

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

**Cruise report No 1/99**

**Survey of the Demersal Resources  
1 March - 29 March 1999**

Instituto de Investigação Pesqueira  
IIP, Luanda  
Angola

Institute of Marine Research  
IMR, Bergen  
Norway



CRUISE REPORTS "DR. FRIDTJOF NANSEN"

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by

**J. Kolding, M. Olsen, H. Einarsson**

Institute of Marine Research  
P.O. Box 1870 Nordnes  
N-5817 Bergen, Norway

**K. Kilongo**  
Instituto de Investigação Pesqueira  
Luanda, Angola

and

**Martin DeGravelle**  
Department of Biological Sciences  
Old Dominion University  
Norfolk, VA 23529, USA

**Bergen, 2000**



## Executive summary

The present survey of the demersal resources in Angola covered the area from the Congo River (6° 00' S) to Benguela (12° 35' S) within the depth range 20-600m. Transects were set approximately at every 12-15 NM (in contrast to previous cruises with an inter-transect distance of about 20 NM), and the total survey effort was 178 successful trawl hauls representing an average coverage of 1 station per 70 NM<sup>2</sup>.

Anomalous oceanographic conditions were found along the whole coast, characterized by a stable structure of unusual warm, low salinity, water all the way from Congo River down to Pta. do Morro. There was no evidence of upwelling over the whole survey area, and the general conditions, although not as extreme, resembled the 1995 situation which has been referred to as "Benguela Niño".

For the 'demersal' species, seabreams, grunts, croakers, and groupers, the estimates of this survey are close to all the previous years, with a few exceptions that may represent previous overestimations. There is perhaps a slightly increasing trend in the overall demersal biomass over the past 5 years, but all the valuable species seem to have remained stable.

For the 'semi-pelagic' species included in the analysis, there is more variation, particularly for horse mackerel, barracudas, and hairtail, although few of the changes are statistically significant. Still, the pelagic species appear to be more influenced by the oceanographic conditions, with horse mackerel fluctuating negatively with the "warm water" events in 1995 and this year, while 'other' carangids and barracudas are fluctuating in opposite phase. Apart from these fluctuations, there appear to be no systematic changes in the stock sizes.

For the deep water resources, shrimps and hake, the overall results of this survey are among the lowest observed since 1985, although again there are few significant differences. These resources, like the semi-pelagic, appear to have been fluctuating synchronously with a peak around 1997-1998, and there are indications that most deep water stocks are distributed deeper this year compared with the peak period. An overall decreasing trend was only observed for striped red shrimp, but this is the only species where the distribution may not have been fully covered, as it is found deeper than 600m.

The area sizes, depth stratification, and distribution ranges, used for biomass calculations have changed between surveys over time. Due to these inconsistencies, and because there for some species appear to be strong deviations between the observed catch rates and the reported biomass figures, there is a need for reviewing the time series with a standardized approach.

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# CHAPTER 1 INTRODUCTION

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## 1.1 Objectives

The objectives of the cruise had been previously discussed and agreed upon by the responsible of the Demersal Programme of the Instituto de Investigação Pesqueira (IIP), of Angola, and the responsible from the Institute of Marine Research , Bergen (IMR) for the Angolan Demersal Programme, and were the following:

- To survey, map, and describe the distribution, composition and abundance of the main demersal species, with special emphasis on sea breams (Sparidae), croakers (Sciaenidae), grunts (Haemulidae), groupers (Serranidae ) and hake (Merluccidae) on the Angolan shelf and slope (down to 600m), from Benguela (12° 35' S) to Congo River (06° 00' S), using bottom trawls and the swept-area method.
- To collect data to carry out a study on the co-occurrence of *Merluccius polli* (hake) and *Dentex macrophthalmus* (large-eyes Dentex) in the area.
- To collect information on catch rates and size composition of the commercially important species of shrimp (*Aristeus varidens* and *Parapenaeus longirostris*).
- To monitor the general hydrographic conditions using a CTD-sonde on each trawl stations all over the survey area, and map the temperature, salinity and oxygen along the standard hydrographic profiles.

## 1.2 Participation

The scientific staff consisted of:

From IIP, Angola: Kumbi KILONGO (Cruise-Leader), Paulo BRINCA, Marcelo TCHICULUPITI, Pedro PANZO, Fernando GOMBO and Enoque CANGAJO.

From IMR, Norway: Jeppe KOLDING (Cruise Leader), Magne OLSEN, Haraldur EINARSSON, Terje HAUGLAND, and Jarle JOHANNESSEN.

From ODU, USA: Martin DeGRAVELLE

### 1.3 Narrative

The vessel left Walvis Bay, Namibia, in the afternoon of March 1<sup>st</sup> and steamed 660 NM north to reach Benguela. In the morning of March 4<sup>th</sup>, the survey commenced, and during the next 9 days the central region of the Angolan coast from Benguela to Luanda (12° 35' to 9° 00' S) was covered. Course tracks were set approximately 12-15 NM apart, covering the shelf and the slope to 600m depth. Semi-random swept-area hauls, allocated according to the area of each 100m depth stratum, were carried out on the shelf during daytime, and on the slope deeper than 400 m also during dark hours. Acoustic registration of the resources was done throughout the survey. On the morning of March 13 the coverage of the northern region from Luanda to Congo River (9° 00' to 6° 00' S) started with the same survey design. The vessel called into port at Luanda in the afternoon of March 14 to exchange crew and departed in the morning of March 16 to resume the survey of the northern sector. The coverage of the northern part of the northern sector was partly impeded by the many restrictions in this area due to oil exploitation, but also from large areas of rough bottom conditions, and the inshore areas from Nzeto to the Congo River was not satisfactorily covered. The survey ended on March 27 when completing the last transect at 6° 00' S (the Congo River), and the cruise finished in the morning of March 29 when 'Dr. Fridtjof Nansen' called at Luanda.



## CHAPTER 2 METHODS

### 2.1 Survey effort

Table 2.1 presents the survey area by depth strata, allocation of trawl stations, total number of successful swept-area hauls, number of hauls failed, number of CTD stations, and the distance surveyed. Table 2.1 also shows the allocation of effort relative to the stratum size as percentage hauls viz. percentage area, by depth, sector, and by the total area. The overall average coverage was 1 trawl station per 70 NM<sup>2</sup>. Figure 2.1 and 2.2 show the general cruise tracks in the central and northern sectors, and the locations of bottom trawl stations and hydrographic transects.

**Table 2.1.** Survey design and effort. Size of the survey area by depth stratum, allocation of trawl stations, proportion of stations relative to stratum size, total number of successful swept-area hauls, number of hauls failed, number of CTD stations, and the distance surveyed, divided into the central sector (Benguela to Luanda), and the northern Sector: (Luanda to Congo River).

Sector	Depth strata (m)						total	failures	CTD st.	Distance
	20-100	100-200	200-300	300-400	400-500	500-600				
Luanda-Benguela								2	89	923
area (NM <sup>2</sup> )	2654	1439	407	372	343	346	5561			
# hauls (BT)	33	14	8	6	6	6	73			
% area	47.7	25.9	7.3	6.7	6.2	6.2	43.3			
% hauls	45.2	19.2	11.0	8.2	8.2	8.2	41.0			
Congo River-Luanda								1	106	1652
area (NM <sup>2</sup> )	3348	1940	601	550	437	409	7285			
# hauls (BT)	38	29	12	12	6	8	105			
% area	46.0	26.6	8.2	7.5	6.0	5.6	56.7			
% hauls	36.2	27.6	11.4	11.4	5.8	7.6	59.0			
Grand total								3	195	2575
area (NM <sup>2</sup> )	6002	3379	1008	922	780	755	12846			
# hauls (BT)	71	43	20	18	12	14	178			
% area	46.7	26.3	7.8	7.2	6.1	5.9				
% hauls	39.9	24.2	11.2	10.1	6.7	7.9				
								181	total hauls	

A stratified semi-random survey design was used in the cruise (Table 2.1, Figure 2.1 and 2.2), with depth and area as stratifying variables. Trawl hauls were taken along transects perpendicular to the coast and with a distance of 12-15 NM apart. Allocation of trawl stations began with a sampling effort proportional to the stratum size (100 m depth intervals by 1° latitude, Table 2.2). The planned design was sometimes slightly changed due to adverse bottom conditions, or in non-accessible areas due to oil exploitation in the northern sector.

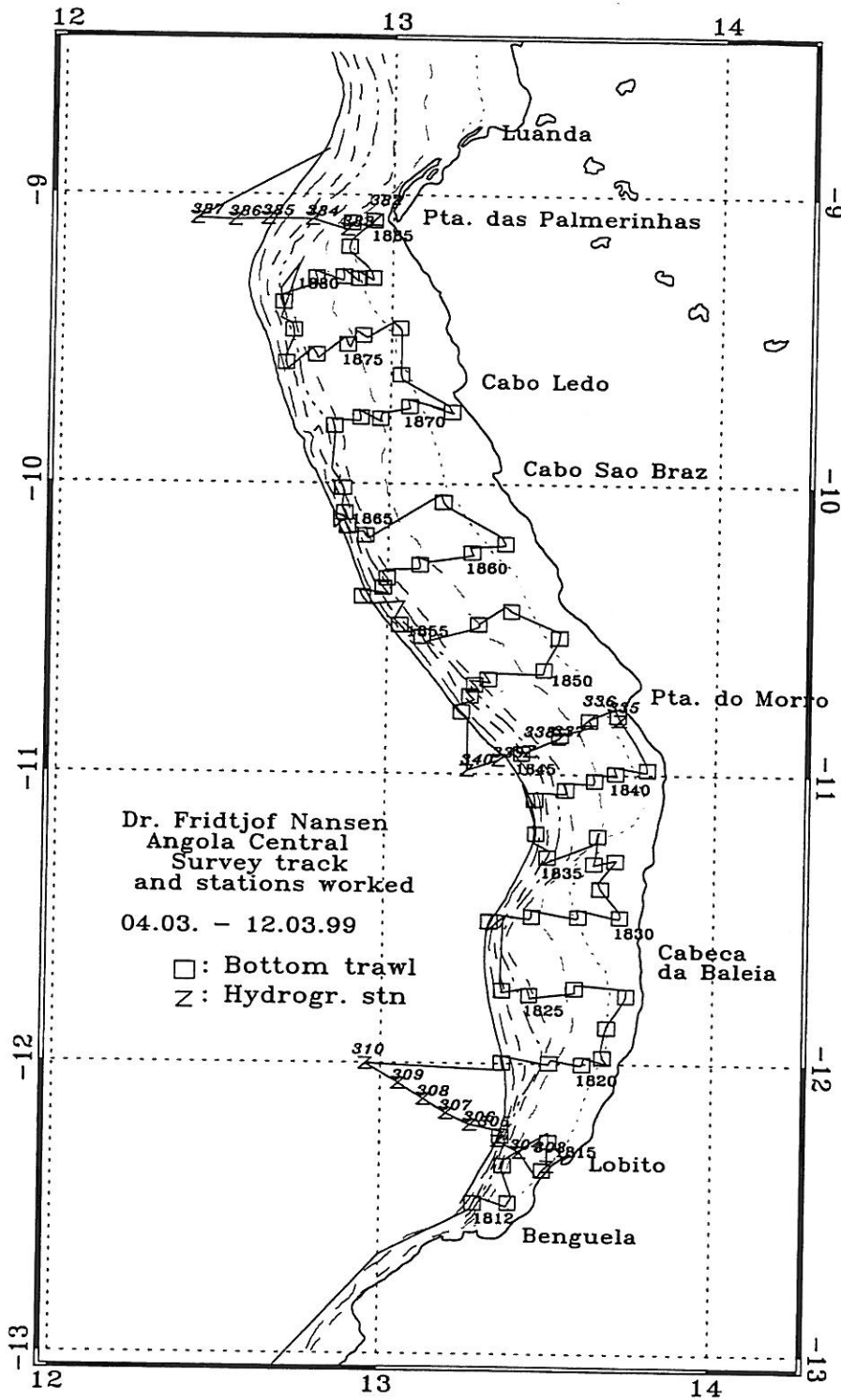
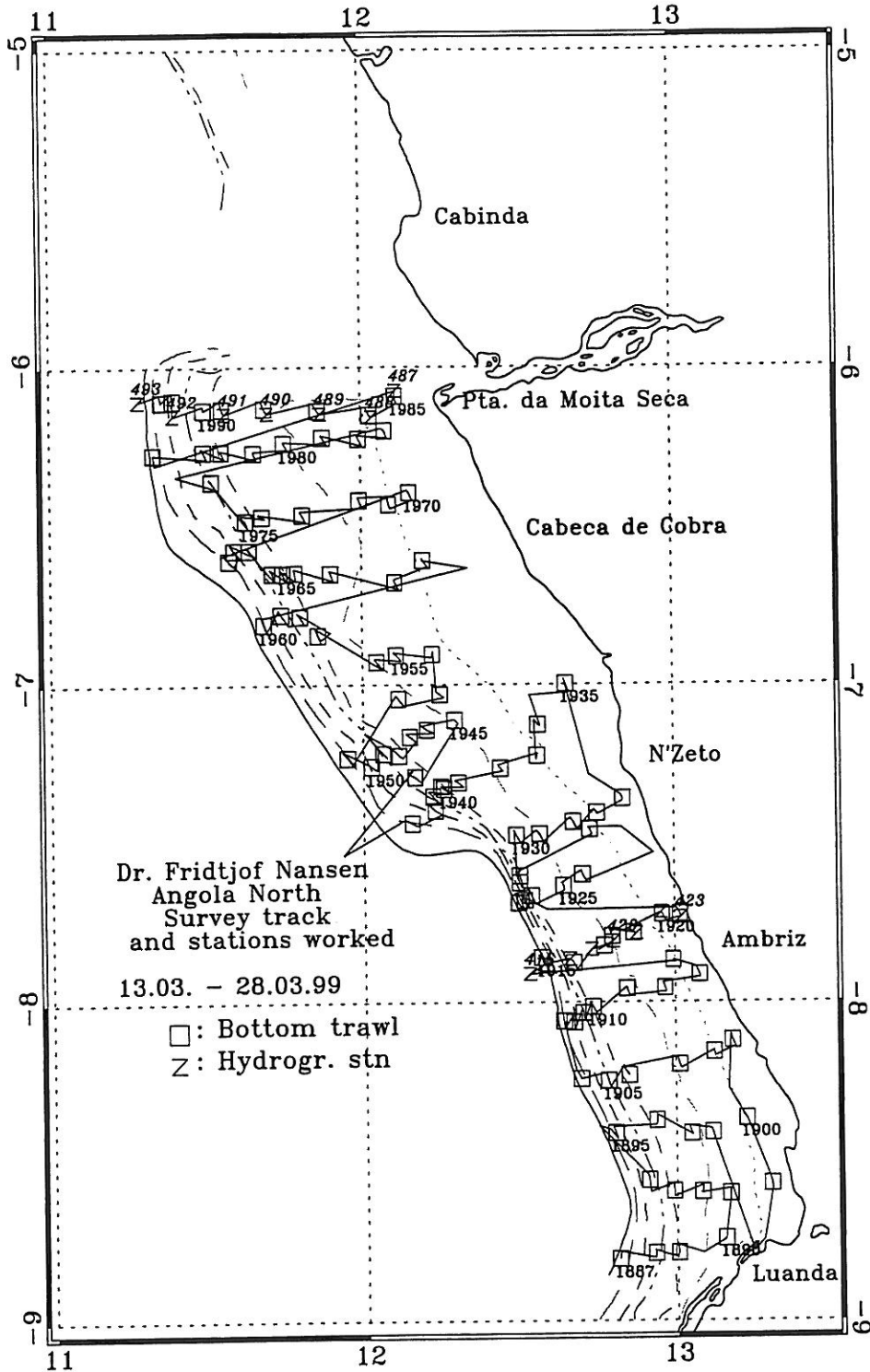


Figure 2.1 Angola central: Benguela to Luanda. Course track with fishing stations and hydrographic transects. Hydrographic stations were also taken at all the fishing stations.



**Figure 2.2.** Angola north : Congo River to Luanda. Course track with fishing stations and hydrographic transects. Hydrographic stations were also taken at all the fishing stations.

## 2.2 Meteorological and hydrographic sampling

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. CTD-stations and current profiles with ADCP were recorded at all of the trawl stations, and at the standard hydrographic transects.

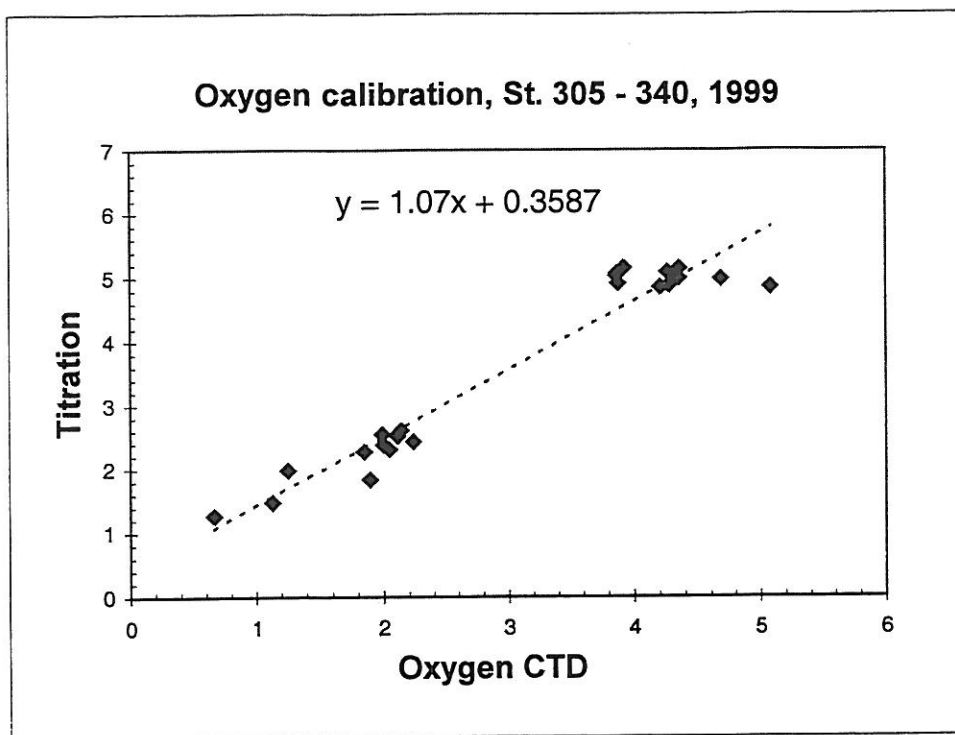
### ADCP current measurements

A ship-born Acoustic Doppler Current Profiler (ADCP) from RD Instruments was activated on every CTD station. The ADCP was set to ping every 4 seconds, the depth cell was chosen to 8 m and the number of cells to 40. As a routine the data were averaged over 300 seconds for analyses onboard. Averaged data were stored on files. The data were analysed by the PC software UMS (Underway Mapping System), supported by the Sea Fisheries Research Institute, Cape Town, South Africa (Zauner, 1993). These data have not been analysed in this report.

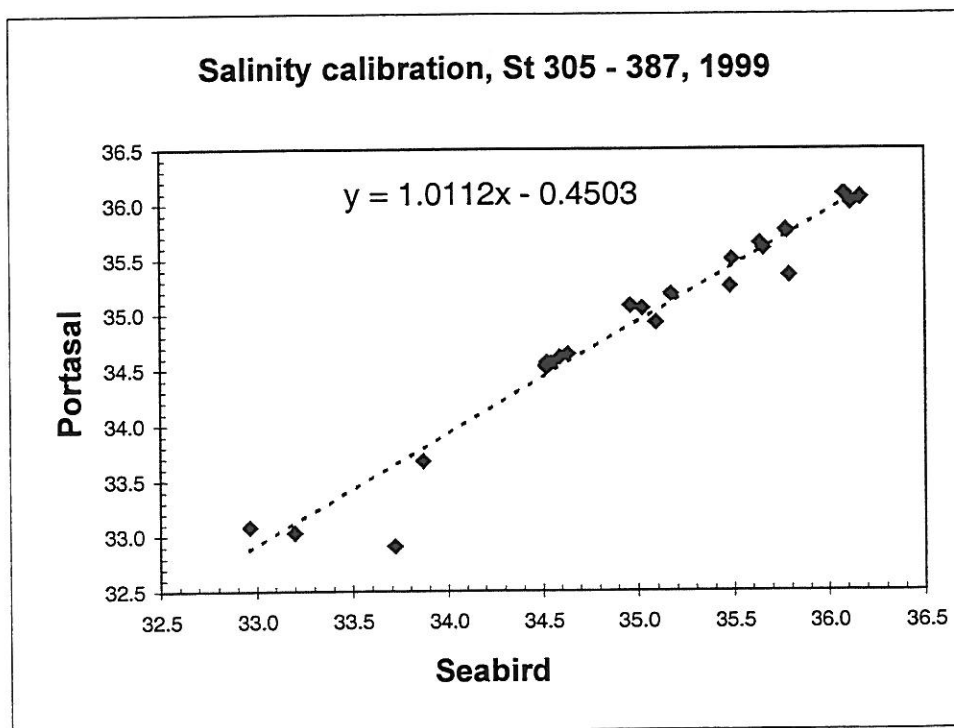
### Conductivity, salinity, and oxygen measurements

A Seabird 911 + CTD probe was used to obtain vertical profiles of temperature, salinity and oxygen. Real time plotting and logging was done using the customised Seabird Seasave software installed on a PC. The profiles were in general taken down to a few meters above the bottom. In deep stations however, data logging was interrupted at 700m. At each station on the standard hydrographic transects 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. The water samples were analysed for dissolved oxygen using the Winkler method, and for salinity using a Guildline Portasal salinometer mod. 8410. A total of 48 samples were taken for oxygen calibration. A linear regression of the Winkler determinations on the CTD values, separated into the central and northern sector respectively, gave the results shown in Figures 2.3 and 2.5. A total of 58 salinity samples were taken for calibration. The results for the central and northern sectors are presented in Figures 2.4 and 2.6.

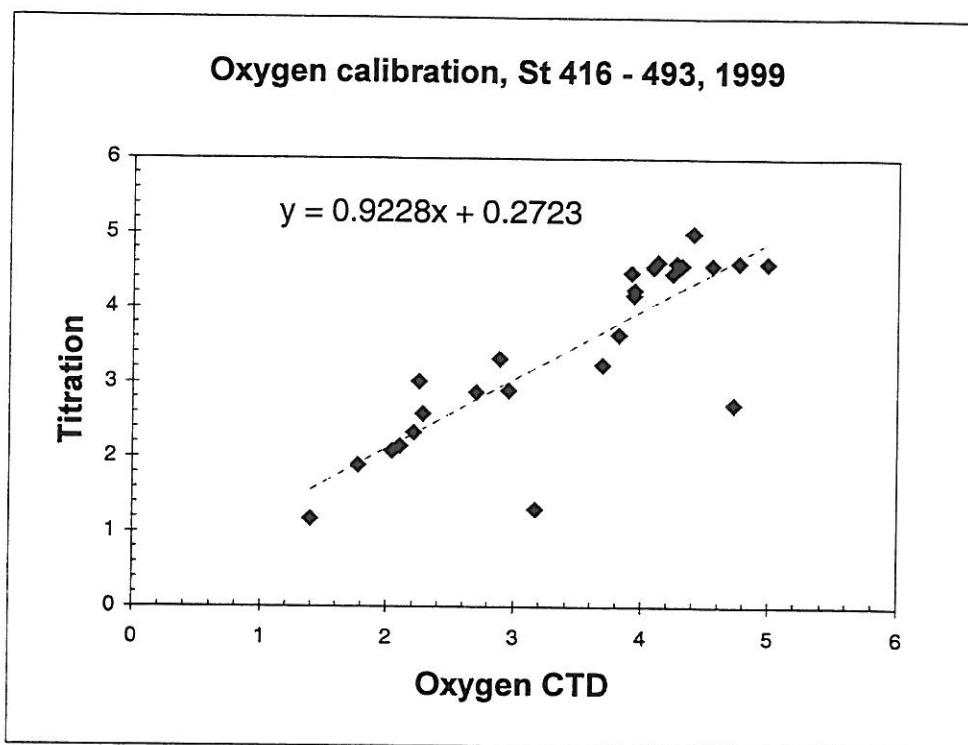
As seen from Figs. 2.3-2.6, and the estimated regression coefficients, there were several cases of rather large discrepancies between the analysed water samples and the CTD values, and between the two sectors. Furthermore, the titrated oxygen values were 'flat-topped' around 5ml/l. The reason for these discrepancies is not known, but could indicate either faulty equipment (the salinometer) or bad titration during the Winkler method for salinity and oxygen calibration respectively. It was decided to trust the CTD readings and consequently the oxygen and salinity values presented in this report have not been adjusted according to calibrated values.



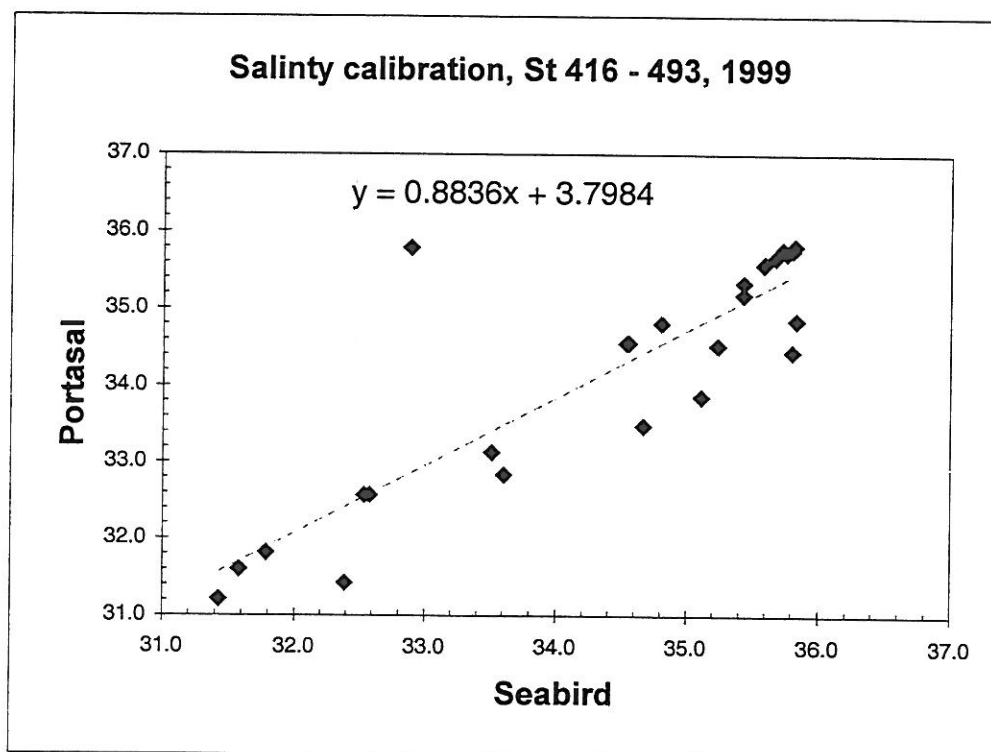
**Figure 2.3.** A linear regression of the Winkler determined oxygen concentrations from the Niskin bottles against the CTD values obtained from hydrographic stations 305-340.



**Figure 2.4.** A linear regression of the salinometer determined salinity concentrations from the Niskin bottles against the CTD values obtained from hydrographic stations 305-387.



**Figure 2.5.** A linear regression of the Winkler determined oxygen concentrations from the Niskin bottles against the CTD values obtained from hydrographic stations 416 - 493.



**Figure 2.6.** A linear regression of the salinometer determined salinity concentrations from the Niskin bottles against the CTD values obtained from hydrographic stations 416 - 493.

## 2.3 Biological sampling

### Sampling gear

A Gisund super bottom trawl was used during this survey with a headline height of 5-6 m and a distance between wings during towing of about 21 m. In samples taken deeper than 300 m, a tickler chain was attached to the footrope to improve the catchability of deep-water shrimp. During trawling a 9.5 m long strapping-rope was fastened between the wires 130 m in front of the trawl doors, giving a constant distance between the doors of 49-50 m, irrespective of depth trawled. All trawl hauls were monitored by SCANMAR trawl sensors on the doors and on top of the trawl to accurately determine the door spread, the headline height, and the actual time the trawl was fishing on the bottom. A more detailed description of the fishing gear is given in ANNEX VII. Acoustic recordings were stored on paper echograms for future analysis if necessary.

### Sampling the catches

Catches were sampled (or sub-sampled for large catches) for species composition by weight and numbers. Length measurements were taken as follows: for fish total body length (cm) was measured to the nearest 1 cm below the longest lobe of caudal fin. The records of fishing stations are presented in Annex I. A total of 558 length samples was measured during the cruise. Pooled length frequency distributions, where individual samples are raised to total catch, of commercially important species by area are shown in Annex II

## 2.4 Areas and depth strata

Table 2.2 shows the areas (NM<sup>2</sup>) in the northern sector (Congo River -Luanda), and in the central sector (Luanda-Benguela) by depth and latitude strata. These are the new complete and updated values of depth strata areas obtained from last years report (Burgos *et al.* 1998) that have been used in this survey (Table 2.1). It should be noted that these strata (or a combination of these) are not the ones that have been used for biomass calculations in the previous surveys. Furthermore, it has been the tradition, although not consistently, when calculating swept-area biomass estimates for the primarily shelf-dwelling resources (seabreams, grunts, croakers, groupers, etc.), to only include the depth strata between 0-200 m (i.e. the traditional inner and outer shelf) in the integration. However, several of these resources have a depth distribution extending deeper than 200m.

In this report the strata used in the swept-area biomass estimates were defined by the depth intervals in Table 2.2 down to 600 m, and by the sum of each latitude interval by Sector (i.e. the total by depth intervals in each Sector, see Table 2.1). All biomass estimates have been integrated over all depths where the species, or group, was found. As will be further elaborated in Chapter 4, there is a need to review and update the biomass estimates of the previous surveys for achieving a consistent time series.

**Table 2.2.** Areas (NM<sup>2</sup>) in the northern sector (Congo River -Luanda), and the central sector (Luanda-Benguela) by depth and latitude strata.

Depth Stratum (m)	Congo River-Luanda				Luanda-Benguela					All-Total
	6-7° S	7-8° S	8-9° S	Total	9-10° S	10-11° S	11-12° S	12-13° S	Total	
20-50	595	520	264	1379	320	353	310	85	1068	2447
50-100	827	685	457	1969	393	607	344	242	1586	3555
100-200	744	706	490	1940	425	587	319	108	1439	3379
200-300	262	145	194	601	160	116	103	28	407	1008
300-400	235	154	161	550	105	116	123	28	372	922
400-500	184	142	111	437	102	101	86	54	343	780
500-600	161	148	100	409	102	104	92	48	346	755
600-700	181	151	76	408	73	66	72	57	268	676
700-800	333	272	97	702	87	101	109	60	357	1059
<b>Total</b>	<b>3522</b>	<b>2923</b>	<b>1950</b>	<b>8395</b>	<b>1767</b>	<b>2151</b>	<b>1558</b>	<b>710</b>	<b>6186</b>	<b>14581</b>

## 2.5 Calculations

All equations and some theoretical background for the calculations are given in ANNEX IV. For conversion of catch rates (kg/hour) to fish densities (t/NM<sup>2</sup>), a distance between the wings of 18.5m was assumed to be the effective fishing area and the length of a haul, recorded as distance over the bottom, was measured by the SCANMAR<sup>®</sup> and GPS. The area swept ( $a_k$ ) for each haul<sub>k</sub> was thus 18.5 times the distance trawled, raised to NM<sup>2</sup>/hour. The catchability coefficient (q), i.e the fraction of the fish encountered by the trawl that was actually caught, was conservatively (and for comparison with previous surveys) assumed equal to 1. Mean fish densities by species and strata were calculated by the swept-area module in NAN-SIS. Total biomass estimates by species, and their confidence intervals, were obtained from a stratified mean density estimator (using equations 1, 2, and 4 in ANNEX IV on a spread-sheet, ANNEX V) and raised to total area. Since NAN-SIS does not produce variance estimates of the mean densities (ANNEX III), the 95% confidence limits for the biomass estimates were calculated with the underlying assumption that the coefficient of variation (CV = SD/mean) is constant when catch rates in kg/hour are converted to densities (t/NM<sup>2</sup>), in other words that the area swept (normalised per hour) was approximately constant for each haul. Coefficients of variation of the catch rates, by depth strata for each species or group, were obtained using a newly developed GRAFER module which is linked to the output of grouped species tables from NAN-SIS (i.e. single or aggregated catch rates by stations). Variance of the densities were estimated from the mean and the CV, and equations 2, 3, 6 and 7 in ANNEX IV were used to calculate standard error (SE) on the arithmetic mean and confidence intervals (see the spreadsheet BIOMASS.xls, and example in ANNEX V). GRAFER was also used to produce the figures and tables with grouped catch-rates and time-series presented in this report. SE and confidence intervals in the figures are based on both the arithmetic mean and the log-normal based Pennington's estimator (equations 8 to 12 in ANNEX IV).



## CHAPTER 3 OCEANOGRAPHIC CONDITIONS

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### 3.1 Surface distribution

The horizontal distributions of surface temperature and surface salinity (5m depth) are shown in Figs. 3.1(a and b) and 3.2(a and b), respectively.

In the Angolan central region (Fig 3.1a) sea surface temperatures (SST) were practically uniform around 27°C . In the Angolan northern region (Fig 3.2a) sea surface temperatures were also uniform, but 1° higher around 28°C.

The surface salinity distribution (Fig. 3.1 b and 3.2 b) was characterised by a strong uniform gradient, perpendicular to the coast, of brackish (S≈30psu) water in the north near the mouth of the Congo River, to oceanic water (S≈36psu) near Lobito.

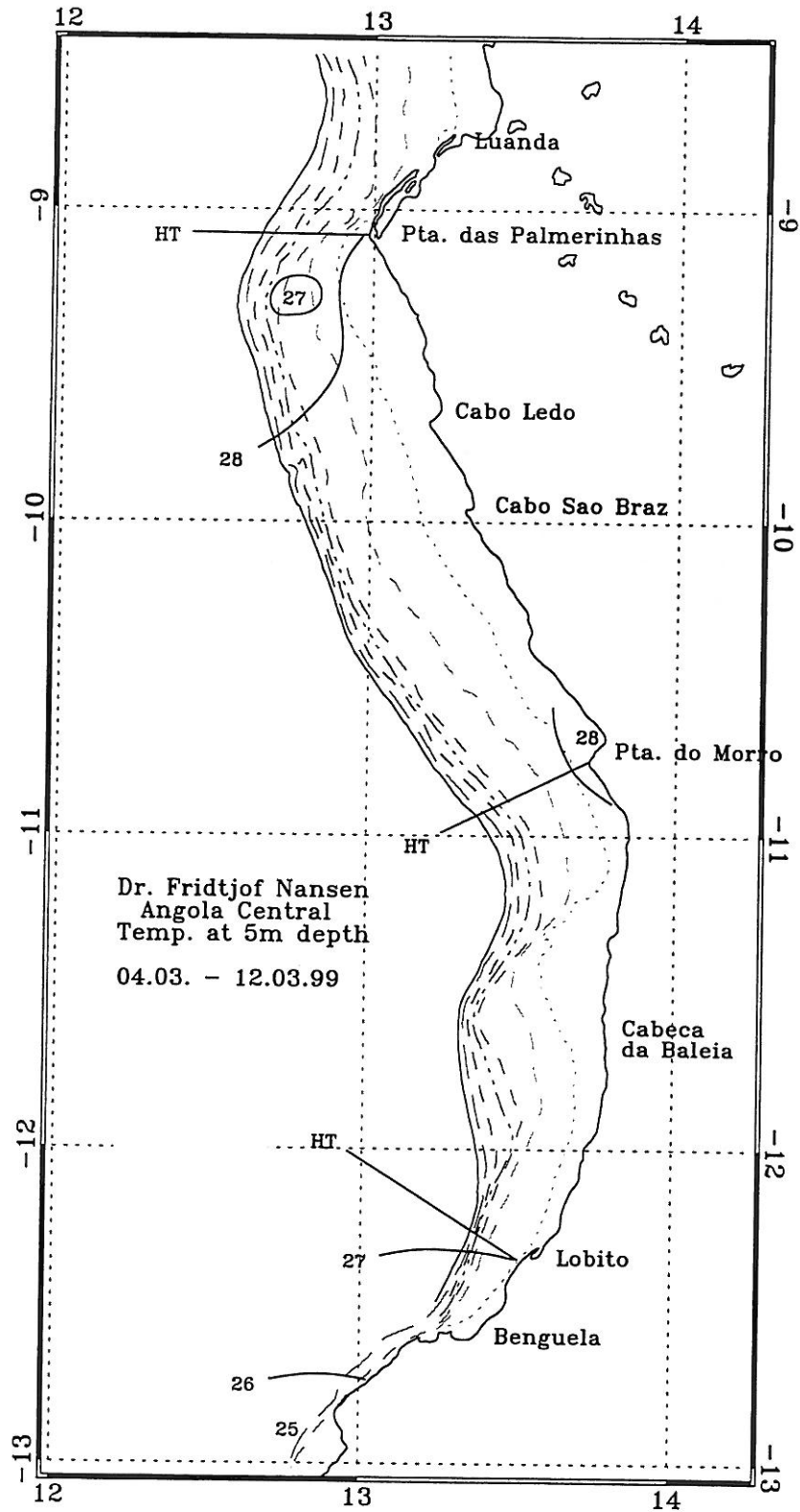
This 'flat' structure with high, nearly constant, temperatures is typical for the summer situation in the areas, whereas the rather thick brackish surface layer, shaped by the discharge plume from the Congo River, is quite different compared with most previous surveys, except 1995.

### 3.2 Vertical sections

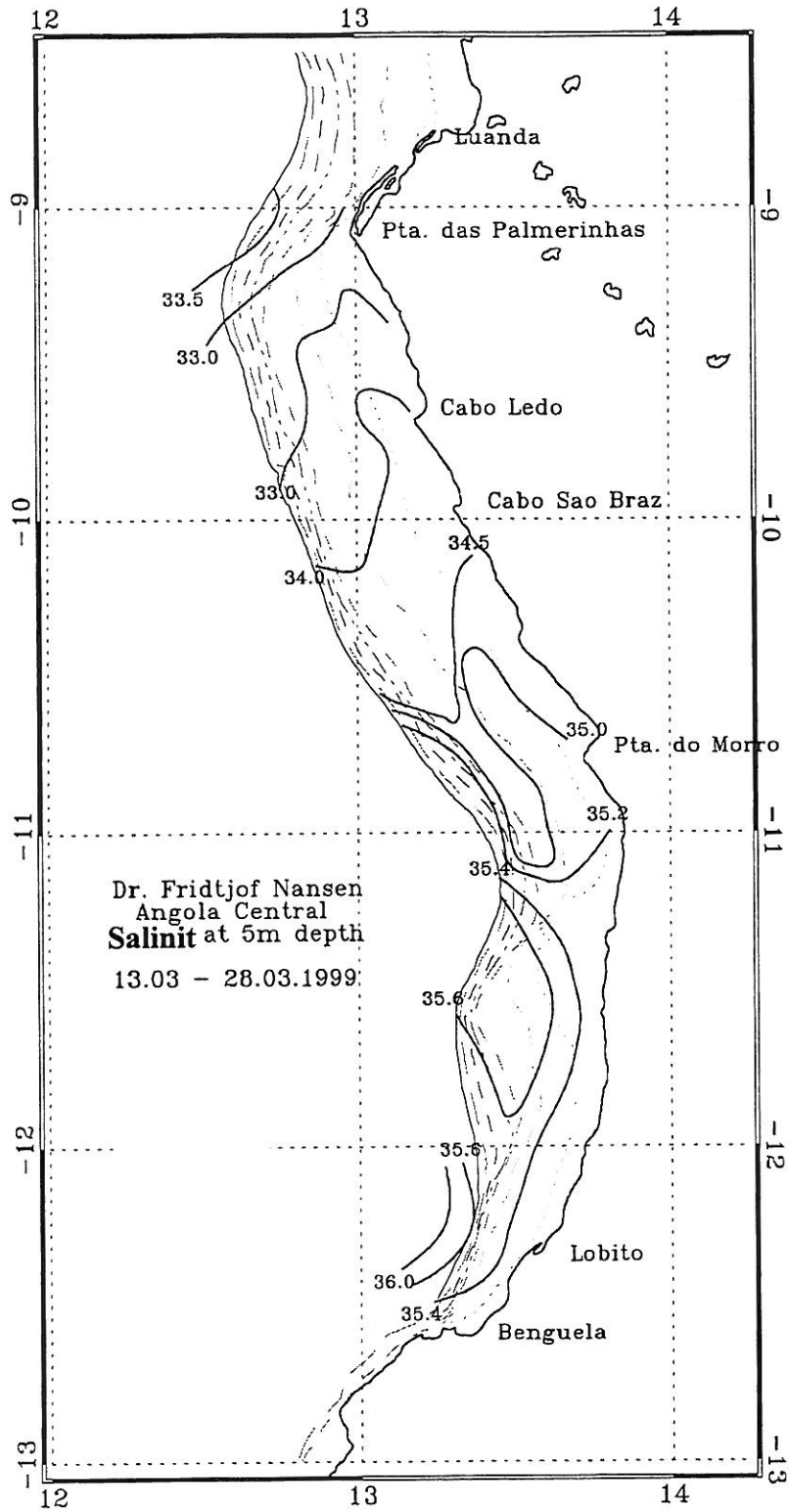
In Figs. 3.3a-c, the vertical distributions of temperature, salinity and oxygen are shown for the 3 sections worked in the Central region during the survey, i.e. off Lobito, Pta. do Morro. and Pta. das Palmerinhas, and Figs. 3.3d-e show the two sections worked in the Northern region, off Ambriz and Pta. da Moita Seca.

All 5 transects reiterate the flat, stable structure, with a 'lid' of warm, low salinity, water all the way from Congo River down to Pta. do Morro. There was no evidence of upwelling over the whole survey area during this cruise.

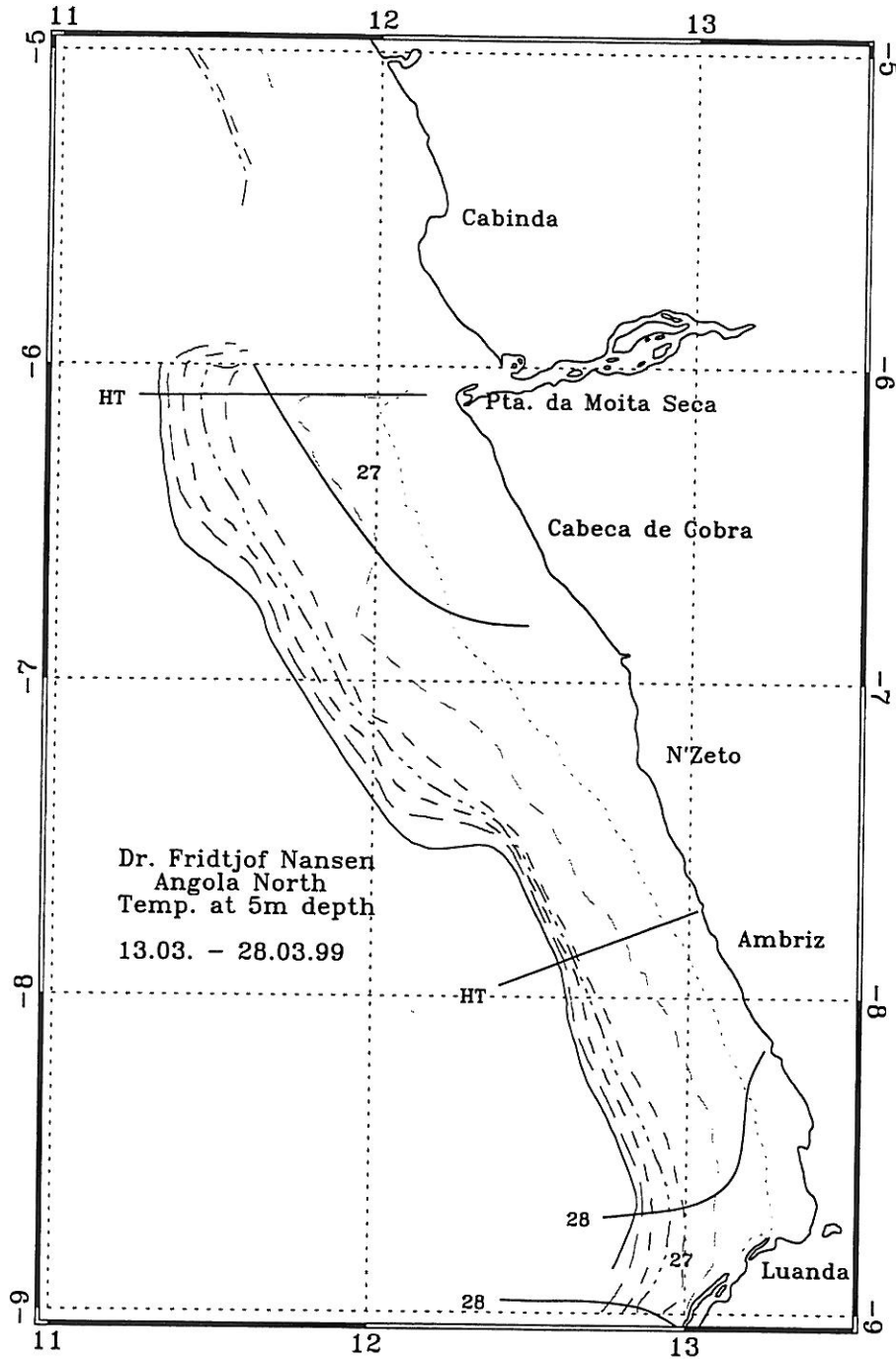
In conclusion, somewhat anomalous oceanographic conditions were found along the whole coast, where the static stability of the sub-saline surface water would inhibit vertical circulation and upward transport of nutrients. The conditions, although not as extreme, resemble the 1995 survey (Bianchi *et al.* 1995).



**Figure 3.1a** Angola Central. Horizontal distribution of surface temperature (5m depth). HT = hydrographic transect.



**Figure 3.1b.** Angola Central. Horizontal distribution of surface salinity (5m depth).



**Figure 3.2a.** Angola North. Horizontal distribution of surface temperature (5m depth). HT = hydrographic transect.

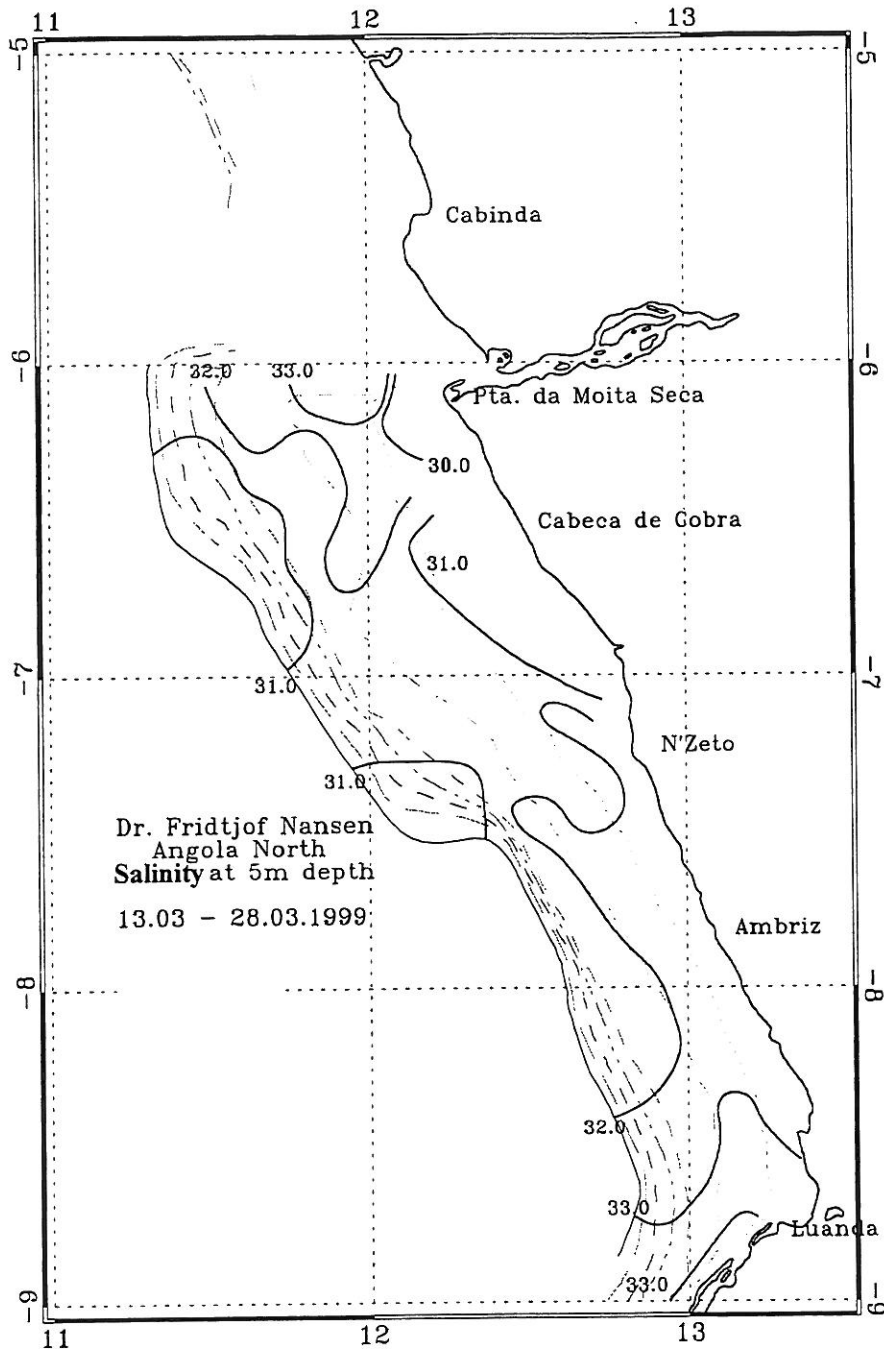
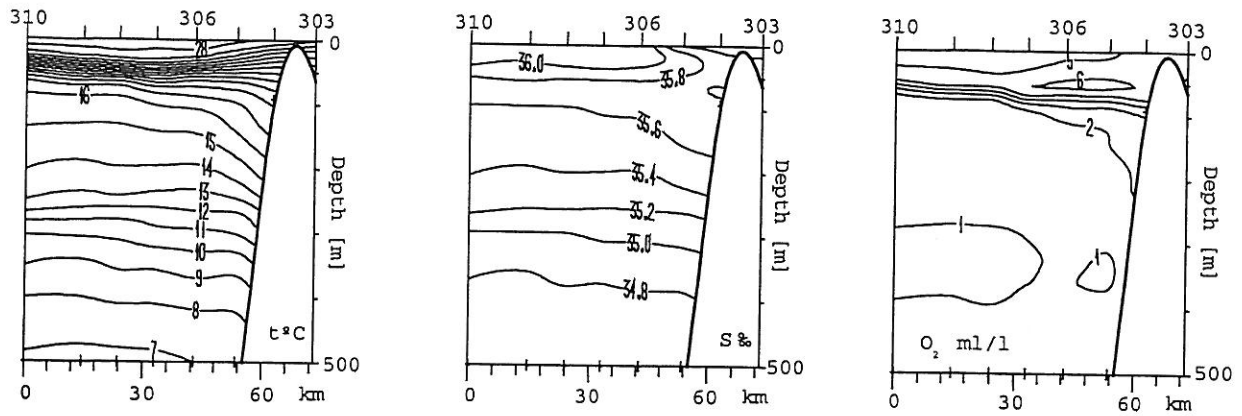
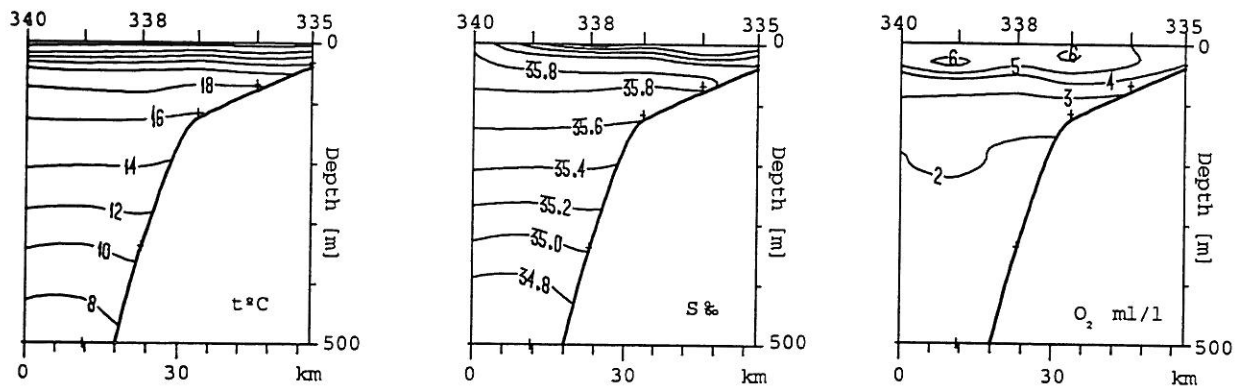


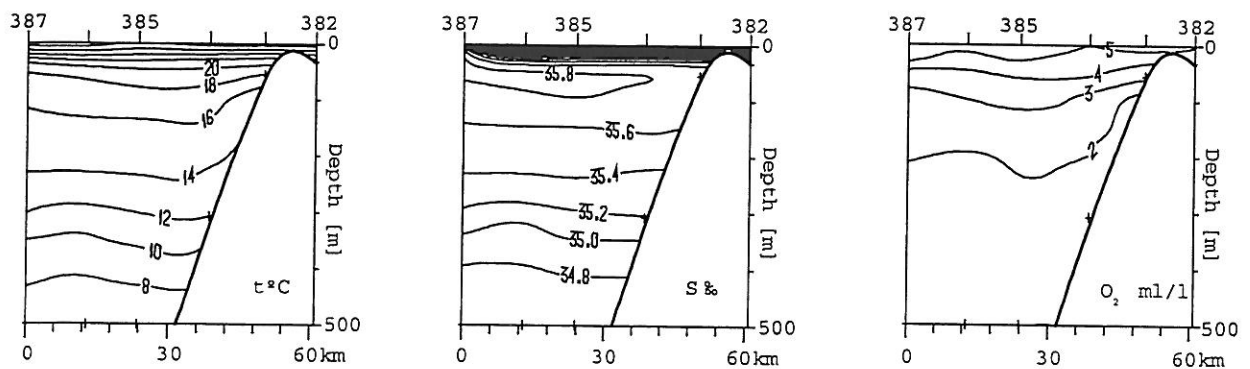
Figure 3.2b. Angola North. Horizontal distribution of surface salinity (5m depth).



**Figure 3.3a.** Angola Central. Vertical sections of a) temperature, b) salinity and c) oxygen on the hydrographic transect at Lobito.



**Figure 3.3b.** Angola Central. Vertical sections of a) temperature, b) salinity and c) oxygen on the hydrographic transect at Pta do Morro.



**Figure 3.3c.** Angola Central. Vertical sections of a) temperature, b) salinity and c) oxygen on the hydrographic transect at Pta das Palmerinhas.

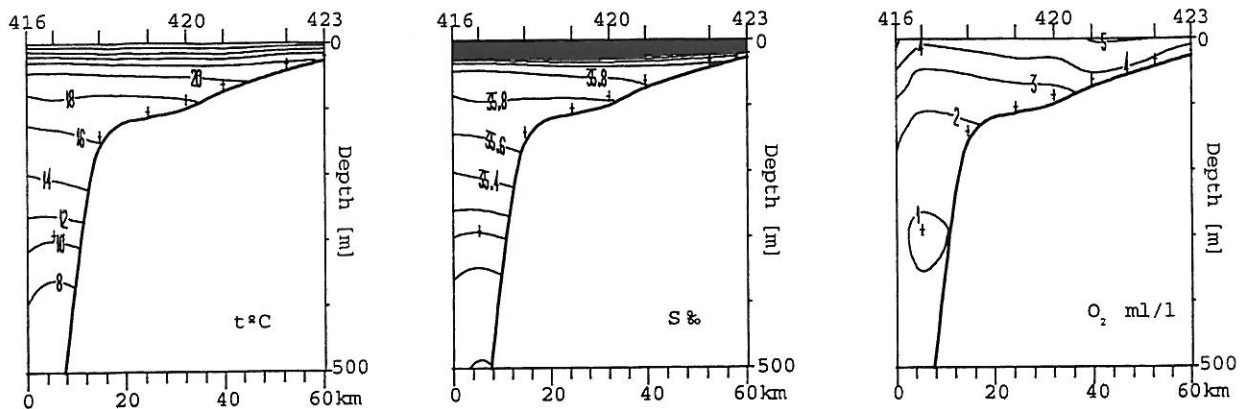


Figure 3.3d. Angola North. Vertical sections of a) temperature, b) salinity and c) oxygen on the hydrographic transect at Ambriz.

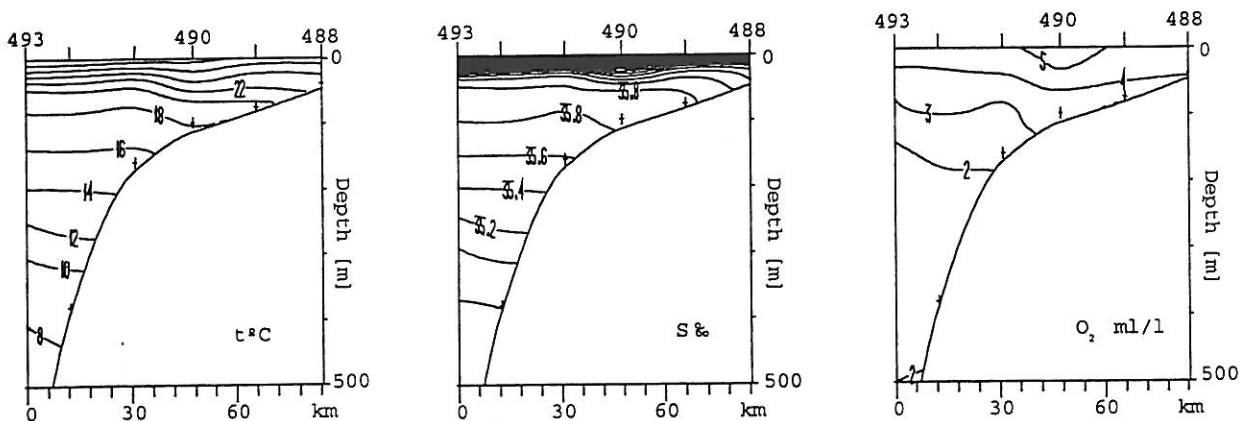


Figure 3.3e. Angola North. Vertical sections of a) temperature, b) salinity and c) oxygen on the hydrographic transect at Pta. da Moita Seca.

## **CHAPTER 4 CATCH RATES, DISTRIBUTION, COMPOSITION AND BIOMASS ESTIMATES OF DEMERSAL RESOURCES (SHELF)**

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Two different depth strata, which have traditionally been used in all the previous surveys, present the total catches and species compositions on the Angolan shelf, i.e. the 20-70 m depth (inner shelf) and 71-200 m depth (outer shelf). However, it should be noted that several of the 'shelf'-species, particularly the Sparidae and the Sciaenidae, have a distribution beyond the 200 m isobath.

The locations of the trawl stations are shown in Figs. 2.1 and 2.2. 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. Mean densities ( $t/NM^2$ ) of the main species sorted by abundance and depth strata, the frequency of occurrence, and the catch distributions are output from NAN-SIS and shown in Annex III.

### **4.1 Luanda-Benguela shelf**

A total of 47 successful swept-area trawl stations were accomplished on the shelf area (Table 2.1). Table 4.1 and Figure 4.1 and 4.2 show 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 Sparidae, Sciaenidae, Haemulidae (=Pomadasyidae), Serranidae, Lutjanidae, Merluccidae, Ophidiidae, and Ariidae, while the group "Pelagic" includes the families Engraulidae, Clupeidae, Carangidae, Scombridae, Sphyraenidae, Stromateidae, and the benthopelagic family Trichiuridae (ANNEX VI give the NAN-SIS species codes used to extract the information in the various tables).

Following the traditional comparison of the present point estimates of mean catch rates with those of the previous survey (in this case Report 2/98), it could be stated that on the inner shelf, the average catch rate of 'Demersal' fish was nearly twice of last years estimate and dominated the average catch rate with a relative contribution of 72%. The average catch rate of both sharks and shrimps were relatively small but, compared with last year's estimates, the sharks were at a similar level while the shrimps have decreased dramatically. The average catch rate of cephalopods was found about half of last year's estimate while non commercial fish was found about one third above last year's estimates. However, considering the precision of the point estimates of mean catch rates (95% confidence intervals, Figs. 4.1 and 4.2), one verifies instead that the average catch rates of the two surveys are not significantly different at the 5% significance level. In other words, the precision in general is very low with the present sampling design and the comparisons therefore become inconclusive.

Figures 4.3 and 4.4 show an attempt to increase the precision by increasing the sample size of the main groups "Demersal" and "Pelagic" (by increasing the stratum to cover almost the whole survey area from 20 to 500 m depth). Furthermore, the comparison is extended to include the results of the previous bottom trawl surveys in the central sector back to 1994.



**Table 4.1.** Central sector March 1999. Catch rates (kg/hour) by main groups in swept area bottom trawl hauls on the shelf. A: Inner shelf (20-70 m), B: Outer shelf (71-200 m).

A. Inner shelf 20-70 m

STAT	Depth	Demersal	Pelagic	Shrimp	Cephalopods	Sharks	Other	Total
1813	68	2039.3	1061.6				136.8	3237.8
1816	60	502.9	374.5		5.4		148.5	1031.2
1821	55	96.2	105.2		2.2		40.5	244.1
1822	59	10505.7	1159.7				804.4	12469.7
1823	31	769.5	383.6			20.9	169.2	1343.3
1829	48	460.0	53.6				127.2	640.8
1830	25	81.6	186.4				83.6	351.6
1831	35	56.9	490.4		1.0		56.7	605.0
1833	46	406.3	84.6	0.1	2.1		40.2	533.4
1841	40	1111.7	200.5			3.0	437.1	1752.3
1842	42	354.2	78.9				86.4	519.6
1851	41	2876.8	341.2	0.2			52.7	3270.9
1861	35	258.1	105.7	1.7			51.9	417.4
1862	70	2251.0	1313.7		6.0	19.6	142.0	3732.4
1871	26	19.9	10.7	0.1	0.8		12.3	43.7
1872	69	541.7	118.2		14.1		149.8	823.9
1873	44	9.5	8.5	0.1	13.2		18.4	49.6
1882	55	9.0	31.2	0.1	5.6		4.0	49.9
1883	36	5.6	9.5	0.2	5.9		2.8	24.0
1884	34	68.2	19.5	0.7	15.8		11.9	116.0
1885	32	20.7	4.9	0.1	14.0		5.7	45.4
1886	59	208.5	4.5		28.9		108.1	350.0
MEAN	45.9	1029.7	279.4	0.2	5.2	2.0	122.3	1438.7
SE	3.0	482.5	83.9	0.1	1.6	1.3	38.3	576.4
% CATCH		71.6	19.4	0.0	0.4	0.1	8.5	

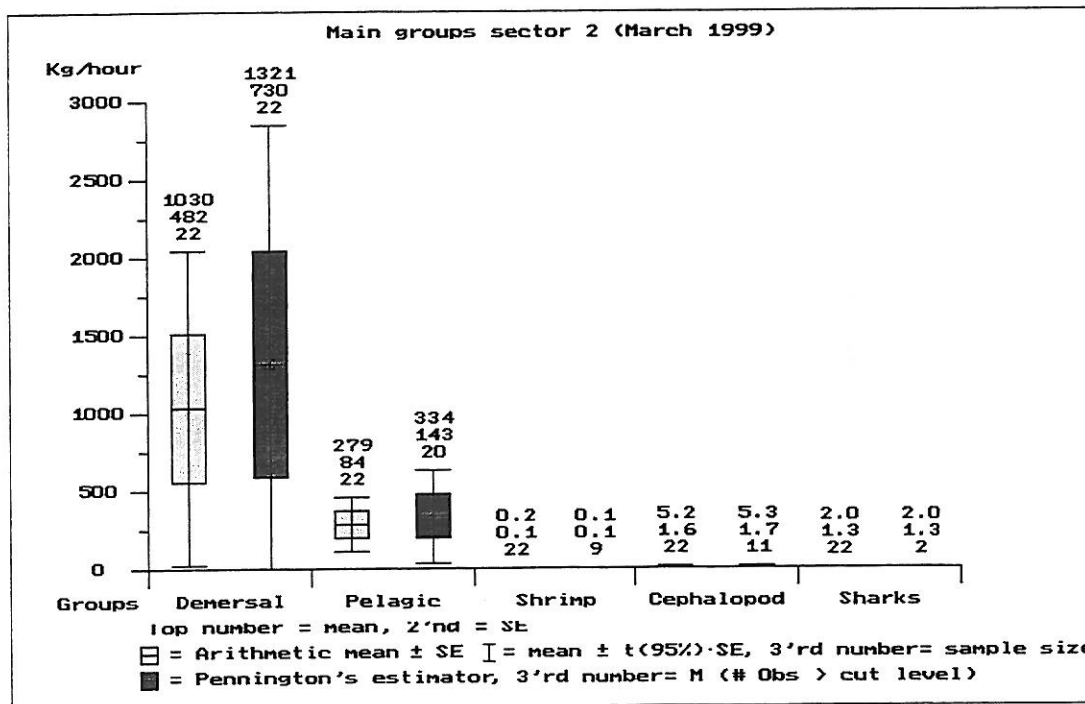


Figure 4.1 . Confidence intervals on the data in table 4.1 A (see Annex IV).

Table 4.1 continued.

B. Outer shelf 71-200 m

STAT	Depth	Demersal	Pelagic	Shrimp	Cephalopods	Sharks	Other	Total
1814	113	1201.8	86.6				1377.5	2665.9
1815	80	1220.9	148.4				255.3	1624.6
1819	112	237.5	0.5		4.9		11.5	254.3
1820	73	1177.7	98.9		2.5		30.2	1309.3
1824	97	95.1	40.9		10.1		324.6	470.7
1828	112	286.4			3.4		22.7	312.5
1834	110	275.5	147.9		5.9		375.9	805.1
1839	109	41.0	22.9		8.4		300.7	372.9
1840	73	982.8	207.7		16.1		114.7	1321.3
1843	79	1676.0	374.1				181.8	2231.9
1844	122	50.6	128.5				120.9	300.0
1849	143	147.3	6.7		17.8		86.0	257.9
1850	79	466.8	230.6		1.0		78.3	776.7
1852	76	727.2	61.9		1.7		137.1	927.8
1853	106	12.4	628.4		39.7		159.6	840.1
1859	110	15.8	312.3		4.1		108.8	440.9
1860	74	10523.3	811.4				71.8	11406.6
1868	118	2388.6	6.5				193.9	2589.0
1869	101	69.7	4.6		23.2		45.0	142.5
1870	74	235.7	58.8		5.2		41.7	341.4
1874	91	319.2	1137.7		7.0		257.4	1721.2
1875	108	30.9	85.3	1.1	27.4	5.2	235.5	385.5
1876	179	60.7	169.0		17.3		276.6	523.6
1880	128	9.5	124.6	1.0	4.0		44.9	183.9
1881	81	158.2	94.3		6.6		2.8	261.8
MEAN	101.9	896.4	199.5	0.1	8.2	0.2	194.2	1298.7
SE	5.1	419.6	55.3	0.1	2.0	0.2	53.8	447.5
% CATCH		69.0	15.4	0.0	0.6	0.0	15.0	

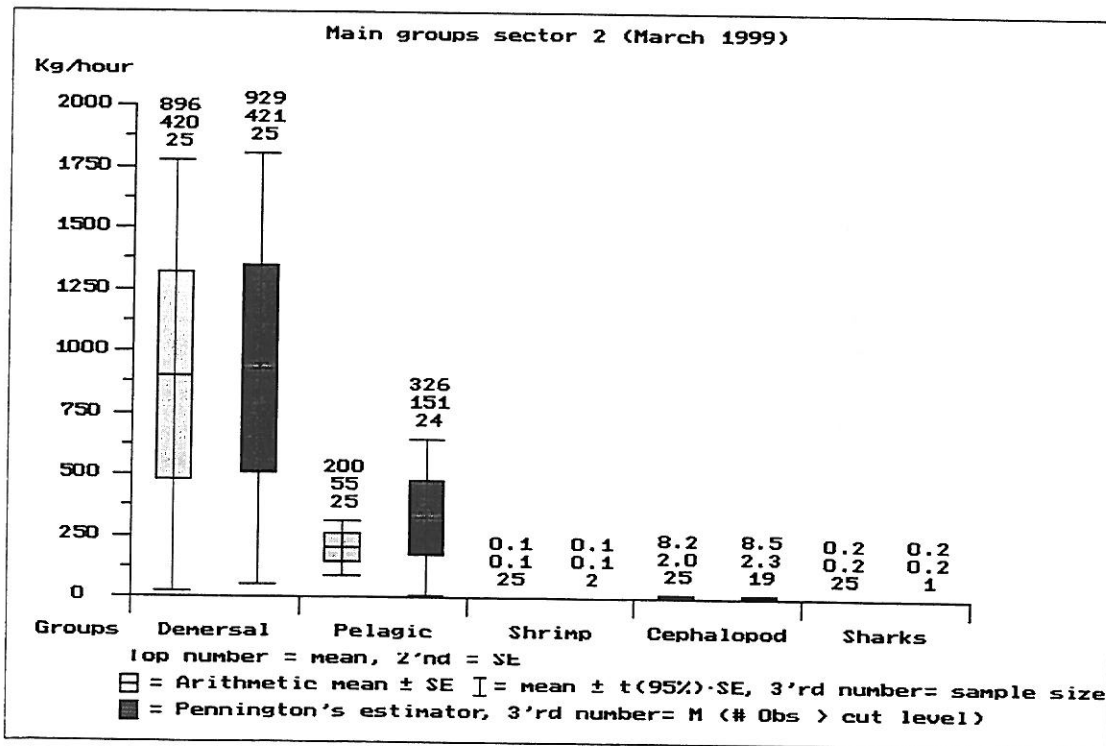


Figure 4.2 Confidence limits on the data in Table 4.1 B (see Annex IV).

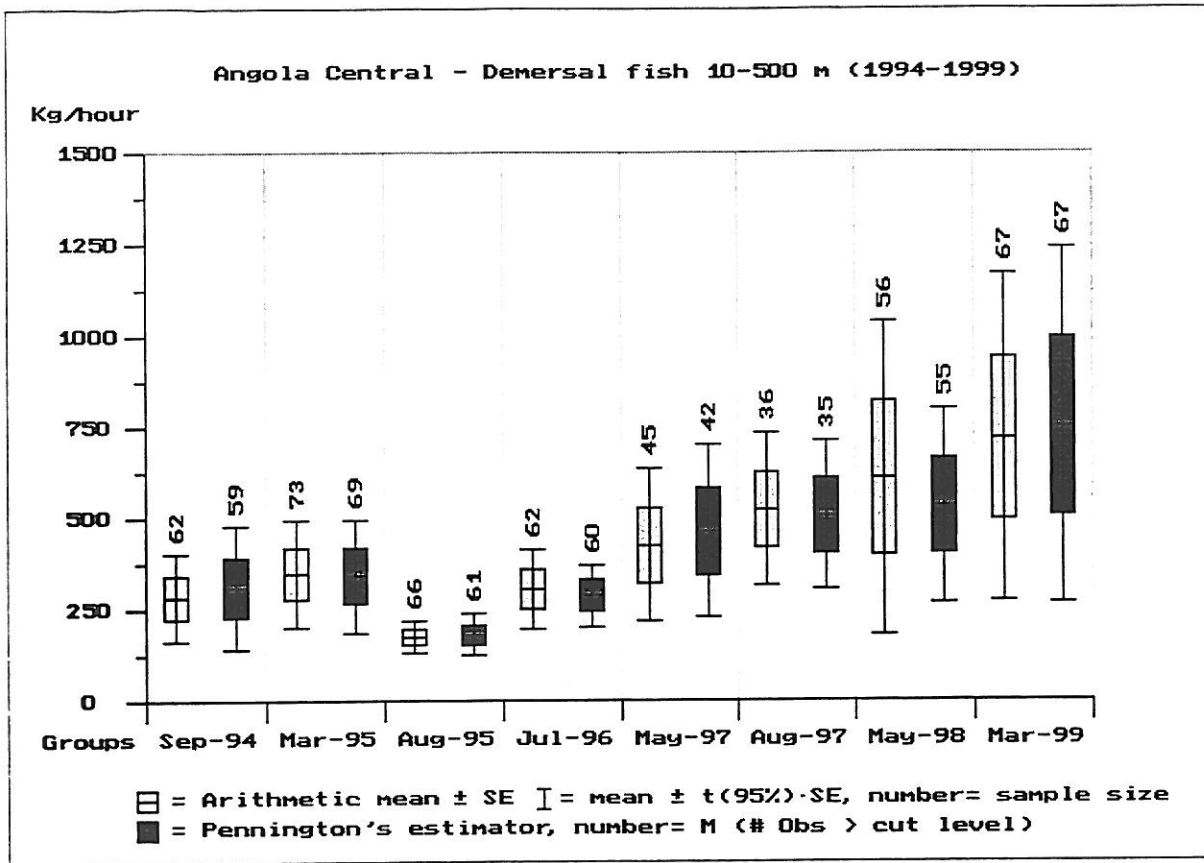


Figure 4.3 A time series of the mean catch rates of the main group "Demersal" from 10 to 500m in the Angola central sector from 1994 to 1999. For calculations of confidence intervals see Annex IV.

