min) Purpose code: 1  
LOG :4386.15 4386.69 0.53 Area code : 1  
FDEPTH: 74 92 GearCond.code: 1  
BDEPTH: 174 122 Validity code: 3  
Towing dir: 90ø Wire out: 200 m Speed: 30 kn\*10

Sorted: Kg Total catch: 30.91 CATCH/HOUR: 168.60

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus capensis	79.64	2733	47.24	5807
Scomber japonicus	42.00	262	24.91	
Trachurus trecae	29.45	535	17.47	5808
MYCTOPHIDAE	7.85	916	4.66	
Etrumeus whiteheadi	3.76	27	2.23	
Trichiurus lepturus	3.16	55	1.87	
Dentex macrophthalmus	2.73	5	1.62	
Total	168.59		100.00	

PROJECT STATION:2674  
DATE:13/ 8/01 GEAR TYPE: PT No:1 POSITION:Lat S 1545  
start stop duration Long E 1145  
TIME :02:14:29 02:44:20 30 (min) Purpose code: 1  
LOG :4431.57 4433.85 2.27 Area code : 1  
FDEPTH: 20 15 GearCond.code: 1  
BDEPTH: 97 124 Validity code: 3  
Towing dir: 270ø Wire out: 90 m Speed: 40 kn\*10

Sorted: 60 Kg Total catch: 725.40 CATCH/HOUR: 1450.80

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	1189.20	17976	81.97	5817
Trachurus capensis	242.40	3048	16.71	5818
Scomber japonicus	14.40	72	0.99	
Trichiurus lepturus	4.80	24	0.33	
Total	1450.80		100.00	

PROJECT STATION:2670  
DATE:12/ 8/01 GEAR TYPE: PT No:1 POSITION:Lat S 1550  
start stop duration Long E 1141  
TIME :18:41:14 18:53:59 13 (min) Purpose code: 1  
LOG :4387.25 4388.11 0.85 Area code : 1  
FDEPTH: 30 18 GearCond.code: 1  
BDEPTH: 112 93 Validity code: 3  
Towing dir: 90ø Wire out: 90 m Speed:430 kn\*10

Sorted: 37 Kg Total catch: 220.44 CATCH/HOUR: 1017.42

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus capensis	883.38	30817	86.83	5809
MYCTOPHIDAE	81.69	16338	8.03	
Trachurus trecae	27.69	443	2.72	5810
Scomber japonicus	12.46	28	1.22	
Trichiurus lepturus	12.18	83	1.20	
Total	1017.40		100.00	

PROJECT STATION:2675  
DATE:13/ 8/01 GEAR TYPE: BT No:8 POSITION:Lat S 1555  
start stop duration Long E 1143  
TIME :06:13:45 06:43:12 29 (min) Purpose code: 1  
LOG :4454.24 4455.82 1.57 Area code : 1  
FDEPTH: 30 85 GearCond.code: 1  
BDEPTH: 30 85 Validity code: 3  
Towing dir: 270ø Wire out: 220 m Speed: 30 kn\*10

Sorted: 65 Kg Total catch: 425.05 CATCH/HOUR: 879.41

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Etrumeus whiteheadi	449.17	8499	51.08	
Trachurus capensis	95.48	2017	10.86	5820
OMMASTREPHIDAE	92.79	4452	10.55	
Trachurus trecae	79.34	1198	9.02	5819
Dentex macrophthalmus	53.13	5582	6.04	
Sarpa salpa	45.06	995	5.12	
Dentex canariensis	35.65	1183	4.05	
Sepia orbignyana	14.52	41	1.65	
Pagellus bellottii	10.76	511	1.22	
Decapterus rhonchus	2.69	68	0.31	
Trichiurus lepturus	0.81	14	0.09	
Total	879.40		99.99	

PROJECT STATION:2671  
DATE:12/ 8/01 GEAR TYPE: PT No:6 POSITION:Lat S 1550  
start stop duration Long E 1143  
TIME :19:48:32 20:18:32 30 (min) Purpose code: 1  
LOG :4391.58 4392.88 1.28 Area code : 1  
FDEPTH: 10 10 GearCond.code: 1  
BDEPTH: 85 102 Validity code: 3  
Towing dir: 270ø Wire out: 150 m Speed: 30 kn\*10

