

## **SURVEY OF THE FISH RESOURCES OF ANGOLA**

**Cruise Report No 3/2015**

**Survey of the demersal resources**  
14 February – 23 March 2015

**Preliminary report**

**Institute of Marine Research**  
IMR, Bergen  
Norway

**Instituto Nacional de Investigação Pesqueira**  
INIP, Luanda  
Angola



## **THE EAF-NANSEN PROJECT**

FAO started the implementation of the project "Strengthening the Knowledge Base for and Implementing an Ecosystem Approach to Marine Fisheries in Developing Countries (EAF-Nansen GCP/INT/003/NOR)" in December 2006 with funding from the Norwegian Agency for Development Cooperation (Norad). The EAF-Nansen project is a follow-up to earlier projects/programmes in a partnership involving FAO, Norad and the Institute of Marine Research (IMR), Bergen, Norway on assessment and management of marine fishery resources in developing countries. The project works in partnership with governments and also GEF-supported Large Marine Ecosystem (LME) projects and other projects that have the potential to contribute to some components of the EAF-Nansen project.

The EAF-Nansen project offers an opportunity to coastal countries in sub-Saharan Africa, working in partnership with the project, to receive technical support from FAO for the development of national and regional frameworks for the implementation of Ecosystem Approach to Fisheries management and to acquire additional knowledge on their marine ecosystems for their use in planning and monitoring. The project contributes to building the capacity of national fisheries management administrations in ecological risk assessment methods to identify critical management issues and in the preparation, operationalization and tracking the progress of implementation of fisheries management plans consistent with the ecosystem approach to fisheries.

## **LE PROJET EAF-NANSEN**

La FAO a initié la mise en oeuvre du projet "Renforcement de la base des connaissances pour mettre en œuvre une approche écosystémique des pêcheries marines dans les pays en développement (EAF-Nansen GCP/INT/003/NOR)" en décembre 2006. Le projet est financé par de l'Agence norvégienne de coopération pour le développement (Norad). Le projet EAF-Nansen fait suite aux précédents projets/ programmes dans le cadre du partenariat entre la FAO, Norad et l'Institut de recherche marine (IMR) de Bergen en Norvège, sur l'évaluation et l'aménagement des ressources halieutiques dans les pays en développement. Le projet est mis en oeuvre en partenariat avec les gouvernements et en collaboration avec les projets grands écosystèmes marins (GEM) soutenus par le Fonds pour l'Environnement Mondial (FEM) et d'autres projets régionaux qui ont le potentiel de contribuer à certains éléments du projet EAF-Nansen.

Le projet EAF-Nansen offre l'opportunité aux pays côtiers de l'Afrique subsaharienne partenaires de recevoir un appui technique de la FAO pour le développement de cadres nationaux et régionaux visant une approche écosystémique de l'aménagement des pêches et la possibilité d'acquérir des connaissances complémentaires sur leurs écosystèmes marins. Ces éléments seront utilisés pour la planification et le suivi des pêcheries et de leurs écosystèmes. Le projet contribue à renforcer les capacités des administrations nationales responsables de l'aménagement des pêches en introduisant des méthodes d'évaluation des risques écologiques pour identifier les questions d'aménagement d'importance majeure ainsi que la préparation, la mise en œuvre et le suivi des progrès de la mise en œuvre de plans d'aménagement des ressources marines conformes à l'approche écosystémique des pêches.

The DR FRIDTJOF NANSEN RESEARCH PROGRAMME is sponsored by the Norwegian Agency for Development Cooperation (NORAD). The Food and Agriculture Organization of the United Nations (FAO) provides support to the Programme through Project GCP/INT/730/NOR: International Cooperation with the Nansen Programme: Fisheries Management and Marine Environment. This project is the follow-up to the Project NORAD/FAO/UNDP GLO/92/013. The Institute of Marine Research (IMR), Bergen, Norway is responsible for the implementation of the Programme in cooperation with FAO Fisheries Department and the local fisheries administrations. The aim of the Nansen Programme is to assist developing countries in fisheries research, management and institutional strengthening.

The programme has previously conducted the following demersal surveys in the area:

January 1985	-	June 1986	(6 surveys)
January 1989	-	December 1989	(3 surveys)
May 1991	-	September 1992	(3 surveys)
January 1994	-	March 2014	(22 surveys)

CRUISE REPORTS "DR. FRIDTJOF NANSEN"

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**Bergen, 2015**

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## Executive summary

Since the late 1990 a demersal survey has been performed annually in February – April to map and describe the distribution, composition and abundance of the main demersal species. Special emphasis has been put on seabreams (Sparidae), croakers (Sciaenidae), grunts (Haemulidae), groupers (Serranidae), snappers (Lutjanidae), hakes (Merlucciidae), cephalopods and shrimps, including collection of biological data such as length, weight, sex, maturity stage and stomach content. In addition the general hydrographical conditions have been monitored by mapping temperature, salinity and oxygen. Water samples have been collected for analyzes of nutrients and phytoplankton, and zooplankton has been sampled along the hydrographic transects.

The hydrography of the Angolan shelf is characterized by a semi-annual seasonal cycle, with two stratified periods in February-March and in October-November. The principal upwelling season occurs in June-August, while it is weak and less regular in December-January. The demersal surveys in March coincide with the late phase of the wet season, characterised by low salinity of the inshore surface waters on the shelf off northern and central Angola resulting from freshwater run-offs.

Angolan waters harbour a great diversity of fish and invertebrate marine species which individually have a relatively low biomass but together form an important fishery. Abundance trends within stocks of low biomass may show great variation from year to year due to low frequency of occurrence and large variability in catch rates. Low biomass estimates with relatively large coefficients of variability may sometimes obscure the greater picture, and make it difficult to use them for management purposes. In 2015 a small error was discovered in the R-code which calculates the biomass estimates and corresponding coefficients of variability (CVs). This error meant that the CVs calculated for estimates prior to 2015 were higher than they should have been. The CVs for all previous data have been recalculated and are shown in this years report. The biomass estimates are not affected by this error.

The 2015 biomass estimates for the combined northern and central regions, i.e. Congo River – Benguela, are generally lower for groupers, croakers, and seabreams than last year. Estimates for hake and shrimps on the other hand have increased. The combined estimate of important demersal species is about 16 % lower than in 2014, and is similar to the combined estimate for 2013, but below the 10 year average. The variation may be a year effect, which is known to occur in both acoustic and bottom trawl suveys in many areas.

In previous survey reports a concern about declining trends in the biomass of bycatch species in the shrimp fishery have been expressed. This trend is less pronounced in this year's survey result.

The main pelagic species caught in the bottom trawl, horse mackerel and sardinellas, are schooling species and may be caught in great abundance, and may therefore obscure the overall tendency for the demersal species. In the northern and central regions, the biomass estimate of Cunene horse mackerel (*T. trecae*) was 35 800 tonnes, which is the highest estimate since 1997.

## CHAPTER 1 INTRODUCTION

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### Objectives

The objectives of the cruise had been previously discussed and agreed upon by the responsible of the Demersal Programme of the Instituto Nacional de Investigação Pesqueira (INIP) of Angola, and the responsible from the Institute of Marine Research (IMR), Norway, 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 seabreams (Sparidae), croakers (Sciaenidae), grunts (Haemulidae), groupers (Serranidae), hakes (Merlucciidae), cephalopods and shrimps (*Parapenaeus longirostris* and *Aristeus varidens*) on the Angolan shelf and slope (down to 800 m), from Cunene River (17°14'S) to Tombua\* (15°40'S), and from Benguela (12°35'S) to Congo River (06°00'S) using bottom trawl and the swept-area method.
- To collect biological data such as length, weight, sex and maturity stage of *Dentex macrophthalmus*, *D. angolensis*, *Pagellus bellottii*, *Pseudolithus* spp., *Umbrina canariensis*, *Merluccius polli*, *M. capensis*, *Trachurus trecae*, *Brachydeuterus auritus*, *Penaeus notialis*, *P. keratourus*, *Aristeus varidens*, *P. longirostris*, and *Chaceon maritae*.
- To collect the stomach contents and otoliths for some species such as *Dentex angolensis*, *D. macrophthalmus*, *U. canariensis*, *Merluccius polli*, *M. capensis*, and *T. trecae*, for subsequent analyses in the INIP Lab.
- To collect depth-stratified samples of zoo- and phytoplankton on five monitoring lines – Luanda, Lobito, Namibe, Congo River, and Cunene – in order to continue the studies on feeding biology, and relate stomach content to estimated zooplankton composition and observed density.
- To monitor the general hydrographical conditions using thermosalinograph and CTD-sonde on trawl stations and five oceanographic lines, and map the vertical and horizontal temperature, salinity, oxygen and fluorescence distribution.
- To collect catch data from approximately 30 random trawl stations in the central region (9 -11°S)
- To do parallel trawling with a commercial midwater trawler in the southern region.

\*The Tombua-Benguela region has been excluded in all the demersal surveys as the bottom is very steep and rocky and unsuitable for bottom trawling, however, the abundance of demersal species in the region is low as the shelf and the slope are very narrow. The trends in the time series of the demersal biomass estimates are therefore insignificantly affected by the exclusion of the region.



## Participation

The scientific staff consisted of:

From INIP, Angola:

14.02-05.03: Virgílio Estevão (local cruise leader), Fátima Delicado, Noemia Nganga, , Adélia Rodrigues, José Amaro Francisco, Marisa De Novato, David Quissungu, Aristóteles Amaro, João Morais, and Tito Milagre

05.03-23.03: Virgílio Estevão (local cruise leader), José Amaro Francisco, Irene Moçambique, Stela Pedro, Pedro Panzo, Noemia Nganga, and David Quissungu

From IMR, Norway:

Arved Staby, cruise leader (14.02-23.03), Oddgeir Alvheim (14.02-23.03), Tore Mørk (14.02-23.03), Inge Nymark (14.02-23.03), Tor Ensrud (05.03-23.03)

## Narrative

R/V “Dr. Fridtjof Nansen” departed Walvis Bay at 15:00 UTC the 14<sup>th</sup> February 2015. The vessel steamed northwards and arrived at the inshore sampling station on the Cunene monitoring line at 08h30. A total of 4 multinet and 14 CTD / WP 2 stations were sampled on this line. The vessel proceeded northwards and completed 27 bottom trawls by the 19<sup>th</sup> February at 16h00. Sampling of the Namibe environmental line (3 multinet and 6 CTD / WP2 stations) started on the 19<sup>th</sup> February at 22h30 and finished on the 20<sup>th</sup> February at 10h30. Three bottom trawls were then completed on the same day between 14<sup>00</sup> and 14<sup>30</sup> S. On the 21<sup>st</sup> February the vessel anchored in Baia dos Elefantos at 06h30 to successfully calibrate all four transducers, before leaving at 13h30 for the central region

The vessel arrived in the central region at 22h00 the 21<sup>th</sup> February and proceeded with the deepest station on Lobito environmental line. At 8h30 on the 22<sup>nd</sup> sampling on the environmental line was interrupted to do bottom trawling on the the upper shelf, before returning to the last three Lobito line stations in the evening. The vessel continued with bottom trawls until 22h00 on 26<sup>th</sup> February, when it broke off surveying to steam to Luanda to drop off a Norwegian crew member whose parent had passed away. After the crewmember was transferred to the Angolan RV Pensador at 12h00 on the 27<sup>th</sup> February the vessel steamed south to complete the bottom trawl coverage of the southern region and sampling the Luanda environmental line on the 2<sup>nd</sup> March at 06h00.

Three transects in the northern region were completed before the vessel broke off transecting at 17h00 on the 4<sup>th</sup> March to call on Luanda for a planed Angolan personnel change and to pick up a Norwegian scientist. The vessel remained in Luanda until the 7<sup>th</sup> March 15h00, then steamed north to commence transecting. The last bottom trawl in the northern region was completed on 13<sup>th</sup> March at 22h30, and the Congo River environmental line was finished on the 14<sup>th</sup> at 06h30. The vessel then steamed south to complete 30 random bottom trawl stations in the central region (9<sup>0</sup> – 11<sup>0</sup> S) between the 15<sup>th</sup> and 14h45 on the 18<sup>th</sup> March. On the 19<sup>th</sup> March at 18h00 the boat arrived outside Namibe to conduct parallel trawling with a commercial midwater trawler. The commercial trawler arrived on the 20<sup>th</sup> at 12h00 and both vessels steamed to 15<sup>030</sup> S to commence trawling on horse mackerel at 18h30. At 20h00 the experiment had to be stopped because of a torn pelagic trawl, and the vessel started steaming to Walvis Bay where it arrived on the 23<sup>rd</sup> March at 08h00.

## CHAPTER 2 METHODS

### Survey effort

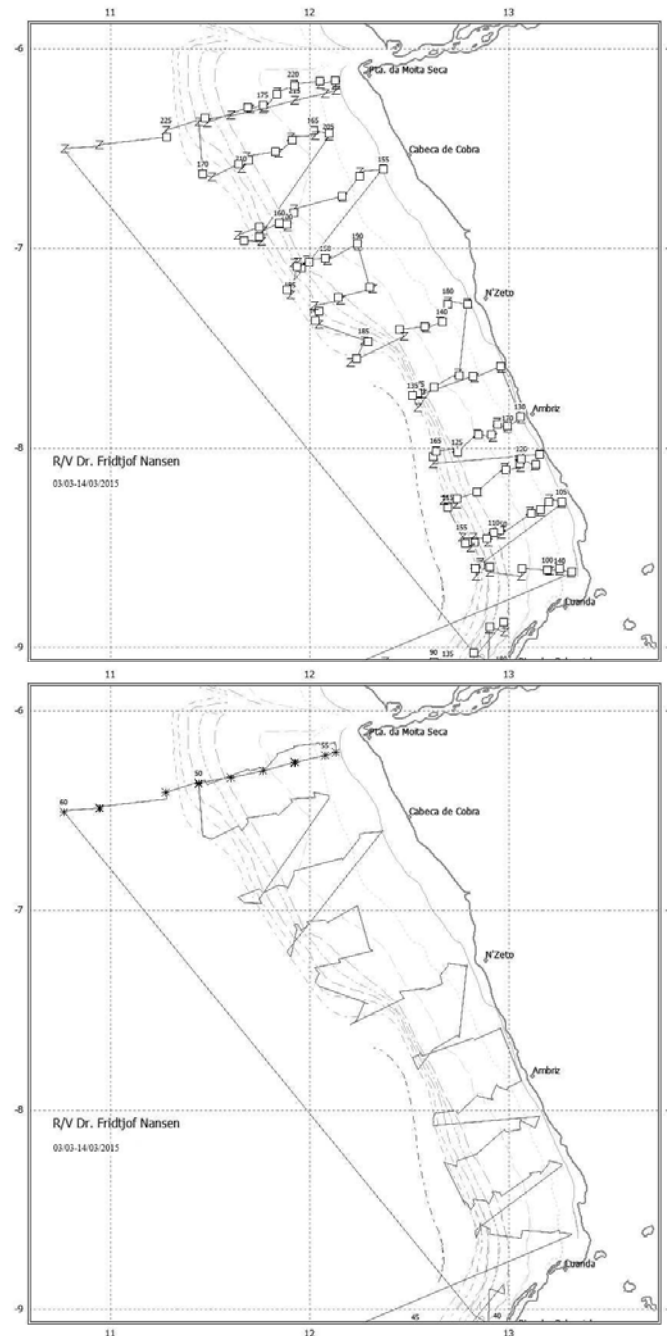
Table 2.1 presents the surveyed area by depth strata, allocation of trawl stations, total number of successful swept-area hauls, number of invalid hauls, number of CTD stations, and the distance surveyed. Table 2.1 also shows the allocation of effort relative to the stratum size as percentage hauls versus percentage area, by depth, by region, and by total area. The overall average coverage was 1 valid trawl station per 93 square nautical miles (NM<sup>2</sup>). Figures 2.1-2.3 show the cruise tracks in the northern, central and southern regions, respectively, and the locations of bottom trawl and hydrographical stations.

**Table 2.1** Survey design and effort for the 2015 demersal survey. 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 in to: northern region (Luanda to Congo River), central region (Benguela to Luanda) and southern region (Cunene to Tombua).

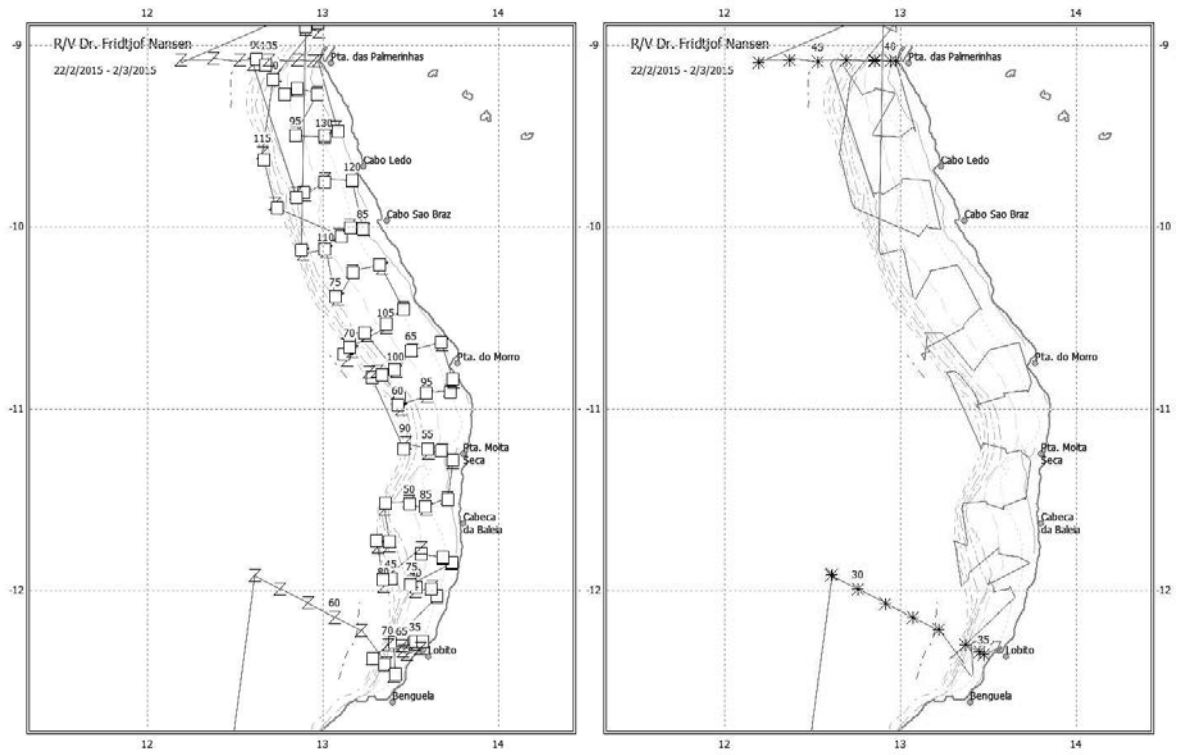
Region	Depth strata									Valid	Invalid	CTD*	Distance
	20-50m	50-100m	100-200m	200-300m	300-400m	400-500m	500-600m	600-700m	700-800m				
<b>Luanda-Congo River</b>													
Area (NM <sup>2</sup> )	1379	1969	1940	601	550	437	409	408	702	<b>8395</b>			
# hauls (BT)	13	20	17	7	7	5	5	4	6	<b>84</b>	2	89	1176
%area	16.4	23.5	23.1	7.2	6.6	5.2	4.9	4.9	8.4	51			
%hauls	15.4	23.8	20.2	8.	8.3	5.9	5.9	4.76	7.14				
<b>Benguela-Luanda</b>													
Area (NM <sup>2</sup> )	1068	1586	1439	407	372	343	346	268	357	<b>6186</b>			
# hauls (BT)	11	18	14	3	6	3	4	3	3	<b>65</b>		82	1179
%area	17.3	25.6	23.3	6.6	6.0	5.5	5.6	4.3	5.8	37			
%hauls	16.9	27.7	21.5	4.6	9.2	4.6	6.2	4.6	4.6				
<b>Cunene-Tombua</b>													
Area (NM <sup>2</sup> )	507	591	594	100	77	48	39			<b>1956</b>			
# hauls (BT)	6	8	6		3	1	1	2		<b>26</b>	1	38	627
%area	25.9	30.2	30.4	5.1	3.9	2.5	2.0	0.0	0.0	12			
%hauls	22.2	29.6	22.2	0.0	11.1	3.7	3.7	7.4	0.0				
<b>Grand total</b>													
Area (NM <sup>2</sup> )	2954	4146	3973	1108	999	828	794	676	1059	<b>16537</b>			
# hauls (BT)	30	46	37	10	17	10	10	9	9	<b>178</b>	3	209	2982
%area	17.9	25.1	24.0	6.7	6.0	5.0	4.8	4.1	6.4				
%hauls	16.9	25.8	20.8	5.6	9.6	5.6	5.6	5.1	5.1	<b>Total hauls: 178</b>			

A stratified semi-random survey design was used with depth and area as stratifying variables. Trawling was, as far as bottom conditions allowed, carried out along transects perpendicular to the coast (Figures 2.1-2.3), and the allocation of trawl stations was proportional to stratum size. Due to time constraints several stations done in 2014 in the central and northern region were omitted on this survey. Trawling shallower than 300 m was mainly done during daytime and deeper than 300 m during dark hours. When necessary the planned design was slightly

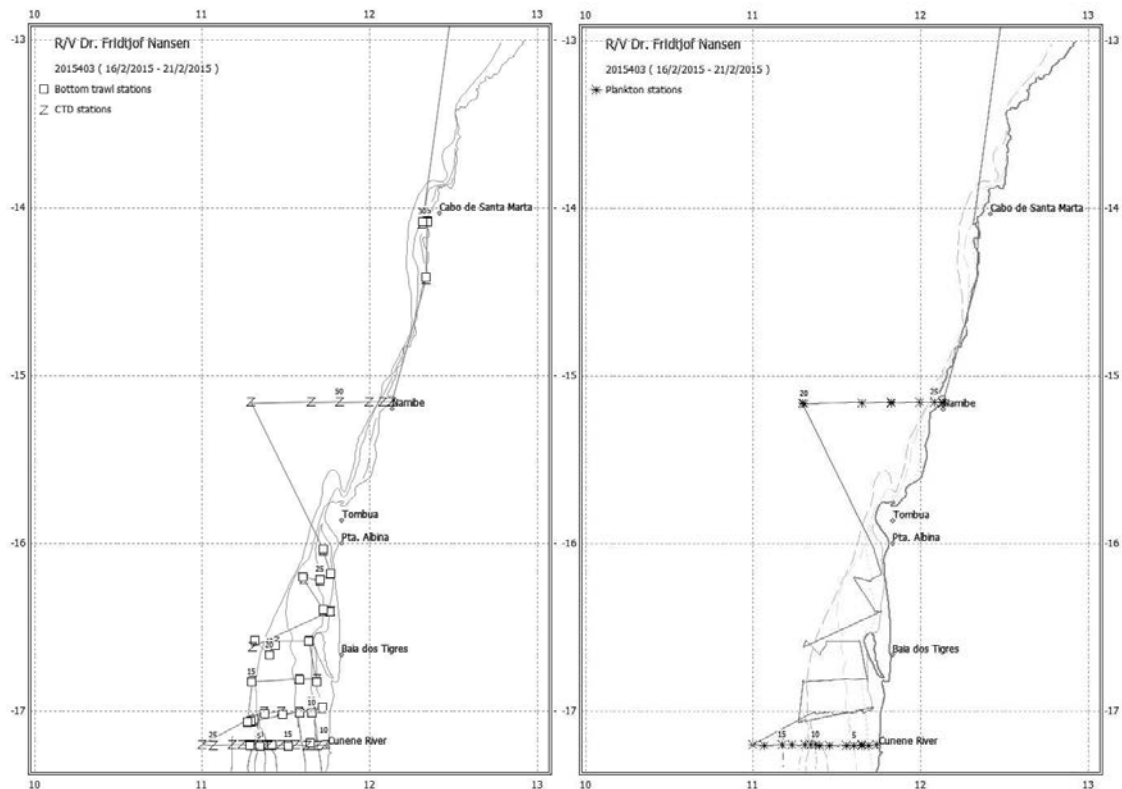
modified due to unsuitable bottom conditions or non-accessible oil production areas in the northern region. Based on a decision made in 2003 the trawl positions of the 2000 demersal survey should be the standard for future surveys in the southern region as the survey had a reasonable good coverage. Furthermore, it was decided that the trawl positions of the 2002 demersal survey should be used as the standard for future surveys in the central and northern regions, as the survey had a good coverage of these regions. Therefore, the station positions and effort have been similar during the 2000 and 2003-2014 surveys in the southern region and during the 2002-2014 surveys in the central and northern regions (see Annex XI). As in 2013 and 2014, additional trawl stations were performed in the area between Benguela and Tombua to obtain a time series of catch rates of demersal important species for future analyses. These stations are not included in the current biomass estimates.



**Figure 2.1** Angola north: Congo River - Ponta das Palmerinhas. Course track with trawl and hydrographical stations. Depth contours at 20, 50, 100, 200, 300, 400, 500 and 600 m.



**Figure 2.2** Angola central: Ponta das Palmerinhas - Benguela. Course track with trawl, hydrographical and plankton stations. Depth contours at 20, 50, 100, 200, 300, 400, 500 and 600 m.



**Figure 2.3** Angola south: Tombua - Cunene. Course track with trawl, hydrographical and plankton stations. Depth contours at 20, 50, 100, 200, 300, 400, 500 and 600 m.

## **Meteorological and hydrographical sampling**

A Seabird 911+ CTD probe was used to obtain vertical profiles of temperature, salinity and oxygen. Real time plotting and logging was done with the customised Seabird Sea save software installed on a PC. Profile data were logged down to a few meters above the bottom. Attached to the CTD was also a Chelsea fluorometer of the type Mk III Aquatracka. It measures chlorophyll A in microgram per litre with an uncertainty of 3%. Factory slope and offset was 0.00921 and -0.02.

The SBE 21 Seacat thermosalinograph was running routinely during the survey obtaining samples of sea surface salinity, relative temperature and fluorescence (5 m depth) every 10 seconds. An attached in-line Turner Design SCUFA Fluorometer continuously measured Chlorophyll A levels [RFU] at 5 m below the sea surface while underway during the entire cruise.

Meteorological data including wind direction and speed, air temperature, global radiation and sea surface temperature (SST) were automatically logged using a WIMDA meteorological station. These observations were averaged by every nautical mile distance sailed.

The vessel-mounted Acoustic Doppler Current Profiler (VMADCP) from RD Instruments was used during the whole survey. In addition an ADCP mounted on the CTD-rig was used beyond about 150 m depth.

## **Plankton sampling**

### *Phytoplankton*

Samples of phytoplankton were collected on the five fixed monitoring lines (Appendix VIII) by obtaining water samples with the CTD bottles at 5, 15, 25, 50 and 75 meter depth. The samples were preserved in 2% formalin.

### *Zooplankton*

Zooplankton samples were collected with both a HYDROBIOS Multinet (180 µm) and WP2 net (180 µm). Multinet sampling was conducted at five depth intervals, 0-25, 25-50, 50-75, 75-100 and 100-200 m, at 3 selected stations on the Namibe, Lobito, Luanda and Congo River monitoring lines, and at four stations on the Cunene line (Appendix VIII). Once at the desired depth the unit was hauled at app. 1-1.5 m/s while the vessel was moving with approximately 2 knots. Data was recorded electronically from only the outer flow meter of the Multinet. A SCANMAR depth sensor gave real-time information of the depth. The nets were opened and closed remotely from the bridge of the vessel. The samples were preserved in 4% formalin. WP2 samples were collected at every CTD station. At shallower stations (< 200m) the net was lowered to approximately 10 m off the bottom, while at deeper stations(> 200m) the net was lowered to a maximum depth corresponding to 200 m wire out. The net was vertically heaved at 0.5 m/s. Samples were preserved in 4% formalin. A flowmeter mounted in the centre of the WP2 recorded the distance sampled on all stations except the Cunene line.

## **Fish sampling**

### *Sampling gear*

A “Gisund Super” bottom trawl with a headline height of about 4.5m was used during the survey, and the doors are of the “Thyborøn” combi type. The distance between the front parts of the wings was about 21m during deployment at a speed of 3 NM h<sup>-1</sup>. These settings have been the standard on all swept area surveys with R/V “Dr. Fridtjof Nansen”.

As in previous surveys, except during the 2002 survey, a 44m long tickler chain was attached to the footrope at depths of more than 300m in order to catch more of the bottom dwelling deep-water shrimps. During all tows deeper than 80m, a 9m long constraining rope was attached between the wires about 120-125m in front of the trawl doors. This kept a constant distance between the doors of about 55m during trawling. In shallow stations with depths less than 80m, the door-to-door distance varied more, depending on bottom type and currents.

Trawl duration was standardized to 30 minutes, however trawls with durations of more than 15 minutes were included in the estimates. The trawling start time is controlled by using a “SCANMAR” sensor to detect the landing of the trawl on the bottom, and the stop-time is defined as the time when the wires start to haul the net. In some cases the towing was interrupted before 30 minutes either due to poor bottom conditions or too high catches of fish indicated by the installed catch sensors. If the stations were not trusted to reflect the density of fish on the bottom they were coded as invalid (code 9) in the Nansis database. Table 2.1 shows the numbers of valid and invalid stations. A detailed description of the fishing gear is given in Annex VII.

### *Sampling the catches*

Catches were sampled for species composition by weight and numbers. The total body length of the fish (cm) was measured to the nearest 1 cm below, the carapace length of shrimps and carapace width of crabs to 1 mm below, and mantle length for squid species to the nearest 1 mm below. The records of fishing stations are presented in Annex I. For selected commercially important species, pooled length frequency distributions, in which individual samples are raised to total catch, are shown by area in Annex II. All biological data records were entered in the Nansis database and were quality controlled during the survey.

### *Acoustic sampling*

Acoustic recordings were carried out at four frequencies: 18, 38, 120 and 200 kHz using a SIMRAD ER60 echo sounder. Acoustic data were not processed on board, but all data were stored to files. A detailed description of the acoustic settings is given in Annex VII.

## **Areas, depth strata and calculations**

Table 2.1 shows the areas in NM<sup>2</sup> for the southern region (Cunene - Tombwa: S17°15’-S16°00’), the central region (Benguela - Ponta das Palmerinhas: S12°40’-S09°00’) and the northern region (Ponta das Palmerinhas - Congo River: S09°00’-S06°00’) by depth strata. These strata are used to calculate the swept-area biomass estimates. All valid stations are treated as representative for the relevant depth intervals where the species or group of species were caught.

All equations for the calculations are given in Annex IV. The effective fishing width of trawl gear used by R/V “Dr Fridtjof Nansen” is considered to be 18.5 m. The effective fishing area is the product of the fishing width multiplied by the towing distance measured by the GPS. It is assumed that all fish within the trawling path are caught, which gives a catchability coefficient ( $q$ ), *i.e.* the fraction of the fish encountered by the trawl that was actually caught, equal to 1. The catchability coefficient is seldom known, but because the coefficient is assumed to be constant between surveys, the swept-area estimates will reflect any change in population abundances between surveys.

The survey design and effort were previously inconsistent, and made difficult any comparison between surveys. Therefore, it was discussed and agreed upon by the responsible of the Demersal Programme of the Instituto Nacional de Investigação Pesqueira of Angola, and the responsible for the Angolan Demersal Programme at the Institute of Marine Research, Norway that all biomass estimates since 1985 should be calculated in a standardized procedure.

Data from the “Nansis” database were exported to flat ASCII text files. The software R 3.0.2<sup>⊗</sup> was used to calculate stratified density estimates sorted by survey and stratified by depth and latitude. Biomass estimates by species or species groups were obtained from a stratified mean density estimator using the equations in Annex IV.

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<sup>⊗</sup> R Development Core Team (2005). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. ISBN 3-900051-07-0, URL <http://www.R-project.org>.

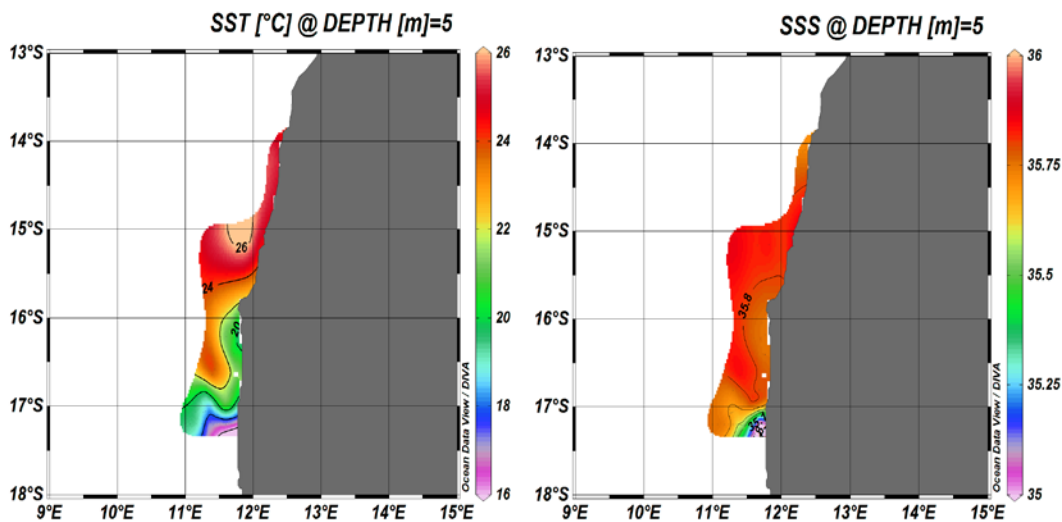
## CHAPTER 3 OCEANOGRAPHIC CONDITIONS

The Angolan shelf is characterized by the semi-annual seasonal cycle, with the two stratified periods, during February-March and in October-November. The principal upwelling season occurs in June-August while it is weak and less regular counterpart in December-January.

### Surface Distribution

#### *Southern Region*

In this region, the surface temperature ranged from 16°C to 26°C. The minimum value (16°C) was observed off the mouth of the Cunene River (Fig.3.1), possibly due to the occurrence of upwelling, characterized by cold waters and a gradual increase in temperature (16-22 ° Celsius) towards the open sea. A maximum temperature of 26°C was observed north of Namibe. Highest values of salinity (<35.75) occurred between Namibe and west of the Cunene river offshore, with lower salinities inshore.

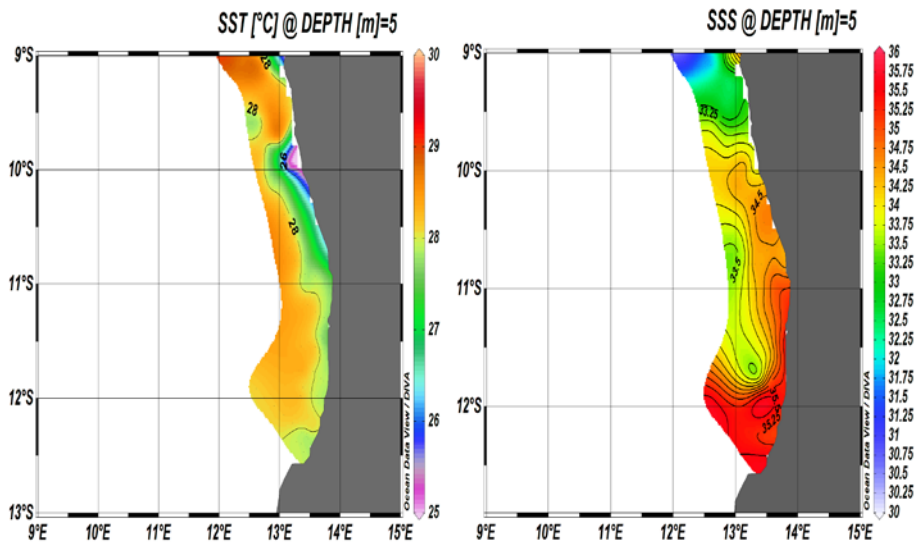


**Figure 3.1** Distribution of SST and salinity at 5m depth in the southern region.

#### *Central Region*

Throughout this region surface water temperature generally showed little variation (27-28°C; Fig. 3.2), except in the coastal area between Cabo Ledo and Cabo de São Braz (10°27'-9°58'S), where temperature decreased to 25-26°C. Salinity varied greatly throughout the region, and ranged between 31-35.5. On the Lobito section in the southern part offshore salinity ranged between 35.25-35.5, while moderately low values (33.5-34.5) occurred offshore north of Lobito and Pta. do Morro, while high precipitation (rainfall) south of Palmeirinha resulted in low salinities (31).

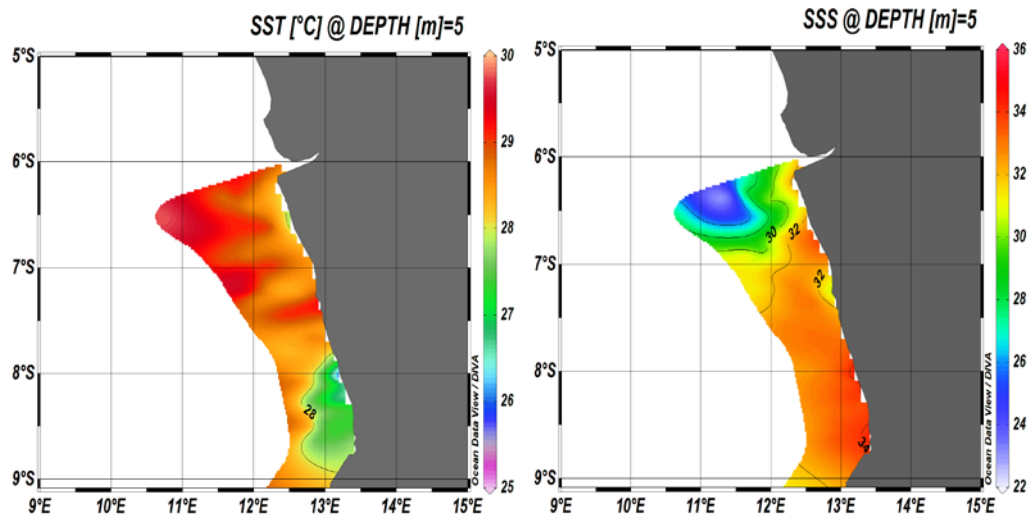




**Figure 3.2** Distribution of SST and salinity at 5m depth in the Central region.

### *Northern Region*

SST fluctuated between 27-30°C, and salinity varied from 24 offshore to 34 in coastal areas (Fig. 3.3). On the section north of Palmeirinhas offshore temperature was 29°C, and near the coastal zone fluctuated between 27-28°C. At the Congo river mouth SST reached 30°C offshore. The highest salinity (34) was observed in Ambriz area, while lowest salinity (24) was observed off the Congo River mouth, which is generally lower compared to recordings made in 2014 (24 -29) and likely a result of high precipitation in the region.

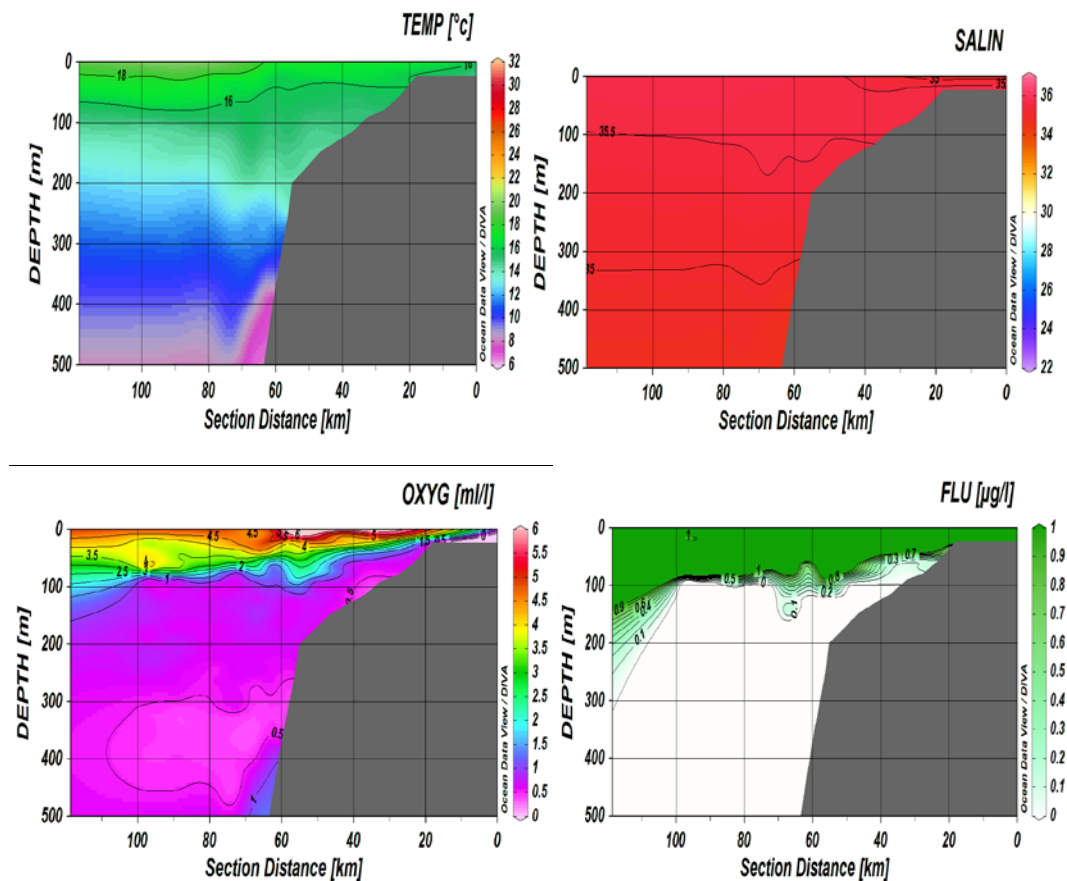


**Figure 3.3** Distribution of SST and salinity at 5m depth in the northern region.

## Standard sections

### *Cunene River*

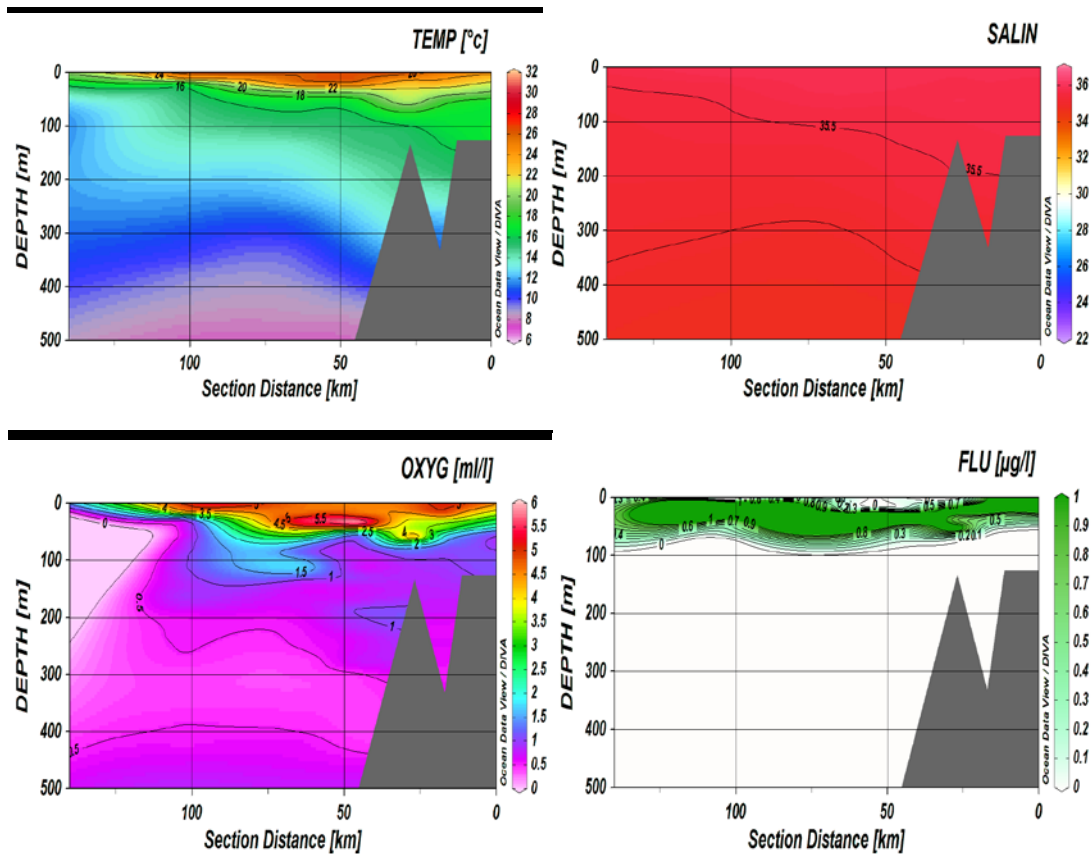
On the Cunene River section temperature varied from 16-18°C between the surface and 100 m (Fig. 3.4), and gradually decreased with depth. Salinity showed little variation. High oxygen concentrations were observed in the upper 80m offshore, but shallower inshore. Below 100m oxygen level were <1ml/l. Fluorescence (1µg/l) indicated high biological activity between the surface and 120 m depth.



**Figure 3.4** Vertical sections of temperature, salinity, oxygen and fluorescence off Cunene River.

### *Namibe*

On the Namibe section the continental shelf (upper 100m) was dominated by high values of temperature, salinity, oxygen and fluorescence (Fig. 3.5). SST varied between 16- 24°C and decreased with depth, while salinity showed little variation throughout the water column. Dissolved oxygen at the surface ranged (5-50m) ranged from 3-5.5 mol/l, and an anoxic layer (< 1 ml/l) was observed offshore generally below 100m depth. High fluorescence (0.5-1µ g/l) occurred between 5-70m depth.



**Figure 3.5** Vertical sections of temperature, salinity, oxygen and fluorescence off Namibe.

### *Lobito*

On the Lobito section the distribution pattern of the mixed layer presented a different picture compared to the Namibe section (Fig. 3.6). The temperature varied between 20–26°C in the upper 30m. Below this layer values declined with depth (8–16°C). The salinity remained at 35,5 along the transect. Oxygen levels varied between 3.5–4.5 ml/l in the surface water, while the oxygen minimum zone (<1ml/l) was located deeper at 310–480m. High fluorescence recordings (0.5–1 µg/l) were observed in the surface layer to 90 m deep.

### *Palmeirinhas*

On the Ponta das Palmeirinhas section (Fig. 3.7), the mixed layer was from 0–30m. Temperature fluctuated between 16–26°C, and was below 10°C below 300 m depth. In the upper water layer over the continental shelf salinity varied from 31–34.5. The presence of less saline water ( $\leq 34$ ) further offshore is a result of freshwater from the Congo River being transported southwards. High oxygen values (4–4.5ml/l) were observed in the surface layer (0–50) m in the coastal zone and offshore, gradually decreasing with depth. The minimum oxygen zone was located below 90m. Highest values of fluorescence (0.9 µg / l) were observed inshore.

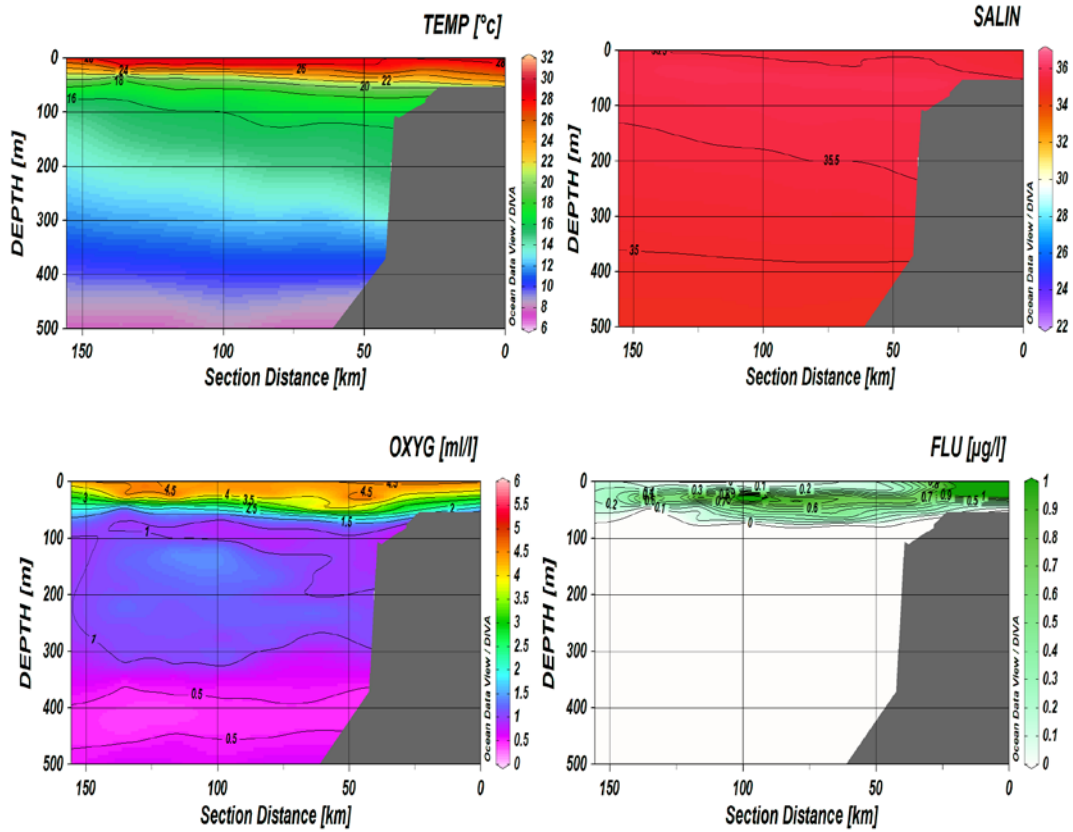


Figure 3.6 Vertical sections of temperature, salinity, oxygen and fluorescence off Lobito.

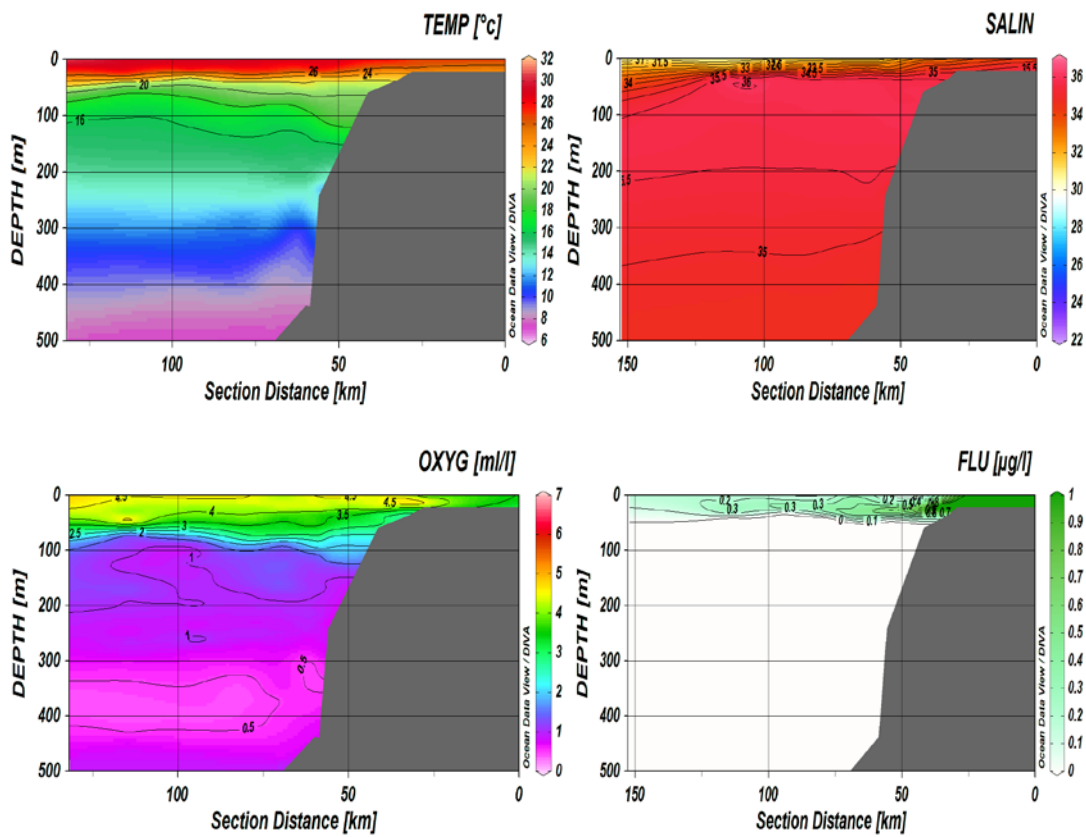
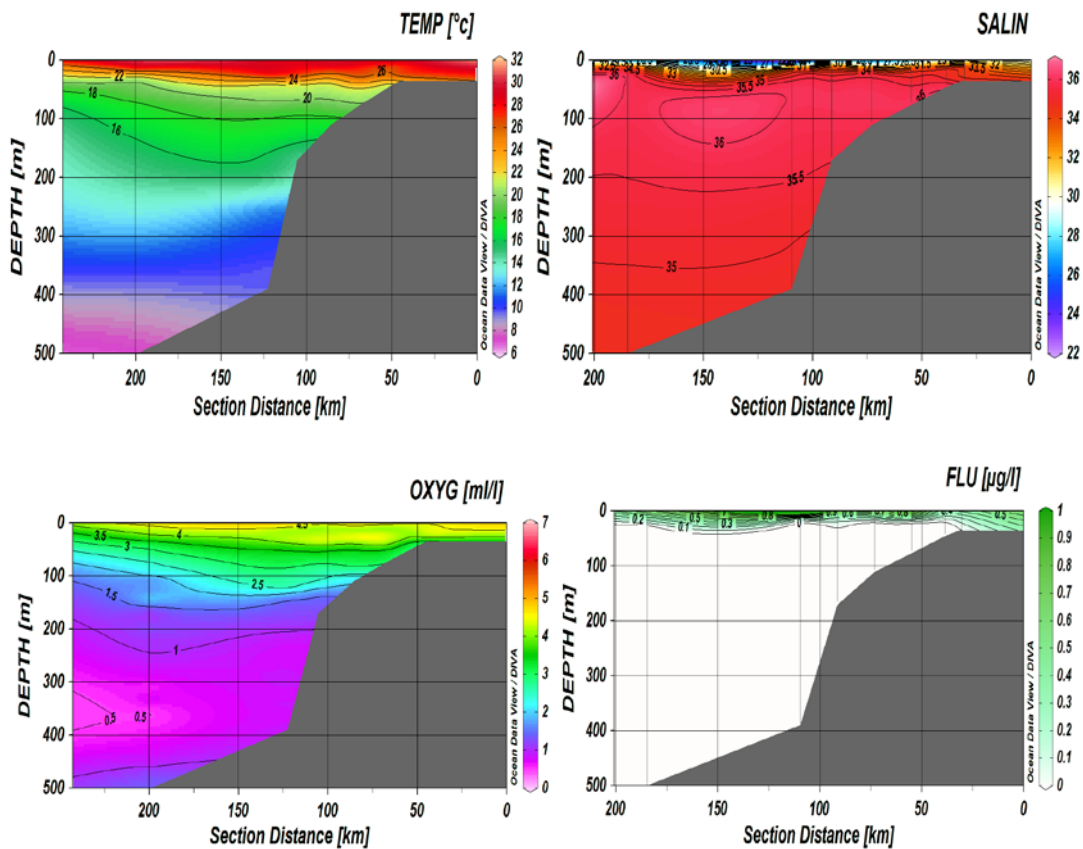


Figure 3.7 Vertical sections of temperature, salinity, oxygen and fluorescence off Ponta das Palmeirinhas.

### Congo River

On the Congo River section (Fig. 3.8), the temperature remained at 28°C in the upper 30 m, which characterizes a mixed layer resulting from the run-off of fresh water from the Congo River. Below this layer the temperature gradually decreased to 20°C at 50 m. Surface salinity varied from 23 to 36. There is a strong mixing process characterized by the laminar bodies of water which adds significantly to the area of the thermocline, ranging from 23 to 36. Below this layer salinity remained stable throughout the water column. The oxygen content remained stable (4.5 ml/l) throughout the entire surface water layer, and the minimum oxygen zone (OMZ) was observed below 100m. In terms of fluorescence, greater biological activity (0.3-0.9  $\mu\text{g/l}$ ) occurred in the surface layer and inshore between the surface and ocean floor.



**Figure 3.8** Vertical sections of temperature, salinity, oxygen and fluorescence off Congo River.

Oxygen titrations of water samples collected at various depths on the Congo River section corresponded well with dissolved oxygen measurements recorded with the oxygen sensor on the Seabird 911 CTD (Fig. 3.9)

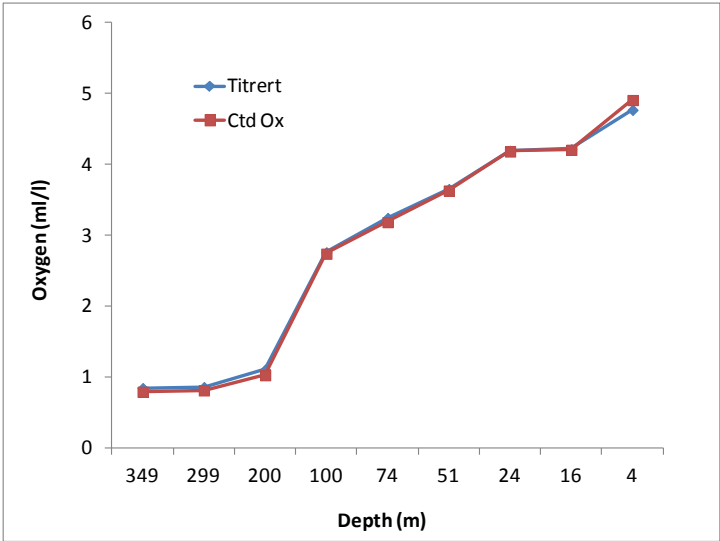


Figure 3.9 Oxygen titrations and CTD oxygen measurements..

## CHAPTER 4 CATCH RATES, DISTRIBUTION, COMPOSITION AND BIOMASS ESTIMATES OF DEMERSAL RESOURCES ON THE SHELF

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The inner shelf is defined as the area between 20 and 70m bottom depth and the outer shelf from 71 to 200m depth. Several of the species which inhabit the shelf, particularly the seabreams (Sparidae) and hakes (Merlucidae), are also found in deeper waters usually in lower density. These are presented in Chapter 5.

Trawl positions are mapped in Figures 2.1-2.3, and the station information and catch by species are presented in Annex I. Pooled length distributions, weighted by the catch of the main species by region, are shown in Annex II. Further, the mean densities (tonnes·NM<sup>-2</sup>) and the frequency of occurrence of the most important species are shown in Annex III. Annex V shows the various Nansis species codes used for species and groups of species, and Annex VI presents the catch rates of these species and species groups.

### Congo River - Ponta das Palmerinhas shelf

The survey covered the northern region of Angolan waters from Luanda to Mouth of Congo River. The area north of Congo River is inaccessible to fisheries research surveys due to the restricted oil exploitation area. During some of the previous surveys, this area (Cabinda) has been covered, but to make plausible comparisons the biomass estimates in Table 4.1 only include trawl stations south of Congo River. A total of 50 successful swept-area trawl stations were accomplished on the shelf area in 2015 (Table 2.1).

The total average catch per hour was 562 kg/h on the inner shelf and 518 kg/h on the outer shelf (Annex VI). On the inner shelf the demersal group had an average catch rate of 217 kg/h, contributing with 39 % to the total average catch. Cephalopods, shrimps and sharks contributed with less than 1 % on the inner shelf. The pelagic group had an average catch rate of 249 kg/h (44 %), dominated by a few hauls with large catches of carangids (*Trachurus trecae*).

On the outer shelf, the demersal group contributed with 33 % to the mean catch rate, while the pelagic group contributed with 28 %. Shrimps, sharks and cephalopods contributed with less than 2 % altogether.

On the inner shelf stations seabreams were caught on all stations and had a mean catch rate of 49 kg/h (9 % of the total). Grunts (except *Brachydeuterus auritus*, big eye grunt) were caught on approximately half of the stations with an average catch rate of 27 kg/h, contributing 5 % of the total. Bigeye grunt was the dominating species on the inner shelf with an average catch rate of about 134 kg/h. Catch rate of croakers was 5,4 kg/h or 1.0 % of the total on the inner shelf, groupers had an even lower mean catch rate of 1 kg/h (less than 1 %), while snappers were not caught.

Seabreams were frequently caught on all stations of the outer shelf with an average catch rate of 71 kg/h (14 %). *Dentex angolensis* was the most abundant seabream with a catch rate of 31

kg/h. Croakers were more abundant on the outer shelf with a mean catch rate of 11 kg/h (2.2 %) and canary drum (*Umbrina canariensis*) was the dominating species of this group.

The most common pelagic group caught on the inner and outer shelf was carangids with 154 kg/h and 126 kg/h respectively, and contributed 28 % and 26% of the total average catch rate. *Chloroscombrus chrysurus* was the main species on the inner shelf, and *Trachurus trecae* had a high representation on both, the inner and outer shelf. Clupeoids were encountered less frequently with a mean catch rate of 73 kg/h (13 %).

*Parapeneus longirostris* was the only shrimp species caught on the outer shelf, occurring in six stations, with a low mean catch rate of 1,3 kg/h.

### *Biomass estimates*

Table 4.1 shows swept-area biomass estimates from 1985 to 2015 for the commercial species and fish groups found on the shelf off northern Angola. The biomass estimates were calculated for three depth strata (20-50m, 51-100m and 101-200m). The biomass estimates presented for the pelagic species cannot be relied on as being a realistic reflection of the true biomass as the species are often unavailable to the bottom trawl. Some of the biomass estimates in Table 4.1 have a high coefficient of variations (CV), e.g. *M. Polli* and clupeids, indicating that the trends in the time series should be interpreted with care.

The biomass estimate of *Trachurus trecae* is 13 600 tonnes, lower than last years record estimate but still the second highest since 1997. The 10 year average is 5 800 tonnes.

The biomass estimate of seabreams in 2015 is 10 250 tonnes, which compared to 2014 means a 50% reduction in biomass. Although the 2015 estimate lies below the last 10 years average (13 000t), the stock seems to be fairly stable when disregarding the high 2014 estimate. Similar to previous years, *Dentex angolensis* was the dominant seabream species in the northern shelf, contributing 32 % of the combined seabream biomass.

The 2015 estimated croaker biomass of 1 600 tonnes is one of the lowest in the time series. The estimate is about a quarter of the 10 year average of 6 100 tonnes. As in previous years *U. Canariensis* was the most common croaker species, and its contribution to the biomass was app 53 % (850 t). The biomass appears to have dropped considerably the last two years, which is similar to the decline observed in 2000-2001.

The biomass estimate of grunts (*Pomadasyss incisus*, *P. jubelini*, *P. rogeri* and *P. peroteti*) was 3 000 tonnes, which is thrice as much as in 2013, but still below the 10 year average of 3 800 t. The 2013 estimate was one of the lowest in the time series, but higher estimates in the last two years may indicate an improvement in the biomass of grunts.

The grouper biomass estimate for 2015 is 350 tonnes, which is close to the 10 year average of 400 tonnes. Considering the entire time series the estimates show a downward trend in biomass, but an increase the last two years may indicate an improvement in the stock. As in previous years, *Epinephelus aeneus* was the most common grouper found on the inner shelf. Snappers are rarely caught as they are rocky dwellers and often unavailable areas. No snappers were caught in 2015.



The biomass estimate of *Parapenaeus longirostris* in 2015 was 36 tonnes. This is low compared to the 2010 estimate of 600 tonnes and is also below the average of the last ten years (136 t).

The 2015 biomass estimate of Sepiidae was 150 tonnes, lower than in 2014, similar to the 2013 estimate but much lower than the ten year average.

The Ommastrephidae biomass estimate was about 500 tonnes, similar to the 2014 estimate, and about three times higher than in 2013 and the highest since 2002.

