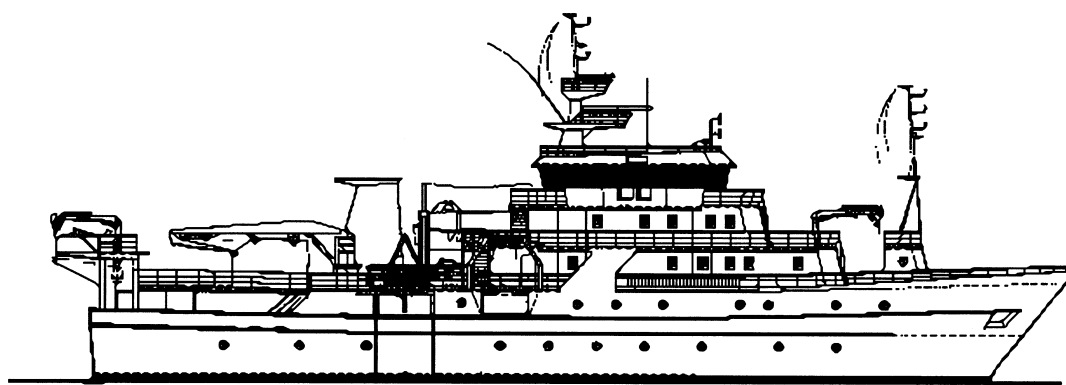


NORAD - FAO/UNDP PROJECT GLO 92/013

CRUISE REPORTS "DR. FRIDTJOF NANSEN"



SURVEYS OF THE FISH RESOURCES OF ANGOLA

Preliminary Cruise Report No 1/97

**Survey of the pelagic resources
25 February - 20 March 1997**

**Institute of Marine Research
IMR, Bergen**

**Institute of Fisheries Research
IIP, Luanda**

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CHAPTER 1 INTRODUCTION

1.1 Objectives

The objectives of the survey, previously agreed upon with the Director of the Instituto de Investigação Pesqueira (IIP) are the following:

- To map the distribution and estimate the abundance of the 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. estimate the biological condition length weight-relationships and reproductive stages. A special study on horse mackerel diel vertical migration in relation to its feeding habits would also be carried out.
- Map the general hydrographic regime by using a CTD-sonde all over the survey area and monitor the temperature, salt and oxygen on IIP standard profiles for hydrographical studies.
- Conduct current measurements with ADCP system.
- On-the-job training for the Angolan participants on the main survey routines would be imparted, including scrutinizing the 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 main species biology.

1.2 Participation

The scientific staff consisted of:

From IIP, Angola: Filomena VAS VELHO, N'Kosi LUYEYE, Bomba BAZIKA, Agostinho DUARTE, Chores PINTO, Isaiás JULIO, Kumbi KILONGO

From IMR, Bergen: Tore MØRK, Martin DAHL, Valantine ANTHONYPILLAI, Inge FOSSEN, Oddgeir ALVHEIM (25/2 to 4/3), Gabriella BIANCHI (5/3 to 21/3)

1.3 Narrative

The vessel left Luanda on 26 February and steamed to the Congo River estuary where the survey started. The shelf north of the Congo River was not covered because of restrictions due to oil drilling activities. The shelf was covered from close to shore (20 m depth) to beyond the 200 m isobath or to where no pelagic fish were recorded. The course track consisted of systematic triangular transects with endpoints about 15 NM apart. From about N'Zeto the course track changed to parallel transects, about 10 NM apart. CTD (Conductivity-Temperature-Depth) and ADCP (Acoustic Doppler Current Profiler) measurements were taken on standard hydrographical sections and along the course track. A call was made in Luanda on 5 March to exchange the cruise leader. The survey was resumed on 6 March and a complete coverage of the area Luanda-Benguela was carried out. The area was covered with parallel tracks, about 7 to 10 NM apart, from about 20 to just beyond 200 m depth. On 13 March the vessel called on Lobito for crew change. The southern region, between Benguela and Cunene, was covered in the period 14 to 18 March. The area between Benguela and Tombua has an extremely narrow and irregular shelf and the cruise track had a triangular, also rather irregular pattern. The shelf from Tombua to Cunene is wider and parallel transects were used, at a distance of about 5 NM. The vessel started steaming to Walvis Bay on 18 March and arrived on 20 March.

1.4 Survey effort

Figures 1a-c show the cruise tracks with fishing stations and the hydrographic profiles and Table 1 the number of hydrographic, pelagic and bottom trawl stations and distance surveyed in the three regions.

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
Cabin.-Palm.	12	32	54	1 129
Palm.-Beng.	7	30	45	1 125
Beng.-Cunene	9	14	22	825
Total	28	76	121	3079

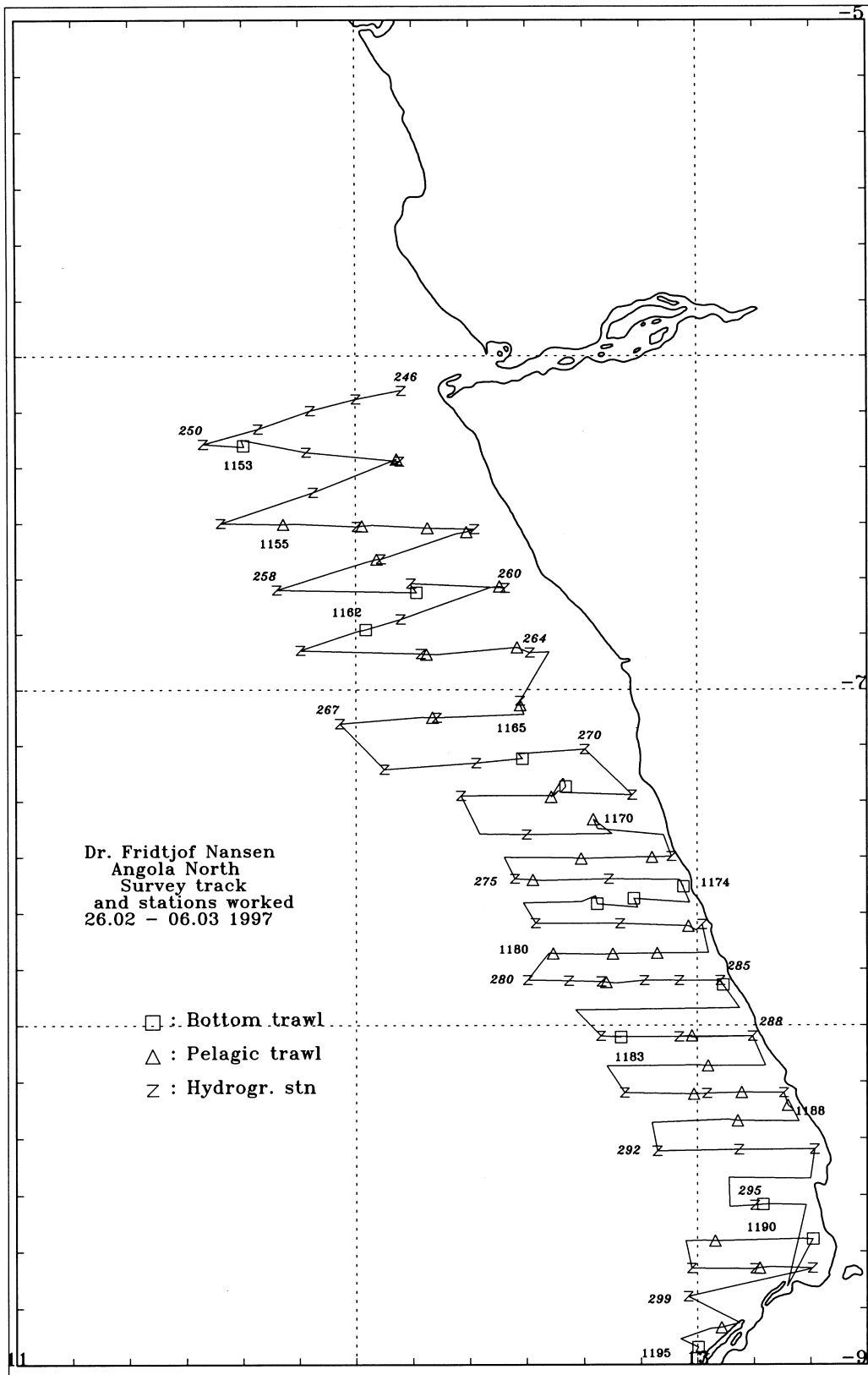


Figure 1a. Course track with fishing and hydrographic stations, Cabinda-Luanda.

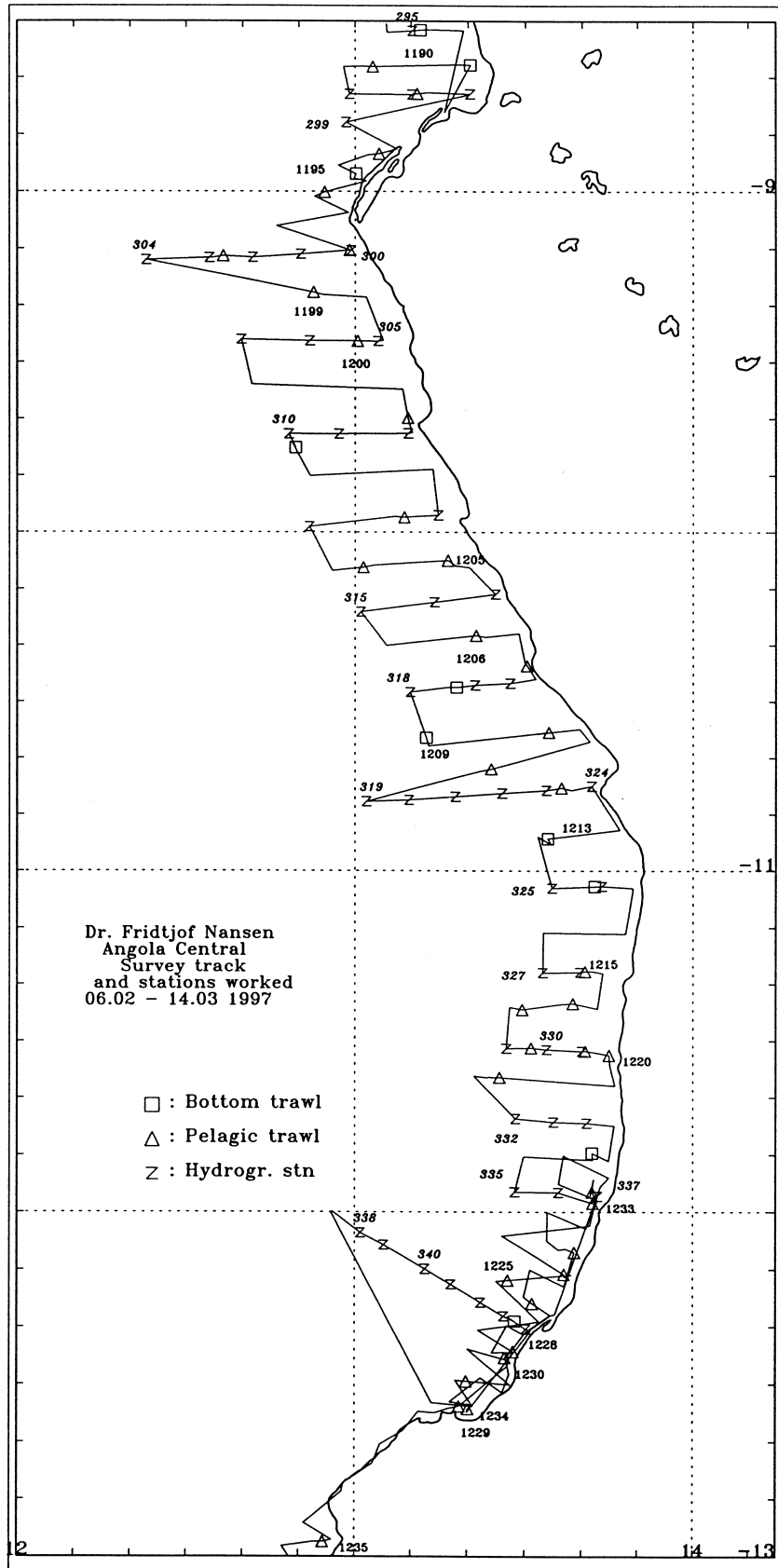


Figure 1b. Course track with fishing and hydrographic stations, Luanda-Benguela.

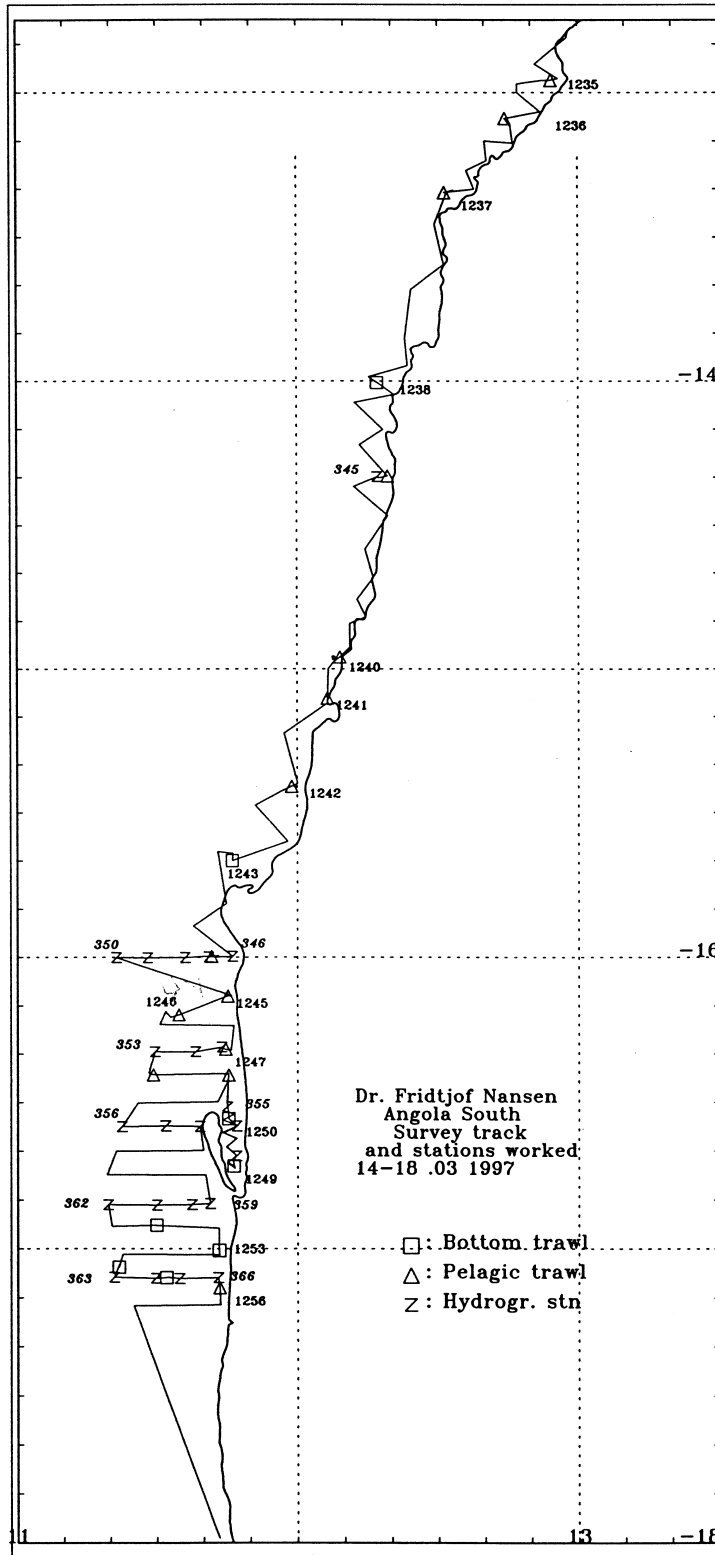


Figure 1c. Course track with fishing and hydrographic stations, Benguela-Cunene.

CHAPTER 2 METHODS

2.1 Hydrographic sampling

A Seabird 911 CTD plus 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. The profiles were usually taken down to a few metres above the bottom, but not deeper than 500 m.. Two Niskin bottles were triggered for water samples on each station, one near the bottom and one near the surface (5 m depth). This was done only in the CDT stations between Cabinda and Luanda. The samples were analysed for salinity using a Guildline Portasal salinometer, and the oxygen content was determined using the Winkler method. These laboratory values were used for calibration of the CTD after removing obvious outliers. Because of a technical problems with the salinometer, no calibration was possible for the rest of the survey. Therefore, salinity values presented here are taken from the CTD without any correction.

For oxygen 46 samples were accepted for the calibration. A linear regression gave the following formula for correcting the oxygen values:

$$O_2 = O_{2ctd} * 1.0985 + 0.0911$$

The standard deviation of the calibration was 0.47.

ADCP current measurements

A ship born Acoustic Doppler Current Profiler (ADCP) from RD Instruments was activated on every CTD station with bottom depths greater than about 25 m. The ADCP was set to ping every 8 seconds, the depth cell was chosen to 8 m and the number of cells to 50. As a routine the data were averaged over 300 seconds for analyses onboard. Both the raw and averaged data were stored on files. The data were analysed by the PC software UMS (Underway Mapping System).

Meteorological observations

Wind (direction and speed), air temperature, global radiation and sea surface temperature (5 m depth) were logged automatically 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. Records of fishing stations are presented in Annex I. Pooled length frequency distributions of selected species by area, are shown in Annex II.

A description of the acoustic instruments and their standard settings is given in Annex III. 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 (pilchard, sardinella and Cunene horse mackerel):

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

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

$$N_i = A \cdot s_A \cdot \frac{p_i}{\sum_{i=1}^n \frac{p_i}{C_{Fi}}} \quad (3)$$

where:

- N_i = number of fish in length group i
- A = area (naut.miles²) of fish concentration
- s_A = mean integrator value in area (A)
- p_i = proportion of fish in length group i in samples from the area
- C_{Fi} = fish conversion factor for length group i

The number per length group (N_i) was then summed and the total number of fish obtained:

$$N = \sum_{i=1}^n N_i \quad (4)$$

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 5 mile where the sample was taken.

In the case of co-occurrence of *Sardinella aurita* and *S. maderensis* (these species cannot be separated in the echo traces), the respective contribution to the s_A value attributed to the 'sardinella' category was split in accordance with their presence in weight in the trawl catches. The biomass of fish per length group (B_i) was calculated by applying their condition factor observed mean weights per length group (W_i) multiplied by number of fish in the same length groups (N_i). The total biomass in each area was obtained by summing the biomass of each length group:

$$B = \sum_{i=1}^n N_i \bar{W}_i \quad (5)$$

The number and biomass per length group in each concentration were at last summed to obtain the totals for each region. The mean integrator values in each sampling unit (s_A -values) were divided between the following categories of fish 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
- round herring
- anchovy
- big-eye grunt (*Brachydeuterus auritus*)
- P2 (carangids, scombrids, barracudas and hairtails)
- other demersal 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 horse mackerel for a study of the feeding habits of this species in relation

to the observed diel vertical migrations. Ten stomachs per length group of 5 cm were taken at each station where the species occurred. Prey identification was limited to the main taxonomic groups: copepods, euphysiids and fish. This latter category was identified to the lowest possible taxonomic level.

CHAPTER 3 OCEANOGRAPHIC CONDITIONS

Surface distribution

Figures 2 a and b show the horizontal distribution of temperature and salinity, respectively, for the region between the Congo River and Pta das Palmeirinhas. Highest temperatures ($T > 28^{\circ}\text{C}$) were found in the northern part, with increasing values offshore. Pockets of relatively cold water ($T < 23^{\circ}\text{C}$) were found off Ambriz and north of Luanda, possibly due to local upwelling. The distribution of salinity shows a similar pattern, with low salinity water particularly in proximity of the Congo River estuary, and increasing values towards the south. The highest salinity values were found off Ambriz ($S > 35.5\text{‰}$), confirming that upwelling or mixing processes occur in this region.

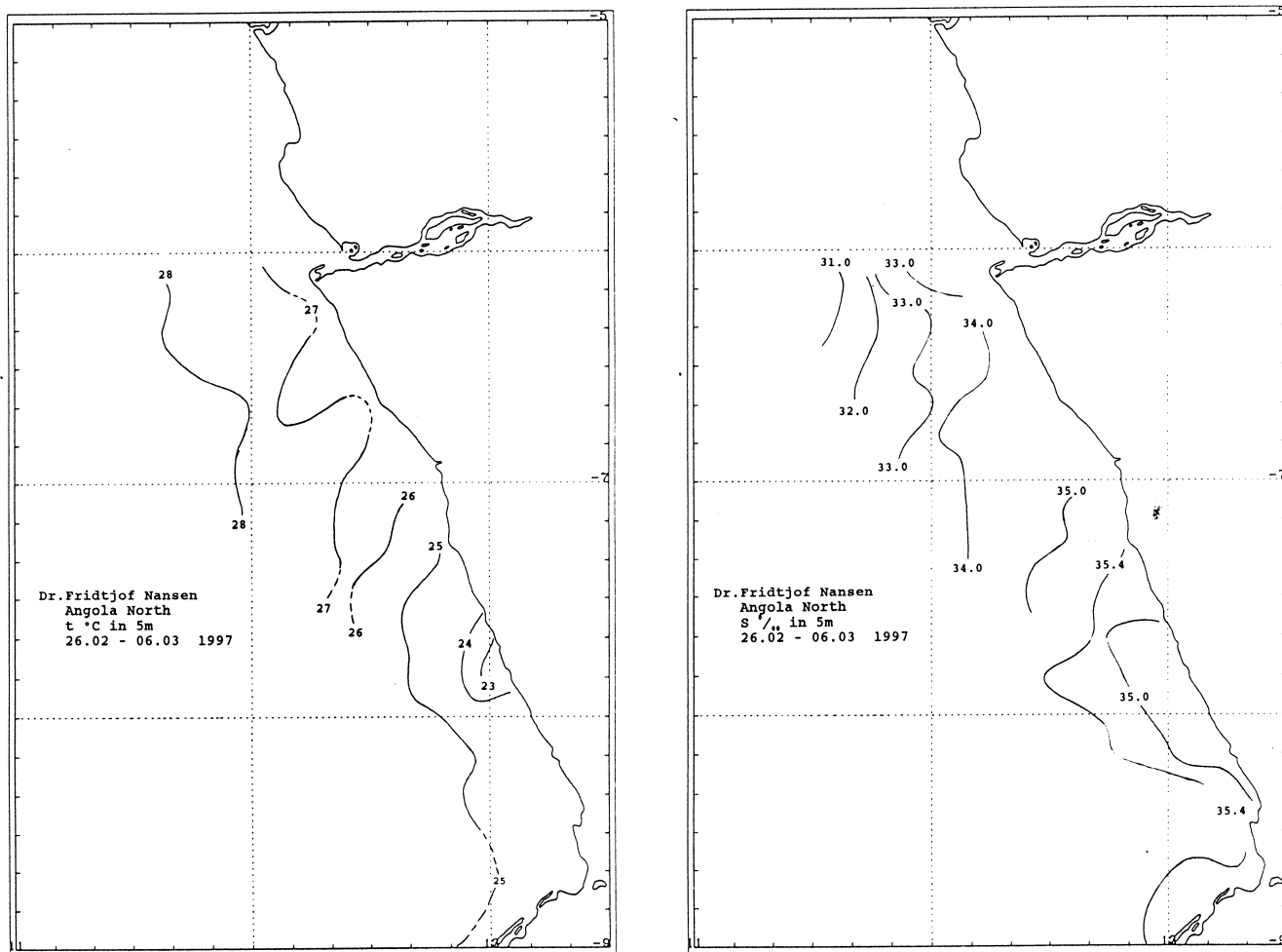


Figure 2. Horizontal distribution of temperature($^{\circ}\text{C}$) and salinity (‰), Congo River - Pta das Palmeirinhas

In the area Pta das Palmeirinhas-Benguela (Fig 3 a and b) there was a similar pattern of increasing temperatures from the coast and offshore. Lowest temperatures were encountered just south of

Pta das Palmeirinhas with values below 23°C , off Pta do Morro and south of Cabeça da Baleia ($T < 24^{\circ}\text{C}$). Salinity values appeared to be quite uniform at the surface (ranging from 35.4 to 35.9‰) and thus much higher than in the northern part where they ranged from 31 to 35.4‰. In the region between Tombua and the Cunene River surface waters become quite cold, down to 17.9°C in Baías dos Tigres. There is a gradient of increasing temperatures from the coast to offshore, indicating an upwelling process in this region (Figure 4).

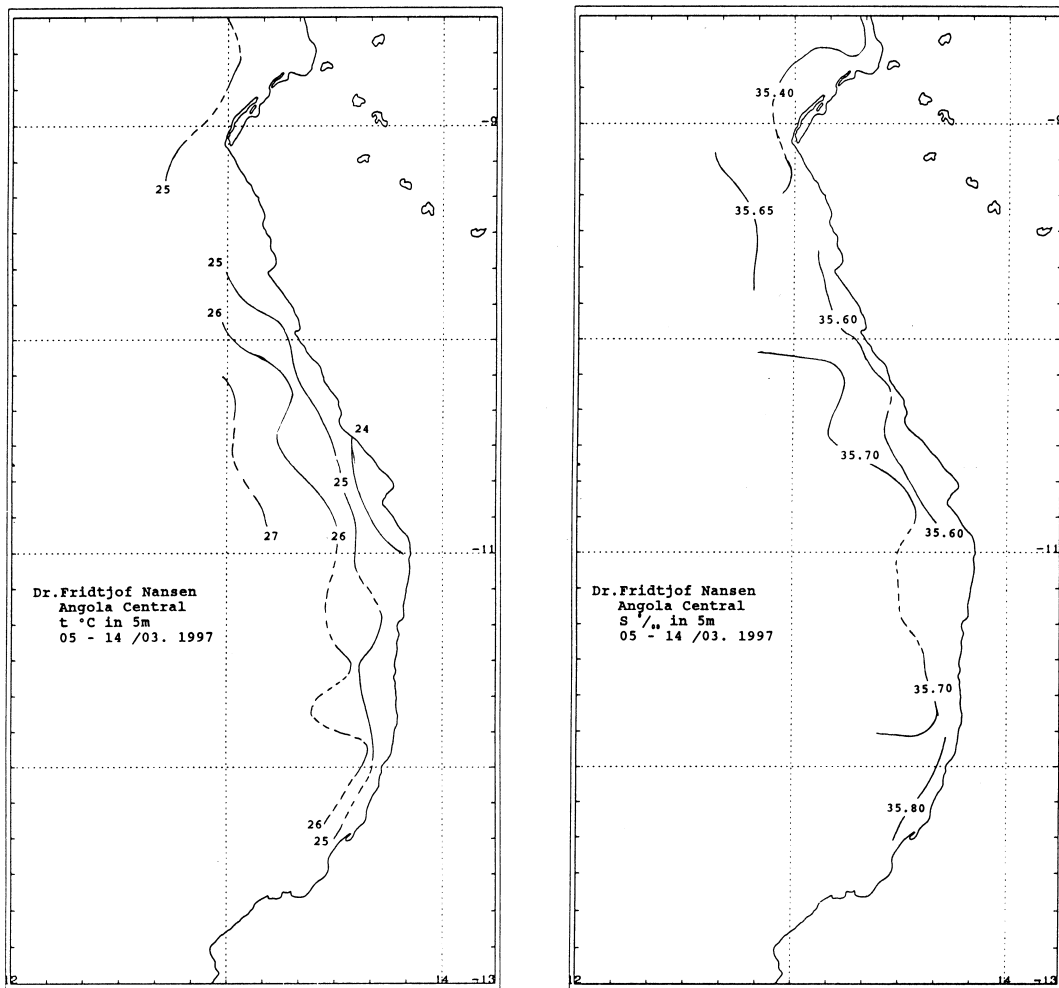


Figure 3. Horizontal distribution of temperature($^{\circ}\text{C}$) and salinity (‰), Pta das Palmeirinhas - Benguela

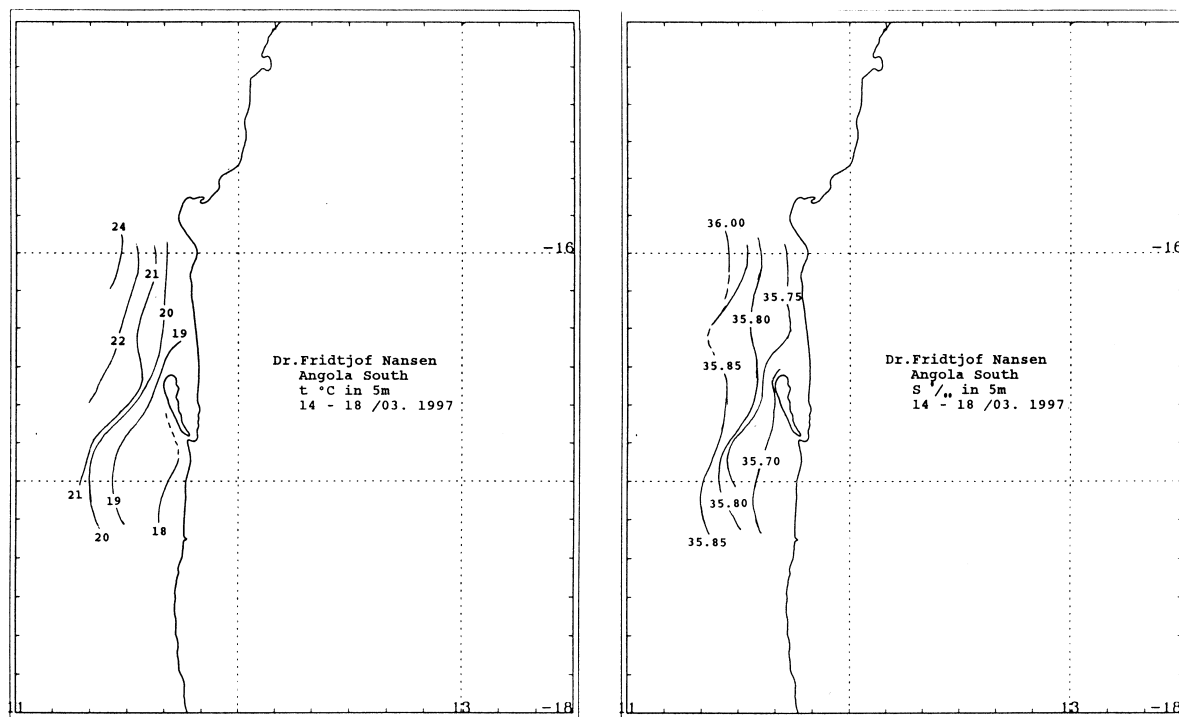


Figure 4. Horizontal distribution of temperature($^{\circ}\text{C}$) and salinity (‰), Tombua - Cunene

Vertical distribution

The vertical distributions of temperature, salinity and oxygen along the standard sections are shown in Figures 5 a-g.

The northernmost section (Pta da Moita Seca, Fig 5a) shows the presence of a stable layer of warm and brackish water, originating from the outflow of the Congo River. Off Ambriz (Fig.5 b) the conditions are more dynamic and the surface layer is broken toward the coast by a possible upwelling process. This confirms the image produced by the horizontal distributions of temperature and salinity discussed above. Signs of slight upwelling were found off Pta das Palmeirinhas, as shown by the horizontal temperature distribution, although so feeble that are not visible in the vertical section. The section at Pta do Morro on the contrary shows clear signs of vertical water displacement toward the surface, both in the temperature and oxygen values. In the southern region (Tombua-Cunene) there was an autumn situations, with clear signs of coastal upwelling throughout. Low oxygen levels ($<2\text{m/l}$) were already found at about 50 m depth.