Sorted: 35 Kg Total catch: 140.08 CATCH/HOUR: 280.16

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	103.60	1856	36.98	5811
Trachurus capensis	63.20	1712	22.56	5812
Etrumeus whiteheadi	50.40	920	17.99	
MYCTOPHIDAE	46.40	20184	16.56	
Trichiurus lepturus	13.12	88	4.68	
Scomber japonicus	2.96	16	1.06	
Sardinella aurita	0.48	2	0.17	
Total	280.16		100.00	

PROJECT STATION:2676  
DATE:13/ 8/01 GEAR TYPE: BT No:8 POSITION:Lat S 1601  
start stop duration Long E 1146  
TIME :08:13:40 08:34:22 21 (min) Purpose code: 1  
LOG :4466.31 4467.32 1.00 Area code : 1  
FDEPTH: 25 24 GearCond.code: 1  
BDEPTH: 25 24 Validity code: 3  
Towing dir: 170ø Wire out: 110 m Speed: 30 kn\*10

Sorted: 32 Kg Total catch: 3004.73 CATCH/HOUR: 8584.94

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	4676.57	302117	54.47	5821
Trachurus capensis	2936.00	249506	34.20	5822
Decapterus rhonchus	890.00	90609	10.37	
Dentex canariensis	47.83	2126	0.56	
OMMASTREPHIDAE	15.94	266	0.19	
Pagellus bellottii	13.29	531	0.15	
Etrumeus whiteheadi	5.31	266	0.06	
Total	8584.94		100.00	

PROJECT STATION:2672  
DATE:12/ 8/01 GEAR TYPE: PT No:3 POSITION:Lat S 1540  
start stop duration Long E 1153  
TIME :22:34:48 22:54:38 20 (min) Purpose code: 1  
LOG :4410.97 4412.25 1.28 Area code : 1  
FDEPTH: 20 20 GearCond.code: 1  
BDEPTH: 97 169 Validity code: 3  
Towing dir: 270ø Wire out: 95 m Speed: 30 kn\*10

Sorted: 106 Kg Total catch: 160.02 CATCH/HOUR: 480.06

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	425.04	3606	88.54	5813
Trachurus capensis	34.89	282	7.27	5814
Trichiurus lepturus	7.92	69	1.65	
MYCTOPHIDAE	7.89	7359	1.64	
Pseudolithus senegalensis	2.07	6	0.43	
Scomber japonicus	1.80	9	0.37	
Shrimps, small, non comm.	0.45	852	0.09	
Total	480.06		99.99	

PROJECT STATION:2677  
DATE:13/ 8/01 GEAR TYPE: BT No:8 POSITION:Lat S 1605  
start stop duration Long E 1144  
TIME :12:53:23 13:07:57 15 (min) Purpose code: 1  
LOG :4507.46 4508.17 0.69 Area code : 1  
FDEPTH: 43 46 GearCond.code: 1  
BDEPTH: 43 46 Validity code: 3  
Towing dir: 270ø Wire out: 180 m Speed: 31 kn\*10

Sorted: 30 Kg Total catch: 3499.60 CATCH/HOUR: 13998.40

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	10445.20	599624	74.62	5823
Trachurus capensis	2296.00	236488	16.40	5824
Rhinoptera marginata	459.20	460	3.28	
Loligo vulgaris	431.20	3668	3.08	
Etrumeus whiteheadi	165.20	6884	1.18	
Merluccius capensis	133.00	2292	0.95	
Boops boops	68.60	916	0.49	
Total	13998.40		100.00	

PROJECT STATION:2678  
 DATE:13/ 8/01 GEAR TYPE: PT No:1 POSITION:Lat S 1615  
 start stop duration Long E 1134  
 TIME :17:00:18 17:32:11 32 (min) Purpose code: 1  
 LOG :4540.64 4542.46 1.78 Area code : 1  
 FDEPTH: 60 60 GearCond.code: 2  
 BDEPTH: 81 84 Validity code: 3  
 Towing dir: 270e Wire out: 150 m Speed: 30 kn\*10  
 Sorted: 33 Kg Total catch: 199.02 CATCH/HOUR: 373.16

