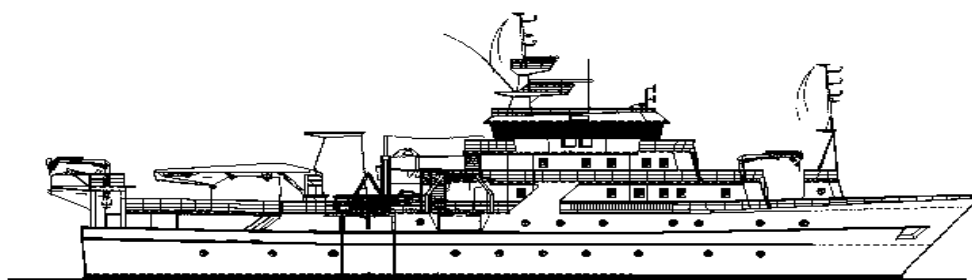


NORAD - FAO/UNDP PROJECT GLO 92/013

CRUISE REPORTS "DR. FRIDTJOF NANSEN"



SURVEYS OF THE FISH RESOURCES OF ANGOLA

Preliminary Cruise Report No 2/98

**Survey of the demersal resources
7 - 22 May 1998**

**Institute of Marine Research
IMR, Bergen
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**Institute of Fisheries Research
IIP, Luanda
Angola**

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by

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**Institute of Marine Research
Bergen, 1998**

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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) and briefly discussed with the Angolan participants of the cruise are the following:

- To describe the distribution, composition and abundance of the major demersal resources, with special emphasis on deep-water shrimps (*Parapenaeus longirostris* and *Aristeus varidens*), seabreams (Sparidae), Benguela hake (*Merluccius polli*) and other species of shrimp in the by-catch, in the area from Luanda to Benguela.
- To map the general hydrographic regime by using a CTD-sonde at trawl stations all over the survey area and monitor temperature, salinity, and oxygen, along IIP standard profiles, for hydrographic studies.
- To carry out comparative fishing trials with the bottom trawls of R/V “Dr. Fridtjof Nansen” and the commercial shrimp trawler “Palmeirinhas”. To investigate the possibility of using this commercial trawler in future demersal surveys in Angola.

1.2 Participation

The scientific staff consisted of:

From IIP, Angola:

Domingos AZEVEDO, Kumbi KILONGO, Gisela RAMOS, Maria de Lourdes SARDINHA, Ana de SOUSA, Pedro TCHIPALANGA and Filipe VIANDA.

From IMR, Norway:

Oddgeir ALVHEIM, Guillermo BURGOS, Magnar MJANGER, Erik OLSEN (7/05-13/5), and Jan Arne VÅGENES.

1.3 Narrative

The vessel left Luanda in the afternoon of May 7 and steamed westwards together with the shrimp trawler 'Palmeirinhas'. In the evening, the vessels started trawling in parallel course to practice the routine and to test the SCANMAR trawl opening sensors on the gear of 'Palmeirinhas'. During this first trawl haul, both trawl warps of 'Dr. F. Nansen' snapped. The whole gear was recovered but the vessel was not ready to trawl until the evening of May 8. From then onwards, the sampling programme began with course tracks approximately 20-25 NM apart, covering the inner, middle and outer shelf and the slope to about 750 m depth. Semi-random bottom trawl hauls were carried out on the shelf during daytime and on the slope deeper than 400 m also during dark hours. The gear inter-calibration with the 'Palmeirinhas' was done in locations corresponding to trawl stations of the standard bottom trawl survey. The joint activity with 'Palmeirinhas' was adapted to the working possibilities of the commercial trawler, that is, 12 working hours a day. The comparison of bottom gear performance between 'Palmeirinhas' and 'Dr. Fridtjof Nansen' was conducted between the evening of May 8 and the morning of May 13. As part of the routine survey of demersal resources, CTD stations were taken at most of the bottom trawl stations. Besides, additional CTD recordings were collected in the standard IIP hydrographic sections of Pta. das Palmeirinhas, Pta. do Morro and Lobito. The studied area delimited by Luanda and Benguela and the isobath of 20 and 800 m was covered from May 8 to May 19. While sailing southwards, the hydrographic section in front of Baia dos Tigres was completed on May 20. The cruise finished on May 22 when 'Dr. Fridtjof Nansen' called in Walvis Bay, Namibia.

1.4 Survey effort

Table 1 presents the number of CTD and fishing stations and the distance surveyed.

Figure 1 shows the general cruise track and the locations of bottom trawl and hydrographic stations.

Table 1. Number of hydrographic stations (CTD), bottom trawl stations (BT), successful swept-area hauls per depth strata and distance surveyed. Luanda-Benguela						
Area	CTD	BT	Swept-area hauls			Distance surveyed (nm ²)
			0-200m	200-400m	400-800m	
Luanda - Benguela	86	72	38	14	19	1400
Baia dos Tigres	7	0	0	0	0	

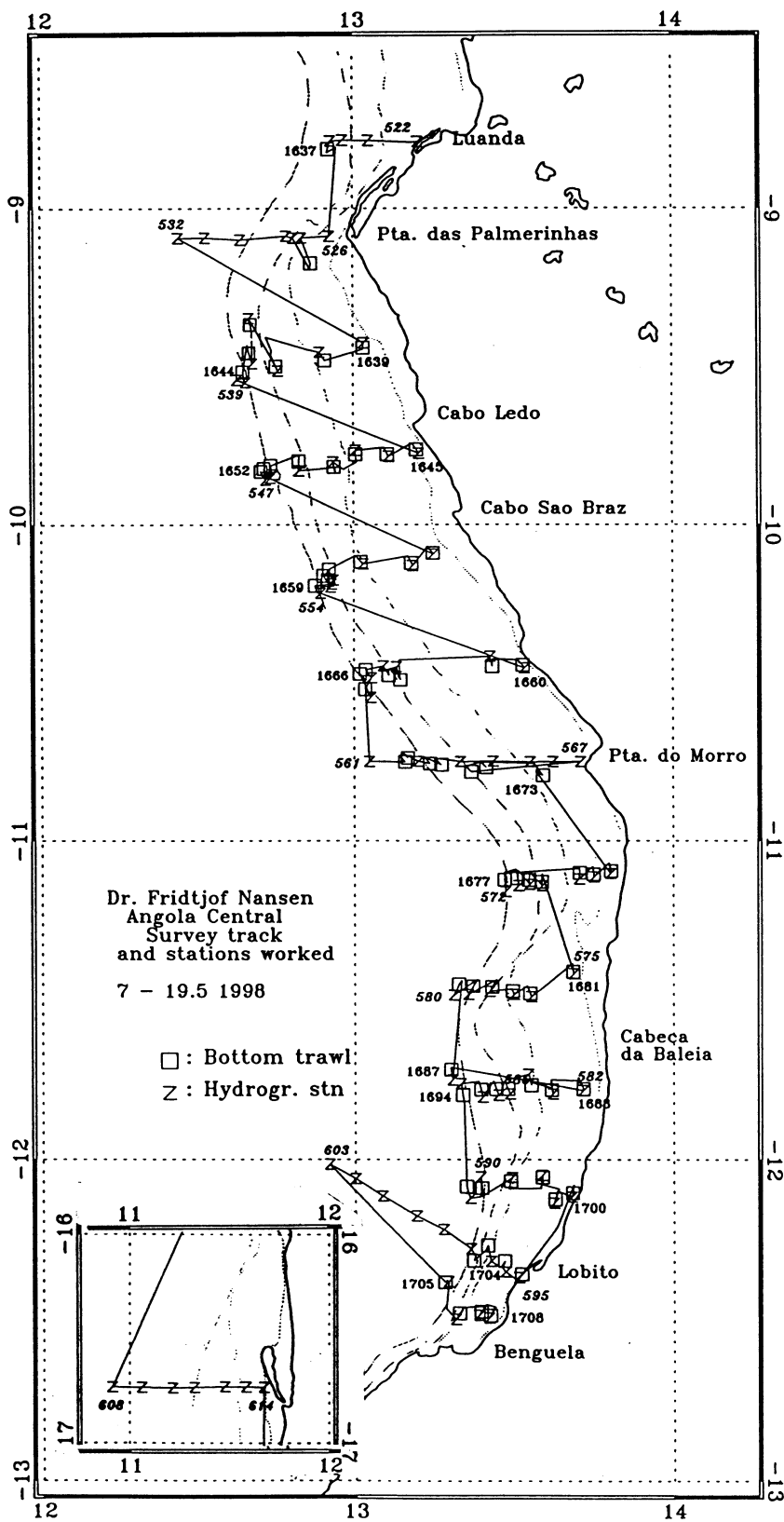


Figure 1. Course track with fishing and hydrographic stations. Luanda-Benguela

CHAPTER 2 METHODS

2.1 Hydrographic sampling

A Seabird 911 + CTD probe was used to obtain vertical profiles of temperature, salinity and oxygen. Real time plotting and logging was done using the Seabird Seasave software installed on a PC. The profiles were in general taken down to a few meters above the bottom. In deep stations however, data logging was interrupted at 700m. At each station two Niskin bottles were triggered for water samples, one near the surface and one near the bottom. In order to calibrate the oxygen and salinity sensors, water samples were analysed for dissolved oxygen using the Winkler method and salinity using a Guildline Portasal salinometer mod. 8410.

A total of 61 samples were accepted for oxygen calibration. A linear regression of the Winkler determinations on the CTD values gave the following results:

$$O_2 = O_{2\text{CTD}} * 1,078 + 0.087$$

The standard deviation of the difference between both measurements was 0.187

A total of 25 salinity samples were accepted for calibration. The average difference between laboratory readings and CTD values was -0.026 with a standard deviation of 0.0142.

The results presented in this preliminary report have not been adjusted according to the last calibration values. Corrected values will be presented in the final version of this report.

No current profiles with ADCP were recorded during this cruise.

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

2.2 Fish sampling

Catches were sampled for species composition by weight and numbers. Samples of deep-water rose shrimp (*Parapenaeus longirostris*) and striped red shrimp (*Aristeus varidens*) were also separated by sex. Length measurements were taken as follows: total body length (cm) of fish was measured to the nearest 1 cm below and carapace length (mm) of shrimp was measured to the nearest 1 mm below. Biological samples, i.e. total body length, total body weight, sex and maturity stages, were taken for *P. longirostris* and *A. varidens*. The records of fishing stations are presented in Annex I. Pooled length frequency distributions of selected species by area are shown in Annex II; individual frequency distributions were pooled together using the catch in the corresponding trawl haul as weighing factor.

Table 2 shows the areas used in the swept-area biomass estimates. These strata were used to make comparable calculations with previous years. More complete and updated values of depth strata areas are presented in Table 3.

Depth stratum (m)	Cabinda-Luanda	Luanda-Benguela
0-50	3 023	1 850
50-100	2 693	1 730
100-200	2 085	1 252
200-300	755	500
300-400	660	350
400-500	540	445
500-600	880	450
600-800	1500	(900)

A stratified semi-random design was used, with depth and degree latitude as stratifying variables. Planned allocation of trawl stations began with a proportional sampling effort to the stratum size. This original design was slightly change to increase the number of trawl stations in the main distributional area of deep-water shrimps. The depth range from 20m to 750m depth was sampled between south of Luanda to Benguela bay. Biomass estimates by species were obtained by summing up the estimates calculated for each depth stratum.

Table 3. Areas of each stratum defined on depth and degree latitude.

Depth stratum (m)	Congo River-Luanda degrees latitude			Luanda-Benguela degrees latitude				Total
	6-7° S	7-8° S	8-9° S	9-10° S	10-11° S	11-12° S	12-13° S	
20-50	595	520	264	320	353	310	85	2447
50-100	827	685	457	393	607	344	242	3556
100-200	744	706	490	425	587	319	108	3378
200-300	262	145	194	160	116	103	28	1008
300-400	235	154	161	105	116	123	28	922
400-500	184	142	111	102	101	86	54	781
500-600	161	148	100	102	104	92	48	754
600-700	181	151	76	73	66	72	57	676
700-800	333	272	97	87	101	109	60	1059
Total	3523	2921	1950	1767	2151	1558	712	14582

The bottom trawl used during this survey has a headline height of 5-6 m and a distance between wings during towing of about 21 m. The footrope was equipped with a tickler chain to improve the catchability of deep-water shrimp in samples taken deeper than 300m. During trawling a 9.5 m long rope (strapping) was fastened between the wires 130 m in front of the doors giving a constant distance between the doors of 49-50 m. All trawl hauls were monitored by SCANMAR trawl sensors and the actual time the trawl was fishing on the bottom was determined with improved accuracy. A more detailed description of the fishing gear is given in Annex IV. For conversion of catch rates to fish densities, the area between the wings is assumed to be the effective fishing area. The catchability coefficient q was assumed equal to 1. The length of a haul, recorded as distance over the bottom, was measured by the GPS.

Acoustic recordings were stored in paper echograms and in the BEI echo-integration system. It was not possible during the cruise to scrutinise the echograms to allocate echo-integrator values between the different species. Raw data were stored for future analysis.

CHAPTER 3 OCEANOGRAPHIC CONDITIONS

3.1 Surface distribution

The horizontal distributions of surface temperature and surface salinity (5m depth) are shown in Figs. 2 a -b, respectively. Sea surface temperatures (SST) between 24 and 28°C were found in the Angolan central region. Compare with last year survey, temperatures were 2-3 degrees higher during this cruise. In general, SST increased monotonically with distance from the coast along the whole coast line. Minimum temperatures were recorded south of Pta. do Morro and between Cabeça da Baleia and Lobito. Sea surface salinity showed a very dynamic distribution in the range 33.2 - 36.0 ‰. A nucleus of water masses of relatively low salinity were found off Pta. das Palmerinhas, probably originated from river discharge. The salinity distribution also suggested the contribution of coastal run-off being transported southwards by a coastal current.

3.2 Vertical sections

In Figs. 3a-d, the vertical distribution of temperature, salinity and oxygen are shown for the 4 sections worked during the survey (3 inside the studied area, and 1 outside off Baia dos Tigres). A thermocline was found between 10 and 30 m depth. Low salinity surface water was evident in the sections off Pta. das Palmerinhas and Pta. do Morro. A relative flat structure was observed in most sections, but there were signs of coastal upwelled water off Lobito. In the additional hydrographic section made on our way to Walvis Bay, off Baia dos Tigres, a clear upwelling process with isolines bending upwards in the direction of the coast in the three fields analysed could be seen.

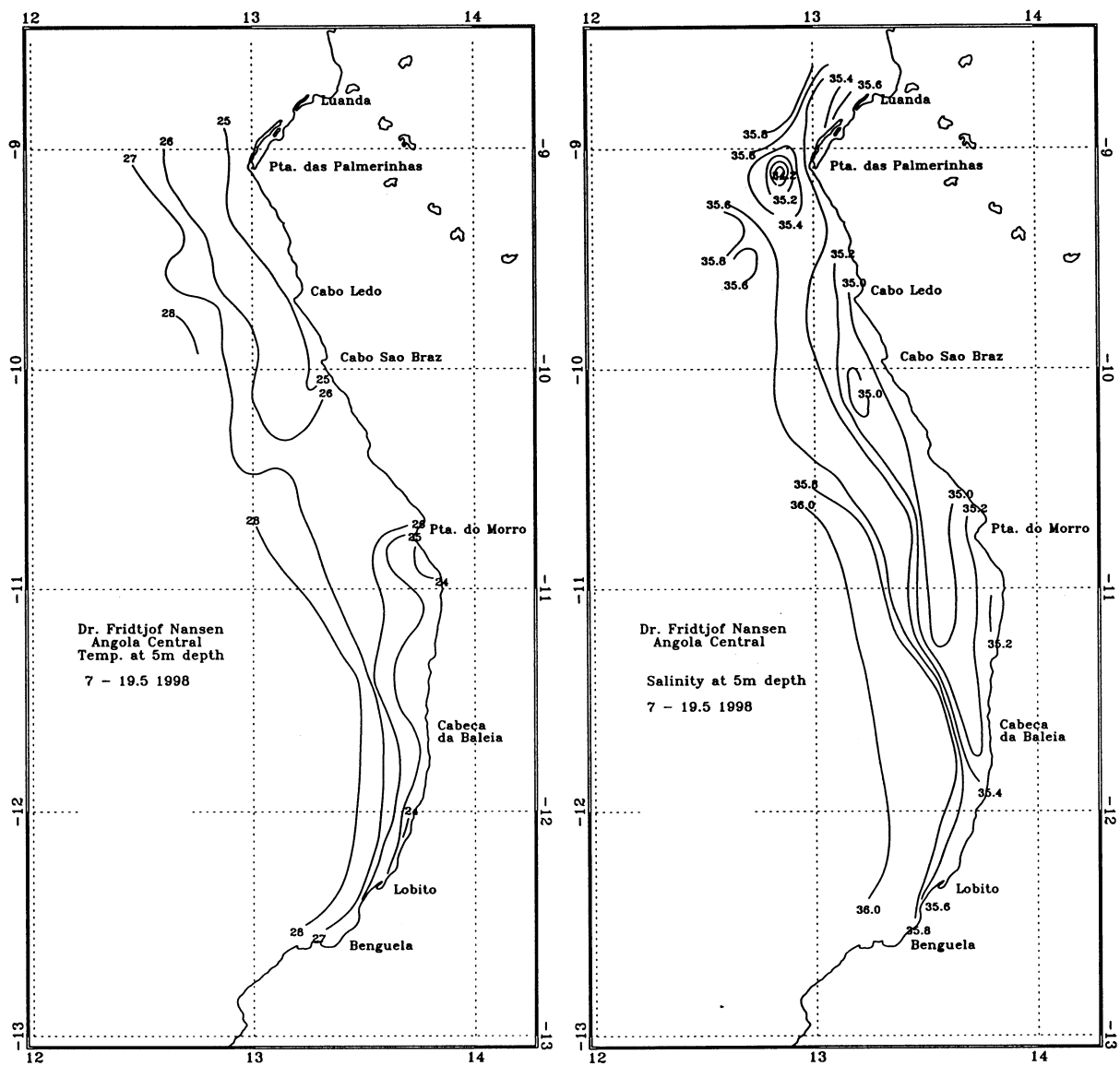


Figure 2. Horizontal distribution of a) surface temperature (5m depth) and b) surface salinity. Luanda-Benguela.

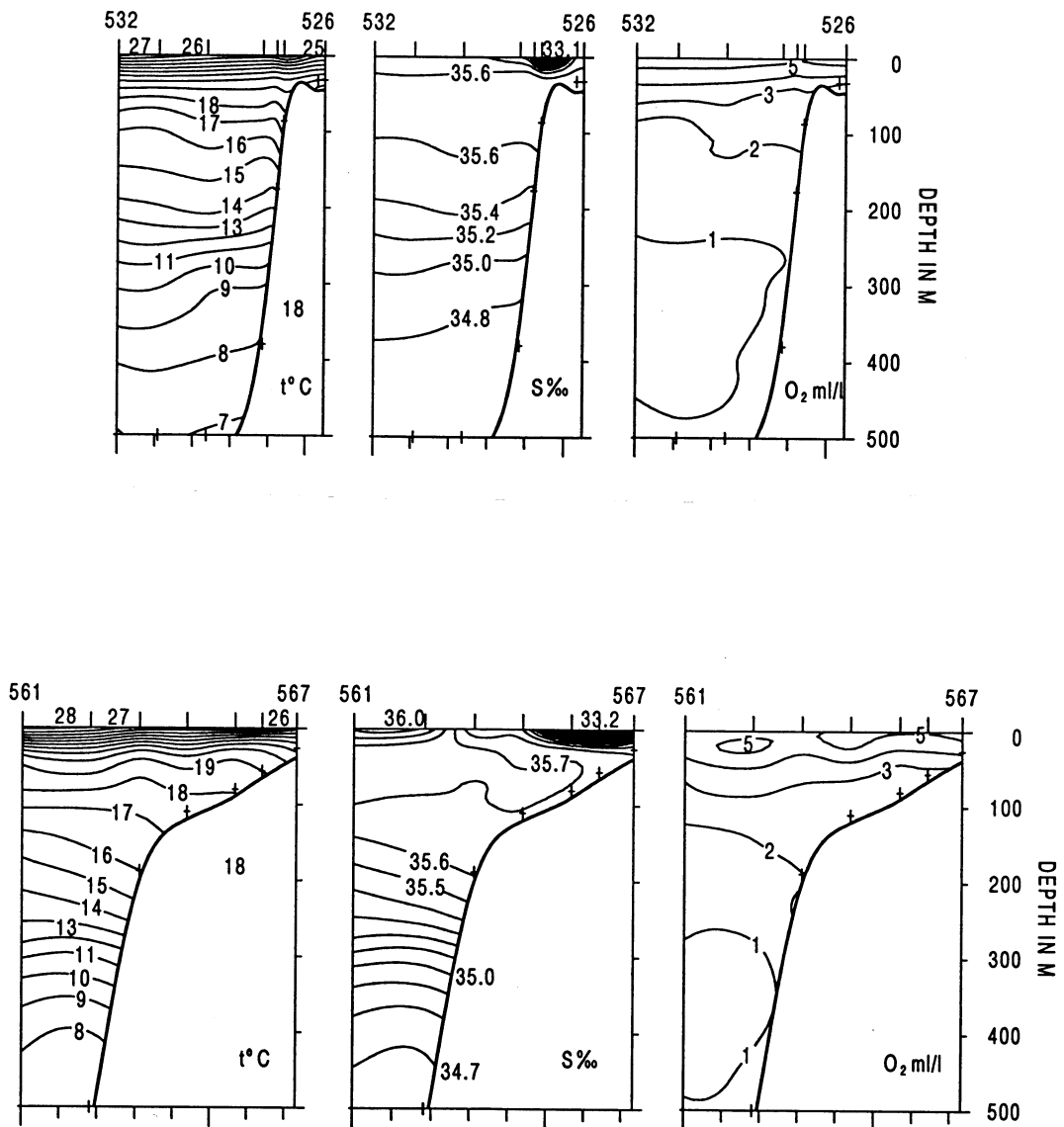


Figure 3. Vertical sections of a) temperature, b) salinity and c) oxygen.

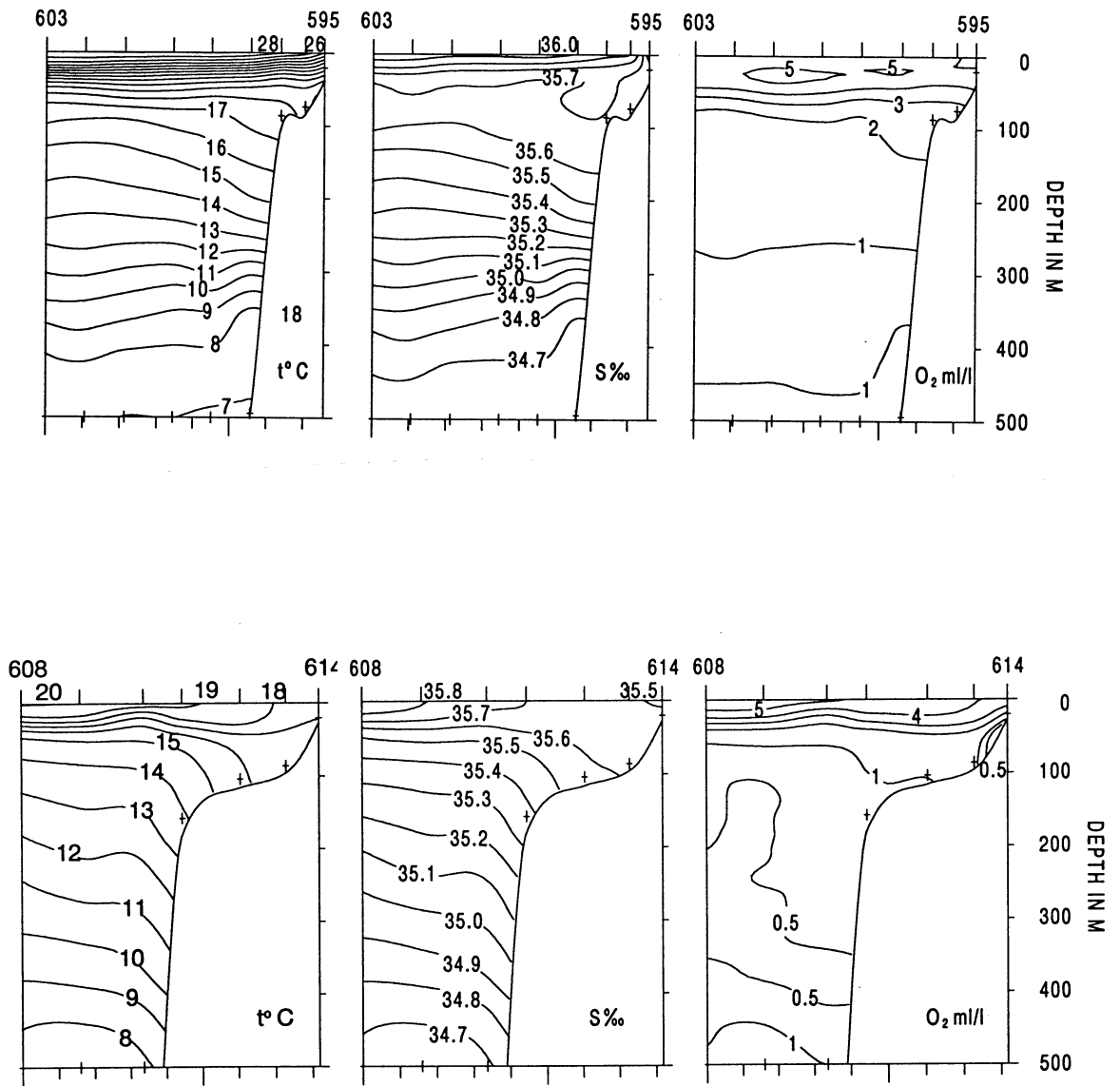


Figure 3 (cont) Vertical sections of a) temperature, b) salinity and c) oxygen.

CHAPTER 4 CATCH RATES, DISTRIBUTION, COMPOSITION AND BIOMASS ESTIMATES OF DEMERSAL FISH (SHELF)

The catch species composition on the Angolan shelf between Luanda and Benguela was studied in two different depth strata: 20-70 m depth (inner shelf) and 71-200 m depth (outer shelf). The results for the slope area are presented in Chapter 5. The locations of the trawl stations are shown in Fig. 1. Records of fishing stations and catches are presented in Annex I, and pooled length distributions (weighted by the catch) of main species are shown in Annex II.

In the swept-area biomass estimates for the shelf down to 200 m, the depth strata 0-50m, 50-100m and 100-200 m were used. Mean densities by depth strata of the main species, the incidence and the catch distributions are shown in Annex III.

4.1 Luanda-Benguela shelf

A total of 38 successful swept-area trawl stations were accomplished on the shelf area. Table 4 shows the catch rates by main species groups for the inner (20-70 m) and the outer shelf (71-200 m). The group "Demersal" comprises the commercially important families Sciaenidae, Haemulidae (=Pomadasyidae), Serranidae, Sparidae and Lutjanidae, while the group "Pelagic" includes the families Engraulidae, Clupeidae, Carangidae, Scombridae, Sphyraenidae and the benthopelagic family Trichiuridae. In the inner shelf, the average catch rate of both 'Demersal' and 'Pelagic' were slightly lower than last year estimates, but still they dominated the average catch rate with a relative contribution of 48% and 44%, respectively. The average catch rate of both sharks and shrimps were relatively small but, compare with last year's estimates, the sharks were in similar level while the shrimps increased dramatically. The average catch rate of both Cephalopods and non commercial fish was found about half of last year's estimates. In the outer shelf, the 'Demersal' group was dominating with a catch rate more than twice of that of last year; however, this increase is the result of one trawl haul that had to be interrupted because of sea bottom conditions and that after 8 minutes brought a catch of 1.6 tonnes of mainly big-eye dentex. Excluding that trawl, the average catch rate of 'Demersal' was 312 kg/hour which is close to last year value. Except for 'Sharks' that had a catch rate similar to last year's, the rest of the groups showed a significant decline.