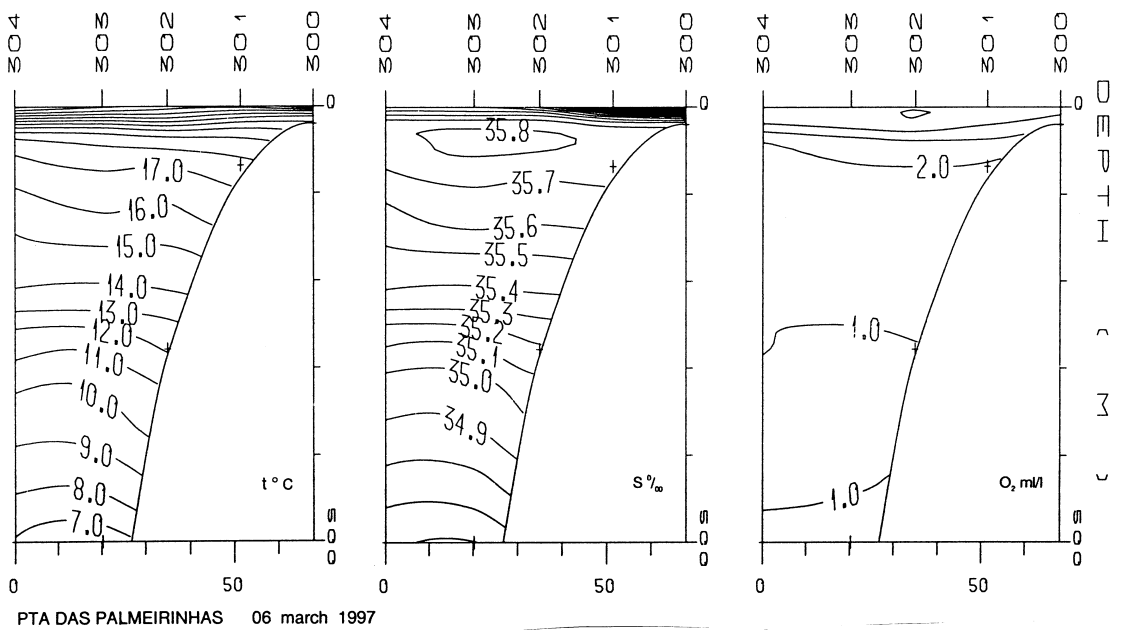
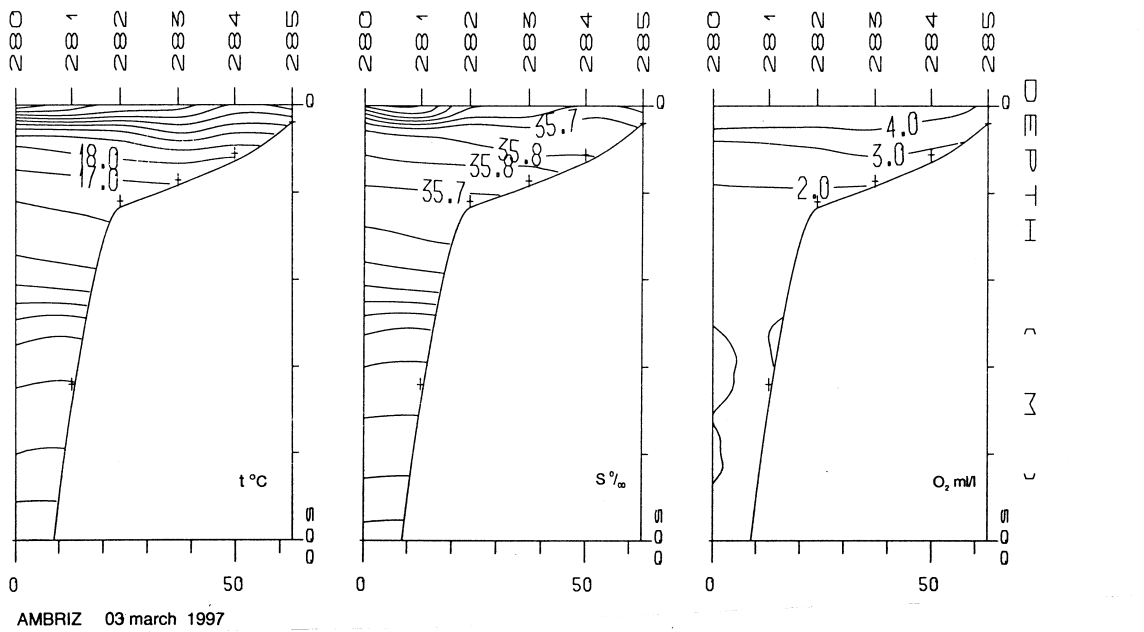
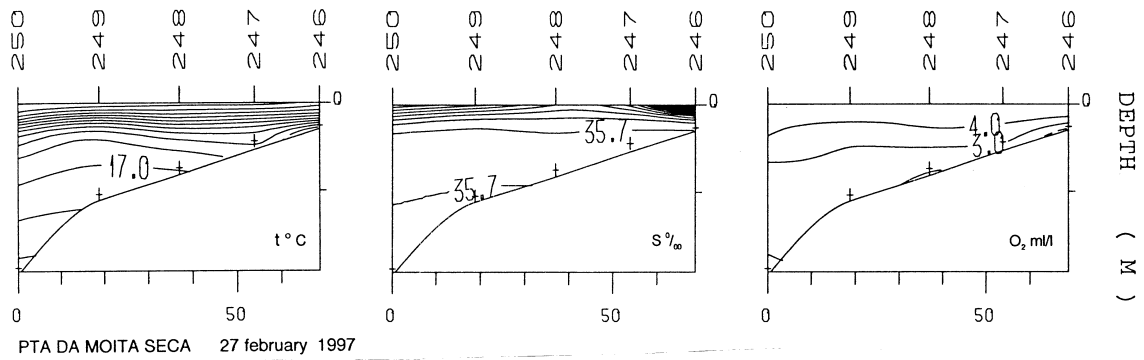
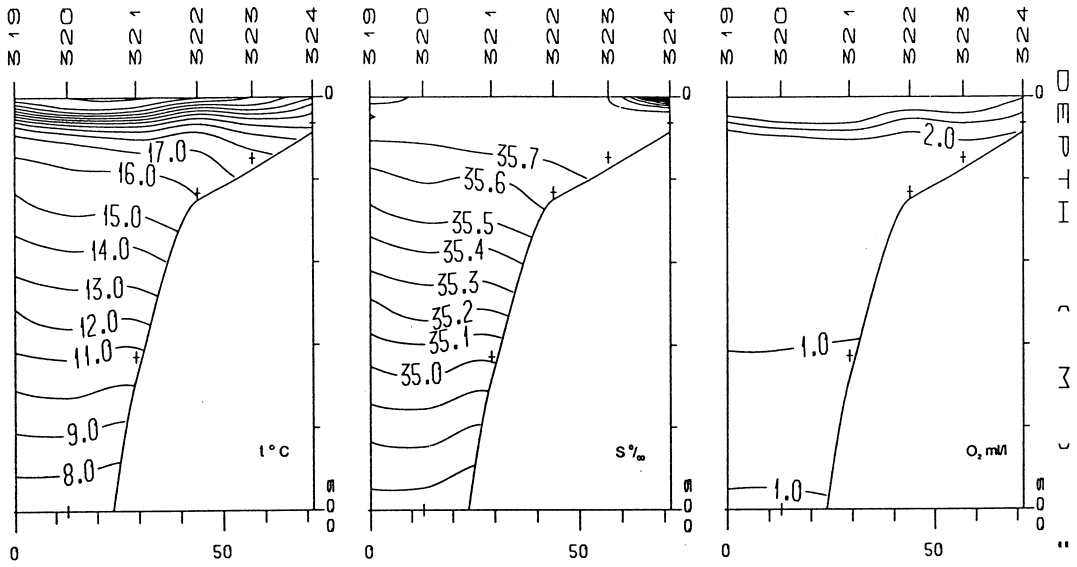
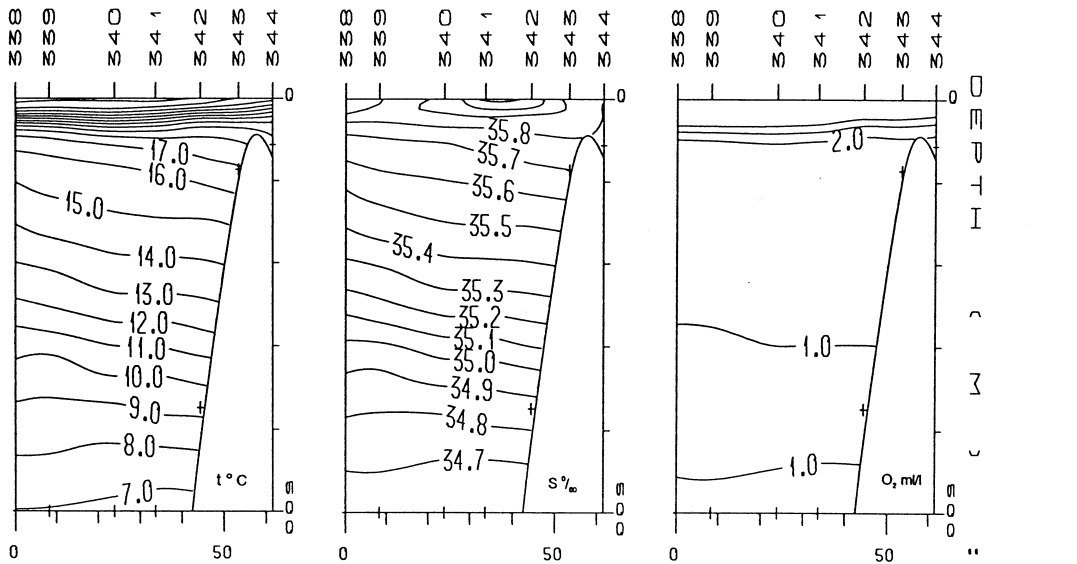


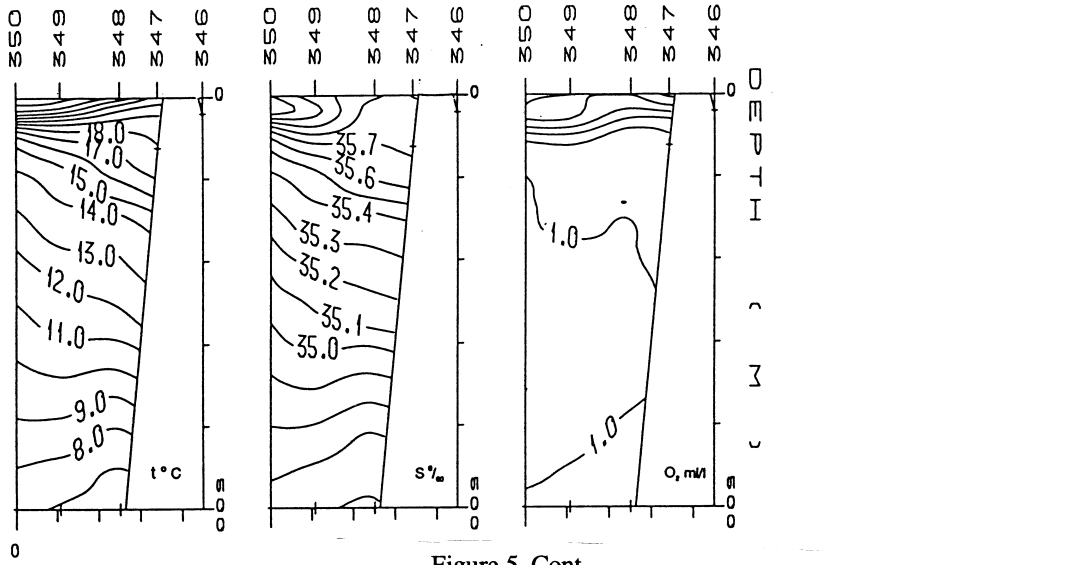
Figure 5 . Vertical profiles of temperature(°C), salinity (‰) and oxygen(ml/l)



PTA DO MORRO 09 March 1997



LOBITO 11 March 1997



TOMBUA 16 March 1997

Figure 5. Cont.

In general, 1997 appears to be the coldest in the series collected by the RV 'Dr. F. Nansen' since 1994. Cooler waters are found to a depth of about 170 m while the values do not diverge much at greater depths. Salinity values are also higher than usual in surface waters. Oxygen levels at surface waters are higher than in previous years but substantially lower in subsurface layers, which indicates the vertical displacement of deep waters. Both halocline and oxycline were located at shallower depths as compared to 1995 and 1996, at about 5-15 m in the northern region and 25-35 m in the central region (Lobito). Figure 6 (a,b and c) show the vertical profiles at selected stations from the transects off Ambriz, Pta das Palmeirinhas and Lobito, respectively, to compare the present with the last year situation, in the same period. Also in the southern region, Tombua to Cunene, surface temperatures were much lower than in 1996, ranging between 17.9 to 22.0°C against 26 to 28 °C of last year. The present condition indicates the onset of the autumn season and should be considered as normal.

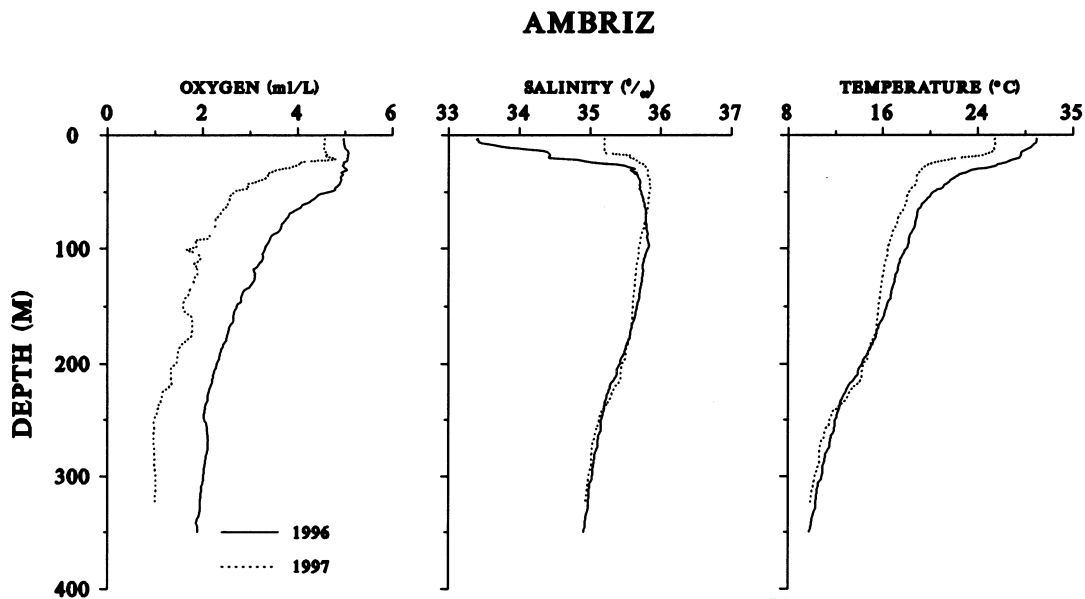
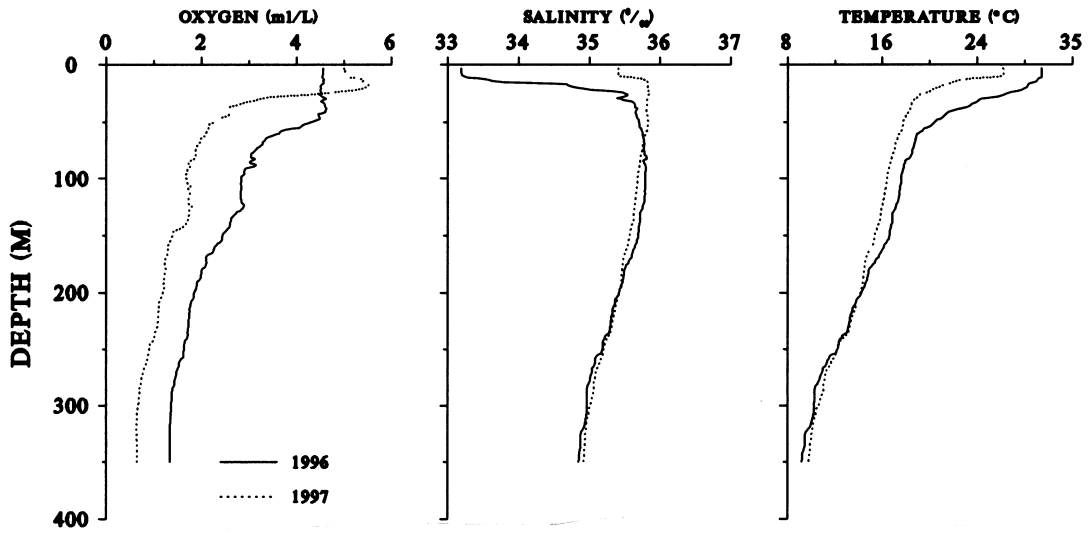


Figure 6. Temperature (°C) and salinity (‰) profiles at selected stations

PTA DAS PALMEIRINHAS



LOBITO

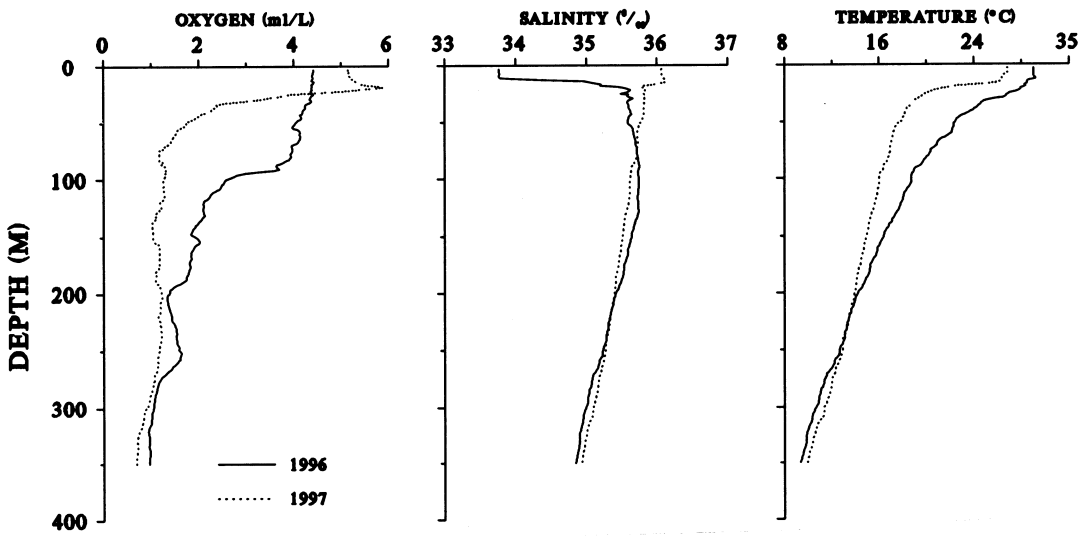


Figure 6. Cont.

CHAPTER 4 DISTRIBUTION, COMPOSITION AND BIOMASS ESTIMATES OF PELAGIC FISH

4.1 Congo River - Pta das Palmeirinhas

As in earlier surveys, the northern region, north of the Congo River estuary, was not covered because of oil extraction activities. The entire exclusion of this area from the survey coverage started with the August-September survey in 1995.

4.1.1 Sardinella

Both species (*Sardinella aurita*, the round sardinella, and *Sardinella maderensis*, the flat sardinella) were found in shelf waters from the Congo River to Pta das Palmeirinhas, with highest concentrations in the shallow area between N'Zeto, Ambriz and off Pta das Palmeirinhas. Figure 7 shows the distribution of both sardinellas for the northern region, including the varying degree of their concentrations as average acoustic integrator values for each area. This distribution coincides with the area of lower surface temperatures and higher surface salinity values (see Chapter 3) found in this region. These values indicate water mixing processes or upwelling, that generate conditions more suitable for pelagic fish.

The two species were usually mixed in the catches. The round sardinella consisted mainly of juveniles and young, with modes of 15 and 23 cm (Fig. 8 a). Its highest concentrations were found just north of N'Zeto and off Ambriz. The biomass of this species was estimated to 90 000 tonnes.

The flat sardinella (Fig. 8 b) was represented by young with lengths between 12 and 23 cm and a mode of 17 cm. Larger specimens (mode 28 cm) were also present but their abundance was much smaller. The biomass of flat sardinella was estimated to about 120 000 tonnes.

Compared with the results obtained in March last year, the biomass estimates for this region are significantly higher for both species. In 1996 the flat sardinella was estimated to 65 000 tonnes, with a similar length distribution as compared to this year, and the round sardinella was estimated to 5 000 tonnes and consisted mainly of large individuals. The former species has shown an increase of about 55 000 tonnes, while the latter is now present at a level of 90 000 tonnes, mostly consisting of young specimens. Although in this report the estimates for the northern region also include the area between Luanda and Pta das Palmeirinhas (contrary to earlier reports) this concentration totalled 21 000 tonnes for the flat sardinella and only 3 000 tonnes for the round

sardinella, which does not influence the overall conclusion that there is an increase in the biomass of both species in this area. (See Chapter 5 for further discussion on comparisons with earlier years).

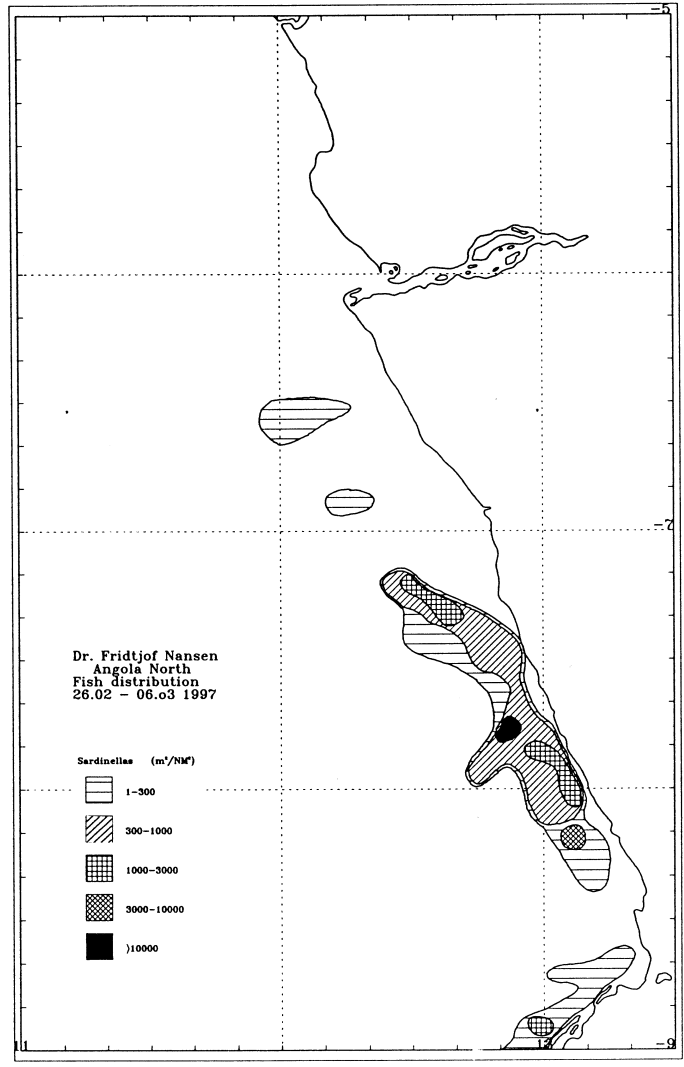
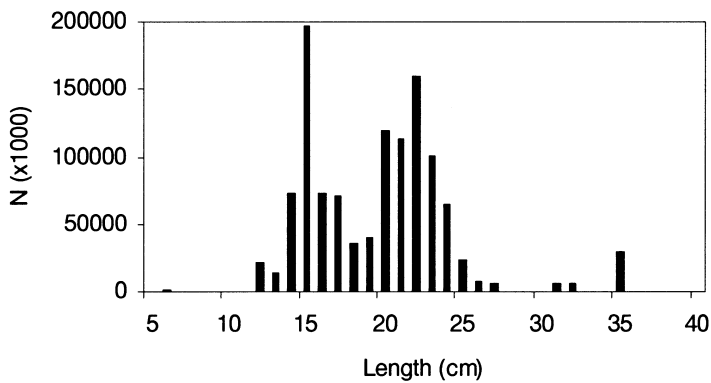


Figure 7. Distribution of *Sardinella* spp. Congo River-Pta das Palmeirinhas



a) *Sardinella aurita*

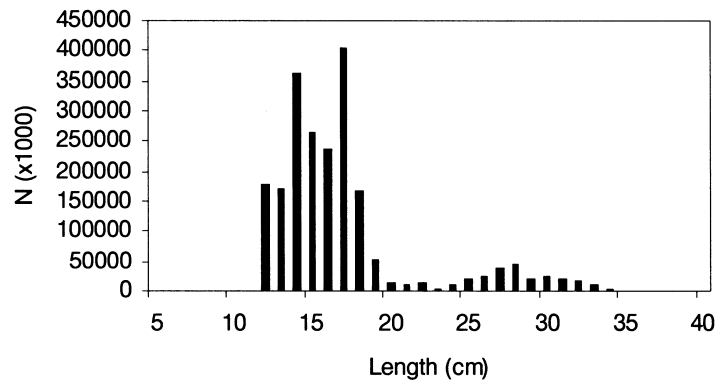
b) *Sardinella maderensis*

Figure 8. Total length distribution of a) round sardinella (*S. aurita*) and b) flat sardinella (*Sardinella maderensis*). Congo River-Pta das Palmeirinhas

4.1.2 Cunene horse mackerel

Figure 9 shows the distribution of horse mackerel for the region from off the Congo River estuary to Pta das Palmeirinhas. The species was widely distributed in this region, occupying also the shallower parts of the shelf south of N'Zeto. The densities were usually low, except for two small areas off N'Zeto, south of Ambriz and between Luanda and Pta das Palmeirinhas, respectively. Figure 10 shows the length distribution of horse mackerel for the whole region. Young fish with a mode of 18 cm dominated, followed by two cohorts with modes of 32 and 46 cm. The young fish was distributed over the whole shelf to Luanda, while the adult fish was in the Pta das Palmeirinhas area. The total biomass of horse mackerel in this region was estimated to about 138 000 tonnes. Compared to the last year estimate for this region (6 000 tons), it appears that, as for the round sardinella, there is a massive increase, particularly of young fish.

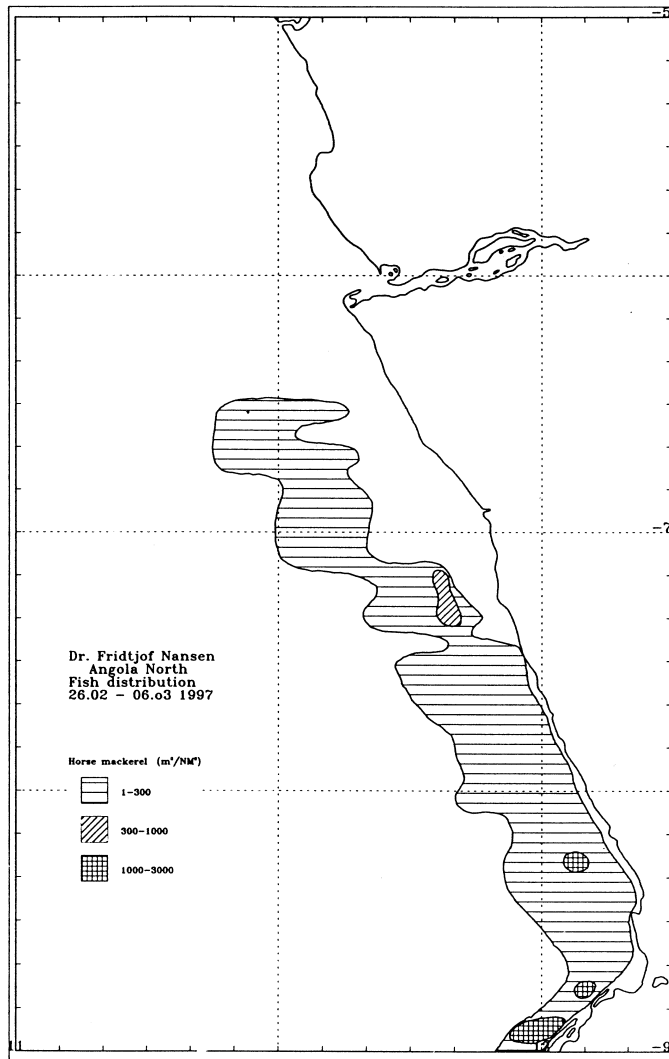


Figure 9. Distribution of Cunene horse mackerel (*Trachurus trecae*). Congo River - Pta das Palmeirinhas

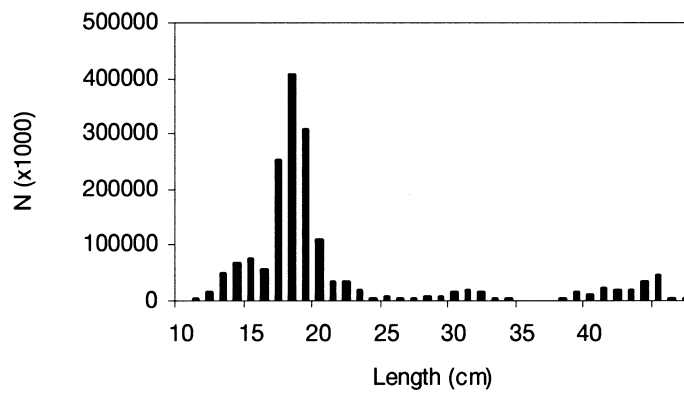


Figure 10. Estimated abundance of Cunene horse mackerel (*Trachurus trecae*) by length groups. Congo River - Pta das Palmeirinhas

4.1.3 Other pelagic species and big-eye grunt

This category includes a large number of pelagic species of the families Carangidae, Sphyraenidae, Trichiuridae, and Scombridae, usually mixed in a highly diverse pelagic community. This makes the abundance estimation with the acoustic system, at species level, practically impossible. For this reason all these species are treated together to give an idea of the order of magnitude of these resources, but the estimate should be considered as very rough. Figure 11 shows the distribution of pelagic fish type 2 for the region and Table 2 shows the catch rates of the main categories included in this group (sardinella and horse mackerel are not included). Highest concentrations were detected in the shallow waters between Pta da Moita Seca and Cabeça da Cobra and between N'Zeto and Ambriz. The biomass estimate was obtained by using an overall average length (about 30 cm) for this area and resulted in a value of about 140 000 tonnes. The composition in the catches shows a dominance of Carangidae (*Selene dorsalis* and *Chloroscombrus chrysurus*) followed by hairtail (*Trichiurus lepturus*), both in the shallow inshore waters as well as over the edge of the shelf. This group includes several species of commercial importance, particularly for small scale fisheries.

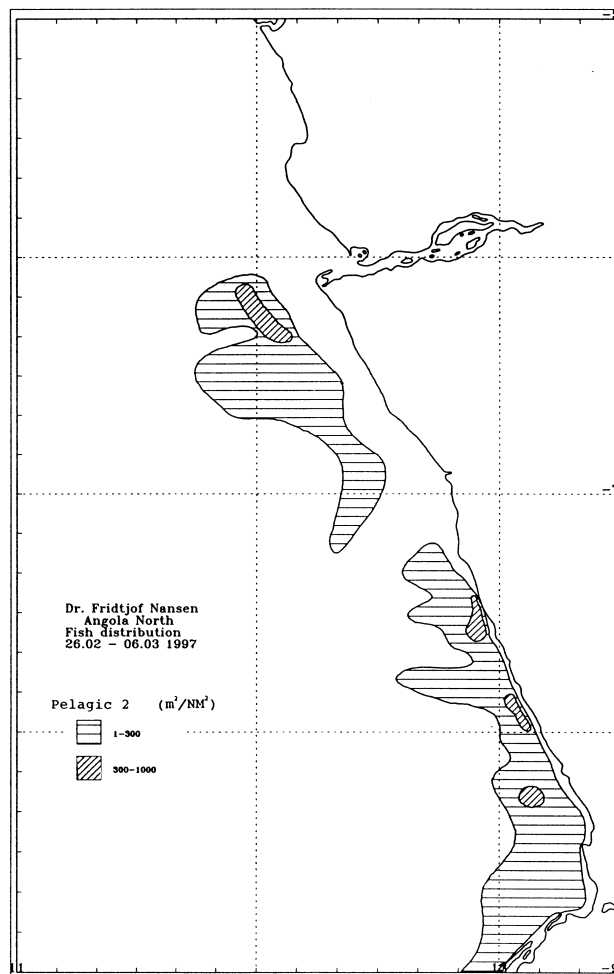


Figure 11. Distribution of other pelagic species.Congo River - Pta das Palmeirinhas

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

ST.NO.	Oth.Caran.	Barracudas	Scombrids	Hairtail	Bigeye g.	Other
1153				0.87		112.38
1154						
1155			17.20	13.12		50.30
1156	255.32		69.02	0.28	14.68	123.94
1157	2.04	22.42	0.20		1.56	52.24
1158	18.78	22.24				206.49
1159			0.58	2.36	2.17	36.97
1160			21.20			510.12
1161		6.43	10.29			11.31
1162						248.00
1163		4.45	20.13	1.01	2.55	140.33
1164	6.18	6.50	38.40			23.40
1165	2.72	18.80				18.40
1166	0.52		0.14	5.48		129.77
1167	211.20		26.07			2018.82
1168	48.92					1254.13
1169						
1170	452.38		143.02		7.00	4397.60
1171	6.66	87.60	13.98		37.08	249.54
1172						655.16
1173						200.00
1174	28.68	84.12		79.08	1857.20	371.52
1175	16.26			1.24	133.16	94.41
1176						5889.76
1177	431.98	46.76		12.29	843.21	412.51
1178	98.52			85.16	20.54	909.44
1179			21.43	428.67	19.90	4756.72
1180			336.00	322.40		49.36
1181	13.66		14.38	1.55		156.83
1182	9844.20			168.52		3987.28
1183			0.43	7.16		255.84
1184			4.04			7.18
1185		2.74	3.56	79.00	14.70	280.20
1186	17.40	2.50	2.04	112.00	0.40	184.26
1187	98.72	43.61		53.21	502.18	5685.30
1188	19.55	60.69		3.60	578.57	146.51
1189	25.76		122.18	269.59	5.71	2106.01
1190	25.84			157.60	16.80	248.00
1191	5.50	2.21		12.00	55.94	152.27
1192	27.97		2.03	147.10		
1193	400.44	32.00	12.72	2.96		114.98
1194	2.56					4.96
1195				288.00		2103.36
1196	40.03					16.81
MEAN	275.04	10.07	19.98	51.23	93.49	872.10

4.2 Luanda-Benguela

4.2.1 Sardinella

Both species were found throughout the area, in the inner part of the shelf, with highest concentrations off Pta do Morro and between Lobito and Cabeça da Baleia. The highest concentrations were found at about in a band along the coast, at about 40 m depth, in the southern part of the area. Figure 12 shows the distribution for this region of the species combined, with an indication of their relative densities. The length distributions showed two main modes for the flat sardinella at 23 and 33 cm. For the round sardinella the length distribution is

less clear, with one clear mode at 23 cm, while for the rest of the distribution is difficult to identify possible cohorts. Biomass estimates showed that the flat sardinella is still dominating, but the relative abundance of the round sardinella is increasing in comparison with previous years. Present estimates indicated about 150 000 tonnes for the former species and about 45 000 tonnes for the latter.