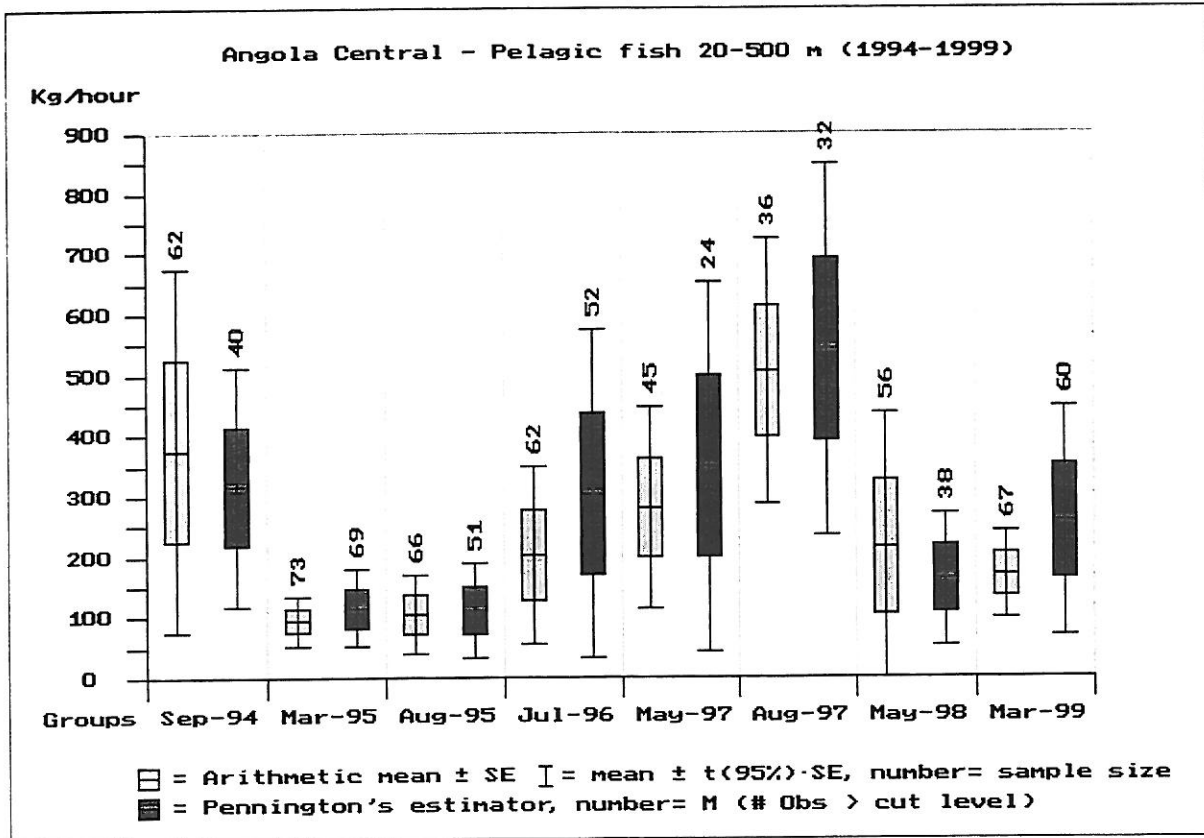


Figure 4.4. A time series of the mean catch rates of the main group "Pelagic" from 20 to 500m in the Angola central sector from 1994 to 1999. For calculations of confidence intervals see Annex IV.

Figures 4.3 and 4.4 show that there seem to be some long-term trends with a steady increase in the “Demersal” group, and a cyclic fluctuation in the “Pelagic” group. The year to year variation, however, is generally small, and very few point estimates are actually significantly different. It should be noted that the August 1995 survey was specifically aimed at the deep-water shrimp and hake resources with sampling only deeper than 150 m, and that the August 1997 survey was specifically aimed at the large-eye Dentex (*Dentex macrophthalmus*) with sampling between 50 and 300 m only. When disregarding these two surveys, none of the annual point estimates are significantly different from each other (although the trends still seem valid).

Concerning the variance of the catch rates in this survey, it should be noted that station 1822 (Table 4.1A) and station 1860 (Table 4.1B), had extraordinarily high catch rates of “Demersal” fish. Both were stations that had to be interrupted (after 12 and 20 minutes, respectively) due to bad bottom conditions (Annex I). Figure 4.5 shows a frequency plot of the catch rates in all the bottom trawl surveys in the central sector from 1994 to 1999. As it can be seen, stations 1822 and 1860 are among the four highest recorded (together with station 1691 of last year’s survey, which was another ‘short’ station of 8 minutes duration and will be discussed below when evaluating the seabream biomass). It therefore seems legitimate to consider these stations as out-liers in the overall context and investigate their effect on the estimates.

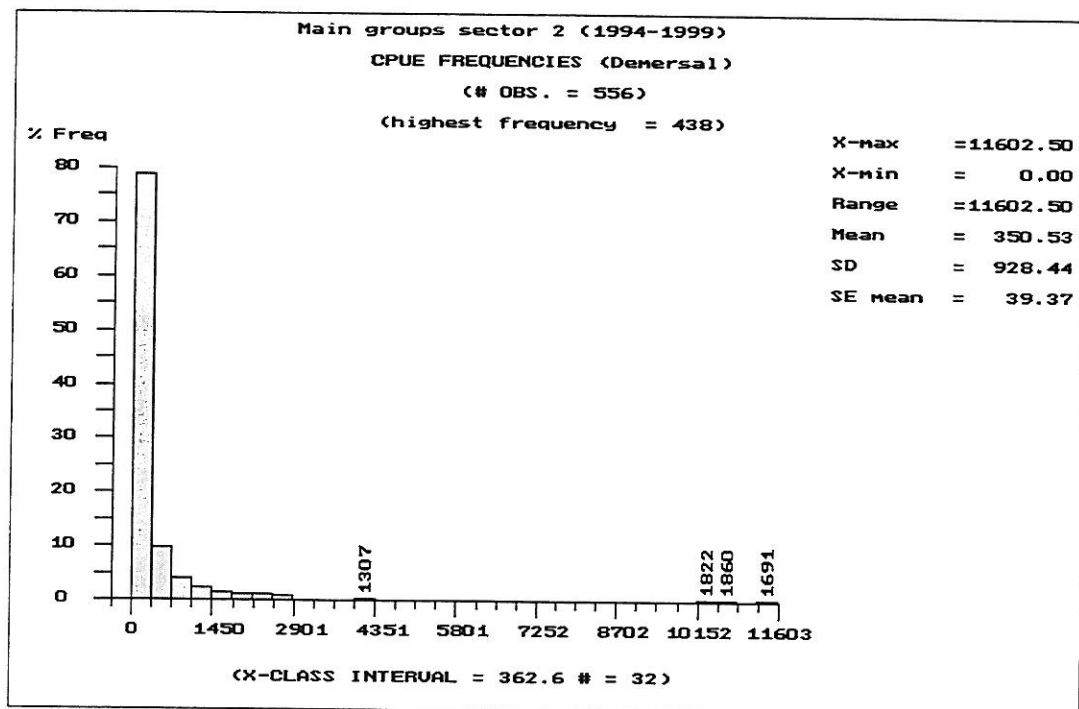


Figure 4.5. Frequency plot of catch rates of the main group “Demersal” on the central Angolan shelf over the years 1994 to 1999 with station numbers of the four highest recorded catch rates.

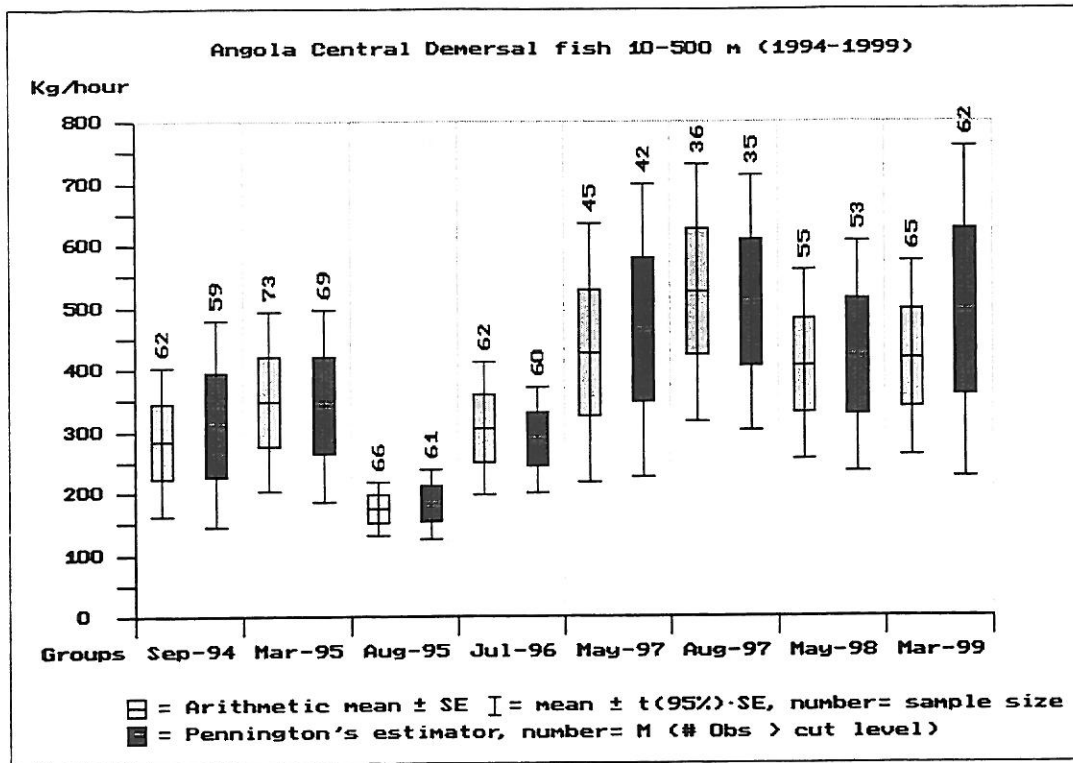


Figure 4.6. Same as Fig. 4.3, but with station 1691 in May 1998, and stations 1822 and 1860 in this survey removed.

Excluding the 3 largest catches (Figure 4.6) from the time series, did change the trend pattern slightly over the last two years, but not significantly. Also the overlap of the confidence intervals between the different surveys did not change.

## 4.2 Pelagic groups

Catch rates of the most important pelagic fish families, caught with bottom trawls during this survey, are presented in Tables 4.2A and B. The "Clupeids" consisted mainly of anchovies (*Engraulis encrasicolus*) whereas last year the group was dominated by *Ilisha africana* and *Sardinella maderensis*. These two species were only rarely encountered in this cruise. The carangids were mainly Cunene horse mackerel (*Trachurus trecae*), Atlantic bumper (*Chloroscombrus chrysurus*), and African lookdown (*Selene dorsalis*). Figure 4.7 and 4.8 show the average catch rates of Cunene horse mackerel and all "other carangids" on the shelf (20-200 m) back to 1994. Figure 4.9 and 4.10 show the average catch rates of barracudas, mainly *Sphyraena guachancho*, on the shelf, and the hairtails, mainly *Trichiurus lepturus*, (down to 600 m as this group is found at all depths).

**Table 4.2.** Central sector March 1999. Catch rates (kg/hour) of main pelagic families on the shelf obtained with bottom trawl hauls. A: Inner shelf (20-70 m), B: Outer shelf (71-200 m).

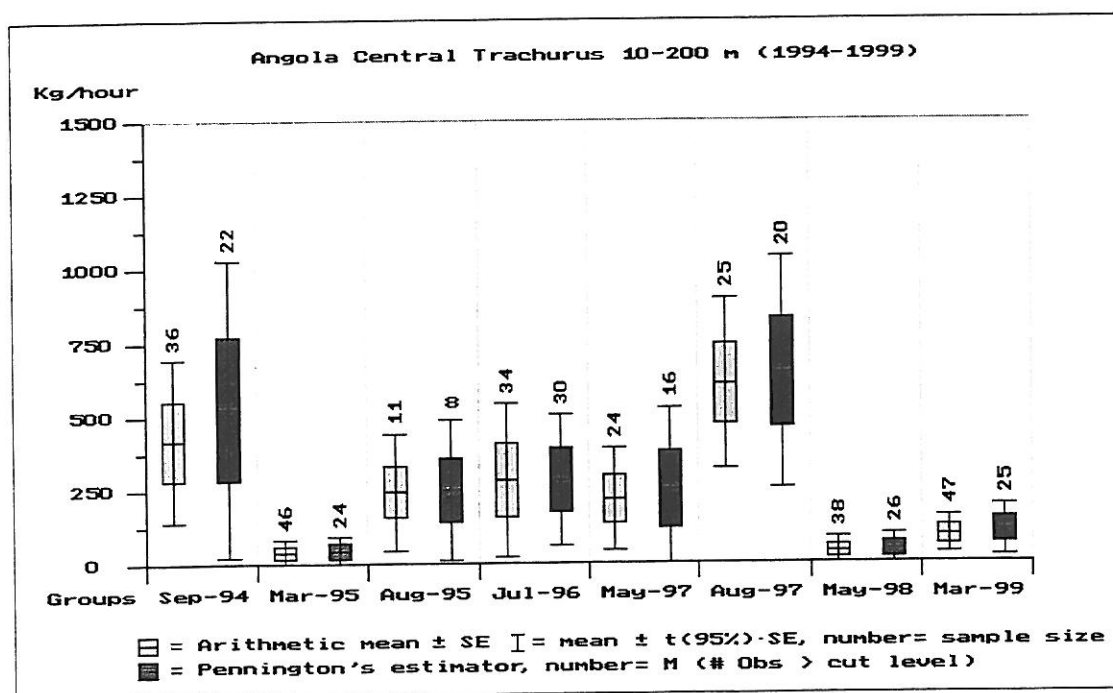
A. Inner shelf 20-70 m

STAT	Depth	Clupeids	Carangids	Scombrids	Hairtails	Barracudas	Other	Total
1813	68	7.3	945.2			109.1	2176.1	3237.8
1816	60		262.3		29.9	82.3	656.7	1031.2
1821	55		74.4		18.0	12.8	138.9	244.1
1822	59		757.4		402.3		11310.0	12469.7
1823	31	22.6	259.0	3.4	86.7	12.0	959.7	1343.3
1829	48		30.4		2.5	20.7	587.2	640.8
1830	25	116.3	42.0		3.9	24.2	165.3	351.6
1831	35	109.9	282.4		6.6	91.5	114.6	605.0
1833	46	14.3	36.8			33.5	448.8	533.4
1841	40	7.3	115.2		78.0		1551.7	1752.3
1842	42	2.0	8.4		63.8	4.7	440.6	519.6
1851	41		263.5		25.9	51.8	2929.7	3270.9
1861	35	8.0	29.2		6.8	61.7	311.7	417.4
1862	70		1176.6		137.1		2418.7	3732.4
1871	26	2.6	1.6			6.5	33.1	43.7
1872	69		118.2				705.7	823.9
1873	44		7.1			1.4	41.1	49.6
1882	55	0.0	4.4			26.8	18.7	49.9
1883	36		8.6			0.8	14.5	24.0
1884	34	1.4	10.0		5.3	2.9	96.5	116.0
1885	32		3.7		0.2	1.0	40.5	45.4
1886	59		2.6			1.9	345.5	350.0
MEAN	45.9	13.3	201.8	0.2	39.4	24.8	1159.3	1438.7
SE	3.0	7.0	70.2	0.2	19.0	7.1	515.6	576.4
% CATCH		0.9	14.0	0.0	2.7	1.7	80.6	

Table 4.2 cont.

## B. Outer shelf 71-200 m

STAT	Depth	Clupeids	Carangids	Scombrids	Hairtail	Barracudas	Other	Total
1814	113	30.0	56.6				2579.3	2665.9
1815	80	1.3	113.4		33.7		1476.2	1624.6
1819	112		0.5				253.8	254.3
1820	73	6.8	72.6		17.4	2.1	1210.3	1309.3
1824	97		17.8		23.0		429.8	470.7
1828	112						312.5	312.5
1834	110		97.4		50.5		657.2	805.1
1839	109				22.9		350.0	372.9
1840	73	36.9	153.1	10.7	7.1		1113.7	1321.3
1843	79	1.4	265.0		107.7		1857.8	2231.9
1844	122		108.5		20.0		171.5	300.0
1849	143		0.4		6.3		251.2	257.9
1850	79	8.9	42.2		179.5		546.1	776.7
1852	76	2.5	59.4				866.0	927.8
1853	106		628.4				211.7	840.1
1859	110	298.5	11.6		2.1		128.7	440.9
1860	74	29.1	739.6			42.8	10595.2	11406.6
1868	118		6.5				2582.6	2589.0
1869	101		4.6				137.9	142.5
1870	74		10.3		46.5	2.0	282.6	341.4
1874	91		1.9		1135.7		583.6	1721.2
1875	108		68.8		16.5		300.2	385.5
1876	179				169.0		354.6	523.6
1880	128		3.4		121.2		59.3	183.9
1881	81		66.5		27.8		167.5	261.8
MEAN	101.9	16.6	101.1	0.4	79.5	1.9	1099.2	1298.7
SE	5.1	11.9	37.4	0.4	45.2	1.7	421.3	447.5
% CATCH		1.3	7.8	0.0	6.1	0.1	84.6	

Figure 4.7. Mean catch rates of horse mackerel (*Trachurus trecae*) in bottom trawls on the central shelf

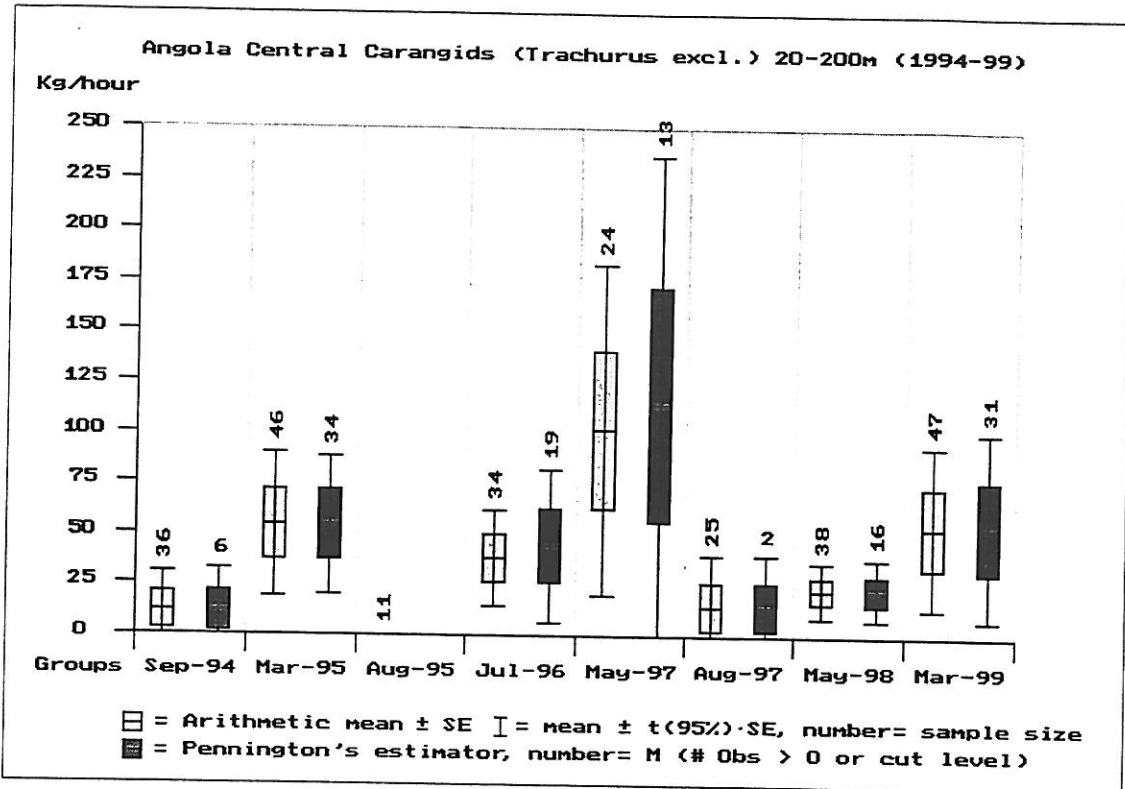


Figure 4.8. Mean catch rates of the family Carangidae, not including Cunene horse mackerel (*Trachurus trecae*), on the central Angolan shelf (20-200 m).

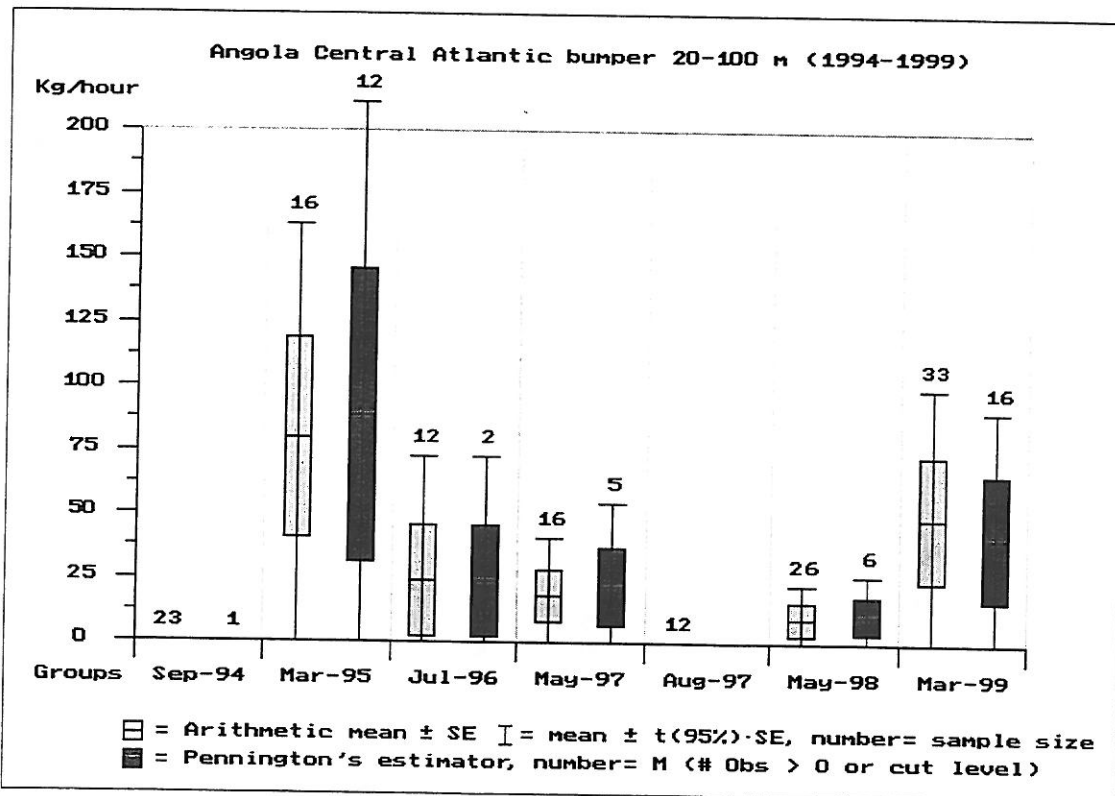


Figure 4.9 Mean catch rates of Atlantic bumper (*Chloroscombrus chrysurus*) on the central Angolan shelf (20-100 m).



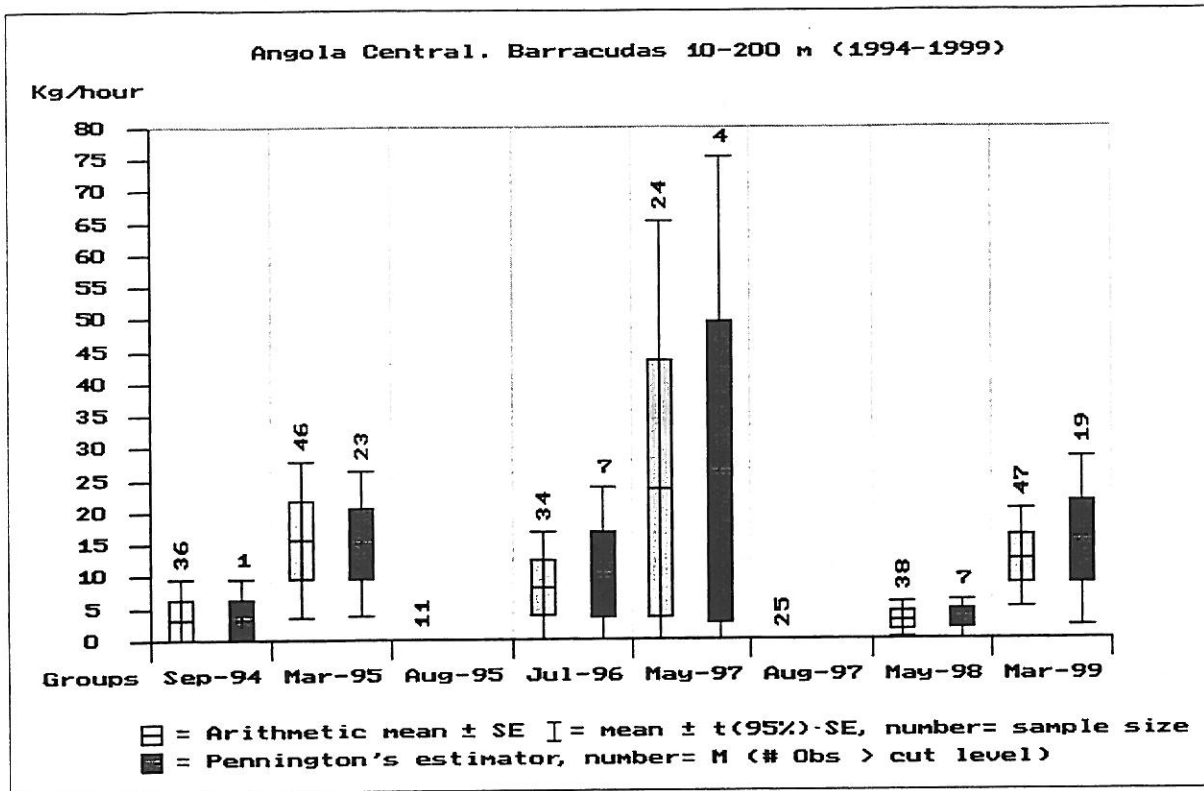


Figure 4.10. Mean catch rates of the family Sphyraenidae (barracudas), on the central Angolan shelf (10-200m).

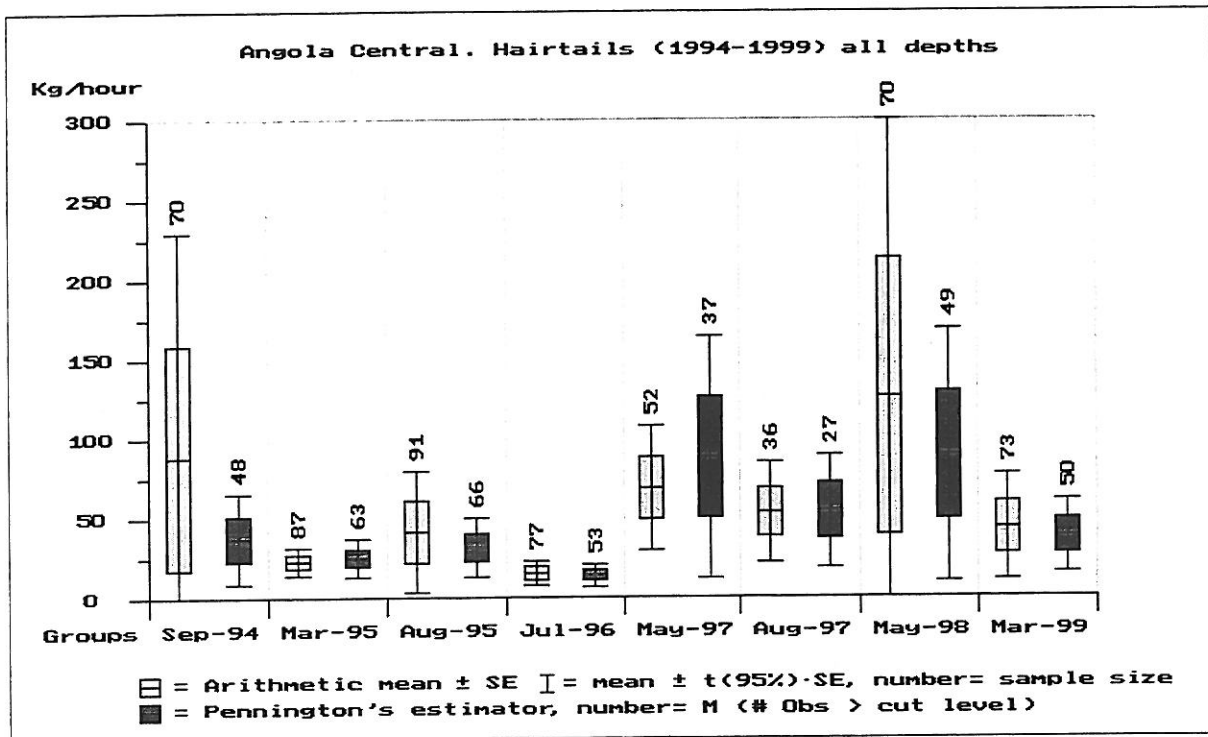


Figure 4.11. Mean catch rates of the family Trichiuridae (hairtail) in the central Angolan region (all depths down to 600 m).

All Figures 4.7-4.11 of the pelagic groups show large confidence intervals, and no clear trends, other than the resources may not have changed much over the past 5 years. The Cunene horse mackerel (Fig. 4.7), again recalling that the cruises in August 1995 and August 1997 had special purposes, may seem to have a declining trend, but this is far from statistically significant. The catch rates of Cunene horse mackerel also seem to explain most of the variation in the overall "Pelagic group" (Fig. 4.4). The 'other' carangids (i.e. all except Cunene horse mackerel) seem to have an inverse pattern of the horse mackerel, mainly due to the Atlantic bumper (*Chloroscombrus chrysurus*), which seem to be highly fluctuating (Fig 4.9). Both barracudas and hairtail seem to have changed little.

It should be noted that the "sample number" given in the figures above the Pennington estimator indicates the number of observations above zero (or above the truncate level of very small catches, see ANNEX IV for explanation). In other words this number, compared with sample number given above the arithmetic mean estimator, provides an indication of the encounter rate relative to the total number of samples (i.e frequency of occurrence). For many of the previous cruises (not taking into account the August 1995 and August 1997 surveys) the 'encounter rate' of both 'other carangids' and barracudas seems very low, but with higher catches during the warm season (March).

### 4.3 Demersal groups

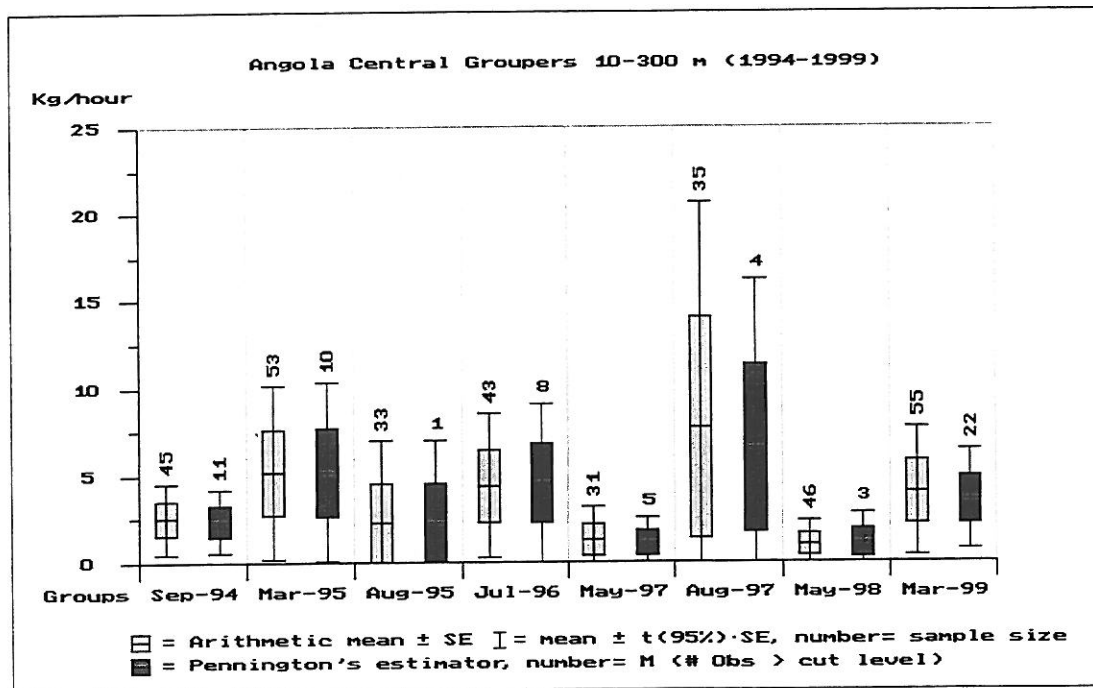
Table 4.3,A and B presents the catch rates of the most valuable demersal species on the shelf down to 200 m grouped into 'families': seabreams (Sparidae except *Boops boops*), snappers (Lutjanidae), groupers (Serranidae), grunts (Haemulidae except *Brachydeuterus auritus*), and croakers (Sciaenidae).

Among the seabreams, *Dentex macrophthalmus* was the dominating species (ANNEX III) followed by *Pagellus belottii*, and *Dentex barnardi*. Snappers were rare except for one large catch of *Lutjanus fulgens* at station 1829. Groupers, mainly *Epinephelus aeneus*, were quite common and occurred in 40% of the catches from 20 to 300 m (Fig. 4.12). This encounter rate is much higher than in any of the previous cruises where the incidence ranges from 6 to 25%. The grunts, apart from the non-commercial bigeye grunt (*Brachydeuterus auritus*), which will be treated separately, were also common in waters shallower than 100 m and consisted mainly of *Pomadysis incisus*, *P. rogeri*, and *P. jubelini*. Last year, this group dominated the demersal groups on the shelf due to a few very large catches (Fig 4.13), but this year the overall mean seems to be back at normal levels. Croakers, mainly *Umbrina canariensis*, *Pseudotolithus typus*, and *Atractoscion aequidens*, were also common, and at times abundant. This group appears consistently to have an extremely skewed, or sometimes bimodal, catch distribution, resulting in very large confidence intervals (Fig. 4.14). The overall picture is, however, fairly stable over the past 5 years.

**Table 4.3.** Central sector March 1999. Catch rates ( kg/hour) of valuable demersal species grouped by families. A: Inner shelf (20-70 m), B: Outer shelf (71-200 m).

A. Inner shelf 20-70 m

STAT	Depth	Seabream	Snappers	Groupers	Grunts	Croakers	Other	Total
1813	68	76.2	7.8	6.3	258.4	2.9	2886.2	3237.8
1816	60	196.1			45.7	4.6	784.9	1031.2
1821	55	27.3		2.0	18.7		196.1	244.1
1822	59	629.6		87.6	537.3	298.2	10917.1	12469.7
1823	31	15.0		9.8	4.5	151.3	1162.7	1343.3
1829	48	110.5	195.5	50.0	55.0		229.9	640.8
1830	25	2.0		2.9	5.5	16.9	324.4	351.6
1831	35	1.7		2.1	34.9	7.5	558.8	605.0
1833	46	172.5		1.9	14.7		344.3	533.4
1841	40	1.7		1.6	1.8	66.6	1680.6	1752.3
1842	42	14.8			9.6	5.4	489.8	519.6
1851	41	16.7		1.3	1.9	6.2	3245.0	3270.9
1861	35	2.6		2.3	14.6	15.2	382.8	417.4
1862	70	542.7		0.4		11.3	3178.0	3732.4
1871	26						43.7	43.7
1872	69	93.3			6.7	8.0	715.9	823.9
1873	44	6.1		3.4			40.2	49.6
1882	55	4.3		0.2			45.4	49.9
1883	36	1.7		2.4			19.9	24.0
1884	34	8.2		1.9		1.1	104.8	116.0
1885	32	9.3		8.0	1.1		27.1	45.4
1886	59	208.5					141.5	350.0
MEAN	45.9	97.3	9.2	8.4	45.9	27.0	1250.9	1438.7
SE	3.0	36.7	8.9	4.4	26.2	14.8	509.8	576.4
% CATCH		6.8	0.6	0.6	3.2	1.9	86.9	



**Figure 4.12.** Mean catch rates of the family Serranidae (groupers) in the central Angolan region from 10 to 300 m over the past 5 years.

Table 4.3 cont.

B. Outer shelf 71-200 m								
STAT	Depth	Seabream	Snappers	Groupers	Grunts	Croakers	Other	Total
1814	113	402.3		10.7		560.3	1692.6	2665.9
1815	80	239.7		7.7	49.7	84.7	1242.9	1624.6
1819	112	199.5					54.8	254.3
1820	73	78.5		1.4		16.2	1213.2	1309.3
1824	97	95.0					375.7	470.7
1828	112	256.4				28.0	28.1	312.5
1834	110	102.5				3.8	698.8	805.1
1839	109	29.9				2.1	340.9	372.9
1840	73	27.2				64.8	1229.4	1321.3
1843	79	52.9				43.6	2135.4	2231.9
1844	122	38.4				3.4	258.2	300.0
1849	143	147.3					110.6	257.9
1850	79	49.0					727.7	776.7
1852	76	84.3					843.6	927.8
1853	106	9.6					830.5	840.1
1859	110	15.8					425.1	440.9
1860	74	646.4					10760.2	11406.6
1868	118	946.3		8.9		1395.6	238.3	2589.0
1869	101	69.7					72.8	142.5
1870	74	201.3		7.8			132.3	341.4
1874	91	99.4				219.8	1402.0	1721.2
1875	108	19.0					366.5	385.5
1876	179	60.7					462.8	523.6
1880	128	9.5					174.4	183.9
1881	81	0.8				0.4	260.6	261.8
MEAN	101.9	155.3	0.0	1.5	2.0	96.9	1043.1	1298.7
SE	5.1	43.9	0.0	0.7	2.0	59.0	420.3	447.5
% CATCH		12.0	0.0	0.1	0.2	7.5	80.3	

Figure 4.13 show a time series of the catch rates of the family Haemulidae (grunts) in the central Angolan region from 20 to 100 m (the range of their distribution) over the past 5 years (the August 1995 deep-water survey not included). There is only a significant difference between the September 1994 survey and the surveys in July 1996 and May 1998. However, in the September 1994 survey, the abundance is surprisingly low with grunts appearing (in insignificant amounts) in only 3 out of 23 stations on the inner shelf, whereas in the May 1998 survey, they had a strong bimodal distribution of low and high catch rates (6 stations with less than 10 kg/hour and 5 stations of more than 200 kg/hour). Such distribution makes the confidence intervals (even the bootstrap looks like a negative exponential distribution, Fig. 4.13) very difficult to define. From the overall stability observed in most other demersal groups, it is hard to believe that the observed differences in this group would be due to density fluctuations in the population alone. Rather it appears that the sampling and survey design for this group is not the most adequate to draw firm conclusions on biomass level changes.

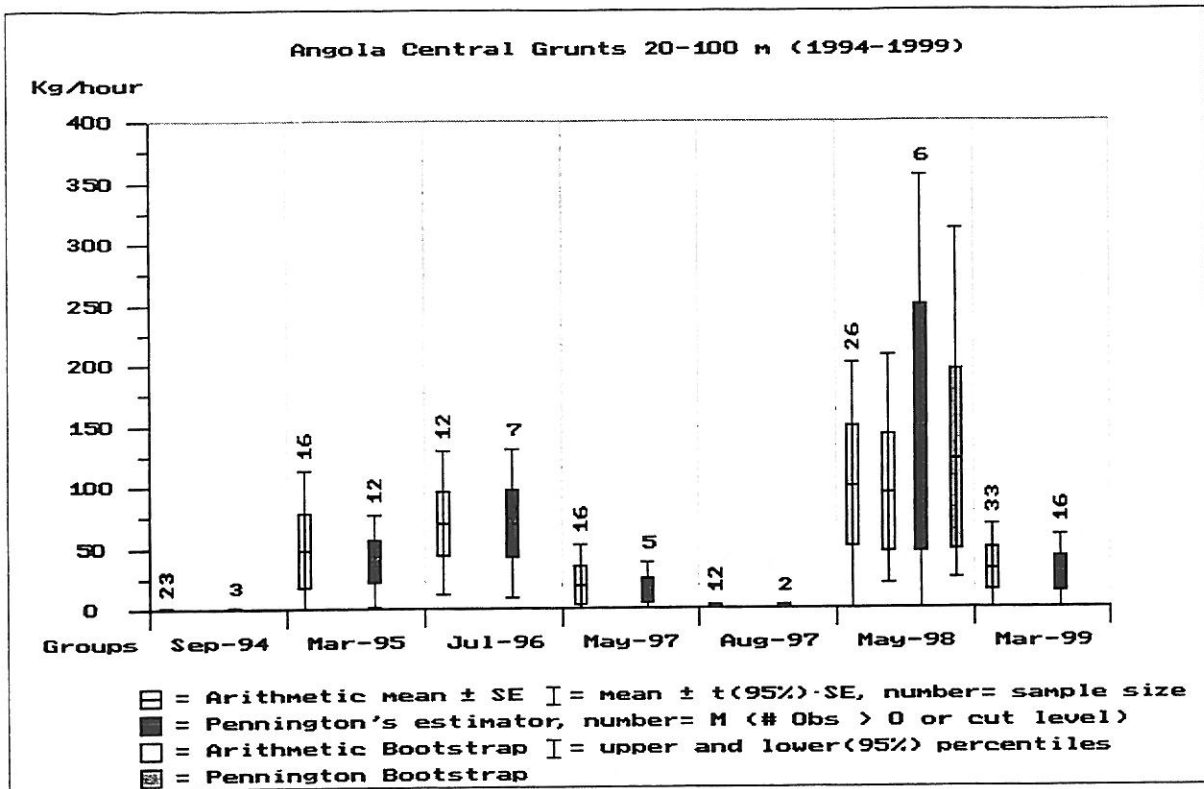


Figure 4.13 Mean catch rates of the family Haemulidae (Grunts) in the central Angolan region from 20 to 100m.

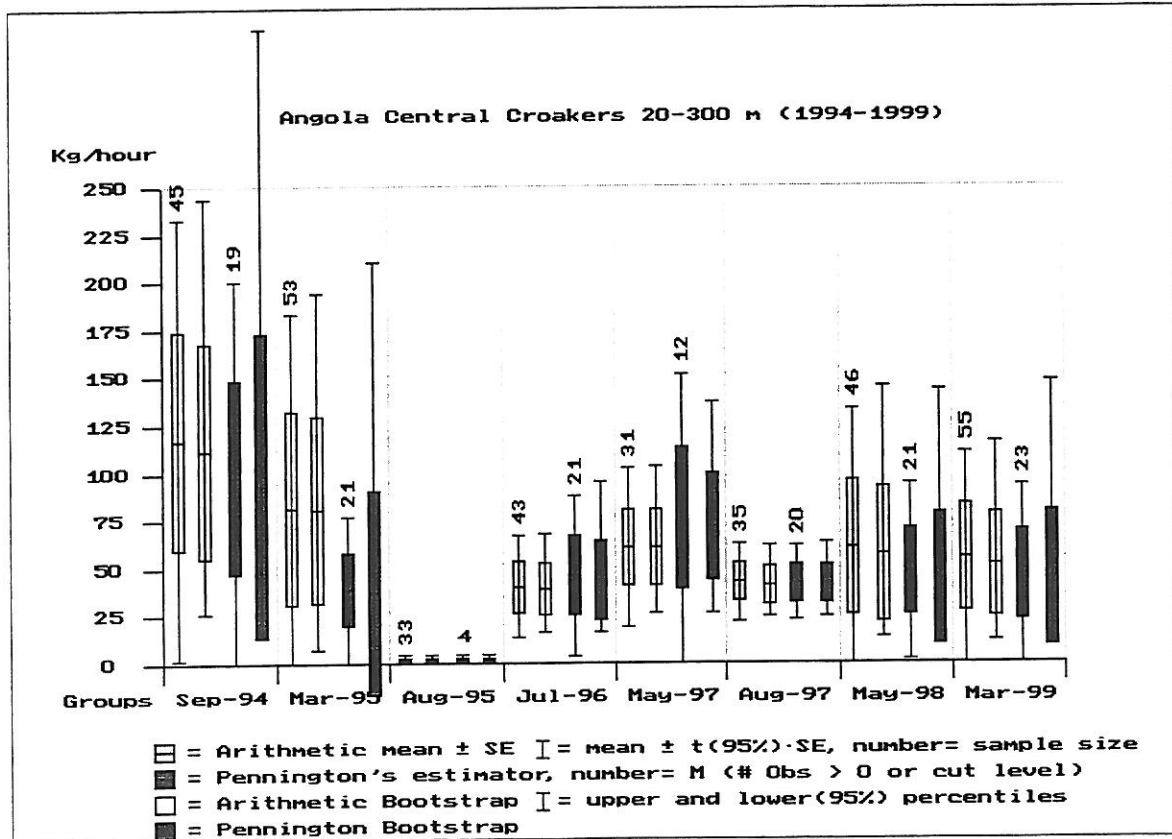


Figure 4.14. Mean catch rates of the family Sciaenidae (Croakers) in the central Angolan region from 20 to 300 m.

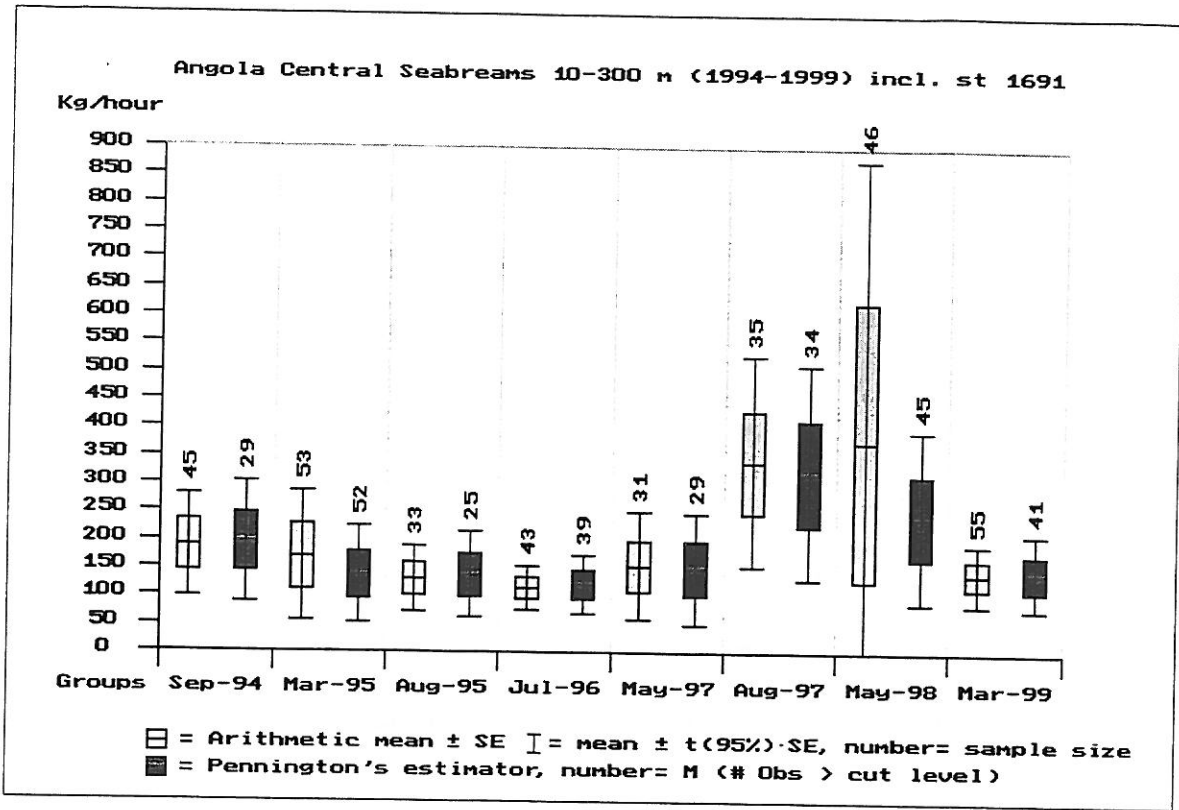


Figure 4.15. Mean catch rates of the valuable seabreams in the central Angolan region from 10 to 300 m with station 1691 from the May 1998 survey included.

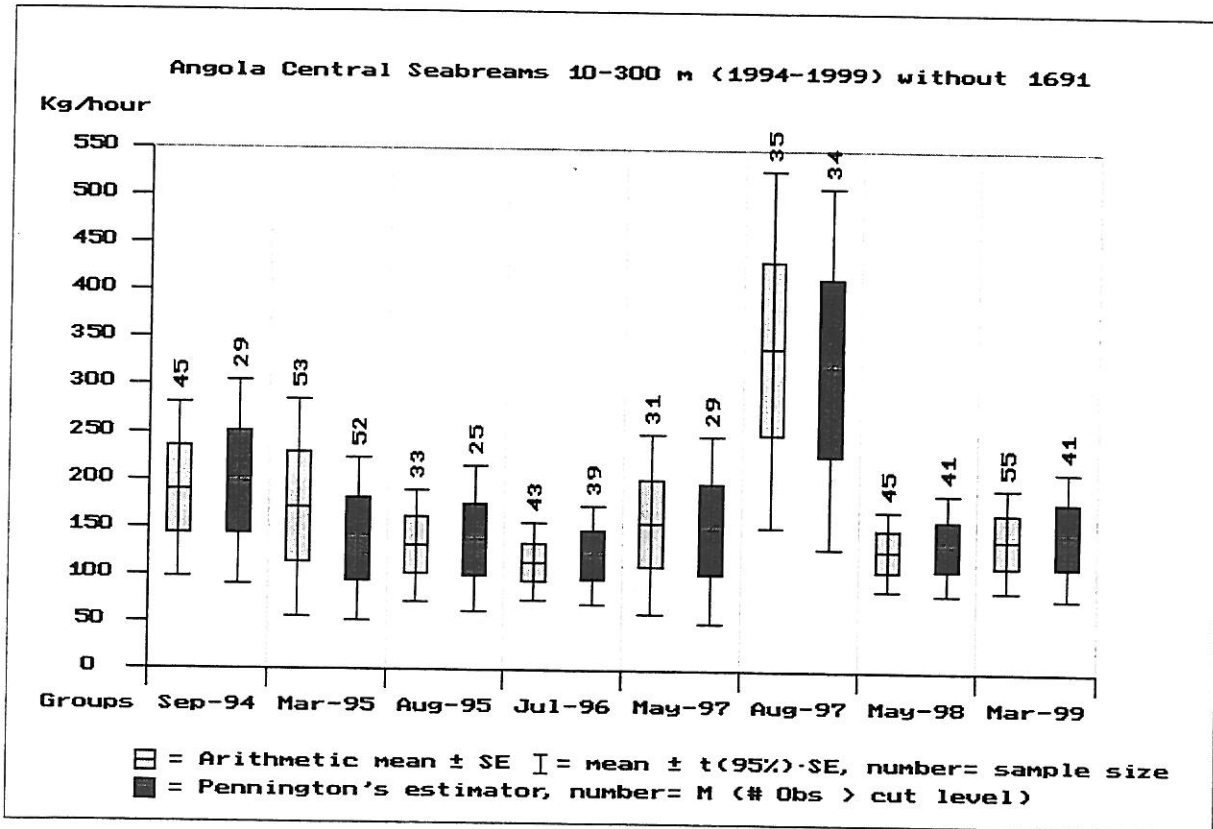


Figure 4.16. Mean catch rates of the valuable seabreams in the central Angolan region from 10 to 300 m with station 1691 from the May 1998 survey excluded.

Figures 4.15 and 4.16 show the mean catch rates of valuable seabreams (all Sparidae except *Boops boops*) over the past 5 years with, and without, station 1691 from the May 1998 survey included. The reason for this presentation is because in the 1998 report the total calculated biomass of the seabream in the central region was around 3 times higher than in the previous years (Table 4.4). Station 1691 (containing the highest catch of demersal fish on record since 1994, Fig 4.5) was an 8 minutes station that had to be interrupted due to bad bottom conditions, but which landed 1.6 tonnes of mainly *Dentex macrophthalmus*. When raised to catch per hour it resulted in the staggering record. It was included in the biomass estimate and generated the threefold increase. Had the variance been included and confidence interval calculated it would have spanned from 0 to more than 150,000 tonnes. With the station excluded (Fig. 4.16) it would have resulted in a biomass estimate of 19,500 tonnes (with 95% confidence interval from 13,000 to 26,000 tonnes), which is in line with this and previous surveys (Table 4.4). This example illustrates the danger of just operating with mean catch densities.

Figures 4.15 and 4.16 also illustrates the mean catch rates of the August 1997 survey, which, although not significantly different (statistically), are considerably higher than all the other surveys. The August 1997 survey was aimed specifically at *Dentex macrophthalmus* in order to establish its distribution and biomass levels, and was therefore conducted within the 50 and 350 m isobaths (Note that although Figs. 4.15 and 4.16 cover the range 20 to 300 m, the general picture does not change if all surveys were delimited by the 50 to 350 m depth interval). The August 1997 Report concluded that the biomass of *Dentex macrophthalmus* in the central region was 22,000 tonnes (Note this estimate has not been included in the time series, Table 4.4). The discrepancy between the May 1997 survey and the August 1997 survey raises the important question on what is the 'true' density of seabreams, calculated from bottom trawl surveys, when different surveys with different aims, but covering the same area, with approximately the same intensity, and with the same gear and methods, arrive at strikingly different results in the catch rates. It also needs to be clarified how, given the differences in catch rates, the August 1997 survey resulted in a biomass estimate not much different from previous surveys. The August 1997 Report is now being reviewed before being finally printed.

Another problem, when evaluating and comparing the seabream biomass estimates from previous surveys, is an inconsistency in how these have been derived in terms of depth strata and their respective areas. It appears that most reports, but not all, only have been using the catch rates on the shelf, i.e down to 200m for calculating biomass estimates of the 'shelf species'. However, as seen from Figure 4.17, the distribution of seabreams extend down to at least 300 m. If the distribution beyond 200m are not included, then on average at least a third of the seabream catches, and 8% of the area, have not been accounted for (Fig. 4.17). Furthermore, some reports have used the area in the shallowest strata from 0 to 50 m, while others are using the area from 20 to 50 m.

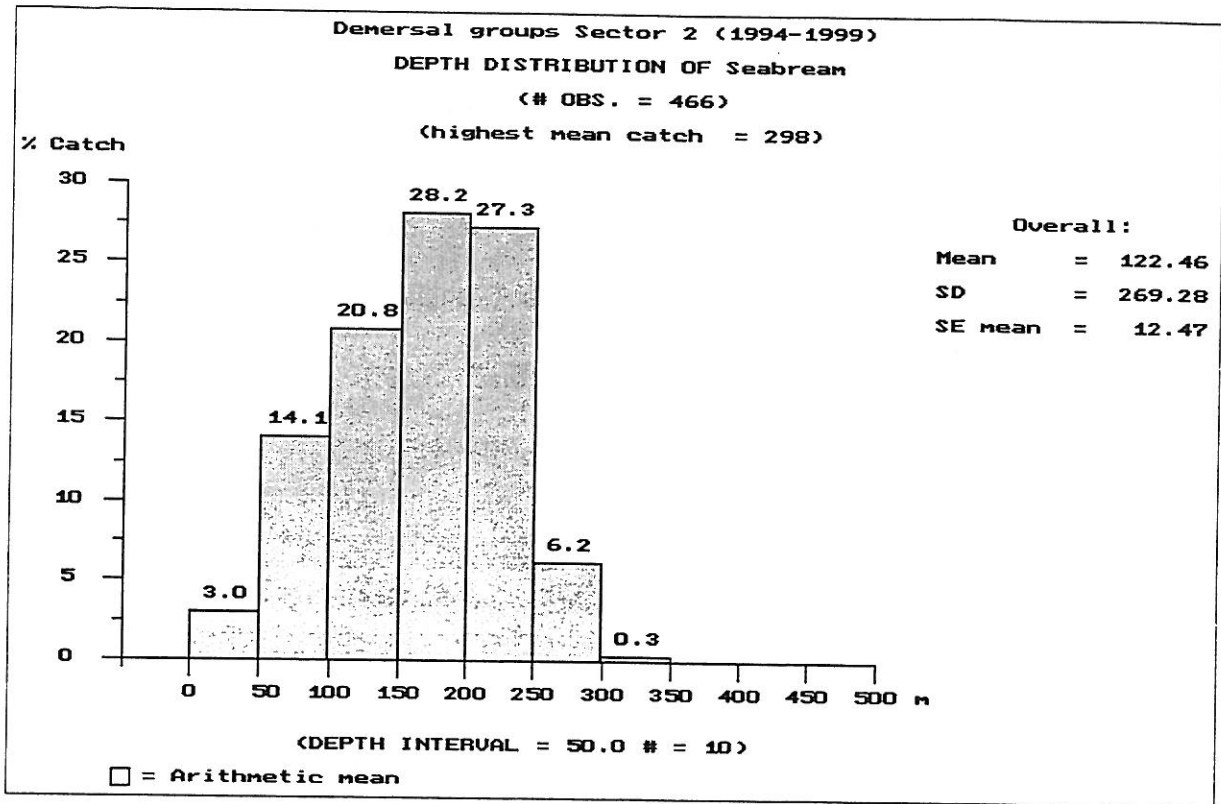


Figure 4.17. Depth distribution in percent catch rates of seabreams in the pooled catches of all surveys in the central region from 1994 to 1999.

Figure 4.18 shows the distribution of the seabreams in the region between Luanda and Benguela. The general distribution, and areas with high concentration, is almost identical with the two previous years.

Despite the stated problems when evaluating and comparing the results of the different cruises, the overall conclusion is that the seabreams in the Luanda-Benguela region seems not to have changed much during the past 5 years. However, activities have already been started for reviewing the time series and reassess the biomass estimates with a standardised approach in order to get a more confident picture.



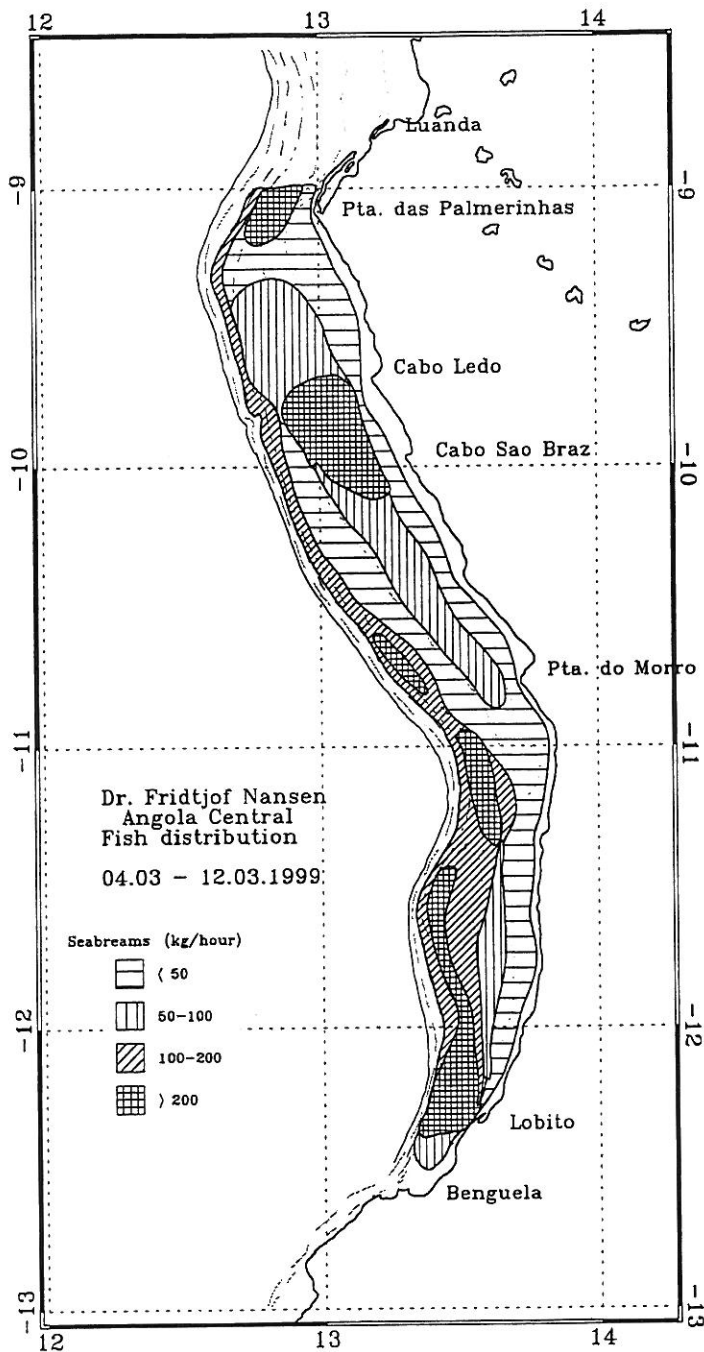


Figure 4.18. Estimated distribution of seabreams (family Sparidae). Luanda-Benguela.

Table 4.4. Biomass estimates (tonnes) of valuable demersal and pelagic fish by main groups on the shelf, by year of investigation. Luanda-Benguela.

	Biomass tonnes											1999 <sup>ⓐ</sup>	
	1986/I ⊙	1989/I ⊙	1991/II ◆	1992 ◆	1994 ◆	1995 ⊙	1996 ◆	1997 ◆	1998 ◆	1999 ⊙	1999 <sup>ⓐ</sup> 95% confidence limits	1999 <sup>ⓐ</sup> 95% confidence limits	
Seabreams	9300	11100	24580	28000	29200	21800	19000	21650	**56110	19960	8224	31694	
Grunts	2700	5600	5500	2000	120	3400	5230	2320	**12700	3246	0	7288	
Croakers	5500	1450	19000	2000	4010	13290	6140	8490		9907	0	23857	
Groupers	470	550	1000	1000	350	470	830	300	330	624	18	1231	
Sum demersal	17970	18700	50080	33000	33680	38960	31200	32760	**78830	33737	9449	60047	
Bigeye grunt	44600	18500	18500	52000	2990	29500	31120	44110	34765	93415	13100	173730	
Horse mackerel	21000	7200	48500	75000	65100	4200	37090	42480	5500	12880	2941	22819	
Other carangids	3100	8500	290	1640	2790	8400	5360	16120	2360	7484	1556	13412	
Barracudas	1900	3000			740	2700	1540	4810	755	1573	647	2499	
Hairtail	17300	12500	4100	1300	26200	5300	5080	23120	47351	7882	0	18081	

⊙ Note that different surveys have used different areas, depth strata, and depth limits in the biomass estimations (see text)

⊙ summer season (February-March)

◆ winter season (May-September)

\*\* Note these figures are overestimated (see Figures 4.13, 4.15, 4.16)

ⓐ Stratified biomass estimates are made from equations (1) and (4), ANNEX IV, covering the whole depth range of the distribution, ANNEX IV. Since NAN-SIS does not produce variance estimates of the mean densities (ANNEX III), the 95% confidence limits for this survey were calculated from the assumption that the coefficient of variation (SD/mean) is constant between catch rates in kg/hour and t/NM<sup>2</sup>, in other words that the area swept (normalised per hour) is approximately constant during the survey. Coefficients of variation by depth strata for the various groups were obtained from the GRAFER module which is linked to NAN-SIS and equations (2), (3), (6) and (7) in ANNEX IV were used to calculate SE and confidence limits.

#### 4.4 Congo River-Luanda shelf

The present survey covered the northern region of Angola from Congo River to Luanda (Fig. 2.2), whereas most of the previous surveys in this region also have covered the Cabinda area north of the Congo River. However, the Cabinda area is now practically inaccessible to fisheries surveys due to the increased restrictions from the oil exploitation. This difference in the survey designs should be remembered when comparing the biomass tables presented, and it also adds support to the already mentioned need for reassessing the time series of the biomasses.

A total of 67 successful swept-area trawl stations were accomplished on the shelf area (20-200 m) in the northern region (Table 2.1). Table 4.5 shows the catch rates by main species groups for the inner (20-70 m) and the outer shelf (71-200 m). The group definitions are the same as for the central region and are given in ANNEX VI.

**Table 4.5.** Northern sector, March 1999. Catch rates (kg/hour) by main groups in swept area bottom trawl hauls on the shelf. A: Inner shelf (20-70 m), B: Outer shelf (71-200 m).

A. Inner shelf 20-70 m								
STAT	Depth	Demersal	Pelagic	Shrimp	Cephalopods	Sharks	Other	Total
1899	32	940.5	1238.7	47.5		5.7	296.8	2529.2
1900	49	2273.8	338.7				109.1	2721.6
1901	32	574.0	454.8			12.7	157.9	1199.4
1902	55	735.2	373.8	1.0			52.0	1162.0
1913	30	626.8	1429.5	11.0		11.4	228.2	2306.9
1914	53	301.5	116.5		1.7		140.1	559.9
1920	44	538.8	216.2	0.9		1.0	145.0	901.9
1921	27	926.6	359.1	4.8		34.5	277.9	1602.9
1927	66	998.6	111.7		2.4		30.1	1142.8
1933	49	552.7	257.0				13.4	823.2
1935	21	44.9	97.8	0.1		3.3	140.1	286.2
1936	45	10.5	5.5		0.3		4.9	21.2
1937	54	170.2	5.9				68.2	244.3
1961	50	21.6	16.2		0.2		1.2	39.2
1970	40	13.7	9.3				4.2	27.2
1971	55	0.7	34.2		0.2		9.4	44.5
1977	44	72.1	85.3	1.2			141.3	299.8
1978	65	23.5	26.9		0.8	97.8	10.7	159.8
1985	32	5.4	0.1				4.1	9.7
1986	46	39.0	12.9				6.5	58.4
MEAN	44.5	443.5	259.5	3.3	0.3	8.3	92.1	807.0
SE	2.8	125.3	88.5	2.4	0.1	5.1	21.4	197.6
% CATCH		55.0	32.2	0.4	0.0	1.0	11.4	

Table 4.5 continued.

B. Outer shelf 71-200 m								
STAT	Depth	Demersal	Pelagic	Shrimp	Cephalopods	Sharks	Other	Total
1889	191	19.7	45.0	19.3	11.7		1184.7	1280.4
1890	83	1572.2	216.9		58.6		88.4	1936.1
1891	78	319.5	291.9		25.1		62.0	698.5
1892	109	61.4	177.2		21.8	12.1	58.1	330.6
1893	178	67.8	129.8	9.0	32.8		1238.6	1478.0
1896	153	2.7	72.5	0.3	16.2		5.1	96.7
1897	112	34.1	48.7		7.0		48.6	138.5
1898	87	800.6	1111.3				58.0	1969.9
1903	98	583.7	515.6		19.6		436.7	1555.6
1904	140	35.5	24.5	1.2	55.0	9.2	868.4	993.9
1910	171	39.7	82.7		17.6	54.6	1582.2	1776.8
1911	110	1297.4	255.0		3.3		156.7	1712.4
1912	76	337.9	365.3		8.4		75.9	787.4
1916	150	23.9	10.1		14.6		41.1	89.7
1917	109	67.1	19.0		4.7		54.8	145.6
1918	97	737.1	40.3		20.9		57.0	855.3
1919	80	69.2	85.4		19.6		55.0	229.3
1924	187	54.3	35.6	1.6	5.8	6.2	1034.9	1138.4
1925	106	2283.9			10.8	45.3	24.4	2364.4
1926	93	102.6	36.1		3.5		52.3	194.5
1930	119	168.7	966.9		26.6	5.0	62.4	1229.5
1931	105	251.2	291.6		9.3	5.0	42.2	599.2
1932	73	1876.4	128.7		40.4		17.1	2062.5
1938	92	397.5			2.2	13.0	23.3	436.0
1939	165	55.3	145.7		9.9		444.6	655.5
1945	96	1.7	18.5		1.6	20.8	5.5	48.0
1946	124	310.1	35.8		9.4	1.2	81.4	437.9
1947	157	43.6	118.1	0.7	11.3	16.8	79.1	269.6
1952	117	96.6	36.7		7.7	11.6	67.6	220.2
1953	90	59.7	10.7		2.4		21.5	94.3
1954	77	301.9	119.1		3.2		31.9	456.0
1955	91	222.5	5.9		8.9	3.1	47.5	287.8
1956	104	78.1	38.9		3.7		78.7	199.4
1957	196	37.8	26.7	11.0	19.7	7.1	378.9	481.2
1962	77	62.1	0.1		2.5		14.4	79.1
1963	120	92.6	546.7		7.6		40.0	686.9
1964	175	30.7	776.2		5.6	4.1	23.9	840.5
1972	90	706.1	1075.7			13.8	9.7	1805.3
1973	121	152.8	36.9		0.9		3.5	194.0
1974	157	108.0	67.8		4.0		38.9	218.7
1979	84	115.2	5.2		0.3		7.4	128.1
1980	109	116.9	26.6		0.5		11.8	155.7
1981	120	386.9	20.5				11.9	419.4
1982	191	78.5	304.0	6.5	20.4		122.2	531.7
1987	83	83.6	557.4				23.8	664.8
1988	114	59.7	38.1		0.7		11.1	109.6
1989	180	71.5	107.9		0.6	24.1	26.3	230.4
MEAN	119.9	308.0	193.0	1.1	11.8	5.4	189.6	708.8
SE	5.4	72.8	41.6	0.5	2.0	1.7	53.7	94.9
% CATCH		43.5	27.2	0.2	1.7	0.8	26.7	

Like in the central region, the “Demersal” group dominated in the overall catches, but with slightly lower proportions in the two strata, and with mean catch rates of about only half the values obtained in the central region. In contrast, the other main groups: “Shrimp”, “Cephalopods”, and “Sharks” had generally higher catch rates than in the central region, while the “Pelagic” group was almost the same. Still, the total catch rates in the northern shelf region were only around half of those in the central region due to the decreased abundance of the Demersal group.

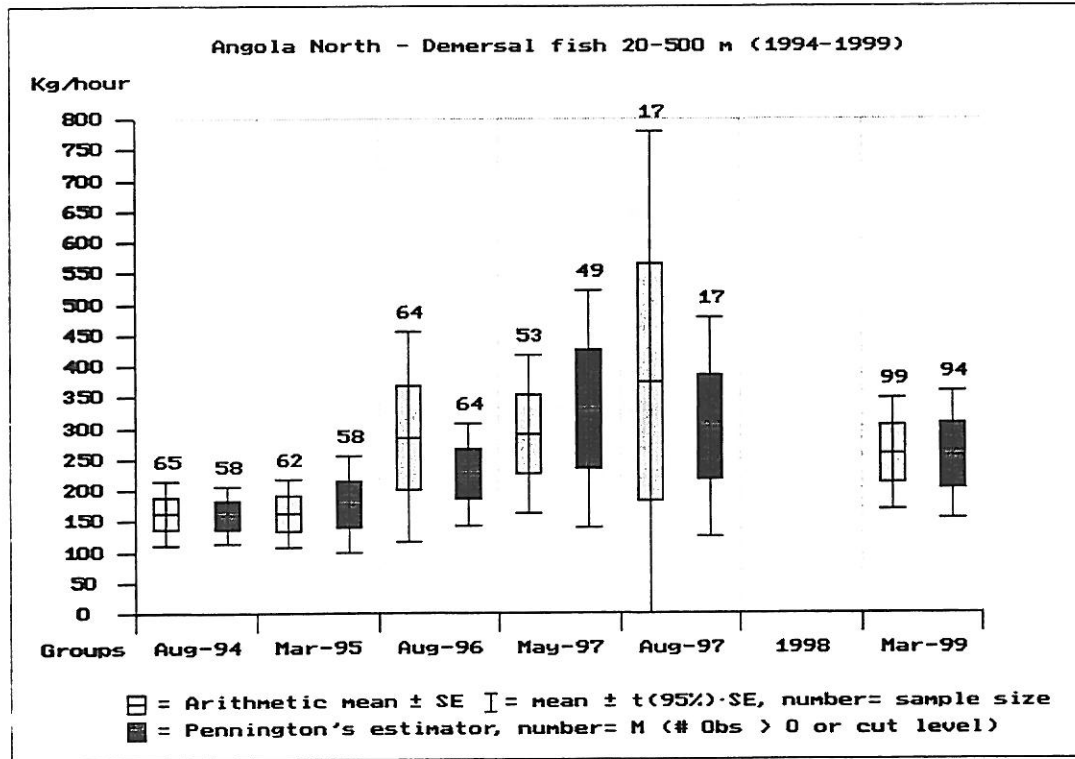
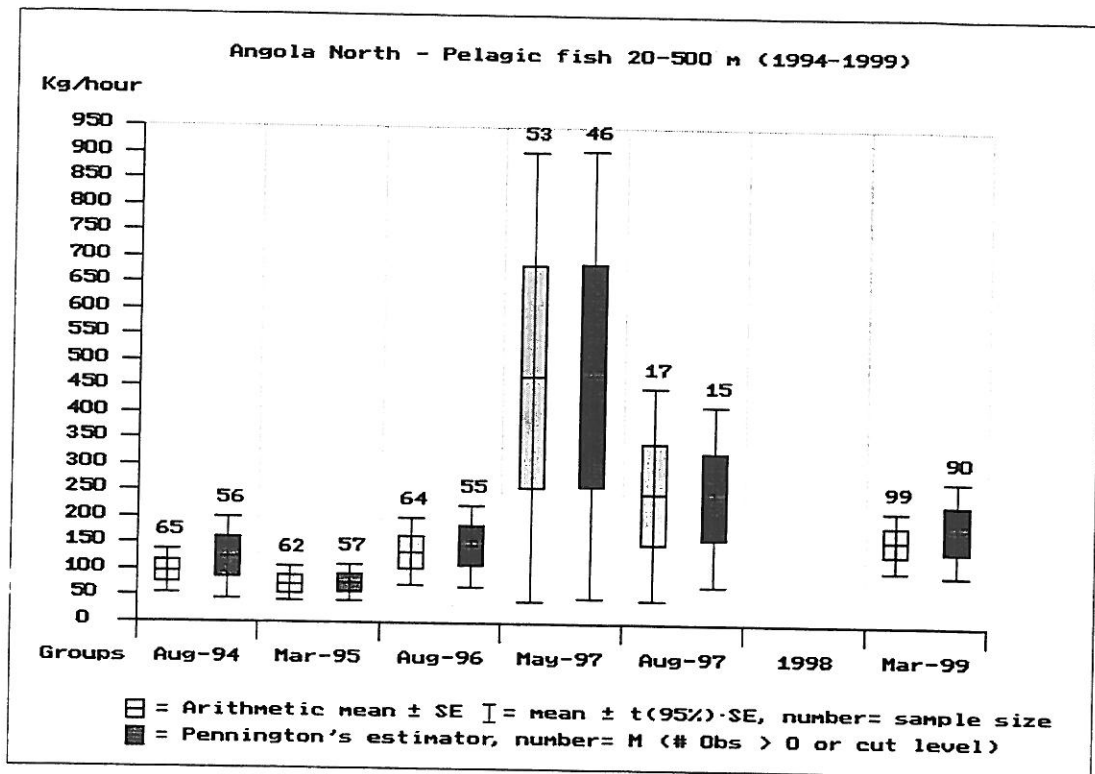


Figure 4.19. A time series of the mean catch rates of the main group “Demersal” from 20 to 500m in the Angola northern sector from 1994 to 1999.

