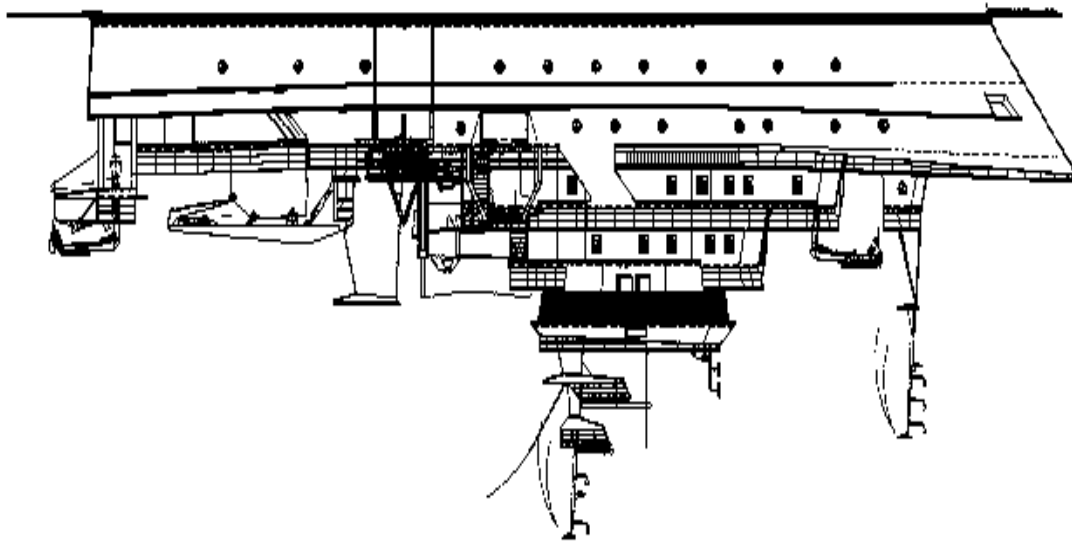


NORAD - FAO/UNDP PROJECT GLO 92/013

CRUISE REPORTS "DR. FRIDTJOF NANSEN"



SURVEYS OF THE FISH RESOURCES OF ANGOLA

Preliminary Cruise Report No 2/99

**Survey of the pelagic resources
2 - 26 August 1999**

**Institute of Marine Research
Research**

Institute of Fisheries

IMR, Bergen

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by

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CHAPTER 1 INTRODUCTION

1.1 Objectives

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

The main objectives of the survey were the following:

- To map the distribution and estimate the abundance of 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 *Trachurus capensis*, the pilchard *Sardinops ocellata* and other pelagic species, mainly carangids.
- To carry out biological studies on the main species, i.e. determination of biological condition, estimation of length weight-relationships and assessment of reproductive stages. A special study on feeding habits of sardinella and horse mackerel would also be carried out.
- Map the general hydrographic condition in the survey area by continuous recording of a weather station and by using a CTD-sonde along standard transects and additional intertransect stations.
- Conduct current measurements with ADCP system.
- On-the-job training for the Angolan participants on the main survey routines would be imparted, including training on the use of our database, scrutinizing of echograms and biomass estimation with the acoustic system.

The aim of these surveys is to build a time series to allow a better understanding of the fluctuations in the main pelagic stocks and of the biology of the main species.

1.2 Participation

The scientific staff consisted of:

From IIP, Luanda: Miguel ANDRÉ, Bomba BAZIKA, Francisco DE ALMEDA, Agostiño DUARTE, Henriette LUTUBA, Filomena VAZ VELHO.

From IMR, Bergen: Gabriella BIANCHI, Guillermo BURGOS, Terje HAUGLAND, Jan Frode WILHELMSSEN

1.3 Narrative

The vessel left Walvis Bay (Namibia) on the evening of 2 August and steamed northwards to the Cunene River. After about one day steaming, one of the crew members became sick and the vessel returned to Walvis Bay on 4 August. The day after, the vessel started steaming again northwards, toward the Angolan border. The survey started on the evening of August 5, from just north of the Cunene River estuary. The survey track followed the one used for the most recent pelagic surveys, i.e. covering from approximately 20 m depth to about 500 m depth. Acoustic sampling in the area started following a course track in parallel transects set approximately 5-7 NM apart. At about 16° S, just before starting the hydrographic transect, another crew member became seriously sick and the vessel started steaming again toward Walvis Bay. The vessel steamed southwards for about twelve hours but following an improvement of the crew member's health condition, the vessel returned to the place where the survey had been interrupted and resumed the work one day later. From Namibe until Benguela, an area where the continental shelf is very narrow, a course track of triangular transects was used. A calibration of the acoustic instruments was undertaken on 12 August at 'Baia dos Elefantes' (approx. 13° 15'S). On the same day, the coverage of the southern Angolan waters was completed. From Benguela and northwards, parallel transects separated by 7NM were set. This represents a lower survey intensity as compared to the previous surveys (with 5 NM inter-transect distance) but it seemed to be necessary in order to make up for the time lost at beginning of the survey. In the area between Pta. das Palmerinhas and Luanda, triangular transects were used instead because of the very narrow continental shelf. Finally, between Cabeça de Cobra and Congo River, a course track in parallel transects separated about 7 to 10 NM was followed. Restricted areas related to the operation of oil platforms between Nzeto and the Congo River could not be surveyed. CTD (Conductivity-Temperature-Depth) and ADCP (Acoustic Doppler Current Profiler) measurements were taken on standard hydrographical sections and along the course track. The vessel reached the Congo River on August 24 and started to sail southwards to Luanda where the survey ended in the morning of August 26.

The surveyed area was divided in three regions. Congo River - north of Pta. das Palmerinhas (9° 00'S) - ANGOLA NORTH - was covered from 18 to 26 August. The region between 9°S and 13°S - ANGOLA CENTRAL - was surveyed from 12 to 18 August. The region limited by the parallel of 13°S and Cunene River - ANGOLA SOUTH - was covered from 5 to 12 August.

1.4 Survey effort

Figures 1a-c show the cruise tracks with fishing and hydrographic stations, and Table 1 summarises the survey effort in each region.

Table 1 Number of bottom (BT) and pelagic (PT) trawl stations, hydrographic stations and distance surveyed (NM) by area.				
Area	BT	PT	CTD	Distance surveyed
Congo R. - Pta.	8	23	37	1215
Palmerinhas	4	17	38	1065
Pta. Palmerinhas - Benguela	12	14	35	1060
Benguela -Cunene				
Total	24	54	110	3340

Figure 1a. Course track with fishing and hydrographic stations, Congo River - Pta. das Palmerinhas.

Figure 1b. Course track with fishing and hydrographic stations, Pta. das Palmerinhas - Benguela.

Figure 1c. Course track with fishing and hydrographic stations, Benguela-Cunene.

CHAPTER 2 METHODS

2.1 Hydrographic sampling

A Seabird 911 + CTD probe was used to obtain vertical profiles of temperature, salinity and oxygen. Real time plotting and logging was done using the Seabird Seasave software installed on a PC. CTD stations were conducted along the cruise track in transects set about 20NM apart. The profiles were in general taken down to a few meters above the bottom. In deep stations, however, data logging was interrupted at 700m. Water samples were collected only at the stations corresponding to the standard IIP profiles. In those stations, two Niskin bottles were triggered, one near the surface and one near the bottom. To calibrate the oxygen sensor, water samples were analysed for dissolved oxygen using the Winkler method. Salinity of water samples could not be measured as the Guildline Portasal salinometer was out of order and the salinity sensor could not be calibrated.

A total of..... samples were accepted for oxygen calibration. A linear regression of the Winkler determinations on the CTD values gave the following results:

$$O_2 = 1.010 * O_{2CTD} + 0.092$$

The standard deviation of the difference between both measurements was 0.132.

Current measurements were carried out with a ship-borne Acoustic Doppler Profiler (ADCP) at each hydrographic station. The ADCP was set to ping every 8 seconds, the depth cell was set to 8 m and the number of cells to 40. As a routine data were averaged over 300 seconds, stored on files and finally analysed by the PC software UMS (Underway Mapping System), supported by Sea Fisheries Research Institute, Cape Town, South Africa.

Meteorological observations including wind direction and speed, air temperature, global radiation and sea surface temperature (SST) were automatically logged every nautical mile using an Anderaa meteorological station.

2.2 Fish sampling

Abundance estimation

The catches were sampled for species composition, by weight and numbers. Biological samples, i.e. length and weight compositions were taken for the target species. Stomach samples of horse mackerel and sardinella were collected for further analysis at the University of Luanda. Records of fishing stations are presented in Annex I.

A description of the acoustic instruments and their standard settings is given in Annex II. This also includes a description of the fishing gear used.

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

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

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

where L is total length and C_F is the fish conversion factor.

This target strength to body length relationship has been used for all the target species although originally estimated for North Sea herring. No specific target strength determinations are at present available for the species under studies.

The following formula was used to calculate the number of fish in each length group (cm) for each fish concentration:

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

where:

- ρ_i = density of fish in length group i
- S_A = mean integrator value
- p_i = proportion of fish in length group i
- C_{fi} = fish conversion factor for length group

The length distribution of a given species within an area was computed by weighing the

length frequencies obtained in each trawl sample within the area by the average S_A value attributed to that species in the nearest 10 miles.

The biomass of fish in each length per unit area was calculated by multiplying the number of fish in each length class by their estimated mean weight obtained from the length-weight relationship of the particular region. The number and biomass per length group in a particular concentration was calculated by multiplying the estimated size distribution by the area occupied by the concentration. The number of individuals and total biomass in each area was obtained by summing up the number and biomass of each length group over the whole size. The number and biomass per length group in each concentration were at last summed to obtain the totals for each region. In the case of co-occurrence of target species of the same genus like *Sardinella aurita* and *S. maderensis* or *Trachurus trecae* and *T. capensis*, the S_A values allocated to the category 'sardinella' or 'horse mackerel' were split according to their length distribution and their catch rate in numbers.

The mean integrator values in each sampling unit (S_A -values) were divided between the following categories on the basis of trawl catches and characteristics of the echo traces:

- sardinella (*S. aurita* and *S. maderensis*)
- horse mackerel (*T. trecae* and *T. capensis*)
- pilchard
- P1 (other clupeiformes, i.e. *Engraulis encrasicolus*, *Ilisha africana*, *Etrumeus whiteheadi*)
- big-eye grunt (*Brachydeuterus auritus*)
- P2 (carangids (other than *Trachurus sp*), scombrids, barracudas and hairtails)
- other demersal fish
- Mesopelagic fish
- plankton

Biological sampling

Total length and body weight were recorded for sardinella and horse mackerel to the nearest 1 cm or 1 g below, respectively. Sex and reproductive stages were described by macroscopic examination, scoring each individually sampled fish according to the following categories:

- 1 Juvenile
- 2 Inactive
- 3 Active
- 4 Ripe
- 5 Running/ Spent

Stomachs were taken of Cunene horse mackerel for a study of the feeding habits of this species in relation to the observed dial vertical migrations.

CHAPTER 3 OCEANOGRAPHIC CONDITIONS

Surface distribution

Figures 2 a and b show the surface water temperatures and salinity for the northern area, respectively. Surface temperatures were lowest near the coast, particularly off Luanda (18°C). Higher temperatures were found in offshore waters, particularly in the north-west part of the shelf (SST 22-23°C). The salinity ranged between 35.7 and 35.8 psu, except in the vicinity of the Congo River estuary where the salinity quickly decreased toward the river mouth. Last year the shelf was characterised by lower salinity, showing an increasing range of values from the coast to the offshore areas. The conditions found during the present survey are however within the range of what has been found in previous surveys and can therefore be considered as normal for the winter period.

Figure 2. Horizontal distribution of a) temperature(°C) and b) salinity (‰), Congo River - Pta das Palmeirinha
Surface temperature and salinity values for the central area are presented in figure 3 a and b

respectively. The temperature had a range of 20 to 22 °C , generally with increasing temperatures from the coast to offshore waters. Salinity ranged from 35.7 to 35.9 psu with as similar pattern as temperature. Also in this case, the values are within the range of those observed in previous cruises at the same time of the year.

In the southern sector (Benguela to Cunene, Fig. 4 a) the frontal area of the Angola-Benguela currents was located in the southern part, with temperatures ranging from 14°C to 18°C at latitudes 17°30'S to 15°30'S. Further north, the isotherms were parallel to the coast, with temperatures of 17°C in proximity of the coast to about 20 °C toward the deeper waters.

The strong influence of waters from the Benguela current in the southern part of the area is also shown by the low salinity values observed (Fig 4 b), with an approximately north-south range of 35.0 psu to 35.8 psu. Between Cunene and Tombua salinity values were also low (35.0 psu) close to the coast. The temperature and salinity patterns near the surface indicate that upwelling was taking place in this area during the survey.

Figure 4. Horizontal distribution of temperature(°C) and salinity (‰), Benguela - Cunene

Vertical distribution

The vertical distribution of temperature, salinity and oxygen along the standard sections is shown in Figures 5 a- f.

The section off the Congo River (Fig. 5 a) shows the presence of a thermocline in the upper 100 m depth, with temperatures ranging between 22-23 °C at the surface to 16 °C. The salinity profile clearly shows the presence of low salinity waters from the Congo River, these not extending much further beyond the river mouth. High oxygen levels are only found in the upper 70-80 m, while in deeper waters the values are below 2 ml/l.

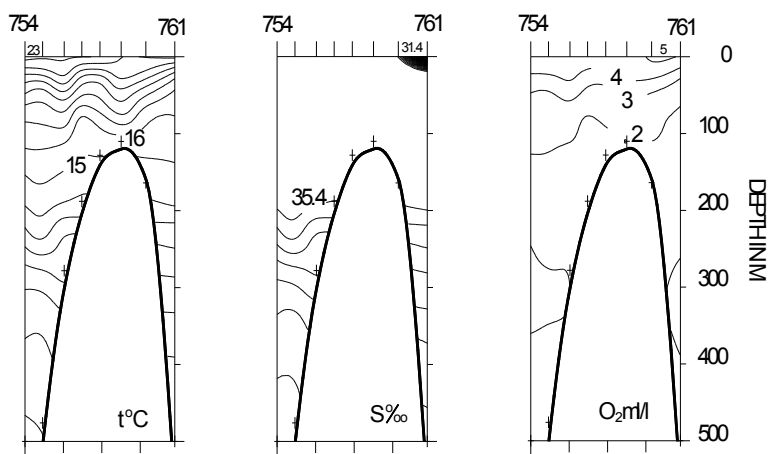
Off Ambriz (Fig. 5b), the influence of the Congo River is not present and the water structure shows a stratification of the isolines for the three parameters.

Also the section of Pta das Palmerinhas (Fig.5b) presents a flat distribution of isotherms, with a slight uplifting of the isotherms toward the coast. The salinity profile does not show the influence of the waters of the Kwanza River like last year (Aug. 98) at the surface layer.

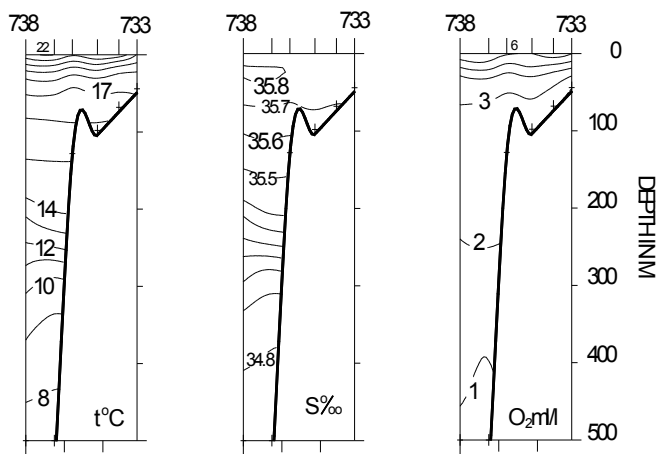
At Pta. do Morro (Fig. 5c), both temperature and oxygen sections suggest a probable presence of coastal upwelling. This process is also reflected by the presence of low oxygen content ($O_2 < 2$ ml/l) at around 250 m depth.

At the Lobito profile (Fig. 5d), the hydrographic conditions are similar to August of last year, i.e. with the thermocline located in the upper 50 m. There is a trend of uplifting of the isotherms in the upper 50 m, close to the coast, probably a sign of weak upwelling. The oxygen section, shows a layer with low oxygen values (1 ml/l) below the isobath of 50 m.

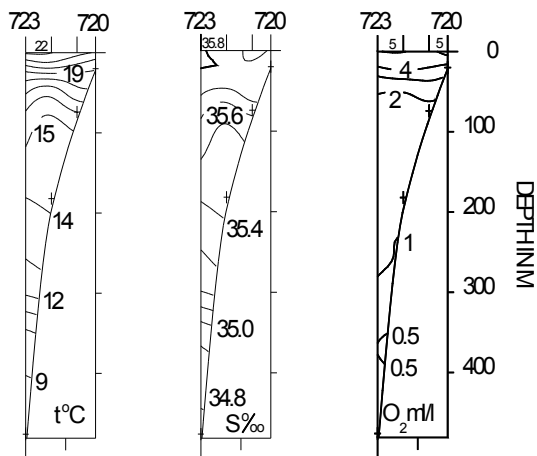
In the southern region, the profile at Baía dos Tigres (Fig. 5e) shows clear signs of coastal upwelling with uplifting of the isolines of temperature, oxygen and salinity in the upper 50 m. Higher temperatures (17°C versus 15° C) and salinity values (35.7 psu versus 35.5 psu) than August of last year are observed at the surface layer in the offshore part of the section. The layer between 150 and 500 m depth is dominated by oxygen content less than 0.5 ml/l.