**Table 4.1** Biomass estimates (tonnes) of important species on the shelf (20-200m) in the northern region. CV values are indicated in brackets

Survey	M.poli		T.treace		Shrimps		Cephalopod		Sharks		Clupeids		Carangids		Scombrids	
1985.1	9	(1.00)	4,496	(0.68)	302	(0.47)	10,463	(0.76)	498	(0.49)	364	(0.59)	9,986	(0.50)	44	(1.00)
1985.2	0		3,324	(0.71)	139	(0.96)	694	(0.35)	451	(0.39)	3,907	(0.98)	3,740	(0.63)	30	(1.00)
1985.3	3,459	(1.00)	16,486	(0.73)	1,448	(0.83)	2,046	(0.41)	870	(0.74)	205	(0.99)	17,742	(0.67)	146	(0.77)
1985.4	7,415	(1.00)	36,044	(0.70)	107	(0.70)	436	(0.44)	78	(0.94)	483	(0.64)	42,506	(0.61)	88	(0.76)
1986.1	56	(1.00)	13,438	(0.49)	1,445	(0.48)	2,853	(0.53)	496	(0.46)	2,053	(0.42)	17,950	(0.38)	30	(1.00)
1986.2	290	(0.74)	8,053	(0.23)	486	(0.37)	1,179	(0.23)	825	(0.31)	1,365	(0.35)	10,364	(0.19)	210	(0.51)
1989.1	62	(0.88)	12,681	(0.55)	92	(0.62)	931	(0.32)	497	(0.59)	1,578	(0.96)	13,264	(0.52)	97	(0.72)
1989.2	250	(1.00)	11,535	(0.40)	509	(0.36)	549	(0.23)	729	(0.47)	1,924	(0.27)	13,966	(0.34)	220	(0.59)
1989.3	1,029	(0.98)	39,959	(0.36)	256	(0.53)	1,715	(0.55)	15,984	(0.67)	5,043	(0.44)	46,704	(0.36)	208	(0.36)
1991.1	0		21,484	(0.35)	381	(0.87)	935	(0.23)	705	(0.36)	1,841	(0.49)	43,605	(0.41)	96	(0.70)
1991.2	312	(0.69)	14,727	(0.43)	2,554	(0.92)	4,225	(0.36)	107	(0.50)	55	(0.46)	14,928	(0.42)	318	(0.45)
1992	1,304	(0.63)	15,520	(0.39)	79	(0.69)	3,114	(0.21)	298	(0.57)	8	(1.00)	17,942	(0.36)	158	(0.53)
1994	51	(0.73)	14,309	(0.49)	478	(0.85)	3,643	(0.28)	52	(0.67)	184	(1.00)	21,225	(0.37)	337	(0.53)
1995.1	127	(0.71)	305	(0.49)	951	(0.53)	451	(0.24)	679	(0.37)	1,369	(0.40)	7,078	(0.36)	181	(0.44)
1996	0		32,155	(0.30)	347	(0.33)	2,203	(0.19)	256	(0.39)	782	(0.83)	33,700	(0.28)	137	(0.69)
1997.1	25	(0.91)	37,094	(0.30)	474	(0.47)	6,218	(0.28)	758	(0.40)	6,391	(0.58)	130,055	(0.52)	288	(0.68)
1999	6	(0.71)	4,106	(0.28)	326	(0.50)	1,202	(0.21)	1,297	(0.32)	6,392	(0.32)	16,570	(0.30)	36	(0.85)
2000	12	(1.00)	6,583	(0.34)	150	(0.53)	609	(0.39)	3,302	(0.87)	619	(0.79)	22,483	(0.46)	69	(0.61)
2001	6	(1.00)	5,502	(0.53)	212	(0.43)	866	(0.54)	391	(0.40)	517	(0.37)	9,560	(0.40)	37	(0.53)
2002	0		9,765	(0.32)	52	(0.30)	956	(0.31)	178	(0.33)	1,442	(0.29)	13,125	(0.25)	75	(0.33)
2003	0		9,766	(0.32)	497	(0.42)	481	(0.34)	243	(0.29)	2,816	(0.31)	28,286	(0.58)	81	(0.84)
2004	0	(1.00)	9,146	(0.30)	196	(0.58)	1,059	(0.15)	492	(0.24)	1,567	(0.38)	12,764	(0.24)	22	(0.60)
2005	0		3,792	(0.29)	146	(0.34)	1,674	(0.19)	734	(0.18)	599	(0.40)	10,292	(0.33)	116	(0.68)
2006	0		5,078	(0.25)	320	(0.56)	1,024	(0.20)	556	(0.43)	2,388	(0.46)	11,445	(0.21)	50	(0.46)
2007	37	(0.99)	2,983	(0.23)	243	(0.43)	703	(0.15)	432	(0.28)	1,797	(0.33)	9,442	(0.24)	195	(0.49)
2008	0	NA	1,938	(0.30)	331	(0.64)	1,204	(0.22)	464	(0.25)	1,754	(0.45)	17,154	(0.39)	151	(0.42)
2009	0	NA	4,412	(0.22)	108	(0.52)	1,010	(0.16)	381	(0.43)	2,961	(0.65)	9,792	(0.37)	100	(0.46)
2010	26	(1.00)	2,073	(0.36)	638	(0.75)	906	(0.19)	316	(0.26)	1,818	(0.86)	5,966	(0.24)	85	(0.65)
2011	0	NA	4,108	(0.55)	106	(0.35)	970	(0.15)	510	(0.33)	3,639	(0.41)	10,792	(0.38)	76	(0.50)
2012	0	NA	7,164	(0.29)	71	(0.64)	2,484	(0.24)	97	(0.36)	39,588	(0.84)	13,824	(0.24)	52	(0.63)
2013	55	(0.69)	2,050	(0.37)	104	(0.39)	465	(0.16)	345	(0.27)	1,452	(0.85)	14,075	(0.41)	6	(1.00)
2014	402	(0.98)	24,612	(0.31)	332	(0.42)	1,542	(0.18)	87	(0.55)	1,955	(0.36)	31,239	(0.25)	302	(0.32)
2015	187	(1.00)	13,700	(0.32)	64	(0.42)	896	(0.27)	105	(0.47)	4,727	(0.86)	23,049	(0.29)	49	(0.77)

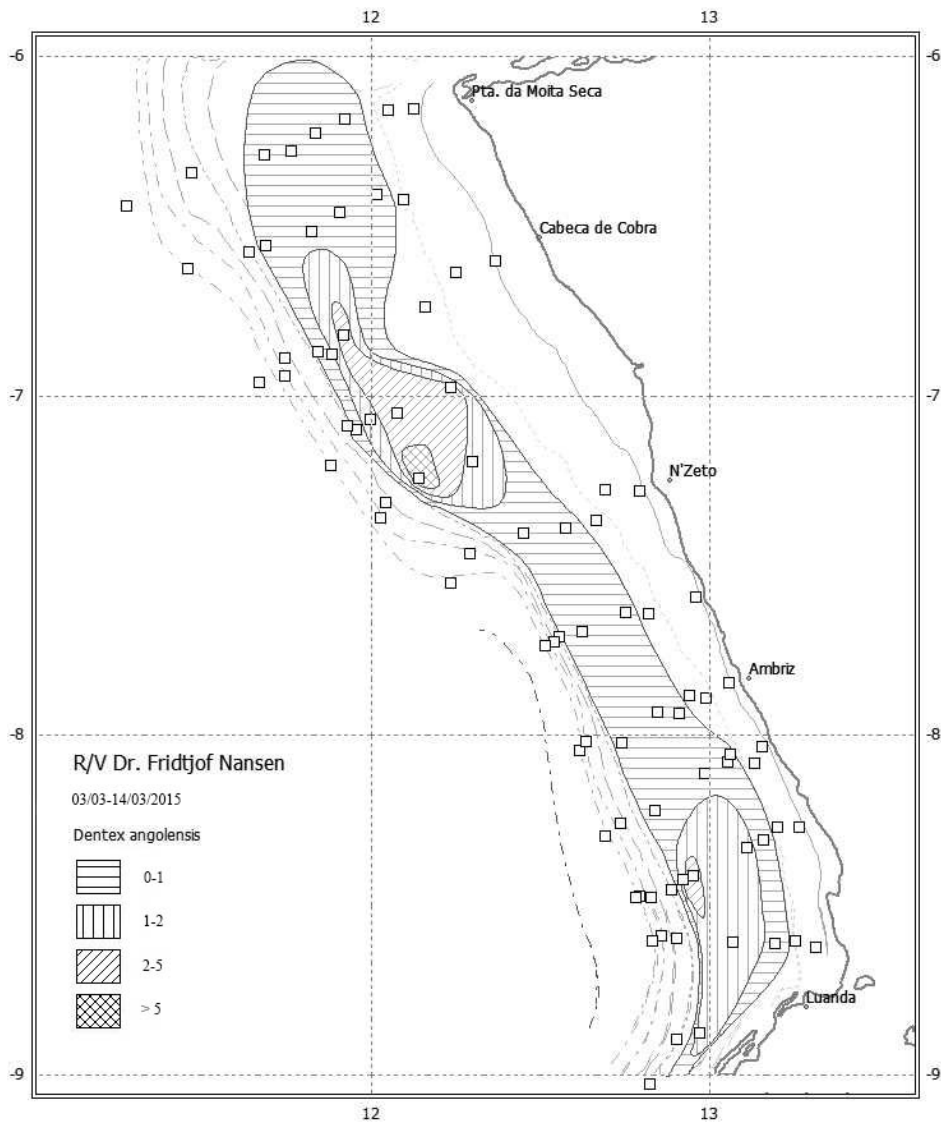
**Table 4.1** Biomass estimates (tonnes) of important species on the shelf (20-200m) in the northern region. CV values are indicated in brackets CONTINUED

Survey	Hairtails	Barracudas	Snappers	Groupers	Grunts	Croakers	Seabreams	P. longirostris
1985.1	15,711 (0.53)	254 (0.54)	0	479 (0.66)	248 (0.52)	1,519 (0.61)	14,690 (0.34)	117 (0.84)
1985.2	1,200 (0.85)	75 (0.42)	63 (0.72)	1,771 (0.48)	381 (0.67)	1,302 (0.59)	12,881 (0.20)	0
1985.3	2,709 (0.41)	26 (1.00)	62 (1.00)	1,978 (0.46)	3,629 (0.48)	8,695 (0.52)	20,897 (0.40)	0
1985.4	3,608 (0.42)	780 (0.89)	0	3,054 (0.37)	14,806 (0.58)	3,692 (0.48)	31,078 (0.24)	10 (1.00)
1986.1	8,078 (0.67)	2,080 (0.34)	434 (1.00)	676 (0.41)	1,231 (0.50)	2,307 (0.50)	17,193 (0.22)	521 (0.66)
1986.2	8,640 (0.50)	756 (0.26)	0	1,515 (0.31)	1,694 (0.31)	5,049 (0.20)	25,098 (0.17)	0
1989.1	2,277 (0.41)	345 (0.44)	0	989 (0.71)	135 (0.59)	4,469 (0.52)	12,958 (0.22)	60 (0.79)
1989.2	3,712 (0.28)	2,973 (0.46)	33 (1.00)	841 (0.38)	1,102 (0.38)	3,231 (0.18)	7,283 (0.20)	22 (0.55)
1989.3	21,132 (0.67)	364 (0.62)	316 (1.00)	315 (0.44)	1,788 (0.51)	4,214 (0.39)	15,344 (0.35)	31 (0.91)
1991.1	11,448 (0.53)	2,739 (0.72)	0	642 (0.56)	822 (0.51)	3,797 (0.43)	4,769 (0.14)	0
1991.2	4,949 (0.31)	79 (0.65)	0	1,022 (0.40)	860 (0.62)	6,450 (0.55)	15,741 (0.23)	129 (0.57)
1992	4,588 (0.28)	14 (0.76)	0	1,844 (0.48)	932 (0.46)	2,778 (0.31)	14,551 (0.13)	49 (1.00)
1994	4,423 (0.26)	325 (0.53)	0	2,474 (0.45)	612 (0.50)	4,095 (0.48)	19,599 (0.25)	478 (0.85)
1995.1	7,208 (0.35)	2,109 (0.56)	481 (0.77)	807 (0.42)	2,921 (0.64)	2,882 (0.38)	8,341 (0.17)	477 (0.69)
1996	3,939 (0.23)	89 (0.69)	0	2,002 (0.50)	5,161 (0.46)	9,292 (0.25)	19,985 (0.35)	10 (0.97)
1997.1	6,323 (0.24)	57 (0.87)	73 (1.00)	549 (0.42)	4,836 (0.54)	12,451 (0.30)	9,009 (0.16)	124 (0.83)
1999	14,001 (0.24)	2,712 (0.36)	5 (1.00)	1,011 (0.36)	5,600 (0.42)	8,528 (0.55)	13,304 (0.15)	113 (0.48)
2000	4,216 (0.46)	1,231 (0.70)	196 (1.00)	620 (0.28)	388 (0.58)	2,450 (0.40)	13,424 (0.21)	18 (0.55)
2001	17,036 (0.57)	856 (0.44)	723 (0.98)	793 (0.58)	2,271 (0.54)	1,458 (0.42)	8,927 (0.24)	101 (0.52)
2002	19,374 (0.37)	1,651 (0.41)	63 (1.00)	509 (0.53)	241 (0.29)	2,835 (0.31)	9,187 (0.21)	21 (0.61)
2003	6,716 (0.31)	2,344 (0.68)	142 (1.00)	334 (0.38)	1,375 (0.34)	8,078 (0.36)	11,346 (0.20)	62 (0.86)
2004	4,668 (0.28)	1,455 (0.59)	37 (0.96)	502 (0.38)	3,316 (0.47)	5,545 (0.38)	11,924 (0.17)	6 (0.77)
2005	5,632 (0.32)	705 (0.69)	278 (0.65)	568 (0.23)	5,754 (0.58)	7,949 (0.32)	18,282 (0.15)	5 (0.53)
2006	11,299 (0.22)	1,570 (0.31)	16 (0.93)	372 (0.38)	2,839 (0.42)	4,087 (0.33)	10,872 (0.15)	176 (0.86)
2007	9,102 (0.33)	1,587 (0.59)	83 (0.69)	460 (0.28)	7,966 (0.72)	3,901 (0.33)	12,758 (0.15)	135 (0.73)
2008	10,986 (0.32)	428 (0.27)	79 (1.00)	614 (0.31)	1,485 (0.38)	8,771 (0.35)	12,833 (0.17)	40 (0.54)
2009	7,272 (0.39)	1,591 (0.45)	168 (0.68)	586 (0.33)	3,209 (0.51)	3,936 (0.32)	9,974 (0.20)	84 (0.65)
2010	2,984 (0.27)	852 (0.48)	0 NA	358 (0.38)	3,197 (0.49)	5,518 (0.38)	13,161 (0.14)	596 (0.79)
2011	4,827 (0.28)	2,919 (0.42)	78 (1.00)	261 (0.51)	6,039 (0.32)	7,243 (0.37)	9,832 (0.12)	11 (0.57)
2012	1,805 (0.43)	954 (0.56)	8 (1.00)	258 (0.35)	5,022 (0.50)	4,703 (0.36)	11,479 (0.16)	42 (0.95)
2013	2,087 (0.25)	2,647 (0.54)	0 NA	134 (0.55)	934 (0.34)	12,598 (0.73)	11,663 (0.16)	36 (0.74)
2014	3,179 (0.63)	743 (0.37)	222 (1.00)	437 (0.38)	1,804 (0.36)	2,635 (0.36)	19,302 (0.16)	196 (0.66)
2015	2,194 (0.32)	1,168 (0.40)	0 NA	350 (0.41)	2,979 (0.41)	1,576 (0.25)	10,249 (0.17)	36 (0.69)

Survey	Ommastrephidae	Sepiidae	D.macrophthalmus	D.angolensis	U.canariensis	B.auritus
1985.1	10,273 (0.77)	13	200 (1.00)	2,196 (0.33)	1,132 (0.74)	40,729 (0.70)
1985.2	0	0	0	2,495 (0.34)	521 (0.89)	6,842 (0.73)
1985.3	0	154 (0.59)	0	2,949 (0.42)	602 (0.68)	9,182 (0.66)
1985.4	84 (0.81)	215 (0.78)	125 (1.00)	6,371 (0.59)	2,650 (0.50)	64,007 (0.62)
1986.1	1,847 (0.76)	808 (0.43)	2,058 (0.34)	3,814 (0.33)	279 (0.45)	95,679 (0.19)
1986.2	0	734 (0.33)	1,483 (0.29)	11,220 (0.21)	1,350 (0.29)	15,408 (0.25)
1989.1	506 (0.52)	288 (0.56)	0	1,612 (0.21)	542 (0.48)	5,450 (0.58)
1989.2	161 (0.32)	272 (0.44)	222 (0.53)	2,299 (0.35)	172 (0.33)	14,252 (0.28)
1989.3	1,661 (0.56)	45 (0.60)	100 (0.58)	2,614 (0.28)	1,194 (0.83)	51,225 (0.36)
1991.1	368 (0.32)	282 (0.46)	158 (0.64)	1,317 (0.23)	496 (0.44)	28,701 (0.43)
1991.2	2,718 (0.53)	229 (0.44)	690 (0.55)	3,198 (0.25)	4,375 (0.80)	1,661 (0.89)
1992	1,071 (0.24)	901 (0.37)	1,532 (0.66)	5,112 (0.16)	680 (0.37)	7,599 (0.70)
1994	441 (0.21)	1,910 (0.24)	1,740 (0.47)	3,451 (0.23)	2,740 (0.68)	7,572 (0.58)
1995.1	72 (0.35)	268 (0.28)	197 (0.68)	2,143 (0.23)	342 (0.70)	12,801 (0.45)
1996	589 (0.17)	929 (0.31)	2,169 (0.48)	4,303 (0.24)	2,073 (0.59)	26,804 (0.62)
1997.1	1,017 (0.43)	5,148 (0.33)	324 (0.47)	2,837 (0.25)	1,161 (0.48)	39,107 (0.27)
1999	391 (0.27)	411 (0.25)	146 (0.46)	2,881 (0.12)	3,582 (0.88)	37,727 (0.24)
2000	214 (0.50)	344 (0.61)	65 (0.52)	4,053 (0.47)	1,271 (0.66)	23,205 (0.42)
2001	176 (0.31)	679 (0.69)	417 (0.52)	1,228 (0.24)	188 (0.83)	13,842 (0.36)
2002	660 (0.44)	97 (0.28)	102 (0.72)	2,089 (0.32)	835 (0.50)	15,791 (0.39)
2003	115 (0.49)	255 (0.64)	16 (0.49)	3,491 (0.17)	3,239 (0.77)	66,410 (0.54)
2004	344 (0.25)	494 (0.24)	79 (0.68)	5,214 (0.24)	1,236 (0.32)	24,512 (0.52)
2005	146 (0.20)	1,307 (0.22)	136 (0.51)	6,727 (0.11)	3,640 (0.46)	52,045 (0.53)
2006	183 (0.45)	418 (0.25)	7 (0.81)	4,630 (0.12)	2,151 (0.56)	61,138 (0.40)
2007	42 (0.35)	429 (0.19)	11 (0.83)	5,980 (0.15)	622 (0.44)	12,523 (0.35)
2008	226 (0.30)	610 (0.33)	0 NA	4,809 (0.17)	3,171 (0.39)	52,481 (0.50)
2009	163 (0.25)	435 (0.21)	8 (0.79)	4,418 (0.17)	985 (0.35)	23,822 (0.72)
2010	137 (0.25)	538 (0.30)	20 (0.67)	7,293 (0.15)	3,389 (0.52)	16,682 (0.45)
2011	44 (0.18)	746 (0.18)	1 (1.00)	5,888 (0.13)	1,975 (0.54)	25,797 (0.52)
2012	212 (0.42)	2,000 (0.30)	46 (1.00)	5,571 (0.19)	1,474 (0.54)	32,819 (0.42)
2013	149 (0.18)	129 (0.36)	5 (0.58)	7,008 (0.22)	11,640 (0.79)	27,898 (0.40)
2014	489 (0.32)	737 (0.24)	0 NA	8,045 (0.19)	1,400 (0.42)	44,915 (0.29)
2015	503 (0.49)	149 (0.28)	2 (1.00)	3,299 (0.16)	853 (0.37)	14,086 (0.47)

## Distribution

*Dentex angolensis* was distributed along the whole northern shelf (Figure 4.1). Lower densities (0-1 tonnes/NM<sup>2</sup>) were observed in most of the area of distribution, with a narrow belt of higher densities (2-5 tonnes/NM<sup>2</sup>) on the outer shelf between Cabeça da Cobra to N'Zeto.



**Figure 4.1** Distribution of *Dentex angolensis* in the northern region, Ponta das Palmerinhas - Congo River. Depth contours at 20, 50, 100, 200, 300, 400, 500 and 600 m.

## Ponta das Palmeirinhas / Luanda - Benguela shelf

The central region covers the area from Ponta das Palmeirinhas (Luanda) to Benguela. A total of 43 successful swept-area trawl stations were completed in this region (Table 2.1).

The average catch rates were 1 023 kg/h on the inner shelf and 1 169 kg/h on the outer shelf (Annex VI). On the inner shelf, the demersal group contributed with 51% to the mean total catch rate, cephalopods 1 %, while shrimps and sharks contributed with less than 1%. The pelagic group contributed with 36 % to the overall catch.

Seabreams were caught on most stations on the inner shelf and contributed 5 % ( 52 kg /h) to the total catch rate. The most common Seabreams on the inner shelf were *Pagellus bellottii* and *Dentex barnardi*.

Croakers were caught with an average catch rate of 28 kg/h on the inner shelf and most of catches consisted of canary drum (*Umbrina canariensis*). The grunts (*Pomadasyss* spp.) were caught with a relatively high average catch rate of 162 kg/h. Groupers had an average catch rate of 1 kg/h. Snappers were not found on the inner shelf.

On the outer shelf, the demersal group had a mean catch rate of 207 kg/h or 18 % of the total catch. Catch rate of cephalopods was 10 kg/h. Similar to the inner shelf, shrimps and sharks had low catch rates and contributed with less than 1%.

Seabreams were caught on all stations and were dominant among the commercial demersal fishes with an average catch rate of 74 kg/h, a third of previous years catch rate. *Dentex angolensis* was the most abundant Seabream, followed by *D. macrophthalmus*. Except for a single tow of 131 kg/h grunts were near absent on the outer shelf. Croakers and groupers had a mean catch rate of 16 kg/h and 0,3 kg/h respectively, both lower than in 2014. Snappers were not caught on the outer shelf either.

### *Biomass estimates*

Table 4.2 shows the time series (1985 to 2015) of swept-area biomass estimates for commercial species and groups of species on the central shelf off Angola. The biomass estimates were calculated as previously described for the shelf off northern Angola.

*Meluccius polli* was the only hake species caught on the central shelf. The biomass estimate of 240 tonnes is the highest since 2004. The length distribution consisted of a weaker length group with a 16 cm mode and a stronger length class with a 32 cm mode (Annex II). Comparing the 2015 length distribution with 2014 suggests that this years strong length class has grown from last years single length group with a mode of 21 cm.

The Biomass estimate of seabreams on the central shelf in 2015 was 7 300 tonnes, about half of the 2014 estimate (16 500 t) but similar to the 2013 estimate. Unlike the 2014 estimate, which was dominated by *D. macrophthalmus*, was the 2015 estimate dominated by *D. angolensis*, which contributed about 36 % (2 590 t) to the total biomass. *D. macrophthalmus* contributed app 13% with an estimate of 960 tonnes. The average length of *D. macrophthalmus* was at 21,4 cm slightly higher than in 2014: *D. angolensis* average length was 18,6 cm, compared to 21 cm in 2014, and *Pagellus bellotti* 19,9 cm, which was similar to last year.

The biomass estimated for the croakers does not include all the commercial species of this group. Due to the size of the vessel, a part of the distribution area (< 20 m), which includes most species of this group, is not covered.

The biomass estimate of croakers decreased from 4 300 tonnes in 2014 to 2 770 tonnes this year. *Umbrina canariensis* was the most abundant croaker, and contributed as in 2014 about 50 % to the total croakers biomass. The average length of this species was 22,6 cm, slightly lower than in 2014.

The 2015 biomass estimate of grunts (*Pomadasyss incisus*, *P. jubelini*, *P. rogeri* and *P.peroteti*) was 9 600 tonnes, which is nearly twice as high as the 2014 estimate. The biomass estimate of big eye grunt (*Brachydeuterus auritus*) was 17 800 tonnes. The length distribution of *B. auritus* consisted of two length groups and had a mean length of 14, 7 cm. The average length of *P. incisus* was 19,7 cm, similar to last year's mean length (20,4 cm.)

The estimate for Groupers is the lowest in the time series, and is only 74 tonnes. The estimate time series shows a decreasing trend since 2011.

The 2015 biomass estimate for *Parapenaeus longirostris* (deep rose shrimp) was 11 tonnes, which is the lowest estimate since 2000. *P. longirostris* is mainly distributed on the upper slope, but on the shelf, the biomass estimates fluctuated and shows a decreasing trend in the time serie, with a significant reduction of 97% in the last 8 years.

**Table 4.2** Biomass estimates (tonnes) of important species on the shelf (20-200 m) in the central region. CV values are indicated in brackets.

Survey	M.poli		T.treace		Shrimps		Cephalopod		Sharks		Clupeids		Carangids		Scombrids	
1985.4	124	(0.58)	74,892	(0.59)	58	(1.00)	5,372	(0.46)	0	-	423	(0.72)	75,408	(0.58)	0	-
1986.1	276	(0.60)	17,856	(0.39)	1,631	(0.55)	1,416	(0.28)	224	(0.88)	676	(0.37)	20,336	(0.33)	39	(0.52)
1986.2	207	(0.58)	21,725	(0.49)	361	(0.68)	1,429	(0.46)	0	-	303	(0.47)	23,609	(0.45)	15	(1.00)
1989.1	121	(0.96)	6,999	(0.25)	237	(0.62)	1,864	(0.35)	148	(0.56)	560	(0.79)	12,736	(0.26)	155	(0.40)
1989.2	1,013	(0.47)	21,232	(0.31)	749	(0.41)	2,232	(0.20)	104	(0.63)	345	(0.49)	26,040	(0.28)	92	(0.30)
1989.3	480	(0.65)	9,579	(0.48)	453	(0.88)	2,015	(0.47)	285	(0.78)	1,707	(0.49)	12,816	(0.46)	310	(0.75)
1991.1	0	(1.00)	86,136	(0.46)	39	(0.58)	850	(0.18)	746	(0.62)	508	(0.48)	87,396	(0.45)	277	(0.50)
1991.2	618	(0.71)	47,927	(0.53)	125	(0.62)	2,021	(0.29)	115	(1.00)	36	(1.00)	48,814	(0.52)	126	(0.81)
1992	1,641	(0.37)	32,878	(0.26)	106	(0.67)	2,597	(0.18)	483	(0.66)	70	(0.60)	35,314	(0.25)	64	(0.53)
1994	2,393	(0.80)	138,071	(0.57)	289	(0.49)	2,639	(0.23)	267	(0.50)	21	(0.58)	139,748	(0.56)	566	(0.48)
1995.1	157	(0.46)	4,562	(0.59)	303	(0.48)	758	(0.26)	172	(0.47)	240	(0.31)	12,145	(0.29)	209	(0.56)
1996	713	(0.65)	49,998	(0.42)	108	(0.51)	2,396	(0.24)	1,539	(0.70)	630	(0.39)	54,559	(0.38)	49	(0.90)
1997.1	4,557	(0.71)	27,475	(0.46)	1,088	(0.56)	3,381	(0.22)	208	(0.60)	2,952	(0.97)	38,139	(0.36)	46	(1.00)
1997	7,635	-	68,984	-	1,391	-	2,531	-	149	-	125	-	70,873	-	279	-
1998	375	(0.86)	4,630	(0.55)	365	(0.45)	2,587	(0.21)	310	(0.50)	2,860	(0.80)	7,606	(0.39)	52	(0.80)
1999	15	(1.00)	12,931	(0.32)	15	(0.41)	880	(0.22)	103	(0.60)	1,918	(0.54)	20,182	(0.26)	33	(0.78)
2000	229	(0.91)	18,716	(0.29)	302	(0.53)	1,736	(0.17)	554	(0.52)	1,594	(0.46)	24,648	(0.24)	267	(0.70)
2001	123	(0.68)	16,510	(0.29)	212	(0.76)	1,374	(0.63)	343	(0.46)	80	(0.53)	20,942	(0.25)	97	(0.47)
2002	1,189	(0.49)	78,504	(0.25)	524	(0.43)	2,927	(0.34)	195	(0.48)	1,656	(0.31)	85,587	(0.23)	744	(0.89)
2003	1,774	(0.51)	25,494	(0.33)	515	(0.42)	1,327	(0.27)	266	(0.43)	1,439	(0.33)	29,369	(0.28)	55	(0.51)
2004	163	(0.90)	12,194	(0.36)	910	(0.66)	1,001	(0.20)	576	(0.45)	2,193	(0.41)	15,255	(0.29)	41	(0.56)
2005	44	(0.84)	6,843	(0.32)	89	(0.38)	1,772	(0.21)	195	(0.39)	1,480	(0.51)	9,337	(0.25)	207	(0.80)
2006	44	(0.63)	9,656	(0.21)	187	(0.60)	1,666	(0.15)	459	(0.44)	2,247	(0.44)	13,375	(0.20)	130	(0.41)
2007	55	(0.50)	7,649	(0.30)	54	(0.34)	1,822	(0.18)	802	(0.74)	2,078	(0.35)	13,485	(0.35)	18	(0.62)
2008	22	(0.72)	3,703	(0.32)	257	(0.56)	1,295	(0.13)	132	(0.42)	945	(0.56)	5,636	(0.23)	17	(0.71)
2009	4	(0.89)	9,770	(0.28)	194	(0.68)	1,635	(0.22)	92	(0.50)	8,784	(0.65)	14,325	(0.25)	21	(0.81)
2010	22	(1.00)	2,354	(0.35)	204	(0.50)	1,628	(0.17)	157	(0.42)	1,420	(0.74)	13,526	(0.69)	79	(0.44)
2011	0	-	10,871	(0.77)	41	(0.45)	1,886	(0.20)	74	(1.00)	268	(0.56)	13,183	(0.63)	48	(0.80)
2012	13	(0.57)	16,536	(0.27)	429	(0.65)	2,944	(0.14)	21	(0.71)	32,688	(0.40)	20,501	(0.24)	3,085	(0.90)
2013	1	(0.82)	2,463	(0.48)	185	(0.47)	1,257	(0.11)	102	(0.73)	1,262	(0.31)	10,400	(0.36)	158	(0.48)
2014	113	(0.54)	7,441	(0.35)	111	(0.62)	2,666	(0.20)	84	(0.82)	35,706	(0.76)	9,768	(0.28)	4,732	(0.67)
2015	242	(0.80)	15,757	(0.25)	28	(0.54)	1,170	(0.26)	36	(1.00)	21,774	(0.36)	21,067	(0.19)	121	(0.51)

**Table 4.2 Continued** Biomass estimates (tonnes) of important species on the shelf (20-200 m) in the central region. CV values are indicated in brackets.

Survey	Hairtails	Barracudas	Snappers	Groupers	Grunts	Croakers	Seabreams	P.longirostris
1985.4	2,568 (0.67)	253 (0.66)	0 -	1,253 (0.59)	5,706 (0.70)	10,235 (0.74)	18,407 (0.44)	58 (1.00)
1986.1	14,874 (0.41)	951 (0.35)	32 (1.00)	406 (0.50)	2,105 (0.42)	4,561 (0.31)	9,037 (0.28)	1,483 (0.60)
1986.2	1,012 (0.39)	1,036 (0.44)	0 -	502 (0.68)	4,933 (0.41)	4,300 (0.46)	13,294 (0.28)	0 -
1989.1	9,992 (0.33)	1,936 (0.68)	0 -	580 (0.46)	3,681 (0.52)	1,395 (0.40)	11,443 (0.30)	235 (0.62)
1989.2	2,095 (0.47)	676 (0.32)	19 (1.00)	3,085 (0.92)	1,085 (0.54)	2,875 (0.44)	11,886 (0.22)	665 (0.45)
1989.3	8,488 (0.74)	704 (0.38)	0 -	660 (0.96)	82 (0.60)	595 (0.71)	4,531 (0.33)	445 (0.89)
1991.1	7,664 (0.44)	583 (0.37)	106 (1.00)	176 (0.60)	425 (0.27)	2,048 (0.50)	9,068 (0.19)	10 (0.74)
1991.2	3,174 (0.27)	82 (0.46)	0 -	1,021 (0.57)	1,882 (0.52)	20,081 (0.83)	25,675 (0.21)	117 (0.66)
1992	11,105 (0.36)	89 (0.66)	0 -	1,140 (0.53)	765 (0.58)	1,546 (0.42)	25,033 (0.26)	106 (0.67)
1994	25,705 (0.78)	4 (1.00)	262 (1.00)	411 (0.37)	64 (0.49)	14,156 (0.51)	29,215 (0.22)	165 (0.42)
1995.1	3,655 (0.26)	2,094 (0.34)	113 (1.00)	383 (0.40)	3,392 (0.60)	14,985 (0.61)	13,960 (0.27)	242 (0.57)
1996	3,501 (0.21)	861 (0.45)	99 (1.00)	671 (0.48)	3,070 (0.30)	5,713 (0.26)	18,312 (0.16)	25 (0.80)
1997.1	20,897 (0.37)	430 (0.91)	0 -	226 (0.66)	1,378 (0.78)	8,468 (0.32)	22,500 (0.34)	1,087 (0.56)
1997.2	13,839 -	0 -	0 -	1,023 -	293 -	7,099 -	31,763 -	1,265 -
1998	29,020 (0.78)	454 (0.42)	0 -	198 (0.63)	9,117 (0.48)	8,609 (0.53)	63,225 (0.72)	186 (0.51)
1999	8,174 (0.41)	1,563 (0.31)	493 (0.95)	616 (0.47)	3,255 (0.54)	9,843 (0.53)	17,373 (0.23)	9 (0.54)
2000	10,990 (0.25)	3,321 (0.34)	98 (0.76)	875 (0.45)	6,824 (0.31)	5,351 (0.25)	18,994 (0.18)	277 (0.58)
2001	5,595 (0.33)	957 (0.25)	3 (1.00)	64 (0.66)	1,329 (0.33)	1,744 (0.41)	12,617 (0.32)	198 (0.81)
2002	8,114 (0.27)	2,152 (0.70)	0 (1.00)	231 (0.63)	3,146 (0.28)	6,554 (0.25)	22,196 (0.36)	402 (0.52)
2003	12,067 (0.32)	480 (0.32)	44 (1.00)	702 (0.45)	8,649 (0.70)	5,369 (0.21)	5,595 (0.19)	449 (0.47)
2004	12,299 (0.53)	401 (0.43)	42 (1.00)	638 (0.74)	3,494 (0.57)	9,040 (0.56)	10,312 (0.30)	906 (0.66)
2005	30,984 (0.51)	255 (0.40)	6 (1.00)	593 (0.49)	5,772 (0.47)	5,367 (0.33)	7,833 (0.18)	56 (0.48)
2006	6,376 (0.29)	960 (0.56)	35 (1.00)	431 (0.49)	3,928 (0.50)	4,748 (0.35)	10,908 (0.19)	178 (0.63)
2007	22,472 (0.57)	749 (0.24)	31 (0.88)	491 (0.51)	9,275 (0.53)	8,081 (0.66)	8,013 (0.22)	36 (0.47)
2008	5,098 (0.38)	1,224 (0.65)	11 (1.00)	151 (0.41)	5,926 (0.57)	3,668 (0.40)	5,763 (0.19)	233 (0.61)
2009	20,549 (0.51)	146 (0.55)	124 (1.00)	207 (0.30)	4,845 (0.33)	2,053 (0.32)	7,282 (0.18)	194 (0.68)
2010	7,315 (0.24)	350 (0.44)	69 (0.43)	284 (0.47)	7,676 (0.35)	2,661 (0.32)	8,732 (0.15)	183 (0.55)
2011	4,517 (0.72)	313 (0.41)	190 (1.00)	444 (0.33)	8,638 (0.66)	6,314 (0.48)	9,001 (0.22)	23 (0.48)
2012	8,357 (0.54)	119 (0.54)	0 -	1,079 (0.76)	15,489 (0.70)	3,291 (0.32)	7,162 (0.15)	386 (0.72)
2013	3,620 (0.32)	1,139 (0.59)	0 -	368 (0.64)	6,159 (0.27)	3,201 (0.30)	8,238 (0.27)	102 (0.68)
2014	3,016 (0.31)	157 (0.38)	0 -	650 (0.42)	5,358 (0.35)	4,271 (0.27)	16,499 (0.31)	75 (0.87)
2015	6,828 (0.41)	472 (0.72)	0 -	74 (0.52)	9,686 (0.36)	2,770 (0.26)	7,259 (0.19)	11 (0.73)

Survey	Ommastrephidae	Sepiidae	D.macrophthalmus	D.angolensis	U.canariensis	B.auritus
1985.4	0 -	0	6,123 (0.82)	2,697 (0.19)	6,271 (0.94)	5,065 (0.58)
1986.1	601 (1.00)	506 (0.38)	220 (0.77)	1,314 (0.69)	2,301 (0.54)	37,489 (0.30)
1986.2	0 -	1,248 (0.53)	1,268 (0.87)	3,905 (0.24)	1,969 (0.69)	19,863 (0.35)
1989.1	1,236 (0.51)	65 (0.57)	6,498 (0.40)	956 (0.28)	885 (0.52)	15,038 (0.46)
1989.2	746 (0.30)	1,279 (0.22)	1,096 (0.56)	3,593 (0.29)	1,093 (0.51)	48,469 (0.49)
1989.3	1,476 (0.58)	124 (0.64)	1,530 (0.89)	1,667 (0.33)	0 -	37,091 (0.29)
1991.1	344 (0.37)	237 (0.27)	2,210 (0.52)	1,212 (0.24)	1,160 (0.86)	19,833 (0.35)
1991.2	693 (0.42)	561 (0.52)	17,098 (0.32)	956 (0.24)	18,422 (0.91)	1,862 (0.44)
1992	2,163 (0.21)	159 (0.60)	18,182 (0.35)	1,514 (0.19)	1,023 (0.59)	27,200 (0.67)
1994	1,041 (0.34)	1,158 (0.38)	20,073 (0.31)	2,364 (0.27)	3,261 (0.76)	220,271 (0.99)
1995.1	2 (1.00)	555 (0.28)	7,243 (0.48)	1,879 (0.44)	11,126 (0.69)	25,947 (0.35)
1996	210 (0.31)	1,387 (0.21)	11,195 (0.26)	1,546 (0.26)	1,112 (0.57)	17,495 (0.36)
1997.1	1,324 (0.28)	1,493 (0.38)	12,220 (0.62)	1,497 (0.23)	4,578 (0.37)	6,424 (0.45)
1997.2	418 -	1,251 -	24,404 -	1,260 -	4,995 -	1,953 -
1998	377 (0.38)	1,315 (0.35)	50,924 (0.89)	1,990 (0.23)	2,239 (0.48)	22,014 (0.49)
1999	201 (0.76)	305 (0.30)	5,178 (0.47)	1,162 (0.24)	7,999 (0.64)	92,569 (0.38)
2000	594 (0.34)	568 (0.29)	5,844 (0.45)	1,578 (0.35)	2,466 (0.31)	56,225 (0.53)
2001	186 (0.57)	220 (0.45)	5,680 (0.43)	1,670 (0.26)	1,076 (0.61)	41,122 (0.43)
2002	2,362 (0.41)	271 (0.37)	11,512 (0.69)	923 (0.28)	3,487 (0.33)	64,561 (0.40)
2003	489 (0.58)	370 (0.36)	557 (0.40)	1,046 (0.30)	1,001 (0.31)	38,312 (0.28)
2004	291 (0.53)	258 (0.30)	3,637 (0.68)	1,063 (0.23)	8,167 (0.60)	26,743 (0.24)
2005	232 (0.36)	1,128 (0.33)	905 (0.34)	978 (0.24)	2,215 (0.39)	35,930 (0.43)
2006	134 (0.31)	877 (0.28)	2,772 (0.25)	1,995 (0.23)	4,243 (0.39)	33,093 (0.52)
2007	43 (0.32)	1,195 (0.24)	1,532 (0.53)	1,312 (0.38)	5,224 (0.86)	40,402 (0.32)
2008	327 (0.28)	285 (0.27)	1,496 (0.52)	1,135 (0.20)	1,801 (0.57)	17,736 (0.23)
2009	115 (0.47)	970 (0.35)	683 (0.37)	1,724 (0.34)	1,373 (0.33)	21,397 (0.50)
2010	179 (0.39)	776 (0.21)	572 (0.47)	2,250 (0.24)	1,097 (0.47)	8,156 (0.41)
2011	35 (0.55)	1,227 (0.24)	453 (0.70)	2,582 (0.31)	3,821 (0.67)	10,858 (0.46)
2012	477 (0.52)	1,679 (0.20)	887 (0.73)	1,725 (0.25)	2,642 (0.37)	17,859 (0.33)
2013	130 (0.30)	692 (0.20)	2,917 (0.71)	1,956 (0.23)	1,095 (0.34)	17,535 (0.34)
2014	414 (0.51)	1,177 (0.24)	8,145 (0.62)	3,744 (0.37)	2,294 (0.38)	10,225 (0.40)
2015	258 (0.59)	400 (0.32)	962 (0.34)	2,591 (0.37)	1,233 (0.29)	17,796 (0.31)

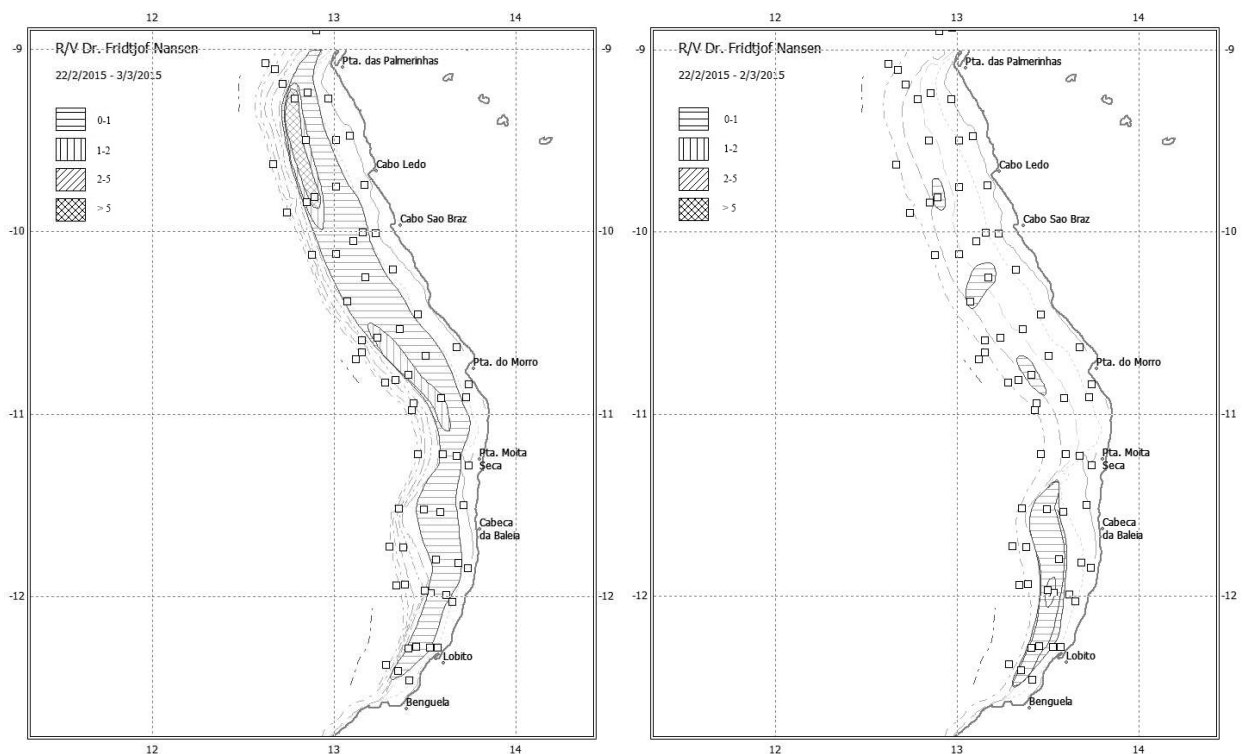
The biomass estimate of Sepiidae has compared to 2014 dropped to 400 tonnes. However, the annual variability and the inadequate sampling gear used (bottom trawl) may indicate that the estimates do not accurately reflect the state of the stock.

For Ommastrephidae, mainly dominated by *Allotethus africanus* on the inner shelf and *Illex coindetti* outer shelf, the biomass estimate was about 260 tonnes in 2015. This is somewhat lower than in 2014, but higher than most estimates in the time series since 2006.

*Trachurus trecae* is the only horse mackerel species caught in the central region in 2015. The biomass estimate for 2015 was 15 760 tonnes, about twice as high as the 2014 estimate and seven times higher than the 2013 estimate. The biomass on the central shelf has been below 30 000 tonnes since 2003, preceded by a very high estimate of 78 000 tonnes in 2002.

### Distribution

Figure 4.2 shows the distribution of *Dentex angolensis* and *Dentex macrophthalmus* in the central region of the Angolan coast. *D. angolensis* was found along the entire central shelf, with the highest densities on the outer shelf in the central and northern parts of its distribution. *D. macrophthalmus* had a patchy distribution and was prevalent in lower densities in the southern area of the central region.



**Figure 4.2** Distribution of *Dentex angolensis* (left) and *D. macrophthalmus* (right) in the central region, Ponta das Palmerinhas - Benguela. Depth contours at 20, 50, 100, 200, 300, 400, 500 and 600m.

## Tombua - Cunene shelf

A total of 19 valid trawl stations were sampled on the southern shelf. The southern region has not been regularly sampled throughout the years, except for the 2000 and 2003-2014 surveys. Other survey results from the time series should therefore be interpreted with caution, as the strategy and design of these surveys were not standardized.

The total average catch per hour on the inner shelf was 2 577 kg/h and 2 838 kg/h on the outer shelf (Annex VI). The pelagic group dominated with 57 % of the mean catch rate on the inner shelf (1 460 kg/h) and 71 % on the outer shelf (851 kg/h). The mean catch rates of the demersal group were 755 kg/h (29 %) on the inner shelf and 661 kg/h (23 %) on outer shelf, respectively. Shrimps were not caught on the inner shelf and only in a single tow on the outer shelf. On the inner shelf the mean catch rates of cephalopods were 57 kg/h and of sharks 104 kg/h, while on the outer shelf they were 30kg/h for cephalopods and 28 kg/h for sharks. The average catch rate of the “other” species group on the inner shelf was 164 kg/h, contributing 6 % to the total catch, and 95 kg/h (3 %) on the outer shelf.

Among the demersal group species found on both the inner and outer shelf, seabreams were the most abundant and were dominated by *D. macrophthalmus*, and *Pagellus bellottii*. This group had an average catch rate of 673 kg/h on the inner shelf and 506 kg/h on the outer shelf. Cape hake (*Merluccius capensis*) was caught in low numbers on the inner shelf (0,2 kg/h) and with an average catch rate of 126 kg/h on the outer shelf, while *Merluccius polli* was only caught on the outer shelf in low quantities (0,7 kg/h). The average catch rate of croakers (mainly *Argyrosomus sp.* and *Atractoscion aequidens*) was 71 kg/h on inner shelf and 26 kg/h on outer shelf. Grunts were found on two stations on inner shelf with a mean catch rate of 3,3 kg/h, while no grunts were caught on the outer shelf. Neither Snappers nor Groupers were caught on the shelf.

The pelagic group was the most predominant group on the inner shelf. Carangids, mainly *Trachurus trecae*, dominated with a mean catch rate of 1 451 kg/h (56 %) of the total on the inner shelf and 2007 kg/h (71 %) on outer shelf. Clupeoids (*Sardinella aurita*) had a mean catch rate of 4 kg/h on inner shelf, while it was only caught in low numbers on the outer shelf (0,9 kg/h). Scombrids catch rate was low (0,7 kg/h) on the inner shelf and were absent on the outer shelf. Barracuda were caught neither on the inner shelf nor on the outer shelf, while Hairtails were caught in low numbers (<1 kg/h) on both the inner and outer shelf.

### *Biomass estimates*

The biomass estimates were calculated the same way as described for the central region. The sampling intensity in the southern region has been variable throughout the years and only strata with at least two stations are included in Table 4.3.

The total biomass of hakes was 3 785 tonnes, of which *Merluccius capensis* contributed 3 764 tonnes, which is much lower than the 2014 estimate (18 429 tonnes) and below the 10 year average (7 163 tonnes). However the 10 year average is driven by two high estimates in 2009 and 2014, and when disregarding these two estimates, the 2015 biomass is similar to the other estimates in this period. Mean length of *M. capensis* in 2015 was 31cm, which is higher than in 2013 (25cm) and 2014 (26cm; Annex II).



**Table 4.3** Biomass estimates (tonnes) of important species on the shelf (20-200 m) in the southern region. CV values are indicated in brackets.

Survey	Hake	T.treace	Horsemackerel	Cephalopod	Sharks	Clupeoids	Carangids	Scombrids
1986.1	1099 (0.32)	14235 (0.35)	23059 (0.26)	1188 (0.55)	618 (0.38)	51 (1.00)	23059 (0.26)	43 (0.58)
1986.2	3709 (0.48)	69542 (0.29)	78132 (0.31)	1555 (0.27)	2593 (0.54)	0 NA	78165 (0.31)	173 (0.53)
1989.1	349 (0.52)	2883 (0.61)	15681 (0.53)	776 (0.35)	188 (0.48)	0 NA	15681 (0.53)	60 (0.45)
1989.2	1121 (0.77)	979 (0.52)	13706 (0.44)	6114 (0.45)	12200 (0.81)	0 NA	13706 (0.44)	35 (0.62)
1989.3	6739 NA	11636 NA	39225 NA	2087 NA	551 NA	0 NA	39225 NA	155 NA
1991.1	2920 (0.76)	21429 (0.35)	50458 (0.30)	732 (0.25)	4005 (0.81)	6 (0.93)	50459 (0.30)	106 (0.80)
1991.2	4385 (0.40)	25595 (0.33)	62961 (0.34)	2192 (0.93)	957 (0.31)	444 (0.95)	62961 (0.34)	0 NA
1992	6756 (0.27)	8106 (0.50)	95433 (0.24)	744 (0.35)	2220 (0.38)	70 (0.91)	95436 (0.24)	0 NA
1993	4023 (0.24)	52839 (0.52)	64235 (0.43)	2501 (0.44)	2278 (0.42)	8 (0.85)	64235 (0.43)	347 (0.61)
2000	3559 (0.47)	185345 (0.62)	218410 (0.51)	1934 (0.17)	2051 (0.28)	43 (0.97)	218473 (0.51)	28 (0.48)
2002	3779 (0.48)	116985 (0.71)	237050 (0.35)	1937 (0.57)	69 (0.55)	1217 (1.00)	237058 (0.35)	711 (0.96)
2003	7014 (0.38)	76533 (0.44)	113879 (0.42)	1630 (0.47)	1163 (0.69)	3601 (0.85)	114293 (0.42)	546 (1.00)
2004	11860 (0.38)	72982 (0.31)	237659 (0.47)	2547 (0.42)	348 (0.43)	12998 (1.00)	237659 (0.47)	5 (1.00)
2005	5067 (0.39)	114 (1.00)	129070 (0.31)	2309 (0.36)	1067 (0.22)	2410 (0.44)	129088 (0.31)	1 (1.00)
2006	3713 (0.23)	126892 (0.27)	184129 (0.28)	1545 (0.37)	3630 (0.77)	308909 (0.58)	184129 (0.28)	2221 (0.98)
2007	3006 (0.31)	100468 (0.32)	107896 (0.30)	1459 (0.28)	2016 (0.28)	1747 (0.44)	107918 (0.30)	95 (0.80)
2008	1722 (0.62)	169349 (0.34)	215813 (0.29)	3235 (0.32)	278 (0.66)	43 (0.73)	215813 (0.29)	1124 (0.50)
2009	31018 (0.19)	322270 (0.45)	322460 (0.45)	1017 (0.29)	271 (0.35)	2148 (1.00)	322460 (0.45)	50 (1.00)
2010	2495 (0.49)	76870 (0.41)	286228 (0.29)	1732 (0.40)	190 (0.59)	100656 (0.68)	286240 (0.29)	605 (0.61)
2011	4827 (0.32)	32076 (0.31)	104890 (0.39)	1683 (0.29)	2054 (0.35)	65380 (0.53)	104890 (0.39)	485 (0.40)
2012	3551 (0.52)	29627 (0.40)	30978 (0.38)	1532 (0.32)	2616 (0.41)	27011 (0.91)	35345 (0.45)	52 (0.82)
2013	2297 (0.58)	64782 (0.37)	74092 (0.34)	3410 (0.38)	1931 (0.52)	5351 (0.49)	74092 (0.34)	290 (0.87)
2014	18432 (0.30)	72569 (0.21)	73178 (0.21)	4741 (0.25)	3233 (0.28)	2168 (0.95)	73178 (0.21)	365 (0.78)
2015	3786 (0.32)	72897 (0.41)	84776 (0.34)	2116 (0.30)	3186 (0.60)	128 (0.54)	84776 (0.34)	16 (0.75)
	Hairtails	Croakers	Seabreams	Ommastrephidae	Sepiidae	D.macrophthalmum	D.angolensis	U.canariensis
1986.1	334 (0.51)	1560 (0.51)	9736 (0.20)	31 (0.38)	138 (0.49)	8304 (0.20)	81 (0.68)	135 (0.74)
1986.2	1694 (0.77)	3960 (0.57)	19201 (0.29)	0 NA	886 (0.33)	17054 (0.32)	5 (1.00)	86 (0.82)
1989.1	965 (0.81)	1492 (0.37)	17853 (0.28)	61 (0.32)	159 (0.64)	17020 (0.28)	139 (0.94)	361 (0.61)
1989.2	510 (0.58)	3601 (0.55)	32669 (0.26)	7 (1.00)	3946 (0.52)	31615 (0.26)	16 (1.00)	442 (0.45)
1989.3	1746 NA	1443 NA	15594 NA	192 NA	17 NA	15509 NA	27 NA	86 NA
1991.1	1335 (0.40)	1341 (0.30)	22333 (0.20)	25 (0.65)	59 (0.38)	20180 (0.22)	6 (1.00)	118 (0.51)
1991.2	255 (0.36)	567 (0.30)	22536 (0.25)	25 (0.54)	31 (0.58)	21994 (0.26)	7 (1.00)	102 (0.65)
1992	13 (0.78)	576 (0.54)	32666 (0.32)	428 (0.64)	150 (0.39)	31822 (0.33)	118 (1.00)	30 (0.58)
1993	361 (0.82)	2744 (0.35)	58399 (0.31)	145 (0.23)	182 (0.67)	57722 (0.30)	238 (0.94)	496 (0.51)
2000	1008 (0.86)	3623 (0.36)	61693 (0.56)	9 (1.00)	514 (0.20)	58636 (0.60)	63 (0.76)	305 (0.43)
2002	0 NA	1046 (0.65)	24802 (0.59)	21 (1.00)	1378 (0.71)	23819 (0.58)	0 NA	12 (1.00)
2003	48 (0.64)	1115 (0.23)	15856 (0.22)	397 (0.41)	1166 (0.64)	13313 (0.22)	0 NA	172 (0.48)
2004	1 (1.00)	518 (0.69)	26946 (0.41)	549 (0.47)	937 (0.89)	24702 (0.44)	1 (1.00)	8 (1.00)
2005	274 (0.84)	6164 (0.40)	12654 (0.30)	1655 (0.51)	327 (0.38)	12121 (0.30)	221 (1.00)	330 (0.71)
2006	26 (0.95)	923 (0.32)	11470 (0.18)	98 (0.54)	1182 (0.48)	11058 (0.19)	0 NA	229 (0.63)
2007	93 (0.73)	4168 (0.66)	15520 (0.21)	555 (0.61)	722 (0.28)	14579 (0.22)	70 (1.00)	563 (0.54)
2008	85 (0.43)	404 (0.54)	9147 (0.22)	6 (1.00)	1561 (0.43)	7276 (0.26)	113 (1.00)	44 (0.56)
2009	27 (0.42)	695 (0.40)	9804 (0.31)	371 (0.51)	315 (0.39)	9618 (0.31)	1 (1.00)	118 (0.71)
2010	148 (0.76)	321 (0.51)	9218 (0.22)	46 (0.60)	659 (0.38)	8118 (0.23)	0 NA	99 (0.83)
2011	649 (0.39)	768 (0.62)	15964 (0.22)	57 (0.76)	305 (0.47)	15671 (0.23)	3 (1.00)	179 (0.56)
2012	659 (0.31)	3713 (0.93)	8704 (0.33)	136 (0.65)	996 (0.25)	5151 (0.42)	0 NA	13 (0.61)
2013	246 (0.61)	3087 (0.40)	8363 (0.28)	1619 (0.37)	358 (0.55)	6859 (0.33)	22 (1.00)	82 (0.45)
2014	14 (1.00)	4050 (0.29)	25168 (0.20)	53 (1.00)	2103 (0.42)	17747 (0.22)	0 NA	72 (0.54)
2015	22 (0.69)	2326 (0.37)	29972 (0.38)	401 (0.48)	743 (0.44)	24526 (0.43)	0 NA	339 (0.97)

The biomass of Seabreams was estimated at 29 972 tonnes, and *D. macrophthalmus* contributed 82 %. The 2015 estimate of seabreams is the highest since 2000 but is mainly driven by two large catches of small (average length of 10 and 11 cm) fish. The difference in mean size between 2015 (11 cm), 2014 (14 cm) and 2013 (15cm) is the visible absence of large fish (>14 cm) in 2015. This may either be the result of undersampling the 200-300m depth strata, distributional changes or a mortality related decrease in larger fish.

Estimates of croakers have varied considerably between previous surveys. The 2015 estimate of 2 326 tonnes is lower than the last three years estimates, but similar to the ten year average (2 429 tonnes). *Attractoscion aequidens* and *Argyrossomus sp.* were the most abundant croakers species, and occurred predominantly in the 20 to 100m depth range.

The 2015 horse mackerel estimate of 84 776 tonnes was higher than the 2013 (74 092 tonnes) and 2014 (73 178 tonnes) estimates. *Trachurus trecae* contributed 72 900 tonnes, and the remainder was allocated to *T. capensis*. The estimate of *T. trecae* was despite the increase in biomass slightly below the 10 year average. However, the swept-area estimates of pelagic fish species are unreliable as the bottom trawl predominantly catches fish close to the seabed. As in 2014 two length cohorts - at 9 and 16 cm - could be distinguished, but the mean length was higher in 2015 (16cm) than in 2014 (11cm).

The biomass estimate of cephalopods in 2015 was 2 116 tonnes, lower than in previous years but similar to the 10 year average (2 266 tonnes).

The biomass estimate of Sharks (which includes Chimaeriformes) was 3 186 tonnes, nearly the same as the 2014 estimate, which was the highest since 2006. The estimates should be carefully interpreted, as they do neither reflect the real species composition nor their biomass due to inadequate sampling gear.

### Distribution

Figure 4.2 shows the distribution of *Dentex macrophthalmus* in the southern survey area. Most of the survey area shallower than 200m was covered by low density registrations, with higher densities in the central part between Pta. Albina and Cunene.

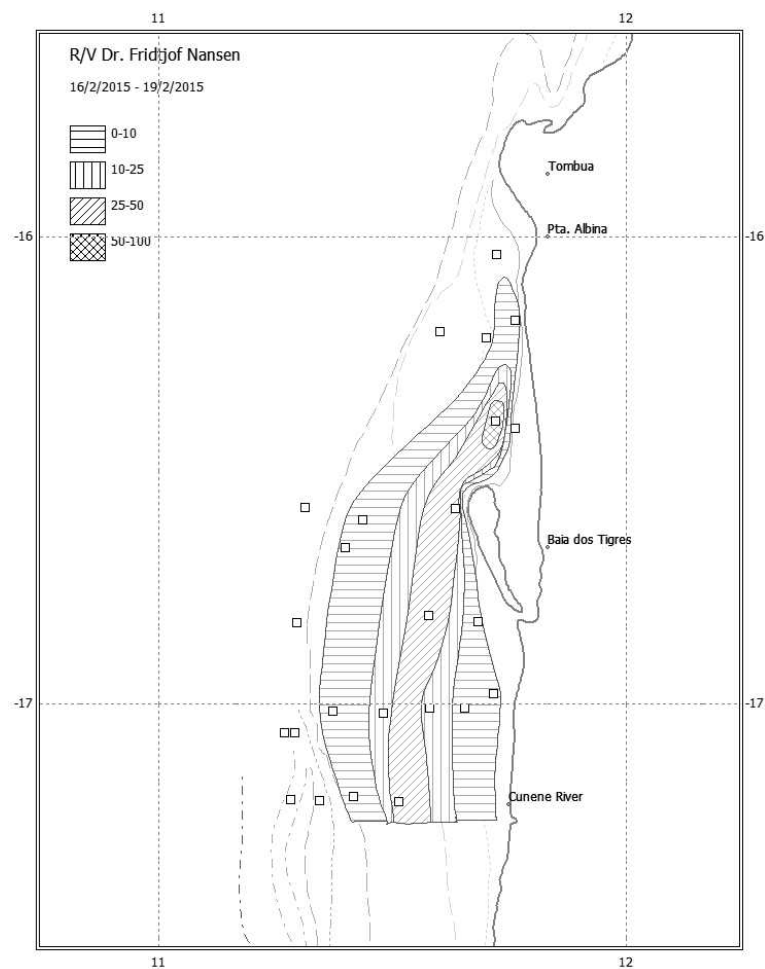


Figure 4.3 Distribution of *Dentex macrophthalmus* in the southern region, Cunene-Tombua. Depth contours at 20, 50, 100, 200, 300, 400, 500 and 600 m.

## CHAPTER 5 CATCH RATES, DISTRIBUTION, COMPOSITION AND BIOMASS ESTIMATES OF DEEP-WATER SPECIES ON THE SLOPE

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The slope is defined in the report, to be between 201 and 800m bottom depth. The trawl positions are mapped in Figures 2.1-2.3 and station information and catch by species are presented in Annex I.

### Congo River - Ponta das Palmeirinhas / Luanda slope

The survey covered the northern region of Angolan waters from Luanda to mouth Congo River, with a total of 34 successful swept-area trawl stations on the slope (Table 2.1).

The average catch rate for all species was 696 kg/h (Annex VI). The contributions to the total mean catch rate by groups were 24 % for the demersal group, 19 % for shrimps, and 1% each for the pelagic group, cephalopods and sharks. The “other” species group dominated the catches and contributed with 55 % to the total mean catch rate. *Merluccius polli* was frequently caught on the upper and lower slope with an average catch rate of 83 kg/h. Seabreams were caught in six stations (only *Dentex angolensis*) with an average catch rate of 14 kg/h.

The average catch rates of the three shrimp species *Nematocarcinus africana*, *Parapenaeus longirostris*, *Aristeus varidens* and were 111, 11 and 6 kg/h respectively. *A. varidens* was caught most frequently, but with the lowest catch rates.

#### *Biomass estimates*

Biomass estimates in tonnes of the most important species groups are presented in Table 5.3.

The biomass estimate of Seabreams was about 1 382 tonnes, a slight increase of the 2014 estimate and above the 10 year average of 745 tonnes. As for previous estimates *Dentex angolensis* was the dominating seabream caught on the upper slope.

This year the biomass estimate for *Merluccius polli* was 7 600 tonnes, the second highest estimate since 2005.

The estimate of *Parapenaeus longirostris* of 1 000 tonnes is similar to the 2014 estimate and the 10 year average (980 tonnes). Between 2005 and 2014 the biomass estimates were stable at approximately 1 000 tonnes, with the exception of 2010, 2012 and 2013. Fluctuations are likely related to environmental dynamics.

The 2015 biomass estimate of *Aristeus varidens* was about 550 tonnes, somewhat lower than previous years (770 tonnes), but similar to previous years estimates and the 10 year average (570 tonnes).

*Nematocarcinus africana* is not a commercially important species. The 2015 biomass estimate was 10 800 tonnes, the highest since 2009.

The biomass estimate of Ommastrephidae in 2015 was 570 tonnes which is the second highest since 2001.

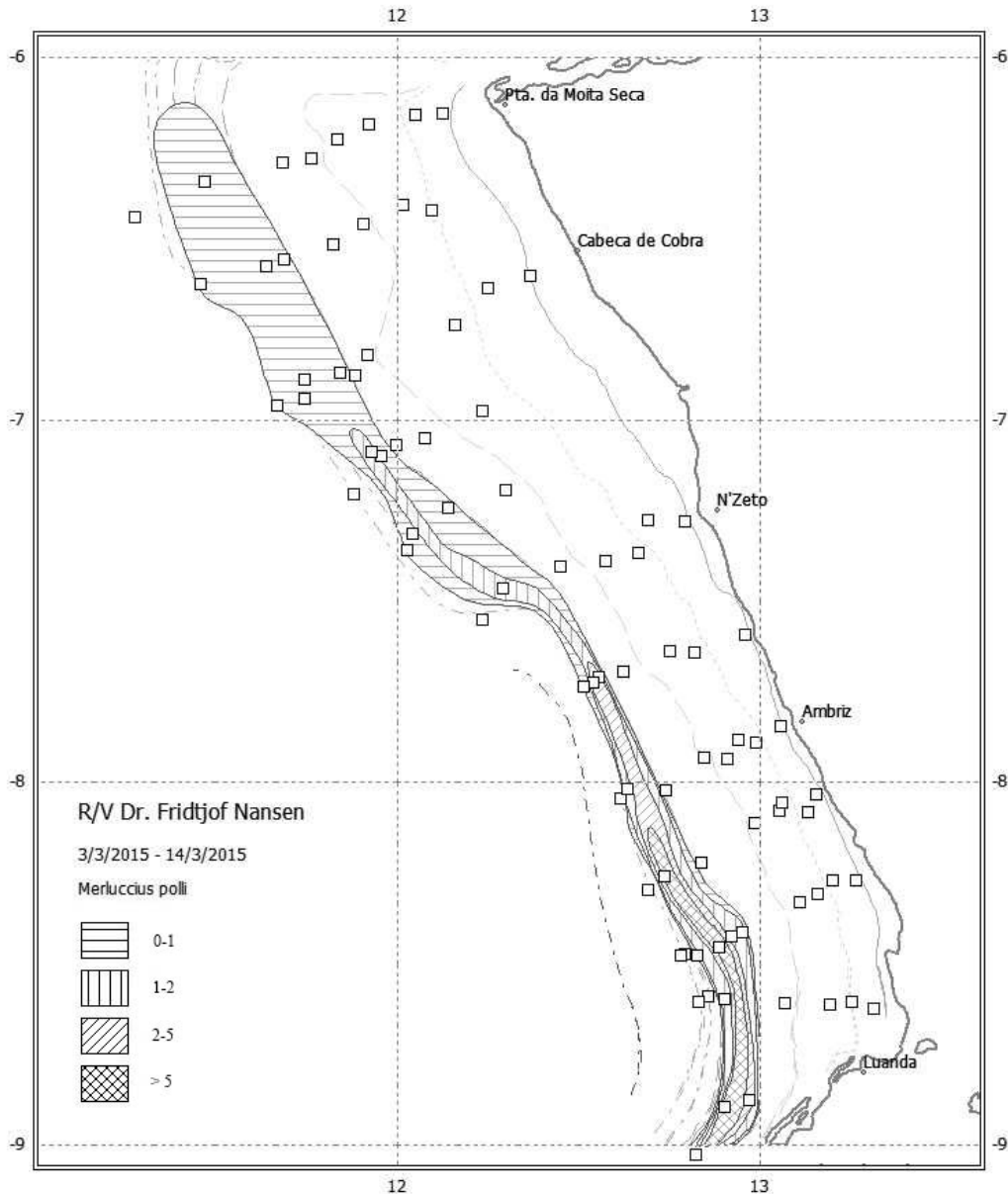
**Table 5.1** Biomass estimates (tonnes) of important species on the slope (200-800m) in the northern region. cv values are indicated in brackets.