Figures 4.19 and 4.20 show the time series of catch rates (20-500 m) for the two main groups: “Demersal” and “Pelagic” in the northern region for the bottom trawl surveys back to 1994. There was no survey of the demersal resources in 1998, and again it should be noted that the August 1997 survey was specifically aimed at the large-eye Dentex (*Dentex macrophthalmus*) with sampling between 50 and 300 m only. The two figures show approximately the same trends, i.e. a slightly increasing trend over time with somewhat higher catch rates in 1997, but the increase is not statistically significant. Furthermore, the possible trend of a steady increase in the “Demersal” group in the northern region is not as clear as the one observed in the central region (Figs. 4.3 and 4.6). The overall reduced catch rates of demersal fish, of around half of those in the central region, seem to be a consistent feature for all the surveys in the northern region. Statistically, however, there are no significant differences in the catch rates between the two regions for each survey. For the “Pelagic” group, the more cyclic fluctuation with a peak in 1997 observed in the central region, seems repeated in the northern region, and the overall catch rates are almost the same.



**Figure 4.20.** A time series of the mean catch rates of the main group "Pelagic" from 20 to 500m in the Angola northern sector from 1994 to 1999.

## 4.5 Pelagic groups

Catch rates of the most important pelagic fish families, caught with bottom trawls during this survey, are presented in Table 4.6,A and B.

**Table 4.6.** Northern sector March 1999. Catch rates ( kg/hour) of main pelagic families on the shelf obtained with bottom trawl hauls. A: Inner shelf (20-70 m), B: Outer shelf (71-200 m).

A. Inner shelf 20-70 m

STAT	Depth	Clupeids	Carangids	Scombrids	Hairtails	Barracudas	Other	Total
1899	32	417.6	717.4		89.5	14.2	1290.6	2529.2
1900	49	259.8	22.5		13.2	43.2	2382.9	2721.6
1901	32	179.3	224.1		18.1	33.3	744.6	1199.4
1902	55	160.1	101.8		79.1	32.7	788.3	1162.0
1913	30	383.0	1025.1		9.1	12.3	877.4	2306.9
1914	53	100.5	4.4			11.6	443.3	559.9
1920	44	24.1	20.4			171.7	685.7	901.9
1921	27	295.5	4.8		8.0	50.8	1243.8	1602.9
1927	66	3.2	80.5		28.0		1031.1	1142.8
1933	49	1.1	12.5		5.9	237.6	566.2	823.2
1935	21	2.4	68.3	9.6	0.8	16.7	188.4	286.2
1936	45		2.1			3.4	15.6	21.2
1937	54		0.4			5.5	238.4	244.3
1961	50		0.2		5.9	10.2	22.9	39.2
1970	40	0.0	3.5			5.8	17.9	27.2
1971	55	0.0	25.2		1.7	7.2	10.3	44.5
1977	44	57.9	2.4		1.6	23.5	214.5	299.8
1978	65	0.1	9.2		1.0	16.6	132.9	159.8
1985	32		0.1				9.6	9.7
1986	46		12.9				45.5	58.4
MEAN	44.5	94.2	116.9	0.5	13.1	34.8	547.5	807.0
SE	2.8	31.2	60.0	0.5	5.7	13.6	136.2	197.6
% CATCH		11.7	14.5	0.1	1.6	4.3	67.8	

Table 4.6 continued.

## B. Outer shelf 71-200 m

STAT	Depth	Clupeids	Carangids	Scombrids	Hairtails	Barracudas	Other	Total
1889	191				45.0		1235.4	1280.4
1890	83	5.6	165.8		45.5		1719.2	1936.1
1891	78	2.7	98.7		190.4		406.6	698.5
1892	109	0.2	2.8		174.2		153.4	330.6
1893	178				129.8		1348.1	1478.0
1896	153				72.5		24.3	96.7
1897	112				48.7		89.7	138.5
1898	87		285.0		826.3		858.6	1969.9
1903	98		206.5		309.0		1040.0	1555.6
1904	140				24.5		969.4	993.9
1910	171				82.7		1694.2	1776.8
1911	110		44.5		210.5		1457.4	1712.4
1912	76	2.4	349.4		13.4		422.2	787.4
1916	150				10.1		79.6	89.7
1917	109				19.0		126.6	145.6
1918	97	1.6	0.3		38.4		815.0	855.3
1919	80	0.3	55.6		27.4	2.1	143.8	229.3
1924	187				35.6		1102.9	1138.4
1925	106						2364.4	2364.4
1926	93		1.1		35.0		158.4	194.5
1930	119				966.9		262.6	1229.5
1931	105		4.9		286.7		307.7	599.2
1932	73	11.2	113.0			4.4	1933.8	2062.5
1938	92						436.0	436.0
1939	165				145.7		509.8	655.5
1945	96		15.7		2.8		29.5	48.0
1946	124		1.4		34.4		402.1	437.9
1947	157				118.1		151.5	269.6
1952	117		0.6		36.1		183.4	220.2
1953	90		7.2			3.6	83.5	94.3
1954	77	0.2	10.1		3.3	105.5	337.0	456.0
1955	91	1.7	0.6		3.2	0.4	281.9	287.8
1956	104		3.5		35.4		160.5	199.4
1957	196				26.7		454.5	481.2
1962	77					0.1	79.0	79.1
1963	120		454.5		92.2		140.2	686.9
1964	175				776.2		64.3	840.5
1972	90		1017.8	2.1	55.8		729.6	1805.3
1973	121		4.6		32.3		157.2	194.0
1974	157				67.8		150.9	218.7
1979	84		0.1		5.1		122.9	128.1
1980	109		25.5		1.0		129.2	155.7
1981	120		9.6		10.9		398.8	419.4
1982	191				304.0		227.7	531.7
1987	83	3.0	502.3		52.1		107.4	664.8
1988	114		1.8		36.3		71.5	109.6
1989	180				107.9		122.5	230.4
MEAN	119.9	0.6	72.0	0.1	117.9	2.5	515.8	708.8
SE	5.4	0.3	26.8	0.1	30.9	2.2	84.3	94.9
% CATCH		0.1	10.2	0.0	16.6	0.4	72.8	



The “Clupeids” in the northern sector consisted mainly of *Ilisha africana* and *Sardinella maderensis*, whereas the dominant clupeid in the central region (*Engraulis encrasicolus*) was absent in the northern region. The carangids consisted mainly of African lookdown (*Selene dorsalis*) and Atlantic bumper (*Chloroscombrus chrysurus*), while the catch rates of the dominating carangid in the central region, the Cunene horse mackerel (*Trachurus trecae*) was down to one third of the catch rates obtained in the central region. Figure 4.21 and 4.22 show the average catch rates of Cunene horse mackerel and all “other carangids” on the northern shelf (20-200 m) back to 1994. Figure 4.23 and 4.24 show the average catch rates of barracudas, mainly *Sphyraena guachancho*, on the northern shelf, and the hairtails, mainly *Trichiurus lepturus*, (down to 600 m as this group is found at all depths).

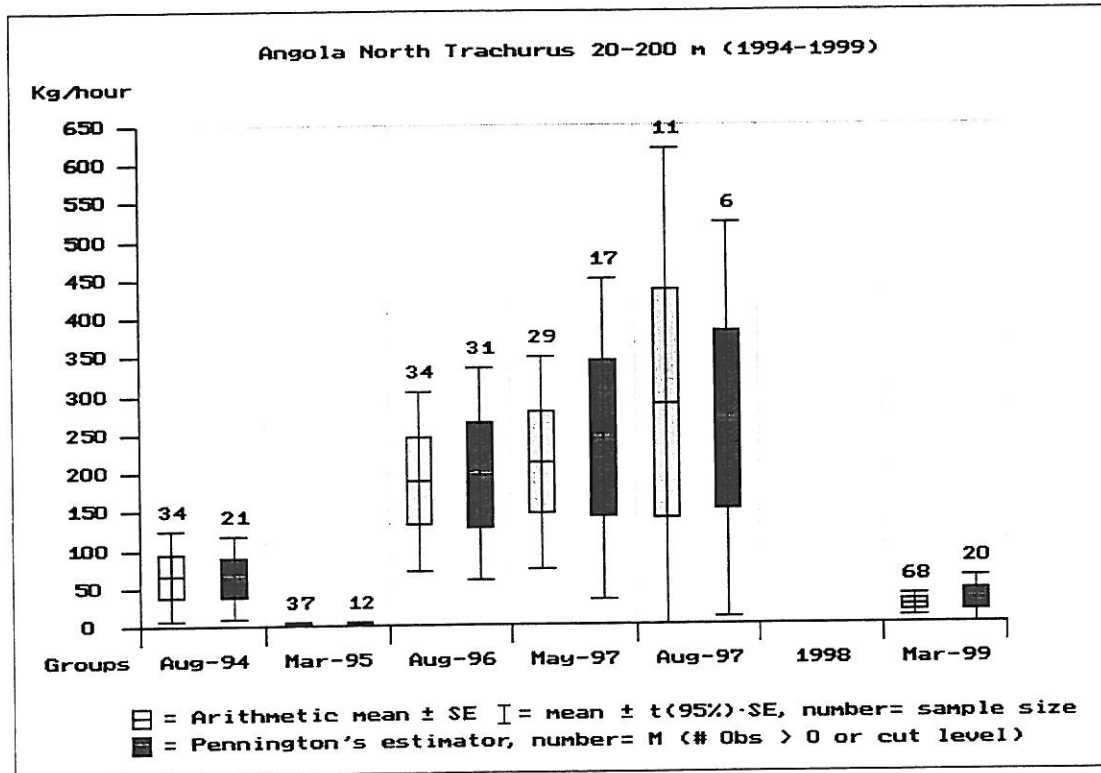


Figure 4.21. Mean catch rates of horse mackerel (*Trachurus trecae*) on the northern shelf

The pattern in catch rates of the Cunene horse mackerel over time in the northern and central region (Fig. 4.21 and 4.7) is very similar with a slight increase from 1994 to 1997, but very low catch rates in 1995 and during this cruise. For the “other carangids” (Fig 4.8 and 4.22) there is less similarity, probably because the proportion of different species is different in the two ‘groups’. However, the considerably higher mean catch rates observed in the northern sector in 1997, and also reflected in the estimated biomass (Table 4.8), is probably an overestimation resulting from a single huge catch (around 10 t/hr) of *Selene dorsalis* obtained during 14 minutes trawling at station 1346.

For the barracudas (Fig. 4.10 and 4.23) and the hairtails (Fig 4. 11 and 4.24), there are no clear pattern in the catch rates (except perhaps a slightly increasing trend for the hairtails in the northern region), but also no significant changes over time. Biomass estimates for all the pelagic groups are presented in Table 4.8.

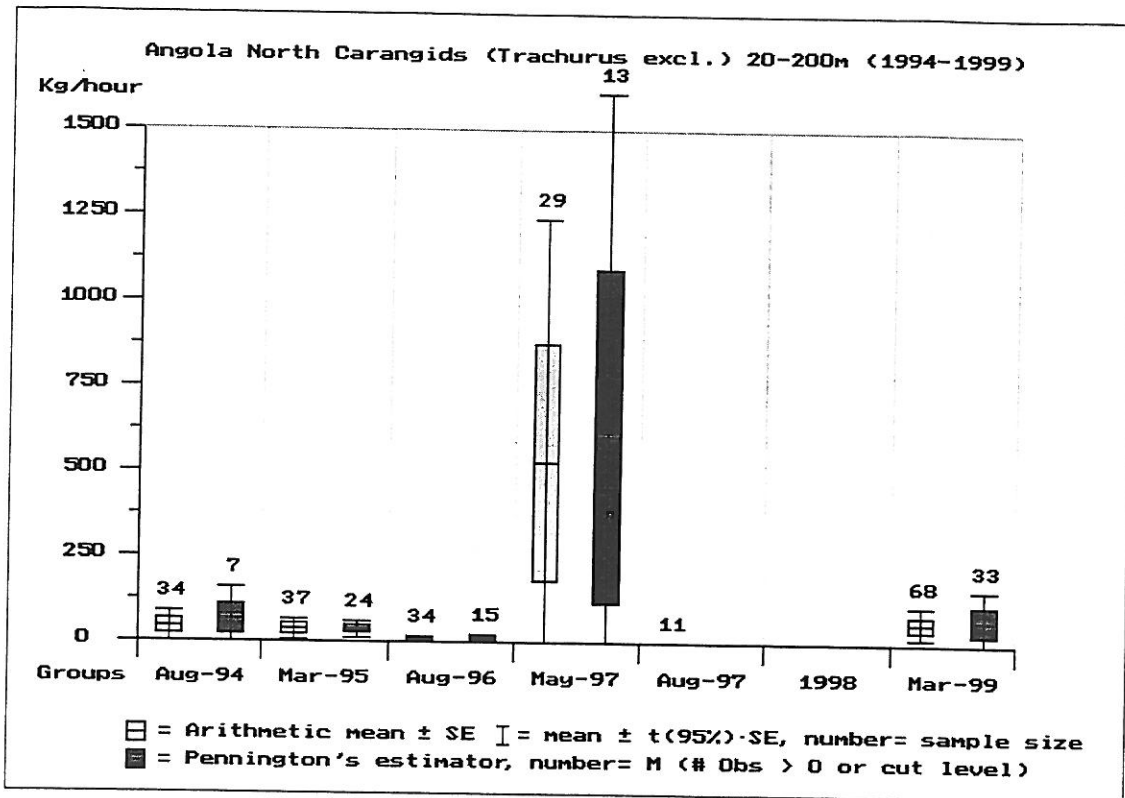


Figure 4.22. Mean catch rates of the family Carangidae, excluding Cunene horse mackerel (*Trachurus trecae*), on the northern Angolan shelf.

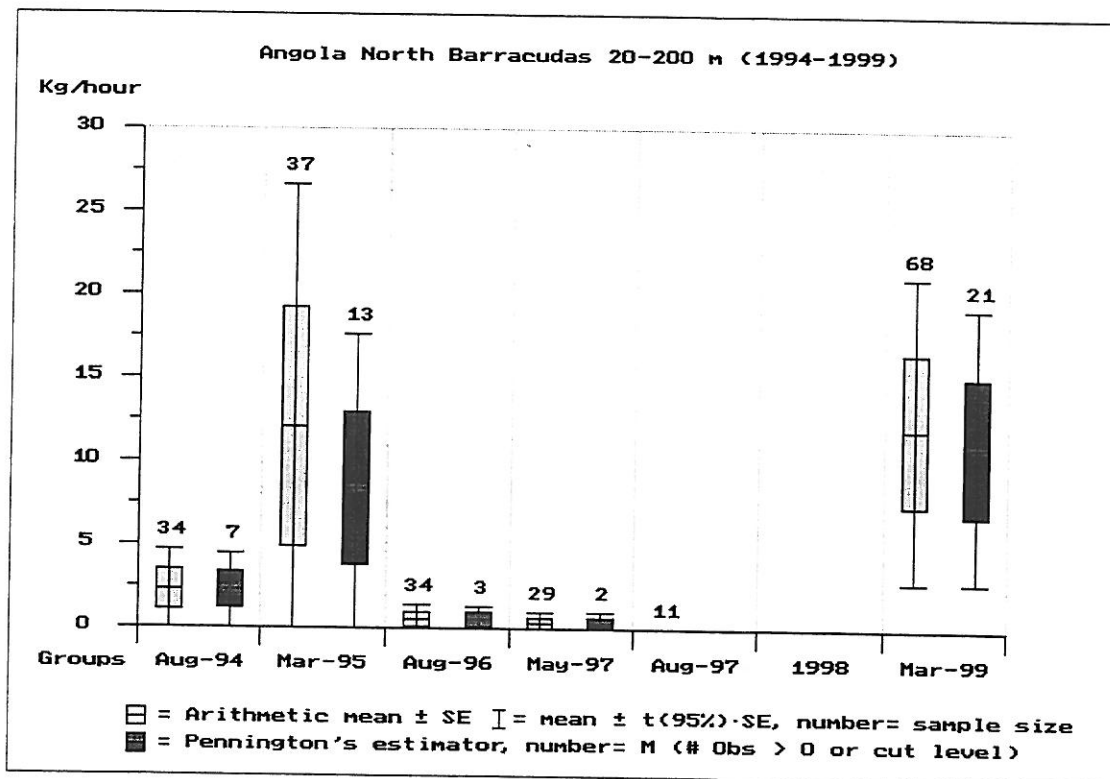
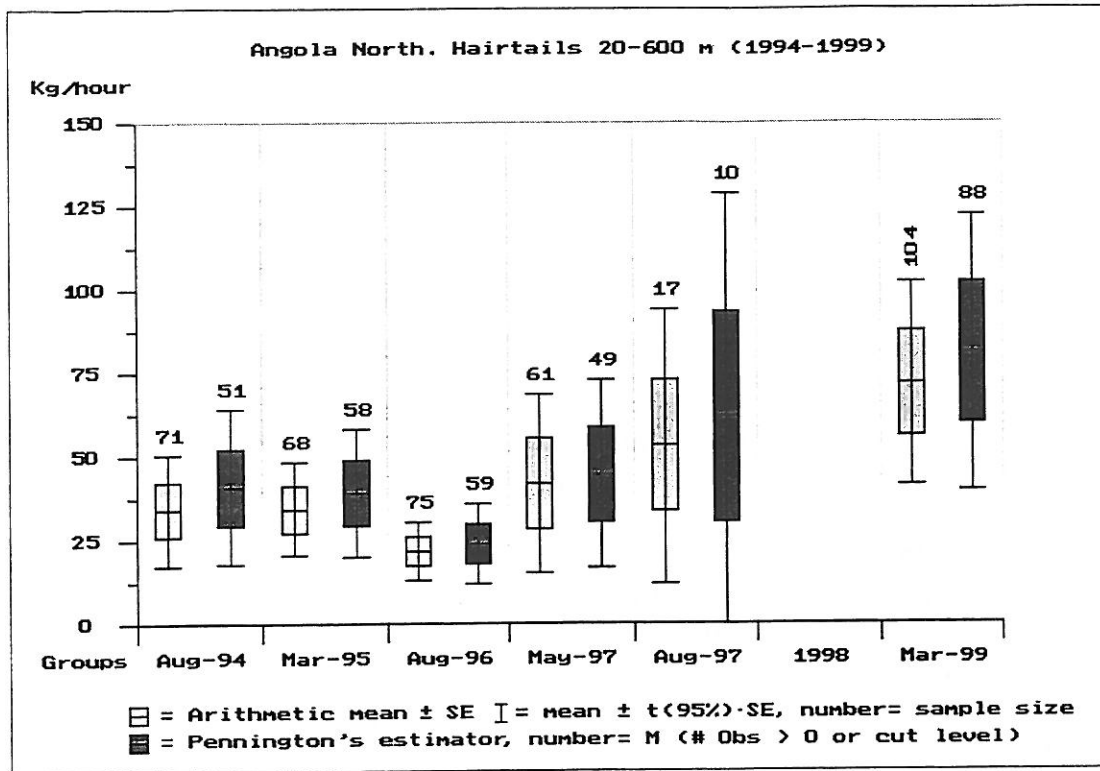


Figure 4.23. Mean catch rates of the family Sphyraenidae (barracudas), on the northern Angolan shelf.



**Figure 4.24.** Mean catch rates of the family Trichiuridae (hairtails) in the northern Angolan region (all depths down to 600 m).

#### 4.6 Demersal groups

Table 4.7,A and B presents the catch rates of the most valuable demersal species on the shelf down to 200 m grouped into 'families': seabreams (Sparidae except *Boops boops*), snappers (Lutjanidae), groupers (Serranidae), grunts (Haemulidae except *Brachydeuterus auritus*), and croakers (Sciaenidae).

Among the seabreams, *Pagellus belottii*, was the dominating species in the north (ANNEX III) followed by *Dentes angolensis*, *Dentex congolensis* and *Pagrus caeruleostictus*. *Dentex macrophthalmus* and *Dentex barnardi*, the first and third most important seabream species in the central region, were not found in the northern region during this cruise. Also Snappers were absent in the northern region. Groupers, mainly *Epinephelus aeneus*, were less common than in the central region but occurred in 30% of the catches from 20 to 300 m (Fig. 4.26). The groupers, like the seabreams (Fig 4.28), appear to have a distinct seasonal pattern in the catch rates, with higher catches during the winter season (August) than during the summer season (March). Among the grunts, the non-commercial bigeye grunt (*Brachydeuterus auritus*) was still the most important species in the north, but with a density of about one fourth of what was found in the central region. The other grunts were almost as abundant in the north as in the central region, but *Pomadysis incisus* and *P. jubelini* had swapped order of importance. *P. rogeri* was absent in the north but a new species *P. peroteti* occurred. The time series of grunts in the two regions (Fig 4.13 and 4.25) are almost identical in the two regions.

Croakers, mainly *Umbrina canariensis*, *Argyrosomus hololepidotus*, and *Pseudotolithus typus*, were still common in the north, but with slightly lower catch rates than in the central region.

The catch rates of seabreams in the northern sector (Fig 4.28) were generally less than half of those found in the central region. Otherwise, apart from the apparently distinct seasonal variation in the north, the time series indicate, like in the central sector, a remarkable stable situation. Also the distribution pattern (Fig. 4.29) seems pretty consistent with previous surveys.

Biomass estimates of the commercially important demersal groups in the northern region are presented in Table 4.8. It should be noted that the time series of the biomass estimates (previous values taken from earlier reports) and those of the catch rates (presented in this report) do some times not correspond. For example, the seabreams had biomass estimates in 1994 and 1996 around 3 times higher than those of 1995, 1997 and the present survey, while the catch rates (Fig. 4.28) were only 16% and 30% higher in 1995 and 1996, respectively, compared to the present survey. Similarly, the mean catch rates of seabreams in 1995 and 1997 were identical (48 kg/hr), while the biomass estimates of these two years differ with 2000 tonnes. Also for grunts there seems apparent inconsistencies between the biomass figures and the catch rates (Fig. 4.25). As already mentioned, this calls for a reassessment of the biomass figures.

**Table 4.7.** Northern sector March 1999. Catch rates ( kg/hour) of valuable demersal species grouped by families. A: Inner shelf (20-70 m), B: Outer shelf (71-200 m).

A. Inner shelf 20-70 m

STAT	Depth	Seabream	Snappers	Groupers	Grunts	Croakers	Other	Total
1899	32	4.7		18.9	69.0	89.0	2347.6	2529.2
1900	49	197.5			357.0	118.8	2048.3	2721.6
1901	32				9.2	38.6	1151.6	1199.4
1902	55	36.2			210.8	83.0	832.1	1162.0
1913	30				87.6	233.7	1985.6	2306.9
1914	53	115.6			130.6	55.3	258.3	559.9
1920	44	17.2		1.9	4.5	291.0	587.3	901.9
1921	27				70.4	48.0	1484.5	1602.9
1927	66	439.3			28.7		674.7	1142.8
1933	49	6.6			546.1		270.5	823.2
1935	21	10.7		0.6		1.3	273.7	286.2
1936	45	5.4					15.8	21.2
1937	54	126.5		38.1			79.7	244.3
1961	50	21.6					17.6	39.2
1970	40	13.0			0.6		13.6	27.2
1971	55	0.7					43.8	44.5
1977	44	6.2		8.0	1.5	36.3	247.8	299.8
1978	65	14.3		7.6			137.9	159.8
1985	32	5.4					4.2	9.7
1986	46	26.1		12.9			19.4	58.4
MEAN	44.5	52.4	0.0	4.4	75.8	49.8	624.7	807.0
SE	2.8	23.5	0.0	2.1	32.1	18.3	171.5	197.6
% CATCH		6.5	0.0	0.5	9.4	6.2	77.4	

Table 4.7 continued.

## B. Outer shelf 71-200 m

STAT	Depth	Seabream	Snappers	Groupers	Grunts	Croakers	Other	Total
1889	191	18.1					1262.3	1280.4
1890	83	51.5				7.6	1876.9	1936.1
1891	78	21.7	1.6			4.1	671.1	698.5
1892	109	59.6				0.8	270.1	330.6
1893	178	43.8				24.0	1410.2	1478.0
1896	153	2.7					94.1	96.7
1897	112	15.5			6.7	2.5	113.7	138.5
1898	87	11.2				10.3	1948.4	1969.9
1903	98	63.8		27.2		15.2	1449.5	1555.6
1904	140	33.4		2.1			958.3	993.9
1910	171	39.7					1737.1	1776.8
1911	110	147.4		0.5		1.1	1563.5	1712.4
1912	76	110.0		86.5	48.9	63.2	478.9	787.4
1916	150	23.9		0.1			65.8	89.7
1917	109	66.5		0.6			78.5	145.6
1918	97	56.8					798.5	855.3
1919	80	42.1		1.4			185.7	229.3
1924	187	27.9				26.4	1084.1	1138.4
1925	106	189.8		97.5		1757.2	320.0	2364.4
1926	93	81.7		1.3			111.6	194.5
1930	119	162.8				4.8	1061.9	1229.5
1931	105	80.2					519.0	599.2
1932	73	100.3		1.2			1960.9	2062.5
1938	92	388.2		3.3			44.6	436.0
1939	165	49.2				6.1	600.2	655.5
1945	96	0.7					47.3	48.0
1946	124	39.1					398.8	437.9
1947	157	39.3				3.7	226.6	269.6
1952	117	60.9				5.6	153.7	220.2
1953	90	55.6					38.7	94.3
1954	77	297.9		2.9			155.3	456.0
1955	91	214.1					73.8	287.8
1956	104	57.6		14.4			127.4	199.4
1957	196	35.5				2.3	443.4	481.2
1962	77	44.7		17.3			17.0	79.1
1963	120	90.1					596.8	686.9
1964	175	30.7					809.8	840.5
1972	90	51.8		25.1			1728.4	1805.3
1973	121	152.4					41.6	194.0
1974	157	106.5					112.2	218.7
1979	84	112.8		2.2			13.1	128.1
1980	109	116.9					38.8	155.7
1981	120	386.9					32.4	419.4
1982	191	25.5				53.0	453.2	531.7
1987	83	35.4					629.4	664.8
1988	114	59.7					49.9	109.6
1989	180	23.0				48.5	158.9	230.4
MEAN	119.9	83.5	0.0	6.0	1.2	43.3	574.7	708.8
SE	5.4	12.7	0.0	2.8	1.1	37.3	89.6	94.9
% CATCH		11.8	0.0	0.9	0.2	6.1	81.1	

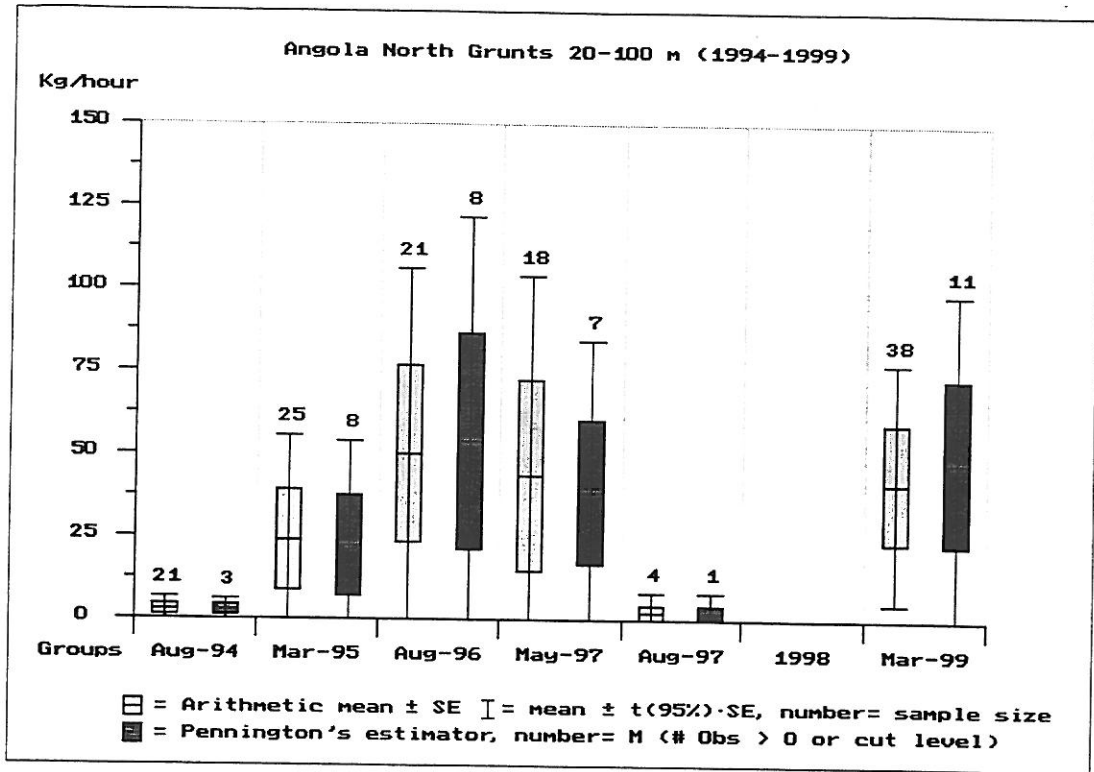


Figure 4.25. Mean catch rates of the family Haemulidae (grunts) in the northern Angolan region from 20 to 100m.

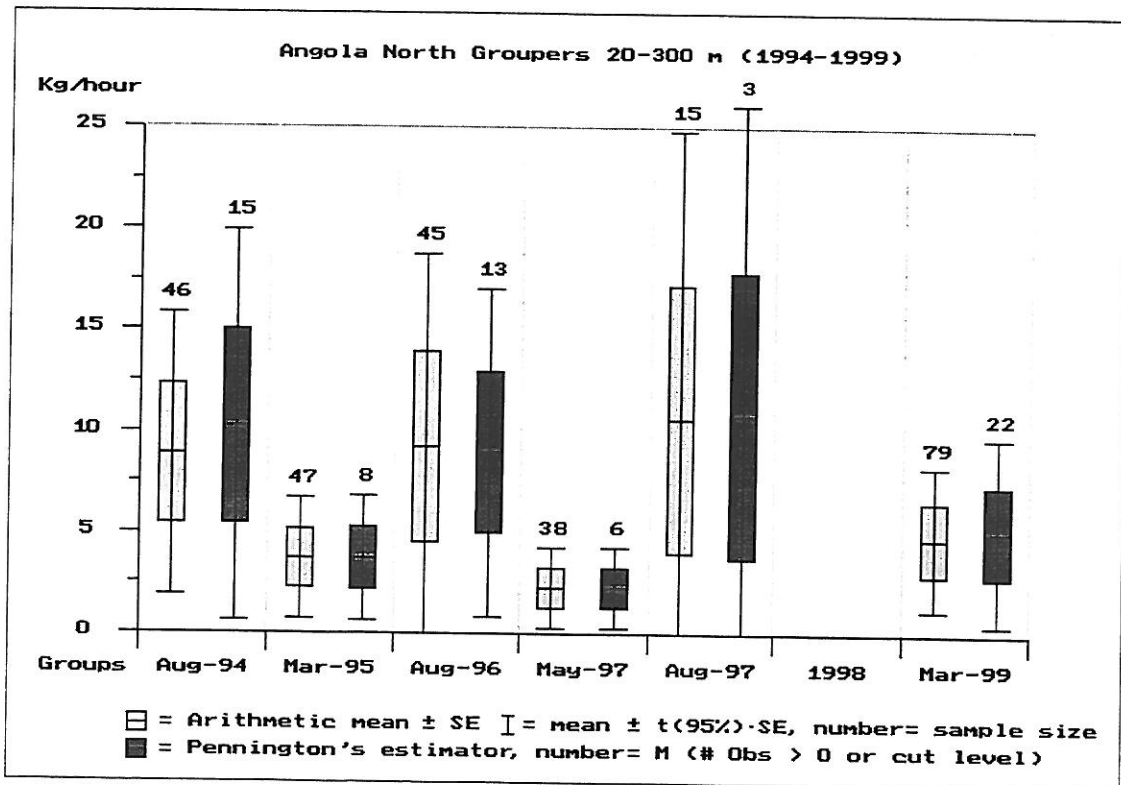


Figure 4.26. Mean catch rates of the family Serranidae (groupers) in the northern Angolan region from 20 to 300 m over the past 5 years.

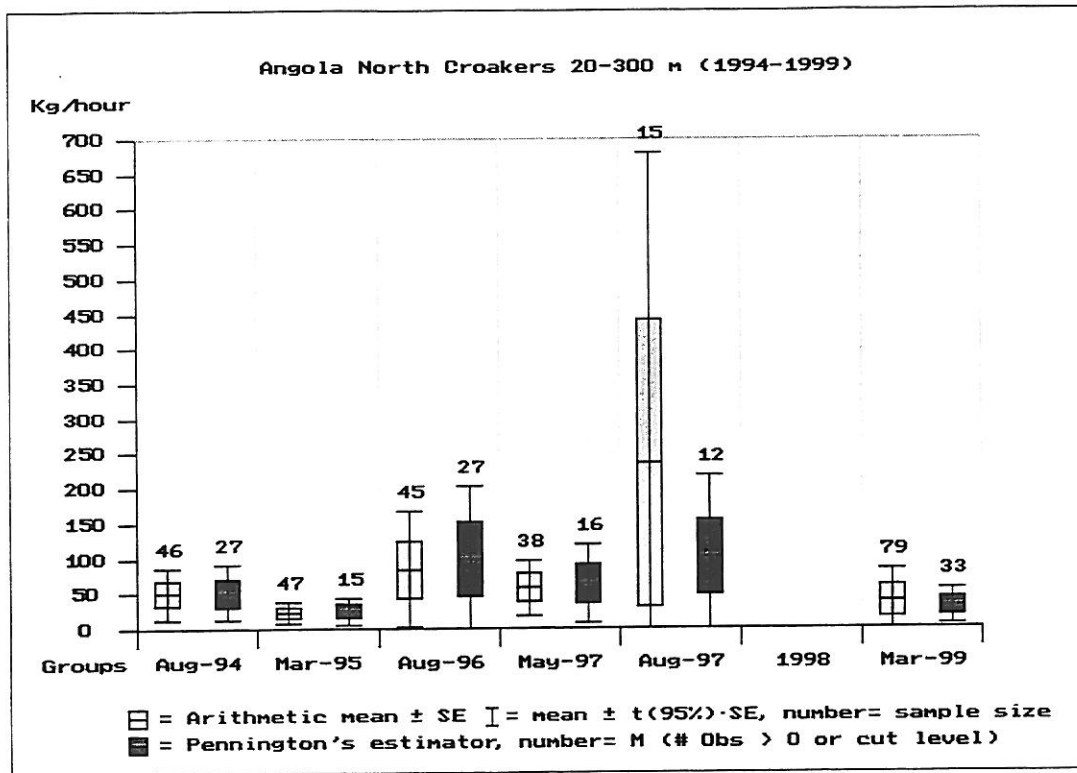


Figure 4.27. Mean catch rates of the family Sciaenidae (croakers) in the northern Angolan region from 20 to 300m.

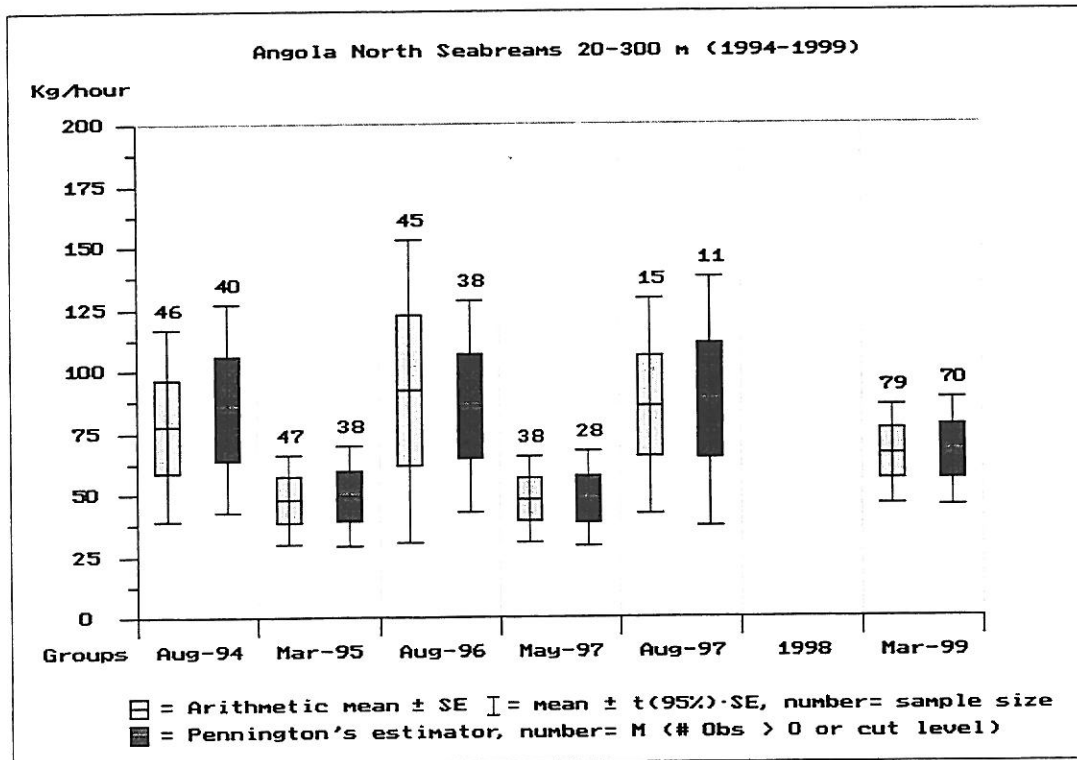
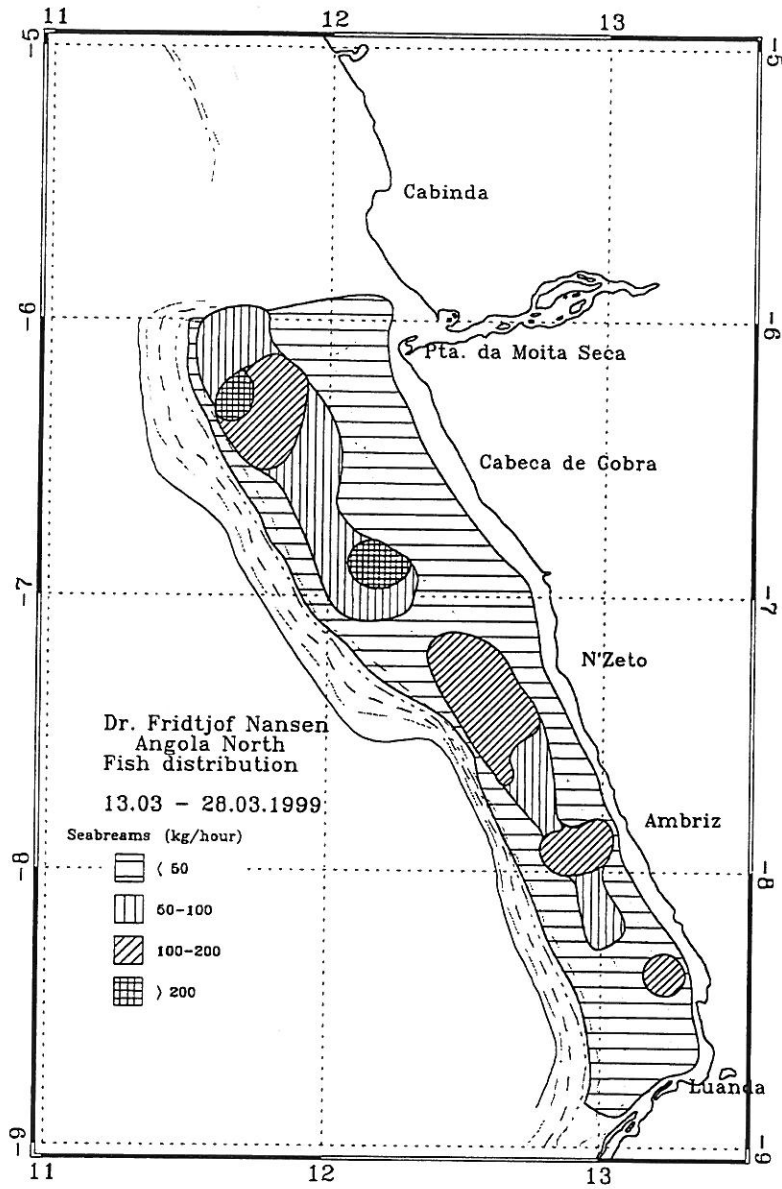


Figure 4.28. Mean catch rates of the valuable seabreams in the northern Angolan region from 20 to 300 m.



**Figure 4.** Estimated distribution of seabreams (family Sparidae).  
Congo River - Luanda.



Table 4.8. Biomass estimates (tonnes) of valuable demersal and pelagic fish by main groups on the shelf□, by year of investigation. The surveys between 1986-1997 covered the area from Cabinda to Luanda. The present 1999 survey covered the area Congo River to Luanda.

	Biomass tonnes◆											
	1986/I ☼	1989/I ☼	1991/II ◆	1992 ◆	1994 ◆	1995 ☼	1996 ◆	1997 ◆	1998 ◆	1999 ☼	1999① 95% confidence limits	
Seabreams	14700	9500	16500	16000	**31200	10100	**30200	12130		13670	9557	17783
Grunts	1400	840	2900	1000	900	4200	11200	10460	No	5630	1187	10074
Croakers	5200	4600	15600	14000	6100	4100	11600	10050	Survey	8641	0	17779
Groupers	740	950	940	3000	3200	900	3700	670		1020	274	1765
Sum demersal	22040	15900	35940	34000	41400	19300	56700	33310		28961	17133	40790
Bigeye grunt	42800	6900	19700	21000	17100	21200	57800	76610		37669	19172	56167
Horse mackerel	11900	9300	12000	20000	18500	600	44700	50950		4170	1659	6556
Other carangids	8900	1650	860	4000	13300	11800	3200	**143790		12409	3051	21766
Barracudas	1800	900	-	1000	820	4100	200	120		2371	736	4405
Hairtail	9600	2200	8300	7000	8900	11200	6700	9190		16931	9460	24401

◆ Note that different surveys have used different areas, depth strata, and depth limits in the biomass estimations (see text)

☼ summer season (February-March)

◆ winter season (May-September)

\*\* Note these figures are probably overestimated (see Figures 4.25 and 4.28)

① Stratified biomass estimates are made from equations (1) and (4), ANNEX IV, covering the whole depth range of the distribution, ANNEX IV. Since NAN-SIS does not produce variance estimates of the mean densities (ANNEX III), the 95% confidence limits for this survey were calculated from the assumption that the coefficient of variation (SD/mean) is constant between catch rates in kg/hour and  $t/NM^2$ , in other words that the area swept (normalised per hour) is approximately constant during the survey. Coefficients of variation by depth strata for the various groups were obtained from the GRAFER module which is linked to NAN-SIS and equations (2), (3), (6) and (7) in ANNEX IV were used to calculate SE and confidence limits.

#### 4.7 Review of results

Table 4.4 and 4.8 give the time series of biomass estimates of the most important 'inshore' species for the central and northern sector respectively. For the 'demersal' species, seabreams, grunts, croakers, and groupers, the estimates of this survey are close to all the previous years, except for seabreams and grunts in 1998 in the central sector, and for seabreams in 1994 and 1996 in the northern sector, which had considerably higher estimates. As explained in the text, all these higher figures are probably overestimations. All other figures in the time series are contained within the 95% confidence intervals estimated for this year in both the northern and central sector. There is perhaps a slightly increasing trend in the overall demersal biomass over the past 5 years, but all the valuable species seem to have remained stable.

For the 'pelagic' species there is more variation, particularly for horse mackerel, barracudas, and hairtail, although few of the changes are statistically significant. Still, the pelagic species appear to be more influenced by the oceanographic conditions, with horse mackerel fluctuating negatively with the warm, low salinity events in 1995 and this year, while 'other' carangids and barracudas are fluctuating in opposite phase.

As emphasized in this report, there is an urgent need to reassess the biomass figures in a standardised way, using the same areas, depth stratification, distribution ranges, and with proper confidence intervals. This work has now been initiated as a separate activity within the co-operation between IIP and IMR. For this reason, no attempt has been made in this report to extend the traditionally presented summary of the biomass estimates for valuable demersal fish in the period 85 - 98.

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

The slope (from 201 to 600m) of the central Sector (Luanda-Benguela) was covered with 26 swept-area hauls, and the slope of the northern sector (Congo River- Luanda) was covered with 38 hauls. The distribution of the hauls by sector, position and depth intervals are shown in Table 2.1 and Figures 2.1 and 2.2. The results from the swept-area analysis by sector and depth intervals are presented in ANNEX III.

Table 5.1 and 5.2 show the composition of the catches on the slope by sector and main groups, using the same group definitions as in Table 4.1 (see ANNEX VI).

**Table 5.1.** Central sector March 1999. Catch rates (kg/hour) by main groups in swept-area bottom trawl hauls on the slope (201-600 m).

STAT	Depth	Demersal	Pelagic	Shrimp	Cephalopods	Sharks	Other	Total
1812	421	25.1	5.8	8.5		120.4	187.9	347.7
1818	600		1.6	0.5	0.6		237.4	240.1
1825	219	402.3	56.4	1.4	24.6		435.2	919.9
1826	409	65.1	2.3	1.3	4.9	3.3	93.1	170.1
1827	599		23.8	148.2	1.1	4.0	96.7	273.8
1835	377	104.8	1.7	2.4	2.4	41.0	76.3	228.7
1836	539	7.1	8.3	91.9			345.8	453.1
1837	551		7.7	77.6	3.8	9.5	567.0	665.6
1838	220	653.7	45.4	9.7	23.5		291.3	1023.6
1845	440	304.2				28.4	102.1	434.7
1846	557		5.0	105.2	2.9	11.3	68.3	192.7
1847	341	315.8	39.5	7.5	31.0		2705.3	3099.2
1848	244	345.1		12.0	27.8		478.8	863.8
1854	337	49.2		8.3	0.8		451.3	509.6
1855	429	6.5	11.3	14.2	2.3		124.8	159.0
1856	554		32.3	42.8	0.7	3.4	246.9	326.1
1857	368	18.6	1.0	2.1	1.1	1.4	99.9	124.2
1858	237	257.0		1.7	15.6	5.4	1787.1	2066.9
1863	226	56.3	4.6	3.8	1.1	9.5	66.5	141.7
1864	446	19.2	3.0	176.7	1.5		154.1	354.4
1865	399	44.8	6.0	57.4	3.1		427.2	538.6
1866	311	5.9	44.8	27.7	13.6	45.6	3414.4	3552.0
1867	232	151.9	19.6	9.0	4.6		967.5	1152.7
1877	430	111.8	16.1	20.0		55.4	151.9	355.1
1878	233	147.9		1.2	1.1		148.6	298.8
1879	276	23.1		14.6	1.4		277.7	316.8
MEAN	384.4	119.8	12.9	32.5	6.5	13.0	538.6	723.4
SE	25.0	32.2	3.3	9.5	1.9	5.3	163.0	172.0
%CATCH		16.6	1.8	4.5	0.9	1.8	74.5	

**Table 5.2.** Northern sector March 1999. Catch rates (kg/hour) by main groups in swept area bottom trawl hauls on the slope (201-600m).

STAT	Depth	Demersal	Pelagic	Shrimp	Cephalopods	Sharks	Other	Total
1887	558	8.4	3.8	150.1		6.2	279.0	447.4
1888	331	92.8		4.8	1.3		470.9	569.7
1894	376	137.0		29.9	4.7		37.7	209.2
1895	443	22.9	26.5	57.1	0.6	31.2	79.1	217.4
1905	317	13.3	1.4	4.9			339.0	358.7
1906	542		15.1	382.7		36.4	114.2	548.4
1907	504		4.4	911.9	6.8	62.6	79.2	1065.0
1908	407	193.4	161.0	289.3	2.8	13.4	126.6	786.6
1909	319	370.8	72.4	11.4	15.6		303.4	773.6
1915	601	5.3		319.7		29.4	77.3	431.7
1922	500	2.7	3.5	451.8	7.6	47.7	89.5	602.9
1923	348	133.8	82.8	160.0	17.5		175.0	569.1
1928	247	24.5	2.6	16.6	0.2		60.3	104.2
1929	333	288.2	1.8	2.2	1.8	20.2	295.2	609.3
1940	204	49.4	29.7		30.5	9.7	327.5	446.8
1941	274	25.2		30.1	26.2		484.4	565.9
1942	329	90.2		7.7			374.9	472.8
1943	424	46.0	6.8	170.5	2.8		116.6	342.6
1944	248	26.2	7.6	50.5	2.5		286.3	373.1
1948	239	7.0	7.5	21.5	2.4		186.9	225.2
1949	303	94.8	72.0	31.1	17.3		546.0	761.2
1950	389	191.5	38.4	11.4	1.7		222.0	465.0
1951	500	20.1	92.8	20.8	1.9		118.4	254.0
1958	250	33.0	21.6	42.0	21.4		721.6	839.6
1959	363	12.8	64.1	54.3	2.6		117.5	251.3
1960	502	8.0	8.2	10.9	1.0	9.7	222.8	260.6
1965	223	49.7	503.6		28.4	2.6	82.4	666.6
1966	275	16.1	42.2	31.2	40.4		828.8	958.7
1967	322	9.1	41.0	54.0	23.4		479.2	606.7
1968	419	125.8	254.1	17.1	47.8	18.0	88.3	551.0
1969	477	40.1	16.3	8.1	0.5	5.8	44.1	115.0
1975	246	24.3	13.2	10.0	71.0		139.1	257.6
1976	291		2.1	14.2	18.1		1211.8	1246.3
1983	262	23.1	24.6	21.8	427.8		146.6	643.9
1984	590	4.7	1.9	56.8	3.2	8.5	159.1	234.2
1990	228	75.5	33.9	9.4	24.4		141.6	284.9
1991	378	19.9	5.1	82.1	5.3		60.8	173.1
1992	459	16.4	4.0	26.9	0.6	17.6	128.9	194.3
MEAN	369.0	60.6	43.8	94.1	22.6	8.4	256.9	486.4
SE	18.2	13.5	14.9	28.5	11.3	2.4	40.0	43.8
% CATCH		12.5	9.0	19.3	4.7	1.7	52.8	

As seen from Table 5.1 and 5.2, the general trends found on the shelf are to a large extent repeated on the slopes. The overall catch rates of the "Demersal" group in the Northern sector are only about half of those found in the Central sector, while the "Shrimp" and "Cephalopods" had generally higher catch rates in the north. Also the "Pelagic" group had relatively higher catch rates in the Northern sector than in the Central, while on the shelf they were almost the same. This general picture seems consistent with previous surveys. In terms of "by-catch" of the commercial shrimp fisheries, the central sector 'shrimps' contributed only 4.5% of the total catches on the slope, while in the northern sector this proportion is increased to 19%.

## 5.1 Deep water shrimp

Table 5.3 and 5.4 show the catch rates of the commercially most important demersal fish (seabream and hake), the most important shrimp species (*Parapeneus longirostris*, *Aristetus varidens*, and *Nematocarcinus africanus*), and 'other' (i.e. by-catch) species on the slopes of the central and northern sectors. As elaborated in Chapter 4, seabream is a major component on the slope down to 350 m, and in the central sector it was this year even more important than hake. Unlike the two previous years, deep-water shrimps were not caught at all stations, and the catch rates were generally low.

**Table 5.3.** Central sector March 1999. Catch rates (kg/hour) by main commercial groups in swept-area bottom trawl hauls on the slope (201-600m).

STAT	Depth	Seabream	Hake	P.longirostris	A.varidens	N.africanus	Other	Total
1812	421		25.1				322.7	347.7
1818	600				0.5		239.6	240.1
1825	219	381.8	20.5	1.4			516.2	919.9
1826	409		65.1			0.4	104.6	170.1
1827	599				6.0	142.2	125.6	273.8
1835	377		104.8			2.4	121.5	228.7
1836	539		7.1		61.2	26.8	358.1	453.1
1837	551				11.3	62.5	591.8	665.6
1838	220	633.3	20.4	9.7			360.3	1023.6
1845	440		304.2				130.5	434.7
1846	557				10.0	95.3	87.5	192.7
1847	341		315.8	7.5			2775.8	3099.2
1848	244	239.6	104.5	12.0			507.7	863.8
1854	337		49.2	8.3			452.1	509.6
1855	429		6.5		5.5	8.8	138.3	159.0
1856	554				5.0	37.9	283.3	326.1
1857	368		18.6	2.1			103.4	124.2
1858	237	63.5	193.5	1.7			1808.2	2066.9
1863	226	27.9	28.4	3.8			81.6	141.7
1864	446		19.2		6.2	167.2	161.8	354.4
1865	399		44.8		28.9	27.2	437.7	538.6
1866	311		5.9	27.7			3518.4	3552.0
1867	232	143.1	8.8	9.0			991.7	1152.7
1877	430		111.8		14.2	3.8	225.3	355.1
1878	233	147.9		1.2			149.7	298.8
1879	276	3.1	20.0	14.6			279.1	316.8
MEAN	384.4	63.1	56.7	3.8	5.7	22.1	572.0	723.4
SE	25.0	29.0	17.2	1.3	2.6	8.9	165.9	172.0
% CATCH		8.7	7.8	0.5	0.8	3.1	79.1	

**Table 5.4.** Northern sector March 1999. Catch rates (kg/hour) by main commercial groups in swept-area bottom trawl hauls on the slope (201-600m).

STAT	Depth	Seabream	Hake	P.longirostris	A.varidens	N.africanus	Other	Total
1887	558		8.4		5.9	143.5	289.6	447.4
1888	331		92.8	4.8			472.2	569.7
1894	376		137.0		3.3	26.6	42.3	209.2
1895	443		22.9		2.6	54.5	137.4	217.4
1905	317		13.3	4.9			340.4	358.7
1906	542					382.3	166.1	548.4
1907	504				1.4	910.5	153.1	1065.0
1908	407		193.4	1.4		287.3	304.5	786.6
1909	319		370.8	8.1			394.8	773.6
1915	601		5.3		6.2	307.7	112.5	431.7
1922	500		2.7		6.1	445.7	148.4	602.9
1923	348		133.8	4.0		155.9	275.3	569.1
1928	247		24.5	16.4			63.2	104.2
1929	333		288.2			2.2	318.9	609.3
1940	204	49.4					397.4	446.8
1941	274	16.2	9.0	30.1			510.7	565.9
1942	329		90.2	7.7			374.9	472.8
1943	424		46.0		3.0	155.8	137.8	342.6
1944	248	8.6	4.2	50.5			309.8	373.1
1948	239	6.0	0.9	21.5			196.8	225.2
1949	303		94.8	31.1			635.3	761.2
1950	389		191.5	8.6	2.8		262.1	465.0
1951	500		20.1		15.4		218.5	254.0
1958	250	33.0		42.0			764.5	839.6
1959	363		12.8	3.2	1.5		233.7	251.3
1960	502		8.0		6.1		246.6	260.6
1965	223	39.3					627.4	666.6
1966	275	16.1		31.2			911.4	958.7
1967	322		9.1			54.0	543.6	606.7
1968	419		125.8			17.1	408.1	551.0
1969	477		40.1		7.4		67.4	115.0
1975	246	21.9		10.0			225.7	257.6
1976	291			14.2			1232.1	1246.3
1983	262	0.9	12.0	21.8			609.1	643.9
1984	590		4.7		2.7	54.1	172.7	234.2
1990	228	41.1		9.4			234.4	284.9
1991	378		19.9		2.1	79.9	71.2	173.1
1992	459		14.2		7.1	19.8	153.2	194.3
MEAN	369.0	6.1	52.5	8.5	1.9	81.5	335.9	486.4
SE	18.2	2.1	14.0	2.1	0.5	29.0	40.9	43.8
% CATCH		1.3	10.8	1.7	0.4	16.8	69.1	

Figure 5.1 to 5.6 show the time series of catch rates of the three main shrimp species, Rose shrimp (*Parapeneus longirostris*), Striped red shrimp (*Aristetus varidens*), and African spider shrimp (*Nematocarcinus africanus*) in the depth intervals of their distribution by sector since 1994. As seen, the catch rates are low for all three species during this survey in both the northern and central sector, but (again not considering the two specialised surveys in August 1995, central sector, and August 1997) few of the changes are significantly different. Still, there seem to be some general trends: *Parapeneus longirostris* appears to have been fluctuating with low catches in 1996 and 1999, and perhaps a peak in 1997.

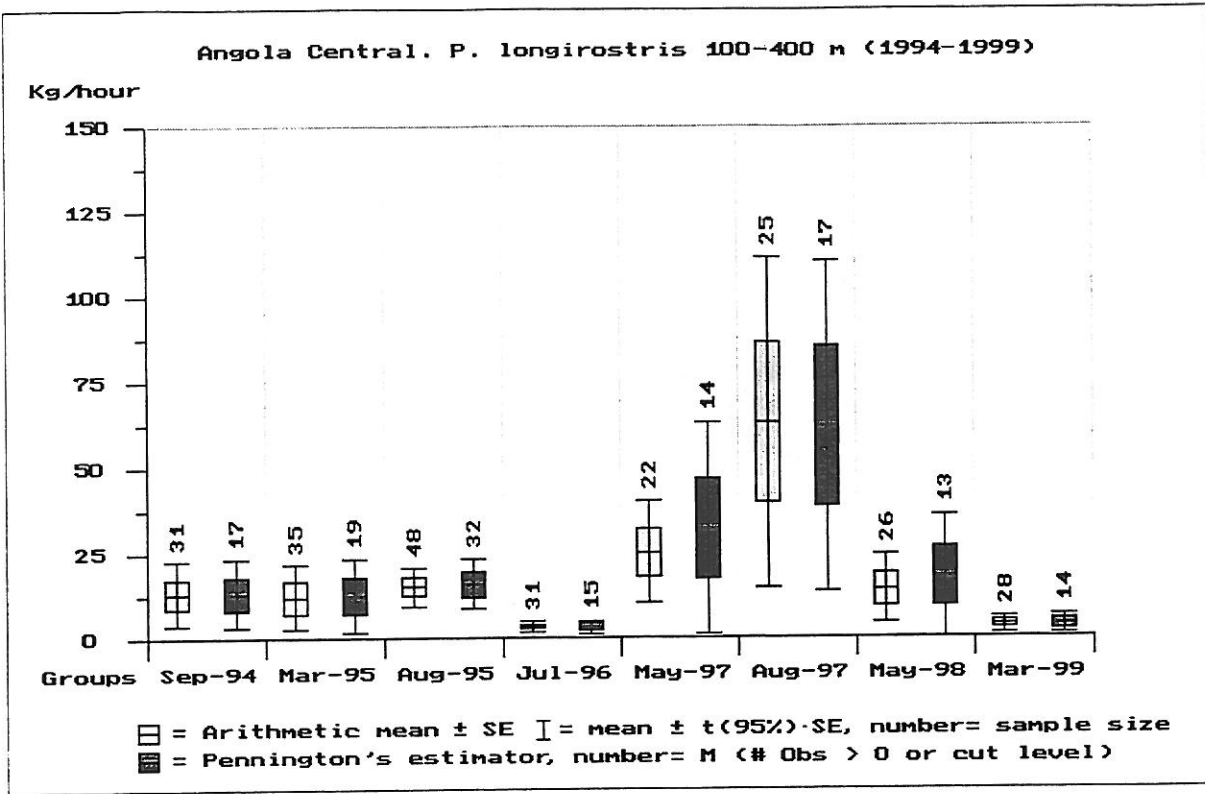


Figure 5.1. Mean catch rates (kg/hour) of the Rose shrimp (*Parapeneus longirostris*), on the Central Angolan shelf in the depth interval 100-400 m.

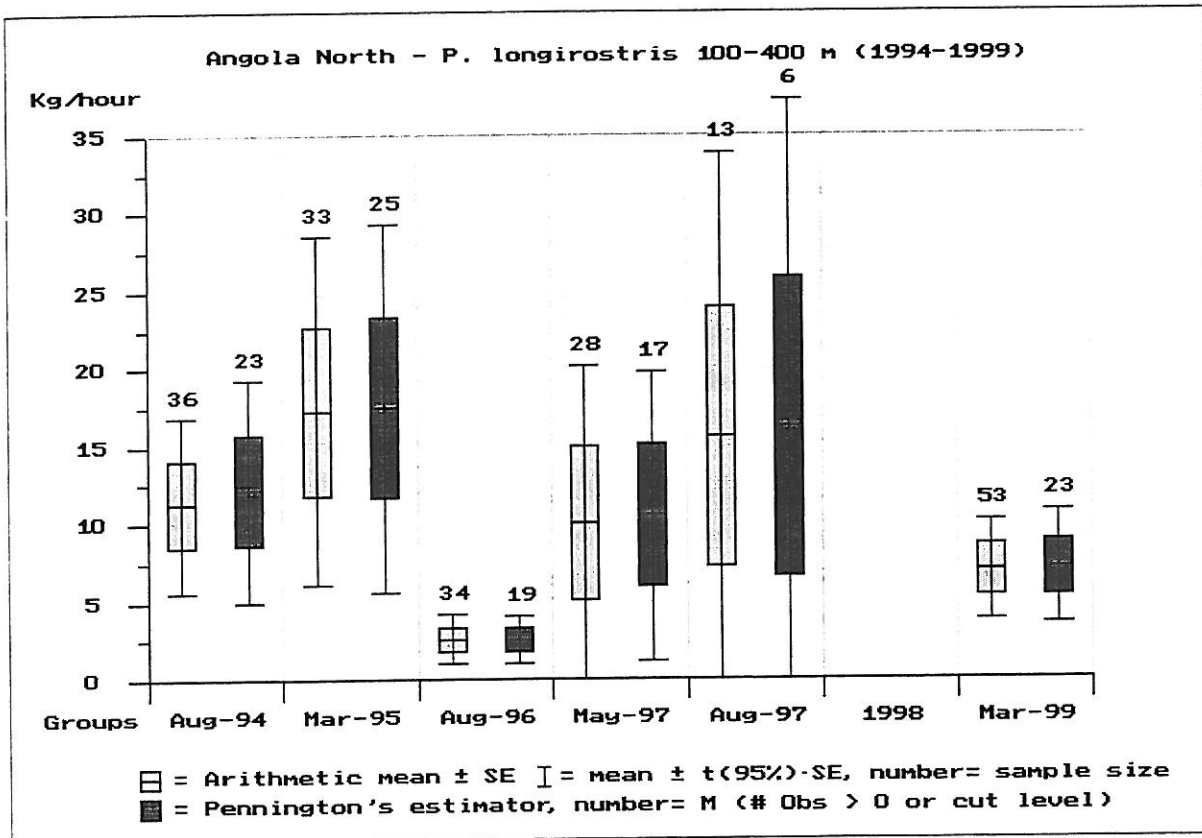


Figure 5.2. Mean catch rates (kg/hour) of the Rose shrimp (*Parapeneus longirostris*), on the Northern Angolan shelf in the depth interval 100-400 m.

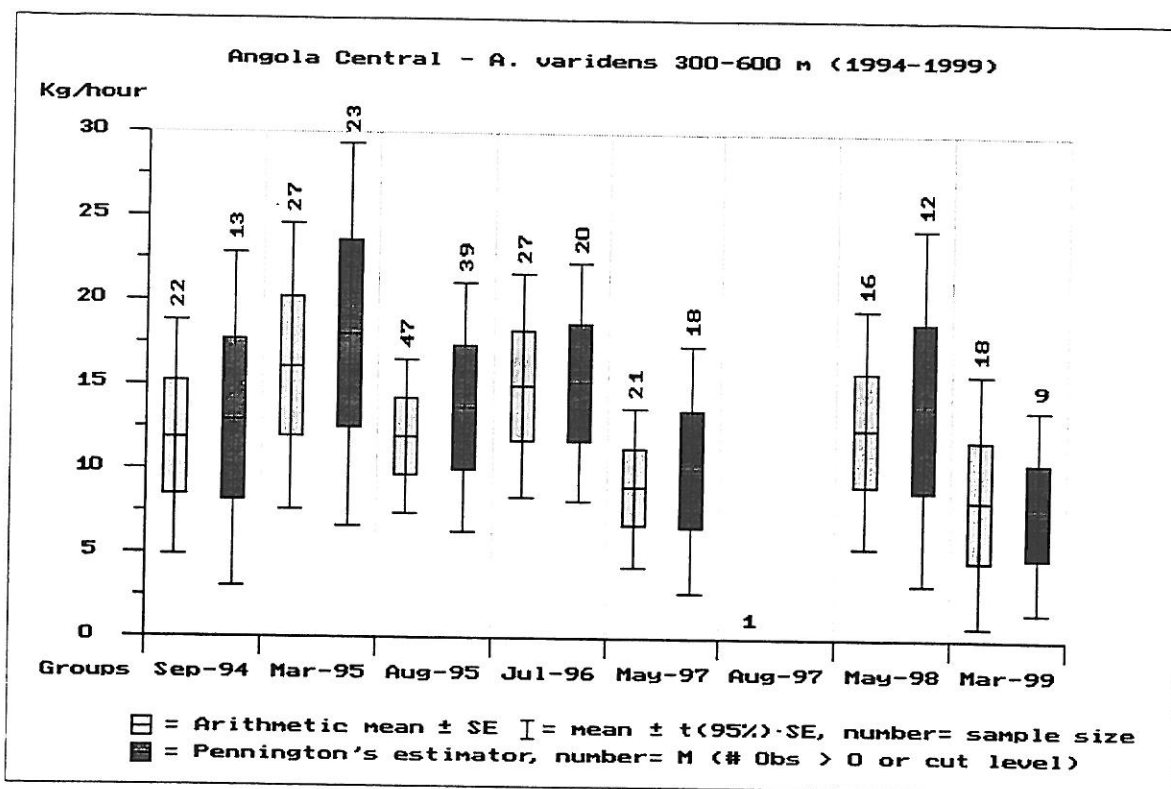


Figure 5.3. Mean catch rates (kg/hour) of the Striped red shrimp (*Aristetus varidens*), on the Central Angolan shelf in the depth interval 300-600 m.

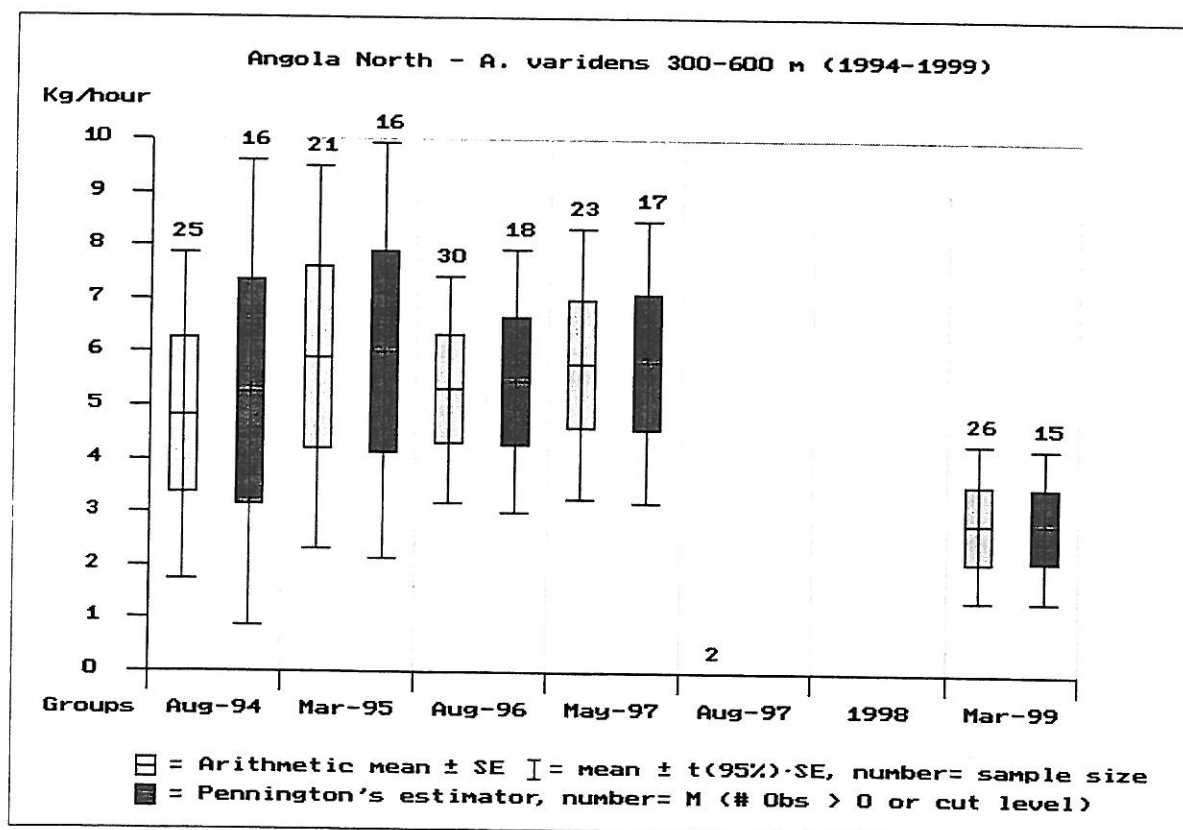


Figure 5.4. Mean catch rates (kg/hour) of the Striped red shrimp (*Aristetus varidens*), on the Northern Angolan shelf in the depth interval 300-600 m.



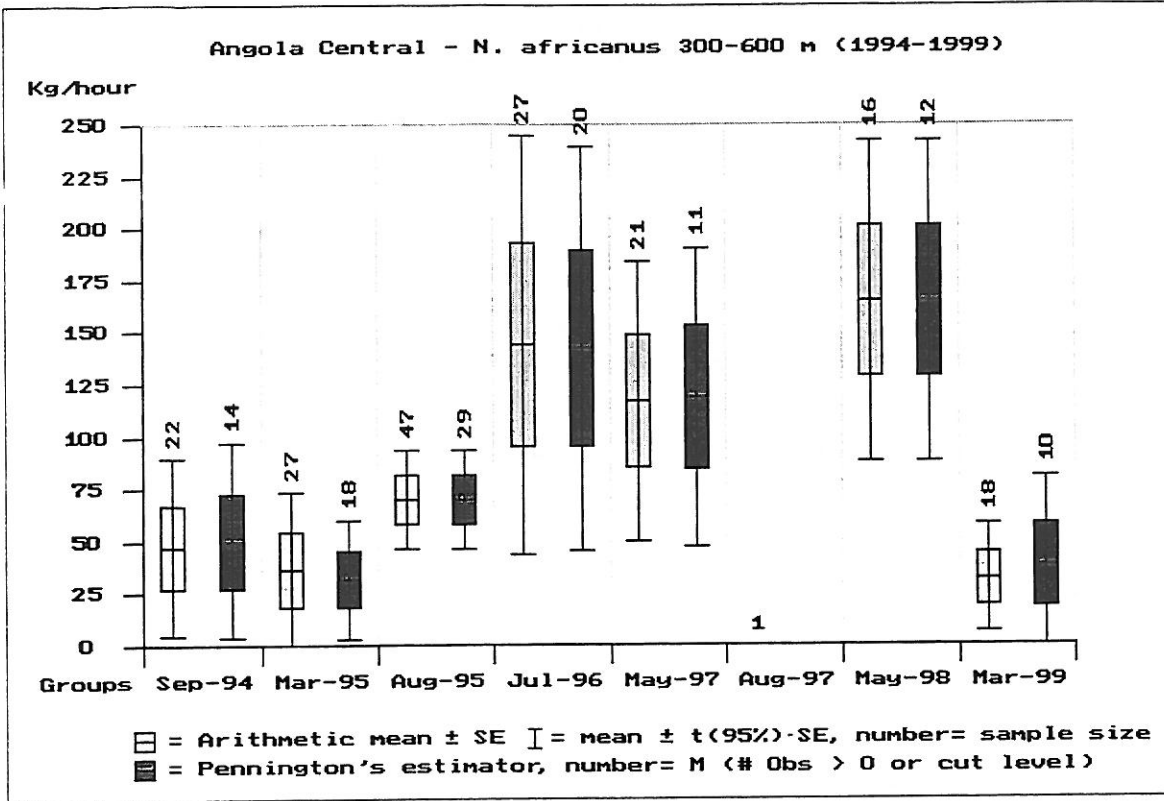


Figure 5.5. Mean catch rates (kg/hour) of the African spider shrimp (*Nematocarcinus africanus*), on the Central Angolan shelf in the depth interval 300-600 m.