Pta da Moita Seca 25.08.1999

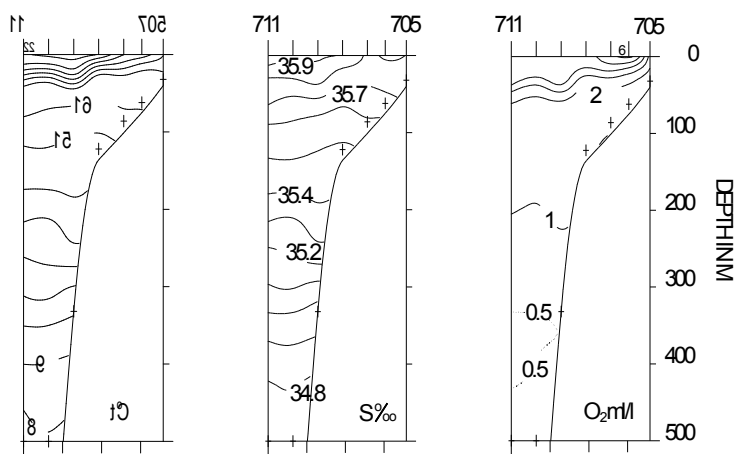


Ambriz 20.08.1999

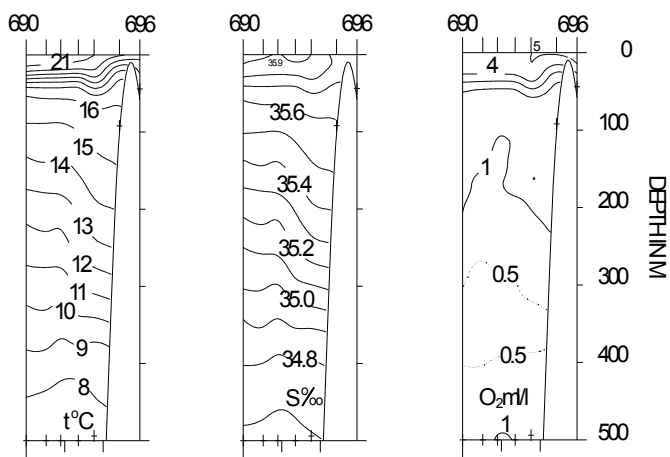


Ponta das Palmeirinhas 17.08.1999

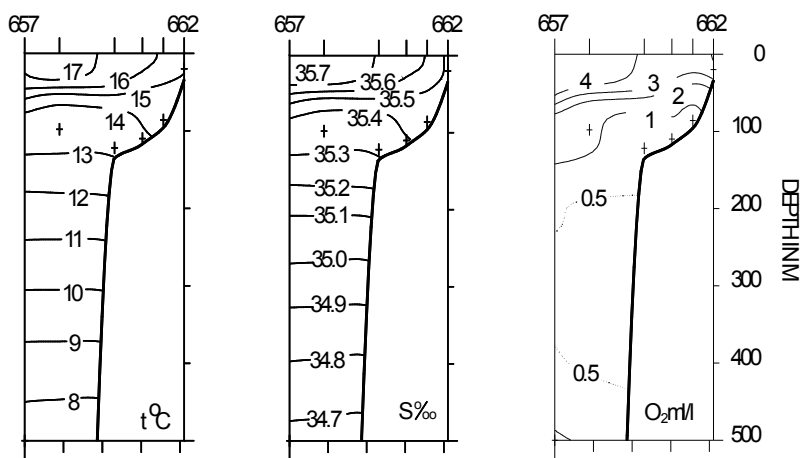
Figure 5. Vertical profiles of temperature(°C), salinity (‰) and oxygen(ml/l).



Ponta do Morro 15.08.1999



Lobito 13.08.1999



Baía dos Tigres 06.08.1999

Figure 5. Cont.

Wind conditions

The wind conditions along the cruise track are presented in figure 6. Winds were quite modest throughout the area, except on the southern shelf, off Baia doe Tigres. Generally, south - south east winds prevailed in the area.

Figure 6. Wind measurements. Congo River to Cunene River.

CHAPTER 4 DISTRIBUTION, COMPOSITION AND BIOMASS ESTIMATES OF PELAGIC FISH

4.1 Congo River - Pta das Palmeirinhas

4.1.1 Sardinella

Both sardinella species *Sardinella maderensis* and *S. aurita* were found in the area, the latter species only sporadically appearing in the catches. *Sardinella maderensis* was found throughout the area, but only one dense concentration was detected in the deeper part of the shelf between Cabeça da Cobra and N'Zeto (Fig. 7). As compared to last year, the distribution seemed to be more extended and with lower densities. The shallow waters between N'Zeto and Pta. da Moita Seca could not be covered because of the oil drilling activity. Sardinella was observed and caught always in the upper water layers, schooling near the surface during daytime and forming loose aggregations during night time. It was associated both with the pelagic community of barracudas, carangids and anchovies in the shallow waters and, in deeper waters, beyond the edge of the continental shelf, (300-400 m depth) with the offshore community of hairtail, scombrids and myctophids, during night time.

The figure 8 shows the length frequency distribution of *Sardinella maderensis*. The distribution consisted of a small proportion of individuals between 15 and 25 cm with a clear mode at 23 cm. This group is distributed in shallow waters between 8° to 9 ° S. The distribution also shows another clear mode at around 30 cm. This group is found throughout of the distribution area. The round sardinella, as mentioned earlier was very scarce throughout the studied area and only three length frequency samples could be taken. The distribution showed that in the station taken at shallow water the mode was around 30 cm. The stations more off shore are dominated by individuals larger than 30 cm.

The biomass of sardinella was estimated at 135 000 tons, that represents 45% of last year estimate. Figure 9 shows the cumulative distribution of the biomass. The bulk of the biomass consisted mainly of individuals larger than 28 cm.

Figure 7. Distribution of *Sardinella* spp. Congo River-Pta das Palmeirinha

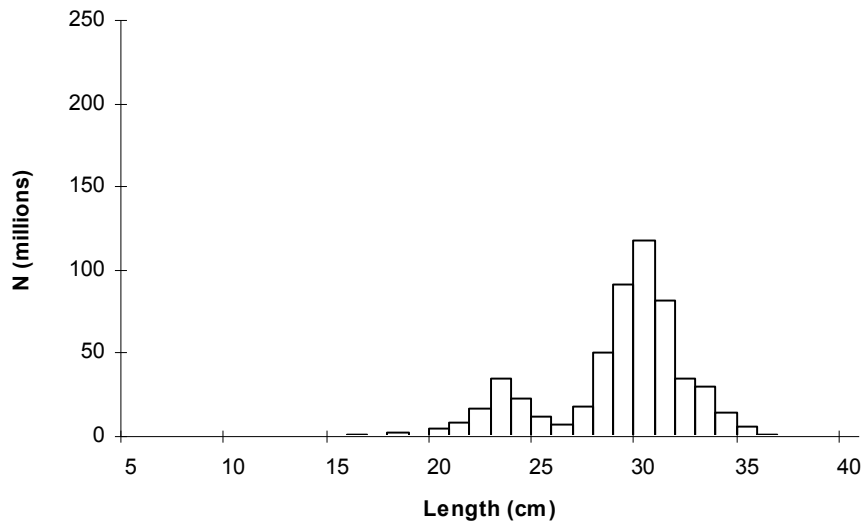


Figure 8. Total length distribution of flat sardinella (*Sardinella maderensis*). Congo River-Pta das Palmeirinhas.

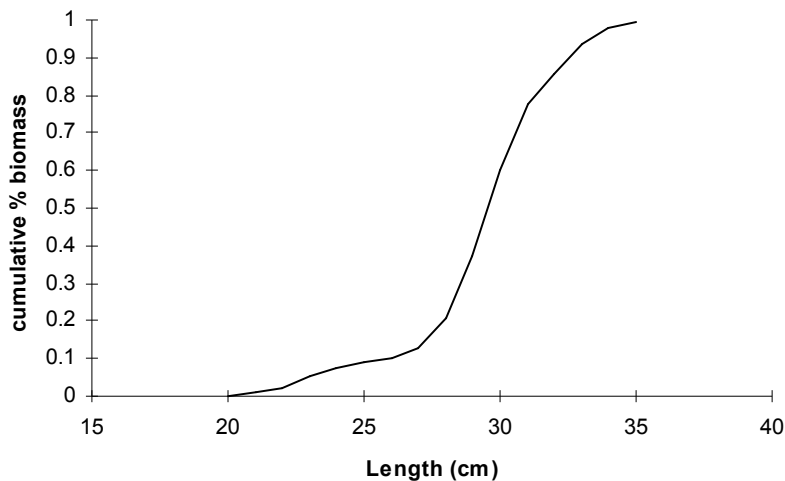


Fig 9. Cumulative percentage biomass by length group, *Sardinella* spp. Congo River-Pta das Palmeirinhas

4.1.2 Cunene horse mackerel

Figure 10 shows the distribution of horse mackerel for the region. The species was found scattered throughout the distribution area. The densities were very low, less than 300 m^2 / NM^2) throughout the area. It was caught from 30 to 400 m depth, with pelagic trawl during night time, close to the surface and with bottom trawl during daytime. The echo-traces, combined with positive fishing or target identification, showed horse mackerel schools mixed and/or alternating with demersal fish during the day while during night time it mixed with myctophids and other predators such as hairtail and scombrids.

Figure 11 shows the length frequency distribution of horse mackerel for the whole region. The distribution showed three well defined length groups between 10 and 15, 15 to 20 and larger than 25 cm with modes at 13, 17 and 29 cm respectively. The distribution also shows that length groups between 20 to 25 cm are absent. The spatial distribution of length frequency shows that the young groups are spread throughout the distribution area.

The estimated biomass for the northern region was about 68 000 tonnes, about 85% higher than last year. About 90 % of the estimates biomass consist of fish larger than 27 cm TL (Fig. 12).

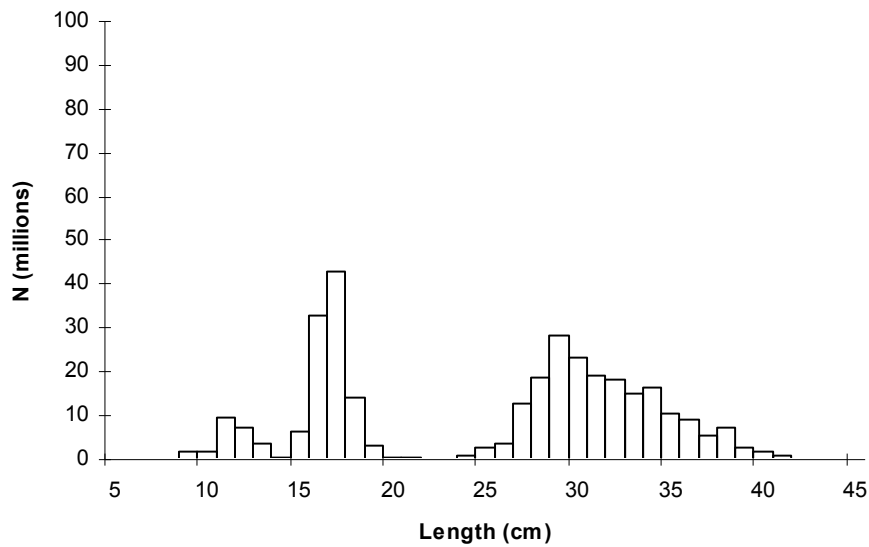


Figure 11. Total length distribution of Cunene horse mackerel (*Trachurus trecae*). Congo River - Pta das Palmeirinhas

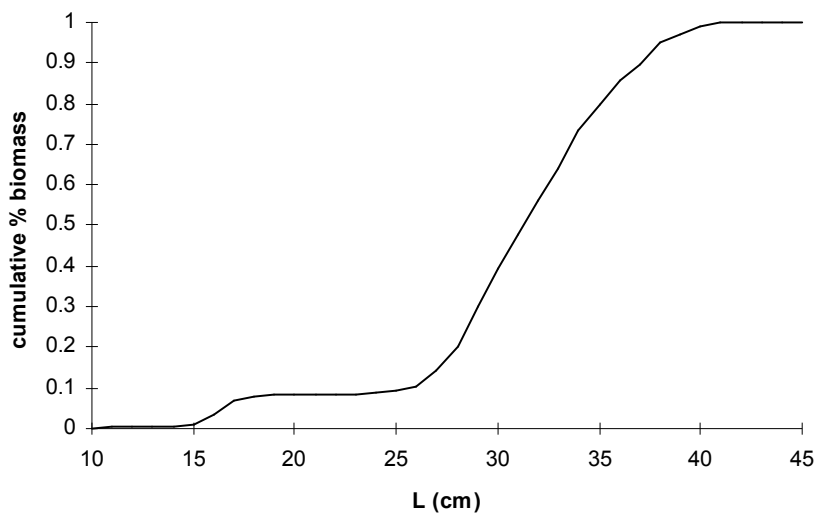


Figure 12. Cumulative percentage biomass by length group, *Trachurus trecae*. Congo River-Pta das Palmeirinhas

4.1.3 Other pelagic species

This category includes members of the family Carangidae (other than horse mackerel), species of the family Scombridae, Sphyraenidae, Stromateidae and *Trichiurus lepturus*. Figure 13 shows that the pelagic species type 2 were widely distributed in the region from shallow coastal waters to beyond the continental shelf. The hairtail was the dominant species, followed by carangids other than horse mackerel (Table 2). One of the usually most abundant species of carangids, *Chloroscombrus chrysurus*, was virtually absent from the

catches.

The biomass estimate, based on an average length of 30 cm and a condition factor equal to 0.01, resulted in 68 000 tonnes. This figure is approximately at the same level as last year estimate (57 000 tons).

Figure 13. Distribution of other pelagic species. Congo River - Pta das Palmeirinhas

Table 2. Catch rates (kg/h) of main groups of pelagic fish. Congo River-Pta das Palmeirinhas

ST.NO.	Carangids	Barracudas	Scombrids	Hairtail	Other
2043				19.31	7.52
2044				81.31	292.29
2045	1.04			58.64	30.35
2046				138.38	170.94
2047	5.24			431.28	224.44
2048	5.34	2.15		8.30	634.32
2049				76.47	281.83
2050					6943.82
2051	0.03			19.20	21.63
2052				19.58	25.77
2053					
2054	71.00			50.08	123.42
2055	0.60	4.92		5.12	11.82
2056	4.60			34.12	14.52
2057	30.26	4.67	4.76		37.12
2058	77.84		6.80	12.04	310.16
2059	228.60				9.32
2060	30.68	10.26	25.95		21.06
2061	57.30	1.68	1.50	2.64	67.08
2062	0.62		18.76	105.88	537.00
2063			26.12	9.20	5.60
2064			7.27	36.84	357.41
2065	21.84	169.54	3.15		27.90
2066	39.36	33.98	12.24	176.45	114.96
2067	8.59			32.04	85.45
2068	2.30		1.10	14.00	193.40
2069			24.77	228.41	145.71
2070	0.12			71.36	84.84
2071			101.57	160.29	
2072			6.06	53.46	360.78
MEAN	19.51	7.57	8.00	61.52	372.28

4.2 Luanda-Benguela

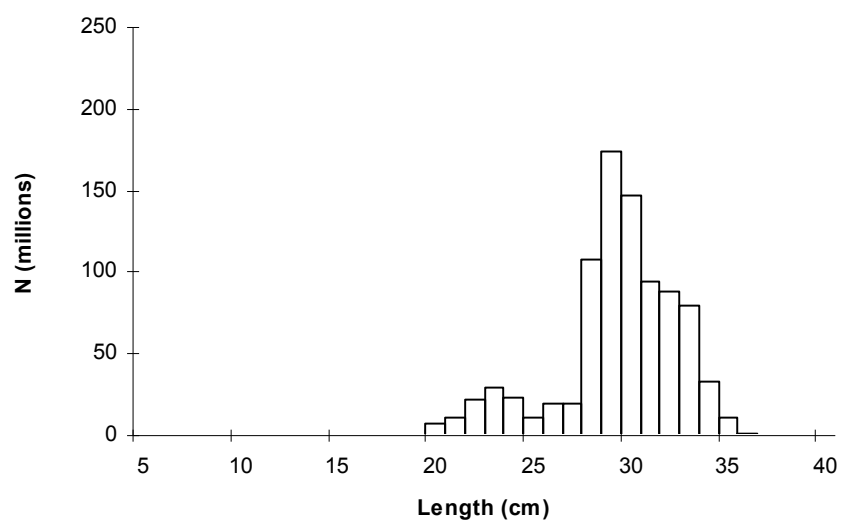
4.2.1 Sardinella

The flat sardinella (*Sardinella maderensis*) dominated also in this area. The round sardinella (*S. aurita*) was caught only sporadically and a few individuals at the time. During this survey, that took place in the same period as the winter survey of 1998, sardinella seemed to have a more extended distribution and occupied a larger surface than last year. On the other hand densities were generally lower (Fig. 14).