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus capensis	358.88	15986	96.17	5825
Etrumeus whiteheadi	12.60	293	3.38	
OMMASTREPHIDAE	1.69	11	0.45	
Total	373.17		100.00	

PROJECT STATION:2679  
 DATE:13/ 8/01 GEAR TYPE: BT No:8 POSITION:Lat S 1616  
 start stop duration Long E 1147  
 TIME :19:46:33 20:07:10 21 (min) Purpose code: 1  
 LOG :4558.17 4559.11 0.93 Area code : 1  
 FDEPTH: 20 19 GearCond.code: 1  
 BDEPTH: 20 19 Validity code: 3  
 Towing dir: 180e Wire out: 100 m Speed: 30 kn\*10  
 Sorted: 13 Kg Total catch: 50.32 CATCH/HOUR: 143.77

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	93.71	8949	65.18	5826
Pagellus bellottii	19.66	1874	13.67	
Merluccius polli	16.11	343	11.21	
Brachydeuterus auritus	7.66	903	5.33	
Grammolites gruvelli	1.83	91	1.27	
Miracorvina angolensis	1.60	46	1.11	
Sepia bertheloti	0.91	11	0.63	
Dentex canariensis	0.80	48	0.56	
Torpedo torpedo	0.46	11	0.32	
Sarpa salpa	0.46	34	0.32	
Boops boops	0.34	23	0.24	
Pseudupeneus prayensis	0.23	11	0.16	
Total	143.77		100.00	

PROJECT STATION:2680  
 DATE:13/ 8/01 GEAR TYPE: PT No:1 POSITION:Lat S 1614  
 start stop duration Long E 1142  
 TIME :21:00:00 21:15:49 16 (min) Purpose code: 1  
 LOG :4565.32 4566.40 1.07 Area code : 1  
 FDEPTH: 28 36 GearCond.code: 1  
 BDEPTH: 56 55 Validity code: 9  
 Towing dir: 350e Wire out: 110 m Speed: 30 kn\*10  
 Sorted: Kg Total catch: CATCH/HOUR:

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

PROJECT STATION:2681  
 DATE:13/ 8/01 GEAR TYPE: PT No:1 POSITION:Lat S 1613  
 start stop duration Long E 1142  
 TIME :21:53:47 22:47:02 53 (min) Purpose code: 1  
 LOG :4568.74 4571.96 3.29 Area code : 1  
 FDEPTH: 32 38 GearCond.code: 1  
 BDEPTH: 65 55 Validity code: 9  
 Towing dir: 180e Wire out: 150 m Speed: 30 kn\*10  
 Sorted: 24 Kg Total catch: 23.71 CATCH/HOUR: 26.84

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sepia orbignyana	13.25	75	49.37	
Trachurus capensis	9.45	1434	35.21	5828
Trachurus trecae	2.28	109	8.49	5827
Merluccius capensis	0.97	20	3.61	
Dentex macrophthalmus	0.53	71	1.97	
Loligo vulgaris	0.12	11	0.45	
Pegusa lascaris	0.06	11	0.22	
GOBIIDAE	0.06	49	0.22	
Trichiurus lepturus	0.05	1	0.19	
TETRAODONTIDAE	0.03	3	0.11	
Bochus podas africanus	0.02	1	0.07	
Zeus faber	0.02	1	0.07	
Total	26.84		99.98	

PROJECT STATION:2682  
 DATE:14/ 8/01 GEAR TYPE: BT No:8 POSITION:Lat S 1625  
 start stop duration Long E 1146  
 TIME :04:17:23 04:37:12 20 (min) Purpose code: 1  
 LOG :4621.08 4622.12 1.03 Area code : 1  
 FDEPTH: 21 32 GearCond.code: 1  
 BDEPTH: 21 32 Validity code: 3  
 Towing dir: 270e Wire out: 80 m Speed: 31 kn\*10  
 Sorted: 21 Kg Total catch: 42.02 CATCH/HOUR: 126.06

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	79.50	8196	63.07	5829
Trachurus capensis	40.20	4824	31.89	5830
Merluccius capensis	3.30	72	2.62	
Sepia bertheloti	0.66	42	0.52	
Pagellus bellottii	0.66	60	0.52	
Loligo vulgaris	0.66	12	0.52	
GOBIIDAE	0.54	30	0.43	
Dentex macrophthalmus	0.48	102	0.38	
Boops boops	0.06	6	0.05	
Total	126.06		100.00	