Table 4. Catch rates (kg/hour) by main groups in swept area bottom trawl hauls on the shelf
LUANDA-BENGUELA

INNER SHELF 0-70 m

ST. NO.	DEP.	Demersal	Pelagic	Sharks	Shrimps	Cephalopod	Other
1639	34	181.73					29.94
1645	25	922.64	627.00				391.40
1646	60	53.92	7.92			21.29	30.66
1653	41	191.58	105.00		0.10	27.16	7.44
1660	27	65.76	65.21	31.35	0.52		32.40
1661	59	23.27	22.86			24.66	15.76
1674	48	2848.60	6146.80	5.40	1.60		8.40
1675	65	66.64	120.20			10.00	32.40
1681	31	2.07	84.01			44.07	5.63
1682	70	89.74	135.80			3.60	20.82
1688	45	191.82	88.54		0.64	5.34	11.32
1699	53	779.44	215.90		3.06	44.88	48.24
1700	30	549.88	573.76		34.25		379.55
1701	51	1996.16	209.62		6.56		232.86
1708	46	1718.28	414.48				97.40
MEAN		645.44	587.81	2.45	3.12	12.07	89.61

OUTER SHELF, 71-200 m

ST. NO.	DEP.	Demersal	Pelagic	Sharks	Shrimps	Lobster	Other
1638	71	45.15	18.93		16.86		217.59
1640	89	95.40	126.78				92.06
1641	165	53.20	111.00	12.60	1.28		31.60
1647	95	187.02		9.94			71.11
1648	114	126.20	3.20	4.60			21.40
1654	76	407.64	251.28				133.58
1655	104	34.24	2.07	3.48			25.48
1662	159	606.00	9.69				158.29
1671	199	12.66	8.52		17.03		696.77
1672	132	74.04	3.20	7.00			81.80
1673	88	55.08	4.04				91.46
1676	80	883.89	130.93		4.55		227.21
1680	170	196.84	96.54		12.62		390.69
1683	97	35.40	74.91				29.14
1689	87	1917.76	1.46				82.71
1690	109	141.98	27.54				38.16
1691	181	11602.50					724.50
1697	105	624.30	22.88				21.90
1698	81	787.73	49.37				174.12
1702	90	35.00	113.40				47.68
1703	109	118.29	7.71				21.46
1706	106	34.03	57.15				31.33
1707	73	392.81	1105.72				226.42
MEAN		802.92	96.80	1.64	2.28		158.11

Catch rates of the most important pelagic fish families are presented in Table 5. Except for the increase on the catch rate of hairtails (*Trichiuridae*) in the inner shelf, all the families considered showed an important decrease in the catch rate when they are compared with last year's estimation. Carangids showed the same average catch rate in the inner and outer shelf, and represented the most important pelagic family in the outer shelf. Cunene Horse mackerel (*Trachurus trecae*) was the most important species, followed by African lookdown (*Selene dorsalis*) and in shallower waters by Atlantic bumper (*Chloroscombrus chrysurus*). Clupeids followed in importance in the inner shelf represented by *Ilisha africana* and *Sardinella maderensis*, both species confined to shallow waters. Barracudas, mainly *Sphyræna guachancho*, were caught only on the inner shelf with a mean catch rate about seven times

lower than the one obtained last year. Small tuna of the family Scombridae were caught incidentally both in the inner and outer shelf.

Table 5. Catch rates (kg/hour) of main pelagic families on the shelf obtained with bottom trawl hauls. LUANDA-BENGUELA

INNER SHELF, 0-70 m

ST.NO.	DEP.	Clupeids	Carangids	Barracudas	Scombrids	Hairtails	Other
1639	34						211.67
1645	25	554.80	26.60	45.60			1314.04
1646	60		0.97		1.16	5.79	105.87
1653	41		59.48	7.24		38.28	226.28
1660	27	3.27	5.82	16.83		39.29	130.03
1661	59		0.02			22.84	63.69
1674	48		65.80	20.60		6060.40	2864.00
1675	65		23.60	14.20		82.40	109.04
1681	31	0.75	76.88	6.38			51.77
1682	70		130.00	1.80	2.40	1.60	114.16
1688	45	1.38	77.16	2.70		7.30	209.12
1699	53		37.40			178.50	875.62
1700	30	141.29	175.05			257.42	963.68
1701	51		22.26			187.36	2235.58
1708	46		203.68			210.80	1815.68
MEAN		46.77	60.31	7.69	0.24	472.80	752.68

OUTER SHELF, 71-200m

ST.NO.	DEP.	Clupeids	Carangids	Barracudas	Scombrids	Hairtails	Other
1638	71		1.83			17.10	279.60
1640	89	0.20	109.58			17.00	187.46
1641	165		0.20			110.80	98.68
1647	95						268.07
1648	114		0.60			2.60	152.20
1654	76		155.08			96.20	541.22
1655	104		0.33			1.74	63.20
1662	159					9.69	764.29
1671	199					8.52	726.46
1672	132					3.20	162.84
1673	88					4.04	146.54
1676	80		26.72			104.21	1115.65
1680	170					96.54	600.15
1683	97		27.77			47.14	64.54
1689	87		1.46				2000.47
1690	109		27.54				180.14
1691	181						12327.00
1697	105		10.00			12.88	646.20
1698	81		25.03			24.34	961.85
1702	90					113.40	82.68
1703	109		1.14			6.57	139.75
1706	106		45.86		11.29		65.36
1707	73		1022.13			83.59	619.23
MEAN		0.01	63.27		0.49	33.02	964.94

Table 6 presents the catch rates of the most important demersal species grouped into families. The family Pomadasidae (grunts) clearly dominated on the inner shelf. The second most important group was seabreams followed by croakers and then groupers. During last year cruise, croakers and then seabreams were the dominant families in the inner shelf while grunts came in third place. The mean catch rate of grunts estimated during this cruise was almost 6 times

higher than that of last year, seabreams had a comparable level while the catch rate of croakers was half of that of last year. Seabreams were the dominating family on the outer shelf with a mean catch rate almost three times higher than last year estimate. The most abundant species were *Dentex macrophthalmus* and *Pagellus bellottii*, followed by *D. angolensis* and *D. barnardi*. Croakers were the second family in importance in the outer shelf with a catch rate twice as high as last year estimate. Like on the inner shelf, the groupers were rare, occurring only in one station. The snappers (*Lutjanus* spp.) were absent on the inner and on the outer shelves.

Table 6. Catch rates (kg/hour) of valuable demersal species grouped by families; bottom trawl hauls on the shelf. LUANDA-BENGUELA

INNER SHELF, 0-70 m

ST.NO.	DEP.	Seabreams	Grunts	Croakers	Groupers	Snappers	Other
1639	34	160.50	5.03		16.20		29.94
1645	25	15.20	273.60	109.44			1542.80
1646	60	53.92					59.87
1653	41	120.72	9.41				201.15
1660	27	1.32	4.94	10.26			178.72
1661	59	20.91	1.61				64.03
1674	48						9010.80
1675	65	36.24	2.60	12.60			177.80
1681	31	1.13			0.94		133.71
1682	70	86.34	2.00				161.62
1688	45	45.08	2.34	5.00			245.24
1699	53	148.90	409.70	29.76			503.16
1700	30		214.07	145.55			1177.82
1701	51	46.84	1083.70	99.26			1215.40
1708	46	2.48	606.06	54.58	27.00		1540.04
MEAN		49.31	174.34	31.10	2.94		1082.81

OUTER SHELF, 71-200 m

ST.NO.	DEP.	Seabreams	Grunts	Croakers	Groupers	Snappers	Other
1638	71	31.44	4.41	8.52			254.16
1640	89	76.78		16.56	2.06		218.84
1641	165	53.20					156.48
1647	95	169.02		11.66			87.39
1648	114	126.20					29.20
1654	76	317.34		18.06			457.10
1655	104	33.62					31.65
1662	159	584.77		21.23			167.98
1671	199	12.66					722.32
1672	132	72.62		1.14			92.28
1673	88	55.08					95.50
1676	80	188.91		35.05			1022.62
1680	170	194.67		2.17			499.85
1683	97	35.40					104.05
1689	87	293.48	6.43	1614.85			87.17
1690	109	130.18		11.80			65.70
1691	181	11518.50					808.50
1697	105	429.10					239.98
1698	81	498.14		287.62			225.46
1702	90	35.00					161.08
1703	109	98.00		20.29			29.17
1706	106	28.71		0.69			93.11
1707	73	44.78		211.17			1469.00
MEAN		653.37	0.47	98.30	0.09		309.50

Figure 4 shows the distribution of the seabreams in the region between Luanda and Benguela.

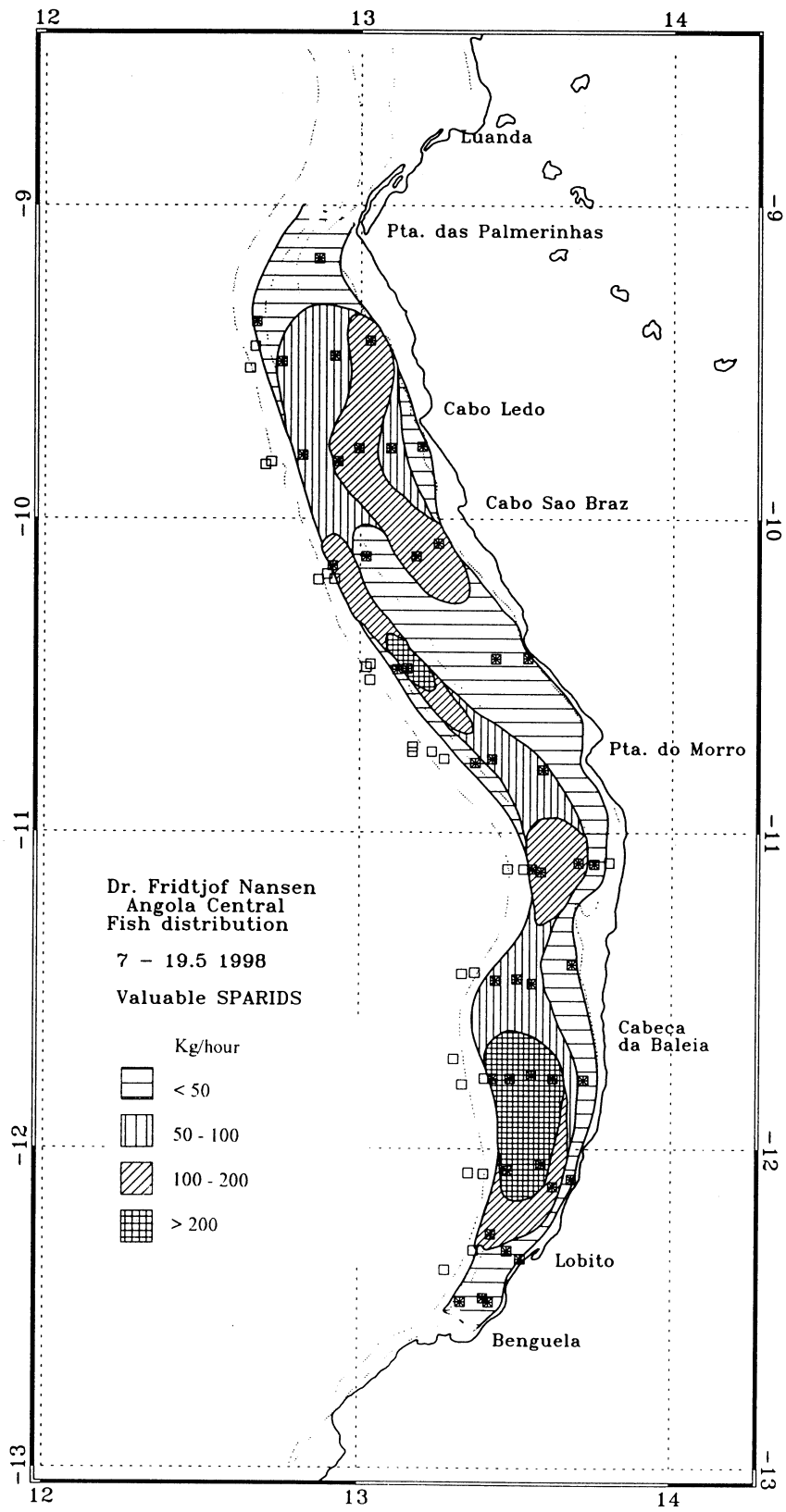


Figure 4. Distribution of seabreams (family Sparidae). Luanda-Benguela

Seabreams were distributed from the inner shelf to about 300 m depth on the slope, with the highest abundance on the outer shelf and upper slope. Four main areas of concentration (>200kg/hr) can be observed for this group. Same as last year, the best catches were taken between Cabeça da Baleia and Lobito.

In Annex III A, swept-area estimates of mean densities based on 38 random bottom trawl hauls are presented for demersal species on the shelf. *Trichiurus lepturus*, *Brachydeuterus auritus* and *Pomadasys juvelini* were the three more abundant species in the 20-50 m zone, followed by *Galeoides decadactylus*. *B. auritus*, *Atractoscion aequidens* and *P. bellottii* were the three more abundant species between 50 and 100 m. The range 100-200m was clearly dominated by *D. macrophthalmus* followed by *D. angolensis* and *S. microlepis*. It is quite remarkable that relatively low densities of *S. microlepis* were found during this cruise while during last year cruise this was the most abundant species between 50-200m depth.

The total biomass of valuable demersal groups is presented in Table 6.

Table 6. Biomass estimates of valuable demersal fish by main groups on the shelf, by year of investigation (tonnes). Luanda-Benguela.									
Biomass (tonnes)									
	1986/I ☼	1989/I ☼	1991/I I◆	1992 ◆	1994 ◆	1995 ☼	1996 ◆	1997 ◆	1998 ◆
Seabreams	9 300	11 100	24 580	28 000	29 200	21 800	19000	21650	56110
Grunts	2 700	5 600	5 500	2 000	120	3 400	5230	2320	12700
Croakers	5 500	1 450	19 000	2 000	4 010	13 290	6140	8490	9689
Groupers	470	550	1 000	1 000	350	470	830	300	330
Sum dem. val.	17 970	18 700	50 080	33 000	33 680	38 960	31200	32760	78830
Bigeye grunt	44 600	18 500	18 500	52 000	2 990	29 500	31120	44110	34765
Horse mackerel	21 000	7 200	48 500	75 000	65 100	4 200	37090	42480	5500
Other carangids	3 100	8 500	290	1 640	2 790	8 400	5360	16120	2360
Barracudas	1 900	3 000			740	2 700	1540	4810	755
Hairtail	17 300	12 500	4100	1 300	26 200	5 300	5080	23120	47351

☼ summer season (February-March)

◆ winter season (May-September)

4.2 Review of results

The most important feature of this year's biomass estimates was the pronounced increase in of Seabreams and grunts as compared with last year. At the same time, with the exception of hairtails, most pelagic and semi-pelagic species showed a strong decrease. A more careful analysis should be done, specially to clarify the reasons for these abrupt changes in the estimates of seabreams and grunts. The results should be considered as very preliminary until a more in depth study is made of the present data.

Table 7 summarises the biomass estimates for valuable demersal fish in the period 85 - 98.

Table 7. Valuable demersal fish. Mean biomass estimates (1000 tonnes) by survey and region.					
Survey	Cunene-Benguela	Benguela-Luanda	Luanda-Cabinda	Benguela-Cabinda	Total
1/85-4/85	N.S.	N.S.	48.8	-	-
1/86-2/86	15.6	21.2	38.3	59.5	78.4
1/89-2/89	28.2	17.9	25.5	43.4	75.1
3/89	N.S.	N.S.	31.7	-	-
Nov/89					68.0*
1/91	26.4	15.0	15.9	30.9	57.3
2/91	36.4	50.1	35.9	86.0	122.4
1/92	47.7	33.0	34.0	67.0	114.7
1/94	N.S.	33.7	41.4	75.1	-
1/95	N.S.	39.0	19.3	58.3	-
2/96	N.S.	31.2	56.7	87.9	-
2/97	N.S.	32.7	33.3	65.0	-
2/98	N.S.	78.8	N.S.	-	-

* From GOA survey, seabreams only.

CHAPTER 5 CATCH RATES, DISTRIBUTION, COMPOSITION AND BIOMASS ESTIMATES OF DEEP-WATER SHRIMP AND HAKE (SLOPE)

The slope off Luanda-Benguela was covered with swept-area hauls with the following distribution: 200-400 m: 14 hauls and 400-800 m: 19 hauls. The results from the swept-area analysis by depth intervals are presented in Annex III C and D.

Table 8. Catch rates (kg/hour) by main groups in swept area bottom trawl hauls on the slope.
LUANDA-BENGUELA

ST.NO.	DEP.	Demersal	Pelagic	Sharks	Shrimps	Cephalopod	Other
1642	289	64.64	57.20		99.52	0.84	745.14
1643	404	260.32		18.99	29.18		154.96
1644	543	25.94	0.77	10.07	9.79		69.52
1649	238	98.28	6.86		2.57	4.00	210.00
1651	693	6.66		2.16	43.30	6.66	176.10
1652	619	5.00		2.60	18.16	1.60	111.26
1656	207	338.00	34.00		54.00	32.00	1934.00
1657	266	47.24	67.50		53.10	2.88	120.20
1658	314	312.54			240.14	6.64	508.04
1659	542		5.60	11.00	197.50	11.00	64.40
1663	222	106.26			8.21	31.46	131.51
1664	377	485.60	0.96	28.16	6.40	1.28	396.16
1665	552	5.40	2.40	1.80	156.60	4.20	150.20
1666	450	22.00	2.00	5.00	130.20	2.60	150.20
1667	725	0.68		2.71	123.16		322.83
1668	653			53.08	148.84	2.31	95.06
1669	438	696.14		46.46	521.48	6.14	130.20
1670	357	376.00	1.20	2.40	180.60		720.00
1677	506			6.19	160.57		45.30
1678	356	420.00	1.60	54.00	360.86	4.60	104.56
1679	252	613.60	9.28		44.00	6.08	488.48
1684	228	341.02	251.60		52.70	2.04	565.94
1685	491	10.80	0.52	9.93	371.90		101.37
1686	736				92.70		482.33
1687	672	13.33	5.33	5.33	112.00	8.67	480.66
1692	243	596.80			4.40	88.40	512.00
1693	349	783.00	18.00	39.60	268.60	6.60	194.20
1694	557	12.00	0.88	4.24	92.48		105.20
1695	698	4.20	0.24		25.78	1.14	162.22
1696	550	12.00		1.40	113.40	3.00	213.30
1704	327	163.06	523.06	6.35	43.06	2.12	1245.17
1705	711	12.00		6.00	156.00	4.00	429.27
MEAN		182.27	30.91	9.92	122.54	7.51	353.74

Table 8 shows the composition of the catches by major groups on the slope. The groups included under 'Demersal' are families of commercial interest (including hake) that represented about 26% of the total catch.. The category 'Shrimps' included all shrimp species caught and made, in average, 17% of the total catch. It is worth noticing that 50% of the catch was conformed by groups not considered in the analysis i.e. 'Other'. Except for the 'Pelagic' group, the catch rates of all the rest categories were lower than last year's ones.

5.1 Deep water shrimp

Table 9 shows the catch rates of important shrimps and bycatch species on the slope off Luanda-Benguela. Deep-water shrimps were caught at all stations, and like in previous investigations spider shrimp (*Nematocarcinus africanus*) had the highest catch rate, a little higher than those obtained in 1997. The overall mean catch of *P. longirostris* was 10.57 kg/h, which is slightly lower than what was obtained in 1997 while the catch rate of *A. varidens* (12.84 kg/h) was much higher than last year. Hake was the most important species of fish in the slope with a mean catch of 150.58 kg/h.

Table 9. Catch rates (kg/hour) of main shrimp and bycatch species in swept area bottom trawl hauls on the slope. LUANDA-BENGUELA.

ST.NO.	DEP.	Sparids	Hakes	Rose shr.	Str. shr.	Spid. shr.	Other
1642	289	9.64	55.00	97.74		0.94	804.02
1643	404		260.32	0.62	22.39	2.09	178.03
1644	543		25.94		4.10		86.05
1649	238	65.71	32.57	2.57			220.86
1651	693		6.66		34.58	8.72	184.92
1652	619		5.00		10.16	8.00	115.46
1656	207	184.00	154.00	54.00			2000.00
1657	266		47.24	51.30		1.08	191.30
1658	314		312.54	21.46	0.38	216.60	516.38
1659	542				2.70	194.80	92.00
1663	222	7.84	98.42	8.21			162.97
1664	377		485.60		1.28	3.68	428.00
1665	552		5.40		9.60	145.80	159.80
1666	450		22.00		13.60	115.60	160.80
1667	725		0.68		1.82	116.52	330.36
1668	653				1.15	146.54	151.60
1669	438		696.14		29.12	492.20	182.96
1670	357		376.00	0.20		180.00	724.00
1677	506				11.22	148.65	52.19
1678	356		420.00	0.30	0.40	360.00	164.92
1679	252	183.20	430.40	43.68			504.16
1684	228	67.32	273.70	52.54			819.74
1685	491		10.80		32.57	338.81	112.34
1686	736				7.70	66.67	500.66
1687	672		13.33		12.00	80.00	519.99
1692	243	496.40	100.40	4.40			600.40
1693	349		783.00	0.20		268.40	258.40
1694	557		12.00		9.28	82.40	111.12
1695	698		4.20		11.92		177.46
1696	550		12.00		21.00	92.00	218.10
1704	327		163.06	1.06	42.00		1776.70
1705	711		12.00		132.00		463.27
MEAN		31.69	150.58	10.57	12.84	95.92	405.28

Figs. 5 and 6 show the distribution of *P. longirostris* and *A. varidens* respectively. The highest catch rates of *P. longirostris* were obtained between Ponta das Palmerinhas and Cabo Ledo, south of Cabo São Bras and between Ponta do Morro and Cabeça da Baleia. *A. varidens* had a much more scattered distribution, with a small area with catch rates between 10 -25 kg/h. off Cabo Ledo and a area with a very high concentration (> 25kg/h) between Lobito and Benguela.

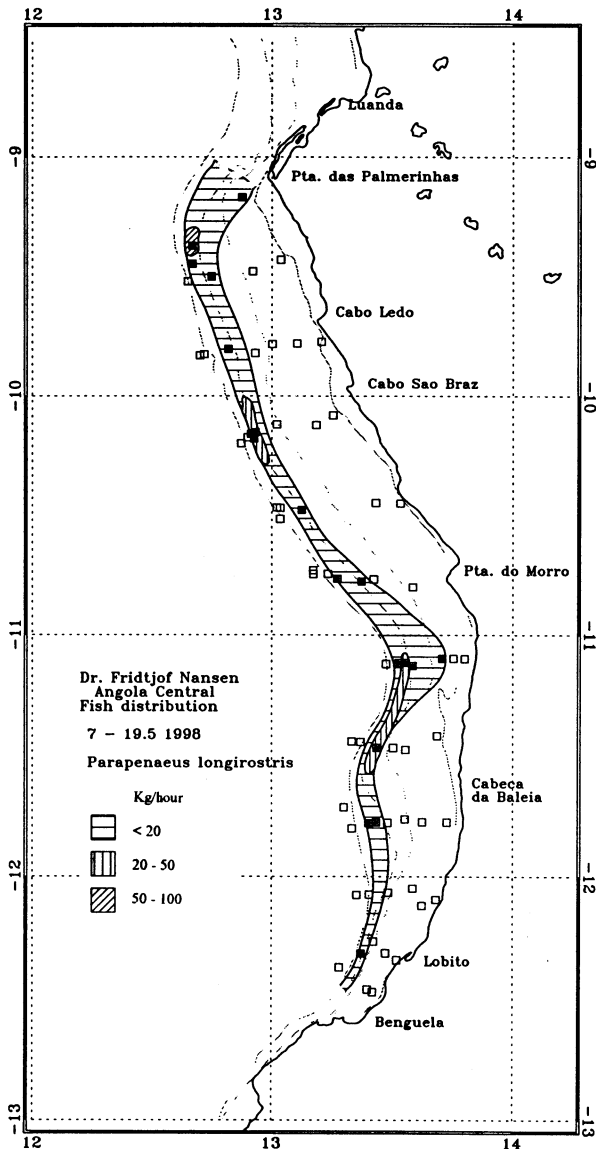


Figure 5. Distribution of rose shrimp (*Parapenaeus longirostris*). Luanda-Benguela.

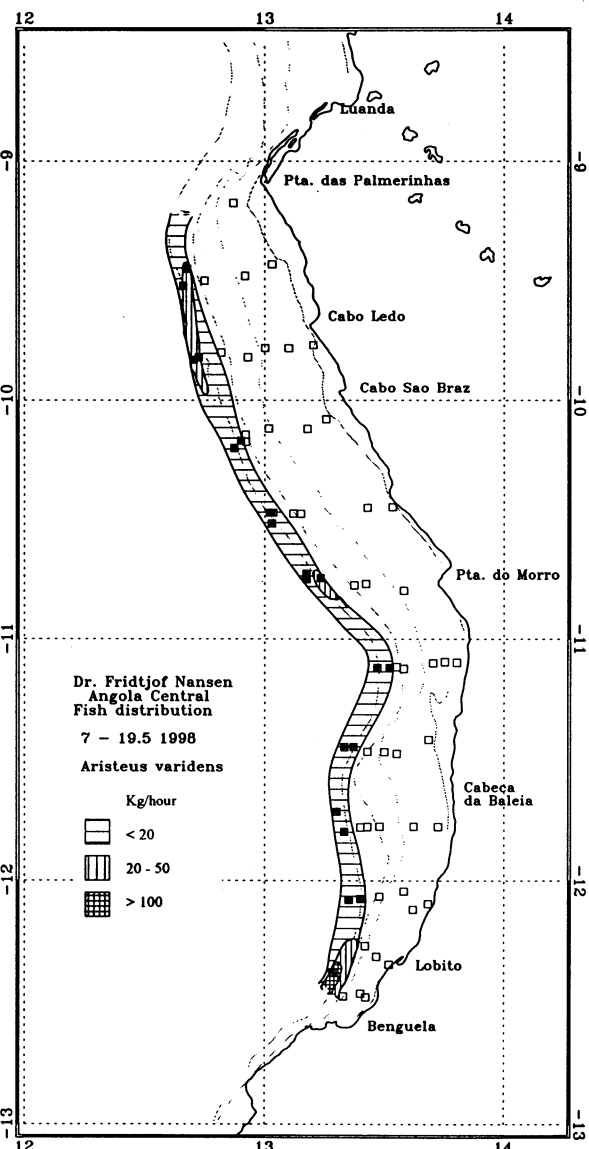


Figure 6. Distribution of striped red shrimp (*Aristeus varidens*). Luanda-Benguela

Mean catch rates of *Parapenaeus longirostris* (rose shrimp) by depth are shown in table 10. In the Luanda -Benguela region, the highest mean catch rate was recorded between 200-300 m , following the same trend found in 1997.

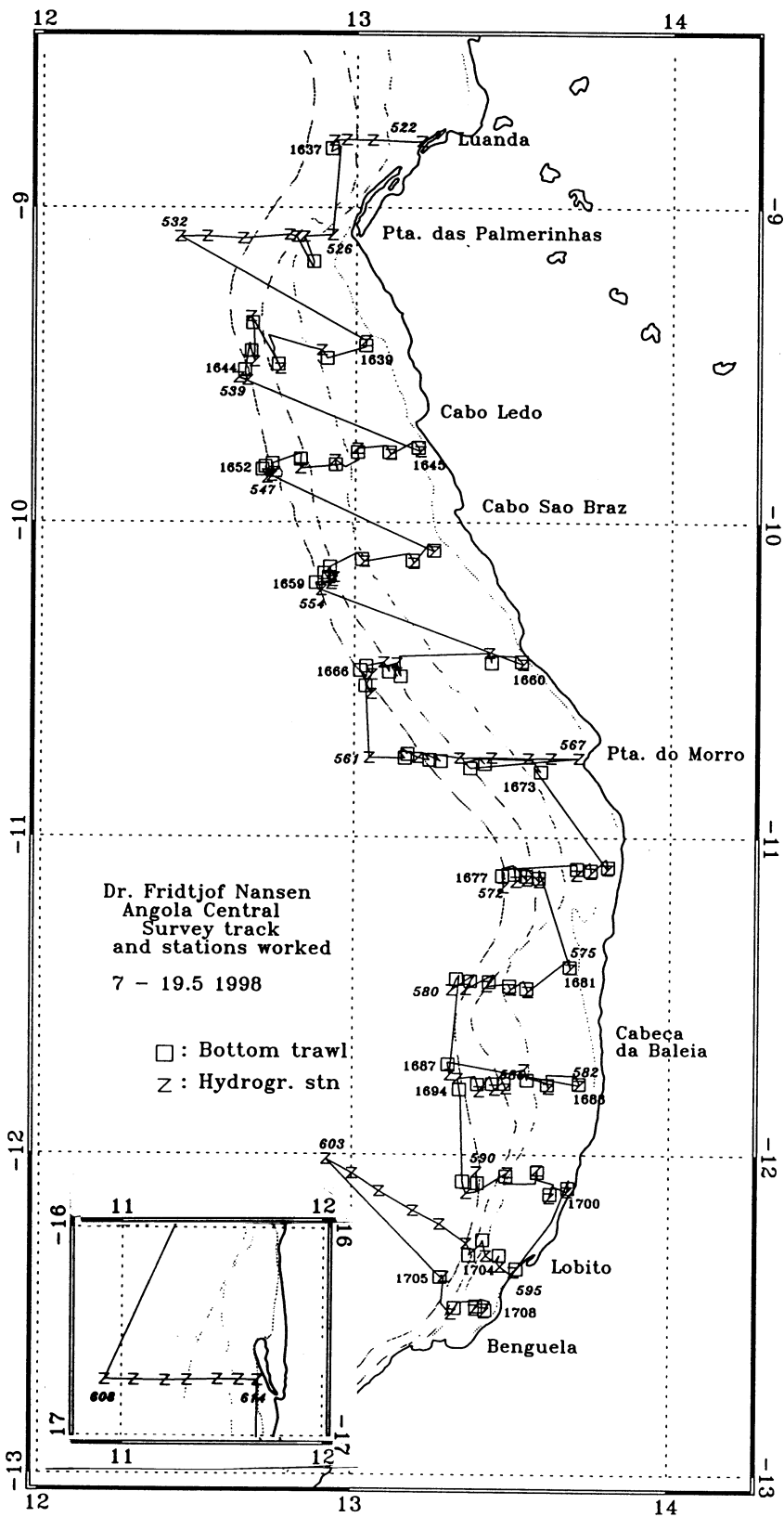
Table 10. Rose shrimp. Mean catch rates (kg/hour) by region, depth range and year of investigation.