The size distributions showed the dominance of a year class with a mode of 30 cm TL throughout the area. Smaller sardinellas (mode of about 23 cm) were found in the inshore areas between Pta do Morro and Lobito. Smaller length groups were not present in the catches. The small size classes are known to occur in very shallow waters, that are not covered by our vessel. For this reason, the presence of small sardinella in the catches is only sporadic and the abundance estimation of this size group not reliable. Figure 15 shows the total length frequency distribution for this species in this area.

The biomass estimate resulted in 228 000 tons, consisting almost entirely of *S. maderensis*. About 90% of the biomass consisted of individuals larger than 27 cm TL (Fig 16). No attempt was made to estimate the biomass of the round sardinella because of its sporadic occurrence. The total biomass estimates from last year survey was 233 000 tons and this shows that, although the distribution pattern of this species was different, the biomass has remained at the same level as last year.

Figure 14. Distribution of *Sardinella* spp. Pta das Palmeirinhas - Benguela.



Sardinella maderensis

Figure 15. Total length distribution of flat sardinella (*Sardinella maderensis*). Pta das Palmeirinhas - Benguela

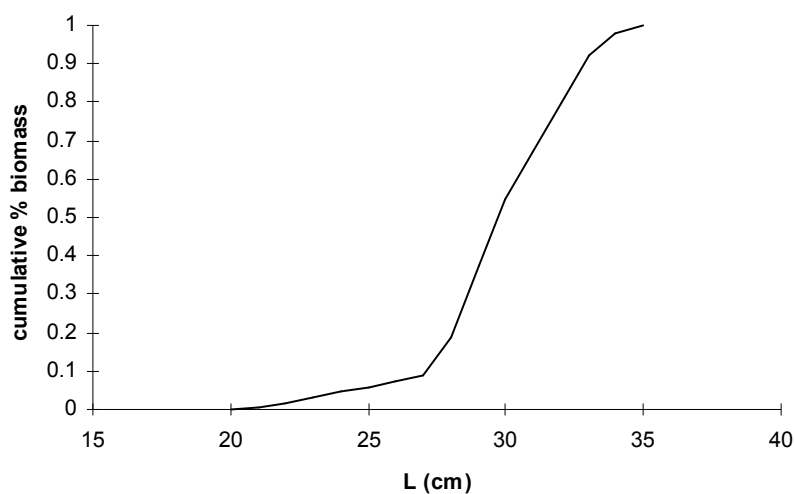


Figure 16. Cumulative percentage biomass by length group, *Sardinella* spp. Pta. das Palmeirinhas-Benguela

4.2.2 Cunene horse mackerel

Similarly to the sardinellas, the Cunene horse mackerel seemed to occupy a larger area than last year but the areas of high concentrations (mean back scattering $> 300 \text{ m}^2 / \text{NM}^2$) were smaller. The densest concentrations were found just north of Lobito and in a shallow area off Cabo São Braz (Fig. 17).

Juvenile horse mackerel (TL $< 20 \text{ cm}$) were found both in shallow and mid-shelf waters, from Lobito to Cabo Ledo. Figure 18 shows the total length frequency distribution of this species.

The biomass of Cunene horse mackerel was estimated at 129 000 tons, about 15% higher than last year. This difference is probably within the range of variability associated with the survey estimate. A large part of the biomass (about 80%) consisted of individuals $> 25 \text{ cm}$ TL (Fig. 19).

Figure 17. Distribution of horse mackerel (*Trachurus trecae*), Pta das Palmeirinhas - Benguela

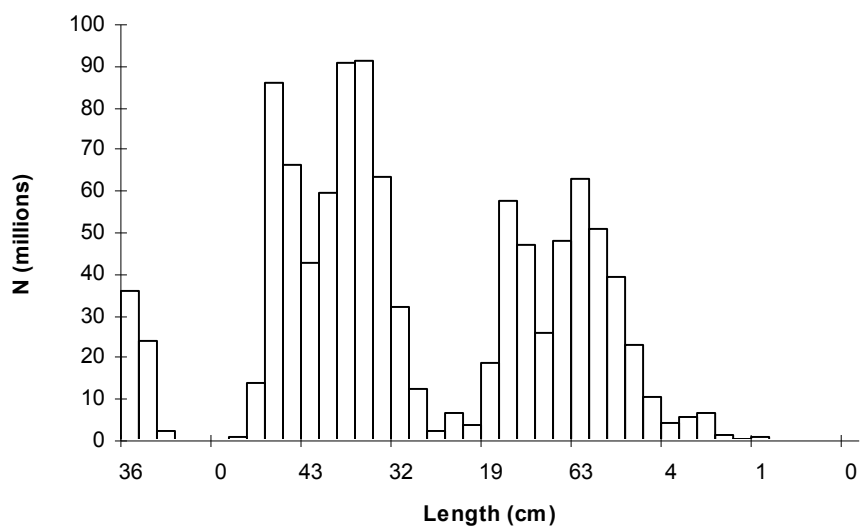


Figure 18. Total length distribution of horse mackerel (*Trachurus trecae*), Pta das Palmeirinhas-Benguela

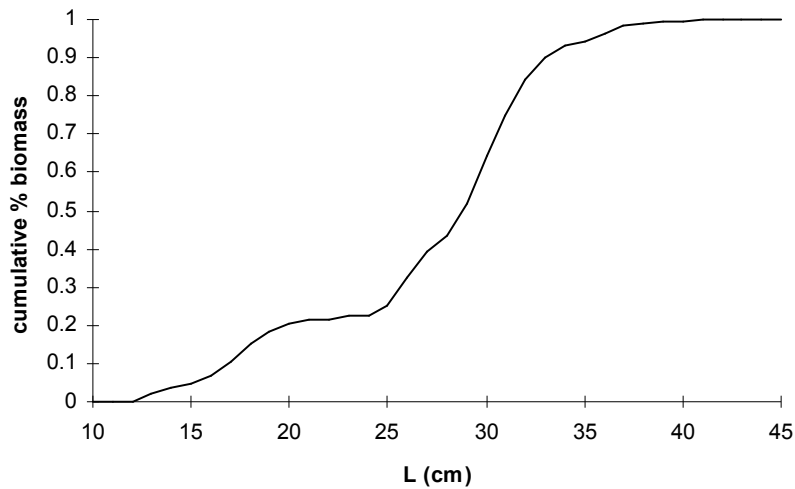


Figure 19. Cumulative percentage biomass of horse mackerel (*Trachurus trecae*), Pta das Palmeirinhas-Benguela

4.2.3 Other pelagic species ('pelagic fish type 2')

Figure 20 shows the distribution of this category and Table 3 the species composition in the catches by major groups.

Pelagic fish type 2 was distributed in low densities throughout the shelf. Species of the family Carangidae particularly *Selene dorsalis*, were the most common in the shallow and mid-waters. *Chloroscombrus chrysurus*, that is usually one of the dominating species in the shallow waters, was practically absent in the catches. In the deeper part of the shelf and slope areas, *Trichiurus lepturus* was the main species and was usually associated with myctophids and apparently followed this group in their diel migrations. Scombrids (*Scomberomorus tritor*, *Sarda sarda*, *Euthynnus allitteratus*, and *Scomber japonicus*) that are usually common in these waters, were virtually absent from the catches.

The biomass estimate, based on an average length of 30 cm and a condition factor equal to 0.01, resulted in about 43 000 tons. This estimate is well below the one obtained last year (81 000 tons), which seems to be due to the distribution area been smaller than the one occupied last year. Furthermore, one of the most common species of carangids, *Chloroscombrus chrysurus* and scombrids were virtually absent in the catches.

Figure 20. Distribution of other pelagic species. Pta das Palmeirinhas - Benguela

Table 3. Catch rates (kg/h) of main groups of pelagic fish. Pta das Palmeirinhas - Benguela

ST.N.	Carangids	Barracudas	Scombrids	Hairtail	Other
2020				38.77	107.22
2021					86.25
2022	7.96	1.20		4.12	512.44
2023	2.09				226.23
2024	0.06			0.06	.29
2025				2.88	1104.9
2026	10.08	9.87		82.32	919.8
2027	12.96	1.76		13.24	217.32
2028	2.74			11.31	2992.29
2029		0.72	3.96	18.96	260.28
2030	0.36			65.88	109.92
2031	352.00			12.00	6699.12
2032				16.55	465.08
2033	92.91	132.18		64.26	3584.07
2034	25.02		3.60	21.72	29.19
2035	75.60	12.00			571.14
2036	33.03	12.84		30.39	1099.89
2037				18.35	33.93
2038	34.74	13.68		66.96	608.10
2039	14.64			9.24	90.54
2040	108.15	10.20			528.00
2041	16.11	160.89		12.69	91.19
MEAN	34.28	15.45	0.33	21.29	890.66

4.3. Benguela - Cunene

4.3.1 Sardinella

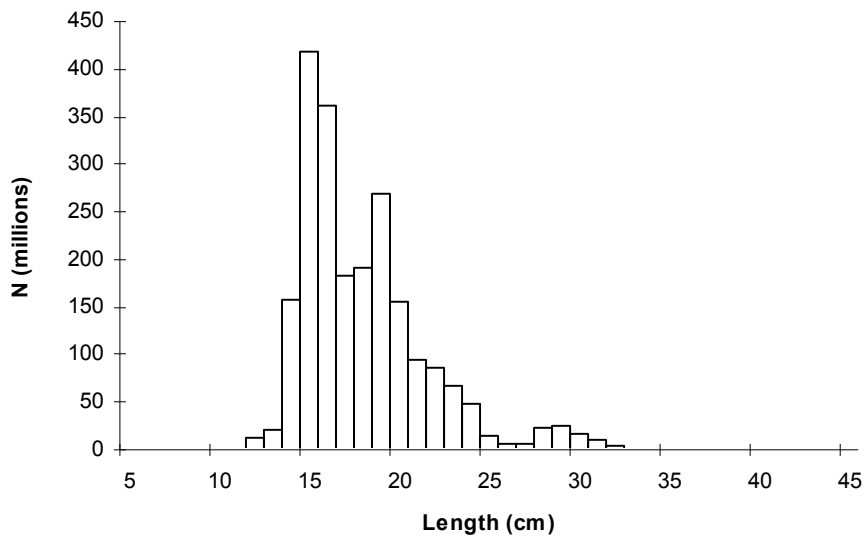
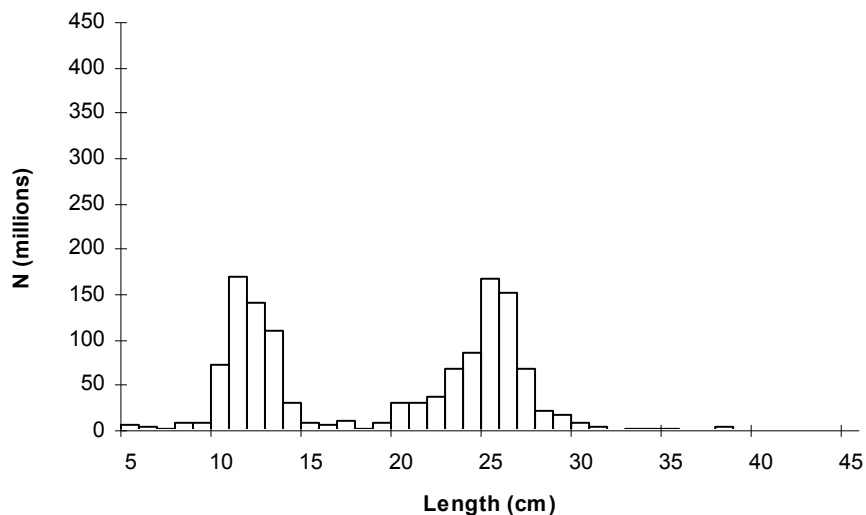
No positive identification of sardinella was made in this region.

4.3.2 Horse mackerel

Both species of horse mackerel, the Cape horse mackerel *Trachurus capensis* and the Cunene horse mackerel *T. trecae* were found off southern Angola. The Cape horse mackerel was present up to 15 ° 30' S. Close to the Cunene River, it occupied most of the shelf and slope areas, from about 50 m depth to beyond the shelf edge. The areas where this species was found were those with highest fish densities. Although the survey covered depths to 500 m, it seems that the distribution of this species extends beyond this limit (Figure 21). The occurrence of *T. capensis* seems to be associated with the colder waters of the Benguela current that reaches its northernmost extension in this area. The shallowest parts of the

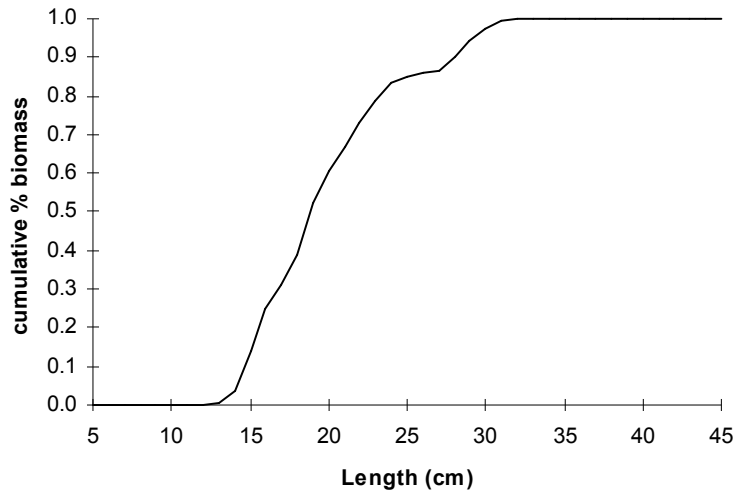
southern shelf (south of Tombua) were instead occupied by young Cunene horse mackerel. Both species overlapped at around 16 ° S, where the shelf narrows to become a thin strip until about Benguela. North of 15 ° S only the Cunene horse mackerel was present.

Figure 22 a and b shows the length frequency distribution of the Cape and Cunene horse mackerels, respectively. The former has two main modes, at about 15 and 20 cm TL. Larger fish (mode 29 cm) represented only a small percentage of the total. The Cunene horse mackerel showed two main modes, at 11 and 25 cm. The youngest were found in the inshore waters of the area between Tombua and Cunene, while the size increased moving northwards. Apparently the front area between the Benguela and Angola Currents, located about between 15 and 17 ° S, is a nursery area for both species.

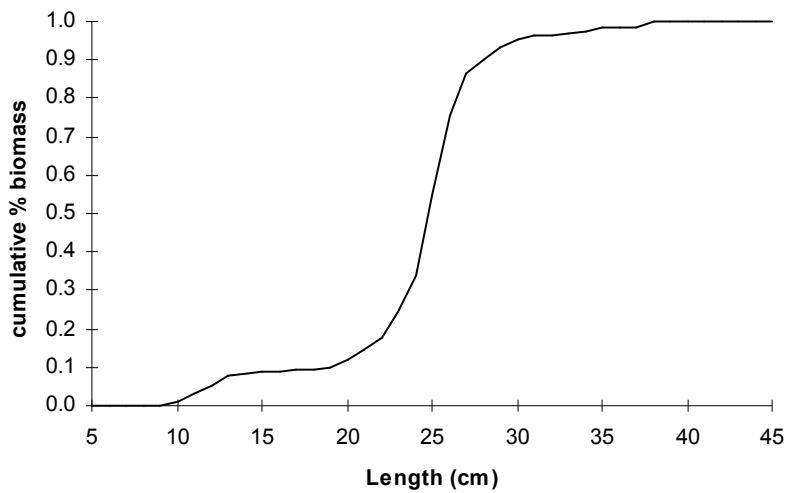
a) *Trachurus capensis*b) *Trachurus trecae*Figure 22. Total length distribution of a) *Trachurus capensis* and b) *T. trecae*. Benguela-Tombua.

The biomass estimate for horse mackerel in the area was 253 000 tons, 124 000 for *Trachurus trecae* and 128 000 for *T. capensis*. While the last year estimate for the former species is almost identical (118 000 tons), the estimate for the Cape horse mackerel is about 40 % lower this year. This difference cannot be evaluated without taking into consideration information on abundance and distribution of this species in Namibian waters. Year-to-year fluctuations, in addition to seasonal fluctuations, should be expected for this species depending on the position of the Angola-Benguela front.