Survey	M.poli		Shrimps		Cephalopod		Sharks		Haitails		Croakers	
1985.1	202	(0.00)	21	(0.00)	976	(0.00)	344	(0.00)	0		0	
1985.3	3,065	(0.36)	767	(0.48)	251	(0.28)	209	(0.55)	511	(1.00)	285	(0.37)
1985.4	28,753	(0.36)	11,989	(0.19)	260	(0.55)	0		1,342	(0.29)	8	(1.00)
1986.1	11,409	(0.15)	14,960	(0.10)	1,630	(0.29)	3,724	(0.52)	3,383	(0.26)	0	
1986.2	27,562	(0.27)	7,854	(0.22)	277	(0.36)	4,431	(0.29)	3,228	(0.26)	19	(1.00)
1989.1	13,518	(0.31)	7,772	(0.50)	1,631	(0.52)	2,376	(0.60)	795	(0.33)	0	
1989.2	8,168	(0.17)	4,370	(0.26)	166	(0.48)	375	(0.57)	352	(0.64)	1,624	(0.53)
1989.3	11,265	(0.39)	5,137	(0.14)	657	(0.46)	2,372	(0.24)	1,579	(0.87)	3	(1.00)
1991.1	19,597	(0.25)	8,671	(0.28)	135	(0.64)	1,376	(0.53)	65	(0.45)	3	(1.00)
1991.2	19,498	(0.28)	2,732	(0.14)	991	(0.42)	2,381	(0.31)	699	(0.26)	64	(0.80)
1992	13,290	(0.18)	8,992	(0.28)	209	(0.28)	1,462	(0.42)	1,148	(0.24)	244	(0.62)
1994	4,096	(0.20)	7,529	(0.23)	328	(0.20)	841	(0.28)	1,753	(0.16)	134	(0.60)
1995.1	5,892	(0.42)	9,641	(0.22)	316	(0.73)	1,367	(0.21)	2,284	(0.30)	0	
1996	5,065	(0.13)	4,435	(0.17)	566	(0.49)	307	(0.27)	1,627	(0.30)	34	(0.60)
1997.1	6,954	(0.12)	14,107	(0.15)	659	(0.15)	824	(0.44)	3,399	(0.52)	0	
1997.2	8,101	(0.17)	5,676	(0.70)	330	(0.79)	10	(1.00)	1,972	(0.60)	35	(1.00)
1999	3,624	(0.21)	11,539	(0.19)	1,142	(0.66)	1,060	(0.16)	3,088	(0.35)	113	(0.47)
2000	4,385	(0.23)	4,683	(0.19)	709	(0.19)	597	(0.34)	1,978	(0.45)	0	
2001	4,840	(0.28)	8,283	(0.27)	1,477	(0.56)	1,966	(0.52)	1,531	(0.29)	0	
2002	3,479	(0.26)	6,415	(0.31)	625	(0.39)	118	(0.33)	3,022	(0.44)	27	(0.76)
2003	5,310	(0.29)	7,986	(0.15)	421	(0.24)	1,305	(0.49)	1,237	(0.48)	27	(0.75)
2004	15,327	(0.50)	12,343	(0.13)	871	(0.27)	1,571	(0.34)	1,695	(0.23)	49	(0.84)
2005	10,994	(0.26)	10,285	(0.14)	382	(0.22)	1,180	(0.39)	1,468	(0.19)	19	(0.46)
2006	7,553	(0.21)	12,526	(0.15)	407	(0.23)	931	(0.60)	2,143	(0.32)	18	(0.79)
2007	4,117	(0.22)	14,856	(0.19)	316	(0.26)	501	(0.40)	749	(0.21)	9	(1.00)
2008	5,925	(0.15)	16,979	(0.16)	716	(0.33)	846	(0.25)	1,365	(0.31)	246	(0.55)
2009	2,814	(0.32)	15,238	(0.16)	984	(0.24)	1,152	(0.31)	1,077	(0.19)	24	(0.66)
2010	3,166	(0.32)	10,135	(0.17)	502	(0.23)	382	(0.31)	2,202	(0.36)	7	(1.00)
2011	2,433	(0.31)	11,151	(0.21)	609	(0.36)	669	(0.39)	1,062	(0.31)	146	(0.63)
2012	9,696	(0.31)	12,707	(0.19)	534	(0.28)	313	(0.32)	1,088	(0.45)	55	(0.81)
2013	3,579	(0.27)	10,060	(0.15)	801	(0.58)	784	(0.45)	762	(0.26)	158	(0.48)
2014	4,794	(0.25)	8,223	(0.16)	902	(0.15)	528	(0.39)	799	(0.30)	2	(1.00)
2015	7,594	(0.45)	12,586	(0.18)	777	(0.21)	482	(0.26)	449	(0.15)	42	(0.81)

Survey	Seabreams		P.longirostris		A.varidens		N.africanus		Ommastrephidae		D.angolensis	
1985.1	0		21	(0.00)	0		0		976	(0.00)	0	
1985.3	1,541	(0.00)	0		0		0		0		1,541	(0.00)
1985.4	0		2,108	(0.38)	6,691	(0.26)	2,864	(0.37)	142	(0.78)	0	
1986.1	108	(0.89)	1,166	(0.57)	538	(0.76)	12,631	(0.09)	1,618	(0.30)	98	(1.00)
1986.2	288	(1.00)	0		1,008	(0.20)	4,643	(0.34)	0		269	(1.00)
1989.1	66	(1.00)	419	(0.51)	204	(0.18)	6,953	(0.55)	1,429	(0.59)	0	
1989.2	4,061	(0.99)	366	(0.44)	164	(0.43)	3,682	(0.31)	135	(0.60)	4,038	(0.99)
1989.3	497	(0.79)	243	(0.29)	91	(0.15)	4,699	(0.15)	645	(0.47)	496	(0.79)
1991.1	49	(0.73)	88	(0.44)	70	(0.51)	8,315	(0.29)	129	(0.64)	49	(0.73)
1991.2	527	(0.29)	205	(0.43)	15	(1.00)	2,445	(0.16)	631	(0.48)	510	(0.29)
1992	510	(0.39)	170	(0.46)	272	(0.30)	8,439	(0.30)	143	(0.31)	465	(0.38)
1994	1,045	(0.40)	532	(0.25)	370	(0.27)	6,602	(0.26)	304	(0.22)	1,045	(0.40)
1995.1	506	(0.43)	860	(0.39)	326	(0.26)	7,269	(0.28)	61	(0.44)	449	(0.47)
1996	597	(0.63)	162	(0.27)	267	(0.18)	3,859	(0.20)	228	(0.29)	345	(0.66)
1997.1	871	(0.48)	605	(0.50)	333	(0.14)	13,096	(0.16)	622	(0.16)	826	(0.50)
1997.2	878	(1.00)	1,317	(0.60)	0		4,088	(0.81)	317	(0.81)	876	(1.00)
1999	389	(0.26)	542	(0.19)	237	(0.16)	10,540	(0.21)	1,121	(0.67)	339	(0.30)
2000	1,650	(0.90)	497	(0.18)	222	(0.19)	3,777	(0.24)	509	(0.25)	1,588	(0.94)
2001	494	(1.00)	535	(0.23)	243	(0.20)	6,746	(0.34)	1,001	(0.79)	481	(1.00)
2002	213	(0.64)	800	(0.46)	127	(0.25)	5,337	(0.37)	364	(0.56)	200	(0.68)
2003	141	(0.48)	629	(0.44)	383	(0.30)	6,873	(0.16)	220	(0.34)	135	(0.47)
2004	299	(0.30)	749	(0.43)	359	(0.16)	10,930	(0.15)	316	(0.23)	284	(0.31)
2005	562	(0.36)	984	(0.28)	639	(0.19)	8,535	(0.17)	330	(0.23)	547	(0.37)
2006	343	(0.42)	923	(0.29)	391	(0.16)	11,073	(0.18)	184	(0.20)	340	(0.42)
2007	612	(0.32)	981	(0.34)	373	(0.12)	13,285	(0.21)	125	(0.35)	595	(0.34)
2008	629	(0.29)	933	(0.31)	615	(0.12)	15,267	(0.18)	207	(0.34)	593	(0.28)
2009	523	(0.38)	971	(0.30)	914	(0.13)	13,121	(0.18)	131	(0.40)	523	(0.38)
2010	1,404	(0.42)	389	(0.27)	388	(0.17)	9,207	(0.19)	96	(0.33)	1,404	(0.42)
2011	1,215	(0.39)	1,138	(0.47)	653	(0.12)	8,793	(0.26)	122	(0.36)	1,211	(0.39)
2012	205	(0.73)	1,980	(0.45)	448	(0.17)	10,197	(0.23)	303	(0.34)	205	(0.73)
2013	982	(0.18)	364	(0.27)	526	(0.13)	9,075	(0.16)	91	(0.34)	973	(0.18)
2014	978	(0.29)	1,097	(0.33)	771	(0.21)	5,949	(0.21)	770	(0.16)	910	(0.31)
2015	1,382	(0.65)	997	(0.21)	550	(0.27)	10,802	(0.20)	572	(0.28)	1,379	(0.65)

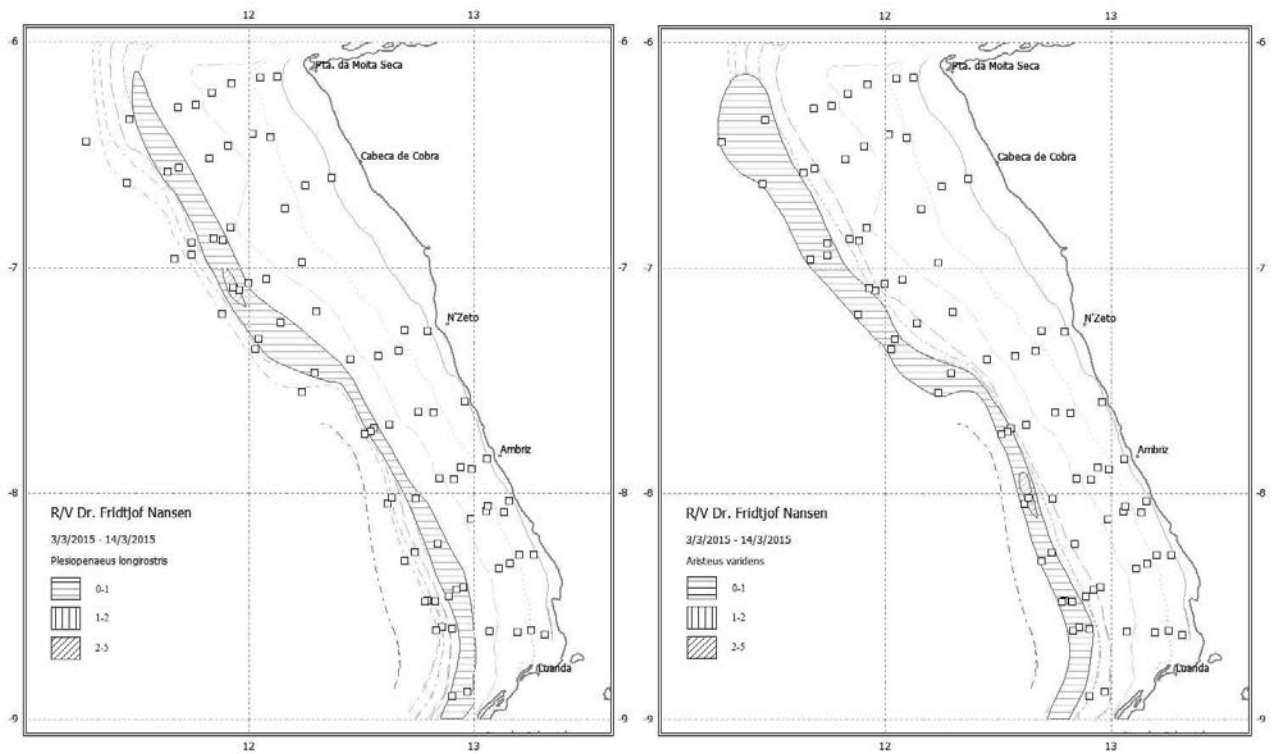
### Distribution

Figure 5.1 shows the estimated distribution of hake (*Merluccius polli*) in the northern region. The distribution covers the slope between Ponta das Palmerinhas / Luanda to Congo River, mainly with densities  $< 5 \text{ t/NM}^2$ , but with a narrow belt of densities from  $> 5 \text{ t/NM}^2$  on the upper slope from south of Ambriz to Ponta das Palmeirinhas.



**Figure 5.1** Distribution of of hake (*Merluccius polli*) in the northern region, Ponta das Palmerinhas / Luanda–Congo River. Depth contours at 20, 50, 100, 200, 300, 400, 500 and 600m.

*P. longirostris* was homogenously distributed on the upper slope, whiel *A. varidens* was more common on the lower slope and also evenly distributed (Figure 5.2).



**Figure 5.2** Distribution of *P. longirostris* and *A. variidens* in the northern region, Ponta das Palmerinhas / Luanda – Congo River. Depth contours at 20, 50, 100, 200, 300, 400, 500 and 600m

## Ponta das Palmeirinhas – Benguela slope

A total of 22 valid swept-area trawl stations were done on the central slope (Table 2.1).

The average catch rate on the slope was 779 kg/h (Annex VI), which is lower than in 2014 but higher than in 2013 (625 kg/h) and 2012 (767 kg/h). The demersal group contributed 208 kg/h, representing 27% of the total mean catch rate, while the pelagic group had an average catch rate of 10 kg/h and contributed app. 1%. Shrimps had a mean catch rate of 145 kg/h (13 %), sharks 9 kg/h (1,1%) and cephalopods 3,3 kg/h (0.4 %). The “other” group, dominated the catches and contributed with 405 kg/h (52%) to the total mean catch rate.

*Merluccius polli* was the only hake species caught, and had an average catch rate of 149 kg/h. Seabreams were only caught in three stations with a mean catch rate of 13,6 kg/h. The average catch rates of *Parapenaeus longirostris* and *Aristeus varidens*, which are the two most commercially important deep-water shrimp species, were 8 kg/h and kg/h, respectively, both lower than in 2014. *Nematocarcinus africana*, a non-commercial shrimp species, was caught on most stations, and had a relatively high catch rate of 117 kg/h in average.

### *Biomass estimates*

Biomass estimates of the most important groups are presented in Table 5.2.

The biomass estimates of the pelagic species may not reflect the true biomass, as pelagic species are often distributed too high in the water column to be available for the bottom trawl.

The 2015 biomass estimate for hake (*M. polli*) was 7 435 tonnes which is slightly lower than the 2014 estimate (8 700 tonnes). The time series shows an increasing trend in biomass since 2013, after the 2004 - 2013 period that showed a clear declining trend. The length distribution of *M. polli* on the central slope is dominated by fish > 25 cm, compared to 2014, when the biomass was composed mainly of fish < 25 cm.

The biomass estimate of seabreams in 2015 was 1 300 tonnes, higher than in 2014 (400 tonnes). Estimates have fluctuated considerably since 2001, and most estimates also had a relatively high CV. This may be the result of either undersampling the depth strata where seabreams are expected, patchiness or changes in the distribution of seabream species. The 2015 estimate was dominated by *D. macrophthalmus* (65%; based on one single large catch) and *D. angolensis* (31%) caught on two stations on the slope.

The *Parapenaeus longirostris* biomass estimate of 600 tonnes was less than in 2014 and about a third of the 2013 estimate, but higher than in the period of 2007-2011. The at times high CVs indicate that the time series should be interpreted with care

The biomass estimate of *Aristeus varidens* in 2015 was 1 080 tonnes, which is less compared to last year, but still higher than most estimates in the period 2000 – 2012 (10 year average is 945 toones). The timeseries of estimates shows an increasing trend since 2002, and the last estimates are indicative of the stock being stable, with corresponding low estimate CVs adding confidence in the estimates.

**Table 5.2** Biomass estimates (tonnes) of important species on the slope (200-800m) in the central region. CV values are indicated in brackets.

Survey	P.longirostris	A.varidens	N.africanus	Ommastrephidae	D.macrophthalmus	D.angolensis
1985.4	886 (0.62)	942 (0.84)	714 (0.49)	0 -	39 (1.00)	215 (0.62)
1986.1	653 (0.39)	492 (0.37)	3,173 (0.51)	971 (0.37)	499 (0.93)	474 (0.96)
1986.2	0 -	0 -	0 -	0 -	6,446 (0.00)	0 -
1989.1	181 (0.54)	194 (0.46)	592 (0.75)	39 (0.33)	804 (0.96)	0 -
1989.2	505 (0.36)	228 (0.30)	1,020 (0.59)	240 (0.73)	26 (1.00)	33 (1.00)
1989.3	375 (0.14)	194 (0.28)	958 (0.41)	409 (0.34)	324 (0.50)	110 (0.94)
1991.1	204 (0.33)	653 (0.09)	3,879 (0.18)	195 (0.33)	706 (0.92)	74 (0.79)
1991.2	190 (0.25)	105 (0.62)	2,659 (0.26)	114 (0.35)	249 (0.79)	239 (0.83)
1992	610 (0.42)	366 (0.25)	3,224 (0.31)	141 (0.27)	358 (0.63)	138 (0.82)
1994	579 (0.37)	647 (0.28)	2,199 (0.44)	168 (0.25)	1,113 (0.68)	40 (1.00)
1995.1	425 (0.41)	753 (0.19)	2,460 (0.51)	30 (0.59)	6,037 (0.57)	226 (0.43)
1995.2	479 (0.19)	698 (0.10)	2,763 (0.15)	85 (0.26)	1,196 (0.32)	95 (0.63)
1996	114 (0.23)	671 (0.15)	4,971 (0.30)	41 (0.28)	974 (0.21)	42 (1.00)
1997.1	685 (0.22)	305 (0.23)	4,093 (0.28)	476 (0.28)	1,700 (0.57)	158 (0.71)
1997.2	2,679 (0.24)	0 -	11 (1.00)	134 (0.11)	4,864 (0.55)	180 (0.48)
1998	556 (0.28)	1,192 (0.45)	7,000 (0.21)	389 (0.37)	1,549 (0.51)	94 (0.98)
1999	214 (0.37)	337 (0.43)	1,206 (0.30)	315 (0.26)	2,806 (0.38)	94 (0.70)
2000	455 (0.43)	379 (0.15)	1,043 (0.40)	426 (0.25)	1,954 (0.45)	105 (0.64)
2001	186 (0.19)	456 (0.25)	517 (0.95)	339 (0.47)	663 (0.75)	102 (1.00)
2002	341 (0.54)	243 (0.21)	3,039 (0.30)	261 (0.32)	2,307 (0.97)	111 (1.00)
2003	223 (0.19)	498 (0.43)	3,284 (0.41)	409 (0.28)	514 (0.87)	92 (1.00)
2004	419 (0.48)	576 (0.17)	6,204 (0.19)	350 (0.43)	10,265 (0.99)	572 (1.00)
2005	574 (0.30)	792 (0.17)	5,640 (0.19)	536 (0.47)	6,260 (0.97)	208 (0.63)
2006	1,330 (0.60)	359 (0.14)	5,351 (0.16)	457 (0.44)	2,138 (0.98)	284 (1.00)
2007	191 (0.58)	653 (0.07)	7,913 (0.16)	138 (0.57)	612 (0.48)	196 (1.00)
2008	415 (0.59)	880 (0.11)	5,085 (0.18)	138 (0.33)	1,681 (0.92)	322 (1.00)
2009	182 (0.43)	1,290 (0.16)	6,009 (0.21)	37 (0.48)	168 (0.00)	0 -
2010	479 (0.45)	746 (0.22)	6,806 (0.25)	40 (0.55)	1,803 (0.98)	613 (1.00)
2011	319 (0.09)	619 (0.08)	3,413 (0.39)	44 (0.14)	274 (0.00)	0 -
2012	1,563 (0.25)	1,077 (0.25)	6,086 (0.18)	675 (0.55)	2,738 (1.00)	0 -
2013	1,647 (0.66)	1,418 (0.23)	5,877 (0.15)	101 (0.26)	481 (0.70)	516 (0.72)
2014	816 (0.34)	1,615 (0.17)	6,810 (0.16)	364 (0.32)	229 (0.57)	197 (0.50)
2015	616 (0.37)	1,076 (0.28)	7,304 (0.21)	105 (0.30)	1,057 (1.00)	243 (0.55)

Survey	M.polli	Shrimps	Cephalopod	Sharks	Hairtails	Seabreams
1985.4	18,790 (0.42)	2,915 (0.49)	301 (0.47)	17 (1.00)	420 (0.69)	253 (0.55)
1986.1	17,757 (0.30)	6,306 (0.29)	1,003 (0.34)	557 (0.36)	16 (1.00)	972 (0.94)
1986.2	24,611 (0.00)	13,247 (0.00)	57 (0.00)	-	498,917 (0.00)	6,446 (0.00)
1989.1	2,803 (0.55)	1,008 (0.39)	39 (0.33)	65 (0.30)	60 (0.91)	804 (0.96)
1989.2	4,940 (0.33)	1,963 (0.34)	277 (0.59)	263 (0.51)	142 (0.24)	58 (0.71)
1989.3	12,633 (0.41)	1,546 (0.23)	410 (0.34)	3,247 (0.15)	35,703 (0.01)	435 (0.43)
1991.1	11,939 (0.14)	4,950 (0.14)	315 (0.20)	732 (0.23)	2,606 (0.90)	780 (0.91)
1991.2	10,540 (0.22)	3,016 (0.23)	114 (0.35)	1,487 (0.37)	395 (0.53)	488 (0.50)
1992	6,999 (0.12)	4,436 (0.24)	189 (0.22)	2,920 (0.38)	410 (0.56)	496 (0.45)
1994	3,803 (0.31)	3,457 (0.28)	219 (0.25)	707 (0.25)	1,213 (0.36)	1,188 (0.66)
1995.1	4,391 (0.16)	4,480 (0.27)	214 (0.31)	1,216 (0.39)	1,145 (0.22)	6,264 (0.55)
1995.2	4,781 (0.16)	4,295 (0.10)	153 (0.19)	1,064 (0.19)	2,234 (0.53)	1,291 (0.29)
1996	6,440 (0.31)	6,457 (0.25)	97 (0.35)	1,581 (0.37)	244 (0.25)	1,016 (0.21)
1997.1	10,375 (0.25)	6,969 (0.15)	538 (0.27)	1,214 (0.36)	902 (0.44)	1,858 (0.50)
1997.2	8,363 (0.15)	2,690 (0.24)	166 (0.12)	42 (0.54)	1,013 (0.09)	5,045 (0.55)
1998	9,991 (0.21)	9,048 (0.16)	428 (0.33)	812 (0.25)	1,840 (0.62)	1,643 (0.47)
1999	2,995 (0.31)	1,806 (0.20)	344 (0.27)	728 (0.37)	728 (0.26)	2,900 (0.36)
2000	5,482 (0.26)	2,445 (0.18)	717 (0.21)	639 (0.29)	871 (0.39)	2,059 (0.45)
2001	4,763 (0.34)	2,575 (0.30)	623 (0.29)	818 (0.78)	297 (0.43)	767 (0.63)
2002	3,012 (0.28)	3,749 (0.25)	469 (0.27)	212 (0.38)	269 (0.23)	2,418 (0.88)
2003	7,155 (0.39)	4,087 (0.34)	420 (0.28)	104 (0.37)	178 (0.54)	606 (0.69)
2004	16,127 (0.32)	7,350 (0.17)	444 (0.36)	476 (0.63)	1,581 (0.44)	10,840 (0.88)
2005	10,074 (0.24)	7,135 (0.15)	578 (0.46)	307 (0.19)	2,655 (0.68)	6,468 (0.93)
2006	6,967 (0.31)	7,180 (0.16)	623 (0.41)	366 (0.36)	954 (0.36)	2,422 (0.81)
2007	6,947 (0.41)	8,939 (0.14)	446 (0.49)	1,054 (0.38)	185 (0.42)	808 (0.18)
2008	6,032 (0.27)	6,490 (0.13)	363 (0.40)	389 (0.56)	762 (0.21)	2,003 (0.61)
2009	5,302 (0.20)	8,079 (0.14)	644 (0.50)	1,382 (0.50)	1,947 (0.34)	168 (0.00)
2010	3,837 (0.23)	8,072 (0.22)	179 (0.17)	350 (0.52)	2,387 (0.84)	2,416 (0.48)
2011	4,318 (0.59)	4,416 (0.31)	223 (0.39)	229 (0.14)	626 (0.80)	274 (0.00)
2012	4,230 (0.40)	9,063 (0.13)	741 (0.50)	228 (0.45)	883 (0.77)	2,738 (1.00)
2013	2,836 (0.18)	9,056 (0.16)	416 (0.30)	889 (0.44)	350 (0.33)	997 (0.46)
2014	8,775 (0.26)	9,627 (0.12)	461 (0.26)	407 (0.27)	125 (0.26)	426 (0.36)
2015	7,435 (0.37)	9,136 (0.17)	243 (0.22)	477 (0.24)	499 (0.44)	1,300 (0.72)

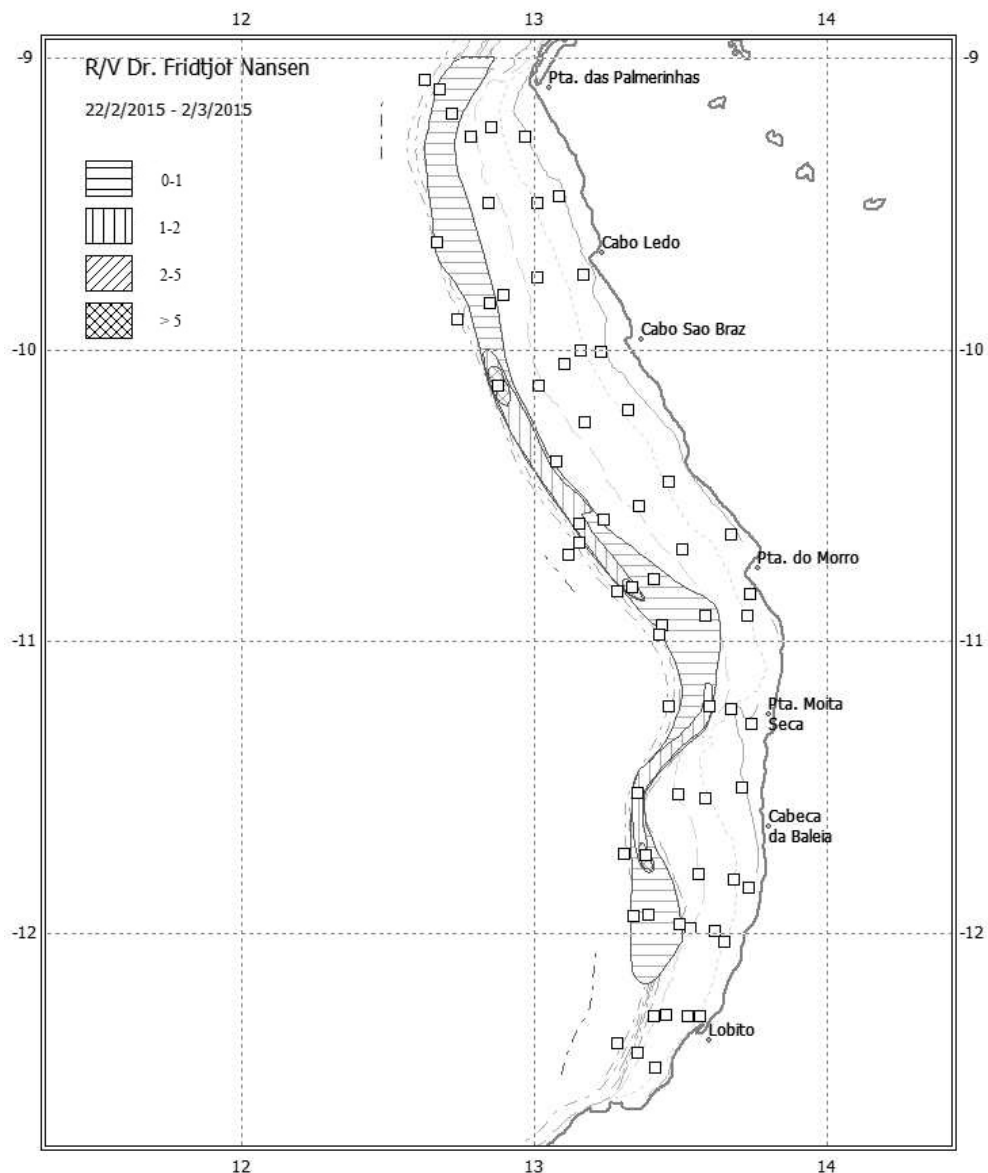


The biomass estimate of the non-commercially shrimp species *Nematocarcinus africana* increased to 7 300 tonnes, which is the highest estimate since 2007.

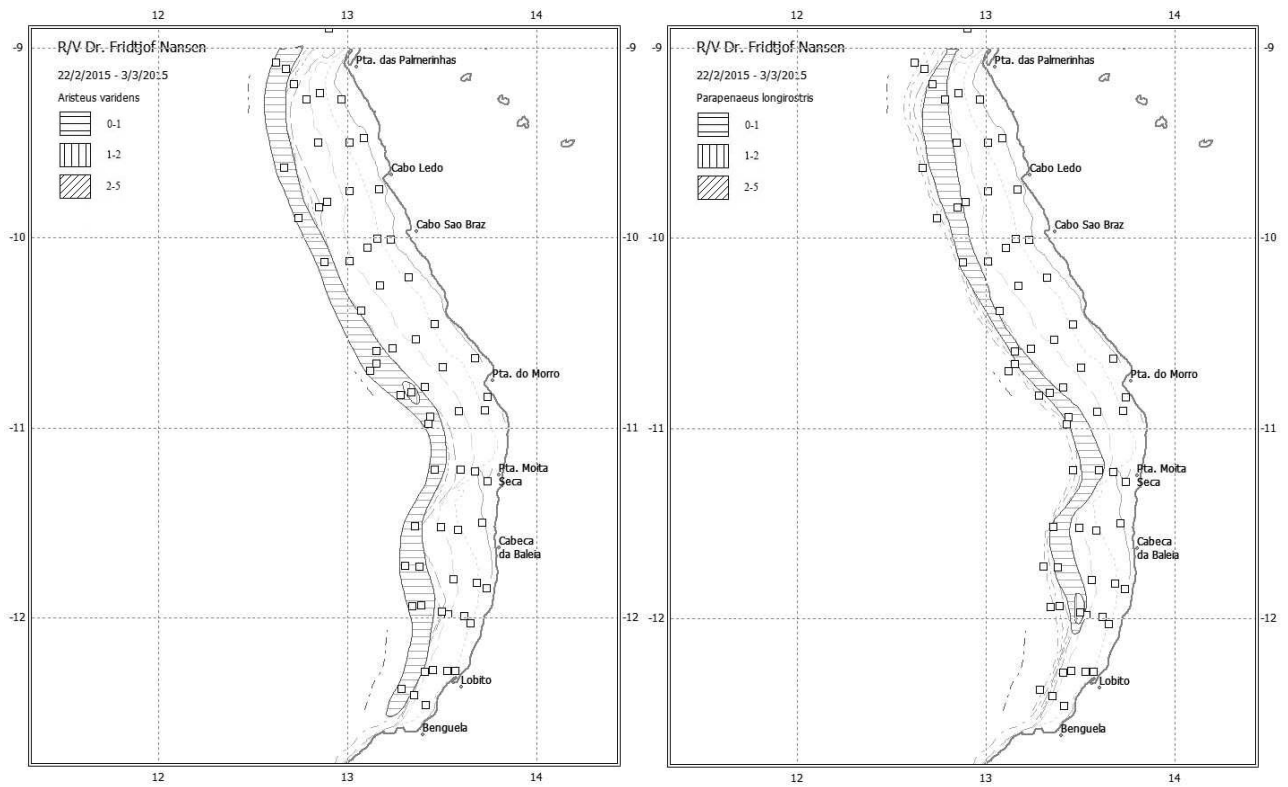
The biomass of Ommastrephidae on the central slope was estimated at 105 tonnes in 2015, three times lower than last year but similar to the 2013 estimate. Due to large differences in estimates and corresponding CVs there is no clear trend in the time series.

### Distribution

Figure 5.2 shows the distribution of hake (*M. polli*) in the central region. The distribution covered large parts of the central slope with the highest densities (1-2 t/NM<sup>2</sup>) between Cabo São Braz and Cabeça da Baleia.



**Figure 5.3** Distribution of Benguela hake (*M. polli*) in the central region, Benguela-Ponta das Palmerinhas / Luanda. Depth contours at 20, 50, 100, 200, 300, 400, 500 and 600m.



**Figure 5.4** Distribution of *A. varidens* and *P. longirostris* in the central region, Benguela-Ponta das Palmerinhas / Luanda. Depth contours at 20, 50, 100, 200, 300, 400, 500 and 600m

## Tombua – Cunene slope

The slope is very steep, uneven and rocky in the south, making it difficult to have long 30 minutes trawls. Six trawl stations were carried out on the southern slope in depths between 300 and 700 meters (Annex VI). The 200-300m depth strata was not sampled in 2015. The total average catch rate in 2014 was 757 kg/h. The demersal group contributed 18.3 % and the “other” group (non-commercial species) dominated the catches and contributed with 73% to the total mean catch rate. Shrimps and sharks contributed with 2 % and 4.5 % respectively. The pelagic group and Cephalopods contributed less than 1 % each.

*Merluccius polli* as well as *M. capensis* (Cape hake) were only caught in low numbers at two separate app. 370 m deep stations *M. paradoxus* (Deepwater Cape hake) was caught at five out of six stations with a mean catch rate of 128.5 kg/h. Striped red shrimp (*Aristeus varidens*) was registered at three stations with a mean catch rate of 6 kg/h.

### *Biomass estimates*

Table 5.3 shows the time series from 2000 to 2015 of the swept-area biomass estimates for different species and species groups on the southern slope. The estimates are based on 6 stations taken in three depth ranges (300-400 m, 400-500 m, and 500-600 m), but are however calculated using the entire area between the 200 and 600 m depth contour. The CV for each of the estimates is high due to the relatively low number of stations, and the estimates must as such be interpreted with care.

In 2015 the biomass estimates of hake is dominated by deep-water hake *M. paradoxus*. The estimated biomass is 680 tonnes, which is lower than in 2014 and below the 10 year average. The general lack of any clear trend in the time series is probably caused by the low sampling effort on the southern slope between 200 and 600 meters. Mean fish size was 42,3 cm.

The biomass of horse mackerel (*Trachurus trecae*) have fluctuated in this region mainly due to the low number of stations as well as the variability in the distribution pattern of this species. The 2015 estimate was 41 tonnes.

The biomass for *Aristeus varidens* is estimated at 51 tonnes in 2015, which is similar to the 2014 estimate but lower than the 10 year average.

The total cephalopod biomass for 2015 is estimated 48 tonnes. This is slightly lower than in 2014, but still much higher than the 10 year average.

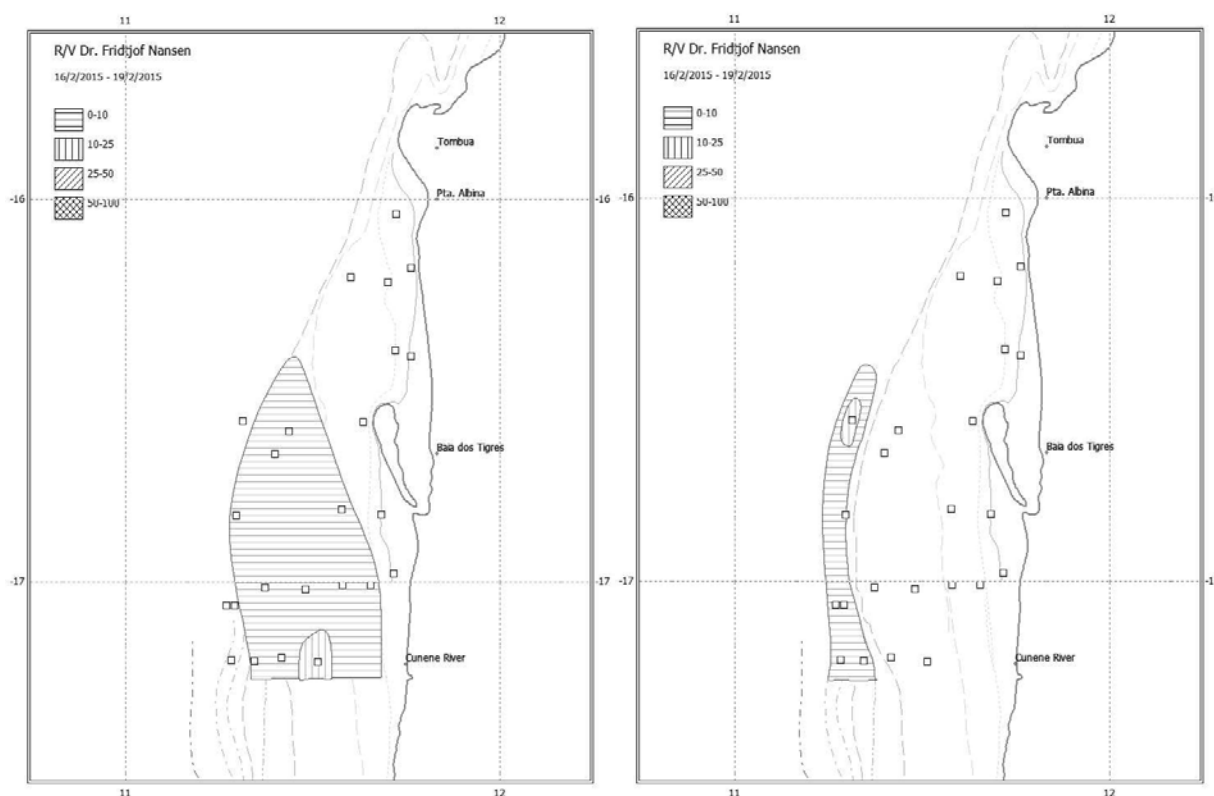
Sharks biomass was estimated to 386 tonnes, higher than last year’s estimate of 116 tonnes. The highest biomass was estimated in 2008 at 4 323 tonnes and no clear trend was noticeable.

**Table 5.3** Biomass estimates (tonnes) of important species group on the slope (200-600m) in the southern region.cv values are indicated in brackets.

Survey	Hake	Horse mackerel	Shrimps	Cephalopod	Sharks	Seabreams	P.longirostris	A.varidens
1986.1	2754 (0.84)	26 (1.00)	182 (0.16)	15 (1.00)	66 (0.40)	1261 (0.95)	0	106 (1.00)
1991.1	3285 (0.52)	62 (0.02)	47 (0.43)	43 (0.14)	463 (0.33)	325 (0.83)	21	0 NA
1991.2	19798 (0.62)	549 (0.48)	0 NA	0 NA	506 (0.68)	2669 (0.08)	0	0 NA
1992	10793 (0.82)	58 (1.00)	235 (0.88)	0 NA	49 (0.19)	2035 (1.00)	15	161 (1.00)
1997.2	3411 NA	13 NA	13 NA	0 NA	917 NA	413 NA	13	0 NA
2000	3358 (0.86)	0 NA	44 (0.84)	0 NA	73 (0.47)	0 NA	44	0 NA
2002	1245 NA	0 NA	20 NA	14 NA	104 NA	0 NA	0	0 NA
2003	454 (1.00)	0 NA	156 (0.91)	0 NA	226 (0.34)	0 NA	79	0 NA
2004	5749 (0.53)	50 (0.62)	97 (0.40)	34 (0.93)	40 (0.97)	579 (0.57)	57	30 (1.00)
2005	882 (0.48)	24 (0.84)	134 (0.71)	15 (1.00)	56 (0.62)	0 NA	3	57 (0.87)
2006	4507 (0.96)	169 (0.66)	72 (1.00)	0 NA	5 (1.00)	0 NA	0	0 NA
2007	1528 NA	0 NA	27 NA	0 NA	4323 NA	0 NA	0	0 NA
2008	964 (0.38)	563 (1.00)	280 (0.61)	9 (1.00)	188 (0.42)	232 (1.00)	45	225 (1.00)
2009	2751 (0.69)	0 NA	705 (0.03)	51 (0.38)	192 (0.93)	0 NA	0	607 (0.13)
2010	2336 (0.36)	921 (1.00)	729 (1.00)	36 (0.55)	4 (1.00)	0 NA	0	196 (1.00)
2011	3902 (0.09)	48 (0.06)	198 (0.41)	5 (1.00)	104 (0.79)	45 (0.47)	12	0 NA
2012	1959 (0.80)	0 NA	33 (1.00)	30 (1.00)	47 (1.00)	0 NA	0	25 (1.00)
2013	229 (0.47)	12 (1.00)	411 (0.44)	10 (1.00)	43 (0.40)	0 NA	21	362 (0.55)
2014	1666 (0.22)	22 (1.00)	80 (0.77)	62 (0.54)	116 (0.74)	6 (1.00)	0	66 (1.00)
2015	680 (0.53)	41 (1.00)	159 (0.60)	48 (0.54)	386 (0.69)	0 (1.00)	0	51 (1.00)

### Distribution

Figure 5.3 shows the distribution of deep-water hake (*Merluccius paradoxus*) and cape hake (*M. capensis*) in the southern slope region. The deep-water hake was caught on the slope deeper than 300 m from the Cunene River northwards to off Baía dos Tigres. The Cape hake (*M. capensis*) was distributed over large areas of the inner and outer shelf in low densities.



**Figure 5.4** Distribution of Cape hake (*Merluccius capensis*; left) and deep-water hake (*M. Paradoxus*) in the southern region, Tombua - Cunene. Depth contours at 20, 50, 100, 200, 300, 400, 500 and 600 m.

## CHAPTER 6 SUMMARY

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From 14<sup>th</sup> February to 13<sup>th</sup> March 2015 the demersal resource survey off Angola was successfully carried out using R/V “Dr. Fridtjof Nansen”. During this survey, the shelf and upper slope (20-800m) from Cunene River to Congo River was covered. In total 178 trawl stations were carried out, of which 175 were valid and used in the biomass estimation of the demersal stocks. To map the oceanographic conditions 209 CTD stations were taken.

### Hydrographical conditions

The demersal surveys in March coincide with the late phase of the wet season, which causes low salinity in the surface waters on the shelf off northern and central Angola due to the freshwater coming from the coastal rivers.

In southern Angola the surface temperature ranged from 16° C to 26° C and salinity values variety throughout to the region. The lowest values (<36) were recorded between Namibe and west of mouth Cunene river in the open sea and around the coastal zone. Thermal front Angola / Benguela during the cruise was located south of the 17° latitude south. On the Namibe transect the oxygen content on the surface varied from 3 to 5.5 ml/l, and high concentrations (5.5 ml/l) were registered in large bags of surface waters. The fluorescence peaks (0.5 to 1 mg/l) occurred between 0 and 100m depth.

In the central region there was little variation (27° C and 28° C) in surface temperature, except in the coastal area between Cabo de São Bráz and Cabo Ledo (10°27-9 58'S°), where temperature fluctuated between 25 and 26° C. The salinity varied between 31 and 35.5. South of Ponta das Palmeirinhas due to high precipitation salinity reached values of around 31. On the transect of Lobito, oxygen content varied between 3.5 and 4.5 ml/l at the surface and oxygen minimum zone (OMZ; 1 ml/l) was located at 310 and 480m depth. From the surface to 90m depth high fluorescence peaks were recorded, ranging from 0.5 to 1 g/l, indicating a high productivity of the primary area.

In the northern region temperature values ranged between 27 and 30°C, and salinity varied from 24 to 34. The higher salinity (34) was recorded in Ambriz area, and a minimal (24) registered at the mouth of the Congo River. On the Congo River transect, the oxygen content in the surface layer remained stable (4.5 ml/l). The minimum oxygen zone (OMZ) was recorded below 100m. In terms of fluorescence, biological activity occurred along the coast, with values around 0.3 - 0.9 mg/l.

### Biomass estimates

Table 6.1 presents the time series from 1985 to 2015 of the biomass estimates for the most important species on the shelf and slope in the northern and central regions off Angola. The estimates on the southern slope are less reliable as the number of tows is very low due to difficult trawling conditions. Tables 4.3 and 5.3 show the biomass estimates of the important species on the southern shelf and slope, respectively.

### *General trend*

The Angolan shelf and slope waters harbour a great diversity of fish and invertebrate marine species, which on their own have a relatively low biomass, but together form an important fishery. Abundance trends of stocks with low and patchy densities may show great variation from year to year due to low sampling frequency and large variability in catch rates that consequently are reflected in high coefficients of variability (CV) of the biomass estimate. Low biomass estimates with large CV's may at times obscure the greater picture. As in previous years catch rates of the current survey are seen in context of the overall trend and compared with the catch trends of the last ten years when the survey methodology has been kept reasonably constant.

### *Seabreams*

Seabreams are one of the most important commercial demersal fish group in Angola. The biomass estimate for the northern and central regions in 2015 was 19 800 tonnes. This is substantially lower than previous year's high estimate of 37 000 tonnes, and also below the last ten year average of 25 400 tonnes. As in previous years, *Dentex angolensis* was the dominant seabream species on the shelf in the northern and central region, whereas in the southern regions *D. macrophthalmus* dominated.

### *Hakes*

Juvenile (0-group) fish made up the *Merluccius polli* biomass on the northern and central region shelf. The biomass was estimate at 430 tonnes, which is similar to the 2014 estimate of 500 tonnes. The total biomass estimate for *M. polli* on the shelf and slope of northern and central regions was 15 400 Tonnes, which is slightly higher than the 2014 estimate and more than double the 2013 biomass. The central-northern stock is composed of two length classes with modes at 16 and 32 cm. Few fish larger than 40 cm were sampled. After a period with a declining trend in abundance between 2004 and 2011, it appears that the stock biomass is in an upward trend since 2012. The total biomass of hakes on the southern shelf was 3 785 tonnes, of which *Merluccius capensis* contributed 3 764 tonnes. This is much lower than the 2014 estimate (18 429t) and below the 10 year average (7 163 t). Variations in *M. capensis* are very likely related to the dynamics of the Angola-Benguela front.

### *Shrimps*

The two commercially important shrimp species *P. longirostris* and *A. varidens* are caught in higher densities in the northern and central regions compared to the southern region. *P. longirostris* is mainly distributed on the upper slope and *A. varidens* on the lower slope. The 2015 biomass estimate of *P. longirostris* was about 1 660 tonnes in the northern and central regions, similar to last year's estimate and just below the average value for the last ten years (2000 tonnes). The estimated biomass of *A. varidens* was about 1 660 tonnes, a decrease compared to the 2014 estimate but still above the average of the ten last years (1 470 t).

### *Grunts*

The biomass estimate of grunts (*Pomadasyus incisus*, *P. Jubelini*, *P. rogeri* and *P. peroteti*) in the central and northern regions was 12 200 tonnes, which is above the 10 year average (10 800t). The 2012 estimate of 20 500 tonnes is the highest ever recorded for this fish group. The 2015 biomass estimate of big eye grunt (*Brachydeuterus auritus*) in the central and northern regions was 30 900 tonnes, substantially lower than the 2012 to 2014 estimates (45 - 55 000 t) and also the last ten year average (56 200 tonnes).

### *Croakers*

The estimated biomass of croakers in 2015 was about 4 300 tonnes in the central and northern regions, which is a quarter of the 2013 estimate (16 400 t) and the lowest estimate since 2001. *Umbrina canariensis* was the most common croaker in the central and northern regions and contributed 49 % to the total croaker biomass. The 2015 estimate of this species was 2 070 tonnes, the lowest since 2001 and substantially lower than the 10 year average (4 600 tonnes).

### *Groupers and snappers*

The 2015 survey gave an estimated biomass of 440 tonnes for groupers, mainly *Epinephelus aeneus* and *E. guaza*. This is the lowest estimate for this group since 1998. The trend in the biomass time series indicates a slight decrease since 2000. Groupers are coastal dwellers and prefer rocky shore and since not their entire distribution is covered, the biomass estimates of this species group may not adequately reflect the state of the stock.

Snappers are rarely caught as they also are rocky dwellers, hence the biomass estimates of snappers may not adequately reflect the state of the stock. No snappers were caught in 2015, compared to an estimate of 200 tonnes in 2014.

### *Pelagic species*

The pelagic species *Trachurus trecae*, *T. capensis*, *Sardinella aurita*, *S. maderensis*, *Sardina pilchardus* and *Engraulis capensis* are schooling pelagic species and may be caught in great abundance, and may therefore obscure the overall tendency for the demersal species.

In the northern and central regions, the biomass estimate of *T. trecae* was 35 800 tonnes, which is the highest estimate since 1997. The estimates have fluctuated due to the relatively low number of stations as well as the variability in the distribution pattern of this species. The carangids biomass estimate was 50 300 tonnes in 2015, the highest since 2003. The Hairtails estimate was 9 460 tonnes in 2015, the highest since 2013, but there has been a decreasing trend in the hairtails biomass index since 2005.

**Table 6.1** Biomass estimates (tonnes) of important species in the central and northern regions. CVs are in brackets.

Survey	M.polli	T.treace	Shrimps	Cephalopod	Sharks	Clupeids	Carangids	Scombrids
1985.1	211 (0.04)	4,496 (0.68)	323 (0.44)	11,438 (0.69)	841 (0.29)	364 (0.59)	9,986 (0.50)	44 (1.00)
1985.2	0	3,324 (0.71)	139 (0.96)	694 (0.35)	451 (0.39)	3,907 (0.98)	3,740 (0.63)	30 (1.00)
1985.3	6,524 (0.56)	16,486 (0.73)	2,215 (0.57)	2,297 (0.36)	1,079 (0.61)	205 (0.99)	17,742 (0.67)	146 (0.77)
1985.4	55,083 (0.27)	110,950 (0.45)	15,069 (0.18)	6,369 (0.39)	96 (0.79)	906 (0.48)	117,929 (0.43)	88 (0.76)
1986.1	29,498 (0.19)	31,313 (0.31)	24,342 (0.11)	6,925 (0.24)	5,004 (0.39)	2,770 (0.33)	38,390 (0.25)	64 (0.59)
1986.2	52,670 (0.14)	30,649 (0.36)	21,957 (0.08)	2,935 (0.25)	5,256 (0.25)	1,693 (0.30)	34,989 (0.31)	226 (0.48)
1989.1	16,503 (0.27)	19,681 (0.36)	9,110 (0.43)	4,465 (0.25)	3,086 (0.47)	2,137 (0.74)	26,000 (0.30)	252 (0.37)
1989.2	14,371 (0.15)	33,008 (0.25)	7,519 (0.18)	3,198 (0.15)	1,472 (0.29)	2,282 (0.24)	40,419 (0.22)	333 (0.41)
1989.3	25,407 (0.27)	49,538 (0.30)	7,393 (0.13)	4,797 (0.29)	21,887 (0.49)	6,749 (0.35)	59,519 (0.30)	518 (0.47)
1991.1	31,536 (0.17)	107,626 (0.37)	14,041 (0.18)	2,235 (0.13)	3,559 (0.26)	2,349 (0.40)	131,007 (0.33)	373 (0.41)
1991.2	30,968 (0.19)	62,772 (0.41)	8,426 (0.29)	7,351 (0.23)	4,090 (0.23)	91 (0.48)	63,901 (0.41)	444 (0.40)
1992	23,233 (0.12)	48,453 (0.21)	13,613 (0.20)	6,109 (0.13)	5,163 (0.25)	82 (0.52)	53,311 (0.21)	223 (0.41)
1994	10,343 (0.23)	77,944 (0.27)	11,756 (0.17)	6,886 (0.17)	1,869 (0.17)	206 (0.90)	86,549 (0.24)	926 (0.36)
1995.1	10,577 (0.25)	5,224 (0.55)	15,395 (0.16)	1,789 (0.19)	3,382 (0.18)	1,679 (0.33)	19,756 (0.23)	393 (0.36)
1995.2	6,880 (0.17)	11,258 (0.37)	4,499 (0.10)	979 (0.33)	1,289 (0.18)	0	11,370 (0.36)	201 (0.59)
1996	12,219 (0.18)	83,774 (0.28)	11,356 (0.16)	5,268 (0.15)	2,641 (0.25)	1,371 (0.51)	89,864 (0.27)	190 (0.56)
1997.1	21,911 (0.19)	64,832 (0.26)	22,638 (0.11)	10,684 (0.18)	3,004 (0.22)	9,833 (0.51)	168,669 (0.41)	335 (0.60)
1997.2	25,581 (0.20)	97,858 (0.20)	9,977 (0.41)	6,260 (0.14)	500 (0.62)	132 (0.81)	99,747 (0.19)	289 (0.69)
1998	10,366 (0.20)	4,630 (0.55)	9,412 (0.15)	3,016 (0.18)	1,122 (0.23)	2,860 (0.80)	7,606 (0.39)	52 (0.80)
1999	6,640 (0.18)	17,083 (0.26)	13,687 (0.16)	3,577 (0.23)	3,192 (0.17)	8,353 (0.27)	36,949 (0.20)	69 (0.58)
2000	10,118 (0.17)	25,701 (0.24)	7,592 (0.13)	3,778 (0.11)	5,098 (0.57)	2,215 (0.40)	47,540 (0.25)	349 (0.57)
2001	9,732 (0.22)	22,012 (0.25)	11,282 (0.21)	4,340 (0.30)	3,519 (0.35)	598 (0.33)	30,501 (0.21)	139 (0.35)
2002	7,680 (0.18)	88,411 (0.22)	10,747 (0.20)	4,980 (0.21)	629 (0.19)	3,067 (0.22)	98,922 (0.20)	820 (0.81)
2003	14,240 (0.23)	35,260 (0.25)	13,086 (0.14)	2,649 (0.16)	1,917 (0.34)	4,255 (0.23)	57,659 (0.32)	137 (0.54)
2004	31,628 (0.29)	21,409 (0.24)	20,863 (0.10)	3,400 (0.11)	3,125 (0.22)	3,760 (0.29)	28,088 (0.19)	63 (0.42)
2005	21,112 (0.18)	10,931 (0.23)	17,650 (0.10)	4,061 (0.11)	2,421 (0.20)	2,134 (0.38)	20,025 (0.21)	332 (0.57)
2006	14,563 (0.18)	14,925 (0.17)	20,214 (0.11)	3,728 (0.11)	2,328 (0.28)	4,663 (0.32)	25,200 (0.14)	183 (0.32)
2007	11,157 (0.27)	10,633 (0.23)	24,092 (0.13)	3,287 (0.13)	2,789 (0.27)	3,875 (0.24)	22,928 (0.23)	214 (0.45)
2008	11,979 (0.15)	5,640 (0.23)	24,057 (0.12)	3,577 (0.12)	1,831 (0.18)	2,700 (0.35)	22,856 (0.30)	168 (0.39)
2009	8,120 (0.17)	14,485 (0.21)	23,619 (0.12)	4,317 (0.13)	3,009 (0.27)	11,816 (0.51)	24,557 (0.21)	121 (0.41)
2010	7,051 (0.19)	4,427 (0.25)	19,050 (0.13)	3,215 (0.11)	1,205 (0.20)	3,238 (0.58)	19,492 (0.48)	164 (0.39)
2011	6,751 (0.39)	15,045 (0.57)	15,715 (0.17)	3,757 (0.13)	1,482 (0.22)	3,907 (0.38)	24,065 (0.39)	124 (0.44)
2012	13,939 (0.25)	24,458 (0.21)	22,275 (0.12)	6,742 (0.12)	659 (0.23)	75,068 (0.48)	35,799 (0.18)	3,138 (0.88)
2013	6,471 (0.17)	4,985 (0.30)	19,405 (0.11)	2,917 (0.17)	2,122 (0.25)	2,718 (0.47)	25,219 (0.28)	166 (0.46)
2014	14,084 (0.19)	32,060 (0.25)	18,296 (0.09)	5,583 (0.11)	1,107 (0.23)	11,321 (0.53)	41,137 (0.20)	5,036 (0.63)
2015	15,441 (0.28)	35,803 (0.22)	21,814 (0.13)	3,131 (0.13)	1,096 (0.16)	26,633 (0.31)	50,276 (0.19)	162 (0.43)

Survey	Hairtails	Barracudas	Snappers	Groupers	Grunts	Croakers	Seabreams	P.longirostris
1985.1	15,711 (0.53)	254 (0.54)	0	479 (0.66)	248 (0.52)	1,519 (0.61)	14,690 (0.34)	138 (0.71)
1985.2	1,200 (0.85)	75 (0.42)	63 (0.72)	1,771 (0.48)	381 (0.67)	1,302 (0.59)	12,881 (0.20)	0
1985.3	3,219 (0.38)	26 (1.00)	62 (1.00)	1,978 (0.46)	3,629 (0.48)	8,979 (0.50)	22,438 (0.38)	0
1985.4	7,937 (0.30)	1,033 (0.69)	0 NA	4,307 (0.31)	20,511 (0.46)	13,935 (0.56)	49,738 (0.22)	3,062 (0.32)
1986.1	26,602 (0.31)	3,099 (0.26)	470 (0.93)	1,087 (0.32)	3,468 (0.32)	6,956 (0.26)	27,435 (0.17)	3,823 (0.31)
1986.2	511,874 (0.01)	1,874 (0.28)	0	2,033 (0.28)	6,995 (0.32)	9,578 (0.23)	45,651 (0.12)	0
1989.1	13,125 (0.26)	2,281 (0.58)	0	1,569 (0.48)	3,816 (0.51)	5,864 (0.41)	25,271 (0.18)	895 (0.31)
1989.2	6,333 (0.23)	3,674 (0.38)	53 (0.73)	3,937 (0.73)	2,228 (0.33)	7,826 (0.21)	23,569 (0.21)	1,559 (0.25)
1989.3	66,901 (0.23)	1,068 (0.33)	316 (1.00)	1,107 (0.60)	1,870 (0.49)	4,812 (0.35)	20,807 (0.27)	1,094 (0.37)
1991.1	21,783 (0.34)	3,322 (0.59)	106 (1.00)	817 (0.46)	1,247 (0.35)	5,848 (0.33)	14,666 (0.13)	302 (0.26)
1991.2	9,218 (0.19)	161 (0.40)	0	2,043 (0.35)	2,742 (0.41)	26,595 (0.64)	42,431 (0.16)	640 (0.23)
1992	17,251 (0.24)	103 (0.58)	0	3,359 (0.33)	1,698 (0.36)	4,772 (0.23)	40,589 (0.17)	935 (0.30)
1994	31,574 (0.69)	329 (0.52)	262 (1.00)	2,908 (0.38)	680 (0.45)	18,320 (0.38)	51,379 (0.16)	1,757 (0.28)
1995.1	14,521 (0.19)	4,222 (0.33)	594 (0.65)	1,397 (0.29)	6,027 (0.47)	18,472 (0.54)	29,271 (0.18)	2,020 (0.26)
1995.2	5,112 (0.35)	0	45 (1.00)	348 (1.00)	0	245 (0.59)	11,363 (0.27)	680 (0.23)
1996	9,254 (0.14)	1,035 (0.41)	109 (1.00)	2,692 (0.39)	8,256 (0.31)	15,215 (0.19)	39,921 (0.19)	310 (0.18)
1997.1	32,077 (0.25)	554 (0.83)	73 (1.00)	781 (0.35)	6,427 (0.45)	21,483 (0.22)	33,690 (0.23)	2,501 (0.28)
1997.2	23,555 (0.18)	0	0	2,840 (0.46)	500 (0.31)	36,999 (0.66)	49,236 (0.18)	5,481 (0.22)
1998	30,861 (0.73)	454 (0.42)	0	198 (0.63)	9,117 (0.48)	8,609 (0.53)	64,867 (0.70)	742 (0.24)
1999	26,027 (0.19)	4,317 (0.26)	531 (0.94)	1,642 (0.28)	8,888 (0.33)	18,534 (0.38)	34,029 (0.14)	878 (0.16)
2000	18,068 (0.20)	4,556 (0.31)	294 (0.71)	1,647 (0.27)	7,213 (0.29)	7,842 (0.21)	36,443 (0.13)	1,259 (0.22)
2001	24,459 (0.41)	1,818 (0.24)	726 (0.97)	859 (0.54)	3,600 (0.36)	3,203 (0.29)	22,805 (0.20)	1,020 (0.21)
2002	30,855 (0.25)	2,318 (0.31)	251 (0.79)	742 (0.41)	3,223 (0.29)	9,196 (0.20)	34,016 (0.25)	1,565 (0.29)
2003	20,199 (0.22)	2,824 (0.57)	186 (0.80)	1,037 (0.33)	10,025 (0.60)	13,474 (0.23)	17,687 (0.14)	1,363 (0.26)
2004	20,349 (0.33)	1,856 (0.47)	79 (0.70)	681 (0.31)	6,810 (0.37)	12,196 (0.40)	32,647 (0.31)	2,143 (0.35)
2005	41,427 (0.40)	963 (0.52)	284 (0.64)	1,176 (0.28)	11,735 (0.37)	13,501 (0.23)	33,064 (0.20)	1,613 (0.20)
2006	20,849 (0.15)	2,561 (0.29)	51 (0.74)	819 (0.32)	6,921 (0.34)	8,956 (0.24)	24,824 (0.13)	2,607 (0.33)
2007	32,508 (0.40)	2,336 (0.41)	113 (0.56)	950 (0.30)	17,242 (0.44)	11,991 (0.46)	22,191 (0.12)	1,342 (0.27)
2008	18,211 (0.22)	1,652 (0.48)	90 (0.88)	1,187 (0.31)	7,411 (0.46)	12,684 (0.27)	21,227 (0.13)	1,622 (0.25)
2009	31,108 (0.35)	1,743 (0.42)	292 (0.58)	779 (0.26)	8,192 (0.28)	6,064 (0.23)	18,108 (0.13)	1,432 (0.23)
2010	14,888 (0.19)	1,202 (0.37)	69 (0.43)	643 (0.30)	10,873 (0.29)	8,256 (0.27)	25,714 (0.10)	1,648 (0.33)
2011	11,390 (0.34)	3,232 (0.38)	267 (0.77)	705 (0.28)	14,677 (0.41)	13,884 (0.31)	20,872 (0.12)	1,492 (0.36)
2012	12,125 (0.38)	1,086 (0.49)	8 (1.00)	1,249 (0.66)	20,538 (0.54)	8,073 (0.25)	21,719 (0.16)	3,971 (0.26)
2013	6,906 (0.19)	3,791 (0.41)	0 NA	760 (0.38)	7,297 (0.24)	16,442 (0.56)	22,022 (0.13)	2,149 (0.51)
2014	7,182 (0.31)	910 (0.31)	222 (1.00)	1,092 (0.29)	7,230 (0.28)	6,975 (0.22)	37,225 (0.16)	2,183 (0.22)
2015	9,458 (0.28)	1,636 (0.35)	0 NA	435 (0.34)	12,172 (0.29)	4,292 (0.18)	19,766 (0.13)	1,661 (0.19)



**Table 6.2** Biomass estimates (tonnes) of important species in the central and northern regions. CVs are in brackets. **CONTINUED**