Area/ depth	Year of investigation									
	1986/ I	1989	1991/ I	1992	1994	1995/ 1	1995/ 2	1996	1997	1998
Cabinda-Luanda										
100-200 m	4	+	+	2	3	8	No	+	2	No
200-300 m	60	10	8	18	15	34	survey	6	26	survey
300-400 m	4	5	1	+	12	10		1	4	
Mean	19	5	2	8	10	16		3	10	
Luanda-Benguela										
100-200 m	32	5	-	2	3	6	6	1	23	3
200-300 m	38	14	14	26	30	16	21	6	51	39
300-400 m	11	26	2	1	14	18	13	3	1	4
Mean	25	11	4	8	13	12	15	3	25	15

Mean catch rates of *A. varidens* (striped red shrimp) are presented in Table 11. In the Luanda-Benguela region, the overall mean catch rate estimate gave the highest value in the time series (22kg/h). The highest mean catch rate was observed within stratum 600-800 m which was not covered in some of the previous surveys including the last.

Table 11 Striped shrimp. Mean catch rates (kg/hour) by region, depth range and year of investigation.

Area/ depth	Year of investigation									
	1986/ 1	1989	1991/ I	1992	1994	1995/ 1	1995/ 2	1996	1997	1998
Cabinda-Luanda										
300-400 m	3	+	+	1	+	2	No	1	1	No
400-500 m	1	3	4	6	6	14	survey	9	10	survey
500-600 m	37	5	1	7	10	3		6	7	
600-800 m	-	3	-	4	5	3		2	4	
Mean	13	3	2	4	5	5		5	5	
Luanda-Benguela										
300-400 m	1	1	3	1	1	17	11	3	7	7
400-500 m	22	10	19	2	23	13	22	23	16	24
500-600 m	16	6	32	5	15	17	4	21	4	10
600-800 m	-	-	-	15	10	9	7	7	-	26
Mean	13	6	12	6	12	14	12	13	9	22



Biomass estimates of commercially important shrimps are presented in Table 18. In the Angolan central region the biomass estimate of *A. varidens* increased considerable and is more than three times compared to last year and the highest in the time series. The biomass of *P. longirostris* was less than half compared to last year.

Table 12. Biomass of commercial deep water shrimps by region and year of investigation (tonnes).

Region/ species	Year of investigation									
	1985/ I	1986/ I	1989	1992	1994	1995/ I	1995/ 2	1996	1997	1998
Cabinda-Luanda										
-Rose shrimp	380	150	550	615	1 110	1 580	No	210	830	No
-Striped red shr.	-	1 200	400	515	610	500	survey	440	590	survey
-Scarlet shrimp	-	+	+	130	+	+		50	10	
Luanda-Benguela										
-Rose shrimp	-	3 400	700	680	710	460	750	130	1780	847
-Striped red shr.	-	1 000	370	570	890	940	730	850	370	1493
-Scarlet shrimp	-	100	+	+	+	+	+	90	10	187
Total		5 850	2 020	2 570	3 410	3 480		1770	3580	

5.2 Benguela hake

The mean catch rates of Benguela hake (*Merluccius polli*) in the two regions by depth zone are shown in Table 13. The mean catch rate estimated in the present survey was lower than the one obtained in 1997, but is among the highest in the time series. Like in previous surveys the best catch rates were obtained between 300 and 400 m depth.

Biomass estimates of hake are presented in Table 14. The biomass estimate represent a decrease of around 25 % in the Luanda-Benguela region compared to the results of last year survey.

Table 13. HAKE. Mean catch rates (kg/hour) by regions, depth range and year of investigation.

Area/ depth	Year of investigation									
	1986/ I	1989	1991/ I	1992	1994	1995/ I	1995/ 2	1996	1997	1998
Cabinda-Luanda										
100-200 m	+	3	1	13	+	2		-	+	
200-300 m	59	44	11	104	28	9	No	43	63	No
300-400 m	289	145	382	264	134	194	survey	136	302	survey
400-500 m	258	223	564	224	43	86		96	17	
500-600 m	83	25	28	21	12	6		7	3	
600-800 m	-	56	-	12	1	10		8	2	
Mean	114	72	203	90	40	47		48	65	
Luanda-Benguela										
100-200 m	6	8	+	31	49	3	39	15	98	8
200-300 m	161	167	30	112	122	23	51	31	301	149
300-400 m	822	82	384	220	55	196	197	330	444	423
400-500 m	433	291	394	174	64	80	121	116	93	247
500-600 m	45	44	180	39	52	27	8	44	2	9
600-800 m	-	-	-	10	5	30	3	10	-	5
Mean	378	93	138	91	63	61	74	95	185	140

Table 14. Biomass estimates of hake by area and year of investigation (tonnes).

Region	Year of investigation									
	1986/ I	1989	1991/ I	1992	1994	1995/ I	1995/ 2	1996	1997	1998
Cabinda-Luanda	17 000	15 300	18 000	14 000	4 700	7 100	*	6170	8500	*
Luanda-Benguela	31 400	5 300	11 000	8 100	6 670	4 950	6830	7510	15230	11370
Total	48 400	20 600	29 000	22 100	11 370	12 050		13680	23730	

* no survey

Fig. 7 shows the distribution of hake in the Luanda-Benguela area. The highest catch rates > 200 kg/ were observed in a large area between South of São Bras and 12 S (South of Cabeça da baleia), and a small area between Ponta das Palmeirinhas and Cabo Iedo.

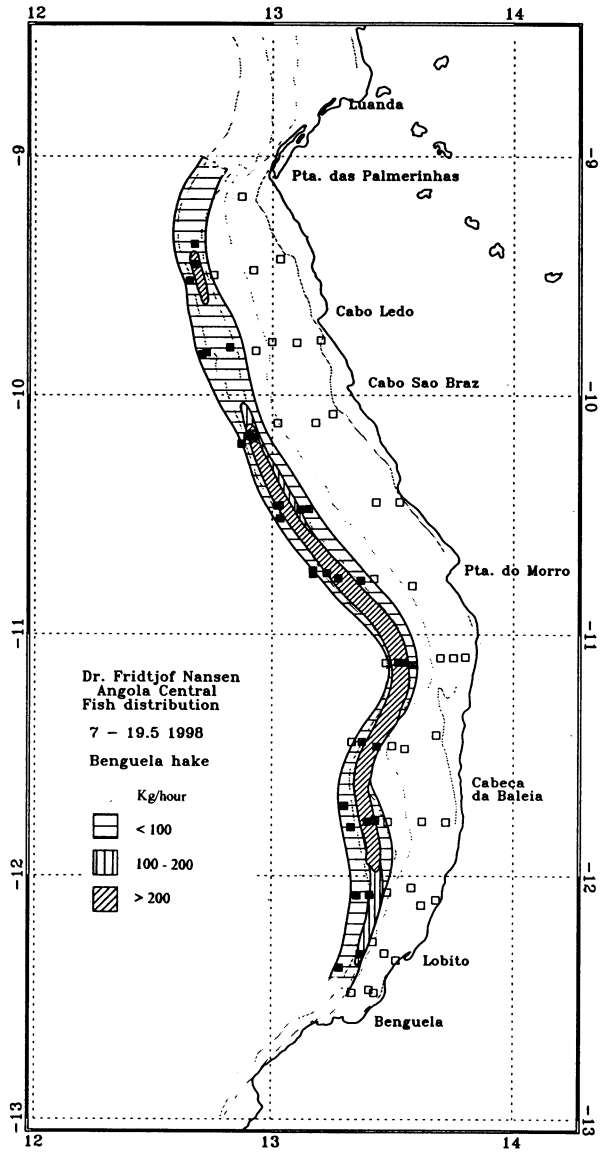


Figure 7. Distribution of Benguela hake (*Merluccius polli*). Luanda-Benguela.

Annex I Records of fishing stations

PROJECT STATION:1637
 DATE: 7/ 5/98 GEAR TYPE: BT No: 3 POSITION:Lat S 849
 start stop duration Long E 1255
 TIME :21:24:08 21:39:15 15 (min) Purpose code: 3
 LOG :3524.82 3525.53 0.70 Area code : 2
 FDEPTH: 321 320 GearCond.code: 9
 BDEPTH: 321 320 Validity code: 9
 Towing dir: 190ø Wire out: 990 m Speed: 28 kn*10

Sorted: Kg Total catch: 60.50 CATCH/HOUR: 242.00

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Merluccius polli	92.40	416	38.18	
Chlorophthalmus atlanticus	80.00	1772	33.06	
Gephyroberyx darwini	26.80	32	11.07	
Laemonema laureysi	9.20	108	3.80	
Pterothrissus bellocci	9.20	64	3.80	
Malacocephalus laevis	6.80	52	2.81	
Trichiurus lepturus	4.00	16	1.65	
Scorpaena normani	3.20	52	1.32	
CONGRIDAE	2.80	28	1.16	
Synagrops microlepis	2.40	100	0.99	
Gadella imberbis	1.60	56	0.66	
Aristeus varidens, male	0.84	96	0.35	3786
Zenopsis conchifer	0.80	4	0.33	
Parapenaeus longirostris, fem.	0.72	88	0.30	3787
Hymenocephalus italicus	0.40	8	0.17	
Solenocera africana	0.40	48	0.17	
Aristeus varidens, female	0.16	8	0.07	3788
Total	241.72		99.89	

PROJECT STATION:1638
 DATE: 8/ 5/98 GEAR TYPE: BT No:12 POSITION:Lat S 910
 start stop duration Long E 1252
 TIME :19:35:26 19:55:55 20 (min) Purpose code: 3
 LOG :3598.53 3599.50 0.94 Area code : 2
 FDEPTH: 72 70 GearCond.code: 2
 BDEPTH: 72 70 Validity code: 2
 Towing dir: 190ø Wire out: 220 m Speed: 30 kn*10

Sorted: 99 Kg Total catch: 99.51 CATCH/HOUR: 298.53

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Pterothrissus bellocci	108.60	20529	36.38	
Brotula barbata	27.30	60	9.14	
Octopus vulgaris	19.95	15	6.68	
Dentex angolensis	18.30	126	6.13	3789
Trichiurus lepturus	17.10	105	5.73	
Citharus linguatula	16.44	261	5.51	
Pagellus bellottii	10.50	72	3.52	3790
Parapenaeus longirostris, fem.	8.40	1377	2.81	3791
Miscellaneous fishes	7.71	2172	2.58	
Thorogobius angolensis	7.26	837	2.43	
Chelidonichthys capensis	6.51	30	2.18	
Parapenaeus longirostris, male	5.70	1626	1.91	3792
Umbria canariensis	4.89	30	1.64	
Sepia officinalis hierredda	4.71	18	1.58	
Pomadasys jubelini	4.41	3	1.48	
Atractoscion aequidens	3.63	3	1.22	
Uranoscopus albus	3.03	33	1.01	
Shrimps, small, non comm.	2.76	1716	0.92	
Torpedo torpedo	2.76	3	0.92	
Saurida brasiliensis	2.67	393	0.89	
Dentex barnardi	2.64	18	0.88	
Epigonus telescopus	2.34	9	0.78	
Zeus faber	1.89	6	0.63	
Dicologlossa cuneata	1.62	6	0.54	
Vanstraelenia chirrophthalmus	1.14	27	0.38	
Laemonema laureysi	1.08	51	0.36	
Trachurus trecae	0.93	9	0.31	
Selene dorsalis	0.90	3	0.30	
Chaetodon hoefleri	0.87	6	0.29	
Brachydeuterus auritus	0.78	42	0.26	
Malacocephalus laevis	0.78	39	0.26	
Scorpaena normani	0.63	9	0.21	
Ephippion guttifer	0.30	9	0.10	
Total	298.53		99.96	

PROJECT STATION:1639
 DATE: 9/ 5/98 GEAR TYPE: BT No:12 POSITION:Lat S 926
 start stop duration Long E 1302
 TIME :05:35:02 05:42:49 8 (min) Purpose code: 3
 LOG :3677.73 3678.04 0.31 Area code : 2
 FDEPTH: 34 34 GearCond.code: 2
 BDEPTH: 34 34 Validity code: 2
 Towing dir: 180ø Wire out: 150 m Speed: 30 kn*10

Sorted: 28 Kg Total catch: 28.22 CATCH/HOUR: 211.65

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Pagrus caeruleostictus	66.75	135	31.54	3795
Pagellus bellottii	62.25	270	29.41	3793
Dentex barnardi	31.50	105	14.88	3794
Chaetodon hoefleri	17.78	113	8.40	
Epinephelus aeneus	16.20	15	7.65	
Trachinus armatus	5.18	8	2.45	
Plectorhinchus mediterraneus	5.03	15	2.38	
Aluterus punctata	2.93	8	1.38	
Raja miraletus	2.70	8	1.28	
Pseudupeneus prayensis	1.35	15	0.64	
Total	211.67		100.01	

PROJECT STATION:1640
 DATE: 9/ 5/98 GEAR TYPE: BT No:12 POSITION:Lat S 929
 start stop duration Long E 1255
 TIME :07:50:25 08:20:01 30 (min) Purpose code: 3
 LOG :3692.69 3694.22 1.51 Area code : 2
 FDEPTH: 88 89 GearCond.code: 2
 BDEPTH: 88 89 Validity code: 2
 Towing dir: 335ø Wire out: 300 m Speed: 30 kn*10

Sorted: 63 Kg Total catch: 156.80 CATCH/HOUR: 313.60

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Selene dorsalis	76.76	180	24.48	3998
Dentex canariensis	66.26	300	21.13	3997
Alloteuthis africana	42.26	20206	13.48	
Trachurus trecae	27.26	676	8.69	3996
Branchiostegus semifasciatus	20.96	16	6.68	
Trichiurus lepturus	17.04	26	5.42	
Umbria ronchus	16.56	56	5.28	
Raja miraletus	11.56	16	3.69	
Pagellus bellottii	6.16	20	1.96	3995
Alectis ciliaris	5.56	6	1.77	
Chaetodon marcellae	4.86	30	1.55	
UBAURO3	4.00	10	1.28	
Dentex canariensis	3.80	20	1.21	
Pterothrissus bellocci	3.00	10	0.96	
Brotula barbata	2.60	6	0.83	
Epinephelus aeneus	2.06	2	0.66	
Zeus faber	1.60	6	0.51	
Sepia officinalis hierredda	1.22	2	0.39	
Dentex angolensis	0.56	6	0.18	
Sardinella aurita	0.20	6	0.06	
Total	314.24		100.21	

PROJECT STATION:1641
 DATE: 9/ 5/98 GEAR TYPE: BT No:12 POSITION:Lat S 930
 start stop duration Long E 1245
 TIME :12:34:40 13:04:32 30 (min) Purpose code: 3
 LOG :3715.20 3716.69 1.47 Area code : 2
 FDEPTH: 168 161 GearCond.code: 2
 BDEPTH: 168 161 Validity code: 2
 Towing dir: 335ø Wire out: 500 m Speed: 30 kn*10

Sorted: 105 Kg Total catch: 105.04 CATCH/HOUR: 210.08

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichiurus lepturus	110.80	148	52.74	
Dentex macrophthalmus	29.80	214	14.19	4000
Dentex angolensis	23.40	74	11.14	3999
Squatina oculata	12.60	2	6.00	
Zeus faber	6.40	20	3.05	
Brotula barbata	4.80	4	2.28	
Pterothrissus bellocci	3.20	24	1.52	
Zenopsis conchifer	2.80	10	1.33	
Todaropsis eblanae	2.60	84	1.24	
Illex coindetii	2.00	50	0.95	
Octopus vulgaris	1.60	2	0.76	
Uranoscopus cadenati	1.60	10	0.76	
Raja miraletus	1.40	2	0.67	
Torpedo torpedo	1.20	2	0.57	
Citharus linguatula	1.20	56	0.57	
Alloteuthis africana	1.00	650	0.48	
Trigla lyra	1.00	8	0.48	
Bembrops heterurus	0.80	10	0.38	
Parapenaeus longirostris, fem.	0.72	154	0.34	4001
Parapenaeus longirostris, male	0.56	132	0.27	4002
Trachurus trecae	0.20	6	0.10	
Total	209.68		99.82	

PROJECT STATION:1642
 DATE: 9/ 5/98 GEAR TYPE: BT No:12 POSITION:Lat S 922
 start stop duration Long E 1240
 TIME :15:26:15 15:56:08 30 (min) Purpose code: 3
 LOG :3728.73 3730.30 1.57 Area code : 2
 FDEPTH: 282 295 GearCond.code: 2
 BDEPTH: 282 295 Validity code: 2
 Towing dir: 170ø Wire out: m Speed: 3 kn*10

Sorted: 483 Kg Total catch: 483.70 CATCH/HOUR: 967.40

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Chlorophthalmus atlanticus	603.60	11490	62.39	
Parapenaeus longirostris, fem.	82.68	10926	8.55	4004
Trichiurus sp.	57.20	138	5.91	
MYCTOPHIDAE	56.38	20084	5.83	
Merluccius polli	55.00	382	5.69	
Synagrops sp.	45.82	20	4.74	
Parapenaeus longirostris, male	15.06	2036	1.56	4005
Pterothrissus bellocci	12.72	742	1.31	
Laemonema laureysi	12.72	10	1.31	
Dentex macrophthalmus	9.64	22	1.00	
Zenopsis conchifer	6.20	42	0.64	
Bembrops heterurus	3.80	42	0.39	
Epigonus telescopus	1.80	424	0.19	
Nematocarcinus africanus	0.94	222	0.10	
Solenocera africana	0.84	10	0.09	
Illex coindetii	0.84	10	0.09	
Pontinus kuhlii	0.64	22	0.07	
Menodermichthys copei	0.64	22	0.07	
Coelorhynchus coelorhynchus	0.52	22	0.05	
Hymenocephalus italicus	0.30	424	0.03	
Total	967.34		100.01	

PROJECT STATION:1643
 DATE: 9/ 5/98 GEAR TYPE: BT No:12 POSITION:Lat S 927
 start stop duration Long E 1240
 TIME :18:59:05 19:29:38 31 (min) Purpose code: 3
 LOG :3741.32 3742.90 1.57 Area code : 2
 FDEPTH: 411 396 GearCond.code:
 BDEPTH: 411 396 Validity code:
 Towing dir: 350ø Wire out:1200 m Speed: 30 kn*10

Sorted: 28 Kg Total catch: 239.36 CATCH/HOUR: 463.28

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Merluccius polli	260.32 1303	56.19	4006
Malacocephalus laevis	48.77 523	10.53	
Hymenocephalus italicus	35.42 4275	7.65	
Dibranchius atlanticus	25.08 1812	5.41	
Etmopterus spinax	18.99 401	4.10	
Aristeus varidens, female	14.90 993	3.22	4008
Chaceon maritae	9.56 15	2.06	
Lophiodes sp.	9.41 87	2.03	
Aristeus varidens, male	7.49 931	1.62	4007
Pterothrissus belloci	7.14 52	1.54	
Coelorrhinus coelorhinc. polli	6.45 174	1.39	
Munida sp. *	5.57 557	1.20	
NETTASTOMATIDAE	4.01 157	0.87	
Plesiopeneus edwardsianus, f.	3.31 62	0.71	4010
Nematocarcinus africanus	2.09 627	0.45	
Halosaurus ovenii	1.74 87	0.38	
Raja alba	1.05 35	0.23	
Plesiopeneus edwardsianus, m.	0.77 10	0.17	4009
PARALEPIDIDAE	0.70 35	0.15	
Parapeneus longirostris, fem.	0.52 45	0.11	
Parapeneus longirostris, male	0.10 10	0.02	
Gadella imberbis	0.06 17	0.01	
Total	463.45	100.04	

PROJECT STATION:1644
 DATE: 9/ 5/98 GEAR TYPE: BT No:12 POSITION:Lat S 931
 start stop duration Long E 1239
 TIME :21:38:25 22:09:25 31 (min) Purpose code: 3
 LOG :3753.05 3754.47 1.40 Area code : 2
 FDEPTH: 545 541 GearCond.code:
 BDEPTH: 545 541 Validity code:
 Towing dir: 170ø Wire out:1400 m Speed: 30 kn*10

Sorted: 30 Kg Total catch: 60.02 CATCH/HOUR: 116.17

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Merluccius polli	25.94 116	22.33	4011
Yarella blackfordi	25.16 675	21.66	
Centroprorus squamosus	8.52 4	7.33	
Lamprogrammus exutus	8.52 93	7.33	
Nezumia aequalis	6.58 350	5.66	
NETTASTOMATIDAE	5.81 178	5.00	
Solenocera africana	5.42 1545	4.67	
Gonostoma sp.	3.87 62	3.33	
Ebinania costaecanarie	3.87 8	3.33	
CONGRIDAE	3.10 105	2.67	
Aristeus varidens, female	2.71 93	2.33	4012
Munida sp. *	2.71 66	2.33	
Laemonema laureysi	2.71 101	2.33	
Hoplostethus cadenati	1.94 62	1.67	
Dibranchius atlanticus	1.55 190	1.33	
Etmopterus spinax	1.55 15	1.33	
Aristeus varidens, male	1.39 166	1.20	4013
Triplphos sp.	1.16 445	1.00	
Gadella imberbis	0.77 93	0.66	
Trichurus lepturus	0.77 31	0.66	
Chlorophthalmus atlanticus	0.77 15	0.66	
Lophius vaillanti	0.39 4	0.34	
Plesiopeneus edwardsianus	0.27 15	0.23	
Talismania longifilis	0.27 39	0.23	
Raja alba	0.19 4	0.16	
Halosaurus ovenii	0.15 4	0.13	
Total	116.09	99.90	

PROJECT STATION:1645
 DATE:10/ 5/98 GEAR TYPE: BT No:12 POSITION:Lat S 946
 start stop duration Long E 1312
 TIME :05:21:40 05:51:33 30 (min) Purpose code: 3
 LOG :3798.90 3800.37 1.43 Area code : 2
 FDEPTH: 24 25 GearCond.code:
 BDEPTH: 24 25 Validity code:
 Towing dir: 330ø Wire out: 150 m Speed: 30 kn*10

Sorted: 26 Kg Total catch: 970.50 CATCH/HOUR: 1941.00

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Engraulis encrasicolus	380.00 84550	19.58	
Galeoides decadactylus	361.00 2584	18.60	
Brachydeuterus auritus	288.80 21760	14.88	
Pomadasy jubelini	273.60 532	14.10	
Sardinella sp.	174.80 26220	9.01	
Arius parkii	144.40 76	7.44	
Pseudotolithus typus	98.80 76	5.09	
Lithognathus mormyrus	91.20 152	4.70	
Sphyrna sphyraena	45.60 304	2.35	
Synagrops microlepis	30.40 114	1.57	
Chloroscombrus chrysurus	19.00 228	0.98	
Pagellus bellottii	15.20 76	0.78	
Miracorvina angolensis	10.64 684	0.55	
Selene dorsalis	7.60 288	0.39	
Total	1941.04	100.02	

PROJECT STATION:1646
 DATE:10/ 5/98 GEAR TYPE: BT No:12 POSITION:Lat S 947
 start stop duration Long E 1306
 TIME :07:13:47 07:43:16 29 (min) Purpose code: 3
 LOG :3809.00 3810.44 1.43 Area code : 2
 FDEPTH: 59 60 GearCond.code:
 BDEPTH: 59 60 Validity code:
 Towing dir: 330ø Wire out: 230 m Speed: 30 kn*10

Sorted: 54 Kg Total catch: 54.40 CATCH/HOUR: 112.55

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Pagellus bellottii	35.59 166	31.62	4014
Dentex canariensis	16.45 95	14.62	4015
Pseudupeneus prayensis	14.90 143	13.24	
Sepia officinalis hierredda	11.79 6	10.48	
Alloteuthis africana	8.69 2150	7.72	
Raja miraletus	8.69 12	7.72	
Trichiurus lepturus	5.79 8	5.14	
Chaetodon hoefleri	4.57 27	4.06	
Zeus faber	2.50 10	2.22	
Dentex gibbosus	1.88 6	1.67	
Auxis thazard	1.16 2	1.03	
Trachurus trecae	0.97 2	0.86	
Octopus vulgaris	0.48 2	0.43	
Todarodes sp.	0.33 2	0.29	
Total	113.79	101.10	

PROJECT STATION:1647
 DATE:10/ 5/98 GEAR TYPE: BT No:12 POSITION:Lat S 947
 start stop duration Long E 1300
 TIME :08:43:45 09:15:20 32 (min) Purpose code: 3
 LOG :3816.95 3818.49 1.52 Area code : 2
 FDEPTH: 94 95 GearCond.code:
 BDEPTH: 94 95 Validity code:
 Towing dir: 170ø Wire out: 320 m Speed: 30 kn*10

Sorted: 52 Kg Total catch: 142.94 CATCH/HOUR: 268.01

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Pagellus bellottii	106.41 261	39.70	4017
Dentex canariensis	28.54 41	10.65	4018
Lepidotrigla cadmani	20.38 169	7.60	
Miscellaneous fishes	19.13 1599	7.14	
Dentex angolensis	17.34 79	6.47	4016
Dentex gibbosus	16.73 56	6.24	
Atractoscion aequidens	11.66 6	4.35	
Zeus faber	11.29 47	4.21	
Squatina oculata	9.94 9	3.71	
Raja miraletus	9.43 15	3.52	
Sepia officinalis hierredda	4.93 6	1.84	
Lithognathus mormyrus	4.05 6	1.51	
Lagocephalus laevigatus	3.38 6	1.26	
Boops boops	2.29 5419	0.85	
Spicara alta	1.41 13	0.53	
Citharus linguatula	1.16 38	0.43	
Total	268.07	100.01	

PROJECT STATION:1648
 DATE:10/ 5/98 GEAR TYPE: BT No:12 POSITION:Lat S 949
 start stop duration Long E 1256
 TIME :11:28:41 11:58:25 30 (min) Purpose code: 3
 LOG :3826.30 3827.65 1.32 Area code : 2
 FDEPTH: 114 113 GearCond.code:
 BDEPTH: 114 113 Validity code:
 Towing dir: 179ø Wire out: 330 m Speed: 30 kn*10

Sorted: 77 Kg Total catch: 77.70 CATCH/HOUR: 155.40

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Dentex angolensis	72.00 742	46.33	4021
Dentex congensis	20.20 202	13.00	4019
Pagellus bellottii	14.40 186	9.27	4020
Dentex macrophthalmus	14.20 194	9.14	4022
Dentex barnardi	5.40 32	3.47	
Squatina oculata	4.60 4	2.96	
Zeus faber	4.00 14	2.57	
Uranoscopus polli	3.40 12	2.19	
Alloteuthis africana	3.20 490	2.06	
Sepia officinalis hierredda	3.00 6	1.93	
Trichiurus lepturus	2.60 4	1.67	
Octopus vulgaris	2.00 4	1.29	
Raja miraletus	2.00 4	1.29	
Citharus linguatula	1.80 24	1.16	
Fistularia petimba	1.00 2	0.64	
Chelidonichthys capensis	0.60 10	0.39	
Trachurus trecae	0.60 10	0.39	
Scorpaena normani	0.40 6	0.26	
Total	155.40	100.01	