Figures 23 a and b show the cumulative biomass by length. About 90% of the biomass of Cape horse mackerel consists of individuals smaller than about 22 cm, while most of the biomass of Cunene horse mackerel consists of fish in the length range 20-25 cm.



a) *Trachurus capensis*



a) *Trachurus trecae*

Figure 23. Cumulative percentage biomass by length group, a) *Trachurus capensis*, b) *T. trecae*

ANNEX I Records of fishing stations

PROJECT STATION:1993
 DATE: 6/ 8/99 GEAR TYPE: PT No:1 POSITION:Lat S 1712 Long E 1142
 start stop duration
 TIME :18:22:42 18:52:08 29 (min) Purpose code: 1
 LOG :9367.15 9368.78 1.64 Area code : 1
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 39 64 Validity code:
 Towing dir: 270ø Wire out: 130 m Speed: 30 kn*10
 Sorted: 111 Kg Total catch: 110.90 CATCH/HOUR: 229.45

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Thyrsites atun	144.83	215	63.12	4652
Etrumeus whiteheadi	37.66	782	16.41	4653
Trachurus trecae	23.59	434	10.28	4651
Pomatomus saltatrix	18.41	41	8.02	
Galeichthys feliceps	1.45	2	0.63	
Trichiurus lepturus	1.45	25	0.63	
Merluccius polli, juveniles	0.83	54	0.36	
Loligo vulgaris	0.41	2	0.18	
Engraulis encrasicolus	0.41	21	0.18	
Sepia orbignyana	0.21	2	0.09	
Sepiella ornata	0.21	2	0.09	
Total	229.46		99.99	

PROJECT STATION:1994
 DATE: 6/ 8/99 GEAR TYPE: PT No:4 POSITION:Lat S 1707 Long E 1125
 start stop duration
 TIME :22:45:04 23:05:04 20 (min) Purpose code: 1
 LOG :9397.97 9399.02 1.03 Area code : 1
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 146 139 Validity code:
 Towing dir: 80ø Wire out: 130 m Speed: 30 kn*10
 Sorted: 8 Kg Total catch: 10.72 CATCH/HOUR: 32.16

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus capensis	18.90	615	58.77	4654
Etrumeus whiteheadi	10.92	204	33.96	4655
Synagrops microlepis	1.86	2466	5.78	4656
Merluccius polli, juveniles	0.36	498	1.12	4657
Tylosurus acus rafaale	0.12	6	0.37	
Total	32.16		100.00	

PROJECT STATION:1995
 DATE: 7/ 8/99 GEAR TYPE: PT No:1 POSITION:Lat S 1657 Long E 1119
 start stop duration
 TIME :05:31:11 06:05:12 34 (min) Purpose code: 1
 LOG :9455.84 9457.50 1.65 Area code : 1
 FDEPTH: 150 250 GearCond.code: 1
 BDEPTH: 221 674 Validity code: 1
 Towing dir: 300ø Wire out: 600 m Speed: 30 kn*10
 Sorted: Kg Total catch: 70.60 CATCH/HOUR: 124.59

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Alopias superciliosus	88.24	2	70.82	
Zenopsis conchifer	26.65	46	21.39	
Trachurus capensis	7.41	37	5.95	4658
PASIPHARIDAE	1.98	3912	1.59	
MYCTOPHIDAE	0.19	109	0.15	
Zenopsis conchifer	0.04	46	0.03	
Total	124.51		99.93	

PROJECT STATION:1996
 DATE: 7/ 8/99 GEAR TYPE: BT No: POSITION:Lat S 1658 Long E 1121
 start stop duration
 TIME :07:25:30 07:49:02 24 (min) Purpose code: 1
 LOG :9464.67 9465.95 1.27 Area code : 1
 FDEPTH: 144 146 GearCond.code:
 BDEPTH: 144 146 Validity code:
 Towing dir: 345ø Wire out: 500 m Speed: 30 kn*10
 Sorted: 154 Kg Total catch: 1753.10 CATCH/HOUR: 4382.75

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus capensis	2878.50	30073	65.68	4659
Dentex macrophthalms	852.15	6185	19.44	4660
Merluccius capensis	401.85	940	9.17	4661
Pterothrissus bellocci	82.50	913	1.88	
Trichiurus lepturus	45.50	258	1.04	
Squalus megalops	37.00	113	0.84	
Helicolenus dactylopterus	31.25	228	0.71	
Zenopsis conchifer	25.75	115	0.59	
Umbrina canariensis	11.50	55	0.26	
Trigla lyra	5.75	55	0.13	
Dicologlossa cuneata	5.50	28	0.13	
Anthias anthias	2.75	28	0.06	
Arnoglossus capensis	2.75	28	0.06	
Total	4382.75		99.99	

PROJECT STATION:1997
 DATE: 7/ 8/99 GEAR TYPE: BT No: POSITION:Lat S 1653 Long E 1143
 start stop duration
 TIME :11:06:05 11:15:49 10 (min) Purpose code: 1
 LOG :9496.65 9497.28 0.62 Area code : 1
 FDEPTH: 21 19 GearCond.code:
 BDEPTH: 21 19 Validity code:
 Towing dir: 360ø Wire out: 100 m Speed: 31 kn*10
 Sorted: 44 Kg Total catch: 126.17 CATCH/HOUR: 757.02

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Diplodus sargus capensis	734.40	3780	97.01	
Trachurus trecae	8.34	246	1.10	4662
Pomatomus saltatrix	7.50	30	0.99	4663
Todaropsis eblanæ	2.70	18	0.36	
Zenopsis conchifer	2.22	6	0.29	
Etrumeus whiteheadi	1.44	42	0.19	4664
Brachydeuterus auritus	0.36	54	0.05	
Engraulis encrasicolus	0.06	18	0.01	
Total	757.02		100.00	

PROJECT STATION:1998
 DATE: 7/ 8/99 GEAR TYPE: BT No: POSITION:Lat S 1652 Long E 1142
 start stop duration
 TIME :13:30:00 13:45:05 15 (min) Purpose code: 1
 LOG :9315.95 9516.69 0.74 Area code : 1
 FDEPTH: 119 123 GearCond.code:
 BDEPTH: 119 123 Validity code:
 Towing dir: 360ø Wire out: 400 m Speed: 30 kn*10
 Sorted: 71 Kg Total catch: 1100.36 CATCH/HOUR: 4401.44

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus capensis	3146.40	105088	71.49	4666
Dentex macrophthalms	979.20	9472	22.25	4665
Merluccius capensis	243.20	448	5.53	
Galeichthys feliceps	21.20	64	0.48	
Mustelus mustelus	7.68	4	0.17	
Epinephelus aeneus	3.76	4	0.09	
Total	4401.44		100.01	

PROJECT STATION:1999
 DATE: 9/ 8/99 GEAR TYPE: BT No: POSITION:Lat S 1632 Long E 1126
 start stop duration
 TIME :06:40:24 06:41:06 18 (min) Purpose code: 1
 LOG :9825.32 9826.21 0.88 Area code : 1
 FDEPTH: 114 113 GearCond.code:
 BDEPTH: 114 113 Validity code:
 Towing dir: 360ø Wire out: 450 m Speed: 30 kn*10
 Sorted: 88 Kg Total catch: 591.10 CATCH/HOUR: 1970.33

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus capensis	1161.33	18693	58.94	4667
Merluccius capensis	464.67	693	23.58	4668
Dentex macrophthalms	138.33	1720	7.02	4669
Squalus megalops	54.67	90	2.77	
Zeus faber	47.00	90	2.39	
Trichiurus lepturus	32.33	313	1.64	
Chelidonichthys capensis	26.00	403	1.32	
Etrumeus whiteheadi	21.33	403	1.08	
Arnoglossus capensis	8.00	23	0.41	
Trigla lyra	6.70	67	0.34	
Pagellus bellottii	5.67	23	0.29	
Uranoscopus cadenati	3.67	23	0.19	
Dicologlossa cuneata	0.67	23	0.03	
Total	1970.37		100.00	

PROJECT STATION:2000
 DATE: 9/ 8/99 GEAR TYPE: BT No: POSITION:Lat S 1638 Long E 1147
 start stop duration
 TIME :10:41:39 10:57:37 16 (min) Purpose code: 1
 LOG :9857.09 9858.06 0.96 Area code : 1
 FDEPTH: 16 17 GearCond.code:
 BDEPTH: 16 17 Validity code:
 Towing dir: 350ø Wire out: 80 m Speed: 30 kn*10
 Sorted: 22 Kg Total catch: 46.68 CATCH/HOUR: 175.05

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	105.00	4811	59.98	4670
Todarodes sagittatus	28.50	3218	16.28	
Decapterus rhonchus	15.83	773	9.04	4671
Carcharhinus falciformis	13.35	4	7.63	
Engraulis encrasicolus	7.80	3199	4.46	
Myliobatis aquila	4.28	15	2.45	
Sepiella sp.	0.30	8	0.17	
Total	175.06		100.01	

PROJECT STATION:2001
 DATE: 9/ 8/99 GEAR TYPE: PT No:4 POSITION:Lat S 1610 Long E 1145
 start stop duration
 TIME :20:00:34 20:09:52 9 (min) Purpose code: 1
 LOG :9938.84 9939.36 0.51 Area code : 1
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 43 46 Validity code:
 Towing dir: 270ø Wire out: 130 m Speed: 30 kn*10
 Sorted: 93 Kg Total catch: 346.83 CATCH/HOUR: 2312.20

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	2262.40	32287	97.85	4672
Todaropsis eblanæ	19.73	567	0.85	
Dasyatis marmorata	12.80	7	0.55	
Etrumeus whiteheadi	9.40	147	0.41	
Sepia orbignyana	3.93	73	0.17	
Alloteuthis africana	3.93	1113	0.17	
Total	2312.19		100.00	

PROJECT STATION:2002
 DATE: 9/ 8/99 GEAR TYPE: PT No:4 POSITION:Lat S 1609 Long E 1132
 start stop duration
 TIME :21:51:23 22:21:20 30 (min) Purpose code: 1
 LOG :9951.76 9953.36 1.60 Area code : 1
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 813 891 Validity code:
 Towing dir: 360ø Wire out: 130 m Speed: 30 kn*10
 Sorted: 105 Kg Total catch: 279.68 CATCH/HOUR: 559.36

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	375.62	2626	67.15	4673
Trachurus capensis	145.14	1230	25.95	4674
MYCTOPHIDAE	34.50	15250	6.17	
Schedophilus huttoni	1.82	10	0.33	
Loligo vulgaris	1.06	6	0.19	
Todarodes sagittatus	0.90	6	0.16	
Thysanoteuthis rhombus	0.32	6	0.06	
Total	559.36		100.01	

PROJECT STATION:2003
 DATE:10/ 8/99 GEAR TYPE: PT No:1 POSITION:Lat S 1556 Long E 1136
 start stop duration
 TIME :02:40:32 03:05:04 25 (min) Purpose code: 1
 LOG :9985.39 9986.80 1.39 Area code : 1

FDEPTH: 5 5 GearCond.code:
 BDEPTH: 540 649 Validity code:
 Towing dir: 360° Wire out: 150 m Speed: 35 kn*10
 Sorted: 31 Kg Total catch: 31.68 CATCH/HOUR: 76.03

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus capensis	29.14	202	38.33	4676
Trachurus trecae	18.67	106	24.56	4675
MYCTOPHIDAE	18.43	10783	24.24	
Sarda sarda	5.54	7	7.29	
Trachipterus sp.	1.51	2	1.99	
Schedophilus huttoni	1.08	12	1.42	
CRANCHIIDAE	1.06	62	1.39	
Todarodes sagittatus	0.50	2	0.66	
Brama brama	0.07	2	0.09	
Melanocetus johnsoni	0.02	2	0.03	
Total	76.02		100.00	

DATE:10/ 8/99 GEAR TYPE: PT No:4 POSITION:Lat S 1509 Long E 1158
 start stop duration
 TIME :21:37:05 21:52:28 15 (min) Purpose code: 1
 LOG : 133.61 134.52 0.91 Area code : 1
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 436 540 Validity code:
 Towing dir: 280° Wire out: 130 m Speed: 30 kn*10
 Sorted: 181 Kg Total catch: 180.76 CATCH/HOUR: 723.04

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	353.76	2188	48.93	4682
MYCTOPHIDAE	305.28	197416	42.22	
Todarodes sagittatus	54.40	40	7.52	
Sphyrna lewini	9.60	4	1.33	
Total	723.04		100.00	

PROJECT STATION:2004
 DATE:10/ 8/99 GEAR TYPE: BT No: POSITION:Lat S 1541 Long E 1154
 start stop duration
 TIME :08:24:49 08:30:11 5 (min) Purpose code: 1
 LOG : 25.55 25.82 0.27 Area code : 1
 FDEPTH: 80 82 GearCond.code:
 BDEPTH: 80 82 Validity code:
 Towing dir: 20° Wire out: 280 m Speed: 30 kn*10
 Sorted: Kg Total catch: 44.36 CATCH/HOUR: 532.32

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Synagrops microlepis	423.84	384984	79.62	
Dentex barnardi	52.08	264	9.78	
Trachurus trecae	11.28	84	2.12	
Trichiurus lepturus	9.60	48	1.80	
Dentex macrophthalmus	8.64	72	1.62	
Pagellus bellottii	7.68	60	1.44	
Lithognathus mormyrus	4.80	12	0.90	
Sarpa salpa	4.80	24	0.90	
Petrolibatrachus rossignoli	3.36	12	0.63	
Dentex gibbosus	2.64	36	0.50	
Dentex angolensis	2.16	36	0.41	
Sepiella ornata	1.44	36	0.27	
Total	532.32		99.99	

PROJECT STATION:2009
 DATE:11/ 8/99 GEAR TYPE: FT No:1 POSITION:Lat S 1445 Long E 1213
 start stop duration
 TIME :03:43:32 04:03:36 20 (min) Purpose code: 1
 LOG : 181.46 182.48 1.02 Area code : 1
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 375 431 Validity code:
 Towing dir: 270° Wire out: 150 m Speed: 30 kn*10
 Sorted: 56 Kg Total catch: 115.44 CATCH/HOUR: 346.32

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
MYCTOPHIDAE	238.80	81192	68.95	
Trachurus trecae	106.74	543	30.82	4683
Trachipterus sp.	0.78	3	0.23	
Total	346.32		100.00	

PROJECT STATION:2005
 DATE:10/ 8/99 GEAR TYPE: BT No: POSITION:Lat S 1536 Long E 1148
 start stop duration
 TIME :10:23:49 10:44:11 20 (min) Purpose code: 1
 LOG : 42.99 43.99 1.00 Area code : 1
 FDEPTH: 111 109 GearCond.code:
 BDEPTH: 111 109 Validity code:
 Towing dir: 80° Wire out: 400 m Speed: 30 kn*10
 Sorted: 102 Kg Total catch: 1326.64 CATCH/HOUR: 3979.92

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	1420.44	10317	35.69	4677
Trachurus capensis	1295.04	9690	32.54	4678
Dentex macrophthalmus	969.00	6156	24.35	4679
Atractoscion aeguidens	69.06	111	1.74	
Raja miraletus	63.84	114	1.60	
Dentex angolensis	53.58	171	1.35	
Spicara alta	39.90	342	1.00	
Pagellus bellottii	26.22	228	0.66	
Myliobatis aquila	22.62	9	0.57	
Anthias anthias	9.12	171	0.23	
Zeus faber	8.82	9	0.22	
Etrumeus whiteheadi	2.28	57	0.06	
Total	3979.92		100.01	

PROJECT STATION:2010
 DATE:11/ 8/99 GEAR TYPE: BT No:2 POSITION:Lat S 1425 Long E 1215
 start stop duration
 TIME :06:18:30 06:27:06 9 (min) Purpose code: 1
 LOG : 201.53 201.97 0.42 Area code : 1
 FDEPTH: 125 140 GearCond.code:
 BDEPTH: 125 140 Validity code:
 Towing dir: 220° Wire out: 400 m Speed: 30 kn*10
 Sorted: 80 Kg Total catch: 441.32 CATCH/HOUR: 2942.13

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Dentex macrophthalmus	2417.33	17967	82.16	4684
Trachurus trecae	261.47	1547	8.89	4685
Dentex angolensis	142.00	467	4.83	
Erythrocles monodi	25.33	100	0.86	
Pagellus bellottii	22.67	133	0.77	
Raja miraletus	20.67	33	0.70	
Spondyliosoma cantharus	19.33	33	0.66	
Scorpaena normani	14.67	33	0.50	
Spicara alta	14.00	100	0.48	
Chelidonichthys capensis	3.33	33	0.11	
Loligo vulgaris	1.33	67	0.05	
Total	2942.13		100.01	

PROJECT STATION:2006
 DATE:10/ 8/99 GEAR TYPE: PT No:2 POSITION:Lat S 1529 Long E 1153
 start stop duration
 TIME :13:52:17 14:14:17 22 (min) Purpose code: 1
 LOG : 72.06 73.29 1.22 Area code : 1
 FDEPTH: 70 70 GearCond.code:
 BDEPTH: 112 116 Validity code:
 Towing dir: 270° Wire out: 220 m Speed: 35 kn*10
 Sorted: Kg Total catch: CATCH/HOUR:

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

PROJECT STATION:2011
 DATE:11/ 8/99 GEAR TYPE: BT No:2 POSITION:Lat S 1425 Long E 1218
 start stop duration
 TIME :09:08:10 09:15:17 7 (min) Purpose code: 1
 LOG : 226.54 226.92 0.37 Area code : 1
 FDEPTH: 91 92 GearCond.code:
 BDEPTH: 91 92 Validity code:
 Towing dir: 290° Wire out: 320 m Speed: 30 kn*10
 Sorted: Kg Total catch: 25.98 CATCH/HOUR: 222.69

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Pagellus bellottii	68.91	386	30.94	4686
Trachurus trecae	42.17	180	18.94	4687
Chelidonichthys capensis	28.46	317	12.78	
Dentex barnardi	23.66	69	10.62	
Atractoscion aeguidens	20.91	17	9.39	
Rhinobatos albomaculatus	19.89	9	8.93	
Zeus faber	6.69	9	3.00	
Spondyliosoma cantharus	5.66	9	2.54	
Todaropsis eblanæ	0.51	9	0.23	
Neomerinthe folgori	0.34	9	0.15	
Total	217.20		97.52	