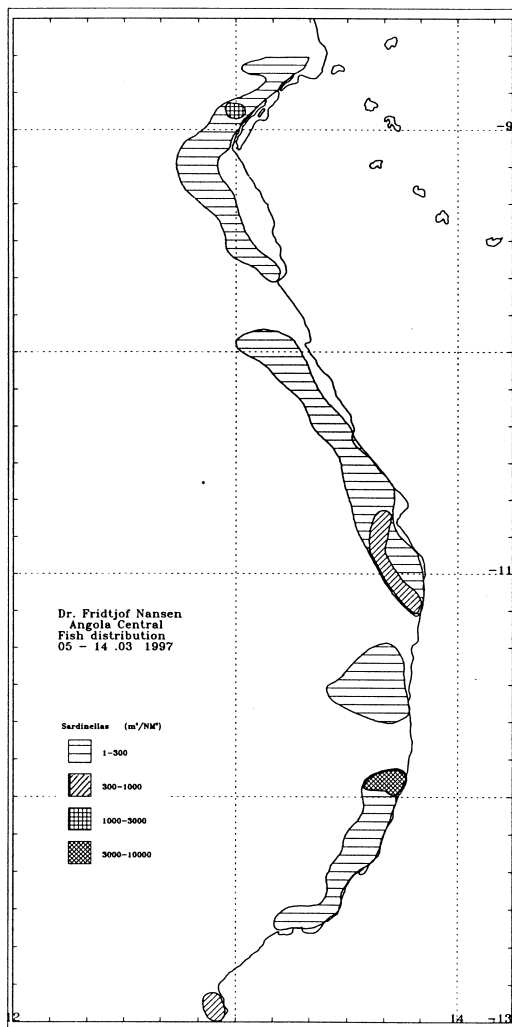
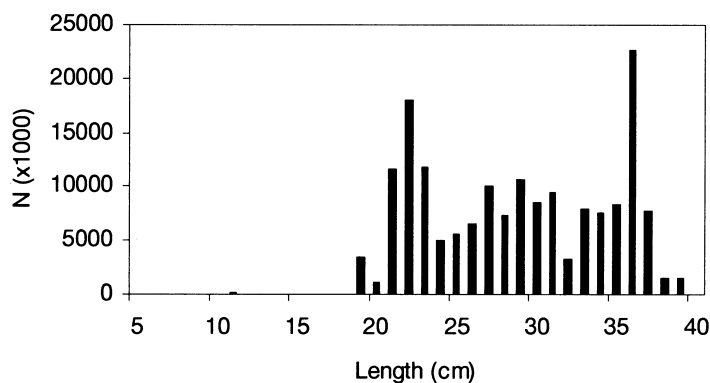
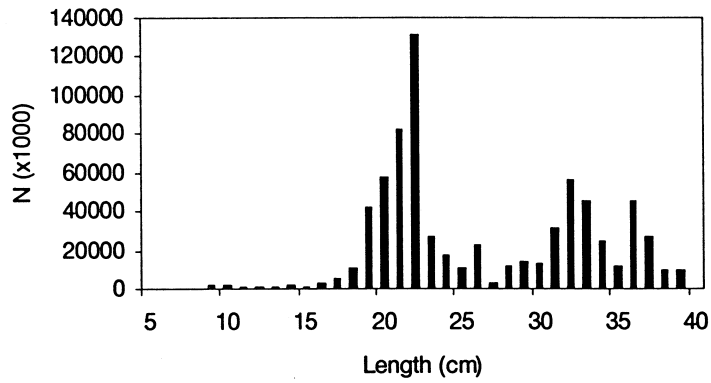


Figure 12. Distribution of *Sardinella* spp. Pta das Palmeirinhas - Benguela



a) *Sardinella aurita*



b) Sardinella maderensis

Figure 13. Total length distribution of a) round sardinella (*S. aurita*) and b) flat sardinella (*Sardinella maderensis*). Pta das Palmeirinhas - Benguela

4.2.2 Cunene horse mackerel

Horse mackerel were evenly distributed over most of the inner shelf in this region (Figure 14). Larger concentrations were found closer to the coast and particularly between Cabeça da Baleia and Benguela.

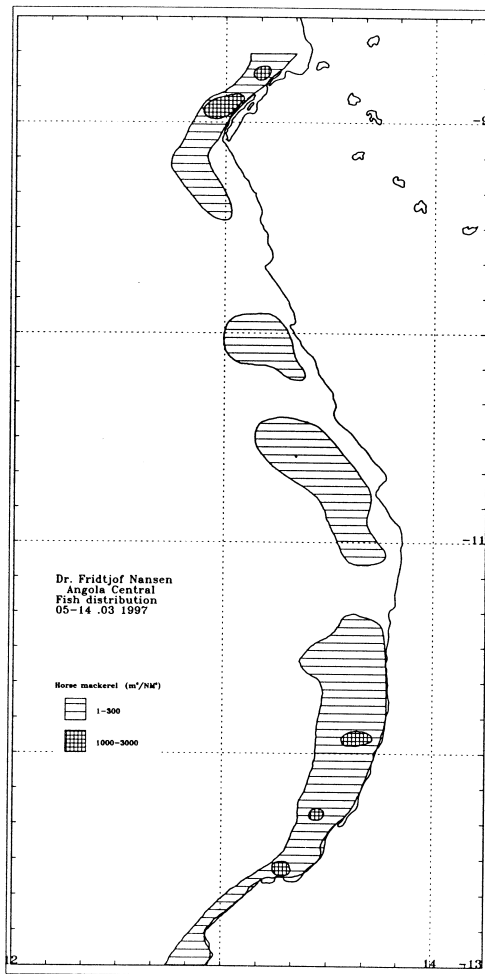


Figure 14. Distribution of horse mackerel (*Trachurus trecae*), Pta das Palmeirinhas - Benguela

The vertical distribution was very much the same as was observed north of Luanda, dense schools close to bottom at daytime and dispersal and concentration of single fish near the surface during the night. The length distribution (Fig. 15) shows that juvenile fish dominates, with a mode of 14 cm. Adult fish shows a mode of 34 cm while intermediate cohorts are barely visible. The biomass estimate for the species was about 55 000 tonnes.

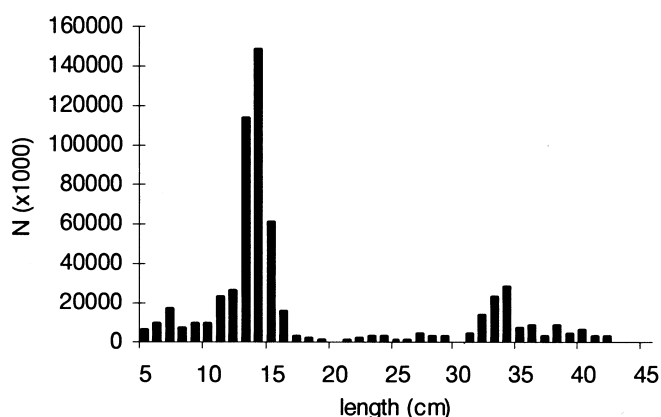


Figure 15. Total length distribution of horse mackerel (*Trachurus trecae*), Pta das Palmeirinhas-Benguela.

4.2.3 Other pelagic species and bigeye grunt

Figure 16 shows that pelagic species type 2 were widely distributed in this region from shallow coastal waters to beyond the edge of the continental shelf. Dense concentrations were found off Pta do Morro and in the Lobito-Benguela area. Large-size hairtail, up to 100 cm TL, appeared to be quite abundant. This species, appreciated in Angola as foodfish, was abundant both inshore and offshore, pelagic and near the bottom. Carangids were almost as abundant (Table 3) and consisted mainly of *Selene dorsalis* and *Chloroscombrus chrysurus*. The estimated biomass totalled about 130 000 tonnes, using an average length of 30 cm.

The big-eye grunt (*Brachydeuterus auritus*) was found in the areas with highest concentrations of pelagic fish (Fig.17). Although belonging to a typically demersal family (Haemulidae) this species follows the diel migration pattern of pelagic species and is found near the surface during nighttime. During daytime it forms loose concentrations close to the bottom. A biomass estimate was attempted based on the acoustic registrations. With an average length of 18 cm and a condition factor of 1.36, the biomass was estimated at about 30 000 tonnes.

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

ST.NO.	DEP.	Carangids	Barracudas	Scombrids	Hairtail	Bigeye g.	Other
1196	5	40.57					16.27
1197	0	3.90	29.90	8.72			8.96
1198	5			51.38	21.84		194.11
1199	0	126.40	21.20		60.40		568.96
1200	0	3.90	1.48	0.34	55.30		116.26
1201	5	2.00	14.00				
1202	237				55.07		780.02
1203	5	463.86	122.17		6.83	1661.38	212.13
1204	5	56.50		6.20	5.20		184.16
1205	0	82.68	23.26		8.52	268.97	148.59
1206	0					0.87	2.78
1207	10	50.31	1.66				18.61
1208	99	28.29	1.39		3.64		664.29
1209	205						436.38
1210	5	116.60	109.55		15.69		52.54
1211	5			10.03			1290.75
1212	0	466.14		56.50	373.66	861.34	766.88
1213	118				113.14		5373.73
1214	72			3.38	158.63		637.47
1215	0	8.60		7.46			
1216	5	10.85	15.12			1314.68	206.51
1217	5	83.90			5.69		360.29
1218	5	8.48	5.34	2.94	25.86	10.55	264.67
1219	0	9.60	1.20		56.20	150.40	111.20
1220	5	1.44			43.30	21.00	151.44
1221	0	19.26			2.36		1426.57
1222	45	241.43			954.29	374.29	1456.14
1223	5	2.01	3.53	7.29			132.21
1224	5	289.58		75.75	179.85		1510.59
1225	5			6.10			1017.06
1226	0	165.14	18.08	0.77	199.84	0.98	70.71
1227	0	69.20			2.05		42.72
1228	93				21.10		1156.47
1229	5	50.64	3.60	50.00	170.52		1124.80
1230	5	2.16	4.77	0.60	145.50		18.00
1231	0	1.84	1.46	24.32	136.00		195.68
1232	0	270.60	13.20		11.83	1.37	2091.51
1233	5	33.67	8.89	28.23			1093.81
MEAN		71.30	10.52	8.95	74.53	122.79	629.03

4.3. Benguela - Cunene

4.3.1 Horse mackerels

In this area two species overlap, the Cunene horse mackerel (*Trachurus trecae*) and the Cape horse mackerel (*Trachurus capensis*). The latter species, the main area of distribution of which is Namibia and South Africa, was caught only sporadically from about Tombua and southward. The Cunene horse mackerel was instead dominating throughout the shelf, to the border with Namibia. Densities were usually low but a few high concentration areas were detected off Cabo Santa Marta, Namibe, Tombua and at the entrance of Baía dos Tigres (Figure 17). As observed in the other regions, horse mackerel followed with great regularity a diel vertical migration, forming schools near the bottom during daytime and dispersing in upper water layers mixed with plankton at night. Horse mackerel appeared to be the dominant species in this region, in all depths and near the bottom as well as in the upper water layers.

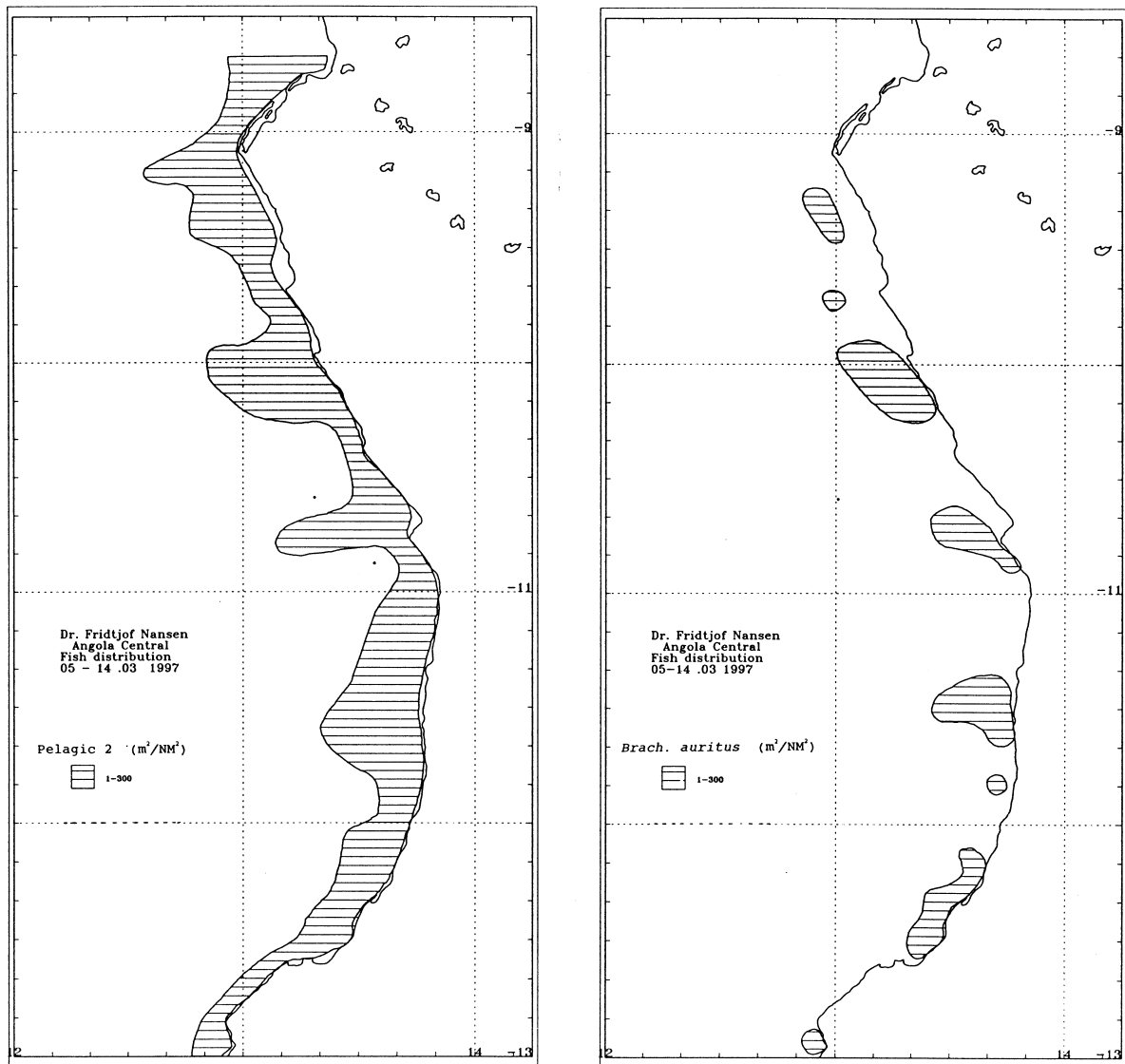


Figure 16. Distribution of other pelagic fish and bigeye grunt (*Brachydeuterus auritus*). Pta das Palmeirinhas - Benguela.

The total length frequency distributions for both species are presented in Figure 18. The figure shows the dominance, for both species, of juvenile and young fish. The biomass estimate for the region totalled 234 000 tonnes, of which more than 90% was Cunene horse mackerel.

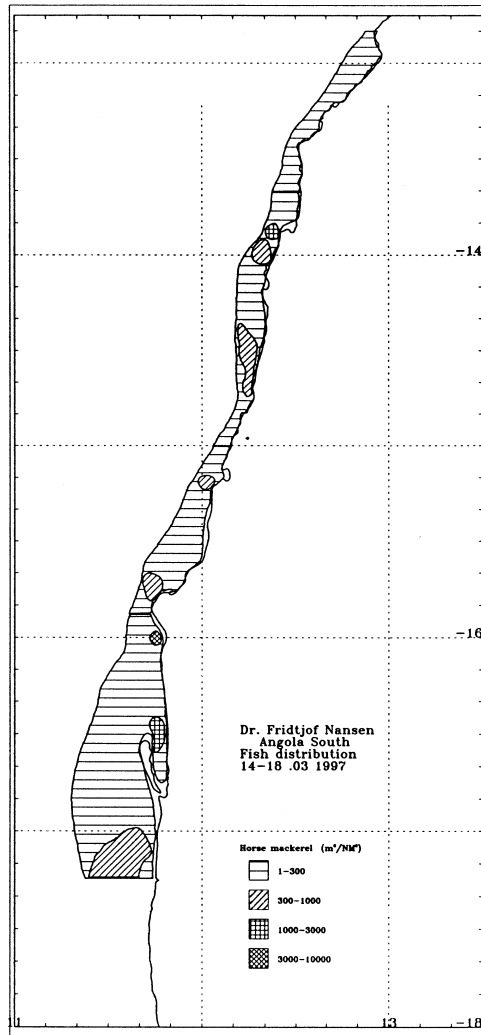
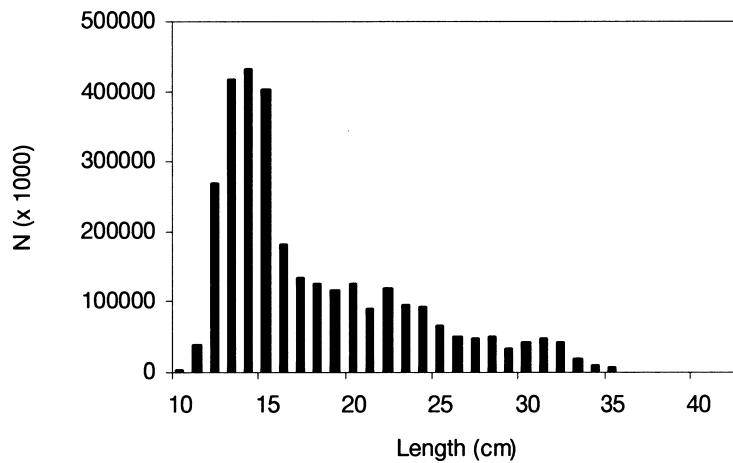
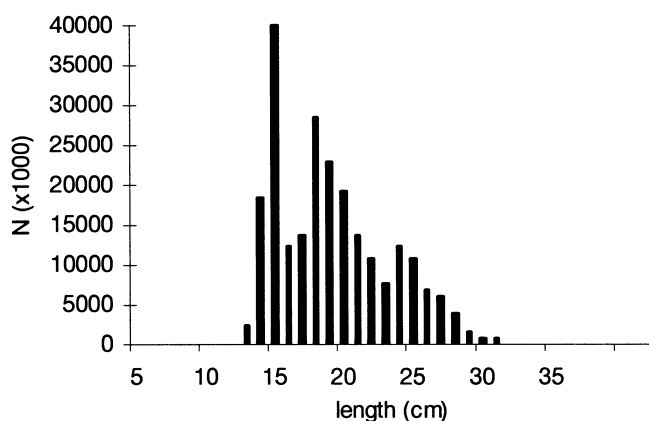


Figure 17. Distribution of *Trachurus trecae* and *Trachurus capensis* , Benguela-Cunene



a) *Trachurus trecae*

Figure 18. Total length distribution of a) *Trachurus trecae* and b) *T.capensis*. Benguela-Tombua.



b) *Trachurus capensis*

Fig 18. Cont

4.3.2 Clupeoid species

Three young specimens of pilchard (*Sardinops sagax ocellatus*) were caught once, in shallow waters outside Baia dos Tigres and no pilchard school was detected from the eco integration system. No biomass estimate was therefore attempted.

The round herring (*Etrumeus whiteheadi*) was caught a few times, in very small amounts. Also in this case, no biomass estimate was attempted.

4.3.4 Other pelagic species

As earlier mentioned, horse mackerel totally dominated the neritic ecosystem of southern Angola (Figure 19). Horse mackerel is an important prey item for larger predators, both demersal and pelagic. *Atractoscion aequidens* and other large sciaenids fed on horse mackerel when near the bottom. Main predators of the upper water layers were *Sarda sarda*, *Trichiurus lepturus* and *Pomatomus saltatrix*. A rough estimate of pelagic species other than clupeids and carangids was attempted, by using an average length of 30 cm and a condition factor of 0.9. It resulted in about 30 000 tonnes.

CHAPTER 5 REVIEW OF SURVEY RESULTS AND AVAILABILITY FOR FISHERY

5.1 Sardinella and horse mackerel

The total biomass of sardinellas was estimated to 495 000 tonnes (Table 4). This value is higher than the last two obtained in the same season but very consistent with the value for the February/March 1994 survey. These changes in biomass probably do not reflect real biomass fluctuations but the abnormal conditions found in 1995 and 1996. Due to the abnormal high temperatures and low salinity values, pelagic species appeared to be more dispersed and thus less available to the acoustic estimation. During the present survey, the climatic conditions seemed to be cooler than normal, probably indicating an early onset of the autumn season. More than 50% of the biomass was infact located in the northern region, which is a situation typical of the colder season.

Survey	Cunene- Benguela	Benguela- Luanda	Luanda- Cabinda	Benguela- Cabinda	TOTAL
1/85	25	220	80	300	325
2/85	110	190	180	370	480
3/85	0	70	190	260	260
4/85	0	200	110	310	310
1/86	10	140	110	250	260
2/86	10	130	130	260	270
1/89	40	200	60	260	300
2/89	20	40	130	170	190
3/89	40	100	60	160	200
1/91	+	180	120	300	300
2/91	+	68	154	222	222
1/92	+	119	161	280	280
1/94	*	410	100	510	510
2/94	*	245	290	535	535
1/95	*	140	24	164	
2/95	+	277	297	574	574
1/96	49	175	70	245	294
2/96	+	130	233	363	363
1/97		195	†300	495	495

* not surveyed

† surveyed from Congo River to Pta das Palmerinhas

The present estimate of horse mackerel (about 437 000 tonnes, Table 5) shows that the stock is maintaining the high levels recorded in later years. The relatively higher presence of young fish is indicative of good recruitment. The smaller amount of older fish, however, indicates a reduction of their absolute abundance as compared to earlier years.

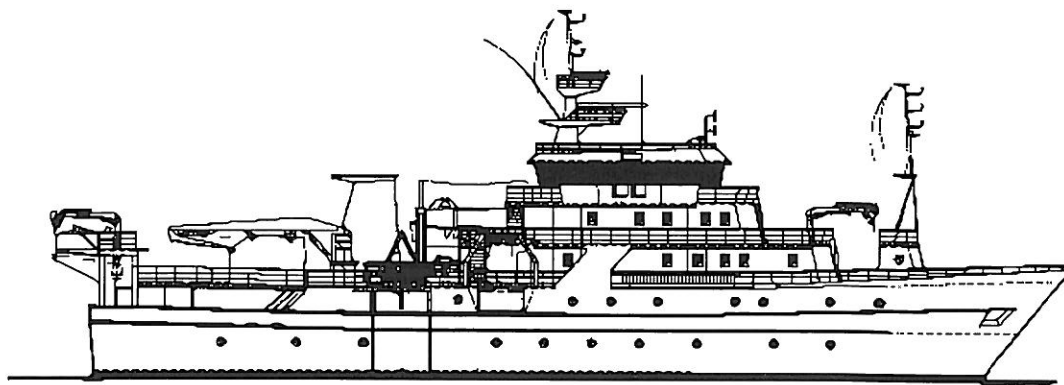
Table 5 Biomass estimates of Cunene horse mackerel by regions and surveys (1 000 tonnes)					
Survey	Cunene-Benguela	Benguela-Luanda	Luanda-Cabinda	Benguela-Cabinda	TOTAL
1/85	30	195	40	235	265
3/85	50	90	40	130	180
4/851/86	100	125	20	145	245
1/89	35	55	40	95	130
3/89	170	40	35	75	245
1/91	100	80	20	100	200
2/91	100	70	30	100	200
1/92	98	86	80	166	264
1/94	*	238	1	239	
2/94	*	130	120	250	
1/95	*	*	84	84	
2/95	70	160	110	270	340
1/96	286	214	6	220	506
2/96	140	157	63	220	360
1/97	234	55	†138	193	427

* not surveyed

† surveyed from Congo River- Pta das Palmerinhas

NORAD - FAO/UNDP PROJECT GLO 92/013

CRUISE REPORTS "DR. FRIDTJOF NANSEN"



SURVEYS OF THE FISH RESOURCES OF ANGOLA

Preliminary Cruise Report No 1/97

**Survey of the pelagic resources
25 February - 20 March 1997**

**Institute of Marine Research
IMR, Bergen**

**Institute of Fisheries Research
IIP, Luanda**

Annex I Records of fishing stations

DR FRIDTJOF NANSEN PROJECT A4 PROJECT STATION 912
 DATE 17/ 7/96 GEAR TYPE BT No.1 POSITION Lat S 909
 start stop duration Long E 1253
 TIME 17:05:00 17:35:00 30 (min) Purpose code: 1
 LOG 3286.90 3288.60 1.70 Area code: 1
 FDEPTH: 57 68 GearCond code: 1
 BDEPTH: 57 68 Validity code: 1
 Towing dir: 270° Wire out: 220 m Speed: 32 kn*10
 Sorted: 65 Kg Total catch: 258.24 CATCH/HOUR: 516.48

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Pagellus bellottii	211.60	3480	40.97
Decapterus punctatus	112.80	224	21.84
Decapterus rhonchus	85.60	160	16.57
Sepia elegans	29.68	48	5.75
Trigla lyra	14.96	112	2.90
Pseudupeneus prayensis	9.92	120	1.92
Dentex barnardi	8.96	40	1.73
Epinephelus aeneus	8.88	16	1.72
Scorpaena stephanica	8.00	112	1.55
Unidentified fish	6.08	96	1.18
Trichiurus lepturus	4.24	8	0.82
Atractoscion aequidens	3.52	8	0.68
Fistularia petimba	3.36	16	0.65
Sardinella maderensis	2.24	8	0.43
Bothus podas africanus	2.00	56	0.39
Citharichthys stampflii	2.00	40	0.39
Dentex angolensis	1.92	24	0.37
Bemrops heterurus	0.72	8	0.14
Total	516.48	100.00	

DR FRIDTJOF NANSEN PROJECT A4 PROJECT STATION 1153
 DATE 27/ 2/97 GEAR TYPE BT No.2 POSITION Lat S 616
 start stop duration Long E 1140
 TIME 09:39:36 09:59:45 20 (min) Purpose code: 1
 LOG 7427.29 7428.20 1.13 Area code: 1
 FDEPTH: 118 117 GearCond code: 1
 BDEPTH: 118 117 Validity code: 1
 Towing dir: 330° Wire out: 400 m Speed: 30 kn*10
 Sorted: 10 Kg Total catch: 37.75 CATCH/HOUR: 113.25

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Dentex congoensis	36.60	600	32.32
Dentex angolensis	30.15	216	26.62
Epinephelus aeneus	20.40	3	18.01
Lepidotrigla cadmani	6.09	84	5.38
Pagellus bellottii	3.51	21	3.10
Lepidotrigla carolae	2.85	114	2.52
Brotula barbata	2.55	3	2.25
Raja miraletus	2.13	6	1.88
Illex coindetii	1.77	30	1.56
Trachurus trecae	1.71	45	1.51
Todaropsis eblanae	1.59	30	1.40
Trichiurus lepturus	0.87	3	0.77
Spicara alta	0.75	15	0.66
Zeus faber	0.75	3	0.66
Saurida brasiliensis	0.60	99	0.53
Chaetodon hoefleri	0.39	3	0.34
Citharus linguatula	0.36	33	0.32
Sepia sp.	0.09	6	0.08
Ariomma bondi	0.09	3	0.08
Total	113.25	99.99	

DR FRIDTJOF NANSEN PROJECT A4 PROJECT STATION 1154
 DATE 27/ 2/97 GEAR TYPE PT No.4 POSITION Lat S 619
 start stop duration Long E 1207
 TIME 13:53:56 14:23:09 29 (min) Purpose code: 1
 LOG 7461.62 7463.75 1.55 Area code: 1
 FDEPTH: 5 5 GearCond code: 1
 BDEPTH: 40 47 Validity code: 1
 Towing dir: 160° Wire out: 200 m Speed: 38 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			

DR FRIDTJOF NANSEN PROJECT A4 PROJECT STATION 1155
 DATE 27/ 2/97 GEAR TYPE PT No.4 POSITION Lat S 630
 start stop duration Long E 1147
 TIME 19:14:13 19:44:06 30 (min) Purpose code: 1
 LOG 7505.40 7507.37 1.99 Area code: 1
 FDEPTH: 5 5 GearCond code: 1
 BDEPTH: 127 122 Validity code: 1
 Towing dir: 93° Wire out: 170 m Speed: 40 kn*10
 Sorted: 3 Kg Total catch: 40.31 CATCH/HOUR: 80.62

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Saurida brasiliensis	33.80	866	41.93
Trachurus trecae	15.70	510	19.47
Trichiurus lepturus	13.12	70	16.27
Euthynnus alletteratus	11.86	12	14.71
Auxis thazard	5.20	6	6.45
Synagrops microlepis	0.40	44	0.50
Hemiramphus balao	0.28	2	0.35
Scomber scombrus	0.14	2	0.17
Illex coindetii	0.12	2	0.15
Total	80.62	100.00	

DR FRIDTJOF NANSEN PROJECT A4 PROJECT STATION 1156
 DATE 27/ 2/97 GEAR TYPE PT No.4 POSITION Lat S 631
 start stop duration Long E 1201
 TIME 21:25:25 21:55:17 30 (min) Purpose code: 1
 LOG 7519.37 7521.20 1.83 Area code: 1
 FDEPTH: 0 0 GearCond code: 1
 BDEPTH: 91 83 Validity code: 1
 Towing dir: 93° Wire out: 170 m Speed: 40 kn*10
 Sorted: 87 Kg Total catch: 231.62 CATCH/HOUR: 463.24

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Selene dorsalis	254.34	900	54.90
Saurida brasiliensis	69.38	13138	14.98
Auxis thazard	64.26	388	13.87
Trachurus trecae	38.34	1830	8.28
Brachydeuterus auritus	14.68	118	3.17
Sardinella maderensis	13.72	70	2.96
Euthynnus alletteratus	4.76	4	1.03
Lagocephalus laevigatus	1.62	10	0.35
Chloroscombrus chrysurus	0.98	4	0.21
Illex coindetii	0.60	10	0.13
Hyperoglyphe moselii	0.28	4	0.06
Trichiurus lepturus	0.28	4	0.06
Total	463.24	100.00	

DR FRIDTJOF NANSEN PROJECT A4 PROJECT STATION 1157
 DATE 27/ 2/97 GEAR TYPE PT No.4 POSITION Lat S 631
 start stop duration Long E 1213
 TIME 23:13:53 23:43:35 30 (min) Purpose code: 1
 LOG 7530.91 7532.76 1.55 Area code: 1
 FDEPTH: 0 0 GearCond code: 1
 BDEPTH: 42 38 Validity code: 1
 Towing dir: 90° Wire out: 170 m Speed: 36 kn*10
 Sorted: Kg Total catch: 39.23 CATCH/HOUR: 78.46