PROJECT STATION:1649
 DATE:10/ 5/98 GEAR TYPE: BT No:12 POSITION:Lat S 948
 start stop duration Long E 1249
 TIME :14:14:01 14:35:28 21 (min) Purpose code: 3
 LOG :3843.52 3844.73 1.18 Area code : 2
 FDEPTH: 239 237 GearCond.code:
 BDEPTH: 239 237 Validity code:
 Towing dir: 360ø Wire out: 750 m Speed: 30 kn*10

Sorted: 112 Kg Total catch: 112.60 CATCH/HOUR: 321.71

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Synagrops microlepis	105.71 5871	32.86	
Dentex angolensis	61.14 154	19.00	4023
Chlorophthalmus atlanticus	60.00 6600	18.65	
Merluccius polli	32.57 209	10.12	4027
Coelorrhinus coelorhincus	20.29 3049	6.31	
Zenopsis conchifer	11.43 140	3.55	
Trichiurus lepturus	6.86 9	2.13	
Raja miraletus	4.86 6	1.51	
Dentex macrophthalmus	4.57 26	1.42	4024
Illex coindetii	4.00 69	1.24	
Pterothrissus belloci	2.57 23	0.80	
Bembrops greyi	1.71 14	0.53	
Parapeneus longirostris, fem.	1.71 263	0.53	4025
Brotula barbata	1.43 6	0.44	
Uranoscopus polli	1.14 9	0.35	
Citharus linguatula	0.86 46	0.27	
Parapeneus longirostris, male	0.86 206	0.27	4026
Total	321.71	99.98	

PROJECT STATION:1650
 DATE:10/ 5/98 GEAR TYPE: BT No:12 POSITION:Lat S 949 Long E 1244
 start stop duration Purpose code: 3
 TIME :15:58:33 16:28:50 30 (min) Area code : 2
 LOG :3853.28 3854.73 1.45 GearCond.code: 2
 FDEPTH: 485 554 Validity code: 2
 BDEPTH: 485 554
 Towing dir: 170e Wire out:1420 m Speed: 30 kn*10
 Sorted: 427 Kg Total catch: 427.09 CATCH/HOUR: 854.18

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Lophius vaillanti	254.40	240	29.78	
Miscellaneous fishes	187.58	2882	21.96	
Merluccius polli	77.40	240	9.06	
Laemonema laureysi	44.64	1740	5.23	
Coelorrhinchus coelorrhinchus	42.00	780	4.92	
Etmopterus spinax	36.00	900	4.21	
Galeus polli	34.20	660	4.00	
NETTASTOMATIDAE	33.60	1320	3.93	4029
Aristeus varidens, female	26.40	1800	3.09	
Coloconger cadenati	16.80	60	1.97	
Hoplostethus cadenati	16.20	60	1.90	
Zenopsis conchifer	15.60	60	1.83	
Nezumia aequalis	13.80	1260	1.62	4028
Aristeus varidens, male	12.00	1500	1.48	
Stereomastis sp.	12.00	960	1.40	
Chaceon maritae	9.60	120	1.12	
Bathynectes piperitus	7.20	240	0.84	
Gadella imberbis	5.40	120	0.63	
Buglossidium luteum	4.20	120	0.49	
Todaropsis eblanæ	3.60	60	0.42	
Halosaurus ovenii	0.60	60	0.07	
Yarella blackfordi	0.36	120	0.04	
Total	854.18		99.99	

PROJECT STATION:1651
 DATE:10/ 5/98 GEAR TYPE: BT No:12 POSITION:Lat S 950 Long E 1242
 start stop duration Purpose code: 3
 TIME :18:59:34 19:29:24 30 (min) Area code : 2
 LOG :3865.36 3866.80 1.41 GearCond.code: 2
 FDEPTH: 665 721 Validity code: 2
 BDEPTH: 665 721
 Towing dir: 158e Wire out:1600 m Speed: 30 kn*10
 Sorted: 25 Kg Total catch: 117.50 CATCH/HOUR: 235.00

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Lamprogrammus exutus	44.28	280	18.84	
Nezumia aequalis	39.00	914	16.60	4031
Aristeus varidens, female	26.66	1262	11.34	
Lophius vaillanti	18.98	36	8.08	
Stereomastis sp.	18.44	1252	7.85	
Nematocarcinus africanus	8.72	2254	3.71	4030
Aristeus varidens, male	7.92	1046	3.37	
Hoplostethus cadenati	7.38	216	3.14	
Miscellaneous fishes	7.28	802	3.10	
Chaceon maritae	6.90	18	2.94	
Lophius vaillanti	6.74	36	2.87	
OPISTHOTEUTHIDAE	6.66	10	2.83	
Merluccius polli	5.94	118	2.53	
Yarella blackfordi	5.58	566	2.37	
Triplophos sp.	5.30	18	2.26	
ALBULIDAE	5.20	90	2.21	
MELANOSTOMIATIDAE	1.60	36	0.68	
CONGRIDAE	1.40	80	0.60	
Dibranchius atlanticus	1.36	18	0.58	
Galeus polli	1.00	28	0.43	
Raja alba	0.80	18	0.34	
Etmopterus spinax	0.40	18	0.17	
Xenodermichthys copei	0.28	10	0.12	
NETTASTOMATIDAE	0.20	10	0.09	
Nemichthys scolopaceus	0.10	10	0.04	
Alepocephalus sp.	0.10	10	0.04	
Bathypterois sp.				
Total	234.88		99.96	

PROJECT STATION:1652
 DATE:10/ 5/98 GEAR TYPE: BT No:12 POSITION:Lat S 949 Long E 1243
 start stop duration Purpose code: 3
 TIME :21:24:18 21:54:00 30 (min) Area code : 2
 LOG :3873.86 3875.35 1.48 GearCond.code: 2
 FDEPTH: 585 653 Validity code: 2
 BDEPTH: 585 653
 Towing dir: 155e Wire out:1400 m Speed: 30 kn*10
 Sorted: 28 Kg Total catch: 69.58 CATCH/HOUR: 139.16

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Lamprogrammus exutus	29.00	150	20.84	
Nezumia aequalis	21.00	930	15.09	
Gonostoma elongatum	13.00	220	9.34	
Diplophos sp.	9.00	450	6.47	
Nematocarcinus africanus	8.00	1674	5.75	
Munida sp. *	7.60	464	5.46	
Yarella blackfordi	7.00	180	5.03	
Chaceon maritae	7.00	16	5.03	
NETTASTOMATIDAE	6.60	190	4.74	
Aristeus varidens, female	6.00	280	4.31	4032
Merluccius polli	5.00	6	3.59	
Aristeus varidens, male	4.16	546	2.99	4033
Etmopterus spinax	2.60	20	1.87	
Lophius vaillanti	2.60	10	1.87	
Hoplostethus cadenati	2.00	160	1.44	
Gadella imberbis	2.00	474	1.44	
Thysanoteuthis rhombus	1.60	4	1.15	
Laemonema laureysi	1.60	204	1.15	
Raja alba	0.60	10	0.43	
Elinania costaeanarie	0.60	14	0.43	
Dibranchius atlanticus	0.60	6	0.43	
Malacocephalus laevis	0.60	14	0.43	
Mycetophum sp.	0.20	140	0.14	
Halosaurus ovenii	0.20	6	0.14	
Talismania longifilis	0.06	44	0.04	
Trichiurus lepturus	0.00			
Total	138.62		99.60	

PROJECT STATION:1653
 DATE:11/ 5/98 GEAR TYPE: BT No:12 POSITION:Lat S 1005 Long E 1315
 start stop duration Purpose code: 3
 TIME :05:25:57 05:55:21 29 (min) Area code : 2
 LOG :3914.82 3916.34 1.51 GearCond.code: 2
 FDEPTH: 39 42 Validity code: 2
 BDEPTH: 39 42
 Towing dir: 324e Wire out: 170 m Speed: 30 kn*10
 Sorted: 33 Kg Total catch: 160.13 CATCH/HOUR: 331.30

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Pagellus bellottii	115.34	983	34.81	4034
Brachydeuterus auritus	61.45	31	18.55	
Trichiurus lepturus	38.28	10	11.55	
Trachurus trecae	32.59	745	9.84	
Alloteuthis africana	14.90	3683	4.50	
Chloroscombrus chrysurus	12.10	124	3.65	
Selene dorsalis	9.41	101	2.84	
Pomadasys incisivus	9.41	62	2.58	
Sepia officinalis hierredda	8.54	17	2.19	
Sphyræna sphyræna	7.24	10	1.87	
Stromateus fiatola	6.21	31	1.62	
Decapterus rhonchus	5.38	41	1.62	
Dentex congoensis	3.72	10	1.12	
Octopus vulgaris	1.03	21	0.31	
Pseudopeneus prayensis	0.10	10	0.03	
Saurida brasiliensis	0.10	21	0.03	
Raja miraletus	0.10	10	0.03	
Parapeneus longirostris				
Total	331.28		99.98	

PROJECT STATION:1654
 DATE:11/ 5/98 GEAR TYPE: BT No:12 POSITION:Lat S 1007 Long E 1311
 start stop duration Purpose code: 3
 TIME :07:15:20 07:45:08 30 (min) Area code : 2
 LOG :3924.02 3925.50 1.46 GearCond.code: 2
 FDEPTH: 76 75 Validity code: 2
 BDEPTH: 76 75
 Towing dir: 340e Wire out: 280 m Speed: 30 kn*10
 Sorted: 63 Kg Total catch: 397.04 CATCH/HOUR: 794.08

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Pagellus bellottii	306.14	2180	38.55	4035
Trichiurus lepturus	96.20	260	12.11	
Trachurus trecae	91.64	1702	11.54	
Brachydeuterus auritus	68.24	1198	8.59	
Selene dorsalis	63.44	312	7.99	
Stromateus fiatola	53.80	66	6.78	
Sepia officinalis hierredda	40.30	26	5.08	
Atractoscion aequidens	18.06	26	2.27	
Zeus faber	16.24	66	2.05	
Lepidotrigla carolae	12.22	104	1.54	
Dentex canariensis	7.42	92	0.93	
Pseudopeneus prayensis	4.16	66	0.52	
Illex coindetii	4.02	66	0.51	
Boops boops	4.00	158	0.50	
Dentex angolensis	3.78	52	0.48	
Saurida brasiliensis	1.16	144	0.15	
Alloteuthis africana	1.16	430	0.15	
Citharus linguatula	0.52	14	0.07	
Total	792.50		99.81	

PROJECT STATION:1655
 DATE:11/ 5/98 GEAR TYPE: BT No:12 POSITION:Lat S 1007 Long E 1301
 start stop duration Purpose code: 3
 TIME :09:31:35 10:02:13 31 (min) Area code : 2
 LOG :3939.52 3941.08 1.53 GearCond.code: 2
 FDEPTH: 103 104 Validity code: 2
 BDEPTH: 103 104
 Towing dir: 325e Wire out: 320 m Speed: 30 kn*10
 Sorted: Kg Total catch: 33.70 CATCH/HOUR: 65.23

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Dentex gibbosus	20.23	70	31.01	4038
Dentex congoensis	11.42	106	17.51	4037
Illex coindetii	10.26	29	15.73	
Zeus faber	5.34	19	8.19	
Squatina oculata	3.48	2	5.33	
Fistularia petimba	2.71	6	4.15	
Pistularia petimba	2.26	2	3.46	
Octopus vulgaris	1.74	6	2.67	
Trichiurus lepturus	1.35	2	2.07	
Lagocephalus laevis	0.97	2	1.49	
Raja miraletus	0.97	2	1.49	
Torpedo torpedo	0.77	4	1.18	
Dentex canariensis	0.77	8	1.18	
Dentex angolensis	0.58	2	0.89	
Lithognathus mormyrus	0.58	6	0.89	
Lepidotrigla carolae	0.48	4	0.74	
Sepia bertheloti	0.43	8	0.66	
Pagellus bellottii	0.33	6	0.51	
Trachurus trecae	0.29	83	0.44	
Saurida brasiliensis	0.29	4	0.29	
Lolligoncula mercatoris	0.19	4	0.09	
Citharus linguatula	0.06	2	0.06	
Boops boops	0.04	4	0.03	
Spicara alta	0.02	4	0.03	
Total	65.27		100.06	

PROJECT STATION:1656
 DATE:11/ 5/98 GEAR TYPE: BT No:12 POSITION:Lat S 1009 Long E 1255
 start stop duration
 TIME :11:42:45 12:12:30 30 (min) Purpose code: 3
 LOG :3950.50 3952.20 1.66 Area code : 2
 FDEPTH: 208 205 GearCond.code:
 BDEPTH: 208 205 Validity code:
 Towing dir: 165ø Wire out: 630 m Speed: 30 kn*10
 Sorted: 119 Kg Total catch: 1196.00 CATCH/HOUR: 2392.00

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Synagrops microlepis	1510.00	93630	63.13	
Pterothrissus belloci	260.00	760	10.87	
Dentex macrophthalmus	184.00	2200	7.69	4042
Merluccius polli	154.00	1100	6.44	4039
Zenopsis conchifer	114.00	1200	4.77	
Chlorophthalmus atlanticus	50.00	2642	2.09	
Parapenaeus longirostris, fem.	44.00	7248	1.84	4040
Trichiurus lepturus	34.00	60	1.42	
Illex coindetii	32.00	400	1.34	
Parapenaeus longirostris, male	10.00	2134	0.42	4041
Total	2392.00		100.01	

PROJECT STATION:1659
 DATE:11/ 5/98 GEAR TYPE: BT No:12 POSITION:Lat S 1012 Long E 1252
 start stop duration
 TIME :21:42:58 22:12:39 30 (min) Purpose code: 3
 LOG :3986.02 3987.47 1.43 Area code : 2
 FDEPTH: 549 534 GearCond.code:
 BDEPTH: 549 534 Validity code:
 Towing dir: 170ø Wire out:1300 m Speed: 30 kn*10
 Sorted: 25 Kg Total catch: 144.75 CATCH/HOUR: 289.50

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Nematocarcinus africanus	194.80	58440	67.29	
Triplophos sp.	16.60	2144	5.73	
Gonostoma sp.	12.20	186	4.21	
Illex coindetii	11.00	10	3.80	
Etmopterus spinax	11.00	32	3.80	
Yarella blackfordi	11.00	198	3.80	
Lamprogrammus exutus	6.60	164	2.28	
Trichiurus lepturus	5.60	186	1.93	
Myctophum sp.	4.40	2904	1.52	
Hoplostethus cadenati	4.40	132	1.52	
Nezumia aequalis	3.40	32	1.17	
Gadella imberbis	2.20	208	0.76	
Aristeus varidens, male	1.60	88	0.55	4050
Laemonema laureysi	1.20	54	0.41	
Munida sp. *	1.20	198	0.41	
Aristeus varidens, female	1.10	56	0.38	4049
Ebinania costaecanarie	0.40	22	0.14	
Chlorophthalmus atlanticus	0.20	10	0.07	
Xenodermichthys copei	0.20	22	0.07	
Lophius vaillanti	0.20	10	0.07	
Nemichthys scolopaceus	0.20	10	0.07	
Total	289.50		99.98	

PROJECT STATION:1657
 DATE:11/ 5/98 GEAR TYPE: BT No:12 POSITION:Lat S 1011 Long E 1255
 start stop duration
 TIME :15:30:23 16:00:33 30 (min) Purpose code: 3
 LOG :3961.09 3962.67 1.54 Area code : 2
 FDEPTH: 283 249 GearCond.code:
 BDEPTH: 283 249 Validity code:
 Towing dir: 345ø Wire out: 850 m Speed: 30 kn*10
 Sorted: 31 Kg Total catch: 145.65 CATCH/HOUR: 291.30

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichiurus lepturus	67.50	228	23.17	
MYCTOPHIDAE	54.44	38698	18.69	
Merluccius polli	47.24	586	16.22	4043
Synagrops microlepis	33.30	2276	11.43	
Parapenaeus longirostris, fem.	30.26	5000	10.39	4045
Chlorophthalmus atlanticus	21.60	2972	7.42	
Parapenaeus longirostris, male	21.04	4644	7.22	4044
Zeus faber	4.78	26	1.64	
Illex coindetii	2.88	36	0.99	
OPHICHTHIDAE	2.60	36	0.89	
Pterothrissus belloci	2.16	8	0.74	
Nematocarcinus africanus	1.08	72	0.37	
Solenocera africana	0.72	216	0.25	
Bathynectes piperitus	0.54	18	0.19	
Malacocephalus laevis	0.26	18	0.09	
Munida sp. *	0.26	54	0.09	
Bembrops heterurus	0.18	10	0.06	
Peristedion cataphractum	0.08	8	0.03	
Total	290.92		99.88	

PROJECT STATION:1660
 DATE:12/ 5/98 GEAR TYPE: BT No:12 POSITION:Lat S 1027 Long E 1332
 start stop duration
 TIME :05:29:05 05:59:44 31 (min) Purpose code: 3
 LOG :4031.74 4033.13 1.35 Area code : 2
 FDEPTH: 25 28 GearCond.code:
 BDEPTH: 25 28 Validity code:
 Towing dir: 325ø Wire out: 165 m Speed: 30 kn*10
 Sorted: 48 Kg Total catch: 100.90 CATCH/HOUR: 195.29

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	48.25	2450	24.71	
Trichiurus lepturus	39.29	534	20.12	
Rhizoprionodon acutus	31.35	14	16.05	
Galeoides decadactylus	17.26	153	8.84	
Sphyraena quachiancho	14.90	21	7.63	
Stromateus fiatola	11.05	110	5.66	
Pseudolithus senegalensis	10.26	14	5.25	
Pomadasya incisus	4.94	161	2.53	
Engraulis encrasicolus	2.98	666	1.53	
Trachurus trecae	2.34	14	1.20	
Raja miraletus	2.34	4	1.20	
Cynoglossus cadenati	1.65	8	0.84	
Pagellus bellottii	1.32	4	0.68	
Selene dorsalis	1.30	116	0.67	
Sphyraena sphyraena	1.16	10	0.59	
Pteroscion peli	0.99	89	0.51	
Alectis alexandrinus	0.81	4	0.41	
Chloroscombrus chrysurus	0.77	4	0.39	
Sphyraena juveniles	0.77	58	0.39	
Decapterus rhonchus	0.56	10	0.29	
Penaeus notialis, female	0.46	8	0.24	4052
Ilisha africana	0.29	10	0.15	
Dicologlossa cuneata	0.10	4	0.05	
Penaeus notialis, male	0.06	2	0.03	4051
Selene dorsalis, juveniles	0.04	488	0.02	
Stromateus fiatola	0.00			
Total	195.24		99.98	

PROJECT STATION:1658
 DATE:11/ 5/98 GEAR TYPE: BT No:12 POSITION:Lat S 1010 Long E 1254
 start stop duration
 TIME :18:57:55 19:28:16 30 (min) Purpose code: 3
 LOG :3973.58 3975.24 1.64 Area code : 2
 FDEPTH: 334 293 GearCond.code:
 BDEPTH: 334 293 Validity code:
 Towing dir: 160ø Wire out:1050 m Speed: 30 kn*10
 Sorted: 56 Kg Total catch: 533.67 CATCH/HOUR: 1067.34

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Chlorophthalmus atlanticus	347.70	6152	32.58	
Merluccius polli	312.54	1976	29.28	4046
Nematocarcinus africanus	216.60	2638	20.29	
Pterothrissus belloci	71.06	494	6.66	
Lophius vaillanti	19.00	362	1.78	
MYCTOPHIDAE	17.66	20144	1.65	
Parapenaeus longirostris, fem.	14.82	2274	1.39	4048
Hymenocephalus italicus	13.30	3888	1.25	
Laemonema laureysi	12.72	286	1.19	
Bathynectes piperitus	8.56	134	0.80	
Parapenaeus longirostris, male	6.64	1006	0.62	4047
Synagrops microlepis	5.52	342	0.52	
Chaunax pictus	4.00	114	0.37	
Munida sp. *	3.22	1026	0.30	
Pontinus accraensis	3.04	58	0.28	
Illex coindetii	2.66	20	0.25	
Todaropsis eblanae	2.28	38	0.21	
Small squids	1.70	556	0.16	
Solenocera africana	1.70	360	0.16	
Gadella imberbis	1.52	38	0.14	
Aristeus varidens	0.38	56	0.04	
Coelorinchus fasciatus	0.38	20	0.04	
Dibranchius atlanticus	0.18	20	0.02	
Malacocephalus laevis	0.18	20	0.02	
Total	1067.36		100.00	

PROJECT STATION:1661
 DATE:12/ 5/98 GEAR TYPE: BT No:12 POSITION:Lat S 1027 Long E 1326
 start stop duration
 TIME :07:08:06 07:38:39 31 (min) Purpose code: 3
 LOG :4040.93 4042.43 1.50 Area code : 2
 FDEPTH: 60 58 GearCond.code:
 BDEPTH: 60 58 Validity code:
 Towing dir: 350ø Wire out: 200 m Speed: 30 kn*10
 Sorted: Kg Total catch: 44.71 CATCH/HOUR: 86.54

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Alloteuthis africana	23.61	445	27.28	
Trichiurus lepturus	22.84	50	26.39	
Raja miraletus	10.03	17	11.59	
Pagellus bellottii	9.58	103	11.07	4054
Dentex canariensis	7.20	46	8.32	4055
Dentex angolensis	3.43	21	3.96	4053
Lagocephalus laevigatus	2.32	2	2.68	
Pomadasya jubelini	1.61	2	1.86	
Zeus faber	1.37	6	1.58	
Sepia officinalis hierredda	1.05	2	1.21	
Chaetodon hoefleri	1.03	6	1.19	
Stromateus fiatola	0.81	2	0.94	
Lithognathus mormyrus	0.75	4	0.87	
Dentex gibbosus	0.70	2	0.81	
Uranoscopus albesca	0.12	2	0.14	
Citharus linguatula	0.08	4	0.09	
Trachurus trecae, juvenile	0.02	6	0.02	
Total	86.55		100.00	

PROJECT STATION:1662
 DATE:12/ 5/98 GEAR TYPE: BT No:12 POSITION:Lat S 1029 Long E 1309
 start stop duration
 TIME :12:39:20 12:52:44 13 (min) Purpose code: 3
 LOG :4074.50 4075.18 0.68 Area code : 2
 FDEPTH: 157 160 GearCond.code: 8
 BDEPTH: 157 160 Validity code: 1
 Towing dir: 330° Wire out: 480 m Speed: 30 kn*10
 Sorted: 98 Kg Total catch: 167.70 CATCH/HOUR: 774.00

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Dentex macropthalmus	481.85	2271	62.25	4057
Spicara alta	109.85	1306	14.19	
Dentex angolensis	90.92	318	11.75	4056
Umbrina canariensis	21.23	69	2.74	
Anthias anthias	20.31	282	2.62	
Scorpaena stephanica	13.38	37	1.73	
Dentex barnardi	12.00	14	1.55	
Trichiurus lepturus	9.69	14	1.25	
Brotula barbata	7.85	9	1.01	
Aulopus cadenati	1.38	9	0.18	
Trigla lyra	1.38	9	0.18	
Citharus linguatula	1.38	32	0.18	
Uranoscopus polli	1.38	9	0.18	
Zenopsis conchifer	1.38	9	0.18	
Total	773.98		99.99	

PROJECT STATION:1665
 DATE:12/ 5/98 GEAR TYPE: BT No: 3 POSITION:Lat S 1031 Long E 1302
 start stop duration
 TIME :22:30:40 23:00:13 30 (min) Purpose code: 3
 LOG :4109.30 4110.66 1.35 Area code : 2
 FDEPTH: 548 556 GearCond.code: 8
 BDEPTH: 548 556 Validity code: 1
 Towing dir: 135° Wire out:1400 m Speed: 30 kn*10
 Sorted: 53 Kg Total catch: 159.30 CATCH/HOUR: 318.60

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Nematocarcinus africanus	145.80	30618	45.76	
Yarella blackfordi	51.00	1242	16.01	
Lamprogrammus exutus	16.20	210	5.08	
Hoplostethus cadenati	15.60	570	4.90	
Triplophos sp.	15.60	402	4.90	
Geryon sp.	10.40	12	3.26	
Laemonema laureysi	9.60	144	3.01	
Gonostoma elongatum	6.60	114	2.07	
Merluccius polli	5.40	6	1.69	
Aristeus varidens, male	4.80	438	1.51	4065
Xenodermichthys copei	4.80	336	1.51	
Aristeus varidens, female	4.80	158	1.51	4064
Todaropsis eblanae	4.20	12	1.32	
Hymenocephalus italicus	3.00	156	0.94	
Trichiurus lepturus	2.40	36	0.75	
Munida sp. *	2.40	138	0.75	
Dicologlossa cuneata	1.80	12	0.56	
CONGRIDAE	1.80	60	0.56	
Gadella imberbis	1.80	30	0.56	
Nezumia aequalis	1.80	6	0.56	
Lophius vaillanti	1.80	12	0.56	
Dibranchius atlanticus	1.80	60	0.56	
Etmopterus spinax	1.80	6	0.56	
Plesiopenaeus edwardsianus	1.20	30	0.38	
Halosaurus ovenii	1.20	6	0.38	
Ebinania costaeacanarie	1.20	12	0.38	
Malacocephalus laevis	1.20	6	0.38	
MYCTOPHIDAE	0.60	126	0.19	
Total	320.60		100.60	

PROJECT STATION:1663
 DATE:12/ 5/98 GEAR TYPE: BT No: 3 POSITION:Lat S 1029 Long E 1307
 start stop duration
 TIME :16:19:57 16:50:27 31 (min) Purpose code: 3
 LOG :4086.44 4088.07 1.61 Area code : 2
 FDEPTH: 222 221 GearCond.code: 8
 BDEPTH: 222 221 Validity code: 1
 Towing dir: 335° Wire out: 650 m Speed: 30 kn*10
 Sorted: 32 Kg Total catch: 143.33 CATCH/HOUR: 277.41

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Merluccius polli	98.42	1558	35.48	4058
Synagrops microlepis	76.20	4204	27.47	
Todaropsis eblanae	30.41	288	10.96	
Chlorophthalmus atlanticus	12.99	697	4.68	
MYCTOPHIDAE	11.50	7339	4.15	
Zenopsis conchifer	10.45	97	3.77	
Pterothrissus belloci	8.96	70	3.23	
Dentex macropthalmus	6.97	45	2.51	
Parapenaeus longirostris, fem.	5.48	956	1.98	4059
Coelorinchus coelorhincus	4.88	184	1.76	
Parapenaeus longirostris, male	2.73	699	0.98	4060
Uranoscopus cadenati	2.26	17	0.81	
Torpedo torpedo	1.74	10	0.63	
Sepia elegans	1.05	35	0.38	
Bembrops heterurus	0.87	45	0.31	
Dentex angolensis	0.87	25	0.31	
Monoleone microstoma	0.62	45	0.22	
Paralepis sp.	0.52	10	0.19	
Trigla lyra	0.25	10	0.09	
Malacocephalus occidentalis	0.17	10	0.06	
Calappa sp.	0.10	10	0.04	
Total	277.44		100.01	

PROJECT STATION:1666
 DATE:13/ 5/98 GEAR TYPE: BT No: 3 POSITION:Lat S 1028 Long E 1301
 start stop duration
 TIME :01:04:34 01:34:51 30 (min) Purpose code: 3
 LOG :4120.51 4121.86 1.32 Area code : 2
 FDEPTH: 449 450 GearCond.code: 8
 BDEPTH: 449 450 Validity code: 1
 Towing dir: 140° Wire out:1300 m Speed: 30 kn*10
 Sorted: 62 Kg Total catch: 156.00 CATCH/HOUR: 312.00