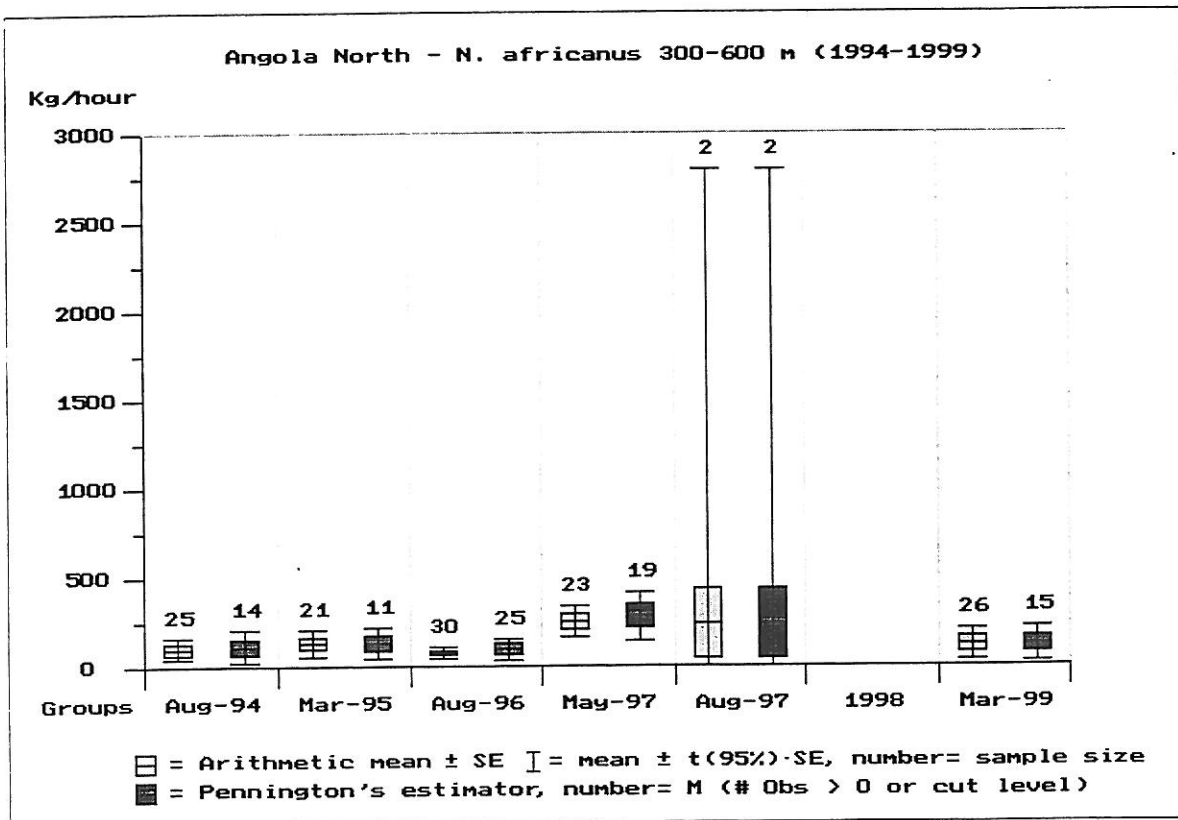


Figure 5.6. Mean catch rates (kg/hour) of the African spider shrimp (*Nematocarcinus africanus*), on the Northern Angolan shelf in the depth interval 300-600 m.

*Aristetus varidens* (Fig. 5.3 and 5.4) is generally more abundant in the central sector than the northern, but may have had a slight downward decline in both sectors since 1994-95. *Nematocarcinus africanus* (Fig 5.5 and 5.6) seems also to have been slightly fluctuating like rose shrimp with a peak from 1997 to 1998.

**Table 5.5.** Rose shrimp (*Parapenaeus longirostris*). Mean catch rates (kg/hour) by region, depth range and year of investigation. Note that the overall mean appears not to have been weighted before 1999 (see Fig 5.1 and 5.2).

Region/ Depth	Year of investigation										
	1986/I	1989	1991/I	1992	1994	1995/I	1995/2	1996	1997	1998	1999
Cabinda-Luanda*											
100-200 m	4	+	+	2	3	8	No	+	2	No	2
200-300 m	60	10	8	18	15	34	Survey	6	26	Survey	21
300-400 m	4	5	1	+	12	10		1	4		6
Mean	19	5	2	8	10	16		3	10		7
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	7
300-400 m	11	26	2	1	14	18	13	3	1	4	8
Mean	25	11	4	8	13	12	15	3	25	15	4

\* From 1997 the surveys did not cover the Cabinda area north of the Congo River.

Mean catch rates (kg/hour) of *Parapenaeus longirostris* by depth are shown in table 5.5. In both the northern and central sector, this species seem to have moved deeper this year than in all the previous years since 1995, but was not caught deeper than 400 m during this survey. This means that the low catch rates would still be representative for the stock levels.

**Table 5.6.** Striped red shrimp (*Aristetus varidens*). Mean catch rates (kg/hour) by region, depth range and year of investigation. Note that the overall mean appears not to have been weighted before 1999 (see Fig 5.3 and 5.4).

Area/ Depth	Year of investigation										
	1986/I	1989	1991/I	1992	1994	1995/I	1995/2	1996	1997	1998	1999
Cabinda-Luanda*											
300-400 m	3	+	+	1	+	2	No	1	1	No	1
400-500 m	1	3	4	6	6	14	Survey	9	10	Survey	3
500-500 m	37	5	1	7	10	3		6	7		5
600-800 m	-	3	-	4	5	3		2	4		-
Mean	13	3	2	4	5	5		5	5		3
Luanda-Benguela											
300-400 m	1	1	3	1	1	17	11	3	7	7	5
400-500 m	22	10	19	2	23	13	22	23	16	24	4
500-500 m	16	6	32	5	15	17	4	21	4	10	16
600-800 m	-	-	-	15	10	9	7	7	-	26	-
Mean	13	6	12	6	12	14	12	13	9	22	8

\* From 1997 the surveys did not cover the Cabinda area north of the Congo River.

Mean catch rates of striped red shrimp (*Aristetus varidens*) are presented in Table 5.6. Also this species seems to have moved deeper, and in 1998 (central sector) the highest mean catch rate was observed within stratum 600-800 m which was not covered in this survey. The declining trend in the catch rates (Fig. 5.3 and 5.4) may therefore not be representative for the stock size, and consequently the biomass estimates (Table 5.7) of this species cannot be fully trusted.

Biomass estimates of the main commercial shrimp species are presented in Table 5.7. Scarlet shrimp (*Plesiopenaeus edwardsianus*) is also included, although the abundance of this species has always been relatively small. The overall results of this survey are among the lowest in the time series, in agreement with the trends in the catch rates (Fig. 5.1- 5.4). However, not taking into account the possible effect of stratification, there seems to be some discrepancies between the biomass estimates and the overall catch rates in the period 1994 to present. Again it seems to be a need for a reassessment of the biomass estimates.

**Table 5.7.** Biomass (tonnes) of commercial deep water shrimps by sector and year of investigation.

Sector/ Species	Year of investigation											1999 95% CL
	1985/I	1986/I	1989	1992	1994	1995/I	1995/2	1996	1997	1998	1999	
Cabinda-Luanda*												
Rose shrimp	380	150	550	615	1110	1580	No	210	830	No	540	305-775
Striped red shr.	-	1200	400	515	610	500	survey	440	590	Survey	148	75-222
Scarlet shrimp	-	+	+	130	+	+		50	10		42	5-78
Luanda-Benguela												
Rose shrimp	-	3400	700	680	710	460	750	130	1780	847	227	82-372
Striped red shr.	-	1000	370	570	890	940	730	850	370	1493	503	102-903
Scarlet shrimp	-	100	+	+	+	+	+	90	10	187	14	0-30
Total		5850	2020	2570	3410	3480		1770	3580		1474	

\* From 1997 the surveys did not cover the Cabinda area north of the Congo River.

## 5.2 Benguela hake

Figure 5.7 and 5.8 show the time series of catch rates of Benguela hake (*Merluccius polli*) in the Central and Northern sector for period 1994-1999 in the depth range 100-600 m, and table 5.8 show the mean catch rates in both sectors by depth zones. The overall trend in the two sectors seems to be identical by a general slow increase until 1997, followed by a fast decrease. The mean catch rate obtained in the present survey were considerably lower than in any of the previous surveys, although significantly different values are only found in the Central sector in 1995 and 1997.

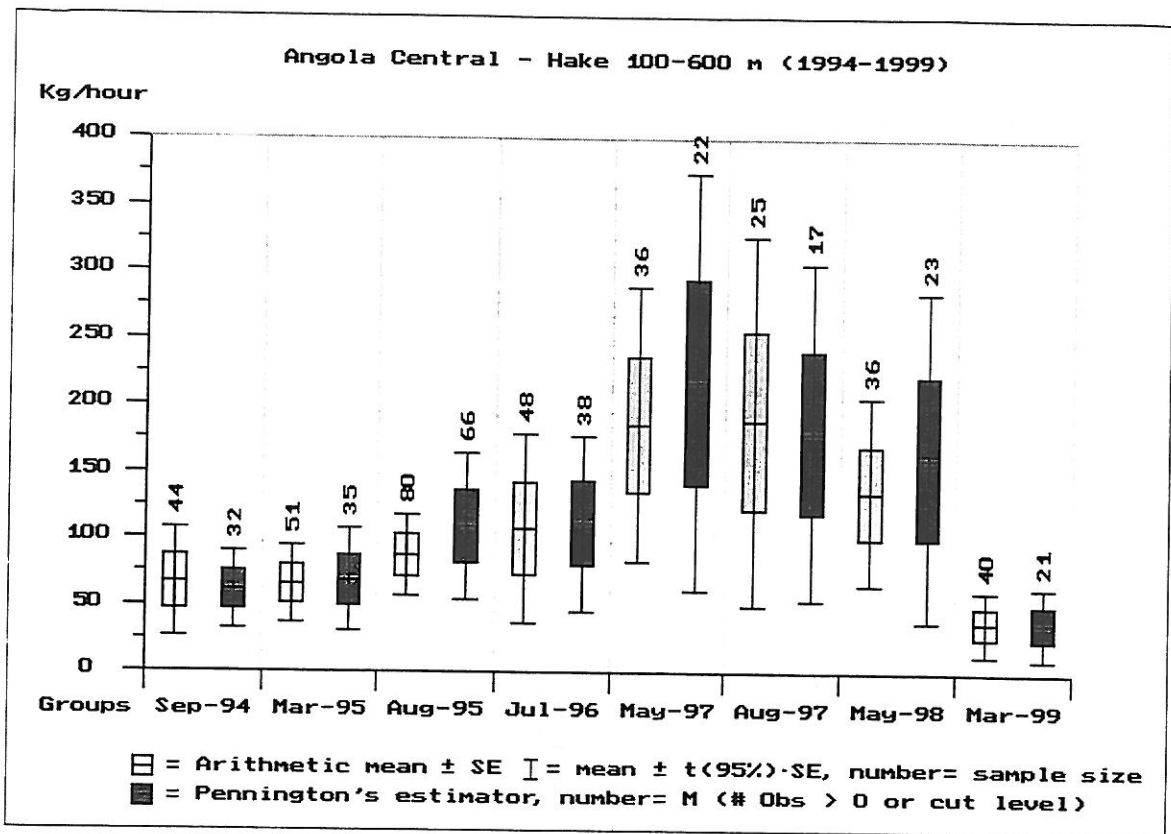


Figure 5.7. Mean catch rates (kg/hour) of the Benguela hake (*Merluccius polli*), on the Central Angolan shelf in the depth interval 100-600 m.

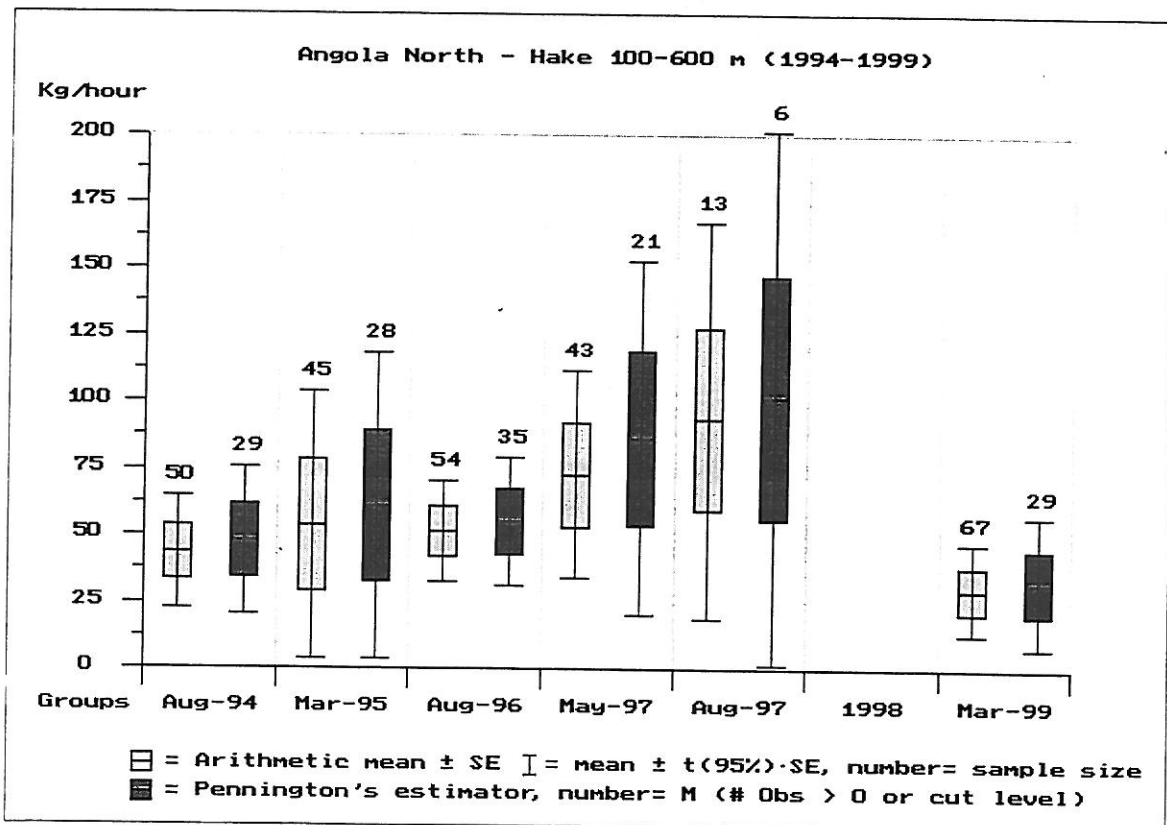


Figure 5.8. Mean catch rates (kg/hour) of the Benguela hake (*Merluccius polli*), on the Northern Angolan shelf in the depth interval 100-600 m.

Also the frequency of occurrence in the trawl hauls appear to have been among the lowest observed during this survey, with hake occurring in 50% of the hauls only. There seems to be a positive correlation between the catch rates of hake and shrimps, particularly with *Parapenaeus longirostris* (Fig. 5.1 and 5.2), and, like the shrimp, also the hake seem to have moved deeper in the present survey compared with 1996 and 1997. However, the distribution appears to have been largely covered within the 600 m isobath which indicate that the catch rates can be used for biomass estimates. It therefore seems that the decrease in overall catch rates and biomass is mainly due to stock changes on the upper part of the slope from 200 to 400 m.

**Table 5.4.** Benguela hake (*Merluccius polli*). 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/I	1995/2	1996	1997	1998	1999
Cabinda-Luanda*											
100-200 m	+	3	1	13	+	2	No	-	+	No	+
200-300 m	59	44	11	104	28	9	Survey	43	63	Survey	4
300-400 m	289	145	382	264	134	194		136	302		121
400-500 m	258	223	564	224	43	86		96	17		74
500-600 m	83	25	28	21	12	6		7	3		6
600-800 m	-	56	-	12	1	10		8	2		-
Mean	114	72	203	90	40	47		48	65		30
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	25
300-400 m	822	82	384	220	55	196	197	330	44	423	87
400-500 m	433	291	394	174	64	80	121	116	93	247	88
500-600 m	45	44	180	39	52	27	8	44	2	9	1
600-800 m	-	-	-	10	5	30	3	10	-	5	-
Mean	378	93	138	91	63	61	74	95	185	140	32

\* From 1997 the surveys did not cover the Cabinda area north of the Congo River.

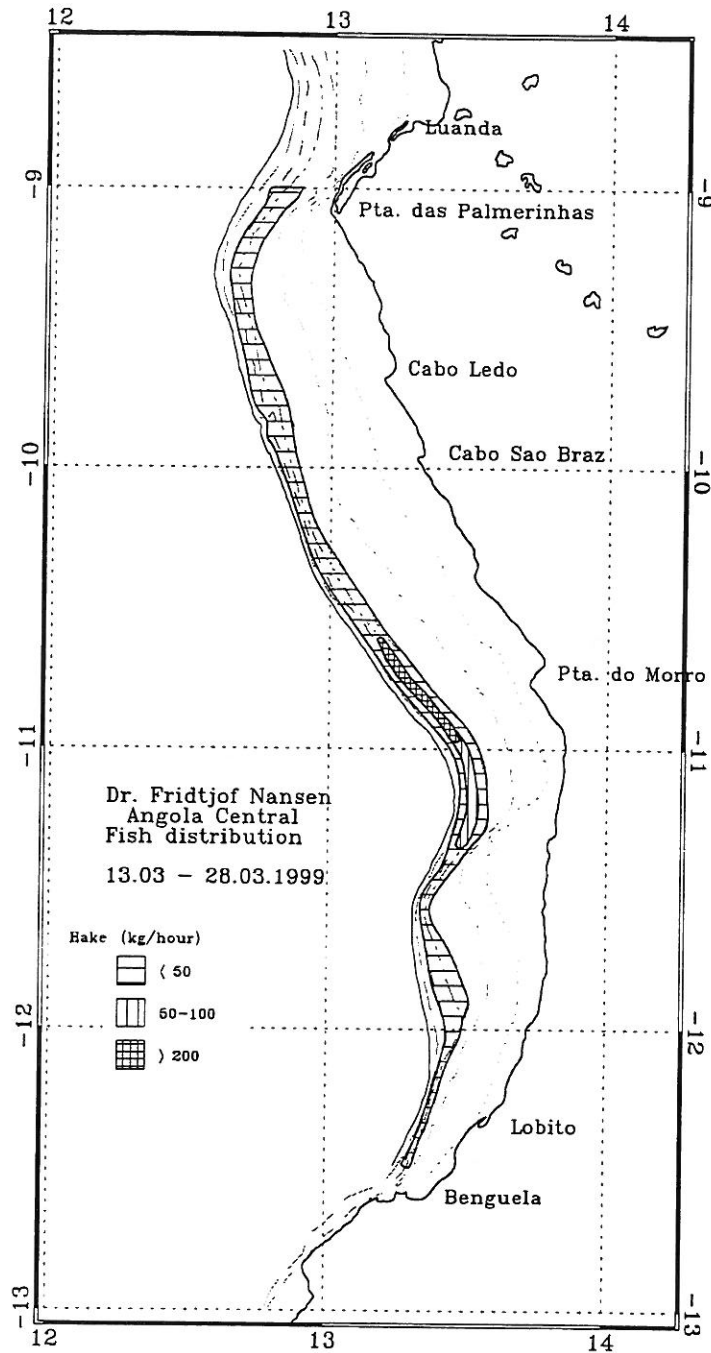
Biomass estimates of hake are presented in Table 5.5. In both the northern and central sector the present results are the lowest in the time series.

**Table 5.5.** Biomass estimates (tonnes) of hake by sector and year of investigation.

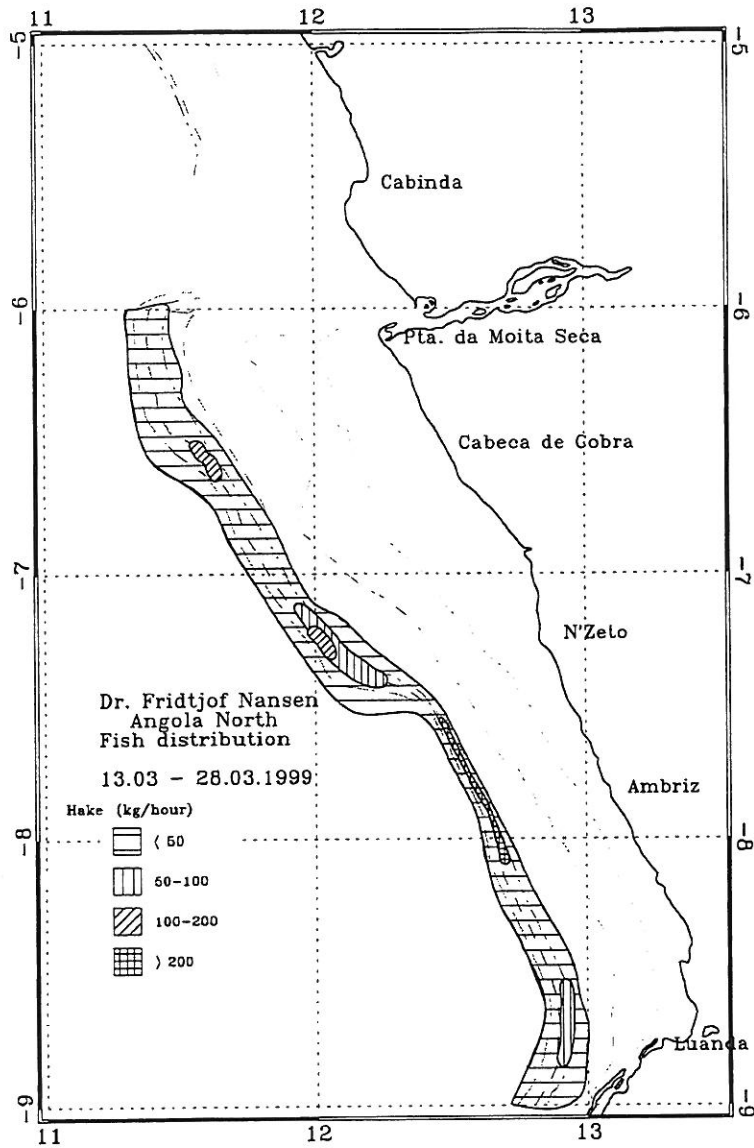
Sector	Year of investigation											1999
	1986/I	1989	1991/I	1992	1994	1995/I	1995/2	1996	1997	1998	1999	95% CL
Cabinda-Luanda*	17000	15300	18000	14000	4700	7100	No survey	6170	8500	No survey	3431	1947-4915
Luanda-Benguela	31400	5300	11000	8100	6670	4950	6830	7510	15230	11370	2987	1158-4816
Total	48400	20600	29000	22100	11370	12050		13680	23730		6418	

\* From 1997 the surveys did not cover the Cabinda area north of the Congo River.

Figure 5.9 and 5.10 show the distribution of hake in the central and northern sectors respectively. Apart from the generally lower catch rates, the geographical distribution and areas of concentrations are similar to previous surveys.



**Figure 5.9.** Estimated distribution of Benguela hake (*Merluccius polli*). Luanda-Benguela.



**Figure 5.10.** Estimated distribution of Benguela hake (*Merluccius polli*). Congo River - Luanda.

## CONCLUSIONS

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- The overall general impression is that few, if any, of the examined stocks have changed significantly over the past 5 years. The majority of previous biomass estimations lie within the estimated 95% confidence limits obtained during this survey, which had a relatively high sampling intensity and smaller distance between transects than traditionally used. Consequently, with the present stratification, sampling intensity, and distribution of the catch rates, it seems that the precision level is too low to associate the observed changes in the catch rates between surveys, with real changes in the stocks.
- Still, judging from the observed general trends, it appears that most stocks showing fluctuations seem to have peaked around 1997 which may indicate that a common external factor are causing these. Anomalous oceanographic conditions, with warm, low salinity, water masses on the surface, were found along the whole coast during this survey, partly resembling the conditions found in 1995. In contrast, the 1996-1998 period in general had higher catch rates together with colder, higher salinity water along shore indicating slight upwelling. If this correlation is valid, it would perhaps explain the lower catch rates observed during this survey, and the trend of moving deeper for the deep demersal stocks. The possible association between catches and the seasonal and/or annual oceanographic conditions should be further examined.

### Future recommendations

- Consideration should be given to present biomass estimates by species or groups, instead of the traditional separation into shelf (20-200m) and slope (200-600m). Some groups are distributed at depth less than 100m (grunts, snappers, barracudas, and anchovies), while others are distributed from inshore to 300m (Sparidae, Sciaenidae and many Carangids). Of the traditional 'slope species', rose shrimp (100-400m) and hake (100-600m) is actually overlapping with the 'shelf species' and only striped red shrimp (300-800m) is truly 'slope', but not from 200m. Squids, sharks and hairtails are found at all depths. It would seem more reasonable to treat the groups as "groups", irrespective of their depth distribution, and it would create less confusion in the comparison and evaluation of the biomass estimates.
- The reports and results from the cruises should in the future not be based on calculated means only. It is imperative that an easy access to generate and evaluate the variance in the aggregated results produced from the database is developed, especially for a programme like this aimed at assisting developing countries in understanding their fisheries and managing their resources.



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## Annex I Records of fishing stations

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1812  
 DATE: 4/ 3/99 GEAR TYPE: BT No:12 POSITION:Lat S 1229 Long E 1317  
 start stop duration  
 TIME :09:39:08 10:09:16 30 (min) Purpose code: 3  
 LOG :8151.21 8152.68 1.46 Area code : 2  
 FDEPTH: 408 434 GearCond.code:  
 BDEPTH: 408 434 Validity code:  
 Towing dir: 25° Wire out:1100 m Speed: 30 km\*10  
 Sorted: 94 Kg Total catch: 174.72 CATCH/HOUR: 349.44

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Gadella maraldi	96.80	836	27.70	
Squalus megalops	84.68	54	24.23	
SCYLIORHINIDAE	35.76	892	10.23	
Nezumia aequalis	25.64	44	7.34	
Morlucciuss polli	25.08	78	7.18	4293
Gonostoma sp.	23.32	682	6.67	
Stomias affinis	18.60	374	5.32	
Chloropthalmus atlanticus	8.70	220	2.49	
Plesionika martia	8.48	2964	2.43	
Ruvettus pretiosus	6.00	6	1.72	
Trichiurus lepturus	5.80	10	1.66	
Lophius vaillanti	3.08	8	0.88	
Coelorhynchus coelorhynchus	2.42	132	0.69	
OOCOEPHALIDAE	1.00	6	0.29	
Triplophos sp.	0.88	166	0.25	
Chaceon maritae	0.72	2	0.21	
Synagrops microlepis	0.56	50	0.16	
HALOSAURIDAE	0.22	22	0.06	
Total	347.74		99.51	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1813  
 DATE: 4/ 3/99 GEAR TYPE: BT No:12 POSITION:Lat S 1229 Long E 1323  
 start stop duration  
 TIME :11:33:13 12:03:16 30 (min) Purpose code: 3  
 LOG :8150.86 8162.17 1.28 Area code : 2  
 FDEPTH: 65 70 GearCond.code:  
 BDEPTH: 65 70 Validity code:  
 Towing dir: 30° Wire out: 240 m Speed: 30 km\*10  
 Sorted: 134 Kg Total catch: 1618.88 CATCH/HOUR: 3237.76

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	1687.80	26094	52.13	4297
Chloroscombrus chrysurus	635.80	5262	19.64	4294
Trachurus trecae	300.70	8754	9.29	4296
Pomadasy rögari	147.92	460	4.57	4299
Pomadasy jubelini	110.00	276	3.40	4298
Sphyræna guanchancho	109.12	170	3.37	
Pagellus bellottii	71.30	654	2.20	4295
Dasyatis margarita	67.90	24	2.10	
Raja miraletus	29.10	48	0.90	
Galeoides decadactylus	24.74	98	0.76	
Psetodes belcheri	11.64	412	0.36	
Selene dorsalis	8.74	24	0.27	
Lutjanus goreensis	7.76	24	0.24	
Sardinella maderensis	7.28	72	0.22	
Serranus accraensis	6.30	72	0.19	
Grammolites gruvelli	3.40	72	0.11	
Umbrina canariensis	2.92	48	0.09	
Lithognathus mormyrus	2.92	24	0.09	
Dentex barmardi	1.94	48	0.06	
Pomadasy incisus	0.48	24	0.01	
Total	3237.76		100.00	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1814  
 DATE: 4/ 3/99 GEAR TYPE: BT No:12 POSITION:Lat S 1221 Long E 1322  
 start stop duration  
 TIME :13:07:23 13:33:47 26 (min) Purpose code: 3  
 LOG :8169.51 8170.77 1.21 Area code : 2  
 FDEPTH: 110 116 GearCond.code: 8  
 BDEPTH: 110 116 Validity code: 1  
 Towing dir: 20° Wire out: 350 m Speed: 30 km\*10  
 Sorted: 98 Kg Total catch: 1164.81 CATCH/HOUR: 2688.02

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Anthias anthias	1290.00	15090	47.99	4300
Umbrina canariensis	530.77	1673	19.75	4302
Boops boops	221.54	1311	8.24	4301
Dentex barmardi	191.54	48	7.13	
Dentex macrophthalmus	190.02	1182	7.07	4304
Trachurus trecae	56.61	1059	2.11	4305
Zeus faber	50.77	97	1.89	
Sardinella aurita	30.00	25	1.12	
Atractoscion aequidens	29.54	21	1.10	4303
Dentex gibbosus	20.77	48	0.77	
Epinephelus alexandrinus *	10.66	2	0.40	
Raja clavata	10.27	25	0.38	
SCORPAENIDAE	10.27	48	0.38	
Chaetodon hoefleri	8.77	48	0.33	
Parapristipoma humile	6.92	25	0.26	
Hoplostethus mediterraneus	4.43	5	0.16	
Chelidonichthys gabonensis	3.00	25	0.11	
Total	2665.88		99.19	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1815  
 DATE: 4/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 1216 Long E 1331  
 start stop duration  
 TIME :15:24:42 15:54:21 30 (min) Purpose code: 3  
 LOG :8183.64 8185.50 1.84 Area code : 2  
 FDEPTH: 82 78 GearCond.code:  
 BDEPTH: 82 78 Validity code:  
 Towing dir: 190° Wire out: 300 m Speed: 30 km\*10  
 Sorted: 83 Kg Total catch: 812.28 CATCH/HOUR: 1624.56

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	802.00	5634	49.37	4310
Zeus faber	178.66	50	11.00	
Pagellus bellottii	170.66	1084	10.50	4308
Trachurus trecae	113.36	3300	6.98	4306
Dentex barmardi	69.00	300	4.25	4311
Umbrina canariensis	50.00	200	3.08	4309
Pomadasy incisus	49.66	234	3.06	4312
Atractoscion aequidens	34.72	38	2.14	4307
Trichiurus lepturus	33.66	66	2.07	
Pseudupeneus prayensis	31.64	234	1.95	
Trigla lyra	23.34	250	1.44	
Arius parkii	23.12	8	1.42	
Raja miraletus	12.66	34	0.78	
Parapristipoma humile	9.66	16	0.59	
Epinephelus aeneus	7.66	16	0.47	
Sphoeroides pachgaster	5.36	8	0.33	
Plectorhynchus mediterraneus	2.44	2	0.15	
Boops boops	2.00	16	0.12	
Fistularia petimba	1.52	6	0.09	
Psetodes belcheri	1.34	50	0.08	
Sardinella aurita	1.34	16	0.08	
Torpedo torpedo	0.76	2	0.05	
Total	1624.56		100.00	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1816  
 DATE: 4/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 1222 Long E 1330  
 start stop duration  
 TIME :16:40:38 17:10:05 29 (min) Purpose code: 3  
 LOG :8190.09 8191.92 1.79 Area code : 2  
 FDEPTH: 64 56 GearCond.code:  
 BDEPTH: 64 56 Validity code:  
 Towing dir: 220° Wire out: 230 m Speed: 30 km\*10  
 Sorted: 94 Kg Total catch: 498.32 CATCH/HOUR: 1031.01

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	256.49	1798	24.88	
Trachurus trecae	227.59	4223	22.07	4316
Pagellus bellottii	179.79	1320	17.44	4315
Sphyræna guanchancho	82.28	137	7.98	
Bembrops heterurus	46.66	809	4.53	
Raja miraletus	44.38	68	4.30	
Citharus linguatula	44.38	2162	4.30	
Pomadasy incisus	36.41	559	3.53	4313
Trichiurus lepturus	29.94	126	2.90	
Selene dorsalis	24.12	137	2.34	
Lithognathus mormyrus	16.28	46	1.58	
Chloroscombrus chrysurus	10.59	68	1.03	
Pomadasy jubelini	9.33	12	0.90	
Sepia officinalis hierredda	5.38	12	0.52	
Cynoglossus browni	4.68	23	0.45	
Umbrina canariensis	4.55	126	0.44	4314
Zeus faber	2.63	12	0.26	
Chaetodon hoefleri	2.40	12	0.23	
Stromateus fiatola	1.86	2	0.18	
Brotula barbata	1.49	2	0.14	
Total	1031.23		100.00	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1817  
 DATE: 4/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 1215 Long E 1322  
 start stop duration  
 TIME :19:36:51 19:58:36 22 (min) Purpose code: 3  
 LOG :8207.54 8208.60 1.04 Area code : 2  
 FDEPTH: 565 576 GearCond.code: 9  
 BDEPTH: 565 576 Validity code: 9  
 Towing dir: 20° Wire out:1500 m Speed: 30 km\*10  
 Sorted: Kg Total catch: CATCH/HOUR:

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

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1818  
 DATE: 5/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 1200 Long E 1322  
 start stop duration  
 TIME :04:37:20 05:07:14 30 (min) Purpose code: 3  
 LOG :8267.95 8269.43 1.60 Area code : 2  
 FDEPTH: 601 599 GearCond.code: 2  
 BDEPTH: 601 599 Validity code:  
 Towing dir: 350° Wire out:1500 m Speed: 30 km\*10  
 Sorted: 31 Kg Total catch: 120.10 CATCH/HOUR: 240.20

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Lamprogrammus sp.	84.16	760	35.04	
Yarellia blackfordi	68.00	2224	28.31	
Hoplostethus cadentis	50.40	1936	20.98	
Malacocephalus occidentalis	14.40	256	6.00	
Triplophos sp.	10.40	1040	4.33	
Laemonema laureysi	2.72	64	1.13	
Xenodermichthys copei	1.60	112	0.67	
Dibranchius sp.	1.60	112	0.67	
Trichiurus lepturus	1.60	40	0.67	
Lophius vaillanti	1.12	8	0.47	
GALATHEIDAE	0.80	96	0.33	
Stomias affinis	0.80	72	0.33	
HIMANTOLOPHIDAE	0.66	8	0.27	
Todaropsis eblanae	0.62	2	0.26	
Aristeus varidens	0.48	512	0.20	
Dasyatis marmorata	0.40	16	0.17	
Ebinania costaecanarie	0.30	8	0.12	
MELANOCETIDAE	0.02	2	0.01	
Total	240.08		99.96	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1819  
 DATE: 5/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 1200 Long E 1331  
 start stop duration  
 TIME :07:13:47 07:31:11 17 (min) Purpose code: 3  
 LOG :8280.92 8281.68 0.87 Area code : 2  
 FDEPTH: 116 107 GearCond.code: 2  
 BDEPTH: 116 107 Validity code:  
 Towing dir: 20° Wire out: 300 m Speed: 30 km\*10  
 Sorted: 72 Kg Total catch: 72.05 CATCH/HOUR: 254.29

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Dentex macropthalmus	161.01	1196	63.32	
Boops boops	37.98	420	14.94	
Dentex angolensis	37.06	138	14.57	4317
Zeus faber	4.20	7	1.65	
Brotula barbata	3.14	4	1.23	
Raja miraletus	2.40	4	0.94	
Sepia officinalis hierredda	2.26	32	0.89	
Octopus vulgaris	2.22	7	0.87	
Dentex gibbosus	1.41	4	0.55	
Paristiodon cataphractum	0.74	14	0.29	
Zenopsis conchifer	0.64	4	0.25	
Trachurus trecae	0.49	11	0.19	
Illex coindetii	0.39	4	0.15	
Chelidonichthys gabonensis	0.35	4	0.14	
Total	254.29		99.98	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1820  
 DATE: 5/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 1200 Long E 1337  
 start stop duration  
 TIME :08:30:16 09:00:03 30 (min) Purpose code: 3  
 LOG :8288.19 8289.60 1.40 Area code : 2  
 FDEPTH: 73 73 GearCond.code: 2  
 BDEPTH: 73 73 Validity code:  
 Towing dir: 20° Wire out: 230 m Speed: 30 km\*10  
 Sorted: 67 Kg Total catch: 654.89 CATCH/HOUR: 1309.78

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	1081.60	9660	82.58	
Pagellus bellottii	70.00	1140	5.34	4319
Trachurus trecae	66.40	860	5.07	4318
Trichiurus lepturus	17.40	40	1.33	
Zeus faber	17.00	80	1.30	
Atractoscion aequidens	16.20	20	1.24	
Pseudupeneus prayensis	6.80	80	0.52	
Sardinella maderensis	6.80	40	0.52	
Dentex macropthalmus	6.80	40	0.52	
Citharus linguatula	6.40	240	0.49	
Selene dorsalis	3.20	120	0.24	
Chloroscombrus chrysurus	3.00	32	0.23	
Sepia orbignyana	2.26	20	0.17	
Sphyraena guachancho	2.14	2	0.16	
Dentex barmardi	1.70	40	0.13	
Epinephelus gorensis	1.36	2	0.10	
Alloteuthis africana	0.20	560	0.02	
Total	1309.26		99.96	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1821  
 DATE: 5/ 3/99 GEAR TYPE: BT No: 2 POSITION:Lat S 1159 Long E 1340  
 start stop duration  
 TIME :10:10:01 10:39:55 30 (min) Purpose code: 3  
 LOG :8295.90 8297.40 1.48 Area code : 2  
 FDEPTH: 52 58 GearCond.code: 2  
 BDEPTH: 52 58 Validity code:  
 Towing dir: 350° Wire out: 160 m Speed: 30 km\*10  
 Sorted: 3 Kg Total catch: 122.00 CATCH/HOUR: 244.00

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	49.98	9862	20.48	
Brachydeuterus auritus	48.22	3594	19.76	
Pomadasy jubelini	18.68	36	7.66	4320
Lithognathus mormyrus	18.52	50	7.59	4321
Trichiurus lepturus	18.00	40	7.38	
Chloroscombrus chrysurus	15.00	106	6.15	4325
Raja miraletus	14.40	36	5.90	
Sphyraena guachancho	12.76	18	5.23	4322
Selene dorsalis	9.44	54	3.87	
Pagellus bellottii	8.80	48	3.61	4324
Grammolites gruvelli	8.76	220	3.59	
Chelidonichthys lastoviza	6.14	44	2.52	
Galeoides decadactylus	5.96	16	2.44	
Chaetodon hoefleri	3.50	44	1.43	
Sepia bertheloti	2.24	2	0.52	
Epinephelus aeneus	1.96	4	0.80	4323
CYNOGLOSSIDAE	1.14	6	0.47	
Brotula barbata	0.56	2	0.23	
Total	244.06		100.03	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1822  
 DATE: 5/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 1153 Long E 1341  
 start stop duration  
 TIME :11:33:10 11:44:59 12 (min) Purpose code: 3  
 LOG :8302.33 8302.89 0.56 Area code : 2  
 FDEPTH: 59 59 GearCond.code: 9  
 BDEPTH: 59 59 Validity code: 1  
 Towing dir: 20° Wire out: 210 m Speed: 30 km\*10  
 Sorted: 104 Kg Total catch: 2494.93 CATCH/HOUR: 12474.65

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	8953.10	160540	71.77	4326
Galeoides decadactylus	671.85	3670	5.39	4329
Pomadasy incisus	537.25	5915	4.31	4328
Chloroscombrus chrysurus	506.45	3315	4.06	
Trichiurus lepturus	402.30	950	3.22	
Pagellus bellottii	298.20	2365	2.39	4330
Lithognathus mormyrus	234.30	1065	1.88	4327
Trachurus trecae	146.75	6865	1.18	4331
Atractoscion aequidens	137.25	235	1.10	
Pseudotolithus typus	118.35	355	0.95	
Selene dorsalis	104.15	475	0.83	
Dentex barmardi	97.05	1895	0.78	
Epinephelus aeneus	87.55	120	0.70	
Stromateus fiatola	66.25	120	0.53	
Umbriina canariensis	42.60	235	0.34	
Torpedo torpedo	37.85	120	0.30	
Grammolites gruvelli	18.95	355	0.15	
Pseudupeneus prayensis	9.45	235	0.08	
Total	12469.65		99.96	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1823  
 DATE: 5/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 1146 Long E 1344  
 start stop duration  
 TIME :12:46:30 13:17:53 31 (min) Purpose code: 3  
 LOG :8309.88 8311.35 1.43 Area code : 2  
 FDEPTH: 31 30 GearCond.code: 2  
 BDEPTH: 31 30 Validity code:  
 Towing dir: 360° Wire out: 210 m Speed: 30 km\*10  
 Sorted: 39 Kg Total catch: 694.58 CATCH/HOUR: 1344.35

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	584.63	57360	43.49	4332
Chloroscombrus chrysurus	206.23	3681	15.34	4333
Galeoides decadactylus	146.69	795	10.91	4335
Pseudotolithus typus	91.05	145	6.77	4334
Trichiurus lepturus	86.71	126	6.45	
Pteroscion peli	54.10	1202	4.02	
Selene dorsalis	41.32	1428	3.07	
Iliaha africana	22.55	826	1.68	
Carcharhinus sp.	17.11	10	1.27	
Pagellus bellottii	15.02	75	1.12	
Stromateus fiatola	13.37	17	0.99	
Sphyraena guachancho	12.02	540	0.89	
Epinephelus aeneus	9.75	17	0.73	
Trachinotus terraia	8.44	2	0.63	
Atractoscion aequidens	6.14	17	0.46	
Pomadasy incisus	4.51	225	0.34	
Arius parkii	4.34	17	0.32	
Sphyraena lewini	3.79	2	0.28	
Scomberomorus tritor	3.37	4	0.25	
Ephippion guttifer	3.21	2	0.24	
Dasyatis marmorata	3.17	2	0.24	
Trachurus trecae	3.00	225	0.22	
Panullirus regius	1.51	2	0.11	
Rhinobatos albomaculatus	0.77	2	0.06	
Trachinus araneus	0.50	2	0.04	
Total	1343.30		99.92	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1824  
 DATE: 5/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 1145 Long E 1335  
 start stop duration  
 TIME :15:05:30 15:20:34 15 (min) Purpose code: 3  
 LOG :8326.56 8327.40 0.82 Area code : 2  
 FDEPTH: 96 97 GearCond.code: 9  
 BDEPTH: 96 97 Validity code: 1  
 Towing dir: 180° Wire out: 310 m Speed: 30 km\*10  
 Sorted: 118 Kg Total catch: 117.67 CATCH/HOUR: 470.68

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Stromateus fiatola	293.52	736	62.36	4340
Pagellus bellottii	53.68	484	11.40	4339
Dentex angolensis	27.36	200	5.81	4336
Trichiurus lepturus	23.04	40	4.90	
Chelidonichthys capensis	22.48	240	4.78	
Dentex barmardi	9.84	44	2.09	4337
Selene dorsalis	8.72	24	1.85	
Trachurus trecae	7.20	12	1.53	4338
Alloteuthis africana	4.48	1440	0.95	
Dentex gibbosus	4.08	12	0.87	
Sepia orbignyana	4.08	4	0.87	
Raja miraletus	2.72	4	0.58	
Branchiostegus semifasciatus	2.32	4	0.49	
Sphaeroides pachyaster	2.28	4	0.48	
Chloroscombrus chrysurus	1.92	12	0.41	
Octopus vulgaris	1.52	4	0.32	
Zeus faber	1.28	4	0.27	
Boops boops	0.16	4	0.03	
Total	470.68		99.99	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1825  
 DATE: 5/3/99 GEAR TYPE: BT No: 8 POSITION: Lat S 1146 Long E 1327  
 start stop duration Purpose code: 3  
 TIME :16:50:21 17:20:03 30 (min) Area code : 2  
 LOG :8338.72 8340.20 1.46 GearCond.code: 2  
 FDEPTH: 221 216 Validity code:  
 BDEPTH: 221 216  
 Towing dir: 350° Wire out: 700 m Speed: 30 km\*10  
 Sorted: 74 Kg Total catch: 459.48 CATCH/HOUR: 918.96

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1829  
 DATE: 6/3/99 GEAR TYPE: BT No: 8 POSITION: Lat S 1130 Long E 1336  
 start stop duration Purpose code: 3  
 TIME :08:18:53 09:21:01 32 (min) Area code : 2  
 LOG :8396.91 8398.53 1.59 GearCond.code: 2  
 FDEPTH: 48 47 Validity code:  
 BDEPTH: 48 47  
 Towing dir: 360° Wire out: 150 m Speed: 30 km\*10  
 Sorted: 140 Kg Total catch: 341.75 CATCH/HOUR: 640.78

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Dentex macrophthalmus	381.80	3492	41.55	4341
Synagrops microlepis	277.20	2136	30.16	
Brotula barbata	98.16	84	10.68	
Trichiurus lepturus	56.40	96	6.14	
Todaropsis eblanae	23.64	168	2.57	
Merluccius polli	20.52	360	2.23	4342
Chelidonichthys capensis	17.40	168	1.89	
Pterothrissus belloci	11.40	96	1.24	
Coelorhynchus coelorhynchus	11.16	60	1.21	
Zenopsis conchifer	7.00	48	0.76	
CALAPPIDAE	4.68	144	0.51	
Uranoscopus polli	3.60	12	0.39	
Bembrops heterurus	3.36	48	0.37	
Parapenaeus longirostris	1.44	36	0.16	
Citharus linguatula	1.20	60	0.13	
Sepia sp.	0.72	12	0.08	
Sepia officinalis hierredda	0.24	12	0.03	
Total	919.92		100.10	

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Lutjanus fulgens	195.47	268	30.51	
Dentex barnardi	63.09	291	9.85	4350
Pomadasyx incisus	55.03	315	8.59	
Pseudupeneus sp.	49.69	803	7.75	
Epinephelus aeneus	42.94	19	6.70	
Acanthurus monroviae	39.53	56	6.17	
Pagellus bellottii	38.06	263	5.94	4349
Parapristipoma humile	26.12	81	4.08	
Plectorhynchus mediterraneus	22.97	38	3.58	
Seriola rivoliana	21.09	9	3.29	
Sphyræna guachancho	20.68	24	3.23	
Raja miraletus	12.56	28	1.96	
Chaetodon hoefleri	9.71	84	1.52	
Priacanthus arenatus	8.25	19	1.29	
Selene dorsalis	7.37	15	1.15	
Serranus sp.	7.03	19	1.10	
Dentex gibbosus	5.87	15	0.92	
Bodianus speciosus	3.41	2	0.53	
Lagocephalus laevigatus	2.96	2	0.46	
Trichiurus lepturus	2.53	6	0.39	
Pagrus caeruleostictus	1.91	2	0.30	
Caranx crysos	1.91	2	0.30	
Diplodus cervinus cervinus	1.52	2	0.24	
Fistularia petimba	0.56	6	0.09	
Sphoeroides "marmor"	0.56	15	0.09	
Total	640.82		100.03	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1826  
 DATE: 6/3/99 GEAR TYPE: BT No: 8 POSITION: Lat S 1145 Long E 1322  
 start stop duration Purpose code: 3  
 TIME :19:04:16 19:35:50 32 (min) Area code : 2  
 LOG :8349.69 8351.21 1.51 GearCond.code: 2  
 FDEPTH: 407 410 Validity code:  
 BDEPTH: 407 410  
 Towing dir: 350° Wire out: 1100 m Speed: 30 km\*10  
 Sorted: 30 Kg Total catch: 90.84 CATCH/HOUR: 170.33

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1830  
 DATE: 6/3/99 GEAR TYPE: BT No: 8 POSITION: Lat S 1130 Long E 1343  
 start stop duration Purpose code: 3  
 TIME :10:42:46 11:01:30 19 (min) Area code : 2  
 LOG :8407.29 8408.30 1.00 GearCond.code: 2  
 FDEPTH: 25 24 Validity code:  
 BDEPTH: 25 24  
 Towing dir: 350° Wire out: 95 m Speed: 30 km\*10  
 Sorted: 111 Kg Total catch: 111.34 CATCH/HOUR: 351.60

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Merluccius polli	65.14	141	38.24	4343
Lammonema lauraysi	49.28	17	28.93	
Malacocephalus occidentalis	10.13	101	5.95	
Bassanago albescens	8.44	146	4.96	
Chaunax pictus	7.88	253	4.63	
Lophius vaillanti	7.88	45	4.63	
Coelorhynchus coelorhynchus	5.91	326	3.47	
Todaropsis eblanae	4.89	66	2.87	
Etmopterus lucifer	3.32	90	1.95	
Trichiurus lepturus	2.31	107	1.36	
Halosaurus ovenii	2.03	129	1.19	
Hymenocephalus italicus	1.07	174	0.63	
Plesionika maris	0.90	360	0.53	
Chlorophthalmus atlanticus	0.51	11	0.30	
Nematocarcinus africanus	0.39	180	0.23	
Total	170.08		99.87	

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Engraulis encrasicolus	116.31	19216	33.08	
Brachydeuterus auritus	49.55	10112	14.09	
Galeoides decadactylus	32.72	66	9.31	4351
Sphyræna guachancho	24.19	41	6.88	4353
Selene dorsalis	20.40	95	5.80	
Ephippion guttifer	18.19	16	5.17	
Pseudotolithus typus	16.86	35	4.80	4352
Rhinoptera marginata	14.78	6	4.20	
Chloroscombrus chrysurus	12.95	63	3.68	
Trachinotus gorensis	7.14	16	2.03	
Chaetodipterus gorensis	6.19	6	1.76	
Pomadasyx rogeri	5.49	13	1.56	
Eucinostomus melanopterus	5.24	54	1.49	
Arius heudeloti	4.86	9	1.38	
Trichiurus lepturus	3.85	6	1.09	
Raja miraletus	3.35	6	0.95	
Epinephelus aeneus	2.91	9	0.83	
Lithognathus mormyrus	1.96	3	0.56	
Drepane africana	1.77	3	0.50	
Alectis alexandrinus	1.52	3	0.43	
Cynoglossus canariensis	1.39	6	0.40	
Total	351.62		99.99	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1827  
 DATE: 6/3/99 GEAR TYPE: BT No: 8 POSITION: Lat S 1131 Long E 1319  
 start stop duration Purpose code: 3  
 TIME :04:45:26 05:15:27 30 (min) Area code : 2  
 LOG :8375.02 8376.63 1.60 GearCond.code: 2  
 FDEPTH: 59 600 Validity code:  
 BDEPTH: 59 600  
 Towing dir: 18° Wire out: 1550 m Speed: 30 km\*10  
 Sorted: 27 Kg Total catch: 136.90 CATCH/HOUR: 273.80

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1831  
 DATE: 6/3/99 GEAR TYPE: BT No: 8 POSITION: Lat S 1124 Long E 1340  
 start stop duration Purpose code: 3  
 TIME :11:59:45 12:29:27 30 (min) Area code : 2  
 LOG :8414.39 8415.73 1.32 GearCond.code: 2  
 FDEPTH: 35 35 Validity code:  
 BDEPTH: 35 35  
 Towing dir: 350° Wire out: 130 m Speed: 30 km\*10  
 Sorted: 78 Kg Total catch: 302.51 CATCH/HOUR: 605.02

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Nematocarcinus africanus	142.20	36350	51.94	
Stomias sp.	34.20	204	12.49	
Trichiurus lepturus	23.80	60	8.69	
Lamprogrammus exotus	18.50	370	6.76	
Yarellia blackfordi	15.80	570	5.77	
Hoplostethus cadematii	12.60	200	4.60	
Aristeus varidens	6.00	420	2.19	
Lophius vaillanti	5.90	20	2.15	
Etmopterus lucifer	4.00	40	1.46	
Triplophos sp.	3.60	450	1.31	
Stomias affinis	1.70	80	0.62	
Ariomma bondi	1.50	30	0.55	
Illex coindetii	1.10	10	0.40	
Laemonema lauraysi	0.90	10	0.33	
Gadella imberbis	0.90	40	0.33	
Coelorhynchus coelorhynchus	0.70	10	0.26	
Geryon sp.	0.40	10	0.15	
Total	273.80		100.00	

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Chloroscombrus chrysurus	145.50	650	24.05	4358
Selene dorsalis	132.90	314	21.97	4355
Engraulis encrasicolus	109.92	26530	18.17	
Sphyræna guachancho	91.52	182	15.13	4357
Pomadasyx rogeri	34.92	54	5.77	4356
Stromateus fiatola	33.60	38	5.55	4354
Cynoglossus canariensis	13.44	70	2.22	
Brachydeuterus auritus	10.66	478	1.76	
Pseudotolithus typus	6.80	12	1.12	
Trichiurus lepturus	6.62	10	1.09	
Galeoides decadactylus	5.66	22	0.94	
Epinephelus aeneus	2.08	4	0.34	
Caranx senegalensis	2.02	2	0.33	
Rhinobatos albomaculatus	1.88	2	0.31	
Pagellus bellottii	1.68	4	0.28	
Trachurus trecae	1.06	52	0.18	
SEPIIDAE	1.00	2	0.17	
Pseudupeneus prayensis	0.96	6	0.16	
Alectis alexandrinus	0.90	2	0.15	
Pteroscion pelli	0.74	16	0.12	
Grammolites graveli	0.64	10	0.11	
Chaetodon hoefleri	0.52	6	0.09	
Total	605.02		100.01	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1828  
 DATE: 6/3/99 GEAR TYPE: BT No: 8 POSITION: Lat S 1130 Long E 1327  
 start stop duration Purpose code: 3  
 TIME :07:14:08 07:43:14 29 (min) Area code : 2  
 LOG :8385.92 8387.28 1.35 GearCond.code: 2  
 FDEPTH: 113 110 Validity code:  
 BDEPTH: 113 110  
 Towing dir: 5° Wire out: 340 m Speed: 30 km\*10  
 Sorted: 55 Kg Total catch: 151.10 CATCH/HOUR: 312.62

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Dentex macrophthalmus	145.59	1105	47.85	4347
Dentex gibbosus	43.45	114	13.90	4345
Pagellus bellottii	35.28	267	11.29	4348
Umbrina canariensis	27.99	120	8.95	4346
Dentex angolemsis	14.23	114	4.55	4344
Dentex barnardi	9.17	39	2.93	
Trigla lyra	8.13	108	2.60	
Raja miraletus	5.17	17	1.65	
Pagrus africanus	4.72	23	1.51	
Chelidonichthys gabonensis	3.41	29	1.09	
Scorpaena stephanica	2.63	6	0.84	
Boops boops	1.99	12	0.64	
Octopus vulgaris	1.76	6	0.56	
Sepia bertheloti	1.66	17	0.53	
Chaetodon hoefleri	1.43	12	0.46	
Pontinus sp.	1.20	12	0.38	
Poristidion cataphractum	0.68	17	0.22	
Total	312.49		99.95	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1832  
 DATE: 6/ 3/99 GEAR TYPE: BT No: POSITION:Lat S 1118 Long E 1342  
 start stop duration  
 TIME :13:00:02 13:01:33 5 (min) Purpose code: 3  
 LOG :8421.27 8421.49 0.22 Area code : 2  
 FDEPTH: 22 22 GearCond.code: 9  
 BDEPTH: 22 22 Validity code: 4  
 Towing dir: 25° Wire out: 90 m Speed: 30 km\*10  
 Sorted: 4 Kg Total catch: 3.90 CATCH/HOUR: 46.80

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Lagocephalus laevigatus	16.80	36	35.90	
Raja miraletus	10.32	24	22.05	
Gremoplites gruvelli	6.24	12	13.33	
Sphyræna guachancho	4.80	12	10.26	
Trichiurus lepturus	4.56	12	9.74	
Engraulis encrasicolus	2.88	720	6.15	
Trachurus trecae	0.72	48	1.54	
Fistularia petimba	0.48	12	1.03	
Total	46.80		100.00	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1833  
 DATE: 6/ 3/99 GEAR TYPE: BT No: POSITION:Lat S 1119 Long E 1338  
 start stop duration  
 TIME :14:01:34 14:01:35 30 (min) Purpose code: 3  
 LOG :8428.22 8429.73 1.48 Area code : 2  
 FDEPTH: 43 48 GearCond.code:  
 BDEPTH: 43 48 Validity code:  
 Towing dir: 20° Wire out: 160 m Speed: 30 km\*10  
 Sorted: 98 Kg Total catch: 266.69 CATCH/HOUR: 533.38

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	217.18	1632	40.72	4361
Pagellus bellottii	156.38	1240	29.32	4362
Sphyræna guachancho	33.50	48	6.28	4363
Selene dorsalis	21.54	54	4.04	
Raja miraletus	17.70	42	3.32	
Lithognathus mormyrus	16.10	22	3.02	
Pomadourus rogeri	14.72	22	2.76	4360
Sardinella maderensis	14.30	42	2.68	4359
Alectis alexandrinus	11.44	6	2.14	
Gremoplites gruvelli	6.82	32	1.28	
Rhinobatos albomaculatus	5.34	6	1.00	
Caranx crysos	3.30	6	0.62	
Chelidonichthys capensis	2.14	16	0.40	
Citharus linguatula	2.14	70	0.40	
Sepia orbignyana	2.14	16	0.40	
Epinephelus aeneus	1.92	6	0.36	
Torpedo torpedo	1.82	6	0.34	
Chaetodon hoefleri	1.50	10	0.28	
Argocheilus imperialis	1.28	38	0.24	
Lagocephalus laevigatus	1.18	12	0.22	
Trachurus trecae	0.54	64	0.10	
Fistularia petimba	0.22	10	0.04	
Antennarius "biocellatus"	0.10	6	0.02	
Parapenaeus longirostris	0.10	10	0.02	
Total	533.40		100.00	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1834  
 DATE: 6/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 1113 Long E 1339  
 start stop duration  
 TIME :15:56:48 16:26:29 30 (min) Purpose code: 3  
 LOG :8436.54 8438.05 1.50 Area code : 2  
 FDEPTH: 111 109 GearCond.code:  
 BDEPTH: 111 109 Validity code:  
 Towing dir: 190° Wire out: 340 m Speed: 30 km\*10  
 Sorted: 193 Kg Total catch: 402.53 CATCH/HOUR: 805.06

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brotula barbata	243.30	330	30.22	
Brachydeuterus auritus	169.20	1940	21.02	4368
Selene dorsalis	57.80	126	7.18	
Synagrops microlepis	56.36	2396	7.00	
Dentex macrophthalmus	52.90	296	6.57	4366
Trichiurus lepturus	50.50	580	6.27	
Pterothrissus belloci	41.12	590	5.11	
Pagellus bellottii	34.90	140	4.34	4364
Trachurus trecae, juvenile	25.80	706	3.20	4367
Dentex angolensis	14.70	70	1.83	4365
Trachurus trecae	13.76	36	1.71	
Zeus faber	10.06	26	1.25	
Trigla lyra	6.06	46	0.75	
Octopus vulgaris	5.60	6	0.70	
Citharus linguatula	5.00	96	0.52	
Raja miraletus	4.90	10	0.61	
Branchiostegus semifasciatus	4.60	6	0.57	
Pontinus accraensis	4.46	40	0.55	
Pentheroscion mbizi	3.26	10	0.40	
Umbra canariensis	0.56	10	0.07	
Sepiella ornata	0.26	6	0.03	
Total	805.10		100.00	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1835  
 DATE: 6/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 1117 Long E 1330  
 start stop duration  
 TIME :17:37:39 18:39:51 31 (min) Purpose code: 3  
 LOG :8451.37 8452.82 1.43 Area code : 2  
 FDEPTH: 382 372 GearCond.code:  
 BDEPTH: 382 372 Validity code:  
 Towing dir: 20° Wire out:1100 m Speed: 30 km\*10  
 Sorted: 31 Kg Total catch: 117.90 CATCH/HOUR: 228.19

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Merluccius polli	104.81	523	45.93	4369
Laemonema laureysi	41.96	523	18.39	
Etmopterus lucifer	30.64	1837	13.43	
Galeus polli	10.37	153	4.54	
GALATHEIDAE *	8.21	821	3.60	
Ceolorhynchus ceolorhynchus	6.83	132	2.99	
Lophius vaillanti	5.73	15	2.51	
Todaropsis eblanae	2.40	8	1.05	
Nematocarcinus africanus	2.40	1293	1.05	
Pterothrissus belloci	2.25	15	0.99	
Chaunax pictus	1.90	79	0.83	
Hymenocephalus italicus	1.90	377	0.83	
Trichiurus lepturus	1.74	87	0.76	
Malacocephalus occidentalis	1.66	21	0.73	
OPHICHTHIDAE	1.61	37	0.71	
Chlorophthalmus atlanticus	1.08	29	0.47	
MYLIOBATTIDAE	1.03	958	0.45	
Bathynectes piperitus	0.79	29	0.35	
Gadella sp.	0.79	29	0.35	
Dibranchius atlanticus	0.45	37	0.20	
Halosaurus evenii	0.15	15	0.07	
Total	228.70		100.23	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1836  
 DATE: 6/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 1112 Long E 1328  
 start stop duration  
 TIME :19:42:15 20:45:24 30 (min) Purpose code: 3  
 LOG :8459.50 8460.96 1.45 Area code : 2  
 FDEPTH: 535 543 GearCond.code:  
 BDEPTH: 535 543 Validity code:  
 Towing dir: 5° Wire out:1450 m Speed: 30 km\*10  
 Sorted: 36 Kg Total catch: 226.54 CATCH/HOUR: 453.08

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Hoplostethus cadenati	119.76	468	26.43	
Yarellia blackfordi	116.40	2916	25.69	
Aristeus varidens	61.16	6428	13.50	
Stomias affinis	44.40	1308	9.80	
Nematocarcinus africanus	26.76	7224	5.91	
Lophius vaillanti	22.32	36	4.93	
Lamprogrammus exutus	15.84	336	3.50	
Trichiurus lepturus	8.28	324	1.83	
Hoplostethus mediterraneus	8.04	7764	1.77	
Merluccius polli	7.08	12	1.56	
Triplophos sp.	4.92	636	1.09	
Nemichthys scolopaceus	4.80	12	1.06	
PANDALIDAE	3.96	540	0.87	
POLYCHAELIDAE	3.96	540	0.87	
Laemonema laureysi	1.44	60	0.32	
Chlorophthalmus atlanticus	1.20	24	0.26	
Xenodermichthys copei	1.08	120	0.24	
Bathynectes piperitus	1.08	12	0.24	
Gadella sp.	0.36	12	0.08	
Nezumia aequalis	0.24	12	0.05	
Total	453.08		100.00	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1837  
 DATE: 7/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 1105 Long E 1327  
 start stop duration  
 TIME :04:37:31 05:07:23 30 (min) Purpose code: 3  
 LOG :8480.39 8481.90 1.50 Area code : 2  
 FDEPTH: 552 549 GearCond.code:  
 BDEPTH: 552 549 Validity code:  
 Towing dir: 350° Wire out:1500 m Speed: 30 km\*10  
 Sorted: 40 Kg Total catch: 332.81 CATCH/HOUR: 665.62

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Hoplostethus cadenati	223.56	8442	33.59	
Lamprogrammus exutus	114.66	3006	17.23	
Stomias affinis	98.28	2502	14.77	
Yarellia blackfordi	85.32	2520	12.82	
Nematocarcinus africanus	62.46	15588	9.38	
Aristeus varidens	11.34	846	1.70	
Laemonema laureysi	10.80	90	1.62	
Triplophos sp.	10.44	1386	1.16	
Trichiurus lepturus	7.74	306	1.57	
Xenodermichthys copei	7.56	774	1.14	
Centroprorus granulatus	7.36	2	1.11	
Bathyrocongus sp.	4.68	378	0.70	
PANDALIDAE	3.78	954	0.57	
Todaropsis eblanae	3.78	18	0.57	
Cubiceps sp.	3.24	18	0.49	
Geryon maritae	2.70	18	0.41	
Etmopterus lucifer	2.16	18	0.32	
Ebinania sp.	1.98	36	0.30	
POLYCHAELIDAE	1.62	270	0.24	
Nemichthys scolopaceus	1.26	72	0.19	
Chlorophthalmus atlanticus	0.90	18	0.14	
Total	665.62		100.02	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1838  
 DATE: 7/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 1103 Long E 1333  
 start stop duration  
 TIME :07:14:10 07:47:38 33 (min) Purpose code: 3  
 LOG :8490.48 8492.11 1.60 Area code : 2  
 FDEPTH: 217 222 GearCond.code:  
 BDEPTH: 217 222 Validity code:  
 Towing dir: 350° Wire out: 630 m Speed: 30 km\*10  
 Sorted: 97 Kg Total catch: 563.00 CATCH/HOUR: 1023.64

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1841  
 DATE: 7/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 1059 Long E 1348  
 start stop duration  
 TIME :12:00:43 12:30:17 30 (min) Purpose code: 3  
 LOG :8515.83 8517.35 1.50 Area code : 2  
 FDEPTH: 40 39 GearCond.code:  
 BDEPTH: 40 39 Validity code:  
 Towing dir: 350° Wire out: 150 m Speed: 30 km\*10  
 Sorted: 28 Kg Total catch: 876.13 CATCH/HOUR: 1752.26

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Dentex macrophthalmus	633.31	3829	61.87	4371
Synagrops microlepis	134.80	10813	13.17	
Pterothrissus belloci	87.96	815	8.59	
Trichurus lepturus	45.44	1802	4.44	
Zenopsis conchifer	36.62	229	3.58	
Brotula barbata	31.58	49	3.09	
Todaropsis eblanæ	20.36	224	1.99	
Merluccius polli	20.36	549	1.99	4370
Parapenæus longirostris	9.67	1578	0.94	
Illex coindetii	2.15	31	0.21	
Sepia elegans	1.02	102	0.10	
Cynoponticus ferox	0.36	2	0.04	
Total	1023.63		100.01	

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	1040.00	74412	59.35	4379
Stromateus fiatola	217.20	260	12.40	4381
Galeoides decadactylus	166.40	250	9.50	
Trachurus trecae	95.68	4888	5.46	4378
Trichurus lepturus	78.00	312	4.45	
Pseudolithus typus	66.56	78	3.88	4380
Raja miraletus	36.40	52	2.00	
Chloroscombrus chrysurus	10.92	52	0.62	
Rhinobatos albomaculatus	10.84	4	0.62	
Sardinella maderensis	7.28	364	0.42	
Selene dorsalis	6.24	156	0.36	
Grammolites gruvelli	3.12	52	0.18	
Dicologlossa sp.	3.12	104	0.18	
Sphyrna lewini	3.00	2	0.17	
Alectis alexandrinus	2.40	2	0.14	
Pomadoury jubelini	1.82	2	0.10	
Epinephelus aeneus	1.60	4	0.09	
Dentex barnardi	0.96	2	0.05	
Pagellus bellottii	0.72	2	0.04	
Total	1752.26		100.01	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1839  
 DATE: 7/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 1101 Long E 1338  
 start stop duration  
 TIME :08:57:15 09:27:06 30 (min) Purpose code: 3  
 LOG :8499.51 8501.03 1.33 Area code : 2  
 FDEPTH: 109 108 GearCond.code:  
 BDEPTH: 109 108 Validity code:  
 Towing dir: 350° Wire out: 330 m Speed: 30 km\*10  
 Sorted: 101 Kg Total catch: 186.46 CATCH/HOUR: 372.92

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1842  
 DATE: 7/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 1048 Long E 1342  
 start stop duration  
 TIME :13:46:11 14:16:12 30 (min) Purpose code: 3  
 LOG :8528.41 8529.98 1.56 Area code : 2  
 FDEPTH: 40 43 GearCond.code:  
 BDEPTH: 40 43 Validity code:  
 Towing dir: 340° Wire out: 130 m Speed: 30 km\*10  
 Sorted: 8 Kg Total catch: 259.78 CATCH/HOUR: 519.56

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Synagrops microlepis	201.32	48854	53.98	
Brotula barbata	73.68	128	19.76	
Dentex macrophthalmus	27.00	196	7.24	4372
Trichurus lepturus	22.90	66	6.14	
Pterothrissus belloci	8.96	232	2.40	
Brachydeuterus auritus	8.96	162	2.40	
Citharus linguatula	7.22	140	1.94	
Todaropsis eblanæ	6.10	56	1.64	
Raja miraletus	3.96	4	1.06	
Torpedo torpedo	3.16	14	0.85	
Pagellus bellottii	2.90	14	0.78	
Sepia officinalis hierredda	2.20	2	0.59	
Zeus faber	2.18	14	0.58	
Ubrina canariensis	1.40	28	0.38	
Pantheroscion mbizi	0.70	8	0.19	
Uranoscopus albesca	0.20	2	0.05	
Alloteuthis africana	0.08	112	0.02	
Total	372.92		100.00	

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	324.44	58912	62.45	4382
Trichurus lepturus	63.84	168	12.29	
Galeoides decadactylus	41.60	92	8.01	4386
Dicologlossa sp.	12.04	252	2.32	
Pagellus bellottii	11.84	36	2.28	4385
Torpedo marmorata	11.12	16	2.14	
Pomadoury jubelini	9.60	10	1.85	4384
Stromateus fiatola	6.32	8	1.22	4383
Grammolites gruvelli	5.88	70	1.13	
Selene dorsalis	5.60	28	1.08	
Rhinobatos albomaculatus	5.56	4	1.07	
Sphyrna guachancho	4.68	10	0.90	
Pseudolithus typus	4.48	6	0.86	
Dentex barnardi	3.00	8	0.58	
Alectis alexandrinus	2.84	2	0.55	
Torpedo 'white spots'	2.48	2	0.48	
Engraulis encrasicolus	1.96	574	0.38	
Cynoglossus canariensis	1.12	14	0.22	
Aryscopus hololepidotus	0.88	2	0.17	
Pseudupeneus prayensis	0.28	14	0.05	
Total	519.56		100.03	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1840  
 DATE: 7/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 1100 Long E 1342  
 start stop duration  
 TIME :10:26:16 10:55:36 29 (min) Purpose code: 3  
 LOG :8506.73 8508.25 1.76 Area code : 2  
 FDEPTH: 73 73 GearCond.code:  
 BDEPTH: 73 73 Validity code:  
 Towing dir: 350° Wire out: 230 m Speed: 30 km\*10  
 Sorted: 65 Kg Total catch: 638.47 CATCH/HOUR: 1320.97

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1843  
 DATE: 7/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 1049 Long E 1337  
 start stop duration  
 TIME :15:16:17 15:41:48 26 (min) Purpose code: 3  
 LOG :8536.75 8538.10 1.28 Area code : 2  
 FDEPTH: 79 79 GearCond.code:  
 BDEPTH: 79 79 Validity code:  
 Towing dir: 150° Wire out: 250 m Speed: 30 km\*10  
 Sorted: 127 Kg Total catch: 966.56 CATCH/HOUR: 2230.52

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	890.81	24263	67.44	4375
Trachurus trecae	149.71	7728	11.33	4374
Aryscopus hololepidotus	61.82	93	4.68	
Brotula barbata	37.12	99	2.81	4373
Engraulis encrasicolus	36.87	683156	2.79	
Citharus linguatula	29.79	652	2.26	
Pagellus bellottii	23.46	130	1.78	
Raja miraletus	19.37	37	1.47	
Sepia sp.	16.14	478	1.22	
Euthynnus alletteratus	8.19	19	0.62	4376
Zeus faber	7.82	37	0.59	
Trichurus lepturus	7.08	19	0.54	
Pseudupeneus prayensis	6.70	37	0.51	
Torpedo torpedo	6.33	19	0.48	
Dentex barnardi	3.72	19	0.28	
Branchiostegus semifasciatus	3.68	6	0.28	
Selene dorsalis	3.35	37	0.25	
Ubrina canariensis	2.98	56	0.23	
Auxis thazard	2.48	2	0.19	4377
GOBIIDAE	1.49	223	0.11	
Ephippion guttifer	1.49	37	0.11	
Ephippion guttifer	0.37	19	0.03	
Pterothrissus belloci	0.37	19	0.03	
Thorogobius angolensis	0.19	19	0.01	
Total	1321.33		100.04	