Survey	<i>A.varidens</i>	<i>N.africanus</i>	<i>Ommastrephidae</i>	<i>Sepiidae</i>	<i>B.auritus</i>	<i>D.angolensis</i>	<i>U.canariensis</i>	<i>D.macrophthalmus</i>
1985.1	0	0	11,249 (0.70)	13	40,729 (0.70)	2,196 (0.33)	1,132 (0.74)	200 (1.00)
1985.2	0	0	0	0	6,842 (0.73)	2,495 (0.34)	521 (0.89)	0
1985.3	0	0	0	154 (0.59)	9,182 (0.66)	4,490 (0.28)	602 (0.68)	0
1985.4	7,633 (0.25)	3,578 (0.31)	225 (0.58)	215 (0.78)	69,072 (0.58)	9,283 (0.41)	8,921 (0.67)	6,286 (0.79)
1986.1	1,030 (0.43)	15,804 (0.12)	5,037 (0.33)	1,334 (0.30)	133,723 (0.16)	5,700 (0.28)	2,606 (0.48)	2,787 (0.31)
1986.2	1,485 (0.23)	4,643 (0.34)	0	2,040 (0.35)	36,750 (0.22)	15,499 (0.17)	3,387 (0.42)	9,215 (0.13)
1989.1	397 (0.24)	7,545 (0.51)	3,209 (0.34)	356 (0.46)	20,488 (0.37)	2,568 (0.17)	1,427 (0.37)	7,302 (0.37)
1989.2	400 (0.25)	4,702 (0.28)	1,286 (0.23)	1,529 (0.20)	64,268 (0.39)	9,997 (0.42)	1,302 (0.44)	1,386 (0.46)
1989.3	285 (0.19)	5,657 (0.14)	4,191 (0.31)	170 (0.49)	88,316 (0.24)	4,888 (0.20)	1,194 (0.83)	1,956 (0.70)
1991.1	723 (0.09)	12,194 (0.21)	1,036 (0.20)	528 (0.27)	48,534 (0.29)	2,651 (0.16)	1,657 (0.61)	3,075 (0.43)
1991.2	119 (0.56)	5,104 (0.16)	4,156 (0.36)	797 (0.39)	3,524 (0.48)	4,903 (0.17)	22,849 (0.75)	18,054 (0.31)
1992	638 (0.19)	11,662 (0.23)	3,519 (0.15)	1,074 (0.32)	34,799 (0.55)	7,229 (0.12)	1,719 (0.38)	20,117 (0.32)
1994	1,017 (0.20)	8,801 (0.22)	1,954 (0.19)	3,167 (0.20)	10,205 (0.47)	6,918 (0.16)	6,075 (0.51)	23,219 (0.27)
1995.1	1,078 (0.15)	9,729 (0.25)	164 (0.25)	881 (0.20)	40,468 (0.28)	4,695 (0.22)	11,929 (0.69)	14,010 (0.36)
1995.2	698 (0.10)	2,763 (0.15)	730 (0.26)	222 (0.74)	0	1,280 (0.22)	209 (0.70)	10,083 (0.31)
1996	938 (0.12)	8,830 (0.19)	1,069 (0.13)	2,342 (0.18)	45,646 (0.39)	6,236 (0.18)	3,150 (0.44)	14,591 (0.21)
1997.1	639 (0.13)	17,189 (0.14)	3,439 (0.17)	6,612 (0.27)	46,071 (0.24)	5,318 (0.17)	5,760 (0.31)	14,289 (0.53)
1997.2	0	4,098 (0.81)	2,491 (0.28)	1,885 (0.12)	1,966 (0.21)	5,712 (0.23)	33,214 (0.74)	31,595 (0.27)
1998	1,192 (0.45)	7,000 (0.21)	766 (0.27)	1,335 (0.34)	22,014 (0.49)	2,084 (0.22)	2,239 (0.48)	52,473 (0.86)
1999	574 (0.26)	11,746 (0.19)	2,028 (0.38)	760 (0.18)	131,249 (0.28)	4,476 (0.10)	11,581 (0.52)	8,181 (0.32)
2000	601 (0.11)	4,820 (0.21)	1,735 (0.17)	960 (0.28)	79,452 (0.39)	7,385 (0.34)	3,771 (0.30)	8,086 (0.36)
2001	699 (0.18)	7,263 (0.32)	1,702 (0.48)	944 (0.50)	54,964 (0.33)	3,482 (0.21)	1,264 (0.54)	6,772 (0.37)
2002	371 (0.16)	8,375 (0.26)	3,648 (0.29)	372 (0.28)	81,844 (0.33)	3,323 (0.22)	4,326 (0.29)	13,935 (0.59)
2003	881 (0.28)	10,157 (0.17)	1,233 (0.26)	625 (0.34)	104,721 (0.35)	4,765 (0.14)	4,260 (0.59)	1,092 (0.46)
2004	935 (0.12)	17,133 (0.12)	1,319 (0.19)	762 (0.19)	51,255 (0.28)	7,084 (0.20)	6,977 (0.62)	13,884 (0.75)
2005	1,431 (0.12)	14,188 (0.13)	1,246 (0.22)	2,075 (0.15)	88,667 (0.36)	8,473 (0.09)	5,933 (0.32)	7,290 (0.83)
2006	750 (0.11)	16,424 (0.13)	961 (0.23)	1,324 (0.20)	94,684 (0.31)	7,236 (0.11)	6,483 (0.32)	4,950 (0.45)
2007	1,026 (0.06)	21,198 (0.15)	347 (0.26)	1,624 (0.18)	52,925 (0.26)	8,083 (0.13)	5,846 (0.77)	2,157 (0.40)
2008	1,508 (0.08)	20,352 (0.15)	898 (0.16)	895 (0.24)	70,217 (0.38)	6,860 (0.14)	5,058 (0.32)	3,176 (0.54)
2009	2,204 (0.11)	19,130 (0.14)	441 (0.20)	1,452 (0.25)	46,010 (0.44)	6,697 (0.15)	2,409 (0.24)	876 (0.30)
2010	1,134 (0.16)	16,013 (0.15)	452 (0.19)	1,316 (0.17)	24,838 (0.33)	11,561 (0.13)	4,493 (0.41)	2,395 (0.75)
2011	1,272 (0.07)	12,206 (0.22)	238 (0.21)	2,026 (0.17)	36,639 (0.39)	9,905 (0.13)	6,038 (0.50)	777 (0.45)
2012	1,525 (0.18)	16,284 (0.16)	1,667 (0.28)	3,713 (0.18)	51,544 (0.29)	7,501 (0.16)	4,125 (0.30)	3,671 (0.77)
2013	1,944 (0.17)	14,952 (0.12)	472 (0.13)	784 (0.19)	45,625 (0.28)	10,486 (0.16)	13,137 (0.70)	3,413 (0.62)
2014	2,387 (0.13)	12,759 (0.13)	2,037 (0.15)	1,919 (0.17)	55,248 (0.25)	12,896 (0.16)	3,698 (0.28)	8,443 (0.60)
2015	1,626 (0.21)	18,106 (0.15)	1,442 (0.23)	372 (0.26)	30,924 (0.27)	7,362 (0.19)	2,066 (0.22)	1,955 (0.56)

# ANNEX I Records of fishing stations

R/V Dr. Fridtjof Nansen		SURVEY:2015403		STATION: 1	
DATE	:16/02/15	GEAR TYPE: BT NO:	27	POSITION:Lat	S 17°11.19
				Lon	E 11°43.96
TIME	:07:39:40	start stop duration	30.2 (min)	Purpose	: 3
LOG	: 3186.66	3188.28	1.6	Region	: 4050
FDEPTH:	25	26		Gear cond.:	0
BDEPTH:	25	26		Validity:	0
Towing dir:	0°	Wire out	: 90 m	Speed	: 3.2 kn
Sorted	: 130	Total catch:	951.57	Catch/hour:	1891.78
SPECIES					
	CATCH/HOUR	% OF TOT. C	SAMP	weight	numbers
Callorhynchus capensis	719.46	342	38.03		
J E L L Y F I S H	531.25	9483	28.08		
Argyrosomus sp.	257.85	76	13.63	1	
Trachurus trecae	123.02	2583	6.50	3	
Sea cucumber - purple	97.42	14	5.15		
Galeichthys feliceps	76.54	231	4.05		
Chelidonichthys gabonensis	15.03	28	0.79		
Myliobatis aquila	13.24	4	0.70		
Mustelus palumbes	9.78	4	0.52		
Mustelus mustelus	9.50	4	0.50		
Rhinobatos blochii	8.55	4	0.45		
Sardinops sagax	6.19	188	0.33	2	
Trichurus lepturus	5.78	480	0.31		
Pomadourus jubelini	5.09	8	0.27	4	
Dicologlossa cuneata	4.59	189	0.24		
Squalus megalops	2.44	8	0.13		
Illex coindetii	2.01	83	0.11		
Sepia orbignyana	1.39	8	0.07		
Umrina canariensis	1.39	4	0.07	5	
Starfish	1.25	147	0.07		
Total	1891.78		100.00		

R/V Dr. Fridtjof Nansen		SURVEY:2015403		STATION: 3	
DATE	:16/02/15	GEAR TYPE: BT NO:	27	POSITION:Lat	S 17°12.64
				Lon	E 11°30.87
TIME	:12:49:02	start stop duration	30.0 (min)	Purpose	: 3
LOG	: 3208.25	3209.86	1.6	Region	: 4050
FDEPTH:	133	136		Gear cond.:	0
BDEPTH:	133	136		Validity:	0
Towing dir:	0°	Wire out	: 320 m	Speed	: 3.2 kn
Sorted	: 209	Total catch:	1168.19	Catch/hour:	2334.05
SPECIES					
	CATCH/HOUR	% OF TOT. C	SAMP	weight	numbers
Dentex macrophthalmus	1520.00	15720	65.12	9	
Merluccius capensis	396.76	1522	17.00	11	
Pterothrissus belloci	270.99	2617	11.61		
Chelidonichthys gabonensis	60.42	212	2.59		
Synagrops microlepis	29.77	6166	1.28		
Trachurus capensis	11.63	236	0.50	10	
Trigla lyra	9.73	100	0.42		
Brotula barbata	9.13	78	0.39		
Atractoscion aeguidens	7.05	12	0.30		
Squalus megalops	3.24	12	0.14		
GOBIDAE	2.80	448	0.12		
Dicologlossa cuneata	2.68	68	0.11		
Zeus faber	2.68	12	0.11		
Illex coindetii	2.58	12	0.11		
Galeichthys feliceps	2.46	12	0.11		
G A S T R O P O D S	1.46	705	0.06		
MYCTOPHIDAE	0.56	212	0.02		
Goneplax sp.	0.12	12	0.01		
Total	2334.05		100.00		

R/V Dr. Fridtjof Nansen		SURVEY:2015403		STATION: 4	
DATE	:16/02/15	GEAR TYPE: BT NO:	27	POSITION:Lat	S 17°11.91
				Lon	E 11°25.07
TIME	:15:04:36	start stop duration	21.7 (min)	Purpose	: 3
LOG	: 3218.64	3219.80	1.2	Region	: 4050
FDEPTH:	175	173		Gear cond.:	0
BDEPTH:	175	173		Validity:	0
Towing dir:	0°	Wire out	: 175 m	Speed	: 3.2 kn
Sorted	: 29	Total catch:	116.22	Catch/hour:	321.64
SPECIES					
	CATCH/HOUR	% OF TOT. C	SAMP	weight	numbers
Merluccius capensis	216.37	617	67.27	13	
Chlorophthalmus atlanticus	50.26	6504	15.63		
Pontinus accraensis	10.54	706	3.28		
Synagrops microlepis	8.75	3105	2.72		
Trigla lyra	7.22	47	2.25		
Merluccius polli	7.03	230	2.19	12	
Pterothrissus belloci	4.35	22	1.35		
Parapenaeus longirostris,f **, female	3.46	299	1.08	22	
Parapenaeus longirostris, m **, male	2.74	234	0.85	23	
Engraulis encrasicolus	2.05	133	0.64	16	
Bembrops heterurus	1.80	42	0.56		
Squalus megalops	1.69	6	0.52		
Dentex macrophthalmus	1.63	14	0.51	15	
Brotula barbata	0.80	3	0.25		
Dicologlossa cuneata	0.77	47	0.24		
Solenocera africana	0.55	138	0.17		
Trachurus capensis	0.50	18	0.15	14	
Squilla mantis	0.33	14	0.10		
GALATHEIDAE	0.28	39	0.09		
Hymenocephalus italicus	0.14	11	0.04		
Ommastraphes pteropus	0.08	3	0.03		
J E L L Y F I S H	0.08	8	0.03		
OPHIDIIDAE	0.06	3	0.02		
MYCTOPHIDAE	0.06	39	0.02		
Lestrolepis intermedia	0.06	3	0.02		
Scyllarides herklotsii	0.06	8	0.02		
Total	321.64		100.00		

R/V Dr. Fridtjof Nansen		SURVEY:2015403		STATION: 5	
DATE	:16/02/15	GEAR TYPE: BT NO:	27	POSITION:Lat	S 17°12.53
				Lon	E 11°20.64
TIME	:18:48:16	start stop duration	30.1 (min)	Purpose	: 3
LOG	: 3231.11	3232.61	1.5	Region	: 4050
FDEPTH:	362	361		Gear cond.:	0
BDEPTH:	362	361		Validity:	0
Towing dir:	0°	Wire out	: 840 m	Speed	: 3.0 kn
Sorted	: 36	Total catch:	160.23	Catch/hour:	319.93
SPECIES					
	CATCH/HOUR	% OF TOT. C	SAMP	weight	numbers
Dentex macrophthalmus	390.64	3224	43.19	29	
Trachurus capensis	206.46	4093	22.83	32	
Merluccius capensis	134.91	390	14.92	30	
Trachurus trecae	64.16	975	7.09	31	
Myliobatis aquila	51.41	8	5.68		
Mustelus mustelus	23.18	6	2.56		
Dicologlossa cuneata	8.23	210	0.91		
Trigla lyra	4.50	46	0.50		
Pterothrissus belloci	4.50	76	0.50		
Galeichthys feliceps	4.34	30	0.48		
Zeus faber	3.76	16	0.42		
Synagrops microlepis	3.44	1079	0.38		
Raja miraletus	3.38	4	0.37		
Squalus megalops	0.70	2	0.08		
Illex coindetii	0.46	16	0.05		

Todaropsis eblanae 0.46 16 0.05  
Total 904.52 100.00

BDEPTH: 663 637 Validity : 0  
Towing dir: 0° Wire out : 1350 m Speed : 2.9 kn  
Sorted : 17 Total catch: 145.50 Catch/hour: 334.10

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 9  
DATE :17/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 17°0.63  
start stop duration Purpose : 3 Lon E 11°34.78  
TIME :13:23:42 13:54:05 30.4 (min)  
LOG : 3320.62 3322.39 1.8 Region : 4050  
FDEPTH: 95 97 Gear cond.: 0  
BDEPTH: 95 97 Validity : 0  
Towing dir: 0° Wire out : 250 m Speed : 3.5 kn  
Sorted : 125 Total catch: 2646.07 Catch/hour: 5225.94

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
Trachurus capensis	4175.87	86496	79.91 34
Dentex macrophthalmus	509.51	7009	9.75 33
Trachurus trecae	386.11	5161	7.39 35
Merluccius capensis	107.85	209	2.06 36
Loligo vulgaris	24.35	41	0.47
Atractoscion aequidens	15.96	41	0.31
Dicologlossa cuneata	3.36	126	0.06
Pterothrissus belloci	2.09	41	0.04
Todaropsis eblanae	0.85	41	0.02
Total	5225.94	100.00	

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
Trachyrincus scabrus	134.79	700	40.34
Merluccius paradoxus	82.43	90	24.67
Nezumia aequalis	43.51	861	13.02
Centrophorus squamosus	27.60	5	8.26
Trachurus capensis	8.63	184	2.58
Chaceon maritae	7.07	9	2.12
Trachurus trecae	5.33	76	1.59
Alepocephalus rostratus	4.71	11	1.41
Todarodes sagittatus	4.04	9	1.21
Sardinella aurita	3.97	48	1.19
Anemones, pink	3.21	11	0.96
Selachophidium guentheri	2.53	34	0.76
Lamprogammus exutus	2.07	11	0.62
Helicolenus dactylopterus	1.79	11	0.54
Hoplostethus cadenati	1.15	69	0.34
Chlorophthalmus atlanticus	0.57	11	0.17
Dead coral	0.34	46	0.10
Synagrops microlepis	0.34	46	0.10
Total	334.10	100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 10  
DATE :17/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 17°0.54  
start stop duration Purpose : 3 Lon E 11°39.24  
TIME :14:59:47 15:31:44 31.9 (min)  
LOG : 3329.47 3331.25 1.8 Region : 4050  
FDEPTH: 61 60 Gear cond.: 0  
BDEPTH: 61 60 Validity : 0  
Towing dir: 0° Wire out : 150 m Speed : 3.3 kn  
Sorted : 93 Total catch: 279.07 Catch/hour: 524.24

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
Dentex macrophthalmus	199.41	5316	38.04 38
Trachurus trecae	127.38	4082	24.30 39
Chelidonichthys capensis	68.43	336	13.05
Argyrosomus sp.	45.01	32	8.59 41
Illex coindetii	21.53	827	4.11 46
Trachurus capensis	20.29	1957	3.87 40
Atractoscion aequidens	15.29	83	2.92 37
Chelidonichthys gabonensis	7.59	274	1.45
Pterothrissus belloci	6.44	150	1.23
Sepia orbignyana	5.52	15	1.05 49
Dicologlossa cuneata	2.27	47	0.43
Merluccius capensis	2.10	15	0.40 42
Raja miraletus	1.95	11	0.37
Pagellus bellottii	0.62	6	0.12
Umbrina canariensis	0.21	6	0.04
Zeus faber	0.09	6	0.02
Total	524.15	99.98	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 15  
DATE :18/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 16°49.61  
start stop duration Purpose : 3 Lon E 11°17.77  
TIME :04:31:53 05:01:53 30.0 (min)  
LOG : 3401.78 3403.23 1.5 Region : 4050  
FDEPTH: 368 366 Gear cond.: 0  
BDEPTH: 368 366 Validity : 0  
Towing dir: 0° Wire out : 860 m Speed : 2.9 kn  
Sorted : 60 Total catch: 440.63 Catch/hour: 881.26

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
Helicolenus dactylopterus	395.50	5124	44.88
Laemonea laureysi	164.92	4032	18.71
Hoplostethus cadenati	98.84	5026	11.22
Galeus polli	98.70	1078	11.20
Lophius vaillanti	23.36	18	2.65
Aristeus varidens, female ***	19.04	3724	2.16
Zameus (Scymnodon) squamulosus	17.78	70	2.02
Malacocephalus laevis	14.70	322	1.67
Neoharriotta pinnata	12.40	5	1.41
S H R I M P S	5.74	40	0.65
Chlorophthalmus atlanticus	5.04	112	0.57
Pterothrissus belloci	3.36	14	0.38
Halosaurus ovenii	3.22	154	0.37
Aristeus varidens, male ***	2.80	1078	0.32
Chaceon maritae	2.48	8	0.28
Loligo vulgaris	1.82	14	0.21 74
Bathyrja smithii	1.82	42	0.21
Bathynectes piperitus	1.54	42	0.17
Triplophos hemingi	1.54	280	0.17
Merluccius polli	1.34	2	0.15
Dicriolepis intronigra	0.98	126	0.11
Trachyrincus scabrus	0.98	28	0.11
Nematocarcinus africanus	0.98	378	0.11
Calappa rubroguttata	0.98	14	0.11
Hymenocephalus italicus	0.84	126	0.10
Nemichthys scolopaceus	0.28	14	0.03
Yarrella blackfordi	0.28	56	0.03
Total	881.26	100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 11  
DATE :17/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 16°58.74  
start stop duration Purpose : 3 Lon E 11°43.01  
TIME :16:31:37 16:53:03 21.4 (min)  
LOG : 3338.25 3339.32 1.1 Region : 4050  
FDEPTH: 23 24 Gear cond.: 0  
BDEPTH: 23 24 Validity : 0  
Towing dir: 0° Wire out : 80 m Speed : 3.0 kn  
Sorted : 50 Total catch: 172.18 Catch/hour: 482.07

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
J E L L Y F I S H	265.42	1862	55.06
Chelidonichthys capensis	114.40	202	23.73
Trachurus trecae	21.84	991	4.53 43
Raja miraletus	21.00	8	4.36
Dasyatis marmorata	19.49	3	4.04
Callorhynchus capensis	9.88	8	2.05
Argyrosomus sp.	7.31	3	1.52
Mustelus mustelus	5.01	6	1.04
Sepia officinalis	4.45	8	0.92 48
Illex coindetii	3.19	193	0.66 47
Pomatomus saltatrix	2.35	8	0.49
Sardinops sagax	2.18	109	0.45 45
Galeichthys falceps	2.10	8	0.44
Trachurus capensis	0.84	50	0.17 44
Trichurus lepturus	0.84	50	0.17
Starfish	0.76	8	0.16
Spondyliosa cantharus	0.42	17	0.09
Umbrina canariensis	0.34	8	0.07
Dentex macrophthalmus	0.25	25	0.05
Total	482.07	100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 16  
DATE :18/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 16°48.66  
start stop duration Purpose : 3 Lon E 11°34.69  
TIME :07:22:52 07:52:55 30.1 (min)  
LOG : 3421.51 3423.08 1.6 Region : 4050  
FDEPTH: 95 96 Gear cond.: 0  
BDEPTH: 95 96 Validity : 0  
Towing dir: 0° Wire out : 240 m Speed : 3.1 kn  
Sorted : 128 Total catch: 4734.89 Catch/hour: 9454.02

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
Trachurus trecae	7762.98	154772	82.11 56
Dentex macrophthalmus	1405.14	21153	14.86 55
Merluccius capensis	164.01	813	1.73 57
Atractoscion aequidens	46.54	148	0.49
Chelidonichthys gabonensis	35.46	222	0.38
Sepia orbignyana	26.60	74	0.28
Illex coindetii	13.30	74	0.14
Total	9454.02	100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 13  
DATE :17/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 17°3.70  
start stop duration Purpose : 3 Lon E 11°17.48  
TIME :23:10:41 23:30:52 20.2 (min)  
LOG : 3376.09 3377.16 1.1 Region : 4050  
FDEPTH: 449 460 Gear cond.: 0  
BDEPTH: 449 460 Validity : 0  
Towing dir: 0° Wire out : 970 m Speed : 3.2 kn  
Sorted : 55 Total catch: 1759.53 Catch/hour: 1759.53

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
Helicolenus dactylopterus	1262.14	7790	71.73 50
Trachyrincus scabrus	207.53	1397	11.79
Merluccius paradoxus	109.95	321	6.25
Laemonea laureysi	56.49	773	3.21
Nezumia aequalis	44.09	1397	2.50
Dead coral	24.38	7225	1.39
Centrophorus squamosus	14.57	59	0.83
Rajella barnardi	13.97	30	0.79
Chaceon maritae	6.54	9	0.37
Lithodes ferox	6.27	6	0.36
Hoplostethus cadenati	5.05	535	0.29
Galeus polli	2.97	3	0.17
GOBIIDAE	1.78	149	0.10
Chlorophthalmus atlanticus	1.78	59	0.10
Trachurus trecae	0.89	30	0.05
Yarrella blackfordi	0.59	59	0.03
Triplophos hemingi	0.30	59	0.02
Trachurus capensis	0.30	30	0.02
Total	1759.53	100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 17  
DATE :18/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 16°49.52  
start stop duration Purpose : 3 Lon E 11°41.04  
TIME :09:02:48 09:29:08 26.3 (min)  
LOG : 3430.57 3431.91 1.3 Region : 4050  
FDEPTH: 25 26 Gear cond.: 0  
BDEPTH: 25 26 Validity : 0  
Towing dir: 0° Wire out : 90 m Speed : 3.1 kn  
Sorted : 33 Total catch: 193.64 Catch/hour: 441.26

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
Trachurus trecae	133.63	5588	30.28 58
Mustelus mustelus	58.70	39	21.24
J E L L Y F I S H	58.43	383	13.24
Loligo vulgaris	46.12	2425	10.45
Stromateus fiatola	25.29	36	5.73
Engraulis encrasicolus	24.25	1641	5.49
Pomatomus saltatrix	15.59	210	3.53
Chelidonichthys gabonensis	11.71	5	2.65
Rhinobatos blochii	7.47	2	1.69
Chelidonichthys capensis	5.65	9	1.28
Sepia officinalis	5.29	9	1.20
Callorhynchus capensis	5.10	2	1.16
Lithognathus mormyrus	3.37	9	0.76
Pagellus bellottii	3.10	18	0.70
Starfish - purple	1.18	292	0.27
Sardinella aurita	0.64	27	0.14
Spondyliosa cantharus	0.27	9	0.06
Sardinops sagax	0.27	9	0.06
Dentex macrophthalmus	0.18	48	0.04 59
Total	441.26	100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 14  
DATE :18/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 17°3.74  
start stop duration Purpose : 3 Lon E 11°16.10  
TIME :01:29:00 01:55:08 26.1 (min)  
LOG : 3384.13 3385.41 1.3 Region : 4050  
FDEPTH: 663 637 Gear cond.: 0

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 18  
DATE :18/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 16°34.98  
start stop duration Purpose : 3 Lon E 11°38.06  
TIME :11:49:22 12:20:11 30.8 (min)  
LOG : 3451.62 3453.43 1.8 Region : 4050  
FDEPTH: 78 78 Gear cond.: 0  
BDEPTH: 78 78 Validity : 0  
Towing dir: 0° Wire out : 195 m Speed : 3.5 kn

Sorted : 138 Total catch: 4268.08 Catch/hour: 8311.74

Table with columns: SPECIES, CATCH/HOUR, % OF TOT. C, SAMP. Lists species like Trachurus trecae, Dentex macrocephthalmus, Callorhynchus capensis, etc.

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 19
DATE :18/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 16°36.36
start stop duration Lon E 11°26.19
TIME :14:06:46 14:37:56 31.2 (min) Purpose : 3
LOG : 3467.07 3468.66 1.6 Region : 4050
FDEPTH: 121 122 Gear cond.: 0
BDEPTH: 121 122 Validity : 0
Towing dir: 0° Wire out : 280 m Speed : 3.1 kn
Sorted : 115 Total catch: 243.63 Catch/hour: 468.82

Table with columns: SPECIES, CATCH/HOUR, % OF TOT. C, SAMP. Lists species like Trachurus trecae, Trachurus capensis, Atractoscion aequidens, etc.

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 20
DATE :18/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 16°40.01
start stop duration Lon E 11°24.01
TIME :15:29:02 15:59:08 30.1 (min) Purpose : 3
LOG : 3471.93 3473.51 1.6 Region : 4050
FDEPTH: 124 127 Gear cond.: 0
BDEPTH: 124 127 Validity : 0
Towing dir: 0° Wire out : 300 m Speed : 3.1 kn
Sorted : 22 Total catch: 145.67 Catch/hour: 290.37

Table with columns: SPECIES, CATCH/HOUR, % OF TOT. C, SAMP. Lists species like Trachurus capensis, Dentex macrocephthalmus, Merluccius capensis, etc.

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 21
DATE :18/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 16°34.78
start stop duration Lon E 11°18.75
TIME :18:44:22 19:14:22 30.0 (min) Purpose : 3
LOG : 3495.07 3496.61 1.6 Region : 4050
FDEPTH: 603 610 Gear cond.: 0
BDEPTH: 603 610 Validity : 0
Towing dir: 0° Wire out : 1340 m Speed : 3.1 kn
Sorted : 39 Total catch: 449.25 Catch/hour: 898.50

Table with columns: SPECIES, CATCH/HOUR, % OF TOT. C, SAMP. Lists species like Merluccius paradoxus, Trachyrincus scabrus, Alepocephalus rostratus, etc.

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 22
DATE :19/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 16°24.55
start stop duration Lon E 11°45.72
TIME :05:16:20 05:46:21 30.0 (min) Purpose : 3
LOG : 3547.11 3548.68 1.6 Region : 4050
FDEPTH: 22 21 Gear cond.: 0
BDEPTH: 22 21 Validity : 0
Towing dir: 0° Wire out : 80 m Speed : 3.1 kn
Sorted : 0 Total catch: 105.87 Catch/hour: 211.74

Table with columns: SPECIES, CATCH/HOUR, % OF TOT. C, SAMP. Lists species like Pagellus bellottii, Illex coindetii, Mustelus mustelus, etc.

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 23
DATE :19/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 16°23.63
start stop duration Lon E 11°43.30
TIME :06:32:50 06:48:57 16.1 (min) Purpose : 3
LOG : 3553.07 3553.89 0.8 Region : 4050
FDEPTH: 52 54 Gear cond.: 0
BDEPTH: 52 54 Validity : 0
Towing dir: 0° Wire out : 130 m Speed : 3.0 kn
Sorted : 125 Total catch: 2477.04 Catch/hour: 9219.75

Table with columns: SPECIES, CATCH/HOUR, % OF TOT. C, SAMP. Lists species like Trachurus trecae, Dentex macrocephthalmus, Pagellus bellottii, etc.

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 24
DATE :19/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 16°12.14
start stop duration Lon E 11°36.12
TIME :08:22:52 08:53:13 30.4 (min) Purpose : 3
LOG : 3566.59 3568.09 1.5 Region : 4050
FDEPTH: 74 72 Gear cond.: 0
BDEPTH: 74 72 Validity : 0
Towing dir: 0° Wire out : 180 m Speed : 3.0 kn
Sorted : 10 Total catch: 71.50 Catch/hour: 141.35

Table with columns: SPECIES, CATCH/HOUR, % OF TOT. C, SAMP. Lists species like Squalus megalops, Chelidonichthys capensis, Scorpaena stephanica, etc.

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 25
DATE :19/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 16°12.92
start stop duration Lon E 11°42.03
TIME :10:10:20 10:41:51 31.5 (min) Purpose : 3
LOG : 3577.12 3578.79 1.7 Region : 4050
FDEPTH: 55 55 Gear cond.: 0
BDEPTH: 55 55 Validity : 0
Towing dir: 0° Wire out : 140 m Speed : 3.2 kn
Sorted : 0 Total catch: 170.55 Catch/hour: 324.75

Table with columns: SPECIES, CATCH/HOUR, % OF TOT. C, SAMP. Lists species like Atractoscion aequidens, Dasystis marmorata, Mustelus mustelus, etc.

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 26
DATE :19/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 16°10.70
start stop duration Lon E 11°45.80
TIME :11:30:22 11:47:11 16.8 (min) Purpose : 3
LOG : 3583.04 3584.03 1.0 Region : 4050
FDEPTH: 37 37 Gear cond.: 0
BDEPTH: 37 37 Validity : 0
Towing dir: 0° Wire out : 110 m Speed : 3.5 kn
Sorted : 163 Total catch: 2690.34 Catch/hour: 9596.93

Table with columns: SPECIES, CATCH/HOUR, % OF TOT. C, SAMP. Lists species like Trachurus trecae, Pagellus bellottii, Chelidonichthys capensis, etc.

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 27  
 DATE :19/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 16°22.23  
 start stop duration Lon E 11°43.36  
 TIME :13:02:08 13:28:53 26.8 (min) Purpose : 3  
 LOG : 3592.22 3593.66 1.4 Region : 4050  
 FDEPTH: 44 40 Gear cond.: 0  
 BDEPTH: 44 40 Validity : 0  
 Towing dir: 0° Wire out : 120 m Speed : 3.2 kn  
 Sorted : 105 Total catch: 222.19 Catch/hour: 498.37

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Pagellus bellottii	314.60	4167	63.13	91
Trachurus trecae	43.04	469	8.64	92
Chelidonichthys capensis	29.79	110	5.98	
Sepia orbignyana	25.53	56	5.12	
Myliobatis aquila	22.54	9	4.52	
Mustelus mustelus	15.21	11	3.05	
Loligo vulgaris	11.51	20	2.31	
Dentex barnardi	10.00	85	2.01	
Raja miraletus	8.07	16	1.62	
Dasyatis marmorata	5.65	2	1.13	
Spondyliosoma cantharus	3.72	81	0.75	
Atractoscion aeguidens	3.16	2	0.63	
Squalus megalops	2.92	4	0.59	
Zeus faber	1.66	20	0.33	
Starfish	0.76	177	0.15	
Dicologlossa cuneata	0.20	20	0.04	
Total	498.37		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 28  
 DATE :20/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 14°24.84  
 start stop duration Lon E 12°19.91  
 TIME :12:48:29 13:18:52 30.4 (min) Purpose : 3  
 LOG : 3762.41 3764.16 1.8 Region : 4050  
 FDEPTH: 66 71 Gear cond.: 0  
 BDEPTH: 66 71 Validity : 0  
 Towing dir: 0° Wire out : 180 m Speed : 3.4 kn  
 Sorted : 103 Total catch: 266.00 Catch/hour: 525.00

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Pagellus bellottii	186.63	2009	35.55	94
Dentex barnardi	82.97	426	15.80	
Pomadasy incisus	76.74	707	14.62	95
Squatina oculata	66.39	16	12.65	
Dasyatis marmorata	13.34	4	2.54	
Spondyliosoma cantharus	12.91	43	2.46	
Raja miraletus	12.36	22	2.35	
Chelidonichthys gabonensis	10.66	107	2.03	
Lithognathus mormyrus	10.50	28	2.00	
Pagrus africanus	9.41	2	1.79	
Atractoscion aeguidens	9.14	8	1.74	97
Pomadasy jubelini	8.45	12	1.61	
Myliobatis aquila	8.21	2	1.56	
Trachurus trecae	6.24	36	1.19	96
Pomatomus saltatrix	4.30	4	0.82	
Diplodus cervinus cervinus	2.68	4	0.51	
Pseudupeneus prayensis	2.29	12	0.44	
Alloteuthis africana	1.42	545	0.27	
Citharus linguatula	0.36	4	0.07	
Total	525.00		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 29  
 DATE :20/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 14°4.97  
 start stop duration Lon E 12°20.57  
 TIME :15:32:54 16:03:07 30.2 (min) Purpose : 3  
 LOG : 3783.57 3785.18 1.6 Region : 4050  
 FDEPTH: 33 34 Gear cond.: 0  
 BDEPTH: 33 34 Validity : 0  
 Towing dir: 0° Wire out : 97 m Speed : 3.2 kn  
 Sorted : 63 Total catch: 249.13 Catch/hour: 494.63

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Pagellus bellottii	427.70	7394	86.47	98
Dasyatis marmorata	33.32	22	6.74	
Sepia officinalis	7.64	10	1.55	100
Pomatomus saltatrix	4.63	2	0.94	
Fistularia petimba	3.99	6	0.81	
Rhinobatos albomaculatus	3.69	2	0.75	
Dentex barnardi	3.51	8	0.73	
Raja miraletus	3.18	6	0.64	
Alloteuthis africana	2.98	695	0.60	
Sphyræna sphyraena	2.64	7	0.53	
Chelidonichthys capensis	0.69	7	0.14	
Trachurus trecae	0.56	56	0.11	99
Total	494.63		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 30  
 DATE :20/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 14°5.03  
 start stop duration Lon E 12°18.82  
 TIME :16:45:43 17:16:02 30.3 (min) Purpose : 3  
 LOG : 3788.34 3789.94 1.6 Region : 4050  
 FDEPTH: 101 96 Gear cond.: 0  
 BDEPTH: 101 96 Validity : 0  
 Towing dir: 0° Wire out : 240 m Speed : 3.2 kn  
 Sorted : 32 Total catch: 184.74 Catch/hour: 365.58

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichurus lepturus	115.84	305	31.69	
Dentex barnardi	53.59	299	14.66	101
Atractoscion aeguidens	34.31	24	9.39	105
Squatina oculata	32.65	12	8.93	
Umbrina canariensis	27.82	162	7.61	103
Dentex macrocephalus	26.04	275	7.12	102
Pagellus bellottii	23.55	232	6.44	107
Chelidonichthys capensis	19.71	230	5.39	
Dentex angolensis	8.55	77	2.34	106
Raja clavata	6.77	2	1.85	
Zeus faber	5.64	10	1.54	
Trigla lyra	3.68	20	1.01	
Perulibatrachus rosignoli	2.30	10	0.63	
Trachurus trecae	1.94	16	0.53	104
Squalus megalops	1.03	2	0.28	
Spherooides pachgaster	0.81	2	0.22	
Spondyliosoma cantharus	0.71	2	0.19	
Chaetodon hoefleri	0.24	2	0.06	
Boops boops	0.22	2	0.06	
Sardinella aurita	0.16	2	0.04	
Saurida brasiliensis	0.02	4	0.01	
Total	365.58		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 31  
 DATE :22/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 12°24.53  
 start stop duration Lon E 13°21.18

TIME :09:21:04 09:51:50 30.8 (min) Purpose : 3  
 LOG : 3988.38 3989.96 1.6 Region : 4040  
 FDEPTH: 112 110 Gear cond.: 0  
 BDEPTH: 112 110 Validity : 0  
 Towing dir: 0° Wire out : 280 m Speed : 3.1 kn  
 Sorted : 97 Total catch: 296.77 Catch/hour: 578.50

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Boops boops	149.36	152	25.82	
Sardinella aurita	99.18	2684	17.14	113
Chelidonichthys capensis	84.21	749	14.56	
Dentex macrocephalus	64.80	462	11.20	109
Trachurus trecae	61.60	1947	10.65	108
Perulibatrachus rosignoli	31.11	164	5.38	
Umbrina canariensis	17.19	53	2.97	111
Octopus vulgaris	12.51	12	2.16	
Cynoptericus ferox	8.50	4	1.47	
Zeus faber	8.25	18	1.43	
Sepia orbignyana	8.19	53	1.42	115
Spherooides pachgaster	7.43	12	1.28	
Dentex barnardi	7.37	29	1.27	112
Pagellus bellottii	6.02	35	1.04	114
Spicara alta	5.73	23	0.99	
Raja miraletus	3.26	6	0.56	
Dentex angolensis	2.11	12	0.36	110
Erythrocles monodi	0.99	6	0.17	
Anthias anthias**	0.47	6	0.08	
Pontinus accraensis	0.12	6	0.02	
Citharus linguatula	0.12	6	0.02	
Total	578.50		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 32  
 DATE :22/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 12°27.61  
 start stop duration Lon E 13°24.71  
 TIME :10:53:48 11:24:12 30.4 (min) Purpose : 3  
 LOG : 3995.71 3997.34 1.6 Region : 4040  
 FDEPTH: 64 68 Gear cond.: 0  
 BDEPTH: 64 68 Validity : 0  
 Towing dir: 0° Wire out : 170 m Speed : 3.2 kn  
 Sorted : 247 Total catch: 1139.42 Catch/hour: 2248.86

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	697.72	5102	31.03	123
Pomadasy jubelini	560.63	1299	24.93	121
Pomadasy incisus	477.20	2305	21.22	122
Stromateus fiatola	151.62	262	6.74	
Trachurus trecae	143.09	1689	6.36	116
Trichurus lepturus	54.12	1117	2.41	
Umbrina canariensis	35.23	118	1.57	125
Pagellus bellottii	33.69	282	1.50	120
Atractoscion aeguidens	18.61	45	0.83	126
Citharus linguatula	14.35	482	0.64	
Chloroscombrus chrysurus	10.89	63	0.48	
Sardinops sagax	9.87	89	0.44	119
Sardinella aurita	7.82	126	0.35	117
Rhinobatos albomaculatus	7.07	2	0.31	
Trachurus ovatus	6.81	28	0.30	
Dentex barnardi	6.26	36	0.28	124
Selene dorsalis	4.44	28	0.20	
Sphyræna sphyraena	2.63	10	0.12	
Sardinella maderensis	2.55	18	0.11	118
Pseudupeneus prayensis	1.46	18	0.06	
Chelidonichthys capensis	1.18	10	0.05	
Boops boops	0.81	81	0.04	
Serranus accraensis	0.55	18	0.02	
Sepia orbignyana	0.18	18	0.01	
Pterothrissus belloci	0.10	10	0.00	
Total	2248.86		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 33  
 DATE :22/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 12°17.06  
 start stop duration Lon E 13°24.50  
 TIME :12:48:26 13:18:52 30.4 (min) Purpose : 3  
 LOG : 4006.89 4008.57 1.7 Region : 4040  
 FDEPTH: 108 109 Gear cond.: 0  
 BDEPTH: 108 109 Validity : 0  
 Towing dir: 0° Wire out : 280 m Speed : 3.3 kn  
 Sorted : 132 Total catch: 362.63 Catch/hour: 715.01

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardinella aurita	510.78	5075	71.44	128
Trachurus trecae	77.55	759	10.85	127
Dentex macrocephalus	36.22	272	5.07	129
Zeus faber	19.05	28	2.66	
Spherooides pachgaster	16.54	22	2.31	
Dentex barnardi	10.75	33	1.50	131
Raja miraletus	10.47	22	1.46	
Umbrina canariensis	5.48	11	0.77	133
Dentex angolensis	5.36	22	0.75	130
Scorpaena stephanica	4.67	6	0.65	
Boops boops	4.02	37	0.56	
Chelidonichthys gabonensis	3.84	34	0.54	
Pomadasy incisus	3.15	16	0.44	
Pagellus bellottii	2.23	11	0.31	132
Scomber japonicus	2.07	12	0.29	
Brotula barbata	1.68	2	0.23	
Pontinus accraensis	1.14	6	0.16	
Total	715.01		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 34  
 DATE :22/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 12°16.58  
 start stop duration Lon E 13°26.87  
 TIME :13:59:48 14:21:03 21.3 (min) Purpose : 3  
 LOG : 4011.71 4012.84 1.1 Region : 4040  
 FDEPTH: 98 97 Gear cond.: 0  
 BDEPTH: 98 97 Validity : 0  
 Towing dir: 0° Wire out : 230 m Speed : 3.2 kn  
 Sorted : 120 Total catch: 598.05 Catch/hour: 1688.61

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sardinella aurita	1440.71	38753	85.32	135
Trachurus trecae	134.96	4616	7.99	134
Dentex macrocephalus	50.82	325	3.01	136
Dentex barnardi	18.07	71	1.07	137
Zeus faber	16.66	28	0.99	
Umbrina canariensis	10.73	42	0.64	139
Pagellus bellottii	8.47	42	0.50	138
Chelidonichthys gabonensis	4.52	42	0.27	
Dentex angolensis	3.25	14	0.19	
Citharus linguatula	0.42	14	0.03	
Total	1688.61		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 35  
 DATE :22/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 12°16.92  
 start stop duration Lon E 13°31.56

TIME :15:26:30 15:57:19 30.8 (min) Purpose : 3  
 LOG : 4018.55 4020.15 1.6 Region : 4040  
 FDEPTH: 76 75 Gear cond.: 0  
 BDEPTH: 76 75 Validity : 0  
 Towing dir: 0° Wire out : 190 m Speed : 3.1 kn  
 Sorted : 129 Total catch: 273.25 Catch/hour: 531.96

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight	numbers	
Trichiurus lepturus	193.78	238	36.43
Pomadasy incisius	131.33	158	24.69
Dasyatis marmorata	47.07	8	8.85
Trachurus trecae	35.39	950	6.65
Rhinobatos albomaculatus	15.42	6	2.90
Pagellus bellottii	15.28	123	2.87
Sepia hieredda**	12.81	18	2.41
Chelidonichthys gabonensis	12.09	127	2.27
Dentex barnardi	11.66	66	2.19
Torpedo torpedo	10.51	10	1.98
Pseudupeneus prayensis	9.56	95	1.80
Raja miraletus	9.54	18	1.79
Citharus linguatula	5.30	271	1.00
Brachydeuterus auritus	5.04	35	0.95
Umbrina canariensis	3.15	11	0.59
Zeus faber	3.08	4	0.58
Atractoscion aequidens	2.39	2	0.45
Dentex angolensis	1.85	35	0.35
Boops boops	1.54	27	0.29
Lagocephalus laevigatus	1.38	2	0.26
Dentex macrophthalms	1.30	8	0.25
Fistularia petimba	1.07	2	0.20
Chaetodon hoefleri	0.97	8	0.18
Sardinella aurita	0.25	4	0.05
Pontinus accraensis	0.18	8	0.03
<b>Total</b>	<b>531.96</b>		<b>100.00</b>

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 36  
 DATE :22/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 12°16.93  
 start stop duration Lon E 13°34.09  
 TIME :16:33:38 17:04:18 30.7 (min) Purpose : 3  
 LOG : 4023.39 4025.01 1.6 Region : 4040  
 FDEPTH: 55 57 Gear cond.: 0  
 BDEPTH: 55 57 Validity : 0  
 Towing dir: 0° Wire out : 150 m Speed : 3.2 kn  
 Sorted : 124 Total catch: 1762.48 Catch/hour: 3449.08

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight	numbers	
Brachydeuterus auritus	1391.82	23245	40.35
Trichiurus lepturus	817.08	836	23.69
Pomadasy incisius	314.01	642	9.10
Trachurus trecae	131.35	1673	3.81
Pagellus bellottii	118.81	892	3.44
Rhinobatos albomaculatus	104.31	27	3.02
Dentex barnardi	95.93	530	2.78
Dasyatis marmorata	73.62	27	2.13
Pomadasy jubelini	71.96	139	2.09
Pseudupeneus prayensis	46.85	585	1.36
Umbrina canariensis	42.39	223	1.23
Galeoides decadactylus	39.61	84	1.15
Sepia hieredda**	37.65	57	1.09
Raja miraletus	35.40	84	1.03
Octopus vulgaris	29.57	27	0.86
Lagocephalus laevigatus	27.34	27	0.79
Pseudocottius typus	22.31	27	0.65
Citharus linguatula	17.57	808	0.51
Chaetodon hoefleri	10.61	57	0.31
Selene dorsalis	6.69	57	0.19
Sardinella maderensis	5.85	168	0.17
Chloroscombrus chrysurus	3.62	27	0.10
Sardinella aurita	2.50	57	0.07
Boops boops	1.39	84	0.04
Sorsogona prionota	0.84	27	0.02
<b>Total</b>	<b>3449.08</b>		<b>100.00</b>

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 37  
 DATE :22/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 12°22.49  
 start stop duration Lon E 13°16.98  
 TIME :23:35:09 00:06:51 31.7 (min) Purpose : 3  
 LOG : 4050.13 4051.80 1.7 Region : 4040  
 FDEPTH: 715 716 Gear cond.: 0  
 BDEPTH: 715 716 Validity : 0  
 Towing dir: 0° Wire out : 1430 m Speed : 3.2 kn  
 Sorted : 31 Total catch: 155.91 Catch/hour: 295.10

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight	numbers	
Yarella blackfordi	153.31	4562	51.95
Hoplostethus cadenati	56.59	804	19.18
Lamprogrammus exultus	17.41	57	5.90
Nezumia aequalis	16.18	407	5.48
Photonetes sp.	10.50	161	3.56
Talismania longifilis	7.29	161	2.47
Glyphus marsupialis	5.87	284	1.99
Opihotheuthis agassizi	5.68	9	1.92
Stomias boa boa	3.97	85	1.35
Eumopterus sp.	2.84	19	0.96
Aristeus varidensis, female ***	2.56	161	0.87
Stereomastis sp.	2.46	161	0.83
Xenodermichthys copei	1.89	132	0.64
HISTIOTEUTHIDAE	1.89	9	0.64
Aristeus varidensis, male ***	1.51	199	0.51
Barbourisia rufa	1.36	2	0.46
Chaceon maritae	1.02	4	0.35
Gadella imberbis	0.66	19	0.22
Halosaurus ovenii	0.57	28	0.19
Diaphus dumerilii	0.38	9	0.13
Triplophos hemingi	0.38	19	0.13
Bathurocomger vicinus	0.38	9	0.13
Diastobranchius capensis	0.38	9	0.13
<b>Total</b>	<b>295.10</b>		<b>100.00</b>

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 38  
 DATE :23/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 12°1.79  
 start stop duration Lon E 13°38.97  
 TIME :05:23:58 05:44:48 20.8 (min) Purpose : 3  
 LOG : 4086.26 4087.36 1.1 Region : 4040  
 FDEPTH: 57 60 Gear cond.: 0  
 BDEPTH: 57 60 Validity : 0  
 Towing dir: 0° Wire out : 160 m Speed : 3.2 kn  
 Sorted : 159 Total catch: 679.07 Catch/hour: 1956.03

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight	numbers	
Sardinella aurita	873.18	6060	44.64
Trachurus trecae	623.76	9272	31.89
Pagellus bellottii	153.15	1815	7.83
Pomadasy incisius	121.70	1524	6.22
Pseudupeneus prayensis	50.55	544	2.58
Lagocephalus laevigatus	21.63	23	1.11
Rhinobatos albomaculatus	21.03	6	1.07

Dentex barnardi	16.33	72	0.83
Raja miraletus	15.96	49	0.82
Brachydeuterus auritus	15.35	242	0.78
Citharus linguatula	8.93	374	0.46
Sarda sarda	8.38	9	0.43
Atractoscion aequidens	7.49	14	0.38
Sepia hieredda**	5.44	12	0.28
Sphyræna sphyraena	3.63	23	0.19
Scomber coilius	3.51	12	0.18
Grammolites gruvelli	3.14	49	0.16
Umbrina canariensis	1.67	12	0.09
Serranus accraensis	0.72	12	0.04
Boops boops	0.35	23	0.02
Arnoglossus imperialis	0.12	12	0.01
Sorsogona prionota	0.00	0	0.00
<b>Total</b>	<b>1956.03</b>		<b>100.00</b>

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 39  
 DATE :23/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 11°59.48  
 start stop duration Lon E 13°37.09  
 TIME :06:27:53 06:57:57 30.1 (min) Purpose : 3  
 LOG : 4090.84 4092.33 1.5 Region : 4040  
 FDEPTH: 72 73 Gear cond.: 0  
 BDEPTH: 72 73 Validity : 0  
 Towing dir: 0° Wire out : 180 m Speed : 3.0 kn  
 Sorted : 0 Total catch: 110.10 Catch/hour: 219.69

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight	numbers	
Trachurus trecae	51.48	477	23.43
Pseudupeneus prayensis	38.71	60	17.62
Pagellus bellottii	34.32	321	15.62
Raja miraletus	27.54	50	12.53
Sepia hieredda**	11.09	18	5.05
Spherooides pachgaster	8.66	6	3.94
Zeus faber	7.96	12	3.62
Dentex barnardi	7.44	46	3.39
Sardinella aurita	6.37	42	2.90
Torpedo torpedo	6.21	10	2.82
Pomadasy incisius	5.97	88	2.72
Chelidonichthys capensis	4.43	62	2.02
Centrarchops chapini	2.79	18	1.27
Citharus linguatula	1.52	42	0.69
Sphyræna sphyraena	1.20	18	0.54
Dentex angolensis	1.18	26	0.54
Umbrina canariensis	1.06	4	0.48
Fistularia petimba	0.92	2	0.42
Alloteuthis africana	0.70	279	0.32
Urchin	0.12	8	0.05
Boops boops	0.04	2	0.02
<b>Total</b>	<b>219.69</b>		<b>100.00</b>

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 40  
 DATE :23/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 11°58.93  
 start stop duration Lon E 13°31.94  
 TIME :08:03:18 08:33:49 30.5 (min) Purpose : 3  
 LOG : 4098.94 4100.42 1.5 Region : 4040  
 FDEPTH: 102 102 Gear cond.: 0  
 BDEPTH: 102 102 Validity : 0  
 Towing dir: 0° Wire out : 250 m Speed : 2.9 kn  
 Sorted : 198 Total catch: 664.17 Catch/hour: 1305.71

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight	numbers	
Sardinella aurita	1031.32	31614	78.99
Erythrocles monodi	61.08	214	5.14
Boops boops	51.25	15	3.93
Dentex macrophthalms	38.28	293	2.93
Zeus faber	35.37	65	2.71
Anthias anthias**	19.40	201	1.49
Dentex angolensis	18.42	71	1.41
Sarda sarda	14.55	10	1.11
Raja miraletus	9.59	195	0.73
Pagellus bellottii	8.89	39	0.68
Atractoscion aequidens	6.80	4	0.52
Spherooides pachgaster	1.83	2	0.14
Chaetodon hoefleri	1.04	6	0.08
Dentex barnardi	0.90	2	0.07
Chelidonichthys capensis	0.85	6	0.06
Illex coindetii	0.14	6	0.01
<b>Total</b>	<b>1305.71</b>		<b>100.00</b>

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 41  
 DATE :23/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 11°58.07  
 start stop duration Lon E 13°29.84  
 TIME :09:49:51 10:19:55 30.1 (min) Purpose : 3  
 LOG : 4104.77 4106.33 1.6 Region : 4040  
 FDEPTH: 265 264 Gear cond.: 0  
 BDEPTH: 265 264 Validity : 0  
 Towing dir: 0° Wire out : 630 m Speed : 3.1 kn  
 Sorted : 112 Total catch: 1082.01 Catch/hour: 2158.98

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight	numbers	
Chlorophthalmus atlanticus	563.94	10501	26.12
Hoplostethus mediterraneus	368.88	323	17.09
Merluccius polli	302.15	1099	14.00
Dentex macrophthalms	242.25	627	11.22
Zenopsis conchifer	204.34	589	9.46
Synagrops microlepis	188.80	14406	8.74
Bembrops heterurus	41.90	96	1.94
Laemonema laureysi	39.77	417	1.38
Parapenaeus longirostris, f **	23.88	1477	1.11
Malacocephalus occidentalis	23.33	152	1.08
Rajella leopardus	19.71	8	0.91
Parapenaeus longirostris, m **, male	18.40	2355	0.85
Spherooides pachgaster	17.26	20	0.80
Cynoponticus ferox	16.50	20	0.76
MYCTOPHIDAE	15.74	6048	0.73
Epigonus telescopus**	14.23	114	0.66
Pterothrissus belloci	12.89	76	0.60
Torpedo torpedo	12.89	20	0.60
Brotula barbata	10.42	6	0.48
Halicolonus dactylopterus	8.72	38	0.40
Myxtriopsis costellatus	8.54	20	0.40
Coelrorinchus caelrorinchus	7.96	190	0.37
Todaropsis eblanae	5.89	58	0.27
Citharus linguatula	0.38	20	0.02
Cynoglossus sp.	0.20	20	0.01
<b>Total</b>	<b>2158.98</b>		<b>100.00</b>

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 42  
 DATE :23/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 11°50.69  
 start stop duration Lon E 13°43.96  
 TIME :12:38:05 13:08:17 30.2 (min) Purpose : 3  
 LOG : 4125.39 4127.16 1.8 Region : 4040  
 FDEPTH: 34 30 Gear cond.: 0  
 BDEPTH: 34 30 Validity : 0  
 Towing dir: 0° Wire out : 100 m Speed : 3.5 kn

Sorted : 218 Total catch: 873.10 Catch/hour: 1734.64

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight numbers			
Pomadasya jubelini	364.45	1685	21.01 183
Pomadasya incisus	274.97	3075	15.85 184
Brachydeuterus auritus	222.20	4212	12.81 187
Trachurus trecae	191.05	4617	11.01 180
Chlorocombus chrysurus	159.42	1415	9.19 181
Sardinella aurita	113.01	1915	6.51 181
Selene dorsalis	62.78	429	3.62
Galeoides decadactylus	53.88	525	3.11
Ilisha africana	49.75	930	2.87
Lagocephalus laevigatus	43.79	151	2.52
Pseudotolithus senegalensis	40.85	79	2.35 185
Trichurus lepturus	40.21	159	2.32
Pseudupeneus prayensis	31.87	548	1.84
Rhinobatos albomaculatus	20.19	16	1.16
Sardinella maderensis	15.10	572	0.87 182
Dasyatis margarita	12.16	8	0.70
Pagellus bellottii	6.28	40	0.36 186
Sphyræna sphyræna	5.72	16	0.33
Umbrina canariensis	5.64	72	0.33 188
Trachinotus ovatus	4.93	24	0.28
Trachinotus goreensis	4.13	8	0.24
Ephippion guttifer	3.70	2	0.21
Citharus linguatula	2.46	79	0.14
Eucinostomus melanopterus	1.91	8	0.11
Dentex barnardi	1.75	8	0.10
Pteroscion pelli	1.43	16	0.08
Penaeus notialis	1.03	8	0.06
Total	1734.64		100.00

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 43  
DATE :23/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 11°48.86  
start stop duration Lon E 13°40.92  
TIME :14:06:38 14:37:08 30.5 (min) Purpose : 3  
LOG : 4132.52 4134.14 1.6 Region : 4040  
FDEPTH: 62 62 Gear cond.: 0  
BDEPTH: 62 62 Validity : 0  
Towing dir: 0° Wire out : 150 m Speed : 3.2 kn  
Sorted : 122 Total catch: 260.09 Catch/hour: 511.65

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight numbers			
Trichurus lepturus	484.54	1407	94.70
Trachurus trecae	14.60	96	2.85 189
Pagellus bellottii	5.98	37	1.17 190
Pseudupeneus prayensis	1.46	8	0.28
Selene dorsalis	1.38	8	0.27
Dentex barnardi	1.34	8	0.26
Pomadasya incisus	1.18	8	0.23
Lepidotrigla cadmani	0.81	4	0.16
Dentex angolensis	0.37	4	0.07
Total	511.65		100.00

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 44  
DATE :23/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 11°47.88  
start stop duration Lon E 13°33.63  
TIME :15:46:18 16:15:00 28.7 (min) Purpose : 3  
LOG : 4142.98 4144.65 1.7 Region : 4040  
FDEPTH: 108 105 Gear cond.: 0  
BDEPTH: 108 105 Validity : 0  
Towing dir: 0° Wire out : 260 m Speed : 3.5 kn  
Sorted : 28 Total catch: 161.29 Catch/hour: 337.07

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight numbers			
Trachurus trecae	106.48	1110	31.59 189
Dentex macrophthalmus	53.71	545	15.93 191
Umbrina canariensis	40.59	134	4.04 193
Dentex angolensis	35.74	178	10.60 190
Dentex barnardi	17.97	79	5.33 194
Spherooides pachgaster	14.52	23	4.31
Chelidonichthys capensis	12.50	102	3.71
Raja miraletus	12.08	19	3.58 197
Atractosteion aequidens	8.88	4	2.64
Anthias anthias	6.94	71	2.06
Sardinella maderensis	6.37	25	1.89 196
Boops boops	3.26	27	0.97
Sardinella aurita	3.11	71	0.92 195
Perullibatrachus rosignoli	2.49	13	0.74
Pagellus bellottii	2.26	8	0.67 192
Branchiostegus semifasciatus	2.17	2	0.64
Scomber japonicus	1.86	8	0.55
Zeus faber	0.98	2	0.29
Scorpaena stephanica	0.94	2	0.28
Pterothrissus bellocci	0.86	4	0.25
Chaetodon hoefleri	0.82	4	0.24
Citharus linguatula	0.71	13	0.21
Illex coindetii	0.67	71	0.20 198
Sepia hieredda**	0.50	4	0.15 199
Pythonicthys microphthalmus	0.29	2	0.09
Pseudupeneus prayensis	0.23	2	0.07
G A S T R O P O D S	0.15	17	0.04
Total	337.07		100.00

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 45  
DATE :23/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 11°56.17  
start stop duration Lon E 13°23.44  
TIME :18:52:47 19:23:42 30.9 (min) Purpose : 3  
LOG : 4161.15 4162.68 1.5 Region : 4040  
FDEPTH: 467 467 Gear cond.: 0  
BDEPTH: 467 467 Validity : 0  
Towing dir: 0° Wire out : 1100 m Speed : 3.0 kn  
Sorted : 22 Total catch: 117.35 Catch/hour: 227.72

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight numbers			
Yarella blackfordi	53.09	1521	23.31
Lophius vaillanti	25.34	6	11.13
Hoplostethus cadenati	20.96	931	9.20
Laemonema laureysi	19.40	885	8.52
Aristeus varidens, female ***, female	18.86	1092	8.28 436
Raja miraletus	16.46	23	7.23
Zameus (Scymnodon) squamulosus	9.31	202	4.09
Malacocephalus occidentalis	9.24	78	4.06
Benthodesmus tenuis	6.99	217	3.07
Stomias boa boa	6.05	171	2.66
Nematocarcinus africanus	5.74	1537	2.52
Chlorophthalmus atlanticus	5.74	140	2.52
Aristeus varidens, male ***, male	5.59	782	2.45 435
Chaceon maritae, female ***, female	5.18	21	2.28 434
Gadella imberbis	3.73	147	1.64
Merluccius polli	3.30	4	1.45 200
Trachurus trecae	2.17	23	0.95 201
OMASTREPHIDAE	2.17	8	0.95
J E L Y F I S H	1.94	16	0.85
Halosaurus ovenii	1.55	78	0.68
Galeus polli	1.32	39	0.58
Borostomias antarcticus	0.93	70	0.41

Deania profundorum	0.78	16	0.34
Acanthephyra sp.	0.54	225	0.24
Triplophos hemingi	0.54	78	0.24
Stereomastis sp.	0.31	47	0.14
Epigonus pandionis	0.23	8	0.10
Chaunax pictus	0.16	155	0.07
Nemichthys scolopaceus	0.08	8	0.03
Total	227.72		100.00

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 46  
DATE :23/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 11°56.35  
start stop duration Lon E 13°20.39  
TIME :21:09:55 21:42:13 32.3 (min) Purpose : 3  
LOG : 4169.86 4171.56 1.7 Region : 4040  
FDEPTH: 647 648 Gear cond.: 0  
BDEPTH: 647 648 Validity : 0  
Towing dir: 0° Wire out : 1450 m Speed : 3.1 kn  
Sorted : 33 Total catch: 166.75 Catch/hour: 309.75

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight numbers			
Yarella blackfordi	89.54	2582	28.91
Neobythites analis	67.80	381	21.89
Hoplostethus cadenati	44.95	1207	14.51
Chaceon maritae, female ***	25.54	111	8.25
Talismania longifilis	12.72	279	4.11
Stomias boa boa	10.68	241	3.45
Aristeus varidens, female ***, female	8.17	444	2.64 438
Merluccius polli	6.78	9	2.19
Nezumia aequalis	6.32	260	2.04
Chaceon maritae, male ***	5.29	19	1.71
Stereomastis sp.	4.64	669	1.50
Nematocarcinus africanus	3.72	594	1.20
Benthodesmus tenuis	3.16	93	1.02
Aristeus varidens, male ***, male	2.88	323	0.93 437
THYSANOTEUTHIDAE	2.79	9	0.90
Halosaurus ovenii	2.79	28	0.90
Luciobrotula nolfi	2.51	19	0.81
Bathyrrocoaster vicinus	2.23	74	0.72
Etmopterus polli	1.95	28	0.63
Loligo vulgaris	1.58	19	0.51
Glyphus marsupialis	1.49	158	0.48
Acanthephyra sp.	0.93	93	0.30
Laemonema laureysi	0.65	9	0.21
Plesionaeus edwardsianus	0.28	9	0.09
Diceratias pileatus	0.19	9	0.06
Galeus polli	0.19	9	0.06
Total	309.75		100.00

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 47  
DATE :23/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 11°43.69  
start stop duration Lon E 13°18.26  
TIME :23:58:14 00:28:43 30.5 (min) Purpose : 3  
LOG : 4183.23 4184.76 1.5 Region : 4040  
FDEPTH: 657 659 Gear cond.: 0  
BDEPTH: 657 659 Validity : 0  
Towing dir: 0° Wire out : 1330 m Speed : 3.0 kn  
Sorted : 30 Total catch: 212.17 Catch/hour: 417.66

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight numbers			
Nematocarcinus africanus	128.15	30150	30.68
Yarella blackfordi	114.92	3321	27.52
Hoplostethus cadenati	47.40	1516	11.35
Borostomias antarcticus	39.41	992	9.44
Lamprogrammus exutus	37.07	331	8.87
Aristeus varidens	13.78	923	3.30 0
Xenodermichthys copei	12.13	896	2.90
Benthodesmus tenuis	3.86	124	0.92
Stereomastis sp.	3.72	482	0.89
Aristeus varidens	2.76	372	0.66
Nezumia aequalis	2.76	69	0.66
Octopoteuthis sicula	1.93	14	0.46
Glyphus marsupialis	1.79	124	0.43
Photoneustes sp.	1.65	28	0.40
Etmopterus polli	1.24	28	0.30
Acanthephyra sp.	1.24	96	0.30
Talismania longifilis	1.10	41	0.26
Triplophos hemingi	0.83	28	0.20
Talismania sp.	0.69	28	0.16
Diceratias pileatus	0.55	28	0.13
MYCTOPHIDAE	0.41	220	0.10
Neobythites analis	0.28	28	0.07
Total	417.66		100.00

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 48  
DATE :24/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 11°43.76  
start stop duration Lon E 13°22.79  
TIME :02:09:06 02:38:33 29.5 (min) Purpose : 3  
LOG : 4193.56 4195.16 1.6 Region : 4040  
FDEPTH: 345 349 Gear cond.: 0  
BDEPTH: 345 349 Validity : 0  
Towing dir: 0° Wire out : 800 m Speed : 3.3 kn  
Sorted : 87 Total catch: 588.41 Catch/hour: 1198.80

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight numbers			
Merluccius polli	838.94	2604	69.98 202
Laemonema laureysi	191.10	2757	15.94
Hymenocephalus italicus	80.54	10934	6.72
Farapaneus longirostris,f **, female	19.52	1406	1.63 441
Malacocephalus occidentalis	16.38	206	1.37
Chaunax pictus	11.47	532	0.96
Etmopterus polli	9.15	1243	0.76
Aristeus varidens, female ***, female	8.88	450	0.74 439
Mustelus mustelus	7.38	2	0.62
Borostomias antarcticus	2.73	81	0.23
Benthodesmus tenuis	2.59	122	0.22
Chaceon maritae	1.77	6	0.15
Coelorrhinchus caelorrhinchus	1.51	55	0.13
Bassanago albescens	1.37	26	0.11
Aristeus varidens, male ***, male	1.22	163	0.10 440
Synagrops microlepis	1.10	122	0.09
Gadella imberbis	1.10	41	0.09
MYCTOPHIDAE	0.81	683	0.07
Avocettina acuticeps	0.69	14	0.06
Lophiodes kempi	0.55	14	0.05
Total	1198.80		100.00

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 49  
DATE :24/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 11°31.05  
start stop duration Lon E 13°21.28  
TIME :04:22:52 04:44:01 21.2 (min) Purpose : 3  
LOG : 4206.52 4207.60 1.1 Region : 4040  
FDEPTH: 372 376 Gear cond.: 0  
BDEPTH: 372 376 Validity : 0  
Towing dir: 0° Wire out : 850 m Speed : 3.1 kn  
Sorted : 26 Total catch: 298.38 Catch/hour: 846.47

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Nematocarcinus africanus	246.52	106817	29.12
Merluccius polli	105.79	374	12.50
Hymenocephalus italicus	82.07	7552	9.70
Hoplostethus melanopterus	80.82	3308	9.55
Yarella blackfordi	79.89	4369	9.44
Laemonema laureysi	76.45	1092	9.03
Etmopterus polli	32.14	1467	3.80
Lamprogammus exutus	26.21	187	3.10
Glyphus marsupialis	19.04	9611	2.25
Chaunax cf. pictus	14.67	874	1.73
Gadella imberbis	10.92	346	1.29
Squalus megalops	9.53	3	1.13
Chlorophthalmus atlanticus	8.74	250	1.03
Aristeus varidens, female ***	8.11	624	0.96
MYCTOPHIDAE	7.18	3745	0.85
Neoharriotta pinnata	6.81	3	0.80
Aristeus varidens, male ***	6.24	999	0.74
J E L L Y F I S H	4.06	62	0.48
APOGONIDAE	3.43	218	0.41
Synagrops microlepis	3.12	281	0.37
Parapanaeus longirostris	3.12	312	0.37
Coelorinchus caelorrhincus	2.81	26	0.33
Malacocephalus laevis	1.87	31	0.22
Galeus polli	1.87	31	0.22
Chaceon maritae	1.53	6	0.18
Zenopsis conchifer	1.02	3	0.12
CANCRIDAE	0.94	31	0.11
Halosaurus ovenii	0.62	94	0.07
Nematopalaemon hastatus	0.31	218	0.04
Leptocephalus	0.31	31	0.04
Peristedion cataphractum	0.31	31	0.04
Total	846.47	100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 50  
DATE :24/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 11°31.46  
start stop duration Purpose : 3  
LOG : 4216.72 4218.23 1.5 Region : 4040  
FDEPTH: 104 104 Gear cond.: 0  
BDEPTH: 104 104 Validity : 0  
Towing dir: 0° Wire out : 240 m Speed : 2.9 kn  
Sorted : 0 Total catch: 140.21 Catch/hour: 273.14