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Nematocarcinus africanus	115.60	25216	37.05	
Laemonema laureysi	39.60	422	12.69	
Merluccius polli	22.00	34	7.05	
Yarella blackfordi	21.00	420	6.73	
Triplophos sp.	14.60	1242	4.68	
Dibranchius atlanticus	12.40	512	3.97	
Nezumia aequalis	11.60	158	3.72	
Hoplostethus cadenati	9.00	310	2.88	
Aristeus varidens, female	9.00	376	2.88	4066
Geryon sp.	8.00	30	2.56	
Gonostoma elongatum	5.60	84	1.79	
Lophius vaillanti	5.00	6	1.60	
Etmopterus spinax	5.00	110	1.60	
Aristeus varidens, male	4.60	390	1.47	4067
Malacocephalus occidentalis	3.60	20	1.15	
Calappa sp.	3.60	34	1.15	
Lamprogrammus exutus	3.00	10	0.96	
Todaropsis eblanae	2.60	10	0.83	
Raja alba	2.00	34	0.64	
Trichiurus lepturus	2.00	24	0.64	
Hymenocephalus italicus	2.00	200	0.64	
CONGRIDAE	1.60	10	0.51	
Chauanax pictus	1.60	30	0.51	
Xenodermichthys copei	1.60	90	0.51	
Nemichthys scolopaceus	1.60	80	0.51	
Munida sp. *	1.60	80	0.51	
Plesiopenaeus edwardsianus	1.00	24	0.32	
Gadella imberbis	0.60	6	0.19	
Halosaurus ovenii	0.60	24	0.19	
Total	312.00		99.93	

PROJECT STATION:1664
 DATE:12/ 5/98 GEAR TYPE: BT No: 3 POSITION:Lat S 1028 Long E 1302
 start stop duration
 TIME :20:12:32 20:42:26 30 (min) Purpose code: 3
 LOG :4101.49 4102.96 1.44 Area code : 2
 FDEPTH: 370 384 GearCond.code: 8
 BDEPTH: 370 384 Validity code: 1
 Towing dir: 150° Wire out:1050 m Speed: 30 kn*10
 Sorted: 56 Kg Total catch: 459.30 CATCH/HOUR: 918.60

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Merluccius polli	495.60	2496	52.86	4061
Chlorophthalmus atlanticus	144.00	2370	15.68	
Hymenocephalus italicus	88.80	64108	9.67	
Malacocephalus occidentalis	43.04	288	4.69	
Pterothrissus belloci	41.92	240	4.56	
Laemonema laureysi	39.84	464	4.34	
Etmopterus spinax	27.20	64	2.96	
Chauanax pictus	9.76	544	1.06	
Lophius vaillanti	5.92	32	0.64	
Dibranchius atlanticus	5.44	416	0.59	
Nematocarcinus africanus	3.68	1198	0.40	
Synagrops microlepis	3.52	160	0.38	
Gadella imberbis	2.88	64	0.31	
NETTASTOMATIDAE	2.40	128	0.26	
Coelorinchus coelorhincus	2.08	64	0.23	
PORTUNIDAE	1.76	16	0.19	
Malacocephalus laevis	1.44	16	0.16	
Todaropsis eblanae	1.28	16	0.14	
Nezumia aequalis	1.28	112	0.14	
Hoplostethus cadenati	1.12	16	0.12	
Galeus polli	0.96	16	0.10	
Trichiurus lepturus	0.96	32	0.10	
Epigonus telescopus	0.96	16	0.10	
Aristeus varidens, male	0.80	112	0.09	4063
Shrimps, small, non comm.	0.80	144	0.09	
Solenocera africana	0.64	64	0.07	
Aristeus varidens, female	0.48	16	0.05	4062
Total	918.56		99.98	

PROJECT STATION:1667
 DATE:13/ 5/98 GEAR TYPE: BT No: 3 POSITION:Lat S 1045 Long E 1310
 start stop duration
 TIME :06:44:28 07:15:15 31 (min) Purpose code: 3
 LOG :4152.98 4154.51 1.51 Area code : 2
 FDEPTH: 726 724 GearCond.code: 8
 BDEPTH: 726 724 Validity code: 1
 Towing dir: 325° Wire out:1600 m Speed: 30 kn*10
 Sorted: 30 Kg Total catch: 232.17 CATCH/HOUR: 449.36

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Nematocarcinus africanus	116.52	27319	25.93	
CONGRIDAE	52.84	190	11.76	
Hoplostethus cadenati	52.84	720	11.76	
Dibranchius atlanticus	50.13	4345	11.16	
Stereomastis sp.	37.90	2355	8.41	
Yarella blackfordi	28.84	1082	6.42	
Lamprogrammus exutus	23.57	108	5.25	
Talismania sp.	19.24	542	4.28	
Gonostoma sp.	19.24	122	4.28	
Triplophos sp.	16.65	1864	3.71	
Nezumia aequalis	9.48	828	2.11	
Xenodermichthys copei	6.50	826	1.45	
PASIPHAIDAE	4.74	406	1.05	
Raja alba	3.66	14	0.81	
Etmopterus spinax	2.71	434	0.60	
Aristeus varidens, female	1.82	74	0.41	
Malacocephalus occidentalis	0.95	54	0.21	
MELANOSTOMIATIDAE	0.68	27	0.15	
Malacocephalus laevis	0.68	14	0.15	
Halosaurus ovenii	0.27	14	0.06	
Munida sp. *	0.14	41	0.03	
Shrimps, small, non comm.	0.08	95	0.02	
Total	449.38		100.01	

PROJECT STATION:1668
 DATE:13/ 5/98 GEAR TYPE: BT No: 3 POSITION:Lat S 1044 Long E 1310
 start stop duration
 TIME :11:29:36 11:55:40 26 (min) Purpose code: 3
 LOG :4168.30 4169.65 1.33 Area code : 2
 FDEPTH: 649 656 GearCond.code:
 BDEPTH: 649 656 Validity code:
 Towing dir: 320° Wire out:1550 m Speed: 30 kn*10
 Sorted: 26 Kg Total catch: 129.70 CATCH/HOUR: 299.31

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Nematocarcinus africanus	146.54	24912	48.96
Centrophorus uyato	53.08	12	17.73
Triplophos sp.	30.00	3360	10.02
Lamprogrammus exutus	16.15	208	5.40
Yarrella blackfordi	15.00	462	5.01
Munida sp. *	8.08	877	2.70
Hoplostethus cadenati	6.92	231	2.31
Gonostoma elongatum	6.92	173	2.31
Nezumia aequalis	3.46	208	1.16
Todaropsis eblanae	2.31	12	0.77
Dibranchius atlanticus	2.31	150	0.77
CONGRIDAE	1.15	23	0.38
Laemonema laureysi	1.15	173	0.38
Xenodermichthys copei	1.15	104	0.38
Gadella imberbis	1.15	35	0.38
Nemichthys scolopaceus	1.15	69	0.38
Aristeus varidens	1.15	35	0.38
Solenocera africana	1.15	58	0.38
Ebinania costaeacanarie	0.23	12	0.08
MYCTOPHIDAE	0.12	23	0.04
GALATHEIDAE *	0.12	92	0.04
Total	299.29		99.96

PROJECT STATION:1671
 DATE:14/ 5/98 GEAR TYPE: BT No: 3 POSITION:Lat S 1047 Long E 1322
 start stop duration
 TIME :05:32:28 06:03:06 31 (min) Purpose code: 3
 LOG :4252.44 4254.00 1.53 Area code : 2
 FDEPTH: 197 201 GearCond.code:
 BDEPTH: 197 201 Validity code:
 Towing dir: 320° Wire out: 600 m Speed: 30 kn*10
 Sorted: 69 Kg Total catch: 379.79 CATCH/HOUR: 735.08

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP	
	weight numbers			
Chlorophthalmus atlanticus	285.83	15900	38.88	
Synagrops microlepis	163.41	1132	22.23	
Pterothrissus bellocci	81.23	650	11.05	
Merluccius polli	79.32	1618	10.79	4074
Zenopsis conchifer	65.48	447	8.91	
Parapenaeus longirostris, fem.	12.56	2032	1.71	4072
Todaropsis eblanae	11.28	149	1.53	
Trichiurus lepturus	8.52	170	1.16	
Dentex angolensis	8.19	33	1.11	
Bembrops heterurus	6.39	64	0.87	
Parapenaeus longirostris, male	4.47	1241	0.61	4073
Dentex congoensis	4.47	21	0.61	
Zeus faber	1.49	12	0.20	
Monolene microstoma	1.06	97	0.14	
Sepia officinalis hierredda	0.64	54	0.09	
Coelorinchus coelorrhincus	0.43	21	0.06	
Squilla mantis	0.21	12	0.03	
Total	734.98		99.98	

PROJECT STATION:1669
 DATE:13/ 5/98 GEAR TYPE: BT No: 3 POSITION:Lat S 1045 Long E 1314
 start stop duration
 TIME :14:19:27 14:49:40 30 (min) Purpose code: 3
 LOG :4182.10 4183.79 1.66 Area code : 2
 FDEPTH: 433 443 GearCond.code:
 BDEPTH: 433 443 Validity code:
 Towing dir: 330° Wire out:1250 m Speed: 30 kn*10
 Sorted: 91 Kg Total catch: 700.21 CATCH/HOUR: 1400.42

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP	
	weight numbers			
Merluccius polli	696.14	3098	49.71	4068
Nematocarcinus africanus	492.20	44844	35.15	
Etmopterus spinax	46.46	8362	3.32	
Laemonema laureysi	33.74	950	2.41	
Hymenocephalus italicus	33.74	5904	2.41	
Pterothrissus bellocci	18.40	92	1.31	
Aristeus varidens, female	16.86	766	1.20	4069
Malacocephalus occidentalis	15.48	138	1.11	
Lophius vaillanti	13.80	92	0.99	
Aristeus varidens, male	12.26	568	0.88	4070
CONGRIDAE	7.66	138	0.55	
Illex coindetii	6.14	30	0.44	
Nezumia aequalis	3.06	184	0.22	
Nemichthys scolopaceus	1.54	46	0.11	
Callinectes sp.	1.54	16	0.11	
RAJIDAE	0.62	46	0.04	
Halosaurus ovenii	0.62	46	0.04	
Solenocera africana	0.16	76	0.01	
Total	1400.42		100.01	

PROJECT STATION:1672
 DATE:14/ 5/98 GEAR TYPE: BT No: 3 POSITION:Lat S 1046 Long E 1325
 start stop duration
 TIME :07:19:23 07:49:31 30 (min) Purpose code: 3
 LOG :4261.48 4263.00 1.48 Area code : 2
 FDEPTH: 131 133 GearCond.code:
 BDEPTH: 131 133 Validity code:
 Towing dir: 130° Wire out: 390 m Speed: 30 kn*10
 Sorted: 83 Kg Total catch: 83.02 CATCH/HOUR: 166.04

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP	
	weight numbers			
Dentex macrophthalmus	64.84	672	39.05	4076
Illex coindetii	32.20	1134	19.39	
Zenopsis conchifer	26.00	16	15.66	
Brotula barbata	9.42	8	5.67	
Dentex angolensis	7.60	62	4.58	4075
Squatina oculata	7.00	2	4.22	
Trichiurus lepturus	3.20	8	1.93	
Zeus faber	2.70	16	1.63	
Sepia officinalis hierredda	2.06	12	1.24	
Torpedo torpedo	1.88	6	1.13	
Lepidotrigla cadmani	1.54	16	0.93	
Uranoscopus albesca	1.50	10	0.90	
Bembrops heterurus	1.28	24	0.77	
Pterothrissus bellocci	1.14	28	0.69	
Atractoscion aequidens	1.14	4	0.69	
Scorpaena normani	1.04	6	0.63	
Monolene microstoma	0.48	20	0.29	
Boops boops	0.28	6	0.17	
Todaropsis eblanae	0.20	2	0.12	
Pagellus bellottii	0.18	2	0.11	
Lagocephalus laevigatus	0.14	2	0.08	
Dicologlossa hexophthalma	0.10	2	0.06	
Spicara alta	0.08	2	0.05	
Citharus linguatula	0.04	2	0.02	
Total	166.04		100.01	

PROJECT STATION:1670
 DATE:13/ 5/98 GEAR TYPE: BT No: 3 POSITION:Lat S 1046 Long E 1316
 start stop duration
 TIME :16:15:24 16:45:03 30 (min) Purpose code: 3
 LOG :4191.84 4193.50 1.65 Area code : 2
 FDEPTH: 354 360 GearCond.code:
 BDEPTH: 354 360 Validity code:
 Towing dir: 331° Wire out:1000 m Speed: 30 kn*10
 Sorted: 69 Kg Total catch: 640.10 CATCH/HOUR: 1280.20

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP	
	weight numbers			
Chlorophthalmus atlanticus	650.00	11022	50.77	
Merluccius polli	376.00	3340	29.37	4071
Nematocarcinus africanus	180.00	60300	14.06	
Pterothrissus bellocci	21.60	160	1.69	
Laemonema laureysi	19.80	260	1.55	
MYCTOPHIDAE	6.00	616	0.47	
Hymenocephalus italicus	4.40	1360	0.34	
Synagrops microlepis	4.20	160	0.33	
Gadella imberbis	4.20	120	0.33	
Chaunax pictus	3.40	100	0.27	
Etmopterus spinax	2.40	100	0.19	
Hoplostethus cadenati	2.00	40	0.16	
Malacocephalus occidentalis	1.80	20	0.14	
Trichiurus lepturus	1.20	80	0.09	
Epigonus telescopus	1.20	60	0.09	
Monolene microstoma	0.60	80	0.05	
Nemichthys scolopaceus	0.40	20	0.03	
Solenocera africana	0.40	80	0.03	
Parapenaeus longirostris	0.20	40	0.02	
Pteristion cataphractum	0.20	20	0.02	
Coelorinchus coelorrhincus	0.20	20	0.02	
Total	1280.20		100.02	

PROJECT STATION:1673
 DATE:14/ 5/98 GEAR TYPE: BT No: 3 POSITION:Lat S 1048 Long E 1335
 start stop duration
 TIME :09:35:11 10:05:20 30 (min) Purpose code: 3
 LOG :4278.21 4279.74 1.51 Area code : 2
 FDEPTH: 86 90 GearCond.code:
 BDEPTH: 86 90 Validity code:
 Towing dir: 320° Wire out: 300 m Speed: 30 kn*10
 Sorted: Kg Total catch: 75.30 CATCH/HOUR: 150.60

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP	
	weight numbers			
Dentex barnardi	36.00	194	23.90	4079
Raja miraletus	21.80	36	14.48	
Alloteuthis africana	18.70	12554	12.42	
Trigla lyra	13.20	86	8.76	
Dentex angolensis	8.20	32	5.44	4077
Brotula barbata	7.56	24	5.02	
Zeus faber	7.30	36	4.85	
Dentex macrophthalmus	7.24	30	4.81	4078
Monolene microstoma	6.48	92	4.30	
Stromateus fiatola	4.34	4	2.88	
Trichiurus lepturus	4.04	10	2.68	
Pagellus bellottii	3.40	22	2.26	4080
Octopus vulgaris	3.12	2	2.07	
Branchiostegus semifasciatus	3.10	2	2.06	
Sepia sp.	2.28	10	1.51	
Torpedo torpedo	1.34	4	0.89	
Scorpaena normani	1.04	12	0.69	
Fistularia petimba	0.64	2	0.42	
Chaetodon hoefleri	0.48	2	0.32	
Dentex congoensis	0.24	2	0.16	
Uranoscopus albesca	0.08	2	0.05	
Total	150.58		99.97	

PROJECT STATION:1674
 DATE:14/ 5/98 GEAR TYPE: BT No: 3 POSITION:Lat S 1106 Long E 1348
 start stop duration
 TIME :13:30:33 14:00:34 30 (min) Purpose code: 3
 LOG :4310.97 4312.57 1.58 Area code : 2
 FDEPTH: 47 49 GearCond.code:
 BDEPTH: 47 49 Validity code:
 Towing dir: 350° Wire out: 140 m Speed: 30 kn*10
 Sorted: 223 Kg Total catch: 4505.40 CATCH/HOUR: 9010.80

PROJECT STATION:1677
 DATE:14/ 5/98 GEAR TYPE: BT No: 3 POSITION:Lat S 1107 Long E 1328
 start stop duration
 TIME :20:16:47 20:47:19 31 (min) Purpose code: 3
 LOG :4350.36 4351.82 1.44 Area code : 2
 FDEPTH: 509 502 GearCond.code:
 BDEPTH: 509 502 Validity code:
 Towing dir: 360° Wire out:1300 m Speed: 30 kn*10
 Sorted: 114 Kg Total catch: 109.56 CATCH/HOUR: 212.05

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichiurus lepturus	6060.40	14254	67.26	
Brachydeuterus auritus	2814.00	21200	31.23	
Lithognathus mormyrus	33.00	40	0.37	
Chloroscombrus chrysurus	28.80	122	0.32	
Sphyræna guachancho	20.60	206	0.23	
Selene dorsalis	20.60	82	0.23	
Trachurus trecae	16.40	122	0.18	
Sphyrna lewini	5.40	2	0.06	
Saurida brasiliensis	4.20	864	0.05	
Galeoides decadactylus	4.20	40	0.05	
Pennaeus notialis	1.60	40	0.02	
Pteroscion peli	1.60	82	0.02	
Total	9010.80		100.02	

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Nematocarcinus africanus	148.65	49548	70.10	
Yarrella blackfordi	13.86	441	6.54	
MELANOSTOMIATIDAE	10.84	217	5.11	
Triplophos sp.	9.45	1258	4.46	
Etmopterus spinax	6.19	77	2.92	
Aristeus varidens, female	5.96	480	2.81	4089
Aristeus varidens, male	5.26	712	2.48	4090
Nezumia aequalis	1.86	46	0.88	
Coelorrhinus coelorrhinus	1.63	31	0.77	
Hoplostethus cadenati	1.55	85	0.73	
Malacocephalus occidentalis	1.47	147	0.69	
Stereomastis sp.	0.93	155	0.44	
Halosaurus ovenii	0.93	85	0.44	
Shrimps, small, non comm.	0.70	194	0.33	
Xenodermichthys copei	0.70	46	0.33	
Gadella imberbis	0.70	31	0.33	
Nemichthys scolopaceus	0.46	15	0.22	
Callinectes sp.	0.31	39	0.15	
OPHICHTHIDAE	0.31	23	0.15	
Epigonus sp.	0.15	39	0.07	
MYCTOPHIDAE	0.15	70	0.07	
Total	212.06		100.02	

PROJECT STATION:1675
 DATE:14/ 5/98 GEAR TYPE: BT No: 3 POSITION:Lat S 1106 Long E 1345
 start stop duration
 TIME :15:05:05 15:35:11 30 (min) Purpose code: 3
 LOG :4319.27 4320.84 1.54 Area code : 2
 FDEPTH: 65 65 GearCond.code:
 BDEPTH: 65 65 Validity code:
 Towing dir: 360° Wire out: 195 m Speed: 30 kn*10
 Sorted: 114 Kg Total catch: 114.60 CATCH/HOUR: 229.20

PROJECT STATION:1678
 DATE:14/ 5/98 GEAR TYPE: BT No: 3 POSITION:Lat S 1107 Long E 1331
 start stop duration
 TIME :22:36:06 23:05:49 30 (min) Purpose code: 3
 LOG :4359.70 4361.26 1.54 Area code : 2
 FDEPTH: 361 351 GearCond.code:
 BDEPTH: 361 351 Validity code:
 Towing dir: 360° Wire out:1080 m Speed: 30 kn*10
 Sorted: 64 Kg Total catch: 472.80 CATCH/HOUR: 945.60

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichiurus lepturus	82.40	240	35.95	
Dentex barnardi	29.00	162	12.65	4083
Selene dorsalis	16.80	50	7.33	
Brachydeuterus auritus	15.20	386	6.63	
Sphyræna guachancho	14.20	16	6.20	
Umbrina canariensis	12.60	48	5.50	
Brotula barbata	11.20	46	4.89	
Sepia officinalis hierredda	10.00	18	4.36	
Raja miraletus	8.00	12	3.49	
Pagellus bellottii	7.20	40	3.14	4082
Trachurus trecae	6.40	116	2.79	4081
Citharus linguatula	4.20	92	1.83	
Branchiostegus semifasciatus	3.80	12	1.66	
Pomadasys jubelini	2.60	10	1.13	
Pterothrissus bellocci	2.20	44	0.96	
Galeoides decadactylus	0.80	2	0.35	
Trachinus araneus	0.60	58	0.26	
Grammolites gruvelli	0.60	10	0.26	
Chloroscombrus chrysurus	0.40	2	0.17	
Torpedo torpedo	0.40	2	0.17	
Cynoglossus sp.	0.20	4	0.09	
Trachinus radiatus	0.20	6	0.09	
Zeus faber	0.20	2	0.09	
Dentex angolensis	0.04	2	0.02	
Total	229.24		100.01	

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Merluccius polli	420.00	1670	44.42	4091
Nematocarcinus africanus	360.00	110400	38.07	
Etmopterus spinax	51.00	1444	5.39	
Laemonema laureysi	45.00	660	4.76	
Pterothrissus bellocci	18.00	90	1.90	
CONGRIDAE	15.00	600	1.59	
Malacocephalus occidentalis	6.00	120	0.63	
Chaunax pictus	4.60	480	0.49	
Todaropsis eblanae	4.60	44	0.49	
Chlorophthalmus atlanticus	4.60	134	0.49	
Scyliorhinus stellaris	3.00	14	0.32	
Nezumia aequalis	3.00	44	0.32	
Callinectes sp.	3.00	60	0.32	
Dibranchius atlanticus	1.60	224	0.17	
Gonostoma elongatum	1.60	30	0.17	
Trichiurus lepturus	1.60	44	0.17	
Lophius vaillanti	1.60	14	0.17	
Yarrella blackfordi	0.40	14	0.04	
Aristeus varidens, female	0.40	44	0.04	
Parapenaeus longirostris, male	0.30	14	0.03	
Munida sp. *	0.16	14	0.02	
Solenocera africana	0.16	14	0.02	
Total	945.62		100.02	

PROJECT STATION:1676
 DATE:14/ 5/98 GEAR TYPE: BT No: 3 POSITION:Lat S 1106 Long E 1342
 start stop duration
 TIME :16:52:05 17:10:42 19 (min) Purpose code: 3
 LOG :4327.84 4328.70 0.85 Area code : 2
 FDEPTH: 80 80 GearCond.code: 9
 BDEPTH: 80 80 Validity code: 1
 Towing dir: 360° Wire out: 240 m Speed: 30 kn*10
 Sorted: 364 Kg Total catch: 394.75 CATCH/HOUR: 1246.58

PROJECT STATION:1679
 DATE:15/ 5/98 GEAR TYPE: BT No: 3 POSITION:Lat S 1107 Long E 1333
 start stop duration
 TIME :05:30:23 06:00:28 30 (min) Purpose code: 3
 LOG :4376.55 4378.03 1.45 Area code : 2
 FDEPTH: 257 246 GearCond.code:
 BDEPTH: 257 246 Validity code:
 Towing dir: 360° Wire out: 750 m Speed: 30 kn*10
 Sorted: 73 Kg Total catch: 580.72 CATCH/HOUR: 1161.44

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	647.05	38548	51.91	
Pagellus bellottii	127.52	625	10.23	4085
Trichiurus lepturus	104.21	284	8.36	
Brotula barbata	82.42	284	6.61	
Dentex canariensis	43.96	227	3.53	4084
Pterothrissus bellocci	37.52	1080	3.01	
Octopus vulgaris	35.24	19	2.83	
Trachurus trecae	26.72	360	2.14	
Citharus linguatula	25.96	445	2.08	
Umbrina canariensis	24.63	417	1.98	
Sepia officinalis hierredda	22.17	455	1.78	
Dentex macropthalmus	17.43	95	1.40	4086
Thorogobius angolensis	13.45	1175	1.08	
Pteroscion peli	12.88	644	1.03	
Atractoscion aequidens	10.42	57	0.84	
Raja miraletus	7.96	19	0.64	
Parapenaeus longirostris, fem.	3.60	928	0.29	4087
Malacocephalus laevis	2.27	76	0.18	
Parapenaeus longirostris, male	0.95	341	0.08	4088
Saurida brasiliensis	0.22	606	0.02	
Total	1246.58		100.02	

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Merluccius polli	430.40	6886	37.06	4094
MYCTOPHIDAE	230.40	149154	19.84	
Dentex macropthalmus	183.20	1088	15.77	4093
Synagrops microlepis	144.80	9620	12.47	
Chlorophthalmus atlanticus	97.60	3070	8.40	
Parapenaeus longirostris, fem.	29.28	5742	2.52	4095
Parapenaeus longirostris, male	14.40	3672	1.24	4096
Pterothrissus bellocci	9.76	80	0.84	
Trichiurus lepturus	9.28	352	0.80	
Illex coindetii	3.68	64	0.32	
Zenopsis conchifer	3.36	48	0.29	
Sepia juveniles	1.76	128	0.07	
Halosaurus ovenii	0.80	32	0.07	
Small squid	0.64	1424	0.06	
Scorpaena normani	0.64	32	0.06	
Dibranchius atlanticus	0.64	80	0.06	
Laemonema laureysi	0.32	16	0.03	
Monolene microstoma	0.16	16	0.01	
Solenocera africana	0.16	16	0.01	
Shrimps, small, non comm.	0.16	96	0.01	
Total	1161.44		100.01	

PROJECT STATION:1680
 DATE:15/ 5/98 GEAR TYPE: BT No: 3 POSITION:Lat S 1108
 start stop duration
 TIME :07:25:49 07:56:19 31 (min) Purpose code: 3 Long E 1335
 LOG :4384.98 4386.57 1.56 Area code : 2
 FDEPTH: 172 167 GearCond.code:
 BDEPTH: 172 167 Validity code:
 Towing dir: 360° Wire out: 510 m Speed: 30 kn*10
 Sorted: 48 Kg Total catch: 359.95 CATCH/HOUR: 696.68

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight numbers			
Synagrops microlepis	282.35	21478	40.53 4101
Dentex macrophthalmus	165.48	1670	23.75 4098
Trichiurus lepturus	96.54	2518	13.86
Dentex angolensis	29.19	103	4.19 4097
Brotula barbata	24.10	29	3.46
Branchiostegus semifasciatus	22.94	15	3.29
Pterothrissus belloci	22.06	364	3.17
Merluccius polli	13.35	31	1.92 4101
Illex coindetii	9.45	145	1.36
Parapenaeus longirostris, fem.	7.97	2026	1.14 4099
Zenopsis conchifer	6.68	58	0.96
Parapenaeus longirostris, male	4.65	1552	0.67 4100
Zeus faber	2.19	15	0.31
Atractoscion aequidens	2.17	15	0.31
Lepidotrigla cadmani	1.74	15	0.25
Saurida brasiliensis	1.61	348	0.23
Monolele microstoma	1.03	58	0.15
Octopus vulgaris	0.87	15	0.12
Nezumia aequalis	0.87	29	0.12
Bembrops heterurus	0.87	15	0.12
Sepia juveniles	0.58	58	0.08
Total	696.69	99.99	

PROJECT STATION:1684
 DATE:15/ 5/98 GEAR TYPE: BT No: 3 POSITION:Lat S 1128
 start stop duration
 TIME :15:34:51 16:04:54 30 (min) Purpose code: 3 Long E 1326
 LOG :4440.71 4442.38 1.62 Area code : 2
 FDEPTH: 227 229 GearCond.code:
 BDEPTH: 227 229 Validity code:
 Towing dir: 30° Wire out: 700 m Speed: 30 kn*10
 Sorted: 71 Kg Total catch: 606.68 CATCH/HOUR: 1213.36

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight numbers			
Synagrops microlepis	278.80	22894	22.98
Merluccius polli	273.70	4110	22.56 4109
Trichiurus lepturus	251.60	1350	20.74
MYCTOPHIDAE	243.10	152162	20.04
Dentex macrophthalmus	67.32	560	5.55 4108
Chlorophthalmus atlanticus	31.96	1718	2.63
Parapenaeus longirostris, fem.	28.74	7664	2.37 4110
Parapenaeus longirostris, male	23.80	8180	1.96 4111
Pterothrissus belloci	9.52	102	0.78
Todaropsis eblanae	1.02	18	0.08
Sepia juveniles	1.02	136	0.08
Coelorrhinchus coelorrhinchus	0.84	850	0.07
Scorpaena normani	0.84	68	0.07
Bembrops heterurus	0.50	18	0.04
Shrimps, small, non comm.	0.16	850	0.01
Squilla mantis	0.16	18	0.01
Halosaurus ovenii	0.16	18	0.01
Monolele microstoma	0.02	18	
Solea vulgaris	0.02	18	
Hymenocephalus italicus	0.02	18	
Total	1213.30	99.98	

PROJECT STATION:1681
 DATE:15/ 5/98 GEAR TYPE: BT No: 3 POSITION:Lat S 1125
 start stop duration
 TIME :10:20:11 10:51:44 32 (min) Purpose code: 3 Long E 1341
 LOG :4408.10 4409.75 1.61 Area code : 2
 FDEPTH: 31 31 GearCond.code:
 BDEPTH: 31 31 Validity code:
 Towing dir: 360° Wire out: 130 m Speed: 30 kn*10
 Sorted: Kg Total catch: 72.80 CATCH/HOUR: 136.50