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	1579.43	39487	70.81	4388
Trachurus trecae	228.05	13848	10.22	4387
Trichurus lepturus	107.70	284	4.83	
Brotula barbata	97.85	141	4.39	4390
Dentex barnardi	50.77	194	2.28	4389
Ubrina canariensis	43.64	704	1.96	
Selene dorsalis	33.44	194	1.50	
Stromateus fiatola	32.03	35	1.44	
Torpedo torpedo	15.14	35	0.68	
Citharus linguatula	14.08	247	0.63	
Zeus faber	12.32	88	0.55	
Raja miraletus	5.28	18	0.24	
Chloroscombrus chrysurus	3.53	18	0.16	
Chaetodon hoefleri	2.82	18	0.13	
Chelidonicichthys capensis	2.12	18	0.10	
Dentex angolensis	2.12	18	0.10	
Sardinella aurita	1.41	35	0.06	
Sphoeroides "marmor"	0.18	18	0.01	
Total	2231.91		100.09	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1844  
 DATE: 7/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 1052 Long E 1332  
 start stop duration  
 TIME :16:40:08 16:46:20 6 (min) Purpose code: 3  
 LOG :8546.10 8546.39 0.29 Area code : 2  
 FDEPTH: 122 121 GearCond.code: 9  
 BDEPTH: 122 121 Validity code: 1  
 Towing dir: 160° Wire out: 400 m Speed: 30 km\*10  
 Sorted: 29 Kg Total catch: 29.87 CATCH/HOUR: 298.70

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	107.40	3630	35.96	4391
Raja miraletus	90.40	150	30.26	
Dentex angolensis	35.90	130	12.02	
Trichiurus lepturus	20.00	20	6.70	
Trigla lyra	16.70	120	5.59	
Brachydeuterus auritus	8.20	140	2.75	
Brotula barbata	5.40	10	1.81	
Citharus linguatula	3.70	120	1.24	
Umbrina canariensis	3.40	10	1.14	
Uranoscopus albesca	2.90	10	0.97	
Dentex barmardi	2.50	10	0.84	
Scorpaena normani	1.10	10	0.37	
Selene dorsalis	1.10	10	0.37	
Pontinus accraensis	0.70	10	0.23	
Boops boops	0.60	40	0.20	
Total	300.00		100.45	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1845  
 DATE: 7/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 1056 Long E 1325  
 start stop duration  
 TIME :18:39:22 19:10:10 31 (min) Purpose code: 3  
 LOG :8556.87 8558.29 1.41 Area code : 2  
 FDEPTH: 436 443 GearCond.code:  
 BDEPTH: 436 443 Validity code:  
 Towing dir: 330° Wire out:1100 m Speed: 30 km\*10  
 Sorted: 71 Kg Total catch: 224.53 CATCH/HOUR: 434.57

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Merluccius polli	304.16	718	69.99	4392
Laemonema laureysi	49.66	2357	11.43	
Centrophorus granulosus	14.63	4	3.37	
Etmopterus sp.	13.76	753	3.17	
CONGRIDAE	12.27	190	2.82	
Malacocephalus occidentalis	10.92	122	2.51	
Hymenoccephalus italicus	9.56	1606	2.20	
Lophius vaillanti	8.40	54	1.93	
Coelorhynchus coelorhynchus	4.82	217	1.11	
Raja miraletus	2.79	4	0.64	
Halosaurus pictus	1.70	81	0.39	
Halosaurus oventi	0.89	62	0.20	
Peristedion cataphractum	0.48	8	0.11	
Bathymectes piperitus	0.35	8	0.08	
Chlorophthalmus atlanticus	0.27	8	0.06	
Total	434.66		100.01	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1846  
 DATE: 8/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 1047 Long E 1314  
 start stop duration  
 TIME :04:41:02 05:12:58 32 (min) Purpose code: 3  
 LOG :8593.94 8595.57 1.60 Area code : 2  
 FDEPTH: 553 560 GearCond.code:  
 BDEPTH: 553 560 Validity code:  
 Towing dir: 320° Wire out:1500 m Speed: 30 km\*10  
 Sorted: 25 Kg Total catch: 102.76 CATCH/HOUR: 192.68

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Nematocarcinus africanus	95.25	26288	49.43	
Hoplostethus cadonati	34.05	1298	17.67	
Yarrella blackfordi	11.03	330	5.72	
Aristeus varidens	9.98	1020	5.18	
Centrophorus granulosus	7.58	2	3.93	
Triplphos sp.	5.85	2048	3.04	
Xenodermichthys copei	5.78	608	3.00	
Trichiurus lepturus	5.03	165	2.61	
Stomias affinis	4.35	90	2.26	
Scymnodon obscurus	3.45	23	1.79	
Lamprogrammus exutus	3.30	38	1.71	
Lophius vaillanti	2.33	8	1.21	
Illex coindetii	1.80	15	0.93	
Todaropsis eblanae	1.13	8	0.59	
Geryon maritae	0.83	8	0.43	
Aricamma bondi	0.38	8	0.20	
Gadella sp.	0.23	23	0.12	
Etmopterus sp.	0.23	23	0.12	
POLYCHAELIDAE	0.15	98	0.08	
Total	192.73		100.02	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1847  
 DATE: 8/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 1044 Long E 1315  
 start stop duration  
 TIME :07:02:21 07:32:20 30 (min) Purpose code: 3  
 LOG :8603.25 8604.60 1.33 Area code : 2  
 FDEPTH: 339 342 GearCond.code:  
 BDEPTH: 339 342 Validity code:  
 Towing dir: 330° Wire out: 950 m Speed: 30 km\*10  
 Sorted: 33 Kg Total catch: 1549.59 CATCH/HOUR: 3099.18

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Chlorophthalmus atlanticus	1842.40	32712	59.45	
Synagrops microlepis	429.58	27260	13.86	
Merluccius polli	315.84	5076	10.19	4393
Laemonema laureysi	229.36	4136	7.40	
Cynoponticus ferox	78.96	188	2.55	
Pterothrissus belloci	47.00	376	1.52	
Trichiurus lepturus	39.48	188	1.27	
Zenopsis conchifer	29.14	94	0.94	
Xenomystax sp.	24.44	94	0.79	
Todaropsis eblanae	24.44	188	0.79	
Coelorhynchus coelorhynchus	14.10	282	0.45	
Gadella sp.	9.40	376	0.30	
Farapanaeus longirostris	7.52	1316	0.24	
Sepia elegans	6.58	282	0.21	
Lophius vaillanti	0.94	84	0.03	
Total	3099.18		99.99	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1848  
 DATE: 8/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 1042 Long E 1316  
 start stop duration  
 TIME :08:43:14 09:13:05 30 (min) Purpose code: 3  
 LOG :8609.88 8611.28 1.38 Area code : 2  
 FDEPTH: 243 244 GearCond.code:  
 BDEPTH: 243 244 Validity code:  
 Towing dir: 330° Wire out: 720 m Speed: 30 km\*10  
 Sorted: 69 Kg Total catch: 431.88 CATCH/HOUR: 863.76

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Synagrops microlepis	249.48	12562	28.88	
Dentex macrophthalmus	239.62	1286	27.74	4395
Chlorophthalmus atlanticus	124.08	7930	14.37	
Merluccius polli	104.50	1706	12.10	4394
Zenopsis conchifer	82.28	408	9.53	
Todaropsis eblanae	27.40	286	3.17	
Pterothrissus belloci	20.46	154	2.37	
Parapanaeus longirostris	12.00	2134	1.39	
Miracorvina angolensis	1.02	2	0.12	
Cynoponticus ferox	0.88	12	0.10	
Calappa sp.	0.88	12	0.10	
Bembrops heterurus	0.78	22	0.09	
Sepia elegans	0.44	22	0.05	
Total	863.82		100.01	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1849  
 DATE: 8/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 1040 Long E 1318  
 start stop duration  
 TIME :10:19:14 10:49:22 30 (min) Purpose code: 3  
 LOG :8617.28 8618.83 1.53 Area code : 2  
 FDEPTH: 147 138 GearCond.code:  
 BDEPTH: 147 138 Validity code:  
 Towing dir: 330° Wire out: 450 m Speed: 30 km\*10  
 Sorted: 64 Kg Total catch: 128.96 CATCH/HOUR: 257.92

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Dentex macrophthalmus	125.44	960	48.64	4398
Spicara alta	46.80	320	18.15	4397
Dentex angolensis	21.88	112	8.48	4396
C E P H A L O P O D A	17.84	742	6.92	
Brotula barbata	8.24	16	3.19	
Bembrops heterurus	8.08	300	3.13	
Trichiurus lepturus	6.32	8	2.45	
Zenopsis conchifer	4.00	20	1.55	
Chelidomichthys capensis	3.80	44	1.47	
Uranoscopus cadonati	3.04	12	1.18	
Zeus faber	2.64	8	1.02	
Pterothrissus belloci	2.00	16	0.78	
Monolele microstoma	1.92	160	0.74	
Citharus linguatula	1.84	44	0.71	
Peristedion cataphractum	1.52	20	0.59	
Pontinus kuhlii	1.04	8	0.40	
Ephippion guttifer	0.96	2	0.37	
Trachurus trecae	0.40	12	0.16	
Microchirus wittei	0.16	4	0.06	
Total	257.92		99.99	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1850  
 DATE: 8/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 1038 Long E 1329  
 start stop duration  
 TIME :12:22:17 12:52:19 30 (min) Purpose code: 3  
 LOG :8631.62 8633.30 1.47 Area code : 2  
 FDEPTH: 83 74 GearCond.code:  
 BDEPTH: 83 74 Validity code:  
 Towing dir: 320° Wire out: 290 m Speed: 30 km\*10  
 Sorted: 65 Kg Total catch: 388.35 CATCH/HOUR: 776.70

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	417.12	5784	53.70	4402
Trichiurus lepturus	179.52	420	23.11	
Trachurus trecae	42.24	1224	5.44	4399
Raja miraletus	31.92	96	4.11	
Dentex angolensis	24.00	228	3.09	4401
Pagellus bellottii	22.08	192	2.84	4400
Citharus linguatula	20.16	552	2.60	
Zeus faber	10.08	60	1.30	
Chelidomichthys capensis	9.36	96	1.21	
Sardinella aurita	6.00	60	0.77	
Chaetodon hoeffleri	3.84	24	0.49	
Dentex barmardi	2.88	24	0.37	
Sardinella maderensis	2.88	12	0.37	
Pterothrissus belloci	1.68	12	0.22	
Sepia sp.	0.96	12	0.12	
Synapturichthys kleini	0.72	12	0.09	
Boops boops	0.72	24	0.09	
Peristedion cataphractum	0.48	12	0.06	
Antennarius "biocellatus"	0.06	2	0.01	
Total	776.70		99.99	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1851  
 DATE: 8/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 1032 Long E 1332  
 start stop duration  
 TIME :13:42:55 14:06:40 24 (min) Purpose code: 3  
 LOG :8639.26 8640.36 1.12 Area code : 2  
 FDEPTH: 43 39 GearCond.code:  
 BDEPTH: 43 39 Validity code:  
 Towing dir: 360° Wire out: 160 m Speed: 30 km\*10  
 Sorted: 70 Kg Total catch: 1308.36 CATCH/HOUR: 3270.90

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	2850.85	76500	87.16	4403
Trachurus trecae	163.73	6060	5.01	4404
Selene dorsalis	59.20	278	1.81	
Sphyrna guanchacho	51.80	48	1.58	
Raja miraletus	44.40	93	1.36	
Chloroscombrus chrysurus	35.15	278	1.07	
Trichiurus lepturus	25.90	48	0.79	
Pagellus bellottii	16.65	185	0.51	
Citharus linguatula	6.48	278	0.20	
Pseudolithus typus	6.15	5	0.19	4405
Alectris alexandrinus	5.40	5	0.17	
Pomadoury tubelini	1.85	3	0.06	
Pseudupeneus prayvensis	1.85	48	0.06	
Epinephelus aeneus	1.30	3	0.04	
Penneus notialis	0.20	3	0.01	
Total	3270.91		100.02	



DR. FRIDTJOF NANSEN PROJECT: A4 PROJECT STATION: 1852  
 DATE: 8/ 3/99 GEAR TYPE: BT No: 8 POSITION: Lat S 1026 Long E 1323  
 start stop duration  
 TIME :15:23:27 15:53:26 30 (min) Purpose code: 3  
 LOG :8650.93 8652.47 1.49 Area code : 2  
 FDEPTH: 75 77 GearCond.code:  
 BDEPTH: 75 77 Validity code:  
 Towing dir: 300° Wire out: 250 m Speed: 30 kn\*10  
 Sorted: 66 Kg Total catch: 463.92 CATCH/HOUR: 927.84

DR. FRIDTJOF NANSEN PROJECT: A4 PROJECT STATION: 1855  
 DATE: 8/ 3/99 GEAR TYPE: BT No: 8 POSITION: Lat S 1029 Long E 1302  
 start stop duration  
 TIME :20:52:14 21:23:21 31 (min) Purpose code: 3  
 LOG :8680.00 8681.57 1.55 Area code : 2  
 FDEPTH: 430 427 GearCond.code: 8  
 BDEPTH: 430 427 Validity code: 1  
 Towing dir: 320° Wire out: 1200 m Speed: 30 kn\*10  
 Sorted: 28 Kg Total catch: 82.12 CATCH/HOUR: 158.94

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	642.60	8318	69.26	4408
Facellus bellottii	84.28	896	9.08	4407
Cheilodichthys capensis	81.20	994	8.75	
Trachurus trecae	38.98	952	4.10	4406
Selene dorsalis	17.64	154	1.90	
Zeus faber	16.80	56	1.81	
Raja miraletus	10.08	28	1.09	
Torpedo torpedo	9.52	14	1.03	
Lagocephalus laevigatus	6.72	14	0.72	
Citharus linguatula	6.72	252	0.72	
Uranoscopus albesca	3.92	14	0.42	
Chloroscombrus chrysurus	3.64	14	0.39	
Sardinella aurita	2.52	28	0.27	
Sepia sp.	1.40	28	0.15	
Fistularia petimba	0.68	2	0.07	
Grammoplites gruvelli	0.56	14	0.06	
Chaetodon hoefleri	0.32	2	0.03	
Arnoglossus imperialis	0.28	14	0.03	
C E P H A L O P O D A	0.28	14	0.03	
Saurida brasiliensis	0.28	28	0.03	
Boops boops	0.28	14	0.03	
Microchirus frechkopi	0.04	2		
<b>Total</b>	<b>927.84</b>	<b>99.97</b>		

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Laemonema laureysi	55.39	499	34.85	
Dibranchius atlanticus	22.18	1341	13.95	
Triplophos sp.	17.01	2526	10.70	
Trichiurus lepturus	11.26	343	7.08	
Nematocarcinus africanus	8.77	1498	5.52	
Yarella blackfordi	7.72	209	4.86	
Merluccius polli	6.45	35	4.06	
Aristeus varidens	5.46	714	3.44	
Hoplostethus sp.	4.35	180	2.74	
Coelorinchus coelorhincus	4.35	64	2.74	
Lophius vaillanti	3.54	12	2.23	
Geryon maritae	2.90	29	1.82	
Bathynectes piperitus	2.50	29	1.57	
Malacocephalus occidentalis	2.50	23	1.57	
Zenopsis conchifer	2.34	6	1.47	
Todaropsis eblanae	2.26	12	1.42	
<b>Total</b>	<b>158.98</b>	<b>100.02</b>		

DR. FRIDTJOF NANSEN PROJECT: A4 PROJECT STATION: 1856  
 DATE: 9/ 3/99 GEAR TYPE: BT No: 8 POSITION: Lat S 1023 Long E 1255  
 start stop duration  
 TIME :04:53:38 05:22:13 29 (min) Purpose code: 3  
 LOG :8698.94 8700.40 1.42 Area code : 2  
 FDEPTH: 557 550 GearCond.code:  
 BDEPTH: 557 550 Validity code:  
 Towing dir: 330° Wire out: 1500 m Speed: 30 kn\*10  
 Sorted: 28 Kg Total catch: 157.93 CATCH/HOUR: 326.75

DR. FRIDTJOF NANSEN PROJECT: A4 PROJECT STATION: 1853  
 DATE: 8/ 3/99 GEAR TYPE: BT No: 8 POSITION: Lat S 1029 Long E 1317  
 start stop duration  
 TIME :16:47:25 16:58:13 11 (min) Purpose code: 3  
 LOG :8659.80 8660.28 0.45 Area code : 2  
 FDEPTH: 105 107 GearCond.code: 9  
 BDEPTH: 105 107 Validity code: 1  
 Towing dir: 160° Wire out: 330 m Speed: 30 kn\*10  
 Sorted: 36 Kg Total catch: 154.02 CATCH/HOUR: 840.11

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Hoplostethus sp.	127.61	4668	39.05	
Yarella blackfordi	39.72	1403	12.16	
Nematocarcinus africanus	37.86	23139	11.59	
Stomias affinis	36.62	857	11.21	
Trichiurus lepturus	32.28	1527	9.88	
Lamprogrammus exilis	26.65	112	8.17	
Aristeus varidens	4.97	546	1.52	
GALATHEIDAE *	3.85	484	1.18	
Triplophos sp.	3.60	12327	1.10	
Geryon maritae	3.10	10	0.95	
Gadella sp.	2.61	87	0.80	
Scymnodon obscurus	2.36	12	0.72	
Xenodermichthys copei	1.24	112	0.38	
Zenopsis conchifer	1.14	2	0.35	
Nephariotia pinnata	0.99	2	0.30	
Illex coindetii	0.74	12	0.23	
Aricomma bondi	0.62	12	0.19	
Nezumia sp.	0.12	12	0.04	
<b>Total</b>	<b>326.12</b>	<b>99.82</b>		

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	628.36	24742	74.79	4409
Trigla lyra	43.20	436	5.14	
Illex coindetii	36.65	2400	4.36	
Citharus linguatula	34.25	1200	4.08	
Raja miraletus	26.45	76	3.15	
Saurida brasiliensis	24.22	6916	2.88	
Sphaeroides pachgaster	14.62	33	1.74	
Dentex angolensis	9.60	131	1.14	
Zeus faber	6.93	27	0.82	
Peristedion cataphractum	5.02	109	0.50	
Brachydeuterus auritus	2.84	22	0.34	
Sepia bertheloti	2.40	22	0.29	
Brotula barbata	2.29	5	0.27	
Torpedo torpedo	1.53	5	0.18	
Uranoscopus cadenati	1.09	5	0.13	
Sepia elegans	0.65	65	0.08	
<b>Total</b>	<b>840.10</b>	<b>99.99</b>		

DR. FRIDTJOF NANSEN PROJECT: A4 PROJECT STATION: 1857  
 DATE: 9/ 3/99 GEAR TYPE: BT No: 8 POSITION: Lat S 1022 Long E 1259  
 start stop duration  
 TIME :07:21:12 07:51:03 30 (min) Purpose code: 3  
 LOG :8708.80 8710.29 1.47 Area code : 2  
 FDEPTH: 357 378 GearCond.code:  
 BDEPTH: 357 378 Validity code:  
 Towing dir: 330° Wire out: 1000 m Speed: 30 kn\*10  
 Sorted: 27 Kg Total catch: 62.90 CATCH/HOUR: 125.80

DR. FRIDTJOF NANSEN PROJECT: A4 PROJECT STATION: 1854  
 DATE: 8/ 3/99 GEAR TYPE: BT No: 8 POSITION: Lat S 1032 Long E 1306  
 start stop duration  
 TIME :18:56:15 19:27:09 31 (min) Purpose code: 3  
 LOG :8673.13 8674.60 1.45 Area code : 2  
 FDEPTH: 345 328 GearCond.code:  
 BDEPTH: 345 328 Validity code:  
 Towing dir: 330° Wire out: 950 m Speed: 30 kn\*10  
 Sorted: 28 Kg Total catch: 263.28 CATCH/HOUR: 509.57

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Chlorophthalmus atlanticus	49.92	972	39.68	
Merluccius polli	18.64	152	14.82	4410
Zenopsis conchifer	11.70	34	9.30	
Laemonema laureysi	10.40	116	8.27	
MYCTOPHIDAE	9.92	10568	7.89	
Syncaemus microlepis	7.12	476	5.66	
Malacocephalus laevis	2.76	16	2.19	
Parapenaeus longirostris	2.12	268	1.69	
Hymenocephalus italicus	1.68	320	1.34	
Pterothrissus bellocci	1.60	8	1.27	
Scylliorhinus cervigoni	1.40	2	1.11	
Scorpaena normani	1.20	4	0.95	
Trichiurus lepturus	1.06	42	0.84	
Geryon sp.	1.04	24	0.83	
Sepia elegans	0.56	2	0.45	
Bathynectes piperitus	0.44	8	0.35	
Illex coindetii	0.40	4	0.32	
Chaunax pictus	0.36	8	0.29	
Gadella marelai	0.36	16	0.29	
Stomias affinis	0.36	48	0.29	
Lophodes kempi	0.32	2	0.25	
Todaropsis eblanae	0.28	116	0.22	
Coelorinchus coelorhincus	0.16	8	0.13	
<b>Total</b>	<b>124.20</b>	<b>98.75</b>		

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Chlorophthalmus atlanticus	401.03	8497	78.70	
Merluccius polli	49.16	465	9.65	
MYCTOPHIDAE	8.71	7742	1.71	
Hymenocephalus italicus	8.52	2535	1.67	
Parapenaeus longirostris	8.32	1084	1.63	
Malacocephalus occidentalis	6.00	58	1.18	
Epigonus pandionis	5.03	58	0.99	
Coelorinchus coelorhincus	4.84	135	0.95	
Chaunax sp.	3.48	116	0.68	
Lophius vaillanti	3.10	77	0.61	
Raja miraletus	2.21	4	0.43	
Bathynectes piperitus	1.94	39	0.38	
Pontinus sp.	1.55	39	0.30	
GALATHEIDAE *	1.55	329	0.30	
Xenomyxax sp.	1.43	4	0.28	
Hoplostethus cadenati	1.16	19	0.23	
Sepia elegans	0.77	19	0.15	
Syncaemus microlepis	0.77	39	0.15	
<b>Total</b>	<b>509.57</b>	<b>99.99</b>		

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1858  
 DATE: 9/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 1020 Long E 1300  
 start stop duration  
 TIME :08:56:38 09:26:04 29 (min) Purpose code: 3  
 LOG :8714.74 8716.30 1.63 Area code : 2  
 FDEPTH: 233 241 GearCond.code:  
 BDEPTH: 233 241 Validity code:  
 Towing dir: 330° Wire out: 700 m Speed: 30 km\*10  
 Sorted: 49 Kg Total catch: 998.98 CATCH/HOUR: 2066.86

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1861  
 DATE: 9/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 1012 Long E 1321  
 start stop duration  
 TIME :14:10:33 14:40:14 30 (min) Purpose code: 3  
 LOG :8747.76 8749.40 1.60 Area code : 2  
 FDEPTH: 36 34 GearCond.code:  
 BDEPTH: 36 34 Validity code:  
 Towing dir: 350° Wire out: 140 m Speed: 30 km\*10  
 Sorted: 74 Kg Total catch: 208.71 CATCH/HOUR: 417.42

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Synagrops microlepis	1126.18	87277	54.49	
Zenopsis conchifer	227.09	521	10.99	
Chlorophthalmus atlanticus	198.12	4866	9.59	
Merluccius polli	193.49	3128	9.36	
Ophirus serpens	52.14	58	4.58	
Brotula barbata	47.50	232	2.30	
Uranoscopus cadenati	44.90	261	2.17	4411
Dentex macrophthalmus	33.60	381	1.63	
Helicolenus dactylopterus	18.58	43	0.90	4412
Dentex angolensis	12.74	174	0.62	
Todaropsis eblanæ	5.38	2	0.26	
Squatina oculata	5.26	2	0.25	
Raja miraletus	2.90	58	0.14	
Sepia elegans	2.52	2	0.12	
Torpedo "dark blotches"	1.74	232	0.08	
Parapenaeus longirostris				
Total	2066.86		100.00	

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	223.52	5006	53.55	4419
Sphyræna guanchancho	61.70	110	14.78	4420
Galeoides decadactylus	28.50	116	6.83	
Pseudolithichthys typus	15.16	12	3.63	4422
Pomadoury jubelini	14.56	26	3.49	4421
Alectis alexandrinus	12.20	8	2.92	
Cynoglossus canariensis	9.80	40	2.35	
Selene dorsalis	8.40	70	2.01	
Engraulis encrasicolus	8.00	1500	1.92	
Trichiurus lepturus	6.80	20	1.63	
Chloroscombus chrysurus	5.80	46	1.39	
Raja miraletus	5.00	16	1.20	
Torpedo "white spots"	3.00	16	0.72	
Epinephelus aeneus	2.30	6	0.55	
Decapterus rhonchus	2.20	6	0.53	
Stromateus fiatola	2.16	2	0.52	
Penaeus notialis	1.70	46	0.41	
Pagellus bellottii	1.60	4	0.38	
Citharus linguatula	1.50	20	0.36	
Dentex barnardi	1.00	2	0.24	
Grammolites gruvelli	0.70	16	0.17	
Dicologlossa sp.	0.70	20	0.17	
Trachurus trecae	0.50	20	0.12	
Pseudupeneus prayensis	0.30	6	0.07	
Citharichthys stampflii	0.18	16	0.04	
Trachinotus goreensis	0.08	2	0.02	
GOBIIDAE	0.06	6	0.01	
Total	417.42		100.01	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1859  
 DATE: 9/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 1017 Long E 1306  
 start stop duration  
 TIME :10:51:07 11:22:01 31 (min) Purpose code: 3  
 LOG :8725.31 8726.98 1.66 Area code : 2  
 FDEPTH: 110 109 GearCond.code:  
 BDEPTH: 110 109 Validity code:  
 Towing dir: 350° Wire out: 320 m Speed: 30 km\*10  
 Sorted: 12 Kg Total catch: 227.80 CATCH/HOUR: 440.90

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1862  
 DATE: 9/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 1004 Long E 1310  
 start stop duration  
 TIME :16:10:13 16:40:14 30 (min) Purpose code: 3  
 LOG :8762.29 8763.94 1.62 Area code : 2  
 FDEPTH: 70 69 GearCond.code:  
 BDEPTH: 70 69 Validity code:  
 Towing dir: 340° Wire out: 240 m Speed: 30 km\*10  
 Sorted: 111 Kg Total catch: 1861.28 CATCH/HOUR: 3722.56

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Engraulis encrasicolus	298.53	93052	67.71	
Chelidonichthys capensis	46.84	542	10.62	
Citharus linguatula	17.44	776	3.96	
Zeus faber	15.10	58	3.42	
Brotula barbata	12.77	39	2.90	
Trachurus trecae	11.63	484	2.64	
Dentex angolensis	7.05	70	1.60	4414
Raja miraletus	5.19	10	1.18	
Sphoeroides pachgaster	4.41	10	1.00	
Dentex macrophthalmus	4.37	17	0.99	4413
Sepia sp.	4.06	48	0.92	
Rhinobatos sp.	3.68	2	0.83	
Pagellus bellottii	3.64	31	0.83	4415
Trichiurus lepturus	2.09	2	0.47	
Priacanthus arenatus	1.16	4	0.26	
Microchirus frechkopi	0.77	4	0.17	
Dentex barnardi	0.70	2	0.16	
SCORPAENIDAE	0.58	10	0.13	
Branchiostegus semifasciatus	0.50	2	0.11	
BLENIIDAE	0.39	10	0.09	
Total	440.90		99.99	

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	1677.60	27948	45.07	
Trachurus trecae	1176.60	40314	31.61	4424
Pagellus bellottii	542.00	7244	14.56	4423
Trichiurus lepturus	137.10	318	3.68	
Pseudupeneus prayensis	32.50	636	0.87	
Raja miraletus	24.38	36	0.65	
Priacanthus arenatus	23.68	70	0.64	
Boops boops	19.08	1378	0.51	
Zeus faber	18.38	36	0.49	
Trigla lyra	17.32	212	0.47	
Citharus linguatula	15.20	778	0.41	
Umbrina canariensis	11.30	36	0.30	
Squatina oculata	9.80	2	0.26	
Squatina oculata	9.80	2	0.26	
Octopus vulgaris	4.24	36	0.11	
Calappa pelii	2.80	4	0.08	
Fistularia petimba	2.80	4	0.08	
Grammolites gruvelli	2.48	142	0.07	
Saurida brasiliensis	2.48	424	0.07	
Sepia orbigynna	1.76	36	0.05	
Dentex barnardi	0.70	36	0.02	
Serranus accraensis	0.36	70	0.01	
Total	3732.36		100.27	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1860  
 DATE: 9/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 1014 Long E 1315  
 start stop duration  
 TIME :12:52:05 13:12:10 20 (min) Purpose code: 3  
 LOG :8739.11 8740.21 1.09 Area code : 2  
 FDEPTH: 75 73 GearCond.code:  
 BDEPTH: 75 73 Validity code:  
 Towing dir: 340° Wire out: 250 m Speed: 30 km\*10  
 Sorted: 133 Kg Total catch: 3801.90 CATCH/HOUR: 11405.70

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1863  
 DATE: 9/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 1011 Long E 1256  
 start stop duration  
 TIME :18:45:38 19:03:04 17 (min) Purpose code: 3  
 LOG :8781.87 8782.78 0.90 Area code : 2  
 FDEPTH: 223 228 GearCond.code:  
 BDEPTH: 223 228 Validity code:  
 Towing dir: 350° Wire out: 640 m Speed: 30 km\*10  
 Sorted: 40 Kg Total catch: 40.15 CATCH/HOUR: 141.71

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	9839.34	105741	86.27	4417
Pagellus bellottii	646.38	7353	5.67	4418
Trachurus trecae	644.67	20121	5.65	4416
Selene dorsalis	94.95	1113	0.83	
Sphyræna guanchancho	42.75	87	0.37	
Boops boops	37.62	258	0.33	
Pseudupeneus prayensis	37.62	429	0.33	
Sardinella maderensis	22.23	87	0.19	
Chelidonichthys capensis	13.68	87	0.12	
Antennarius "biocellatus"	8.55	171	0.07	
Sardinella aurita	6.84	87	0.06	
Scorpaena normani	3.42	87	0.03	
Citharus linguatula	3.42	342	0.03	
Grammolites gruvelli	3.42	87	0.03	
Ephippium guttifer	1.71	87	0.01	
Total	11406.60		99.99	

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Merluccius polli	28.38	487	20.03	4425
Dentex macrophthalmus	27.88	240	19.67	4426
MYCTOPHIDAE	17.96	12766	12.67	
Pterothrissus belloci	10.38	81	7.32	
Squatina oculata	9.46	4	6.68	
Synagrops microlepis	8.22	356	5.80	
Grammolites gruvelli	7.73	191	5.45	
Trichiurus lepturus	4.55	7	3.21	
Brotula barbata	4.20	56	2.96	
Parapenaeus longirostris	3.81	1733	2.69	
Raja miraletus	3.81	7	2.69	
Chlorophthalmus atlanticus	3.53	244	2.49	
GONEPLACIDAE	2.08	134	1.47	
Uranoscopus polli	1.98	14	1.40	
Torpedo "white spots"	1.76	4	1.24	
Hoplunnis sp.	1.48	56	1.04	
Todaropsis eblanæ	1.13	11	0.80	
Xenomystax sp.	0.81	4	0.57	
Scorpaena normani	0.67	42	0.47	
Peristedion cataphractum	0.56	95	0.40	
Calappa sp.	0.39	18	0.28	
Trigla lyra	0.35	4	0.25	
Conger conger	0.32	11	0.23	
Malacocephalus occidentalis	0.25	4	0.18	
Total	141.69		99.99	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1864  
DATE: 9/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 1009 Long E 1252  
start stop duration  
TIME :20:12:34 20:41:51 29 (min) Purpose code: 3  
LOG :8787.18 8788.77 1.60 Area code : 2  
FDEPTH: 443 449 GearCond.code:  
BDEPTH: 443 449 Validity code:  
Towing dir: 350° Wire out:1250 m Speed: 30 kn\*10  
Sorted: 29 Kg Total catch: 171.62 CATCH/HOUR: 355.08

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1867  
DATE:10/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 948 Long E 1250  
start stop duration  
TIME :09:14:38 09:44:08 30 (min) Purpose code: 3  
LOG :8823.23 8824.57 1.33 Area code : 2  
FDEPTH: 226 238 GearCond.code:  
BDEPTH: 226 238 Validity code:  
Towing dir: 350° Wire out: 660 m Speed: 30 kn\*10  
Sorted: 59 Kg Total catch: 581.34 CATCH/HOUR: 1162.68

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Nematocarcinus africanus	167.21	46924	47.09	
Laemonema laureysi	39.35	782	11.08	
MYCTOPHIDAE	29.30	2930	8.25	
B I V A L V E S	19.86	99	5.59	
Merluccius polli	19.24	50	5.42	
Hoplostethus cadenati	18.50	708	5.21	
Geryon maritae	7.94	25	2.24	
Aristeus varidens	6.21	484	1.75	
Triplophos sp.	5.83	87	1.64	
Yarrella blackfordi	5.83	372	1.64	
Coelorinchus coelorhincus	5.71	124	1.61	
Chaunax sp.	5.71	50	1.61	
Stomias affinis	4.59	87	1.29	
Malacocephalus occidentalis	3.85	37	1.08	
Plesiopaneus edwardsianus	3.23	62	0.91	
Peristedion cataphractum	2.98	583	0.84	
Trichiurus lepturus	2.98	99	0.84	
Bassanago albescens	2.36	37	0.66	
Scorpaena normani	1.16	2	0.33	
Thysanoteuthis rhombus	0.74	12	0.21	
Todaropsis eblanae	0.74	12	0.21	
Gadella sp.	0.62	25	0.17	
Zemoderlichthys copei	0.37	37	0.10	
Hydrolagus italicus	0.12	12	0.03	
Total	354.43		99.80	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1865  
DATE:10/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 1006 Long E 1252  
start stop duration  
TIME :03:21:17 05:00:07 31 (min) Purpose code: 3  
LOG :8802.36 8803.85 1.46 Area code : 2  
FDEPTH: 399 399 GearCond.code:  
BDEPTH: 399 399 Validity code:  
Towing dir: 350° Wire out:1440 m Speed: 30 kn\*10  
Sorted: 26 Kg Total catch: 278.26 CATCH/HOUR: 538.57

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Scorpaena normani	117.97	23	21.90	
Dibranchius atlanticus	60.33	4407	11.20	
Laemonema laureysi	60.10	534	11.16	
Geryon maritae	50.98	223	9.47	
Merluccius polli	44.75	223	8.31	
Stomias affinis	29.61	534	5.50	
Aristeus varidens	28.94	2650	5.37	
Nematocarcinus africanus	27.15	7479	5.04	
Coelorinchus coelorhincus	20.90	468	3.88	
Hydrolagus italicus	18.48	1848	3.43	
Lophius vaillanti	14.52	4	2.70	
Gadella sp.	14.03	691	2.61	
Malacocephalus occidentalis	14.03	112	2.61	
Chaunax sp.	13.35	134	2.48	
Triplophos sp.	6.91	691	1.28	
Bathymectes piperitus	6.02	68	1.12	
Trichiurus lepturus	6.02	178	1.12	
Todaropsis eblanae	3.12	23	0.58	
Plesiopaneus edwardsianus	1.34	68	0.25	
Total	538.55		100.01	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1866  
DATE:10/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 1001 Long E 1252  
start stop duration  
TIME :06:32:32 07:00:42 28 (min) Purpose code: 3  
LOG :8808.95 8810.23 1.01 Area code : 2  
FDEPTH: 300 321 GearCond.code:  
BDEPTH: 300 321 Validity code:  
Towing dir: 350° Wire out: 900 m Speed: 30 kn\*10  
Sorted: 81 Kg Total catch: 1657.55 CATCH/HOUR: 3551.89

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Chlorophthalmus atlanticus	3252.86	113850	91.58	
Carcharhinus limbatus	45.64	2	1.28	
Trichiurus lepturus	44.79	60	1.26	
Hydrolagus italicus	37.71	5304	1.06	
Dibranchius atlanticus	34.78	1768	0.98	
Parapaneus longirostris	27.71	3654	0.78	
Coelorinchus coelorhincus	26.53	825	0.75	
Pterothrissus belloci	26.53	178	0.75	
Synagrops microlepis	14.14	649	0.40	
Todaropsis eblanae	13.56	118	0.38	
Laemonema laureysi	6.49	178	0.18	
Merluccius polli	5.89	60	0.17	
Lophius vaillanti	4.71	118	0.13	
Calappa sp.	4.71	60	0.13	
Scorpaena normani	2.96	60	0.08	
GALATHEIDAE *	2.96	354	0.08	
Total	3551.97		99.99	

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Synagrops microlepis	848.30	63376	72.96	
Dentex macropphthalmus	64.96	422	5.59	4423
Zenopsis conchifer	58.14	272	5.00	
Dentex angolensis	44.64	130	3.84	4422
Dentex angolensis	33.50	86	2.88	
Brotula barbata	28.24	24	2.43	
Trichiurus sp.	19.60	30	1.69	
Coelorinchus coelorhincus	16.16	578	1.39	
Parapaneus longirostris	9.02	1445	0.78	
Merluccius polli	8.84	68	0.76	
Bembrops heterurus	8.66	86	0.74	
Uranoscopus albesca	6.12	52	0.53	
Illex coindetii	2.72	52	0.23	
Todaropsis eblanae	1.54	18	0.13	
Citharus linguatula	1.02	86	0.09	
Lophiodon kempi	0.54	2	0.05	
Dibranchius atlanticus	0.34	18	0.03	
Sepia elegans	0.34	18	0.03	
Total	1152.68		99.15	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1868  
DATE:10/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 946 Long E 1255  
start stop duration  
TIME :10:52:37 11:23:34 31 (min) Purpose code: 3  
LOG :8831.16 8832.68 1.52 Area code : 2  
FDEPTH: 118 117 GearCond.code:  
BDEPTH: 118 117 Validity code:  
Towing dir: 360° Wire out: 300 m Speed: 30 kn\*10  
Sorted: 182 Kg Total catch: 1337.68 CATCH/HOUR: 2589.06

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Ubrina canariensis	1389.19	2957	53.66	4428
Dentex macropthalmus	702.74	4343	27.14	4427
Pagellus bellottii	101.03	168	3.90	4424
Spicara alta	95.98	225	3.71	
Dentex angolensis	73.82	197	2.85	4426
Dentex barnardi	61.74	159	2.38	4425
Boops boops	37.90	1545	1.46	
Chelidonichthys gabonensis	35.92	323	1.39	
Anthias anthias	31.99	197	1.24	
Brotula barbata	17.13	14	0.66	
Epinephelus aeneus	8.90	2	0.34	
Trachurus trecae	6.46	238	0.25	
Pentheroscion mbizi	6.39	4	0.25	
Citharus linguatula	6.17	112	0.24	
Pagrus pagrus	5.19	4	0.20	
Branchiostegus semifasciatus	5.07	4	0.20	
Dentex gibbosus	1.74	2	0.07	
Peristedion cataphractum	1.68	29	0.06	
Total	2589.04		100.00	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1869  
DATE:10/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 946 Long E 1258  
start stop duration  
TIME :12:35:37 12:57:14 22 (min) Purpose code: 3  
LOG :8839.99 8841.14 1.11 Area code : 2  
FDEPTH: 101 100 GearCond.code:  
BDEPTH: 101 100 Validity code:  
Towing dir: 10° Wire out: 330 m Speed: 30 kn\*10  
Sorted: 52 Kg Total catch: 52.24 CATCH/HOUR: 142.47

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Dentex angolensis	22.31	139	15.66	4430
OMASTREPHIDAE	19.06	6807	13.38	
Dentex gibbosus	17.73	27	12.44	4433
Pagellus bellottii	15.22	106	10.68	4429
Dentex barnardi	14.45	55	10.14	4432
Citharus linguatula	9.11	218	6.39	
Chelidonichthys gabonensis	7.31	55	5.13	
Saurida brasiliensis	6.90	1121	4.84	
Trachurus trecae	4.64	161	3.26	4431
Uranoscopus polli	4.04	5	2.84	
Raja miraletus	3.98	5	2.79	
Scorpaena sp.	3.79	8	2.66	
Trigla lyra	3.55	22	2.49	
Illex coindetii	2.78	63	1.95	
Zeus faber	2.45	8	1.72	
Branchiostegus semifasciatus	1.75	3	1.23	
Sepia sp.	1.31	25	0.92	
Brotula barbata	1.31	3	0.92	
Chaetodon hoefleri	0.82	5	0.58	
Total	142.51		100.02	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1870  
 DATE:10/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 944 Long E 1304  
 start stop duration Purpose code: 3  
 TIME :13:58:37 14:28:25 30 (min) Area code : 2  
 LOG :8847.89 8849.40 1.49 GearCond.code:  
 FDEPTH: 74 74 Validity code:  
 BDEPTH: 74 74  
 Towing dir: 360° Wire out: 260 m Speed: 30 km\*10  
 Sorted: 66 Kg Total catch: 170.21 CATCH/HOUR: 340.42

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Pagellus bellottii	181.60	550	53.35	4436
Trichiurus lepturus	46.50	106	13.66	
Brachydeuterus auritus	26.40	226	7.76	4437
Dentex angolensis	15.90	150	4.64	4434
Trachurus trecae	10.30	276	3.03	4435
Pseudupeneus prayensis	9.60	186	2.82	
Raja miraletus	8.80	16	2.59	
Epinephelus aeneus	6.40	2	1.88	
Citharus linguatula	6.30	250	1.85	
Branchiostegus semifasciatus	4.70	16	1.38	
Dentex barnardi	3.90	26	1.15	
Dasyatris marmorata	3.60	2	1.06	
Octopus sp.	3.52	2	1.03	
Grammolites gruvelli	3.30	66	0.97	
Brotula barbata	2.70	16	0.79	
Sphyraena guachancho	2.00	6	0.59	
Sepia sp.	1.70	16	0.50	
Uranoscopus polli	1.10	6	0.32	
Epinephelus guaza ?	1.10	6	0.32	
Trigla lyra	1.00	10	0.29	
ANTENNARIIDAE	0.50	6	0.15	
SERRANIDAE	0.30	6	0.09	
Boops boops	0.20	10	0.06	
Chelidonichthys gabonensis	0.10	6	0.03	
<b>Total</b>	<b>341.42</b>		<b>100.31</b>	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1871  
 DATE:11/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 945 Long E 1311  
 start stop duration Purpose code: 3  
 TIME :05:33:07 05:59:02 26 (min) Area code : 2  
 LOG :8870.76 8872.14 1.36 GearCond.code:  
 FDEPTH: 25 26 Validity code:  
 BDEPTH: 25 26  
 Towing dir: 334° Wire out: 100 m Speed: 30 km\*10  
 Sorted: 19 Kg Total catch: 18.95 CATCH/HOUR: 43.73

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	19.89	143	45.48	
Sphyraena guachancho	6.48	32	14.82	
Raja miraletus	6.12	12	13.99	
Torpedo "white spots"	2.68	7	6.13	
Engraulis encrasicolus	2.42	552	5.53	
Galeoides decadactylus	1.45	9	3.32	
Chloroscombrus chrysurus	1.45	9	3.32	
Dicologlossa cuneata	1.08	5	2.47	
Sepia orbignyana	0.76	2	1.74	
Lagocephalus laevisgatus	0.60	2	1.37	
Syacium micrum	0.23	2	0.53	
Sardinella maderensis	0.18	5	0.41	
Penaeus notialis	0.14	7	0.32	
Selene dorsalis	0.12	2	0.27	
Grammolites gruvelli	0.09	12	0.21	
Eucinostomus melanopterus	0.02	2	0.05	
<b>Total</b>	<b>43.71</b>		<b>99.96</b>	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1872  
 DATE:11/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 937 Long E 1302  
 start stop duration Purpose code: 3  
 TIME :07:22:23 07:50:44 28 (min) Area code : 2  
 LOG :8883.52 8885.03 1.47 GearCond.code:  
 FDEPTH: 71 66 Validity code:  
 BDEPTH: 71 66  
 Towing dir: 360° Wire out: 230 m Speed: 30 km\*10  
 Sorted: 59 Kg Total catch: 384.98 CATCH/HOUR: 824.96

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	415.93	6129	50.42	
Trachurus trecae	116.44	2691	14.11	4438
Sea urchins	95.70	19678	11.60	
Pagellus bellottii	90.96	808	11.03	4439
Sepia orbignyana	17.55	1059	2.13	
Boops boops	11.98	43	1.45	
Psettodes belcheri	8.23	195	1.00	
Umbrina canariensis	7.95	195	0.96	
Pseudupeneus prayensis	7.39	167	0.90	
Pomadasy incisus	6.69	28	0.81	
Saurida brasiliensis	6.41	1254	0.78	
Chelidonichthys gabonensis	6.28	56	0.76	
Raja miraletus	5.85	15	0.71	
Torpedo torpedo	5.85	15	0.71	
Torpedo "dark blotches"	4.61	15	0.56	
Erotula barbata	4.22	2	0.51	
Chastodon hoefleri	2.66	15	0.32	
Dentex barnardi	2.38	15	0.29	
Alloteuthis africana	2.10	752	0.25	
Decapterus rhonchus	1.80	2	0.22	
Microchirus wittei	1.39	28	0.17	
Grammolites gruvelli	1.11	15	0.13	
OPHIDIIDAE	0.28	15	0.03	
Fistularia petimba	0.13	2	0.02	
<b>Total</b>	<b>823.89</b>		<b>99.87</b>	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1873  
 DATE:11/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 928 Long E 1302  
 start stop duration Purpose code: 3  
 TIME :08:55:46 09:29:23 34 (min) Area code : 2  
 LOG :8893.35 8895.08 1.73 GearCond.code:  
 FDEPTH: 42 45 Validity code:  
 BDEPTH: 42 45  
 Towing dir: 315° Wire out: 130 m Speed: 30 km\*10  
 Sorted: 28 Kg Total catch: 28.37 CATCH/HOUR: 50.06

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Alloteuthis africana	10.36	2940	20.70	
Raja miraletus	7.94	21	15.86	
Psettodes belcheri	4.80	168	9.59	
Dentex barnardi	4.62	16	9.23	
Selene dorsalis	3.74	7	7.47	
Epinephelus aeneus	3.37	7	6.73	
Sepia orbignyana	2.81	25	5.61	
Grammolites gruvelli	1.76	132	3.52	
Caranx crysos	1.69	2	3.38	
Uraspis secunda	1.66	2	3.32	
Dicologlossa cuneata	1.46	5	2.92	
Pagellus bellottii	1.46	7	2.92	
Sphyraena guachancho	1.41	4	2.82	
Chelidonichthys gabonensis	0.97	4	1.94	
Torpedo nobiliana	0.60	2	1.20	
Pseudupeneus prayensis	0.42	4	0.84	
Scorpaena angolensis	0.25	4	0.50	
Trachinocephalus myops	0.21	2	0.42	
Plesiopeneus edwardsianus	0.07	2	0.14	
<b>Total</b>	<b>49.60</b>		<b>99.11</b>	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1874  
 DATE:11/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 929 Long E 1255  
 start stop duration Purpose code: 3  
 TIME :10:41:22 11:11:13 30 (min) Area code : 2  
 LOG :8902.62 8904.12 1.49 GearCond.code:  
 FDEPTH: 88 93 Validity code:  
 BDEPTH: 88 93  
 Towing dir: 320° Wire out: 270 m Speed: 30 km\*10  
 Sorted: 54 Kg Total catch: 858.61 CATCH/HOUR: 1717.22

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichiurus lepturus	1135.74	2830	66.14	
Umbrina canariensis	219.84	544	12.80	4442
Stromateus fiatola	100.72	98	5.87	4443
Dentex barnardi	84.96	292	4.95	4440
Brotula barbata	75.68	116	4.41	
Priacanthus arenatus	43.44	64	2.53	4444
Pagellus bellottii	18.40	46	1.07	
Zeus faber	10.76	28	0.63	4441
Branchiostegus semifasciatus	5.52	24	0.32	
Octopus vulgaris	5.24	4	0.31	
Uranoscopus albesca	4.60	2	0.27	
Dentex angolensis	4.14	70	0.24	
Sepia elegans	3.68	24	0.21	
Dicologlossa cuneata	2.36	2	0.14	
Fistularia petimba	2.30	24	0.13	
Uraspis secunda	1.92	4	0.11	
<b>Total</b>	<b>1721.22</b>		<b>100.24</b>	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1875  
 DATE:11/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 931 Long E 1252  
 start stop duration Purpose code: 3  
 TIME :12:06:53 12:36:39 30 (min) Area code : 2  
 LOG :8909.67 8911.32 1.60 GearCond.code:  
 FDEPTH: 109 106 Validity code:  
 BDEPTH: 109 106  
 Towing dir: 340° Wire out: 340 m Speed: 30 km\*10  
 Sorted: 46 Kg Total catch: 192.85 CATCH/HOUR: 385.70

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Raja miraletus	120.14	24	31.15	
Selene dorsalis	66.88	152	17.34	4447
Uranoscopus albesca	32.26	144	8.36	
Alloteuthis africana	19.70	9570	5.11	
Citharus linguatula	17.60	200	4.56	
Dentex macrophthalmus	17.28	92	4.48	4445
Trichiurus lepturus	16.54	26	4.29	
Zeus faber	15.74	60	4.08	
Stromateus fiatola	10.72	8	2.78	
Brotula barbata	10.44	12	2.71	
Chelidonichthys gabonensis	7.54	44	1.95	
Brachydeuterus auritus	7.34	40	1.90	4446
Sepia officinalis hierreda	5.84	4	1.51	
Squatina oculata	5.20	4	1.35	
Saurida brasiliensis	4.94	820	1.28	
Fistularia petimba	4.72	8	1.22	
Merluccius polli juveniles	4.64	384	1.20	
Pontinus accraensis	3.20	16	0.83	
Pterothrissus belloci	2.54	14	0.66	
Chelidonichthys capensis	2.00	6	0.52	
OMMASTREPHIDAE	1.90	54	0.49	
Trachurus trecae	1.90	84	0.49	
Torpedo torpedo	1.86	4	0.48	
Bembrops heterurus	1.80	16	0.47	
Dentex angolensis	1.32	10	0.34	
Parapeneus longirostris	1.10	246	0.29	
Dentex barnardi	0.36	2	0.09	
<b>Total</b>	<b>385.50</b>		<b>99.93</b>	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1876  
 DATE:11/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 933 Long E 1246  
 start stop duration  
 TIME :14:03:45 14:33:41 30 (min) Purpose code: 3  
 LOG :8921.07 8922.56 1.48 Area code : 2  
 FDEPTH: 176 181 GearCond.code:  
 BDEPTH: 176 181 Validity code:  
 Towing dir: 340° Wire out: 480 m Speed: 30 km\*10  
 Sorted: 38 Kg Total catch: 261.78 CATCH/HOUR: 523.56

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1879  
 DATE:12/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 922 Long E 1240  
 start stop duration  
 TIME :05:44:37 06:15:00 30 (min) Purpose code: 3  
 LOG :8979.79 8981.30 1.52 Area code : 2  
 FDEPTH: 274 277 GearCond.code:  
 BDEPTH: 274 277 Validity code:  
 Towing dir: 350° Wire out: 800 m Speed: 30 km\*10  
 Sorted: 55 Kg Total catch: 159.38 CATCH/HOUR: 318.76

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichiurus lepturus	168.96	504	32.27	
Zenopsis conchifer	156.00	672	29.80	
Raja clavata	85.76	48	12.56	
Dentex macropthalmus	35.48	194	5.39	4449
Dentex angolensis	27.24	94	5.20	4448
Pterothrissus belloci	19.92	144	3.80	
Raja miraletus	10.56	12	2.02	
OMMASTREPHIDAE	10.56	48	2.02	
Grammolites gruvelli	10.56	132	2.02	
Octopus sp.	6.72	24	1.28	
Arnoglossus imperialis	6.72	288	1.28	
Zeus faber	6.00	12	1.15	
Gadella maraldi	1.08	2	0.21	
<b>Total</b>	<b>523.56</b>		<b>100.00</b>	

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Chlorophthalmus atlanticus	94.72	2400	29.72	
Epigonus telescopus	58.84	448	18.46	
Synagrops microlepis	40.24	3366	12.62	
Merluccius polli	20.00	160	6.27	
Coelorinchus coelorhincus	19.20	704	6.02	
Parapenaeus longirostris	14.56	2912	4.57	
Zenopsis conchifer	13.40	36	4.20	
Leaonema laureysi	12.64	208	3.97	
Erythrocles monodi	10.28	8	3.22	
Malacocephalus occidentalis	7.84	80	2.46	
Bembrops heterurus	7.04	128	2.21	
Brotula barbata	5.80	4	1.82	
Xenomystax sp.	4.44	14	1.39	
Dentex macropthalmus	3.08	12	0.97	
Gephyroberyx darwini	2.44	4	0.77	
Todaropsis eblanae	1.44	16	0.45	
Calappa sp.	0.80	16	0.25	
<b>Total</b>	<b>316.76</b>		<b>99.37</b>	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1877  
 DATE:11/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 935 Long E 1241  
 start stop duration  
 TIME :16:07:41 16:37:40 30 (min) Purpose code: 3  
 LOG :8932.19 8933.63 1.42 Area code : 2  
 FDEPTH: 432 427 GearCond.code:  
 BDEPTH: 432 427 Validity code:  
 Towing dir: 350° Wire out: 100 m Speed: 30 km\*10  
 Sorted: 103 Kg Total catch: 176.86 CATCH/HOUR: 353.72

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1880  
 DATE:12/ 3/99 GEAR TYPE: BT No: 2 POSITION:Lat S 917 Long E 1246  
 start stop duration  
 TIME :08:48:45 09:18:07 29 (min) Purpose code: 3  
 LOG :8990.93 8992.44 1.50 Area code : 2  
 FDEPTH: 127 128 GearCond.code:  
 BDEPTH: 127 128 Validity code:  
 Towing dir: 350° Wire out: 360 m Speed: 30 km\*10  
 Sorted: 89 Kg Total catch: 88.89 CATCH/HOUR: 183.91

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Merluccius polli	111.80	696	31.61	4450
Coelorinchus coelorhincus	56.08	304	15.85	
Centropronus granulosus	38.60	10	10.91	
Leaonema laureysi	35.92	328	10.15	
Lophius vaillanti	16.52	16	4.67	
Trichiurus lepturus	16.08	268	4.55	
Aristeus varidens	14.20	592	4.01	
Geryon maritae	13.12	48	3.71	
Etmopterus sp.	12.32	204	3.48	
Hymenocephalus italicus	10.40	1164	2.94	
Bassanago albescens	6.56	40	1.85	
Dibranchius atlanticus	3.96	220	1.12	
Nematocarcinus africanus	3.84	1068	1.09	
Galeus polli	2.80	20	0.79	
Plesiopeneaeus edwardsianus	1.92	40	0.54	
Malacocephalus occidentalis	1.88	12	0.53	
Scyllorhinus cervigoni	1.68	2	0.47	
Gadomus sp.	1.64	56	0.46	
Zenopsis conchifer	1.48	4	0.42	
Raja sp.	1.24	4	0.35	
Bembrops heterurus	0.96	8	0.27	
Stomias affinis	0.68	12	0.19	
Bathymectes piperitus	0.48	12	0.14	
Paralepis sp.	0.28	12	0.08	
NETTASTOMATIDAE	0.28	12	0.08	
Raja clavata	0.16	4	0.05	
Halosaurus sp.	0.12	12	0.03	
MYCTOPHIDAE	0.12	164	0.03	
<b>Total</b>	<b>355.12</b>		<b>100.37</b>	

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichiurus lepturus	121.18	434	65.89	
Pterothrissus belloci	17.36	151	9.44	
Brotula barbata	13.45	12	7.31	
Chelidoniichthys gabonensis	6.41	41	3.49	
Dentex angolensis	4.88	19	2.65	
Dentex macropthalmus	4.57	39	2.48	4452
Torpedo "white spots"	3.46	6	1.88	
Trachurus trecae	3.39	6	1.84	
Illex coindetii	3.33	95	1.81	
Uranoscopus polli	1.30	12	0.71	
Parapenaeus longirostris	0.95	170	0.52	
Citharus linguatula	0.83	31	0.45	
Todaropsis eblanae	0.68	52	0.37	
Zeus faber	0.64	4	0.35	
Zenopsis conchifer	0.60	2	0.33	
Bembrops heterurus	0.41	4	0.22	
Saurida brasiliensis	0.27	46	0.15	
Microchirus wittei	0.10	2	0.05	
Spicara alta	0.08	2	0.04	
<b>Total</b>	<b>183.89</b>		<b>99.98</b>	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1878  
 DATE:11/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 928 Long E 1242  
 start stop duration  
 TIME :17:48:55 18:18:28 30 (min) Purpose code: 3  
 LOG :8939.69 8941.15 1.45 Area code : 2  
 FDEPTH: 232 233 GearCond.code:  
 BDEPTH: 232 233 Validity code:  
 Towing dir: 335° Wire out: 700 m Speed: 30 km\*10  
 Sorted: 81 Kg Total catch: 149.21 CATCH/HOUR: 298.42

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1881  
 DATE:12/ 3/99 GEAR TYPE: BT No: 2 POSITION:Lat S 917 Long E 1251  
 start stop duration  
 TIME :10:31:46 11:01:29 30 (min) Purpose code: 3  
 LOG :9001.21 9002.89 1.66 Area code : 2  
 FDEPTH: 82 80 GearCond.code:  
 BDEPTH: 82 80 Validity code:  
 Towing dir: 360° Wire out: 270 m Speed: 30 km\*10  
 Sorted: 65 Kg Total catch: 130.92 CATCH/HOUR: 261.84

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Dentex macropthalmus	147.04	590	49.27	4451
Brotula barbata	63.50	326	21.28	
Citharus linguatula	21.90	318	7.34	
Bembrops heterurus	14.28	156	4.79	
Scorpaena normani	7.30	78	2.45	
Pterothrissus belloci	7.14	46	2.39	
Hoplostethus mediterraneus	6.90	40	2.31	
Uranoscopus polli	6.10	60	2.04	
Calappa sp.	3.96	106	1.33	
Raja sp.	3.26	4	1.09	
Hoplunnis punctata	3.04	16	1.02	
Chlorophthalmus atlanticus	3.04	352	1.02	
Ariomma bondi	2.88	30	0.97	
Coelorinchus coelorhincus	2.74	124	0.92	
Xenomystax sp.	2.14	16	0.72	
Parapenaeus longirostris	1.24	442	0.42	
Todaropsis eblanae	1.06	16	0.36	
Dentex angolensis	0.84	4	0.28	
NETTASTOMATIDAE	0.46	16	0.15	
<b>Total</b>	<b>298.82</b>		<b>100.15</b>	

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	156.96	1462	59.95	4455
Selene dorsalis	56.80	714	21.69	4454
Trichiurus lepturus	27.84	120	10.63	
Chloroscombrus chrysurus	6.88	40	2.63	
Alloteuthis africana	5.04	1612	1.92	
Trachurus trecae	2.80	44	1.07	4453
Pterothrissus belloci	2.16	16	0.82	
OMMASTREPHIDAE	1.52	32	0.58	
Dentex angolensis	0.80	4	0.31	
Chaetodon hoeffleri	0.48	4	0.18	
Umbrina canariensis	0.40	4	0.15	
Thorogobius angolensis	0.08	12	0.03	
Monoleme microstoma	0.08	4	0.03	
<b>Total</b>	<b>261.84</b>		<b>99.99</b>	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1882  
 DATE:12/3/99 GEAR TYPE: BT No: 2 POSITION: Lat S 917  
 start stop duration Long E 1254

TIME :11:58:56 12:28:52 30 (min) Purpose code: 3  
 LOG :9008.85 9010.43 1.55 Area code : 2  
 FDEPTH: 57 53 GearCond.code: 2  
 BDEPTH: 57 53 Validity code:  
 Towing dir: 360° Wire out: 220 m Speed: 30 km\*10

Sorted: 25 Kg Total catch: 24.96 CATCH/HOUR: 49.92

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sphyræna guachancho	23.32	30	46.71	4456
Alloteuthis africana	5.56	1768	11.14	
Brachydeuterus auritus	4.48	32	8.97	
Sphyræna sphyraena	3.48	10	6.97	
Uraspis secunda	3.40	4	5.61	
Lithognathus mormyrus	2.80	2	4.73	
Citharus linguatula	2.36	54	4.73	
Decapterus punctatus	0.96	10	1.92	
Pagellus bellottii	0.88	6	1.76	
Cynoglossus canariensis	0.76	4	1.52	
Grammolites gruvelli	0.56	8	1.12	
Dentex angolensis	0.48	6	0.96	
Torpedo torpedo	0.20	2	0.40	
Serranus accraensis	0.16	2	0.32	
Dentex barnardi	0.16	2	0.32	
Parapenaeus longirostris	0.12	22	0.24	
Brotula barbata	0.12	2	0.24	
Trachurus trecae	0.04	14	0.08	
Engraulis encrasicolus	0.04	6	0.08	
Saurida brasiliensis	0.04	8	0.08	
<b>Total</b>	<b>49.92</b>		<b>99.98</b>	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1883  
 DATE:12/3/99 GEAR TYPE: BT No: 2 POSITION: Lat S 917  
 start stop duration Long E 1256

TIME :13:38:59 14:08:45 30 (min) Purpose code: 3  
 LOG :9019.06 9020.41 1.33 Area code : 2  
 FDEPTH: 38 34 GearCond.code: 2  
 BDEPTH: 38 34 Validity code:  
 Towing dir: 350° Wire out: m Speed: km\*10

Sorted: 12 Kg Total catch: 12.00 CATCH/HOUR: 24.00

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Selene dorsalis	8.52	48	35.50	
Alloteuthis africana	3.98	936	16.58	
Epinephelus aeneus	2.36	8	9.83	
Sepia elegans	1.92	6	8.00	
Raja miraletus	1.72	2	7.17	
Pagellus bellottii	1.72	6	7.17	
Brachydeuterus auritus	1.54	146	6.42	
Sphyræna sphyraena	0.84	2	3.50	
Grammolites gruvelli	0.56	20	2.33	
Citharus linguatula	0.28	14	1.17	
Syacium micranthum	0.24	2	1.00	
Penaeus notialis	0.20	6	0.83	
Trachurus trecae	0.12	76	0.50	
<b>Total</b>	<b>24.00</b>		<b>100.00</b>	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1884  
 DATE:12/3/99 GEAR TYPE: BT No: 2 POSITION: Lat S 911  
 start stop duration Long E 1252

TIME :15:09:18 15:35:30 26 (min) Purpose code: 3  
 LOG :9027.39 9028.66 1.17 Area code : 2  
 FDEPTH: 67 0 GearCond.code: 2  
 BDEPTH: 67 0 Validity code:  
 Towing dir: 360° Wire out: 230 m Speed: 30 km\*10

Sorted: 50 Kg Total catch: 50.33 CATCH/HOUR: 116.15

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	56.49	1071	48.64	4458
Alloteuthis africana	11.93	3358	10.27	
Dentex angolensis	7.48	39	6.44	4459
Trachurus trecae	6.69	235	5.76	4457
Brotula barbata	6.14	12	5.29	
Trichurus lepturus	5.26	32	4.53	
Zeus faber	3.18	7	2.74	
Octopus vulgaris	3.14	5	2.70	
Sphyræna sphyraena	2.86	7	2.46	
Epinephelus aeneus	1.94	2	1.67	
Selene dorsalis	1.94	5	1.67	
Decapterus rhonchus	1.38	5	1.19	
Sardinella aurita	1.38	7	1.19	
Umbrina canariensis	1.11	9	0.96	
Parapenaeus longirostris	0.74	168	0.64	
Saurida brasiliensis	0.74	150	0.64	
Pagellus bellottii	0.74	2	0.64	
Sepia elegans	0.69	2	0.59	
Pterothrissus belloci	0.60	5	0.52	
Boops boops	0.42	25	0.36	
Torpedo *white spots*	0.32	5	0.28	
Fistularia petimba	0.28	2	0.24	
Microchirus wittei	0.18	2	0.15	
Citharus linguatula	0.18	2	0.15	
Antennarius *biocellatus*	0.18	2	0.15	
Grammolites gruvelli	0.05	2	0.04	
<b>Total</b>	<b>116.04</b>		<b>99.91</b>	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1885  
 DATE:12/3/99 GEAR TYPE: BT No: 2 POSITION: Lat S 905  
 start stop duration Long E 1257

TIME :16:36:04 17:06:15 30 (min) Purpose code: 3  
 LOG :9035.97 9037.42 1.40 Area code : 2  
 FDEPTH: 33 31 GearCond.code: 2  
 BDEPTH: 33 31 Validity code:  
 Towing dir: 210° Wire out: 120 m Speed: 30 km\*10

Sorted: 23 Kg Total catch: 22.71 CATCH/HOUR: 45.42

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Alloteuthis africana	12.40	6656	27.30	
Pagellus bellottii	8.78	70	19.33	4460
Epinephelus aeneus	8.00	2	17.61	
Alectis alexandrinus	3.56	2	7.84	
Citharus linguatula	3.02	24	6.65	
Brachydeuterus auritus	2.36	40	5.20	
Sepia orbignyana	1.60	12	3.52	
Rhinobatos albomaculatus	1.52	2	3.35	
Pomadasys rogeri	1.08	2	2.38	
Sphyræna sphyraena	1.04	2	2.29	
Balistes vetula	0.88	2	1.94	
Dentex barnardi	0.50	2	1.10	
Pseudupeneus prayensis	0.26	12	0.57	
Trichurus lepturus	0.20	2	0.44	
Trachurus trecae	0.14	6	0.31	
Penaeus notialis	0.08	2	0.18	
<b>Total</b>	<b>45.42</b>		<b>100.01</b>	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1886  
 DATE:12/3/99 GEAR TYPE: BT No: 2 POSITION: Lat S 906  
 start stop duration Long E 1252

TIME :17:43:59 18:13:29 30 (min) Purpose code: 3  
 LOG :9041.79 9043.30 1.49 Area code : 2  
 FDEPTH: 57 60 GearCond.code: 2  
 BDEPTH: 57 60 Validity code:  
 Towing dir: 200° Wire out: 170 m Speed: 30 km\*10

Sorted: 72 Kg Total catch: 175.00 CATCH/HOUR: 350.00

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Pagellus bellottii	203.50	1896	58.14	4461
Pseudupeneus prayensis	32.46	366	9.27	
Sepia orbignyana	28.90	50	8.26	
Trachinocephalus myops	23.06	360	6.59	
Chelidonicichthys capensis	19.70	216	5.63	
Scorpaena angolensis	7.00	86	2.00	
Bothus podas africanus	6.26	196	1.79	
Dicologlossa hexophthalma	4.10	280	1.17	
Raja miraletus	4.08	6	1.17	
Dentex barnardi	3.00	6	0.86	
Dactylopterus volitans	2.80	6	0.80	
Fistularia petimba	2.76	18	0.79	
Trachurus trecae	2.60	6	0.74	
Synagrops microlepis	2.56	486	0.73	
Citharus linguatula	2.30	230	0.66	
Lithognathus mormyrus	2.00	16	0.57	
Sphyræna sphyraena	1.86	6	0.53	
Paraconger notialis	0.50	10	0.14	
Microchirus sp.	0.30	6	0.09	
Liocarcinus corrugatus	0.26	40	0.07	
<b>Total</b>	<b>350.00</b>		<b>100.00</b>	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1887  
 DATE:13/3/99 GEAR TYPE: BT No: 2 POSITION: Lat S 848  
 start stop duration Long E 1249

TIME :05:12:49 05:42:08 29 (min) Purpose code: 3  
 LOG :9113.69 9115.06 1.37 Area code : 1  
 FDEPTH: 553 563 GearCond.code: 2  
 BDEPTH: 553 563 Validity code:  
 Towing dir: 90° Wire out: 1500 m Speed: 30 km\*10

Sorted: 29 Kg Total catch: 216.24 CATCH/HOUR: 447.39

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Nematocarcinus africanus	143.54	27931	32.08	
Hoplostethus cadenati	83.79	823	18.73	
Triplophos sp.	59.69	5462	13.34	
Yareella blackfordi	44.07	1303	9.85	
Lamprogrammus exultus	31.51	234	7.04	
Xenodermichthys copei	22.82	2406	5.10	
Geryon maritae	13.92	33	3.11	
Merluccius polli	8.38	31	1.87	
Raja sp.	7.76	17	1.73	
Etmopterus sp.	6.21	31	1.39	
Aristeus varidens	5.90	403	1.32	
Stomias affinis	5.59	93	1.25	
GALATHEIDAE *	5.44	420	1.22	
Trichurus lepturus	3.79	141	0.85	
MORIDAE	2.17	17	0.49	
Fistularia petimba	1.32	6	0.30	
Plesiopeneus edwardsianus	0.62	31	0.14	
Bathyroconger vicinus	0.31	17	0.07	
Nezumia sp.	0.31	31	0.07	
LITHODIDAE *	0.25	2	0.06	
<b>Total</b>	<b>447.39</b>		<b>100.01</b>	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1888  
DATE:13/ 3/99 GEAR TYPE: BT No: 2 POSITION:Lat S 847 Long E 1256  
start stop duration  
TIME :07:28:29 07:45:13 17 (min) Purpose code: 3  
LOG :9123.51 9124.11 0.53 Area code : 1  
FDEPTH: 329 333 GearCond.code: 8  
BDEPTH: 329 333 Validity code: 1  
Towing dir: 360e Wire out: 950 m Speed: 30 km\*10  
Sorted: 28 Kg Total catch: 150.42 CATCH/HOUR: 566.19

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1891  
DATE:13/ 3/99 GEAR TYPE: BT No:12 POSITION:Lat S 836 Long E 1310  
start stop duration  
TIME :13:17:33 13:38:46 21 (min) Purpose code: 3  
LOG :9153.86 9154.77 0.90 Area code : 1  
FDEPTH: 78 78 GearCond.code: 8  
BDEPTH: 78 78 Validity code: 1  
Towing dir: 360e Wire out: 270 m Speed: 30 km\*10  
Sorted: 59 Kg Total catch: 244.44 CATCH/HOUR: 698.40

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Synagrops microlepis	267.18	8876	47.19	
Merluccius pollii	92.75	1112	16.38	4462
Chlorophthalmus atlanticus	69.21	1175	12.22	
Mycotophum sp.	59.26	90053	10.47	
Laemonema laureysi	34.48	335	6.09	
Pterothrissus bellocci	19.55	145	3.45	
Zenopsis conchifer	5.58	18	0.99	
Parapenaeus longirostris	4.76	508	0.84	
Malacocephalus occidentalis	4.45	64	0.79	
Coelorrinchus coelorhincus	3.67	64	0.65	
Gadella maraldi	3.53	127	0.62	
Epigonus telescopus	1.76	18	0.31	
Neoronia caroli	1.27	18	0.22	
Bassanago albescens	0.95	18	0.17	
Scorpaena normani	0.95	32	0.17	
Stereomastis sp.	0.32	32	0.06	
Total	569.67		100.62	

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	290.74	4894	41.63	4468
Trichiurus lepturus	190.40	743	27.26	
Trachurus trecae	98.74	3211	14.14	4469
Torpedo torpedo	17.37	23	2.49	
Octopus vulgaris	13.71	11	1.96	
Pagellus bellottii	12.91	57	1.85	4471
Raja miraletus	12.57	23	1.80	
Fistularia petimba	11.43	23	1.64	
Zeus faber	8.74	34	1.25	
Alloteuthis africana	6.86	1829	0.98	
Dentex barnardi	6.46	23	0.92	
Stromateus fiatola	6.40	26	0.92	
Atractoscion aequidens	4.11	23	0.59	
Saurida brasiliensis	2.74	526	0.39	
Sepia elegans	2.69	9	0.39	
Sardinella aurita	2.51	46	0.36	
Dentex angolensis	2.29	23	0.33	4470
OMMASTREPHIDAE	1.83	34	0.26	
Lutjanus fulgens	1.60	3	0.23	
Boops boops	1.37	137	0.20	
Citharus linguatula	1.37	34	0.20	
Scorpaena normani	0.69	11	0.10	
Pterothrissus bellocci	0.46	11	0.07	
Engraulis encrasicolus	0.23	34	0.03	
Gadella maraldi	0.23	11	0.03	
Total	698.45		100.02	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1889  
DATE:13/ 3/99 GEAR TYPE: BT No:12 POSITION:Lat S 847 Long E 1300  
start stop duration  
TIME :09:18:16 09:48:05 30 (min) Purpose code: 3  
LOG :9131.05 9132.53 1.47 Area code : 1  
FDEPTH: 189 192 GearCond.code: 8  
BDEPTH: 189 192 Validity code: 1  
Towing dir: 360e Wire out: 580 m Speed: 30 km\*10  
Sorted: 29 Kg Total catch: 640.20 CATCH/HOUR: 1280.40

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1892  
DATE:13/ 3/99 GEAR TYPE: BT No:12 POSITION:Lat S 836 Long E 1305  
start stop duration  
TIME :14:44:41 15:07:45 23 (min) Purpose code: 3  
LOG :9162.36 9163.34 0.95 Area code : 1  
FDEPTH: 110 108 GearCond.code: 8  
BDEPTH: 110 108 Validity code: 1  
Towing dir: 360e Wire out:9163 m Speed: 80 km\*10  
Sorted: 26 Kg Total catch: 126.71 CATCH/HOUR: 330.55