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Chelidonichthys capensis	57.58	532	21.08
Spherooides pachgaster	47.34	64	17.33
Pterothrissus belloci	46.68	275	17.09
Dentex macropthalmus	41.88	469	15.33
Brotula multibarbata	23.77	33	8.70
Dentex angolensis	12.97	64	4.75
Citharus linguatula	8.77	164	3.21
Torpedo torpedo	5.63	16	2.06
Trichiurus lepturus	4.29	33	1.57
Octopus vulgaris	4.29	4	1.57
Dentex barnardi	3.90	18	1.43
Trachurus trecae	3.31	119	1.21
Pontinus kuhlii	2.49	14	0.91
Synagrops microlepis	2.14	234	0.78
Brachydeuterus auritus	2.12	12	0.78
Pagellus bellottii	1.68	8	0.61
Saurida brasiliensis	1.25	136	0.46
Scorpaena normani	1.03	8	0.38
Illex coindetii	0.90	39	0.33
Zeus faber	0.64	6	0.24
Boops boops	0.23	2	0.09
Peristedion cataphractum	0.23	4	0.09
Bembrops sp.	0.02	2	0.01
Total	273.14	100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 51  
DATE :24/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 11°32.23  
start stop duration Purpose : 3  
LOG : 4224.22 4225.85 1.6 Region : 4040  
FDEPTH: 62 62 Gear cond.: 0  
BDEPTH: 62 62 Validity : 0  
Towing dir: 0° Wire out : 160 m Speed : 3.1 kn  
Sorted : 80 Total catch: 320.96 Catch/hour: 605.20

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Pomadasya incisa	221.45	1426	36.59
Trachurus trecae	84.48	2199	13.96
Pagellus bellottii	68.94	588	11.39
Sepia hieredda**	31.98	45	5.28
Octopus vulgaris	27.15	15	4.49
Boops boops	24.66	354	4.08
Raja miraletus	22.78	53	3.76
Selene dorsalis	22.25	91	3.68
Dentex barnardi	19.08	121	3.15
Lagocephalus laevigatus	15.69	30	2.59
Pseudupeneus prayensis	13.58	113	2.24
Sardinella maderensis	10.18	45	1.68
Brachydeuterus auritus	9.96	60	1.65
Dentex angolensis	8.07	166	1.33
Torpedo torpedo	7.09	8	1.17
Sardinella aurita	6.34	136	1.05
Alloteuthis africana	5.20	4458	0.86
Citharus linguatula	3.92	128	0.65
Umbrina canariensis	1.89	8	0.31
Serranus accraensis	0.53	8	0.09
Total	605.20	100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 52  
DATE :24/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 11°29.92  
start stop duration Purpose : 3  
LOG : 4236.10 4236.88 0.8 Region : 4040  
FDEPTH: 28 28 Gear cond.: 0  
BDEPTH: 28 28 Validity : 0  
Towing dir: 0° Wire out : 90 m Speed : 3.2 kn  
Sorted : 118 Total catch: 572.47 Catch/hour: 2344.59

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Sardinella aurita	1054.81	37020	44.99
Brachydeuterus auritus	550.57	9027	23.48
Trichiurus lepturus	125.28	389	5.34
Pomadasya perotaei	70.81	156	3.02
Sardinella maderensis	67.90	1966	2.90
Chloroscombrus chrysurus	61.27	602	2.61
Galeoides decadactylus	60.45	586	2.58
Gymnura micrura	53.69	20	2.29
Rhinobatos albomaculatus	48.49	20	2.07
Selene dorsalis	33.87	176	1.44
Umbrina canariensis	30.55	430	1.30
Pseudolithus senegalensis	28.42	78	1.21
Pteroscion pelli	27.65	487	1.18

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Ilisha africana	25.11	430	1.07
Ephippion guttifer	21.99	20	0.94
Eucinostomus melanopterus	21.58	20	0.92
Trachinotus ovatus	11.88	57	0.51
Alectis alexandrinus	10.89	20	0.46
Pomadasya incisa	9.75	197	0.42
Trachurus trecae	8.35	233	0.36
Sphyræna sphyraena	7.41	57	0.32
Etrumeus whiteheadi	5.65	1069	0.24
Dicologlossa cuneata	3.11	57	0.13
Cynoglossus canariensis	2.74	20	0.12
Lagocephalus laevigatus	2.33	20	0.10
Total	2344.59	100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 53  
DATE :24/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 11°16.97  
start stop duration Purpose : 3  
LOG : 4251.13 4252.84 1.7 Region : 4040  
FDEPTH: 23 25 Gear cond.: 0  
BDEPTH: 23 25 Validity : 0  
Towing dir: 0° Wire out : 80 m Speed : 3.5 kn  
Sorted : 166 Total catch: 786.77 Catch/hour: 1606.75

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Brachydeuterus auritus	467.26	19154	29.08
Pomadasya incisa	285.11	2536	17.74
Sphyræna sphyraena	112.91	329	7.03
Pomadasya jubelini	97.52	339	6.07
Pteroscion pelli	90.00	2010	5.60
Ilisha africana	89.24	2536	5.55
Trachurus trecae	62.76	1550	3.91
Stromateus fiatola	57.41	94	3.57
Trichiurus lepturus	47.91	347	2.98
Chloroscombrus chrysurus	47.54	347	2.96
Galeoides decadactylus	45.66	498	2.84
Lagocephalus laevigatus	37.58	188	2.34
Sardinella aurita	25.73	658	1.60
Pomadasya perotaei	21.32	57	1.33
Gymnura micrura	17.52	6	1.09
Pseudolithus senegalensis	15.52	38	0.97
Pseudupeneus prayensis	11.93	151	0.74
Pagellus bellottii	7.70	38	0.48
Chilomycterus reticulatus	7.31	2	0.46
Selene dorsalis	6.94	339	0.43
Ephippion guttifer	6.64	4	0.41
Rhinobatos albomaculatus	6.62	2	0.41
Umbrina canariensis	6.21	123	0.39
Etrumeus whiteheadi	4.41	741	0.27
Lithognathus mormyrus	3.86	18	0.24
Raja miraletus	3.82	8	0.24
Scorpaena stephanica	3.75	65	0.23
Dasyatis marmorata	3.31	6	0.21
Dentex barnardi	2.45	10	0.15
Sardinella maderensis	2.25	84	0.14
Seriola carpenteri	1.88	10	0.12
Dicologlossa cuneata	1.70	29	0.11
Atractoscion aegidens	1.57	2	0.10
Sepia orbignyana	1.12	10	0.07
Seriola lalandi	0.57	10	0.04
Dasyatis margarita	0.52	2	0.04
Fistularia petimba	0.47	10	0.03
Torpedo marmorata	0.39	2	0.02
Panullus regius	0.39	2	0.02
Total	1606.75	100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 54  
DATE :24/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 11°13.74  
start stop duration Purpose : 3  
LOG : 4258.54 4260.03 1.5 Region : 4040  
FDEPTH: 65 68 Gear cond.: 0  
BDEPTH: 65 68 Validity : 0  
Towing dir: 0° Wire out : 150 m Speed : 3.2 kn  
Sorted : 149 Total catch: 864.60 Catch/hour: 1824.69

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Brachydeuterus auritus	1303.01	11715	71.41
Trachurus trecae	361.10	12853	19.79
Raja miraletus	60.72	148	3.33
Sardinella aurita	34.15	625	1.97
Torpedo torpedo	18.23	25	1.00
Pagellus bellottii	16.88	184	0.93
Zeus faber	11.38	25	0.62
Pseudupeneus prayensis	8.70	97	0.48
Lagocephalus laevigatus	5.76	36	0.32
Dentex angolensis	3.55	87	0.19
Chelidonichthys gabonensis	1.22	13	0.07
Total	1824.69	100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 55  
DATE :24/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 11°13.32  
start stop duration Purpose : 3  
LOG : 4265.36 4267.05 1.7 Region : 4040  
FDEPTH: 151 154 Gear cond.: 0  
BDEPTH: 151 154 Validity : 0  
Towing dir: 0° Wire out : 390 m Speed : 3.3 kn  
Sorted : 34 Total catch: 315.27 Catch/hour: 620.81

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Synagrops microlepis	449.91	55034	72.47
Merluccius polli	62.60	1004	10.08
Brotula barbata	40.84	91	6.58
Raja miraletus	14.24	33	2.29
Dentex angolensis	14.02	47	2.26
Bembrops heterurus	9.04	118	1.46
Zenopsis conchifer	6.54	118	1.05
Pterothrissus belloci	6.36	33	1.02
Sepia orbignyana	3.86	33	0.62
Helicolenus dactylopterus	2.68	18	0.43
Scorpaena accraensis	2.68	18	0.43
Illex coindetii	1.85	33	0.30
Trichiurus lepturus	1.67	33	0.27
Chlorophthalmus atlanticus	1.34	67	0.22
Citharus linguatula	1.34	33	0.22
Parapanaeus longirostris	1.18	268	0.19
GOBIIDAE	0.67	18	0.11
Total	620.81	100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 56  
DATE :24/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 11°13.22  
start stop duration Purpose : 3  
LOG : 4277.92 4279.37 1.5 Region : 4040  
FDEPTH: 533 523 Gear cond.: 0



BDEPTH: 533 523 Validity : 0  
 Towing dir: ° Wire out : 1200 m Speed : 2.9 km  
 Sorted : 27 Total catch: 413.50 Catch/hour: 813.98

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Nematocarcinus africanus	395.08	123396	48.54	
Hoplostethus cadenati	146.46	3130	17.99	
Aristeus varidens, female ***	54.33	3189	6.67	446
Aristeus varidens, male ***	54.33	8150	6.67	444
Lamprogrammus exutus	43.70	797	5.37	
Yarella blackfordi	35.43	1329	4.35	
Benthodesmus tenuis	19.19	650	2.36	
Ariomma bondi	14.76	354	1.81	
Gadella imberbis	8.86	354	1.09	
Triphophos hemingi	5.91	679	0.73	
Etmopterus polli	5.91	1181	0.73	
Stereomastis sp.	5.61	915	0.69	
Chaceon maritae	4.92	18	0.60	
Malacocephalus occidentalis	3.54	30	0.44	
Nezumia micronychodon	2.95	118	0.36	
Stomias boa boa	2.66	89	0.33	
Galeus polli	2.36	30	0.29	
Melanostigma sp.	2.07	30	0.25	
Laemonema laureysi	1.48	89	0.18	
Chlorophthalmus atlanticus	1.18	30	0.15	
Dicerarias pileatus	0.89	148	0.11	
Cataetyx laticeps	0.59	89	0.07	
Synagrops microlepis	0.59	118	0.07	
Xenodermichthys copei	0.30	30	0.04	
Diplophos taenia	0.30	30	0.04	
Glyphus marsupialis	0.30	118	0.04	
Nemichthys scolopaceus	0.30	30	0.04	
<b>Total</b>	<b>813.98</b>		<b>100.00</b>	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 57  
 DATE :24/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 10°49.64  
 Lon E 13°16.91  
 TIME :21:27:00 21:57:02 30.0 (min) Purpose : 3  
 LOG : 4308.43 4309.92 1.5 Region : 4040  
 FDEPTH: 492 488 Gear cond.: 0  
 BDEPTH: 492 488 Validity : 0  
 Towing dir: ° Wire out : 1150 m Speed : 3.0 km  
 Sorted : 23 Total catch: 269.50 Catch/hour: 538.28

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Nematocarcinus africanus	251.78	75535	46.78	
Hoplostethus cadenati	110.29	2922	20.49	
Trichiurus lepturus	48.34	2197	8.98	
Lamprogrammus exutus	46.14	1450	8.57	
Chaceon maritae, female ***	19.41	308	3.61	
Yarella blackfordi	9.01	242	1.67	
Squalus megalops	8.31	2	1.54	
Aristeus varidens, female ***	7.25	879	1.35	448
Aristeus varidens, male ***	5.27	461	0.98	447
Stomias boa boa	5.27	176	0.98	
Gadella imberbis	4.39	176	0.82	
Chaceon maritae, male ***	3.91	88	0.73	
Triphophos hemingi	3.52	395	0.65	
Laemonema laureysi	3.52	176	0.65	
MELANOSTOMIATIDAE	2.42	66	0.45	
Stereomastis sp.	1.98	242	0.37	
Benthodesmus tenuis	1.76	44	0.33	
Avocettina acuticeps	1.32	88	0.24	
Glyphus marsupialis	1.10	220	0.20	
Chaunax pictus	0.88	22	0.16	
Shrimps, small, non comm.	0.66	264	0.12	
Xenodermichthys copei	0.66	66	0.12	
Cataetyx laticeps	0.66	110	0.12	
Sergestes sp.	0.44	66	0.08	
<b>Total</b>	<b>538.28</b>		<b>100.00</b>	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 58  
 DATE :24/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 10°48.75  
 Lon E 13°20.07  
 TIME :23:49:49 00:20:07 30.3 (min) Purpose : 3  
 LOG : 4315.92 4317.44 1.5 Region : 4040  
 FDEPTH: 332 335 Gear cond.: 0  
 BDEPTH: 332 335 Validity : 0  
 Towing dir: ° Wire out : 770 m Speed : 3.0 km  
 Sorted : 30 Total catch: 928.45 Catch/hour: 1838.51

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Merluccius polli	823.80	3008	44.81	242
Chlorophthalmus atlanticus	659.29	14671	35.86	
Laemonema laureysi	179.86	3499	9.78	
Helicolenus dactylopterus	47.27	737	2.57	
Aristeus varidens, female ***	28.85	1412	1.57	450
Parapanaeus longirostris, f **, female	27.62	3131	1.50	451
Chaunax pictus	23.33	982	1.27	
Hymenocephalus italicus	19.03	4358	1.04	
Aristeus varidens, male ***	11.05	982	0.60	449
Epigonus telescopus**	4.91	61	0.27	
Bathynectes piperitus	3.07	123	0.17	
MYCTOPHIDAE	1.84	1105	0.10	
Synagrops microlepis	1.84	1044	0.10	
Benthodesmus tenuis	1.23	61	0.07	
Coelorinchus caelorrhincus	1.23	123	0.07	
Peristedion cataphractum	1.23	123	0.07	
Hoplostethus cadenati	1.23	61	0.07	
Leptrolepis sp.	0.61	61	0.03	
Avocettina acuticeps	0.61	61	0.03	
Parapanaeus longirostris, m **	0.61	61	0.03	
<b>Total</b>	<b>1838.51</b>		<b>100.00</b>	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 59  
 DATE :25/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 10°56.51  
 Lon E 13°26.12  
 TIME :01:52:45 02:22:47 30.0 (min) Purpose : 3  
 LOG : 4325.85 4327.40 1.6 Region : 4040  
 FDEPTH: 391 382 Gear cond.: 0  
 BDEPTH: 391 382 Validity : 0  
 Towing dir: ° Wire out : 860 m Speed : 3.1 km  
 Sorted : 21 Total catch: 204.43 Catch/hour: 408.32

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Nematocarcinus africanus	187.67	45497	45.96	
Hymenocephalus italicus	33.44	3811	8.29	
Laemonema laureysi	25.35	288	6.21	
Chaunax pictus	23.73	1079	5.81	
Merluccius polli	22.25	60	5.45	243
Aristeus varidens, female ***	21.75	1798	5.33	
Yarella blackfordi	19.77	7	4.84	
Etmopterus polli	18.16	1097	4.45	
Bathyrconger vicinus	14.56	252	3.57	
Lamprogrammus exutus	14.02	72	3.43	
Aristeus varidens, male ***	4.31	593	1.06	
Malacocephalus occidentalis	4.13	54	1.01	

Dibranchius atlanticus	3.95	288	0.97
Gadella imberbis	3.42	108	0.24
MYCTOPHIDAE	2.34	1456	0.57
Helicolenus dactylopterus	2.16	18	0.53
Synagrops microlepis	1.80	108	0.44
Borostomias antarcticus	1.44	36	0.35
Halosaurus ovenii	1.26	72	0.31
Chlorophthalmus atlanticus	0.90	18	0.22
Parapanaeus longirostris	0.90	54	0.22
Peristedion cataphractum	0.54	36	0.13
Chaceon maritae	0.48	2	0.12
<b>Total</b>	<b>408.32</b>		<b>100.00</b>

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 60  
 DATE :25/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 10°58.59  
 Lon E 13°25.64  
 TIME :03:47:57 04:18:02 30.1 (min) Purpose : 3  
 LOG : 4332.40 4333.90 1.5 Region : 4040  
 FDEPTH: 507 509 Gear cond.: 0  
 BDEPTH: 507 509 Validity : 0  
 Towing dir: ° Wire out : 1060 m Speed : 3.0 km  
 Sorted : 27 Total catch: 327.72 Catch/hour: 653.70

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Hoplostethus cadenati	254.20	1064	38.89	
Nematocarcinus africanus	210.16	63694	32.15	
Lamprogrammus exutus	68.46	2513	10.47	
Stomias boa boa	31.36	1029	4.80	
Triphophos hemingi	18.19	2114	2.78	
Aristeus varidens, female ***	14.60	838	2.23	454
OMMASTREPHIDAE	8.86	48	1.35	
MELANOSTOMIATIDAE	7.42	383	1.14	
Yarella blackfordi	4.55	120	0.70	
Myxtriopsis rostellatus	4.55	24	0.70	
Trichiurus lepturus	3.83	120	0.59	
Stereomastis sp.	3.59	335	0.55	
Aristeus varidens, male ***	3.59	598	0.55	453
Hoplostethus cadenati	3.59	120	0.55	0
Neoharriotia pinnata	3.35	24	0.51	
Etmopterus polli	2.39	96	0.37	
Ommastrephes pteropus	2.39	48	0.37	
Caelorinchus braueri	2.15	24	0.33	
Dibranchius atlanticus	1.20	96	0.18	
Sergestes sp.	1.20	191	0.18	
Acanthephyra sp.	0.96	263	0.15	
Gadella imberbis	0.96	48	0.15	
Nezumia micronychodon	0.96	24	0.15	
Cataetyx laticeps	0.72	120	0.11	
Bassanago albescens	0.48	24	0.07	
<b>Total</b>	<b>653.70</b>		<b>100.00</b>	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 61  
 DATE :25/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 10°54.74  
 Lon E 13°35.12  
 TIME :06:16:44 06:46:50 30.1 (min) Purpose : 3  
 LOG : 4346.94 4348.52 1.6 Region : 4040  
 FDEPTH: 115 115 Gear cond.: 0  
 BDEPTH: 115 115 Validity : 0  
 Towing dir: ° Wire out : 280 m Speed : 3.2 km  
 Sorted : 61 Total catch: 1882.33 Catch/hour: 3752.15

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Synagrops microlepis	2731.30	532788	72.79	
Trichiurus lepturus	422.67	13656	11.26	
Uranoscopus albesca	131.06	618	3.49	
Pontinus accraensis	97.02	433	2.59	
Scorpaena normani	74.15	494	1.98	
Pterothrissus belloci	64.88	680	1.73	
Brotula barbata	64.88	185	1.73	
Citharus linguatula	40.17	680	1.07	
Dentex angolensis	32.75	185	0.87	244
Sphoeroides pachyaster	28.39	62	0.76	
Bembris heterurus	24.72	247	0.66	
Umbriina canariensis	18.54	62	0.49	246
Trigloporus lastoviza	11.12	62	0.30	
Merluccius polli	10.50	371	0.28	245
<b>Total</b>	<b>3752.15</b>		<b>100.00</b>	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 62  
 DATE :25/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 10°54.55  
 Lon E 13°43.59  
 TIME :08:19:14 08:49:17 30.1 (min) Purpose : 3  
 LOG : 4359.32 4360.85 1.5 Region : 4040  
 FDEPTH: 52 51 Gear cond.: 0  
 BDEPTH: 52 51 Validity : 0  
 Towing dir: ° Wire out : 140 m Speed : 3.0 km  
 Sorted : 60 Total catch: 228.60 Catch/hour: 456.44

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	105.52	10477	23.12	252
Trichiurus lepturus	82.32	2907	18.04	
Raja miraletus	55.77	120	12.22	
Pagellus bellottii	48.78	497	10.69	
Lagocephalus laevigatus	28.65	28	6.28	
Citharus linguatula	26.78	797	5.87	
Trachurus trecae	14.82	377	3.25	250
Stromateus fiatola	14.68	40	3.22	
Torpedo torpedo	11.46	36	2.51	
Grammolites gruvelli	8.39	120	1.84	
Argyrosomus sp.	7.31	12	1.60	
Pterothrissus belloci	7.07	162	1.55	
GOBIIDAE	6.71	3732	1.47	
Rhinobatos albomaculatus	6.03	2	1.32	
Selene dorsalis	5.67	78	1.24	
Octopus vulgaris	5.23	4	1.15	
Dentex barnardi	3.71	224	0.81	248
Pomadourus incisus	3.43	28	0.75	249
Sepia orbignyana	2.44	50	0.53	
Pseudotolithus senegalensis	2.42	6	0.53	247
Pseudupeneus prayensis	2.38	28	0.52	
Umbriina canariensis	1.54	21	0.34	251
Pteroscion pelli	1.40	56	0.31	
Chloroscombrus chrysurus	1.20	8	0.26	
Dicologlossa cuneata	0.84	14	0.18	
Serranus accraensis	0.64	14	0.14	
Brotula barbata	0.42	8	0.09	
Illex coindetii	0.36	8	0.08	
Scorpaena stephanica	0.28	8	0.06	
Antennarius striatus	0.14	8	0.03	
Zeus faber	0.08	8	0.02	
<b>Total</b>	<b>456.44</b>		<b>100.00</b>	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 63  
 DATE :25/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 10°50.22  
 Lon E 13°44.32  
 TIME :09:44:59 10:15:19 30.3 (min) Purpose : 3

LOG : 4367.44 4369.02 1.6 Region : 4040 Umbrina canariensis 2.01 6 0.16 273  
 FDEPTH: 36 37 Gear cond.: 0 Trachurus trecae 1.38 35 0.11  
 BDEPTH: 36 37 Validity : 0 Dentex macrophthalmus 1.14 12 0.09 272  
 Towing dir: 0° Wire out : 100 m Speed : 3.1 km Parapagurus dimorphus 0.35 35 0.03  
 Sorted : 59 Total catch: 296.83 Catch/hour: 587.01

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
Brachydeuterus auritus	246.61	42.01	253
Trichirus lepturus	59.72	10.17	
Galeoides decadactylus	57.75	9.84	
Pteroscion pelli	48.75	8.30	
Pseudotolithus senegalensis	32.04	5.46	257
Pomadasy jubelini	28.38	4.83	255
Dicologlossa cuneata	25.81	4.40	
Ilisha africana	19.97	3.40	
Trachurus trecae	18.79	3.20	254
Chloroscombrus chrysurus	17.90	3.05	
Pomadasy perotaei	6.43	1.09	
Pomadasy incisus	6.43	1.09	256
Gymnura micrura	5.20	0.89	
Selene dorsalis	4.65	0.79	
Pisodonophis seminctus	2.87	0.49	
Sepia orbignyana	2.57	0.44	
Sardinella maderensis	1.19	0.20	
Umbrina canariensis	0.99	0.17	
Sardinella aurita	0.89	0.15	
Penaeus notialis	0.10	0.02	
Total	587.01	100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 64  
 DATE :25/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 10°38.02  
 start stop duration Lon E 13°40.35  
 TIME :11:42:51 12:02:31 19.7 (min) Purpose : 3  
 LOG : 4380.61 4381.70 1.1 Region : 4040  
 FDEPTH: 31 31 Gear cond.: 0  
 BDEPTH: 31 31 Validity : 0  
 Towing dir: 0° Wire out : 100 m Speed : 3.3 km  
 Sorted : 0 Total catch: 217.57 Catch/hour: 663.66

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
Brachydeuterus auritus	236.58	35.65	259
Galeoides decadactylus	60.70	9.15	
Sardinella aurita	54.11	8.15	260
Chloroscombrus chrysurus	41.24	6.21	
Pseudotolithus senegalensis	32.58	4.91	263
Rhinobatos albomaculatus	31.91	4.81	
Gymnura micrura	27.76	4.18	
Umbrina canariensis	22.45	3.38	262
Sardinella maderensis	20.65	3.11	261
Trachurus trecae	20.19	3.04	258
Ilisha africana	19.16	2.89	
Trichirus lepturus	16.41	2.47	
Pteroscion pelli	15.74	2.37	
Lagocephalus laevigatus	11.93	1.80	
Eucinostomus melanopterus	10.86	1.64	
Sphyraena sphyraena	7.05	1.06	
Trachinotus ovatus	6.19	0.93	
Stromateus fiatola	6.16	0.93	
Dicologlossa cuneata	5.31	0.80	
Penaeus notialis	3.90	0.59	426
Pomadasy incisus	2.47	0.37	
Raja miraletus	2.35	0.35	
Ephippion guttifer	2.26	0.34	
Pomadasy perotaei	1.83	0.28	
Selene dorsalis	1.19	0.18	
Pisodonophis seminctus	0.98	0.15	
Torpedo marmorata	0.88	0.13	
Pseudupeneus prayensis	0.43	0.06	
Dasyatis margarita	0.37	0.06	
Citharus linguatula	0.03	0.00	
Total	663.66	100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 65  
 DATE :25/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 10°40.92  
 start stop duration Lon E 13°30.23  
 TIME :13:35:07 13:51:28 16.4 (min) Purpose : 3  
 LOG : 4392.91 4393.80 0.9 Region : 4040  
 FDEPTH: 86 89 Gear cond.: 0  
 BDEPTH: 86 89 Validity : 0  
 Towing dir: 0° Wire out : 210 m Speed : 3.2 km  
 Sorted : 0 Total catch: 59.83 Catch/hour: 219.56

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
Trachurus trecae	148.29	67.54	265
Chelidonichthys gabonensis	24.15	11.00	
Dentex angolensis	9.39	4.28	266
Trichirus lepturus	7.89	3.59	
Brachydeuterus auritus	5.91	2.69	268
Raja miraletus	3.38	1.54	
Brotula barbata	3.30	1.50	
Pontinus accraensis	2.97	1.35	
Citharus linguatula	2.57	1.17	
Microchirus frechkopi	1.83	0.84	
Allotautis africana	1.61	0.74	
Pagellus bellottii	1.54	0.70	267
Sardinella maderensis	1.47	0.67	269
Zeus faber	1.32	0.60	
Trachinotus ovatus	0.95	0.43	
Torpedo torpedo	0.81	0.37	
Sardinella aurita	0.81	0.37	
Chloroscombrus chrysurus	0.59	0.27	270
Pterothrissus belloci	0.55	0.25	
Sepia orbignyana	0.18	0.08	
Illex coindetii	0.04	0.02	
Total	219.56	100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 66  
 DATE :25/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 10°47.15  
 start stop duration Lon E 13°24.45  
 TIME :15:08:48 15:39:19 30.5 (min) Purpose : 3  
 LOG : 4402.81 4404.47 1.7 Region : 4040  
 FDEPTH: 148 146 Gear cond.: 0  
 BDEPTH: 148 146 Validity : 0  
 Towing dir: 0° Wire out : 390 m Speed : 3.3 km  
 Sorted : 33 Total catch: 623.61 Catch/hour: 1225.97

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
Synagrops microlepis	1109.53	90.50	
Trichirus lepturus	33.22	2.71	
Dentex angolensis	33.07	2.70	271
Brotula barbata	14.63	1.19	
Zenopsis conchifer	9.63	0.79	
Saurida brasiliensis	4.82	0.39	
Citharus linguatula	4.82	0.39	
Merluccius polli	4.48	0.37	
Todaropsis eblanae	3.79	0.31	
Pterothrissus belloci	3.11	0.25	

Umbrina canariensis 2.01 6 0.16 273  
 Trachurus trecae 1.38 35 0.11  
 Dentex macrophthalmus 1.14 12 0.09 272  
 Parapagurus dimorphus 0.35 35 0.03  
 Total 1225.97 100.00

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 67  
 DATE :25/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 10°34.74  
 start stop duration Lon E 13°14.27  
 TIME :17:35:37 18:03:26 27.8 (min) Purpose : 3  
 LOG : 4418.88 4420.35 1.5 Region : 4040  
 FDEPTH: 132 132 Gear cond.: 0  
 BDEPTH: 132 132 Validity : 0  
 Towing dir: 0° Wire out : 320 m Speed : 3.2 km  
 Sorted : 34 Total catch: 148.81 Catch/hour: 320.95

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
Synagrops microlepis	105.25	32.79	
Pterothrissus belloci	49.35	15.37	
Illex coindetii	47.19	14.70	455
Dentex angolensis	40.63	12.66	274
Brotula barbata	27.43	8.55	
Citharus linguatula	11.91	3.71	
Chelidonichthys capensis	9.75	3.04	
Spherooides pachyaster	9.58	2.98	
Umbrina canariensis	5.95	1.85	
Peristedion cataphractum	3.88	1.21	
Bembrops heterurus	3.45	1.08	
Uranoscopus polli	2.93	0.91	
Sepia orbignyana	1.12	0.35	
Bassanago albescens	1.04	0.32	
Parapagurus longirostris, f **, female	0.46	0.14	457
Raja miraletus	0.43	0.13	
Syacium micrum	0.35	0.11	
Arnoglossus imperialis	0.17	0.05	
Anthias anthias	0.09	0.03	
Total	320.95	100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 68  
 DATE :25/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 10°35.70  
 start stop duration Lon E 13°9.21  
 TIME :20:19:55 20:49:59 30.1 (min) Purpose : 3  
 LOG : 4427.84 4429.31 1.5 Region : 4040  
 FDEPTH: 335 346 Gear cond.: 0  
 BDEPTH: 335 346 Validity : 0  
 Towing dir: 0° Wire out : 800 m Speed : 3.0 km  
 Sorted : 27 Total catch: 462.91 Catch/hour: 923.66

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
Chlorophthalmus atlanticus	590.22	63.90	
Hymenocephalus italicus	58.34	6.32	
Merluccius polli	49.52	5.36	275
Pontinus accraensis	39.69	4.30	
Laemonema laureysi	34.26	3.71	
Echeneis naucrates	26.80	2.90	
Zenopsis conchifer	18.32	1.98	
Aristeus varidens, female ***, female	17.64	1.91	458
Bathynectes piperitus	12.21	1.32	
Chamaeleon pictus	12.21	1.32	
Aristeus varidens, male ***, male	11.19	1.21	456
Loligo vulgaris	9.16	0.99	
Aricmonia	8.82	0.95	
Chaceon maritae	8.82	0.95	
Caelorinchus braueri	8.14	0.88	
Parapagurus longirostris, f **	4.41	0.48	
Yarella blackfordi	4.41	0.48	
GALATHEIDAE *	3.73	0.40	
Acanthehyra sp.	1.36	0.15	
Bembrops heterurus	1.36	0.15	
Peristedion cataphractum	1.36	0.15	
MYCTOPHIDAE	1.02	0.11	
Nematocarcinus africanus	0.68	0.07	
Total	923.66	100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 69  
 DATE :25/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 10°41.97  
 start stop duration Lon E 13°9.09  
 TIME :23:35:13 00:06:16 31.1 (min) Purpose : 3  
 LOG : 4440.24 4441.77 1.5 Region : 4040  
 FDEPTH: 726 733 Gear cond.: 0  
 BDEPTH: 726 733 Validity : 0  
 Towing dir: 0° Wire out : 1450 m Speed : 3.0 km  
 Sorted : 31 Total catch: 285.30 Catch/hour: 551.30

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
Lamprogrammus exutus	260.52	47.26	
Stereomastis sp.	44.35	8.04	
Hoplostethus cadenati	41.04	7.44	
Yarella blackfordi	38.96	7.07	
Nezumia aequalis	32.70	5.93	
Bassanago albescens	32.52	5.90	
Talsmania longifiliis	25.04	4.54	
Zenopsis conchifer	15.13	2.74	
Anemone - purple	11.30	2.05	
Chrysaora hyoscocella	10.78	1.96	
Lamprogrammus niger	6.26	1.14	
Octopoteuthis sicula	6.09	1.10	
Elinania costacanarie	4.70	0.85	
Aristeus varidens, female ***, female	4.35	0.79	459
Stomias boa boa	3.65	0.66	
Bathyrococong vicinus	3.13	0.57	
Borostomias antarcticus	2.26	0.41	
Triplphos hemingi	2.09	0.38	
Dicrolene intronigra	1.74	0.32	
Dibranchius atlanticus	1.39	0.25	
Halosaurus ovenii	1.22	0.22	
S H R I M P S	0.87	0.16	
Acanthehyra sp.	0.87	0.16	
Xenodermichthys copei	0.35	0.06	
Total	551.30	100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 70  
 DATE :26/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 10°39.71  
 start stop duration Lon E 13°9.12  
 TIME :02:04:38 02:30:15 25.6 (min) Purpose : 3  
 LOG : 4444.66 4450.90 1.4 Region : 4040  
 FDEPTH: 512 510 Gear cond.: 0  
 BDEPTH: 512 510 Validity : 0  
 Towing dir: 0° Wire out : 1080 m Speed : 3.2 km  
 Sorted : 25 Total catch: 328.35 Catch/hour: 768.97

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
Nematocarcinus africanus	585.69	76.17	
Lamprogrammus exutus	90.42	11.76	
Hoplostethus cadenati	44.15	5.74	

Yarrella blackfordi	13.40	457	1.74
Aristeus varidens, female ***	8.52	487	1.11
Borostomias antarcticus	6.09	152	0.79
Bathyrhynchus vicinus	3.65	244	0.48
Aristeus varidens, male ***	2.44	365	0.32
Gadella imberbis	2.13	61	0.28
Benthodesmus tenuis	2.13	61	0.28
Bassanago albescens	2.13	30	0.28
Laemonema laureysi	1.83	61	0.24
Pareuxochinus brachypterus	1.52	30	0.20
Stomias boa boa	1.22	122	0.16
Starfish	0.91	30	0.12
Avocettina acuticeps	0.61	61	0.08
Stereomastis sp.	0.61	61	0.08
Nezumia nequalis	0.61	30	0.08
MYCTOPHIDAE	0.61	335	0.08
Xenodermichthys copei	0.30	30	0.04
Total	768.97		100.00

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 71  
DATE :26/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 10°31.96  
start stop duration Lon E 13°21.54  
TIME :05:34:03 06:04:27 30.4 (min) Purpose : 3  
LOG : 4468.72 4470.31 1.6 Region : 4040  
FDEPTH: 94 93 Gear cond.: 0  
BDEPTH: 94 93 Validity : 0  
Towing dir: 0° Wire out : 240 m Speed : 3.1 kn  
Sorted : 64 Total catch: 1083.58 Catch/hour: 2138.64

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Sardinella aurita	1562.21 42276	73.05	277
Trachurus trecae	241.58 10838	11.30	276
Brachydeuterus auritus	94.62 738	4.42	279
Zeus faber	61.07 101	2.86	
Chelidonichthys capensis	49.66 369	2.32	
Raja miraletus	49.66 67	2.32	
Dentex angolensis	14.43 2349	0.67	278
Torpedo torpedo	12.41 34	0.58	
Citharus linguatula	10.74 403	0.50	
Dicologlossa cuneata	10.07 34	0.47	
Sardinella maderensis	7.38 34	0.35	
Fistularia petimba	6.71 34	0.31	
Sepia orbignyana	6.38 34	0.30	
Dentex barnardi	5.70 34	0.27	
Peristodion cataphractum	4.36 67	0.20	
Saurida brasiliensis	1.68 201	0.08	
Total	2138.64		100.00

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 72  
DATE :26/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 10°27.20  
start stop duration Lon E 13°27.45  
TIME :07:22:58 07:53:12 30.2 (min) Purpose : 3  
LOG : 4479.23 4480.75 1.5 Region : 4040  
FDEPTH: 50 53 Gear cond.: 0  
BDEPTH: 50 53 Validity : 0  
Towing dir: 0° Wire out : 120 m Speed : 3.0 kn  
Sorted : 0 Total catch: 104.48 Catch/hour: 207.37

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Pomadasy jubelini	33.54 67	16.18	
Galeoides decadactylus	31.32 52	15.10	
Dentex barnardi	20.28 64	9.78	282
Raja miraletus	15.32 22	7.39	
Plectorhynchus mediterraneus	14.49 32	6.99	
Brachydeuterus auritus	11.23 2882	5.42	283
Octopus vulgaris	9.53 6	4.59	
Alectis alexandrinus	9.05 10	4.36	
Umbrina canariensis	7.13 18	3.44	281
Sphyrana quasichancho	6.87 10	3.28	
Pomadasy inciaus	6.39 36	3.08	280
Pseudotolithus senegalensis	6.15 4	2.97	284
Lagocephalus laevigatus	6.15 6	2.97	
Pseudupeneus prayensis	5.10 50	2.46	
Trichurus lepturus	4.74 8	2.29	
Selene dorsalis	3.31 6	1.60	
Allotautis africana	3.12 1360	1.50	
Chilomycterus reticulatus	2.76 2	1.33	
Chaetodon hoefleri	1.95 16	0.94	
Sphyrana sphyraena	1.89 4	0.91	
Stromateus fiatola	1.77 2	0.85	
Dentex gibbosus	1.21 2	0.58	
Citharus linguatula	1.19 26	0.57	
Epinephelus aeneus	1.05 2	0.51	
Rypticus saponaceus	0.52 10	0.25	
Scorpaena stephanica	0.50 8	0.24	
Chloroscombrus chrysurus	0.44 2	0.21	
Grammolites gruvelli	0.26 8	0.12	
Scorpaena scrofa	0.12 2	0.06	0
Total	207.37		100.00

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 73  
DATE :26/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 10°12.46  
start stop duration Lon E 13°19.29  
TIME :10:18:36 10:48:47 30.2 (min) Purpose : 3  
LOG : 4500.49 4502.02 1.5 Region : 4040  
FDEPTH: 49 50 Gear cond.: 0  
BDEPTH: 49 50 Validity : 0  
Towing dir: 0° Wire out : 130 m Speed : 3.0 kn  
Sorted : 0 Total catch: 197.88 Catch/hour: 393.14

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Pomadasy jubelini	200.96 401	51.12	287
Brachydeuterus auritus	67.39 2382	17.14	286
Trachurus trecae	32.30 705	8.22	285
Raja miraletus	30.64 60	7.79	
Selene dorsalis	17.17 972	4.37	
Lagocephalus laevigatus	13.51 18	3.44	
Galeoides decadactylus	12.32 34	3.13	
Chloroscombrus chrysurus	4.63 28	1.18	
Ilisha africana	2.74 30	0.70	
Sardinella maderensis	2.60 16	0.66	289
Trichurus lepturus	2.28 10	0.58	
Alectis alexandrinus	1.79 2	0.45	
Dentex barnardi	1.59 42	0.40	291
Sardinella aurita	1.29 16	0.33	288
Pagellus bellottii	1.15 6	0.29	290
Citharus linguatula	0.46 4	0.12	
Pseudupeneus prayensis	0.32 4	0.08	
Total	393.14		100.00

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 74  
DATE :26/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 10°14.90  
start stop duration Lon E 13°10.23  
TIME :12:09:44 12:38:15 28.5 (min) Purpose : 3  
LOG : 4511.69 4513.13 1.4 Region : 4040  
FDEPTH: 97 97 Gear cond.: 0

BDEPTH: 97 97 Validity : 0  
Towing dir: 0° Wire out : 300 m Speed : 3.0 kn  
Sorted : 165 Total catch: 1223.38 Catch/hour: 2573.73

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Trachurus trecae	1087.26 48067	42.24	292
Brachydeuterus auritus	587.76 5167	22.84	293
Sardinella aurita	382.91 9715	14.88	295
Umbrina canariensis	109.50 421	4.25	294
Chelidonichthys gabonensis	107.86 873	4.19	
Atractoscion aequidens	79.69 57	3.10	296
Zeus faber	65.22 151	2.53	
Dentex barnardi	49.71 151	1.93	300
Pagellus bellottii	34.50 151	1.34	297
Dentex angolensis	21.08 316	0.82	298
Dentex macrophthalmus	14.45 30	0.56	299
Raja miraletus	8.29 15	0.32	
Sphoeroides pachgaster	8.29 15	0.32	
Citharus linguatula	5.43 135	0.21	
Boops boops	5.11 76	0.20	
Brotula barbata	4.71 2	0.18	
Illex coindetii	1.05 15	0.04	
Pterothrissus belloci	0.90 0	0.04	
Total	2573.73		100.00

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 75  
DATE :26/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 10°22.98  
start stop duration Lon E 13°24.36  
TIME :14:09:30 14:40:42 31.2 (min) Purpose : 3  
LOG : 4524.02 4525.69 1.7 Region : 4040  
FDEPTH: 174 175 Gear cond.: 0  
BDEPTH: 174 175 Validity : 0  
Towing dir: 0° Wire out : 420 m Speed : 3.2 kn  
Sorted : 35 Total catch: 1164.91 Catch/hour: 2240.21

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Synagrops microlepis	2129.13 304171	95.04	
Sphoeroides pachgaster	83.13 63	3.71	
Illex coindetii	8.88 127	0.40	
Pterothrissus belloci	6.98 63	0.31	
Rostroraja alba	3.77 2	0.17	
Dentex angolensis	3.54 21	0.16	301
Raja miraletus	1.50 2	0.07	
Torpedo torpedo	1.40 4	0.06	
Chlorophthalmus atlanticus	0.63 254	0.03	
Torpedo spotted	0.62 2	0.03	
Fistularia petimba	0.40 2	0.02	
Dentex macrophthalmus	0.21 2	0.01	
Total	2240.21		100.00

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 76  
DATE :26/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 10°37.32  
start stop duration Lon E 13°07.81  
TIME :16:30:26 17:00:32 30.1 (min) Purpose : 3  
LOG : 4540.53 4542.15 1.6 Region : 4040  
FDEPTH: 107 107 Gear cond.: 0  
BDEPTH: 107 107 Validity : 0  
Towing dir: 0° Wire out : 310 m Speed : 3.2 kn  
Sorted : 61 Total catch: 341.30 Catch/hour: 680.33

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Trachurus trecae	463.14 17480	68.08	302
Boops boops	72.14 576	10.60	
Dentex angolensis	20.29 132	2.98	303
Chelidonichthys gabonensis	19.73 219	2.90	
Sphoeroides pachgaster	16.78 34	2.47	
Zeus faber	16.56 34	2.43	
Umbrina canariensis	12.62 33	1.85	308
Illex coindetii	12.62 407	1.85	460
Dentex congoensis	12.40 329	1.82	304
Trichurus lepturus	7.28 8	1.07	
Dentex barnardi	5.26 22	0.77	306
Saurida brasiliensis	3.95 1810	0.58	
Citharus linguatula	3.51 56	0.52	
Pagellus bellottii	3.51 22	0.52	305
Sardinella aurita	3.29 88	0.48	307
Torpedo torpedo	1.73 2	0.25	
Raja miraletus	1.71 2	0.25	
Sepia orbignyana	1.53 12	0.23	
Brachydeuterus auritus	1.53 12	0.23	
Fistularia petimba	0.74 2	0.11	
Total	680.33		100.00

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 77  
DATE :26/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 10°17.47  
start stop duration Lon E 12°52.58  
TIME :19:16:52 19:46:54 30.0 (min) Purpose : 3  
LOG : 4558.16 4559.63 1.5 Region : 4040  
FDEPTH: 383 378 Gear cond.: 0  
BDEPTH: 383 378 Validity : 0  
Towing dir: 0° Wire out : 920 m Speed : 2.9 kn  
Sorted : 75 Total catch: 834.44 Catch/hour: 1667.77

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Merluccius polli	1086.96 4375	65.17	309
Nematocarcinus africanus	161.81 30340	9.70	
Hymnococephalus italicus	115.20 11696	6.91	
Chaunax pictus	107.07 2111	6.42	
Laemonema laureysi	88.60 638	5.31	
Neoharriotta pinnata	28.14 22	1.69	
Malacocephalus occidentalis	13.85 88	0.83	
Dibranchius atlanticus	13.19 1165	0.79	
Trichurus lepturus	12.53 550	0.75	
Lophius vaillanti	11.71 6	0.70	
Squalus megalops	7.59 22	0.46	
Aristeus varidens, female ***	6.82 396	0.41	462
Aristeus varidens, male ***	6.38 877	0.38	461
Chelidonichthys gabonensis	2.64 22	0.16	
Bathyrhynchus vicinus	2.64 66	0.16	
Coelorrhinus caelorrhinus	1.98 66	0.12	
Parapanaeus longirostris	0.22 44	0.01	
Acanthephyra sp.	0.22 132	0.01	
Zeus sp.	0.22 22	0.01	
Total	1667.77		100.00

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 78  
DATE :27/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 8°53.71  
start stop duration Lon E 12°54.03  
TIME :05:38:10 06:08:11 30.0 (min) Purpose : 3  
LOG : 4634.55 4636.10 1.6 Region : 4054  
FDEPTH: 320 311 Gear cond.: 0  
BDEPTH: 320 311 Validity : 0  
Towing dir: 0° Wire out : 800 m Speed : 3.1 kn  
Sorted : 90 Total catch: 653.39 Catch/hour: 1306.34

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Merluccius polli	991.19	4291	75.88
Laemonema laureysi	70.88	682	5.43
Heart urchin	58.28	464	4.46
Pontinus accraensis	25.81	232	1.98
Zenopsis conchifer	25.65	58	1.96
Chlorophthalmus atlanticus	25.07	754	1.92
Bathyrcongiger vicinus	24.79	232	1.90
Bembrops heterurus	18.41	536	1.41
Malacocephalus occidentalis	13.34	72	1.02
Gephyroberyx darwini	8.42	14	0.64
Trichiurus lepturus	6.38	276	0.49
Nezumia microrychodon	6.38	218	0.49
Eplgonus sp.	6.38	102	0.49
Parapanaeus longirostris, f **, female	5.80	376	0.44
Chaunax sp.	4.06	30	0.31
Lophiodes kempii	3.92	30	0.30
Dibranchus atlanticus	2.90	218	0.22
Gadella imberbis	2.76	102	0.21
Acanthocarpus brevipinnis	2.18	30	0.17
Illex coindetii	1.88	30	0.14
Synagrops microlepis	1.30	44	0.10
Halosaurus ovenii	0.58	30	0.04
Total	1306.34		100.00

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Xenodermichthys copei		0.63	47
Avocettina acuticeps		0.32	32
Total	429.31		100.00

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Lamprogrammus exutus	166.00	1345	31.16
Yarella blackfordi	125.64	3427	23.58
Borostomias antarcticus	52.29	1371	9.81
Hoplostethus cadonati	39.85	1320	7.48
Chaceon maritae, female ***	33.25	127	6.24
Stereomastis sp.	23.61	2259	4.43
Nematocarcinus africanus	22.08	56780	4.14
Ariomma bondi	16.75	25	3.14
Aristeus varidensis, female ***	11.68	584	2.19
Illex coindetii	8.88	51	1.67
Nezumia microrychodon	7.11	254	1.33
Etmopterus polli	5.58	76	1.05
Talimania longifilis	3.05	102	0.57
Chaunax pictus	3.05	51	0.57
Bassanago albescens	2.28	25	0.43
Aristeus varidensis, male ***	1.78	178	0.33
Trichiurus lepturus	1.52	76	0.29
Dibranchus atlanticus	1.52	51	0.29
Sergestes sp.	1.52	102	0.29
Bathyraxia smithii	1.27	51	0.24
Glyphus marsupialis	0.76	25	0.14
Talimania sp.	0.76	76	0.14
Avocettina acuticeps	0.76	25	0.14
Xenodermichthys copei	0.76	51	0.14
**	0.76	25	0.14
Acanthephyra sp.	0.25	25	0.05
Total	532.78		100.00

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Pterothrissus belloci	567.48	2969	40.39
Synagrops microlepis	204.46	241931	20.39
Zenopsis conchifer	100.33	287	7.19
Brotula multibarbata	94.10	120	6.75
Merluccius polli	71.83	1006	5.15
Dentex angolensis	66.56	263	4.77
Coelorinchus caelorrhincus	51.96	1987	3.73
Parapanaeus longirostris, f **, female	49.80	7878	3.57
Bembrops heterurus	29.69	311	2.13
Parapanaeus longirostris, m **, male	24.90	5102	1.79
Trichiurus lepturus	19.87	287	1.42
MYCTOPHIDAE	17.48	11278	1.25
Illex coindetii	9.10	32	0.65
Bathyrcongiger vicinus	2.15	24	0.15
Dicologlossus cuneata	1.20	24	0.09
Peristodion cataphractum	0.96	24	0.07
Dibranchus atlanticus	0.96	32	0.07
Monolele microstoma	0.96	24	0.07
Squilla mantis	0.72	24	0.05
GOBIIDAE	0.24	24	0.02
Total	1394.75		100.00

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Synagrops microlepis	218.25	12356	33.17
Bembrops heterurus	60.58	634	9.21
Pterothrissus belloci	52.05	328	7.91
Chlorophthalmus atlanticus	49.86	984	7.58
Zenopsis conchifer	40.68	87	6.18
Parapanaeus longirostris, m **, male	38.05	3742	5.78
Parapanaeus longirostris, f **, female	29.09	2298	4.42
Brotula barbata	28.11	20	4.27
Trichiurus lepturus	27.34	87	4.15
MYCTOPHIDAE	23.18	14871	3.52
Merluccius polli	21.65	525	3.29
Dentex angolensis	21.47	60	3.26
Malacocephalus occidentalis	18.15	87	2.76
Coelorinchus caelorrhincus	16.18	306	2.46
Pontinus accraensis	3.94	44	0.60
Illex coindetii	3.94	44	0.60
Lestrolepis intermedia	3.72	197	0.57
Monolele microstoma	1.75	109	0.27
Total	657.97		100.00

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Nematocarcinus africanus	162.58	50999	37.87
Laemonema laureysi	61.09	395	14.23
Hoplostethus cadonati	42.30	2352	9.85
Lamprogrammus exutus	27.94	1515	6.51
Stomias boa boa	21.31	647	4.96
Chaunax sp.	13.42	268	3.13
Centrophorus granulosus	12.27	4	2.86
Stereomastis sp.	11.36	841	2.65
Zenopsis conchifer	9.15	16	2.13
Merluccius polli	9.12	8	2.12
Gadella imberbis	8.05	410	1.88
Neoharriotta pinnata	6.12	2	1.42
Yarella blackfordi	6.00	237	1.40
Aristeus varidensis, female ***, female	5.37	197	1.25
Benthodesmus tenuis	5.05	174	1.18
Diplophos taenia	4.58	568	1.07
Dibranchus atlanticus	3.95	174	0.92
Acanthephyra sp.	3.31	426	0.77
Chaceon maritae	2.94	10	0.68
Nezumia microrychodon	2.53	95	0.59
Ariomma bondi	2.53	47	0.59
Trichiurus lepturus	2.21	95	0.51
Aristeus varidensis, male ***, male	1.42	103	0.33
S H R I W P S	1.10	142	0.26
Dicrolene intronigra	1.10	142	0.26
Bassanago albescens	0.79	32	0.18
Zameus (Scymnodon) squamulosus	0.79	16	0.18
Total	657.97		100.00

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Lagocephalus laevigatus	89.02	99	46.81
Trachurus trecae	20.98	536	11.03
Pagellus bellottii	16.80	128	8.83
Squatinella oculata	16.07	146	8.45
Raja miraletus	13.41	2	7.05
Octopus vulgaris	9.36	18	4.40
Sepia orbignyana	5.68	4	2.99
Alloteuthis africana	5.11	1759	2.69
Sepia orbignyana	3.73	22	1.96
Selene dorsalis	2.56	24	1.35
Chelidonichthys gabonensis	1.56	14	0.82
Fistularia petimba	1.50	4	0.79
Alectis alexandrinus	1.34	2	0.70
Dentex angolensis	1.26	28	0.66
Saurida brasiliensis	1.01	197	0.53
Dentex barnardi	0.51	8	0.27
Citharus linguatula	0.47	18	0.25
Brotula multibarbata	0.39	2	0.21
Serranus accraensis	0.24	4	0.12
Grammolites gruvelli	0.18	4	0.09
Arnoglossus imperialis	0.02	2	0.01
Total	190.19		100.00

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Chloroscombrus chrysurus	99.37	813	39.48
Lagocephalus laevigatus	24.02	29	9.54
Selene dorsalis	22.56	343	8.96
Sardinella aurita	18.42	254	7.32
Raja miraletus	17.99	28	7.15
Total	190.19		100.00

Rhinobatos albomaculatus	14.91	12	5.92		
Sardinella maderensis	11.50	124	4.57	329	
Pomadoury rogeri	9.47	18	3.76	328	
Pagellus bellottii	6.63	45	2.63	326	
Alectis alexandrinus	5.05	8	2.01		
Trachurus trecae	4.83	154	1.92	325	
Eucinostomus melanopterus	2.96	32	1.18		
Scomberomorus tritor	2.25	2	0.89		
Citharus linguatula	2.09	18	0.83		
Epinephelus aeneus	1.48	2	0.59		
Brachydeuterus auritus	1.44	87	0.57	327	
Dasyatis marmorata	1.40	2	0.56		
Sphyraena sphyraena	1.14	4	0.45		
Trachinotus goreensis	1.01	2	0.40		
Galeichthys faliceps	0.97	2	0.38		
Dasyatis pastinaca	0.61	2	0.24		
Galeoides decadactylus	0.57	4	0.23		
Trichiurus lepturus	0.51	2	0.20		
Sepia orbignyana	0.32	2	0.13		
Penaeus notialis	0.12	2	0.05		
GOBIIDAE	0.10	36	0.04		
Total	251.72		100.00		

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 86  
DATE :28/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 9°44.60  
start stop duration Lon E 13°9.98  
TIME :10:48:57 11:18:52 29.9 (min) Purpose : 3  
LOG : 4810.78 4812.45 1.7 Region : 4040  
FDEPTH: 32 32 Gear cond.: 0  
BDEPTH: 32 32 Validity : 0  
Towing dir: 0° Wire out : 100 m Speed : 3.4 kn  
Sorted : 0 Total catch: 41.52 Catch/hour: 83.29

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
Chlorophthalmus atlanticus	23.07	187	27.70
Lagocephalus laevigatus	14.18	44	17.03
Alectis alexandrinus	9.75	10	11.71
Caranx crysos	8.30	6	9.97
Pomadoury perotaei	5.26	6	6.31
Raja miraletus	4.99	8	6.00
Aluterus heudelotii	3.65	12	4.38
Pagellus bellottii	2.97	18	3.56
Balistes capricus	2.97	4	3.56
Alloteneuthis africana	2.47	700	2.96
Lagocephalus lagocephalus	2.29	4	2.75
Pomadoury rogeri	1.81	2	2.17
Citharus linguatula	0.66	6	0.79
Sardinella maderensis	0.60	4	0.72
Trichiurus lepturus	0.32	2	0.39
Total	83.29		100.00

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 87  
DATE :28/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 9°45.04  
start stop duration Lon E 13°0.62  
TIME :12:49:24 13:21:19 31.9 (min) Purpose : 3  
LOG : 4822.92 4824.73 1.8 Region : 4040  
FDEPTH: 93 95 Gear cond.: 0  
BDEPTH: 93 95 Validity : 0  
Towing dir: 0° Wire out : 240 m Speed : 3.4 kn  
Sorted : 125 Total catch: 325.65 Catch/hour: 612.12

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
Trachurus trecae	541.64	18992	88.48 331
Dentex angolensis	20.86	314	3.41 332
Dentex congoensis	10.34	103	1.69 333
Rajella leopardus	5.71	2	0.93
Caranx hippos	5.45	4	0.89
Atractosteion aequidens	5.09	4	0.83 334
Dentex barnardi	3.34	15	0.55
Boops boops	3.16	32	0.52
Sepia orbignyana	2.74	2	0.45
Raja miraletus	2.73	6	0.45
Chelidonichthys gabonensis	2.05	19	0.33
Alloteneuthis africana	1.97	682	0.32
Umbrina canariensis	1.75	4	0.29 336
Brotula barbata	1.30	4	0.21
Pagellus bellottii	1.17	15	0.19
Sardinella maderensis	0.94	6	0.15
Selene dorsalis	0.70	6	0.12
Sardinella aurita	0.56	9	0.09 335
Brachydeuterus auritus	0.33	6	0.05
Citharus linguatula	0.28	2	0.05
Total	612.12		100.00

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 88  
DATE :28/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 9°48.62  
start stop duration Lon E 12°53.57  
TIME :14:41:05 15:12:45 31.7 (min) Purpose : 3  
LOG : 4833.52 4835.10 1.6 Region : 4040  
FDEPTH: 124 124 Gear cond.: 0  
BDEPTH: 124 124 Validity : 0  
Towing dir: 0° Wire out : 310 m Speed : 3.0 kn  
Sorted : 92 Total catch: 404.31 Catch/hour: 765.74

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
Trachurus trecae	437.41	13445	57.12 337
Dentex angolensis	195.95	733	25.59 338
Chelidonichthys gabonensis	30.21	205	3.94
Spicara alta	28.56	318	3.73
Zeus faber	20.85	25	2.72
Cynoponticus ferox	17.84	2	2.33
Dentex barnardi	7.97	16	1.04 339
Sphoeroides pachgaster	5.45	8	0.71
Erythrocles monodi	5.04	8	0.66
Raja miraletus	3.90	8	0.51
Umbrina canariensis	3.67	8	0.48
Dentex macropthalmus	3.67	16	0.48 340
Pterothrissus bellocci	1.88	8	0.24
Citharus linguatula	1.23	32	0.16
Dentex congoensis	0.81	8	0.11
Illex coindetii	0.64	17	0.08
Peristedion cataphractum	0.64	8	0.08
Total	765.74		100.00

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 89  
DATE :28/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 9°50.37  
start stop duration Lon E 12°50.95  
TIME :16:15:43 16:45:36 29.9 (min) Purpose : 3  
LOG : 4840.77 4842.33 1.6 Region : 4040  
FDEPTH: 213 204 Gear cond.: 0  
BDEPTH: 213 204 Validity : 0  
Towing dir: 0° Wire out : 500 m Speed : 3.1 kn  
Sorted : 32 Total catch: 652.98 Catch/hour: 1311.20

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
Trachurus trecae	437.41	13445	57.12 337
Dentex angolensis	195.95	733	25.59 338
Chelidonichthys gabonensis	30.21	205	3.94
Spicara alta	28.56	318	3.73
Zeus faber	20.85	25	2.72
Cynoponticus ferox	17.84	2	2.33
Dentex barnardi	7.97	16	1.04 339
Sphoeroides pachgaster	5.45	8	0.71
Erythrocles monodi	5.04	8	0.66
Raja miraletus	3.90	8	0.51
Umbrina canariensis	3.67	8	0.48
Dentex macropthalmus	3.67	16	0.48 340
Pterothrissus bellocci	1.88	8	0.24
Citharus linguatula	1.23	32	0.16
Dentex congoensis	0.81	8	0.11
Illex coindetii	0.64	17	0.08
Peristedion cataphractum	0.64	8	0.08
Total	765.74		100.00

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
Trachurus trecae	437.41	13445	57.12 337
Dentex angolensis	195.95	733	25.59 338
Chelidonichthys gabonensis	30.21	205	3.94
Spicara alta	28.56	318	3.73
Zeus faber	20.85	25	2.72
Cynoponticus ferox	17.84	2	2.33
Dentex barnardi	7.97	16	1.04 339
Sphoeroides pachgaster	5.45	8	0.71
Erythrocles monodi	5.04	8	0.66
Raja miraletus	3.90	8	0.51
Umbrina canariensis	3.67	8	0.48
Dentex macropthalmus	3.67	16	0.48 340
Pterothrissus bellocci	1.88	8	0.24
Citharus linguatula	1.23	32	0.16
Dentex congoensis	0.81	8	0.11
Illex coindetii	0.64	17	0.08
Peristedion cataphractum	0.64	8	0.08
Total	765.74		100.00

Cynoglossus canariensis	824.48	74970	62.88		
Zenopsis conchifer	141.16	14	10.77		
Trachurus trecae	66.00	114	5.03	344	
Brotula barbata	50.20	52	3.83		
Grammolites gruvelli	36.63	343	2.79		
Dentex angolensis	35.14	104	2.68		
Raja miraletus	34.34	38	2.62		
Torpedo torpedo	29.00	38	2.21		
Pterothrissus bellocci	22.51	191	1.72		
Mystriophis rostellatus	21.37	76	1.63		
Nezumia microrychodon	14.12	305	1.08		
Illex coindetii	8.78	153	0.67		
Umbrina canariensis	7.29	12	0.56	343	
Hymenocephalus italicus	6.87	114	0.52		
Parapanaeus longirostris, f **, female	6.49	757	0.49	470	
Saurida brasiliensis	2.67	382	0.20		
Merluccius polli	1.51	10	0.11	342	
Parapanaeus longirostris, m **, male	1.14	161	0.09	469	
Citharus linguatula	1.14	38	0.09		
Sea urchin	0.38	38	0.03		
Total	1311.20		100.00		

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 90  
DATE :28/02/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 9°4.42  
start stop duration Lon E 12°37.35  
TIME :23:36:13 00:06:54 30.7 (min) Purpose : 3  
LOG : 4894.91 4896.42 1.5 Region : 4040  
FDEPTH: 719 723 Gear cond.: 0  
BDEPTH: 719 723 Validity : 0  
Towing dir: 0° Wire out : 1420 m Speed : 3.0 kn  
Sorted : 27 Total catch: 135.45 Catch/hour: 264.90

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
Nematocarcinus africanus	51.83	10737	19.56
Yarella blackfordi	51.53	909	19.45
Lamprogrammus exutus	29.04	88	10.96
Coelorrhinus simorhynchus	23.66	323	8.93
Nezumia microrychodon	18.09	430	6.83
Talismania longifilis	16.82	68	6.35
Borostomias antarcticus	13.40	362	5.06
Stereomastis sp.	12.52	548	4.72
J E L Y F I S H	11.25	88	4.25
Anemones, pink	7.82	0	2.95
Zenopsis conchifer	7.43	29	2.81
ANTHOZOA (Sea anemones)	5.67	10	2.14
Aristeus varidens, female ***, female	5.48	149	2.07 464
Hoplostethus cadenati	2.54	108	0.96
Monomitopus metriostoma	1.96	108	0.74
Photonetes sp.	1.37	39	0.52
**	0.88	10	0.33
Bathyrroconger vicinus	0.68	10	0.26
Halosaurus ovenii	0.68	10	0.26
Sergeates sp.	0.49	29	0.18
Dibranchius atlanticus	0.49	20	0.18
Diastobranchius capensis	0.49	10	0.18
Xenodermichthys copei	0.39	20	0.15
Triplophos hemingi	0.29	29	0.11
Bathyterois phenax *	0.10	10	0.04
Total	264.90		100.00

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 91  
DATE :01/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 9°6.42  
start stop duration Lon E 12°40.44  
TIME :01:53:01 02:18:18 25.3 (min) Purpose : 3  
LOG : 4903.27 4904.63 1.4 Region : 4040  
FDEPTH: 438 436 Gear cond.: 0  
BDEPTH: 438 436 Validity : 0  
Towing dir: 0° Wire out : 960 m Speed : 3.2 kn  
Sorted : 23 Total catch: 136.14 Catch/hour: 323.12

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
Nematocarcinus africanus	159.49	49073	49.36
Chaunax pictus	47.71	769	14.76
Dibranchius atlanticus	32.47	1666	10.05
Yarella blackfordi	17.23	0	5.33
Aristeus varidens, female ***	14.24	712	4.41
Anemones, white	10.40	57	3.22
Hoplostethus cadenati	6.12	384	1.90
Etmopterus polli	5.70	142	1.76
Laemonema laureysi	3.70	57	1.15
Glyphus marsupialis	3.28	57	1.01
Xenodermichthys copei	2.71	271	0.84
Benthodesmus tenuis	2.42	100	0.75
Halosaurus ovenii	2.28	128	0.71
Gadella imberbis	2.14	85	0.66
Aristeus varidens, male ***	1.85	228	0.57
Borostomias antarcticus	1.85	28	0.57
HISTIOPTHYRIDAE	1.71	14	0.53
Malacocephalus occidentalis	1.42	14	0.44
Merluccius polli	1.42	2	0.44
Chlorophthalmus atlanticus	1.28	28	0.40
Galeus polli	1.00	14	0.31
Bathynectes piperitus	0.71	14	0.22
Nezumia microrychodon	0.57	28	0.18
Triplophos hemingi	0.43	43	0.13
Bathyraxia smithii	0.28	14	0.09
Stereomastis sp.	0.28	28	0.09
Hymenocephalus italicus	0.28	28	0.09
Parapanaeus longirostris	0.14	14	0.04
Total	323.12		100.00

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 92  
DATE :01/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 9°16.02  
start stop duration Lon E 12°46.98  
TIME :05:23:30 05:53:45 30.3 (min) Purpose : 3  
LOG : 4919.89 4921.45 1.6 Region : 4040  
FDEPTH: 117 116 Gear cond.: 0  
BDEPTH: 117 116 Validity : 0  
Towing dir: 0° Wire out : 300 m Speed : 3.1 kn  
Sorted : 66 Total catch: 2040.42 Catch/hour: 4047.11

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
Synagrops microlepis	1952.23	230886	48.24
Brotula barbata	1527.35	1968	37.74
Dentex angolensis	249.64	1291	6.17 345
Sphoeroides pachgaster	88.54	123	2.19
Raja miraletus	54.11	61	1.34
Chelidonichthys gabonensis	46.12	430	1.14
Citharus linguatula	25.21	615	0.62
Torpedo torpedo	24.60	61	0.61
Pterothrissus bellocci	20.91	123	0.52
Zeus faber	19.68	61	0.49
Umbrina canariensis	17.22	61	0.43 346
Branchiostegus semifasciatus	15.99	61	0.40
GOBIIDAE	3.07	1906	0.08
Dibranchius atlanticus	2.46	123	0.06
Total	4047.11		100.00

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 93  
 DATE :01/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 9°14.25  
 start stop duration Purpose : 3  
 LOG : 4927.73 4929.37 1.6 Region : 4040  
 FDEPTH: 76 81 Gear cond.: 0  
 BDEPTH: 76 81 Validity : 0  
 Towing dir: 0° Wire out : 180 m Speed : 3.3 kn  
 Sorted : 42 Total catch: 102.13 Catch/hour: 203.92