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight numbers			
Selene dorsalis	74.63	152	54.67
Sepia officinalis hierredda	36.19	45	26.51
Alloteuthis africana	7.88	2363	5.77
Sphyræna quachancho	6.38	6	4.67
Seriola carpenteri	2.25	2	1.65
Chelidonicichthys gabonensis	1.50	8	1.10
Lagocephalus laevigatus	1.50	2	1.10
Dicologlossa cuneata	1.50	8	1.10
Pagellus bellottii	1.13	6	0.83
Epinephelus aeneus	0.94	4	0.69
Sardinella maderensis	0.75	2	0.55
Fistularia petimba	0.56	2	0.41
Cynoglossus browni	0.38	8	0.28
Citharus linguatula	0.19	6	0.14
Total	135.78	99.47	

PROJECT STATION:1685
 DATE:15/ 5/98 GEAR TYPE: BT No: 3 POSITION:Lat S 1127
 start stop duration
 TIME :17:57:30 18:28:08 31 (min) Purpose code: 3 Long E 1322
 LOG :4452.84 4454.35 1.49 Area code : 2
 FDEPTH: 486 496 GearCond.code:
 BDEPTH: 486 496 Validity code:
 Towing dir: 30° Wire out:1200 m Speed: 30 kn*10
 Sorted: 28 Kg Total catch: 258.92 CATCH/HOUR: 501.14

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight numbers			
Nematocarcinus africanus	338.81	112128	67.61
Miscellaneous fishes	20.55	7835	4.10
Chlorophthalmus atlanticus	17.59	540	3.51
Aristeus varidens, male	17.42	2472	3.48 4113
Trigla sp.	16.90	2516	3.37
Yarella blackfordi	15.33	261	3.06
Aristeus varidens, female	15.15	1343	3.02 4112
Merluccius polli	10.80	35	2.16
Etmopterus spinax	9.93	314	1.98
Laemonema laureysi	7.66	122	1.53
Coelorrhinchus coelorrhinchus	6.79	139	1.35
Nezumia aequalis	6.45	70	1.29
Hoplostethus cadenati	3.14	139	0.63
MYCTOPHIDAE	1.92	801	0.38
Halosaurus ovenii	1.74	17	0.35
OPHICHTHIDAE	0.87	105	0.17
Lophius vaillanti	0.70	17	0.14
Benthodesmus sp.	0.52	17	0.10
Ebinania costaecanariae	0.52	35	0.10
Solenocera africana	0.52	35	0.10
Hymenocephalus italicus	0.52	139	0.10
Phrynichthys wedli	0.35	35	0.07
Stereomastis sp.	0.17	17	0.03
Nemichthys scolopaceus	0.17	17	0.03
Total	494.52	98.66	

PROJECT STATION:1682
 DATE:15/ 5/98 GEAR TYPE: BT No: 3 POSITION:Lat S 1129
 start stop duration
 TIME :12:37:19 13:07:12 30 (min) Purpose code: 3 Long E 1333
 LOG :4424.70 4426.23 1.50 Area code : 2
 FDEPTH: 70 70 GearCond.code:
 BDEPTH: 70 70 Validity code:
 Towing dir: 340° Wire out: 210 m Speed: 30 kn*10
 Sorted: Kg Total catch: 125.00 CATCH/HOUR: 250.00

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight numbers			
Trachurus trecae	114.80	668	45.92 4105
Dentex barnardi	51.20	278	20.48 4103
Pagellus bellottii	30.40	268	12.16 4102
Selene dorsalis	15.20	30	6.08
Raja miraletus	12.80	20	5.12
Chaetodon hoefleri	5.20	36	2.08
Dentex gibbosus	3.80	16	1.52 4104
Alloteuthis africana	3.60	1414	1.44
Scomber japonicus	2.40	6	0.96
Zeus faber	2.40	4	0.96
Pomadoury incisus	2.00	8	0.80
Sphyræna sphyraena	1.80	6	0.72
Trichiurus lepturus	1.60	2	0.64
Lithognathus mormyrus	1.40	4	0.56
Dentex macrophthalmus	0.48	2	0.19
Dentex angolensis	0.46	22	0.18 4106
Citharus linguatula	0.20	4	0.08
Grammolites gruvelli	0.16	2	0.06
Ephippion guttifer	0.06	4	0.02
Total	249.96	99.97	

PROJECT STATION:1686
 DATE:15/ 5/98 GEAR TYPE: BT No: 3 POSITION:Lat S 1127
 start stop duration
 TIME :20:41:19 20:59:42 18 (min) Purpose code: 3 Long E 1320
 LOG :4464.40 4465.32 0.91 Area code : 2
 FDEPTH: 738 733 GearCond.code: 9
 BDEPTH: 738 733 Validity code: 1
 Towing dir: 30° Wire out:1600 m Speed: 30 kn*10
 Sorted: 33 Kg Total catch: 172.50 CATCH/HOUR: 575.00

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight numbers			
Triplophos sp.	153.33	16863	26.67
Hoplostethus cadenati	81.67	1930	14.20
Yarella blackfordi	78.33	2193	13.62
Nematocarcinus africanus	66.67	110	11.59
MELANOSTOMIATIDAE	43.33	340	7.54
Xenodermichthys copei	33.67	2497	5.86
Lamprogrammus exutus	15.00	83	2.61
Talismania sp.	13.33	367	2.32
OPHIDIIDAE	11.67	233	2.03
Glyphus marsupialis	8.33	550	1.45
Laemonema laureysi	8.33	250	1.45
Stereomastis sp.	6.67	417	1.16
Yarella sp.	6.67	267	1.16
Aristeus varidens, female	6.00	193	1.04 4114
Chaceon maritae	6.00	10	1.04
Synaphobranchus kaupii	6.00	33	1.04
PASIPHAEIDAE	5.00	167	0.87
Heterocarpus grimaldii	5.00	17	0.87
Laemonema sp.	5.00	17	0.87
Nemichthys scolopaceus	5.00	67	0.87
Nezumia aequalis	5.00	83	0.87
Coloconger cadenati	3.33	17	0.58
Aristeus varidens, male	1.70	23	0.30 4115
Total	575.03	100.01	

PROJECT STATION:1683
 DATE:15/ 5/98 GEAR TYPE: BT No: 3 POSITION:Lat S 1128
 start stop duration
 TIME :14:17:15 14:24:10 7 (min) Purpose code: 3 Long E 1330
 LOG :4433.44 4433.86 0.42 Area code : 2
 FDEPTH: 97 97 GearCond.code: 9
 BDEPTH: 97 97 Validity code: 1
 Towing dir: 340° Wire out: 290 m Speed: 30 kn*10
 Sorted: Kg Total catch: 16.30 CATCH/HOUR: 139.71

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight numbers			
Trichiurus lepturus	47.14	111	33.74 4107
Dentex macrophthalmus	33.43	411	23.93
Selene dorsalis	27.43	60	19.63
Raja miraletus	19.71	26	14.11
Alloteuthis africana	5.14	1834	3.68
Zeus faber	3.43	17	2.46
Pagellus bellottii	1.97	26	1.41
Illex coindetii	0.86	9	0.62
Trachurus trecae	0.34	26	0.24
Total	139.45	99.82	

PROJECT STATION:1687
 DATE:16/ 5/98 GEAR TYPE: BT No: 3 POSITION:Lat S 1143
 start stop duration
 TIME :00:19:07 00:27:46 9 (min) Purpose code: 3 Long E 1318
 LOG :4488.80 4489.24 0.42 Area code : 2
 FDEPTH: 672 672 GearCond.code: 9
 BDEPTH: 672 672 Validity code: 1
 Towing dir: 355ø Wire out:1550 m Speed: 30 kn*10
 Sorted: 37 Kg Total catch: 93.80 CATCH/HOUR: 625.33

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Gonostoma elongatum	163.33	3153	26.12	
Nematocarcinus africanus	80.00	9400	12.79	
Lamprogrammus exutus	66.67	813	10.66	
Yarella blackfordi	46.67	1100	7.46	
Hoplostethus cadenati	45.33	1347	7.25	
Triplophos sp.	36.67	2380	5.86	
Plesiopeanaeus edwardsianus	20.00	1080	3.20	4118
Chaceon maritae	18.67	113	2.99	
Lophius vaillantii	17.33	67	2.77	
Gadella imberbis	15.33	1233	2.45	
Laemonema laureysi	13.33	647	2.13	
Munida sp. *	13.33	1547	2.13	
Merluccius polli	13.33	13	2.13	
CONGRIDAE	12.00	433	1.92	
Nezumia aequalis	10.00	247	1.60	
Todaropsis eblanae	8.67	13	1.39	
Talismania longifilis	6.67	80	1.07	
Aristeus varidens, female	6.67	167	1.07	4116
Xenodermichthys copei	6.67	200	1.07	
Trichiurus lepturus	5.33	33	0.85	
Haloaenus ovenii	5.33	147	0.85	
Etmopterus spinax	5.33	13	0.85	
Aristeus varidens, male	5.33	213	0.85	4117
Dibranchius atlanticus	3.33	13	0.53	
Total	625.32		99.99	

PROJECT STATION:1690
 DATE:16/ 5/98 GEAR TYPE: BT No: 3 POSITION:Lat S 1146
 start stop duration
 TIME :08:43:00 09:13:12 30 (min) Purpose code: 3 Long E 1333
 LOG :4540.17 4541.73 1.54 Area code : 2
 FDEPTH: 108 109 GearCond.code: 2
 BDEPTH: 108 109 Validity code: 1
 Towing dir: 350ø Wire out: 330 m Speed: 30 kn*10
 Sorted: 71 Kg Total catch: 103.84 CATCH/HOUR: 207.68

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Dentex macrophthalmus	48.90	328	23.55	4127
Dentex angolensis	46.20	210	22.25	4126
Selene dorsalis	22.80	40	10.98	
Anthias anthias	20.40	156	9.82	
Dentex barnardi	13.92	36	6.70	
Umbrina canariensis	11.80	58	5.68	
Pagellus bellottii	11.50	96	5.54	4125
Dentex gibbosus	9.66	12	4.65	4128
Raja miraletus	5.78	10	2.78	
Trachurus trecae	4.74	4	2.28	
Alloteuthis africana	3.42	1454	1.65	
Trigla lyra	2.46	28	1.18	
Chaetodon hoefleri	1.80	4	0.87	
Scorpaena normani	1.62	6	0.78	
Zeus faber	1.44	10	0.69	
Citharus linguatula	1.04	24	0.50	
Monolene microstoma	0.20	4	0.10	
Total	207.68		100.00	

PROJECT STATION:1691
 DATE:16/ 5/98 GEAR TYPE: BT No: 3 POSITION:Lat S 1147
 start stop duration
 TIME :10:47:06 10:55:13 8 (min) Purpose code: 3 Long E 1329
 LOG :4551.38 4551.81 0.40 Area code : 2
 FDEPTH: 183 178 GearCond.code: 9
 BDEPTH: 183 178 Validity code: 1
 Towing dir: 340ø Wire out: 550 m Speed: 30 kn*10
 Sorted: 117 Kg Total catch: 1643.60 CATCH/HOUR: 12327.00

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Dentex macrophthalmus	11434.50	75315	92.76	4129
Spicara alta	525.00	1995	4.26	
Erythrocles monodi	105.00	105	0.85	
Dentex angolensis	84.00	210	0.68	
Boops boops	84.00	735	0.68	
Hyperoglyphe moselii	73.50	105	0.60	
Illex coindetii	21.00	105	0.17	
Total	12327.00		100.00	

PROJECT STATION:1688
 DATE:16/ 5/98 GEAR TYPE: BT No: 3 POSITION:Lat S 1147
 start stop duration
 TIME :05:24:30 05:54:56 30 (min) Purpose code: 3 Long E 1343
 LOG :4520.51 4522.20 1.67 Area code : 2
 FDEPTH: 41 49 GearCond.code: 2
 BDEPTH: 41 49 Validity code: 1
 Towing dir: 355ø Wire out: 150 m Speed: 30 kn*10
 Sorted: 63 Kg Total catch: 148.86 CATCH/HOUR: 297.72

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	134.10	6288	45.04	
Trachurus trecae	69.88	18116	23.47	
Pagellus bellottii	44.32	414	14.89	4121
Torpedo sp.	7.42	14	2.49	
Trichiurus lepturus	7.30	12	2.45	
Alloteuthis africana	5.34	1792	1.79	
Lithognathus mormyrus	5.30	10	1.78	
Atractoscion aequidens	5.00	14	1.68	
Selene dorsalis	4.94	36	1.66	
Sphyræna guachancho	2.70	4	0.91	
Caranx hippos	2.34	4	0.79	
Pomadasyus incisus	2.34	14	0.79	
Sardinella maderensis	1.38	4	0.46	
Chaetodon hoefleri	1.36	14	0.46	
Monolene microstoma	1.08	4	0.36	
Dentex canariensis	0.76	4	0.26	
Pseudupeneus prayensis	0.64	10	0.21	
Penaeus notialis, female	0.56	8	0.19	4119
Calappa pelii	0.36	4	0.12	
Uranoscopus albesca	0.28	10	0.09	
Citharus linguatula	0.18	4	0.06	
Penaeus notialis, male	0.08	6	0.03	4120
Total	297.66		99.98	

PROJECT STATION:1692
 DATE:16/ 5/98 GEAR TYPE: BT No: 3 POSITION:Lat S 1147
 start stop duration
 TIME :11:27:13 12:23:44 30 (min) Purpose code: 3 Long E 1326
 LOG :4560.07 4561.67 1.57 Area code : 2
 FDEPTH: 244 241 GearCond.code: 3
 BDEPTH: 244 241 Validity code: 1
 Towing dir: 340ø Wire out: 740 m Speed: 30 kn*10
 Sorted: 117 Kg Total catch: 600.80 CATCH/HOUR: 1201.60

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Dentex macrophthalmus	496.40	3564	41.31	4130
Synagrops microlepis	411.40	23312	34.24	
Merluccius polli	100.40	1292	8.36	4131
Zenopsis conchifer	90.20	884	7.51	
Todaropsis eblanae	88.40	832	7.36	
Chlorophthalmus atlanticus	8.60	816	0.72	
Parapenaeus longirostris, male	2.60	590	0.22	4133
Parapenaeus longirostris, fem.	1.80	324	0.15	4132
Nezumia aequalis	1.80	84	0.15	
Total	1201.60		100.02	

PROJECT STATION:1693
 DATE:16/ 5/98 GEAR TYPE: BT No: 3 POSITION:Lat S 1147
 start stop duration
 TIME :14:17:36 14:19:08 30 (min) Purpose code: 3 Long E 1324
 LOG :4569.82 4571.44 1.59 Area code : 2
 FDEPTH: 347 351 GearCond.code: 2
 BDEPTH: 347 351 Validity code: 1
 Towing dir: 350ø Wire out:1050 m Speed: 30 kn*10
 Sorted: 60 Kg Total catch: 655.00 CATCH/HOUR: 1310.00

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Merluccius polli	783.00	7000	59.77	4134
Nematocarcinus africanus	268.40	69784	20.49	
Hymenocephalus italicus	44.00	10412	3.36	
Etmopterus spinax	39.60	1130	3.02	
Pterothrissus belloci	37.40	242	2.85	
Laemonema laureysi	35.20	1012	2.69	
Chlorophthalmus atlanticus	33.00	682	2.52	
Trichiurus lepturus	18.00	792	1.37	
MYCTOPHIDAE	8.80	4224	0.67	
Sepia orbignyana	6.60	660	0.50	
Gadella imberbis	6.60	176	0.50	
Geryon sp.	6.60	22	0.50	
Epigonus telescopus	5.00	66	0.38	
Lophius vaillantii	4.40	22	0.34	
Nezumia aequalis	4.40	88	0.34	
Malacocephalus occidentalis	2.40	44	0.18	
Bathynectes piperitus	2.20	22	0.17	
CONGRIDAE	2.20	44	0.17	
Chaunax pictus	1.60	132	0.12	
Munida sp. *	0.40	44	0.03	
Parapenaeus longirostris	0.20	44	0.02	
Total	1310.00		99.99	

PROJECT STATION:1689
 DATE:16/ 5/98 GEAR TYPE: BT No: 3 POSITION:Lat S 1147
 start stop duration
 TIME :07:24:09 07:31:09 7 (min) Purpose code: 3 Long E 1337
 LOG :4531.88 4532.26 0.39 Area code : 2
 FDEPTH: 86 88 GearCond.code: 9
 BDEPTH: 86 88 Validity code: 1
 Towing dir: 350ø Wire out: 270 m Speed: 30 kn*10
 Sorted: 234 Kg Total catch: 234.00 CATCH/HOUR: 2005.71

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Atractoscion aequidens	1523.14	883	75.94	
Dentex barnardi	201.43	806	10.04	4123
Umbrina canariensis	91.71	249	4.57	
Pagellus bellottii	76.54	411	3.82	4122
Zeus faber	47.83	60	2.38	
Dentex angolensis	15.51	69	0.77	4124
Raja miraletus	14.57	26	0.73	
Chaetodon hoefleri	8.57	60	0.43	
Sepia orbignyana	6.51	9	0.32	
Plectorhynchus mediterraneus	6.43	9	0.32	
Fistularia petimba	5.23	17	0.26	
Boops boops	2.91	60	0.15	
Trachurus trecae	1.46	9	0.07	
Brachydeuterus auritus	0.09	17		
Total	2001.93		99.80	

PROJECT STATION:1694
 DATE:16/ 5/98 GEAR TYPE: BT No: 3 POSITION:Lat S 1148
 start stop duration Long E 1320
 TIME :16:21:03 16:51:07 30 (min) Purpose code: 3
 LOG :4578.17 4579.69 1.50 Area code : 2
 FDEPTH: 555 558 GearCond.code:
 BDEPTH: 555 558 Validity code:
 Towing dir: 172° Wire out:1500 m Speed: 30 kn*10

Sorted: 27 Kg Total catch: 107.33 CATCH/HOUR: 214.66

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Nematocarcinus africanus	22.40	3502	38.39	
Yarrella blackfordi	44.00	1338	20.50	
Hoplostethus cadenati	12.88	560	6.00	
Merluccius polli	12.00	16	5.59	
Lamprogrammus exutus	10.48	336	4.78	
MELANOSTOMIATIDAE	8.08	144	3.86	
Laemonema laureysi	6.64	96	3.09	
Aristeus varidens, female	6.56	384	3.06	4135
Etmopterus spinax	4.24	128	1.98	
Ebinania costaecanarie	3.80	200	1.77	
NETTASTOMATIDAE	3.68	144	1.71	
Yarrella sp.	3.12	48	1.45	
Gadella imberbis	2.96	104	1.38	
Aristeus varidens, male	2.72	368	1.27	4136
Nezumia aequalis	2.56	408	1.19	
Triplophos sp.	1.52	192	0.71	
Stereomastis sp.	1.44	248	0.67	
Chlorophthalmus atlanticus	1.08	32	0.50	
Coelorinchus coelorhincus	1.04	8	0.48	
Benthodesmus sp.	0.88	40	0.41	
Glyphus marsupialis	0.80	120	0.37	
Xenodermichthys copei	0.56	64	0.26	
Talismania sp.	0.48	32	0.22	
Nemichthys scolopaceus	0.40	56	0.19	
HIMANTOLOPHIDAE	0.16	16	0.07	
Chaunax pictus	0.08	8	0.04	
Dibranchius atlanticus	0.08	8	0.04	
Bathynectes piperitus	0.08	8	0.04	
Peristedion cataphractum	0.08	8	0.04	
Total	214.80		100.06	

PROJECT STATION:1695
 DATE:16/ 5/98 GEAR TYPE: BT No: 3 POSITION:Lat S 1205
 start stop duration Long E 1321
 TIME :19:15:06 19:45:03 30 (min) Purpose code: 3
 LOG :4595.87 4597.29 1.41 Area code : 2
 FDEPTH: 704 691 GearCond.code:
 BDEPTH: 704 691 Validity code:
 Towing dir: 165° Wire out:1600 m Speed: 30 kn*10

Sorted: 34 Kg Total catch: 96.79 CATCH/HOUR: 193.58

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Yarrella blackfordi	35.10	824	18.13	
MELANOSTOMIATIDAE	31.14	620	16.09	
Hoplostethus cadenati	27.30	994	14.10	
Nezumia aequalis	23.88	624	12.34	
Glyphus marsupialis	13.86	780	7.16	
Talismania sp.	10.92	270	5.64	
Aristeus varidens, female	10.32	526	5.33	4137
Miscellaneous fishes	7.86	1754	4.06	
Lamprogrammus exutus	4.80	24	2.48	
Merluccius polli	4.20	6	2.17	
Bathygadus sp.	4.08	36	2.11	
Lophius vaillanti	3.78	12	1.95	
Stereomastis sp.	3.90	426	1.55	
Yarrella sp.	2.58	192	1.33	
Halosaurus ovenii	1.86	66	0.96	
Aristeus varidens, male	1.60	206	0.83	4138
Illex coindetii	1.14	18	0.59	
NETTASTOMATIDAE	1.08	36	0.56	
Triplophos sp.	0.84	108	0.43	
Laemonema laureysi	0.78	24	0.40	
Chaceon maritae	0.76	12	0.39	
Phrynichthys wedli	0.66	6	0.34	
Coelorinchus coelorhincus	0.54	6	0.28	
Nemichthys scolopaceus	0.54	18	0.28	
Xenodermichthys copei	0.30	18	0.15	
Benthodesmus sp.	0.24	18	0.12	
Gadella imberbis	0.24	6	0.12	
Laemonema sp.	0.12	18	0.06	
Ebinania costaecanarie	0.06	18	0.03	
Total	193.58		99.98	

PROJECT STATION:1696
 DATE:17/ 5/98 GEAR TYPE: BT No: 3 POSITION:Lat S 1205
 start stop duration Long E 1324
 TIME :23:42:39 00:12:42 30 (min) Purpose code: 3
 LOG :4608.26 4609.82 1.55 Area code : 2
 FDEPTH: 555 544 GearCond.code:
 BDEPTH: 555 544 Validity code:
 Towing dir: 175° Wire out:1450 m Speed: 30 kn*10

Sorted: 34 Kg Total catch: 171.60 CATCH/HOUR: 343.20

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Yarrella blackfordi	110.00	4160	32.05	
Nematocarcinus africanus	92.00	2398	26.81	
Triplophos sp.	30.00	3300	8.74	
Gonostoma elongatum	28.00	550	8.16	
Aristeus varidens, female	13.00	580	3.79	4139
Merluccius polli	12.00	20	3.50	
Laemonema laureysi	11.00	170	3.21	
Aristeus varidens, male	8.00	960	2.33	4140
Pterothrissus belloci	7.00	30	2.04	
Lamprogrammus exutus	4.00	110	1.17	
Lophius vaillanti	4.00	10	1.17	
Hoplostethus cadenati	4.00	170	1.17	
Todaropsis eblanae	3.00	20	0.87	
Nezumia aequalis	2.40	50	0.70	
Xenodermichthys copei	2.00	210	0.58	
Chlorophthalmus atlanticus	2.00	40	0.58	
Halosaurus ovenii	2.00	90	0.58	
Gadella imberbis	1.40	50	0.55	
Munida sp.	1.40	170	0.41	
Etmopterus spinax	1.40	20	0.41	
Malacocephalus occidentalis	1.40	40	0.41	
Ebinania costaecanarie	1.00	60	0.29	
CONGRIDAE	0.60	40	0.17	
Talismania longifilis	0.60	40	0.17	
Glyphus marsupialis	0.40	10	0.12	
Total	343.10		99.98	

PROJECT STATION:1697
 DATE:17/ 5/98 GEAR TYPE: BT No: 3 POSITION:Lat S 1204
 start stop duration Long E 1329
 TIME :05:26:15 05:56:05 30 (min) Purpose code: 3
 LOG :4627.79 4629.26 1.47 Area code : 2
 FDEPTH: 104 106 GearCond.code:
 BDEPTH: 104 106 Validity code:
 Towing dir: 196° Wire out: 350 m Speed: 30 kn*10

Sorted: 60 Kg Total catch: 329.55 CATCH/HOUR: 659.10

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Dentex macrophthalmus	395.44	3386	60.00	4142
Boops boops	195.20	2046	29.62	
Dentex angolensis	28.16	198	4.27	4141
Trichiurus lepturus	12.88	22	1.95	
Trachurus trecae	10.00	176	1.52	
Zeus faber	10.00	176	1.52	
Lagocephalus laevigatus	6.16	396	0.93	
Pagellus bellottii	5.50	198	0.83	4143
Trigla lyra	4.30	44	0.65	
Chaetodon hoefleri	1.44	12	0.22	
Total	669.08		101.51	

PROJECT STATION:1698
 DATE:17/ 5/98 GEAR TYPE: BT No: 3 POSITION:Lat S 1203
 start stop duration Long E 1335
 TIME :07:26:47 07:58:49 32 (min) Purpose code: 3
 LOG :4639.37 4640.81 1.42 Area code : 2
 FDEPTH: 81 80 GearCond.code:
 BDEPTH: 81 80 Validity code:
 Towing dir: 180° Wire out: 300 m Speed: 30 kn*10

Sorted: 72 Kg Total catch: 539.32 CATCH/HOUR: 1011.23

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Pagellus bellottii	429.62	4946	42.48	4144
Umbrina canariensis	284.06	998	28.09	4147
Sepia officinalis hierredda	39.94	113	3.95	
Dentex macrophthalmus	35.31	240	3.49	4145
Octopus vulgaris	31.65	56	3.13	
Dentex barnardi	31.37	197	3.10	4146
Trachurus trecae	25.03	324	2.48	
Trichiurus lepturus	24.34	56	2.41	
Raja doutrei	23.21	43	2.30	
Zeus faber	18.56	43	1.84	
Alloteuthis africana	18.00	9000	1.78	
Pseudupeneus prayensis	11.40	113	1.13	
Scorpaenodes sp.	9.84	15	0.97	
Chaetodon hoefleri	9.56	71	0.95	
Uranoscopus albesca	5.06	15	0.50	
Trigla lyra	4.50	56	0.45	
Atractoscion sp.	3.56	2	0.35	
Boops boops	1.97	15	0.19	
Dentex gibbosus	1.84	28	0.18	
Citharus linguatula	1.56	56	0.15	
Todaropsis eblanae	0.56	15	0.06	
Lagocephalus laevigatus	0.28	15	0.03	
Total	1011.22		100.01	

PROJECT STATION:1699
 DATE:17/ 5/98 GEAR TYPE: BT No: 3 POSITION:Lat S 1207
 start stop duration Long E 1337
 TIME :09:15:43 09:45:33 30 (min) Purpose code: 3
 LOG :4648.07 4649.69 1.60 Area code : 2
 FDEPTH: 52 54 GearCond.code:
 BDEPTH: 52 54 Validity code:
 Towing dir: 10° Wire out: 180 m Speed: 30 kn*10

Sorted: 64 Kg Total catch: 545.67 CATCH/HOUR: 1091.34

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Pomadasys incisus	312.80	1800	28.66	
Trichiurus lepturus	178.50	582	16.36	
Brachydeuterus auritus	170.84	16230	15.65	
Pagellus bellottii	118.14	946	10.83	4148
Pomadasys jubelini	95.90	170	8.88	
Sepia officinalis hierredda	44.88	52	4.11	
Atractoscion aequidens	29.76	18	2.73	
Trachurus trecae	27.88	136	2.55	
Dentex barnardi	21.76	98	1.99	4149
Lithognathus mormyrus	20.24	52	1.85	
Raja miraletus	15.46	34	1.42	
Trigla lyra	10.20	68	0.93	
Selene dorsalis	9.52	52	0.87	
Dentex gibbosus	9.00	68	0.82	
Torpedo torpedo	8.86	52	0.81	
Pseudupeneus prayensis	7.30	34	0.67	
Brotula barbata	2.34	18	0.21	
Penaeus notialis, female	1.70	18	0.16	
Bembrops heterurus	1.54	18	0.14	
Citharus linguatula	1.52	52	0.14	
Penaeus notialis, male	1.36	52	0.12	
Scorpaena stephanica	1.02	18	0.09	
Total	1091.52		99.99	