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Synagrops microlepis	1090.22	64642	85.15	
Trichiurus lepturus	45.04	72	3.52	
Pterothrissus bellocci	45.02	362	3.52	
Zenopsis conchifer	23.72	56	1.85	
Parapenaeus longirostris	19.30	4624	1.51	
Dentex angolensis	12.48	50	0.97	4463
Brotula barbata	10.16	16	0.79	
Todarodes sagittatus	6.44	282	0.50	
Bembrops heterurus	6.04	80	0.47	
Dentex macrophthalmus	5.64	24	0.44	4464
Chelidonichthys gabonensis	5.22	40	0.41	
Illex coindetii	3.22	30	0.25	
Sepia elegans	2.02	160	0.16	
Scorpaena normani	1.60	40	0.12	
Merluccius pollii	1.60	40	0.12	
Zeus faber	1.48	6	0.12	
Citharus linguatula	0.80	40	0.06	
Saurida brasiliensis	0.40	40	0.03	
Total	1280.40		99.99	

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichiurus lepturus	174.21	1080	52.70	
Dentex angolensis	37.77	292	11.43	4472
Raja miraletus	33.08	44	10.01	
Pagellus bellottii	21.86	146	6.61	4473
Sepia orbignyana	14.45	13	4.37	
Squatina aculeata	12.13	3	3.69	
Saurida brasiliensis	10.33	1816	3.13	
Pterothrissus bellocci	7.67	70	2.32	
OMMASTREPHIDAE	7.36	141	2.23	
Brotula barbata	4.49	8	1.36	
Trachurus trecae	2.82	86	0.85	
Fistularia petimba	1.41	3	0.43	
Merluccius pollii, juveniles	0.94	23	0.28	
Ubrina canariensis	0.78	8	0.24	
Scorpaena normani	0.78	5	0.24	
Chelidonichthys gabonensis	0.31	3	0.09	
Sardinella aurita	0.16	8	0.05	
Total	330.55		100.01	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1890  
DATE:13/ 3/99 GEAR TYPE: BT No:12 POSITION:Lat S 845 Long E 1309  
start stop duration  
TIME :11:40:02 12:10:06 30 (min) Purpose code: 3  
LOG :9145.08 9146.38 1.29 Area code : 1  
FDEPTH: 83 83 GearCond.code: 8  
BDEPTH: 83 83 Validity code: 1  
Towing dir: 20e Wire out: 270 m Speed: 30 km\*10  
Sorted: 103 Kg Total catch: 969.04 CATCH/HOUR: 1938.08

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1893  
DATE:13/ 3/99 GEAR TYPE: BT No:12 POSITION:Lat S 836 Long E 1259  
start stop duration  
TIME :16:53:27 17:23:06 30 (min) Purpose code: 3  
LOG :9173.28 9174.74 1.44 Area code : 1  
FDEPTH: 181 175 GearCond.code: 8  
BDEPTH: 181 175 Validity code: 1  
Towing dir: 360e Wire out: 570 m Speed: 30 km\*10  
Sorted: 34 Kg Total catch: 738.99 CATCH/HOUR: 1477.98

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	1511.62	22962	78.00	4467
Trachurus trecae	164.26	5116	8.48	4465
Octopus vulgaris	47.42	38	2.45	
Trichiurus lepturus	45.54	186	2.35	
Pagellus bellottii	32.86	150	1.70	4466
Pterothrissus bellocci	32.84	280	1.69	
Lithognathus mormyrus	18.66	38	0.96	
Galeoides decadactylus	13.82	56	0.71	
Raja miraletus	12.32	18	0.64	
Sepia elegans	9.64	14	0.50	
Atractoscion aequidens	7.60	18	0.39	
Torpedo torpedo	7.46	18	0.38	
Zenopsis conchifer	6.34	18	0.33	
Stromateus fiatola	5.64	14	0.29	
Citharus linguatula	4.72	130	0.24	
Pseudupeneus prayensis	4.48	18	0.23	
Sardinella aurita	3.36	56	0.17	
Sardinella maderensis	2.24	18	0.12	
OMMASTREPHIDAE	1.50	38	0.08	
Selene dorsalis	1.50	18	0.08	
Boops boops	1.50	56	0.08	
Pseudupeneus prayensis	0.74	18	0.04	
Total	1936.06		99.91	

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Synagrops microlepis	1058.40	79848	71.61	
Trichiurus lepturus	129.84	390	8.78	
Pterothrissus bellocci	88.20	504	5.97	
Illex coindetii	30.24	648	2.05	
Spicara alta	29.92	116	2.02	
Dentex macrophthalmus	26.76	98	1.81	4475
Zenopsis conchifer	25.20	72	1.71	
Dentex angolensis	17.04	64	1.15	4474
Brotula barbata	16.44	20	1.11	
Miracorvina angolensis	10.14	20	0.69	
Parapenaeus longirostris	9.00	2088	0.61	
Pentheroscion mbizi	7.20	36	0.49	
Mycotophum sp.	7.20	5688	0.49	
Ubrina canariensis	6.66	18	0.45	
Chelidonichthys gabonensis	4.68	36	0.32	
Bembrops heterurus	4.32	36	0.29	
Raja straeleni	4.22	2	0.29	
Sepia elegans	2.52	72	0.17	
Total	1477.98		100.01	

DR. FRIDTJOF NANSSEN PROJECT:A4 PROJECT STATION:1894  
DATE:13/ 3/99 GEAR TYPE: BT No:12 POSITION:Lat S 834 Long E 1255  
start stop duration  
TIME :19:40:09 20:00:20 20 (min) Purpose code: 3  
LOG :9189.52 9190.47 0.95 Area code : 1  
FDEPTH: 379 372 GearCond.code:  
BDEPTH: 379 372 Validity code:  
Towing dir: 350e Wire out:1040 m Speed: 30 km\*10  
Sorted: 70 Kg Total catch: 69.74 CATCH/HOUR: 209.22

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Merluccius polli	136.98	720	65.47	4476
Nematocarcinus africanus	26.61	5706	12.72	
Laemonema laureysi	9.84	147	4.70	
Malacocephalus laevis	7.35	48	3.51	
Pterothrissus belloci	6.51	36	3.11	
Bassanago albescens	5.76	120	2.75	
OMMASTREPHIDAE	4.65	33	2.22	
Aristeus validens	3.33	201	1.59	
Coelrorinchus coelrorhincus	3.15	72	1.51	
Bembrops heterurus	2.34	33	1.12	
Zenopsis conchifer	1.32	3	0.63	
Lophius vaillanti	0.72	3	0.34	
Hymenocephalus sp.	0.66	66	0.32	
Total	209.22		99.99	

DR. FRIDTJOF NANSSEN PROJECT:A4 PROJECT STATION:1895  
DATE:14/ 3/99 GEAR TYPE: BT No:12 POSITION:Lat S 825 Long E 1248  
start stop duration  
TIME :05:43:21 06:09:14 26 (min) Purpose code: 3  
LOG :9216.67 9217.91 1.18 Area code : 1  
FDEPTH: 442 444 GearCond.code:  
BDEPTH: 442 444 Validity code:  
Towing dir: 340e Wire out:1180 m Speed: 30 km\*10  
Sorted: 19 Kg Total catch: 94.20 CATCH/HOUR: 217.38

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Nematocarcinus africanus	54.51	13627	25.08	
Squalus sp.	30.37	7	13.97	
Trichiurus lepturus	26.49	78	12.19	
Laemonema laureysi	24.16	369	11.11	
Merluccius polli	22.85	76	10.51	4477
Hymenocephalus italicus	14.93	3115	6.87	
Lophiodon sp.	14.22	18	6.54	
Gadella maraldi	6.48	325	2.98	
Zenopsis conchifer	6.32	9	2.91	
Bassanago albescens	5.52	88	2.54	
Chaunax pictus	4.04	18	1.86	
Aristeus validens	2.63	238	1.21	
Coelrorinchus coelrorhincus	1.29	129	0.59	
Halosaurus ovenii	1.06	44	0.49	
Emtopterus sp.	0.78	9	0.36	
Illex coindetii	0.62	9	0.29	
Triplophos sp.	0.25	44	0.12	
Varrilla blackfordi	0.25	9	0.12	
Cubiceps sp.	0.25	9	0.12	
Malacocephalus occidentalis	0.25	9	0.12	
POLYCHAELIDAE	0.09	9	0.04	
Total	217.36		100.02	

DR. FRIDTJOF NANSSEN PROJECT:A4 PROJECT STATION:1896  
DATE:14/ 3/99 GEAR TYPE: BT No:12 POSITION:Lat S 822 Long E 1256  
start stop duration  
TIME :07:45:12 08:00:55 16 (min) Purpose code: 3  
LOG :9227.57 9228.39 0.79 Area code : 1  
FDEPTH: 157 148 GearCond.code: 9  
BDEPTH: 157 148 Validity code: 1  
Towing dir: 2e Wire out: 450 m Speed: 30 km\*10  
Sorted: 26 Kg Total catch: 25.79 CATCH/HOUR: 96.71

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichiurus lepturus	72.45	98	74.91	
Illex coindetii	15.86	319	15.40	
Zenopsis conchifer	3.49	4	3.61	
Dentex angolensis	2.66	11	2.75	
Uranoscopus polli	0.98	11	1.01	
Zeus faber	0.38	4	0.39	
Todaropsis eblanæ	0.38	15	0.39	
Parapanaeus longirostris	0.26	64	0.27	
Saurida brasiliensis	0.11	19	0.11	
Bathynectes piperitus	0.08	4	0.08	
Synagrops microlepis	0.04	8	0.04	
Peristedion cataphractum	0.04	4	0.04	
Total	96.73		100.00	

DR. FRIDTJOF NANSSEN PROJECT:A4 PROJECT STATION:1897  
DATE:14/ 3/99 GEAR TYPE: BT No:12 POSITION:Lat S 825 Long E 1303  
start stop duration  
TIME :09:20:15 09:49:29 29 (min) Purpose code: 3  
LOG :9238.47 9239.94 1.46 Area code : 1  
FDEPTH: 111 112 GearCond.code:  
BDEPTH: 111 112 Validity code:  
Towing dir: 350e Wire out: 340 m Speed: 30 km\*10  
Sorted: 4 Kg Total catch: 66.93 CATCH/HOUR: 138.48

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichiurus lepturus	48.74	228	35.20	
Dentex angolensis	9.39	74	6.78	4478
Brachydeuterus auritus	9.39	120	6.78	
Torpedo torpedo	9.00	12	6.50	
Pomadasy's jubelini	6.74	12	4.87	
Pagellus bellottii	6.12	33	4.42	4479
Brotula barbata	6.00	6	4.33	
Illex coindetii	5.13	103	3.70	
Stromateus fiatola	5.07	6	3.66	
Uranoscopus albesca	4.68	23	3.38	
Citharus linguatula	4.32	35	3.12	
Raja miraletus	3.85	4	2.78	
Zeus faber	2.86	23	2.07	
Priacanthus arenatus	2.86	12	2.07	
Scorpaena stephanica	2.73	12	1.97	
Pentheroscion mbizi	2.50	12	1.81	
Saurida brasiliensis	2.19	331	1.58	
Chelidomichthys gabonensis	2.07	12	1.49	
Pterothrissus belloci	1.94	23	1.40	
Octopus vulgaris	1.84	6	1.33	
Sphoeroides pachgaster	1.03	2	0.74	
Total	138.45		99.98	

DR. FRIDTJOF NANSSEN PROJECT:A4 PROJECT STATION:1898  
DATE:14/ 3/99 GEAR TYPE: BT No:12 POSITION:Lat S 825 Long E 1307  
start stop duration  
TIME :10:56:37 11:26:32 30 (min) Purpose code: 3  
LOG :9246.80 9248.45 1.63 Area code : 1  
FDEPTH: 87 87 GearCond.code:  
BDEPTH: 87 87 Validity code:  
Towing dir: 170e Wire out: 260 m Speed: 30 km\*10  
Sorted: 101 Kg Total catch: 984.95 CATCH/HOUR: 1969.90

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichiurus lepturus	826.30	2482	41.95	
Brachydeuterus auritus	779.14	12586	39.55	4481
Trachurus trecae	284.98	8494	14.47	4480
Raja miraletus	17.78	20	0.90	
Torpedo torpedo	11.22	58	0.57	
Dentex angolensis	11.22	58	0.57	
Stromateus fiatola	9.28	20	0.47	
Uranoscopus albesca	8.12	20	0.41	
Atractoscion aequidens	7.16	16	0.36	4482
Zeus faber	6.42	38	0.28	
Pteroscion peli	3.10	38	0.16	
Citharus linguatula	1.94	20	0.10	
Pterothrissus belloci	1.54	20	0.08	
Saurida brasiliensis	0.78	154	0.04	
Fistularia petimba	0.76	2	0.04	
Priacanthus arenatus	0.76	2	0.04	
Chaetodon hoefleri	0.40	2	0.02	
Total	1969.90		100.01	

DR. FRIDTJOF NANSSEN PROJECT:A4 PROJECT STATION:1899  
DATE:16/ 3/99 GEAR TYPE: BT No:12 POSITION:Lat S 834 Long E 1318  
start stop duration  
TIME :07:21:17 07:51:38 30 (min) Purpose code: 3  
LOG :9302.21 9303.77 1.53 Area code : 1  
FDEPTH: 31 32 GearCond.code:  
BDEPTH: 31 32 Validity code:  
Towing dir: 350e Wire out: 150 m Speed: 30 km\*10  
Sorted: 83 Kg Total catch: 1265.22 CATCH/HOUR: 2530.44

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	728.00	35590	28.77	
Chloroscombrus chrysurus	670.46	14400	26.50	
Ilisha africana	417.56	13784	16.50	
Bucinostomus melanopterus	109.04	1440	4.31	
Trichiurus lepturus	89.52	362	3.54	
Pseudotolithus typus	89.02	164	3.52	4483
Solenocera africana	47.54	1696	1.88	
Dasysatis sp.	43.00	82	1.70	
Torpedo nobiliana	42.50	206	1.68	
Psettodes belcheri	37.02	618	1.46	
Pomadasy's rogeri	36.70	84	1.45	
Selene dorsalis	32.92	1028	1.30	
Pomadasy's incisus	32.30	222	1.28	
Arius parkii	30.86	22	1.22	
Drepane africana	21.80	20	0.86	
Spinephelus aeneus	18.90	56	0.75	
Gymnura sp.	17.32	2	0.68	
Dicologlossa cuneata	16.44	194	0.65	
Sphyræna guachancho	14.18	56	0.56	
Alectis alexandrinus	8.22	412	0.32	
Trachinotus teraia	5.80	8	0.23	
Carcharhinus sp.	5.74	8	0.23	
Conger conger	5.54	2	0.22	
Lithognathus mormyrus	4.72	28	0.19	
Citharus linguatula	4.12	194	0.16	
Total	2529.22		99.96	

DR. FRIDTJOF NANSSEN PROJECT:A4 PROJECT STATION:1900  
DATE:16/ 3/99 GEAR TYPE: BT No:12 POSITION:Lat S 822 Long E 1314  
start stop duration  
TIME :09:15:51 09:22:18 6 (min) Purpose code: 3  
LOG :9315.46 9315.81 0.34 Area code : 1  
FDEPTH: 47 50 GearCond.code: 9  
BDEPTH: 47 50 Validity code: 1  
Towing dir: 330e Wire out: 180 m Speed: 30 km\*10  
Sorted: 30 Kg Total catch: 272.23 CATCH/HOUR: 2722.30

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	1581.70	116540	58.10	
Pomadasy's jubelini	302.60	900	11.12	4485
Ilisha africana	259.80	8440	9.54	
Dentex barnardi	175.80	410	6.46	4484
Pseudotolithus typus	103.20	120	3.79	
Galeoides decadactylus	83.60	820	3.07	
Pomadasy's incisus	54.40	410	2.00	
Sphyræna guachancho	39.10	100	1.44	
Plectorhincus mediterraneus	18.80	20	0.69	
Pteroscion peli	15.60	610	0.53	
Selene dorsalis	14.30	340	0.57	
Trichiurus lepturus	13.20	70	0.48	
Pagrus africanus	11.30	40	0.42	
Panulirus regius	11.00	20	0.40	
Lithognathus mormyrus	10.40	30	0.38	
Pseudupeneus prayensis	8.80	200	0.32	
Chloroscombrus chrysurus	8.20	140	0.30	
Sphyræna guachancho	4.10	140	0.15	
Cynoglossus browni	3.60	10	0.13	
Citharus linguatula	2.10	70	0.08	
Total	2721.60		99.97	



DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1901  
DATE:16/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 807  
Long E 1311  
start stop duration  
TIME :12:14:51 12:44:49 30 (min) Purpose code: 3  
LOG :9333.60 9334.89 1.29 Area code : 1  
FDEPTH: 32 32 GearCond.code:  
BDEPTH: 32 32 Validity code:  
Towing dir: 165e Wire out: 150 m Speed: 30 kn\*10  
Sorted: 97 Kg Total catch: 599.72 CATCH/HOUR: 1199.44

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	518.96	25590	43.27	
Chloroscombus chrysurus	182.80	2776	15.24	
Ilisha africana	171.02	4876	14.26	
Galeoides decadactylus	71.18	238	5.93	
Selene dorsalis	41.26	828	3.44	
Cynoglossus canariensis	35.58	170	2.97	
Pseudotolithus typus	34.98	50	2.92	4487
Sphyraena guachancho	33.32	90	2.78	
Dasyatis margarita	29.72	30	2.48	
Trichiurus lepturus	18.14	114	1.51	
Galeocerdo cuvieri	12.72	4	1.06	
Pomadoury peroteti	9.24	36	0.77	4486
Sardinella maderensis	8.28	182	0.69	
Torpedo "white spots"	7.70	22	0.64	
Arius parkii	7.16	4	0.60	
Stromateus fiatola	5.28	12	0.44	
Panulirus regius	4.56	8	0.38	
Pteroscion peli	3.62	80	0.30	
Callinectes pallidus	2.60	4	0.22	
RHINOBATIDAE	1.28	2	0.11	
Squilla mantis	0.04	2		
Total	1199.44		100.01	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1902  
DATE:16/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 809  
Long E 1307  
start stop duration  
TIME :13:48:50 13:55:20 7 (min) Purpose code: 3  
LOG :9342.64 9342.95 0.28 Area code : 1  
FDEPTH: 55 55 GearCond.code: 9  
BDEPTH: 55 55 Validity code: 1  
Towing dir: 350e Wire out: 220 m Speed: 30 kn\*10  
Sorted: 23 Kg Total catch: 135.92 CATCH/HOUR: 1165.03

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	398.06	26031	34.17	
Ilisha africana	157.80	506	13.54	
Pomadoury incisus	119.57	583	10.26	
Pomadoury peroteti	91.20	197	7.83	4490
Chloroscombus chrysurus	81.00	814	6.95	
Trichiurus lepturus	79.11	231	6.79	
Umbрина canariensis	44.23	94	3.80	4489
Sphyraena guachancho	32.74	249	2.81	
Pagrus caeruleostictus	23.66	43	2.03	
Selene dorsalis	20.83	351	1.79	
Pseudotolithus typus	19.89	26	1.71	
Argyrosomus regius	18.86	17	1.62	
Panulirus regius	17.49	26	1.50	
Monolene microstoma	15.43	77	1.32	
Galeoides decadactylus	13.71	26	1.18	
Dentex barnardi	11.66	77	1.00	4488
Plectrocinchus mediterraneus	7.20	9	0.62	
Chaetodon hoeferi	5.40	43	0.46	
Sardinella maderensis	2.31	43	0.20	
Pennaeus notialis	1.03	26	0.09	
Pagellus bellottii	0.86	9	0.07	
Total	1162.04		99.74	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1903  
DATE:16/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 812  
Long E 1301  
start stop duration  
TIME :15:20:32 15:50:17 30 (min) Purpose code: 3  
LOG :9354.22 9355.75 1.48 Area code : 1  
FDEPTH: 98 97 GearCond.code:  
BDEPTH: 98 97 Validity code:  
Towing dir: 145e Wire out: 350 m Speed: 30 kn\*10  
Sorted: 90 Kg Total catch: 777.79 CATCH/HOUR: 1555.58

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	474.28	5562	30.49	4494
Trichiurus lepturus	309.02	1706	19.87	
Trachurus trecae	206.54	6048	13.28	4491
Mola mola	150.00	2	9.64	
Raja miraletus	145.06	272	9.33	
Citharus linguatula	48.44	1132	3.11	
Pagellus bellottii	37.68	240	2.42	4493
Uranoscopus albesca	36.98	200	2.38	
Epinephelus aeneus	27.16	4	1.75	
Dentex angolensis	21.68	166	1.39	4492
Scorpaena normani	16.20	158	1.04	
Sepia officinalis hierredda	15.92	14	1.02	
Umbрина canariensis	15.20	28	0.98	
Saurida brasiliensis	9.74	1204	0.63	
Trigla lyra	9.74	86	0.63	
Pterothrissus belloci	8.02	86	0.52	
OMMASTREPHIDAE	3.72	72	0.24	
Brotula barbata	3.32	2	0.21	
Boops boops	3.30	86	0.21	
Chelidonichthys gabonensis	3.16	158	0.20	
Zeus faber	2.86	14	0.18	
Dentex barnardi	2.52	8	0.16	4496
Dentex gibbosus	1.88	4	0.12	4495
Fistularia petimba	1.80	4	0.12	
Friacanthus arenatus	1.36	4	0.09	
Total	1555.58		100.01	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1904  
DATE:16/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 814  
Long E 1251  
start stop duration  
TIME :17:36:38 18:06:02 29 (min) Purpose code: 3  
LOG :9371.07 9372.65 1.57 Area code : 1  
FDEPTH: 136 143 GearCond.code:  
BDEPTH: 136 143 Validity code:  
Towing dir: 320e Wire out: 450 m Speed: 30 kn\*10  
Sorted: 29 Kg Total catch: 480.37 CATCH/HOUR: 993.87

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Synagrops microlepis	738.46	35350	74.30	
Raja miraletus	39.54	31	3.98	
Brotula barbata	36.00	37	3.62	
Dentex angolensis	27.72	265	2.79	4498
Octopus vulgaris	25.24	91	2.54	
Trichiurus lepturus	24.46	35	2.46	
Pterothrissus belloci	16.22	122	1.63	
Illex coindetii	15.81	304	1.59	
Todaropsis eblanæ	13.99	60	1.41	
Mustelus sp.	9.19	2	0.92	
Chelidonichthys gabonensis	8.81	273	0.89	
Psetodes belcheri	7.61	244	0.77	
Peristedion cataphractum	5.77	273	0.58	
Microchirus frechkopi	4.57	122	0.46	
Dentex congensis	3.74	99	0.38	4497
Zeus faber	2.13	60	0.21	
Serranus sp.	1.82	10	0.18	
Scorpaena normani	1.82	31	0.18	
Bassanago albescens	1.82	31	0.18	
Pagellus bellottii	1.57	8	0.16	
Hoplunnis punctata	1.53	91	0.15	
Branchiostegus semifasciatus	1.32	2	0.13	
Parapenaeus longirostris	1.22	122	0.12	
Sphoeroides pachyaster	0.70	2	0.07	
Spicara alta	0.62	8	0.06	
Dentex macrophthalmus	0.35	4	0.04	
Total	993.85		99.99	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1905  
DATE:16/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 815  
Long E 1247  
start stop duration  
TIME :19:43:59 20:14:17 30 (min) Purpose code: 3  
LOG :9381.25 9382.74 1.48 Area code : 1  
FDEPTH: 320 314 GearCond.code:  
BDEPTH: 320 314 Validity code:  
Towing dir: 350e Wire out: 950 m Speed: 30 kn\*10  
Sorted: 29 Kg Total catch: 179.33 CATCH/HOUR: 358.66

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Chlorophthalmus atlanticus	204.24	2964	56.95	
Leaeonema laureysi	37.44	480	10.44	
Synagrops microlepis	21.48	636	5.99	
Malacocephalus occidentalis	14.64	84	4.08	
Coelorrhinus coelorhincus	14.40	396	4.01	
Merluccius polli	13.32	72	3.71	
Pterothrissus belloci	10.80	84	3.01	
Gephyroberyx darwini	8.18	8	2.28	
Hymenocephalus italicus	5.88	684	1.64	
Gadella maraldi	5.16	84	1.44	
Parapenaeus longirostris	4.92	540	1.37	
Scorpaena normani	4.56	48	1.27	
PORTUNIDAE	4.32	72	1.20	
Cynopentecus ferox	2.16	48	0.60	
Coloconger cadamati *	1.58	2	0.44	
Trichiurus lepturus	1.44	84	0.40	
CALAPPIDAE	1.32	60	0.37	
Lophius vaillanti	1.28	4	0.36	
Raja miraletus	0.80	2	0.22	
Zenopsis conchifer	0.50	2	0.14	
Peristedion cataphractum	0.24	12	0.07	
Total	358.66		99.99	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1906  
DATE:16/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 814  
Long E 1242  
start stop duration  
TIME :21:51:54 22:21:56 30 (min) Purpose code: 3  
LOG :9393.46 9394.89 1.42 Area code : 1  
FDEPTH: 539 545 GearCond.code:  
BDEPTH: 539 545 Validity code:  
Towing dir: 335e Wire out: 1450 m Speed: 30 kn\*10  
Sorted: 30 Kg Total catch: 274.20 CATCH/HOUR: 548.40

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Nematocarcinus africanus	382.32	91764	69.72	
Stomias sp.	48.24	918	8.80	
Centroscymnus crepidater	36.36	612	6.63	
Hoplostethus mediterraneus	33.48	1242	6.11	
Benthodesmus sp.	15.12	504	2.76	
UNIDENTIFIED FISH	6.84	612	1.25	
Gonostoma sp.	4.32	90	0.79	
Geryon maritae	3.00	6	0.55	
Triplophos sp.	2.88	18	0.53	
Lophius vaillanti	2.36	4	0.43	
Coelorrhinus coelorhincus	2.16	36	0.39	
Gadella sp.	2.16	216	0.39	
UNIDENTIFIED FISH	1.44	18	0.26	
Nemichthys scolopaceus	1.44	36	0.26	
Stomias affinis	1.44	90	0.26	
Malacocephalus laevis	1.08	36	0.20	
Laemonema sp.	0.72	18	0.13	
DIRETMIDAE	0.72	18	0.13	
Cubiceps sp.	0.72	18	0.13	
Bathyuroconger vicinus	0.72	36	0.13	
PORTUNIDAE	0.52	6	0.09	
Plesiopenaeus edwardsianus	0.36	18	0.07	
Total	548.40		100.01	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1907  
 DATE:17/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 804 Long E 1239  
 start stop duration  
 TIME :05:05:37 05:35:31 30 (min) Purpose code: 3  
 LOG :9413.60 9415.07 1.47 Area code : 1  
 FDEPTH: 500 508 GearCond.code:  
 BDEPTH: 500 508 Validity code:  
 Towing dir: 177e Wire out:1400 m Speed: 30 km\*10

Sorted: 61 Kg Total catch: 532.48 CATCH/HOUR: 1064.96

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Nematocarcinus africanus	910.52	135286	85.50	
Centrophorus granulosus	62.64	16	5.88	
Hoplostethus cadematii	20.74	782	1.95	
Stomias affinis	11.90	272	1.12	
Lamprogrammus exotus	11.56	204	1.09	
Chaulioides sp.	9.86	34	0.93	
Todaropsis eblanae	6.80	34	0.64	
Gadella sp.	5.78	272	0.54	
Trichiurus lepturus	4.42	238	0.42	
Ectreposebastes imus	3.74	34	0.35	
Bathymectes piperitus	3.40	34	0.32	
Xenodermichthys copei	3.40	374	0.32	
Leomonema laureysi	2.38	68	0.22	
Yareella blackfordi	2.04	34	0.19	
Aristeus varidens	1.36	102	0.13	
Promethichthys prometheus	1.02	34	0.10	
Ariomma bondi	1.02	34	0.10	
Triphops sp.	1.02	306	0.10	
GALATHEIDAE *	0.68	136	0.06	
Mesichthys scolopaceus	0.68	68	0.06	
<b>Total</b>	<b>1064.96</b>		<b>100.02</b>	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1910  
 DATE:17/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 801 Long E 1244  
 start stop duration  
 TIME :11:33:27 12:03:05 30 (min) Purpose code: 3  
 LOG :9442.32 9443.65 1.30 Area code : 1  
 FDEPTH: 174 168 GearCond.code:  
 BDEPTH: 174 168 Validity code:  
 Towing dir: 155e Wire out: 522 m Speed: 30 km\*10

Sorted: 35 Kg Total catch: 888.42 CATCH/HOUR: 1776.84

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Synagrops microlepis	1510.08	78188	84.99	
Trichiurus lepturus	82.68	180	4.65	
Squatina aculeata	49.80	2	2.80	
Dentex angolensis	31.20	124	1.76	4501
Zenopsis conchifer	27.80	66	1.56	
OMMASTREPHIDAE	17.60	88	0.99	
Pterothrissus belloci	9.72	36	0.69	
Zeus faber	8.52	54	0.55	
Dentex macrophthalmus	6.44	10	0.36	4502
Brotula barbata	6.04	44	0.34	
Spicara alta	4.84	2	0.27	
Squatina oculata	3.52	220	0.20	
Monolele microstoma	3.20	4	0.18	
Torpedo torpedo	1.12	2	0.06	
Lagocephalus laevis	1.04	2	0.06	
Lophiodes kempi	0.60	2	0.03	
Ophiurus serpens	0.60	2	0.03	
Aulopus filamentosus	0.32	2	0.02	
<b>Total</b>	<b>1776.84</b>		<b>99.99</b>	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1908  
 DATE:17/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 804 Long E 1240  
 start stop duration  
 TIME :07:36:37 08:06:35 30 (min) Purpose code: 3  
 LOG :9422.88 9424.40 1.51 Area code : 1  
 FDEPTH: 404 410 GearCond.code:  
 BDEPTH: 404 410 Validity code:  
 Towing dir: 170e Wire out:1200 m Speed: 30 km\*10

Sorted: 91 Kg Total catch: 393.23 CATCH/HOUR: 786.46

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Nematocarcinus africanus	287.28	57446	36.53	
Merluccius polli	193.38	532	24.59	4499
Trichiurus lepturus	161.00	1654	20.47	
Dibranchius atlanticus	33.42	1970	4.25	
Leomonema laureysi	31.26	402	3.97	
Chaulioides sp.	30.90	150	3.93	
Hymenocephalus italicus	13.82	1774	1.76	
Centrophorus granulosus	13.40	4	1.70	
Malacocephalus occidentalis	6.90	56	0.88	
Gadella sp.	3.92	196	0.50	
Coelorinchus coelorrhincus	2.80	56	0.36	
Zenopsis conchifer	2.60	2	0.33	
Mistioteuthis reversa	1.40	10	0.18	
Parapneustes longirostris	1.40	196	0.18	
Illex coindetii	1.40	18	0.18	
Bathymectes piperitus	1.02	10	0.13	
Solenocera africana	0.66	66	0.08	
<b>Total</b>	<b>786.56</b>		<b>100.02</b>	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1909  
 DATE:17/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 802 Long E 1242  
 start stop duration  
 TIME :09:45:12 10:15:26 30 (min) Purpose code: 3  
 LOG :9433.30 9434.68 1.35 Area code : 1  
 FDEPTH: 317 321 GearCond.code:  
 BDEPTH: 317 321 Validity code:  
 Towing dir: 165e Wire out: 900 m Speed: 30 km\*10

Sorted: 55 Kg Total catch: 387.10 CATCH/HOUR: 774.20

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Merluccius polli	370.76	2028	47.89	4500
Synagrops microlepis	67.34	2964	8.70	
Aulopus cadematii	44.64	1002	5.77	
Benthodesmus tenuis	42.64	1964	5.51	
Leomonema laureysi	41.34	702	5.34	
Pterothrissus belloci	30.94	208	4.00	
Trichiurus lepturus	29.72	34	3.84	
Zenopsis conchifer	27.36	78	3.53	
Hymenocephalus italicus	24.70	2470	3.19	
Coelorinchus coelorrhincus	24.70	274	3.19	
OMMASTREPHIDAE	15.60	144	2.01	
Gadella imberbis	10.66	456	1.38	
Setarches guntheri	9.10	286	1.18	
Parapneustes longirostris	8.06	910	1.04	
Bathymectes piperitus	5.46	204	0.71	
Dibranchius atlanticus	5.46	520	0.71	
Malacocephalus laevis	3.90	40	0.50	
Solenocera africana	3.38	430	0.44	
GALATHEIDAE *	2.86	390	0.37	
Scorpaena normani	2.60	52	0.34	
Ophiurus serpens	0.82	2	0.11	
Ophiurus serpens	0.78	14	0.10	
Lophius vaillanti	0.52	14	0.07	
Bassanago albescens	0.26	14	0.03	
<b>Total</b>	<b>773.60</b>		<b>99.95</b>	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1911  
 DATE:17/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 757 Long E 1251  
 start stop duration  
 TIME :13:33:50 14:05:34 32 (min) Purpose code: 3  
 LOG :9455.27 9456.61 1.33 Area code : 1  
 FDEPTH: 109 110 GearCond.code:  
 BDEPTH: 109 110 Validity code:  
 Towing dir: 163e Wire out: 360 m Speed: 30 km\*10

Sorted: 66 Kg Total catch: 913.28 CATCH/HOUR: 1712.40

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuteros auritus	1107.19	11417	64.66	4504
Trichiurus lepturus	210.47	774	12.29	
Dentex angolensis	64.91	403	3.79	4506
Saurida brasiliensis	51.09	1518	2.98	
Selene dorsalis	44.06	165	2.57	
Boops boops	41.25	3328	2.41	
Pagellus bellottii	37.84	298	2.21	4505
Chelidonichthys gabonensis	26.25	281	1.53	
Dentex gibbosus	22.73	19	1.33	
Citharus linguatula	22.50	728	1.31	
Dentex barnardi	17.93	49	1.05	4503
Zeus faber	14.53	71	0.85	
Brotula barbata	11.29	9	0.66	
Torpedo torpedo	10.31	24	0.60	
Raja miraletus	6.90	9	0.09	
Uranoscopus albesca	6.56	71	0.40	
Scorpaena normani	4.22	47	0.25	
Dentex congoensis	3.19	77	0.19	
Fistularia petimba	3.08	8	0.18	
Octopus vulgaris	1.73	2	0.10	
Umbria canariensis	1.13	2	0.07	
Dentex macrophthalmus	0.75	2	0.04	
OMMASTREPHIDAE	0.75	8	0.04	
Sepia officinalis hierredda	0.60	2	0.04	
Trachurus trecae	0.47	24	0.03	
Serranus sp.	0.47	24	0.03	
Sepia orbignyana	0.23	2	0.01	
<b>Total</b>	<b>1712.43</b>		<b>100.00</b>	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1912  
 DATE:17/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 757 Long E 1258  
 start stop duration  
 TIME :15:19:16 15:39:17 20 (min) Purpose code: 3  
 LOG :9465.15 9466.21 1.05 Area code : 1  
 FDEPTH: 76 75 GearCond.code:  
 BDEPTH: 76 75 Validity code:  
 Towing dir: 340e Wire out: 280 m Speed: 30 km\*10

Sorted: 34 Kg Total catch: 262.48 CATCH/HOUR: 787.44

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	257.28	8115	32.67	4511
Selene dorsalis	76.32	648	9.69	
Epinephelus aeneus	68.28	12	8.67	
Umbria canariensis	63.18	171	8.02	4510
Pagellus bellottii	51.00	525	6.48	4509
Pomadasys incisus	48.90	219	6.21	
Dentex angolensis	39.36	201	5.00	4508
Raja miraletus	37.32	66	4.74	
Epinephelus guaza ?	16.20	3	2.06	
Chlorocentrus chrysurus	15.84	120	2.01	
Brachydeuteros auritus	15.60	264	1.98	4512
Trichiurus lepturus	13.44	36	1.71	
Dentex barnardi	12.48	75	1.52	4507
Plectorhynchus mediterraneus	12.00	9	0.34	
Citharus linguatula	10.08	444	1.28	
Pseudupeneus prayensis	7.68	168	0.98	
Saurida brasiliensis	7.44	1344	0.94	
Sepia officinalis hierredda	6.84	27	0.87	
Stromateus fiatola	5.40	6	0.69	
Dentex congoensis	3.84	33	0.49	
Pagrus caeruleostictus	3.36	6	0.43	
Chelidonichthys gabonensis	3.12	24	0.40	
Sardinella aurita	2.40	24	0.30	
Cephalopholis taeniops	1.98	6	0.26	
Boops boops	1.68	144	0.21	
Octopus vulgaris	1.56	3	0.20	
Torpedo torpedo	1.20	12	0.15	
Uranoscopus polli	0.96	12	0.12	
Chaetodon hoefleri	0.96	6	0.12	
Grammolites gruvelli	0.72	24	0.09	
Mystriopsis rostellatus	0.54	3	0.07	
Brotula barbata	0.48	12	0.06	
<b>Total</b>	<b>787.44</b>		<b>99.99</b>	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1913  
DATE:17/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 755  
start stop duration Long E 1305  
TIME :16:47:39 17:17:44 30 (min) Purpose code: 3  
LOG :9474.79 9476.45 1.63 Area code : 1  
FDEPTH: 31 29 GearCond.code:  
BDEPTH: 31 29 Validity code:  
Towing dir: 330e Wire out: 140 m Speed: 30 km\*10  
Sorted: 83 Kg Total catch: 1148.45 CATCH/HOUR: 2296.90

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Chloroscombrus chrysurus	995.50	10666	43.34	
Ilisha africana	379.20	11950	16.51	
Brachydeuterus auritus	266.76	18960	11.61	
Pteroscion pelli	171.82	5332	7.48	
Pomadasy peroteti	71.08	94	3.09	4514
Stromatolites fiatola	67.00	350	2.92	
Pseudotolithus typus	61.88	144	2.69	4513
Galeoides decadactylus	42.00	150	1.83	
Torpedo sp.	32.00	26	1.39	
Selene dorsalis	29.62	600	1.29	
Arius parkii	26.76	26	1.17	
Cynoglossus brownii	24.00	150	1.04	
Pomadasy peroteti	16.50	126	0.72	
Callinectes marginatus	14.24	6	0.62	
Sphyræna guachancho	12.26	26	0.53	
Arius parkii	12.00	10	0.52	
Dasyatis sp.	11.60	12	0.51	
Penæus notialis	11.00	1326	0.48	
Dasyatis marmorata	10.44	2	0.45	
Ephippion guttifer	9.24	6	0.40	
Trichurus lepturus	9.12	18	0.40	
Familirus regius	8.40	16	0.37	
Rhizoprionodon acutus	7.96	14	0.35	
Gymnura sp.	5.36	4	0.23	
Sardinella maderensis	3.76	52	0.16	
Leptocharias smithii	3.44	6	0.15	
Raja miraletus	1.56	2	0.07	
Myrichthys perdalis	1.40	4	0.06	
Panulirus regius	1.00	26	0.04	
Total	2306.90		100.42	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1914  
DATE:17/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 752  
start stop duration Long E 1300  
TIME :18:04:36 18:13:33 9 (min) Purpose code: 3  
LOG :9482.69 9483.11 0.22 Area code : 1  
FDEPTH: 54 52 GearCond.code: 9  
BDEPTH: 54 52 Validity code: 1  
Towing dir: 135e Wire out: 200 m Speed: 30 km\*10  
Sorted: 84 Kg Total catch: 84.38 CATCH/HOUR: 562.53

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardinella maderensis	100.53	900	17.87	4516
Pomadasy incisus	89.53	813	15.92	
Pagellus bellottii	77.87	693	13.84	4517
Raja miraletus	47.60	247	8.46	
Pseudotolithus typus	46.40	33	8.25	
Pomadasy jubelini	41.07	80	7.30	4515
Dentex barnardi	33.33	167	5.93	4518
Pagrus liscorius	24.47	127	4.35	
Cynoglossus canariensis	17.93	233	3.19	
Torpedo torpedo	15.87	267	2.82	
Citharus linguatula	11.60	447	2.06	
Sphyræna guachancho	11.60	20	2.06	
Grammolites gruvelli	11.47	353	2.04	
Umrina canariensis	8.93	127	1.59	
MURAENESOCIDAE	5.27	267	0.94	
Selene dorsalis	4.40	87	0.78	
Pagrus caeruleostictus	4.40	20	0.78	
Panulirus regius	3.20	7	0.57	
Pseudupeneus prayensis	1.73	87	0.31	
Sepia orbignyana	1.73	7	0.31	
C R A B S	0.93	7	0.17	
Total	559.86		99.54	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1915  
DATE:18/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 752  
start stop duration Long E 1234  
TIME :05:36:27 06:06:34 30 (min) Purpose code: 3  
LOG :9528.56 9529.96 1.38 Area code : 1  
FDEPTH: 604 598 GearCond.code:  
BDEPTH: 604 598 Validity code:  
Towing dir: 155e Wire out:1650 m Speed: 30 km\*10  
Sorted: 42 Kg Total catch: 215.88 CATCH/HOUR: 431.76

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Nematocarcinus africanus	307.68	84288	71.26	
Triplophos sp.	32.80	4288	7.60	
Centrorophorus granuloseus	22.56	6	5.23	
Lamprogrammus exutus	13.44	48	3.11	
GALATHEIDAE *	8.64	1712	2.00	
Hoplostethus cadenati	7.04	80	1.63	
Aristeus variidens	6.24	320	1.45	
Plesiopeneus edwardsianus	5.76	432	1.33	
Merluccius polli	5.28	16	1.22	
Centrorophorus uyato	5.00	2	1.16	
Geryon maritæe	5.00	8	1.16	
Yarellia blackfordi	3.20	80	0.74	
Stomias affinis	3.04	64	0.70	
Xenodermichthys copei	1.60	304	0.37	
Ethinania costaeacarie	1.44	16	0.33	
Centroscymnus sp.	1.40	4	0.32	
Ectreposeustes imus	0.64	16	0.15	
Etmopterus spinax	0.48	16	0.11	
Aricomma bondi	0.32	16	0.07	
Lophius vaillanti	0.16	16	0.04	
Total	431.72		99.98	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1916  
DATE:18/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 753  
start stop duration Long E 1240  
TIME :07:46:57 08:17:10 30 (min) Purpose code: 3  
LOG :9536.85 9538.23 1.37 Area code : 1  
FDEPTH: 147 152 GearCond.code:  
BDEPTH: 147 152 Validity code:  
Towing dir: 150e Wire out: 480 m Speed: 30 km\*10  
Sorted: 45 Kg Total catch: 44.84 CATCH/HOUR: 89.68

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Dentex angolensis	18.56	100	20.70	4520
Zenopsis conchifer	16.30	24	18.18	
Trichurus lepturus	10.06	8	11.22	
Todaropsis eblanae	8.26	320	9.21	
Saurida brasiliensis	4.48	1202	5.00	
Citharus linguatula	4.04	100	4.50	
Dentex congoensis	3.78	62	4.21	4521
Illex coindetii	3.16	152	3.52	
Sepia orbignyana	3.02	12	3.37	
Raja miraletus	2.50	4	2.79	
Pterothrissus belloci	2.44	18	2.72	
Zeus faber	2.24	12	2.50	
Spicara alta	1.86	14	2.07	4519
Dentex macrocephthalmus	1.52	8	1.69	
Brotula barbata	1.44	2	1.61	
Scorpaena sp.	1.28	2	1.43	
POLYCHAELIDAE	0.98	160	1.99	
Yarellia blackfordi	0.68	22	0.76	
Aulopus filamentosus	0.64	8	0.71	
Chelidonicichthys gabonensis	0.54	6	0.60	
Gonostoma sp.	0.46	16	0.51	
Triplophos sp.	0.30	30	0.33	
Uranoscopus polli	0.28	6	0.31	
Stomias affinis	0.22	8	0.25	
Nemichthys scolopaceus	0.18	4	0.20	
Sepia elephas	0.16	10	0.18	
Aricomma bondi	0.12	2	0.13	
Bombrops heterurus	0.12	2	0.13	
Serranus sp.	0.06	2	0.07	
Total	89.68		99.99	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1917  
DATE:18/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 749  
start stop duration Long E 1246  
TIME :09:47:51 10:14:06 26 (min) Purpose code: 3  
LOG :9549.27 9550.63 1.34 Area code : 1  
FDEPTH: 106 111 GearCond.code:  
BDEPTH: 106 111 Validity code:  
Towing dir: 215e Wire out: 350 m Speed: 30 km\*10  
Sorted: 62 Kg Total catch: 61.87 CATCH/HOUR: 142.78

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Dentex angolensis	30.92	182	21.66	4524
Saurida brasiliensis	25.92	5892	18.15	
Trichurus lepturus	19.02	42	13.32	
Dentex barnardi	16.48	51	11.54	4522
Dentex congoensis	7.80	115	5.46	4523
Dentex gibbosus	6.14	12	4.30	
Chelidonicichthys gabonensis	6.12	58	4.29	
Fistularia petimba	5.31	12	3.72	
Raja miraletus	5.28	7	3.70	
Zenopsis conchifer	5.17	7	3.62	
Pagellus bellottii	5.17	7	3.62	
Sepia sp.	2.96	5	1.78	
Brotula barbata	2.54	18	2.07	
Branchiostegus semifasciatus	1.11	2	0.78	
Zeus faber	0.99	5	0.69	
Octopus vulgaris	0.83	2	0.58	
Uranoscopus polli	0.81	2	0.57	
Chaetodon hoefleri	0.76	7	0.53	
Sepia orbignyana	0.69	9	0.48	
Serranus cabrilla	0.44	2	0.31	
Sphoeroides pachygaster	0.35	2	0.25	
Todaropsis eblanae	0.21	5	0.15	
Citharus linguatula	0.21	9	0.15	
Spicara alta	0.14	14	0.10	
Nemichthys scolopaceus	0.12	2	0.08	
Serranus sp.	0.12	2	0.08	
Total	145.60		101.98	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1918  
DATE:18/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 748  
start stop duration Long E 1248  
TIME :11:07:18 11:37:06 30 (min) Purpose code: 3  
LOG :9555.87 9557.34 1.45 Area code : 1  
FDEPTH: 97 97 GearCond.code:  
BDEPTH: 97 97 Validity code:  
Towing dir: 340e Wire out: 330 m Speed: 30 km\*10  
Sorted: 100 Kg Total catch: 427.64 CATCH/HOUR: 855.28

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	679.20	6000	79.41	4528
Trichurus lepturus	38.36	78	4.49	
Dentex congoensis	23.68	416	2.77	4527
Chelidonicichthys gabonensis	21.28	296	2.49	
Dentex angolensis	20.32	240	2.38	4525
Citharus linguatula	19.36	928	2.26	
Allotheuthis africana	12.96	4672	1.52	
Pagellus bellottii	11.84	96	1.38	4526
Sepia officinalis hierredda	6.04	14	0.71	
Brotula barbata	5.12	40	0.60	
Raja miraletus	3.12	6	0.36	
OMASTREPHIDAE	2.04	4	0.24	
Uranoscopus albesca	1.92	32	0.22	
Saurida brasiliensis	1.92	8	0.22	
Sardinella maderensis	1.76	256	0.21	
Fistularia petimba	1.60	8	0.19	
Boops boops	1.16	4	0.14	
Boops boops	1.12	88	0.13	
Dentex gibbosus	0.92	2	0.11	
Torpedo torpedo	0.76	2	0.09	
Arnoglossus imperialis	0.48	24	0.06	
Trachurus trecae	0.32	8	0.04	
Total	855.28		100.02	

DR. FRIDTJOF NANSEN PROJECT: A4 PROJECT STATION: 1919  
DATE: 18/ 3/99 GEAR TYPE: BT No: 8 POSITION: Lat S 747 Long E 1252  
start stop duration Purpose code: 3  
LOG : 9564.01 9565.53 1.50 Area code : 1  
FDEPTH: 77 83 GearCond. code:  
RDEPTH: 77 83 Validity code:  
Towing dir: 280° Wire out: 280 m Speed: 30 kn\*10  
Sorted: 36 Kg Total catch: 114.64 CATCH/HOUR: 229.28

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	55.60	1096	24.25	4531
Trichiurus lepturus	27.44	50	11.97	
Brachydeuterus auritus	25.60	486	11.17	4533
Saurida brasiliensis	25.40	4150	11.08	
Pagellus bellottii	14.70	200	9.07	4532
Dentex congoensis	13.40	230	6.41	4530
Alloteuthis africana	13.40	668	5.84	
Fistularia petimba	8.52	18	3.72	
Chelidonichthys gabonensis	7.50	100	3.27	
Dentex angolensis	6.60	146	2.88	4529
Sepia officinalis hierredda	5.12	12	2.23	
Citharus linguatula	4.96	126	2.16	
Raja miraletus	2.40	4	1.05	
Sphyræna guachancho	2.12	6	0.92	
Torpedo torpedo	1.72	2	0.75	
Epinephelus aeneus	1.24	2	0.54	
Pseudopeneus prayensis	1.10	26	0.48	
Octopus vulgaris	1.04	2	0.45	
Grammolites gruvelli	1.00	6	0.44	
Trigla lyra	0.90	6	0.39	
Brotula barbata	0.76	2	0.33	
Uranoscopus polli	0.50	10	0.22	
Sardinella aurita	0.28	36	0.12	
Chaetodon hoefferi	0.28	2	0.12	
Serranus accraensis	0.20	6	0.09	
Boops boops	0.10	6	0.04	
Total		229.28		99.99

DR. FRIDTJOF NANSEN PROJECT: A4 PROJECT STATION: 1920  
DATE: 18/ 3/99 GEAR TYPE: BT No: 8 POSITION: Lat S 743 Long E 1257  
start stop duration Purpose code: 3  
LOG : 9576.65 9578.11 1.43 Area code : 1  
FDEPTH: 43 44 GearCond. code:  
RDEPTH: 43 44 Validity code:  
Towing dir: 160° Wire out: 180 m Speed: 30 kn\*10  
Sorted: 118 Kg Total catch: 450.95 CATCH/HOUR: 901.90

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Pteroscopus pelli	243.10	1620	26.95	
Brachydeuterus auritus	224.02	20650	24.84	4534
Sphyræna guachancho	171.70	1656	19.04	
Galeoides decadactylus	63.90	558	7.09	
Stromateus fiatola	57.28	88	6.35	
Pseudotolithus typus	47.88	86	5.31	4535
Ilisha africana	24.12	496	2.67	
Selene dorsalis	16.38	190	1.82	
Raja miraletus	14.44	34	1.60	
Pagellus bellottii	14.04	118	1.56	
Cynoglossus capensis	3.06	18	0.34	
Caranx crysos	2.96	4	0.33	
Pomadourys jubelini	2.92	6	0.32	
Coloconger cadenati	2.50	4	0.28	
Epinephelus aeneus	1.92	4	0.21	
Pagrus caeruleostictus	1.72	8	0.19	
Pomadourys incisus	1.62	10	0.18	
Grammolites gruvelli	1.62	28	0.18	
Dentex barnardi	1.44	4	0.16	
Torpedo torpedo	1.26	10	0.14	
Chloroscombrus chrysurus	1.08	10	0.12	
Rhizoprionodon acutus	1.00	2	0.11	
Homonolepis microstoma	0.90	10	0.10	
Fenaëus notialis	0.88	20	0.10	
Parapristipoma humile	0.16	2	0.02	
Total		901.90		100.01

DR. FRIDTJOF NANSEN PROJECT: A4 PROJECT STATION: 1921  
DATE: 18/ 3/99 GEAR TYPE: BT No: 8 POSITION: Lat S 743 Long E 1301  
start stop duration Purpose code: 3  
LOG : 9582.27 9583.50 1.21 Area code : 1  
FDEPTH: 27 27 GearCond. code:  
RDEPTH: 27 27 Validity code:  
Towing dir: 330° Wire out: 120 m Speed: 30 kn\*10  
Sorted: 145 Kg Total catch: 641.20 CATCH/HOUR: 1603.00

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	797.80	14860	49.77	
Ilisha africana	295.20	13120	18.42	
Stromateus fiatola	91.60	205	5.71	4537
Pomadourys jubelini	70.40	580	4.39	
Galeoides decadactylus	62.40	580	3.89	
Callinectes marginatus	59.80	120	3.73	
Sphyræna guachancho	50.80	120	3.17	
Leptocharias smithii	34.50	50	2.15	
Pseudotolithus typus	26.23	73	1.64	4536
Pentanezum quinquarius	26.20	660	1.63	
Pteroscopus pelli	21.80	1200	1.36	
Gymnura natalensis	10.95	5	0.68	
Arius parkii	10.40	18	0.65	
Dasyatis margarita	9.70	8	0.61	
Trichiurus lepturus	8.00	80	0.50	
Cynoglossus canariensis	6.70	23	0.42	
Fenaëus notialis	4.80	80	0.30	
Fanulirus regius	4.30	10	0.27	
Raja miraletus	3.00	8	0.19	
Selene dorsalis	2.80	160	0.17	
Chloroscombrus chrysurus	2.00	20	0.12	
Dasyatis marmorata	1.63	3	0.10	
Citharus linguatula	1.60	20	0.10	
Sardinella maderensis	0.30	20	0.02	
Total		1602.91		99.99

DR. FRIDTJOF NANSEN PROJECT: A4 PROJECT STATION: 1922  
DATE: 19/ 3/99 GEAR TYPE: BT No: 12 POSITION: Lat S 741 Long E 1230  
start stop duration Purpose code: 3  
TIME : 05:28:07 05:58:12 30 (min) Area code : 1  
LOG : 9630.26 9631.82 1.53 Area code : 1  
FDEPTH: 481 518 GearCond. code:  
RDEPTH: 481 518 Validity code:  
Towing dir: 150° Wire out: 1450 m Speed: 30 kn\*10  
Sorted: 52 Kg Total catch: 301.47 CATCH/HOUR: 602.94

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Nematocarcinus africanus	445.74	9722	73.93	
Centrophorus sp.	47.72	12	7.91	
Gadella maraldi	20.06	894	3.33	
Triplophos sp.	17.54	2462	2.91	
Hoplostethus cadenati	17.22	916	2.86	
Stereomastix sp.	7.02	348	1.16	
Aristeus varidens	6.10	414	1.01	
Hymenocephalus italicus	5.66	436	0.94	
Laemonema lauryesi	5.46	284	0.91	
Todaropsis eblanae	5.02	22	0.83	
Trichiurus lepturus	3.46	26	0.57	
Malacocephalus laevis	3.28	66	0.54	
Yarellia blackfordi	3.28	88	0.54	
Lamprogadus exutus	3.28	22	0.54	
Xenodermichthys copei	2.84	240	0.47	
Merluccius polli	2.72	6	0.45	
Illex coindetii	2.62	44	0.43	
Bassanago albescens	1.30	22	0.22	
Stomias affinis	1.30	22	0.22	
Halosaurus owenii	0.88	22	0.15	
NETTASTOMATIDAE	0.42	22	0.07	
Total		602.92		99.99

DR. FRIDTJOF NANSEN PROJECT: A4 PROJECT STATION: 1923  
DATE: 19/ 3/99 GEAR TYPE: BT No: 12 POSITION: Lat S 741 Long E 1231  
start stop duration Purpose code: 3  
TIME : 07:39:47 08:10:41 31 (min) Area code : 1  
LOG : 9638.19 9639.85 1.63 Area code : 1  
FDEPTH: 348 348 GearCond. code:  
RDEPTH: 348 348 Validity code:  
Towing dir: 150° Wire out: 1050 m Speed: 30 kn\*10  
Sorted: 94 Kg Total catch: 294.04 CATCH/HOUR: 569.11

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Nematocarcinus africanus	155.94	32400	27.40	
Merluccius polli	133.82	730	23.51	4538
Trichiurus lepturus	72.04	103	12.66	
Laemonema lauryesi	58.47	939	10.27	
Setarches guentheri	37.65	2688	6.62	
Pterothrissus belloci	22.08	143	3.88	
Illex coindetii	17.46	294	3.07	
Synagrops microlepis	10.76	538	1.89	
Gadella maraldi	10.76	269	1.89	
Benthodesmus tenuis	10.76	401	1.89	
Dibranchius atlanticus	6.72	538	1.18	
Chaunax pictus	6.72	267	1.18	
Hymenocephalus italicus	6.64	1345	1.17	
Epigonus telescopus	4.72	89	0.83	
Myctophum sp.	4.03	941	0.71	
Parapanaeus longirostris	4.03	134	0.71	
Coelorhynchus coelorhynchus	2.05	45	0.36	
Malacocephalus occidentalis	1.88	17	0.33	
Zenopsis conchifer	1.63	6	0.29	
Bembrops greyi	0.89	17	0.16	
Total		569.05		100.00

DR. FRIDTJOF NANSEN PROJECT: A4 PROJECT STATION: 1924  
DATE: 19/ 3/99 GEAR TYPE: BT No: 12 POSITION: Lat S 740 Long E 1233  
start stop duration Purpose code: 3  
TIME : 09:35:02 10:05:09 30 (min) Area code : 1  
LOG : 9646.84 9648.56 1.69 Area code : 1  
FDEPTH: 183 191 GearCond. code:  
RDEPTH: 183 191 Validity code:  
Towing dir: 150° Wire out: 580 m Speed: 30 kn\*10  
Sorted: 127 Kg Total catch: 569.12 CATCH/HOUR: 1138.24

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Synagrops microlepis	973.94	54830	85.57	
Trichiurus lepturus	35.56	72	3.12	
Zenopsis conchifer	31.04	52	2.73	
Pentheroscion mbizi	22.02	194	1.93	
Dentex angolensis	21.96	34	1.93	4539
Zeus faber	20.24	54	1.78	
Leptocharias smithii	6.20	2	0.54	
Dentex macrophthalmus	5.90	72	0.52	4540
Illex coindetii	5.82	6	0.39	
Miracorvina angolensis	4.42	6	0.27	
Pterothrissus belloci	4.38	48	0.38	
Spicara alta	3.06	22	0.27	
Parapanaeus longirostris	1.62	568	0.14	
Bassanago albescens	1.14	16	0.10	
Brotula barbata	1.12	2	0.10	
Total		1138.42		100.01

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1925  
 DATE:19/ 3/99 GEAR TYPE: BT No:12 POSITION:Lat S 738 Long E 1239  
 start stop duration  
 TIME :11:12:57 11:26:35 14 (min) Purpose code: 3  
 LOG :9656.39 9657.02 0.61 Area code : 1  
 FDEPTH: 106 105 GearCond.code: 9  
 BDEPTH: 106 105 Validity code: 1  
 Towing dir: 330e Wire out: 350 m Speed: 30 kn\*10  
 Sorted: 491 Kg Total catch: 551.70 CATCH/HOUR: 2364.43

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1928  
 DATE:19/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 736 Long E 1230  
 start stop duration  
 TIME :19:00:35 19:30:17 30 (min) Purpose code: 3  
 LOG :9718.08 9719.69 1.60 Area code : 1  
 FDEPTH: 242 251 GearCond.code: 9  
 BDEPTH: 242 251 Validity code: 1  
 Towing dir: 160e Wire out: 750 m Speed: 30 kn\*10  
 Sorted: 13 Kg Total catch: 52.09 CATCH/HOUR: 104.18

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Umbrina canariensis	1221.94	2837	51.68	4543
Argyrosomus hololepidotus	327.34	90	13.84	4546
Boops boops	225.26	15566	9.53	
Argyrosomus hololepidotus	181.54	6240	7.68	
Epinephelus guaza ?	97.46	4	4.12	
Dentex barnardi	73.11	197	3.09	4544
Dentex gibbosus	57.86	21	2.45	4545
Leptocharias smithii	45.34	13	1.92	
Pagrus caeruleostictus	29.91	26	1.26	
Atractosteion aequidens	26.40	21	1.12	4547
Plectrohinchus mediterraneus	14.14	4	0.60	
Pagrus auriga	10.63	4	0.45	
Pagellus bellottii	9.69	26	0.41	4541
Dentex angolensis	8.57	21	0.36	4542
Sepia officinalis hierredda	7.54	4	0.32	
Zenopsis conchifer	6.86	9	0.29	
Anthias anthias	4.80	21	0.20	
Torpedo torpedo	3.60	4	0.15	
Octopus vulgaris	3.26	4	0.14	
Zeus faber	3.17	9	0.13	
Raja miraletus	2.91	4	0.12	
Fistularia petimba	1.80	4	0.08	
Trigla lyra	1.29	4	0.05	
Total	2364.42	99.99		

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Synagrops sp.	30.86	1316	29.62	
Merluccius polli	24.52	234	23.54	4554
Parapenaeus longirostris	16.44	2302	15.78	
Gadella maraldi	8.10	254	7.78	
Myxtriopsis rostellatus	4.58	18	4.40	
MYCTOPHIDAE	4.56	2632	4.38	
Lamprogrammus sp.	4.04	202	3.88	
Trichiurus lepturus	2.56	204	2.46	
OPHICHTHIDAE	2.54	152	2.44	
Raja miraletus	1.62	4	1.56	
Lophius vaillanti	1.52	50	1.46	
CONGRIDAE	1.52	50	1.46	
Aulopus cadenati	0.50	50	0.48	
Peristodion cataphractum	0.50	152	0.48	
Illex coindetii	0.16	2	0.15	
Solenocera africana	0.16	22	0.15	
Total	104.18	100.02		

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1926  
 DATE:19/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 736 Long E 1242  
 start stop duration  
 TIME :12:41:28 13:11:04 30 (min) Purpose code: 3  
 LOG :9665.54 9666.85 1.29 Area code : 1  
 FDEPTH: 93 93 GearCond.code: 9  
 BDEPTH: 93 93 Validity code: 1  
 Towing dir: 160e Wire out: 320 m Speed: 30 kn\*10  
 Sorted: 48 Kg Total catch: 97.26 CATCH/HOUR: 194.52

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1929  
 DATE:19/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 737 Long E 1230  
 start stop duration  
 TIME :20:30:04 21:00:13 30 (min) Purpose code: 3  
 LOG :9722.29 9723.79 1.48 Area code : 1  
 FDEPTH: 308 357 GearCond.code: 9  
 BDEPTH: 308 357 Validity code: 1  
 Towing dir: 340e Wire out: 950 m Speed: 30 kn\*10  
 Sorted: 38 Kg Total catch: 302.80 CATCH/HOUR: 605.60

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Chelidonichthys gabonensis	42.84	870	22.02	
Dentex congoensis	39.12	1476	20.11	
Dentex angolensis	38.04	462	19.56	4548
Trichiurus lepturus	35.04	72	18.01	
Brachydeuterus auritus	19.32	144	9.93	4549
Pagellus bellottii	3.96	54	2.04	
Sepia officinalis hierredda	3.48	10	1.79	
Citharus linguatula	2.64	84	1.36	
Fistularia petimba	1.52	4	0.78	
Epinephelus aeneus	1.28	2	0.66	
Raja miraletus	1.16	2	0.60	
Trachurus trecae	1.08	36	0.56	
Spicara alta	0.96	120	0.49	
Torpedo torpedo	0.96	2	0.49	
Zeus faber	0.84	6	0.43	
Brotula barbata	0.76	2	0.39	
Dentex barnardi	0.56	2	0.29	
Chaetodon hoefleri	0.40	4	0.21	
Boops boops	0.36	24	0.19	
Uranoscopus polli	0.20	2	0.10	
Total	194.52	100.01		

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Merluccius polli	288.20	1672	47.59	4555
Chlorophthalmus agassizi	114.40	2156	18.89	
GALATHEIDAE *	62.04	1136	10.24	
Synagrops microlepis	30.36	1914	5.01	
Gadella maraldi	23.98	484	3.96	
Pterothrissus belloci	16.72	110	2.76	
Bathynectes piperitus	15.84	220	2.62	
Coelorrhinus coelorrhinus	15.84	484	2.62	
Centrophorus uyato	14.12	4	2.33	
Lophius vaillanti	10.06	90	1.66	
Rhinocimaera atlantica	6.06	2	1.00	
Nematocarcinus africanus	2.20	462	0.36	
MYCTOPHIDAE	2.20	2486	0.36	
Illex coindetii	1.76	22	0.29	
Trichiurus lepturus	1.76	2	0.29	
C R A B S	1.54	22	0.25	
Hymenocephalus italicus	1.10	682	0.18	
CONGRIDAE	1.10	22	0.18	
Total	609.28	100.59		

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1927  
 DATE:19/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 727 Long E 1244  
 start stop duration  
 TIME :15:00:41 16:40:42 22 (min) Purpose code: 3  
 LOG :9699.33 9700.45 1.08 Area code : 1  
 FDEPTH: 66 66 GearCond.code: 9  
 BDEPTH: 66 66 Validity code: 1  
 Towing dir: 150e Wire out: 240 m Speed: 30 kn\*10  
 Sorted: 76 Kg Total catch: 421.22 CATCH/HOUR: 1148.78

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1930  
 DATE:20/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 728 Long E 1230  
 start stop duration  
 TIME :05:08:26 05:38:36 30 (min) Purpose code: 3  
 LOG :9749.23 9750.90 1.64 Area code : 1  
 FDEPTH: 118 119 GearCond.code: 9  
 BDEPTH: 118 119 Validity code: 1  
 Towing dir: 150e Wire out: 380 m Speed: 30 kn\*10  
 Sorted: 64 Kg Total catch: 614.75 CATCH/HOUR: 1229.50

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	527.92	7126	45.95	
Pagellus bellottii	418.01	8165	36.39	4553
Trachurus trecae	67.01	1650	5.83	4550
Pomadoury incanus	28.72	177	2.50	
Trichiurus lepturus	27.98	71	2.44	
Dentex congoensis	20.05	412	1.75	4552
Decapterus punctatus	13.47	851	1.17	4551
Grammophilus gruweli	8.05	177	0.70	
Saurida brasiliensis	5.51	1383	0.48	
Pseudopenaeus prayensis	4.80	106	0.42	
Sardinella aurita	3.19	196	0.28	
Uranoscopus polli	3.03	19	0.26	
Boops boops	2.67	374	0.23	
Octopus vulgaris	2.35	5	0.20	
Citharus linguatula	2.13	213	0.19	
Chaetodon hoefleri	2.13	19	0.19	
Torpedo torpedo	1.91	5	0.17	
Raja miraletus	1.75	3	0.15	
Dentex angolensis	1.25	19	0.11	
Fistularia petimba	0.82	3	0.07	
Total	1142.75	99.48		

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichiurus lepturus	950.46	1786	77.30	
Dentex angolensis	105.84	756	8.61	4557
Dentex congoensis	52.50	1050	4.27	4556
Chelidonichthys gabonensis	43.48	462	3.54	
Illex coindetii	18.90	64	1.54	
Trichiurus lepturus	16.40	400	1.33	
Spicara alta	7.36	252	0.60	
Sepia origynana	6.30	22	0.51	
Squatina oculata	5.02	2	0.41	
Umbrina canariensis	4.84	22	0.39	
Uranoscopus polli	4.62	22	0.38	
Dentex canariensis	4.42	42	0.36	
Raja miraletus	3.98	8	0.32	
Brotula barbata	2.08	2	0.17	
Sepia elegans	1.40	2	0.11	
Boops boops	1.06	64	0.09	
Citharus linguatula	0.84	64	0.07	
Total	1229.50	100.00		

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1931  
DATE:20/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 728  
Long E 1234  
start stop duration  
TIME :06:39:04 07:09:16 30 (min) Purpose code: 3  
LOG :9755.47 9758.10 1.63 Area code : 1  
FDEPTH: 104 105 GearCond.code: 1  
BDEPTH: 104 105 Validity code: 1  
Towing dir: 150e Wire out: 330 m Speed: 30 km\*10  
Sorted: 87 Kg Total catch: 299.61 CATCH/HOUR: 599.22

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichiurus lepturus	286.68	378	47.84	
Brachydeuterus auritus	170.28	1362	28.42	4559
Dentex congoensis	34.26	828	5.72	4561
Dentex angolensis	33.00	348	5.51	4558
Pagellus bellottii	12.96	156	2.16	4560
Spicara alta	8.80	430	1.47	
Trigla lyra	6.52	82	1.09	
Saurida brasiliensis	6.44	1576	1.07	
Fistularia petimba	6.28	12	1.05	
Illex coindetii	5.70	252	0.95	
Squatina oculata	5.00	2	0.83	
Trachurus	4.88	148	0.81	
Citharus linguatula	4.52	170	0.75	
Sepia officinalis hierredda	3.26	4	0.54	
Uranoscopus polli	2.66	14	0.44	
Raja miraletus	1.72	4	0.29	
Zeus faber	1.70	14	0.28	
Chelidonichthys gabonensis	1.34	8	0.22	
Brotula barbata	1.00	2	0.17	
Sphoeroides pachgaster	0.88	8	0.15	
Boops boops	0.66	44	0.11	
Sepia orbignyana	0.38	22	0.06	
Lophiodes kempi	0.30	8	0.05	
Total	599.22		99.98	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1932  
DATE:20/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 726  
Long E 1241  
start stop duration  
TIME :08:25:42 08:55:19 30 (min) Purpose code: 3  
LOG :9766.88 9768.46 1.56 Area code : 1  
FDEPTH: 72 73 GearCond.code: 1  
BDEPTH: 72 73 Validity code: 1  
Towing dir: 150e Wire out: 240 m Speed: 30 km\*10  
Sorted: 125 Kg Total catch: 1032.46 CATCH/HOUR: 2064.92

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	1774.80	26060	85.95	
Trachurus trecae	106.86	2534	5.18	4562
Pagellus bellottii	57.30	782	2.77	4563
Dentex congoensis	42.00	1310	2.03	4564
Sepia officinalis hierredda	26.08	68	1.26	
Sardinella aurita	11.22	68	0.54	
Sepia orbignyana	5.44	18	0.26	
Torpedo torpedo	4.94	18	0.24	
Octopus vulgaris	4.94	18	0.24	
Sphyraena guachancho	4.42	18	0.21	
Saurida brasiliensis	4.08	1258	0.20	
Seriola carpenteri	3.76	6	0.18	
Illex coindetii	3.24	68	0.16	
Fistularia petimba	2.16	6	0.10	
Chelidonichthys gabonensis	1.88	52	0.09	
Decapterus punctatus	1.54	52	0.07	
Citharus linguatula	1.24	120	0.06	
Epinephelus aeneus	1.24	2	0.06	
Raja miraletus	1.20	18	0.06	
Dentex angolensis	1.02	34	0.05	
Decapterus rhonchus	0.86	18	0.04	
Pseudupeneus prayensis	0.86	34	0.04	
Alloteuthis africana	0.68	392	0.03	
Arnoglossus imperialis	0.52	68	0.03	
Grammolites gruvelli	0.18	18	0.01	
Total	2062.46		99.86	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1933  
DATE:20/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 724  
Long E 1245  
start stop duration  
TIME :09:57:17 10:02:03 5 (min) Purpose code: 3  
LOG :9775.18 9775.42 0.23 Area code : 1  
FDEPTH: 49 49 GearCond.code: 9  
BDEPTH: 49 49 Validity code: 1  
Towing dir: 150e Wire out: 180 m Speed: 30 km\*10  
Sorted: 69 Kg Total catch: 68.61 CATCH/HOUR: 823.32

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Pomadasys jubelini	546.12	948	66.33	4565
Sphyraena guachancho	237.60	432	28.86	
Pagrus caeruleostictus	6.60	12	0.80	
Decapterus rhonchus	5.00	36	0.73	
Trichiurus lepturus	5.88	12	0.71	
Trachinus radiatus	4.80	12	0.58	
Raja miraletus	4.56	12	0.55	
Decapterus punctatus	3.84	276	0.47	
Trachurus trecae	2.64	72	0.32	
Cynoglossus browni	2.28	12	0.28	
Citharichthys stampflii	1.20	12	0.15	
Sardinella aurita	1.08	24	0.13	
Citharus linguatula	0.60	24	0.07	
Total	823.20		99.98	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1934  
DATE:20/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 722  
Long E 1250  
start stop duration  
TIME :11:04:26 11:05:55 1 (min) Purpose code: 3  
LOG :9782.47 9782.50 0.01 Area code : 1  
FDEPTH: 23 22 GearCond.code: 8  
BDEPTH: 23 22 Validity code: 4  
Towing dir: 340e Wire out: 120 m Speed: 30 km\*10  
Sorted: 12 Kg Total catch: 11.51 CATCH/HOUR: 690.60

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sphyraena guachancho	407.40	720	58.99	
Acanthurus monroviae	44.40	60	6.43	
Arius parkii	36.00	60	5.21	
Scyllarides herklotsii	34.20	60	4.95	
Pomadasys jubelini	33.60	60	4.87	
Leptocharias smithii	29.40	60	4.26	
Chaetodipterus lippei	28.20	120	4.08	
Pagrus caeruleostictus	22.80	60	3.30	
Pomadasys incisus	13.20	120	1.91	
Bodianus speciosus	9.00	60	1.30	
Parakuhlia macrophthalmus	9.00	600	1.30	
Chloroscombrus chrysurus	7.80	60	1.13	
Ilisha africana	6.60	1260	0.96	
Brachydeuterus auritus	3.60	1320	0.52	
Cephalopholis sp.	3.00	60	0.43	
Decapterus punctatus	1.20	180	0.17	
Trichiurus lepturus	0.60	60	0.09	
Sardinella maderensis	0.60	60	0.09	
Total	690.60		99.99	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1935  
DATE:21/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 700  
Long E 1239  
start stop duration  
TIME :05:35:31 06:06:15 31 (min) Purpose code: 3  
LOG :9818.93 9820.69 1.66 Area code : 1  
FDEPTH: 20 22 GearCond.code: 1  
BDEPTH: 20 22 Validity code: 1  
Towing dir: 160e Wire out: 120 m Speed: 30 km\*10  
Sorted: 148 Kg Total catch: 147.96 CATCH/HOUR: 286.37