PROJECT STATION:2007
 DATE:10/ 8/99 GEAR TYPE: BT No: POSITION:Lat S 1529 Long E 1152
 start stop duration
 TIME :14:56:24 15:21:59 26 (min) Purpose code: 1
 LOG : 76.28 77.65 1.37 Area code : 1
 FDEPTH: 114 114 GearCond.code: 8
 BDEPTH: 114 114 Validity code: 3
 Towing dir: 10° Wire out: 420 m Speed: 30 kn*10
 Sorted: 62 Kg Total catch: 62.24 CATCH/HOUR: 143.63

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Dentex macrophthalmus	81.37	549	56.65	4681
Anthias anthias	50.82	1142	35.38	
Trachurus trecae	4.75	39	3.31	4680
Trachurus capensis	2.72	21	1.89	
Spondyliosoma cantharus	2.40	5	1.67	
Dentex angolensis	1.38	7	0.96	
Neomerinthe folgori	0.09	2	0.06	
Branchiostegus semifasciatus	0.09	2	0.06	
Total	143.62		99.98	

PROJECT STATION:2012
 DATE:11/ 8/99 GEAR TYPE: BT No:2 POSITION:Lat S 1356 Long E 1224
 start stop duration
 TIME :16:31:51 16:45:53 14 (min) Purpose code: 1
 LOG : 293.12 293.81 0.66 Area code : 1
 FDEPTH: 38 24 GearCond.code:
 BDEPTH: 38 24 Validity code:
 Towing dir: 180° Wire out: 160 m Speed: 30 kn*10
 Sorted: 54 Kg Total catch: 434.88 CATCH/HOUR: 1863.77

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Pagellus bellottii	1537.71	8160	82.51	4688
Trachurus trecae	207.00	913	11.11	4689
Lithognathus mormyrus	50.40	240	2.70	
Squalus megalops	42.86	4	2.30	
Dentex barnardi	18.51	60	0.99	

Atractoscion aequidens 7.20 9 0.39
 Total 1863.68 100.00

PROJECT STATION:2013
 DATE:11/ 8/99 GEAR TYPE: PT No:4 POSITION:Lat S 1341
 start stop duration Long E 1226
 TIME :19:50:57 20:10:40 20 (min) Purpose code: 1
 LOG : 323.52 324.56 1.03 Area code : 1
 FDEPTH: 10 10 GearCond.code: 1
 BDEPTH: 129 127 Validity code: 1
 Towing dir: 65ø Wire out: 120 m Speed: 30 kn*10
 Sorted: Kg Total catch: 42.54 CATCH/HOUR: 127.62

SPECIES CATCH/HOUR % OF TOT. C SAMP
 weight numbers
 MYCTOPHIDAE 87.78 8778 68.78
 Trachurus trecae 39.84 225 31.22 4690
 Total 127.62 100.00

Pomadasys inciscus 12.56 76 2.28
 Sepia officinalis hierreda 11.88 4 2.16
 Dentex barnardi 9.96 76 1.81
 Pseudotolithus typus 6.52 6 1.19
 Raja miraletus 6.44 14 1.17
 Galeichthys feliceps 5.72 4 1.04
 Brachydeuterus auritus 4.28 110 0.78
 Trachurus trecae, juvenile 3.64 830 0.66 4696
 Sepia sp. 3.36 16 0.61
 Trichiurus lepturus 3.32 6 0.60
 Zeus faber 3.00 2 0.55
 Galeoides decadactylus 2.52 6 0.46
 Chaetodon hoefleri 1.72 10 0.31
 Chelidonichthys capensis 1.24 10 0.23
 Sphyræna sphyraena 0.68 2 0.12
 Umbrina canariensis 0.60 4 0.11
 Syacium micrurum 0.44 10 0.08
 Citharus linguatula 0.36 6 0.07
 Saurida brasiliensis 0.08 14 0.01
 Total 549.80 100.00

PROJECT STATION:2018
 DATE:12/ 8/99 GEAR TYPE: PT No:5 POSITION:Lat S 1248
 start stop duration Long E 1250
 TIME :18:02:24 18:22:26 20 (min) Purpose code: 1
 LOG : 448.42 449.32 0.90 Area code : 2
 FDEPTH: 10 10 GearCond.code: 1
 BDEPTH: 787 674 Validity code: 1
 Towing dir: 90ø Wire out: 140 m Speed: 30 kn*10
 Sorted: 95 Kg Total catch: 376.02 CATCH/HOUR: 1128.06

SPECIES CATCH/HOUR % OF TOT. C SAMP
 weight numbers
 Trachurus trecae 329.28 1833 29.19 4699
 Sardinella maderensis 250.47 684 22.20 4697
 MYCTOPHIDAE 185.34 120462 16.43
 Trichiurus lepturus 179.97 1062 15.95 4698
 Isurus oxyrinchus 120.00 3 10.64
 Sarda sarda 42.24 30 3.74
 Prionace glauca 20.76 3 1.84
 Total 1128.06 99.99

PROJECT STATION:2014
 DATE:11/ 8/99 GEAR TYPE: PT No:1 POSITION:Lat S 1340
 start stop duration Long E 1226
 TIME :20:48:08 21:04:35 16 (min) Purpose code: 1
 LOG : 325.98 326.85 0.85 Area code : 1
 FDEPTH: 70 70 GearCond.code: 1
 BDEPTH: 131 168 Validity code: 1
 Towing dir: 240ø Wire out: 200 m Speed: 30 kn*10
 Sorted: Kg Total catch: 17.02 CATCH/HOUR: 63.83

SPECIES CATCH/HOUR % OF TOT. C SAMP
 weight numbers
 MYCTOPHIDAE 63.75 29599 99.87
 Synagrops microlepis 0.08 4 0.13
 Total 63.83 100.00

PROJECT STATION:2019
 DATE:12/ 8/99 GEAR TYPE: PT No:5 POSITION:Lat S 1241
 start stop duration Long E 1304
 TIME :22:22:19 22:37:51 16 (min) Purpose code: 1
 LOG : 473.04 474.00 0.96 Area code : 1
 FDEPTH: 10 10 GearCond.code: 1
 BDEPTH: 254 319 Validity code: 1
 Towing dir: 270ø Wire out: 140 m Speed: 30 kn*10
 Sorted: 64 Kg Total catch: 501.50 CATCH/HOUR: 1880.63

SPECIES CATCH/HOUR % OF TOT. C SAMP
 weight numbers
 MYCTOPHIDAE 1773.00 8865 94.28
 Trachurus trecae 97.35 454 5.18 4700
 Macroparalepis macrogeneion 2.93 195 0.16
 Trichiurus lepturus 2.78 11 0.15
 Sphyræna sphyraena 2.63 8 0.14
 Synagrops microlepis 1.95 98 0.10
 Total 1880.64 100.01

PROJECT STATION:2016
 DATE:12/ 8/99 GEAR TYPE: PT No:1 POSITION:Lat S 1321
 start stop duration Long E 1237
 TIME :03:45:49 04:05:32 20 (min) Purpose code: 1
 LOG : 375.49 376.57 1.08 Area code : 1
 FDEPTH: 1 1 GearCond.code: 1
 BDEPTH: 88 96 Validity code: 1
 Towing dir: 350ø Wire out: 150 m Speed: 30 kn*10
 Sorted: 35 Kg Total catch: 34.90 CATCH/HOUR: 104.70

SPECIES CATCH/HOUR % OF TOT. C SAMP
 weight numbers
 Trachurus trecae 93.60 303 89.40 4692
 MYCTOPHIDAE 9.18 5874 8.77
 Decapterus rhonchus 0.96 15 0.92
 Scomber japonicus 0.96 3 0.92
 Total 104.70 100.01

PROJECT STATION:2020
 DATE:13/ 8/99 GEAR TYPE: PT No:1 POSITION:Lat S 1224
 start stop duration Long E 1323
 TIME :03:49:15 04:12:31 23 (min) Purpose code: 1
 LOG : 523.43 524.81 1.36 Area code : 2
 FDEPTH: 10 10 GearCond.code: 1
 BDEPTH: 105 98 Validity code: 1
 Towing dir: 122ø Wire out: 140 m Speed: 35 kn*10
 Sorted: Kg Total catch: 94.50 CATCH/HOUR: 246.52

SPECIES CATCH/HOUR % OF TOT. C SAMP
 weight numbers
 Sardinella maderensis 100.33 316 40.70 4701
 Trachurus trecae 100.23 389 40.66 4702
 Trichiurus lepturus 38.77 164 15.73
 Synagrops microlepis 5.74 1216 2.33 4703
 Sardinella aurita 0.94 3 0.38
 Saurida brasiliensis 0.21 65 0.09
 Total 246.22 99.89

PROJECT STATION:2017
 DATE:12/ 8/99 GEAR TYPE: BT No:2 POSITION:Lat S 1256
 start stop duration Long E 1255
 TIME :15:55:18 16:25:23 30 (min) Purpose code: 1
 LOG : 437.24 438.75 1.50 Area code : 1
 FDEPTH: 34 58 GearCond.code: 1
 BDEPTH: 34 58 Validity code: 1
 Towing dir: 270ø Wire out: 160 m Speed: 30 kn*10
 Sorted: Kg Total catch: 274.90 CATCH/HOUR: 549.80

SPECIES CATCH/HOUR % OF TOT. C SAMP
 weight numbers
 Pagellus bellottii 172.24 1068 31.33 4694
 Atractoscion aequidens 105.96 100 19.27
 Dentex macrophthalmus 63.08 490 11.47 4695
 Trachurus trecae 58.60 432 10.66 4693
 Lithognathus morumyrus 36.60 90 6.66
 Alloteuthis africana 18.12 6272 3.30
 Boops boops 16.88 174 3.07

PROJECT STATION:2021
 DATE:13/ 8/99 GEAR TYPE: PT No:5 POSITION:Lat S 1210
 start stop duration Long E 1313
 TIME :09:30:19 09:50:36 20 (min) Purpose code: 1
 LOG : 567.72 568.82 1.08 Area code : 2
 FDEPTH: 10 10 GearCond.code: 1
 BDEPTH: 1008 982 Validity code: 1
 Towing dir: 122ø Wire out: 140 m Speed: 30 kn*10
 Sorted: Kg Total catch: 28.75 CATCH/HOUR: 86.25

SPECIES CATCH/HOUR % OF TOT. C SAMP
 weight numbers
 MYCTOPHIDAE 85.80 64350 99.48
 Brama brama 0.12 6 0.14
 Selene dorsalis, juveniles 0.12 78 0.14
 Arionma bondi 0.12 12 0.14
 Lestrolepis intermedia 0.06 9 0.07
 Zenopsis conchifer 0.03 3 0.03

Total 86.25 100.00

PROJECT STATION:2022
 DATE:13/ 8/99 GEAR TYPE: BT No:2 POSITION:Lat S 1216 Long E 1334
 start stop duration
 TIME :14:30:11 15:00:06 30 (min) Purpose code: 1
 LOG : 602.79 604.30 1.50 Area code : 2
 FDEPTH: 60 59 GearCond.code:
 BDEPTH: 60 59 Validity code:
 Towing dir: 300° Wire out: 250 m Speed: 30 kn*10
 Sorted: Kg Total catch: 436.50 CATCH/HOUR: 873.00

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	347.20	6340	39.77	4705
Pomadasys incisus	131.40	1056	15.05	
Pagellus bellottii	126.40	926	14.48	
Umbriina canariensis	109.00	520	12.49	
Dentex macropthalmus	33.60	276	3.85	
Boops boops	28.80	510	3.30	4704
Epinephelus aeneus	24.00	2	2.75	
Sepia bertheloti	20.60	76	2.36	
Atractoscion aeguidens	13.48	8	1.54	
Chaetodon hoefleri	13.20	86	1.51	
Selene dorsalis	7.96	18	0.91	
Pomadasys jubelini	5.84	6	0.67	
Dentex barnardi	5.20	60	0.60	
Trichiurus lepturus	4.12	8	0.47	
Sphyaena sphyraena	1.20	8	0.14	
Fistularia petimba	0.50	16	0.06	
Citharus linguatula	0.26	8	0.03	
Arnoglossus imperialis	0.16	8	0.02	
Total	872.92		100.00	

PROJECT STATION:2023
 DATE:13/ 8/99 GEAR TYPE: PT No:4 POSITION:Lat S 1200 Long E 1340
 start stop duration
 TIME :19:59:19 20:22:12 23 (min) Purpose code: 1
 LOG : 646.96 648.25 1.27 Area code : 2
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 55 62 Validity code:
 Towing dir: 300° Wire out: 140 m Speed: 30 kn*10
 Sorted: 61 Kg Total catch: 242.30 CATCH/HOUR: 632.09

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	403.83	4923	63.89	4707
Sardinella maderensis	214.96	1576	34.01	4706
Sardinella aurita	8.77	104	1.39	4709
Trachinotus ovatus	2.09	10	0.33	
Alloteuthis africana	1.67	365	0.26	
Engraulis encrasicolus	0.83	188	0.13	4708
Total	632.15		100.01	

PROJECT STATION:2024
 DATE:13/ 8/99 GEAR TYPE: PT No:4 POSITION:Lat S 1157 Long E 1327
 start stop duration
 TIME :22:08:58 22:28:25 19 (min) Purpose code: 1
 LOG : 660.37 661.47 1.10 Area code : 2
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 349 363 Validity code:
 Towing dir: 300° Wire out: 140 m Speed: 30 kn*10
 Sorted: 47 Kg Total catch: 47.00 CATCH/HOUR: 148.42

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
MYCTOPHIDAE	147.73	716473	99.54	
Ariomma bondi	0.35	3	0.24	
Macroparalepis macrogeneion	0.09	22	0.06	
Trachipterus sp.	0.06	3	0.04	
Arnoglossus sp.	0.06	3	0.04	
Selene dorsalis	0.06	9	0.04	
Trichiurus lepturus	0.06	35	0.04	
Total	148.41		100.00	

PROJECT STATION:2025
 DATE:14/ 8/99 GEAR TYPE: PT No:1 POSITION:Lat S 1151 Long E 1332
 start stop duration
 TIME :01:58:58 02:18:54 20 (min) Purpose code: 1
 LOG : 688.59 689.69 1.10 Area code : 2
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 150 119 Validity code:
 Towing dir: 115° Wire out: 140 m Speed: 32 kn*10
 Sorted: 37 Kg Total catch: 370.10 CATCH/HOUR: 1110.30

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
MYCTOPHIDAE	1089.60	736776	98.14	
Synagrops microlepis	12.90	6126	1.16	
Trichiurus lepturus	2.88	3	0.26	
Trachurus trecae	2.52	48	0.23	4710
Trachurus trecae, juvenile	2.40	24	0.22	
Total	1110.30		100.01	

PROJECT STATION:2026
 DATE:14/ 8/99 GEAR TYPE: PT No:7 POSITION:Lat S 1153 Long E 1345
 start stop duration
 TIME :04:20:56 04:40:36 20 (min) Purpose code: 1
 LOG : 702.48 703.67 1.18 Area code : 2
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 28 31 Validity code:
 Towing dir: 360° Wire out: 120 m Speed: 30 kn*10
 Sorted: 121 Kg Total catch: 423.64 CATCH/HOUR: 1270.92

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	787.71	13557	61.98	

Trachurus trecae 247.59 2751 19.48 4711
 Trichiurus lepturus 82.32 327 6.48
 Sardinella maderensis 75.60 369 5.95 4712
 Galeoides decadactylus 19.32 75 1.52
 Atractoscion aeguidens 17.22 12 1.35
 Illisha africana 14.91 264 1.17
 Selene dorsalis 10.08 117 0.79
 Sphyaena sphyraena 9.87 33 0.78
 Sardinella aurita 5.04 75 0.40
 Total 1269.66 99.90

PROJECT STATION:2027
 DATE:14/ 8/99 GEAR TYPE: BT No:2 POSITION:Lat S 1131 Long E 1339
 start stop duration
 TIME :14:30:37 15:00:10 30 (min) Purpose code: 1
 LOG : 788.85 790.27 1.39 Area code : 2
 FDEPTH: 40 36 GearCond.code:
 BDEPTH: 40 36 Validity code:
 Towing dir: 95° Wire out: 200 m Speed: 30 kn*10
 Sorted: Kg Total catch: 129.70 CATCH/HOUR: 259.40

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Pomadasys incisus	72.28	402	27.86	
Atractoscion aeguidens	33.16	22	12.78	
Umbriina canariensis	28.36	84	10.93	
Dentex barnardi	16.92	60	6.52	
Trachurus trecae	14.08	266	5.43	4714
Sepia officinalis hierredda	13.64	30	5.26	
Trichiurus lepturus	13.24	22	5.10	
Selene dorsalis	12.96	38	5.00	
Epinephelus aeneus	9.48	12	3.65	
Pagellus bellottii	9.00	58	3.47	
Plectorhynchus mediterraneus	6.84	12	2.64	
Lithognathus mormyrus	6.80	12	2.62	
Arius parkii	3.84	2	1.48	
Galeoides decadactylus	3.80	8	1.46	
Pseudupeneus prayensis	3.56	26	1.37	
Chaetodon hoefleri	3.08	22	1.19	
Pseudotolithus typus	3.04	6	1.17	
Sphyaena guachancho	1.44	4	0.56	
Alloteuthis africana	1.20	746	0.46	
Stromateus fiatola	1.20	2	0.46	
Pagrus africanus	0.60	2	0.23	
Citharus linguatula	0.36	2	0.14	
Sphyaena sphyraena	0.32	12	0.12	
Trachurus trecae, juvenile	0.16	40	0.06	4713
Total	259.36		99.96	