PROJECT STATION:1700
 DATE:17/ 5/98 GEAR TYPE: BT No: 3 POSITION:Lat S 1206 Long E 1341
 start stop duration
 TIME :10:49:34 11:20:26 31 (min) Purpose code: 3
 LOG :4656.44 4658.08 1.63 Area code : 2
 FDEPTH: 29 30 GearCond.code: 2
 BDEPTH: 29 30 Validity code:
 Towing dir: 10ø Wire out: 120 m Speed: 30 kn*10
 Sorted: 114 Kg Total catch: 794.30 CATCH/HOUR: 1537.35

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichiurus lepturus	257.42	691	16.74	
Pomadasy inciscus	176.13	1287	11.46	
Chloroscombrus chrysurus	163.94	1084	10.66	4150
Pseudolithus typus	143.61	190	9.34	
Brachydeuterus auritus	142.26	4972	9.25	
Ilisha africana	140.90	2114	9.17	
Conger conger	112.45	54	7.31	
Dasyatis margarita	84.00	68	5.46	
Dicologlossa cuneata	52.84	1328	3.44	
Stromateus fiatola	50.32	68	3.27	
Galeoides decadactylus	40.65	95	2.64	
Pteroscion pelli	38.52	298	2.51	
Pomadasy jubelini	37.94	122	2.47	
Penaeus notialis, male	19.35	1030	1.26	4152
Torpedo nobiliana	16.26	81	1.06	
Penaeus notialis, female	14.90	393	0.97	4151
Grammolites gruvelli	12.19	163	0.79	
Raja miraletus	10.84	14	0.71	
Trachurus trecae	10.84	27	0.71	
Lithognathus mormyrus	9.48	14	0.62	
Umbrina canariensis	1.94	14	0.13	
Sardinella maderensis	0.39	14	0.03	
Selene dorsalis	0.27	14	0.02	
Total	1537.44		100.02	

PROJECT STATION:1703
 DATE:18/ 5/98 GEAR TYPE: BT No: 3 POSITION:Lat S 1216 Long E 1325
 start stop duration
 TIME :12:16:24 12:37:12 21 (min) Purpose code: 3
 LOG :4711.94 4712.85 0.90 Area code : 2
 FDEPTH: 109 108 GearCond.code: 9
 BDEPTH: 109 108 Validity code: 1
 Towing dir: 210ø Wire out: 330 m Speed: 30 kn*10
 Sorted: 51 Kg Total catch: 51.60 CATCH/HOUR: 147.43

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Dentex angolensis	46.00	146	31.20	4158
Pagellus bellottii	27.14	37	18.41	4157
Dentex barnardi	22.29	69	15.12	4159
Umbrina canariensis	20.29	71	13.76	4156
Trichiurus lepturus	6.57	17	4.46	
Zeus faber	4.29	6	2.91	
Lagocephalus laevigatus	4.00	6	2.71	
Octopus vulgaris	3.43	6	2.33	
Raja miraletus	2.29	6	1.55	
Scorpaena normani	1.71	3	1.16	
Dentex gibbosus	1.43	9	0.97	
Chaetodon hoeferli	1.14	3	0.77	
Trachurus trecae	1.14	6	0.77	
Sepia officinalis hierredda	0.86	3	0.58	
Pagrus africanus	0.31	9	0.21	
Anthias anthias				
Total	147.46		100.01	

PROJECT STATION:1701
 DATE:18/ 5/98 GEAR TYPE: BT No: 3 POSITION:Lat S 1221 Long E 1331
 start stop duration
 TIME :08:06:21 08:36:05 30 (min) Purpose code: 3
 LOG :4690.10 4691.59 1.46 Area code : 2
 FDEPTH: 51 51 GearCond.code: 2
 BDEPTH: 51 51 Validity code:
 Towing dir: 230ø Wire out: 180 m Speed: 30 kn*10
 Sorted: 97 Kg Total catch: 1222.60 CATCH/HOUR: 2445.20

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	676.00	13196	27.65	
Pomadasy inciscus	598.82	3992	24.49	
Pomadasy jubelini	484.88	658	19.83	
Trichiurus lepturus	187.36	1302	7.66	
Atractoscion aequidens	89.38	76	3.66	
Lithognathus mormyrus	78.98	278	3.23	
Epigonus telescopus	52.14	658	2.13	
Galeoides decadactylus	33.42	228	1.37	4153
Dentex barnardi	31.14	76	1.27	
Torpedo torpedo	16.96	582	0.69	
Citharus linguatula	15.18	304	0.62	
Uranoscopus albesca	13.42	76	0.55	
Pagellus bellottii	13.40	26	0.55	
Zeus faber	12.90	50	0.53	
Selene dorsalis	11.38	254	0.47	
Pteroscion pelli	9.88	102	0.40	
Umbrina canariensis	9.36	50	0.38	
Trachurus trecae	8.10	26	0.33	
Pseudupeneus prayensis	7.84	102	0.32	
Scorpaena stephanica	5.56	50	0.23	
Erotula barbata	4.06	50	0.17	
Raja miraletus	4.04	50	0.17	4154
Penaeus notialis, female	3.78	26	0.15	
Chaetodon hoeferli	2.52	102	0.10	4155
Penaeus notialis, male				
Total	2445.20		100.00	

PROJECT STATION:1704
 DATE:18/ 5/98 GEAR TYPE: BT No: 3 POSITION:Lat S 1219 Long E 1322
 start stop duration
 TIME :13:51:29 14:08:31 17 (min) Purpose code: 3
 LOG :4720.87 4721.73 0.85 Area code : 2
 FDEPTH: 342 312 GearCond.code: 9
 BDEPTH: 342 312 Validity code: 1
 Towing dir: 12ø Wire out:1050 m Speed: 30 kn*10
 Sorted: 94 Kg Total catch: 561.80 CATCH/HOUR: 1982.82

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichiurus lepturus	523.06	572	26.38	
Chlorophthalmus atlanticus	518.82	11933	26.17	
Pterothrissus belloci	353.65	2569	17.84	
Merluccius polli	163.06	911	8.22	4160
Laemonema laureysi	114.35	14580	5.77	
Hymenocephalus italicus	72.00	31496	3.63	
MICTOPHIDAE	55.06	13214	2.78	
Lophius vaillanti	47.29	85	2.38	
Aristeus varidens, female	36.71	1991	1.85	4161
Malacocephalus occidentalis	31.76	360	1.60	
GALATHEIDAE *	12.71	3812	0.64	
Zeus faber	9.18	21	0.46	
Etmopterus spinax	6.35	106	0.32	
Nezumia aequalis	6.35	275	0.32	
Chaceon maritae	6.35	21	0.32	
Trigla lyra	5.29	911	0.27	4162
Aristeus varidens, male	4.24	21	0.21	
Epigonus telescopus	2.82	127	0.14	
Synagrops microlepis	2.12	21	0.11	
Ebinania costaeacanarie	2.12	21	0.11	
Illex coindetii	1.41	21	0.07	
Citharus linguatula	0.71	64	0.04	
Parapenaeus longirostris, fem.	0.71	21	0.04	
Halosaurus ovenii	0.35	21	0.02	
Parapenaeus longirostris, male				
Total	1982.82		100.01	

PROJECT STATION:1702
 DATE:18/ 5/98 GEAR TYPE: BT No: 3 POSITION:Lat S 1228 Long E 1328
 start stop duration
 TIME :10:01:52 10:33:37 30 (min) Purpose code: 3
 LOG :4698.52 4699.98 1.45 Area code : 2
 FDEPTH: 89 91 GearCond.code: 2
 BDEPTH: 89 91 Validity code:
 Towing dir: 210ø Wire out: 270 m Speed: 30 kn*10
 Sorted: Kg Total catch: 98.04 CATCH/HOUR: 196.08

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichiurus lepturus	113.40	286	57.83	
Pagellus bellottii	32.40	352	16.52	4155
Sepia officinalis hierredda	13.60	16	6.94	
Trigla lyra	13.60	110	6.94	
Raja miraletus	9.40	14	4.79	
Zeus faber	3.28	18	1.53	
Chaetodon hoeferli	1.60	2	0.82	
Lagocephalus laevigatus	1.00	20	0.51	4154
Dentex barnardi	0.80	2	0.41	
Fistularia petimba	0.80	2	0.41	
Uranoscopus cadenati	0.80	2	0.41	
Dentex gibbosus	0.80	2	0.41	
Uranoscopus polli	0.80	2	0.41	
Dentex angolensis	0.40	4	0.20	
Dentex macrophthalmus	0.40	2	0.20	
Scorpaena stephanica	0.40	4	0.20	
Citharus linguatula	0.40	28	0.20	
Total	196.08		99.99	

PROJECT STATION:1705
 DATE:19/ 5/98 GEAR TYPE: BT No: 3 POSITION:Lat S 1223 Long E 1317
 start stop duration
 TIME :01:27:03 01:35:58 9 (min) Purpose code: 3
 LOG :4806.42 4806.87 0.44 Area code : 2
 FDEPTH: 711 710 GearCond.code: 2
 BDEPTH: 711 710 Validity code:
 Towing dir: 26ø Wire out:1600 m Speed: 30 kn*10
 Sorted: 30 Kg Total catch: 91.10 CATCH/HOUR: 607.33

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Hoplostethus cadenati	194.00	7180	31.94	
Yarella blackfordi	80.00	1600	13.17	
Gonostoma elongatum	70.00	1320	11.53	
Aristeus varidens, female	69.33	3453	11.42	4163
Aristeus varidens, male	62.67	7620	10.32	4164
Nezumia aequalis	22.67	580	3.73	
Talismania longifilis	22.00	360	3.62	
Plesiopeanaeus edwardsianus, f.	22.00	800	3.62	4165
Laemonema laureysi	16.00	100	2.63	
Merluccius polli	12.00	20	1.98	
Triplophos sp.	10.00	1060	1.65	
Etmopterus spinax	6.00	60	0.99	
Todaropsis eblanae	4.00	20	0.66	
Lamprogrammus exutus	4.00	20	0.66	
CONGRIDAE	4.00	160	0.66	
Solenocera africana	2.00	120	0.33	
Munida sp. *	2.00	240	0.33	
Halosaurus ovenii	2.00	100	0.33	
Xenodermichthys copei	2.00	100	0.33	
Dibranchius atlanticus	0.60	20	0.10	
Total	607.27		100.00	

PROJECT STATION:1706
 DATE:19/ 5/98 GEAR TYPE: BT No: 3 POSITION:Lat S 1229
 start stop duration Long E 1320
 TIME :05:30:00 05:51:00 21 (min) Purpose code: 3
 LOG :4828.21 4829.42 1.17 Area code : 2
 FDEPTH: 104 107 GearCond.code:
 BDEPTH: 104 107 Validity code:
 Towing dir: 29ø Wire out: 320 m Speed: 30 kn*10
 Sorted: 43 Kg Total catch: 43.00 CATCH/HOUR: 122.86

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	45.86	86	37.33	
Dentex macrophthalmus	15.00	109	12.21	4167
Sarda sarda	11.29	9	9.19	
Sepia officinalis hierredda	8.26	9	6.72	
Dentex barnardi	7.74	23	6.30	4168
Trigla sp.	7.46	54	6.07	
Boops boops	4.63	40	3.77	
Spicara alta	4.49	20	3.65	
Raja miraletus	4.20	6	3.42	
Dentex angolensis	3.60	23	2.93	4166
Zeus faber	2.66	6	2.17	
Chaetodon hoefleri	2.26	14	1.84	
Pagellus bellottii	1.63	6	1.33	
Scorpaena stephanica	1.57	3	1.28	
Dentex gibbosus	0.74	3	0.60	
Umbrina canariensis	0.69	3	0.56	
Scorpaena normani	0.34	3	0.28	
Pseudupeneus prayensis	0.09	6	0.07	
Total	122.51		99.72	

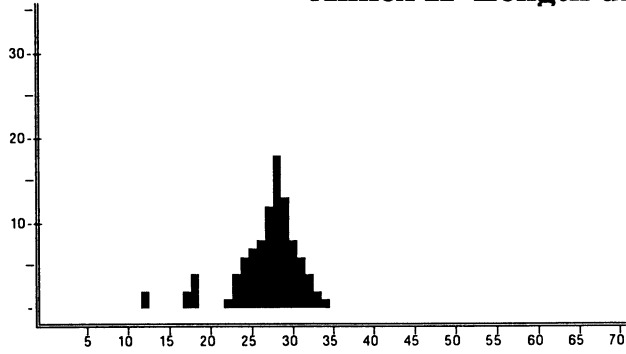
PROJECT STATION:1707
 DATE:19/ 5/98 GEAR TYPE: BT No: 3 POSITION:Lat S 1228
 start stop duration Long E 1324
 TIME :07:20:47 07:50:12 29 (min) Purpose code: 3
 LOG :4837.14 4838.75 1.60 Area code : 2
 FDEPTH: 71 75 GearCond.code:
 BDEPTH: 71 75 Validity code:
 Towing dir: 40ø Wire out: 240 m Speed: 31 kn*10
 Sorted: 79 Kg Total catch: 833.71 CATCH/HOUR: 1724.92

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	899.38	5810	52.14	
Umbrina canariensis	170.54	588	9.89	
Sepia officinalis hierredda	150.33	174	8.72	
Selene dorsalis	122.75	370	7.12	
Lithognathus mormyrus	122.75	327	7.12	
Trichiurus lepturus	83.59	348	4.85	
Atractoscion aequidens	40.63	43	2.36	
Dentex macrophthalmus	22.37	197	1.30	4169
Raja miraletus	18.25	23	1.06	
Torpedo torpedo	15.00	43	0.87	
Brachydeuterus auritus	14.11	1152	0.82	
Citharus linguatula	13.70	217	0.79	
Fistularia petimba	12.81	23	0.74	
Pagellus bellottii	12.62	110	0.73	
Dentex barnardi	9.79	43	0.57	
Pterothrissus belloci	6.52	130	0.38	
Zeus faber	5.65	43	0.33	
Grammolites gruvelli	2.83	43	0.16	
Laemonema laureysi	1.10	23	0.06	
Thorogobius angolensis	0.23	23	0.01	
Total	1724.95		100.02	

PROJECT STATION:1708
 DATE:19/ 5/98 GEAR TYPE: BT No: 3 POSITION:Lat S 1229
 start stop duration Long E 1325
 TIME :08:51:40 09:21:20 30 (min) Purpose code: 3
 LOG :4844.25 4845.80 1.52 Area code : 2
 FDEPTH: 45 47 GearCond.code:
 BDEPTH: 45 47 Validity code:
 Towing dir: 30ø Wire out: 160 m Speed: 30 kn*10
 Sorted: 71 Kg Total catch: 1115.10 CATCH/HOUR: 2230.20

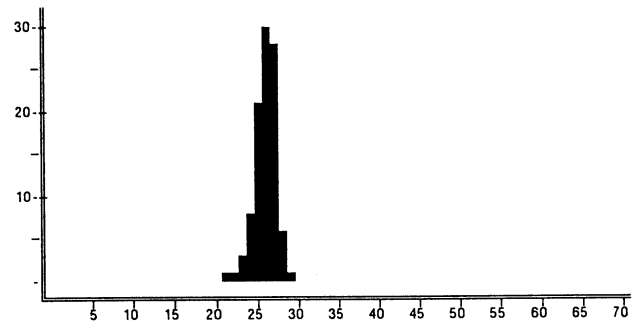
SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	908.80	7412	40.75	
Pomadasy's jubelini	601.40	1024	26.97	
Trichiurus lepturus	210.80	528	9.45	
Lithognathus mormyrus	119.36	248	5.35	
Selar crumenophthalmus	107.26	252	4.81	
Trachurus trecae	80.60	528	3.61	
Rhinobatos albomaculatus	60.50	32	2.71	
Atractoscion aequidens	41.24	930	1.85	
Epinephelus aeneus	27.00	2	1.21	
Brotula barbata	20.46	62	0.92	
Chloroscombrus chrysurus	15.82	94	0.71	
Torpedo torpedo	14.26	32	0.64	
Umbrina canariensis	13.34	94	0.60	
Pomadasy's incisus	4.66	32	0.21	
Pagellus bellottii	2.48	32	0.11	
Dicologlossa cuneata	1.86	32	0.08	
Citharus linguatula	0.32	32	0.01	
Total	2230.16		99.99	

Annex II Length distributions of main species



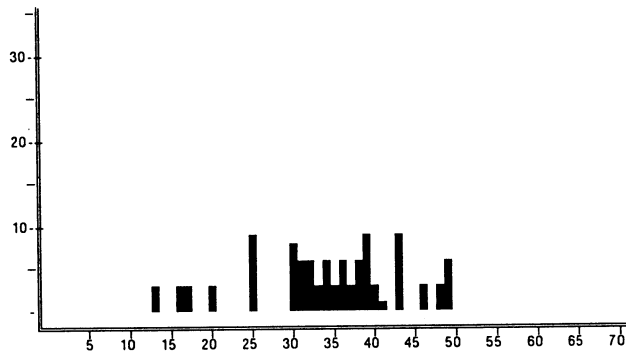
Penaeus notialis, male
Luanda - Benguela
Pooled sample (weighted by catch).

MEAN LENGTH = 27.32cm N= 84
NUMBER OF SUBSAMPLES : 4



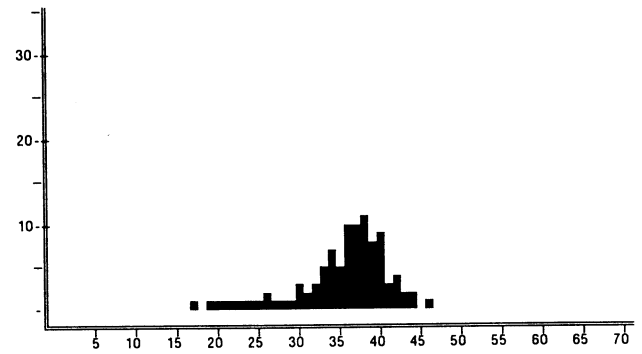
Aristeus varidens, male
Luanda - Benguela
Pooled sample (weighted by catch).

MEAN LENGTH = 26.35cm N= 1129
NUMBER OF SUBSAMPLES : 19



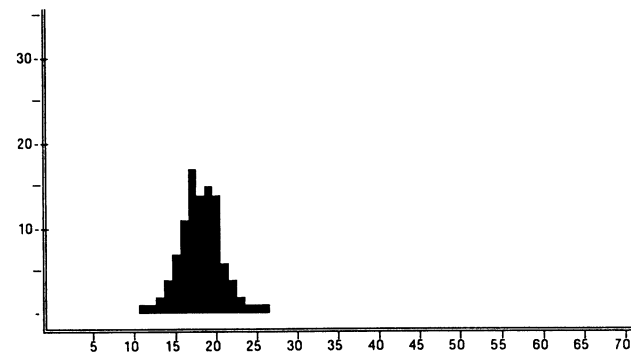
Penaeus notialis, female
Luanda - Benguela
Pooled sample (weighted by catch).

MEAN LENGTH = 34.80cm N= 40
NUMBER OF SUBSAMPLES : 4



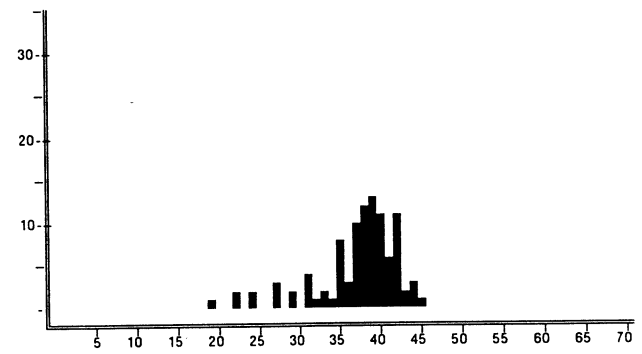
Aristeus varidens, female
Luanda - Benguela
Pooled sample (weighted by catch).

MEAN LENGTH = 35.58cm N= 953
NUMBER OF SUBSAMPLES : 19



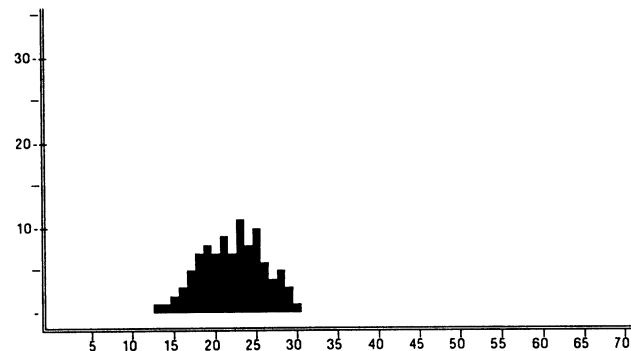
Parapenaeus longirostris, male
Luanda - Benguela
Pooled sample (weighted by catch).

MEAN LENGTH = 18.66cm N= 1069
NUMBER OF SUBSAMPLES : 13



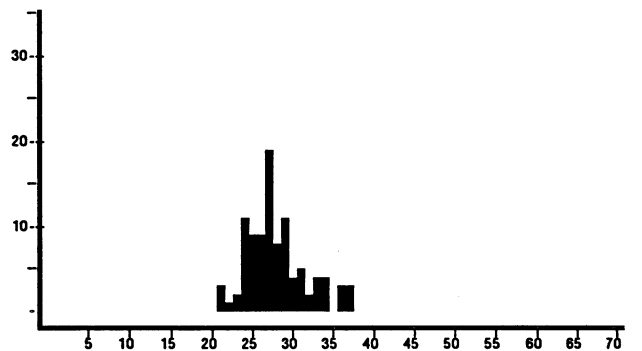
Plesiopenaeus edwardsianus
Luanda - Benguela
Pooled sample (weighted by catch).

MEAN LENGTH = 38.24cm N= 116
NUMBER OF SUBSAMPLES : 4



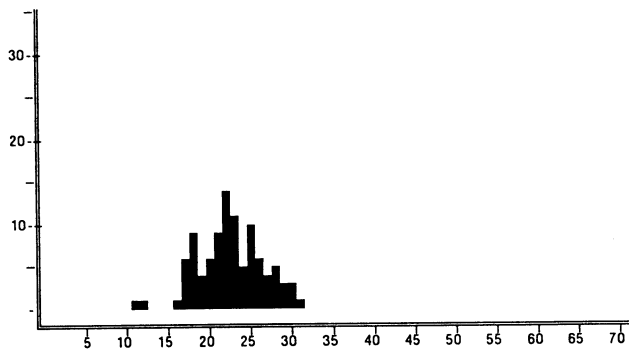
Parapenaeus longirostris, fem.
Luanda - Benguela
Pooled sample (weighted by catch).

MEAN LENGTH = 22.63cm N= 1658
NUMBER OF SUBSAMPLES : 14



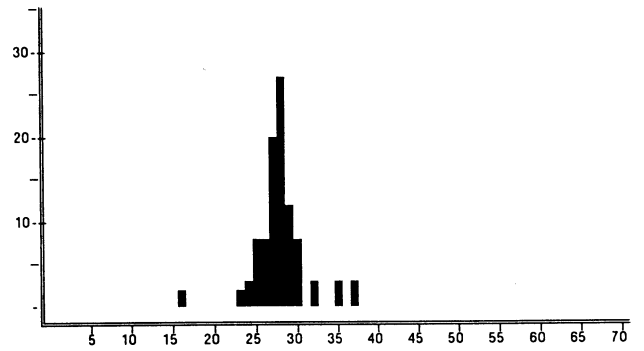
Umbrina canariensis
Luanda - Benguela
Pooled sample (weighted by catch).

MEAN LENGTH = 28.39cm N= 97
NUMBER OF SUBSAMPLES : 2



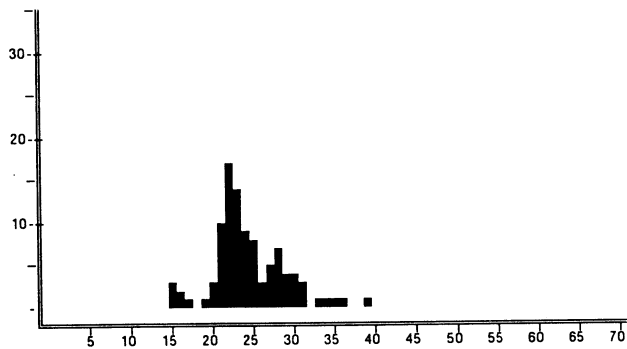
Dentex angolensis
Luanda - Benguela
Pooled sample (weighted by catch).

MEAN LENGTH = 22.95cm N= 627
NUMBER OF SUBSAMPLES : 17



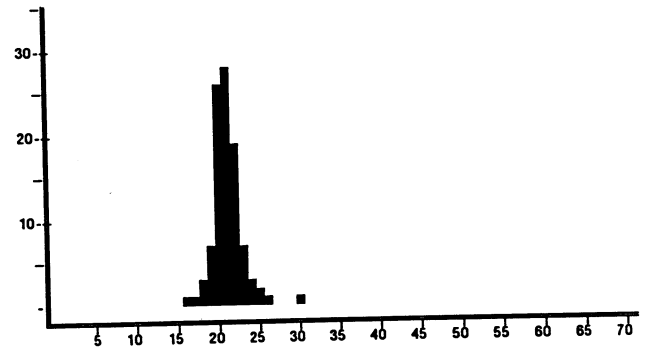
Dentex gibbosus
Luanda - Benguela
Pooled sample (weighted by catch).

MEAN LENGTH = 28.32cm N= 48
NUMBER OF SUBSAMPLES : 3



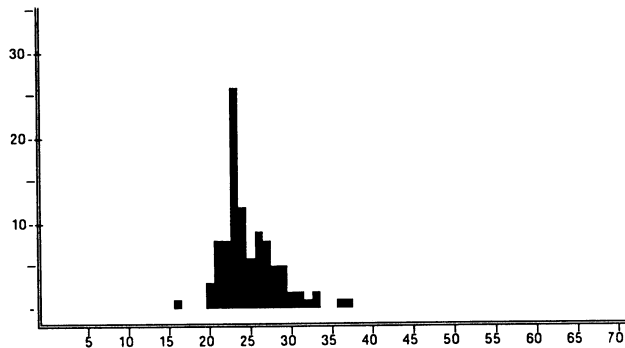
Dentex barnardi
Luanda - Benguela
Pooled sample (weighted by catch).

MEAN LENGTH = 24.80cm N= 381
NUMBER OF SUBSAMPLES : 10



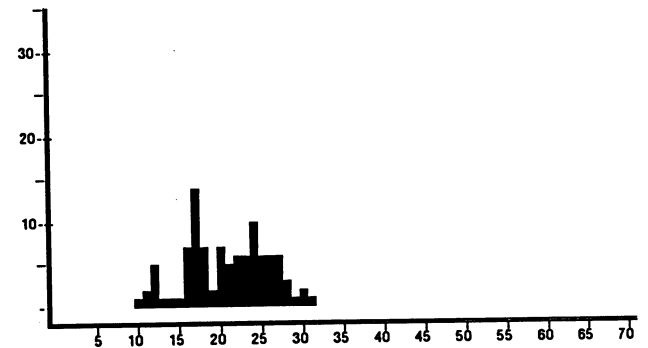
Dentex macrophthalmus
Luanda - Benguela
Pooled sample (weighted by catch).

MEAN LENGTH = 21.61cm N= 1187
NUMBER OF SUBSAMPLES : 18



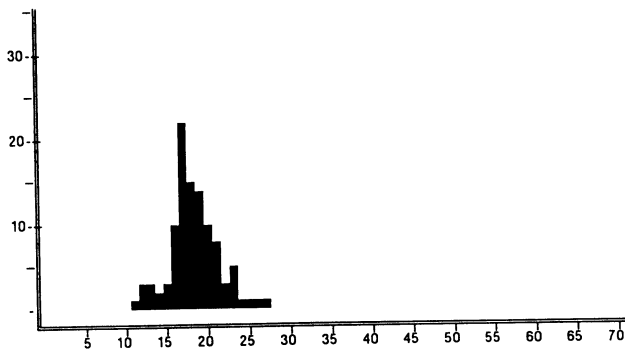
Dentex canariensis
Luanda - Benguela
Pooled sample (weighted by catch).

MEAN LENGTH = 25.23cm N= 140
NUMBER OF SUBSAMPLES : 4



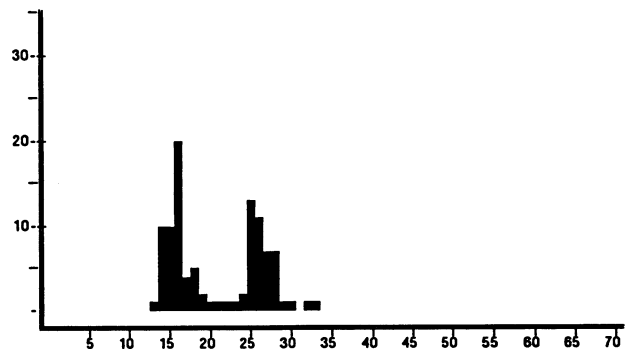
Pagellus bellottii
Luanda - Benguela
Pooled sample (weighted by catch).