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Sphyræna guachancho	21.90	46	27.91
Engraulis encrasicolus	15.40	9058	19.63
Trachurus trecae	15.40	208	19.63
Sardinella aurita	9.20	72	11.73
Illex coindetii	3.96	2084	5.05
Boops boops	3.88	532	4.95
Decapterus rhonchus	2.04	70	2.60
Sardinella maderensis	1.90	10	2.42
Brachydeuterus auritus	1.56	12	1.99
Trachurus trecae, juvenile	1.10	238	1.40
Saurida brasiliensis	1.10	606	1.40
Sphyræna sphyraena	0.52	2	0.66
Sardinella aurita	0.30	126	0.38
Scomberomorus tritor	0.20	2	0.25
Total	78.46	100.00	

DR FRIDTJOF NANSEN PROJECT A4 PROJECT STATION 1158
 DATE 28/ 2/97 GEAR TYPE PT No.7 POSITION Lat S 632
 start stop duration Long E 1220
 TIME 00:55:34 01:24:31 29 (min) Purpose code: 1
 LOG 7541.01 7542.57 1.85 Area code: 1
 FDEPTH: 0 0 GearCond code: 1
 BDEPTH: 23 29 Validity code: 1
 Towing dir: 280° Wire out: 160 m Speed: 3 kn*10
 Sorted: 1 Kg Total catch: 119.63 CATCH/HOUR: 247.51

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Engraulis encrasicolus	167.38	104611	67.63
Sphyræna guachancho	21.93	91	8.86
Sardinella aurita - Juveniles	17.79	1047	7.19
Ilisha africana	9.83	308	3.97
Chloroscombrus chrysurus	7.80	110	3.15
Decapterus rhonchus	7.32	2094	2.96
Selene dorsalis	3.66	74	1.48
Rhizoprionodon acutus	3.62	2	1.46
Caranx crysos	3.27	12	1.32
Trachinotus ovatus	2.59	12	1.05
Todarodes sagittatus	0.95	10	0.38
Illex coindetii	0.46	157	0.19
Galeoides decadactylus	0.33	4	0.13
Sphyræna sphyraena	0.31	2	0.13
Pagellus bellottii	0.17	2	0.07
Sepiella ornata	0.10	4	0.04
Total	247.51	100.01	

DR FRIDTJOF NANSEN PROJECT A4 PROJECT STATION 1159
 DATE 28/ 2/97 GEAR TYPE PT No.4 POSITION Lat S 637
 start stop duration Long E 1204
 TIME 03:09:46 03:38:19 29 (min) Purpose code: 1
 LOG 7556.44 7558.06 1.61 Area code: 1
 FDEPTH: 0 0 GearCond code: 1
 BDEPTH: 80 84 Validity code: 1
 Towing dir: 280° Wire out: 180 m Speed: 3 kn*10
 Sorted: Kg Total catch: 20.34 CATCH/HOUR: 42.08

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Trachurus trecae	27.00	1281	64.16
Saurida brasiliensis	3.14	604	7.46
Trichiurus lepturus	2.36	2	5.61
Lagocephalus laevigatus	2.32	35	5.51
Brachydeuterus auritus	2.17	21	5.16
Sardinella aurita	2.05	14	4.87
Sardinella maderensis	1.22	6	2.90
EXOCOETIDAE	0.79	2	1.88
Scomber japonicus	0.58	6	1.38
Illex coindetii	0.39	60	0.93
Engraulis encrasicolus	0.06	6	0.14
Total	42.08	100.00	

DR. FRIDTJOF NANSEN PROJECT A4 PROJECT STATION 1160
 DATE 28/ 2/97 GEAR TYPE: BT No.2 POSITION: Lat S 643
 start stop duration Long E 1211
 TIME 08:19:36 08:49:06 30 (min) Purpose code: 1
 LOG 7600.45 7601.75 1.61 Area code: 1
 FDEPTH: 63 64 GearCond code:
 BDEPTH: 63 64 Validity code:
 Towing dir: 252° Wire out: 250 m Speed: 30 kn*10
 Sorted: 9 Kg Total catch: 265.66 CATCH/HOUR: 531.32

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP	
weight numbers				
Trachurus trecae, juvenile	349.60	11218	65.80	2574
Sardinella aurita	115.20	2712	21.68	2573
Trachurus trecae	29.00	58	5.46	
Scomber japonicus	21.20	280	3.99	
Pagellus bellottii	7.52	192	1.42	
Trachinus sp.	3.60	16	0.68	
Sepia sp.	3.28	32	0.62	
Pistularia petimba	1.04	8	0.20	
Saurida brasiliensis	0.64	88	0.12	
Illex coindetii	0.24	32	0.05	
Total	531.32	100.02		

DR. FRIDTJOF NANSEN PROJECT A4 PROJECT STATION 1161
 DATE 28/ 2/97 GEAR TYPE: PT No.7 POSITION: Lat S 641
 start stop duration Long E 1226
 TIME 11:17:56 11:49:56 28 (min) Purpose code: 1
 LOG 7620.31 7620.35 1.60 Area code: 1
 FDEPTH: 0 0 GearCond code:
 BDEPTH: 16 22 Validity code:
 Towing dir: 250° Wire out: 180 m Speed: 3 kn*10
 Sorted: 13 Kg Total catch: 13.08 CATCH/HOUR: 28.03

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP	
weight numbers				
Chaetodipterus lippei	10.50	21	37.46	
Scomber japonicus	10.29	11	36.71	
Sphyræna guachancho	6.43	9	22.94	
Chaetodipterus gorenensis	0.77	2	2.75	
Pistularia petimba	0.04	4	0.14	
Total	28.03	100.00		

DR. FRIDTJOF NANSEN PROJECT A4 PROJECT STATION 1162
 DATE 28/ 2/97 GEAR TYPE: BT No.2 POSITION: Lat S 649
 start stop duration Long E 1201
 TIME 14:22:00 14:52:00 29 (min) Purpose code: 1
 LOG 7643.80 7645.40 1.47 Area code: 1
 FDEPTH: 89 91 GearCond code:
 BDEPTH: 89 91 Validity code:
 Towing dir: 250° Wire out: 320 m Speed: 3 kn*10
 Sorted: Kg Total catch: 119.80 CATCH/HOUR: 247.86

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP	
weight numbers				
Dentex canariensis	67.86	153	27.38	
Epinephelus caninus	46.76	2	18.87	2575
Sparus pagrus pagrus	36.52	66	14.73	
Dentex gibbosus	36.00	35	14.52	
Seriola dumerilii	22.66	2	9.14	
Saurida brasiliensis	14.69	3455	5.93	
Raja miraletus	4.70	8	1.90	
Illex coindetii	3.31	393	1.34	
Mustelus mustelus	3.10	2	1.25	
Sparus auriga	3.00	2	1.21	
Chaetodipterus lippei	2.13	4	0.86	
Lepidotrigla cadmani	1.84	60	0.74	
Sepia orbignyana	1.59	35	0.64	
Citharus linguatula	1.34	89	0.54	
Sparus caeruleostictus	1.18	2	0.48	
Lagocephalus laevigatus	0.93	4	0.38	
Zeus faber	0.33	2	0.13	
Arnoglossus imperialis	0.06	6	0.02	
Total	248.00	100.06		

DR. FRIDTJOF NANSEN PROJECT A4 PROJECT STATION 1163
 DATE 28/ 2/97 GEAR TYPE: PT No.4 POSITION: Lat S 654
 start stop duration Long E 1212
 TIME 18:37:56 19:08:26 31 (min) Purpose code: 1
 LOG 7677.31 7679.19 1.90 Area code: 1
 FDEPTH: 0 0 GearCond code:
 BDEPTH: 78 72 Validity code:
 Towing dir: 90° Wire out: 170 m Speed: 40 kn*10
 Sorted: 3 Kg Total catch: 87.05 CATCH/HOUR: 168.48

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP	
weight numbers				
Saurida brasiliensis	115.35	27360	68.47	
Trachurus trecae	24.00	1204	14.25	2576
Scomberomorus tritor	20.13	4	11.95	
Sphyræna guachancho	4.45	4	2.64	
Brachydeuterus auritus	2.55	15	1.51	
Trichiurus lepturus	1.01	2	0.60	
Sardinella aurita	0.50	2	0.30	
Lagocephalus laevigatus	0.48	2	0.28	
Total	168.47	100.00		

DR. FRIDTJOF NANSEN PROJECT A4 PROJECT STATION 1164
 DATE 28/ 2/97 GEAR TYPE: PT No.4 POSITION: Lat S 652
 start stop duration Long E 1228
 TIME 20:47:23 21:17:30 (min) Purpose code: 1
 LOG 7692.50 7694.63 1.98 Area code: 1
 FDEPTH: 0 0 GearCond code:
 BDEPTH: 25 24 Validity code:
 Towing dir: 90° Wire out: 170 m Speed: 40 kn*10
 Sorted: 37 Kg Total catch: 37.24 CATCH/HOUR: 74.48

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP	
weight numbers				
Scomberomorus tritor	38.40	24	51.56	
Trachinotus gorenensis	15.80	22	21.21	
Sphyræna guachancho	6.50	6	8.73	
Selene dorsalis	5.80	12	7.79	
Elops lacerta	2.94	4	3.81	
Trachinotus ovatus	2.30	4	3.09	
BELONIDAE	0.98	2	1.32	
EXOCOETIDAE	0.50	2	0.67	
Alloteuthis africana	0.46	148	0.62	
Sardinella maderensis - Juv.	0.38	156	0.51	2577
Decapterus rhonchus	0.38	28	0.51	
Boops boops	0.14	34	0.19	
Total	74.48	100.01		

DR. FRIDTJOF NANSEN PROJECT A4 PROJECT STATION 1165
 DATE 1/ 3/97 GEAR TYPE: PT No.4 POSITION: Lat S 703
 start stop duration Long E 1229
 TIME 23:36:07 00:06:22 30 (min) Purpose code: 1
 LOG 7710.24 7712.00 1.79 Area code: 1
 FDEPTH: 0 0 GearCond code:
 BDEPTH: 46 45 Validity code:
 Towing dir: 160° Wire out: 180 m Speed: 35 kn*10
 Sorted: 20 Kg Total catch: 19.96 CATCH/HOUR: 39.92

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP	
weight numbers				
Sphyræna guachancho	18.80	20	47.09	
Illex coindetii	4.48	2634	11.22	
Boops boops	4.00	754	10.02	
Trachinotus ovatus	3.40	6	8.52	
Trachinotus gorenensis	3.00	4	7.52	
Alectis alexandrinus	2.60	2	6.51	
Selene dorsalis	2.26	16	5.71	
Trachurus trecae, juvenile	0.44	116	1.10	2578
Decapterus rhonchus	0.44	16	1.10	
Sepiella ornata	0.42	14	1.05	
Saurida brasiliensis	0.06	30	0.15	
Total	39.92	99.99		

DR. FRIDTJOF NANSEN PROJECT A4 PROJECT STATION 1166
 DATE 1/ 3/97 GEAR TYPE: PT No.4 POSITION: Lat S 705
 start stop duration Long E 1213
 TIME 02:18:17 02:48:55 31 (min) Purpose code: 1
 LOG 7729.10 7730.79 1.83 Area code: 1
 FDEPTH: 0 0 GearCond code:
 BDEPTH: 106 112 Validity code:
 Towing dir: 265° Wire out: 185 m Speed: 36 kn*10
 Sorted: 70 Kg Total catch: 70.22 CATCH/HOUR: 135.91

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP	
weight numbers				
Saurida brasiliensis	96.29	17625	70.85	
Trachurus trecae	18.77	705	13.81	2579
Trachinotus ovatus	9.77	19	7.19	
Trichiurus lepturus	5.48	6	4.03	
Boops boops	2.48	476	1.82	
Echeneis naucrates	1.39	4	1.02	
Illex coindetii	0.89	523	0.65	
Decapterus rhonchus	0.52	19	0.38	
Sepiella ornata	0.14	4	0.10	
Scomber japonicus	0.14	2	0.10	
Selene dorsalis, juveniles	0.04	27	0.03	
Total	135.91	99.98		

DR. FRIDTJOF NANSEN PROJECT A4 PROJECT STATION 1167
 DATE 1/ 3/97 GEAR TYPE: BT No.2 POSITION: Lat S 712
 start stop duration Long E 1229
 TIME 09:02:52 09:22:54 20 (min) Purpose code: 1
 LOG 7782.34 7783.34 1.08 Area code: 1
 FDEPTH: 73 73 GearCond code:
 BDEPTH: 73 73 Validity code:
 Towing dir: 330° Wire out: 330 m Speed: 30 kn*10
 Sorted: 81 Kg Total catch: 752.03 CATCH/HOUR: 2256.09

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP	
weight numbers				
Trachurus trecae	1683.00	28050	74.60	2580
Decapterus rhonchus	211.20	693	9.16	
Pagellus bellottii	173.25	1650	7.68	
Raja miraletus	59.40	99	2.63	
Epinephelus aeneus	34.20	3	1.52	
Scomber japonicus	26.07	231	1.16	
Umbra canariensis	14.85	33	0.66	
Sardinella aurita	9.57	231	0.42	
Chaetodon hoefleri	8.91	66	0.39	
Priacanthus arenatus	8.58	33	0.38	
Spicara alta	7.92	2343	0.35	
Rhinobatos albomaculatus	4.26	3	0.19	
Pseudupeneus prayensis	3.96	33	0.18	
Boops boops	3.96	231	0.18	
Leptocharias smithii	3.69	6	0.16	
Saurida brasiliensis	2.64	429	0.12	
Citharus linguatula	0.63	99	0.03	
Total	2256.09	100.01		

DR FRIDTJOF NANSEN PROJECT A4 PROJECT STATION:1168
 DATE: 1/ 3/97 GEAR TYPE: BT No.2 POSITION:Lat S 717
 start stop duration Long E 1237
 TIME 13:37:58 14:04:10 26 (min) Purpose code: 1
 LOG 7820 64 7821 91 1.36 Area code : 1
 FDEPTH: 60 56 GearCond code:
 BDEPTH: 60 56 Validity code:
 Towing dir: 350° Wire out: 24 m Speed: 31 kn*10
 Sorted: 68 Kg Total catch: 564.66 CATCH/HOUR: 1303.06

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Trachurus trecae	934.15	44003	71.69
Dentex barnardi	51.69	111	3.97
Decapterus rhonchus	48.92	55	3.75
Pagellus bellottii	48.55	1366	3.73
Boops boops	46.52	3877	3.57
Epinephelus aeneus	44.54	5	3.42
Pomadasys incisus	41.54	295	3.19
Alloteuthis africana	33.60	6552	2.58
Sardinella aurita	22.71	720	1.74
Raja miraletus	15.88	18	1.22
Chaetodon hoefferi	4.25	18	0.33
Umbrina canariensis	3.69	18	0.28
Pseudupeneus prayensis	2.58	18	0.20
Lepidotrigla cadmani	2.03	18	0.16
Engraulis encrasicolus	1.85	258	0.14
Fistularia petimba	0.55	37	0.04
Total	1303.05		100.01

DR FRIDTJOF NANSEN PROJECT A4 PROJECT STATION:1169
 DATE: 1/ 3/97 GEAR TYPE: PT No.9 POSITION:Lat S 719
 start stop duration Long E 1234
 TIME 14:57:20 15:27:20 30 (min) Purpose code: 1
 LOG 7827 01 7828 91 1.71 Area code : 1
 FDEPTH: 10 10 GearCond code:
 BDEPTH: 74 66 Validity code:
 Towing dir: 32° Wire out: 200 m Speed: 36 kn*10
 Sorted: Kg Total catch: CATCH/HOUR:

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

DR FRIDTJOF NANSEN PROJECT A4 PROJECT STATION:1170
 DATE: 1/ 3/97 GEAR TYPE: PT No.4 POSITION:Lat S 723
 start stop duration Long E 1242
 TIME 21:19:29 21:49:09 30 (min) Purpose code: 1
 LOG 7881 30 7883 06 1.82 Area code : 1
 FDEPTH: 5 5 GearCond code:
 BDEPTH: 58 62 Validity code:
 Towing dir: 150° Wire out: 170 m Speed: 40 kn*10
 Sorted: 128 Kg Total catch: 2500.00 CATCH/HOUR: 5000.00

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Sardinella aurita	4294.60	38088	85.89
Selene dorsalis	345.12	194	6.90
Scomber scombrus	113.88	1010	2.28
Chloroscombrus chrysurus	107.26	738	2.15
Sardinella maderensis	62.58	388	1.25
Trachurus trecae	37.70	1826	0.75
Sarda sarda	29.14	38	0.58
Brachydeuterus auritus	7.00	78	0.14
Saurida brasiliensis	1.94	234	0.04
Engraulis encrasicolus	0.78	38	0.02
Total	5000.00		100.00

DR FRIDTJOF NANSEN PROJECT A4 PROJECT STATION:1171
 DATE: 2/ 3/97 GEAR TYPE: PT No.4 POSITION:Lat S 730
 start stop duration Long E 1252
 TIME 00:08:33 00:38:19 30 (min) Purpose code: 1
 LOG 7902 33 7903 95 1.62 Area code : 1
 FDEPTH: 0 0 GearCond code:
 BDEPTH: 36 39 Validity code:
 Towing dir: 270° Wire out: 200 m Speed: 36 kn*10
 Sorted: 66 Kg Total catch: 197.43 CATCH/HOUR: 394.86

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Sardinella maderensis	164.40	5832	41.64
Sphyrna guachancho	87.60	180	22.19
Brachydeuterus auritus	37.08	1068	9.39
Trachurus trecae	33.90	1338	8.59
Sardinella aurita	18.78	672	4.76
Scomberomorus tritor	13.98	18	3.54
Saurida brasiliensis	9.24	3422	2.34
Liza ramada	8.64	12	2.19
Ilisha africana	4.56	36	1.15
Selene dorsalis	3.42	18	0.87
Chloroscombrus chrysurus	3.24	18	0.82
Alloteuthis africana	3.12	1068	0.79
BELONIDAE	2.22	6	0.56
Boops boops	1.92	270	0.49
EXOCETIDAE	1.74	6	0.44
Hemiramphus balao	0.90	6	0.23
Sepia orbignyana	0.12	36	0.03
Total	394.86		100.02

DR FRIDTJOF NANSEN PROJECT A4 PROJECT STATION:1172
 DATE: 2/ 3/97 GEAR TYPE: PT No.6 POSITION:Lat S 730
 start stop duration Long E 1239
 TIME 02:01:37 02:31:51 30 (min) Purpose code: 1
 LOG 7913 75 7915 37 1.76 Area code : 1
 FDEPTH: 0 0 GearCond code:
 BDEPTH: 85 93 Validity code:
 Towing dir: 270° Wire out: 170 m Speed: 36 kn*10
 Sorted: 30 Kg Total catch: 327.58 CATCH/HOUR: 655.16

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Trachurus trecae	616.00	31210	94.02
Lagocephalus laevigatus	14.96	176	2.28
Engraulis encrasicolus	11.22	1210	1.71
Saurida brasiliensis	11.00	1716	1.68
Sepia orbignyana	1.32	44	0.20
Alloteuthis africana	0.66	154	0.10
Total	655.16		99.99

DR FRIDTJOF NANSEN PROJECT A4 PROJECT STATION:1173
 DATE: 2/ 3/97 GEAR TYPE: PT No.2 POSITION:Lat S 734
 start stop duration Long E 1231
 TIME 04:57:24 05:27:08 30 (min) Purpose code: 1
 LOG 7933 44 7935 23 1.68 Area code : 1
 FDEPTH: 0 0 GearCond code:
 BDEPTH: 132 119 Validity code:
 Towing dir: 90° Wire out: 180 m Speed: 40 kn*10
 Sorted: Kg Total catch: 100.00 CATCH/HOUR: 200.00

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Sphyrna lewini	200.00	2	100.00
Total	200.00		100.00

DR FRIDTJOF NANSEN PROJECT A4 PROJECT STATION:1174
 DATE: 2/ 3/97 GEAR TYPE: BT No.2 POSITION:Lat S 735
 start stop duration Long E 1258
 TIME 08:51:29 09:06:16 15 (min) Purpose code: 1
 LOG 7961 98 7962 78 0.82 Area code : 1
 FDEPTH: 24 25 GearCond code:
 BDEPTH: 24 25 Validity code:
 Towing dir: 340° Wire out: 150 m Speed: 30 kn*10
 Sorted: 4 Kg Total catch: 605.15 CATCH/HOUR: 2420.60

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Brachydeuterus auritus	1857.20	79244	76.72
Ilisha africana	191.60	6216	7.92
Sphyrna guachancho	80.12	188	3.31
Trichiurus lepturus	79.08	400	3.27
Pteroscacion pelli	49.04	4312	2.03
Galeoides decadactylus	46.92	348	1.94
Pseudolithus typus	22.52	24	0.93
Stromateus fiatola	21.72	80	0.90
Selene dorsalis	20.12	856	0.83
Arius parkii	15.80	24	0.65
Leptocharias smythii	10.80	4	0.45
Chloroscombrus chrysurus	8.56	348	0.35
Sepiella ornata	6.15	184	0.25
Sphyrna sphyraena	4.00	80	0.17
Trachurus trecae	2.68	160	0.11
Eucinostomus melanopterus	2.40	24	0.10
Parapenaeus sp.	1.88	52	0.08
Total	2420.60		100.01

DR FRIDTJOF NANSEN PROJECT A4 PROJECT STATION:1175
 DATE: 2/ 3/97 GEAR TYPE: BT No.2 POSITION:Lat S 737
 start stop duration Long E 1249
 TIME 10:54:12 11:25:05 31 (min) Purpose code: 1
 LOG 7979 02 7980 71 1.67 Area code : 1
 FDEPTH: 68 69 GearCond code:
 BDEPTH: 68 69 Validity code:
 Towing dir: 150° Wire out: 250 m Speed: 31 kn*10
 Sorted: 63 Kg Total catch: 126.62 CATCH/HOUR: 245.07

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Brachydeuterus auritus	133.16	1587	54.34
Trachurus trecae	23.03	1285	9.40
Decapterus rhonchus	16.26	23	6.63
Alloteuthis africana	14.52	7088	5.92
Pagellus bellottii	12.04	314	4.91
Dentex barnardi	11.96	105	4.88
Raja miraletus	11.26	15	4.59
Dentex congoensis	5.23	108	2.13
Dentex angolensis	3.10	128	1.26
Sardinella aurita	2.86	46	1.17
Sepia orbignyana	2.52	15	1.03
Citharus linguatula	1.78	147	0.73
Fistularia petimba	1.28	8	0.52
Trichiurus lepturus	1.24	4	0.51
Sardinella maderensis	1.08	12	0.44
Saurida brasiliensis	0.70	116	0.29
Lepidotrigla cadmani	0.66	4	0.27
Zeus faber	0.54	4	0.22
Arnoglossus imperialis	0.46	58	0.19
Octopus vulgaris	0.39	4	0.16
Grammolites gruvelli	0.39	8	0.16
Lepidotrigla carolae	0.31	27	0.13
Engraulis encrasicolus	0.15	15	0.06
Boops boops	0.15	8	0.06
Total	245.07		100.00

DR FRIDTJOF NANSEN PROJECT A4 PROJECT STATION 1176
 DATE: 2/ 3/97 GEAR TYPE: BT No.2 POSITION: Lat S 738
 start stop duration Long E 1242
 TIME 12:37:14 13:06:56 30 (min) Purpose code: 1
 LOG 7989 43 7991 04 1.46 Area code: 1
 FDEPTH: 98 96 GearCond code: 1
 BDEPTH: 98 96 Validity code: 1
 Towing dir: 360° Wire out: 320 m Speed: 30 kn*10

Sorted: 61 Kg Total catch: 2944 88 CATCH/HOUR: 5889 76

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	5292.94	264598	89.87	2592
Umbina canariensis	253.88	574	4.31	
Dentex congoensis	113.04	382	1.92	
Pomadasy s rogeri	104.42	96	1.77	
Raja miraletus	50.78	96	0.86	
Dentex gibbosus	35.44	96	0.60	
Illex coindetii	14.36	766	0.24	
Dentex angolensis	12.46	192	0.21	
Sepia orbignyana	12.44	96	0.21	
Total	5889.76		99.99	

DR FRIDTJOF NANSEN PROJECT A4 PROJECT STATION 1177
 DATE: 2/ 3/97 GEAR TYPE: PT No.4 POSITION: Lat S 742
 start stop duration Long E 1258
 TIME 16:40:53 18:20:21 29 (min) Purpose code: 1
 LOG 8033 88 8035 54 1.55 Area code: 1
 FDEPTH: 5 5 GearCond code: 1
 BDEPTH: 36 30 Validity code: 1
 Towing dir: 150° Wire out: 170 m Speed: 40 kn*10

Sorted: 10 Kg Total catch: 843.44 CATCH/HOUR: 1745.05

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	843.21	27083	48.32	
Chloroscombrus chrysurus	421.97	5781	24.18	2593
Illex africana	186.25	5007	10.67	
Stromateus fiatola	69.64	182	3.99	
Trachurus trecae	63.27	2959	3.63	2595
Sardinella maderensis	61.68	1479	3.53	2594
Sphyrna afra	35.38	2	2.03	
Rhizoprionodon acutus	15.52	4	0.89	
Trichiurus lepturus	12.29	205	0.70	
Sphyrna guachancho	10.70	46	0.61	
Selene dorsalis	10.01	273	0.57	
Galeoides decacetylus	6.14	23	0.35	
Sardinella aurita	5.46	91	0.31	
Pteroscion pelli	2.73	68	0.16	
Sepiella ornata	1.14	68	0.07	
Penaeus sp.	0.68	68	0.04	
Sphyrna sphyraena	0.68	23	0.04	
Total	1746.75		100.09	

DR FRIDTJOF NANSEN PROJECT A4 PROJECT STATION 1178
 DATE: 2/ 3/97 GEAR TYPE: PT No.4 POSITION: Lat S 747
 start stop duration Long E 1253
 TIME 20:42:13 21:12:03 30 (min) Purpose code: 1
 LOG 8051 39 8052 88 1.67 Area code: 1
 FDEPTH: 5 5 GearCond code: 1
 BDEPTH: 71 81 Validity code: 1
 Towing dir: 270° Wire out: 170 m Speed: 40 kn*10

Sorted: 85 Kg Total catch: 556.83 CATCH/HOUR: 1113.66

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardinella maderensis	722.80	14078	64.90	2596
Sardinella aurita	115.04	1182	10.33	2598
Chloroscombrus chrysurus	94.24	546	8.46	2599
Trichiurus lepturus	85.16	116	7.65	
Trachurus trecae	64.36	4446	5.78	2597
Brachydeuterus auritus	20.54	246	1.84	
Selene dorsalis	4.28	12	0.38	
Engraulis encrasicolus	3.12	402	0.28	
Alectis alexandrinus	2.44	2	0.22	
Sepia officinalis hierredda	1.68	12	0.15	
Total	1113.66		99.99	

DR FRIDTJOF NANSEN PROJECT A4 PROJECT STATION 1179
 DATE: 2/ 3/97 GEAR TYPE: PT No.4 POSITION: Lat S 747
 start stop duration Long E 1245
 TIME 22:06:01 22:36:59 31 (min) Purpose code: 1
 LOG 8058 58 8060 12 1.68 Area code: 1
 FDEPTH: 5 5 GearCond code: 1
 BDEPTH: 106 110 Validity code: 1
 Towing dir: 270° Wire out: 170 m Speed: 30 kn*10

Sorted: 34 Kg Total catch: 2700.47 CATCH/HOUR: 5226.72

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	4753.66	223063	90.95	2600
Trichiurus lepturus	428.67	612	8.20	
Scomber japonicus	21.43	153	0.41	
Brachydeuterus auritus	19.90	153	0.38	
Engraulis encrasicolus	1.53	306	0.03	
Saurida brasiliensis	1.53	306	0.03	
Total	5226.72		100.00	

DR FRIDTJOF NANSEN PROJECT A4 PROJECT STATION 1180
 DATE: 3/ 3/97 GEAR TYPE: PT No.6 POSITION: Lat S 747
 start stop duration Long E 1235
 TIME 23:54:34 00:24:19 30 (min) Purpose code: 1
 LOG 8069 60 8071 11 1.54 Area code: 1
 FDEPTH: 5 5 GearCond code: 1
 BDEPTH: 385 240 Validity code: 1
 Towing dir: 90° Wire out: 180 m Speed: 36 kn*10

Sorted: 88 Kg Total catch: 353.88 CATCH/HOUR: 707.76

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Euthynnus alletteratus	336.00	640	47.47	
Trichiurus lepturus	322.40	368	45.55	
MYCTOPHIDAE	43.92	3928	6.21	
Synagrops microlepis	2.80	360	0.40	
Alloteuthis africana	1.44	624	0.20	
Ictidionus sp.	0.80	144	0.11	
Ariomma bondi	0.32	8	0.05	
Selene dorsalis, juveniles	0.08	88	0.01	
Total	707.76		100.00	

DR FRIDTJOF NANSEN PROJECT A4 PROJECT STATION 1181
 DATE: 3/ 3/97 GEAR TYPE: PT No.9 POSITION: Lat S 752
 start stop duration Long E 1244
 TIME 04:00:49 04:29:45 29 (min) Purpose code: 1
 LOG 8092 87 8094 51 1.73 Area code: 1
 FDEPTH: 5 5 GearCond code: 1
 BDEPTH: 117 112 Validity code: 1
 Towing dir: 90° Wire out: 200 m Speed: 30 kn*10

Sorted: 28 Kg Total catch: 90.10 CATCH/HOUR: 186.41

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	109.92	4924	58.97	2601
Saurida sp.	29.69	9037	15.93	
Euthynnus alletteratus	14.38	10	7.71	
Selene dorsalis	13.66	25	7.33	
Caramx crysos	6.00	4	3.22	
Illex coindetii	4.14	269	2.22	
Sepia officinalis hierredda	2.75	68	1.48	
BLONIDAE	1.92	6	1.03	
Trichiurus lepturus	1.55	2	0.83	
Echeneis naucrates	1.32	4	0.71	
Trachinotus ovatus	1.03	2	0.55	
Lagocephalus laevigatus	0.06	6	0.03	
Total	186.42		100.01	

DR FRIDTJOF NANSEN PROJECT A4 PROJECT STATION 1182
 DATE: 3/ 3/97 GEAR TYPE: BT No.2 POSITION: Lat S 753
 start stop duration Long E 1305
 TIME 07:13:06 07:28:27 15 (min) Purpose code: 1
 LOG 8114 59 8115 40 0.83 Area code: 1
 FDEPTH: 23 24 GearCond code: 1
 BDEPTH: 23 24 Validity code: 1
 Towing dir: 325° Wire out: 145 m Speed: 30 kn*10

Sorted: 26 Kg Total catch: 3500.00 CATCH/HOUR: 14000.00

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Chloroscombrus chrysurus	9485.44	1207288	67.75	2604
Trachurus trecae	1772.08	168508	12.66	2603
Sardinella maderensis	1125.20	46204	8.04	2602
Illex africana	467.48	19024	3.34	
Pteroscion pelli	440.28	26636	3.14	
Selene dorsalis	298.96	16308	2.14	
Trichiurus lepturus	168.52	2176	1.20	
Stromateus fiatola	125.04	544	0.89	
Decapterus rhonchus	59.60	2716	0.43	
Pomadasy incisus	27.16	544	0.19	
Pomadasy rogeri	11.60	8	0.08	
Sphyrna lewini	10.40	8	0.07	
Sepia elegans	5.44	544	0.04	
Arius parkii	1.60	4	0.01	
Penaeus notialis	1.00	20	0.01	
Total	14000.00		99.99	

DR FRIDTJOF NANSEN PROJECT A4 PROJECT STATION 1183
 DATE: 3/ 3/97 GEAR TYPE: BT No.2 POSITION: Lat S 802
 start stop duration Long E 1246
 TIME 12:16:37 12:47:39 31 (min) Purpose code: 1
 LOG 8161 11 8162 73 1.57 Area code: 1
 FDEPTH: 122 157 GearCond code: 1
 BDEPTH: 122 157 Validity code: 1
 Towing dir: 270° Wire out: 430 m Speed: 30 kn*10