PROJECT STATION:2028
 DATE:14/ 8/99 GEAR TYPE: PT No:4 POSITION:Lat S 1121 Long E 1328
 start stop duration
 TIME :18:33:39 18:40:11 7 (min) Purpose code: 1
 LOG : 821.11 821.44 0.33 Area code : 2
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 334 355 Validity code:
 Towing dir: 270° Wire out: 130 m Speed: 30 kn*10
 Sorted: Kg Total catch: 368.14 CATCH/HOUR: 3155.49

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
MYCTOPHIDAE	2722.29	2024709	86.27	
Sardinella maderensis	267.09	1149	8.46	4716
Trachurus trecae	149.14	463	4.73	4715
Trichiurus lepturus	11.31	26	0.36	
Trachipterus sp.	2.91	17	0.09	
Selene dorsalis	2.74	9	0.09	
Total	3155.48		100.00	

PROJECT STATION:2029
 DATE:14/ 8/99 GEAR TYPE: PT No:4 POSITION:Lat S 1122 Long E 1339
 start stop duration
 TIME :20:46:26 21:06:18 20 (min) Purpose code: 1
 LOG : 833.87 834.95 1.08 Area code : 2
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 36 37 Validity code:
 Towing dir: 360° Wire out: 130 m Speed: 30 kn*10
 Sorted: 122 Kg Total catch: 122.48 CATCH/HOUR: 367.44

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	111.24	759	30.27	4719
Sardinella maderensis	102.48	549	27.89	4717
Trachurus trecae	83.52	681	22.73	4718
Trichiurus lepturus	18.96	33	5.16	
Alloteuthis africana	10.35	708	2.82	
Brachydeuterus auritus	10.35	4476	2.82	
Sepia officinalis hierredda	10.20	12	2.78	
MYCTOPHIDAE	6.60	5511	1.80	
Sarda sarda	3.96	3	1.08	
Pomadasys incisus	2.46	12	0.67	
Pagellus bellottii	2.40	75	0.65	
Atractoscion aeguidens	1.80	3	0.49	
Sphyaena sphyraena	0.72	18	0.20	
Sardinella aurita	0.60	3	0.16	
Chelidonichthys capensis	0.60	3	0.16	
Trachurus trecae, juvenile	0.48	423	0.13	
Pteroscion pelli	0.42	3	0.11	
Illisha africana	0.30	3	0.08	
Total	367.44		100.00	

PROJECT STATION:2030
 DATE:15/ 8/99 GEAR TYPE: PT No:1 POSITION:Lat S 1108

start stop duration Long E 1337
 TIME :01:20:04 01:50:10 30 (min) Purpose code: 1
 LOG : 871.73 873.30 1.57 Area code : 2
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 128 111 Validity code:
 Towing dir: 95° Wire out: 140 m Speed: 30 kn*10

FDEPTH: 5 5 GearCond.code:
 BDEPTH: 105 107 Validity code:
 Towing dir: 266° Wire out: 140 m Speed: 30 kn*10
 Sorted: 29 Kg Total catch: 29.81 CATCH/HOUR: 89.43

Sorted: 126 Kg Total catch: 125.60 CATCH/HOUR: 251.20

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Trachurus trecae	75.04	358	29.87
Sphyrna zygaena	68.00	2	27.07
Trichiurus lepturus	65.88	210	26.23
Sardinella maderensis	36.08	146	14.36
Brachydeuterus auritus	3.20	22	1.27
Synagrops microlepis	1.32	660	0.53
Sardinella aurita	0.88	2	0.35
Sepiella ornata	0.40	14	0.16
Trachinotus ovatus	0.36	2	0.14
Saurida brasiliensis	0.04	18	0.02
Total	251.20	100.00	

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Trichiurus lepturus	21.72	33	24.29
Selene dorsalis	21.54	105	24.09
Sardinella maderensis	14.46	57	16.17
Trachurus trecae	9.90	174	11.07
Stromateus fiatola	5.34	6	5.97
Saurida brasiliensis	4.38	861	4.90
Euthynnus alletteratus	3.60	3	4.03
Trachinotus ovatus	3.48	9	3.89
Brachydeuterus auritus	2.46	27	2.75
Alloteuthis africana	1.98	792	2.21
Synagrops microlepis	0.42	90	0.47
Sepiella ornata	0.12	3	0.13
Illex coindetii	0.03	3	0.03
Total	89.43	100.00	

PROJECT STATION:2031
 DATE:15/ 8/99 GEAR TYPE: PT No:4 POSITION:Lat S 1102 Long E 1349
 start stop duration Purpose code: 1
 TIME :04:04:04 04:19:18 15 (min) Area code : 2
 LOG : 891.18 892.12 0.93 GearCond.code: 1
 FDEPTH: 5 5 Validity code: 1
 BDEPTH: 41 47
 Towing dir: 275° Wire out: 140 m Speed: 32 kn*10

PROJECT STATION:2035
 DATE:16/ 8/99 GEAR TYPE: BT No:2 POSITION:Lat S 1014 Long E 1325
 start stop duration Purpose code: 1
 TIME :05:01:36 06:00:47 21 (min) Area code : 2
 LOG :1114.92 1116.13 1.16 GearCond.code: 1
 FDEPTH: 28 32 Validity code: 30
 BDEPTH: 28 32
 Towing dir: 264° Wire out: 120 m Speed: 30 kn*10

Sorted: 100 Kg Total catch: 2513.28 CATCH/HOUR: 10053.12

Sorted: 86 Kg Total catch: 237.53 CATCH/HOUR: 678.66

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Brachydeuterus auritus	3352.00	7000	33.34
Sardinella maderensis	3342.00	11700	33.24
Trachurus trecae	2990.00	15000	29.74
Selene dorsalis	352.00	900	3.50
Trichiurus lepturus	12.00	200	0.12
Atractoscion aequidens	5.12	4	0.05
Total	10053.12	99.99	

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Brachydeuterus auritus	571.14	6957	84.16
Selene dorsalis	75.50	857	11.14
Trachurus trecae	19.91	117	2.93
Sphyrna guachancho	12.00	23	1.77
Total	678.65	100.00	

PROJECT STATION:2032
 DATE:15/ 8/99 GEAR TYPE: PT No:4 POSITION:Lat S 1037 Long E 1329
 start stop duration Purpose code: 1
 TIME :18:43:31 19:12:48 29 (min) Area code : 2
 LOG :1020.02 1021.66 1.60 GearCond.code: 1
 FDEPTH: 5 5 Validity code: 30
 BDEPTH: 79 66
 Towing dir: 90° Wire out: 130 m Speed: 30 kn*10

PROJECT STATION:2036
 DATE:16/ 8/99 GEAR TYPE: BT No:2 POSITION:Lat S 1005 Long E 1317
 start stop duration Purpose code: 1
 TIME :13:01:17 13:01:21 20 (min) Area code : 2
 LOG :1176.51 1177.54 1.00 GearCond.code: 1
 FDEPTH: 25 24 Validity code: 30
 BDEPTH: 25 24
 Towing dir: 135° Wire out: 110 m Speed: 30 kn*10

Sorted: Kg Total catch: 235.25 CATCH/HOUR: 486.72

Sorted: 119 Kg Total catch: 405.30 CATCH/HOUR: 1215.90

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Sardinella maderensis	450.99	1620	92.66
Trichiurus lepturus	16.55	37	3.40
Brachydeuterus auritus	10.68	66	2.19
Trachurus trecae	5.09	23	1.05
Alloteuthis africana	3.19	1593	0.66
Sepiella ornata	0.12	4	0.02
Bregmaceros sp.	0.04	23	0.01
COBIIDAE	0.02	35	
Saurida brasiliensis	0.02	12	
Merluccius polli, juveniles	0.02	41	
Total	486.72	99.99	

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Brachydeuterus auritus	882.48	14934	72.58
Pteroscion peli	134.43	2958	11.06
Trachurus trecae	38.94	366	3.20
Pseudotolithus senegalensis	30.60	123	2.52
Trichiurus lepturus	30.39	336	2.50
Galeoides decadactylus	24.06	417	1.98
Selene dorsalis	22.44	264	1.85
Sphyrna guachancho	12.84	21	1.06
Decapterus rhonchus	10.59	30	0.87
Cynoglossus senegalensis	8.97	51	0.74
Pagellus bellottii	7.95	30	0.65
Callinectes sp.	5.52	9	0.45
Ilisha africana	3.87	51	0.32
Selene dorsalis, juveniles	1.41	489	0.12
Penaeus kerathurus	0.60	60	0.05
Total	1215.09	99.95	

PROJECT STATION:2033
 DATE:15/ 8/99 GEAR TYPE: PT No:4 POSITION:Lat S 1034 Long E 1337
 start stop duration Purpose code: 1
 TIME :21:18:57 21:38:33 20 (min) Area code : 2
 LOG :1037.30 1038.36 1.06 GearCond.code: 1
 FDEPTH: 5 5 Validity code: 30
 BDEPTH: 32 34
 Towing dir: 300° Wire out: 130 m Speed: 30 kn*10

PROJECT STATION:2037
 DATE:16/ 8/99 GEAR TYPE: PT No:4 POSITION:Lat S 953 Long E 1251
 start stop duration Purpose code: 1
 TIME :18:33:14 19:03:47 31 (min) Area code : 2
 LOG :1222.83 1224.27 1.44 GearCond.code: 1
 FDEPTH: 5 5 Validity code: 30
 BDEPTH: 206 154
 Towing dir: 85° Wire out: 130 m Speed: 30 kn*10

Sorted: 149 Kg Total catch: 1380.18 CATCH/HOUR: 4140.54

Sorted: 29 Kg Total catch: 29.09 CATCH/HOUR: 56.30

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Brachydeuterus auritus	2308.95	31224	55.76
Sardinella maderensis	1071.00	4569	25.87
Trachurus trecae	267.12	1953	6.45
Galeoides decadactylus	92.61	189	2.24
Sepia officinalis hierredda	73.71	30	1.78
Sphyrna sphyraena	73.08	126	1.76
Trichiurus lepturus	64.26	252	1.55
Selene dorsalis	63.30	441	1.53
Sphyrna afra	59.10	3	1.43
Pomadysys jubelini	35.91	30	0.87
Trachinotus ovatus	29.61	189	0.72
Pteroscion peli	1.26	30	0.03
Penaeus notialis	0.63	30	0.02
Total	4140.54	100.01	

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Sardinella maderensis	30.31	126	53.84
Trichiurus lepturus	18.35	31	32.59
Trachurus trecae	4.03	66	7.16
MYCTOPHIDAE	2.94	1103	5.22
Synagrops microlepis	0.37	89	0.66
Todarodes sagittatus	0.27	8	0.48
Naucrates ductor	0.02	4	0.04
Saurida brasiliensis	0.02	8	0.04
Total	56.31	100.03	

PROJECT STATION:2034
 DATE:16/ 8/99 GEAR TYPE: PT No:4 POSITION:Lat S 1030 Long E 1318
 start stop duration Purpose code: 1
 TIME :00:08:13 00:28:09 20 (min) Area code : 2
 LOG :1059.47 1060.54 1.07

PROJECT STATION:2038
 DATE:16/ 8/99 GEAR TYPE: PT No:4 POSITION:Lat S 950 Long E 1311
 start stop duration Purpose code: 1
 TIME :21:31:43 21:51:49 20 (min) Area code : 2
 LOG :1244.49 1245.61 1.12 GearCond.code: 1
 FDEPTH: 5 5 Validity code: 30
 BDEPTH: 31 38
 Towing dir: 265° Wire out: 130 m Speed: 30 kn*10

Sorted: 95 Kg Total catch: 255.89 CATCH/HOUR: 767.67

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	353.85	3942	46.09	4743
Sardinella maderensis	212.49	918	27.68	4745
Trichiurus lepturus	66.96	360	8.72	
Trachurus trecae	44.16	282	5.75	4744
Decapterus rhonchus	34.74	54	4.53	
Sepia officinalis hierredda	16.20	18	2.11	
Pseudotolithus senegalensis	13.86	18	1.81	
Sphyraena guachancho	13.68	18	1.78	
Ilisha africana	4.86	54	0.63	
Pteroscion peli	1.98	18	0.26	
Alloteuthis africana	1.80	810	0.23	
Galeoides decadactylus	1.80	18	0.23	
Todarodes sagittatus	0.72	18	0.09	
Penaeus notialis	0.54	9	0.07	
Total	767.64		99.98	

Total 280.88 100.00

PROJECT STATION:2042
 DATE:17/ 8/99 GEAR TYPE: PT No:4 POSITION:Lat S 906 Long E 1247
 start stop duration
 TIME :22:53:29 23:13:14 20 (min) Purpose code: 1
 LOG :1456.29 1457.43 1.14 Area code : 2
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 235 278 Validity code:
 Towing dir: 90ø Wire out: 145 m Speed: 32 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:2039
 DATE:17/ 8/99 GEAR TYPE: PT No:4 POSITION:Lat S 945 Long E 1249
 start stop duration
 TIME :01:38:41 01:58:31 20 (min) Purpose code: 1
 LOG :1276.19 1277.43 1.24 Area code : 2
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 252 274 Validity code:
 Towing dir: 264ø Wire out: 140 m Speed: 32 kn*10
 Sorted: 59 Kg Total catch: 58.74 CATCH/HOUR: 176.22

PROJECT STATION:2043
 DATE:18/ 8/99 GEAR TYPE: PT No:2 POSITION:Lat S 848 Long E 1300
 start stop duration
 TIME :09:25:29 09:47:17 22 (min) Purpose code: 1
 LOG :1548.82 1550.01 1.19 Area code : 3
 FDEPTH: 120 120 GearCond.code:
 BDEPTH: 189 212 Validity code:
 Towing dir: 295ø Wire out: 300 m Speed: 30 kn*10
 Sorted: Kg Total catch: 12.34 CATCH/HOUR: 33.65

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
MYCTOPHIDAE	69.09	45402	39.21	
Trachurus trecae	61.80	213	35.07	4746
Sardinella maderensis	21.24	69	12.05	4747
Selene dorsalis	14.64	18	8.31	
Trichiurus lepturus	9.24	6	5.24	
Macroparalepis macrogeneion	0.12	12	0.07	
Sepiella ornata	0.06	6	0.03	
Lagocephalus laevigatus	0.03	3	0.02	
Total	176.22		100.00	

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichiurus lepturus	19.31	57	57.38	
Trachurus trecae	6.82	11	20.27	
THYSANOTEUTHIDAE	4.36	5	12.96	
GONOSTOMATIDAE	3.16	20880	9.39	
Total	33.65		100.00	

PROJECT STATION:2040
 DATE:17/ 8/99 GEAR TYPE: PT No:4 POSITION:Lat S 935 Long E 1306
 start stop duration
 TIME :06:31:51 06:55:25 24 (min) Purpose code: 1
 LOG :1317.09 1318.39 1.26 Area code : 2
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 37 43 Validity code:
 Towing dir: 265ø Wire out: 130 m Speed: 30 kn*10
 Sorted: 94 Kg Total catch: 281.82 CATCH/HOUR: 704.55

PROJECT STATION:2044
 DATE:18/ 8/99 GEAR TYPE: PT No:2 POSITION:Lat S 843 Long E 1258
 start stop duration
 TIME :14:17:41 14:38:57 21 (min) Purpose code: 1
 LOG :1586.76 1587.83 1.05 Area code : 3
 FDEPTH: 220 210 GearCond.code:
 BDEPTH: 270 274 Validity code:
 Towing dir: 360ø Wire out: m Speed: kn*10
 Sorted: Kg Total catch: 130.80 CATCH/HOUR: 373.71

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardinella maderensis	441.60	1830	62.68	4748
Decapterus rhonchus	105.00	308	14.90	4751
Sardinella aurita	69.30	240	9.84	4749
Trachurus trecae	58.20	255	8.26	4750
Sphyraena guachancho	10.20	23	1.45	
Brachydeuterus auritus	9.60	60	1.36	
Atractoscion aequidens	7.50	8	1.06	
Selene dorsalis	3.15	15	0.45	
Total	704.55		100.00	

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
MYCTOPHIDAE	290.00	213506	77.60	
Trichiurus lepturus	81.31	214	21.76	
Zenopsis conchifer	2.06	6	0.55	
Todarodes sagittatus	0.23	3	0.06	
Total	373.60		99.97	

PROJECT STATION:2040
 DATE:17/ 8/99 GEAR TYPE: PT No:4 POSITION:Lat S 935 Long E 1306
 start stop duration
 TIME :06:31:51 06:55:25 24 (min) Purpose code: 1
 LOG :1317.09 1318.39 1.26 Area code : 2
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 37 43 Validity code:
 Towing dir: 265ø Wire out: 130 m Speed: 30 kn*10
 Sorted: 94 Kg Total catch: 281.82 CATCH/HOUR: 704.55