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Mobula rochebrunei	107.57	4	37.56	
Hemicaranx bicolor	45.64	246	15.94	
Arius parkii	25.86	27	9.03	
Sphyraena guachancho	16.65	39	5.81	
Galeosides decadactylus	15.52	101	5.42	
Pagrus caeruleostictus	10.66	23	3.72	
Chloroscombrus chrysurus	9.95	54	3.47	
Scomberomorus tritor	9.64	15	3.37	
Elops lacerta	8.77	15	3.06	
Selene dorsalis	7.39	43	2.58	
Brachydeuterus auritus	6.46	99	2.26	
Alectis alexandrimus	5.32	4	1.86	
Albula vulpes	3.83	14	1.34	
Chaetodipterus lippei	2.50	6	0.87	
Rhizoprionodon acutus	1.74	2	0.61	
Leptocharias smithii	1.59	2	0.56	
Sardinella maderensis	1.49	10	0.52	
Pseudolithus typus	1.28	2	0.45	
Ilisha africana	0.89	17	0.31	
Trichiurus lepturus	0.83	2	0.29	
Ophichthus ophis	0.62	2	0.22	
Epinephelus aeneus	0.62	2	0.22	
Leptocottus laevigatus	0.48	2	0.17	
PLEURONECTIDAE	0.35	2	0.12	
Dicologlossa hexophthalma	0.21	2	0.07	
Dicologlossa cuneata	0.19	2	0.07	
Penaeus kerathurus	0.10	2	0.03	
Trachinocephalus myops	0.06	6	0.02	
Total	286.21		99.95	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1936  
DATE:21/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 708  
Long E 1234  
start stop duration  
TIME :07:52:55 08:19:50 27 (min) Purpose code: 3  
LOG :9836.25 9837.57 1.25 Area code : 1  
FDEPTH: 44 45 GearCond.code: 3  
BDEPTH: 44 45 Validity code: 1  
Towing dir: 335e Wire out: 170 m Speed: 30 km\*10  
Sorted: 10 Kg Total catch: 9.52 CATCH/HOUR: 21.16

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Arius parkii	5.09	7	24.05	
Pagrus caeruleostictus	4.22	9	19.94	
Sphyraena guachancho	3.44	4	16.26	
Caranx crysos	2.09	2	9.88	
Syacium micrurum	1.44	7	6.81	
Trachinus radiatus	1.33	4	6.29	
Pagellus bellottii	1.18	7	5.58	
SOLEIDAE	0.98	4	4.63	
Chelidonichthys gabonensis	0.84	4	3.97	
Sepia orbignyana	0.27	2	1.28	
Fistularia petimba	0.27	7	1.28	
Total	21.15		99.97	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1937  
DATE:21/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 713  
Long E 1234  
start stop duration  
TIME :09:36:47 09:45:36 9 (min) Purpose code: 3  
LOG :9847.17 9847.60 0.42 Area code : 1  
FDEPTH: 54 54 GearCond.code: 9  
BDEPTH: 54 54 Validity code: 1  
Towing dir: 5e Wire out: 200 m Speed: 30 km\*10  
Sorted: 37 Kg Total catch: 36.66 CATCH/HOUR: 244.40

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Pagrus caeruleostictus	105.13	213	43.02	4566
Rhinobatos albomaculatus	53.73	27	21.98	
Epinephelus aeneus	22.93	7	9.38	
Epinephelus costae	15.13	20	6.19	
Dentex barnardi	12.27	40	5.02	
Pagrus auriga	8.93	7	3.65	
Raja miraletus	7.73	13	3.16	
Boops boops	5.67	2087	2.32	
Sphyræna guachancho	5.47	7	2.24	
Chaetodon hoeferi	2.27	13	0.93	
Syacium micurus	1.93	7	0.79	
Chelidonichthys capensis	1.73	7	0.71	
Pseudupeneus prayensis	0.80	7	0.33	
Decapterus punctatus	0.40	20	0.16	
Pagellus bellottii	0.13	7	0.05	
<b>Total</b>	<b>244.25</b>		<b>99.93</b>	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1938  
DATE:21/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 716  
Long E 1227  
start stop duration  
TIME :11:10:50 11:25:16 14 (min) Purpose code: 3  
LOG :9858.98 9859.65 0.66 Area code : 1  
FDEPTH: 91 93 GearCond.code: 9  
BDEPTH: 91 93 Validity code: 1  
Towing dir: 145e Wire out: 300 m Speed: 30 km\*10  
Sorted: 102 Kg Total catch: 101.74 CATCH/HOUR: 436.03

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Dentex barnardi	334.29	1071	76.67	4567
Pagellus bellottii	38.66	184	8.87	4568
Leptocharias smithii	13.03	9	2.99	
Pagrus pagrus	8.74	26	2.00	
Rhinobatos rhinobatos	7.03	4	1.61	
Pterothrinchus mediterraneus	5.57	9	1.28	
Fistularia petimba	5.57	17	1.28	
Trigla lyra	3.43	17	0.79	
Epinephelus aeneus	3.26	4	0.75	
Dentex gibbosus	2.91	9	0.67	
Pagrus caeruleostictus	2.49	4	0.57	
Sepia orbignyana	2.23	13	0.51	
Scorpaena normani	2.14	4	0.49	
Zeus faber	2.14	9	0.49	
Chaetodon hoeferi	1.80	13	0.41	
Dentex congongensis	1.11	17	0.25	
Citharus linguatula	0.51	17	0.12	
Brachydeuterus auritus	0.43	4	0.10	
AMTENNARIIDAE	0.34	4	0.08	
Saurida brasiliensis	0.34	94	0.08	
<b>Total</b>	<b>436.02</b>		<b>100.01</b>	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1939  
DATE:21/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 719  
Long E 1219  
start stop duration  
TIME :11:40:09 13:21:23 30 (min) Purpose code: 3  
LOG :9872.00 9873.31 1.29 Area code : 1  
FDEPTH: 164 166 GearCond.code: 9  
BDEPTH: 164 166 Validity code: 9  
Towing dir: 141e Wire out: 500 m Speed: 30 km\*10  
Sorted: 102 Kg Total catch: 327.74 CATCH/HOUR: 655.48

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Synagrops microlepis	404.44	25066	61.70	
Trichiurus lepturus	145.70	698	22.23	
Dentex angolensis	46.32	214	7.07	4569
Pterothrinchus bellucci	14.12	110	2.15	
OMASTREPHIDAE	9.18	162	1.40	
Bembrops heterurus	6.46	86	0.99	
Pteroscion pelli	6.12	60	0.93	
Zenopsis conchifer	5.28	18	0.81	
Chelidonichthys gabonensis	4.94	86	0.75	
Brotula barbata	3.72	8	0.57	
Uranoscopus polli	3.24	26	0.49	
Dentex congongensis	1.92	32	0.29	4570
Citharus linguatula	1.02	26	0.16	
Dentex macropthalmus	0.96	12	0.15	
Monolene microstoma	0.86	52	0.13	
Sepia officinalis hierredda	0.68	18	0.10	
Microchirus frechkopi	0.52	18	0.08	
<b>Total</b>	<b>655.48</b>		<b>100.00</b>	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1940  
DATE:21/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 720  
Long E 1216  
start stop duration  
TIME :14:44:03 15:14:40 31 (min) Purpose code: 3  
LOG :9880.60 9882.19 1.55 Area code : 1  
FDEPTH: 204 204 GearCond.code: 9  
BDEPTH: 204 204 Validity code: 9  
Towing dir: 125e Wire out: 620 m Speed: 30 km\*10  
Sorted: 112 Kg Total catch: 230.83 CATCH/HOUR: 446.77

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Synagrops microlepis	201.81	17626	45.17	
Dentex angolensis	49.39	147	11.05	4571
Zenopsis conchifer	33.60	114	7.52	
Pterothrinchus bellucci	32.59	257	7.29	
OMASTREPHIDAE	30.33	447	6.79	
Trichiurus lepturus	29.69	101	6.65	
Bembrops heterurus	16.35	190	3.66	
Spicara alta	11.42	74	2.56	
Uranoscopus polli	9.95	56	2.23	
Squatina aculeata	9.72	6	2.18	
Brotula barbata	8.05	14	1.80	
Chelidonichthys gabonensis	3.41	31	0.76	
Scorpaena normani	3.27	19	0.73	
Torpedo torpedo	2.71	4	0.61	
Lophiodes kempfi	1.97	4	0.44	
Peristedion cataphractum	0.89	174	0.20	
Monolene microstoma	0.39	39	0.09	
Bassanus albescens	0.39	6	0.09	
Squilla cadenati	0.31	14	0.07	
Microchirus wittei	0.25	6	0.06	
Sepia officinalis hierredda	0.14	6	0.03	
Citharus linguatula	0.14	6	0.03	
<b>Total</b>	<b>446.77</b>		<b>100.01</b>	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1941  
DATE:21/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 721  
Long E 1214  
start stop duration  
TIME :16:31:11 17:01:14 30 (min) Purpose code: 3  
LOG :9889.51 9890.94 1.41 Area code : 1  
FDEPTH: 270 277 GearCond.code: 9  
BDEPTH: 270 277 Validity code: 9  
Towing dir: 130e Wire out: 800 m Speed: 30 km\*10  
Sorted: 44 Kg Total catch: 282.97 CATCH/HOUR: 565.94

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Synagrops microlepis	199.84	8880	35.31	
Ariomma bondi	73.44	1872	12.98	
Pterothrinchus bellucci	73.28	576	12.95	
Zenopsis conchifer	52.16	240	9.22	
Bembrops heterurus	32.48	336	5.74	
Parapanaeus longirostris	30.08	4144	5.32	
Todaropsis eblanæ	15.52	208	2.74	
CHLOROPHTHALMIDAE	14.72	36	2.60	
Dentex angolensis	14.48	36	2.56	4572
Chlorophthalmus atlanticus	11.20	48	1.89	
Illex coindetii	10.72	144	1.89	
Scorpaena normani	10.56	160	1.87	
Merluccius polli	8.96	112	1.58	
Coelorhynchus coelorhynchus	6.88	176	1.22	
Antigonia capros	5.12	336	0.90	
Brotula barbata	4.10	6	0.72	
Dentex macropthalmus	1.76	16	0.31	
Peristedion cataphractum	0.48	16	0.08	
Raja sp.	0.16	4	0.03	
<b>Total</b>	<b>565.94</b>		<b>100.00</b>	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1942  
DATE:21/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 724  
Long E 1214  
start stop duration  
TIME :18:05:51 18:36:08 30 (min) Purpose code: 3  
LOG :9895.48 9897.03 1.53 Area code : 1  
FDEPTH: 330 328 GearCond.code: 9  
BDEPTH: 330 328 Validity code: 9  
Towing dir: 125e Wire out: 990 m Speed: 30 km\*10  
Sorted: 23 Kg Total catch: 236.40 CATCH/HOUR: 472.80

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Chlorophthalmus atlanticus	271.20	5184	57.36	
Merluccius polli	90.24	504	19.09	4573
Laeonema laureysi	62.16	792	13.15	
CHLOROPHTHALMIDAE	10.08	192	2.13	
Parapanaeus longirostris	7.68	744	1.62	
GALATHEIDAE	6.72	1056	1.42	
Malacocephalus occidentalis	5.76	72	1.22	
Lophius vaillanti	4.80	96	1.02	
C R A B S	4.56	48	0.96	
Coelorhynchus coelorhynchus	3.60	120	0.76	
Scorpaena normani	3.36	24	0.71	
Hymenocephalus italicus	2.64	456	0.56	
<b>Total</b>	<b>472.80</b>		<b>100.00</b>	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1943  
 DATE:21/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 726 Long E 1210  
 start stop duration  
 TIME :20:08:35 20:39:31 31 (min) Purpose code: 3  
 LOG :9905.18 9906.80 1.61 Area code : 1  
 FDEPTH: 423 424 GearCond.code:  
 BDEPTH: 423 424 Validity code:  
 Towing dir: 300e Wire out:1200 m Speed: 31 km\*10  
 Sorted: 77 Kg Total catch: 177.01 CATCH/HOUR: 342.60

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Nematocarcinus africanus	155.81	39070	45.48	
Laemoneca laureysi	47.63	585	13.90	
Merluccius polli	45.99	182	13.42	4574
Dibranchius atlanticus	16.28	1628	4.75	
Hymenocephalus italicus	13.95	1628	4.07	
B I V A L V E S	12.60	17	3.68	
S H R I M P S	11.63	931	3.39	
Malacocephalus occidentalis	8.73	58	2.55	
Chaunax pictus	7.90	99	2.31	
Lophius vailanti	5.19	17	1.51	
Trichiurus lepturus	4.61	8	1.35	
C R A B S	3.46	50	1.01	
Aristeus varidens	3.04	197	0.89	
Todaropsis eblanae	2.81	17	0.82	
Benthodesmus tenuis	2.15	116	0.63	
Coelorrhinus coelorrhinus	0.83	8	0.24	
Total	342.61		100.00	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1944  
 DATE:22/ 3/99 GEAR TYPE: BT No: 2 POSITION:Lat S 717 Long E 1210  
 start stop duration  
 TIME :05:26:27 05:57:08 31 (min) Purpose code: 3  
 LOG :9954.18 9955.80 1.60 Area code : 1  
 FDEPTH: 250 246 GearCond.code:  
 BDEPTH: 250 246 Validity code:  
 Towing dir: 130e Wire out: 800 m Speed: 30 km\*10  
 Sorted: 58 Kg Total catch: 192.75 CATCH/HOUR: 373.06

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Synagrops microlepis	166.74	7868	44.70	
Pterothrissus bellocci	87.10	1074	23.35	
Parapenaeus longirostris	50.52	7752	13.54	
Miracorvina angolensis	13.45	14	3.61	
Brotula barbata	12.15	15	3.26	
Dentex angolensis	8.11	25	2.17	
Trichiurus lepturus	7.55	27	2.02	
Aricomma bondi	4.74	116	1.27	
Merluccius polli	4.16	126	1.12	
Chlorophthalmus atlanticus	3.48	590	0.93	
Zenopsis conchifer	2.50	21	0.67	
Lestidiops sp.	2.32	116	0.62	
Illex coindetii	1.84	25	0.49	
Uranoscopus polli	1.65	10	0.44	
Scorpaena normani	1.55	10	0.42	
Citharus linguatula	1.16	116	0.31	
MYCTOPHIDAE	1.16	358	0.31	
Torpedo torpedo	0.95	2	0.25	
Coelorrhinus coelorrhinus	0.77	10	0.21	
Sepia elegans	0.68	10	0.18	
Dentex macrophthalmus	0.48	2	0.13	
Total	373.06		100.00	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1945  
 DATE:22/ 3/99 GEAR TYPE: BT No: 2 POSITION:Lat S 707 Long E 1218  
 start stop duration  
 TIME :07:55:20 08:08:37 13 (min) Purpose code: 3  
 LOG :9970.73 9971.16 0.19 Area code : 1  
 FDEPTH: 96 96 GearCond.code: 8  
 BDEPTH: 96 96 Validity code: 1  
 Towing dir: 310e Wire out: 300 m Speed: 30 km\*10  
 Sorted: 10 Kg Total catch: 10.39 CATCH/HOUR: 47.95

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Leptocharias smithii	20.77	5	43.32	
Seriola carpenteri	15.69	5	32.72	
Zenopsis conchifer	3.14	28	6.55	
Trichiurus lepturus	2.77	5	5.78	
Raja miraletus	2.26	5	4.71	
Todaropsis eblanae	1.38	18	2.88	
Boops boops	1.02	111	2.13	
Dentex angolensis	0.65	9	1.36	
Alloteuthis africana	0.18	55	0.38	
Erythrocles monodi	0.09	9	0.19	
Total	47.95		100.02	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1946  
 DATE:22/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 709 Long E 1213  
 start stop duration  
 TIME :10:03:11 10:34:03 31 (min) Purpose code: 3  
 LOG :9981.11 9982.72 1.60 Area code : 1  
 FDEPTH: 125 122 GearCond.code:  
 BDEPTH: 125 122 Validity code:  
 Towing dir: 140e Wire out: 390 m Speed: 30 km\*10  
 Sorted: 119 Kg Total catch: 225.49 CATCH/HOUR: 436.43

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	270.56	2563	61.99	4575
Trichiurus lepturus	34.41	74	7.88	
Dentex angolensis	25.24	248	5.78	4577
Chelidonichthys gabonensis	20.55	385	4.71	
Dentex congensis	13.84	209	3.17	4576
Saurida brasiliensis	11.25	25	2.58	
Brotula barbata	10.41	8	2.39	
OMMASTREPHIDAE	9.14	143	2.09	
Citharus linguatula	8.55	259	1.96	
Spicara alta	7.55	226	1.73	
Aricomma bondi	7.47	87	1.71	
Dibranchius atlanticus	5.36	612	1.23	
Pterothrissus bellocci	4.28	37	0.98	
Fistularia petimba	1.57	4	0.36	
Lophius vailanti	1.20	4	0.27	
Squatina oculata	1.16	2	0.27	
Scorpaena normani	1.12	4	0.26	
Selene dorsalis	0.99	2	0.23	
Raja miraletus	0.89	2	0.20	
Priacanthus arenatus	0.66	2	0.15	
Peristedion cataphractum	0.58	17	0.13	
Boops boops	0.43	29	0.10	
Trachurus trecae	0.43	4	0.10	
Sepia sp.	0.25	4	0.06	
Total	437.89		100.33	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1947  
 DATE:22/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 710 Long E 1209  
 start stop duration  
 TIME :11:50:40 12:20:07 29 (min) Purpose code: 3  
 LOG :9991.40 9992.92 1.50 Area code : 1  
 FDEPTH: 160 154 GearCond.code:  
 BDEPTH: 160 154 Validity code:  
 Towing dir: 130e Wire out: 500 m Speed: 30 km\*10  
 Sorted: 62 Kg Total catch: 129.76 CATCH/HOUR: 268.47

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichiurus lepturus	118.06	1514	43.98	
Dentex angolensis	38.19	197	14.23	4578
Pterothrissus bellocci	31.53	230	11.74	
Chelidonichthys gabonensis	25.82	261	9.62	
Leptocharias smithii	16.78	4	6.25	
OMMASTREPHIDAE	8.32	124	3.10	
Bembrops heterurus	7.08	93	2.64	
Pentheroscione mbizi	3.10	25	1.15	
Lophius vailanti	2.92	12	1.09	
Octopus vulgaris	2.86	6	1.07	
Saurida brasiliensis	2.86	670	1.07	
Uranoscopus albesca	1.74	12	0.65	
Brotula barbata	1.37	2	0.51	
Monolene microstoma	1.24	62	0.46	
Uranoscopus polli	1.24	6	0.46	
Dentex macrophthalmus	1.12	12	0.42	
Citharus linguatula	1.12	25	0.42	
Torpedo torpedo	0.91	2	0.34	
Parapenaeus longirostris	0.74	168	0.28	
Scorpaena normani	0.66	6	0.25	
Brachydeuterus auritus	0.62	6	0.23	
Dibranchius atlanticus	0.62	68	0.23	
Umbria canariensis	0.58	2	0.22	
Sepia sp.	0.12	25	0.04	
Total	269.60		100.45	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1948  
 DATE:22/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 713 Long E 1207  
 start stop duration  
 TIME :13:43:24 14:13:01 30 (min) Purpose code: 3  
 LOG : 2.00 3.40 1.37 Area code : 1  
 FDEPTH: 236 242 GearCond.code:  
 BDEPTH: 236 242 Validity code:  
 Towing dir: 319e Wire out: 700 m Speed: 30 km\*10  
 Sorted: 31 Kg Total catch: 112.62 CATCH/HOUR: 225.24

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
MYCTOPHIDAE	76.86	48048	34.12	
Spicara alta	43.56	232	19.34	
Parapenaeus longirostris	21.48	3336	9.54	
Brotula barbata	21.00	80	9.32	
Synagrops microlepis	20.34	1302	9.03	
Trichiurus lepturus	7.54	24	3.35	
Bembrops heterurus	7.46	116	3.31	
Pterothrissus bellocci	7.28	62	3.23	
Scorpaena normani	3.52	58	1.56	
Dentex angolensis	3.44	12	1.53	
Dentex macrophthalmus	2.60	24	1.15	
OMMASTREPHIDAE	2.40	24	1.07	
Torpedo torpedo	1.88	2	0.83	
Bassanago albescens	1.28	36	0.57	
Monolene microstoma	1.10	226	0.49	
Aricomma bondi	1.02	18	0.45	
Merluccius polli	0.92	18	0.41	
Uranoscopus polli	0.82	4	0.36	
Zenopsis conchifer	0.64	14	0.28	
Peristedion cataphractum	0.10	4	0.04	
Total	225.24		99.98	



DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1949  
 DATE:22/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 713  
 start stop duration Long E 1204  
 TIME :16:31:51 17:01:28 30 (min) Purpose code: 3  
 LOG : 20.84 22.26 1.38 Area code : 1  
 FDEPTH: 302 303 GearCond.code: 1  
 BDEPTH: 302 303 Validity code: 1  
 Towing dir: 315e Wire out: 900 m Speed: 30 km\*10  
 Sorted: 65 Kg Total catch: 380.60 CATCH/HOUR: 761.20

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Chlorophthalmus atlanticus	326.16	6900	42.85	
Merluccius polli	94.80	768	12.45	4580
Synagrops microlepis	83.64	4176	10.99	
Trichiurus lepturus	59.40	1512	7.80	
Pterothrissus belloci	44.28	384	5.82	
Parapenaeus longirostris	31.08	44	4.08	
GALATHEIDAE *	22.92	1896	3.01	
Laemonema laureysi	16.32	288	2.14	
Benthodesmus tenuis	12.60	624	1.66	
Gadella maraldi	12.60	420	1.66	
Illex coindetii	10.92	168	1.43	
Lophius vaillanti	10.44	204	1.37	
Peristidion cataphractum	8.40	204	1.10	
C R A B S	6.24	624	0.82	
Hymenocephalus italicus	6.24	624	0.82	
Zenopsis conchifer	4.00	22	0.53	
Sepia elegans	3.36	204	0.44	
Todaropsis eblanae	3.00	24	0.39	
Bathynectes piperitus	2.04	24	0.27	
Malacocephalus laevis	1.32	12	0.17	
Scorpaena normani	1.20	24	0.16	
MYCTOPHIDAE	0.24	84	0.03	
<b>Total</b>	<b>761.20</b>		<b>99.99</b>	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1952  
 DATE:23/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 703  
 start stop duration Long E 1207  
 TIME :05:11:43 05:41:51 30 (min) Purpose code: 3  
 LOG : 67.68 69.31 1.63 Area code : 1  
 FDEPTH: 114 119 GearCond.code: 1  
 BDEPTH: 114 119 Validity code: 1  
 Towing dir: 135e Wire out: 340 m Speed: 30 km\*10  
 Sorted: 110 Kg Total catch: 110.08 CATCH/HOUR: 220.16

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichiurus lepturus	36.12	76	16.41	
Dentex angolensis	29.44	274	13.37	4585
Saurida brasiliensis	21.20	4024	9.63	
Brachydeuterus auritus	21.00	198	9.54	
Dentex coepensis	19.32	320	8.78	4586
Trigla lyra	14.68	288	6.67	
Pagellus bellottii	12.10	150	5.50	4584
Boops boops	9.16	530	4.16	
Squatina aculeata	7.76	4	3.52	
Illex coindetii	7.42	130	3.37	
Raja miraletus	6.08	10	2.76	
Brotula barbata	6.08	10	2.76	
Priacanthus arenatus	5.68	16	2.58	
Umbra canariensis	5.60	26	2.54	4583
Citharus linguatula	5.26	174	2.39	
Leptocharias smithii	3.80	2	1.73	
Ariomma boni	3.80	52	1.73	
Pterothrissus belloci	3.04	22	1.38	
Uranoscopus polli	1.02	6	0.46	
GALATHEIDAE *	0.72	72	0.33	
Selene dorsalis	0.60	2	0.27	
Sepia orbignyana	0.28	6	0.13	
<b>Total</b>	<b>220.16</b>		<b>100.01</b>	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1950  
 DATE:22/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 715  
 start stop duration Long E 1202  
 TIME :18:48:46 18:53:51 5 (min) Purpose code: 3  
 LOG : 31.85 32.07 0.21 Area code : 1  
 FDEPTH: 400 378 GearCond.code: 9  
 BDEPTH: 400 378 Validity code: 1  
 Towing dir: 310e Wire out: 1150 m Speed: 30 km\*10  
 Sorted: 39 Kg Total catch: 38.75 CATCH/HOUR: 465.00

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Merluccius polli	191.52	864	41.19	4581
Coelorrhinchus coelorhynchus	72.60	12	15.61	
Chaunax pictus	55.92	684	12.03	
Hymenocephalus italicus	42.96	4752	9.24	
Benthodesmus tenuis	35.28	2448	7.59	
Malacocephalus laevis	16.08	96	3.46	
Laemonema laureysi	14.76	192	3.17	
Parapenaeus longirostris	8.64	612	1.86	
Bassanago albescens	7.68	156	1.65	
POLYCHAELIDAE	7.68	1068	1.65	
Trichiurus lepturus	3.12	312	0.67	
Epigonus telescopus	3.00	48	0.65	
Aristeus varidens	2.76	456	0.59	
Illex coindetii	1.68	24	0.36	
Dibranchius atlanticus	0.84	108	0.18	
MYCTOPHIDAE	0.48	372	0.10	
<b>Total</b>	<b>465.00</b>		<b>100.00</b>	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1953  
 DATE:23/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 702  
 start stop duration Long E 1215  
 TIME :06:40:51 06:41:34 16 (min) Purpose code: 3  
 LOG : 81.63 82.53 0.87 Area code : 1  
 FDEPTH: 89 90 GearCond.code: 9  
 BDEPTH: 89 90 Validity code: 1  
 Towing dir: 310e Wire out: 300 m Speed: 30 km\*10  
 Sorted: 25 Kg Total catch: 25.13 CATCH/HOUR: 94.24

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Pagellus bellottii	41.33	304	43.86	4587
Priacanthus arenatus	7.50	19	7.96	
Dentex angolensis	5.55	49	5.89	4588
Pseudupeneus prayvensis	4.35	90	4.62	
Brachydeuterus auritus	4.13	38	4.38	
Trachurus trecae	3.94	94	4.18	
Sphyræna guachancho	3.56	4	3.78	
Dentex barmardi	3.26	19	3.46	
Decapterus rhonchus	3.23	4	3.43	
Chelidonichthys capensis	2.51	15	2.66	
Dentex gibbosus	2.33	8	2.47	
Pagrus pagrus	2.06	8	2.19	
Chelidonichthys gabonensis	1.76	19	1.87	
Raja miraletus	1.61	4	1.71	
Branchiostegus semifasciatus	1.50	4	1.59	
Todaropsis eblanae	1.20	15	1.27	
Illex coindetii	1.16	15	1.23	
Dentex coepensis	1.05	38	1.11	
Pistularia petimba	0.98	4	1.04	
Citharus linguatula	0.68	38	0.72	
Zeus faber	0.53	4	0.56	
Arnoglossus imperialis	0.04	4	0.04	
<b>Total</b>	<b>94.26</b>		<b>100.02</b>	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1954  
 DATE:23/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 654  
 start stop duration Long E 1214  
 TIME :09:04:34 09:16:12 12 (min) Purpose code: 3  
 LOG : 91.35 91.97 0.61 Area code : 1  
 FDEPTH: 76 77 GearCond.code: 9  
 BDEPTH: 76 77 Validity code: 1  
 Towing dir: 185e Wire out: 269 m Speed: 30 km\*10  
 Sorted: 91 Kg Total catch: 91.20 CATCH/HOUR: 456.00

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Pagellus bellottii	202.90	2160	44.50	4589
Sphyræna aphyraena	56.60	255	12.41	
Dentex barmardi	50.00	205	10.96	4591
Sphyræna guachancho	48.90	5	10.72	
Dentex angolensis	37.30	170	8.18	4590
Decapterus rhonchus	8.40	50	1.84	
Raja miraletus	7.40	20	1.62	
Chaetodon hoeffleri	5.30	35	1.16	
Brotula barbata	5.15	5	1.13	
Priacanthus arenatus	4.95	10	1.09	
Pagrus pagrus	4.55	15	1.00	
Chelidonichthys gabonensis	3.95	20	0.87	
Trichiurus lepturus	3.30	5	0.72	
Sepia officinalis hierredda	3.20	10	0.70	
Dentex gibbosus	3.10	10	0.68	
Epinephelus aeneus	2.90	5	0.64	
Pseudupeneus prayvensis	2.75	60	0.60	
Torpedo torpedo	2.15	5	0.47	
Decapterus sp.	1.30	40	0.29	
Brachydeuterus auritus	1.15	20	0.25	
Trachurus trecae	0.40	10	0.09	
Citharus linguatula	0.20	10	0.04	
Sardinella maderensis	0.15	5	0.03	
<b>Total</b>	<b>456.00</b>		<b>99.99</b>	

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Benthodesmus tenuis	91.53	2615	36.05	
POLYCHAELIDAE	28.66	1924	11.29	
Chaunax pictus	28.45	157	11.20	
STOMIDAE	21.48	306	8.46	
Merluccius polli	20.13	43	7.93	4582
Aristeus varidens	15.39	1539	6.06	
Geryon maritae	10.37	35	4.08	
Triplophos sp.	10.03	1152	3.95	
Plesionenaeus edwardsianus	5.36	157	2.11	
Yarellia blackfordi	4.61	157	1.82	
Malacocephalus laevis	3.39	21	1.34	
CONGRIDAE	3.06	157	1.21	
Laemonema laureysi	3.06	306	1.21	
Ehinania costacarrarie	2.30	75	0.91	
Dibranchius atlanticus	2.30	306	0.91	
Trichiurus lepturus	1.26	2	0.50	
Todaropsis eblanae	1.22	8	0.48	
Lamprogrammus exotus	0.72	2	0.28	
Sepia sp.	0.68	8	0.27	
<b>Total</b>	<b>254.00</b>		<b>100.06</b>	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1955  
 DATE:23/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 654 Long E 1207  
 start stop duration Purpose code: 3  
 TIME :10:30:45 11:00:49 30 (min) Area code : 1  
 LOG : 101.68 103.28 1.56 GearCond.code:  
 FDEPTH: 91 91 Validity code:  
 BDEPTH: 91 91  
 Towing dir: 140e Wire out: 300 m Speed: 30 kn\*10  
 Sorted: 52 Kg Total catch: 143.91 CATCH/HOUR: 287.82

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Dentex congoensis	102.20	1716	35.51	4592
Pagellus bellottii	32.68	1058	32.20	4593
Saurida brasiliensis	21.28	5860	7.39	
Dentex gibbosus	18.06	36	6.27	
Fistularia petimba	9.72	22	3.38	
Brachydeuterus auritus	8.40	84	2.92	
Sepia officinalis hierredda	8.24	26	2.86	
Raja miraletus	5.20	10	1.81	
Citharus linguatula	3.78	210	1.31	
Trichurus lepturus	3.20	4	1.11	
Leptocharias smithii	3.08	8	1.07	
Torpedo torpedo	2.52	28	0.93	
Chelidonicichthys gabonensis	2.48	4	0.88	
Zeus faber	2.28	4	0.79	
Sardinella aurita	1.68	36	0.58	
Dentex barnardi	1.12	8	0.39	
OMMASTREPHIDAE	0.70	8	0.24	
Decapterus rhonchus	0.56	14	0.19	
Sphyræna guachancho	0.44	2	0.15	
Total		287.82	99.98	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1956  
 DATE:23/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 656 Long E 1203  
 start stop duration Purpose code: 3  
 TIME :12:08:37 12:38:12 30 (min) Area code : 1  
 LOG : 111.52 113.11 1.58 GearCond.code:  
 FDEPTH: 103 104 Validity code:  
 BDEPTH: 103 104  
 Towing dir: 140e Wire out: 330 m Speed: 30 kn\*10  
 Sorted: 98 Kg Total catch: 98.21 CATCH/HOUR: 196.42

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Saurida brasiliensis	38.74	11930	19.72	
Trichurus lepturus	35.38	74	18.01	
Pagellus bellottii	23.32	148	11.87	4598
Dentex congoensis	17.76	400	9.04	4595
Dentex angolensis	14.68	166	7.47	4594
Epinephelus aeneus	14.40	2	7.33	
Brotula barbata	8.84	8	4.50	
Chelidonicichthys gabonensis	8.04	272	4.09	
Spicara alta	6.20	78	3.16	
Priacanthus arenatus	4.68	12	2.38	
Trachurus trerca	3.48	92	1.77	4597
Boops boops	3.48	92	1.77	4597
Aricomma bondi	3.32	66	1.69	
Sepia officinalis hierredda	2.84	18	1.45	
Raja miraletus	2.68	6	1.36	
Brachydeuterus auritus	2.68	26	1.36	4596
Fistularia petimba	2.16	6	1.10	
Dentex gibbosus	1.80	4	0.92	
Citharus linguatula	1.20	44	0.61	
Trigla lyra	1.04	6	0.53	
Leptocephalus laevigatus	1.04	4	0.53	
OMMASTREPHIDAE	0.88	12	0.45	
Zeus faber	0.76	2	0.39	
Total		199.40	101.50	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1957  
 DATE:23/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 651 Long E 1152  
 start stop duration Purpose code: 3  
 TIME :16:28:43 16:50:55 22 (min) Area code : 1  
 LOG : 149.00 150.10 1.08 GearCond.code:  
 FDEPTH: 200 191 Validity code:  
 BDEPTH: 200 191  
 Towing dir: 165e Wire out: 600 m Speed: 30 kn\*10  
 Sorted: 72 Kg Total catch: 176.44 CATCH/HOUR: 481.20

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Synagrops microlepis	286.91	10759	59.62	
Trichurus lepturus	26.67	65	5.54	
Brotula barbata	22.69	30	4.72	
Zenopsis conchifer	21.76	35	4.52	
Pagellus bellottii	20.62	164	4.29	
Bembrops heterurus	16.36	153	3.40	
Illex coindetii	12.65	153	2.63	
Dentex angolensis	11.24	44	2.34	4599
Parapenaeus longirostris	11.02	1778	2.29	
Heptanchias perlo	7.09	3	1.47	
Todaropsis eblanae	6.33	87	1.32	
Torpedo torpedo	5.89	11	1.22	
Raja miraletus	4.64	14	0.96	
Dentex macrophthalmus	3.60	30	0.75	
SQUILLIDAE	3.27	131	0.68	
Uranoscopus polli	3.27	33	0.68	
Echeneis naucratis	2.73	3	0.57	
Rhinobatos albomaculatus	2.62	11	0.54	
Aulopus filamentosus	2.29	22	0.48	
Pteroscion pelli	2.29	11	0.48	
Scorpaena normani	1.96	131	0.41	
Monolepis microstoma	1.96	5	0.24	
Sea cucumbers	1.15	5	0.24	
Sepia elegans	0.76	33	0.16	
Spicara alta	0.65	5	0.14	
Chaetodon sp.	0.44	98	0.09	
Total		481.19	100.02	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1958  
 DATE:23/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 647 Long E 1148  
 start stop duration Purpose code: 3  
 TIME :18:37:27 19:07:16 30 (min) Area code : 1  
 LOG : 162.09 163.65 1.54 GearCond.code:  
 FDEPTH: 251 249 Validity code:  
 BDEPTH: 251 249  
 Towing dir: 145e Wire out: 750 m Speed: 30 kn\*10  
 Sorted: 67 Kg Total catch: 419.78 CATCH/HOUR: 839.56

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Synagrops microlepis	517.92	21816	61.69	
Chlorophthalmus atlanticus	108.00	3720	12.86	
Parapenaeus longirostris	42.00	5472	5.00	
Dentex angolensis	29.12	84	3.47	4601
CHLOROPHTHALMIDAE	26.16	792	3.12	
Trichurus lepturus	21.56	132	2.57	
Illex coindetii	13.44	120	1.60	
Uranoscopus cadenati	11.28	96	1.34	
Pterothrissus bellocci	10.32	96	1.23	
Brotula barbata	9.46	8	1.13	
Todaropsis eblanae	7.92	144	0.94	
Peristedion cataphractum	7.68	288	0.91	
CONGRIDAE	6.96	48	0.83	
Spicara alta	6.30	140	0.75	
Bembrops heterurus	6.00	72	0.71	
Scorpaena normani	4.80	96	0.57	
Aulopus filamentosus	4.56	24	0.54	
Dentex macrophthalmus	3.92	48	0.47	4600
Zenopsis conchifer	2.16	48	0.26	
Total		839.56	99.99	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1959  
 DATE:23/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 647 Long E 1145  
 start stop duration Purpose code: 3  
 TIME :20:42:27 21:02:25 20 (min) Area code : 1  
 LOG : 170.89 171.89 0.99 GearCond.code: 9  
 FDEPTH: 362 364 Validity code: 1  
 BDEPTH: 362 364  
 Towing dir: 330e Wire out:1050 m Speed:30 kn\*10  
 Sorted: 32 Kg Total catch: 83.75 CATCH/HOUR: 251.25

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Benthodesmus tenuis	62.73	2232	24.97	
Solenocera africana	49.50	8433	19.70	
Laemonema laureysi	31.14	387	12.39	
Chaunax pictus	27.27	468	10.85	
Merluccius polli	12.78	72	5.09	
Malacocephalus laevis	10.53	99	4.19	
Hymenocephalus italicus	8.37	1044	3.33	
Raja alba	8.28	12	3.30	
Raja clavata	5.46	12	2.17	
GALATHEIDAE	4.14	414	1.65	
Lophius vaillanti	3.51	72	1.40	
Peristedion cataphractum	3.42	54	1.36	
Parapenaeus longirostris	3.24	288	1.29	
Zenopsis conchifer	3.06	36	1.22	
Coelorhynchus coelorhynchus	2.88	63	1.15	
Pterothrissus bellocci	2.88	18	1.15	
MYCTOPHIDAE	2.70	63	1.07	
Illex coindetii	2.61	27	1.04	
C R A B S	1.74	3	0.69	
Aristeus variidens	1.53	27	0.61	
Trichurus lepturus	1.32	3	0.53	
Epigonus telescopus	1.17	18	0.47	
Dibranchius atlanticus	0.99	108	0.39	
Total		251.25	100.01	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1960  
 DATE:23/ 3/99 GEAR TYPE: BT No: 8 POSITION:Lat S 649 Long E 1141  
 start stop duration Purpose code: 3  
 TIME :22:47:35 23:14:30 27 (min) Area code : 1  
 LOG : 181.75 183.05 1.30 GearCond.code: 3  
 FDEPTH: 498 505 Validity code:  
 BDEPTH: 498 505  
 Towing dir: 345e Wire out:1450 m Speed: 30 kn\*10  
 Sorted: 46 Kg Total catch: 117.21 CATCH/HOUR: 260.47

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Lophiodon kempfi	38.87	22	14.92	
CONOSMATIDAE	35.47	2144	13.62	
POLYCHÆTIDAE	32.64	2420	12.53	
Laemonema laureysi	21.82	118	8.38	
Lamprogrammus exultans	18.44	47	7.08	
Hoplostethus cadenati	16.98	513	6.52	
Raja sp.	15.76	36	6.05	
Chaunax pictus	8.82	73	3.39	
Merluccius polli	7.96	22	3.06	
UNIDENTIFIED FISH	7.67	304	2.94	
Centrophorus granulosus	7.64	2	2.93	
Benthodesmus tenuis	6.51	218	2.50	
Geryon maritae	6.22	16	2.39	
Aristeus variidens	6.07	520	2.33	
Plesiopeneus edwardsianus	4.84	11	1.86	
Dibranchius atlanticus	3.40	398	1.31	
Holcomycteronus sp.	3.40	398	1.31	
Zenopsis conchifer	2.76	7	1.06	
Synagrops microlepis	2.31	102	0.89	
Malacocephalus laevis	2.18	29	0.84	
Etmopterus spinax	2.02	29	0.78	
Gadella imberbis	2.02	64	0.78	
Coelorhynchus coelorhynchus	1.89	22	0.73	
Trichurus lepturus	1.73	7	0.66	
OMMASTREPHIDAE	0.87	7	0.33	
C R A B S	0.87	7	0.33	
Trachipterus sp.	0.58	7	0.22	
Peristedion cataphractum	0.44	16	0.17	
Halosaurus ovenii	0.29	16	0.11	
Total		260.62	100.08	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1961  
DATE:24/ 3/99 GEAR TYPE: BT No: 2 POSITION:Lat S 637 Long E 1212  
start stop duration  
TIME :05:32:52 06:02:48 30 (min) Purpose code: 3  
LOG : 236.87 238.38 1.52 Area code : 1  
FDEPTH: 50 49 GearCond.code:  
BDEPTH: 50 49 Validity code:  
Towing dir: 140e Wire out: 170 m Speed: 30 kn\*10

Sorted: 20 Kg Total catch: 19.59 CATCH/HOUR: 39.18

SPECIES	CATCH/HOUR weight numbers	% OF TOT. C	SAMP
Pagrus caeruleostictus	15.20 30	38.80	4603
Sphyræna guanchancho	10.20 16	26.03	
Trichiurus lepturus	5.86 10	14.96	
Pagellus bellottii	4.84 20	12.35	4604
Dentex barnardi	1.52 4	3.88	
Trachinus radiatus	0.76 2	1.94	
Alloteuthis africana	0.22 92	0.56	
Uranoscopus polli	0.20 2	0.51	
Trachurus trecae	0.18 4	0.46	
Fistularia petimba	0.10 2	0.26	
Trachinus amatus	0.08 2	0.20	
Saurida brasiliensis	0.02 8	0.05	
Total	39.18	100.00	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1962  
DATE:24/ 3/99 GEAR TYPE: BT No: 2 POSITION:Lat S 641 Long E 1206  
start stop duration  
TIME :07:16:50 07:46:41 30 (min) Purpose code: 3  
LOG : 246.89 248.42 1.52 Area code : 1  
FDEPTH: 77 76 GearCond.code:  
BDEPTH: 77 76 Validity code:  
Towing dir: 150e Wire out: 250 m Speed: 30 kn\*10

Sorted: 40 Kg Total catch: 39.55 CATCH/HOUR: 79.10

SPECIES	CATCH/HOUR weight numbers	% OF TOT. C	SAMP
Pagellus bellottii	37.28 416	47.13	4605
Epinephelus aeneus	17.32 4	21.90	
Pagrus caeruleostictus	4.82 10	5.71	
Priacanthus arenatus	3.48 10	4.40	
Fistularia petimba	3.22 10	4.07	
Branchiostegus semifasciatus	2.94 2	3.72	
Dentex angolensis	2.78 10	3.51	
Sepia orbignyana	2.52 8	3.19	
Chaetodon hoefleri	1.92 12	2.43	
Chelidonichthys capensis	1.46 8	1.85	
Zeus faber	0.64 2	0.81	
Chelidonichthys gabonensis	0.50 8	0.63	
Dentex congensis	0.16 2	0.20	
Pseudupeneus prayensis	0.16 2	0.20	
Saurida brasiliensis	0.10 12	0.13	
Sphyræna guanchancho	0.10 2	0.13	
Total	79.10	100.01	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1963  
DATE:24/ 3/99 GEAR TYPE: BT No: 2 POSITION:Lat S 639 Long E 1154  
start stop duration  
TIME :09:38:40 10:08:38 30 (min) Purpose code: 3  
LOG : 265.00 266.48 1.44 Area code : 1  
FDEPTH: 120 119 GearCond.code:  
BDEPTH: 120 119 Validity code:  
Towing dir: 150e Wire out: 370 m Speed: 30 kn\*10

Sorted: 171 Kg Total catch: 343.44 CATCH/HOUR: 686.88

SPECIES	CATCH/HOUR weight numbers	% OF TOT. C	SAMP
Selene dorsalis	440.92 1650	64.19	
Trichiurus lepturus	92.16 154	13.42	
Dentex congensis	73.90 1230	10.76	4606
Ariomma bondi	19.38 266	2.82	
Dentex angolensis	14.96 150	2.18	4608
Trachurus trecae	13.58 302	1.98	4607
Chelidonichthys gabonensis	5.56 194	0.81	
Todaropsis eblanae	4.12 98	0.60	
Raja miraletus	3.02 8	0.44	
Brachydeuterus auritus	2.38 24	0.35	
Sepia officinalis hierredra	2.16 4	0.31	
Fistularia petimba	2.08 6	0.30	
Zeus faber	1.92 6	0.28	
Brotula barbata	1.62 2	0.24	
Spherooides pachgaster	1.56 6	0.23	
Saurida brasiliensis	1.46 482	0.21	
Raja clavata	1.44 2	0.21	
Priacanthus arenatus	1.34 4	0.20	
Illex coindetii	1.28 18	0.19	
Pagellus bellottii	1.22 12	0.18	
Chaetodon hoefleri	0.64 4	0.09	
Boops boops	0.18 12	0.03	
Total	686.88	100.02	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1964  
DATE:24/ 3/99 GEAR TYPE: BT No: 2 POSITION:Lat S 639 Long E 1147  
start stop duration  
TIME :11:38:19 12:08:28 30 (min) Purpose code: 3  
LOG : 277.24 278.80 1.53 Area code : 1  
FDEPTH: 171 179 GearCond.code:  
BDEPTH: 171 179 Validity code:  
Towing dir: 150e Wire out: 520 m Speed: 30 kn\*10

Sorted: 47 Kg Total catch: 420.24 CATCH/HOUR: 640.48

SPECIES	CATCH/HOUR weight numbers	% OF TOT. C	SAMP
Trichiurus lepturus	776.16 4984	92.35	4609
Dentex angolensis	29.92 148	3.56	
Pterothrissus bellocci	6.72 56	0.80	
OMMASTREPHIDAE	5.60 56	0.67	
Uranoscopus polli	5.60 28	0.67	
Chelidonichthys gabonensis	5.60 56	0.67	
Leptochararias smithii	4.12 2	0.49	
Uranoscopus albesca	2.80 28	0.33	
Citharus linguatula	1.12 28	0.13	
Brotula barbata	0.96 2	0.11	
Monolele microstoma	0.56 28	0.07	
Dentex congensis	0.56 10	0.07	
Zenopsis conchifer	0.56 28	0.07	
Dentex macrophthalmus	0.20 2	0.02	
Total	840.48	100.01	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1965  
DATE:24/ 3/99 GEAR TYPE: BT No: 2 POSITION:Lat S 639 Long E 1145  
start stop duration  
TIME :11:07:19 13:37:28 30 (min) Purpose code: 3  
LOG : 284.07 285.40 1.39 Area code : 1  
FDEPTH: 223 222 GearCond.code:  
BDEPTH: 223 222 Validity code:  
Towing dir: 140e Wire out: 690 m Speed: 30 kn\*10

Sorted: 40 Kg Total catch: 333.32 CATCH/HOUR: 666.64

SPECIES	CATCH/HOUR weight numbers	% OF TOT. C	SAMP
Trichiurus lepturus	503.60 2940	75.54	
Dentex angolensis	39.28 118	5.89	4610
Synagrops microlepis	36.80 2300	5.52	
OMMASTREPHIDAE	28.40 380	4.26	
Pterothrissus bellocci	15.60 180	2.34	
Zenopsis conchifer	10.80 24	1.62	
Pentheroscion mbizi	10.40 100	1.56	
Ariomma bondi	6.40 140	0.96	
Brotula barbata	4.48 6	0.67	
Uranoscopus polli	3.20 20	0.48	
Squatina aculeata	2.20 8	0.39	
Chelidonichthys gabonensis	2.00 20	0.30	
Grammolites grueli	1.20 20	0.18	
Raja miraletus	1.08 2	0.16	
Monolele microstoma	0.80 60	0.12	
Total	666.64	99.99	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1966  
DATE:24/ 3/99 GEAR TYPE: BT No: 2 POSITION:Lat S 639 Long E 1143  
start stop duration  
TIME :14:46:34 15:16:03 29 (min) Purpose code: 3  
LOG : 291.50 292.97 1.44 Area code : 1  
FDEPTH: 270 280 GearCond.code:  
BDEPTH: 270 280 Validity code:  
Towing dir: 165e Wire out: 830 m Speed: 30 kn\*10

Sorted: 52 Kg Total catch: 463.35 CATCH/HOUR: 958.66

SPECIES	CATCH/HOUR weight numbers	% OF TOT. C	SAMP
Chlorophthalmus atlanticus	358.80 9583	37.43	
Chlorophthalmus sp.	232.39 4868	24.24	
Synagrops microlepis	122.65 6590	12.79	
Pterothrissus bellocci	44.65 430	4.66	
Trichiurus lepturus	42.23 134	4.41	
OMMASTREPHIDAE	37.66 430	3.93	
Parapenaeus longirostris	31.20 2797	3.25	
Zenopsis conchifer	20.86 91	2.18	
Dentex angolensis	16.06 48	1.68	4611
Ariomma bondi	15.60 377	1.63	
Uranoscopus polli	10.22 81	1.07	
GALATHEIDAE *	10.22 726	1.07	
Coelrorinchus coelrorhincus	4.30 108	0.45	
Sepia sp.	2.69 81	0.28	
Echelus myrus	2.15 27	0.22	
Scorpaena normani	2.15 27	0.22	
Epigonus telescopus	1.61 54	0.17	
Chascanopsetta lugubris	1.61 27	0.17	
Peristedion cataphractum	1.08 27	0.11	
Monolele microstoma	0.54 27	0.06	
Total	958.67	100.02	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1967  
DATE:24/ 3/99 GEAR TYPE: BT No: 2 POSITION:Lat S 635 Long E 1138  
start stop duration  
TIME :17:01:20 17:32:00 31 (min) Purpose code: 3  
LOG : 304.90 306.52 1.59 Area code : 1  
FDEPTH: 324 320 GearCond.code:  
BDEPTH: 324 320 Validity code:  
Towing dir: 135e Wire out: 960 m Speed: 30 kn\*10

Sorted: 88 Kg Total catch: 313.38 CATCH/HOUR: 606.54

SPECIES	CATCH/HOUR weight numbers	% OF TOT. C	SAMP
Chlorophthalmus atlanticus	312.85 5079	51.58	
Synagrops microlepis	69.08 2508	11.39	
Nematocarcinus africanus	54.00 14032	8.90	
Benthodesmus tenuis	22.57 1132	3.72	
Xiphias gladius	21.75 2	3.59	
Trichiurus lepturus	18.46 39	3.04	
MYCTOPHIDAE	16.35 3894	2.70	
Hymenocephalus italicus	16.30 3014	2.69	
Gadella maraldi	13.86 881	2.29	
Todaropsis eblanae	13.51 157	2.23	
Chlorophthalmus sp.	10.55 201	1.74	
Pterothrissus bellocci	10.37 87	1.71	
Illex coindetii	9.68 105	1.60	
Merluccius polli	9.06 70	1.49	
Zenopsis conchifer	4.86 17	0.80	
Malaccocephalus laevis	1.84 17	0.30	
Mystriophis rostellatus	0.91 2	0.15	
Laemonema laureysi	0.52 10	0.09	
Sepia elegans	0.17 10	0.03	
Total	606.69	100.04	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1968  
DATE:24/ 3/99 GEAR TYPE: BT No: 2 POSITION:Lat S 635 Long E 1136  
start stop duration  
TIME :19:43:34 20:13:36 30 (min) Purpose code: 3  
LOG : 320.46 322.01 1.54 Area code : 1  
FDEPTH: 420 418 GearCond.code:  
BDEPTH: 420 418 Validity code:  
Towing dir: 140e Wire out:1200 m Speed: 30 kn\*10

Sorted: 72 Kg Total catch: 275.51 CATCH/HOUR: 551.02

SPECIES	CATCH/HOUR weight numbers	% OF TOT. C	SAMP
Benthodesmus tenuis	253.36 10160	45.98	
Merluccius polli	125.76 536	22.82	4612
Illex coindetii	47.76 368	8.67	
Laemonema laureysi	29.76 328	5.40	
Hymenocephalus italicus	24.48 2448	4.44	
Nematocarcinus africanus	17.12 4648	3.11	
Coelrorinchus coelrorhincus	13.44 248	2.44	
Malaccocephalus laevis	13.44 120	2.44	
Emmoterus spinax	9.76 248	1.77	
Centropristus granulatus	8.20 2	1.49	
Dibranchius atlanticus	2.48 120	0.45	
POLYCHAELIDAE	2.48 120	0.45	
Hoplostethus cadenati	1.68 16	0.30	
Trichiurus lepturus	0.76 2	0.14	
Beryx splendens	0.54 2	0.10	
Total	551.02	100.00	

DR. FRIDTJOF NANSEN PROJECT: A4 PROJECT STATION: 1969  
DATE: 24/3/99 GEAR TYPE: BT No: 2 POSITION: Lat S 637 Long E 1135  
start stop duration Purpose code: 3  
LOG : 325.28 327.77 1.46 Area code : 1  
FDEPTH: 478 476 GearCond.code:  
BDEPTH: 478 476 Validity code:  
Towing dir: 320e Wire out: 1350 m Speed: 30 km\*10  
Sorted: 43 Kg Total catch: 57.49 CATCH/HOUR: 114.98

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Merluccius polli	40.12	104	34.89	4613
Lamprogrammus exutus	17.50	60	15.22	
Benthodesmus temis	14.78	2246	12.85	
Aristeus varidens	7.44	482	6.47	
POLYCHAELIDAE	7.38	1078	6.42	
Lopholoebe kempfi	5.64	2	4.91	
Centroporus granulatus	4.44	2	3.86	
Diephus sp.	2.78	30	2.42	
Dibranchius atlanticus	2.46	92	2.14	
Laemonea lauroysi	2.46	154	2.14	
Zenopsis conchifer	2.18	2	1.90	
Trichiurus lepturus	1.52	4	1.32	
Etmopterus spinax	1.24	30	1.08	
Malacocephalus laevis	1.04	8	0.90	
Chaunax pictus	1.04	2	0.90	
Plesiopeneus edwardsianus	0.68	8	0.59	
Nezumia sp.	0.62	30	0.54	
Todaropsis eblanae	0.46	2	0.40	
Coelorrhinus coelorrhinus	0.40	4	0.35	
Hoplostethus cadernati	0.36	2	0.31	
Coloconger cadernati	0.28	2	0.24	
Scyliorhinus stellaris	0.16	2	0.14	
Total	114.98		99.99	

DR. FRIDTJOF NANSEN PROJECT: A4 PROJECT STATION: 1970  
DATE: 25/3/99 GEAR TYPE: BT No: 2 POSITION: Lat S 624 Long E 1209  
start stop duration Purpose code: 3  
LOG : 373.23 374.81 1.56 Area code : 1  
FDEPTH: 40 40 GearCond.code:  
BDEPTH: 40 40 Validity code:  
Towing dir: 150e Wire out: 150 m Speed: 30 km\*10  
Sorted: 14 Kg Total catch: 13.60 CATCH/HOUR: 27.20

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Pagrus caeruleostictus	12.98	22	47.72	
Sphyraena guachancho	5.84	14	21.47	
Caranx cryos	3.42	4	12.57	
Galeosides decadactylus	1.72	2	6.32	
Albulu vulpes	1.54	2	5.66	
Trachinus radiatus	0.82	2	3.01	
Pomadourys jubelini	0.62	2	2.28	
Trachinocephalus myops	0.10	2	0.37	
Brachydeuterus auritus	0.08	2	0.29	
Trachurus trecae	0.06	2	0.22	
Sardinella maderensis	0.02	2	0.07	
Total	27.20		99.98	

DR. FRIDTJOF NANSEN PROJECT: A4 PROJECT STATION: 1971  
DATE: 25/3/99 GEAR TYPE: BT No: 2 POSITION: Lat S 625 Long E 1205  
start stop duration Purpose code: 3  
LOG : 380.97 382.55 1.58 Area code : 1  
FDEPTH: 55 54 GearCond.code:  
BDEPTH: 55 54 Validity code:  
Towing dir: 335e Wire out: 200 m Speed: 30 km\*10  
Sorted: 22 Kg Total catch: 22.24 CATCH/HOUR: 44.48

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Alectis alexandrinus	10.80	8	24.28	
Decapterus rhonchus	8.04	14	18.08	
Sphyraena guachancho	7.20	18	16.19	
Seriola carpenteri	6.26	14	14.07	
Lagocephalus laevigatus	3.22	6	7.24	
Stromateus fiatola	1.96	2	4.41	
Trichiurus lepturus	1.72	4	3.87	
Fistularia petimba	1.58	8	3.55	
Raja miraletus	1.14	2	2.56	
Chelidichthys capensis	0.78	4	1.75	
Pagellus bellottii	0.70	4	1.57	
Uranoscopus polli	0.52	4	1.17	
Sepia orbignyana	0.22	2	0.49	
Torpedo torpedo	0.20	2	0.45	
Decapterus punctatus	0.12	4	0.27	
Sardinella maderensis	0.02	2	0.04	
Total	44.48		99.99	

DR. FRIDTJOF NANSEN PROJECT: A4 PROJECT STATION: 1972  
DATE: 25/3/99 GEAR TYPE: BT No: 2 POSITION: Lat S 625 Long E 1200  
start stop duration Purpose code: 3  
LOG : 392.74 394.30 1.45 Area code : 1  
FDEPTH: 89 90 GearCond.code:  
BDEPTH: 89 90 Validity code:  
Towing dir: 150e Wire out: 300 m Speed: 30 km\*10  
Sorted: 173 Kg Total catch: 902.62 CATCH/HOUR: 1805.24

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Selene dorsalis	868.34	9778	48.10	
Brachydeuterus auritus	629.18	8118	34.85	
Trachurus trecae	118.34	2666	6.56	4616
Trichiurus lepturus	55.76	144	3.09	
Chloroscobrus chrysurus	31.14	240	1.72	
Epinephelus aeneus	25.08	6	1.39	
Dentex angolensis	22.16	138	1.23	4615
Dentex congoensis	19.10	240	1.06	4617
Squatina oculata	13.84	2	0.77	
Pagellus bellottii	8.94	56	0.50	
Chaetodon hoefleri	2.58	18	0.14	
Stromateus fiatola	2.34	4	0.13	
Sarda sarda	2.12	2	0.12	
Brotula barbata	2.08	2	0.12	
Pseudupeneus prayensis	2.06	34	0.11	
Dentex barnardi	1.60	6	0.09	
Priacanthus arenatus	0.66	2	0.04	
Total	1805.32		100.02	

DR. FRIDTJOF NANSEN PROJECT: A4 PROJECT STATION: 1973  
DATE: 25/3/99 GEAR TYPE: BT No: 2 POSITION: Lat S 628 Long E 1149  
start stop duration Purpose code: 3  
LOG : 410.08 411.44 1.34 Area code : 1  
FDEPTH: 120 121 GearCond.code:  
BDEPTH: 120 121 Validity code:  
Towing dir: 160e Wire out: 380 m Speed: 30 km\*10  
Sorted: 97 Kg Total catch: 97.02 CATCH/HOUR: 194.04

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Dentex congoensis	119.68	1418	61.68	4619
Trichiurus lepturus	32.32	80	16.26	
Dentex angolensis	31.52	260	16.64	4620
Trachurus trecae	4.04	66	2.08	4621
Chelidichthys gabonensis	1.52	52	0.78	
Pagellus bellottii	1.20	2	0.47	
Fistularia petimba	0.92	2	0.62	
OMMASTREPHIDAE	0.88	36	0.45	
Aricomma bondi	0.52	6	0.27	
Chloroscobrus chrysurus	0.52	4	0.27	
Pterothrissus belloci	0.40	4	0.21	
Boops boops	0.36	10	0.19	
Citharus linguatula	0.16	6	0.08	
Total	194.04		100.00	

DR. FRIDTJOF NANSEN PROJECT: A4 PROJECT STATION: 1974  
DATE: 25/3/99 GEAR TYPE: BT No: 2 POSITION: Lat S 628 Long E 1141  
start stop duration Purpose code: 3  
LOG : 424.24 424.94 0.68 Area code : 1  
FDEPTH: 159 154 GearCond.code: 9  
BDEPTH: 159 154 Validity code: 1  
Towing dir: 160e Wire out: 510 m Speed: 30 km\*10  
Sorted: 51 Kg Total catch: 51.02 CATCH/HOUR: 218.66

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichiurus lepturus	67.80	309	31.01	
Dentex angolensis	57.17	274	26.15	4624
Dentex congoensis	41.91	587	19.17	4622
Spicara alta	14.49	141	6.63	
Pterothrissus belloci	10.46	73	4.78	
Priacanthus arenatus	10.37	30	4.74	
Dentex macrophthalmus	7.37	77	3.37	
OMMASTREPHIDAE	4.03	107	1.84	
Chelidichthys gabonensis	2.23	30	1.02	
Boops boops	1.54	39	0.70	
Scorpaena normani	0.69	9	0.32	
Saurida brasiliensis	0.26	56	0.12	
Monolele microstoma	0.26	21	0.12	
Peristedion cataphractum	0.09	4	0.04	
Total	218.67		100.01	

DR. FRIDTJOF NANSEN PROJECT: A4 PROJECT STATION: 1975  
DATE: 25/3/99 GEAR TYPE: BT No: 2 POSITION: Lat S 629 Long E 1138  
start stop duration Purpose code: 3  
LOG : 435.35 436.78 1.41 Area code : 1  
FDEPTH: 243 248 GearCond.code:  
BDEPTH: 243 248 Validity code:  
Towing dir: 170e Wire out: 750 m Speed: 30 km\*10  
Sorted: 66 Kg Total catch: 133.05 CATCH/HOUR: 257.52

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Synagrops microlepis	85.26	4409	33.11	
OMMASTREPHIDAE	70.53	1326	27.39	
Dentex macrophthalmus	18.70	186	7.26	4625
Aricomma bondi	14.11	352	5.48	
Chlorophthalmus atlanticus	13.53	3528	5.25	
Trichiurus lepturus	13.22	31	5.13	
Uranoscopus polli	11.17	118	4.34	
Parapeneus longirostris	9.99	1881	3.88	
Zenopsis conchifer	7.49	35	2.91	
Pterothrissus belloci	6.10	56	2.37	
Dentex angolensis	3.21	14	1.25	
Pentheroscion mbizi	2.42	23	0.94	
Brotula barbata	0.95	2	0.37	
Sepia elegans	0.45	25	0.17	
Aulopus cadernati	0.45	4	0.17	
Total	257.58		100.02	

DR. FRIDTJOF NANSEN PROJECT: A4 PROJECT STATION: 1976  
DATE: 25/3/99 GEAR TYPE: BT No: 2 POSITION: Lat S 622 Long E 1131  
start stop duration Purpose code: 3  
LOG : 451.38 452.86 1.46 Area code : 1  
FDEPTH: 291 290 GearCond.code:  
BDEPTH: 291 290 Validity code:  
Towing dir: 150e Wire out: 900 m Speed: 30 km\*10  
Sorted: 67 Kg Total catch: 621.56 CATCH/HOUR: 1243.12

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Chlorophthalmus atlanticus	1063.14	21118	85.52	
Chlorophthalmus sp.	60.84	1424	4.89	
Synagrops microlepis	35.88	1424	2.89	
Chascanopsetta lugubris	28.66	352	2.31	
Parapeneus longirostris	14.24	3588	1.15	
Todarodes sagittatus	9.16	98	0.74	
Brotula barbata	8.98	118	0.72	
Pterothrissus belloci	7.38	4	0.59	
Laemonea laureysi	5.26	58	0.31	
Monolele microstoma	3.90	98	0.31	
Zenopsis conchifer	3.52	352	0.28	
Trichiurus lepturus	2.40	24	0.19	
Myxiphius rostellatus	2.14	22	0.17	
Bathynectes piperitus	0.60	2	0.05	
Total	1246.30		100.25	

DR. FRIDTJOF NANSEN PROJECT: A4 PROJECT STATION: 1977  
DATE: 26/ 3/99 GEAR TYPE: BT No: 2 POSITION: Lat S 612 Long E 1205  
start stop duration  
TIME : 05:31:51 06:01:19 29 (min) Purpose code: 3  
LOG : 517.16 518.61 1.44 Area code : 1  
FDEPTH: 43 44 GearCond.code: 4  
BDEPTH: 43 44 Validity code: 4  
Towing dir: 155e Wire out: 150 m Speed: 30 km\*10  
Sorted: 144 Kg Total catch: 144.92 CATCH/HOUR: 299.83

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Galeoides decadactylus	118.30	130	39.46	
Engraulis encrasicolus	48.14	17592	16.06	
Pseudotolithus typus	36.25	31	12.09	4626
Sphyræna guachancho	23.48	116	7.83	
Brachydeuterus auritus	17.05	310	5.69	
Sardinella maderensis	9.74	1763	3.25	
Stromateus fiatola	8.46	12	2.82	
Epinephelus aeneus	8.03	2	2.68	
Rhinobatos albomaculatus	7.55	8	2.52	
Pagellus bellottii	3.83	27	1.28	
Arius parkii	3.02	2	1.01	
Raja miraletus	2.79	6	0.93	
Pagrus caeruleostictus	2.38	4	0.79	
Selene dorsalis	2.32	27	0.77	
Trichiurus lepturus	1.57	2	0.52	
Pomadoury jubelini	1.49	4	0.50	
Saurida brasiliensis	1.39	46	0.46	
Famulirus regius	1.20	2	0.40	
Penaeus notialis	1.18	50	0.39	
Trachinus armatus	0.64	12	0.21	
Trachinocephalus myops	0.50	8	0.17	
Uranoscopus polli	0.35	2	0.12	
Pseudupeneus prayensis	0.08	2	0.03	
Decapterus rhonchus	0.08	2	0.03	
Total	299.82		100.01	

DR. FRIDTJOF NANSEN PROJECT: A4 PROJECT STATION: 1978  
DATE: 26/ 3/99 GEAR TYPE: BT No: 2 POSITION: Lat S 614 Long E 1200  
start stop duration  
TIME : 07:23:04 07:53:00 30 (min) Purpose code: 3  
LOG : 526.86 528.33 1.29 Area code : 1  
FDEPTH: 65 64 GearCond.code: 4  
BDEPTH: 65 64 Validity code: 4  
Towing dir: 160e Wire out: 200 m Speed: 30 km\*10  
Sorted: 80 Kg Total catch: 79.90 CATCH/HOUR: 159.80

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Carcharhinus limbatus	90.00	2	56.32	
Sphyræna guachancho	16.62	52	10.40	
Dentex angolensis	7.82	38	4.89	4627
Leptocharias smithii	7.80	2	4.88	
Epinephelus aeneus	7.56	4	4.73	
Raja miraletus	7.20	10	4.51	
Pagellus bellottii	5.26	32	3.29	4628
Selene dorsalis	3.72	10	2.33	
Decapterus rhonchus	2.56	54	1.60	
Seriola carpenteri	2.26	4	1.41	
Brachydeuterus auritus	1.60	52	1.00	
Branchiostegus semifasciatus	1.52	2	0.95	
Dentex barnardi	1.26	4	0.79	
Pseudupeneus prayensis	1.14	10	0.71	
Trichiurus lepturus	1.02	2	0.64	
Zeus faber	0.88	2	0.55	
Octopus vulgaris	0.82	2	0.51	
Decapterus punctatus	0.70	28	0.44	
Sardinella maderensis	0.06	2	0.04	
Total	159.80		99.99	

DR. FRIDTJOF NANSEN PROJECT: A4 PROJECT STATION: 1979  
DATE: 26/ 3/99 GEAR TYPE: BT No: 2 POSITION: Lat S 613 Long E 1153  
start stop duration  
TIME : 09:17:51 09:48:06 30 (min) Purpose code: 3  
LOG : 539.75 541.24 1.49 Area code : 1  
FDEPTH: 84 83 GearCond.code: 4  
BDEPTH: 84 83 Validity code: 4  
Towing dir: 160e Wire out: 270 m Speed: 30 km\*10  
Sorted: 64 Kg Total catch: 64.05 CATCH/HOUR: 128.10

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Dentex angolensis	47.80	220	37.31	4629
Pagellus bellottii	31.44	192	24.54	4630
Dentex barnardi	20.52	62	16.02	4631
Dentex congoensis	11.90	162	9.29	4632
Trichiurus lepturus	5.06	6	3.95	
Epinephelus costae	2.24	2	1.75	
Pseudupeneus prayensis	1.50	22	1.17	
Dentex gibbosus	1.14	2	0.89	
Raja miraletus	1.04	2	0.81	
Priacanthus arenatus	1.02	2	0.80	
Torpedo torpedo	1.02	2	0.80	
Chelidonichthys capensis	0.90	4	0.70	
Scorpaena stephanica	0.76	2	0.59	
Fistularia petimba	0.50	2	0.39	
Chaetodon hoefleri	0.44	4	0.34	
Illex coindetii	0.30	4	0.23	
Chelidonichthys gabonensis	0.24	2	0.19	
Trachurus trecae	0.14	2	0.11	
Brachydeuterus auritus	0.12	2	0.09	
Sepia elegans	0.02	2	0.02	
Total	128.10		99.99	

DR. FRIDTJOF NANSEN PROJECT: A4 PROJECT STATION: 1980  
DATE: 26/ 3/99 GEAR TYPE: BT No: 2 POSITION: Lat S 614 Long E 1145  
start stop duration  
TIME : 11:13:15 11:43:25 30 (min) Purpose code: 3  
LOG : 552.73 554.05 1.28 Area code : 1  
FDEPTH: 108 109 GearCond.code: 4  
BDEPTH: 108 109 Validity code: 4  
Towing dir: 150e Wire out: 330 m Speed: 30 km\*10  
Sorted: 78 Kg Total catch: 77.86 CATCH/HOUR: 155.72

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Dentex congoensis	67.84	878	43.57	4635
Dentex angolensis	45.48	276	29.21	4634
Trachurus trecae	25.52	336	16.39	4633
Chelidonichthys gabonensis	4.36	58	2.80	
Raja miraletus	3.16	8	2.03	
Zeus faber	1.60	4	1.03	
Dentex gibbosus	1.52	4	0.98	
Torpedo torpedo	1.48	2	0.95	
Dentex barnardi	1.08	4	0.69	
Ariomma bondi	1.04	16	0.67	
Trichiurus lepturus	1.04	2	0.67	
Pagellus bellottii	0.96	6	0.62	
OMMASTREPHIDAE	0.32	8	0.21	
Sepia sp.	0.16	4	0.10	
Citharus linguatula	0.12	2	0.08	
Boops boops	0.04	2	0.03	
Total	155.72		100.03	

DR. FRIDTJOF NANSEN PROJECT: A4 PROJECT STATION: 1981  
DATE: 26/ 3/99 GEAR TYPE: BT No: 2 POSITION: Lat S 616 Long E 1139  
start stop duration  
TIME : 12:58:32 13:25:24 27 (min) Purpose code: 3  
LOG : 563.14 564.46 1.30 Area code : 1  
FDEPTH: 120 120 GearCond.code: 4  
BDEPTH: 120 120 Validity code: 4  
Towing dir: 150e Wire out: 370 m Speed: 30 km\*10  
Sorted: 68 Kg Total catch: 188.71 CATCH/HOUR: 419.36

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Dentex congoensis	326.58	3824	77.88	4638
Dentex angolensis	57.67	333	13.75	4636
Trichiurus lepturus	10.93	33	2.61	
Trachurus trecae	9.60	87	2.29	4637
Spicara alta	4.80	93	1.14	
Branchiostegus semifasciatus	2.80	7	0.67	
Pagellus bellottii	2.67	20	0.64	
Chelidonichthys gabonensis	1.87	33	0.45	
Ariomma bondi	1.60	27	0.38	
Priacanthus arenatus	0.84	2	0.20	
Total	419.36		100.01	

DR. FRIDTJOF NANSEN PROJECT: A4 PROJECT STATION: 1982  
DATE: 26/ 3/99 GEAR TYPE: BT No: 2 POSITION: Lat S 616 Long E 1133  
start stop duration  
TIME : 14:43:31 15:13:10 30 (min) Purpose code: 3  
LOG : 574.08 575.53 1.43 Area code : 1  
FDEPTH: 193 189 GearCond.code: 4  
BDEPTH: 193 189 Validity code: 4  
Towing dir: 160e Wire out: 570 m Speed: 30 km\*10  
Sorted: 107 Kg Total catch: 265.85 CATCH/HOUR: 531.70

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichiurus lepturus	304.04	1678	57.18	
Pentheroscion mbizi	53.02	522	9.97	
Pterothrissus bellocci	40.26	342	7.57	
Synagrops microlepis	39.88	3036	7.50	
Dentex angolensis	25.48	110	4.79	4639
OMMASTREPHIDAE	19.14	236	3.60	
MYCTOPHIDAE	11.78	9802	2.22	
Chelidonichthys gabonensis	10.68	110	2.01	
Parapeneus longirostris	6.54	1468	1.23	
Bassanago albescens	5.88	100	1.11	
Zenopsis conchifer	3.86	6	0.73	
Brotula barbata	3.36	4	0.63	
Bemrops heterurus	2.32	28	0.44	
Torpedo torpedo	2.24	2	0.42	
Monolele microstoma	1.98	100	0.37	
Sepia sp.	1.26	34	0.24	
Total	531.72		100.01	

DR. FRIDTJOF NANSEN PROJECT: A4 PROJECT STATION: 1983  
DATE: 26/ 3/99 GEAR TYPE: BT No: 2 POSITION: Lat S 616 Long E 1130  
start stop duration  
TIME : 16:44:03 17:14:22 30 (min) Purpose code: 3  
LOG : 584.62 586.07 1.43 Area code : 1  
FDEPTH: 261 262 GearCond.code: 4  
BDEPTH: 261 262 Validity code: 4  
Towing dir: 160e Wire out: 790 m Speed: 30 km\*10  
Sorted: 101 Kg Total catch: 321.93 CATCH/HOUR: 643.86