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Selene dorsalis	98.00	807	48.06	
Trachurus trecae	48.88	1697	23.97	350
Brachydeuterus auritus	14.50	50	7.11	351
Umbrina canariensis	6.61	72	3.24	348
Dentex angolensis	6.57	38	3.22	347
Lagocephalus laevigatus	5.23	4	2.57	
Raja miraletus	4.99	8	2.45	
Pagellus bellottii	4.61	34	2.26	349
Brotula barbata	3.55	6	1.74	
Parapenaeus longirostris,f **, female	2.80	605	1.37	471
Octopus vulgaris	2.00	4	0.98	
Alloteuthis africana	1.16	280	0.57	
Scomber japonicus	0.92	4	0.45	
Fistularia petimba	0.88	4	0.43	
Citharus linguatula	0.88	24	0.43	
Dibranchius atlanticus	0.72	40	0.35	
Saurida brasiliensis	0.56	128	0.27	
Trichiurus lepturus	0.40	20	0.20	
Boops boops	0.32	4	0.16	
Illex coindetii	0.24	4	0.12	
Parapenaeus longirostris, m **, male	0.12	27	0.06	472
Total	203.92		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 94  
 DATE :01/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 9°16.25  
 start stop duration Purpose : 3  
 LOG : 4940.30 4941.79 1.5 Region : 4040  
 FDEPTH: 28 28 Gear cond.: 0  
 BDEPTH: 28 28 Validity : 0  
 Towing dir: 0° Wire out : 100 m Speed : 3.0 kn  
 Sorted : 97 Total catch: 197.24 Catch/hour: 394.22

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	183.08	13099	46.44	352
Chloroscombrus chrysurus	77.95	843	19.77	
Pseudupeneus prayensis	29.25	224	7.42	
Ephippion guttifer	20.27	16	5.14	
Alectis alexandrinus	17.83	24	4.52	
Pagellus bellottii	17.31	96	4.39	353
Selene dorsalis	16.47	452	4.18	
Arius parkii	7.12	24	1.80	
Raja miraletus	5.16	8	1.31	
Sphraena guachancho	3.82	6	0.97	
Lagocephalus laevigatus	2.20	8	0.56	
Ballistes capriciscus	2.08	4	0.53	
Chilomycterus spinosus mauretanicus	1.88	4	0.48	
Uranoscopus polli	1.68	4	0.43	
Pomadasy jubelini	1.68	4	0.43	
Sardinella aurita	1.60	76	0.41	354
Trachinus radiatus	1.08	4	0.27	
Epinephelus aeneus	0.98	2	0.25	
Galeoides decadactylus	0.72	4	0.18	
Eucinostomus melanopterus	0.64	8	0.16	
Trachinotus ovatus	0.52	4	0.13	
Trachinocephalus myops	0.36	4	0.09	
Scorpaena scrofa	0.36	4	0.09	
Rypticus saponaceus	0.20	4	0.05	
Total	394.22		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 95  
 DATE :01/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 9°29.86  
 start stop duration Purpose : 3  
 LOG : 4957.06 4958.63 1.6 Region : 4040  
 FDEPTH: 111 114 Gear cond.: 0  
 BDEPTH: 111 114 Validity : 0  
 Towing dir: 0° Wire out : 330 m Speed : 3.1 kn  
 Sorted : 93 Total catch: 555.36 Catch/hour: 1099.36

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Selene dorsalis	397.29	1200	36.14	
Synagrops microlepis	287.90	52343	26.19	
Torpedo macranyana	260.59	12	23.70	
Octopus vulgaris	93.38	36	3.04	
Dentex angolensis	33.38	202	3.04	355
Citharus linguatula	18.77	297	1.71	
Brotula barbata	14.02	12	1.27	
Pterothrissus belloci	11.52	59	1.05	
Chelidichthys gabonensis	10.57	71	0.96	
Umbrina canariensis	9.26	24	0.84	356
Trichiurus lepturus	6.77	12	0.62	
Zeus faber	4.51	36	0.41	
Pontinus accraensis	2.85	24	0.26	
Bembrops heterurus	2.85	24	0.26	
Sepia orbignyana	2.38	12	0.22	
Pagellus bellottii	1.90	12	0.17	
Illex coindetii	0.71	12	0.06	
G A S T R O P O D S	0.71	59	0.06	
Total	1099.36		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 96  
 DATE :01/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 9°29.89  
 start stop duration Purpose : 3  
 LOG : 4969.10 4970.77 1.7 Region : 4040  
 FDEPTH: 51 52 Gear cond.: 0  
 BDEPTH: 51 52 Validity : 0  
 Towing dir: 0° Wire out : 140 m Speed : 3.3 kn  
 Sorted : 0 Total catch: 180.42 Catch/hour: 360.24

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Chloroscombrus chrysurus	224.71	1212	62.38	
Pagellus bellottii	47.60	272	13.21	357
Lagocephalus laevigatus	25.28	24	7.02	
Alectis alexandrinus	21.84	32	6.06	
Raja miraletus	17.33	34	4.81	
Aluterus heudelotii	8.61	12	2.39	
Rhinobatos albomaculatus	3.03	4	0.84	
Pomadasy perotaei	2.44	2	0.68	
Chelidichthys gabonensis	1.88	16	0.50	
Trachurus trecae	1.80	2	0.52	
Alloteuthis africana	1.74	266	0.48	
Selene dorsalis	1.36	4	0.38	

SPECIES	CATCH/HOUR		% OF TOT. C
	weight	numbers	
Dasyatis marmorata	1.18	2	0.33
Citharus linguatula	0.82	6	0.23
Chilomycterus spinosus mauretanicus	0.30	2	0.08
Sepia orbignyana	0.18	2	0.05
Pseudupeneus prayensis	0.16	2	0.04
Total	360.24		100.00

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 97  
 DATE :01/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 9°28.49  
 start stop duration Purpose : 3  
 LOG : 4979.76 4981.35 1.6 Region : 4040  
 FDEPTH: 27 26 Gear cond.: 0  
 BDEPTH: 27 26 Validity : 0  
 Towing dir: 0° Wire out : 100 m Speed : 3.4 kn  
 Sorted : 136 Total catch: 276.52 Catch/hour: 593.60

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Pagellus bellottii	91.11	386	15.35	358
Dentex barnardi	88.01	215	14.83	359
Chloroscombrus chrysurus	87.58	365	14.75	
Pagrus africanus	63.63	73	10.72	
Ballistes capriciscus	57.96	103	9.76	
Pomadasy perotaei	39.84	56	6.71	360
Pagrus caeruleostictus	30.65	56	5.16	
Ballistes punctatus	19.43	17	3.27	
Acanthurus monroviae	18.08	26	3.04	
Decapterus rhonchus**	13.74	17	2.31	
Alectis alexandrinus	12.41	26	2.09	
Rypticus saponaceus	10.39	142	1.75	
Chaetodon hoefleri	10.22	90	1.72	
Raja miraletus	6.55	13	1.10	
Aluterus heudelotii	6.44	13	1.08	
Lithognathus mormyrus	6.05	9	1.02	
Lagocephalus laevigatus	5.97	9	1.01	
Ephippion guttifer	5.75	4	0.97	
Scomberomorus tritor	5.09	2	0.86	
Hemicaranx bicolor	4.16	17	0.70	
Plectrochinchus mediterraneus	3.52	9	0.59	
Panulirus regius	2.96	2	0.50	
Dasyatis marmorata	1.80	9	0.30	
Pseudupeneus prayensis	1.16	9	0.20	
Scorpaena stephanica	0.56	4	0.09	
Fistularia petimba	0.56	9	0.09	
Total	593.60		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 98  
 DATE :02/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 8°37.32  
 start stop duration Purpose : 3  
 LOG : 5129.78 5131.48 1.7 Region : 4054  
 FDEPTH: 35 33 Gear cond.: 0  
 BDEPTH: 35 33 Validity : 0  
 Towing dir: 0° Wire out : 100 m Speed : 3.3 kn  
 Sorted : 158 Total catch: 2525.90 Catch/hour: 4931.79

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	1943.12	78881	39.40	365
Chloroscombrus chrysurus	1333.63	52889	27.04	
Sardinella aurita	1037.16	10372	21.03	362
Sardinella maderensis	237.42	3655	4.81	363
Galeoides decadactylus	143.39	531	2.91	
Pagellus bellottii	110.90	875	2.25	364
Sphraena guachancho	59.04	312	1.20	
Trachurus trecae	37.49	2718	0.76	361
Selene dorsalis	17.18	719	0.35	
Dentex barnardi	5.94	125	0.12	366
Decapterus rhonchus**	2.19	62	0.04	
Scomberomorus tritor	1.97	2	0.04	
Penaeus notialis	1.43	45	0.03	396
Pseudupeneus prayensis	0.62	62	0.01	
Trichiurus lepturus	0.31	94	0.01	
Total	4931.79		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 99  
 DATE :02/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 8°36.32  
 start stop duration Purpose : 3  
 LOG : 5138.32 5139.89 1.6 Region : 4054  
 FDEPTH: 56 54 Gear cond.: 0  
 BDEPTH: 56 54 Validity : 0  
 Towing dir: 0° Wire out : 140 m Speed : 3.1 kn  
 Sorted : 219 Total catch: 537.06 Catch/hour: 1072.69

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Galeoides decadactylus	201.65	1412	18.80	
Pagellus bellottii	197.54	1870	18.42	369
Pomadasy incisus	193.70	1724	18.06	370
Sphraena guachancho	118.70	611	11.07	
Trachurus trecae	110.75	5601	10.32	367
Chloroscombrus chrysurus	80.65	1612	7.52	
Pseudupeneus prayensis	32.02	749	2.98	
Selene dorsalis	28.42	945	2.65	
Lagocephalus laevigatus	22.75	34	2.12	
Brachydeuterus auritus	21.85	1222	2.04	368
Mustelus mustelus	11.82	2	1.10	
Raja miraletus	10.63	34	0.99	
Citharus linguatula	9.01	597	0.84	
Sepia orbignyana	7.65	58	0.71	374
Pagrus caeruleostictus	4.07	14	0.38	
Chaetodon hoefleri	3.54	20	0.33	
Sardinella maderensis	3.36	44	0.31	372
Sardinella aurita	3.30	58	0.31	371
Dentex barnardi	3.20	82	0.30	373
Decapterus punctatus	2.28	48	0.21	
Fistularia petimba	2.08	5	0.19	
Grammolites gruvelli	1.98	64	0.18	
Loligo vulgaris	1.30	39	0.12	
Ilisha africana	0.24	5	0.02	
Boops boops	0.18	5	0.02	
GOBIIDAE	0.04	5	0.00	
Total	1072.69		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 100  
 DATE :02/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 8°36.80  
 start stop duration Purpose : 3  
 LOG : 5145.26 5146.81 1.6 Region : 4054  
 FDEPTH: 74 78 Gear cond.: 0  
 BDEPTH: 74 78 Validity : 0  
 Towing dir: 0° Wire out : 180 m Speed : 3.0 kn  
 Sorted : 106 Total catch: 880.78 Catch/hour: 1714.69

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	744.33	22752	43.41	375

	377.19	10378	22.00	376
Brachydeuterus auritus				
Pomadasys incisus	274.05	1606	15.98	377
Galeoides decadactylus	95.67	405	5.58	
Selene dorsalis	49.12	1119	2.86	
Pagellus bellottii	40.05	389	2.34	379
Brotula multibarbata	28.05	16	1.64	
Dentex angolensis	26.26	130	1.53	380
Raja miraletus	25.62	64	1.49	
Umbra canariensis	13.45	130	0.78	378
Torpedo torpedo	7.46	16	0.43	
Trichiurus lepturus	7.28	49	0.42	
Citharus linguatula	6.64	276	0.39	
Fistularia petimba	3.56	171	0.21	
Alectis alexandrinus	3.08	16	0.18	
Atractoscion aeguidens	2.59	16	0.15	
Chelidichthys gabonensis	2.59	16	0.15	
Allotautis africana	2.26	681	0.13	
Sphyræna sphyraena	1.93	33	0.11	
Saurida brasiliensis	1.13	356	0.07	
Pterothrissus belloci	0.95	33	0.06	
Sepia orbignyana	0.64	33	0.04	
'Unidentified crab2'	0.64	292	0.04	
Gobiidae	0.16	64	0.01	
Total	1714.69		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 101  
DATE :02/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 8°36.40  
start stop duration Purpose : 3  
TIME :18:00:24 18:30:36 30.2 (min) Region : 4054  
LOG : 5155.95 5157.44 1.5 Gear cond.: 0  
FDEPTH: 113 115 Validity : 0  
BDEPTH: 113 115 Speed : 3.0 km  
Towing dir: 0° Wire out : 270 m Catch/hour: 324.82  
Sorted : 90 Total catch: 163.44

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
Pterothrissus belloci	74.97	394	23.08
Trichiurus lepturus	71.23	203	21.93
Dentex angolensis	33.39	244	10.28
Brotula barbata	24.64	32	7.59
Umbra canariensis	17.13	68	5.27
Pagellus bellottii	16.06	127	4.94
Scorpaena normani	12.32	227	3.79
Synagrops microlepis	10.18	1455	3.13
Torpedo macranyana	8.15	4	2.51
Chelidichthys gabonensis	7.51	52	2.31
Citharus linguatula	6.64	119	2.04
Cynoponticus ferox	5.96	12	1.84
Sepia orbignyana	4.57	83	1.41
Raja miraletus	3.74	8	1.15
Spicara alta	3.14	36	0.97
Boops boops	2.90	36	0.89
Fistularia petimba	2.86	4	0.88
Hoplunnis punctata	2.42	441	0.75
Dentex congoensis	2.23	40	0.69
Octopus macropus	2.07	8	0.64
Chelidichthys capensis	1.59	12	0.49
Zeus faber	1.59	16	0.49
Dentex canariensis	1.47	4	0.45
Scorpaena stephanica	1.31	4	0.40
Peristedion cataphractum	1.23	32	0.38
Illex coindetii	0.95	12	0.29
Bembrops heterurus	0.72	12	0.22
Physiculus cyanostrophus	0.72	28	0.22
Pontinus accraensis	0.48	4	0.15
Uranoscopus polli	0.48	4	0.15
Parapandalus narval	0.48	151	0.15
G A S T R O P O D S	0.40	56	0.12
Arnoglossus imperialis	0.24	40	0.07
B I V A L V E S	0.20	52	0.06
Dicologlossa hexopthalma	0.20	4	0.06
Serranus africanus	0.16	4	0.05
Perulibrachius rossignoli	0.16	4	0.05
OPHIDIIDAE	0.12	8	0.04
Calappa sp.	0.12	12	0.04
Urchin	0.12	4	0.04
Total	324.82		100.00

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 102  
DATE :02/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 8°35.86  
start stop duration Purpose : 3  
TIME :20:44:18 21:14:20 30.0 (min) Region : 4054  
LOG : 5169.81 5171.34 1.5 Gear cond.: 0  
FDEPTH: 419 413 Validity : 0  
BDEPTH: 419 413 Speed : 3.0 km  
Towing dir: 0° Wire out : 950 m Catch/hour: 584.24  
Sorted : 23 Total catch: 292.51

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
Nematocarcinus africanus	335.27	100582	57.39
Merluccius polli	46.98	214	8.04
Neoharriotta pinnata	36.69	22	6.28
Hymenocephalus italicus	34.93	4196	5.98
Chaunax pictus	30.32	967	5.19
Lophius vaillanti	15.86	6	2.71
Laemonema laureysi	14.28	286	2.44
Yarella blackfordi	9.45	308	1.62
Squalus megalops	7.51	2	1.29
Trichiurus lepturus	6.81	22	1.17
Aristeus varidens, female ***	6.15	260	1.05
Malacocephalus occidentalis	5.93	44	1.02
Halosaurus ovenii	5.93	527	1.02
Etmopterus spinax	5.71	132	0.98
Aristeus varidens, male ***	4.17	298	0.71
J E L Y F I S H	3.52	66	0.60
Bathyrcoonger vicinus	1.98	88	0.34
Coelorhynchus caelorrhynchus	1.54	88	0.26
Gadella imberbis	1.54	44	0.26
Chlorophthalmus atlanticus	1.54	22	0.26
Stomias boa boa	1.54	44	0.26
Epigonus telescopus	1.32	44	0.23
Dibranchius atlanticus	1.32	66	0.23
Diplophos taenia	1.10	176	0.19
Fleisopeneus edwardsianus	0.88	22	0.15
Xenodermichthys copei	0.66	154	0.21
Hoplostethus cadenati	0.66	22	0.11
Solenocera africana	0.44	44	0.08
Acanthephyra sp.	0.22	44	0.04
Total	584.24		100.00

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 103  
DATE :02/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 8°35.26  
start stop duration Purpose : 3  
TIME :22:49:21 23:20:04 30.7 (min) Region : 4054  
LOG : 5177.52 5179.02 1.5 Gear cond.: 0  
FDEPTH: 527 534 Validity : 0  
BDEPTH: 527 534 Speed : 2.9 km  
Towing dir: 0° Wire out : 1070 m Catch/hour: 879.56  
Sorted : 28 Total catch: 450.19

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
Nematocarcinus africanus	497.04	111599	56.51
Lamprogrammus exutus	221.63	11285	25.20
Hoplostethus cadenati	87.53	3751	9.95
Stomias affinis	21.57	500	2.45
Aristeus varidens, female ***	14.38	719	1.63
Stereomastis sp.	7.92	844	0.89
Illex coindetii	5.31	63	0.60
Aristeus varidens, male ***	3.44	469	0.39
Xenodermichthys copei	3.44	281	0.39
Shrimps unidentified	3.13	344	0.36
Bathyrcoonger vicinus	2.19	156	0.25
Gadella imberbis	1.88	94	0.21
Benthodesmus tenuis	1.56	63	0.18
Malacocephalus laevis	1.56	31	0.18
Scopelosaurus sp.	0.94	31	0.11
Chlorophthalmus atlanticus	0.94	31	0.11
Diceratias pileatus	0.63	63	0.07
**	0.63	31	0.07
Yarella blackfordi	0.63	31	0.07
Acanthephyra sp.	0.63	31	0.07
Halosaurus ovenii	0.63	31	0.07
Galeus polli	0.53	94	0.06
Nezumia micronychodon	0.31	156	0.04
Avocettina acuticeps	0.31	31	0.04
Dicrolene intronigra	0.31	31	0.04
Hymenocephalus italicus	0.31	63	0.04
Triplophos hemingi	0.31	31	0.04
Total	879.56		100.00

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 104  
DATE :03/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 8°36.37  
start stop duration Purpose : 3  
TIME :01:02:30 01:32:56 30.4 (min) Region : 4054  
LOG : 5184.44 5185.95 1.5 Gear cond.: 0  
FDEPTH: 723 703 Validity : 0  
BDEPTH: 723 703 Speed : 3.0 km  
Towing dir: 0° Wire out : 1420 m Catch/hour: 699.47  
Sorted : 27 Total catch: 354.75

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
Yarella blackfordi	248.12	12534	35.47
Nematocarcinus africanus	217.36	50547	31.08
Stereomastis sp.	46.91	1922	6.71
Lamprogrammus exutus	41.27	282	5.90
Borostomias antarcticus	29.22	615	4.18
J E L Y F I S H	23.54	538	3.37
Triplophos hemingi	21.28	3076	3.04
Hoplostethus cadenati	19.48	538	2.79
Talismania longifilis	15.64	538	2.24
Xenodermichthys copei	6.92	410	0.99
Octopoteuthis sicula	6.41	26	0.92
Bathyrcoonger vicinus	2.56	26	0.37
Stomias boa boa	2.56	51	0.37
S H R I M P S	2.31	103	0.33
OMASTRAPHIDAE	2.05	26	0.29
Diceratias pileatus	2.05	26	0.29
Ariomma bondi	1.79	26	0.26
Etreposebastes imus	1.54	26	0.22
Monomitopus sp.	1.54	26	0.22
Dibranchius atlanticus	1.28	51	0.18
Aristeus varidens	1.03	77	0.15
Bathyrcoonger vicinus	1.03	103	0.15
Scopelosaurus sp.	0.77	26	0.11
Chauliodus sp.	0.77	26	0.11
Gadella imberbis	0.51	26	0.07
Dicrolene intronigra	0.51	51	0.07
Sergestes sp.	0.51	51	0.07
**	0.51	26	0.07
Total	699.47		100.00

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 105  
DATE :03/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 8°16.15  
start stop duration Purpose : 3  
TIME :05:31:59 06:02:14 30.3 (min) Region : 4054  
LOG : 5219.45 5221.00 1.6 Gear cond.: 0  
FDEPTH: 30 29 Validity : 0  
BDEPTH: 30 29 Speed : 3.1 km  
Towing dir: 0° Wire out : 100 m Catch/hour: 234.65  
Sorted : 59 Total catch: 118.31

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
Brachydeuterus auritus	66.09	7327	28.16
Drepane africana	40.15	99	17.11
Chlorocobrus chrysurus	29.00	333	12.36
Alectis alexandrinus	27.21	28	11.60
Galeoides decadactylus	21.14	103	9.01
Pseudotolithus senegalensis	12.69	28	5.41
Sepia hieredda**	7.38	16	3.14
Sphyræna guachancho	5.32	12	2.27
Selene dorsalis	4.84	206	2.06
Sphyræna sphyraena	3.05	8	1.30
Lophius vaillanti	2.98	24	1.27
Trachinotus goreensis	2.70	8	1.15
penaeus notialis, female, female	2.10	48	0.90
Rhinobatos albomaculatus	2.02	2	0.86
Carcharhinus leucas	2.02	2	0.86
Sardinella maderensis	1.67	32	0.71
penaeus notialis, male, male	1.23	52	0.53
Pseudupeneus prayensis	0.99	16	0.42
Ilisha africana	0.56	16	0.24
Trachinotus ovatus	0.52	4	0.22
Cynoglossus senegalensis	0.36	4	0.15
Eucinostomus melanopterus	0.28	4	0.12
Citharus linguatula	0.24	12	0.10
Sardinella aurita	0.12	4	0.05
Total	234.65		100.00

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 106  
DATE :03/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 8°16.12  
start stop duration Purpose : 3  
TIME :07:04:39 07:34:45 30.1 (min) Region : 4054  
LOG : 5225.33 5226.93 1.6 Gear cond.: 0  
FDEPTH: 47 49 Validity : 0  
BDEPTH: 47 49 Speed : 3.2 km  
Towing dir: 0° Wire out : 120 m Catch/hour: 130.01  
Sorted : 65 Total catch: 65.22

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
Trachurus trecae	53.42	3586	41.09
Pagellus bellottii	20.57	235	15.82
Chlorocobrus chrysurus	12.76	150	9.81
Raja miraletus	11.00	22	8.45
Pseudotolithus senegalensis	7.48	8	5.75
Lagocephalus laevigatus	6.94	8	5.34
Drepane africana	4.17	6	3.20

Pagrus caeruleostictus	2.61	6	2.01		Parapenaeus longirostris, female	6.24	425	0.40	420
Dasyatis marmorata	1.85	2	1.43		Illex coindetii	6.24	112	0.40	
Dentex barnardi	1.83	18	1.41	400	Citharus linguatula	5.49	176	0.35	
Pseudupeneus prayensis	1.50	46	1.15		Zeus faber	4.87	12	0.31	
Dentex canariensis	1.20	8	0.92		Chloroscombrus chrysurus	4.75	38	0.30	
Pomadourus incisus	1.20	6	0.92	399	Zenopsis conchifer	4.37	100	0.28	
Brachydeuterus auritus	0.98	197	0.75	401	Raja miraletus	4.37	12	0.28	
Chaetodon hoefleri	0.80	8	0.61		Chelidonichthys gabonensis	2.75	26	0.18	
Sphyrna guanchancho	0.68	2	0.52		Bassanago albescens	1.99	12	0.13	
Alloteuthis africana	0.42	120	0.32						
Selene dorsalis	0.24	6	0.18		Total	1568.76		100.00	
Citharus linguatula	0.10	4	0.08						
Seriola carpenteri	0.08	2	0.06						
Grammolites gruvelli	0.08	2	0.06						
Sardinella aurita	0.08	4	0.06						
Sardinella maderensis	0.04	2	0.03						
Total	130.01		100.00						

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 107  
 DATE :03/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 8°18.51  
 start stop duration Lon E 13°9.33  
 TIME :08:19:25 08:49:43 30.3 (min) Purpose : 3  
 LOG : 5231.06 5232.61 1.6 Region : 4054  
 FDEPTH: 65 62 Gear cond.: 0  
 BDEPTH: 65 62 Validity : 0  
 Towing dir: 0° Wire out : 160 m Speed : 3.1 kn  
 Sorted : 65 Total catch: 332.08 Catch/hour: 657.58

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
Trachurus trecae	263.56	20040	40.08
Lagocephalus laevis	88.32	109	13.43
Chloroscombrus chrysurus	77.82	713	11.83
Stromateus fiatola	56.63	109	8.61
Brachydeuterus auritus	43.37	6257	6.59
Drepana africana	28.91	20	4.40
Pseudupeneus prayensis	16.73	188	2.54
Dentex angolensis	11.25	103	1.71
Pagellus bellottii	9.80	40	1.49
Sepia orbignyana	7.23	30	1.10
Raja miraletus	7.13	20	1.08
Branchiostegus semifasciatus	6.04	10	0.92
Alloteuthis africana	6.04	1584	0.92
Pagellus bellottii	5.84	89	0.89
Galeoides decadactylus	5.25	20	0.80
Zeus faber	4.16	10	0.63
Citharus linguatula	4.16	228	0.63
Selene dorsalis	3.86	69	0.59
Dentex barnardi	3.27	69	0.50
Grammolites gruvelli	2.38	40	0.36
Serranus accraensis	1.19	30	0.18
Sardinella maderensis	1.19	10	0.18
Fistularia petimba	1.09	10	0.17
Chaetodon hoefleri	0.99	10	0.15
Saurida brasiliensis	0.50	158	0.08
Torpedo torpedo	0.30	10	0.05
Sardinella aurita	0.20	10	0.03
Chelidonichthys gabonensis	0.20	20	0.03
Unidentified crab	0.10	20	0.02
Pontinus accraensis	0.10	10	0.02
Total	657.58		100.00

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 108  
 DATE :03/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 8°19.71  
 start stop duration Lon E 13°6.54  
 TIME :09:46:21 10:16:24 30.1 (min) Purpose : 3  
 LOG : 5238.18 5239.56 1.4 Region : 4054  
 FDEPTH: 83 78 Gear cond.: 0  
 BDEPTH: 83 78 Validity : 0  
 Towing dir: 0° Wire out : 200 m Speed : 2.8 kn  
 Sorted : 152 Total catch: 636.97 Catch/hour: 1271.82

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
Brachydeuterus auritus	496.87	16185	39.07
Trachurus trecae	310.28	18098	24.40
Galeoides decadactylus	118.58	637	9.32
Chloroscombrus chrysurus	100.97	865	7.94
Selene dorsalis	31.19	489	2.45
Dentex angolensis	29.61	236	2.33
Pagellus bellottii	29.09	301	2.29
Citharus linguatula	27.75	687	2.18
Lagocephalus laevis	19.79	16	1.56
Epinephelus aeneus	16.19	8	1.27
Sphyrna guanchancho	14.94	50	1.17
Brotula barbata	14.60	26	1.15
Raja miraletus	14.42	34	1.13
Pseudotolithus senegalensis	9.30	26	0.73
Alectis alexandrinus	8.81	8	0.69
Arygocampus sp.	4.53	8	0.36
Sepia orbignyana	3.19	58	0.25
Stromateus fiatola	3.09	8	0.24
Alloteuthis africana	2.68	697	0.21
Trichiurus lepturus	2.60	50	0.20
Pentheroscion mbizi	2.44	8	0.19
Grammolites gruvelli	2.36	34	0.19
Fistularia petimba	2.36	8	0.19
Saurida brasiliensis	2.26	621	0.18
Chelidonichthys gabonensis	1.76	16	0.14
Dentex barnardi	1.68	84	0.13
Pontinus accraensis	0.50	8	0.04
Total	1271.82		100.00

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 109  
 DATE :03/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 8°24.72  
 start stop duration Lon E 12°57.03  
 TIME :12:02:42 12:32:47 30.1 (min) Purpose : 3  
 LOG : 5252.97 5254.55 1.6 Region : 4054  
 FDEPTH: 162 158 Gear cond.: 0  
 BDEPTH: 162 158 Validity : 0  
 Towing dir: 0° Wire out : 400 m Speed : 3.2 kn  
 Sorted : 122 Total catch: 786.47 Catch/hour: 1568.76

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
Synagrops microlepis	804.47	48048	51.28
Spicara alta	216.18	1109	13.78
Trichiurus lepturus	163.56	261	10.43
Dentex angolensis	76.56	249	4.88
Merluccius polli	48.49	636	3.09
Erythrocles monodi	43.14	176	2.75
Brotula barbata	38.90	20	2.48
Pterothrissus bellocci	34.17	249	2.18
Anthias anthias	26.69	437	1.70
Helicolenus dactylopterus	23.70	112	1.51
Bembrops heterurus	11.47	76	0.73
Miracorvina angolensis	10.23	12	0.65
Umbrina canariensis	9.85	12	0.62
Atractoscion aeguidens	6.90	2	0.44
Lophodes kempii	6.86	12	0.44
Gephyroberyx darwini	6.50	10	0.41

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 110  
 DATE :03/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 8°25.42  
 start stop duration Lon E 12°55.18  
 TIME :13:36:25 14:06:26 30.0 (min) Purpose : 3  
 LOG : 5259.16 5260.67 1.5 Region : 4054  
 FDEPTH: 212 219 Gear cond.: 0  
 BDEPTH: 212 219 Validity : 0  
 Towing dir: 0° Wire out : 500 m Speed : 3.0 kn  
 Sorted : 79 Total catch: 334.68 Catch/hour: 668.91

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
Synagrops microlepis	195.43	9390	29.22
Zenopsis conchifer	119.72	224	17.90
Pterothrissus bellocci	60.72	346	9.08
Dentex angolensis	58.76	188	8.78
Bembrops heterurus	51.09	368	7.64
Brotula barbata	47.11	56	7.04
Merluccius polli	44.75	332	6.69
Illex coindetii	17.55	180	2.62
MYCTOPHIDAE	12.81	3584	1.92
Umbrina canariensis	12.09	24	1.81
Coelrorinchus caelrorinchus	10.21	144	1.53
Parapenaeus longirostris, f ** , female	8.55	432	1.28
Parapenaeus longirostris, m ** , male	7.97	518	1.19
Spicara alta	6.40	14	0.96
Helicolenus dactylopterus	2.74	8	0.41
Chlorophthalmus atlanticus	2.66	64	0.40
Citharus linguatula	2.66	44	0.40
Erythrocles monodi	2.46	2	0.37
Gephyroberyx darwini	2.16	8	0.32
Trichiurus lepturus	2.08	8	0.31
Dentex macrophthalmus	1.00	2	0.15
Total	668.91		100.00

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 111  
 DATE :03/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 8°27.20  
 start stop duration Lon E 12°53.12  
 TIME :15:11:14 15:41:37 30.4 (min) Purpose : 3  
 LOG : 5265.07 5266.63 1.6 Region : 4054  
 FDEPTH: 313 307 Gear cond.: 0  
 BDEPTH: 313 307 Validity : 0  
 Towing dir: 0° Wire out : 760 m Speed : 3.1 kn  
 Sorted : 58 Total catch: 528.86 Catch/hour: 1044.15

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
Chlorophthalmus atlanticus	495.76	10270	47.48
Merluccius polli	344.72	1919	33.01
Synagrops microlepis	49.58	1866	4.75
Laemonema laureysi	37.31	355	3.57
Lophodes kempii	17.69	10	1.69
Malacocephalus laevis	16.17	89	1.55
Helicolenus dactylopterus	14.93	195	1.43
Bembrops heterurus	13.15	267	1.26
Illex coindetii	10.66	89	1.02
MYCTOPHIDAE	8.17	1848	0.78
Trichiurus lepturus	8.00	373	0.77
Parapenaeus longirostris, f ** , female	6.22	586	0.60
Zenopsis conchifer	4.98	18	0.18
Torpedo nobiliana	4.74	2	0.45
Coelrorinchus caelrorinchus	4.44	89	0.43
Pterothrissus bellocci	3.55	18	0.34
Gephyroberyx darwini	1.60	18	0.15
Acanthocarpus brevipinnis	1.42	18	0.14
Leptolepis intermedia	0.71	36	0.07
Citharus linguatula	0.36	18	0.03
Total	1044.15		100.00

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 112  
 DATE :03/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 8°28.52  
 start stop duration Lon E 12°49.53  
 TIME :17:18:57 17:48:59 30.0 (min) Purpose : 3  
 LOG : 5273.44 5274.95 1.5 Region : 4054  
 FDEPTH: 460 465 Gear cond.: 0  
 BDEPTH: 460 465 Validity : 0  
 Towing dir: 0° Wire out : 1100 m Speed : 3.0 kn  
 Sorted : 51 Total catch: 305.00 Catch/hour: 609.39

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
Nematocarcinus africanus	309.29	62637	50.75
Hoplostethus cadonati	94.95	4484	15.58
Lamprogrammus exultus	56.10	1942	9.21
Chaunax pictus	20.86	72	3.42
Gadella imberbis	19.18	839	3.15
Xenodermichthys copei	15.70	312	2.58
Lophius vaillanti	13.67	24	2.24
Laemonema laureysi	10.19	228	1.67
Ariatus varidensis, female *** , female	9.71	444	1.59
Stomias boa boa	8.75	228	1.44
Yarella blackfordi	7.55	228	1.24
Illex coindetii	6.35	48	1.04
Neoharriotta pinnata	6.23	12	1.02
Trichiurus lepturus	5.75	252	0.94
Benthodesmus tenuis	5.63	252	0.92
Ariatus varidensis, male *** , male	3.48	420	0.57
Bassanago albescens	3.36	228	0.55
Halosaurus ovenii	2.40	96	0.39
Merluccius polli	1.84	4	0.30
Branchius atlanticus	1.68	72	0.28
Ariomma bondi	1.44	24	0.24
Plesiopeanaus edwardsianus	1.44	24	0.24
Bathynectes piperitus	0.84	24	0.14
Stereomastis sp.	0.60	96	0.10
Diplophos taenia	0.60	72	0.10
Sergestes sp.	0.60	84	0.10
Acanthephyra sp.	0.36	168	0.06
Bufocearias wedli	0.36	72	0.06
Dicrolene intronigra	0.24	48	0.04
Galeus polli	0.12	12	0.02
Gonostoma elongatum	0.12	24	0.02
Total	609.39		100.00

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 113  
 DATE :03/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 8°28.30  
 start stop duration Lon E 12°47.55  
 TIME :19:28:07 19:58:10 30.1 (min) Purpose : 3



LOG : 5280.26 5281.73 1.5 Region : 4054  
FDEPTH: 597 599 Gear cond.: 0  
BDEPTH: 597 599 Validity : 0  
Towing dir: 0° Wire out : 1350 m Speed : 2.9 km  
Sorted : 42 Total catch: 543.66 Catch/hour: 1085.51

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Yarrella blackfordi	280.59	2492	25.85	
Nematocarcinus africanus	278.78	805	25.68	
Hoplostethus cadenati	149.77	5607	13.80	
Chaceon maritae	70.34	130	6.48	0
Lamprogrammus exutus	68.01	1012	6.26	
Stomias boa boa	57.88	1376	5.33	
Lophius vaillanti	54.25	52	5.00	
Stereomastis sp.	22.84	3115	2.10	
Diplophos taenia	22.84	25957	2.10	
Chaceon maritae	15.83	52	1.46	
Gadella imberbis	12.46	1142	1.15	
Benthodesmus tenuis	11.16	363	1.03	
Xenodermichthys copei	10.90	779	1.00	
Nezumia duodecim	7.27	260	0.67	
Sergestes sp.	5.19	960	0.48	
Aristeus varidens, female ***	3.89	104	0.36	425
Bufoceratias wedli	3.63	78	0.33	
Malacocephalus laevis	2.34	26	0.22	
Scopelosaurus meadi	1.82	52	0.17	
Aristeus varidens, male ***	1.56	104	0.14	426
Dicrolene intronigra	1.56	363	0.14	
Acanthephyra sp.	1.30	104	0.12	
PANDALIDAE	0.78	156	0.07	
Bathyrcoconger vicinus	0.52	26	0.05	
Total	1085.51		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 114  
DATE :03/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 8°28.62  
start stop duration Lon E 12°46.75  
TIME :21:34:57 22:04:59 30.0 (min) Purpose : 3  
LOG : 5285.68 5287.23 1.6 Region : 4054  
FDEPTH: 705 694 Gear cond.: 0  
BDEPTH: 705 694 Validity : 0  
Towing dir: 0° Wire out : 1500 m Speed : 3.1 km  
Sorted : 28 Total catch: 307.67 Catch/hour: 614.73

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Hoplostethus cadenati	175.38	4791	28.53	
Nematocarcinus africanus	158.68	43363	25.81	
Lamprogrammus exutus	94.95	527	15.45	
Yarrella blackfordi	56.70	1429	9.22	
Stereomastis sp.	20.88	1780	3.40	
Borostomias antarcticus	18.90	330	3.07	
Nezumia aequalis	14.29	374	2.32	
Bassanago albescens	13.63	220	2.22	
Triplophos hemingi	11.65	1319	1.89	
Xenodermichthys copei	9.23	747	1.50	
SEPIOLIDAE	7.69	22	1.25	
**	6.37	308	1.04	
HISTIOTEUTHIDAE	4.62	22	0.75	
Talismania longifilis	3.96	132	0.64	
Ebinania costaecanarie	3.74	22	0.61	
Trachyrincus scabrus	2.86	22	0.46	
**	1.98	66	0.32	
Halosaurus ovenii	1.98	22	0.32	
Dicrolene intronigra	1.76	88	0.29	
Stomias boa boa	1.54	44	0.25	
Aristeus varidens, female ***	1.32	66	0.21	
Dibranchius atlanticus	0.66	22	0.11	
Melanonus sp.	0.66	22	0.11	
Pasiphaea sp.	0.44	22	0.07	
Glyphus marsupialis	0.44	22	0.07	
Avocettina acuticeps	0.22	22	0.04	
Sergestes sp.	0.22	22	0.04	
Total	614.73		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 115  
DATE :04/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 8°17.86  
start stop duration Lon E 12°41.47  
TIME :00:22:48 00:53:48 31.0 (min) Purpose : 3  
LOG : 5302.73 5304.19 1.5 Region : 4054  
FDEPTH: 720 712 Gear cond.: 0  
BDEPTH: 720 712 Validity : 0  
Towing dir: 0° Wire out : 1420 m Speed : 2.8 km  
Sorted : 30 Total catch: 676.39 Catch/hour: 1309.14

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Yarrella blackfordi	592.06	13488	45.23	
Nematocarcinus africanus	250.18	68377	19.11	
Hoplostethus cadenati	150.91	3917	11.53	
Lamprogrammus exutus	74.34	490	5.68	
Xenodermichthys copei	56.98	3517	4.35	
Anemone - purple	47.19	45	3.60	
Triplophos hemingi	23.15	2270	1.77	
Stereomastis sp.	21.29	3294	1.63	
Talismania longifilis	20.92	490	1.60	
Bassanago albescens	17.36	267	1.33	
Nezumia aequalis	16.03	401	1.22	
Borostomias antarcticus	14.69	445	1.12	
Galeoides decadactylus	8.90	45	0.68	
HISTIOTEUTHIDAE	8.46	534	0.65	
**	2.23	89	0.17	
Glyphus marsupialis	1.34	45	0.10	
Dibranchius atlanticus	1.34	89	0.10	
Chaceon maritae, male ***	0.89	2	0.07	
Aristeus varidens, female ***	0.89	45	0.07	
Total	1309.14		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 116  
DATE :04/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 8°15.39  
start stop duration Lon E 12°44.21  
TIME :03:05:52 03:35:54 30.0 (min) Purpose : 3  
LOG : 5311.82 5313.41 1.6 Region : 4054  
FDEPTH: 419 417 Gear cond.: 0  
BDEPTH: 419 417 Validity : 0  
Towing dir: 0° Wire out : 900 m Speed : 3.2 km  
Sorted : 54 Total catch: 731.36 Catch/hour: 1461.26

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Merluccius polli	900.36	3129	61.62	475
Hymenocephalus italicus	278.36	29940	19.05	
Nematocarcinus africanus	162.92	39301	11.15	
Laemonema laureysi	45.31	701	3.10	
Malacocephalus occidentalis	12.69	108	0.87	
Centrophorus granulosus	7.99	2	0.55	
Gadella imberbis	7.27	270	0.50	
Neoharriotta pinnata	7.19	2	0.49	
Dibranchius atlanticus	7.01	298	0.48	
Yarrella blackfordi	7.01	460	0.48	
Bathyrcoconger vicinus	5.67	539	0.39	
Total	1461.26		100.00	

J E L L Y F I S H	4.32	82	0.30
Hoplostethus cadenati	3.24	136	0.22
Chaunax pictus	2.98	162	0.20
Lamprogrammus exutus	2.98	54	0.20
Plesiopeneus edwardsianus	2.70	82	0.18
Aristeus varidens, female ***	1.62	162	0.11
476			
Aristeus ovenii	0.54	28	0.04
Nezumia aequalis	0.54	28	0.04
Xenodermichthys copei	0.28	28	0.02
Aristeus varidens, male ***	0.28	28	0.02
Total	1461.26		100.00

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 117  
DATE :04/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 8°13.27  
start stop duration Lon E 12°50.30  
TIME :05:28:58 05:49:11 20.2 (min) Purpose : 3  
LOG : 5324.54 5325.59 1.1 Region : 4054  
FDEPTH: 144 141 Gear cond.: 0  
BDEPTH: 144 141 Validity : 0  
Towing dir: 0° Wire out : 340 m Speed : 3.1 km  
Sorted : 119 Total catch: 422.23 Catch/hour: 1252.91

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Synagrops microlepis	1049.47	108668	83.76	
Boops boops	74.36	110	5.94	
Illex coindetii	32.70	748	2.61	478
Trichiurus lepturus	27.83	42	2.22	
Dentex angolensis	16.02	92	1.28	477
J E L L Y F I S H	15.04	312	1.20	
Spicara alta	8.81	125	0.70	
Dibranchius atlanticus	7.27	531	0.58	
Pterothrissus belloci	5.82	31	0.46	
Uranoscopus polli	5.19	83	0.41	
Brotula barbata	4.57	12	0.36	
Zeus faber	3.95	12	0.31	
Saurida brasiliensis	1.87	448	0.15	
Total	1252.91		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 118  
DATE :04/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 8°6.60  
start stop duration Lon E 12°58.94  
TIME :07:50:21 08:20:25 30.1 (min) Purpose : 3  
LOG : 5338.26 5339.79 1.5 Region : 4054  
FDEPTH: 95 94 Gear cond.: 0  
BDEPTH: 95 94 Validity : 0  
Towing dir: 0° Wire out : 250 m Speed : 3.1 km  
Sorted : 119 Total catch: 256.33 Catch/hour: 511.81

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	241.44	2915	47.17	479
Trachurus trecae	148.35	5946	28.99	480
Dentex angolensis	27.47	198	5.37	481
Trichiurus lepturus	14.78	32	2.89	
Citharus linguatula	14.66	399	2.86	
Lagocephalus laevigatus	12.06	13	2.32	
Chelidomichthys capensis	11.50	96	2.25	
Alloteuthis africana	5.35	1813	1.05	
Zeus faber	4.75	8	0.93	
Illex coindetii	4.35	0	0.85	488
Uranoscopus albesca	4.03	16	0.79	
Branchiostegus semifasciatus	3.99	4	0.78	
Dentex barnardi	3.35	12	0.62	482
Fistularia petimba	3.00	4	0.59	
Boops boops	2.52	36	0.49	
Saurida brasiliensis	2.28	831	0.44	
Pagrus caeruleostictus	1.48	4	0.29	
Dibranchius atlanticus	1.44	116	0.28	
Brotula barbata	1.42	2	0.28	
Galeoides decadactylus	1.28	4	0.25	
SOLEIDAE	1.00	4	0.20	
Sepia orbignyana	0.40	8	0.08	489
Pontinus accraensis	0.36	4	0.07	
Pagellus bellottii	0.28	4	0.05	
Torpedo torpedo	0.24	4	0.05	
Sardinella aurita	0.12	4	0.02	
GOBIIDAE	0.04	8	0.01	
Zenopsis conchifer	0.04	4	0.01	
Total	511.81		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 119  
DATE :04/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 8°4.65  
start stop duration Lon E 13°3.03  
TIME :09:20:58 09:51:32 30.6 (min) Purpose : 3  
LOG : 5345.19 5346.76 1.6 Region : 4054  
FDEPTH: 72 70 Gear cond.: 0  
BDEPTH: 72 70 Validity : 0  
Towing dir: 0° Wire out : 170 m Speed : 3.1 km  
Sorted : 70 Total catch: 70.30 Catch/hour: 137.98

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Lagocephalus laevigatus	47.50	45	34.42	
Trachurus trecae	27.05	1443	19.60	484
Dentex angolensis	14.09	110	10.21	483
Brachydeuterus auritus	12.88	141	9.33	486
Galeoides decadactylus	11.31	37	8.19	
Raja miraletus	7.83	14	5.68	
Torpedo torpedo	4.47	10	3.24	
Dasyatis marmorata	1.90	2	1.38	
Pseudupeneus prayensis	1.41	12	1.02	
Dentex barnardi	1.35	10	0.98	487
Epinephelus aeneus	1.33	2	0.97	
Pagellus bellottii	1.16	14	0.84	485
Sphyraena guachancho	1.08	2	0.78	
Citharus linguatula	0.96	31	0.70	
Zeus faber	0.84	2	0.61	
Alloteuthis africana	0.79	157	0.57	
Fistularia petimba	0.75	2	0.54	
Brotula barbata	0.57	2	0.41	
Sepia orbignyana	0.47	2	0.34	
Dibranchius atlanticus	0.14	12	0.10	
Sardinella aurita	0.10	4	0.07	
Total	137.98		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 120  
DATE :04/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 8°3.25  
start stop duration Lon E 13°3.57  
TIME :10:27:17 10:58:02 30.8 (min) Purpose : 3  
LOG : 5348.95 5350.60 1.7 Region : 4054  
FDEPTH: 66 66 Gear cond.: 0  
BDEPTH: 66 66 Validity : 0  
Towing dir: 0° Wire out : 160 m Speed : 3.2 km  
Sorted : 0 Total catch: 38.44 Catch/hour: 75.00

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Galeoides decadactylus	34.93	113	46.57	

Species	Weight	Numbers	% of Tot. C	SAMP
Trachurus trecae	12.14	712	16.18	490
Lagocephalus laevisgatus	11.43	10	15.24	
Dentex angolensis	7.26	59	9.68	491
Raja miraletus	2.71	4	3.62	
Torpedo torpedo	1.54	4	2.06	
Fistularia petimba	1.50	4	2.00	
Decapterus rhonchus**	0.74	18	0.99	
Brachydeuterus auritus	0.55	8	0.73	493
Pagellus bellottii	0.37	6	0.49	492
Pseudupeneus prayensis	0.35	2	0.47	
Chaetodon hoefleri	0.33	2	0.44	
Sardinella aurita	0.33	14	0.44	494
Sphyraena sphyraena	0.21	2	0.29	
Grammolites gruvelli	0.20	4	0.26	
Alloteuthis africana	0.16	31	0.21	
Selene dorsalis	0.14	2	0.18	
Citharus linguatula	0.12	4	0.16	
<b>Total</b>	<b>75.00</b>		<b>100.00</b>	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 121  
 DATE :04/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 8°4.86  
 Lon E 12°37.97  
 start stop duration Purpose : 3  
 TIME :11:48:08 12:18:10 30.0 (min) Region : 4054  
 LOG : 5355.26 5357.02 1.8 Gear cond.: 0  
 FDEPTH: 44 42 Validity : 0  
 BDEPTH: 44 42 Speed : 3.5 kn  
 Towing dir: 0° Wire out : 110 m  
 Sorted : 0 Total catch: 43.21 Catch/hour: 86.33

Species	Weight	Numbers	% of Tot. C	SAMP
Galeoides decadactylus	43.56	84	50.45	
Dasysatis marmorata	20.26	16	23.47	
Alectis alexandrinus	9.01	14	10.44	
Raja miraletus	5.61	12	6.50	
Rhinobatos albomaculatus	1.30	2	1.50	
Sepia orbignyana	1.16	4	1.34	497
Brachydeuterus auritus	1.00	26	1.16	496
Pagellus bellottii	0.96	16	1.11	495
Epinephelus aeneus	0.86	2	1.00	
Dasysatis margarita	0.60	2	0.69	
Alloteuthis africana	0.46	122	0.53	
Cynoglossus canariensis	0.36	2	0.42	
Citharus linguatula	0.30	8	0.35	
Torpedo torpedo	0.22	8	0.25	
Eucinostomus melanopterus	0.22	2	0.25	
Chaetodon hoefleri	0.20	2	0.23	
Peneaus notialis	0.14	4	0.16	
Grammolites gruvelli	0.12	2	0.14	
<b>Total</b>	<b>86.33</b>		<b>100.00</b>	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 122  
 DATE :04/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 8°2.04  
 Lon E 13°9.21  
 start stop duration Purpose : 3  
 TIME :12:56:07 13:26:08 30.0 (min) Region : 4054  
 LOG : 5359.94 5361.56 1.6 Gear cond.: 0  
 FDEPTH: 29 30 Validity : 0  
 BDEPTH: 29 30 Speed : 3.2 kn  
 Towing dir: 0° Wire out : 90 m  
 Sorted : 0 Total catch: 28.17 Catch/hour: 56.30

Species	Weight	Numbers	% of Tot. C	SAMP
Pomadasys incisus	26.06	142	46.29	499
Pagellus bellottii	6.90	66	12.25	498
Raja miraletus	5.54	12	9.83	
Ephippion guttifer	4.60	2	8.16	
Sepia orbignyana	3.90	8	6.92	
Mustelus mustelus	2.64	2	4.69	
Alectis alexandrinus	2.40	6	4.26	
Eucinostomus melanopterus	1.02	14	1.81	
Pagrus caeruleostictus	0.88	2	1.56	
Galeoides decadactylus	0.82	2	1.46	
Pseudupeneus prayensis	0.70	6	1.24	
Brachydeuterus auritus	0.46	82	0.82	450
Peneaus notialis	0.40	12	0.71	
<b>Total</b>	<b>56.30</b>		<b>100.00</b>	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 123  
 DATE :07/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 8°2.62  
 Lon E 12°36.97  
 start stop duration Purpose : 3  
 TIME :21:15:22 21:45:25 30.1 (min) Region : 4054  
 LOG : 5472.36 5473.86 1.5 Gear cond.: 0  
 FDEPTH: 613 616 Validity : 0  
 BDEPTH: 613 616 Speed : 3.0 kn  
 Towing dir: 0° Wire out : 1400 m  
 Sorted : 60 Total catch: 260.04 Catch/hour: 519.21

Species	Weight	Numbers	% of Tot. C	SAMP
Nematocarcinus africanus	228.10	5054	43.93	
Hoplostethus cadenati	73.12	2466	14.08	
Lamprogrammus exutus	62.06	721	11.95	
Yarrella blackfordi	53.49	1577	10.30	
Borostomias sp.	21.46	445	4.13	
Stereomastis sp.	14.92	2071	2.87	
Nezumia micronychodon	11.14	335	2.15	
Torpedo nobiliana	9.98	2	1.92	
Gadella imberbis	7.29	545	1.40	
Aristeus varidens, female ***, female	5.11	252	0.98	501
Stomias boa boa	4.69	309	0.90	
Bathyrcoonger vicinus	4.19	194	0.81	
Xenodermichthys copei	3.35	226	0.65	
Chaceon maritae, male ***, male	3.15	10	0.61	445
Chaceon maritae, female ***, female	1.52	4	0.29	452
**	1.50	16	0.29	
Etmopterus spinax	1.42	16	0.27	
OMASTREPHIDAE	1.34	8	0.26	
Talismania longifillius	1.34	84	0.26	
Triplophos hemingi	1.26	210	0.24	
Cataetys laticeps	1.08	202	0.21	
Dibranchius atlanticus	1.00	56	0.19	
J E L Y F I S H	1.00	8	0.19	
Benthodesmus tenuis	0.92	26	0.18	
Eggs of ray	0.84	34	0.16	
Opiathoteuthis agassizi	0.58	8	0.11	
Chaunax pictus	0.50	8	0.10	
Halosaurus ovenii	0.50	28	0.10	
Diastobranthus capensis	0.50	8	0.10	
Diceratias pileatus	0.42	34	0.08	
Aristeus varidens, male ***, male	0.42	58	0.08	500
Bathyrcoonger vicinus	0.32	34	0.06	
Lophius vaillanti	0.24	8	0.05	
Melanonus zugmayeri	0.24	8	0.05	
Scopelosaurus sp.	0.16	8	0.03	
Nemichthys scolopaceus	0.08	8	0.02	
<b>Total</b>	<b>519.21</b>		<b>100.00</b>	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 124

DATE :07/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 8°1.06  
 Lon E 12°37.97  
 start stop duration Purpose : 3  
 TIME :23:35:42 00:05:47 30.1 (min) Region : 4054  
 LOG : 5479.63 5481.16 1.5 Gear cond.: 0  
 FDEPTH: 517 523 Validity : 0  
 BDEPTH: 517 523 Speed : 3.1 kn  
 Towing dir: 0° Wire out : 1060 m  
 Sorted : 34 Total catch: 894.77 Catch/hour: 1784.78

Species	Weight	Numbers	% of Tot. C	SAMP
Lamprogrammus exutus	761.97	13121	42.69	
Nematocarcinus africanus	552.53	9926	30.96	
Hoplostethus cadenati	151.00	473	8.46	
Aristeus varidens, female ***, female	45.64	1919	2.56	504
Yarrella blackfordi	29.92	311	1.68	
Borostomias elusens	27.53	415	1.54	
Stereomastis sp.	20.15	1245	1.13	
Aristeus varidens, male ***, male	17.63	882	0.99	503
Etmopterus spinax	17.63	52	0.99	
Xenodermichthys copei	16.60	477	0.89	
Laemonema laureysi	15.96	726	0.89	
Bathyrcoonger vicinus	15.96	311	0.89	
Halosaurus ovenii	15.04	156	0.84	
Gadella imberbis	12.45	52	0.70	
Coloconger cadenati	12.45	52	0.70	
Benthodesmus tenuis	12.45	52	0.70	
Triplophos hemingi	11.41	52	0.64	
Plesionika martia	11.41	311	0.64	
Bathyrcoonger vicinus	11.41	52	0.64	
Hymenocephalus italicus	11.41	104	0.64	
Coelorhynchus caelorhynchus	11.41	52	0.64	
Merluccius polli	2.85	4	0.16	502
<b>Total</b>	<b>1784.78</b>		<b>100.00</b>	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 125  
 DATE :08/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 8°1.24  
 Lon E 12°44.34  
 start stop duration Purpose : 3  
 TIME :05:22:20 05:52:55 30.6 (min) Region : 4054  
 LOG : 5492.90 5494.48 1.6 Gear cond.: 0  
 FDEPTH: 168 167 Validity : 0  
 BDEPTH: 168 167 Speed : 3.1 kn  
 Towing dir: 0° Wire out : 400 m  
 Sorted : 67 Total catch: 401.67 Catch/hour: 788.09

Species	Weight	Numbers	% of Tot. C	SAMP
Synagrops microlepis	519.46	36328	65.91	
Illex coindetii	58.67	956	7.44	511
Trichiurus lepturus	47.48	69	6.02	
Zenopsis conchifer	36.77	45	4.67	
Sphoeroides pachyaster	33.75	39	4.28	
Brotula barbata	31.67	51	4.02	
Pterothrissus bellocci	15.40	118	1.95	
Saurida brasiliensis	10.50	1815	1.33	
Chlorophthalmus atlanticus	8.14	1089	1.03	
Dentex angolensis	6.83	27	0.87	505
Trachurus trecae	6.44	6	0.82	506
Uranoscopus polli	3.83	29	0.49	
Cynopentacnus ferox	1.96	2	0.25	
Parapaneus longirostris, f **, female	1.28	245	0.16	509
Miracorvina angolensis	1.08	4	0.14	
Torpedo torpedo	1.00	2	0.13	
Trachurus trecae	0.98	39	0.12	507
Citharus linguatula	0.59	10	0.07	
Bembrops heterurus	0.59	29	0.07	
Mystriophis rostellatus	0.59	10	0.07	
Dentex macrophthalmus	0.47	2	0.06	508
Parapaneus longirostris, m **, male	0.25	67	0.03	510
Monolene microstoma	0.20	49	0.02	
Squilla mantis	0.10	20	0.01	
Bathyrcoonger vicinus	0.10	10	0.01	
<b>Total</b>	<b>788.09</b>		<b>100.00</b>	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 126  
 DATE :08/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 7°55.96  
 Lon E 12°50.65  
 start stop duration Purpose : 3  
 TIME :07:23:57 07:54:24 30.5 (min) Region : 4054  
 LOG : 5503.65 5505.24 1.6 Gear cond.: 0  
 FDEPTH: 105 106 Validity : 0  
 BDEPTH: 105 106 Speed : 3.1 kn  
 Towing dir: 0° Wire out : 230 m  
 Sorted : 112 Total catch: 253.75 Catch/hour: 500.00

Species	Weight	Numbers	% of Tot. C	SAMP
Trachurus trecae	289.06	10534	57.81	512
Lagocephalus inermis	39.80	49	7.96	
Dentex angolensis	27.67	311	5.53	513
Pagellus bellottii	25.81	355	5.16	516
Dentex congongensis	24.63	593	4.93	514
Caranx rhonchus	19.33	18	3.87	
Brotula barbata	10.84	4	2.17	
Fistularia petimba	10.82	22	2.16	
Trichiurus lepturus	8.08	18	1.62	
Brachydeuterus auritus	7.49	63	1.50	515
Zeus faber	7.49	28	1.50	
Raja miraletus	6.50	10	1.30	
Lepidotrigla cadmani	6.11	57	1.22	
Saurida brasiliensis	4.53	922	0.91	
Citharus linguatula	3.55	191	0.71	
Lepidotrigla carolae	2.76	99	0.55	
Scorpaena normani	1.77	28	0.35	
Selene dorsalis	1.46	10	0.29	
Sepia officinalis	1.18	18	0.24	
Alloteuthis africana	0.59	205	0.12	
Engraulis encrasicolus	0.53	99	0.11	
<b>Total</b>	<b>500.00</b>		<b>100.00</b>	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 127  
 DATE :08/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 7°56.02  
 Lon E 12°54.53  
 start stop duration Purpose : 3  
 TIME :08:54:52 09:24:55 30.0 (min) Region : 4054  
 LOG : 5511.15 5512.65 1.5 Gear cond.: 0  
 FDEPTH: 86 86 Validity : 0  
 BDEPTH: 86 87 Speed : 3.0 kn  
 Towing dir: 0° Wire out : 220 m  
 Sorted : 0 Total catch: 57.55 Catch/hour: 114.95

Species	Weight	Numbers	% of Tot. C	SAMP
Lagocephalus lagocephalus	21.25	24	18.49	
Dentex congongensis	16.10	342	14.01	
Lepidotrigla cadmani	14.22	154	12.37	
Pomadasy incisus	14.18	18	12.34	
Seriola carpenteri	12.98	6	11.29	
Raja miraletus	10.93	22	9.50	
Pagellus bellottii	9.91	124	8.62	
Fistularia petimba	3.99	6	3.48	
Citharus linguatula	3.85	190	3.35	
Zeus faber	1.92	10	1.67	



Nezumia aequalis	10.68	231	2.57	
Stereomastis sp.	10.50	1033	2.52	
Zenopsis conchifer	9.44	18	2.27	
OMMASTREPHIDAE	8.01	53	1.93	
Lophiodes kempii	5.66	6	1.36	
J E L L Y F I S H	5.34	18	1.28	
Aristeus varidensis, female ***	3.92	160	0.94	540
Merluccius polli	3.17	2	0.76	
Chaceon maritae, male ***	1.29	2	0.31	
Avocettina acuticeps	1.25	89	0.30	
Trichurus lepturus	1.07	71	0.26	
Chaceon maritae, female ***	0.95	2	0.23	
Eggs of ray	0.71	18	0.17	
Dibranchius atlanticus	0.71	142	0.17	
Monomitopus metriostoma	0.71	89	0.17	
Plesionika martia	0.71	160	0.17	
Xenodermichthys copei	0.53	36	0.13	
Stomias boa boa	0.53	18	0.13	
Scopelosaurus meadi	0.36	18	0.09	
Dicrolene intronigra	0.18	36	0.04	
Bathyrroconger vicinus	0.18	18	0.04	
Aristeus varidensis, male ***	0.18	36	0.04	
Diceratias pileatus	0.18	18	0.04	541
Total	416.10		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 136  
 DATE :09/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 7°41.68  
 start stop duration Purpose : 3  
 TIME :05:28:48 05:58:57 30.2 (min) Lon E 12°37.30  
 LOG : 5607.58 5609.25 1.7 Region : 4054  
 FDEPTH: 119 118 Gear cond.: 0  
 BDEPTH: 119 118 Validity : 0  
 Towing dir: 0° Wire out : 300 m Speed : 3.3 kn  
 Sorted : 102 Total catch: 491.39 Catch/hour: 977.89

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight	numbers	
Trachurus trecae	567.16	26760	58.00
Dentex congoensis	215.32	4241	22.02
Saurida brasiliensis	67.06	18	6.86
Lepidotrigla carolae	33.03	279	3.38
Dentex angolensis	25.07	157	2.56
Pagellus bellottii	23.08	259	2.36
Spicara alta	9.75	488	1.00
Uranoscopus polli	8.56	40	0.88
Brachydeuterus auritus	7.16	40	0.73
Fistularia petimba	6.27	10	0.64
Citharus linguatula	5.67	368	0.58
Zeus faber	3.78	10	0.39
Boops boops	1.59	50	0.16
Ariomma bondi	1.29	30	0.13
Pterothrissus belloci	1.19	10	0.12
Illex coindetii	1.09	20	0.11
Scorpaena normani	0.38	40	0.04
G A S T R O P O D S	0.20	20	0.02
Dibranchius atlanticus	0.10	30	0.01
Arnoglossus imperialis	0.10	90	0.01
Total	977.89		100.00

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 137  
 DATE :09/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 7°38.16  
 start stop duration Purpose : 3  
 TIME :07:29:18 07:59:21 30.1 (min) Lon E 12°44.97  
 LOG : 5619.36 5620.91 1.6 Region : 4054  
 FDEPTH: 89 88 Gear cond.: 0  
 BDEPTH: 89 88 Validity : 0  
 Towing dir: 0° Wire out : 220 m Speed : 3.1 kn  
 Sorted : 73 Total catch: 72.94 Catch/hour: 145.64

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight	numbers	
Lepidotrigla cadmani	53.23	437	36.55
Lagocephalus laevigatus	35.06	40	24.07
Raja miraletus	11.92	22	8.18
Pagellus bellottii	6.69	94	4.59
Fistularia petimba	6.19	18	4.25
Rhinobatos albamaculatus	5.47	2	3.76
Dentex congoensis	5.37	118	3.69
Trachurus trecae	5.03	292	3.45
Alloteuthis africana	3.89	990	2.67
Citharus linguatula	2.12	66	1.45
Caranx crysos	1.90	2	1.30
Pomadasya jubelini	1.22	2	0.84
Sepia orbignyana	1.20	4	0.32
Illex coindetii	1.16	14	0.80
Saurida brasiliensis	1.10	280	0.75
Cynoglossus canariensis	0.90	2	0.62
Dentex angolensis	0.78	16	0.53
Sepia officinalis	0.60	2	0.41
Brachydeuterus auritus	0.60	4	0.41
Sardinella aurita	0.58	22	0.40
Chaetodon hoefleri	0.36	2	0.25
G A S T R O P O D S	0.14	16	0.10
Grammolites gruvelli	0.12	2	0.08
B I V A L V E S	0.02	2	0.01
Total	145.64		100.00

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 138  
 DATE :09/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 7°16.82  
 start stop duration Purpose : 3  
 TIME :11:03:28 11:25:00 21.5 (min) Lon E 12°47.41  
 LOG : 5646.17 5647.28 1.1 Region : 4054  
 FDEPTH: 25 24 Gear cond.: 0  
 BDEPTH: 25 24 Validity : 0  
 Towing dir: 0° Wire out : 85 m Speed : 3.1 kn  
 Sorted : 0 Total catch: 96.39 Catch/hour: 268.62

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight	numbers	
Ilisha africana ***	88.20	4618	32.84
Chloroscombrus chrysurus	49.66	532	18.49
Pomadasya incisus	38.74	348	14.42
Sphyraena guachancho	28.82	95	10.73
Scyllarides herklotti	15.75	28	5.86
Pseudupeneus prayensis	7.86	92	2.93
Pagrus caeruleostictus	7.83	14	2.92
Lethrinus atlanticus	6.83	11	2.54
Raja miraletus	6.63	11	2.47
Selene dorsalis	5.10	67	1.90
Elops senegalensis	2.68	8	1.00
Trichurus lepturus	1.67	50	0.62
Sepia orbignyana	1.14	6	0.43
Galeoides decadactylus	0.95	8	0.35
Chelidonichthys gabonensis	0.89	8	0.33
Portunus validus	0.86	3	0.32
Sardinella maderensis	0.84	14	0.31
Chilomycterus spinosus mauretanicus	0.81	30	0.30
Brachydeuterus auritus	0.75	17	0.29
Chaetodon hoefleri	0.64	11	0.24
Aluterus heudelotii	0.50	6	0.19
Scorpaena stephanica	0.42	3	0.16

Pteroscion pelli	0.22	3	0.08
Balistes punctatus	0.20	3	0.07
PORIFERA (Sponges)	0.20	3	0.07
Citharus linguatula	0.14	6	0.05
Dentex congoensis	0.11	3	0.04
Spherooides marmoratus	0.11	3	0.04
Caranx sp.	0.06	3	0.02
Synodus saurus	0.03	3	0.01
Total	268.62		100.00

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 139  
 DATE :09/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 7°16.63  
 start stop duration Purpose : 3  
 TIME :12:26:54 12:56:56 30.0 (min) Lon E 12°41.36  
 LOG : 5654.25 5655.96 1.7 Region : 4054  
 FDEPTH: 43 42 Gear cond.: 0  
 BDEPTH: 43 42 Validity : 0  
 Towing dir: 0° Wire out : 110 m Speed : 3.4 kn  
 Sorted : 0 Total catch: 108.93 Catch/hour: 217.64