Sorted: 68 Kg Total catch: 136.10 CATCH/HOUR: 263.42

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Boops boops	79.55	3240	30.20	
Spicara alta	42.97	619	16.31	
Dentex angolensis	40.06	186	15.21	
Dentex macropthalmus	24.97	345	9.48	
Trachurus trecae	22.45	871	8.52	2605
Lepidotrigla cadmani	10.41	132	3.95	
Zenopsis conchifer	7.63	12	2.90	
Trichiurus lepturus	7.16	8	2.72	
Dentex barnardi	6.31	128	2.40	
Illex coindetii	3.99	139	1.51	
Citharus linguatula	2.94	105	1.12	
Brotula barbata	2.79	4	1.06	
Zeus faber	2.48	12	0.94	
Fagellus bellottii	2.05	19	0.78	
Ephippion guttifer	1.47	4	0.56	
Sparus pagrus pagrus *	1.32	8	0.50	
Aulopus cadenati	0.97	8	0.37	
Uranoscopus polli	0.77	4	0.29	
Octopus vulgaris	0.74	4	0.28	
Pontinus accraensis	0.58	4	0.22	
Cynoglossus browni	0.43	4	0.16	
Peristidion cataphractum	0.35	19	0.13	
Vanstraelenia chirophthalmus	0.31	8	0.12	
Sepia officinalis hierredda	0.23	4	0.09	
Sepia officinalis hierredda	0.15	12	0.06	
Sardinella maderensis	0.15	4	0.06	
Scorpaena stephanica	0.12	4	0.05	
Arnoglossus imperialis	0.08	12	0.03	
Total	263.43		100.02	

DR FRIDTJOF NANSEN PROJECT A4 PROJECT STATION 1184
 DATE: 3/ 3/97 GEAR TYPE: PT No.5 POSITION: Lat S 802
 start stop duration Long E 1259
 TIME 14:42:33 15:12:44 30 (min) Purpose code: 1
 LOG 8177 13 8179 15 0.28 Area code: 1
 FDEPTH: 0 0 GearCond code: 1
 BDEPTH: 82 83 Validity code: 1
 Towing dir: 90° Wire out: 200 m Speed: 40 kn*10

Sorted: 6 Kg Total catch: 5.61 CATCH/HOUR: 11.22

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Scomberomorus tritor	4.04	2	36.01	
Alloteuthis africana	3.60	1974	32.09	
Sardinella maderensis	3.16	12	28.16	2606
Lagocephalus laevigatus	0.30	4	2.67	
Echeneis naucrates	0.12	2	1.07	
Total	11.22		100.00	

DR FRIDTJOF NANSEN PROJECT A4 PROJECT STATION 1185
 DATE: 3/ 3/97 GEAR TYPE: PT No:5 POSITION Lat S 807
 TIME start stop duration Purpose code: 1 Long E 1302
 LOG 18 20 51 18 50 50 30 (min) Area code: 1
 FDEPTH: 5 5 GearCond code: 1
 BDEPTH: 81 90 Validity code: 1
 Towing dir: 270° Wire out: 170 m Speed: 40 kn*10
 Sorted: 14 Kg Total catch: 190.10 CATCH/HOUR: 380.20

SPECIES	CATCH/HOUR	% OF TOT	C	SAMP
	weight numbers			
Sardinella maderensis	178.00	800	46.82	2608
Trichiurus lepturus	79.00	240	20.78	
Sardinella aurita	39.50	320	10.39	2609
Trachurus trecae	31.10	1060	8.18	2607
Alloteuthis africana	27.00	4240	7.10	
Brachydeuterus auritus	14.70	100	3.87	
Scomberomorus tritor	3.56	2	0.94	
Sphyræna guachancho	2.74	2	0.72	
Sepiella ornata	2.40	30	0.63	
Saurida brasiliensis	2.20	280	0.58	
Total	380.20		100.01	

DR FRIDTJOF NANSEN PROJECT A4 PROJECT STATION 1186
 DATE: 3/ 3/97 GEAR TYPE: PT No:4 POSITION Lat S 812
 TIME start stop duration Purpose code: 1 Long E 1259
 LOG 22 39 08 23 08 38 30 (min) Area code: 1
 FDEPTH: 5 5 GearCond code: 1
 BDEPTH: 105 95 Validity code: 1
 Towing dir: 90° Wire out: 170 m Speed: 34 kn*10
 Sorted: 159 Kg Total catch: 159.30 CATCH/HOUR: 318.60

SPECIES	CATCH/HOUR	% OF TOT	C	SAMP
	weight numbers			
Mobula rochebrunei	160.00	2	50.22	
Trichiurus lepturus	112.00	252	35.15	
Trachurus trecae	24.20	42	7.60	2610
Selene dorsalis	17.40	38	5.46	
Sphyræna guachancho	2.50	2	0.78	
Sarda sarda	2.04	2	0.64	
Brachydeuterus auritus	0.40	2	0.13	
Saurida brasiliensis	0.06	10	0.02	
Total	318.60		100.00	

DR FRIDTJOF NANSEN PROJECT A4 PROJECT STATION 1187
 DATE: 4/ 3/97 GEAR TYPE: PT No:2 POSITION Lat S 812
 TIME start stop duration Purpose code: 1 Long E 1308
 LOG 00 17 29 00 45 58 28 (min) Area code: 1
 FDEPTH: 5 5 GearCond code: 1
 BDEPTH: 58 50 Validity code: 1
 Towing dir: 90° Wire out: 180 m Speed: 36 kn*10
 Sorted: 103 Kg Total catch: 2978.74 CATCH/HOUR: 6383.01

SPECIES	CATCH/HOUR	% OF TOT	C	SAMP
	weight numbers			
Sardinella maderensis	4614.04	61806	72.29	2611
Trachurus trecae	905.64	10560	14.19	2612
Brachydeuterus auritus	502.18	8499	7.87	
Sardinella aurita	137.34	1714	2.15	2613
Chloroscombrus chrysurus	98.72	943	1.55	
Trichiurus lepturus	53.21	171	0.83	
Sphyræna guachancho	43.61	2	0.68	
Alectis alexandrinus	18.86	4	0.30	
Ilisha africana	6.00	86	0.09	
Alloteuthis africana	1.71	943	0.03	
Sepia juveniles	1.71	343	0.03	
Total	6383.02		100.01	

DR FRIDTJOF NANSEN PROJECT A4 PROJECT STATION 1188
 DATE: 4/ 3/97 GEAR TYPE: PT No:7 POSITION Lat S 814
 TIME start stop duration Purpose code: 1 Long E 1316
 LOG 02 15 54 02 44 15 28 (min) Area code: 1
 FDEPTH: 0 0 GearCond code: 1
 BDEPTH: 22 18 Validity code: 1
 Towing dir: 160° Wire out: 150 m Speed: 36 kn*10
 Sorted: 63 Kg Total catch: 377.49 CATCH/HOUR: 808.91

SPECIES	CATCH/HOUR	% OF TOT	C	SAMP
	weight numbers			
Brachydeuterus auritus	578.57	45489	71.52	
Ilisha africana	64.29	2160	7.95	
Sphyræna guachancho	57.86	193	7.15	
Trachurus trecae	52.71	3947	6.52	2614
Chloroscombrus chrysurus	13.89	257	1.72	
Hemicaranx bicolor	12.21	64	1.51	
Selene dorsalis	5.66	231	0.70	
Arius parkii	5.21	2	0.64	
Trichiurus lepturus	3.60	77	0.45	
Loligo vulgaris	3.34	193	0.41	
Galeoides decadactylus	3.09	13	0.38	
Sardinella maderensis	2.96	90	0.37	
Sphyræna guachancho	2.83	13	0.35	2615
Eucinostomus melanopterus	2.06	39	0.25	
Sepia juveniles	0.64	26	0.08	
Total	808.92		100.00	

DR FRIDTJOF NANSEN PROJECT A4 PROJECT STATION 1189
 DATE: 4/ 3/97 GEAR TYPE: PT No:5 POSITION Lat S 817
 TIME start stop duration Purpose code: 1 Long E 1307
 LOG 04 22 40 04 51 11 29 (min) Area code: 1
 FDEPTH: 5 5 GearCond code: 1
 BDEPTH: 72 82 Validity code: 1
 Towing dir: 270° Wire out: 170 m Speed: 40 kn*10
 Sorted: Kg Total catch: 1222.46 CATCH/HOUR: 2529.23

SPECIES	CATCH/HOUR	% OF TOT	C	SAMP
	weight numbers			
Manta birostris	2068.97	2	81.80	
Trichiurus lepturus	269.59	863	10.66	
Scomberomorus tritor	105.52	48	4.17	
Selene dorsalis	25.76	60	1.02	
Sardinella aurita	19.76	112	0.78	2616
Euthynnus alletteratus	16.66	10	0.66	
Sardinella maderensis	12.21	48	0.48	2617
Brachydeuterus auritus	5.71	31	0.23	
Trachurus trecae	3.52	4	0.14	
Remora sp	1.03	4	0.04	
Echeneis naucrates	0.52	4	0.02	
Total	2529.25		100.00	

DR FRIDTJOF NANSEN PROJECT A4 PROJECT STATION 1190
 DATE: 4/ 3/97 GEAR TYPE: BT No:2 POSITION Lat S 832
 TIME start stop duration Purpose code: 1 Long E 1312
 LOG 13 04 28 13 34 17 30 (min) Area code: 1
 FDEPTH: 68 60 GearCond code: 1
 BDEPTH: 68 60 Validity code: 1
 Towing dir: * Wire out: 240 m Speed: 30 kn*10
 Sorted: 56 Kg Total catch: 224.12 CATCH/HOUR: 448.24

SPECIES	CATCH/HOUR	% OF TOT	C	SAMP
	weight numbers			
Trichiurus lepturus	157.60	640	35.16	
Trachurus trecae	139.60	744	31.14	2618
Sepia officinalis hierreda	23.76	48	5.30	
Brachydeuterus auritus	16.80	104	3.75	
Selene dorsalis	14.00	48	3.12	
Torpedo torpedo	13.52	40	3.02	
Pagellus bellottii	13.44	104	3.00	
Alloteuthis africana	11.84	4144	2.64	
Citharus linguatula	11.20	296	2.50	
Brotula barbata	10.72	24	2.39	
GOBIIDAE	8.80	2856	1.96	
Decapterus rhonchus	7.92	8	1.77	
Dentex barnardi	5.92	64	1.32	
Chloroscombrus chrysurus	3.92	48	0.87	
Stromateus fiatola	1.92	8	0.43	
BRCSO1	1.60	8	0.36	
Chaetodon hoefleri	1.20	8	0.27	
Sepiella ornata	0.80	56	0.18	
Bembrops heterurus	0.80	16	0.18	
Dentex angolensis	0.80	8	0.18	
Zeus faber	0.80	24	0.18	
Pterothrissus belloci	0.64	16	0.14	
Parapenaeus longirostris	0.64	184	0.14	
Total	448.24		100.00	

DR FRIDTJOF NANSEN PROJECT A4 PROJECT STATION 1191
 DATE: 5/ 3/97 GEAR TYPE: PT No:7 POSITION Lat S 838
 TIME start stop duration Purpose code: 1 Long E 1320
 LOG 19 41 58 20 12 35 31 (min) Area code: 1
 FDEPTH: 5 33 GearCond code: 1
 BDEPTH: 25 33 Validity code: 1
 Towing dir: 270° Wire out: 170 m Speed: 30 kn*10
 Sorted: 39 Kg Total catch: 117.76 CATCH/HOUR: 227.92

SPECIES	CATCH/HOUR	% OF TOT	C	SAMP
	weight numbers			
Sardinella maderensis	60.77	700	26.66	2619
Trachurus trecae	56.90	4293	24.96	2622
Brachydeuterus auritus	55.94	395	24.54	2621
Sardinella aurita	14.59	124	6.40	2623
Trichiurus lepturus	12.00	39	5.27	2620
Galeoides decadactylus	7.90	19	3.47	
Hemicaranx bicolor	7.35	27	3.22	
Chloroscombrus chrysurus	5.50	54	2.41	
Sphyræna guachancho	2.21	4	0.97	
Sepia officinalis hierreda	1.70	31	0.75	
Penaeus notialis	0.93	19	0.41	
Atractosteus semidens	0.93	4	0.41	
Lagocephalus laevisgatus	0.70	4	0.31	
Eucinostomus melanopterus	0.50	4	0.22	
Total	227.92		100.00	

DR FRIDTJOF NANSEN PROJECT A4 PROJECT STATION 1192
 DATE: 5/ 3/97 GEAR TYPE: PT No:4 POSITION Lat S 838
 TIME start stop duration Purpose code: 1 Long E 1303
 LOG 21 59 48 22 30 59 31 (min) Area code: 1
 FDEPTH: 5 5 GearCond code: 1
 BDEPTH: 118 152 Validity code: 1
 Towing dir: 270° Wire out: 165 m Speed: 40 kn*10
 Sorted: 92 Kg Total catch: 91.50 CATCH/HOUR: 177.10

SPECIES	CATCH/HOUR	% OF TOT	C	SAMP
	weight numbers			
Trichiurus lepturus	85.30	528	48.16	2625
Trichurus lepturus	61.80	161	34.90	2626
Selene dorsalis	27.97	68	15.79	2624
Euthynnus alletteratus	2.03	2	1.15	
Total	177.10		100.00	

DR FRIDTJOF NANSEN PROJECT A4 PROJECT STATION 1193
 DATE: 6/ 3/97 GEAR TYPE: PT No:4 POSITION Lat S 843
 TIME start stop duration Purpose code: 1 Long E 1311
 LOG 01 16 03 01 45 43 30 (min) Area code: 1
 FDEPTH: 5 5 GearCond code: 1
 BDEPTH: 76 66 Validity code: 1
 Towing dir: 90° Wire out: 180 m Speed: 36 kn*10
 Sorted: 56 Kg Total catch: 281.65 CATCH/HOUR: 563.30

SPECIES	CATCH/HOUR	% OF TOT	C	SAMP
	weight numbers			
Chloroscombrus chrysurus	194.80	2936	70.09	2628
Sardinella maderensis	79.06	332	14.04	2629
Sphyræna guachancho	32.00	6	5.68	
Trachurus trecae	29.20	760	5.18	2630
Sarda sarda	12.72	16	2.26	
Sardinella aurita	6.40	26	1.14	2631
Selene dorsalis	5.64	24	1.00	
Trichiurus lepturus	2.96	16	0.53	
Sepiella ornata	0.32	8	0.06	
Total	563.10		99.98	

DR. FRIDTJOF NANSEN PROJECT A4 PROJECT STATION: 1194
 DATE: 6/ 3/97 GEAR TYPE: PT No.4 POSITION: Lat S 853
 start stop duration Purpose code: 1
 TIME 06:32:10 07:02:31 30 (min) Area code: 1
 LOG 8482.60 8484.35 1.90 GearCond code: 1
 FDEPTH: 5 5 Validity code:
 BDEPTH: 90 125
 Towing dir: 260° Wire out: 175 m Speed: 40 kn*10
 Sorted: 4 Kg Total catch: 3.76 CATCH/HOUR: 7.52

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP	
	weight numbers			
Sardinella maderensis	3.56	14	47.34	2632
Chloroscombrus chrysurus	2.56	18	34.04	2633
Trachinotus ovatus	1.22	4	16.22	
Trachurus trecae, juvenile	0.10	10	1.33	
Sepia officinalis hierredda	0.04	2	0.53	
Trachurus trecae	0.04	2	0.53	
Total	7.52	99.99		

DR. FRIDTJOF NANSEN PROJECT A4 PROJECT STATION: 1195
 DATE: 6/ 3/97 GEAR TYPE: BT No.2 POSITION: Lat S 857
 start stop duration Purpose code: 1
 TIME 08:46:50 09:01:58 15 (min) Area code: 1
 LOG 8497.13 8497.83 0.84 GearCond code: 1
 FDEPTH: 181 177 Validity code:
 BDEPTH: 181 177
 Towing dir: 207° Wire out: 580 m Speed: 30 kn*10
 Sorted: 100 Kg Total catch: 597.84 CATCH/HOUR: 2391.36

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP	
	weight numbers			
Trachurus trecae	1468.80	3148	61.42	2635
Synagrops microlepis	322.80	33552	13.50	
Trichiurus lepturus	288.00	840	12.04	
Pterothrissus bellocci	74.40	336	3.11	
Brotula barbata	69.60	144	2.91	
Dentex macrophthalmus	62.40	288	2.61	2634
Parapenaeus longirostris	57.60	11520	2.41	
Zenopsis conchifer	27.60	72	1.15	
Torpedo torpedo	6.00	24	0.25	
Umbrina canariensis	4.80	24	0.20	
Chelidonichthys gabonensis	4.32	24	0.18	
Dentex angolensis	2.40	24	0.10	
Thorogobius angolensis	2.40	72	0.10	
Coelorinchus acanthiger	0.24	24	0.01	
Total	2391.36	99.99		

DR. FRIDTJOF NANSEN PROJECT A4 PROJECT STATION: 1196
 DATE: 6/ 3/97 GEAR TYPE: PT No.6 POSITION: Lat S 900
 start stop duration Purpose code: 1
 TIME 10:39:12 11:10:42 32 (min) Area code: 1
 LOG 8509.07 8511.13 1.89 GearCond code: 1
 FDEPTH: 5 5 Validity code:
 BDEPTH: 234 271
 Towing dir: 260° Wire out: 180 m Speed: 34 kn*10
 Sorted: 30 Kg Total catch: 30.32 CATCH/HOUR: 56.85

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP	
	weight numbers			
Selene dorsalis	40.03	120	70.41	2638
Sardinella maderensis	10.59	38	18.63	2637
Sardinella aurita	5.25	19	9.23	2636
Trachinotus ovatus	0.54	4	0.95	
Echeneis naucrates	0.43	2	0.76	
Total	56.84	99.98		

DR. FRIDTJOF NANSEN PROJECT STATION: 1197
 DATE: 6/ 3/97 GEAR TYPE: PT No.7 POSITION: Lat S 910
 start stop duration Purpose code: 1
 TIME 15:02:54 15:32:54 30 (min) Area code: 1
 LOG 8544.86 8546.56 1.81 GearCond code: 1
 FDEPTH: 0 0 Validity code:
 BDEPTH: 19 18
 Towing dir: 268° Wire out: 120 m Speed: 36 kn*10
 Sorted: 26 Kg Total catch: 25.74 CATCH/HOUR: 51.48

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP	
	weight numbers			
Sphyræna guachancho	29.90	48	58.08	2639
Scomber japonicus	8.72	6	16.94	
Stromateus fiatola	5.64	4	10.96	
Trachinotus goreensis	3.90	8	7.58	
Caranx hippos	3.20	4	6.22	
Sepiella ornata	0.06	2	0.12	
Citharus linguatula	0.06	2	0.12	
Total	51.48	100.02		

DR. FRIDTJOF NANSEN PROJECT STATION: 1198
 DATE: 6/ 3/97 GEAR TYPE: PT No.5 POSITION: Lat S 911
 start stop duration Purpose code: 1
 TIME 18:10:56 18:42:48 32 (min) Area code: 1
 LOG 8566.82 8568.65 1.80 GearCond code: 1
 FDEPTH: 5 5 Validity code:
 BDEPTH: 539 636
 Towing dir: 268° Wire out: 170 m Speed: 40 kn*10
 Sorted: 143 Kg Total catch: 142.57 CATCH/HOUR: 267.32

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP	
	weight numbers			
MYCTOPHIDAE	157.84	157838	59.05	
Euthynnus alletteratus	30.94	23	11.57	
Trichiurus lepturus	21.84	186	8.17	2640
Cubiceps sp	21.84	431	8.17	
Katsuwonus pelamis	20.44	11	7.65	
Brama brama	7.43	53	2.78	
Ommastrephes pteropus	4.11	24	1.54	
Desmodema polyictica	1.73	34	0.65	
Aricmma bondi	0.86	14	0.32	
Gempylus serpens	0.30	2	0.11	
Total	267.33	100.01		

PROJECT STATION: 1199
 DATE: 7/ 3/97 GEAR TYPE: PT No.6 POSITION: Lat S 918
 start stop duration Purpose code: 1
 TIME 23:48:17 00:17:57 30 (min) Area code: 1
 LOG 8609.46 8611.19 1.73 GearCond code: 1
 FDEPTH: 0 0 Validity code:
 BDEPTH: 68 55
 Towing dir: 100° Wire out: 170 m Speed: 34 kn*10
 Sorted: 97 Kg Total catch: 388.48 CATCH/HOUR: 776.96

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP	
	weight numbers			
Sardinella maderensis	258.00	1536	33.21	2642
Brotula barbata	242.40	2568	31.20	2643
Selene dorsalis	126.40	448	16.27	2644
Trachurus trecae	59.60	1120	7.67	2641
Trichiurus lepturus	40.00	208	5.15	2645
Sphyræna guachancho	21.20	16	2.73	
Trichiurus lepturus	20.40	40	2.63	2646
Alloteuthis africana	4.56	2456	0.59	
Sardinella aurita	2.64	24	0.34	
Sepia officinalis hierredda	0.56	8	0.07	
Illex coindetii	0.32	32	0.04	
Synagrops microlepis	0.32	40	0.04	
Saurida brasiliensis	0.24	48	0.03	
Selene dorsalis, juveniles	0.16	56	0.02	
Sepiella ornata	0.16	8	0.02	
Trichiurus lepturus	0.00			2646
Total	776.96	100.01		

PROJECT STATION: 1200
 DATE: 7/ 3/97 GEAR TYPE: PT No.2 POSITION: Lat S 926
 start stop duration Purpose code: 1
 TIME 02:42:02 03:11:38 30 (min) Area code: 1
 LOG 8630.59 8632.26 2.18 GearCond code: 1
 FDEPTH: 0 0 Validity code:
 BDEPTH: 44 52
 Towing dir: 270° Wire out: 170 m Speed: 34 kn*10
 Sorted: 18 Kg Total catch: 88.64 CATCH/HOUR: 177.28

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP	
	weight numbers			
Trachurus trecae	102.30	4482	57.71	2650
Trichiurus lepturus	55.30	180	31.19	2649
Sardinella maderensis	5.16	46	2.91	2648
Sardinella aurita	4.66	44	2.63	2647
Decapterus rhonchus	3.90	18	2.20	
Alloteuthis africana	3.54	1266	2.00	
Sphyræna guachancho	1.48	2	0.83	
Scomber japonicus	0.34	2	0.19	
Boops boops	0.30	18	0.17	
Sepia juveniles	0.18	6	0.10	
Saurida brasiliensis	0.12	36	0.07	
Total	177.28	100.00		

PROJECT STATION: 1201
 DATE: 7/ 3/97 GEAR TYPE: PT No.7 POSITION: Lat S 940
 start stop duration Purpose code: 1
 TIME :09:18:10 09:48:18 30 (min) Area code: 1
 LOG 8688.58 8690.27 1.47 GearCond code: 1
 FDEPTH: 5 5 Validity code:
 BDEPTH: 26 25
 Towing dir: 168° Wire out: 150 m Speed: 40 kn*10
 Sorted: 8 Kg Total catch: 8.00 CATCH/HOUR: 16.00

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP	
	weight numbers			
Sphyræna guachancho	14.00	18	87.50	2651
Chloroscombrus chrysurus	2.00	8	12.50	
Total	16.00	100.00		

PROJECT STATION: 1202
 DATE: 7/ 3/97 GEAR TYPE: BT No.2 POSITION: Lat S 945
 start stop duration Purpose code: 1
 TIME 13:22:00 13:41:21 19 (min) Area code: 1
 LOG 8717.57 8718.50 1.09 GearCond code: 1
 FDEPTH: 234 239 Validity code:
 BDEPTH: 234 239
 Towing dir: 332° Wire out: 360 m Speed: 31 kn*10
 Sorted: 29 Kg Total catch: 264.44 CATCH/HOUR: 835.07

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP	
	weight numbers			
Synagrops microlepis	367.58	24227	44.02	
MYCTOPHIDAE	114.95	85895	13.77	
Merluccius polli	72.00	1162	8.62	
Trichiurus lepturus	55.07	328	6.59	2654
Dentex macrophthalmus	49.58	243	5.94	2653
Illex coindetii	45.73	581	5.48	
Dentex angolensis	44.53	104	5.33	2652
Zenopsis conchifer	34.61	733	4.14	
Parapenaeus longirostris	25.52	20236	3.06	
Pterothrissus bellocci	11.12	152	1.33	
Malacocephalus laevis	10.11	531	1.21	
Alloteuthis africana	2.27	960	0.27	
Saurida brasiliensis	2.02	253	0.24	
Total	835.09	100.00		

PROJECT STATION: 1203
 DATE: 7/ 3/97 GEAR TYPE: PT No:1 POSITION: Lat S 957 Long E 1309
 start stop duration
 TIME 18:30:56 19:00:23 29 (min) Purpose code: 1
 LOG 8761.55 8763.17 1.60 Area code: 1
 FDEPTH: 5 5 GearCond code: 1
 BDEPTH: 57 69 Validity code: 1
 Towing dir: 266° Wire out: 170 m Speed: 30 kn*10
 Sorted: 90 Kg Total catch: 1192.38 CATCH/HOUR: 2466.99

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	1661.38	16053	67.34	2657
Chloroscombrus chrysurus	276.00	1918	11.19	2660
Selene dorsalis	187.86	1314	7.61	2659
Sphyræna guachancho	122.17	157	4.95	2658
Trachurus trecae	110.36	1600	4.47	2656
Sardinella maderensis	96.00	430	3.89	2655
Trichiurus lepturus	6.83	25	0.28	
Saurida brasiliensis	5.77	848	0.23	
Total	2466.37		99.96	

PROJECT STATION: 1204
 DATE: 7/ 3/97 GEAR TYPE: PT No:5 POSITION: Lat S 1006 Long E 1301
 start stop duration
 TIME 22:24:07 22:54:18 30 (min) Purpose code: 1
 LOG 8792.29 8794.07 2.03 Area code: 1
 FDEPTH: 5 5 GearCond code: 1
 BDEPTH: 101 97 Validity code: 1
 Towing dir: 84° Wire out: 170 m Speed: 40 kn*10
 Sorted: 23 Kg Total catch: 126.03 CATCH/HOUR: 252.06

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	93.20	3232	36.98	2661
Lagocephalus laevis	77.60	648	30.79	
Selene dorsalis	55.50	132	22.02	2662
Saurida brasiliensis	6.00	880	2.38	
Illex coindetii	5.60	488	2.22	
Trichiurus lepturus	5.20	6	2.06	
Euthynnus alletteratus	3.38	24	1.34	
Scomber japonicus	2.82	22	1.12	
Trachinotus ovatus	1.00	2	0.40	
GOBIIDAE	0.88	688	0.35	
Sepia officinalis hierredda	0.88	40	0.35	
Total	252.06		100.01	

PROJECT STATION: 1205
 DATE: 8/ 3/97 GEAR TYPE: PT No:2 POSITION: Lat S 1005 Long E 1317
 start stop duration
 TIME 00:30:17 00:58:55 29 (min) Purpose code: 1
 LOG 8806.24 8808.01 1.60 Area code: 1
 FDEPTH: 0 0 GearCond code: 1
 BDEPTH: 27 25 Validity code: 1
 Towing dir: 125° Wire out: 180 m Speed: 36 kn*10
 Sorted: 61 Kg Total catch: 257.17 CATCH/HOUR: 532.08

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	268.97	2623	50.55	2665
Engraulis encrasicolus	67.86	9046	12.75	
Galeoides decadaetulus	41.79	141	7.85	
Chloroscombrus chrysurus	41.38	323	7.78	2663
Selene dorsalis	24.33	132	4.57	2664
Sphyræna guachancho	20.28	33	3.81	
Pomadasys incisus	18.79	33	3.53	
Trachurus trecae	18.00	106	3.38	2666
Decapterus rhonchus	16.97	33	3.19	
Trichiurus lepturus	8.52	41	1.60	
Sphyræna sphyraena	2.98	8	0.56	
Sardinella maderensis	2.15	58	0.40	
Total	532.02		99.97	

PROJECT STATION: 1206
 DATE: 8/ 3/97 GEAR TYPE: PT No:4 POSITION: Lat S 1018 Long E 1321
 start stop duration
 TIME 07:01:10 07:31:59 31 (min) Purpose code: 1
 LOG 8863.24 8865.18 1.67 Area code: 1
 FDEPTH: 0 0 GearCond code: 1
 BDEPTH: 56 49 Validity code: 1
 Towing dir: 85° Wire out: 170 m Speed: 40 kn*10
 Sorted: 2 Kg Total catch: 1.89 CATCH/HOUR: 3.66

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardinella maderensis	1.68	4	45.90	
Brachydeuterus auritus	0.87	6	23.77	
Tylosurus acus rafale	0.77	2	21.04	
Engraulis encrasicolus	0.33	12	9.02	
Total	3.65		99.73	

PROJECT STATION: 1207
 DATE: 8/ 3/97 GEAR TYPE: PT No:7 POSITION: Lat S 1024 Long E 1330
 start stop duration
 TIME 08:59:10 09:30:37 31 (min) Purpose code: 1
 LOG 8876.68 8878.65 1.90 Area code: 1
 FDEPTH: 10 10 GearCond code: 1
 BDEPTH: 24 20 Validity code: 1
 Towing dir: 147° Wire out: 170 m Speed: 35 kn*10
 Sorted: 36 Kg Total catch: 36.47 CATCH/HOUR: 70.59

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Chloroscombrus chrysurus	50.31	358	71.27	2667
Sardinella maderensis	13.84	197	19.61	2668
Sardinella aurita	2.71	23	3.84	2669
Sphyrna lewini	1.94	2	2.75	
Sphyræna guachancho	1.66	2	2.35	
Sepiella ornata	0.12	4	0.17	
Total	70.58		99.99	

PROJECT STATION: 1208
 DATE: 8/ 3/97 GEAR TYPE: BT No:2 POSITION: Lat S 1027 Long E 1318
 start stop duration
 TIME 11:26:54 11:55:22 28 (min) Purpose code: 1
 LOG 8892.49 8893.86 1.42 Area code: 1
 FDEPTH: 96 101 GearCond code: 1
 BDEPTH: 96 101 Validity code: 1
 Towing dir: 265° Wire out: 350 m Speed: 28 kn*10
 Sorted: 33 Kg Total catch: 325.55 CATCH/HOUR: 697.61

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	555.43	20848	79.62	2672
Illex coindetii	39.92	4629	5.72	
Dentex macrophthalmus	23.25	161	3.33	2673
Chloroscombrus chrysurus	18.86	133	2.70	2671
Squatina oculata	13.31	19	1.91	
Selene dorsalis	9.43	19	1.35	2670
Zeus faber	7.71	39	1.11	
Todarodes sagittatus	5.40	135	0.77	
Trichiurus lepturus	3.64	4	0.52	
Citharus linguatula	3.09	174	0.44	
Pagellus bellottii	2.85	34	0.41	
Saurida brasiliensis	2.70	366	0.39	
Sepia bertheloti	2.51	28	0.36	
Dentex angolensis	2.14	28	0.31	
Lepidotrigla cadmani	1.93	19	0.28	
Pontinus accoraensis	1.74	19	0.25	
Dentex barnardi	1.54	9	0.22	
Sphyræna guachancho	1.39	2	0.20	
Lepidotrigla carolae	0.77	19	0.11	
Total	697.61		100.00	

PROJECT STATION: 1209
 DATE: 8/ 3/97 GEAR TYPE: BT No:2 POSITION: Lat S 1036 Long E 1313
 start stop duration
 TIME 13:45:24 14:15:05 30 (min) Purpose code: 1
 LOG 8908.23 8909.52 1.51 Area code: 1
 FDEPTH: 182 228 GearCond code: 1
 BDEPTH: 182 228 Validity code: 1
 Towing dir: 162° Wire out: 580 m Speed: 30 kn*10
 Sorted: 31 Kg Total catch: 218.19 CATCH/HOUR: 436.38

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Merluccius polli	160.30	2184	36.73	
Zenopsis conchifer	135.10	112	30.96	
Dentex macrophthalmus	73.50	546	16.84	2671
Illex coindetii	19.04	364	4.36	
Synagrops microlepis	12.88	798	2.95	
Dentex angolensis	12.60	42	2.89	2672
Spicara alta	6.70	42	1.76	
Pterothrissus belloci	6.30	56	1.44	
Brotula barbata	4.34	14	0.99	
Parapenaeus longirostris	1.82	406	0.42	
Grammolites cruvelli	0.98	14	0.22	
Chlorophthalmus atlanticus	0.98	98	0.22	
Citharus linguatula	0.42	84	0.10	
Malacocephalus laevis	0.28	28	0.06	
Saurida brasiliensis	0.14	14	0.03	
Total	436.38		99.97	

PROJECT STATION: 1210
 DATE: 8/ 3/97 GEAR TYPE: PT No:6 POSITION: Lat S 1035 Long E 1334
 start stop duration
 TIME 16:46:39 17:19:52 33 (min) Purpose code: 1
 LOG 8930.35 8932.37 2.20 Area code: 2
 FDEPTH: 5 5 GearCond code: 2
 BDEPTH: 46 54 Validity code: 1
 Towing dir: 263° Wire out: 190 m Speed: 40 kn*10
 Sorted: 53 Kg Total catch: 161.91 CATCH/HOUR: 294.38