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Illex coindetii	427.42	400	66.38	
Synagrops microlepis	67.62	4214	10.50	
Chlorophthalmus atlanticus	27.66	728	4.30	
Parapeneus longirostris	21.84	2324	3.39	
Trichiurus lepturus	21.68	70	3.37	
Chlorophthalmus atlanticus	18.90	2618	2.94	
Pterothrissus bellocci	16.18	182	2.51	
Merluccius polli	12.04	428	1.87	
Pentheroscion mbizi	10.16	64	1.58	
Brotula barbata	3.76	6	0.58	
MYCTOPHIDAE	3.64	876	0.57	
Ariomma bondi	3.64	70	0.57	
Zenopsis conchifer	3.22	22	0.50	
Benthodesmus tenuis	2.94	148	0.46	
Dentex angolensis	0.92	4	0.14	
Scorpaena normani	0.84	8	0.13	
UNIDENTIFIED FISH	0.70	148	0.11	
Sepia elegans	0.36	14	0.06	
Peristedion cataphractum	0.22	8	0.03	
Beryx splendens	0.18	2	0.03	
Total	643.92		100.02	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1984  
DATE:26/ 3/99 GEAR TYPE: BT No: 2 POSITION: Lat S 616  
Long E 1120  
start stop duration  
TIME :19:26:24 19:56:26 30 (min) Purpose code: 3  
LOG : 604.91 606.48 1.55 Area code : 1  
FDEPTH: 592 587 GearCond.code:  
BDEPTH: 592 587 Validity code:  
Towing dir: 165° Wire out:1650 m Speed: 30 km\*10  
Sorted: 50 Kg Total catch: 117.06 CATCH/HOUR: 234.12

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Hoplostethus cadonati	71.26	1492	30.44	
Nematocarcinus africanus	54.12	12516	23.12	
STOMIIDAE	35.00	5516	14.95	
Lamprogrammus exutus	22.36	56	9.55	
Malacocephalus laevis	13.10	2	5.60	
Gadella maraldi	8.48	1064	3.62	
Centropronus granulatus	7.12	2	3.04	
CONGRIDAE	6.38	210	2.73	
Merluccius polli	4.70	8	2.01	
Todaropsis eblanae	3.22	36	1.38	
Aristeus varidens	2.66	162	1.14	
Trichiurus lepturus	1.40	4	0.80	
Cubiceps sp.	1.34	8	0.57	
Ceratomyxus crepidater	1.34	8	0.57	
Gentonyx maritae	1.14	4	0.49	
Total	234.16		100.04	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1985  
DATE:27/ 3/99 GEAR TYPE: BT No: 2 POSITION: Lat S 606  
Long E 1207  
start stop duration  
TIME :05:29:49 05:59:47 30 (min) Purpose code: 3  
LOG : 665.80 667.26 1.45 Area code : 1  
FDEPTH: 33 31 GearCond.code:  
BDEPTH: 33 31 Validity code:  
Towing dir: 150° Wire out: 120 m Speed: 30 km\*10  
Sorted: 5 Kg Total catch: 4.84 CATCH/HOUR: 9.68

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Pagrus pagrus	4.92	6	50.83	
Rhinobatos albomaculatus	2.52	2	26.03	
Lagocephalus laevis	1.62	4	16.74	
Pagellus bellottii	0.52	2	5.37	
Trachurus trecae	0.10	2	1.03	
Total	9.68		100.00	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1986  
DATE:27/ 3/99 GEAR TYPE: BT No: 2 POSITION: Lat S 609  
Long E 1202  
start stop duration  
TIME :07:32:10 08:01:48 30 (min) Purpose code: 3  
LOG : 679.18 680.82 1.63 Area code : 1  
FDEPTH: 46 46 GearCond.code:  
BDEPTH: 46 46 Validity code:  
Towing dir: 330° Wire out: 170 m Speed: 30 km\*10  
Sorted: 29 Kg Total catch: 29.22 CATCH/HOUR: 58.44

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Pagrus caeruleostictus	15.56	20	26.63	
Epinephelus aeneus	12.86	8	22.01	
Pagrus pagrus	7.52	8	12.87	
Decapterus rhonchus	7.50	10	12.83	
Seriola carpenteri	5.42	4	9.27	
Raja miraletus	5.22	8	8.93	
Dentex barnardi	2.50	4	4.28	
Lagocephalus laevis	1.30	2	2.22	
Pagellus bellottii	0.56	2	0.96	
Total	58.44		100.00	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1987  
DATE:27/ 3/99 GEAR TYPE: BT No: 2 POSITION: Lat S 608  
Long E 1152  
start stop duration  
TIME :09:41:44 10:11:48 30 (min) Purpose code: 3  
LOG : 694.92 696.58 1.65 Area code : 1  
FDEPTH: 82 84 GearCond.code:  
BDEPTH: 82 84 Validity code:  
Towing dir: 330° Wire out: 270 m Speed: 30 km\*10  
Sorted: 113 Kg Total catch: 332.41 CATCH/HOUR: 664.82

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Selene dorsalis	434.12	2064	65.30	
Trachurus trecae	66.56	670	10.01	4642
Trichiurus lepturus	52.08	80	7.83	
Brachydeuterus auritus	48.16	404	7.24	
Dentex angolensis	24.80	134	3.73	4640
Ariomma bondi	10.24	14	1.54	
Dentex congoensis	8.54	110	1.28	4641
Raja miraletus	4.74	8	0.71	
Zeus faber	3.26	8	0.49	
Sardinella aurita	3.02	18	0.45	
Pseudopeneus prayensis	2.40	44	0.36	
Chelidichthys gabonensis	1.64	18	0.25	
Chloroscombrus chrysurus	1.64	8	0.25	
Prisicanthus arenatus	1.52	4	0.23	
Pagellus bellottii	1.50	16	0.23	
Dentex barnardi	0.60	2	0.09	
Total	664.82		99.99	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1988  
DATE:27/ 3/99 GEAR TYPE: BT No: 2 POSITION: Lat S 608  
Long E 1142  
start stop duration  
TIME :11:52:11 12:22:08 30 (min) Purpose code: 3  
LOG : 710.31 711.93 1.61 Area code : 1  
FDEPTH: 113 115 GearCond.code:  
BDEPTH: 113 115 Validity code:  
Towing dir: 340° Wire out: 345 m Speed: 30 km\*10  
Sorted: 55 Kg Total catch: 54.78 CATCH/HOUR: 109.56

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichiurus lepturus	36.28	88	33.11	
Dentex congoensis	29.04	344	26.51	4643
Dentex angolensis	28.84	170	26.32	4644
Raja miraletus	2.52	4	2.30	
Spicara alta	2.16	28	1.97	
Ariomma bondi	2.12	28	1.94	
Selene dorsalis	1.56	4	1.42	
Torpedo torpedo	1.48	2	1.35	
Chelidichthys gabonensis	1.24	16	1.13	
Dentex gibbosus	0.92	2	0.84	
Zeus faber	0.76	2	0.69	
OMMASTREPHIDAE	0.68	10	0.62	
Chaetodon hoeferi	0.64	4	0.58	
Dentex barnardi	0.44	2	0.40	
Pagellus bellottii	0.44	4	0.40	
Trachurus trecae	0.24	2	0.22	
Pterothrissus belloci	0.20	2	0.18	
Total	109.56		99.98	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1989  
DATE:27/ 3/99 GEAR TYPE: BT No: 2 POSITION: Lat S 608  
Long E 1133  
start stop duration  
TIME :13:52:39 14:22:04 29 (min) Purpose code: 3  
LOG : 723.79 725.37 1.57 Area code : 1  
FDEPTH: 176 183 GearCond.code:  
BDEPTH: 176 183 Validity code:  
Towing dir: 350° Wire out: 520 m Speed: 30 km\*10  
Sorted: 67 Kg Total catch: 111.42 CATCH/HOUR: 230.52

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichiurus lepturus	107.92	617	46.82	
Pentheroscion mbizi	48.50	451	21.04	4645
Carcharhinus falciformis	24.12	2	10.46	
Pterothrissus belloci	23.01	194	9.98	
Dentex congoensis	21.02	89	9.12	4646
Chelidichthys gabonensis	1.99	29	0.86	
Raja miraletus	1.49	21	0.65	
OMMASTREPHIDAE	0.58	4	0.25	
Brotula barbata	0.58	70	0.25	
Scorpaena normani	0.54	2	0.23	
Microchirus frechkopi	0.50	12	0.22	
Zenopsis conchifer	0.08	4	0.03	
Total	230.41		99.94	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1990  
DATE:27/ 3/99 GEAR TYPE: BT No: 2 POSITION: Lat S 608  
Long E 1130  
start stop duration  
TIME :15:24:43 15:39:11 14 (min) Purpose code: 3  
LOG : 732.68 733.50 0.81 Area code : 1  
FDEPTH: 226 229 GearCond.code: 9  
BDEPTH: 226 229 Validity code: 1  
Towing dir: 269° Wire out: 675 m Speed: 30 km\*10  
Sorted: 66 Kg Total catch: 66.48 CATCH/HOUR: 284.91

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Pterothrissus belloci	52.46	600	18.41	
Synagrops microlepis	51.94	2824	18.23	
Dentex angolensis	40.20	163	14.11	4648
Pentheroscion mbizi	34.46	266	12.10	4647
Trichiurus lepturus	33.94	86	11.91	
OMMASTREPHIDAE	24.26	231	8.51	
Zenopsis conchifer	16.63	56	5.84	
Chelidichthys gabonensis	12.00	111	4.21	
Parapeneus longirostris	9.43	1384	3.31	
Bembrops heterurus	3.60	47	1.26	
Bathysolea sp.	1.89	60	0.66	
Brotula barbata	1.37	4	0.48	
Dentex macrophthalmus	0.86	9	0.30	
Uranoscopus polli	0.77	9	0.27	
CAPROIDAE	0.69	13	0.24	
Peristodion cataphractum	0.26	4	0.09	
Sepia elegans	0.17	9	0.06	
Total	284.93		99.99	

DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1991  
DATE:27/ 3/99 GEAR TYPE: BT No: 2 POSITION: Lat S 606  
Long E 1124  
start stop duration  
TIME :17:48:29 18:18:24 30 (min) Purpose code: 3  
LOG : 746.99 748.56 1.56 Area code : 1  
FDEPTH: 376 380 GearCond.code:  
BDEPTH: 376 380 Validity code:  
Towing dir: 360° Wire out: 100 m Speed: 30 km\*10  
Sorted: 49 Kg Total catch: 86.57 CATCH/HOUR: 173.14

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Nematocarcinus africanus	79.94	15100	46.17	
Lammonema laureysi	26.98	338	15.58	
Merluccius polli	19.88	78	11.48	4649
Chaunax pictus	8.26	64	4.77	
POLYCHAETIDAE	7.60	570	4.39	
Malacocephalus laevis	5.22	42	3.01	
Benthodesmus tenuis	5.08	190	2.93	
UNIDENTIFIED FISH	3.82	252	2.21	
Todaropsis eblanae	3.04	36	1.76	
Epigonus telescopus	3.04	42	1.76	
Zenopsis conchifer	2.76	6	1.59	
Illex coindetii	2.24	18	1.29	
Aristeus varidens	2.14	206	1.24	
Helicolenus dactylopterus	1.36	2	0.79	
MYCTOPHIDAE	0.64	252	0.37	
Gadella maraldi	0.64	64	0.37	
Coelorhynchus coelorhynchus	0.50	10	0.29	
Total	173.14		100.00	

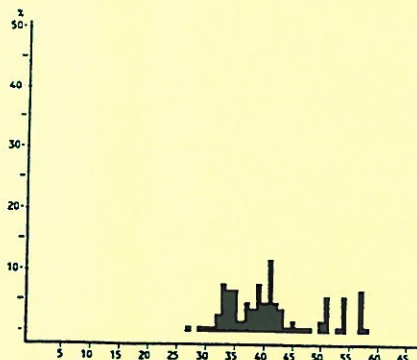
DR. FRIDTJOF NANSEN PROJECT:A4 PROJECT STATION:1992  
 DATE:27/ 3/99 GEAR TYPE: ET No: 2 POSITION:Lat S 607  
 start stop duration Long E 1122  
 TIME :19:34:28 20:04:23 30 (min) Purpose code: 3  
 LG : 756.04 757.54 1.48 Area code : 1  
 FDEPTH: 455 463 GearCond.code:  
 BDEPTH: 455 463 Validity code:  
 Towing dir: 360e Wire out:1300 m Speed: 30 km\*10  
 Sorted: 37 Kg Total catch: 97.43 CATCH/HOUR: 194.86

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
STOMIIDAE	62.66	840	32.16	
Nematocarcinus africanus	19.82	2416	10.17	
Laemonema laureysi	15.20	84	7.80	
Merluccius polli	14.20	26	7.29	4650
Maulisia microlenis	8.82	930	4.53	
Helicolenus dactylopterus	8.82	442	4.53	
Gadella imberbis	7.70	658	3.95	
Centrophorus granulosus	7.64	2	3.92	
Aristeus varidens	7.08	680	3.63	
Ebinania costaecanarie	7.08	8	3.63	
Etmopterus spinax	5.54	112	2.84	
Bathygadus melanobranchus	4.70	22	2.41	
Halosaurus ovenii	4.42	112	2.27	
POLYCHAELIDAE	4.42	330	2.27	
SCYLORHINIDAE	4.42	112	2.27	
Trichiurus lepturus	3.96	4	2.03	
Laemonema laureysi	2.38	8	1.22	
OPHIIDAE	2.18	112	1.12	
Chaceon maritae	2.10	14	1.08	
Todaropsis eblanae	0.64	8	0.33	
Coelorinchus coelorhincus	0.56	8	0.29	
Total	194.34		99.74	





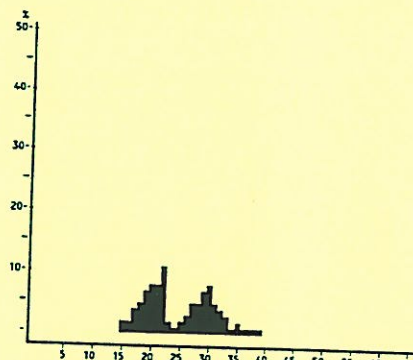
## Annex II Length distribution of main species



*Brotula barbata*

Pooled sample ( weighted by catch).

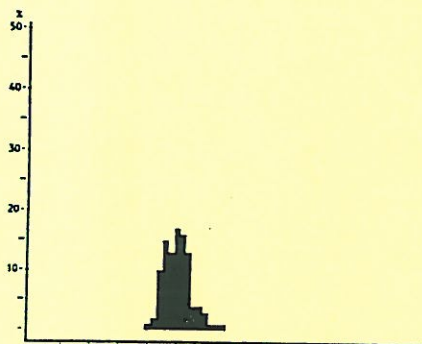
MEAN LENGTH = 41.70cm N = 88  
 NUMBER OF SUBSAMPLES : 3  
 SAMPLES FOUND BETWEEN ST. NO.1840 AND 1874.  
 SAMPLES SEARCHED BETWEEN ST. NO.1812 AND 1992 .



*Merluccius polli*

Pooled sample ( weighted by catch).

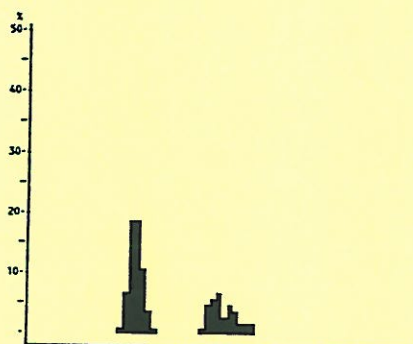
MEAN LENGTH = 25.87cm N = 1404  
 NUMBER OF SUBSAMPLES : 27  
 SAMPLES FOUND BETWEEN ST. NO.1812 AND 1992.  
 SAMPLES SEARCHED BETWEEN ST. NO.1812 AND 1992 .



*Chloroscombrus chrysurus*

Pooled sample ( weighted by catch).

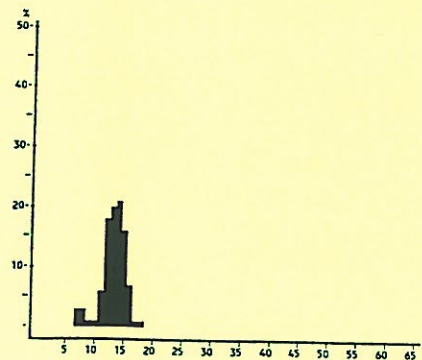
MEAN LENGTH = 25.72cm N = 249  
 NUMBER OF SUBSAMPLES : 4  
 SAMPLES FOUND BETWEEN ST. NO.1813 AND 1831.  
 SAMPLES SEARCHED BETWEEN ST. NO.1812 AND 1992 .



*Selene dorsalis*

Pooled sample ( weighted by catch).

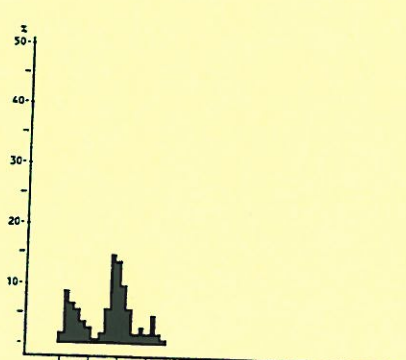
MEAN LENGTH = 24.17cm N = 233  
 NUMBER OF SUBSAMPLES : 3  
 SAMPLES FOUND BETWEEN ST. NO.1831 AND 1881.  
 SAMPLES SEARCHED BETWEEN ST. NO.1812 AND 1992 .



*Trachurus trecae*

Pooled sample ( weighted by catch).

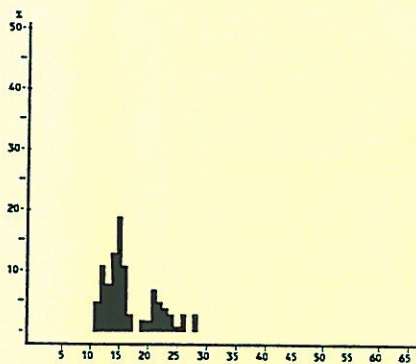
MEAN LENGTH = 14.01cm N = 3216  
 NUMBER OF SUBSAMPLES : 30  
 SAMPLES FOUND BETWEEN ST. NO.1813 AND 1987.  
 SAMPLES SEARCHED BETWEEN ST. NO.1812 AND 1992 .



*Brachydeuterus auritus*

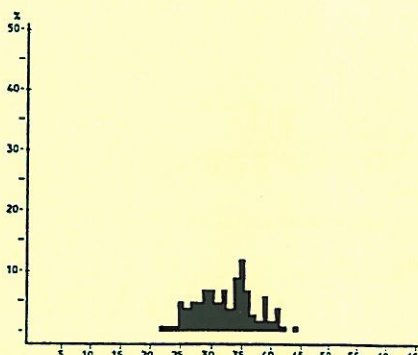
Pooled sample ( weighted by catch).

MEAN LENGTH = 13.86cm N = 2977  
 NUMBER OF SUBSAMPLES : 32  
 SAMPLES FOUND BETWEEN ST. NO.1813 AND 1956.  
 SAMPLES SEARCHED BETWEEN ST. NO.1812 AND 1992 .



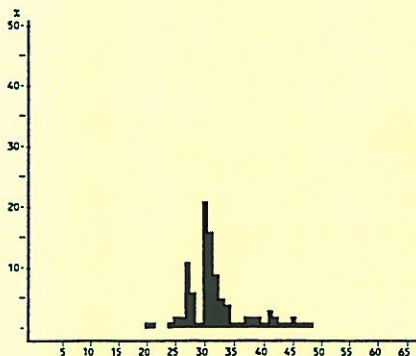
*Pomadasys incisus*

Pooled sample ( weighted by catch).  
 MEAN LENGTH = 17.20cm N= 102  
 NUMBER OF SUBSAMPLES : 4  
 SAMPLES FOUND BETWEEN ST. NO.1815 AND 1822.  
 SAMPLES SEARCHED BETWEEN ST. NO.1812 AND 1992 .



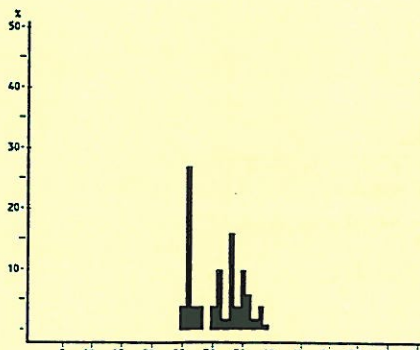
*Pomadasys jubelini*

Pooled sample ( weighted by catch).  
 MEAN LENGTH = 32.99cm N= 275  
 NUMBER OF SUBSAMPLES : 8  
 SAMPLES FOUND BETWEEN ST. NO.1813 AND 1933.  
 SAMPLES SEARCHED BETWEEN ST. NO.1812 AND 1992 .



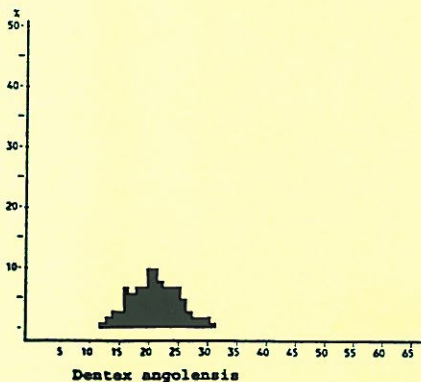
*Pomadasys peroteti*

Pooled sample ( weighted by catch).  
 MEAN LENGTH = 32.64cm N= 88  
 NUMBER OF SUBSAMPLES : 3  
 SAMPLES FOUND BETWEEN ST. NO.1901 AND 1913.  
 SAMPLES SEARCHED BETWEEN ST. NO.1812 AND 1992 .

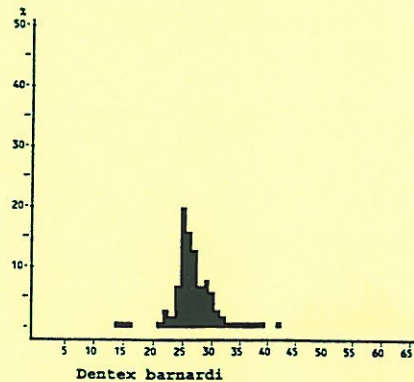


*Pomadasys rogeri*

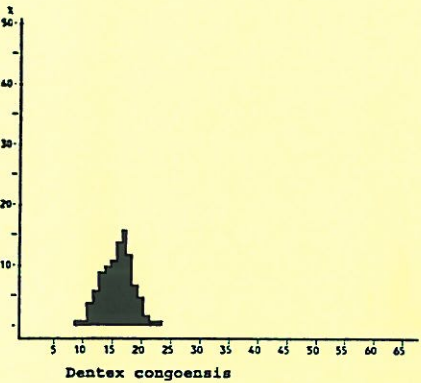
Pooled sample ( weighted by catch).  
 MEAN LENGTH = 31.12cm N= 50  
 NUMBER OF SUBSAMPLES : 3  
 SAMPLES FOUND BETWEEN ST. NO.1813 AND 1833.  
 SAMPLES SEARCHED BETWEEN ST. NO.1812 AND 1992 .



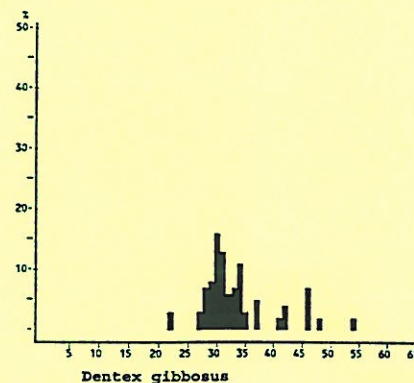
**Dentex angolensis**  
 Pooled sample ( weighted by catch ).  
 MEAN LENGTH = 21.57cm N= 3179  
 NUMBER OF SUBSAMPLES : 60  
 SAMPLES FOUND BETWEEN ST. NO.1819 AND 1990.  
 SAMPLES SEARCHED BETWEEN ST. NO.1812 AND 1992 .



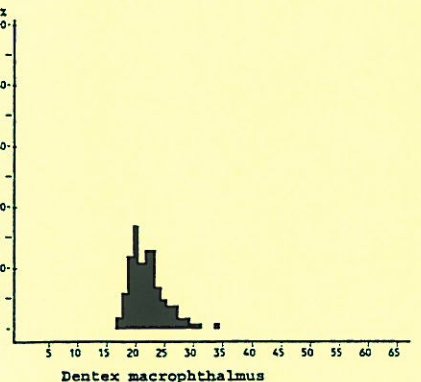
**Dentex barnardi**  
 Pooled sample ( weighted by catch ).  
 MEAN LENGTH = 27.69cm N= 724  
 NUMBER OF SUBSAMPLES : 19  
 SAMPLES FOUND BETWEEN ST. NO.1815 AND 1979.  
 SAMPLES SEARCHED BETWEEN ST. NO.1812 AND 1992 .



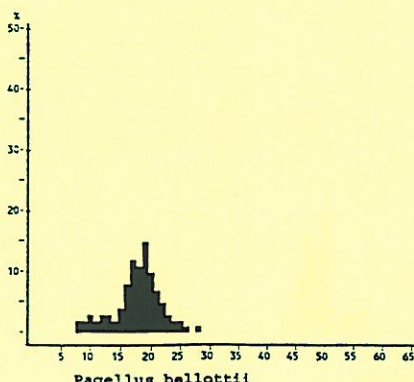
**Dentex congouensis**  
 Pooled sample ( weighted by catch ).  
 MEAN LENGTH = 16.34cm N= 1842  
 NUMBER OF SUBSAMPLES : 23  
 SAMPLES FOUND BETWEEN ST. NO.1904 AND 1988.  
 SAMPLES SEARCHED BETWEEN ST. NO.1812 AND 1992 .



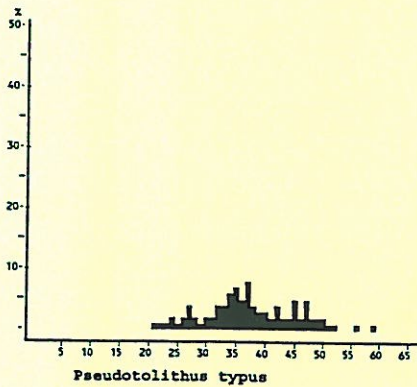
**Dentex gibbosus**  
 Pooled sample ( weighted by catch ).  
 MEAN LENGTH = 35.37cm N= 57  
 NUMBER OF SUBSAMPLES : 6  
 SAMPLES FOUND BETWEEN ST. NO.1828 AND 1925.  
 SAMPLES SEARCHED BETWEEN ST. NO.1812 AND 1992 .



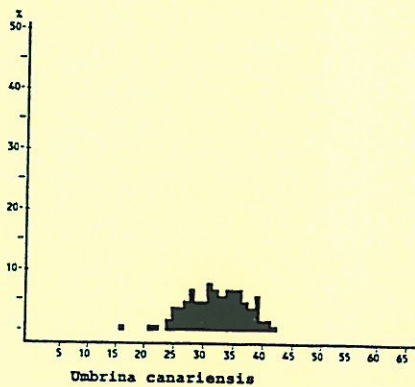
**Dentex macrophthalmus**  
 Pooled sample ( weighted by catch ).  
 MEAN LENGTH = 22.72cm N= 1397  
 NUMBER OF SUBSAMPLES : 23  
 SAMPLES FOUND BETWEEN ST. NO.1814 AND 1975.  
 SAMPLES SEARCHED BETWEEN ST. NO.1812 AND 1992 .



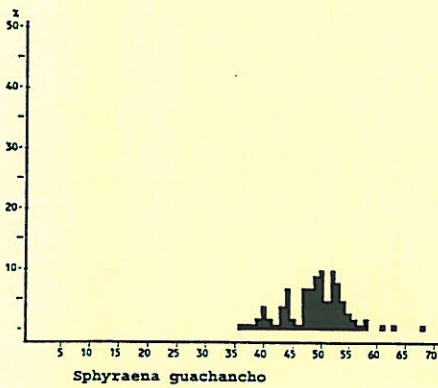
**Pagellus bellottii**  
 Pooled sample ( weighted by catch ).  
 MEAN LENGTH = 18.41cm N= 2954  
 NUMBER OF SUBSAMPLES : 51  
 SAMPLES FOUND BETWEEN ST. NO.1813 AND 1979.  
 SAMPLES SEARCHED BETWEEN ST. NO.1812 AND 1992 .



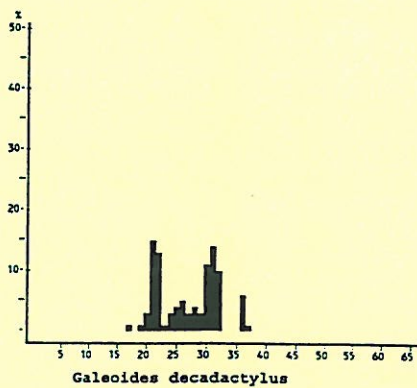
Pooled sample ( weighted by catch ).  
 MEAN LENGTH = 38.76cm N= 319  
 NUMBER OF SUBSAMPLES : 11  
 SAMPLES FOUND BETWEEN ST. NO.1823 AND 1977.  
 SAMPLES SEARCHED BETWEEN ST. NO.1812 AND 1992 .



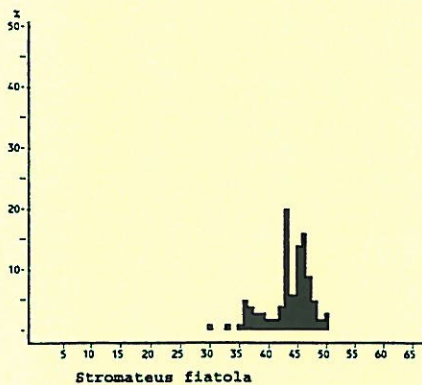
Pooled sample ( weighted by catch ).  
 MEAN LENGTH = 32.51cm N= 660  
 NUMBER OF SUBSAMPLES : 10  
 SAMPLES FOUND BETWEEN ST. NO.1814 AND 1952.  
 SAMPLES SEARCHED BETWEEN ST. NO.1812 AND 1992 .



Pooled sample ( weighted by catch ).  
 MEAN LENGTH = 49.62cm N= 117  
 NUMBER OF SUBSAMPLES : 7  
 SAMPLES FOUND BETWEEN ST. NO.1821 AND 1882.  
 SAMPLES SEARCHED BETWEEN ST. NO.1812 AND 1992 .



Pooled sample ( weighted by catch ).  
 MEAN LENGTH = 27.52cm N= 142  
 NUMBER OF SUBSAMPLES : 4  
 SAMPLES FOUND BETWEEN ST. NO.1822 AND 1842.  
 SAMPLES SEARCHED BETWEEN ST. NO.1812 AND 1992 .



Pooled sample ( weighted by catch ).  
 MEAN LENGTH = 44.05cm N= 181  
 NUMBER OF SUBSAMPLES : 5  
 SAMPLES FOUND BETWEEN ST. NO.1824 AND 1874.  
 SAMPLES SEARCHED BETWEEN ST. NO.1812 AND 1992 .

## Annex III Swept Area

SWEPT AREA ANALYSIS FROM STATION 1812 TO STATION 1886

A. Luanda - Benguela (Shelf)

SPECIES NAME	SAMPLE DISTRIB. BY CATCH CLASSES Lower limits, Kg/nm <sup>2</sup>					% inci- dence	Mean dens. t/nm <sup>2</sup>	Mean densities by bottom depth strata t/nm <sup>2</sup>				
	>0	10	30	100	300			1000	20-50m	50-100m	100-200m	200-300m
<i>Brachydeuterus auritus</i>	10	3	5	7	5	3	60	20.61	13.37	49.47	0.47	
<i>Trachurus trecae</i>	20	5	9	3	1		69	2.68	0.68	5.54	2.34	
<i>Dentex macrophthalmus</i>	6	6	6	3			36	1.92		0.01	3.58	6.88
<i>Trichiurus lepturus</i>	20	6	6	1	1		62	1.81	0.68	3.83	0.97	0.46
<i>Pagellus bellottii</i>	18	8	6	3			64	1.81	0.62	4.44	0.47	
<i>Synagrops microlepis</i>	2	2	4		2		18	1.81		0.01	0.68	11.25
<i>Umbrina canariensis</i>	10	4	1	1	1		31	1.46		0.67	4.82	
<i>Chloroscombrus chrysurus</i>	11	1	2	2			29	1.08	1.09	2.33		
<i>Anthias anthias</i>		1			1		4	0.86			3.38	
<i>Galeoides decadactylus</i>	5	2	2	1			18	0.72	1.03	1.32		
<i>Brotula barbata</i>	17	7	3				49	0.53	0.02	0.32	0.95	1.20
<i>Selene dorsalis</i>	18	7	2				49	0.50	0.82	0.62	0.29	
<i>Stromateus fiatola</i>	5	3	3				20	0.46	0.66	0.83	0.02	
<i>Pomadasys incisus</i>	4	2		1			13	0.43	0.14	1.15		
<i>Dentex barnardi</i>	20	5	2				49	0.42	0.18	0.57	0.71	
<i>Raja miraletus</i>	26	6	2				62	0.38	0.33	0.36	0.66	0.04
<i>Sphyræna guachancho</i>	10	5	2				31	0.36	0.76	0.48		
<i>Zenopsis conchifer</i>	5	3	2				18	0.35			0.39	1.73
<i>Engraulis encrasicolus</i>	4	1	3				15	0.34	0.59	0.05	0.66	
<i>Dentex angolensis</i>	19	4					42	0.25	0.02	0.13	0.65	0.23
<i>Chlorophthalmus atlanticus</i>	2		3				9	0.25				1.71
<i>Boops boops</i>	10	3	1				25	0.24		0.13	0.75	
<i>Merluccius polli</i>	5		2				13	0.23				1.60
<i>Zeus faber</i>	20	1	1				40	0.22	0.01	0.41	0.29	
<i>Pseudolithus typus</i>	5	1	2				15	0.21	0.51	0.22		
<i>Lithognathus mormyrus</i>	7		1				15	0.19	0.04	0.51		
<i>Citharus linguatula</i>	28	2					55	0.17	0.03	0.24	0.26	0.10
<i>Chelidonichthys gabonensis</i>	15	3					33	0.15	0.01	0.20	0.27	0.08
<i>Pterothrissus belloci</i>	13	1	1				27	0.15		0.01	0.22	0.59
<i>Atractoscion aequidens</i>	3	1	1				9	0.14	0.02	0.34	0.08	
<i>Pomadasys rogeri</i>	3	1	1				9	0.14	0.15	0.30		
<i>Epinephelus aeneus</i>	15	1	1				31	0.12	0.20	0.19	0.02	
<i>Lutjanus fulgens</i>			1				2	0.12	0.47			
<i>Pomadasys jubelini</i>	6		1				13	0.11	0.06	0.27		
<i>Pseudupeneus prayensis</i>	12	3					27	0.10	0.01	0.29		
<i>Spicara alta</i>	1	1	1				5	0.09			0.34	
<i>Trigla lyra</i>	8	1					16	0.08		0.06	0.21	
<i>Todaropsis eblanae</i>	10						18	0.06			0.02	0.38
<i>Dentex gibbosus</i>	6	1					13	0.06	0.01	0.01	0.21	
<i>Sea urchins</i>			1				2	0.06		0.16		
<i>Alloteuthis africana</i>	11						20	0.05	0.10	0.03	0.04	
<i>Scorpaena sp.</i>	1	1					4	0.05		0.13	0.01	
<i>Torpedo torpedo</i>	10	1					20	0.05		0.14	0.02	
<i>Raja clavata</i>	1	1					4	0.05			0.19	
<i>Dasyatis margarita</i>		1					2	0.05		0.14		
<i>Grammolites gruveli</i>	20						36	0.05	0.05	0.08	0.03	0.03
<i>Bembrops heterurus</i>	8	1					16	0.05		0.07	0.02	0.15
<i>Ophisurus serpens</i>		1					2	0.05				0.35
<i>Parapenaeus longirostris</i>	13						24	0.04			0.01	0.23
<i>Penaeus notialis</i>	5						9		0.01			
<i>Plesiopenaeus edwardsianus</i>	1						2					
Other fish								1.12	1.40	0.93	1.06	1.47
Sum all species								43.23	24.07	76.99	25.09	28.48
Sum Snappers								0.13	0.47	0.02		
Sum Groupers								0.14	0.22	0.20	0.05	
Sum Grunts								21.34	13.84	51.20	0.49	
Sum Croakers								1.89	0.67	1.32	4.93	0.01
Sum Seabreams								4.89	0.88	5.80	6.39	7.11
Sum Sharks								0.03	0.06	0.02	0.01	0.06
Sum Rays								0.58	0.48	0.66	0.89	0.07
Sum Squids								0.25	0.14	0.19	0.38	0.42

SWEPT AREA ANALYSIS FROM STATION 1812 TO STATION 1886

B. Luanda - Benguela (Slope)

SPECIES NAME	SAMPLE DISTRIB. BY CATCH CLASSES Lower limits, Kg/nm						% inci- dence	Mean dens. t/nm <sup>2</sup>	Mean densities by bottom depth strata t/nm <sup>2</sup>			
	>0	10	30	100	300	1000			200-300m	300-400m	400-500m	500-600m
<i>Chlorophthalmus atlanticus</i>	8	1	3	1	1	1	58	9.60	1.71	39.27	0.05	0.01
<i>Synagrops microlepis</i>	5	1	3	1	2		46	4.12	11.25	2.85		
<i>Dentex macrophthalmus</i>	2	3	2	2			31	2.12	6.89			
<i>Merluccius polli</i>	11	3	4	2			77	2.00	1.60	3.32	3.18	0.04
<i>Laemonema laureysi</i>	7	7	1				58	0.84	0.05	2.15	1.31	0.09
<i>Nematocarcinus africanus</i>	6	2	3				42	0.71		0.18	0.92	1.99
<i>Zenopsis conchifer</i>	6	4	1				42	0.60	1.73	0.25	0.02	0.01
<i>Hoplostethus cadenati</i>	3	2	2				27	0.59		0.01	0.09	2.45
<i>Yarrella blackfordi</i>	4	3	1				31	0.45			0.07	1.87
<i>Trichiurus lepturus</i>	14	5					73	0.44	0.46	0.64	0.22	0.43
<i>Brotula barbata</i>	2	4	1				27	0.37	1.20			
<i>Stomias affinis</i>	7	3	1				42	0.32		0.18	0.13	1.05
<i>Pterothrissus belloci</i>	6	2	1				35	0.30	0.59	0.52		
<i>Coelorinchus coelorhincus</i>	15	2					65	0.29	0.22	0.49	0.46	
<i>Lamprogrammus exutus</i>	4		1				19	0.23				0.99
<i>Todaropsis eblanae</i>	19						73	0.20	0.38	0.29	0.05	0.03
<i>Aristeus varidens</i>	8	2					38	0.20		0.17	0.15	0.53
<i>Scorpaena normani</i>	5		1				23	0.18	0.03	0.73	0.01	
<i>Dibranchius atlanticus</i>	4	2					23	0.18		0.63	0.15	
<i>Hoplostethus sp.</i>	1		1				8	0.17			0.02	0.72
<i>Parapenaeus longirostris</i>	11	1					46	0.15	0.23	0.32		
<i>Hymenocephalus italicus</i>	8	1					35	0.14		0.47	0.13	
<i>Lophius vaillanti</i>	14						54	0.14		0.18	0.23	0.18
<i>Gadella maraldi</i>	1		1				8	0.13			0.55	
<i>Cynoponticus ferox</i>	2	1					12	0.12	0.01	0.50		
<i>Squalus megalops</i>		1					4	0.11			0.48	
<i>Ophisurus serpens</i>		1					4	0.11	0.35			
<i>Geryon maritae</i>	6	1					27	0.11		0.30	0.13	0.04
<i>Lamprogrammus sp.</i>		1					4	0.10				0.44
<i>Malacocephalus occidentalis</i>	11						42	0.10	0.03	0.13	0.17	0.08
<i>Centrophorus granulosus</i>	3	1					15	0.09			0.32	0.08
<i>Triplophos sp.</i>	10						35	0.09		0.04	0.13	0.21
<i>Carcharhinus limbatus</i>		1					4	0.08		0.35		
MYCTOPHIDAE	5						19	0.08	0.07	0.11	0.15	
<i>Epigonus telescopus</i>		1					4	0.08	0.25			
<i>Dentex angolensis</i>	2	1					12	0.07	0.23			
<i>Etmopterus lucifer</i>	3	1					15	0.06		0.19	0.02	0.03
<i>Uranoscopus cadenati</i>		1					4	0.05	0.18			
SCYLIORHINIDAE		1					4	0.05			0.20	
<i>Bembrops heterurus</i>	6						23	0.05	0.15		0.01	
<i>Xenomystax sp.</i>	5						19	0.05	0.03	0.16		
<i>Plesionika martia</i>	2						8	0.01			0.05	
PANDALIDAE	2						8	0.01				0.04
<i>Plesiopenaeus edwardsianus</i>	3						12	0.01		0.01	0.03	
Other fish								0.76	0.86	0.65	0.99	0.61
Sum all species								26.66	28.50	55.09	10.42	11.92
Sum Snappers												
Sum Groupers												
Sum Grunts												
Sum Croakers									0.01			
Sum Seabreams								2.19	7.12			
Sum Sharks								0.48	0.06	0.61	1.21	0.15
Sum Rays								0.03	0.07	0.02	0.03	
Sum Squids								0.23	0.42	0.34	0.05	0.05
Sum												

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

26

8

6

6

6

DEPTH AREA ANALYSIS FROM STATION 1887 TO STATION 1992

Congo River - Luanda (Shelf)

SPECIES NAME	SAMPLE DISTRIB. BY CATCH CLASSES					% incidence	Mean dens. t/nm <sup>2</sup>	Mean densities by bottom depth strata t/nm <sup>2</sup>			
	Lower limits, Kg/nm >0 10 30 100 300 1000							20- 50m	50-100m	100-200m	200-300m
<i>Brachydeuterus auritus</i>	17	1	4	10	4	46	5.61	9.55	10.43	2.05	
<i>Macragnops microlepis</i>	2	5	6	4	3	25	3.30			7.25	4.20
<i>Trichiurus lepturus</i>	33	17	11	6		84	2.76	0.36	2.40	4.52	2.01
<i>Merluccius dorsalis</i>	13	4		3		25	0.87	0.36	1.95	0.59	
<i>Merluccius chrysurus</i>	7	1	2	1	1	15	0.83	4.30	0.21		
<i>Merluccius africanus</i>	2		4	2		10	0.72	3.58	0.27		
<i>Merluccius atlanticus</i>	4		1	1	1	9	0.68				4.47
<i>Merluccius canariensis</i>	8	2			1	14	0.66		0.21	1.63	
<i>Merluccius bellottii</i>	30	10	2	1		54	0.62	0.06	1.77	0.19	
<i>Merluccius angolensis</i>	38	17	1			71	0.60		0.41	1.07	0.56
<i>Merluccius congoensis</i>	21	7	2	1		39	0.48		0.40	0.98	
<i>Merluccius jubelini</i>	4	2	1	1		10	0.43	2.23	0.12	0.01	
<i>Merluccius barnardi</i>	19	3	1	1		30	0.35	0.38	0.77	0.14	
<i>Merluccius guachancho</i>	17	5	2			29	0.34	1.55	0.22		
<i>Merluccius belloci</i>	23	9	1			42	0.30		0.07	0.37	0.97
<i>Merluccius coindetii</i>	19	1		1		27	0.26		0.01	0.14	1.35
<i>Merluccius hololepidotus</i>			1	1		1	0.25			0.67	
<i>Merluccius miraletus</i>	40	3	2			57	0.23	0.08	0.53	0.15	0.01
<i>Merluccius typus</i>	3	5	2			13	0.22	0.93	0.17		
<i>Merluccius incisus</i>	2	3	2			9	0.21	0.19	0.57		
<i>Merluccius decadactylus</i>	4	5	1			13	0.21	1.09	0.05		
<i>Merluccius peli</i>	6		2			10	0.20	1.08		0.01	
<i>Merluccius conchifer</i>	23	3				33	0.15		0.03	0.20	0.43
<i>Merluccius boops</i>	19	1	1			27	0.15		0.03	0.37	
<i>Merluccius sp.</i>	1	1	1			4	0.14				0.90
<i>Melidonichthys gabonensis</i>	36	3				49	0.13		0.14	0.22	0.04
MASTREPHIDAE	21	4				32	0.13		0.01	0.10	0.56
<i>Merluccius longirostris</i>	15	4				24	0.13			0.06	0.69
<i>Merluccius brasiliensis</i>	25	2				34	0.11		0.11	0.21	
<i>Merluccius fiatola</i>	9	2	1			15	0.11	0.54	0.04	0.01	
<i>Merluccius caeruleostictus</i>	13	1	1			19	0.11	0.16	0.22	0.04	
<i>Merluccius barbata</i>	38	1				49	0.11		0.02	0.18	0.21
<i>Merluccius aeneus</i>	16	1				22	0.10	0.10	0.25	0.02	
<i>Merluccius maderensis</i>	12		1			16	0.10	0.06	0.30		
<i>Merluccius smithii</i>	9	3				15	0.09	0.09	0.14	0.09	
<i>Merluccius peroteti</i>	2	1	1			4	0.09	0.22	0.16		
<i>Merluccius mbizi</i>	8	2				13	0.08			0.15	0.15
<i>Merluccius linguatula</i>	35	1				46	0.08	0.02	0.18	0.07	
<i>Merluccius alta</i>	16	2				23	0.07			0.11	0.18
<i>Merluccius bondi</i>	16	1				22	0.07		0.01	0.05	0.35
<i>Merluccius gibbosus</i>	12	1				16	0.06		0.04	0.12	
<i>Merluccius torpedo</i>	26	1				34	0.06		0.12	0.05	0.02
<i>Merluccius mola</i>			1			1	0.06		0.21		
<i>Merluccius vulgaris</i>	12	1				16	0.05		0.11	0.04	
<i>Merluccius guaza</i>	1		1			3	0.05		0.02	0.13	
<i>Merluccius heterurus</i>	11	1				15	0.05			0.05	0.19
CTOPHIDAE	4	1				6	0.05			0.01	0.26
<i>Merluccius melanopterus</i>			1			1	0.05	0.26			
<i>Merluccius parkii</i>	7	1				9	0.05	0.28			
<i>Merluccius africana</i>	1	1				3	0.02	0.11			
<i>Merluccius notialis</i>	5					6	0.01	0.04			
<i>Merluccius kerathurus</i>	1					1					
Other fish							1.30	2.22	1.57	0.82	1.21
All species							23.89	29.84	24.27	22.87	18.76
Snappers							0.16		0.30		
Groupers							6.39	12.32	11.32	2.08	
Grunts							1.45	2.01	0.44	2.52	
Croakers							2.45	0.68	3.70	3.01	0.19
Seabreams							0.20	0.16	0.31	0.25	0.04
Sharks							0.46	0.88	0.74	0.21	0.03
Rays							0.57		0.33	0.40	2.03
Squids											

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

79

14

24

29

12

SWEPT AREA ANALYSIS FROM STATION 1887 TO STATION 1992

D. Congo River - Luanda (Slope)

SPECIES NAME	SAMPLE DISTRIB. BY CATCH CLASSES Lower limits, Kg/nm					% inci- dence	Mean dens. t/nm <sup>2</sup>	Mean densities by bottom depth strata t/nm <sup>2</sup>			
	>0	10	30	100	300			1000	200-300m	300-400m	400-500m
Nematocarcinus africanus	4	4	4	3	1	42	2.76		0.86	4.04	10.40
Chlorophthalmus atlanticus	4		4	3	1	32	2.50	4.47	3.45		
Synagrops microlepis	3	7	6	2		47	1.96	4.20	2.01		
Merluccius polli	17	3	8	1		76	1.88	0.14	4.44	1.93	0.15
Trichiurus lepturus	25	4	1	1		82	0.99	2.01	0.53	0.85	0.07
Illex coindetii	16	1			1	47	0.51	1.35	0.13	0.22	
Benthodesmus tenuis	8	3	2			34	0.50	0.01	0.57	1.49	0.04
Laemonema laureysi	15	8				58	0.48	0.01	1.00	0.67	0.14
Pterothrissus belloci	12	8				53	0.47	0.97	0.51		
Chlorophthalmus sp.	2	1	1			11	0.30	0.90	0.03		
Parapenaeus longirostris	14	5				50	0.29	0.69	0.22	0.01	
Zenopsis conchifer	21	3				63	0.20	0.43	0.16	0.05	0.02
Hoplostethus cadenati	6	2				21	0.20			0.08	1.13
OMMASTREPHIDAE	5	4				24	0.20	0.56	0.06		0.01
Dentex angolensis	7	3				24	0.18	0.56			
Hymenocephalus italicus	13	1				37	0.17		0.35	0.30	
Coelorinchus coelorhincus	20	1				55	0.17	0.03	0.45	0.08	0.02
Chaunax pictus	8	1				24	0.14		0.30	0.18	0.05
Centrophorus granulosus	7	1				21	0.12			0.14	0.57
Triplophos sp.	5	2				18	0.12			0.12	0.57
STOMIIDAE	1	2				8	0.11			0.36	0.19
Lamprogrammus exutus	7	1				21	0.11			0.09	0.56
GALATHEIDAE *	8	1				24	0.11	0.03	0.28		0.09
Arionma bondi	8	1				24	0.11	0.35			0.01
MYCTOPHIDAE	9	1				26	0.10	0.26	0.06		
Gadella maraldi	11					29	0.10	0.02	0.20	0.11	0.05
Chlorophthalmus agassizi			1			3	0.10		0.32		
Myctophum sp.	1		1			5	0.09		0.28		
Malacocephalus laevis	14					37	0.08		0.14	0.09	0.09
POLYCHAELIDAE	7	1				21	0.08		0.05	0.18	0.19
Aristeus varidens	15					39	0.07		0.03	0.18	0.13
Brotula barbata	10					26	0.07	0.21			
Dibranchius atlanticus	9	1				26	0.07		0.04	0.23	0.02
Todaropsis eblanae	12					32	0.06	0.07	0.05	0.04	0.06
Bembrops heterurus	5	1				16	0.06	0.19	0.01		
Spicara alta	2	1				8	0.06	0.18			
Stomias sp.		1				3	0.05				0.28
Solenocera africana	3	1				11	0.05		0.15		
Pentheroscion mbizi	4					11	0.05	0.15			
Yarella blackfordi	5	1				16	0.05			0.03	0.29
CHLOROPHTHALMIDAE	3					8	0.05	0.11	0.03		
Aulopus cadenati	2	1				8	0.05		0.14		
Plesiopenaeus edwardsianus	6					16	0.02			0.03	0.07
S H R I M P S	1					3	0.01			0.05	
Other fish							1.11	0.86	0.85	1.18	2.09
Sum all species							16.96	18.76	17.70	12.73	17.29
Sum Snappers											
Sum Groupers											
Sum Grunts											
Sum Croakers							0.06	0.19			
Sum Seabreams							0.21	0.64			
Sum Sharks							0.30	0.04	0.06	0.57	0.89
Sum Rays							0.05	0.03	0.04		0.14
Sum Squids							0.79	2.03	0.26	0.27	0.07
Sum											

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

38

12

12

8

6



## Annex IV

### 1. Stratified mean density and confidence intervals

The stratified estimator of mean density in the entire area is calculated as (Cochran, 1977; eq. 5.1, p. 91)

$$\bar{y}_{st} = \sum_{i=1}^L W_i \bar{y}_i, \quad (1)$$

where

$L$  is the number of strata,

$W_i = \frac{\text{area}_i}{\text{total area}}$  is the proportion of the survey area in the  $i^{\text{th}}$  stratum,

$\bar{y}_i = \frac{\sum_{k=1}^{n_i} y_{i,k}}{n_i}$  is the average catch in the  $i^{\text{th}}$  stratum

$n_i$  is the number of tows in the  $i^{\text{th}}$  stratum, and

$y_{i,k}$  is the catch by the  $k^{\text{th}}$  tow in stratum  $i$  (normalized to either kg/hour

or  $\text{t/nmi}^2 = \frac{y_{ik}}{\text{area swept}_{ik}}$  for biomass estimates).

The estimated variance of the stratified mean,  $\bar{y}_{st}$ , is

$$\text{var}(\bar{y}_{st}) = \sum_{i=1}^L W_i^2 \frac{s_i^2}{n_i}, \quad (2)$$

where

$$s_i^2 = \frac{\sum_{k=1}^{n_i} (y_{i,k} - \bar{y}_i)^2}{n_i - 1}. \quad (3)$$

When  $\bar{y}_{st}$  is estimated in  $\text{t/nmi}^2$  then an estimate of the total biomass in the area is calculated by

$$B = \bar{y}_{st} \cdot \text{total area} \quad (4)$$

## 2. Precision of the estimates of mean density

### 2.1. Estimates based on the sample mean

The estimate of the standard error for each stratum mean is given by

$$se(\bar{y}) = \sqrt{\frac{s^2}{n}}, \quad (5)$$

where  $s_i^2$  is from equation (3).

The standard error of the stratified mean ( $\bar{y}_{st}$ , equation 1), i.e. the square root of the variance of  $\bar{y}_{st}$ , is calculated as

$$se(\bar{y}_{st}) = \sqrt{\text{var}(\bar{y}_{st})}, \quad (6)$$

where  $\text{var}(\bar{y}_{st})$  is defined by equation (2).

If the sample size is “large” enough, then the Central Limit Theorem states that each time a survey is conducted there is a 95% chance that the true mean lies in the interval (see Cochran, 1977, pp. 39-44)

$$\bar{y}_{st} \pm t_{(n-1)} se(\bar{y}_{st}), \quad (7)$$

where  $t$  is from Students t-table with  $(n-1)$  degrees of freedom and  $\alpha = 0.025$ .

### 2.2. Estimates of the mean based on lognormal theory - The Pennington estimator

Since abundance data from marine surveys usually have a large variance (much higher than the mean) and are highly skewed to the right, the sample sizes are typically not large enough so that equation (2) is a valid 95% confidence interval. In fact, the confidence associated with the interval given by equation (7) is usually much lower than 95% (McConnaughey and Conquest, 1992; Conquest *et al.*, 1996; Pennington, 1996). A major problem to the degree of skewness is due to the high proportion of zero tows often observed. Development of confidence intervals is complicated by the asymmetric distribution, and the occurrence of zero catches confounds an effective normalization transformation. Logarithmic transformation will

stabilize the variance but data will still not be normally distributed and interpretation of re-transformed means is difficult (Pennington and Grosslein 1978).

One way to generate more precise estimates of the mean and more accurate confidence statements for skewed marine data is to base the estimators on the lognormal Delta distribution (Pennington, 1983, 1996; Conquest *et al.*, 1996), in which catches are divided into zero and non-zero units, followed by transformation of the non-zero values to natural logarithms. When it is found that the transformed non-zero data are approximated by a lognormal distribution (*i.e.* the logged values are normally distributed), then a more efficient estimator of mean density,  $c_i$ , within each stratum is given by (Pennington, 1983, 1996)

$$c_i = \frac{m_i}{n_i} \exp(\bar{x}_i) G_{m_i}(s_{x,i}^2 / 2), \quad (8)$$

where

$m_i$  is the number of sample values greater than 0 in stratum  $i$ ,

$\bar{x}_i$  and  $s_{x,i}^2$  are the mean and variance, respectively, of the log transformed values of catches greater than 0, and

$G_m(f)$  is an infinite series function of  $m$  and  $f$  [for example,  $m = m_i$  and  $f = s_{x,i}^2 / 2$  in equation (8)] which is used to correct for bias in re-transformation from log to arithmetic scale and is defined by

$$G_m(f) = 1 + \frac{m-1}{m} f + \sum_{j=2}^{\infty} \frac{(m-1)^{2j-1} f^j}{m^j (m+1)(m+3)\cdots(m+2j-3)j!} \quad (9)$$

The variance of  $c_i$  is given by

$$\text{var}(c_i) = \frac{m_i}{n_i} \exp(2\bar{x}_i) \left\{ \frac{m_i}{n_i} G_{m_i}^2(s_{x,i}^2 / 2) - \frac{(m_i-1)}{(n_i-1)} G_{m_i} \left( \frac{m_i-2}{m_i-1} s_{x,i}^2 \right) \right\} \quad (10)$$

### 2.3. The modified Pennington estimator

In contrast to estimates based on the sample mean (equation 1 and 2), which are highly sensitive to a single or a few isolated high catch rates that may account for more than 50% of the total catch, Pennington's estimator (equations 8 and 10) is sensitive to low catch rates which contribute little to the total catch, but when log-transformed may give large negative values resulting in a distribution skewed to the left. In such a case a more precise estimator of mean density within each stratum,  $\hat{\mu}_i$ , is given by (modified from Pennington, 1983, 1996)

$$\hat{\mu}_i = \frac{(n_i - m_i)}{n_i} \bar{y}'_i + \frac{m_i}{n_i} \exp(\bar{x}_i) G_{m_i}(s_{x,i}^2 / 2), \quad (11)$$

where

$m_i$  is the number of sample values greater than a defined 'cut-level' (rather than 0 as in equation 8) in stratum  $i$ ,

$\bar{y}'_i$  denotes the arithmetic mean of the non-transformed values less than the cut-level,

and

$\bar{x}_i$  and  $s_{x,i}^2$  are the mean and variance, respectively, of the logged values of catches greater than the cut-level.

The variance of  $\hat{\mu}_i$  is given by

$$\text{var}(\hat{\mu}_i) = \text{var}(c_i) + \left( \frac{n_i - m_i - 1}{n_i(n_i - 1)} \right) s_i'^2 + \left( \frac{m_i(n_i - m_i)}{n_i^2(n_i - 1)} \right) \bar{y}'_i{}^2 - 2 \left( \frac{n_i - m_i}{n_i(n_i - 1)} \right) \bar{y}'_i \times c_i, \quad (12)$$

where

$s_i'^2$  is the variance of the values less than the cut-level (equation 3), and

$c_i$  and  $\text{var}(c_i)$  are equations (8) and (10) with  $m_i$  bigger than the cut-level.

There is no single objective criterion upon which to define a cut-level bigger than zero. Basically the logged Delta distribution should be viewed (e.g. in GRAFER) in order to determine if it is skewed to the left and/or contains isolated small catches. As a 'rule of thumb' (Pennington pers. com.) the cut-level should be set =  $(2\bar{x}_i - x_{\max})$ , where  $\bar{x}_i$  and  $x_{\max}$  are the mean and the largest value, respectively, of the log transformed values of catches greater than 0.

#### 2.4. Stratified mean and confidence interval based on lognormal theory

The stratified estimate of mean density (denoted by  $\hat{\mu}_{st}$ ) in the entire area is calculated by replacing  $\bar{y}_i$  with  $\hat{\mu}_i$  for each stratum in equation (1). The standard error of  $\hat{\mu}_{st}$  is obtained by substituting  $\text{var}(\hat{\mu}_i)$  for  $s_i^2 / n_i$  (which equals  $\text{var}(\bar{y}_i)$ ) in equation (2) and then

$$\text{se}(\hat{\mu}_{st}) = \sqrt{\text{var}(\hat{\mu}_{st})} \quad (13)$$

Sometimes the  $\hat{\mu}_{st}$ -estimator is higher than the one based on the sample mean. This is because, given the sample sizes typical for marine surveys, the sample mean tends to underestimate the true mean most of the time for these highly skewed distributions (Pennington, 1983, 1996; Conquest *et al.*, 1996).

An approximate 95% confidence interval for  $\hat{\mu}_{st}$  is given by

$$\hat{\mu}_{st} \pm t_{(n-1)} \text{se}(\hat{\mu}_{st}) \quad (14)$$



## Annex V Excel sheet used for calculations of biomass and confidence intervals

Made 23/3 1999 by Jeppe Kolding

This example is the biomass of seabreams in Sector 2 1998

This sheet is used to calculate stratified mean density, total biomass, and 95% confidence limits on the total biomass.

Inputs are only required in the yellow fields and optionally the t-value can be set. NOTE that the Station field MUST be 1 even if there is no catch

Density ( $t/m^2$ ) is from NAN-SIS and Coefficient of variation (CV) is from GRAFER using the same depth intervals

The underlying assumption is that the CV from the catch (kg/hour) is equal for for the density ( $t/m^2$ ), i.a. that the swept area is constant per hour

Input from NANSIS

GRAFER

Depth (m)	Area	No Stations	Density ( $t/m^2$ )	CV (kg/hour)	Equation(1)=	SD	Est. Variance	Equation (2)=
20-50	1068	9	2.38	0.9	0.46	2.142	4.588	0.019
50-100	1586	17	4.74	0.93	1.35	4.408	19.432	0.093
100-200	1439	12	5.37	1.14	1.39	6.122	37.476	0.209
200-300	407	8	4.03	1.31	0.29	5.279	27.871	0.019
300-400	372	1	0	0	0.00	0.000	0.000	0.000
400-500	343	1	0	0	0.00	0.000	0.000	0.000
500-600	346	1	0	0	0.00	0.000	0.000	0.000
<b>Total</b>	<b>5561</b>						<b>Var(strat-mean)=</b>	

t-value =

Stratified mean =

SE(strat-mean) =

95% Confidence limits:

Total biomass =





## Annex VI

NAN-SIS species codes used in defining the 'grouped species' tables

<b>GROUP MAIN</b>	<b>Demersal</b>	<b>Pelagic</b>	<b>Shrimp</b>	<b>Cephalopod</b>	<b>sharks</b>
	SPA0000	ENG0000	SHR0000	SQU0000	SHA0000
	POD0000	CLU0000			
	SCI0000	CAR0000			
	ARD0000	SCM0000			
	SER0000	SPH0000			
	LUT0000	TRI0000			
	OPDAA00	STRAA00			
	MERME00				
<b>PELAGIC</b>	<b>Clupeids</b>	<b>Carangids</b>	<b>Scombrids</b>	<b>Hairtails</b>	<b>Barracudas</b>
	ENG0000	CAR0000	SCM0000	TRI0000	SPH0000
	CLU0000				
<b>DEMERSAL</b>	<b>Seabream</b>	<b>Snappers</b>	<b>Groupers</b>	<b>Grunts</b>	<b>Croakers</b>
	SPADE00	LUT0000	SER0000	PODPO00	SCI0000
	SPADI00				
	SPALI00				
	SPAPA00				
	SPAPR00				
	SPASP00				
<b>DEEP 1</b>	<b>Seabream</b>	<b>Hake</b>	<b>P.longiros</b>	<b>A.varidens</b>	<b>N.africanus</b>
	SPADE00	MERME03	SHRPE31	SHRAR22	SHRNE21
	SPADI00	MERME12	SHRPEP1	SHRARA1	
	SPALI00	MERME13	SHRPEP2	SHRARA2	
	SPAPA00	MERME92			
	SPAPR00				
SPASP00					
<b>DEEP 2</b>	<b>Hake</b>	<b>Ommastrep</b>	<b>Sepiidae</b>	<b>A.varidens</b>	<b>P.longiros</b>
	MERME03	SQUOM21	SQUSE10	SHRAR22	SHRPE31
	MERME12	SQUOM31	SQUSE11	SHRARA1	SHRPEP1
	MERME13	SQUOM51	SQUSE12	SHRARA2	SHRPEP2
	MERME92		SQUSE13		
		SQUSE15			

NAN-SIS sectors in Angola

Latitude	Sector	Region
6° - 5° S	4	Cabinda
9° - 6° S	3	Pta.das Palmeirinhas – Congo River
13° - 9° S	2	Benguela – Pta.das Palmeirinhas
17°14' - 13° S	1	Cunene River – Benguela
17°14' >> S	5	South of Cunene River (Namibia)

## Annex VII Instruments and fishing gear used

### Fishing gear

The vessel has two different sized "Åkrahamn" pelagic trawls and one "Gisund super bottom trawl". The pelagic trawl is equipped with a trawleye that provides information on the trawl opening and distance of the footrope to the bottom.

The bottom trawl has a headline of 31 m, footrope 47 m and 20 mm meshsize in the codend with an innernett of 10 mm meshsize. The estimated opening is 6 m (observed 5.7) and distance between wings during towing about 18 m. The sweeps are 40 m long. The trawl is equipped with a 12" rubber bobbins gear. The doors are of 'Thyborøn' combi type, 7.81 m<sup>2</sup>, 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 at every second haul.

The SCANMAR system was used on some of the 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..

# F/F Dr. Fridtjof Nansen

OVER/UNDER/SIDER

OVERDEL:  
50 STK 11" PLASTKULER

UNDERDEL:  
14 M/M WIRE OMSP. MED

14 M/M BLYTAU

+ KJETTING.

TOTAL VEKT UNDER 400 KG.

SIDER:

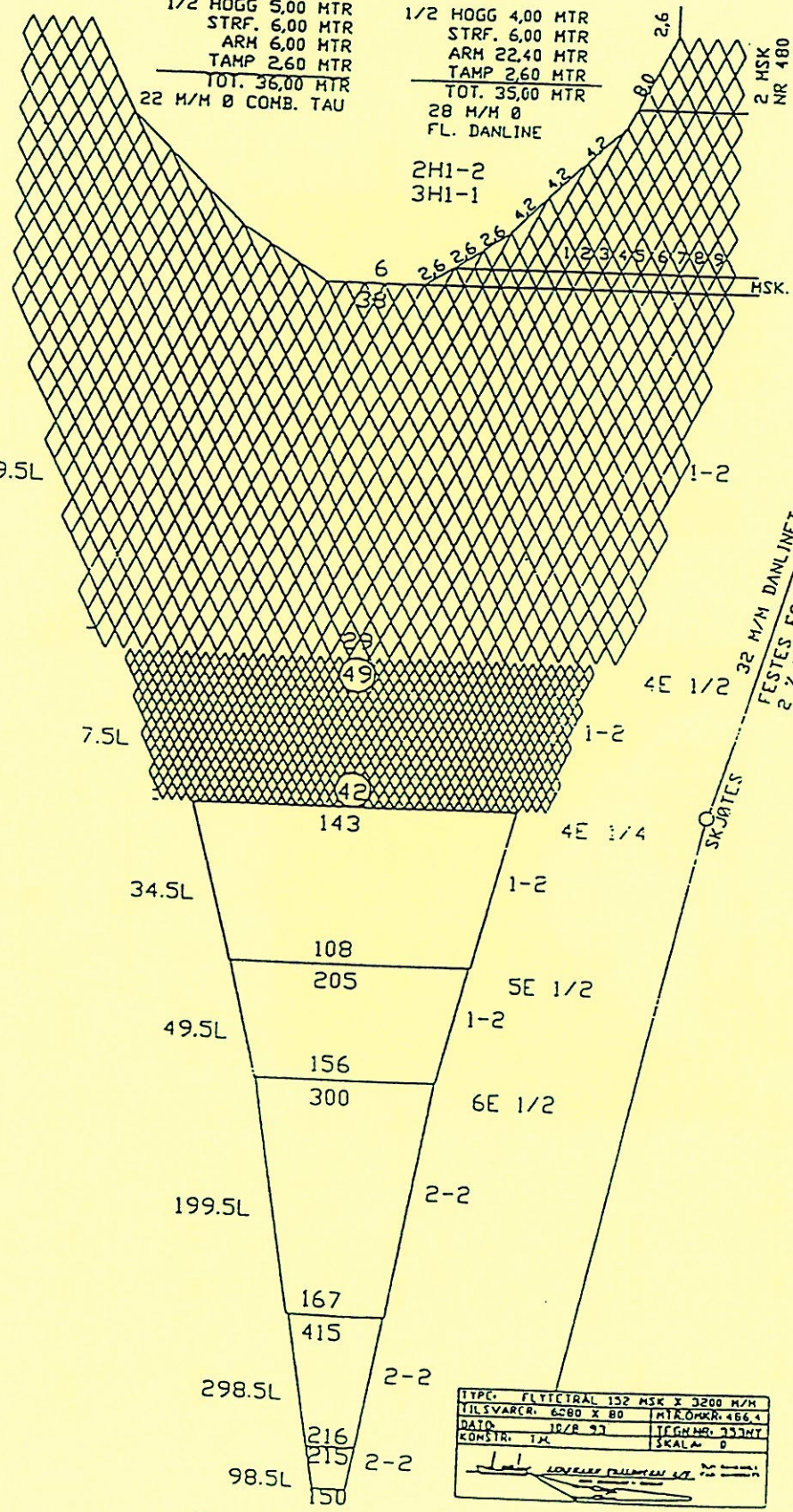
1/2 HOGG 5,00 MTR  
STRF. 6,00 MTR  
ARM 6,00 MTR  
TAMP 2,60 MTR  
TOT. 36,00 MTR  
22 M/M Ø COMB. TAU

1/2 HOGG 4,00 MTR  
STRF. 6,00 MTR  
ARM 22,40 MTR  
TAMP 2,60 MTR  
TOT. 35,00 MTR  
28 M/M Ø  
FL. DANLINE

2H1-2  
3H1-1

2 HSK  
NR 480

M/M	NR.	I MTR.	I EVING
3200.0	240	22.4	4
3200.0	240	32.0	4 9.5L
1620.0	160	13.0	4
400.0	48	14.0	4
200.0	32	10.00	4
100.0	24	20.0	4
38.0	12	11.4	4
38.0	18	3.76	4



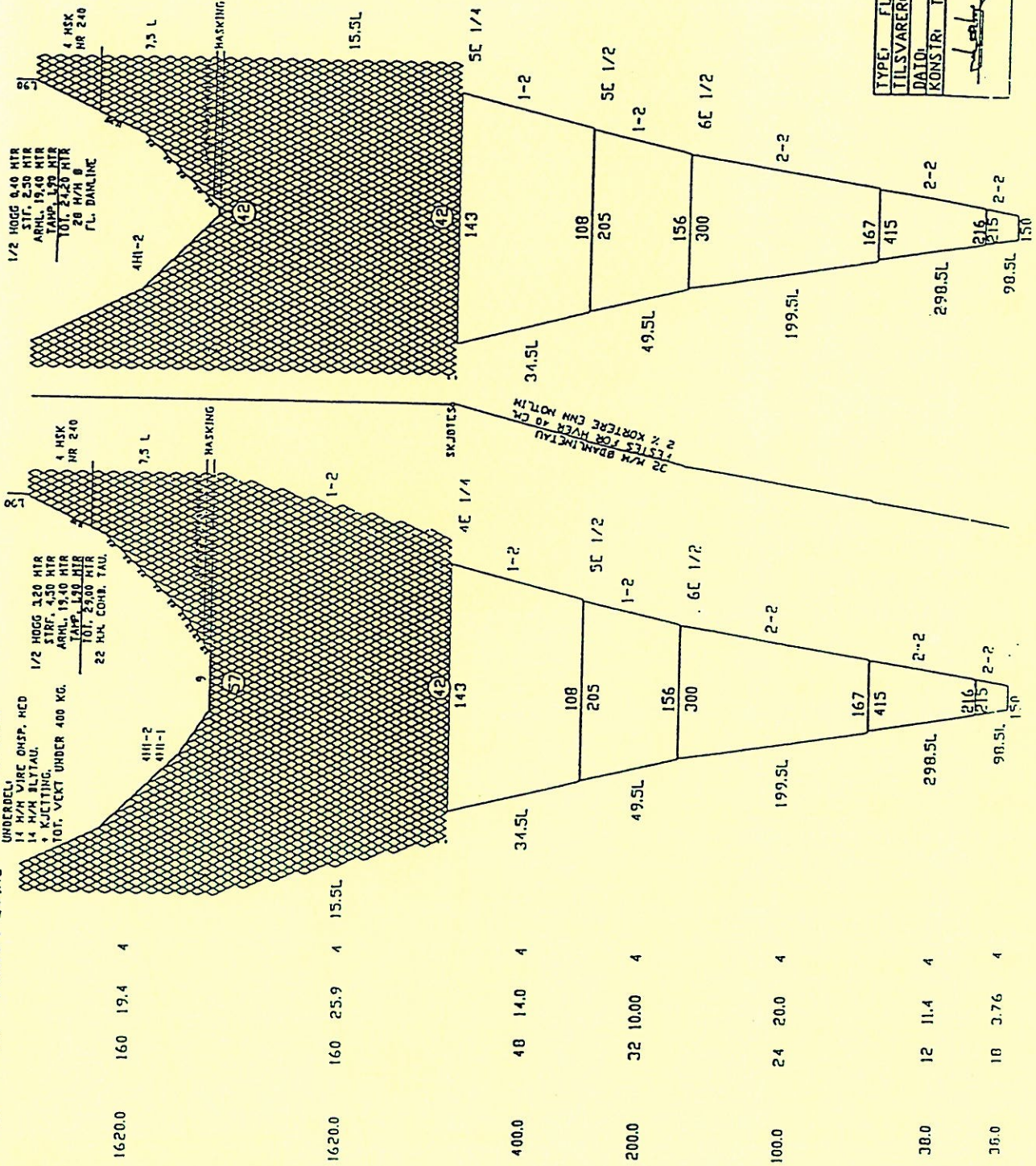
TYPE: FLYTETRAL 152 MSK X 3200 M/M	
TILSVARER: 6280 X 80	TMT.OMR: 466.4
DAIR: 18/28 97	TEGN.NR: 757MT
KONSTR. TM	SKALA: 0

32 M/M DANLINETAU  
FESTES FOR HVER 40 CM  
2 1/2 KORTERE ENN NOTLIN

SKJØRITES

# F/F Dr. Fridtjof Nansen

OVER/UNDER  
 MASKER TRAAD LENGDE MASKER  
 M/H NR. I MTR. I EVING



TYPE:	FLYETRAL 198 HSK X 1620 H/H
TILSVARER:	4010 X 80 MTR/OMKR: 320
DATA:	23/6 93
KONSTR:	T-H
TEGMNR:	510
SKALA:	1:0

AKUTMANNS FLYETRAL 198  
 10.11.1991  
 10.11.1991

Bottom trawl: High opening shrimp and fish trawl with net headline 31 m (floatline), foot-  
 rope 47 m, gear with 12 cm diameter roller disks, 40 m sweeps, estimated headline height  
 6 m and distance between wings during towing 18-20 m.