PROJECT STATION:2045
 DATE:18/ 8/99 GEAR TYPE: PT No:4 POSITION:Lat S 836 Long E 1310
 start stop duration
 TIME :19:27:55 19:50:05 22 (min) Purpose code: 1
 LOG :1630.78 1631.97 1.16 Area code : 3
 FDEPTH: 50 5 GearCond.code:
 BDEPTH: 82 86 Validity code:
 Towing dir: 215ø Wire out: 130 m Speed: 30 kn*10
 Sorted: Kg Total catch: 43.03 CATCH/HOUR: 117.35

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardinella maderensis	441.60	1830	62.68	4748
Decapterus rhonchus	105.00	308	14.90	4751
Sardinella aurita	69.30	240	9.84	4749
Trachurus trecae	58.20	255	8.26	4750
Sphyraena guachancho	10.20	23	1.45	
Brachydeuterus auritus	9.60	60	1.36	
Atractoscion aequidens	7.50	8	1.06	
Selene dorsalis	3.15	15	0.45	
Total	704.55		100.00	

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichiurus lepturus	58.64	112	49.97	
Trachurus trecae	27.33	90	23.29	4752
Sardinella maderensis	13.20	44	11.25	4753
MYCTOPHIDAE	6.90	3679	5.88	
Engraulis encrasicolus	2.75	115	2.34	
Stomias sp.	2.75	14	2.34	
Sepia officinalis hierredda	2.24	5	1.91	
Saurida brasiliensis	1.39	19	1.18	
MELANOSTOMIATIDAE	1.09	25	0.93	
Trachinotus ovatus	1.04	3	0.89	
Glyphus marsupialis	0.03	3	0.03	
Total	117.36		100.01	

PROJECT STATION:2041
 DATE:17/ 8/99 GEAR TYPE: BT No:2 POSITION:Lat S 928 Long E 1306
 start stop duration
 TIME :08:27:55 08:42:11 14 (min) Purpose code: 1
 LOG :1329.97 1330.83 0.84 Area code : 2
 FDEPTH: 23 23 GearCond.code:
 BDEPTH: 23 23 Validity code:
 Towing dir: 340ø Wire out: 105 m Speed: 30 kn*10
 Sorted: Kg Total catch: 65.54 CATCH/HOUR: 280.89

PROJECT STATION:2046
 DATE:18/ 8/99 GEAR TYPE: PT No:5 POSITION:Lat S 835 Long E 1300
 start stop duration
 TIME :21:17:46 21:36:54 19 (min) Purpose code: 1
 LOG :1641.65 1642.72 1.30 Area code : 3
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 170 192 Validity code:
 Towing dir: 282ø Wire out: 130 m Speed: 30 kn*10
 Sorted: Kg Total catch: 100.84 CATCH/HOUR: 318.44

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sphyraena guachancho	160.99	257	57.28	
Pagrus caeruleostictus	28.89	60	10.29	
Selene dorsalis	14.14	47	5.03	
Trichiurus lepturus	12.69	21	4.52	
Arius parkii	11.14	4	3.97	
Sepia officinalis hierredda	8.23	9	2.93	
Brachydeuterus auritus	5.91	34	2.10	
Galeoides decadactylus	5.31	13	1.89	
Elops lacerta	5.31	9	1.89	
Plectorhinchus mediterraneus	5.06	9	1.80	
Pomadasys jubelini	4.97	4	1.77	
Dentex barnardii	4.63	21	1.65	
Atractoscion aequidens	4.63	4	1.65	
Pseudotolithus senegalensis	3.17	4	1.13	
Pomadasys incisus	2.31	9	0.82	
Decapterus rhonchus	1.97	4	0.70	
Pseudupeneus prayensis	1.03	9	0.37	
Epinephelus sp.	0.60	4	0.21	

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
MYCTOPHIDAE	156.73	10472	49.22	
Trichiurus lepturus	138.38	666	43.46	4756
Sardinella maderensis	13.39	51	4.20	4754
Trachurus trecae	9.16	47	2.88	4755
Synagrops microlepis	0.82	13	0.26	
Total	318.48		100.02	

PROJECT STATION:2047
 DATE:19/ 8/99 GEAR TYPE: PT No:5 POSITION:Lat S 847 Long E 1302
 start stop duration
 TIME :00:33:27 01:03:29 30 (min) Purpose code: 1

LOG :1667.04 1668.75 1.64 Area code : 3
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 155 160 Validity code:
 Towing dir: 360° Wire out: 140 m Speed: 34 kn*10

Sorted: 174 Kg Total catch: 357.26 CATCH/HOUR: 714.52

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichiurus lepturus	431.28	1206	60.36	
MYCTOPHIDAE	133.20	60828	18.64	
Sardinella maderensis	76.04	222	10.64	4758
Trachurus trecae	53.64	168	7.51	4757
Synagrops microlepis	13.80	998	1.93	
Trachinotus ovatus	3.12	10	0.44	
Alectis ciliaris	2.12	2	0.30	
Pentheroscion mbizi	0.96	2	0.13	
Saurida brasiliensis	0.44	36	0.06	
Total	714.60		100.01	

DATE:19/ 8/99 GEAR TYPE: PT No:4 PROJECT STATION:2051
 start stop duration POSITION:Lat S 816
 Long E 1256
 TIME :21:00:29 21:19:07 19 (min) Purpose code: 1
 LOG :1816.58 1817.57 0.99 Area code : 3
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 118 121 Validity code:
 Towing dir: 265° Wire out: 120 m Speed: 30 kn*10

Sorted: 16 Kg Total catch: 15.96 CATCH/HOUR: 50.40

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichiurus lepturus	19.20	22	38.10	
Sardinella maderensis	18.44	57	36.59	4765
Trachurus trecae	9.54	92	18.93	4764
Saurida brasiliensis	2.21	243	4.38	
Sardinella aurita	0.82	3	1.63	
Loligo vulgaris	0.13	9	0.26	
Fistularia petimba	0.03	3	0.06	
Selene dorsalis	0.03	22	0.06	
Total	50.40		100.01	

DATE:19/ 8/99 GEAR TYPE: PT No:4 PROJECT STATION:2048
 start stop duration POSITION:Lat S 828
 Long E 1319
 TIME :06:10:49 06:41:48 31 (min) Purpose code: 1
 LOG :1715.53 1717.28 1.75 Area code : 3
 FDEPTH: 0 0 GearCond.code:
 BDEPTH: 28 30 Validity code:
 Towing dir: 360° Wire out: 130 m Speed: 30 kn*10

Sorted: 115 Kg Total catch: 379.38 CATCH/HOUR: 734.28

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	444.04	6825	60.47	
Sardinella maderensis	168.72	1082	22.98	4760
Trachurus trecae	84.17	366	11.46	4759
Pomadasy jubelini	9.21	14	1.25	
Trichiurus lepturus	8.30	19	1.13	
Atractoscion aequidens	6.68	14	0.91	
Sardinella aurita	5.42	25	0.74	
Chloroscombrus chrysurus	5.34	6	0.73	
Sphyræna guachancho	2.15	6	0.29	
Sepiella ornata	0.25	6	0.03	
Total	734.28		99.99	

DATE:20/ 8/99 GEAR TYPE: PT No:4 PROJECT STATION:2052
 start stop duration POSITION:Lat S 809
 Long E 1254
 TIME :00:50:11 01:22:23 32 (min) Purpose code: 1
 LOG :1847.89 1849.48 1.59 Area code : 3
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 117 114 Validity code:
 Towing dir: 85° Wire out: 140 m Speed: 32 kn*10

Sorted: 35 Kg Total catch: 35.22 CATCH/HOUR: 66.04

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	20.70	64	31.34	4767
Trichiurus lepturus	19.58	23	29.65	
Sardinella maderensis	18.08	60	27.38	4766
Saurida brasiliensis	3.00	923	4.54	
Arius parkii	1.91	2	2.89	
Sardinella aurita	1.31	4	1.98	
Loligo vulgaris	1.16	13	1.76	
Sepiella ornata	0.23	23	0.35	
Illex coindetii	0.04	4	0.06	
Lagocephalus laevis	0.04	13	0.06	
Total	66.05		100.01	

DATE:19/ 8/99 GEAR TYPE: BT No:2 PROJECT STATION:2049
 start stop duration POSITION:Lat S 827
 Long E 1304
 TIME :09:28:43 09:57:13 29 (min) Purpose code: 1
 LOG :1739.82 1741.24 1.42 Area code : 3
 FDEPTH: 107 106 GearCond.code:
 BDEPTH: 107 106 Validity code:
 Towing dir: 360° Wire out: 350 m Speed: 30 kn*10

Sorted: 122 Kg Total catch: 580.02 CATCH/HOUR: 1200.04

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	840.46	2772	70.04	4761
Trichiurus lepturus	76.47	68	6.37	
Dentex angolensis	75.29	354	6.27	
Umbrina canariensis	72.54	217	6.04	
Atractoscion aequidens	39.70	21	3.31	
Dentex macrophthalmus	30.08	89	2.51	
Branchiostegus semifasciatus	29.09	21	2.42	
Brotula barbata	9.04	10	0.75	
Epinephelus costae	6.89	10	0.57	
Miracorvina angolensis	6.68	10	0.56	
Chelidonichthys capensis	3.74	29	0.31	
Illex coindetii	2.17	50	0.18	
Chaetodon hoefleri	1.97	21	0.16	
Uranoscopus polli	1.39	10	0.12	
Pagellus bellottii	1.39	10	0.12	
Todaropsis eblanae	0.60	10	0.05	
Citharus linguatula	0.60	10	0.05	
Monolepis microstoma	0.39	10	0.03	
Scorpaena normani	0.17	21	0.01	
Saurida brasiliensis	0.10	29	0.01	
Total	1198.76		99.88	

DATE:20/ 8/99 GEAR TYPE: PT No:2 PROJECT STATION:2053
 start stop duration POSITION:Lat S 804
 Long E 1244
 TIME :08:03:26 08:18:41 15 (min) Purpose code: 1
 LOG :1907.97 1908.80 0.83 Area code : 3
 FDEPTH: 110 110 GearCond.code:
 BDEPTH: 255 205 Validity code:
 Towing dir: 70° Wire out: 300 m Speed: 30 kn*10

Sorted: Kg Total catch: CATCH/HOUR:

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

DATE:19/ 8/99 GEAR TYPE: PT No:4 PROJECT STATION:2050
 start stop duration POSITION:Lat S 816
 Long E 1316
 TIME :18:16:23 18:31:55 16 (min) Purpose code: 1
 LOG :1795.72 1796.58 0.86 Area code : 3
 FDEPTH: 0 0 GearCond.code:
 BDEPTH: 28 30 Validity code:
 Towing dir: 300° Wire out: 130 m Speed: 30 kn*10

Sorted: 114 Kg Total catch: 1864.42 CATCH/HOUR: 6991.58

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardinella maderensis	5559.56	48919	79.52	4762
Brachydeuterus auritus	937.20	45668	13.40	
Arius parkii	289.39	199	4.14	
Sardinella aurita	102.23	330	1.46	
Trachurus trecae	47.78	795	0.68	4763
Pomadasy jubelini	23.03	41	0.33	
Pteroscion peli	14.59	266	0.21	
Sepia officinalis hierredda	11.18	11	0.16	
Parapanaeus longirostris	6.64	795	0.09	
Total	6991.60		99.99	

DATE:20/ 8/99 GEAR TYPE: BT No:2 PROJECT STATION:2054
 start stop duration POSITION:Lat S 757
 Long E 1251
 TIME :11:07:57 11:37:49 30 (min) Purpose code: 1
 LOG :1933.39 1935.03 1.64 Area code : 3
 FDEPTH: 106 103 GearCond.code:
 BDEPTH: 106 103 Validity code:
 Towing dir: 360° Wire out: 350 m Speed: 30 kn*10

Sorted: 241 Kg Total catch: 241.01 CATCH/HOUR: 482.02

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	237.52	600	49.28	4768
Selene dorsalis	71.00	220	14.73	4769
Trichiurus lepturus	50.08	70	10.39	
Epinephelus guaza ?	31.32	2	6.50	
Atractoscion aequidens	29.56	12	6.13	
Dentex angolensis	10.92	112	2.27	
Umbrina canariensis	8.56	18	1.78	
Epinephelus aeneus	7.12	2	1.48	
Pagrus africanus	5.76	6	1.19	
Dentex congensis	5.12	100	1.06	
Pagellus bellottii	4.96	22	1.03	
Dentex macrophthalmus	4.60	12	0.95	
Anthias anthias	4.28	24	0.89	
Dentex canariensis	2.04	4	0.42	
Chelidonichthys capensis	1.92	14	0.40	
Branchiostegus semifasciatus	1.72	4	0.36	

Loligo vulgaris	1.52	30	0.32
Zeus faber	1.16	4	0.24
Boops boops	1.12	46	0.23
Spicara alta	0.84	38	0.17
Chaetodon hoefleri	0.52	4	0.11
Illex coindetii	0.36	12	0.07
Saurida brasiliensis	0.02	4	
Total	482.02		100.00

Pagrus africanus	3.58	10	0.35
Citharus linguatula	0.76	18	0.08
Saurida brasiliensis	0.38	66	0.04
Chelidonichthys capensis	0.18	10	0.02
Total	1001.84		99.00

PROJECT STATION:2055
 DATE:20/ 8/99 GEAR TYPE: PT No:7 POSITION:Lat S 755
 start stop duration Long E 1307
 TIME :13:55:01 14:25:10 30 (min) Purpose code: 1
 LOG :1955.44 1957.33 1.89 Area code : 3
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 19 19 Validity code:
 Towing dir: 320ø Wire out: 200 m Speed: 30 kn*10

PROJECT STATION:2059
 DATE:21/ 8/99 GEAR TYPE: PT No:5 POSITION:Lat S 723
 start stop duration Long E 1223
 TIME :14:43:34 15:13:47 30 (min) Purpose code: 1
 LOG :2160.60 2162.47 1.87 Area code : 3
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 206 289 Validity code:
 Towing dir: 250ø Wire out: 160 m Speed: 32 kn*10

Sorted: 11 Kg Total catch: 11.23 CATCH/HOUR: 22.46

Sorted: 119 Kg Total catch: 118.96 CATCH/HOUR: 237.92

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Trichiurus lepturus	5.12 100	22.80	
Sphyræna sphyraena	4.92 18	21.91	
Ilisha africana	4.72 74	21.02	
Brachydeuterus auritus	2.04 86	9.08	
Rhizoprionodon acutus	1.60 2	7.12	
Sardinella maderensis	1.52 10	6.77	
Pomadasy jubelini	1.16 2	5.16	
Selene dorsalis	0.60 10	2.67	
Galeoides decadactylus	0.24 2	1.07	
Sardinella aurita	0.24 2	1.07	
Pentanemus quinquarius	0.16 4	0.71	
Alloteuthis africana	0.08 94	0.36	
Sepiella ornata	0.04 6	0.18	
Stromateus fiatola	0.02 4	0.09	
Total	22.46	100.01	

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Selene dorsalis	228.60 628	96.08	4077
Sardinella maderensis	7.72 30	3.24	4076
Sardinella aurita	1.40 4	0.59	
Sepiella ornata	0.20 10	0.08	
Total	237.92	99.99	

PROJECT STATION:2056
 DATE:20/ 8/99 GEAR TYPE: PT No:4 POSITION:Lat S 745
 start stop duration Long E 1244
 TIME :21:44:31 22:14:21 30 (min) Purpose code: 1
 LOG :2017.22 2018.91 1.69 Area code : 3
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 107 100 Validity code:
 Towing dir: 80ø Wire out: 140 m Speed:380 kn*10

PROJECT STATION:2060
 DATE:21/ 8/99 GEAR TYPE: PT No:4 POSITION:Lat S 715
 start stop duration Long E 1246
 TIME :18:40:36 19:12:21 32 (min) Purpose code: 1
 LOG :2191.73 2193.55 1.79 Area code : 3
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 29 33 Validity code:
 Towing dir: 250ø Wire out: 130 m Speed: 30 kn*10

Sorted: 32 Kg Total catch: 32.50 CATCH/HOUR: 65.00

Sorted: Kg Total catch: 48.98 CATCH/HOUR: 91.84

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Trichiurus lepturus	34.12 48	52.49	
Trachurus trecae	11.76 54	18.09	4072
Sardinella aurita	6.98 20	10.58	4071
Sardinella maderensis	6.36 24	9.78	4070
Selene dorsalis	4.60 12	7.08	
Saurida brasiliensis	0.76 194	1.17	
Illex coindetii	0.28 24	0.43	
Alloteuthis africana	0.24 78	0.37	
Total	65.00	99.99	

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Scomberomorus tritor	25.95 24	28.26	
Decapterus rhonchus	22.05 36	24.01	4078
Stromateus fiatola	13.50 21	14.70	
Sphyræna guachancho	10.26 15	11.17	
Trachinotus ovatus	5.25 8	5.72	
Trachurus trecae	3.90 8	4.25	
Trachinotus gorensis	3.38 6	3.68	
Alloteuthis africana	3.26 2143	3.55	
Sepia orbignyana	1.91 2	2.08	
Dentex barnardi	0.75 2	0.82	
Pagellus bellottii	0.68 2	0.74	
Pomadasy incisus	0.56 4	0.61	
Boops boops	0.26 23	0.28	
Sepiella ornata	0.08 2	0.09	
Selene dorsalis, juveniles	0.04 23	0.04	
Dentex congoensis	0.02 8	0.02	
Total	91.85	100.02	