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sphyræna guachancho	109.55	118	37.21	2677
Selene dorsalis	77.73	327	26.40	2678
Chloroscombrus chrysurus	38.87	218	13.20	2676
Sardinella maderensis	35.27	124	11.98	2673
Trichiurus lepturus	15.69	13	5.33	
Sardinella aurita	11.91	67	4.05	2674
Trachurus trecae	5.36	15	1.82	2675
Total	294.38		99.99	

PROJECT STATION: 1211
 DATE: 8/ 3/97 GEAR TYPE: PT No:5 POSITION: Lat S 1042 Long E 1324
 start stop duration
 TIME 20:24:33 20:56:17 32 (min) Purpose code: 1
 LOG 8960.98 8962.93 1.86 Area code: 2
 FDEPTH: 5 5 GearCond code: 2
 BDEPTH: 117 123 Validity code: 1
 Towing dir: 256° Wire out: 170 m Speed: 40 kn*10
 Sorted: 34 Kg Total catch: 693.75 CATCH/HOUR: 1300.78

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	1186.31	45744	91.20	2679
Mobula rochebrunei	93.75	2	7.21	
Euthynnus alletteratus	6.47	4	0.50	
Breemaceros nectabanus	4.99	2779	0.38	
Saurida brasiliensis	3.92	891	0.30	
Scomber japonicus	3.56	36	0.27	
Lagocephalus laevis	1.78	36	0.14	
Total	1300.78		100.00	

PROJECT STATION: 1212
 DATE: 9/ 3/97 GEAR TYPE: PT No.6 POSITION: Lat S 1045 Long E 1336
 start stop duration
 TIME 03:47:16 04:17:42 30 (min) Purpose code: 1
 LOG 9015.37 9017.26 1.81 Area code: 2
 FDEPTH: 0 0 GearCond code:
 BDEPTH: 70 62 Validity code:
 Towing dir: 86° Wire out: 175 m Speed: 36 kn*10
 Sorted: 100 Kg Total catch: 1265.17 CATCH/HOUR: 2530.34

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	861.34	8508	34.04	
Selene dorsalis	443.34	1370	17.52	2682
Trachurus trecae	410.40	17194	16.22	2681
Trichurus lepturus	373.66	1244	14.77	2683
Sardinella maderensis	304.80	1066	12.05	2680
Euthynnus alletteratus	51.94	24	2.05	
Sepia bertheloti	30.40	50	1.20	
Trachinotus ovatus	22.80	76	0.90	
Sardinella aurita	14.44	50	0.57	
Alloteuthis africana	6.84	2154	0.27	
Scomber japonicus	4.56	24	0.18	
Total	2524.52		99.77	

PROJECT STATION: 1216
 DATE: 9/ 3/97 GEAR TYPE: PT No.4 POSITION: Lat S 1123 Long E 1338
 start stop duration
 TIME 17:55:51 18:26:34 31 (min) Purpose code: 1
 LOG 9120.04 9121.80 2.10 Area code: 1
 FDEPTH: 5 5 GearCond code:
 BDEPTH: 38 45 Validity code:
 Towing dir: 280° Wire out: 175 m Speed: 35 kn*10
 Sorted: 72 Kg Total catch: 799.37 CATCH/HOUR: 1547.17

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	1314.68	13988	84.97	2688
Trachurus trecae	172.45	4833	11.15	2689
Sardinella aurita	20.01	213	1.29	2690
Sphyræna guachancho	15.12	21	0.98	
Alloteuthis africana	12.99	3896	0.84	
Chloroscombrus chrysurus	8.30	43	0.54	
Trachinotus ovatus	2.55	21	0.16	
Sepiella ornata	1.06	43	0.07	
Total	1547.16		100.00	

PROJECT STATION: 1213
 DATE: 9/ 3/97 GEAR TYPE: BT No.2 POSITION: Lat S 1054 Long E 1334
 start stop duration
 TIME 07:22:24 07:43:28 21 (min) Purpose code: 1
 LOG 9043.67 9044.73 1.18 Area code: 1
 FDEPTH: 118 118 GearCond code:
 BDEPTH: 118 118 Validity code:
 Towing dir: 150° Wire out: 370 m Speed: 30 kn*10
 Sorted: 35 Kg Total catch: 1920.40 CATCH/HOUR: 5486.86

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Synagrops microlepis	2671.43	226286	48.69	
Trachurus trecae	2286.57	85643	41.67	2684
Dentex macrophthalmus	116.29	786	2.12	
Trichurus lepturus	113.14	3143	2.06	
Illex coindetii	83.29	2286	1.52	
Pterothrissus belloci	58.14	314	1.06	
Pontinus accraensis	44.00	157	0.80	
Zenopsis conchifer	40.86	314	0.74	
Scorpaena normani	33.00	157	0.60	
Todaropsis eblanae	29.86	157	0.54	
Brotula barbata	10.29	11	0.19	
Total	5486.87		99.99	

PROJECT STATION: 1217
 DATE: 9/ 3/97 GEAR TYPE: PT No.5 POSITION: Lat S 1124 Long E 1330
 start stop duration
 TIME 19:26:21 19:57:00 31 (min) Purpose code: 1
 LOG 9127.87 9129.89 2.18 Area code: 1
 FDEPTH: 5 5 GearCond code:
 BDEPTH: 82 269 Validity code:
 Towing dir: 270° Wire out: 180 m Speed: 40 kn*10
 Sorted: 36 Kg Total catch: 232.44 CATCH/HOUR: 449.88

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
MYCTOPHIDAE	321.68	296930	71.50	
Selene dorsalis	75.48	163	16.78	
Hemicaranx bicolor	38.61	27	8.58	
Trachinotus ovatus	8.42	35	1.87	
Trichurus lepturus	5.69	674	1.26	
Total	449.88		99.99	

PROJECT STATION: 1218
 DATE: 9/ 3/97 GEAR TYPE: PT No.5 POSITION: Lat S 1131 Long E 1331
 start stop duration
 TIME 21:46:15 22:15:42 29 (min) Purpose code: 1
 LOG 9142.17 9144.20 1.74 Area code: 1
 FDEPTH: 5 5 GearCond code:
 BDEPTH: 93 80 Validity code:
 Towing dir: 90° Wire out: 180 m Speed: 40 kn*10
 Sorted: 66 Kg Total catch: 153.62 CATCH/HOUR: 317.83

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardinella maderensis	126.83	381	39.90	2693
Trachurus trecae, juvenile	69.52	2671	21.87	2692
Trachurus trecae	43.45	70	13.67	2691
Trichurus lepturus	25.86	74	8.14	2694
Synagrops microlepis	11.59	1928	3.65	
Brachydeuterus auritus	10.55	70	3.32	
Trachinotus ovatus	8.48	21	2.67	
Sardinella aurita	8.28	41	2.61	2695
Sphyræna guachancho	5.34	4	1.68	
Scomber japonicus	2.94	17	0.93	
Alloteuthis africana	2.52	575	0.79	
Bregmaceros sp.	2.15	1076	0.68	
Sepiella ornata	0.33	17	0.10	
Total	317.84		100.01	

PROJECT STATION: 1214
 DATE: 9/ 3/97 GEAR TYPE: BT No.2 POSITION: Lat S 1103 Long E 1342
 start stop duration
 TIME 10:12:50 10:28:23 16 (min) Purpose code: 1
 LOG 9065.60 9066.42 0.86 Area code: 1
 FDEPTH: 74 69 GearCond code:
 BDEPTH: 74 69 Validity code:
 Towing dir: 86° Wire out: 270 m Speed: 30 kn*10
 Sorted: 36 Kg Total catch: 213.18 CATCH/HOUR: 799.43

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Synagrops microlepis	519.75	154508	65.02	
Trichurus lepturus	158.63	1125	19.84	2685
Trachurus trecae	77.63	2475	9.71	2686
Brotula barbata	7.88	23	0.99	
GOBIDAE	6.30	1485	0.79	
Dentex barnardi	5.63	23	0.70	
Pterothrissus belloci	4.73	113	0.59	
Torpedo torpedo	4.50	23	0.56	
Sepiella ornata	3.60	45	0.45	
Scomber japonicus	3.38	23	0.42	
Citharus linguatula	3.38	68	0.42	
Atractoscion aequidens	2.48	23	0.31	
Parapenaeus longirostris	1.13	495	0.14	
Merluccius polli	0.23	23	0.03	
Boops boops	0.23	23	0.03	
Total	799.48		100.00	

PROJECT STATION: 1219
 DATE: 10/ 3/97 GEAR TYPE: PT No.2 POSITION: Lat S 1132 Long E 1341
 start stop duration
 TIME 23:57:36 00:27:46 30 (min) Purpose code: 1
 LOG 9153.04 9154.83 1.63 Area code: 2
 FDEPTH: 0 0 GearCond code:
 BDEPTH: 35 31 Validity code: 1
 Towing dir: 90° Wire out: 180 m Speed: 32 kn*10
 Sorted: 34 Kg Total catch: 164.30 CATCH/HOUR: 328.60

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	150.40	1688	45.77	2701
Trichurus lepturus	54.58	106	16.61	2696
Trachurus trecae	42.40	928	12.90	2698
Alloteuthis africana	17.44	5864	5.31	
Trachurus trecae, juvenile	16.56	4792	5.04	2697
Sardinella maderensis	14.40	360	4.38	2700
Sardinella aurita	10.32	128	3.14	2699
Engraulis encrasicolus	10.00	1560	3.04	
Trachinotus goreensis	8.08	16	2.46	
Trichurus lepturus	1.62	10	0.49	2707
Trachinotus ovatus	1.52	16	0.46	
Sphyræna guachancho	1.20	8	0.37	
Boops boops	0.08	8	0.02	
Total	328.60		99.99	

PROJECT STATION: 1215
 DATE: 9/ 3/97 GEAR TYPE: PT No.2 POSITION: Lat S 1118 Long E 1341
 start stop duration
 TIME 15:26:33 15:47:25 21 (min) Purpose code: 1
 LOG 9107.35 9108.54 1.36 Area code: 1
 FDEPTH: 0 0 GearCond code:
 BDEPTH: 26 22 Validity code:
 Towing dir: * Wire out: 200 m Speed: 38 kn*10
 Sorted: 6 Kg Total catch: 5.62 CATCH/HOUR: 16.06

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachinotus ovatus	8.60	17	53.55	
Scomberomorus tritor	7.46	3	46.45	
Total	16.06		100.00	

PROJECT STATION: 1220
 DATE: 10/ 3/97 GEAR TYPE: PT No.7 POSITION: Lat S 1133 Long E 1345
 start stop duration
 TIME 01:06:45 01:36:54 30 (min) Purpose code: 1
 LOG 9158.00 9159.66 1.81 Area code: 1
 FDEPTH: 5 5 GearCond code:
 BDEPTH: 22 24 Validity code:
 Towing dir: 171° Wire out: 180 m Speed: 36 kn*10
 Sorted: 50 Kg Total catch: 108.59 CATCH/HOUR: 217.18

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
<i>Ilisha africana</i>	90.30	1524	41.58	
<i>Trichiurus lepturus</i>	37.80	74	17.40	2705
<i>Brachydeuterus auritus</i>	21.00	690	9.67	2703
<i>Sardinella maderensis</i>	18.30	134	8.43	2702
<i>Synagrops microlepis</i>	12.06	930	5.55	
<i>Galeoides decadactylus</i>	5.94	42	2.74	
<i>Trichiurus lepturus</i>	5.50	212	2.53	2708
<i>Stromateus fiatola</i>	4.86	6	2.24	
<i>Trachurus trecae</i>	4.50	144	2.07	2704
<i>Lagocephalus laevigatus</i>	3.24	6	1.49	
<i>Mustelus mustelus</i>	2.52	6	1.16	
<i>Eucinostomus melanopterus</i>	1.98	24	0.91	
<i>Trachurus trecae, juvenile</i>	1.92	474	0.88	2706
<i>Chloroscombrus chrysurus</i>	1.44	180	0.66	
<i>Sepia officinalis hierredda</i>	1.38	42	0.64	
<i>Engraulis encrasicolus</i>	1.38	450	0.64	
<i>Alloteuthis africana</i>	1.32	858	0.61	
<i>Atractoscion aequidens</i>	1.02	6	0.47	
<i>Sardinella aurita</i>	0.48	6	0.22	
<i>Sepia bertheloti</i>	0.24	12	0.11	
Total	217.18		100.00	

PROJECT STATION: 1221
 DATE: 10/ 3/97 GEAR TYPE: PT No.6 POSITION: Lat S 1136 Long E 1326
 start stop duration
 TIME 04:05:23 04:35:53 31 (min) Purpose code: 1
 LOG 9181.75 9183.38 1.86 Area code: 1
 FDEPTH: 0 0 GearCond code:
 BDEPTH: 126 137 Validity code:
 Towing dir: 275° Wire out: 180 m Speed: 34 kn*10
 Sorted: 33 Kg Total catch: 748.13 CATCH/HOUR: 1447.99

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
<i>Trachurus trecae</i>	1135.74	37740	78.44	2709
<i>Mobula rochebrunei</i>	232.26	4	16.04	
<i>Lepidochelys olivacea</i>	58.26	2	4.02	
<i>Selene dorsalis</i>	9.87	21	0.68	
<i>Trachinotus ovatus</i>	9.39	19	0.65	
<i>Trichiurus lepturus</i>	2.36	2	0.16	
<i>Hemiramphus balao</i>	0.31	2	0.02	
Total	1448.19		100.01	

PROJECT STATION: 1222
 DATE: 10/ 3/97 GEAR TYPE: PT No.2 POSITION: Lat S 1150 Long E 1342
 start stop duration
 TIME 09:31:09 09:52:36 21 (min) Purpose code: 1
 LOG 9223.38 9224.64 1.21 Area code: 1
 FDEPTH: 45 45 GearCond code:
 BDEPTH: 45 45 Validity code:
 Towing dir: 180° Wire out: 165 m Speed: 30 kn*10
 Sorted: 105 Kg Total catch: 1059.15 CATCH/HOUR: 3026.14

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
<i>Trichiurus lepturus</i>	954.29	1857	31.53	2713
<i>Trachurus trecae, juvenile</i>	857.14	366486	28.32	2712
<i>Brachydeuterus auritus</i>	374.29	3971	12.37	2710
<i>Trachurus trecae</i>	221.43	4543	7.32	2714
<i>Selene dorsalis</i>	201.43	743	6.66	2711
<i>Pomadourus incisus</i>	99.14	743	3.28	
<i>Dentex barnardi</i>	75.43	200	2.49	
<i>Pagellus bellottii</i>	50.57	429	1.67	
<i>Atractoscion aequidens</i>	32.00	29	1.06	
<i>Umbrina canariensis</i>	24.29	114	0.80	
<i>Raja miraletus</i>	22.29	29	0.74	
<i>Pomadourus jubelini</i>	20.57	29	0.68	
<i>Chloroscombrus chrysurus</i>	20.29	143	0.67	
<i>Decapterus rhonchus</i>	19.71	29	0.65	
<i>Epinephelus aeneus</i>	18.14	9	0.60	
<i>Chaetodon hoefleri</i>	10.29	57	0.34	
<i>Pseudupeneus prayensis</i>	9.43	57	0.31	
<i>Priacanthus arenatus</i>	8.57	29	0.28	
<i>Chelidonichthys capensis</i>	4.57	29	0.15	
<i>Citharus linguatula</i>	1.71	57	0.06	
<i>Bembrops sp.</i>	0.57	29	0.02	
Total	3026.15		100.00	

PROJECT STATION: 1223
 DATE: 10/ 3/97 GEAR TYPE: PT No.6 POSITION: Lat S 1158 Long E 1342
 start stop duration
 TIME 14:06:15 14:40:44 34 (min) Purpose code: 1
 LOG 9260.02 9262.28 1.31 Area code: 1
 FDEPTH: 5 5 GearCond code:
 BDEPTH: 35 36 Validity code:
 Towing dir: 100° Wire out: 190 m Speed: 38 kn*10
 Sorted: 82 Kg Total catch: 82.19 CATCH/HOUR: 145.04

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
<i>Sardinella maderensis</i>	117.97	358	81.34	2715
<i>Sardinella aurita</i>	14.12	32	9.74	2716
<i>Sarda sarda</i>	4.15	4	2.86	
<i>Sphyraena guachancho</i>	3.53	4	2.43	
<i>Scomberomorus tritor</i>	3.14	2	2.16	
<i>Trachinotus ovatus</i>	1.18	4	0.81	
<i>Chloroscombrus chrysurus</i>	0.83	4	0.57	
<i>Sepiella ornata</i>	0.07	2	0.05	
<i>Sepia officinalis hierredda</i>	0.05	2	0.03	
Total	145.04		99.99	

PROJECT STATION: 1224
 DATE: 10/ 3/97 GEAR TYPE: PT No.5 POSITION: Lat S 1211 Long E 1337
 start stop duration
 TIME 18:18:55 18:27:01 8 (min) Purpose code: 1
 LOG 9295.53 9296.06 0.50 Area code: 1
 FDEPTH: 5 5 GearCond code:
 BDEPTH: 44 41 Validity code:
 Towing dir: 180° Wire out: 170 m Speed: 40 kn*10
 Sorted: 67 Kg Total catch: 274.10 CATCH/HOUR: 2055.75

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
<i>Sardinella maderensis</i>	1245.60	3833	60.59	2721
<i>Chloroscombrus chrysurus</i>	284.85	1860	13.86	2718
<i>Trachurus trecae</i>	213.38	615	10.38	2719
<i>Trichiurus lepturus</i>	179.85	525	8.75	2720
<i>Scomber japonicus</i>	75.75	135	3.68	2717
<i>Sardinella aurita</i>	19.73	53	0.96	
<i>Trachurus trecae</i>	14.93	653	0.73	2722
<i>Galeoides decadactylus</i>	8.25	15	0.40	
<i>Pomatomus saltatrix</i>	6.30	8	0.31	
<i>Selene dorsalis</i>	4.73	23	0.23	
<i>Engraulis encrasicolus</i>	2.40	473	0.12	2723
Total	2055.77		100.01	

PROJECT STATION: 1225
 DATE: 10/ 3/97 GEAR TYPE: PT No.5 POSITION: Lat S 1212 Long E 1327
 start stop duration
 TIME 20:02:42 20:33:03 30 (min) Purpose code: 1
 LOG 9308.74 9310.55 1.94 Area code: 1
 FDEPTH: 5 5 GearCond code:
 BDEPTH: 104 114 Validity code:
 Towing dir: 265° Wire out: 165 m Speed: 40 kn*10
 Sorted: 39 Kg Total catch: 511.58 CATCH/HOUR: 1023.16

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
MYCTOPHIDAE	582.12	523710	56.89	
<i>Trachurus trecae</i>	429.00	13790	41.93	2724
<i>Euthynnus alletteratus</i>	6.10	4	0.60	
<i>Cubiceps sp.</i>	5.94	132	0.58	
Total	1023.16		100.00	

PROJECT STATION: 1226
 DATE: 11/ 3/97 GEAR TYPE: PT No.6 POSITION: Lat S 1224 Long E 1328
 start stop duration
 TIME 23:48:16 00:19:48 32 (min) Purpose code: 1
 LOG 9338.95 9340.88 1.69 Area code: 2
 FDEPTH: 0 0 GearCond code:
 BDEPTH: 61 52 Validity code:
 Towing dir: 220° Wire out: 176 m Speed: 38 kn*10
 Sorted: 34 Kg Total catch: 242.92 CATCH/HOUR: 455.48

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
<i>Trichiurus lepturus</i>	167.29	506	36.73	2727
<i>Chloroscombrus chrysurus</i>	92.91	488	20.40	2726
<i>Selene dorsalis</i>	68.91	227	15.13	2725
<i>Trichiurus lepturus</i>	32.55	98	7.15	2728
<i>Trachurus trecae</i>	27.94	75	6.13	2730
<i>Sphyraena guachancho</i>	17.25	11	3.79	
<i>Trachurus trecae, juvenile</i>	11.74	1029	2.58	2729
<i>Sepia officinalis hierredda</i>	8.85	13	1.94	
<i>Stromateus fiatola</i>	4.65	4	1.02	
<i>Sardinella maderensis</i>	3.28	23	0.72	
<i>Alloteuthis africana</i>	3.23	263	0.71	
<i>Agyrosomus hololepidotus</i>	2.78	2	0.61	
<i>Atractoscion aequidens</i>	2.59	2	0.57	
<i>Sardinella aurita</i>	2.33	6	0.51	
<i>Caranx crysos</i>	1.95	2	0.43	
<i>Trachinotus ovatus</i>	1.93	6	0.42	
<i>Decapterus rhonchus</i>	1.39	6	0.31	
<i>Brachydeuterus auritus</i>	0.98	6	0.22	
<i>Sphyraena sphyraena</i>	0.83	6	0.18	
<i>Scomber japonicus</i>	0.77	2	0.17	
<i>Engraulis encrasicolus</i>	0.71	229	0.16	
<i>Sepia bertheloti</i>	0.53	13	0.12	
MYCTOPHIDAE	0.13	144	0.03	
Total	455.52		100.03	

PROJECT STATION: 1227
 DATE: 11/ 3/97 GEAR TYPE: PT No.6 POSITION: Lat S 1229 Long E 1320
 start stop duration
 TIME 03:16:43 03:45:41 29 (min) Purpose code: 1
 LOG 9364.87 9366.72 1.81 Area code: 2
 FDEPTH: 0 0 GearCond code:
 BDEPTH: 97 257 Validity code:
 Towing dir: 274° Wire out: 180 m Speed: 38 kn*10
 Sorted: 55 Kg Total catch: 55.09 CATCH/HOUR: 113.98

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
<i>Selene dorsalis</i>	63.72	134	55.90	2731
MYCTOPHIDAE	41.38	23448	36.30	
<i>Trachinotus ovatus</i>	5.48	19	4.81	
<i>Trichiurus lepturus</i>	2.05	2	1.80	
<i>Lagocephalus laevigatus</i>	1.34	23	1.16	
Total	113.97		99.99	

PROJECT STATION 1228
 DATE: 11/ 3/97 GEAR TYPE: BT No.2 POSITION: Lat S 1219 Long E 1328
 start stop duration
 TIME 15:29:11 15:58:08 29 (min) Purpose code: 1
 LOG 9453 60 9455 05 1.52 Area code: 2
 FDEPTH: 88 97 GearCond code: 1
 BDEPTH: 88 97 Validity code: 1
 Towing dir: 300° Wire out: 308 m Speed: 30 kn*10
 Sorted: 67 Kg Total catch: 569.16 CATCH/HOUR: 1177.57

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	782.59	2075	66.46	2732
Dentex macropthalmus	121.34	1037	10.30	
Trachurus trecae, juvenile	109.03	7070	9.26	2733
Dentex gibbosus	51.87	35	4.40	
Pagellus bellottii	22.51	157	1.91	
Trichiurus lepturus	21.10	52	1.79	
Sparus pagrus africanus *	14.77	35	1.25	
Scorpaena angolensis	13.72	17	1.17	
Umbrina canariensis	11.26	35	0.96	
Dentex barnardi	9.85	35	0.84	
Lepidotrigla cadmani	8.09	87	0.69	
Citharus linguatula	3.87	106	0.33	
Uranoscopus polli	3.68	17	0.31	
Illex coindetii	1.94	246	0.16	
Boops boops	1.06	17	0.09	
Dentex angolensis	0.89	17	0.08	
Total	1177.57		100.00	

PROJECT STATION 1229
 DATE: 11/ 3/97 GEAR TYPE: PT No.4 POSITION: Lat S 1234 Long E 1320
 start stop duration
 TIME 18:50:35 19:06:04 15 (min) Purpose code: 1
 LOG 9478 04 9478 96 1.05 Area code: 2
 FDEPTH: 5 5 GearCond code: 1
 BDEPTH: 35 41 Validity code: 1
 Towing dir: 10° Wire out: 175 m Speed: 40 kn*10
 Sorted: 10 Kg Total catch: 349.89 CATCH/HOUR: 1399.56

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	1079.92	3212	77.16	2734
Trichiurus lepturus	170.52	636	12.18	2735
Scomber japonicus	32.00	68	2.29	
Chloroscombrus chrysurus	27.52	108	1.97	
Sardinella maderensis	24.60	140	1.76	2736
Sarda sarda	18.00	16	1.29	
Sardinella aurita	16.12	100	1.15	2737
Selene dorsalis	12.56	44	0.90	
Decapterus rhonchus	10.56	20	0.75	
Sphyaena sphyraena	3.60	12	0.26	
Sepia officinalis hierredda	2.56	4	0.18	
Mugil curema	1.60	4	0.11	
Total	1399.56		100.00	

PROJECT STATION 1230
 DATE: 11/ 3/97 GEAR TYPE: PT No.4 POSITION: Lat S 1225 Long E 1327
 start stop duration
 TIME 21:36:30 21:56:38 20 (min) Purpose code: 1
 LOG 9500 05 9501 14 1.19 Area code: 1
 FDEPTH: 5 5 GearCond code: 1
 BDEPTH: 66 67 Validity code: 1
 Towing dir: 10° Wire out: 175 m Speed: 40 kn*10
 Sorted: 25 Kg Total catch: 57.01 CATCH/HOUR: 171.03

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichiurus lepturus	145.50	522	85.07	2739
Trachurus trecae	7.32	45	4.28	
Sepia orbignyana	3.39	6	1.98	
Sphyaena sphyraena	3.33	3	1.95	
Sardinella maderensis	3.12	15	1.82	
Selene dorsalis	2.16	9	1.26	
Trachurus trecae, juvenile	1.86	606	1.09	2738
Engraulis encrasicolus	1.56	600	0.91	2740
Sphyaena sphyraena	1.44	12	0.84	
Sardinella aurita	0.75	3	0.44	
Scomber japonicus	0.60	3	0.35	
Total	171.03		99.99	

PROJECT STATION 1231
 DATE: 12/ 3/97 GEAR TYPE: PT No.5 POSITION: Lat S 1216 Long E 1331
 start stop duration
 TIME 00:20:12 00:49:53 30 (min) Purpose code: 1
 LOG 9521 89 9523 49 1.82 Area code: 1
 FDEPTH: 0 0 GearCond code: 1
 BDEPTH: 79 90 Validity code: 1
 Towing dir: 305° Wire out: 175 m Speed: 36 kn*10
 Sorted: 44 Kg Total catch: 179.65 CATCH/HOUR: 359.30

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichiurus lepturus	136.00	350	37.85	2743
Trachurus trecae	100.80	218	28.05	2741
Trachurus trecae, juvenile	78.00	7900	21.71	2742
Sarda sarda	22.60	18	6.29	
Sardinella maderensis	14.60	122	4.06	2744
Trachinotus ovatus	1.84	4	0.51	
Scomber japonicus	1.72	6	0.48	
Sphyaena sphyraena	1.46	4	0.41	
Sardinella aurita	1.38	8	0.38	
Sepia bertheloti	0.84	24	0.23	
Illex coindetii	0.06	4	0.02	
Total	359.30		99.99	

PROJECT STATION 1232
 DATE: 12/ 3/97 GEAR TYPE: PT No.6 POSITION: Lat S 1207 Long E 1339
 start stop duration
 TIME 02:41:52 03:10:38 29 (min) Purpose code: 1
 LOG 9539 94 9541 45 1.63 Area code: 1
 FDEPTH: 0 0 GearCond code: 1
 BDEPTH: 37 59 Validity code: 1
 Towing dir: 300° Wire out: 175 m Speed: 34 kn*10
 Sorted: 105 Kg Total catch: 1154.45 CATCH/HOUR: 2388.52

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardinella maderensis	905.79	2549	37.92	2743
Trachurus trecae	565.10	1639	23.66	2744
Sardinella aurita	519.12	1297	21.73	2742
Chloroscombrus chrysurus	249.21	1502	10.43	2746
Trachurus trecae, juvenile	56.44	3664	2.36	2745
Engraulis encrasicolus	44.83	8284	1.88	2747
Sphyaena sphyraena	13.20	46	0.55	
Trichiurus lepturus	11.83	46	0.50	
Selene dorsalis	11.15	68	0.47	
Decapterus rhonchus	10.24	23	0.43	
Braichydeuterus auritus	1.37	23	0.06	
Sepia bertheloti	0.23	23	0.01	
Total	2388.51		100.00	

PROJECT STATION 1233
 DATE: 12/ 3/97 GEAR TYPE: PT No.5 POSITION: Lat S 1156 Long E 1342
 start stop duration
 TIME 05:35:03 06:08:44 34 (min) Purpose code: 1
 LOG 9563 34 9565 40 2.27 Area code: 1
 FDEPTH: 5 5 GearCond code: 1
 BDEPTH: 43 43 Validity code: 1
 Towing dir: 10° Wire out: 175 m Speed: 40 kn*10
 Sorted: 67 Kg Total catch: 659.89 CATCH/HOUR: 1164.51

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardinella maderensis	919.55	3034	78.96	2748
Sardinella aurita	355.08	369	13.32	2749
Chloroscombrus chrysurus	33.67	201	2.89	2750
Sarda sarda	22.85	23	1.96	
Trachurus trecae	12.74	34	1.09	
Sphyaena sphyraena	8.89	16	0.76	
Ucaopsis secunda	6.44	5	0.55	
Scomberomorus tritor	5.38	2	0.46	
Total	1164.60		99.99	

PROJECT STATION 1234
 DATE: 14/ 3/97 GEAR TYPE: PT No.2 POSITION: Lat S 1234 Long E 1319
 start stop duration
 TIME 13:10:05 13:36:58 27 (min) Purpose code: 1
 LOG 9668 70 9670 56 1.89 Area code: 1
 FDEPTH: 20 20 GearCond code: 1
 BDEPTH: 53 38 Validity code: 1
 Towing dir: 270° Wire out: 180 m Speed: 40 kn*10
 Sorted: 1 Kg Total catch: 1.03 CATCH/HOUR: 2.29

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Lagocephalus laevis	2.29	18	100.00	
Total	2.29		100.00	

PROJECT STATION 1235
 DATE: 14/ 3/97 GEAR TYPE: PT No.5 POSITION: Lat S 1257 Long E 1254
 start stop duration
 TIME 20:14:53 20:44:39 30 (min) Purpose code: 1
 LOG 9711 54 9713 08 1.62 Area code: 1
 FDEPTH: 0 0 GearCond code: 1
 BDEPTH: 48 71 Validity code: 1
 Towing dir: 265° Wire out: 175 m Speed: 16 kn*10
 Sorted: 104 Kg Total catch: 1000.43 CATCH/HOUR: 2000.86

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardinella maderensis	1504.32	3936	75.18	2751
Trachurus trecae	286.08	806	14.30	2753
Trichiurus lepturus	163.20	344	8.16	2752
Sardinella aurita	15.92	38	0.80	
Pomatomus saltatrix	11.20	6	0.56	
Decapterus punctatus	8.44	18	0.42	
Engraulis encrasicolus	6.52	864	0.33	2754
Trachurus trecae, juvenile	2.68	614	0.13	2755
Alloteuthis africana	2.50	1112	0.12	
Total	2000.86		100.00	

PROJECT STATION 1236
 DATE: 14/ 3/97 GEAR TYPE: PT No.5 POSITION: Lat S 1305 Long E 1244
 start stop duration
 TIME 23:28:09 23:58:15 30 (min) Purpose code: 1
 LOG 9734 98 9736 65 1.54 Area code: 1
 FDEPTH: 0 0 GearCond code: 1
 BDEPTH: 225 108 Validity code: 1
 Towing dir: 160° Wire out: 175 m Speed: 31 kn*10
 Sorted: 35 Kg Total catch: 106.14 CATCH/HOUR: 212.28

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
MYCTOPHIDAE	149.40	84365	70.38	
Trachurus trecae	51.90	1986	24.45	2756
Synagrops microlepis	6.42	552	3.02	
Lestidium atlanticum	4.56	552	2.15	
Total	212.28		100.00	

PROJECT STATION: 1237
 DATE: 15/ 3/97 GEAR TYPE: PT No:2 POSITION: Lat S 1321 Long E 1231
 start stop duration
 TIME 01:31:11 02:01:26 30 (min) Purpose code: 1
 LOG 9768 30 9770 27 2.11 Area code : 1
 FDEPTH: 10 10 GearCond code:
 BDEPTH: 468 121 Validity code:
 Towing dir: 83° Wire out: 175 m Speed: 40 kn*10
 Sorted: 17 Kg Total catch: 43.51 CATCH/HOUR: 87.02