PROJECT STATION:2683  
 DATE:14/ 8/01 GEAR TYPE: BT No:8 POSITION:Lat S 1644  
 start stop duration Long E 1146  
 TIME :09:12:13 09:32:09 20 (min) Purpose code: 1  
 LOG :4654.62 4655.65 1.01 Area code : 1  
 FDEPTH: 18 19 GearCond.code: 1  
 BDEPTH: 18 19 Validity code: 3  
 Towing dir: 345e Wire out: 90 m Speed: 30 kn\*10  
 Sorted: 60 Kg Total catch: 2983.50 CATCH/HOUR: 8950.50

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	6105.00	135300	68.21	5831
Lithognathus mormyrus	999.00	9450	11.16	
Pomatomus saltatrix	645.00	5550	7.21	
Myliobatis aquila	472.50	900	5.28	
Diplodus sargus *	382.50	5550	4.27	
Atractoscion aequidens	162.00	1500	1.81	
Decapterus rhonchus	90.00	1950	1.01	
Selene dorsalis	58.50	2400	0.65	
Sphyræna sphyræna	24.00	300	0.27	
Trichiurus lepturus	12.00	300	0.13	
Total	8950.50		100.00	

PROJECT STATION:2684  
 DATE:14/ 8/01 GEAR TYPE: BT No:8 POSITION:Lat S 1634  
 start stop duration Long E 1145  
 TIME :11:16:54 11:36:32 20 (min) Purpose code: 1  
 LOG :4666.89 4668.02 1.12 Area code : 1  
 FDEPTH: 24 25 GearCond.code: 1  
 BDEPTH: 24 25 Validity code: 3  
 Towing dir: 345e Wire out: 90 m Speed: 31 kn\*10  
 Sorted: 30 Kg Total catch: 4499.95 CATCH/HOUR: 13499.85

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	13255.50	1343787	98.19	5833
Trachurus capensis	244.35	25323	1.81	5832
Total	13499.85		100.00	

PROJECT STATION:2685  
 DATE:14/ 8/01 GEAR TYPE: PT No:6 POSITION:Lat S 1630  
 start stop duration Long E 1133  
 TIME :18:07:15 18:37:10 30 (min) Purpose code: 1  
 LOG :4692.54 4693.87 1.31 Area code : 1  
 FDEPTH: 10 10 GearCond.code: 1  
 BDEPTH: 97 93 Validity code: 3  
 Towing dir: 90e Wire out: 150 m Speed: 30 kn\*10  
 Sorted: 58 Kg Total catch: 2941.03 CATCH/HOUR: 5882.06

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus capensis	4600.00	572322	78.20	5834
Etrumeus whiteheadi	1116.90	51510	18.99	
Sepia orbignyana	119.34	204	2.03	
OMMASTREPHIDAE	39.70	306	0.67	
Sardinops ocellatus	6.12	102	0.10	
Total	5882.06		99.99	

PROJECT STATION:2686  
 DATE:14/ 8/01 GEAR TYPE: PT No:3 POSITION:Lat S 1636  
 start stop duration Long E 1123  
 TIME :22:41:32 22:57:30 16 (min) Purpose code: 1  
 LOG :4720.88 4722.07 1.02 Area code : 1  
 FDEPTH: 25 25 GearCond.code: 1  
 BDEPTH: 126 130 Validity code: 3  
 Towing dir: 270e Wire out: 130 m Speed: 30 kn\*10  
 Sorted: 27 Kg Total catch: 92.79 CATCH/HOUR: 347.96

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus capensis	338.63	15409	97.32	5835
Etrumeus whiteheadi	9.34	79	2.68	
Total	347.97		100.00	

PROJECT STATION:2687  
 DATE:15/ 8/01 GEAR TYPE: BT No:8 POSITION:Lat S 1646  
 start stop duration Long E 1129  
 TIME :07:49:41 07:53:37 4 (min) Purpose code: 1  
 LOG :4786.56 4786.68 0.12 Area code : 1  
 FDEPTH: 114 115 GearCond.code: 1  
 BDEPTH: 114 115 Validity code: 3  
 Towing dir: 270e Wire out: 350 m Speed: 30 kn\*10  
 Sorted: 33 Kg Total catch: 198.00 CATCH/HOUR: 2970.00