MEAN LENGTH = 21.18cm N= 1198
NUMBER OF SUBSAMPLES : 20



Dentex congoensis
Luanda - Benguela
Pooled sample (weighted by catch).

MEAN LENGTH = 18.72cm N= 156
NUMBER OF SUBSAMPLES : 2



Trachurus trecae
Luanda - Benguela
Pooled sample (weighted by catch).

MEAN LENGTH = 21.05cm N= 191
NUMBER OF SUBSAMPLES : 3

Annex III Swept area analysis

SWEPT AREA ANALYSIS FROM STATION 1638 TO STATION 1708

A. Luanda-Benguela. Demersal species shelf

SPECIES NAME	SAMPLE DISTRIB. BY CATCH CLASSES					% incidence	Mean dens. t/nm ²	Mean densities by bottom depth strata t/nm ²				
	Lower limits, Kg/nm							- 50m	50-100m	100-200m	200-200m	
	>0	10	30	100	300	1000						
Dentex macrophthalmus	8	4	1	2		1	42	11.19				
Trichiurus lepturus	15	5	9			1	79	6.61	23.31	0.23	35.10	
Brachydeuterus auritus	4	3	3	4	1		39	5.19	15.71	1.93	0.71	
Pagellus bellottii	18	7	4	2			82	1.51	0.93	3.29	0.19	
Atractoscion aequidens	8	2	1		1		32	1.42	0.17	2.74	0.01	
Pomadasyd jubelini	3	1	2	2			21	1.33	3.40	1.17		
Trachurus trecae	19	4	2	1			68	1.24	0.75	2.26	0.16	
Pomadasyd incisus	5		2	1			21	0.96	0.70	1.79		
Umbrina canariensis	10	1	1	1			34	0.60	0.06	1.20	0.16	
Spicara alta	4		1	1			16	0.56			1.76	
Dentex angolensis	17	5					58	0.46		0.14	1.26	
Dentex barnardi	10	5	1				42	0.44	0.15	0.78	0.18	
Galeoides decadactylus	3	2		1			16	0.44	1.63	0.11		
Lithognathus morayrus	7	2	3				32	0.42	0.96	0.43		
Synagrops microlepis		1	2				8	0.42	0.12		1.24	
Selene dorsalis	13	3	1				45	0.41	0.43	0.65	0.06	
Sepia officinalis hierredda	14	4	1				50	0.35	0.16	0.66	0.04	
Engraulis encrasicolus	1			1			5	0.35	1.49			
Boops boops	7	1	1				24	0.26		0.02	0.80	
Chlorophthalmus atlanticus			1				3	0.25			0.80	
Pterothrissus belloci	6	2	1				24	0.24		0.33	0.30	
Pseudotolithus typus			2				5	0.21	0.89			
Chloroscombrus chrysurus	6		1				18	0.20	0.86			
Brotula barbata	11		1				32	0.19	0.08	0.29	0.13	
Raja miraletus	24						63	0.18	0.06	0.33	0.05	
Zeus faber	24	1					66	0.16		0.27	0.12	
Dentex canariensis	6	3					21	0.16		0.35		
Sardinella sp.			1				3	0.16	0.68			
Alloteuthis africana	13	1					37	0.14	0.10	0.24	0.02	
Arius parkii			1				3	0.13	0.56			
Ilisha africana	1		1				5	0.12	0.50			
Stromateus fiatola	5	2					16	0.11	0.25	0.12		
Octopus vulgaris	9	2					29	0.10	0.01	0.20	0.03	
Zenopsis conchifer	4	1					13	0.09			0.29	
Erythrocles monodi			1				3	0.09			0.29	
Conger conger				1				0.09	0.40			
Selar crumenophthalmus				1			3	0.09	0.39			
Pagrus caeruleostictus		1					3	0.08	0.32			
Merluccius polli	1	1					5	0.08			0.26	
Citharus linguatula	21						55	0.08		0.17	0.02	
Illex coindetii	6	1					18	0.07		0.01	0.21	
Torpedo torpedo	9	1					26	0.07	0.05	0.12	0.01	
Dasyatis margarita		1					3	0.07	0.30			
Epigonus telescopus	1	1					5	0.07		0.16		
Dentex gibbosus	11						29	0.06		0.07	0.09	
Pteroscion peli	4	1					13	0.06	0.15	0.05		
Chaetodon hoefleri	15						39	0.06	0.09	0.07	0.02	
Hyperoglyphe moselii		1					3	0.06			0.20	
Trigla lyra	8						21	0.05		0.08	0.03	
Sphyræna sphyraena	3	1					11	0.05	0.21			
Sphyræna guachancho	5						13	0.05	0.17	0.03		
Dicologlossa cuneata	4	1					13	0.05	0.20			
Rhinobatos albomaculatus			1				3	0.05	0.22			
Pseudupeneus prayensis	9						24	0.05	0.01	0.09		
Parapeneus longirostris, fem.	5						13	0.03		0.03	0.06	
Penaeus notialis, female	5						13	0.02	0.06	0.01		
Penaeus notialis, male	5						13	0.02	0.07	0.01		
Parapeneus longirostris, male	5						13	0.02		0.01	0.03	
Penaeus notialis	1						3		0.01			
Parapeneus longirostris	1						3					
Shrimps, small, non comm.	1						3			0.01		
Other fish								0.62	0.72	0.60	0.64	
Sum all species								38.64	57.33	24.13	45.27	
Sum Snappers								0.04	0.18			
Sum Groupers								7.49	19.83	6.26		
Sum Grunts								2.32	1.35	4.37	0.17	
Sum Croakers								14.62	2.38	4.76	37.73	
Sum Seabreams								0.07	0.15	0.02	0.08	
Sum Sharks								0.41	0.72	0.50	0.06	
Sum Rays								0.68	0.27	1.12	0.34	
Sum Squids								0.09	0.14	0.06	0.09	
Sum commercial shrimps								0.09	0.14	0.06	0.09	

Number of stations included in analysis, total and by depth strata

38

9

17

12

SWEPT AREA ANALYSIS FROM STATION 1638 TO STATION 1708

A. Luanda-Benguela. Demersal species slope (200-600)

SPECIES NAME	SAMPLE DISTRIB. BY CATCH CLASSES					% incidence	Mean dens. t/nm ²	Mean densities by bottom depth strata t/nm ²				
	Lower limits, Kg/nm							200-300m	300-400m	400-500m	500-600m	
	>0	10	30	100	300	1000						
<i>Merluccius polli</i>	7	3	7	6			92	6.22	4.82	13.58	7.69	0.66
<i>Nematocarcinus africanus</i>	4	2	7	3			64	3.47	0.01	5.39	7.76	3.32
<i>Chlorophthalmus atlanticus</i>	10	3	2	4			76	3.31	3.53	8.96	0.15	0.02
<i>Synagrops microlepis</i>	4	2	3	1	1		44	3.17	9.86	0.09		
<i>Dentex macrophthalmus</i>	3	1	2	1			28	1.22	3.80			
<i>Trichiurus lepturus</i>	10	2	1	1			56	1.20	1.44	3.02	0.02	0.05
<i>Pterothrissus belloci</i>	11	3	1	1			64	1.13	1.16	2.97	0.20	0.03
MYCTOPHIDAE	7	3	2				48	0.89	2.42	0.47	0.02	
<i>Laemonema laureysi</i>	10	6	1				68	0.58	0.05	1.46	0.70	0.37
<i>Lophius vaillanti</i>	11	1	1				52	0.49		0.43	0.16	1.28
<i>Yarella blackfordi</i>	7	2	1				40	0.40			0.33	1.25
<i>Hymenocephalus italicus</i>	7	4	1				48	0.39		1.23	0.57	0.02
<i>Etmopterus spinax</i>	12	4					64	0.35		0.69	0.64	0.31
<i>Zenopsis conchifer</i>	5	1	1				28	0.31	0.91			0.08
<i>Parapenaeus longirostris, fem.</i>	8	3					44	0.31	0.89	0.08		
Miscellaneous fishes	1		1				8	0.29			0.18	0.92
<i>Aristeus varidens, female</i>	13	1					56	0.21		0.21	0.47	0.30
<i>Todaropsis eblanae</i>	9	1					40	0.18	0.48	0.04	0.03	0.05
<i>Malacocephalus occidentalis</i>	8	2					40	0.14		0.48	0.15	0.01
<i>Parapenaeus longirostris, male</i>	12						48	0.13	0.36	0.04		
<i>Triplophos sp.</i>	7						28	0.12			0.14	0.37
<i>Aristeus varidens, male</i>	13						52	0.11		0.03	0.35	0.18
<i>Coelorrhinchus coelorrhinchus</i>	9	1					40	0.11	0.10	0.01	0.06	0.22
<i>Hoplostethus cadonati</i>	11						44	0.10		0.02	0.11	0.28
<i>Nezumia aequalis</i>	15						60	0.10	0.01	0.08	0.19	0.16
<i>Illex coindetii</i>	9						36	0.08	0.17	0.03	0.05	0.06
<i>Trichiurus sp.</i>		1					4	0.07	0.23			
<i>Dentex angolensis</i>	1	1					8	0.07	0.23			
<i>Lamprogrammus exutus</i>	6						24	0.07			0.03	0.23
NETTASTOMATIDAE	4	1					20	0.07		0.01	0.03	0.21
<i>Malacocephalus laevis</i>	4	1					20	0.07		0.01	0.40	0.01
<i>Dibranchius atlanticus</i>	8						32	0.06		0.01	0.32	0.02
<i>Gonostoma elongatum</i>	4						16	0.06		0.01	0.05	0.16
<i>Synagrops sp.</i>		1					4	0.06	0.18			
<i>Galeus polli</i>	1	1					8	0.05		0.01		0.17
<i>Solenocera africana</i>	10						40	0.02	0.01	0.02	0.01	0.03
<i>Glyphus marsupialis</i>	2						8					0.01
<i>Parapenaeus longirostris</i>	2						8					
<i>Plesiopenaeus edwardsianus, f.</i>	1						4				0.03	
<i>Plesiopenaeus edwardsianus, m.</i>	1						4				0.01	
<i>Plesiopenaeus edwardsianus</i>	3						12				0.01	0.01
<i>Aristeus varidens</i>	1						4					
Shrimps, small, non comm.	4						16	0.61	0.14	0.85	0.81	0.86
Other fish												
Sum all species								26.22	30.80	40.24	21.67	11.65
Sum Snappers												
Sum Groupers												
Sum Grunts												
Sum Croakers												
Sum Seabreams								1.29	4.03			
Sum Sharks								0.41		0.72	0.64	0.53
Sum Rays								0.02	0.03		0.04	
Sum Squids								0.27	0.66	0.12	0.08	0.11
Sum												
Sum commercial shrimps								4.25	1.27	5.77	8.64	3.85

Number of stations included in analysis, total and by depth strata

25 8 6 4 7

SWEPT AREA ANALYSIS FROM STATION 1638 TO STATION 1708

A. Luanda-Benguela. Demersal species slope (600-1000)

SPECIES NAME	SAMPLE DISTRIB. BY CATCH CLASSES					% inci- dence	Mean dens. t/nm ²	Mean densities by bottom depth strata t/nm ²			
	Lower limits, Kg/nm >0 10 30 100 300 1000							600-700m	700-800m	800-900m	900-900m
Nematocarcinus africanus	2	2	2			75	1.80	1.64	2.06		
Hoplostethus cadenati	4	3	1			100	1.78	0.63	3.71		
Yarella blackfordi	4	4				100	1.27	0.77	2.10		
Gonostoma elongatum	2	1	1			50	1.11	1.30	0.80		
Triplophos sp.	5	1	1			88	1.06	0.50	1.99		
Lamprogrammus exutus	6	2				100	0.88	1.13	0.48		
Nezumia aequalis	7	1				100	0.58	0.68	0.42		
Aristeus varidens, female	6	1				88	0.55	0.35	0.88		
Aristeus varidens, male	5	1				75	0.36	0.13	0.73		
MELANOSTOMIATIDAE	2	2				50	0.34	0.26	0.48		
CONGRIDAE	4	1				63	0.31	0.11	0.65		
Stereomastis sp.	3	1				50	0.28	0.15	0.50		
Dibranchius atlanticus	5	1				75	0.25	0.05	0.58		
Centrophorus uyato		1				13	0.22	0.35			
Lophius vaillanti	5					50	0.22	0.35			
Xenodermichthys copei	6	1				88	0.21	0.06	0.47		
Talismania sp.	3					38	0.19	0.08	0.37		
Laemonema laureysi	6					75	0.18	0.12	0.27		
Merluccius polli	5					63	0.18	0.21	0.14		
Chaceon maritae	5					63	0.17	0.24	0.07		
Munida sp. "	5					63	0.13	0.20	0.02		
Talismania longifilis	3					38	0.12	0.05	0.25		
Glyphus marsupialis	2					13	0.10	0.10	0.09		
Plesiopeanaeus edwardsianus, f.	1					1	0.09		0.25		
Plesiopeanaeus edwardsianus	1					13	0.09	0.14			
Etmopterus spinax	5					63	0.08	0.06	0.10		
Gadella imberbis	4					50	0.08	0.13			
Gonostoma sp.	1					13	0.08		0.22		
Todaropsis eblanae	3					38	0.07	0.08	0.05		
Miscellaneous fishes	2					25	0.07	0.11			
OPHIDIIDAE	1					13	0.05		0.13		
PASIPHAIDAE	2					25	0.04		0.11		
Heterocarpus grimaldii	1					13	0.02		0.06		
Solenocera africana	2					25	0.01	0.01	0.02		
Aristeus varidens	1					13	0.01	0.01			
Shrimps, small, non comm.	1					13					
Other fish							0.39	0.41	0.39		
Sum all species							13.37	10.41	18.39		
Sum Snappers											
Sum Groupers											
Sum Grunts											
Sum Croakers											
Sum Seabreams											
Sum Sharks							0.31	0.42	0.10		
Sum Rays							0.02	0.01	0.04		
Sum Squids							0.12	0.15	0.05		
Sum											
Sum commercial shrimps							3.07	2.38	4.20		

Number of stations included in analysis, total and by depth strata

8

5

3

Annex IV 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 where as follows:

Tranceiver-1 menu (38 kHz lowering keel)

Transducer depth	5.00 m
Absorbion 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	50, 100, 250, 500 and 1000 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 -45 dB

Fishing gear

The vessel has two different sized "Åkrahamn" pelagic trawls and one "Gisund super bottom trawl". During the present survey only the bottom trawl was used.

The bottom trawl has a headline of 31 m, footrope 47 m and 20 mm meshsize in the codend with an innernet 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. This distance is kept constant at all depths by the use of a 9.5 m strap between the wires at 130 m distance from the doors (applied at depths greater than 60 m). A tickler chain (44 m in total) was attached at the footrope to improve the catchability of deep-water shrimp.

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.

SWEPT AREA ANALYSIS FROM STATION 1638 TO STATION 1708

A. Luanda-Benguela. Demersal species shelf

SPECIES NAME	SAMPLE DISTRIB. BY CATCH CLASSES Lower limits, Kg/nm					% inci- dence	Mean dens. t/nm ²	Mean densities by bottom depth strata t/nm ²					
	>0	10	30	100	300			1000	- 50m	50-100m	100-200m	200-200m	
Dentex macrophthalmus	8	4	1	2		1	42	11.19			0.23	35.10	
Trichiurus lepturus	15	5	9			1	79	6.61	23.31		1.93	0.71	
Brachydeuterus auritus	4	3	3	4	1		39	5.19	15.71		3.29		
Pagellus bellottii	18	7	4	2			82	1.51	0.93		2.74	0.19	
Atractoscion aequidens	8	2	1		1		32	1.42	0.17		3.08	0.01	
Pomadasys jubelini	3	1	2	2			21	1.33	3.40		1.17		
Trachurus trecae	19	4	2	1			68	1.24	0.75		2.26	0.16	
Pomadasys incisus	5		2	1			21	0.96	0.70		1.79		
Umbrina canariensis	10	1	1	1			34	0.60	0.06		1.20	0.16	
Spicara alta	4		1	1			16	0.56				1.76	
Dentex angolensis	17	5					58	0.46			0.14	1.26	
Dentex barnardi	10	5	1				42	0.44	0.15		0.78	0.18	
Galeoides decadactylus	3	2		1			16	0.44	1.63		0.11		
Lithognathus mormyrus	7	2	3				32	0.42	0.96		0.43		
Synagrops microlepis		1	2				8	0.42	0.12			1.24	
Selene dorsalis	13	3	1				45	0.41	0.43		0.65	0.06	
Sepia officinalis hierredda	14	4	1				50	0.35	0.16		0.66	0.04	
Engraulis encrasicolus	1			1			5	0.35	1.49				
Boops boops	7	1	1				24	0.26			0.02	0.80	
Chlorophthalmus atlanticus			1				3	0.25				0.80	
Pterothrissus belloci	6	2	1				24	0.24			0.33	0.30	
Pseudolithus typus			2				5	0.21	0.89				
Chloroscombrus chrysurus	6		1				18	0.20	0.86				
Brotula barbata	11	1					32	0.19	0.08		0.29	0.13	
Raja miraletus	24						63	0.18	0.06		0.33	0.05	
Zeus faber	24	1					66	0.16			0.27	0.12	
Dentex canariensis	6	3					21	0.16			0.35		
Sardinella sp.			1				3	0.16	0.68				
Alloteuthis africana	13	1					37	0.14	0.10		0.24	0.02	
Arius parkii			1				3	0.13	0.56				
Ilisha africana	1		1				5	0.12	0.50				
Stromateus fiatola	5	2					16	0.11	0.25		0.12		
Octopus vulgaris	9	2					29	0.10	0.01		0.20	0.03	
Zenopsis conchifer	4	1					13	0.09				0.29	
Erythrocles monodi			1				3	0.09				0.29	
Conger conger			1					0.09	0.40				
Selar crumenophthalmus			1				3	0.09	0.39				
Pagrus caeruleostictus		1					3	0.08	0.32				
Merluccius polli	1	1					5	0.08				0.26	
Citharus linguatula	21						55	0.08			0.17	0.02	
Illex coindetii	6	1					18	0.07			0.01	0.21	
Torpedo torpedo	9	1					26	0.07	0.05		0.12	0.01	
Dasyatis margarita		1					3	0.07	0.30				
Epigonus telescopus	1	1					5	0.07			0.16		
Dentex gibbosus	11						29	0.06			0.07	0.09	
Pteroscion peli	4	1					13	0.06	0.15		0.05		
Chaetodon hoeferi	15						39	0.06	0.09		0.07	0.02	
Hyperoglyphe moselii		1					3	0.06				0.20	
Trigla lyra	8						21	0.05			0.08	0.03	
Sphyraena sphyraena	3	1					11	0.05	0.21				
Sphyraena guachancho	5						13	0.05	0.17		0.03		
Dicologlossa cuneata	4	1					13	0.05	0.20				
Rhinobatos albomaculatus		1					3	0.05	0.22				
Pseudupeneus prayensis	9						24	0.05	0.01		0.09		
Parapeneaus longirostris, fem.	5						13	0.03			0.03	0.06	
Peneaus notialis, female	5						13	0.02	0.06		0.01		
Peneaus notialis, male	5						13	0.02	0.07		0.01		
Parapeneaus longirostris, male	5						13	0.02			0.01	0.03	
Peneaus notialis	1						3		0.01				
Parapeneaus longirostris	1						3						
Shrimps, small, non comm.	1						3				0.01		
Other fish								0.62	0.72		0.60	0.64	

Sum all species	38.64	57.33	24.13	45.27	
Sum Snappers					
Sum Groupers	0.04	0.18			
Sum Grunts	7.49	19.83	6.26		
Sum Croakers	2.32	1.35	4.37	0.17	
Sum Seabreams	14.62	2.38	4.76	37.73	
Sum Sharks	0.07	0.15	0.02	0.08	
Sum Rays	0.41	0.72	0.50	0.06	
Sum Squids	0.68	0.27	1.12	0.34	
Sum					
Sum commercial shrimps	0.09	0.14	0.06	0.09	
Number of stations included in analysis, total and by depth strata	38	9	17	12	

SWEPT AREA ANALYSIS FROM STATION 1638 TO STATION 1708

A. Luanda-Benguela. Demersal species slope (200-600)

SPECIES NAME	SAMPLE DISTRIB. BY CATCH CLASSES					% inci- dence	Mean dens. t/nm ²	Mean densities by bottom depth strata t/nm ²				
	Lower limits, Kg/nm							200-300m	300-400m	400-500m	500-600m	
	>0	10	30	100	300	1000						
<i>Merluccius polli</i>	7	3	7	6			92	6.22	4.82	13.58	7.69	0.66
<i>Nematocarcinus africanus</i>	4	2	7	3			64	3.47	0.01	5.39	7.76	3.32
<i>Chlorophthalmus atlanticus</i>	10	3	2	4			76	3.31	3.53	8.96	0.15	0.02
<i>Synagrops microlepis</i>	4	2	3	1	1		44	3.17	9.86	0.09		
<i>Dentex macrophthalmus</i>	3	1	2	1			28	1.22	3.80			
<i>Trichiurus lepturus</i>	10	2	1	1			56	1.20	1.44	3.02	0.02	0.05
<i>Pterothrissus bellocci</i>	11	3	1	1			64	1.13	1.16	2.97	0.20	0.03
MYCTOPHIDAE	7	3	2				48	0.89	2.42	0.47	0.02	
<i>Laemonema laureysi</i>	10	6	1				68	0.58	0.05	1.46	0.70	0.37
<i>Lophius vaillanti</i>	11	1	1				52	0.49		0.43	0.16	1.28
<i>Yarella blackfordi</i>	7	2	1				40	0.40			0.33	1.25
<i>Hymenocephalus italicus</i>	7	4	1				48	0.39		1.23	0.57	0.02
<i>Etmopterus spinax</i>	12	4					64	0.35		0.69	0.64	0.31
<i>Zenopsis conchifer</i>	5	1	1				28	0.31	0.91			0.08
<i>Parapenaeus longirostris, fem.</i>	8	3					44	0.31	0.89	0.08		
Miscellaneous fishes	1		1				8	0.29			0.18	0.92
<i>Aristeus varidens, female</i>	13	1					56	0.21		0.21	0.47	0.30
<i>Todaropsis eblanae</i>	9	1					40	0.18	0.48	0.04	0.03	0.05
<i>Malacocephalus occidentalis</i>	8	2					40	0.14		0.48	0.15	0.01
<i>Parapenaeus longirostris, male</i>	12						48	0.13	0.36	0.04		
<i>Triplophos sp.</i>	7						28	0.12			0.14	0.37
<i>Aristeus varidens, male</i>	13						52	0.11		0.03	0.35	0.18
<i>Coelorinchus coelorhincus</i>	9	1					40	0.11	0.10	0.01	0.06	0.22
<i>Hoplostethus cadenati</i>	11						44	0.10		0.02	0.11	0.28
<i>Nezumia aequalis</i>	15						60	0.10	0.01	0.08	0.19	0.16
<i>Illex coindetii</i>	9						36	0.08	0.17	0.03	0.05	0.06
<i>Trichiurus sp.</i>		1					4	0.07	0.23			
<i>Dentex angolensis</i>	1	1					8	0.07	0.23			
<i>Lamprogrammus exutus</i>	6						24	0.07			0.03	0.23
NETTASTOMATIDAE	4	1					20	0.07		0.01	0.03	0.21
<i>Malacocephalus laevis</i>	4	1					20	0.07		0.01	0.40	0.01
<i>Dibranchius atlanticus</i>	8						32	0.06		0.01	0.32	0.02
<i>Gonostoma elongatum</i>	4						16	0.06		0.01	0.05	0.16
<i>Synagrops sp.</i>		1					4	0.06	0.18			
<i>Galeus polli</i>	1	1					8	0.05		0.01		0.17
<i>Solenocera africana</i>	10						40	0.02	0.01	0.02	0.01	0.03
<i>Glyphus marsupialis</i>	2						8					0.01
<i>Parapenaeus longirostris</i>	2						8					
<i>Plesiopenaeus edwardsianus, f.</i>	1						4				0.03	
<i>Plesiopenaeus edwardsianus, m.</i>	1						4				0.01	
<i>Plesiopenaeus edwardsianus</i>	3						12				0.01	0.01
<i>Aristeus varidens</i>	1						4					
Shrimps, small, non comm.	4						16			0.01		
Other fish								0.61	0.14	0.85	0.81	0.86
Sum all species								26.22	30.80	40.24	21.67	11.65
Sum Snappers												
Sum Groupers												
Sum Grunts												
Sum Croakers												
Sum Seabreams								1.29	4.03			
Sum Sharks								0.41		0.72	0.64	0.53
Sum Rays								0.02	0.03		0.04	
Sum Squids								0.27	0.66	0.12	0.08	0.11
Sum												
Sum commercial shrimps								4.25	1.27	5.77	8.64	3.85

Number of stations included in analysis, total and by depth strata

25 8 6 4 7

SWEPT AREA ANALYSIS FROM STATION 1638 TO STATION 1708

A. Luanda-Benguela. Demersal species slope (600-1000)

SPECIES NAME	SAMPLE DISTRIB. BY CATCH CLASSES					% inci- dence	Mean dens. t/nm ²	Mean densities by bottom depth strata t/nm ²				
	Lower limits, Kg/nm							600-700m	700-800m	800-900m	900-900m	
	>0	10	30	100	300	1000						
Nematocarcinus africanus	2	2	2				75	1.80	1.64	2.06		
Hoplostethus cadenati	4	3	1				100	1.78	0.63	3.71		
Yarrella blackfordi	4	4					100	1.27	0.77	2.10		
Gonostoma elongatum	2	1	1				50	1.11	1.30	0.80		
Triplophos sp.	5	1	1				88	1.06	0.50	1.99		
Lamprogrammus exutus	6	2					100	0.88	1.13	0.48		
Nezumia aequalis	7	1					100	0.58	0.68	0.42		
Aristeus varidens, female	6	1					88	0.55	0.35	0.88		
Aristeus varidens, male	5	1					75	0.36	0.13	0.73		
MELANOSTOMIATIDAE	2	2					50	0.34	0.26	0.48		
CONGRIDAE	4	1					63	0.31	0.11	0.65		
Stereomastis sp.	3	1					50	0.28	0.15	0.50		
Dibranchius atlanticus	5	1					75	0.25	0.05	0.58		
Centrophorus uyato			1				13	0.22	0.35			
Lophius vaillanti	5						50	0.22	0.35			
Xenodermichthys copei	6	1					88	0.21	0.06	0.47		
Talismania sp.	3						38	0.19	0.08	0.37		
Laemonema laureysi	6						75	0.18	0.12	0.27		
Merluccius polli	5						63	0.18	0.21	0.14		
Chaceon maritae	5						63	0.17	0.24	0.07		
Munida sp. *	5						63	0.13	0.20	0.02		
Talismania longifilis	3						38	0.12	0.05	0.25		
Glyphus marsupialis	2						13	0.10	0.10	0.09		
Plesiopenaeus edwardsianus, f.	1							0.09		0.25		
Plesiopenaeus edwardsianus	1						13	0.09	0.14			
Etmopterus spinax	5						63	0.08	0.06	0.10		
Gadella imberbis	4						50	0.08	0.13			
Gonostoma sp.	1						13	0.08		0.22		
Todaropsis eblanae	3						38	0.07	0.08	0.05		
Miscellaneous fishes	2						25	0.07	0.11			
OPHIDIIDAE	1						13	0.05		0.13		
PASIPHAEIDAE	2						25	0.04		0.11		
Heterocarpus grimaldii	1						13	0.02		0.06		
Solenocera africana	2						25	0.01	0.01	0.02		
Aristeus varidens	1						13	0.01	0.01			
Shrimps, small, non comm.	1						13					
Other fish								0.39	0.41	0.39		
Sum all species								13.37	10.41	18.39		
Sum Snappers												
Sum Groupers												
Sum Grunts												
Sum Croakers												
Sum Seabreams												
Sum Sharks								0.31	0.42	0.10		
Sum Rays								0.02	0.01	0.04		
Sum Squids								0.12	0.15	0.05		
Sum												
Sum commercial shrimps								3.07	2.38	4.20		

Number of stations included in analysis, total and by depth strata

8

5

3