PROJECT STATION:2057
 DATE:21/ 8/99 GEAR TYPE: PT No:4 POSITION:Lat S 723
 start stop duration Long E 1249
 TIME :09:02:38 09:30:25 28 (min) Purpose code: 1
 LOG :2115.57 2117.16 1.55 Area code : 3
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 34 41 Validity code:
 Towing dir: 250ø Wire out: 130 m Speed: 30 kn*10

PROJECT STATION:2061
 DATE:21/ 8/99 GEAR TYPE: PT No:4 POSITION:Lat S 711
 start stop duration Long E 1232
 TIME :22:18:09 22:38:18 20 (min) Purpose code: 1
 LOG :2217.66 2218.73 1.07 Area code : 3
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 53 56 Validity code:
 Towing dir: 247ø Wire out: 130 m Speed: 40 kn*10

Sorted: Kg Total catch: 35.84 CATCH/HOUR: 76.80

Sorted: 54 Kg Total catch: 53.88 CATCH/HOUR: 161.64

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Stromateus fiatola	27.26 34	35.49	
Decapterus rhonchus	24.77 36	32.25	4074
Caranx crysos	9.86 13	12.84	
Scomberomorus tritor	4.76 4	6.20	
Sphyræna sphyraena	4.67 4	6.08	
Alectis alexandrinus	2.96 2	3.85	
Selene dorsalis	2.27 4	2.96	
Naucrates ductor	0.26 2	0.34	
Total	76.81	100.01	

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Decapterus rhonchus	55.38 63	34.26	
Sardinella maderensis	43.02 186	26.61	4080
Trachurus trecae	31.44 81	19.45	4079
Alloteuthis africana	10.68 4521	6.61	
Sardinella aurita	6.60 24	4.08	
Stromateus fiatola	5.76 6	3.56	
Trichiurus lepturus	2.64 6	1.63	
Trachinotus gorensis	1.92 3	1.19	
Sphyræna sphyraena	1.68 3	1.04	
Euthynnus alletteratus	1.50 3	0.93	
Saurida brasiliensis	0.60 126	0.37	
Boops boops	0.24 12	0.15	
Sepiella ornata	0.18 3	0.11	
Total	161.64	99.99	

PROJECT STATION:2058
 DATE:21/ 8/99 GEAR TYPE: BT No:2 POSITION:Lat S 729
 start stop duration Long E 1234
 TIME :11:31:41 12:01:33 30 (min) Purpose code: 1
 LOG :2134.19 2135.64 1.44 Area code : 3
 FDEPTH: 106 108 GearCond.code:
 BDEPTH: 106 108 Validity code:
 Towing dir: 170ø Wire out: 380 m Speed: 30 kn*10

PROJECT STATION:2062
 DATE:22/ 8/99 GEAR TYPE: PT No:5 POSITION:Lat S 720
 start stop duration Long E 1213
 TIME :01:22:03 01:52:21 30 (min) Purpose code: 1
 LOG :2239.33 2241.03 1.68 Area code : 3
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 254 301 Validity code:
 Towing dir: 247ø Wire out: 160 m Speed: 32 kn*10

Sorted: Kg Total catch: 506.09 CATCH/HOUR: 1012.18

Sorted: Kg Total catch: 332.97 CATCH/HOUR: 665.94

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Trachurus trecae	595.00 978	58.78	4075
Dentex congoensis	99.26 988	9.81	
Umbrina canariensis	90.24 142	8.92	
Selene dorsalis	77.84 206	7.69	
Dentex angolensis	33.46 366	3.31	
Boops boops	24.26 460	2.40	
Illex coindetii	22.94 8920	2.27	
Trichiurus lepturus	12.04 38	1.19	
Alloteuthis africana	9.96 2642	0.98	
Sepia orbignyana	9.78 10	0.97	
Atractoscion aequidens	8.96 2	0.89	
Scomberomorus tritor	6.80 2	0.67	
Zeus faber	6.40 10	0.63	

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
MYCTOPHIDAE	525.76 27164	78.95	
Trichiurus lepturus	105.88 278	15.90	
Sarda sarda	11.36 4	1.71	
Euthynnus alletteratus	7.40 4	1.11	
Sepiella ornata	6.40 416	0.96	
Trachurus trecae	3.68 6	0.55	
Sepiella sp.	2.24 160	0.34	
Sardinella maderensis	1.32 4	0.20	
Macroparalepis macrogeneion	0.96 80	0.14	
Selene dorsalis	0.62 2	0.09	

Synagrops microlepis 0.32 16 0.05
 Total 665.94 100.00

Auxis thazard 5.52 5 1.46
 Total 376.99 99.99

PROJECT STATION:2063
 DATE:22/ 8/99 GEAR TYPE: BT No:2 POSITION:Lat S 703
 start stop duration Long E 1205
 TIME :07:20:55 07:51:12 30 (min) Purpose code: 1
 LOG :2288.47 2290.34 1.86 Area code : 3
 FDEPTH: 120 116 GearCond.code:
 BDEPTH: 120 116 Validity code:
 Towing dir: 330° Wire out: 400 m Speed: 30 kn*10
 Sorted: Kg Total catch: 62.06 CATCH/HOUR: 124.12

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Trachurus trecae	83.20	230	67.03
Scomber japonicus	26.12	24	21.04
Trichiurus lepturus	9.20	6	7.41
Dentex angolensis	2.40	16	1.93
Dentex congoensis	1.08	14	0.87
Torpedo torpedo	0.76	2	0.61
Illex coindetii	0.76	24	0.61
Umbrina canariensis	0.60	2	0.48
Total	124.12		99.98

PROJECT STATION:2064
 DATE:22/ 8/99 GEAR TYPE: BT No:2 POSITION:Lat S 702
 start stop duration Long E 1202
 TIME :08:33:24 09:05:56 33 (min) Purpose code: 1
 LOG :2293.54 2295.28 1.73 Area code : 3
 FDEPTH: 121 127 GearCond.code:
 BDEPTH: 121 127 Validity code:
 Towing dir: 240° Wire out: 430 m Speed: 30 kn*10
 Sorted: Kg Total catch: 240.34 CATCH/HOUR: 436.98

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Dentex congoensis	128.00	1876	29.29
Dentex angolensis	96.36	684	22.05
Umbrina canariensis	50.91	131	11.65
Trichiurus lepturus	36.84	44	8.43
Trachurus trecae	34.11	291	7.81
Spicara alta	23.18	1178	6.45
Mustelus mustelus	19.42	5	4.44
Illex coindetii	11.64	349	2.66
Squatina oculata	8.91	2	2.04
Scomber japonicus	7.27	15	1.66
Zeus faber	6.36	15	1.46
Sepia officinalis hierredda	4.87	5	1.11
Arionma bondi	1.45	29	0.33
Chelidonicichthys gabonensis	0.73	7	0.17
Lepidotrigla carolae	0.58	15	0.13
Total	435.63		99.68

PROJECT STATION:2065
 DATE:22/ 8/99 GEAR TYPE: PT No:4 POSITION:Lat S 646
 start stop duration Long E 1215
 TIME :14:35:46 15:10:21 35 (min) Purpose code: 1
 LOG :2341.32 2343.44 2.12 Area code : 3
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 53 47 Validity code:
 Towing dir: 158° Wire out: 160 m Speed: 38 kn*10
 Sorted: 129 Kg Total catch: 129.76 CATCH/HOUR: 222.45

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Sphyræna guachancho	169.54	149	76.21
Trachinotus ovatus	17.21	22	7.74
Caranx senegallus	12.17	12	5.47
Stromateus fiatola	11.55	12	5.19
Caranx crysos	4.18	5	1.88
Alectis alexandrinus	3.91	3	1.76
Scomberomorus tritor	3.15	2	1.42
Selene dorsalis	0.72	2	0.32
Total	222.43		99.99

PROJECT STATION:2066
 DATE:22/ 8/99 GEAR TYPE: PT No:4 POSITION:Lat S 654
 start stop duration Long E 1152
 TIME :18:15:10 18:40:14 25 (min) Purpose code: 1
 LOG :2372.28 2373.75 1.40 Area code : 3
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 228 290 Validity code:
 Towing dir: 250° Wire out: 150 m Speed: 40 kn*10
 Sorted: 29 Kg Total catch: 157.08 CATCH/HOUR: 376.99

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Trichiurus lepturus	176.45	605	46.80
Sardinella maderensis	77.04	283	20.44
Sphyræna sphyraena	33.98	29	9.01
MYCTOPHIDAE	27.36	18562	7.26
Trachinotus ovatus	20.54	38	5.45
Naucrates ductor	18.82	29	4.99
Sardinella aurita	10.56	43	2.80
Euthynnus alletteratus	6.72	10	1.78

PROJECT STATION:2067
 DATE:22/ 8/99 GEAR TYPE: PT No:4 POSITION:Lat S 643
 start stop duration Long E 1158
 TIME :21:39:32 22:17:40 38 (min) Purpose code: 1
 LOG :2400.14 2402.34 2.53 Area code : 3
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 107 89 Validity code:
 Towing dir: 70° Wire out: 150 m Speed: 30 kn*10
 Sorted: Kg Total catch: 121.81 CATCH/HOUR: 192.33

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Trachurus trecae	65.31	208	33.96
Sardinella maderensis	57.09	246	29.68
Trichiurus lepturus	32.04	28	16.66
Sardinella aurita	25.20	82	13.10
Selene dorsalis	4.55	13	2.37
Trachinotus ovatus	4.04	9	2.10
SYNSA03	1.82	827	0.95
Alloteuthis africana	0.60	161	0.31
MYCTOPHIDAE	0.43	262	0.22
Sepiella ornata	0.28	9	0.15
Arionma bondi	0.03	3	0.02
Total	191.39		99.52

PROJECT STATION:2068
 DATE:23/ 8/99 GEAR TYPE: PT No:4 POSITION:Lat S 637
 start stop duration Long E 1214
 TIME :00:32:17 01:02:14 30 (min) Purpose code: 1
 LOG :2419.97 2421.62 1.62 Area code : 3
 FDEPTH: 10 10 GearCond.code:
 BDEPTH: 49 48 Validity code:
 Towing dir: 136° Wire out: 160 m Speed: 36 kn*10
 Sorted: Kg Total catch: 117.84 CATCH/HOUR: 235.68

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Sardinella aurita	75.20	294	31.91
Brachydeuterus auritus	70.70	510	30.00
Trachurus trecae	24.88	96	10.56
Sardinella maderensis	23.90	116	10.14
Alloteuthis africana	14.90	7990	6.32
Trichiurus lepturus	14.00	22	5.94
Engraulis encrasicolus	6.30	1164	2.67
Decapterus rhonchus	2.30	94	0.98
Sepiella ornata	1.90	80	0.81
Scomber japonicus	1.10	10	0.47
Boops boops	0.50	36	0.21
Total	235.68		100.01

PROJECT STATION:2069
 DATE:23/ 8/99 GEAR TYPE: BT No:2 POSITION:Lat S 632
 start stop duration Long E 1149
 TIME :07:56:22 08:24:47 28 (min) Purpose code: 1
 LOG :2483.01 2484.63 1.61 Area code : 3
 FDEPTH: 122 119 GearCond.code:
 BDEPTH: 122 119 Validity code:
 Towing dir: 70° Wire out: 420 m Speed: 30 kn*10
 Sorted: Kg Total catch: 483.99 CATCH/HOUR: 1037.12

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Trachurus trecae	638.23	1695	61.54
Trichiurus lepturus	228.41	420	22.02
Dentex congoensis	100.18	2096	9.66
Dentex angolensis	37.16	255	3.58
Scomber japonicus	24.77	73	2.39
Illex coindetii	5.46	219	0.53
Arionma bondi	2.91	36	0.28
Total	1037.12		100.00

PROJECT STATION:2070
 DATE:23/ 8/99 GEAR TYPE: BT No:2 POSITION:Lat S 619
 start stop duration Long E 1205
 TIME :11:40:37 13:20:35 30 (min) Purpose code: 1
 LOG :2525.22 2526.48 1.23 Area code : 3
 FDEPTH: 52 51 GearCond.code:
 BDEPTH: 52 51 Validity code:
 Towing dir: 160° Wire out: 200 m Speed: 30 kn*10
 Sorted: Kg Total catch: 80.46 CATCH/HOUR: 160.92

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Trichiurus lepturus	71.36	146	44.35
Brachydeuterus auritus	29.34	244	18.54
Pagellus bellottii	18.36	94	11.41
Pomadourus incisus	10.88	52	6.76
Alloteuthis africana	4.36	1560	2.71
Trachurus trecae	3.88	10	2.41
Balistes capricus	3.04	6	1.89
Pseudotolithus typus	2.96	2	1.84

Dentex canariensis	2.48	10	1.54
Raja miraletus	1.76	2	1.09
Chelidonichthys capensis	1.64	6	1.02
Epinephelus aeneus	1.48	2	0.92
Sardinella maderensis	1.48	6	0.92
Sepiella ornata	1.32	12	0.82
Anthias anthias	1.12	10	0.70
Umbrina canariensis	0.88	2	0.55
Dentex angolensis	0.64	2	0.40
Boops boops	0.64	28	0.40
Pernaena notialis	0.60	14	0.37
Chaetodon hoeferi	0.52	2	0.32
Pagrus caeruleostictus	0.48	2	0.30
Citharus linguatula	0.20	2	0.12
Selene dorsalis, juveniles	0.16	36	0.10
Decapterus rhonchus	0.12	2	0.07
Total	160.20		99.55

DATE:23/ 8/99 GEAR TYPE: PT No:4 PROJECT STATION:2071
 start stop duration POSITION:Lat S 621
 TIME :18:20:33 18:20:53 35 (min) Purpose code: 1 Long E 1135
 LOG :2578.35 2580.50 2.13 Area code : 3
 FDEPTH: 0 0 GearCond.code:
 BDEPTH: 202 157 Validity code:
 Towing dir: 70ø Wire out: 130 m Speed: 30 kn*10

Sorted: 31 Kg Total catch: 152.75 CATCH/HOUR: 261.86

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight	numbers	
Trichiurus lepturus	160.29	557	61.21
Auxis thazard	101.57	257	38.79
Total	261.86		100.00

DATE:24/ 8/99 GEAR TYPE: PT No:4 PROJECT STATION:2072
 start stop duration POSITION:Lat S 615
 TIME :01:41:39 03:21:21 20 (min) Purpose code: 1 Long E 1127
 LOG :2648.07 2649.20 1.10 Area code : 3
 FDEPTH: 5 5 GearCond.code:
 BDEPTH: 336 362 Validity code:
 Towing dir: ø Wire out: 160 m Speed: 34 kn*10

Sorted: Kg Total catch: 140.10 CATCH/HOUR: 420.30

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight	numbers	
MYCTOPHIDAE	357.54	246069	85.07
Trichiurus lepturus	53.46	108	12.72
Auxis thazard	6.06	18	1.44
Macroparalepis macrogeneion	2.04	189	0.49
Epigonus sp.	1.20	45	0.29
Total	420.30		100.01

DATE:24/ 8/99 GEAR TYPE: BT No:2 PROJECT STATION:2073
 start stop duration POSITION:Lat S 604
 TIME :08:58:11 09:23:28 25 (min) Purpose code: 1 Long E 1140
 LOG :2689.06 2690.42 1.32 Area code : 3
 FDEPTH: 125 155 GearCond.code:
 BDEPTH: 125 155 Validity code:
 Towing dir: 85ø Wire out: 450 m Speed: 30 kn*10

Sorted: Kg Total catch: 12.12 CATCH/HOUR: 29.09

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight	numbers	
Dentex angolensis	21.46	113	73.77
Spicara alta	2.11	19	7.25
Dentex congoensis	1.87	24	6.43
Zenopsis conchifer	1.25	2	4.30
Trichiurus lepturus	1.20	2	4.13
Illex coindetii	0.82	17	2.82
Chelidonichthys capensis	0.24	5	0.83
Todarodes sagittatus	0.19	7	0.65
Total	29.14		100.18

Annex II Instruments and fishing gear used

Acoustic instruments

The SIMRAD EK500/38 kHz scientific sounder was used during the survey for fish abundance estimation. The Bergen Echo Integrator system (BEI) was used to scrutinise the acoustic records from the 38kHz echo sounder, and to allocate integrator values to fish species.

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

Tranceiver-1 menu (38 kHz lowering keel)

Transducer depth	5.5 or 8.0 m
Absorption coeff.	10dB/km
Pulse length	medium (1 ms)
Bandwith	wide
Max Power	2000 Watt
2-way beam angle	-21.0 dB
Sv Transducer gain	27.45 dB
Ts Transducer gain	27.65 dB
Angle sensitivity	21.9
3 dB beamwidth	6.8° alongship 6.7° athwardship
Alongship offset	-0.03°
Athwardship effect	0.06°

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, 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

A calibration experiment using a standard copper sphere, performed in Baia dos Elefantes (13° 15' S) on 12/8 1999 gave the following results: Sv Transducer gain 27.45 dB, Ts Transducer gain 27.65 dB.

Fishing gear

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

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

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