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus capensis	2565.00	180210	86.36	5836
Dentex macrophthalmus	326.70	9000	11.00	
Merluccius capensis	28.80	180	0.97	
Chelidonichthys capensis	23.40	90	0.79	
Miracorvina angolensis	15.30	90	0.52	
Sepia bertheloti	8.10	180	0.27	
Etrumeus whiteheadi	2.70	90	0.09	
Total	2970.00		100.00	

PROJECT STATION:2688  
 DATE:15/ 8/01 GEAR TYPE: BT No:8 POSITION:Lat S 1700  
 start stop duration Long E 1139  
 TIME :16:27:53 16:42:32 15 (min) Purpose code: 1  
 LOG :4872.23 4872.98 0.73 Area code : 1  
 FDEPTH: 63 56 GearCond.code: 1  
 BDEPTH: 63 56 Validity code: 3  
 Towing dir: 90ø Wire out: 240 m Speed: 30 kn\*10

Sorted: 32 Kg Total catch: 385.32 CATCH/HOUR: 1541.28

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus capensis	1387.20	98112	90.00	5837
Merluccius capensis	124.80	2592	8.10	
Miracorvina angolensis	10.56	144	0.69	
Arius heudeloti	6.72	48	0.44	
Trichurus lepturus	6.72	240	0.44	
Dentex macrophthalmus	2.40	144	0.16	
Illex coindetii	1.44	48	0.09	
Umbrina canariensis	1.44	48	0.09	
Total	1541.28		100.01	

## ANNEX II FISHING GEAR

The vessel has three different sized four-panel 'Åkrahavn' pelagic trawls and one 'Gisund super bottom trawl'. The two smallest pelagic trawls and the demersal trawl were used during the survey. The smallest pelagic trawl has 10-12 m vertical opening under normal operation, whereas the intermediate sized trawl has 15-18 m opening. The intermediate trawl was fitted with codend Multisampler for obtaining depth-specific samples.

The bottom trawl has a 31 m headline and a 47 m footrope fitted with a 12" rubber bobbins gear. The codend has 20 mm meshes, and has an inner net with 10 mm mesh size. The vertical opening is about 5.5 m. The distance between the wing tips is about 18 m during towing. The sweeps are 40 m long. The trawl doors are 'Thyborøn' combi, 8 m<sup>2</sup> and weigh 2000 kg. The door spreading is about 45 m when using restraining rope.

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

The pelagic trawls are equipped with a trawl eye that provides information about the trawl opening and the distance of the footrope to the bottom. A pressure sensor is used to show the depth on the headline.



## ANNEX III TECHNICAL SPECIFICATIONS FOR THE ACOUSTIC INSTRUMENTS

### Echo sounder

The SIMRAD EK500/38 kHz scientific sounder was used during the survey for fish abundance estimation. The lowering keel was not submerged during the survey. The Bergen Echo Integrator system (BEI) was used to scrutinise the acoustic records. The 38 kHz transducer was calibrated 09 August in Baía dos Elephantes. The settings of 38 kHz echo sounder were as follows:

#### Tranceiver-1 menu (38 kHz, mounted in lowering keel)

Transducer depth	20.07-1508: 5.5 m (keel not submerged), 16.08-17.08: 8.0 m (subm.)
Absorption coeff.	10 dB/km
Pulse length	Medium (1 ms)
Bandwidth	Wide
Max Power	2000 Watt
2-way beam angle	-21.0 dB
Sv Transducer gain	27.37 dB
TS Transducer gain	27.49 dB
Angle sensitivity	21.9
3 dB beamwidth	7.0 ° along ship 6.7 ° athwardship
Along ship offset	0.14 °
Athwardship effect	-0.02 °

#### Display menu

Echogram	1 (38 kHz)
Bottom range	15 m
Bottom range start	10 m
Sv colour min	-67 dB

#### Printer menu

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

**Bottom detection menu** Minimum level -50 dB