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
MYCTOPHIDAE	61.80	52968	71.02		
Mola mola	13.30	2	15.28		
Lestidium atlanticum	5.28	4524	6.07		
Trachurus trecae	4.30	154	4.94	2757	
Synagrops microlepis	1.20	108	1.38		
Illex coindetii	0.56	2	0.64		
Remora sp	0.34	4	0.39		
Alloteuthis africana	0.16	44	0.18		
Ariomma bondi	0.08	12	0.09		
Total	87.02		99.99		

PROJECT STATION: 1241
 DATE: 15/ 3/97 GEAR TYPE: PT No:4 POSITION: Lat S 1506 Long E 1206
 start stop duration
 TIME 21:39:25 21:59:30 20 (min) Purpose code: 1
 LOG 9937 36 9938 36 1.02 Area code : 1
 FDEPTH: 0 0 GearCond code:
 BDEPTH: 46 90 Validity code:
 Towing dir: 360° Wire out: 175 m Speed: 30 kn*10
 Sorted: 61 Kg Total catch: 293.72 CATCH/HOUR: 881.16

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Sardinella maderensis	282.00	660	32.00	2763	
Trachurus trecae	163.80	588	18.59	2762	
Trichiurus lepturus	162.00	624	18.38	2765	
Pomatomus saltatrix	67.20	39	7.63		
MYCTOPHIDAE	63.00	40152	7.15		
Atractoscion aequidens	54.60	33	6.20		
Sardinella aurita	48.60	144	5.52	2764	
Raja sp.	30.00	3	3.40		
Pseudotolithus elongatus	8.28	12	0.94		
Trachinotus ovatus	1.68	12	0.19		
Total	881.16		100.00		

PROJECT STATION: 1238
 DATE: 15/ 3/97 GEAR TYPE: BT No:2 POSITION: Lat S 1400 Long E 1217
 start stop duration
 TIME 08:46:41 09:14:57 28 (min) Purpose code: 1
 LOG 9833 57 9834 89 1.51 Area code : 1
 FDEPTH: 126 139 GearCond code:
 BDEPTH: 126 139 Validity code:
 Towing dir: 301° Wire out: 500 m Speed: 31 kn*10
 Sorted: 105 Kg Total catch: 2029.92 CATCH/HOUR: 4349.83

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Trachurus trecae	3808.93	122548	87.57	2758	
Dentex macrophthalmus	229.50	2316	5.28		
Atractoscion aequidens	184.07	24	4.23		
Dentex angolensis	43.82	165	1.01		
Zeus faber	23.14	41	0.53		
Pagellus bellottii	21.51	289	0.49		
Lagocephalus laevigatus	12.00	41	0.28		
Lepidotrigla cadmani	9.11	124	0.21		
Todaropsis eblanae	5.38	124	0.12		
Citharus linguatula	4.56	124	0.10		
Boops boops	4.14	41	0.10		
Monolele microstoma	1.65	41	0.04		
Arnoglossus imperialis	1.24	84	0.03		
Total	4349.05		99.99		

PROJECT STATION: 1242
 DATE: 16/ 3/97 GEAR TYPE: PT No:6 POSITION: Lat S 1525 Long E 1159
 start stop duration
 TIME 00:00:39 00:01:14 29 (min) Purpose code: 1
 LOG 9963 85 9965 85 2.02 Area code : 1
 FDEPTH: 20 20 GearCond code:
 BDEPTH: 77 336 Validity code:
 Towing dir: 244° Wire out: 175 m Speed: 40 kn*10
 Sorted: 62 Kg Total catch: 2562.14 CATCH/HOUR: 5300.98

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Trachurus trecae	3189.93	17584	60.18	2767	
Sardinella maderensis	1958.13	5777	36.94	2766	
Sardinella aurita	152.92	339	2.88		
Total	5300.98		100.00		

PROJECT STATION: 1243
 DATE: 16/ 3/97 GEAR TYPE: BT No:2 POSITION: Lat S 1540 Long E 1146
 start stop duration
 TIME 05:29:13 05:59:42 30 (min) Purpose code: 1
 LOG 9998 93 438 93 1.53 Area code : 1
 FDEPTH: 110 114 GearCond code:
 BDEPTH: 110 114 Validity code:
 Towing dir: 15° Wire out: 400 m Speed: 30 kn*10
 Sorted: 58 Kg Total catch: 2597.99 CATCH/HOUR: 5195.98

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Trachurus trecae	3414.76	35496	65.72	2768	
Dentex macrophthalmus	300.16	2000	5.78		
Scomber japonicus	241.80	1478	4.65		
Dentex gibbosus	232.30	260	4.47		
Dentex angolensis	231.42	696	4.45		
Trachurus capensis	116.58	608	2.24		
Zeus faber	105.28	86	2.03		
Lepidopus caudatus	74.82	86	1.44		
Sparus pagrus pagrus *	68.74	174	1.32		
Squatina oculata	60.00	4	1.15		
Raja miraletus	57.42	96	1.11		
Atractoscion aequidens	51.50	32	0.99		
Erythrocles monodi	38.28	86	0.74		
Squalus blainvillei	38.28	86	0.74		
Uranoscopus polli	28.72	174	0.55		
Pseudupeneus prayensis	27.84	348	0.54		
Pagellus bellottii	25.24	174	0.49		
Illex coindetii	20.88	522	0.40		
Lepidotrigla carolae	16.54	86	0.32		
Squalus megalops	16.40	16	0.32		
Umbrina canariensis	12.18	86	0.23		
Plectorhynchus macrolepis	9.00	4	0.17		
Sepia officinalis hierredda	7.84	86	0.15		
Total	5195.98		100.00		

PROJECT STATION: 1239
 DATE: 15/ 3/97 GEAR TYPE: PT No:6 POSITION: Lat S 1420 Long E 1219
 start stop duration
 TIME 13:31:12 13:59:37 28 (min) Purpose code: 1
 LOG 9873 88 9875 73 1.78 Area code : 1
 FDEPTH: 20 20 GearCond code:
 BDEPTH: 51 88 Validity code:
 Towing dir: 252° Wire out: 175 m Speed: 40 kn*10
 Sorted: 14 Kg Total catch: 13.87 CATCH/HOUR: 29.72

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Stromateus fiatola	11.25	11	37.85		
Sardinella maderensis	7.71	21	25.94	2760	
Sardinella aurita	6.64	15	22.34	2759	
Sarda sarda	1.56	2	5.25		
Trichiurus lepturus	1.33	2	4.48		
Trachinotus ovatus	1.22	2	4.10		
Total	29.71		99.96		

PROJECT STATION: 1244
 DATE: 16/ 3/97 GEAR TYPE: PT No:1 POSITION: Lat S 1560 Long E 1142
 start stop duration
 TIME 10:30:21 10:56:41 26 (min) Purpose code: 1
 LOG 38.68 39.99 1.41 Area code : 1
 FDEPTH: 20 20 GearCond code:
 BDEPTH: 43 34 Validity code:
 Towing dir: 90° Wire out: 200 m Speed: 30 kn*10
 Sorted: Kg Total catch: CATCH/HOUR:

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
J E L L Y F I S H	0.00				
Total					

PROJECT STATION: 1240
 DATE: 15/ 3/97 GEAR TYPE: PT No:5 POSITION: Lat S 1458 Long E 1209
 start stop duration
 TIME 19:46:48 20:16:56 30 (min) Purpose code: 1
 LOG 9926 46 9928 22 1.74 Area code : 1
 FDEPTH: 0 0 GearCond code:
 BDEPTH: 105 184 Validity code:
 Towing dir: 225° Wire out: 175 m Speed: 31 kn*10
 Sorted: 36 Kg Total catch: 220.94 CATCH/HOUR: 441.88

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
MYCTOPHIDAE	325.68	125220	73.70		
Synagrops microlepis	56.88	6000	12.87		
Trachurus trecae	49.80	1980	11.27	2761	
Sarda sarda	4.08	4	0.92		
Lestidium atlanticum	3.12	312	0.71		
Pseenes pellicudus	1.60	2	0.36		
Sardinella maderensis	0.72	2	0.16		
Total	441.88		99.99		

PROJECT STATION: 1245
 DATE: 16/ 3/97 GEAR TYPE: PT No:4 POSITION: Lat S 1608 Long E 1145
 start stop duration
 TIME 01:40:09 01:40:12 3 (min) Purpose code: 1
 LOG 90.23 90.38 0.15 Area code : 1
 FDEPTH: 0 0 GearCond code: 9
 BDEPTH: 40 41 Validity code: 1
 Towing dir: 249° Wire out: 175 m Speed: 30 kn*10
 Sorted: 11 Kg Total catch: 11.76 CATCH/HOUR: 235.20

SPECIES	CATCH/HOUR		% OF TOT	C	SAMP
	weight	numbers			
Trachurus trecae	219.00	4140	93.11	2769	
Sphyrna lewini	15.80	20	6.72		
Engraulis encrasicolus	0.40	40	0.17		
Total	235.20		100.00		

PROJECT STATION: 1246
 DATE 16/ 3/97 GEAR TYPE: PT No.5 POSITION: Lat S 1612 Long E 1135
 start stop duration
 TIME 19:43:01 20:13:27 30 (min) Purpose code: 1
 LOG : 101.00 102.59 1.76 Area code : 1
 FDEPTH: 0 0 GearCond code: 1
 BDEPTH: 79 108 Validity code: 1
 Towing dir: 249° Wire out: 175 m Speed: 30 kn*10
 Sorted: 31 Kg Total catch: 102.07 CATCH/HOUR: 204.14

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT	C	SAMP
Trachurus trecae	180.90	8196	88.62		2770
Sarda sarda	8.90	6	4.36		
Trachinotus ovatus	6.80	16	3.33		
Etrumeus whiteheadi	4.08	36	2.00		
Todarodes sagittatus	1.98	12	0.97		
Pomatomus saltatrix	0.66	2	0.32		
MYCTOPHIDAE	0.54	300	0.26		
Illex coindetii	0.18	18	0.09		
Scomber japonicus	0.10	2	0.05		
Total	204.14		100.00		

PROJECT STATION: 1247
 DATE 16/ 3/97 GEAR TYPE: PT No.5 POSITION: Lat S 1619 Long E 1145
 start stop duration
 TIME 23:16:40 23:21:37 5 (min) Purpose code: 1
 LOG : 129.21 129.51 0.32 Area code : 1
 FDEPTH: 15 15 GearCond code: 1
 BDEPTH: 41 44 Validity code: 1
 Towing dir: 270° Wire out: 180 m Speed: 40 kn*10
 Sorted: 17 Kg Total catch: 167.07 CATCH/HOUR: 2004.84

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT	C	SAMP
Trachurus trecae, juvenile	1459.68	80544	72.81		2772
Trachurus trecae	545.16	4572	27.19		2771
Total	2004.84		100.00		

PROJECT STATION: 1248
 DATE 17/ 3/97 GEAR TYPE: PT No.5 POSITION: Lat S 1624 Long E 1129
 start stop duration
 TIME 02:24:20 02:31:37 7 (min) Purpose code: 1
 LOG : 149.34 149.78 0.48 Area code : 1
 FDEPTH: 20 20 GearCond code: 1
 BDEPTH: 94 93 Validity code: 1
 Towing dir: 90° Wire out: 175 m Speed: 40 kn*10
 Sorted: 30 Kg Total catch: 394.25* CATCH/HOUR: 3379.63

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT	C	SAMP
Trachurus trecae	2908.29	53709	86.05		2773
Trachurus capensis	256.29	5237	7.58		2774
Sarda sarda	95.80	111	2.54		
Scomber japonicus	65.74	557	1.95		
Trachinotus ovatus	63.51	111	1.88		
Total	3379.63		100.00		

PROJECT STATION: 1249
 DATE 17/ 3/97 GEAR TYPE: BT No.2 POSITION: Lat S 1643 Long E 1146
 start stop duration
 TIME 08:49:35 09:19:11 30 (min) Purpose code: 1
 LOG : 198.37 199.72 1.42 Area code : 1
 FDEPTH: 16 16 GearCond code: 1
 BDEPTH: 16 16 Validity code: 1
 Towing dir: 350° Wire out: 100 m Speed: 30 kn*10
 Sorted: 68 Kg Total catch: 2019.75 CATCH/HOUR: 4039.50

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT	C	SAMP
Trachurus trecae	3060.00	52538	75.75		2775
Azygoscopus hololepidotus	400.00	14	9.90		
Gymnura micura	216.00	18	5.35		
Myliobatis aquila	114.00	100	2.82		
Galeichthys felliceps	110.50	250	2.74		
Stromateus fiatola	91.00	200	2.25		
Dasyatis marmorata	48.00	12	1.19		
Total	4039.50		100.00		

PROJECT STATION: 1250
 DATE 17/ 3/97 GEAR TYPE: BT No.2 POSITION: Lat S 1633 Long E 1145
 start stop duration
 TIME 15:28:54 15:56:43 28 (min) Purpose code: 1
 LOG : 221.21 222.43 1.54 Area code : 1
 FDEPTH: 20 19 GearCond code: 1
 BDEPTH: 20 19 Validity code: 1
 Towing dir: 360° Wire out: 110 m Speed: 30 kn*10
 Sorted: 50 Kg Total catch: 830.70 CATCH/HOUR: 1780.07

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT	C	SAMP
Trachurus trecae	1255.07	23265	70.51		2776
Lithognathus mormyrus	205.07	1873	11.52		
Pomadasyus incisus	107.79	1166	6.06		
Pomadasyus jubelini	91.93	495	5.16		
Myliobatis aquila	63.64	34	3.58		
Pagellus bellottii	29.36	600	1.65		
Dasyatis marmorata	19.07	34	1.07		
Trachurus capensis	8.14	354	0.46		
Total	1780.07		100.01		

PROJECT STATION: 1251
 DATE 17/ 3/97 GEAR TYPE: PT No.4 POSITION: Lat S 1624 Long E 1145
 start stop duration
 TIME 17:51:47 18:21:32 30 (min) Purpose code: 1
 LOG : 230.36 232.10 1.37 Area code : 1
 FDEPTH: 0 0 GearCond code: 1
 BDEPTH: 22 23 Validity code: 1
 Towing dir: 190° Wire out: 175 m Speed: 30 kn*10
 Sorted: 36 Kg Total catch: 1315.30 CATCH/HOUR: 2630.60

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT	C	SAMP
Trachurus trecae	2562.00	46270	97.39		2777
Sarda sarda	68.60	70	2.61		
Total	2630.60		100.00		

PROJECT STATION: 1252
 DATE 18/ 3/97 GEAR TYPE: BT No.2 POSITION: Lat S 1655 Long E 1130
 start stop duration
 TIME 08:52:56 09:13:19 20 (min) Purpose code: 1
 LOG : 365.19 366.14 1.02 Area code : 1
 FDEPTH: 112 114 GearCond code: 1
 BDEPTH: 112 114 Validity code: 1
 Towing dir: 270° Wire out: 400 m Speed: 30 kn*10
 Sorted: 64 Kg Total catch: 1597.00 CATCH/HOUR: 4791.00

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT	C	SAMP
Trachurus trecae	1803.00	47775	37.63		2778
Dentex macropthalmus	1312.50	16950	27.40		
Trachurus capensis	972.00	28125	20.29		2779
Pterothrissus belloci	249.00	3075	5.20		
Squalus mitsukurii	147.00	450	3.07		
Attractocion aequidens	131.25	300	2.74		
Zeus faber	63.00	150	1.31		
Merluccius capensis	60.75	225	1.27		
Zenopsis conchifer	9.75	75	0.20		
Pagellus bellottii	8.25	75	0.17		
Dicologlossa cuneata	7.50	375	0.16		
Anthias anthias	6.75	75	0.14		
Lepidotrigla cadmani	6.00	75	0.13		
Umbrina canariensis	6.00	75	0.13		
Perulibatrachus rossignoli	6.00	75	0.13		
Illex coindetii	1.50	60	0.03		
Spicara alta	0.75	150	0.02		
Total	4791.00		100.02		

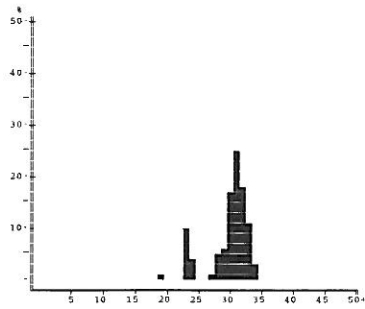
PROJECT STATION: 1253
 DATE 18/ 3/97 GEAR TYPE: BT No.2 POSITION: Lat S 1700 Long E 1143
 start stop duration
 TIME 11:37:23 11:56:15 19 (min) Purpose code: 1
 LOG : 386.80 387.67 1.10 Area code : 1
 FDEPTH: 22 22 GearCond code: 1
 BDEPTH: 22 22 Validity code: 1
 Towing dir: 160° Wire out: 120 m Speed: 25 kn*10
 Sorted: 30 Kg Total catch: 120.28 CATCH/HOUR: 379.83

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT	C	SAMP
Trachurus trecae	336.00	5469	88.46		2780
Engraulis encrasicolus	15.28	2034	4.02		2781
Attractocion aequidens	7.07	38	1.86		
Loligo vulgaris	5.43	25	1.43		
Octopus macropus	3.92	13	1.03		
Pagellus bellottii	3.92	101	1.03		
Etrumeus whiteheadi	3.16	51	0.83		
Sepia officinalis hierredda	2.78	13	0.73		
Dicologlossa cuneata	0.88	25	0.23		
Lithognathus mormyrus	0.63	13	0.17		
Sardinops ocellatus	0.63	51	0.17		
TRACHINIDAE	0.13	13	0.03		
Total	379.83		99.99		

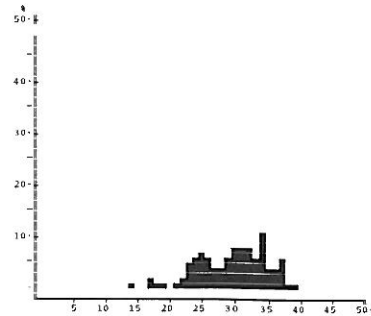
PROJECT STATION: 1254
 DATE 18/ 3/97 GEAR TYPE: BT No.2 POSITION: Lat S 1704 Long E 1122
 start stop duration
 TIME 14:57:59 15:12:06 14 (min) Purpose code: 1
 LOG : 413.77 414.53 0.68 Area code : 1
 FDEPTH: 153 148 GearCond code: 1
 BDEPTH: 153 148 Validity code: 1
 Towing dir: 20° Wire out: 550 m Speed: 30 kn*10
 Sorted: 61 Kg Total catch: 1399.72 CATCH/HOUR: 5998.80

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT	C	SAMP
Dentex macropthalmus	4509.69	36981	75.18		
Trachurus capensis	545.87	4821	9.10		2782
Pterothrissus belloci	329.49	2657	5.49		
Merluccius capensis	130.80	394	2.18		
Anthias anthias	93.43	3671	1.56		
Trigla lyra	85.59	789	1.43		
Helicolenus dactylopterus	65.91	493	1.10		
Octopus vulgaris	63.94	99	1.07		
Pontinus accraensis	61.97	99	1.03		
Trachurus trecae	46.24	591	0.77		
Chelidonichthys capensis	45.21	99	0.75		
Zenopsis conchifer	20.66	296	0.34		
Total	5998.80		100.00		

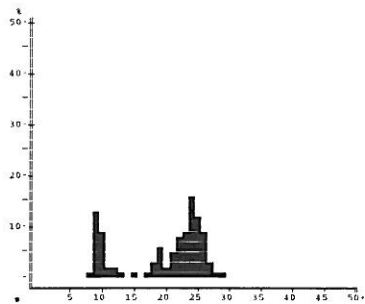
Annex II. Length distributions of main species



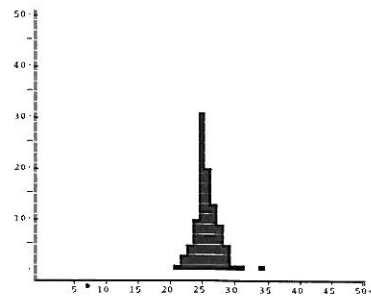
Selene dorsalis
Congoriver - Luanda
MEAN LENGTH = 30.38cm N= 78
NUMBER OF SUBSAMPLES : 2



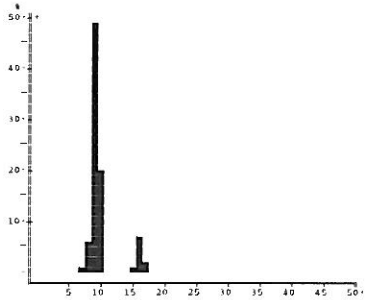
Selene dorsalis
Luanda-Benguela
MEAN LENGTH = 30.03cm N= 557
NUMBER OF SUBSAMPLES : 11



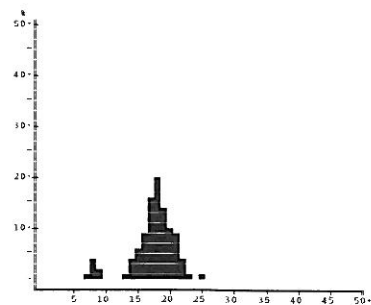
Chloroscombrus chrysurus
Congoriver - Luanda
MEAN LENGTH = 20.17cm N= 286
NUMBER OF SUBSAMPLES : 4



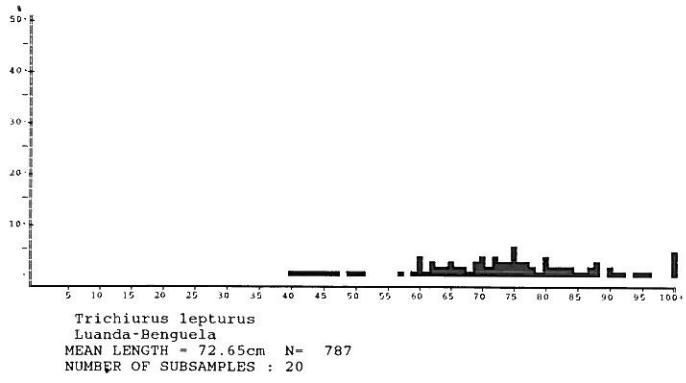
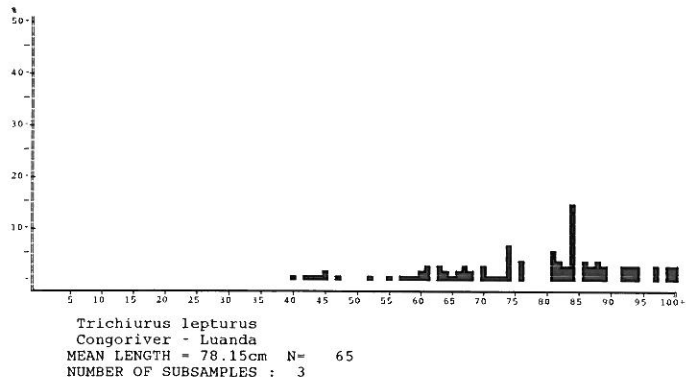
Chloroscombrus chrysurus
Luanda-Benguela
MEAN LENGTH = 26.31cm N= 677
NUMBER OF SUBSAMPLES : 10



Brachydeuterus auritus
Congoriver - Luanda
MEAN LENGTH = 10.33cm N= 109
NUMBER OF SUBSAMPLES : 1



Brachydeuterus auritus
Luanda-Benguela
MEAN LENGTH = 17.96cm N= 680
NUMBER OF SUBSAMPLES : 6



Annex III Instruments and fishing gear used

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

Tranceiver-1 menu (38 kHz lowering keel)

Transducer depth	5.00-7.00 m
Absorbtion coeff.	10 dB/km
Pulse length	medium (1ms)
Bandwidth	wide
Max power	2000 Watt
2-way beam angle	-21.0 dB
SV transducer gain	27.7 dB
TS transducer gain	27.8 dB
Angle sensitivity	21.9
3 dB beamwidth	6.8 dg
Alongship offset	0.00 "
Athwardship offset	0.04 "

Display menu

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

Printer- menu

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

Bottom detection menu Minimum level -50 dB

Fishing gear

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

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

Both pelagic trawls have double lining at the codend, with meshes of about 20 mm.

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

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

Annex IV Estimation of age and growth, *Sardinella maderensis*

by Inge Fossen

Studies on length and growth of tropical species is usually rather difficult because of the lack of clear marks on the hard structures. Daily growth rings can be determined, but this is a rather tedious and time consuming method, that can be implemented only with great difficulty.

Sardinella maderensis is found off West Africa from Mauritania to Angola. Maximum abundance is in the areas with seasonal upwelling, i.e. off Senegal, Ivory Coast - Ghana and off Gabon to Central Angola. The southern stock ranges from Cape Lopez (Gabon) to Benguela (Angola).

Earlier growth studies of *S. maderensis* are available for Senegal (Samb, 1988) and Congo (Ghenou and Leguen, as cited by Samb, 1988), but no study of this type is available for Angola. For this reason, an attempt was made in the course of this survey to identify suitable methods for determination of age at length and of growth parameters for this species. Because of clear seasonality in Angolan marine waters, with surface temperatures falling from 28 °C to about 20 °C, presence of clear marks on hard body structures was expected.

1) Modal Progression Analysis on length data

Length frequencies were obtained from the data collected through the surveys with the RV 'Dr. Fridtjof Nansen' in the period 1994 to 1997 (Table 1). The analyses were performed by geographical region, i.e. Cabinda to Luanda and Luanda to Benguela. Specimens were always measured for total length.

The program package FiSAT (Gayanilo et al, 1994) was used. Cohorts were identified using the Bhattacharya method, followed by Modal Progression Analysis and identification of growth curve. An attempt was also made to use ELEFAN and the following results were obtained (Table 2):

Figure 1 shows the growth curves obtained from the above two methods, for the two regions. MPA suggests a slower growth, with specimens reaching about 35 cm in 4 years. ELEFAN indicates a much faster growth, the fish reaching a length of more than 30 cm after two years. Table 1 shows the growth parameters and the growth performance indices for the two regions/methods. The growth performance ($\phi' = \log K + 2\log L_{\infty}$) was higher in the ELEFAN output, while the differences between regions were minimal. The values obtained with MPA conform with the results obtained for Senegal and Congo (Samb, 1988).

Table 2. Growth parameters for <i>S. maderensis</i> , Cabinda- Luanda and Luanda-Benguela			
	L_{∞}	K	ϕ'
MPA (C.-L.)	45.43	0.40	2.92
MPA (L.-B.)	43.37	0.48	2.95
ELEFAN (C.-L.)	40.00	0.93	3.17
ELEFAN (L.-B.)	42.40	0.88	3.20

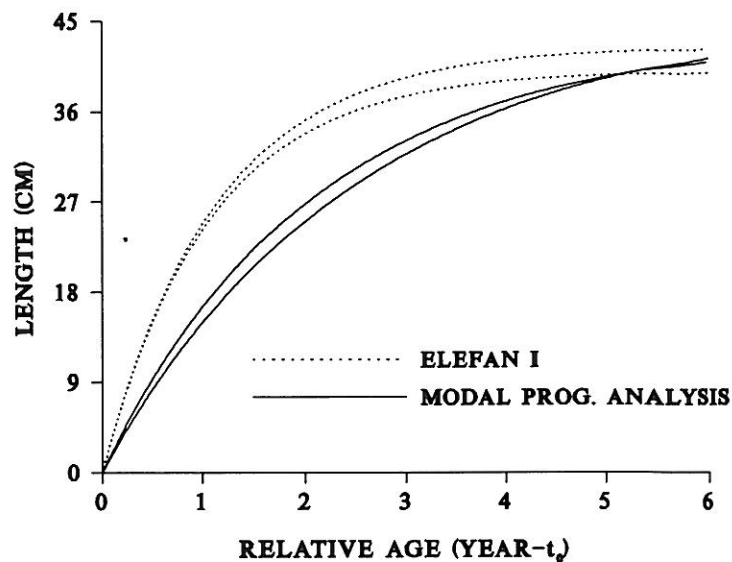


Figure 1. Growth curves for *Sardinella maderensis* for the regions Cabinda-Luanda and Luanda-Benguela

2) Age determination from otoliths

A first investigation on the applicability of this method to *S. maderensis* was based on a small sample of 50 otoliths (*Sagitta*), from specimens of 19 to 40 cm TL. Age determination was performed with a binocular and direct illumination on a black background. To facilitate the detection of growth rings, otoliths were first polished with sand paper and immersed in mineral oil.

Growth rings were clearly visible. All specimens had an outer hyaline ring indicating that they were undergoing a period of slower growth. Assuming that the distance between the hyaline rings represents one year growth, it appears that *Sardinella maderensis* reach the size of 30 cm in about 3-4 years and 40 cm in about 4-6 years. Although this first attempt is based on a small sample, they clearly indicate that age determination on otoliths is possible for this species.

3) Summary

This preliminary analysis shows that there was good agreement between length at age from otolith reading and the estimated growth function from the length frequency data obtained with MPA. Furthermore, the growth performance index obtained from this latter method appears to be consistent with earlier studies on this species from Senegal and Congo (Samb, 1988). This is reasonable, considering that the environmental conditions in these areas are quite similar to those found off northern and central Angola.

Literature cited:

B. Samb. 1988. Seasonal growth, mortality and recruitment pattern of *Sardinella maderensis* off Senegal. In: Contributions to tropical fisheries biology. FAO Fisheries report N 389. Rome, 519 p.

Table 1. Length frequency distributions of *Sardinella maderensis*, Cabinda-Luanda and Luanda-Benguela

Length (cm)	Cabinda-Luanda						Luanda-Benguela					
	MAR.94	FEB.95	AUG.95	MAR.96	AUG.96	FEB.97	MAR.94	FEB.95	AUG.95	MAR.96	AUG.96	MAR.97
5	-	-	0.08	-	-	-	-	-	-	-	-	-
6	-	1.66	-	0.05	-	-	-	-	-	-	-	-
7	-	-	-	7.60	-	-	-	-	-	-	-	-
8	-	-	-	8.23	24.89	-	-	-	-	-	-	-
9	-	4.13	-	2.53	21.06	-	-	-	-	-	-	0.03
10	-	33.11	-	1.80	1.91	-	-	-	-	-	-	0.35
11	0.32	18.45	0.13	6.29	1.91	-	-	-	-	-	-	0.37
12	0.79	3.27	0.33	17.30	1.91	8.43	-	-	-	-	-	0.18
13	0.42	-	0.23	17.92	-	8.07	-	-	-	-	-	0.08
14	0.05	-	0.26	17.92	-	17.05	-	-	0.05	-	-	0.19
15	0.16	-	0.08	5.25	0.01	12.53	-	-	0.05	-	-	0.33
16	0.68	0.07	0.13	1.69	0.03	11.19	-	-	0.05	-	-	0.08
17	2.01	0.07	0.20	0.43	0.04	18.99	-	-	0.14	-	-	0.40
18	0.98	0.07	0.10	0.61	0.04	7.91	-	-	0.05	-	-	0.74
19	0.59	0.07	0.31	0.56	0.03	2.54	0.27	-	0.19	-	-	1.48
20	0.19	0.07	0.20	0.40	-	0.72	1.89	-	0.05	-	-	5.85
21	0.41	1.28	0.23	0.68	0.01	0.53	1.35	-	0.10	-	-	7.97
22	2.17	0.51	0.08	0.34	-	0.59	1.63	-	0.10	0.15	0.15	11.34
23	0.97	1.21	0.10	0.53	0.37	0.19	1.35	-	0.14	0.46	0.46	18.00
24	1.58	2.22	0.13	0.63	0.16	0.47	5.41	-	0.05	0.28	0.28	3.69
25	0.99	3.34	0.74	1.31	1.84	0.99	8.38	-	0.05	0.15	0.15	2.38
26	1.13	7.46	1.02	4.33	6.31	1.15	8.38	-	-	-	-	1.49
27	3.24	5.92	0.67	2.70	2.67	1.73	3.51	-	-	-	-	3.06
28	4.20	4.53	0.87	3.02	2.80	2.13	1.63	-	0.05	0.23	0.23	0.41
29	3.50	4.04	1.31	3.23	3.36	0.99	8.67	2.56	0.38	1.68	1.68	1.57
30	5.74	2.19	3.43	3.04	2.16	1.17	11.74	17.92	2.09	3.78	4.00	1.91
31	14.59	1.43	10.40	1.99	5.45	0.87	16.22	23.12	10.41	5.07	11.33	1.74
32	20.33	0.99	16.65	2.39	7.80	0.99	11.46	33.36	18.74	4.31	17.59	4.34
33	13.82	1.14	22.37	2.69	7.83	0.87	6.33	20.48	23.59	5.15	23.86	7.78
34	11.26	1.15	19.11	1.71	5.05	0.49	6.64	-	19.54	3.11	25.37	6.30
35	6.54	0.89	12.35	0.38	1.34	0.22	2.57	-	14.22	1.08	11.05	3.42
36	2.56	0.48	5.84	0.29	0.47	0.06	2.57	2.56	6.70	0.14	2.76	1.68
37	0.61	0.26	1.69	0.10	0.29	0.03	-	-	2.00	-	1.18	6.30
38	0.05	-	0.56	-	0.12	-	-	-	0.81	-	-	3.78
39	0.12	-	0.20	-	0.01	-	-	-	0.33	-	-	1.36
40	-	-	0.18	-	0.07	-	-	-	0.14	-	-	1.41
41	-	-	-	-	-	-	-	-	-	-	-	-
42	-	-	-	-	0.01	-	-	-	-	-	-	-

Annex V Feeding habits, *Trachurus trecae*

by

Kumbi Kilongo

The Cunene horse mackerel is an important pelagic species throughout tropical West Africa. In the regions with seasonal upwelling, like in Angola, this species reaches its maximum abundance. Besides its wide geographical distribution, little is known about its biology, particularly in the Angolan region.