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight	numbers	
Pagrus caeruleostictus	127.11	583	58.40
Dentex canariensis	46.67	106	21.44
Sphyraena guachancho	8.77	18	4.03
Alectis alexandrinus	7.67	2	3.53
Pseudupeneus prayensis	4.04	38	1.85
Dentex barnardi	3.52	16	1.62
Seriola carpenteri	3.40	4	1.56
Bodianus speciosus	3.24	2	1.49
Pagellus bellottii	2.96	14	1.36
Epinephelus aeneus	2.68	4	1.23
Scomberomorus tritor	1.58	2	0.73
Fistularia petimba	1.46	4	0.67
Dasyatis marmorata	0.82	2	0.38
Chilomycterus spinosus mauretanicus	0.62	2	0.28
Zeus faber	0.52	2	0.24
Boops boops	0.48	116	0.20
Trachurus radiatus	0.44	2	0.22
Chaetodon hoefleri	0.42	4	0.19
Xyrichtys novacula	0.34	2	0.16
Pomadasya incisus	0.24	4	0.11
Chloroscombrus chrysurus	0.20	2	0.09
Trachurus trecae	0.20	20	0.09
Alloteuthis africana	0.14	48	0.06
Selene dorsalis	0.08	2	0.04
Prognathodes marcellae	0.04	2	0.02
Anthias anthias	0.02	4	0.01
Total	217.64		100.00

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 140  
 DATE :09/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 7°22.01  
 start stop duration Purpose : 3  
 TIME :14:12:45 14:42:48 30.1 (min) Lon E 12°39.81  
 LOG : 5663.85 5665.51 1.7 Region : 4054  
 FDEPTH: 64 61 Gear cond.: 0  
 BDEPTH: 64 61 Validity : 0  
 Towing dir: 0° Wire out : 150 m Speed : 3.3 kn  
 Sorted : 0 Total catch: 64.07 Catch/hour: 127.93

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight	numbers	
Pagellus bellottii	75.85	897	59.29
Caranx rhonchus	37.74	130	29.50
Balistes caprisicus	5.67	10	4.43
Pagrus caeruleostictus	2.58	8	2.01
Pseudupeneus prayensis	1.40	12	1.09
Raja miraletus	1.10	2	0.86
Epinephelus aeneus	0.86	2	0.67
Alloteuthis africana	0.72	228	0.56
Chelidonichthys gabonensis	0.54	4	0.42
Sphyraena guachancho	0.46	2	0.36
Trachurus trecae	0.38	20	0.30
Brachydeuterus auritus	0.34	4	0.27
Chaetodon hoefleri	0.30	4	0.23
Total	127.93		100.00

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 141  
 DATE :09/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 7°23.40  
 start stop duration Purpose : 3  
 TIME :15:45:15 16:05:18 20.1 (min) Lon E 12°34.45  
 LOG : 5672.31 5673.43 1.1 Region : 4054  
 FDEPTH: 87 87 Gear cond.: 0  
 BDEPTH: 87 87 Validity : 0  
 Towing dir: 0° Wire out : 240 m Speed : 3.3 kn  
 Sorted : 87 Total catch: 86.75 Catch/hour: 259.60

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight	numbers	
Dentex congoensis	75.23	2047	28.98
Trachurus trecae	56.44	2822	21.74
Lagocephalus laevigatus	36.33	39	13.99
Chelidonichthys gabonensis	24.12	174	9.29
Pagellus bellottii	19.57	266	7.54
Caranx rhonchus	9.76	36	3.76
Fistularia petimba	8.65	24	3.33
Raja miraletus	7.06	12	2.72
Saurida brasiliensis	5.66	1164	2.18
Dentex angolensis	5.48	96	2.11
Alloteuthis africana	4.85	1149	1.87
Sepia orbignyana	2.75	33	1.06
Sardinella aurita	1.98	84	0.76
Citharus linguatula	1.20	54	0.46
Arnoglossus imperialis	0.30	21	0.12
Illex coindetii	0.15	3	0.06
Spicara alta	0.09	6	0.03
Total	259.60		100.00

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 142  
 DATE :09/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 7°24.24  
 start stop duration Purpose : 3  
 TIME :17:15:37 17:46:14 30.6 (min) Lon E 12°26.95  
 LOG : 5681.87 5683.40 1.5 Region : 4054  
 FDEPTH: 118 118 Gear cond.: 0  
 BDEPTH: 118 118 Validity : 0  
 Towing dir: 0° Wire out : 300 m Speed : 3.0 kn  
 Sorted : 62 Total catch: 132.72 Catch/hour: 260.15

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight	numbers	
Trachurus trecae	55.67	2454	21.40
Dentex congoensis	29.17	408	11.21
Pagellus bellottii	28.30	200	10.88
Umbrina canariensis	24.23	82	9.31
Raja straeleni	16.78	8	6.45
Dentex angolensis	16.78	90	6.45
Brotula barbata	15.96	14	6.13
Spicara alta	10.19	325	3.92
Lepidotrigla cadmani	8.43	86	3.24

Species	Weight	Count	Percentage
Boops boops	5.84	118	2.25
Octopus vulgaris	4.74	4	1.82
Lagoccephalus laevis	4.55	4	1.75
Dentex barnardi	4.39	12	1.69
Raja miraletus	4.35	8	1.67
Perulibatrachus rosignoli	4.31	16	1.66
Citharus linguatula	4.23	298	1.63
Zeus faber	3.45	8	1.33
Saurida brasiliensis	3.25	945	1.25
Ariomma bondi	2.90	31	1.12
Brachydeuterus auritus	2.67	20	1.02
Chelidonichthys capensis	2.63	16	1.01
Pagrus caeruleostictus	1.72	4	0.66
Fistularia petimba	1.45	4	0.56
Serranus cabrilla	1.14	8	0.44
Sepia orbigynana	0.74	8	0.29
Illex coindetii	0.71	12	0.27
Uranoscopus polli	0.63	4	0.24
Sardinella aurita	0.47	8	0.18
Arnoglossus imperialis	0.47	27	0.18
<b>Total</b>	<b>260.15</b>	<b>100.00</b>	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 143  
DATE :09/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 7°33.08  
start stop duration Purpose : 3  
TIME :21:13:59 21:44:00 30.0 (min) Lon E 12°14.07  
LOG : 5705.66 5707.10 1.4 Region : 4054  
FDEPTH: 709 701 Gear cond.: 0  
BDEPTH: 709 701 Validity : 0  
Towing dir: 0° Wire out : 1500 m Speed : 2.9 km  
Sorted : 51 Total catch: 136.31 Catch/hour: 272.44

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
Yarella blackfordi	55.31	686	20.30
Stereomastis sp.	43.57	3028	15.99
Rajella barnardi	39.97	50	14.67
Nezumia micronychodon	30.28	905	11.11
Lophiodes kemp	22.09	30	8.11
Chaceon maritae, male ***	14.44	36	5.30
Torpedo nobiliana	13.31	2	4.89
Stomias boa	11.74	0	4.31
Talismania longifillis	10.49	96	3.85
Lamprogrammus exutus	7.05	20	2.59
Hoplostethus cadonati	3.05	70	1.12
Erimania costaeacanarie	2.95	6	1.08
OMASTREPHIDAE	2.75	16	1.01
Loligo vulgaris	2.50	2	0.92
Caristius sp.	2.50	10	0.92
Aristeus varidens, female ***, female	2.45	96	0.90
Halosaurus ovenii	2.20	36	0.81
Dibranchius atlanticus	1.35	146	0.50
Triplophos hemingi	1.00	130	0.37
Nematocarcinus africanus	0.75	126	0.28
SQUALIDAE	0.55	6	0.20
Borostomias sp.	0.45	6	0.17
Caristius groenlandicus	0.40	6	0.15
Plesionaeus edwardsianus	0.35	10	0.13
GALATHIIDAE *	0.25	40	0.09
Aristeus varidens, male ***, male	0.20	25	0.07
Heterocarpus grimaldii	0.20	6	0.07
Nephropsis atlantica	0.15	10	0.06
Plesionika martia	0.10	10	0.04
Cataetys laticeps	0.05	6	0.02
<b>Total</b>	<b>272.44</b>	<b>100.00</b>	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 144  
DATE :09/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 7°27.92  
start stop duration Purpose : 3  
TIME :23:37:34 00:05:59 28.4 (min) Lon E 12°17.37  
LOG : 5715.02 5716.37 1.4 Region : 4054  
FDEPTH: 428 428 Gear cond.: 0  
BDEPTH: 428 428 Validity : 0  
Towing dir: 0° Wire out : 920 m Speed : 2.9 km  
Sorted : 29 Total catch: 230.57 Catch/hour: 486.78

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
Lophiodes kemp	189.75	177	38.98
Laemonema laureysi	58.52	635	12.02
Nematocarcinus africanus	49.06	14158	10.08
Merluccius polli	47.92	230	9.85
Hymenoccephalus italicus	40.20	4197	8.26
Eumoteus polli	23.43	74	4.40
Plesionaeus edwardsianus	10.34	148	2.13
Dibranchius atlanticus	9.31	724	1.91
Chaunax pictus	8.13	89	1.67
Malacocephalus occidentalis	6.50	118	1.34
Yarella blackfordi	6.06	177	1.24
Bathynectes vicinus	5.47	59	1.12
Centrophorus granulosus	5.28	2	1.08
Chaceon maritae, male ***	4.86	8	1.00
Chaceon maritae, female ***	3.84	17	0.79
Gadella imberbis	2.66	103	0.55
Starfish	2.36	74	0.49
Xenodermichthys copei	2.22	118	0.46
GALATHIIDAE *	1.77	281	0.36
Stomias boa	1.48	30	0.30
Plesionika martia	1.33	488	0.27
Parapanaeus longirostris, f **, female	1.33	133	0.27
Spatangus capensis	1.33	15	0.27
Bathynectes piperitus	1.18	30	0.24
Aristeus varidens, male ***, male	1.03	148	0.21
Benthodesmus tenuis	0.74	30	0.15
Eggs of ray	0.74	30	0.15
Aristeus varidens, female ***, female	0.74	103	0.15
Coloconger cadonati	0.30	15	0.06
Stereomastis sp.	0.30	44	0.06
Avocettina acuticeps	0.30	15	0.06
Panaeus notialis	0.15	118	0.03
Halosaurus ovenii	0.15	59	0.03
<b>Total</b>	<b>486.78</b>	<b>100.00</b>	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 145  
DATE :10/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 7°21.48  
start stop duration Purpose : 3  
TIME :03:14:04 03:44:21 30.3 (min) Lon E 12°11.66  
LOG : 5737.40 5738.89 1.5 Region : 4054  
FDEPTH: 527 531 Gear cond.: 0  
BDEPTH: 527 531 Validity : 0  
Towing dir: 0° Wire out : 1100 m Speed : 3.0 km  
Sorted : 26 Total catch: 293.92 Catch/hour: 582.60

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
Nematocarcinus africanus	287.81	65280	49.40
Lophiodes kemp	78.71	87	13.51
Lamprogrammus exutus	73.48	872	12.61
Chaceon maritae, male ***	27.47	44	4.72
Yarella blackfordi	25.29	720	4.34
Hoplostethus cadonati	23.77	938	4.08

Species	Weight	Count	Percentage
Aristeus varidens, female ***, female	10.03	262	1.72
Stomias boa	7.85	174	1.35
Centrophorus granulosus	7.85	2	1.35
Chaceon maritae, female ***	7.63	44	1.31
Loligo vulgaris	6.32	44	1.09
Plesionaeus edwardsianus	4.36	65	0.75
Stereomastis sp.	3.92	327	0.67
Xenodermichthys copei	2.83	153	0.49
Benthodesmus tenuis	2.83	87	0.49
Aristeus varidens, male ***, male	2.40	283	0.41
Gadella imberbis	1.74	65	0.30
Dibranchius atlanticus	1.53	131	0.26
Malacocephalus occidentalis	1.09	22	0.19
Halosaurus ovenii	0.87	22	0.15
Nezumia micronychodon	0.87	22	0.15
Triplophos hemingi	0.87	109	0.15
Plesionika martia	0.87	174	0.15
Coloconger cadonati	0.87	109	0.15
Bathynectes piperitus	0.44	22	0.07
Bathynectes vicinus	0.44	22	0.07
Dicrolene intronigra	0.22	22	0.04
Avocettina acuticeps	0.22	22	0.04
<b>Total</b>	<b>582.60</b>	<b>100.00</b>	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 146  
DATE :10/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 7°18.88  
start stop duration Purpose : 3  
TIME :04:55:55 05:27:52 32.0 (min) Lon E 12°26.65  
LOG : 5744.66 5746.31 1.6 Region : 4054  
FDEPTH: 436 438 Gear cond.: 0  
BDEPTH: 436 438 Validity : 0  
Towing dir: 0° Wire out : 950 m Speed : 3.1 km  
Sorted : 37 Total catch: 243.99 Catch/hour: 458.19

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
Hymenoccephalus italicus	121.62	11878	26.54
Gadella maraldi	108.60	1431	23.70
Lophiodes kemp	28.26	58	6.17
Chaunax pictus	27.08	377	5.91
Merluccius polli	22.50	71	4.91
Yarella blackfordi	21.99	355	4.80
Malacocephalus occidentalis	18.44	143	4.02
Chaceon maritae, female ***, female	16.53	119	3.61
Gadella imberbis	15.14	520	3.30
Nematocarcinus africanus	11.12	3110	2.43
Chaceon maritae, male ***, male	8.56	24	1.87
Stereomastis sp.	8.51	958	1.86
Benthodesmus tenuis	8.28	295	1.81
Dibranchius atlanticus	7.68	674	1.68
Conger conger	6.50	85	1.42
Parapanaeus longirostris, f **, female	4.13	402	0.90
Aristeus varidens, female ***, female	3.66	225	0.80
Coelorrhinchus caelorrhinchus	3.55	36	0.77
Stomias boa	3.06	98	0.67
NETTASTOMATIDAE	2.12	83	0.46
Aristeus varidens, male ***, male	1.65	212	0.36
Triplophos hemingi	1.65	223	0.36
Nezumia aequalis	1.41	201	0.31
Plesionaeus edwardsianus	1.30	23	0.28
Halosaurus ovenii	1.30	83	0.28
Coloconger cadonati	1.05	23	0.23
Galeus polli	0.94	11	0.20
Parapanaeus longirostris, m **, male	0.67	119	0.15
Etmopterus pusillus	0.34	11	0.07
Bathynectes piperitus	0.34	23	0.07
Dicologlossa cuneata	0.23	11	0.05
<b>Total</b>	<b>458.19</b>	<b>100.00</b>	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 147  
DATE :10/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 7°14.61  
start stop duration Purpose : 3  
TIME :07:32:36 08:03:36 31.0 (min) Lon E 12°9.44  
LOG : 5756.43 5757.90 1.5 Region : 4054  
FDEPTH: 232 226 Gear cond.: 0  
BDEPTH: 232 226 Validity : 0  
Towing dir: 0° Wire out : 580 m Speed : 2.8 km  
Sorted : 132 Total catch: 658.00 Catch/hour: 1273.55

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
Synagrops microlepis	452.90	28258	35.56
Dentex angolensis	313.55	716	24.62
Brotula barbata	216.59	213	17.01
Illex coindetii	59.81	677	4.70
Zenopsis conchifer	54.97	145	4.32
Pterothrissus belloci	41.23	329	3.24
Parapanaeus longirostris, f **, female	38.32	3174	3.01
Chlorophthalmus atlanticus	23.32	3648	1.83
Bemrops heterurus	19.16	184	1.50
Spherooides pachgaster	17.90	19	1.41
Merluccius polli	10.06	58	0.79
Dibranchius atlanticus	9.68	794	0.76
Parapanaeus longirostris, m **, male	5.52	1094	0.43
Uranoscopus polli	3.19	87	0.25
Ariomma bondi	2.90	48	0.23
Monolepis microstoma	1.94	126	0.15
Epigonus telescopus	1.45	281	0.11
Peristedion cataphractum	0.48	10	0.04
Gobiidae	0.39	19	0.03
Symphurus sp.	0.19	29	0.02
<b>Total</b>	<b>1273.55</b>	<b>100.00</b>	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 148  
DATE :10/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 7°11.65  
start stop duration Purpose : 3  
TIME :10:00:01 10:32:11 32.2 (min) Lon E 12°18.00  
LOG : 5770.91 5772.61 1.7 Region : 4054  
FDEPTH: 120 121 Gear cond.: 0  
BDEPTH: 120 121 Validity : 0  
Towing dir: 0° Wire out : 290 m Speed : 3.2 km  
Sorted : 34 Total catch: 432.85 Catch/hour: 807.30

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
Saurida brasiliensis	275.47	63242	34.12
Trachurus trecae	110.04	0	13.63
Trichurus lepturus	87.45	222	10.83
Umbrina canariensis	75.31	222	9.33
Dentex angolensis	59.66	509	7.39
Fistularia petimba	52.45	140	6.50
Brotula barbata	49.29	45	6.11
Zeus faber	21.02	65	2.60
Brachydeuterus auritus	20.89	170	2.59
Seriola carpenteri	12.27	13	1.52
Pagellus bellottii	10.31	65	1.28
Loligo vulgaris	7.57	313	0.94
Dentex barnardi	7.05	26	0.87
Pterocarpus pelli	6.79	39	0.84
Citharus linguatula	5.09	144	0.63
Chelidonichthys gabonensis	4.18	26	0.52

Dentex congoensis	2.87	52	0.36
Dibranchius atlanticus	0.39	78	0.05
Boops boops	0.13	13	0.02
Total	808.26		100.12

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 149  
 DATE :10/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 6°58.44  
 start stop duration Lon E 12°14.16  
 TIME :12:19:31 12:51:13 31.7 (min) Purpose : 3  
 LOG : 5785.52 5787.20 1.7 Region : 4054  
 FDEPTH: 84 83 Gear cond.: 0  
 BDEPTH: 84 83 Validity : 0  
 Towing dir: 0° Wire out : 190 m Speed : 3.2 kn  
 Sorted : 102 Total catch: 235.31 Catch/hour: 445.38

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Pagellus bellottii	206.31 1694	46.32	597
Dentex angolensis	95.03 600	21.34	601
Dentex congoensis	66.08 827	14.84	596
Trachurus trecae	29.00 1119	6.51	594
Dentex barnardi	24.28 74	5.45	600
Umrina canariensis	5.96 10	1.34	599
Fistularia petimba	3.54 9	0.79	
Raja miraletus	2.84 4	0.64	
Priacanthus aeneatus	2.27 4	0.51	
Chelidonichthys gabonensis	1.78 13	0.40	
Chaetodon hoefleri	1.57 9	0.35	
Sphyræna sphyraena	1.53 4	0.34	
Cynoglossus senegalensis	1.21 4	0.27	
Pagrus caeruleostictus	1.21 4	0.27	
Pomadourus incius	0.91 4	0.20	
Saurida brasiliensis	0.61 184	0.14	
Illex coindetii	0.57 9	0.13	598
Citharus linguatula	0.26 17	0.06	
Alloteuthis africana	0.23 57	0.05	
Sardinella maderensis	0.09 4	0.02	
Arnoglossus imperialis	0.09 9	0.02	
Total	445.38	100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 150  
 DATE :10/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 7°2.91  
 start stop duration Lon E 12°4.62  
 TIME :14:27:04 14:57:25 30.3 (min) Purpose : 3  
 LOG : 5799.22 5800.69 1.5 Region : 4054  
 FDEPTH: 121 120 Gear cond.: 0  
 BDEPTH: 121 120 Validity : 0  
 Towing dir: 0° Wire out : 300 m Speed : 2.9 kn  
 Sorted : 84 Total catch: 449.33 Catch/hour: 888.59

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Trachurus trecae	700.07 39692	78.78	602
Dentex angolensis	71.00 492	7.99	604
Chelidonichthys gabonensis	51.36 451	5.78	
Dentex congoensis	14.16 305	1.59	606
Priacanthus aeneatus	11.43 23	1.29	
Lagocephalus laevigatus	10.26 10	1.16	
Raja miraletus	5.70 8	0.64	
Zeus faber	4.92 10	0.55	
Citharus linguatula	4.83 178	0.54	
Pagellus bellottii	4.61 32	0.52	603
Uranoscopus polli	3.68 10	0.41	
Illex coindetii	3.05 115	0.34	605
Boops boops	1.58 32	0.18	
Fistularia petimba	1.01 2	0.11	
Saurida brasiliensis	0.95 324	0.11	
Total	888.59	100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 151  
 DATE :10/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 7°4.12  
 start stop duration Lon E 11°59.76  
 TIME :16:05:00 16:31:26 26.0 (min) Purpose : 3  
 LOG : 5807.01 5808.35 1.3 Region : 4054  
 FDEPTH: 152 153 Gear cond.: 0  
 BDEPTH: 152 153 Validity : 0  
 Towing dir: 0° Wire out : 340 m Speed : 3.1 kn  
 Sorted : 77 Total catch: 77.42 Catch/hour: 178.66

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Spherooides pachgaster	73.62 89	41.20	
Dentex angolensis	41.26 141	23.09	608
Zenopsis conchifer	16.11 23	9.02	
Brotula barbata	14.26 14	7.98	
Lepidotrigla cadmani	8.38 65	4.69	
Trichurus lepturus	7.25 7	4.06	
Saurida brasiliensis	5.75 1484	3.22	
Citharus linguatula	2.75 60	1.54	
Spicara alta	2.42 23	1.36	
Illex coindetii	1.82 23	1.02	609
Octopus vulgaris	1.43 2	0.80	
Ariomma bondi	1.34 30	0.75	
Umrina canariensis	0.97 2	0.54	
Pterothrissus bellocci	0.67 7	0.37	
Dentex congoensis	0.35 7	0.19	
Lophiodes kempi	0.30 2	0.17	
Total	178.66	100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 152  
 DATE :10/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 7°6.00  
 start stop duration Lon E 11°57.43  
 TIME :17:24:09 17:54:28 30.3 (min) Purpose : 3  
 LOG : 5813.68 5815.27 1.6 Region : 4054  
 FDEPTH: 276 268 Gear cond.: 0  
 BDEPTH: 276 268 Validity : 0  
 Towing dir: 0° Wire out : 660 m Speed : 3.1 kn  
 Sorted : 66 Total catch: 151.95 Catch/hour: 300.69

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Synagrops microlepis	71.44 3030	23.76	
Chlorophthalmus atlanticus	64.51 1884	21.45	
Parapanaeus longirostris, f **, female	30.47 3701	10.13	613
Merluccius polli	24.93 469	8.29	609
Illex coindetii	21.57 202	7.17	611
Acanthocarpus brevipinnis	15.83 182	5.26	
Brotula barbata	14.96 13	4.98	
Bemrops heterurus	12.45 299	4.14	
Pontinus accraensis	7.62 87	2.53	
Dentex angolensis	7.48 20	2.49	610
Pterothrissus bellocci	4.18 26	1.39	
Priacanthus aeneatus	3.76 6	1.25	
Parapanaeus longirostris, m **, male	3.70 1110	1.23	612
Gadella imberbis	3.30 131	1.10	
Nezumia duodecim	3.05 55	1.01	
Raja straeleni	3.05 8	1.01	
Peristedion cataphractum	2.47 59	0.82	
Coelorhynchus caelorrhincus	1.25 59	0.41	

Ariomma bondi	0.81	16	0.27
Zenopsis conchifer	0.77	2	0.26
Parasudis fraserbrunneri	0.77	16	0.26
Trichurus lepturus	0.59	16	0.20
Malacocephalus occidentalis	0.44	30	0.14
Conger conger	0.44	8	0.14
Lestrolepis intermedia	0.26	44	0.09
Gadella maraldi	0.22	4	0.07
Epigonus telescopus**	0.22	55	0.07
MYCTOPHIDAE	0.12	222	0.04
Gephyroberyx darwini	0.06	2	0.02
Dibranchius atlanticus	0.04	4	0.01
Total	300.75		100.02

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 153  
 DATE :10/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 7°5.32  
 start stop duration Lon E 11°55.90  
 TIME :19:14:53 19:44:57 30.1 (min) Purpose : 3  
 LOG : 5818.94 5820.48 1.5 Region : 4054  
 FDEPTH: 319 309 Gear cond.: 0  
 BDEPTH: 319 309 Validity : 0  
 Towing dir: 0° Wire out : 780 m Speed : 3.1 kn  
 Sorted : 73 Total catch: 145.64 Catch/hour: 290.60

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Chlorophthalmus atlanticus	120.32 2323	41.40	
Merluccius polli	45.29 445	15.59	614
Laemonema laureysi	37.71 531	12.98	
Pontinus accraensis	20.03 261	6.89	
Malacocephalus occidentalis	14.09 128	4.85	
Nezumia micronychodon	9.94 184	3.42	
Synagrops microlepis	5.75 204	1.98	
Parasudis fraserbrunneri	5.31 96	1.83	
Benthodesmus tenuis	4.83 235	1.66	
Illex coindetii	4.71 36	1.62	615
Pterothrissus bellocci	3.91 20	1.35	
Lophiodes kempi	3.87 24	1.33	
Hymenoccephalus italicus	3.47 643	1.19	
Bassanago albescens	3.31 48	1.14	
TRIGLIDAE	2.23 12	0.77	
Parapanaeus longirostris, f **, female	1.28 160	0.44	616
Zenopsis conchifer	1.24 4	0.43	
Acanthocarpus brevipinnis	1.20 20	0.41	
Peristedion cataphractum	0.80 24	0.27	
Parapanaeus longirostris, m **, male	0.40 60	0.14	617
Bemrops heterurus	0.32 8	0.11	
Gadella imberbis	0.20 8	0.07	
Aristeus varidens	0.20 8	0.07	
Epigonus telescopus**	0.20 8	0.07	
Total	290.60	100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 154  
 DATE :10/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 7°12.31  
 start stop duration Lon E 11°52.94  
 TIME :23:29:10 23:59:32 30.4 (min) Purpose : 3  
 LOG : 5833.63 5833.09 1.5 Region : 4054  
 FDEPTH: 625 618 Gear cond.: 0  
 BDEPTH: 625 618 Validity : 0  
 Towing dir: 0° Wire out : 1240 m Speed : 2.9 kn  
 Sorted : 59 Total catch: 243.14 Catch/hour: 480.51

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Hoplostethus cadenati	117.31 5423	24.41	
Nematocarcinus africanus	80.95 21984	16.85	
Yarella blackfordi	63.00 1415	13.11	
Lamprogrammus exutus	46.48 119	9.67	
Stomias boa boa	39.68 870	8.26	
Stereomastis sp.	19.29 1589	4.01	
Xenodermichthys copei	16.21 877	3.37	
Lophiodes kempi	14.31 32	2.98	
Triplophos hemingi	13.75 1700	2.86	
Aristeus varidens, female ***, female	6.96 277	1.45	619
Opistotheutis rossi	6.80 8	1.41	
Malacocephalus occidentalis	5.22 24	1.09	
Nezumia micronychodon	4.74 8	0.99	
Chaceon maritae, female ***	4.51 16	0.94	
Etmopterus polli	4.11 7	0.86	
Chlamydoselachus anguineus	4.07 2	0.85	
Illex coindetii	3.95 32	0.82	
Bathyrhoconger vicinus	3.95 55	0.82	
Ijlmia loppelii	3.40 2	0.71	
Chaceon maritae, male ***	3.32 8	0.69	
Coloconger cadenati	2.77 237	0.58	
Plesiopanaeus edwardsianus	2.69 111	0.56	
Talismania longifillis	2.29 95	0.48	
J E L Y F I S H	2.06 8	0.43	
Diastobranchius sp.	1.34 47	0.28	
Photichthys braueri	1.23 16	0.25	
Deania profundorum	1.11 8	0.23	
Peristedion cataphractum	0.79 24	0.16	
Dibranchius atlanticus	0.71 32	0.15	
Benthodesmus tenuis	0.71 32	0.15	
Borostomias sp.	0.63 32	0.13	
Gadella imberbis	0.47 16	0.10	
Caristius sp.	0.47 24	0.10	
Plesionika martia	0.32 79	0.07	
Dicrolene intronigra	0.32 63	0.07	
SQUALIDAE	0.16 16	0.03	
Eggs of ray	0.16 8	0.03	
Aristeus varidens, male ***, male	0.16 16	0.03	618
Munida sp.	0.08 16	0.02	
Avocettina acuticeps	0.08 8	0.02	
Total	480.51	100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 155  
 DATE :11/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 6°36.21  
 start stop duration Lon E 12°22.01  
 TIME :06:20:07 06:50:56 30.8 (min) Purpose : 3  
 LOG : 5882.73 5884.31 1.6 Region : 4054  
 FDEPTH: 24 25 Gear cond.: 0  
 BDEPTH: 24 25 Validity : 0  
 Towing dir: 0° Wire out : 90 m Speed : 3.1 kn  
 Sorted : 195 Total catch: 194.87 Catch/hour: 379.37

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Brachydeuterus auritus	110.73 2104	29.19	620
Ilisha africana	52.37 1355	13.80	
Dasyatis centroura	50.23 2	13.24	
Sphyræna sphyraena	31.42 115	8.28	
Galeoides decadactylus	27.49 177	7.25	
Pomadourus rogeri	16.35 14	4.31	624
Pseudolithus senegalensis	13.24 29	3.49	623
Pomadourus perotaii	11.52 16	3.04	621
Scorberomorus tritor	10.86 23	2.85	
Ephippion guttifer	7.71 2	2.03	
Pagrus caeruleostictus	6.46 19	1.70	622
Selene dorsalis	5.92 113	1.56	
Trichurus lepturus	5.18 68	1.37	

	start	stop	duration	Lon	E 11°53.01
Balistes caprisicus	4.26	6	1.12		
Trachinocephalus myops	3.91	80	1.03		
Dasyatis marmorata	3.68	2	0.97		
Chloroscombrus chrysaureus	2.65	35	0.70		
Pteroscion pelli	2.41	43	0.64		
Panulirus regius	2.38	4	0.63		
Lagocephalus laevigatus	2.10	10	0.55		
Trachinus armatus	1.83	27	0.48		
Bothus podas	1.27	27	0.33		
Engraulis encrasicolus	1.09	1043	0.29		
Sepia orbignyana	1.05	6	0.28		
Synaptura cadenati	0.68	2	0.18		
penaeus kerathurus, female, female	0.49	12	0.13	624	
Pagellus bellottii	0.45	2	0.12		
Sardinella madarensis	0.35	19	0.09		
penaeus kerathurus, male, male	0.33	14	0.09	626	
Pomadasya inciaus	0.23	2	0.06		
Dicologlossa hexophthalma	0.19	2	0.05		
penaeus notialis, female, male	0.18	8	0.05	625	
Caranx crysos	0.18	2	0.05		
Pseudupeneus prayensis	0.14	2	0.04		
Caranx crysos	0.12	2	0.03	0	
penaeus notialis, male, male	0.04	2	0.01	627	
Total	379.50		100.03		

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 156  
 DATE :11/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 6°38.11  
 start stop duration Purpose : 3  
 TIME :08:06:56 08:32:54 26.0 (min) Region : 4054  
 LOG : 5892.67 5893.98 1.3 Gear cond.: 0  
 FDEPTH: 47 47 Validity : 0  
 BDEPTH: 47 47 Validity : 0  
 Towing dir: 0° Wire out : 120 m Speed : 3.0 km  
 Sorted : 0 Total catch: 45.48 Catch/hour: 105.08

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Pseudotolithus senegalensis	18.53	18	628
Pagrus caeruleostictus	15.94	37	
Pagrus pagrus	9.20	16	631
Balistes caprisicus	8.99	14	8.55
Brachydeuterus auritus	8.50	74	8.09
Galeoides decadactylus	5.89	14	5.61
Pomadasya jubelini	5.38	9	5.12
Raja miraletus	5.18	12	4.93
Pagellus bellottii	5.11	28	4.86
Albula vulpes	3.10	5	2.95
Sphyraena guachancho	2.66	2	2.53
Alectis alexandrinus	2.47	2	2.35
Sphyraena sphyraena	2.24	7	2.13
Dasyatis margarita	2.01	2	1.91
Trichurus lepturus	1.96	5	1.87
Selar crumenophthalmus	1.80	5	1.72
Dentex barnardi	1.73	5	1.65
Syacium micrurum	1.52	12	1.45
Cynoglossus canariensis	1.22	5	1.17
Arius parkii	0.49	2	0.46
Decapterus rhonchus**	0.35	9	0.33
Trachinocephalus myops	0.32	0	0.31
Selene dorsalis	0.28	2	0.26
Trachinus armatus	0.18	2	0.18
Citharus linguatula	0.02	2	0.02
Total	105.08		100.00

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 157  
 DATE :11/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 6°44.22  
 start stop duration Purpose : 3  
 TIME :09:42:43 10:13:00 30.3 (min) Region : 4054  
 LOG : 5902.06 5903.62 1.6 Gear cond.: 0  
 FDEPTH: 69 70 Validity : 0  
 BDEPTH: 69 70 Validity : 0  
 Towing dir: 0° Wire out : 170 m Speed : 3.1 km  
 Sorted : 0 Total catch: 36.65 Catch/hour: 72.60

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Lagocephalus laevigatus	30.35	44	41.80
Pagellus bellottii	14.18	107	19.54
Balistes caprisicus	5.19	10	7.15
Dactylopterus volitans	4.97	8	6.85
Raja miraletus	4.91	10	6.77
Caranx crysos	4.08	4	5.62
Trichurus lepturus	3.59	8	4.94
Trachinus radiatus	2.69	10	3.71
Fistularia petimba	1.39	4	1.91
Alloteuthis africana	0.34	101	0.46
Syacium micrurum	0.32	2	0.44
Trachinocephalus myops	0.30	2	0.41
Chelidonichthys capensis	0.30	2	0.41
Total	72.60		100.00

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 158  
 DATE :11/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 6°49.17  
 start stop duration Purpose : 3  
 TIME :12:14:20 12:46:18 32.0 (min) Region : 4054  
 LOG : 5920.12 5921.82 1.7 Gear cond.: 0  
 FDEPTH: 114 117 Validity : 0  
 BDEPTH: 114 117 Validity : 0  
 Towing dir: 0° Wire out : 290 m Speed : 3.2 km  
 Sorted : 0 Total catch: 89.83 Catch/hour: 168.59

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Dentex angolensis	73.04	317	43.33
Umbrina canariensis	31.34	81	18.59
Dentex congongensis	19.44	235	11.53
Dentex barnardi	8.24	17	4.89
Zeus faber	6.76	15	4.01
CORAL	6.38	15	3.78
Zenopsis conchifer	4.97	4	2.95
Raja miraletus	3.85	6	2.28
Squatina oculata	3.25	2	1.93
Spherooides pachgaster	2.98	4	1.77
Chelidonichthys gabonensis	2.70	19	1.60
Brotula barbata	1.87	2	0.99
Fistularia petimba	1.29	4	0.77
PORIFERA (Sponges)	1.03	6	0.61
Chaetodon hoefleri	0.71	4	0.42
Syacium micrurum	0.26	4	0.16
Trachurus treca	0.21	6	0.12
Alloteuthis africana	0.15	4	0.09
Illex coindetii	0.13	13	0.08
Saurida brasiliensis	0.06	6	0.03
Sepia hieredda**	0.06	4	0.03
Starfish	0.06	2	0.03
Total	168.59		100.00

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 159  
 DATE :11/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 6°52.71

start stop duration Purpose : 3  
 TIME :13:41:14 14:12:07 30.9 (min) Region : 4054  
 LOG : 5926.44 5927.98 1.5 Gear cond.: 0  
 FDEPTH: 171 187 Validity : 0  
 BDEPTH: 171 187 Validity : 0  
 Towing dir: 0° Wire out : 450 m Speed : 3.0 km  
 Sorted : 53 Total catch: 386.30 Catch/hour: 750.34

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Synagrops microlepis	492.74	47852	65.67
Brotula barbata	53.30	49	7.10
Saurida brasiliensis	34.38	7808	4.58
Miracorvina angolensis	30.18	12	4.02
Trichurus lepturus	18.53	25	2.47
Dentex angolensis	17.56	68	2.34
Zenopsis conchifer	16.12	33	2.15
Zeus faber	14.10	39	1.88
Pteroscion pelli	13.17	105	1.76
Illex coindetii	11.77	245	1.57
Citharus linguatula	10.26	152	1.37
Bembrops heterurus	6.88	105	0.92
Spicara alta	6.29	35	0.84
Spherooides pachgaster	5.63	10	0.75
Pagellus bellottii	3.38	12	0.45
Lophiodes kempii	2.37	2	0.32
Pontinus accraensis	2.33	47	0.31
Aulopus cadenati	1.86	12	0.25
Aricomma sp	1.63	280	0.22
Torpedo torpedo	1.61	2	0.21
Peristedion cataphractum	1.40	23	0.19
Syacium micrurum	1.17	105	0.16
Parapanaeus longirostris, f **, female	1.17	175	0.16
Stereomastis sp.	0.93	23	0.12
Fistularia petimba	0.87	2	0.12
Chelidonichthys capensis	0.35	12	0.05
MYCTOPHIDAE	0.23	140	0.03
Ephippium guttifer	0.12	12	0.02
Total	750.34		100.00

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 160  
 DATE :11/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 6°52.29  
 start stop duration Purpose : 3  
 TIME :15:20:06 15:50:28 30.4 (min) Region : 4054  
 LOG : 5933.00 5934.50 1.5 Gear cond.: 0  
 FDEPTH: 263 272 Validity : 0  
 BDEPTH: 263 272 Validity : 0  
 Towing dir: 0° Wire out : 600 m Speed : 3.0 km  
 Sorted : 107 Total catch: 453.20 Catch/hour: 895.36

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Synagrops microlepis	381.30	375	42.59
Chlorophthalmus atlanticus	285.28	7713	31.86
Parapanaeus longirostris, m **, male	55.12	8349	6.16
Parapanaeus longirostris, f **, female	33.94	4244	3.79
Bembrops heterurus	26.47	326	2.96
Parasudis fraserbrunneri	21.99	693	2.46
Merluccius polli	16.18	318	1.81
Brotula barbata	15.41	22	1.72
MYCTOPHIDAE	10.71	800	1.20
Illex coindetii	9.80	90	1.09
Pterothrissus belloci	8.73	73	0.98
Trichurus lepturus	7.47	30	0.83
Pontinus accraensis	5.39	47	0.60
Aricomma bondi	4.74	73	0.53
Epigonus telescopus**	3.34	146	0.37
Coelorrhinchus caelorrhinchus	2.53	40	0.28
Lophiodes kempii	2.19	8	0.24
URCHINS	1.13	8	0.13
Dentex angolensis	1.07	4	0.12
Malacocephalus occidentalis	0.97	24	0.11
Lestrolepis intermedia	0.73	40	0.08
Syacium micrurum	0.40	40	0.04
RAJIDAE	0.16	8	0.02
Saurida brasiliensis	0.16	24	0.02
Dactylopterus volitans	0.08	8	0.01
Peristedion cataphractum	0.08	8	0.01
Total	895.36		100.00

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 161  
 DATE :11/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 6°53.36  
 start stop duration Purpose : 3  
 TIME :18:09:38 18:41:36 32.0 (min) Region : 4054  
 LOG : 5943.10 5944.70 1.6 Gear cond.: 0  
 FDEPTH: 444 455 Validity : 0  
 BDEPTH: 444 455 Validity : 0  
 Towing dir: 0° Wire out : 100 m Speed : 3.0 km  
 Sorted : 19 Total catch: 88.99 Catch/hour: 167.01

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Laemonema laureysi	23.05	113	13.80
Hymenocephalus italicus	22.45	2567	13.44
Merluccius polli	17.08	30	10.23
Stereomastis sp.	13.96	938	8.36
Chaux pictus	13.96	233	8.36
Benthodesmus tenuis	13.21	135	7.91
Aristeus varidens, female ***, female	9.98	803	5.98
Lophiodes kempii	8.26	15	4.94
Nematocarcinus africanus	7.06	420	4.23
Centrophorus squamosus	6.27	2	3.75
Malacocephalus laevis	4.88	53	2.92
Gadella imberbis	3.75	120	2.25
Aristeus varidens, male ***, male	3.53	510	2.11
Dibranchius atlanticus	2.40	188	1.44
Etmopterus spinax	1.88	53	1.12
Monomitopus metriostoma	1.88	113	1.12
Bathymetes piperitus	1.65	38	0.99
Squalus syato	1.58	8	0.94
Yarellia blackfordi	1.58	53	0.94
Etmopterus polli	1.43	45	0.85
Plesiopanaeus edwardsianus	1.05	60	0.63
Nezumia micronychodon	1.05	53	0.63
Illex coindetii	1.05	8	0.63
Chaceon maritimus	0.96	2	0.57
Coloconger cadenati	0.90	30	0.54
Triplophos hemingi	0.83	98	0.49
Synaphobranchus kaupii	0.53	8	0.31
NETTASTOMATIDAE	0.38	15	0.22
Halosaurus ovenii	0.30	26	0.18
PARALEPIDIDAE	0.08	8	0.04
Xenodermichthys copei	0.08	8	0.04
Total	167.01		100.00

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 162  
 DATE :11/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 6°57.61  
 start stop duration Purpose : 3  
 TIME :20:54:52 21:24:53 30.0 (min) Region : 4054  
 LOG : 5955.55 5957.01 1.5 Gear cond.: 0  
 FDEPTH: 716 716

BDEPTH: 716 716 Validity : 0  
 Towing dir: 0° Wire out : 1600 m Speed : 2.9 km  
 Sorted : 29 Total catch: 702.44 Catch/hour: 1404.41

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Hoplostethus cadenati	509.83	13627	36.30	
Lamprogrammus exultus	267.91	912	19.08	
Yarrella blackfordi	161.95	3935	11.53	
Nezumia micronechodon	159.95	3839	11.39	
Bassanago albescens	150.19	816	10.69	
Monomitopus metriostoma	20.15	1823	1.43	
Stereomastis sp.	18.71	1152	1.33	
Halosaurus ovenii	17.27	336	1.23	
Xenodermichthys copei	16.79	768	1.20	
Talismania sp.	13.44	528	0.96	
Torpedo nobiliana	11.72	2	0.83	
Bathygadus macrops	11.44	528	0.81	
Dibranchius atlanticus	7.20	432	0.51	
UNIDENTIFIED FISH	5.76	528	0.41	
Glyphus marsupialis	5.28	288	0.38	
Triplophus hemingi	5.28	432	0.38	
Merluccius polli	5.24	6	0.37	644
Benthodesmus tenuis	4.32	336	0.31	
Etmopterus polli	4.32	48	0.31	
Talismania longifilis	3.84	48	0.27	
Aristeus varidens	1.92	192	0.14	
MELANOSTOMIATIDAE	1.92	240	0.14	
Total	1404.41		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 163  
 DATE :11/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 6°56.50  
 Lon E 11°44.69  
 TIME :23:27:38 23:57:59 30.4 (min) Purpose : 3  
 LOG : 5963.90 5965.43 1.5 Region : 4054  
 FDEPTH: 515 519 Gear cond.: 0  
 BDEPTH: 515 519 Validity : 0  
 Towing dir: 0° Wire out : 1100 m Speed : 3.0 km  
 Sorted : 30 Total catch: 124.75 Catch/hour: 246.62

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Yarrella blackfordi	74.65	2032	30.27	
Lamprogrammus exultus	29.89	79	12.12	
Triplophus hemingi	28.71	4254	11.64	
Stereomastis sp.	17.63	1637	7.15	
Nematocarcinus africanus	17.24	4112	6.99	
Gadella imberbis	13.52	538	5.48	
Aristeus varidens, female ***, female	8.70	395	3.53	646
Stomias boa boa	7.35	158	2.98	
Zameus (Scymnodon) squamulosus	6.37	2	2.58	
Laemonema laureysi	5.69	261	2.31	
Benthodesmus elongatus	4.27	127	1.73	
Hoplostethus cadenati	4.27	158	1.73	
Etmopterus polli	3.64	47	1.47	
Aristeus varidens, male ***, male	3.32	277	1.35	645
Sepia sp	3.16	16	1.28	
GALATHEIDAE *	2.21	1621	0.90	
Dipturus dourei	2.06	32	0.83	
Merluccius polli	1.94	4	0.79	647
Chlamydoselachus anguineus	1.80	2	0.73	
Xenodermichthys copei	1.34	127	0.55	
Dibranchius atlanticus	1.27	63	0.51	
Halosaurus ovenii	1.19	24	0.48	
Chauliognathus pictus	1.03	16	0.42	
Plesionika edwardsianus	0.79	24	0.32	
Bathynectes piperitus	0.79	24	0.32	
Dicrolene intronigra	0.71	214	0.29	
Starfish	0.55	8	0.22	
Coloconger cadenati	0.47	24	0.19	
S H R I M P S	0.47	40	0.19	
Gnathopis sp.	0.40	24	0.16	
Nezumia micronechodon	0.40	16	0.16	
Bathyrhynchus vicinus	0.32	40	0.13	
Plesionika martia	0.32	119	0.13	
Avocettina acuticeps	0.16	8	0.06	
Total	246.62		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 164  
 DATE :12/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 6°25.22  
 Lon E 12°5.65  
 TIME :05:23:09 05:53:24 30.3 (min) Purpose : 3  
 LOG : 6004.02 6005.70 1.7 Region : 4054  
 FDEPTH: 53 55 Gear cond.: 0  
 BDEPTH: 53 55 Validity : 0  
 Towing dir: 0° Wire out : 140 m Speed : 3.3 km  
 Sorted : 57 Total catch: 173.13 Catch/hour: 343.40

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Pomadoury incisus	184.07	801	53.60	647
Lagocephalus laevis	96.81	161	28.19	
Pagrus caeruleostictus	18.98	60	5.53	648
Decapterus rhonchus**	10.23	292	2.98	
Pagellus bellottii	7.97	48	2.32	649
Balistes capricus	4.82	6	1.40	
Pseudotolithus senegalensis	4.11	6	1.20	
Trichurus lepturus	3.41	10	0.99	
Syacium micrurum	2.98	18	0.87	
Caranx crysos	2.30	2	0.67	
Alectis alexandrinus	2.00	2	0.58	
Uranoscopus polli	1.73	6	0.50	
Trachinus armatus	1.61	18	0.47	
Chelidonichthys capensis	1.13	6	0.33	
Trachinocephalus myops	0.77	6	0.23	
Dicologlossa cuneata	0.48	6	0.14	
Total	343.40		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 165  
 DATE :12/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 6°24.34  
 Lon E 12°1.01  
 TIME :07:29:33 07:59:25 29.9 (min) Purpose : 3  
 LOG : 6012.36 6013.85 1.5 Region : 4054  
 FDEPTH: 82 82 Gear cond.: 0  
 BDEPTH: 82 82 Validity : 0  
 Towing dir: 0° Wire out : 0 m Speed : 3.0 km  
 Sorted : 0 Total catch: 148.97 Catch/hour: 299.24

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	122.57	1539	40.96	654
Dentex angolensis	60.66	251	20.27	650
Trichurus lepturus	38.57	24	12.89	
Trachurus trecae	26.51	1388	8.86	655
RHINOBATIDAE	14.78	6	4.94	
Lagocephalus laevis	9.04	10	3.02	
Selene dorsalis	5.76	56	1.93	
Pagellus bellottii	5.70	56	1.91	651
Brotula barbata	3.11	4	1.04	
Dentex barnardi	2.35	8	0.79	653
Dentex congoensis	1.97	26	0.66	652

Raja miraletus	1.79	4	0.60	
Pomadoury incisus	1.35	8	0.45	
Saurida brasiliensis	1.10	70	0.37	
Umbrina canariensis	1.06	6	0.36	656
Citharus linguatula	0.84	26	0.28	
Sardinella aurita	0.60	14	0.20	
Cynoglossus canariensis	0.46	2	0.15	
Boops boops	0.34	12	0.11	
Uranoscopus polli	0.24	2	0.08	
Parapenaeus longirostris, m **, male	0.12	30	0.44	665
Sepia orbignyana	0.10	4	0.03	
Parapenaeus longirostris, f **, female	0.08	24	0.03	666
Zeus faber	0.06	2	0.02	
G A S T R O P O D S	0.04	10	0.01	
Total	299.24		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 166  
 DATE :12/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 6°27.47  
 Lon E 11°54.52  
 TIME :10:05:48 10:35:48 30.0 (min) Purpose : 3  
 LOG : 6023.65 6025.24 1.6 Region : 4054  
 FDEPTH: 109 110 Gear cond.: 0  
 BDEPTH: 109 110 Validity : 0  
 Towing dir: 0° Wire out : 270 m Speed : 3.2 km  
 Sorted : 36 Total catch: 174.31 Catch/hour: 348.62

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	212.96	288	61.09	663
Trachurus trecae	36.72	1792	10.53	664
Trichurus lepturus	19.20	26	5.51	
Cynoponticus ferox	16.60	2	4.76	
Dentex angolensis	12.58	72	3.61	658
Saurida brasiliensis	9.68	2240	2.78	
Octopus vulgaris	7.76	8	2.23	
Uranoscopus albesca	6.96	32	2.00	
Umbrina canariensis	5.70	22	1.64	659
Squatina oculata	4.64	2	1.33	
Zeus faber	3.26	14	0.94	
Citharus linguatula	2.72	56	0.78	
Pagellus bellottii	2.16	24	0.62	661
Dentex congoensis	1.76	16	0.50	660
Pteroscion pelli	1.68	8	0.48	
Illex coindetii	1.28	48	0.37	662
Priacanthus arenatus	1.10	2	0.32	
Boops boops	0.80	16	0.23	
Raja miraletus	0.70	2	0.20	
Torpedo torpedo	0.36	2	0.10	
Total	348.62		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 167  
 DATE :12/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 6°30.84  
 Lon E 11°49.51  
 TIME :11:45:47 12:15:51 30.1 (min) Purpose : 3  
 LOG : 6031.99 6033.60 1.6 Region : 4054  
 FDEPTH: 122 125 Gear cond.: 0  
 BDEPTH: 122 125 Validity : 0  
 Towing dir: 0° Wire out : 300 m Speed : 3.2 km  
 Sorted : 0 Total catch: 44.36 Catch/hour: 88.54

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Dentex angolensis	26.95	146	30.43	667
Dentex congoensis	12.25	212	13.44	671
Selene dorsalis	9.90	16	11.18	
Trichurus lepturus	7.66	12	8.66	
Ariomma bondi	6.73	158	7.60	
Brotula barbata	5.55	4	6.27	
Trachurus trecae	4.87	248	5.50	668
Spicara alta	4.07	56	4.60	
Brachydeuterus auritus	3.79	30	4.28	669
Illex coindetii	1.64	80	1.85	670
Pteroscion pelli	1.02	8	1.15	
Boops boops	0.92	20	1.04	
Sphoeroides pachygaster	0.84	2	0.95	
Priacanthus arenatus	0.52	2	0.59	
Citharus linguatula	0.52	14	0.59	
Pontinus accraensis	0.28	2	0.32	
Sepia orbignyana	0.28	2	0.32	
Zeus faber	0.22	2	0.25	
Chelidonichthys gabonensis	0.22	8	0.25	
Saurida brasiliensis	0.18	52	0.20	
Pagellus bellottii	0.14	2	0.16	
Total	88.54		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 168  
 DATE :12/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 6°33.38  
 Lon E 11°41.39  
 TIME :13:38:03 14:03:37 25.6 (min) Purpose : 3  
 LOG : 6042.51 6043.86 1.4 Region : 4054  
 FDEPTH: 227 234 Gear cond.: 0  
 BDEPTH: 227 234 Validity : 0  
 Towing dir: 0° Wire out : 550 m Speed : 3.2 km  
 Sorted : 43 Total catch: 206.17 Catch/hour: 483.78

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Synagrops microlepis	267.08	16343	55.21	
Brotula barbata	48.76	49	10.08	
Parapenaeus longirostris, m **	27.03	4221	5.59	
Parapenaeus longirostris, f **	25.81	3180	5.34	
Dentex angolensis	25.67	73	5.31	674
MYCTOPHIDAE	19.01	9306	3.93	
Bembrops heterurus	14.06	206	2.91	
Merluccius polli	13.63	206	2.82	672
Illex coindetii	11.73	192	2.43	673
Chlorophthalmus atlanticus	9.86	361	2.04	
Trichurus lepturus	5.16	7	1.07	
Ariomma sp.	4.36	99	0.90	
Parasudis fraserbrunneri	3.45	772	0.71	
Pteroscion pelli	2.79	16	0.58	
Uranoscopus albesca	1.64	9	0.34	
Citharus linguatula	0.99	75	0.20	
OMMASTREPHIDAE	0.82	2874	0.17	
Pontinus accraensis	0.42	16	0.09	
Peristodion cataphractum	0.42	9	0.09	
Epigonus telescopus**	0.33	42	0.07	
G A S T R O P O D S	0.33	9	0.07	
Solenocera africana	0.16	42	0.03	
Lestrolepis intermedia	0.16	9	0.03	
Goneplax sp.	0.09	9	0.02	
Total	483.78		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 169  
 DATE :12/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 6°34.62  
 Lon E 11°38.48  
 TIME :16:02:32 16:26:47 24.3 (min) Purpose : 3  
 LOG : 6052.19 6053.42 1.2 Region : 4054  
 FDEPTH: 326 332 Gear cond.: 0



BDEPTH: 326 332 Validity : 0  
 Towing dir: 0° Wire out : 770 m Speed : 3.0 km  
 Sorted : 0 Total catch: 65.10 Catch/hour: 160.94

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Chlorophthalmus atlanticus	66.01	1426	41.01	
Merluccius polli	26.11	91	16.22	677
Laemonema laureysii	13.05	178	8.11	
Parapenaeus longirostris, f **	9.07	1137	5.64	678
Synagrops microlepis	7.24	361	4.50	
GADIDAE	4.65	534	2.89	
Trichurus lepturus	4.08	20	2.53	
Parasudis fraserbrunneri	3.73	121	2.32	
Coeliorhynchus caeliorhynchus	3.61	59	2.24	
Synagrops bellus	3.39	62	2.10	
Malacocephalus occidentalis	3.29	25	2.04	
Benthodesmus tenuis	3.02	126	1.87	
Illex coindetii	2.89	32	1.80	680
Setarches guentheri	1.80	54	1.12	
Gadella imberbis	1.21	44	0.75	
Chaceon maritae	1.11	2	0.69	
Pontinus accraensis	1.09	12	0.68	
Hymenocephalus italicus	1.06	161	0.66	
Pterothrissus belloci	0.87	5	0.54	
Epigonus telescopus**	0.82	22	0.51	
Zenopsis conchifer	0.62	5	0.38	
Raja straeleni	0.57	2	0.35	
Parapenaeus longirostris, m **	0.32	48	0.20	679
Chascanopsetta lugubris	0.22	15	0.14	
Bembrops heterurus	0.22	5	0.14	
Parapandalus narval	0.17	69	0.11	
LOLIGINIDAE	0.17	49	0.11	
Peristedion cataphractum	0.17	22	0.11	
UNIDENTIFIED FISH	0.10	2	0.05	
Grammicolepis brachiusculus	0.07	5	0.05	
MYCTOPHIDAE	0.07	44	0.05	
Lophiodes kempi	0.07	2	0.05	
Solenocera africana	0.05	2	0.03	
Total	160.94		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 170  
 DATE :13/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 6°37.57  
 start stop duration Lon E 11°27.57  
 TIME :18:55:00 19:25:03 30.1 (min) Purpose : 3  
 LOG : 6067.17 6068.60 1.4 Region : 4054  
 FDEPTH: 667 669 Gear cond.: 0  
 BDEPTH: 667 669 Validity : 0  
 Towing dir: 0° Wire out : 1480 m Speed : 2.9 km  
 Sorted : 19 Total catch: 125.11 Catch/hour: 249.80

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Yarella blackfordi	60.98	1294	24.41	
Lamprogrammus niger	36.78	96	14.72	
Hoplostethus cadenati	26.76	803	10.71	
Nezumia microrychodon	25.40	611	10.17	
Stereomastis sculpta	19.41	156	7.77	
Bassanago albescens	11.26	84	4.51	
Dicrione intransigra	9.82	731	3.93	
Merluccius polli	7.89	8	3.16	680
Chaceon maritae, male ***	5.89	14	2.36	
Coral - Alcyonaria?	4.55	12	1.82	
Chaceon maritae	4.29	12	1.72	
Aristeus varidens, female ***	3.95	144	1.58	681
UNIDENTIFIED FISH	3.83	347	1.53	
Halosaurus ovenii	3.83	40	1.53	
Lophus vaillanti	3.83	24	1.53	
SQUATINIDAE	3.71	36	1.49	
Lithodes ferox	2.88	6	1.15	
Synaphobranchus kaupii	2.28	48	0.91	
Shrimps, small, non comm.	1.92	288	0.77	
Bathygadus macrops	1.80	48	0.72	
Stomias boa boa	1.68	36	0.67	
Xenodermichthys copei	1.56	60	0.62	
Glyphus marsupialis	1.32	72	0.53	
Triplophos hemingi	1.20	156	0.48	
Dibranchius atlanticus	1.08	48	0.43	
Talismania longifilis	1.08	12	0.43	
Starfish	0.72	24	0.29	
Aristeus varidens, male ***	0.12	12	0.05	682
Total	249.80		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 171  
 DATE :13/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 6°9.37  
 start stop duration Lon E 12°97.55  
 TIME :05:15:39 05:45:43 30.1 (min) Purpose : 3  
 LOG : 6131.73 6133.29 1.6 Region : 4054  
 FDEPTH: 34 32 Gear cond.: 0  
 BDEPTH: 34 32 Validity : 0  
 Towing dir: 0° Wire out : 100 m Speed : 3.1 km  
 Sorted : 0 Total catch: 117.13 Catch/hour: 233.71

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Brachydeuterus auritus	77.30	1437	33.07	
CHLACRIDAE	40.35	267	17.26	
Pseudolithus senegalensis	35.00	78	14.97	
Ilisha africana	32.38	754	13.86	
Selene dorsalis	16.20	355	6.93	
Sphyræna guachancho	5.91	18	2.53	
Trichurus lepturus	5.03	12	2.15	
Uranoscopus polli	2.85	16	1.22	
Elops senegalensis	2.08	4	0.89	
Psettodes belcheri	2.02	2	0.86	
Galeoides decadactylus	1.82	6	0.78	
Caranx hippos	1.80	6	0.77	
Pteroscion pelli	1.54	50	0.66	
Sardinella maderensis	1.14	72	0.49	
penaeus notialis, female, female	1.14	30	0.49	685
Chloroscombrus chrysurus	1.08	12	0.46	
Pagrus caeruleostictus	0.88	4	0.38	
Dicologlossa cuneata	0.84	10	0.36	
Uraspis secunda	0.84	10	0.36	
Trachinocephalus myops	0.76	16	0.32	
Stromateus fiatola	0.58	2	0.25	
Sepia orbignyana	0.48	2	0.20	
Umbrina canariensis	0.40	4	0.17	
Sardinella aurita	0.40	4	0.17	
Trachinus arenatus	0.34	6	0.15	
Syacium micrurus	0.24	2	0.10	
Panulirus regius	0.16	2	0.07	
Penaeus kerathurus	0.12	4	0.05	
Grammolites gruweli	0.08	4	0.03	
Total	233.71		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 172  
 DATE :13/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 6°9.54  
 start stop duration Lon E 12°92.92  
 TIME :07:06:41 07:36:46 30.1 (min) Purpose : 3  
 LOG : 6139.54 6141.24 1.7 Region : 4054

FDEPTH: 44 45 Gear cond.: 0  
 BDEPTH: 44 45 Validity : 0  
 Towing dir: 0° Wire out : 120 m Speed : 3.4 km  
 Sorted : 0 Total catch: 133.57 Catch/hour: 266.43

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Pagrus caeruleostictus	168.05	401	63.08	689
Pagrus pagrus	36.82	46	13.82	688
Acanthurus monroviae	25.01	38	9.39	
Dentex barnardi	9.20	36	3.45	691
Pagellus bellottii	6.02	32	2.26	690
Epinephelus aeneus	4.79	2	1.80	
Pseudupeneus prayensis	4.05	22	1.52	
Sepia orbignyana	2.31	2	0.87	
Cephalopholis taeniops	2.11	2	0.79	
Caranx crysos	2.09	2	0.79	
Raja miraletus	1.44	2	0.54	
Stromateus fiatola	1.40	2	0.52	
Lagocephalus laevigatus	1.36	4	0.51	
Selene dorsalis	1.08	2	0.40	
Fistularia petimba	0.26	2	0.10	
Caranx rhonchus	0.24	14	0.09	
Trachinus arenatus	0.14	2	0.05	
Trachinocephalus myops	0.06	2	0.02	
Total	266.43		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 173  
 DATE :13/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 6°11.02  
 start stop duration Lon E 11°55.25  
 TIME :09:01:34 09:32:35 31.0 (min) Purpose : 3  
 LOG : 6150.23 6151.78 1.6 Region : 4054  
 FDEPTH: 73 74 Gear cond.: 0  
 BDEPTH: 73 74 Validity : 0  
 Towing dir: 0° Wire out : 180 m Speed : 3.0 km  
 Sorted : 0 Total catch: 48.39 Catch/hour: 93.60

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Dentex angolensis	32.11	170	34.30	692
Dentex barnardi	12.80	44	13.68	694
Lagocephalus laevigatus	7.83	6	8.37	
Dentex congoensis	7.33	99	7.83	697
Brotula barbata	6.96	8	7.44	
Pagellus bellottii	3.56	27	3.80	693
Pagrus caeruleostictus	3.48	8	3.72	
Umbrina canariensis	3.37	6	3.60	695
Branchiostegus semifasciatus	3.15	6	3.37	
Epinephelus aeneus	2.98	2	3.18	
Raja miraletus	2.80	4	3.00	
Sepia orbignyana	1.95	8	2.09	
Chaetodon hoefleri	1.49	8	1.59	
Brachydeuterus auritus	1.16	17	1.24	696
Pseudupeneus prayensis	0.83	6	0.89	
Trachurus trecae	0.81	29	0.87	698
Selene dorsalis	0.68	2	0.72	
Citharus linguatula	0.23	4	0.25	
Boops boops	0.06	2	0.06	
Total	93.60		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 174  
 DATE :13/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 6°13.62  
 start stop duration Lon E 11°50.09  
 TIME :10:44:01 11:15:07 30.8 (min) Purpose : 3  
 LOG : 6159.43 6160.86 1.4 Region : 4054  
 FDEPTH: 93 93 Gear cond.: 0  
 BDEPTH: 93 93 Validity : 0  
 Towing dir: 0° Wire out : 230 m Speed : 2.8 km  
 Sorted : 0 Total catch: 50.29 Catch/hour: 98.00

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	40.88	1462	41.72	700
Dentex angolensis	25.45	148	25.97	699
Epinephelus aeneus	15.47	2	15.79	
Pagellus bellottii	4.13	47	4.22	705
Dentex congoensis	2.57	49	2.62	702
Dentex barnardi	1.73	8	1.77	703
Chelidonichthys capensis	1.64	14	1.67	
Raja miraletus	1.60	2	1.63	
Brachydeuterus auritus	1.52	14	1.55	704
Dentex canariensis	1.05	2	1.07	
Octopus vulgaris	1.01	2	1.03	
Chelidonichthys gabonensis	0.49	4	0.50	
Citharus linguatula	0.18	6	0.18	
Sardinella aurita	0.10	4	0.10	
Illex coindetii	0.06	6	0.06	
Dibranchius atlanticus	0.06	4	0.06	
Starfish	0.04	2	0.04	
Saurida brasiliensis	0.02	2	0.02	
Total	98.00		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 175  
 DATE :13/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 6°16.74  
 start stop duration Lon E 11°45.94  
 TIME :12:11:24 12:39:05 27.7 (min) Purpose : 3  
 LOG : 6166.95 6168.55 1.6 Region : 4054  
 FDEPTH: 110 110 Gear cond.: 0  
 BDEPTH: 110 110 Validity : 0  
 Towing dir: 0° Wire out : 300 m Speed : 3.5 km  
 Sorted : 0 Total catch: 113.08 Catch/hour: 245.12

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trachurus trecae	85.14	3163	34.74	701
Dentex congoensis	37.41	342	15.26	707
Dentex angolensis	33.38	169	13.62	706
Boops boops	24.45	561	9.98	
Epinephelus aeneus	17.82	2	7.27	
Chelidonichthys capensis	8.58	78	3.50	
Sphoeroides pachgaster	6.68	11	2.72	
Raja miraletus	5.87	9	2.40	
Mustelus mustelus	5.68	2	2.32	
Dentex canariensis	3.47	4	1.41	
Trichurus lepturus	2.69	2	1.10	
Pterothrissus belloci	2.47	52	1.01	
Ariomma bondi	2.41	52	0.98	
Zeus faber	2.08	7	0.85	
Brotula barbata	1.93	2	0.79	
Illex coindetii	1.50	117	0.61	708
Citharus linguatula	1.00	30	0.41	
Saurida brasiliensis	0.63	139	0.26	
Chaetodon hoefleri	0.43	2	0.18	
Dentex barnardi	0.41	2	0.17	
Pagellus bellottii	0.33	4	0.13	709
Sepia orbignyana	0.26	2	0.11	
G A S T R O P O D S	0.20	30	0.08	
Dicologlossa hexophthalma	0.15	2	0.06	
Arnoglossus imperialis	0.09	13	0.04	
Parapenaeus longirostris, f **, female	0.07	20	0.03	711

Total 245.12 100.00

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 176  
 DATE :13/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 6°17.39  
 start stop duration Lon E 11°41.17  
 TIME :15:18:44 15:50:57 32.2 (min) Purpose : 3  
 LOG : 6181.59 6183.30 1.7 Region : 4054  
 FDEPTH: 118 119 Gear cond.: 0  
 BDEPTH: 118 119 Validity : 0  
 Towing dir: 0° Wire out : 310 m Speed : 3.2 kn  
 Sorted : 0 Total catch: 70.17 Catch/hour: 130.67