In the course of the present survey 1149 stomachs of Cunene horse mackerel were collected for quantitative laboratory analysis of their contents. Inverted and regurgitated stomachs were not observed. About 61% of horse mackerel examined for stomach sampling had empty stomachs (Table 1). The study area was divided into three main regions according to the geographical distribution and abundance of horse mackerel: Cabinda - Luanda, Luanda - Lobito and Lobito - Cunene River.

The data were grouped by length, depth, and by day and night time (Tables 1 to 3). The following is only a preliminary analysis of the data collected. A more thorough analysis will be conducted at a later stage.

1. CABINDA - LUANDA

A total of 398 stomachs was collected in this area, 68.4% of which were empty. The area was characterised by a high concentration of horse mackerel of the size class between 10 -19 cm. The highest levels of full stomachs were observed in this size class both during day and night. Degree of fullness decreased significantly between the length groups 30 to 40 cm (Figure 1 a). Euphausiid was the main prey with 68.8% of occurrence during the day time and 54.7% during the night time (Table 2). This group was dominant throughout the day and in all length groups. Amphipods and phytoplankton were less consumed in this area. The analysis of strata showed that euphausiids were consumed from 0 to 100 m of depth, with higher occurrence between 0 and 50 m during both periods (Table 3).

2. LUANDA - LOBITO

471 stomachs were collected in this area and 71.6% were empty. The highest abundance of horse mackerel was observed between the length group 10 - 19 cm. The highest percentage of full stomachs during daytime was observed in the length group ≥ 40 , but this result is not too reliable

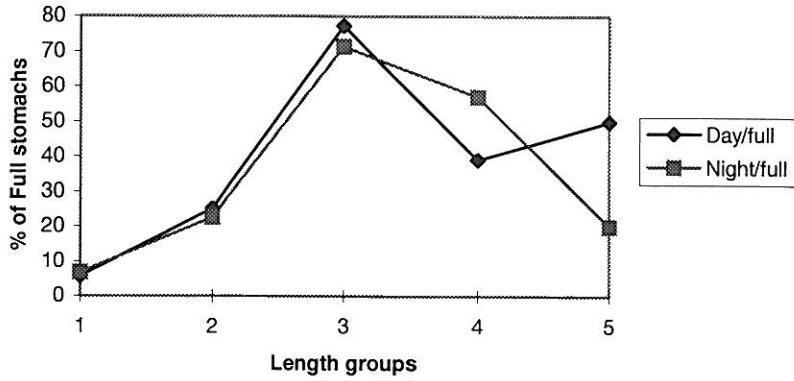
due to the small number of stomachs sampled in this size group. No stomachs were collected for the group of less than 9 cm during the day time (Figure 1 b). Euphausiids were the preferred prey in this region, with the highest frequency of occurrence throughout the length groups both during daytime as well as nighttime. Amphipods, fish larvae and foraminifera were of the less importance according to the frequency of occurrence (Table 2). Euphausiids were mainly consumed in the stratum between 0 - 50 m of depth during both periods, while fish larvae dominated the stratum ≥ 100 m during daytime (Table 3). Foraminifera were found only in this area and during nighttime, between 0 and 50 m of depth.

3. LOBITO - RIO CUNENE

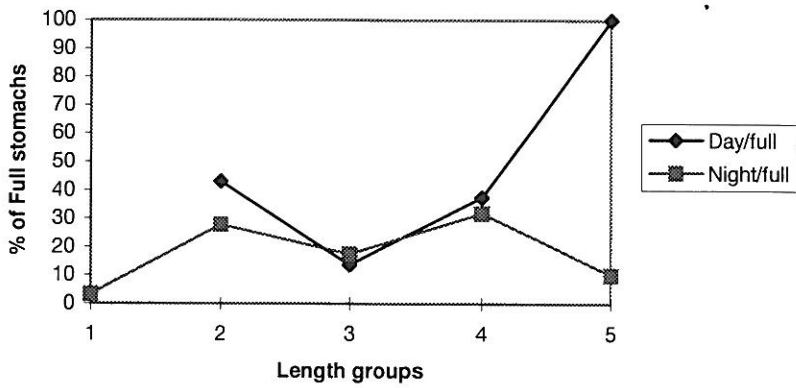
280 stomachs were collected between Lobito and Cunene River and about 53.9 % were empty. The number of full stomachs was higher between the length group 10 - 19 during the night time, and between the length group 30 - 39 during the day time (Figure 1 c). No predator of the length group ≥ 40 was analysed. Copepods were the dominant prey of horse mackerel in this region, with 34.8 % of occurrence during the day time and 63 % during the night time (Table 2). Worms and mysids were only found in this region and were mostly consumed during daytime. Copepods were the main prey between 0 -50 m during both periods, and mysids between 100 - 150 m during the day time (Table 3). Copepods were also more consumed (100 % of occurrence) between 100 and 150 m depth, during nighttime.

Figure 1: Percentage of full stomachs by length groups (cm), regions and time of the day
 (1= ≤9, 2= 10-19, 3=20-29, 4=30-39, 5= ≥40).

a. CABINDA - LUANDA



b. LUNDA - LOBITO



c. LOBITO - RIO CUNENE

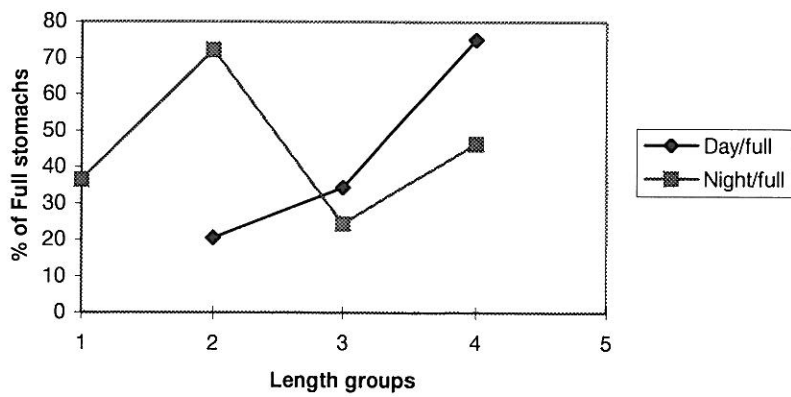


Table 1: Full and empty stomachs by region, size groups and time of the day

CABINDA - LUANDA						
DAY	≤ 9	10 - 19	20 - 29	30 - 39	≥ 40	Total
Empty	18	98	5	14	3	138
Full	1	33	17	9	3	63
NIGHT						
Empty	14	105	2	9	4	134
Full	1	44	5	12	1	63
Total						398
LUANDA - LOBITO						
DAY	≤ 9	10 - 19	20 - 29	30 - 39	≥ 40	Total
Empty		57	19	15		91
Full		43	3	9	1	56
NIGHT						
Empty	28	122	38	49	9	246
Full	1	47	8	23	1	79
Total						471
LOBITO - CUNENE RIVER						
DAY	≤ 9	10 - 19	20 - 29	30 - 39	≥ 40	Total
Empty		31	23	1		55
Full		8	12	3		23
NIGHT						
Empty	7	25	34	30		96
Full	4	65	11	26		106
Total						280
					Total	1149

Table 2: Frequency of occurrence of main prey groups by region, size group and time of the day

CABINDA - LUANDA						
DAY	≤ 9	10 - 19	20 - 29	30 - 39	≥ 40	Total
Euphausiids		75	66.7	40	50	68.8
Fish					50	1.0
Copepods	100	13.5	11.1			11.5
Not identified		3.8	19.4	60		13.5
Phytoplanc.		5.8				3.1
Diatoms			2.8			1.0
Amphipods			1.9			1.0
NIGHT						
Euphausiids	50	49	42	33	50	54.7
Fish		26.6	21.4		50	7.8
Copepods		11.8	21.4	33		17.2
Not identified		9.8	14.3	33		14.1
Phytoplanc.		2.0				1.6
Amphipods		2.0				1.6
Fish larvae	50	4				3.1
LUANDA - LOBITO						
DAY	≤ 9	10 - 19	20 - 29	30 - 39	≥ 40	Total
Euphausiids		66.7	100	87.5		74.3
Fish				12.5	100	5.6
Copepods		4.2				2.8
Not identified		12.5				8.3
Fish larvae			16.7			11.1
NIGHT						
Euphausiids	67.7	66.2	100	66.7	66.7	68.6
Fish		4.1		7.4	33.3	5.1
Copepods	33	8.1		3.7		6.8
Not identified		21.6				13.6
Phytoplanc.				7.4		1.7
Amphipods				3.7		0.8
Fish larvae				3.7		0.8
Diatoms				7.4		1.7
Foraminifera		1.3				0.8
LOBITO - CUNENE RIVER						
DAY	≤ 9	10 - 19	20 - 29	30 - 39	≥ 40	Total
Euphausiids		21.4		10.5		19.9
Fish				10.5		4.3
Copepods.		42.9	76.9			34.8
Fish larvae				5.3		2.2
Mysids		7.1	15.4	73.7		37
Worm		28.6	7.7			10.9
NIGHT						
Euphausiids	60	6.0	33.3	33.3		15.6
Fish				50		6.3
Copepods	40	77	41.7	16.7		63.5
Not identified		3				2.1
Phytoplanc.			16.7			2.1
Amphipods		9				6.3
Fish larvae		4.5	8.3			4.2

Table 3. Frequency of occurrence of horse mackerel preys by length groups (cm), depth, regions, day and night time.

CABINDA - LUANDA						
DAY	≤9	10 - 19	20 -29	30 - 39	≥ 40	Total
0 - 50 m						
Euphausiids		90.6	82.6			87.3
Copepods		9.4	13.0			10.9
Diatoms m			4.3			1.8
50 - 100						
Euphausiids		100	100	100	100	100
100 - 150 m	-	-	-	-	-	-
NIGHT						
0 - 50 m						
Euphausiids	100	50.0				50.0
Fish		7.7				7.4
Copepods		30.8				39.6
Phytoplankton		7.7				7.4
Amphipods		3.8				3.4
Fish larvae	50					1.9
LUANDA - LOBITO						
DAY	≤ 9	10 - 19	20 - 29	30 - 39	≥ 40	Total
0 - 50 m						
Euphausiids		88.9		87.5		85.2
Fish		5.6		12.5	100	11.1
Copepods		5.6				3.7
50 - 100 m						
Fish larvae		20.0				20.0
Euphausiids		80.0				80.0
100 - 150 m						
Fish larvae		100				100
NIGHT						
0 - 50 m						
Euphausiids	60.0	79.5	90.0	66.7	66.7	72.6
Fish		2.6	9.1	8.3	33.3	6.1
Foraminifera		2.6				1.2
Copepods	40.0	15.4		4.2		9.5
Fish larvae				4.2		1.2
Diatoms				4.2		1.2
Phytoplankton				12.5		3.6
LOBITO - CUNENE RIVER						
DAY	≤ 9	10 - 19	20 - 29	30 - 39	≥ 40	Total
0 - 50 m						
Copepods		40.0	90.9			75.0
Worms		60.0	9.1			25.0
50 - 100 m	-	-	-	-	-	-
100 - 150 m						
Mysids		50.0	100	66.7		65.5
Fish		16.7		9.5		10.3
Euphausiids		16.7		19.1		17.2
Fish larvae				4.8		3.4
Copepods		16.7				3.4
NIGHT	(Continuation Lobito - Cunene River)					

0 -50 m						
Euphausiids	60.0	6.7	40.0	22.2		15.5
Copepods	40.0	75.0	30.0	11.1		60.7
Fish larvae		8.3	10.0	55.6		13.1
Amphipods		8.3				6.0
Fish				11.1		1.2
Phytoplankton			20.0			2.4
Worm	1.7					1.2
50 - 100 m	-	-	-	-	-	-
100 - 150 m						
Copepods		100	100	100		100

Annex VI Maturity stages of main pelagic species

Congo River - Pta das Palmeirinhas

Sardinella aurita

LEN	WEI	N	LOWW	HIGW	S1	S2	S3	S4	S5
11,	1 ,	1,	1 ,	1 ,	0,	100,	0,	0,	0,
12,	10 ,	5,	2 ,	20 ,	20,	80,	0,	0,	0,
13,	11 ,	7,	2 ,	20 ,	43,	57,	0,	0,	0,
14,	19 ,	21,	3 ,	30 ,	5,	95,	0,	0,	0,
15,	27 ,	47,	10 ,	40 ,	0,	98,	2,	0,	0,
16,	28 ,	34,	4 ,	40 ,	6,	82,	12,	0,	0,
17,	36 ,	25,	4 ,	50 ,	0,	84,	16,	0,	0,
18,	48 ,	23,	5 ,	60 ,	0,	83,	13,	0,	4,
19,	58 ,	12,	40 ,	70 ,	0,	67,	33,	0,	0,
20,	72 ,	21,	50 ,	90 ,	0,	67,	24,	5,	5,
21,	84 ,	54,	70 ,	190 ,	0,	69,	22,	2,	7,
22,	93 ,	49,	10 ,	110 ,	0,	47,	43,	0,	10,
23,	97 ,	37,	10 ,	120 ,	0,	59,	32,	0,	8,
24,	110 ,	36,	11 ,	140 ,	0,	44,	39,	0,	17,
25,	113 ,	18,	12 ,	150 ,	0,	33,	28,	11,	28,
26,	140 ,	10,	16 ,	170 ,	0,	30,	50,	10,	10,
27,	133 ,	16,	17 ,	180 ,	0,	19,	44,	25,	13,
28,	97 ,	11,	18 ,	210 ,	0,	18,	45,	36,	0,
29,	136 ,	9,	18 ,	240 ,	0,	0,	44,	56,	0,
30,	253 ,	3,	240 ,	260 ,	0,	33,	33,	33,	0,
31,	231 ,	5,	26 ,	300 ,	0,	0,	0,	100,	0,
32,	285 ,	4,	270 ,	310 ,	0,	0,	0,	25,	75,
33,	313 ,	4,	270 ,	340 ,	0,	0,	0,	100,	0,
34,	320 ,	1,	320 ,	320 ,	0,	100,	0,	0,	0,
35,	404 ,	5,	370 ,	450 ,	0,	0,	0,	80,	20,
37,	550 ,	1,	550 ,	550 ,	0,	0,	0,	0,	100,

Sardinella maderensis

LEN	WEI	N	LOWW	HIGW	S1	S2	S3	S4	S5
11,	20 ,	1,	20 ,	20 ,	100,	0,	0,	0,	0,
12,	23 ,	2,	23 ,	23 ,	100,	0,	0,	0,	0,
13,	28 ,	13,	22 ,	32 ,	70,	31,	0,	0,	0,
14,	34 ,	30,	20 ,	40 ,	54,	33,	10,	3,	0,
15,	37 ,	25,	30 ,	49 ,	32,	56,	8,	4,	0,
16,	41 ,	17,	30 ,	53 ,	12,	82,	6,	0,	0,
17,	50 ,	21,	30 ,	64 ,	5,	90,	0,	0,	5,
18,	53 ,	9,	50 ,	60 ,	0,	100,	0,	0,	0,
19,	66 ,	9,	50 ,	74 ,	11,	89,	0,	0,	0,
20,	74 ,	18,	70 ,	80 ,	0,	83,	6,	0,	11,
21,	84 ,	18,	80 ,	100 ,	0,	39,	17,	0,	44,
22,	113 ,	10,	90 ,	290 ,	0,	10,	50,	10,	30,
23,	100 ,	2,	100 ,	100 ,	0,	0,	0,	0,	100,
24,	118 ,	10,	30 ,	130 ,	0,	20,	0,	60,	20,
25,	131 ,	15,	30 ,	170 ,	0,	13,	13,	47,	27,
26,	165 ,	16,	140 ,	190 ,	0,	0,	13,	81,	6,
27,	182 ,	24,	18 ,	220 ,	0,	4,	4,	67,	25,
28,	195 ,	24,	60 ,	220 ,	0,	0,	4,	67,	29,
29,	195 ,	19,	60 ,	260 ,	0,	5,	5,	37,	53,
30,	233 ,	18,	24 ,	290 ,	0,	0,	0,	61,	39,
31,	278 ,	14,	240 ,	340 ,	0,	0,	7,	43,	50,
32,	299 ,	12,	270 ,	340 ,	0,	0,	0,	42,	58,
33,	326 ,	14,	290 ,	380 ,	0,	0,	0,	43,	57,
34,	350 ,	4,	340 ,	380 ,	0,	0,	0,	0,	100,
35,	350 ,	1,	350 ,	350 ,	0,	0,	0,	0,	100,
36,	420 ,	1,	420 ,	420 ,	0,	0,	0,	0,	100,

Trachurus trecae

LEN	WEI	N	LOWW	HIGW	S1	S2	S3	S4	S5
6,	2 ,	1,	2 ,	2 ,	100,	0,	0,	0,	0,
7,	4 ,	14,	3 ,	5 ,	100,	0,	0,	0,	0,
8,	7 ,	30,	5 ,	9 ,	100,	0,	0,	0,	0,
9,	10 ,	24,	6 ,	13 ,	54,	46,	0,	0,	0,
10,	11 ,	30,	9 ,	17 ,	27,	60,	13,	0,	0,
11,	13 ,	35,	10 ,	30 ,	17,	80,	3,	0,	0,
12,	20 ,	191,	10 ,	33 ,	35,	56,	8,	0,	0,
13,	23 ,	309,	10 ,	40 ,	35,	51,	11,	2,	0,
14,	28 ,	248,	20 ,	49 ,	25,	54,	17,	4,	1,
15,	35 ,	74,	20 ,	61 ,	19,	59,	12,	5,	4,
16,	48 ,	33,	20 ,	70 ,	24,	70,	6,	0,	0,
17,	55 ,	34,	30 ,	81 ,	6,	76,	15,	3,	0,
18,	62 ,	21,	50 ,	72 ,	5,	90,	0,	0,	5,
19,	82 ,	7,	60 ,	141 ,	14,	71,	14,	0,	0,
20,	88 ,	4,	80 ,	90 ,	0,	25,	75,	0,	0,
21,	102 ,	5,	90 ,	110 ,	0,	60,	40,	0,	0,
22,	115 ,	6,	110 ,	120 ,	0,	67,	33,	0,	0,
23,	122 ,	5,	120 ,	130 ,	0,	0,	80,	20,	0,
24,	146 ,	5,	130 ,	160 ,	0,	20,	80,	0,	0,
25,	158 ,	10,	19 ,	192 ,	0,	20,	40,	20,	20,
26,	172 ,	19,	16 ,	210 ,	0,	58,	16,	11,	16,
27,	195 ,	11,	180 ,	200 ,	0,	45,	45,	9,	0,
28,	206 ,	5,	190 ,	220 ,	0,	20,	60,	20,	0,
29,	235 ,	2,	220 ,	250 ,	0,	0,	100,	0,	0,
31,	510 ,	1,	510 ,	510 ,	0,	0,	0,	0,	100,
33,	378 ,	1,	378 ,	378 ,	0,	0,	0,	0,	100,
34,	384 ,	5,	375 ,	400 ,	0,	0,	0,	60,	40,
35,	427 ,	10,	372 ,	490 ,	0,	0,	10,	60,	30,
36,	457 ,	11,	414 ,	520 ,	0,	0,	0,	55,	45,
37,	502 ,	9,	448 ,	580 ,	0,	11,	0,	11,	78,
38,	502 ,	25,	426 ,	543 ,	0,	0,	0,	48,	52,
39,	525 ,	17,	419 ,	590 ,	0,	6,	0,	35,	59,
40,	579 ,	15,	520 ,	650 ,	0,	0,	7,	27,	67,
41,	524 ,	2,	428 ,	620 ,	0,	0,	0,	0,	100,
42,	562 ,	1,	562 ,	562 ,	0,	0,	0,	0,	100,
44,	651 ,	1,	651 ,	651 ,	0,	0,	0,	100,	0,

Pta das Palmeirinhas-Benguela

Sardinella aurita

LEN	WEI	N	LOWW	HIGW	S1	S2	S3	S4	S5
11,	10 ,	1,	10 ,	10 ,	100,	0,	0,	0,	0,
16,	40 ,	1,	40 ,	40 ,	0,	100,	0,	0,	0,
18,	55 ,	2,	50 ,	60 ,	0,	50,	50,	0,	0,
19,	68 ,	4,	60 ,	70 ,	0,	25,	75,	0,	0,
20,	73 ,	12,	60 ,	80 ,	0,	42,	42,	0,	17,
21,	86 ,	21,	70 ,	120 ,	0,	14,	57,	0,	29,
22,	102 ,	48,	80 ,	240 ,	8,	27,	33,	4,	27,
23,	121 ,	31,	11 ,	250 ,	0,	35,	42,	0,	23,
24,	118 ,	35,	100 ,	140 ,	0,	43,	40,	0,	17,
25,	130 ,	8,	80 ,	150 ,	0,	38,	13,	0,	50,
26,	186 ,	10,	130 ,	300 ,	0,	50,	20,	0,	30,
27,	180 ,	7,	160 ,	200 ,	0,	29,	57,	0,	14,
28,	239 ,	11,	190 ,	350 ,	0,	9,	73,	9,	9,
29,	256 ,	15,	220 ,	380 ,	0,	13,	53,	27,	7,
30,	273 ,	12,	230 ,	410 ,	0,	33,	17,	42,	8,
31,	317 ,	11,	270 ,	450 ,	0,	9,	18,	55,	18,
32,	315 ,	8,	230 ,	420 ,	0,	0,	38,	13,	50,
33,	355 ,	11,	270 ,	440 ,	0,	0,	0,	73,	27,
34,	423 ,	7,	320 ,	500 ,	0,	14,	43,	14,	29,
35,	439 ,	12,	350 ,	570 ,	0,	0,	17,	42,	42,
36,	470 ,	24,	370 ,	590 ,	0,	0,	0,	54,	46,
37,	547 ,	9,	460 ,	640 ,	0,	0,	0,	22,	78,
38,	455 ,	2,	420 ,	490 ,	0,	0,	0,	0,	100,
39,	430 ,	1,	430 ,	430 ,	0,	0,	0,	0,	100,

Sardinella maderensis

LEN	WEI	N	LOWW	HIGW	S1	S2	S3	S4	S5
11,	10 ,	2,	10 ,	10 ,	100,	0,	0,	0,	0,
12,	10 ,	4,	10 ,	10 ,	100,	0,	0,	0,	0,
13,	20 ,	9,	20 ,	20 ,	100,	0,	0,	0,	0,
14,	23 ,	17,	20 ,	30 ,	53,	47,	0,	0,	0,
15,	28 ,	6,	20 ,	30 ,	17,	83,	0,	0,	0,
17,	48 ,	4,	40 ,	50 ,	25,	50,	0,	0,	25,
18,	57 ,	8,	50 ,	60 ,	0,	100,	0,	0,	0,
19,	64 ,	24,	57 ,	72 ,	42,	58,	0,	0,	0,
20,	71 ,	20,	64 ,	79 ,	45,	40,	10,	0,	5,
21,	82 ,	14,	80 ,	90 ,	7,	43,	14,	0,	36,
22,	100 ,	12,	88 ,	130 ,	8,	25,	42,	0,	25,
23,	94 ,	5,	68 ,	100 ,	0,	40,	20,	0,	40,
24,	118 ,	14,	30 ,	130 ,	0,	50,	0,	43,	7,
25,	126 ,	16,	30 ,	160 ,	0,	25,	0,	50,	25,
26,	161 ,	17,	140 ,	190 ,	0,	18,	18,	59,	6,
27,	173 ,	11,	18 ,	220 ,	0,	9,	9,	73,	9,
28,	201 ,	15,	60 ,	350 ,	0,	7,	13,	47,	33,
29,	212 ,	13,	60 ,	370 ,	8,	8,	31,	46,	8,
30,	277 ,	38,	220 ,	420 ,	0,	0,	11,	66,	24,
31,	312 ,	82,	230 ,	470 ,	0,	1,	15,	55,	29,
32,	337 ,	94,	250 ,	480 ,	0,	3,	9,	51,	37,
33,	348 ,	88,	260 ,	510 ,	0,	0,	7,	39,	55,
34,	371 ,	38,	260 ,	540 ,	0,	8,	8,	45,	39,
35,	408 ,	8,	362 ,	450 ,	0,	0,	0,	63,	38,
36,	420 ,	2,	410 ,	430 ,	0,	0,	0,	50,	50,

Ponta das Palmerinhas- Benguela

Trachurus trecae

LEN	WEI	N	LOWW	HIGW	S1	S2	S3	S4	S5
6,	4 ,	4,	2 ,	5 ,	100,	0 ,	0 ,	0 ,	0 ,
7,	4 ,	15,	3 ,	5 ,	100,	0 ,	0 ,	0 ,	0 ,
8,	6 ,	11,	5 ,	10 ,	100,	0 ,	0 ,	0 ,	0 ,
9,	8 ,	5,	6 ,	10 ,	100,	0 ,	0 ,	0 ,	0 ,
11,	18 ,	22,	10 ,	20 ,	5 ,	95 ,	0 ,	0 ,	0 ,
12,	21 ,	25,	10 ,	30 ,	16 ,	76 ,	8 ,	0 ,	0 ,
13,	24 ,	129,	20 ,	30 ,	47 ,	47 ,	6 ,	0 ,	0 ,
14,	29 ,	229,	20 ,	40 ,	17 ,	74 ,	8 ,	0 ,	0 ,
15,	33 ,	134,	20 ,	40 ,	22 ,	72 ,	6 ,	1 ,	0 ,
16,	39 ,	31,	30 ,	50 ,	6 ,	81 ,	13 ,	0 ,	0 ,
17,	49 ,	10,	30 ,	60 ,	10 ,	50 ,	40 ,	0 ,	0 ,
18,	63 ,	3,	50 ,	70 ,	0 ,	100 ,	0 ,	0 ,	0 ,
19,	70 ,	2,	60 ,	80 ,	0 ,	50 ,	50 ,	0 ,	0 ,
21,	100 ,	1,	100 ,	100 ,	0 ,	100 ,	0 ,	0 ,	0 ,
22,	110 ,	6,	97 ,	120 ,	0 ,	67 ,	33 ,	0 ,	0 ,
23,	122 ,	12,	90 ,	140 ,	0 ,	58 ,	33 ,	8 ,	0 ,
24,	147 ,	11,	130 ,	160 ,	0 ,	36 ,	45 ,	18 ,	0 ,
25,	160 ,	6,	140 ,	180 ,	0 ,	50 ,	17 ,	33 ,	0 ,
26,	170 ,	5,	141 ,	190 ,	0 ,	40 ,	40 ,	20 ,	0 ,
27,	201 ,	26,	180 ,	231 ,	0 ,	54 ,	27 ,	19 ,	0 ,
28,	214 ,	20,	150 ,	240 ,	0 ,	60 ,	40 ,	0 ,	0 ,
29,	236 ,	11,	220 ,	260 ,	0 ,	36 ,	55 ,	0 ,	9 ,
30,	255 ,	6,	220 ,	280 ,	0 ,	33 ,	17 ,	50 ,	0 ,
31,	312 ,	13,	270 ,	510 ,	0 ,	31 ,	31 ,	15 ,	23 ,
32,	323 ,	35,	290 ,	370 ,	0 ,	14 ,	31 ,	40 ,	14 ,
33,	338 ,	60,	270 ,	390 ,	2 ,	10 ,	30 ,	32 ,	27 ,
34,	355 ,	72,	30 ,	400 ,	0 ,	1 ,	38 ,	33 ,	28 ,
35,	394 ,	34,	350 ,	463 ,	0 ,	3 ,	18 ,	41 ,	38 ,
36,	419 ,	20,	360 ,	470 ,	0 ,	0 ,	20 ,	20 ,	60 ,
37,	443 ,	15,	360 ,	490 ,	0 ,	0 ,	7 ,	33 ,	60 ,
38,	481 ,	24,	410 ,	543 ,	0 ,	0 ,	4 ,	42 ,	54 ,
39,	498 ,	22,	419 ,	570 ,	0 ,	5 ,	14 ,	32 ,	50 ,
40,	560 ,	17,	460 ,	660 ,	0 ,	6 ,	6 ,	18 ,	71 ,
41,	582 ,	10,	428 ,	650 ,	0 ,	0 ,	10 ,	30 ,	60 ,
42,	599 ,	10,	470 ,	660 ,	0 ,	10 ,	0 ,	40 ,	50 ,
44,	651 ,	1,	651 ,	651 ,	0 ,	0 ,	0 ,	100 ,	0 ,

Benguela- Cunene

Trachurus trecae

LEN	WEI	N	LOWW	HIGW	S1	S2	S3	S4	S5
11,	13 ,	4,	10 ,	20 ,	75 ,	25 ,	0 ,	0 ,	0 ,
12,	19 ,	34,	10 ,	30 ,	6 ,	88 ,	3 ,	3 ,	0 ,
13,	22 ,	100,	10 ,	30 ,	6 ,	91 ,	3 ,	0 ,	0 ,
14,	27 ,	78,	20 ,	50 ,	3 ,	87 ,	8 ,	3 ,	0 ,
15,	35 ,	74,	30 ,	50 ,	3 ,	82 ,	12 ,	1 ,	1 ,
16,	39 ,	45,	30 ,	50 ,	2 ,	71 ,	20 ,	4 ,	2 ,
17,	47 ,	21,	40 ,	60 ,	0 ,	71 ,	24 ,	0 ,	5 ,
18,	56 ,	30,	40 ,	64 ,	7 ,	33 ,	30 ,	7 ,	23 ,
19,	66 ,	26,	60 ,	80 ,	0 ,	19 ,	38 ,	23 ,	19 ,
20,	78 ,	31,	60 ,	100 ,	0 ,	32 ,	29 ,	23 ,	16 ,
21,	91 ,	24,	80 ,	100 ,	0 ,	17 ,	63 ,	17 ,	4 ,
22,	105 ,	31,	80 ,	120 ,	0 ,	32 ,	55 ,	6 ,	6 ,
23,	122 ,	31,	100 ,	150 ,	0 ,	10 ,	71 ,	6 ,	13 ,
24,	140 ,	27,	130 ,	160 ,	0 ,	19 ,	70 ,	7 ,	4 ,
25,	147 ,	18,	120 ,	170 ,	0 ,	11 ,	50 ,	39 ,	0 ,
26,	177 ,	6,	160 ,	200 ,	0 ,	0 ,	33 ,	67 ,	0 ,
27,	188 ,	4,	170 ,	210 ,	0 ,	0 ,	50 ,	50 ,	0 ,
28,	210 ,	5,	190 ,	250 ,	0 ,	0 ,	40 ,	20 ,	40 ,
29,	213 ,	6,	200 ,	230 ,	0 ,	17 ,	0 ,	83 ,	0 ,
30,	248 ,	5,	240 ,	260 ,	0 ,	0 ,	60 ,	40 ,	0 ,
31,	281 ,	18,	240 ,	320 ,	0 ,	11 ,	22 ,	44 ,	22 ,
32,	299 ,	17,	280 ,	330 ,	0 ,	12 ,	35 ,	24 ,	29 ,
33,	348 ,	16,	310 ,	400 ,	0 ,	0 ,	25 ,	38 ,	38 ,
34,	361 ,	15,	310 ,	390 ,	0 ,	7 ,	7 ,	33 ,	53 ,
35,	403 ,	9,	380 ,	430 ,	0 ,	0 ,	0 ,	44 ,	56 ,
36,	401 ,	8,	350 ,	430 ,	0 ,	0 ,	0 ,	63 ,	38 ,
37,	430 ,	2,	420 ,	440 ,	0 ,	0 ,	0 ,	100 ,	0 ,
38,	500 ,	1,	500 ,	500 ,	0 ,	0 ,	0 ,	0 ,	100 ,