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichurus lepturus	26.37	24	20.18	
Dentex congoensis	25.25	331	19.32	716
Umbrina canariensis	22.42	69	17.16	715
Dentex angolensis	15.46	101	11.83	712
Umbrina canariensis	8.12	17	6.21	
Brotula sp.	6.39	7	4.89	
Spicara alta	6.16	69	4.72	
Branchiostegus semifasciatus	3.39	6	2.59	
Trachurus trecae	2.55	91	1.95	713
Octopus vulgaris	2.12	2	1.62	
Spherooides pachgaster	1.96	2	1.50	
Chelidonichthys capensis	1.51	15	1.15	
Saurida brasiliensis	1.47	335	1.13	
Pterothrissus belloci	1.47	6	1.13	
Illex coindetii	1.43	57	1.10	714
Citharus linguatula	1.02	43	0.78	
Zeus faber	0.95	2	0.73	
Zenopsis conchifer	0.88	391	0.67	
Uranoscopus albesca	0.60	4	0.46	
Aricomma bonaldi	0.35	7	0.27	
Boops boops	0.28	6	0.21	
Peristedion cataphractum	0.22	4	0.17	
Pagellus bellottii	0.15	2	0.11	
Microchirus frechkopi	0.09	2	0.07	
Arnoglossus imperialis	0.04	6	0.03	
GOBIIDAE	0.02	2	0.01	
Total	130.67		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 177  
 DATE :13/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 6°20.67  
 start stop duration Lon E 11°28.25  
 TIME :18:04:59 18:35:19 30.3 (min) Purpose : 3  
 LOG : 6198.55 6200.02 1.5 Region : 4054  
 FDEPTH: 352 355 Gear cond.: 0  
 BDEPTH: 352 355 Validity : 0  
 Towing dir: 0° Wire out : 860 m Speed : 2.9 kn  
 Sorted : 40 Total catch: 216.75 Catch/hour: 428.78

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Chlorophthalmus atlanticus	151.34	435	35.29	
Malacocephalus occidentalis	82.69	36	19.28	
Bembrops heterurus	57.96	1165	13.52	
Gadella maraldi	42.73	445	9.97	
Merluccius polli	15.85	115	3.70	717
Chaceon maritae	10.76	36	2.51	
Epigonus telescopus	9.08	89	2.12	
Trichurus lepturus	6.94	8	1.62	
Chaux pictus	6.84	125	1.60	
GALATHEIDAE *	6.59	997	1.54	

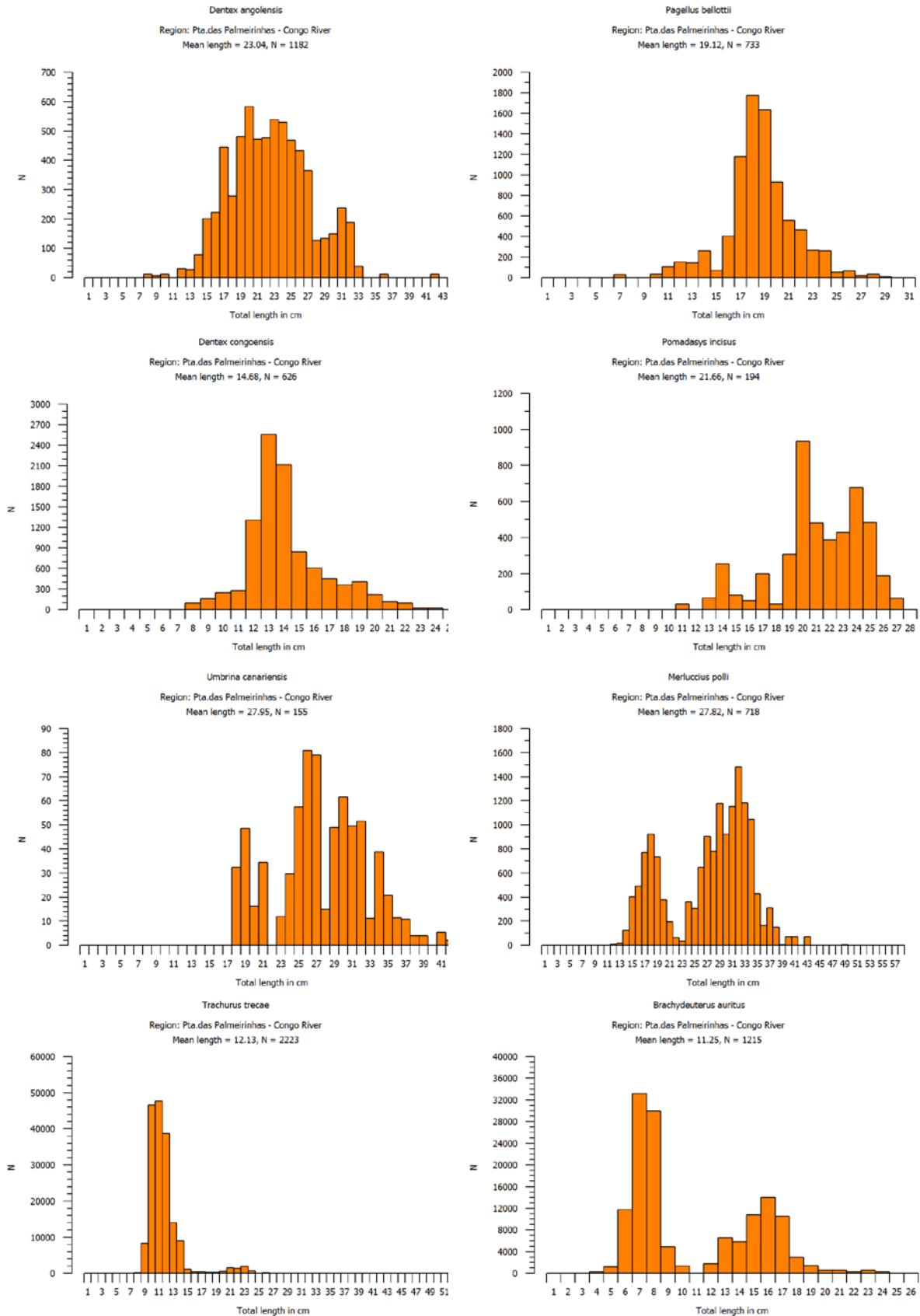
Trachipterus trachipterus	6.13	204	1.43	
Bathyracogaster vicinus	5.42	53	1.26	
Illex coindetii	5.16	45	1.20	719
Bembrops greyi	3.03	44	0.71	
Hymenocephalus sp.	2.04	204	0.48	
Bathynectes piperitus	1.78	26	0.42	
Pterothrissus belloci	1.78	8	0.42	
Aristeus varidens, male ***	1.68	222	0.39	719
Cyttopsis rosea	1.50	36	0.35	
Todaropsis eblanae	1.50	18	0.35	
Lophiodes kempi	1.42	18	0.33	
Trigla lyra	1.25	8	0.29	
Gadella imberbis	1.07	26	0.25	
Crabs - hairy	0.97	8	0.23	
Aristeus varidens, female ***	0.97	142	0.23	718
Chascanopsetta lugubris	0.71	8	0.17	
Halosaurus ovenii	0.53	8	0.12	
Dibranchius atlanticus	0.53	26	0.12	
Nezumia aequalis	0.44	18	0.10	
S H R I M P S	0.08	89	0.02	
Total	428.78		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2015403 STATION: 178  
 DATE :13/03/15 GEAR TYPE: BT NO: 27 POSITION:Lat S 6°26.34  
 start stop duration Lon E 11°16.81  
 TIME :21:19:53 21:49:54 30.0 (min) Purpose : 3  
 LOG : 6215.07 6216.58 1.5 Region : 4054  
 FDEPTH: 754 762 Gear cond.: 0  
 BDEPTH: 754 762 Validity : 0  
 Towing dir: 0° Wire out : 1600 m Speed : 3.0 kn  
 Sorted : 28 Total catch: 171.38 Catch/hour: 342.53

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Coral - Alcyonaria?	206.26	180	60.22	
Yarella blackfordi	38.13	636	11.13	
Nezumia aequalis	16.07	300	4.69	
Stereomastis sp.	14.51	1175	4.24	
Rajella barnardi	13.95	48	4.07	
Todaropsis eblanae	6.84	24	2.00	
Talismania longifilis	6.12	96	1.79	
Ebinania costaecanarie	4.56	12	1.33	
Aristeus varidens, female ***	3.84	132	1.12	720
Chaceon maritae	3.84	12	1.12	
Zameus (Scymnodon) squamulosus	3.24	12	0.95	
Malacocephalus occidentalis	3.00	36	0.88	
Zeus faber	2.76	12	0.81	
Lophiodes kempi	2.76	12	0.81	
Bristle worms (straws)	2.40	168	0.70	
Trichurus lepturus	2.28	12	0.67	
Xenodermichthys copei	2.16	48	0.63	
Plesiopeanaeus edwardsianus	1.68	84	0.49	
Stomias boa boa	1.68	48	0.49	
Halosaurus ovenii	1.44	60	0.42	
Nematocarcinus africanus	1.08	216	0.32	
Triplophos hemingi	0.96	132	0.28	
Gadella imberbis	0.96	60	0.28	
Dicrolene intronigra	0.72	36	0.21	
Hoplostethus cadematii	0.60	12	0.18	
Dibranchius atlanticus	0.48	72	0.14	
Aristeus varidens, male ***	0.12	24	0.04	721
Borostomias antarcticus**	0.12	24	0.04	
Total	342.53		100.00	

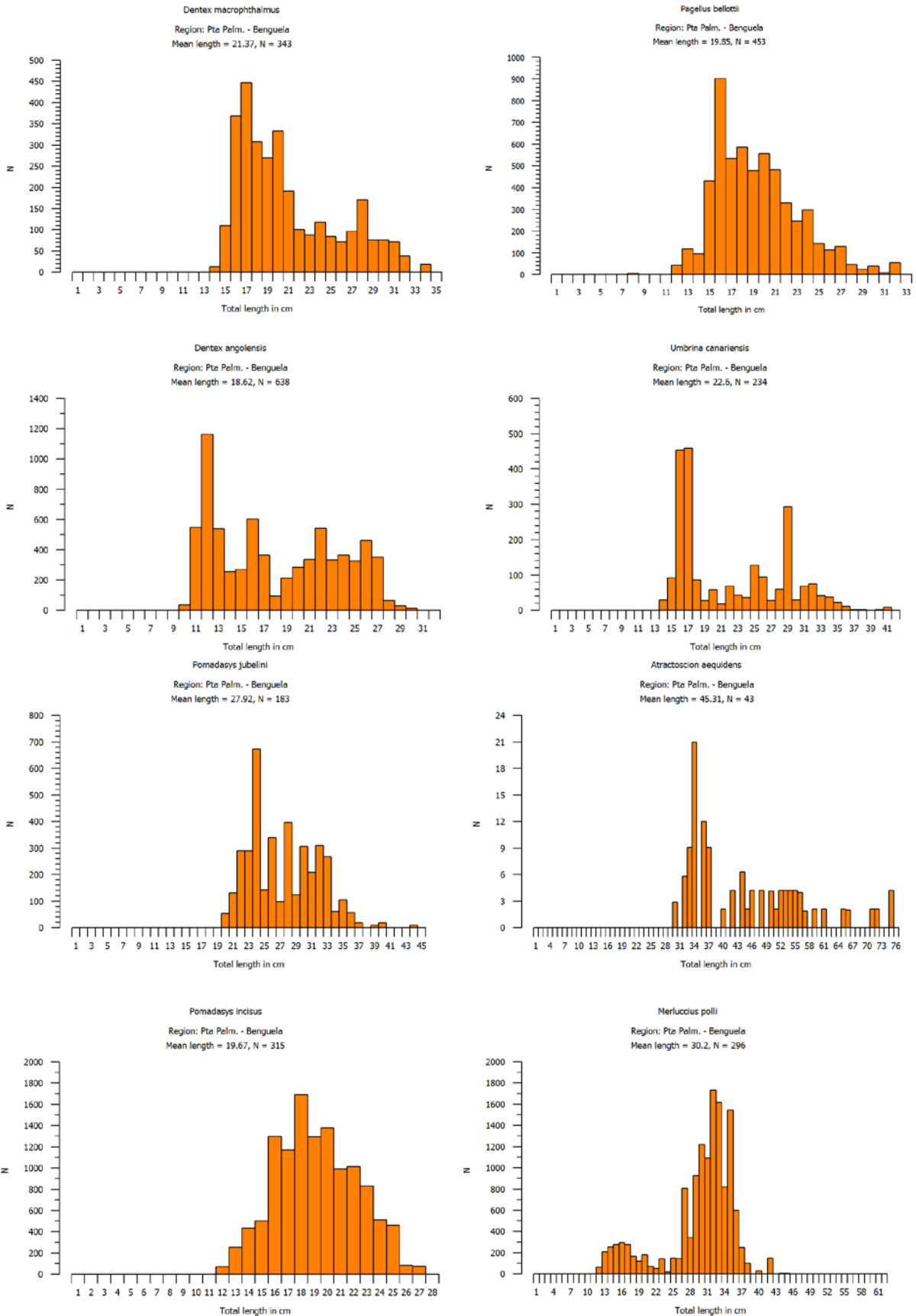
## ANNEX II Length distribution of main species

### Northern Angola: Pooled length frequency distribution of the main species weighted by the catch



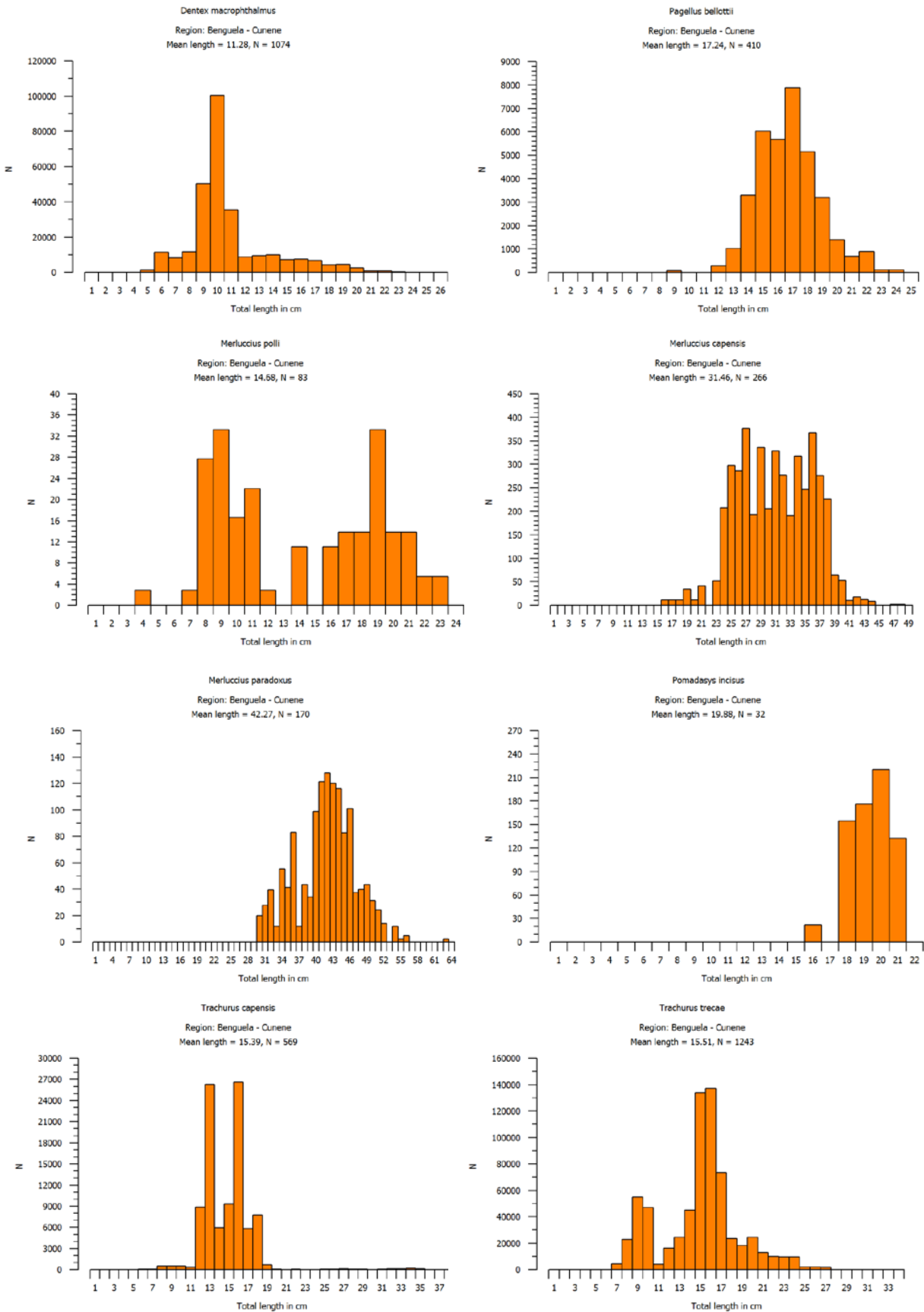
# ANNEX II Length distribution of main species

## Central Angola: Pooled length frequency distribution of the main species weighted by the catch



# ANNEX II Length distribution of main species

## Southern Angola: Pooled length frequency distribution of the main species weighted by the catch



## ANNEX III Swept area estimates

North: Congo River - Palmerinhas shelf (20-200m)

SPECIES NAME	SAMPLE DISTRIB. BY CATCH CLASSES					% incidence	Mean dens. t/nm <sup>2</sup>	depth strata t/nm <sup>2</sup>		
	>0	10	30	100	300			1000	Mean densities by bottom	
			Lower limits, Kg/nm					20-50m	50-100m	100-200m
Brachydeuterus auritus	20	3	4	3	1	63.27	2.707	6.102	2.379	0.479
Trachurus trecae	13	7	6	4		61.22	2.643	0.216	3.121	3.965
Synagrops microlepis	1			3	1	10.2	1.893			5.458
Chloroscombrus chrysurus	8	3	1	1	1	28.57	1.545	5.137	0.461	0.009
Sardinella aurita	18				1	38.78	0.652	2.42	0.013	0.015
Pagellus bellottii	36	3	3			85.71	0.613	0.376	1.105	0.245
Dentex angolensis	20	10				61.22	0.601		0.584	1.08
Galeoides decadactylus	11	2	5			36.73	0.548	0.835	0.842	
Pomadasy incisus	9	1	3			26.53	0.484	0.167	1.133	
Trichiurus lepturus	20	4	1			51.02	0.377	0.036	0.125	0.92
Dentex congoensis	17	3	1			42.86	0.356		0.286	0.707
Lagocephalus laevigatus	15	5				40.82	0.298	0.039	0.716	0.03
Saurida brasiliensis	21	2	1			48.98	0.278		0.025	0.772
Pagrus caeruleostictus	14		2			32.65	0.222	0.754	0.053	0.003
Sardinella maderensis	10	1	1			24.49	0.202	0.743	0.013	
Umbrina canariensis	13	2				30.61	0.201	0.001	0.048	0.526
Sphyræna guachancho	11	2	1			28.57	0.198	0.396	0.24	
Brotula barbata	13	4				34.69	0.186		0.049	0.482
Spicara alta	9		1			20.41	0.173			0.5
Chelidonichthys gabonensi	13	1	1			30.61	0.149	0.002	0.051	0.372
Selene dorsalis	18	3				42.86	0.145	0.123	0.212	0.086
Raja miraletus	33					67.35	0.137	0.109	0.21	0.076
Ephippion guttifer	3	1	1			10.2	0.126	0.473		
Sphoeroides pachgaster	5	3				16.33	0.11			0.318
Citharus linguatula	34	1				71.43	0.096	0.002	0.131	0.129
Pterothrissus bellocci	7	2				18.37	0.092		0.002	0.263
Fistularia petimba	23	1				48.98	0.089	0.004	0.066	0.179
Zeus faber	20	1				42.86	0.088	0.001	0.02	0.23
Illex coindetii	18	2				40.82	0.086		0.011	0.237
Ilisha africana	4	2				12.24	0.071	0.265		
Dentex barnardi	20					40.82	0.07	0.051	0.092	0.06
Pseudupeneus prayensis	16	2				36.73	0.068	0.126	0.09	
Pseudotolithus senegalensis	7	1				16.33	0.068	0.216	0.027	
Drepane africana	4	1				10.2	0.065	0.171	0.049	
Lepidotrigla cadmani	4	1				10.2	0.06		0.116	0.044
Ilisha africana ***		1				2.04	0.058	0.219		
Zenopsis conchifer	6	1				14.29	0.052			0.151
Pomadasy jubelini	4	1				10.2	0.047	0.023	0.106	
Alectis alexandrinus	11					22.45	0.045	0.126	0.031	
Caranx rhonchus	4	1				10.2	0.044	0.001	0.081	0.036
Epinephelus aeneus	11					22.45	0.044	0.022	0.071	0.03
Pomadasy perotaei	1	1				4.08	0.042	0.158		
Stromateus fiatola	3	1				8.16	0.041	0.005	0.102	
Dasyatis centroura		1				2.04	0.033	0.126		
Dentex canariensis	4	1				10.2	0.032	0.108	0.002	0.009
Merluccius polli		1				2.04	0.031			0.091
Sepia orbignyana	21					42.86	0.03	0.024	0.044	0.019
Sphyræna sphyraena	6	1				14.29	0.029	0.099	0.006	
Pagrus pagrus	1	1				4.08	0.028	0.107		
Erythrocles monodi		1				2.04	0.028			0.081
Miracorvina angolensis	2	1				6.12	0.028			0.081
CALOCARIDIDAE		1				2.04	0.026	0.1		
Lagocephalus inermis		1				2.04	0.026			0.074
Lepidotrigla carolae	3					6.12	0.023		0.002	0.064
Alloteuthis africana	19					38.78	0.021	0.002	0.051	0.002
Rhinobatos albomaculatus	5					10.2	0.021	0.065	0.009	
Torpedo torpedo	10					20.41	0.02		0.024	0.029
Chelidonichthys capensis	11					22.45	0.02		0.027	0.026
Brotula multibarbata	1					2.04	0.019		0.049	
Pteroscion peli	8					16.33	0.019	0.014		0.043
Seriola carpenteri	4					8.16	0.019	0.008	0.023	0.023
Balistes capriscus	5					10.2	0.019	0.034	0.026	
Uranoscopus polli	9					18.37	0.018	0.007	0.003	0.042
Anthias anthias	2					4.08	0.017			0.05
Dasyatis marmorata	5					10.2	0.017	0.06	0.003	
Cynoponticus ferox	3					6.12	0.016			0.046
Helicolenus dactylopterus	1					2.04	0.015			0.044

## ANNEX III Swept area estimates

North: Congo River - Palmerinhas shelf (20-200 m) CONTINUED

SPECIES NAME	SAMPLE DISTRIB. BY CATCH CLASSES						% inci- dence	Mean dens. t/nm <sup>2</sup>	depth strata t/nm <sup>2</sup>		
	>0	10	30	100	300	1000			Mean densities by bottom		
								20-50m	50-100m	100-200m	
Acanthurus monroviae	1						2.04	0.015	0.057		
Lagocephalus lagocephalu	1						2.04	0.015		0.038	
Uranoscopus albesca	4						8.16	0.014		0.007	0.031
Gymnura micrura	1						2.04	0.013	0.05		
Bembrops heterurus	4						8.16	0.013			0.037
Mustelus mustelus	3						6.12	0.013	0.006	0.02	0.01
Raja straeleni	1						2.04	0.011			0.033
Octopus vulgaris	5						10.2	0.011		0.002	0.03
Branchiostegus semifascia	4						8.16	0.011		0.023	0.006
Pomadasys rogeri	1						2.04	0.011	0.041		
Panulirus regius	5						10.2	0.011	0.04		
Priacanthus arenatus	4						8.16	0.011		0.004	0.026
Scyllarides herklotsii	1						2.04	0.01	0.039		
RHINOBATIDAE	1						2.04	0.01		0.026	
Parapenaeus longirostris	1						2.04	0.004			0.012
penaeus notialis, female	3						6.12	0.002	0.009		
Parapenaeus longirostris, f	4						8.16	0.002			0.005
Penaeus notialis	4						8.16	0.001	0.005		
penaeus notialis, male	2						4.08	0.001	0.003		
Parapandalus narval	1						2.04				0.001
penaeus kerathurus, femal	1						2.04		0.001		
Parapenaeus longirostris, l	2						4.08				
penaeus notialis, male	1						2.04		0.001		
Penaeus kerathurus	1						2.04				
Other fish								0.243	0.283	0.133	0.336
Sum all species								17.05	20.612	13.179	18.652
Sum SNAPPERS, JOBFISHES											
Sum GROUPERS, SEABASSES								0.064	0.027	0.073	0.083
Sum POD											
Sum CROAKERS, DRUMS, WEAKE., KOB								0.335	0.257	0.093	0.667
Sum PANDORAS, PORGIES, SEABREAMS,								1.929	1.397	2.123	2.117
Sum SHARKS, CHIMAERAS								0.019	0.011	0.02	0.024
Sum BATOID FISHES, RAYS								0.27	0.417	0.273	0.155
Sum CEPHALOPODS								0.163	0.044	0.112	0.309
Numbers of stations included in analysis, total and by depth strata								49	13	19	17

## ANNEX III Swept area estimates

North: Congo River - Palmerinhas slope (200-500 m)

SPECIES NAME	SAMPLE DISTRIB. BY CATCH CLASSES						% incidence	Mean dens. t/nm <sup>2</sup>	depth strata t/nm <sup>2</sup>		
	Lower limits, Kg/nm								Mean densities by bottom		
	>0	10	30	100	300	1000			200-300m	300-400m	400-500m
Merluccius polli	9	8	1	2	1		100	4.639	1.107	7.853	4.958
Synagrops microlepis	5	3	3	2			61.9	2.811	8.098	0.335	
Chlorophthalmus atlanticu	7	4	3	1			71.43	2.157	2.167	4.287	0.016
Nematocarcinus africanus	3	1	3	2			42.86	1.797		0.755	4.637
Pterothrissus belloci	7	2		1			47.62	1.013	2.991	0.047	
Hymenocephalus italicus	6	3	2				52.38	0.901	0.002	0.323	2.379
Dentex angolensis	3	2		1			28.57	0.764	2.293		
Laemonema laureysi	5	7					57.14	0.701		1.236	0.867
Chaunax pictus	8	1	1				47.62	0.606		0.439	1.378
Zenopsis conchifer	6	2	2				47.62	0.568	1.287	0.416	
Brotula barbata	3	2	1				28.57	0.561	1.683		
Lophiodes kempfi	10		1				52.38	0.449	0.016	0.211	1.121
Bembrops heterurus	10	2					57.14	0.383	0.715	0.433	
Parapenaeus longirostris,f	12	3					71.43	0.353	0.893	0.14	0.026
Malacocephalus occidenta	13	1					66.67	0.296	0.007	0.621	0.259
Illex coindetii	14	1					71.43	0.281	0.65	0.157	0.035
Gadella maraldi	1	1	1				14.29	0.238	0.001	0.21	0.504
Parapenaeus longirostris, l	9	1					47.62	0.202	0.599	0.003	0.003
Dibranchius atlanticus	13	1					66.67	0.187	0.053	0.109	0.399
Hoplostethus cadenati	5		1				28.57	0.171	0.001	0.015	0.498
Brotula multibarbata		1					4.76	0.134	0.403		
Trichiurus lepturus	13						61.9	0.129	0.187	0.14	0.059
MYCTOPHIDAE	10						47.62	0.117	0.274	0.072	0.007
Coelorrhinchus caelorhincus	7	1					38.1	0.117	0.289	0.038	0.024
Gadella imberbis	14						66.67	0.117	0.051	0.067	0.232
Yarrella blackfordi	8						38.1	0.103		0.019	0.29
Pontinus accraensis	7						33.33	0.095	0.062	0.222	
Aristeus varidens, female *	10						47.62	0.093		0.071	0.209
Lamprogrammus exutus	1	1					9.52	0.093			0.279
Heart urchin		1					4.76	0.09		0.269	
Etmopterus polli	4						19.05	0.087		0.147	0.114
Neoharriotta pinnata	2	1					14.29	0.078			0.234
Bathyroconger vicinus	6						28.57	0.071	0.009	0.141	0.062
Benthodesmus tenuis	7						33.33	0.064		0.037	0.156
Parasudis fraserbrunneri	6						28.57	0.059	0.136	0.042	
Aristeus varidens, male **	10						47.62	0.052		0.076	0.081
Lophius vaillanti	2						9.52	0.046			0.139
Stomias boa boa	7						33.33	0.044		0.016	0.117
Chaceon maritae, female *	3						14.29	0.043			0.13
Coloconger cadenati	4						19.05	0.04		0.11	0.011
Lophiodes caularis	1						4.76	0.039			0.118
Bathynectes piperitus	8						38.1	0.037		0.084	0.028
Stereomastis sp.	5						23.81	0.037			0.112
Acanthocarpus brevipinnis	5						23.81	0.033	0.076	0.022	
Malacocephalus laevis	2						9.52	0.033		0.075	0.023
Plesiopenaeus edwardsiar	7						33.33	0.031			0.094
Centrophorus granulatus	3						14.29	0.031		0.032	0.062
Xenodermichthys copei	5						23.81	0.03			0.09
Sphoeroides pachgaster	1						4.76	0.03	0.09		
Helicolenus dactylopterus	2						9.52	0.027	0.013	0.069	
Chaceon maritae	4						19.05	0.027		0.077	0.005
Nezumia micronychodon	3						14.29	0.027		0.076	0.005
Halosaurus ovenii	10						47.62	0.025		0.019	0.056
SHRIMP S	2						9.52	0.025		0.074	
Gephyroberyx darwini	5						23.81	0.024	0.01	0.061	
Chaceon maritae, male ***	3						14.29	0.024			0.071
Epigonus telescopus	3						14.29	0.019	0.007	0.045	0.006
Umbrina canariensis	1						4.76	0.019	0.057		
GALATHEIDAE *	3						14.29	0.019		0.047	0.009
Ariomma bondi	5						23.81	0.016	0.043		0.007
Epigonus telescopus**	7						33.33	0.015	0.021	0.023	
Borostomias elusens	1						4.76	0.012		0.036	
JELLYFISH	2						9.52	0.012			0.036
Etmopterus spinax	2						9.52	0.012			0.035
Squalus megalops	1						4.76	0.012			0.035
Bassanago albescens	3						14.29	0.011		0.018	0.016
Conger conger	2						9.52	0.011	0.002		0.03
Triplophos hemingi	4						19.05	0.011		0.015	0.017
Spicara alta	1						4.76	0.01	0.03		
Trachipterus trachipterus	1						4.76	0.01		0.03	
Plesionika martia	3						14.29	0.008		0.016	0.007
Shrimps, small, non comm.	1						4.76	0.006	0.019		
Solenocera africana	5						23.81	0.001	0.001	0.001	0.002



## ANNEX III Swept area estimates

**North:** Congo River - Palmerinhas slope (200-500 m)

SPECIES NAME	SAMPLE DISTRIB. BY CATCH CLASSES						% incidence	Mean dens. t/nm <sup>2</sup>	depth strata t/nm <sup>2</sup>		
	Lower limits, Kg/nm								Mean densities by bottom		
	>0	10	30	100	300	1000		200-300m	300-400m	400-500m	
Sergestes sp.	1						4.76	0.001		0.003	
Acanthephyra sp.	2						9.52	0.001		0.003	
Aristeus varidens	2						9.52	0.001	0.001	0.001	
Parapandalus narval	1						4.76		0.001		
Penaeus notialis	1						4.76			0.001	
Other fish								0.211	0.23	0.217	
Sum all species								21.649	24.575	20.095	
Sum SNAPPERS, JOBFISHES											
Sum GROUPERS, SEABASSES								0.006	0.017		
Sum POD											
Sum CROAKERS, DRUMS, WEAKF., KOBS								0.023	0.07		
Sum PANDORAS, PORGIES, SEABREAMS,								0.766	2.297		
Sum SHARKS, CHIMAERAS								0.242		0.178	
Sum BATOID FISHES, RAYS								0.014	0.015	0.025	
Sum CEPHALOPODS								0.285	0.654	0.165	
Numbers of stations included in analysis, total and by depth strata								21	7	7	

## ANNEX III Swept area estimates

### North: Congo River - Palmerinhas slope (500-800 m)

SPECIES NAME	SAMPLE DISTRIB. BY CATCH CLASSES						% incidence	Mean dens. t/nm <sup>2</sup>	depth strata t/nm <sup>2</sup>		
	Lower limits, Kg/nm								Mean densities by bottom		
	>0	10	30	100	300	1000			500-600m	600-700m	700-800m
Nematocarcinus africanus	3	2	6	2			86.67	5.936	10.976	3.6	3.231
Yarella blackfordi	4	7	3	1			100	4.001	2.78	1.638	7.583
Lamprogrammus exutus	3	6	3	1			86.67	3.929	7.666	1.423	2.697
Hoplostethus cadenati	7	2	5	1			100	3.445	2.797	2.803	4.734
Stereomastis sp.	12	2					93.33	0.625	0.485	0.397	0.993
Nezumia micronychodon	6	1	1				53.33	0.537	0.011	0.285	1.314
Coral - Alcyonaria?	1		1				13.33	0.466		0.032	1.367
Bassanago albescens	3		1				26.67	0.442		0.167	1.158
Xenodermichthys copei	13						93.33	0.34	0.235	0.207	0.577
Stomias boa boa	9	2					73.33	0.312	0.497	0.33	0.11
Triplophos hemingi	14						93.33	0.283	0.274	0.22	0.355
Lophiodes kemp	4	1					33.33	0.273	0.533	0.115	0.172
Aristeus varidens, female *	12	1					86.67	0.243	0.55	0.129	0.049
Chaceon maritae	3	1					26.67	0.214	0.587	0.03	0.025
Talismania longifilis	9						60	0.15		0.058	0.392
Borostomias antarcticus	3						20	0.141		0.122	0.3
Lophius vaillanti	2	1					20	0.133	0.37	0.028	
Chaceon maritae, male ***	7						46.67	0.127	0.186	0.089	0.107
Rajella barnardi	1	1					13.33	0.123			0.37
Gadella imberbis	9						60	0.114	0.281	0.052	0.01
Nezumia aequalis	4						26.67	0.114		0.122	0.219
Anemone - purple		1					6.67	0.111			0.332
Halosaurus ovenii	10						66.67	0.101	0.117	0.043	0.144
Lamprogrammus niger		1					6.67	0.086		0.258	
Torpedo nobiliana	3						20	0.08		0.067	0.173
Borostomias sp.	4						26.67	0.08		0.236	0.003
Benthodesmus tenuis	7						46.67	0.076	0.187	0.011	0.03
Bathyrcongus vicinus	9						60	0.067	0.128	0.056	0.017
Aristeus varidens, male ***	11						73.33	0.065	0.188	0.005	0.002
J E L L Y F I S H	4						26.67	0.065		0.036	0.158
Borostomias elusens	1						6.67	0.06	0.18		
Diplophos taenia	1						6.67	0.052	0.156		
Stomias affinis	1						6.67	0.049	0.147		
Laemonema laureysi	2						13.33	0.047	0.142		
Monomitopus metriostom.	2						13.33	0.047		0.002	0.139
Stereomastis sculpta	1						6.67	0.045		0.136	
Merluccius polli	5						33.33	0.044	0.032	0.064	0.036
Etmopterus spinax	2						13.33	0.042	0.116	0.009	
Dibranchius atlanticus	12						80	0.041	0.019	0.025	0.08
Dicrolene intronigra	10						66.67	0.037	0.019	0.083	0.008
Coloconger cadenati	4						26.67	0.037	0.091	0.019	
**	4						26.67	0.036	0.004	0.041	0.063
Chaceon maritae, female *	4						26.67	0.032	0.052	0.044	
Talismania sp.	1						6.67	0.031			0.093
HISTIOTEUTHIDAE	2						13.33	0.031		0.03	0.063
Bathygadus macrops	2						13.33	0.03		0.013	0.079
Plesionika martia	6						40	0.029	0.083	0.004	0.001
Bathynectes piperitus	4						26.67	0.028	0.083	0.002	
Etmopterus polli	3						20	0.027	0.024	0.028	0.03
Hymenocephalus italicus	2						13.33	0.026	0.077		
Ebinania costaecanarie	3						20	0.025		0.024	0.051
Coelorrinchus caelorhincus	1						6.67	0.025	0.075		
Plesiopenaeus edwardsiar	5						33.33	0.022	0.035	0.019	0.014
UNIDENTIFIED FISH	2						13.33	0.022		0.027	0.04
Glyphus marsupialis	4						26.67	0.021		0.012	0.052
OMMASTREPHIDAE	4						26.67	0.021		0.031	0.033
Zameus (Scymnodon) squa	2						13.33	0.021	0.042		0.021
Illex coindetii	2						13.33	0.021	0.036	0.027	
Malacocephalus occidenta	3						20	0.021	0.007	0.036	0.02
Loligo vulgaris	2						13.33	0.02	0.043		0.017
Trachipterus trachipterus	1						6.67	0.018		0.055	
Centrophorus granulosus	1						6.67	0.018	0.053		
SEPIOLIDAE	1						6.67	0.017		0.05	
Nezumia duodecim	1						6.67	0.017	0.05		
Opistotheutis rossi	1						6.67	0.016		0.047	
Todaropsis eblanae	1						6.67	0.015			0.045
Octopoteuthis sicula	1						6.67	0.014			0.043
Sergestes sp.	3						20	0.013	0.035	0.001	0.003
Chlamydoselachus anguin	2						13.33	0.013	0.012	0.028	
Shrimps unidentified	1						6.67	0.007	0.021		
Aristeus varidens	2						13.33	0.007			0.02
S H R I M P S	2						13.33	0.006	0.003		0.015
Shrimps, small, non comm.	1						6.67	0.004		0.013	
Acanthephyra sp.	2						13.33	0.004	0.013		
PANDALIDAE	1						6.67	0.002	0.005		
Pasiphaea sp.	1						6.67	0.001		0.003	
Heterocarpus grimaldii	1						6.67				0.001
Other fish								0.195	0.18	0.24	0.163
Sum all species								24.036	30.682	13.673	27.753
Sum SNAPPERS, JOBFINES											
Sum GROUPERS, SEABASSES											
Sum POD											
Sum CROAKERS, DRUMS, WEAKE., KOBS											
Sum PANDORAS, PORGIES, SEABREAMS,											
Sum SHARKS, CHIMAERAS								0.136	0.251	0.101	0.055
Sum BATOID FISHES, RAYS								0.211	0.014	0.075	0.544
Sum CEPHALOPODS								0.163	0.1	0.189	0.201
Numbers of stations included in analysis, total and by depth strata								15	5	5	5

## ANNEX III Swept area estimates:

**Central:** Palmerinhas - Benguela. Shelf (20-200 m)

SPECIES NAME	Lower limits, Kg/nm						% incidence	Mean dens. t/nm <sup>2</sup>	Mean densities by bottom depth strata t/nm <sup>2</sup>			
	>0	10	30	100	300	1000			0-30m	30-50m	50-100m	100-200m
Synagrops microlepis	2		2	2	4		19.2	5.8				18.9
Brachydeuterus auritus	12	4	6	6	3		59.6	5.6	7.8	10.3	7.3	0.0
Sardinella aurita	19	2	2	3	5		59.6	5.0	6.8	4.6	6.0	3.4
Trachurus trecae	10	10	9	8	1		73.1	4.4	0.4	1.3	7.8	2.3
Trichiurus lepturus	14	7	3	3			51.9	1.6	1.1	0.5	2.3	1.4
Chloroscombrus chrysurus	10	7	4		1		42.3	1.5	1.9	6.3	0.7	0.0
Pomadasys incisus	9		8	1			34.6	1.4	1.7	1.0	2.4	0.0
Brotula barbata	11	3				1	28.9	1.1			0.0	3.5
Pomadasys jubelini	2	3	1	2			15.4	0.8	0.6	2.2	0.9	
Pagellus bellottii	26	9	4				75.0	0.7	0.7	0.6	1.3	0.1
Dentex angolensis	22	8	2				61.5	0.6			0.2	1.6
Galeoides decadactylus	5	7	4				30.8	0.6	0.8	1.2	0.7	
Selene dorsalis	20	5		1			50.0	0.5	0.4	0.5	0.4	0.8
Raja miraletus	34	6					76.9	0.4	0.1	0.3	0.6	0.2
Lagocephalus laevigatus	19	5					46.2	0.3	0.3	0.4	0.5	
Umbrina canariensis	26	3	1				57.7	0.3	0.2	0.1	0.3	0.3
Dentex barnardi	27	2	1				57.7	0.3	0.5	0.0	0.4	0.1
Sardinella maderensis	18	1	1				38.5	0.2	0.4	1.1	0.0	0.0
Chelidonichthys gabonensis	15	3	1				36.5	0.2			0.4	0.2
Zeus faber	17	4					40.4	0.2			0.3	0.3
Pterothrissus belloci	12	5					32.7	0.2			0.0	0.7
Sphoeroides pachgaster	10	3					25.0	0.2			0.0	0.6
Pseudupeneus prayensis	21	4					48.1	0.2	0.3	0.1	0.4	
Dentex macrophthalmus	5	6					21.2	0.2			0.1	0.5
Citharus linguatula	39	2					78.9	0.2	0.0	0.0	0.2	0.3
Stromateus fiatola	4	2	1				13.5	0.2	0.3	0.0	0.3	
Rhinobatos albomaculatus	10	1	1				23.1	0.2	0.4	0.3	0.2	
Torpedo mackayana	1		1				3.9	0.2				0.5
Spicara alta	3		1				7.7	0.2				0.5
Chelidonichthys capensis	6	3					17.3	0.1			0.1	0.3
Sphyræna guachancho	5	1	1				13.5	0.1	0.1	0.2	0.2	
Ilisha africana	6	2					15.4	0.1	0.7	0.3		
Pseudotolithus senegalensis	8	2					19.2	0.1	0.3	0.4	0.0	
Sepia orbignyana	26	2					53.9	0.1	0.1	0.0	0.2	0.0
Pteroscion peli	4	2					11.5	0.1	0.7	0.3	0.0	
Octopus vulgaris	9	1					19.2	0.1			0.1	0.1
Atractoscion aequidens	9	1					19.2	0.1	0.0		0.2	0.0
Pomadasys perotaei	5	2					13.5	0.1	0.8	0.1	0.0	
Sphyræna sphyraena	10		1				21.2	0.1	0.7	0.1	0.0	
Uranoscopus albesca			1				1.9	0.1				0.3
Alectis alexandrinus	12						23.1	0.1	0.4	0.1	0.1	
Dasyatis marmorata	5	2					13.5	0.1	0.0	0.0	0.2	
Merluccius polli	2	2					7.7	0.1				0.2
Erythrocles monodi	2	2					7.7	0.1				0.2
Torpedo torpedo	13						25.0	0.1			0.1	0.1
Pontinus accraensis	9		1				19.2	0.1			0.0	0.2
Gymnura micrura	3	1					7.7	0.1	0.4	0.1		
Scorpaena normani	2	1					5.8	0.1				0.2
Illex coindetii	15	1					30.8	0.1			0.0	0.2
Drepane africana	2	1					5.8	0.0	0.3	0.0	0.0	
Ephippion guttifer	6						11.5	0.0	0.3	0.0		
Pagrus africanus		1					1.9	0.0	0.4			
Balistes capriscus	2	1					5.8	0.0	0.4	0.0		
Brotula multibarbata	3						5.8	0.0			0.0	0.1
Bembrops heterurus	6						11.5	0.0				0.1
Dicologlossa cuneata	6						11.5	0.0	0.0	0.1	0.0	
Alloteuthis africana	14						26.9	0.0		0.0	0.1	

## ANNEX III Swept area estimates:

**Central:** Palmerinhas - Benguela. Shelf (20-200 m) **continued.**

SPECIES NAME	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			0-30m	30-50m	50-100m	100-200m
Eucinostomus melanopterus	6						11.5	0.0	0.1	0.1		
Pagrus caeruleostictus	3						5.8	0.0	0.2	0.0	0.0	
Perulibatrachus rossignoli	2	1					5.8	0.0				0.1
Cynoponticus ferox	3						5.8	0.0				0.1
Anthias anthias	3						5.8	0.0				0.1
Fistularia petimba	15						28.9	0.0	0.0		0.0	0.0
Trachinotus ovatus	7						13.5	0.0	0.1	0.0	0.0	
Chaetodon hoeferi	9						17.3	0.0	0.1	0.0	0.0	0.0
Helicolenus dactylopterus	2						3.9	0.0				0.1
Dentex congoensis	4						7.7	0.0			0.0	0.0
Branchiostegus semifasciatus	3						5.8	0.0			0.0	0.0
Sarda sarda	2						3.9	0.0			0.0	0.0
Chlorophthalmus atlanticus	3						5.8	0.0		0.1		0.0
Epinephelus aeneus	4						7.7	0.0	0.0	0.0	0.0	
Penaeus notialis	6						11.5	0.0	0.1	0.0		
Pseudotolithus typus	1						1.9	0.0			0.0	
Anthias anthias**	2						3.9	0.0				0.0
Zenopsis conchifer	3						5.8	0.0				0.0
Grammolites gruveli	8						15.4	0.0			0.0	
Plectorhinchus mediterraneus	2						3.9	0.0	0.0		0.0	
Balistes punctatus	1						1.9	0.0	0.1			
Aluterus heudelotii	3						5.8	0.0	0.0	0.0	0.0	
Saurida brasiliensis	9						17.3	0.0			0.0	0.0
Acanthurus monroviae	1						1.9	0.0	0.1			
Parapenaeus longirostris	3						5.8	0.0				0.0
Parapenaeus longirostris, m **	1						1.9	0.0			0.0	
Parapandalus narval	1						1.9					0.0
Parapenaeus longirostris, f **	1						1.9					
Other fish								0.2	0.6	0.2	0.1	0.2
Sum all species								35.8	31.6	33.1	35.4	38.9
Sum SNAPPERS, JOBFISHES												
Sum GROUPERS, SEABASSES								0.0	0.1	0.0	0.0	0.1
Sum POD												
Sum CROAKERS, DRUMS, WEAKF., KOBES								0.6	1.3	0.8	0.6	0.4
Sum PANDORAS, PORGIES, SEABREAMS,								1.9	1.8	0.6	2.0	2.3
Sum SHARKS, CHIMAERAS								0.0	0.0		0.0	
Sum BATOID FISHES, RAYS								0.9	0.9	0.7	1.1	0.9
Sum CEPHALOPODS								0.3	0.1	0.0	0.4	0.3
Numbers of stations included in analysis, total and by depth strata								52	5	8	23	16

## ANNEX III Swept area estimates: \_

**Central:** Palmerinhas - Benguela. Slope (200-500 m)

SPECIES NAME	Lower limits, Kg/nm						% incidence	Mean dens. t/nm <sup>2</sup>	Mean densities by bottom depth strata t/nm <sup>2</sup>		
	>0	10	30	100	300	1000			200-300	300-400	400-500
Merluccius polli	5	3	2	2	2		93.3	9.5	3.1	18.3	0.4
Chlorophthalmus atlanticus	6	1		3			66.7	4.2	4.9	6.1	0.1
Nematocarcinus africanus	2		5	1			53.3	3.0		2.8	6.2
Cynoglossus canariensis				1			6.7	1.8	6.6		
Laemonema laureysi	6	3	3				80.0	1.6	0.2	3.1	0.3
Synagrops microlepis	5		3				53.3	1.4	5.4	0.0	
Pterothrissus belloci	2	1		1			26.7	1.3	4.9		
Zenopsis conchifer	3	1	3				46.7	1.1	3.8	0.2	
Hymenocephalus italicus	3	5	1				60.0	0.9	0.1	1.8	0.3
Hoplostethus mediterraneus				1			6.7	0.8	3.0		
Chaunax pictus	7	1	1				60.0	0.6		0.9	0.6
Dentex macrophthalmus			1				6.7	0.5	1.9		
Yarella blackfordi	5	2					46.7	0.4		0.5	0.7
Bembrops heterurus	3	2					33.3	0.3	1.0	0.1	
Hoplostethus cadenati	4		1				33.3	0.3		0.0	1.2
Parapenaeus longirostris	7	2					60.0	0.3	0.9	0.0	0.0
Trichiurus lepturus	5	1					40.0	0.3	0.4	0.1	0.5
Dentex angolensis	1	2					20.0	0.3	0.9		
Aristeus varidens, female ***	7						46.7	0.2		0.4	0.2
Malacocephalus occidentalis	9						60.0	0.2	0.3	0.2	0.1
Parapenaeus longirostris, f **	3	1					26.7	0.2	0.4	0.2	
Lamprogrammus exutus	2	1					20.0	0.2		0.2	0.4
Brotula multibarbata		1					6.7	0.2	0.7		
Brotula barbata	2	1					20.0	0.2	0.7		
Hoplostethus melanopterus		1					6.7	0.2		0.4	
Coelorinchus caelorhincus	7	1					53.3	0.2	0.6	0.0	0.0
Neoharriotta pinnata	2	1					20.0	0.2		0.2	0.3
Pontinus accraensis	2	1					20.0	0.2	0.0	0.3	
MYCTOPHIDAE	8						53.3	0.1	0.4	0.1	
Trachurus trecae	1	1					13.3	0.1	0.5		0.0
Etmopterus polli	3	1					26.7	0.1		0.3	0.0
Helicolenus dactylopterus	2	1					20.0	0.1	0.1	0.2	
Heart urchin		1					6.7	0.1		0.3	
Lophius vaillanti	3						20.0	0.1		0.1	0.3
Dibranchius atlanticus	5	1					40.0	0.1	0.0	0.1	0.3
Aristeus varidens	3						20.0	0.1		0.1	0.2
Raja miraletus	1	1					13.3	0.1	0.3		0.1
Bathyrcongus vicinus	5						33.3	0.1	0.0	0.2	0.0
Torpedo torpedo	2						13.3	0.1	0.3		
Aristeus varidens, male ***	7						46.7	0.1		0.1	0.1
Grammolites grueli		1					6.7	0.1	0.3		
Squalus megalops	4						26.7	0.1		0.1	0.1
Gadella imberbis	8						53.3	0.1		0.1	0.1
Mystriophis rostellatus	2						13.3	0.1	0.2		
Echeneis naucrates	1						6.7	0.1		0.1	
Chaceon maritae, female ***	2						13.3	0.1			0.2
Parapenaeus longirostris, m **	2						13.3	0.1	0.2	0.0	
Glyphus marsupialis	3						20.0	0.1		0.1	0.0
Illex coindetii	4						26.7	0.0	0.2	0.0	
Nezumia micronychodon	3						20.0	0.0	0.1	0.0	0.0
Rajella leopardus	1						6.7	0.0	0.2		
Epigonus telescopus**	2						13.3	0.0	0.1	0.0	
Sphoeroides pachgaster	1						6.7	0.0	0.1		
Bathynectes piperitus	3						20.0	0.0		0.1	0.0
Cynoponticus ferox	1						6.7	0.0	0.1		
Benthodesmus tenuis	5						33.3	0.0		0.0	0.1
Chaunax cf. pictus	1						6.7	0.0		0.1	

## ANNEX III Swept area estimates: \_

**Central:** Palmerinhas - Benguela. Slope (200-500 m) **continued**

SPECIES NAME	Lower limits, Kg/nm						% incidence	Mean dens. t/nm <sup>2</sup>	Mean densities by bottom depth strata t/nm <sup>2</sup>		
	>0	10	30	100	300	1000			200-300	300-400	400-500
Stomias boa boa	3						20.0	0.0			0.1
Chaceon maritae	4						26.7	0.0		0.1	
Halosaurus ovenii	6						40.0	0.0		0.0	0.1
Anemones, white	1						6.7	0.0			0.1
Zameus (Scymnodon) squamulosus	1						6.7	0.0			0.1
JELLYFISH	3						20.0	0.0		0.0	0.0
Loligo vulgaris	1						6.7	0.0		0.0	
Ariomma bondi	1						6.7	0.0		0.0	
Caelorinchus braueri	1						6.7	0.0		0.0	
Gephyroberyx darwini	1						6.7	0.0		0.0	
Umbrina canariensis	1						6.7	0.0	0.1		
Mustelus mustelus	1						6.7	0.0		0.0	
Borostomias antarcticus	4						26.7	0.0		0.0	0.0
Epigonus sp.	1						6.7	0.0		0.0	
Todaropsis eblanae	1						6.7	0.0	0.0		
Etmopterus spinax	1						6.7	0.0			0.0
Acanthephyra sp.	4						26.7	0.0		0.0	0.0
Plesiopenaeus edwardsianus	1						6.7	0.0			0.0
Shrimps, small, non comm.	1						6.7	0.0			0.0
Sergestes sp.	1						6.7	0.0			0.0
Solenocera africana	1						6.7	0.0			0.0
Nematopalaemon hastatus	1						6.7	0.0		0.0	
Other fish								0.2	0.1	0.2	0.2
Sum all species								33.2	43.4	38.4	13.8
Sum SNAPPERS, JOBFISHES											
Sum GROUPERS, SEABASSES											
Sum POD											
Sum CROAKERS, DRUMS, WEAKF., KOBES								0.0	0.1		
Sum PANDORAS, PORGIES, SEABREAMS,								0.8	2.9		
Sum SHARKS, CHIMAERAS								0.4		0.6	0.6
Sum BATOID FISHES, RAYS								0.2	0.8		0.1
Sum CEPHALOPODS								0.1	0.2	0.1	0.0
Numbers of stations included in analysis, total and by depth strata								15.0	4.0	7.0	4.0

## ANNEX III Swept area estimates: \_

**Central:** Palmerinhas - Benguela. Slope (500-800 m)

SPECIES NAME	Lower limits, Kg/nm						% incidence	Mean dens. t/nm <sup>2</sup>	Mean densities by bottom depth strata t/nm <sup>2</sup>		
	>0	10	30	100	300	1000			500-600	600-700	700-800
Nematocarcinus africanus	2	1	3	2			80	5.15	11.16	1.70	0.59
Lamprogrammus exutus	3	4	2				90	2.44	1.89	2.15	3.45
Hoplostethus cadenati	2	7	2				110	2.40	4.12	1.42	1.09
Yarrella blackfordi	3	4	3				100	2.06	0.50	3.55	2.65
Stereomastis sp.	9	1					100	0.37	0.18	0.34	0.67
Borostomias antarcticus	3	2					50	0.37	0.05	0.99	0.18
Aristeus varidens, female ***	6	1					70	0.33	0.68	0.12	0.09
Stomias boa boa	6	1					70	0.25	0.47	0.11	0.08
Aristeus varidens, male ***	5	1					60	0.24	0.57	0.02	0.02
Talismania longifilis	6						60	0.22		0.18	0.55
Neobythites analis	1	1					20	0.22		0.72	
Laemonema laureysi	3	1					40	0.21	0.52	0.01	
Nezumia aequalis	4	1					50	0.19	0.01	0.10	0.54
Chaceon maritae, female ***	1	1					20	0.19		0.62	
Bassanago albescens	4	1					50	0.13	0.03	0.02	0.37
Benthodesmus tenuis	5						50	0.11	0.23	0.08	
Ariomma bondi	3						30	0.11	0.15	0.18	
Zenopsis conchifer	3						30	0.11	0.07		0.25
Nezumia micronychodon	5						50	0.11	0.05	0.07	0.20
Aristeus varidens	3						30	0.11		0.30	0.05
Triplophos hemingi	6						60	0.09	0.20	0.01	0.03
Coelorinchus simorhynchus	1						10	0.08			0.27
Gadella imberbis	5						50	0.07	0.17		0.01
Etmopterus polli	5						50	0.06	0.07	0.09	
Xenodermichthys copei	8						80	0.06	0.01	0.14	0.03
Merluccius polli	2						20	0.05	0.07	0.07	
Photonectes sp.	3						30	0.04		0.02	0.13
Chaunax sp.	1						10	0.04	0.11		
Centrophorus granulosus	1						10	0.04	0.10		
Anemone - purple	1						10	0.04			0.13
J E L L Y F I S H	1						10	0.04			0.13
Chrysaora hysoscella	1						10	0.04			0.12
Glyphus marsupialis	5						50	0.03	0.00	0.04	0.06
Bathyroconger vicinus	5						50	0.03	0.03	0.02	0.05
Neoharriotta pinnata	2						20	0.03	0.08		
Chaceon maritae	3						30	0.03	0.07		0.01
OMMASTREPHIDAE	1						10	0.03	0.07		
Dibranchius atlanticus	5						50	0.03	0.04	0.02	0.02
Illex coindetii	1						10	0.03		0.09	
Octopoteuthis sicula	2						20	0.03		0.02	0.07
Anemones, pink	1						10	0.03			0.09
Acanthephyra sp.	6						60	0.03	0.04	0.03	0.01
Trichiurus lepturus	3						30	0.03	0.05	0.02	
MELANOSTOMIATIDAE	1						10	0.03	0.06		
Lamprogrammus niger	1						10	0.02			0.07
ANTHOZOA (Sea anemones)	1						10	0.02			0.06
Opisthoteuthis agassizi	1						10	0.02			0.06
Halosaurus ovenii	4						40	0.02		0.03	0.03
Chaceon maritae, male ***	1						10	0.02		0.06	
Diplophos taenia	2						20	0.02	0.04		
Ebinania costaecanarie	1						10	0.02			0.05
Mystriophis rostellatus	1						10	0.02	0.04		
Malacocephalus occidentalis	1						10	0.01	0.03		
Sergestes sp.	3						30	0.01	0.01	0.02	0.01
S H R I M P S	2						20	0.01	0.01		0.01
Plesiopenaeus edwardsianus	1						10	0.00		0.00	
Other fish								0.15	0.16	0.16	0.13
Sum all species								16.61	22.12	13.52	12.34
Sum SNAPPERS, JOBFISHES											
Sum GROUPERS, SEABASSES											
Sum POD											
Sum CROAKERS, DRUMS, WEAFF., KOBES											
Sum PANDORAS, PORGIES, SEABREAMS,											
Sum SHARKS, CHIMAERAS								0.15	0.28	0.10	0.03
Sum BATOID FISHES, RAYS								0.00		0.01	
Sum CEPHALOPODS								0.13	0.09	0.16	0.15
Numbers of stations included in analysis, total and by depth strata								10.00	4.00	3.00	3.00

## ANNEX III Swept area estimates: \_

**South:** Tombua - Cunene. Shelf (20-200 m)

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								0-50m	50-100m	100-200m
	>0	10	30	100	300	1000					
Trachurus trecae	4	3	5	1		4	77.3	39.0	31.4	68.8	3.4
Dentex macrophthalmus	7	1	1	2	3	1	68.2	12.7	0.1	24.1	10.4
Trachurus capensis	5		3			1	40.9	6.3	0.0	13.3	2.9
Pagellus bellottii	5	1	3	1	1		50.0	3.6	10.0	1.1	
Merluccius capensis	3		5	1			40.9	1.8		0.9	5.1
JELLYFISH	2	1	1	1			22.7	1.2	3.9		
Callorhynchus capensis	2		1	1			18.2	1.2	3.2	0.5	
Chelidonichthys capensis	11	2	2				68.2	0.8	1.5	0.6	0.1
Atractoscion aequidens	9	3	1				59.1	0.7	0.3	1.3	0.2
Pterothrissus belloci	5	1	1				31.8	0.5		0.0	1.9
Loligo vulgaris	6	1	2				40.9	0.5	0.8	0.5	0.1
Argyrosomus inodorus	2	1	1				18.2	0.4	1.2	0.2	0.1
Dentex barnardi	3	4					31.8	0.3	0.2	0.6	
Mustelus mustelus	6		1				31.8	0.3	0.7	0.1	0.1
Sepia orbignyana	7	1					36.4	0.2	0.2	0.4	
Umbrina canariensis	5		1				27.3	0.2	0.0	0.5	0.0
Raja miraletus	10	2					54.6	0.2	0.4	0.2	0.0
Trigla lyra	7		1				36.4	0.2	0.0	0.0	0.8
Illex coindetii	8	2					45.5	0.2	0.3	0.3	0.0
Dasyatis marmorata	3	2					22.7	0.2	0.3	0.3	
Chelidonichthys gabonensis	3	2					22.7	0.2	0.1	0.2	0.3
Trichiurus lepturus	4		1				22.7	0.2	0.0	0.4	0.0
Sepia officinalis	4	1					22.7	0.2	0.1	0.3	
Squalus megalops	7		1				36.4	0.2	0.0	0.4	0.0
Myliobatis aquila	6	1					31.8	0.2	0.2	0.0	0.3
Sea cucumber - purple			1				4.6	0.1	0.4		
Galeichthys feliceps	5	1					27.3	0.1	0.3		0.1
Squatina oculata		2					9.1	0.1		0.3	
Pomadasys incisus	1	1					9.1	0.1	0.1	0.2	
Synagrops microlepis	3	1					18.2	0.1			0.5
Rhinobatos albomaculatus	1	1					9.1	0.1	0.4		
Chlorophthalmus atlanticus	1	1					9.1	0.1			0.3
Zeus faber	12						54.6	0.1	0.0	0.1	0.1
Spondyliosoma cantharus	8						36.4	0.1	0.2	0.0	
Dicologlossa cuneata	12						54.6	0.1	0.0	0.1	0.1
Engraulis encrasicolus	4						18.2	0.0	0.1		0.0
Pomatomus saltatrix	4						18.2	0.0	0.1	0.0	
Stromateus fiatola	1						4.6	0.0	0.1		
Dasyatis sp.	1						4.6	0.0			0.1
Rhinobatos blochii	2						9.1	0.0	0.1		
Scorpaena normani	1						4.6	0.0			0.1
Lithognathus mormyrus	2						9.1	0.0	0.0	0.0	
Pomadasys jubelini	2						9.1	0.0	0.0	0.0	
Pontinus accraensis	1						4.6	0.0			0.1
Bathyraja smithii	1						4.6	0.0			0.1
Brotula barbata	2						9.1	0.0			0.1
Mustelus palumbes	1						4.6	0.0	0.0		
Octopus vulgaris	2						9.1	0.0			0.0
Sardinops sagax	3						13.6	0.0	0.0		
Pagrus africanus	1						4.6	0.0		0.0	
Dentex angolensis	1						4.6	0.0		0.0	
Parapenaeus longirostris	1						4.6	0.0			0.0
Solenocera africana	1						4.6	0.0			0.0
Other fish								0.1	0.1	0.1	0.1
Sum all species								73.1	56.9	116.3	27.3
Sum SNAPPERS, JOBFISHES											
Sum GROUPERS, SEABASSES											
Sum CROAKERS, DRUMS, WEAKF., KOBS								1.3	1.4	2.0	0.3
Sum PANDORAS, PORGIES, SEABREAMS,								16.8	10.5	26.0	10.4
Sum SHARKS, CHIMAERAS								1.8	4.0	1.3	0.2
Sum BATOID FISHES, RAYS								0.8	1.3	0.5	0.5
Sum CEPHALOPODS								1.1	1.4	1.5	0.2
Numbers of stations included in analysis, total and by depth strata								22	7	9	6



## ANNEX III Swept area estimates: \_

**South:** Tombua - Cunene. Slope (200-700 m)

SPECIES NAME	SAMPLE DISTRIB. BY CATCH CLASSES						% inci- dence	Mean dens. t/nm <sup>2</sup>	Mean densities by bottom depth strata t/nm <sup>2</sup>		
	Lower limits, Kg/nm								300-400m	400-500m	500-700m
	>0	10	30	100	300	1000					
Helicolenus dactylopterus	2	1		1	1		83.33	9.324	6.819	39.673	0.878
Merluccius paradoxus	1	1	2	1			83.33	3.911	0.217	3.456	6.524
Trachyrincus scabrus	2		3				83.33	2.608	0.017	6.523	3.03
Laemonema laureysi	1	2	1				66.67	1.442	3.423	1.776	0.01
Nezumia aequalis	1	3					66.67	0.797	0.51	1.383	0.794
Hoplostethus cadenati	5		1				100	0.776	1.747	0.159	0.334
Galeus polli	3		1				66.67	0.666	1.947	0.093	0.003
Alepocephalus rostratus	2	1					50	0.496			0.992
Nezumia duodecim		1					16.67	0.367			0.733
Lophius vaillanti	3						50	0.314	0.611		0.221
Pontinus accraensis		1					16.67	0.314	0.943		
S H R I M P S	1	1					33.33	0.265	0.796		
Centrophorus squamosus	3						50	0.238		0.458	0.323
Lamprogrammus exutus	2	1					50	0.223			0.446
Aristeus varidens	3						50	0.202	0.388		0.145
Coelorinchus caelorhincus		1					16.67	0.197	0.59		
Yarrella blackfordi	2	1					50	0.194	0.005	0.019	0.378
Malacocephalus laevis	2						33.33	0.164	0.493		
Chaceon maritae	4						66.67	0.16	0.043	0.206	0.222
Trachurus capensis	4						66.67	0.147	0.183	0.009	0.169
Chlorophthalmus atlanticus	5						83.33	0.147	0.245	0.056	0.112
Todarodes sagittatus	3						50	0.133	0.092		0.205
Dead coral	2						33.33	0.13		0.766	0.004
Neoharriotta pinnata	2						33.33	0.125	0.374		
Zameus (Scymnodon) squamulosus	1						16.67	0.102	0.307		
Chaceon maritae, male ***	1						16.67	0.091			0.182
Halosaurus ovenii	2						33.33	0.089	0.056		0.14
Rajella barnardi	2						33.33	0.078		0.439	0.01
Merluccius capensis	1						16.67	0.06	0.18		
Epigonus telescopus	1						16.67	0.053	0.158		
Bathynectes piperitus	3						50	0.051	0.142		0.008
Lithodes ferox	2						33.33	0.049		0.197	0.032
Bathyroconger vicinus	2						33.33	0.035			0.071
Trachurus trecae	2						33.33	0.035		0.028	0.06
Plesiopenaeus edwardsianus	1						16.67	0.031			0.062
Chaceon maritae, female ***	1						16.67	0.029			0.058
Synaphobranchus kaupii	1						16.67	0.024			0.048
Sardinella aurita	1						16.67	0.023			0.045
Selachophidium guentheri	3						50	0.022			0.045
Pterothrissus belloci	1						16.67	0.019	0.058		
Bathyraja smithii	3						50	0.019	0.031		0.017
Anemones, pink	1						16.67	0.018			0.036
Etmopterus pusillus	1						16.67	0.014			0.029
Etmopterus spinax	1						16.67	0.012			0.024
Loligo vulgaris	1						16.67	0.01	0.031		
Triplophos hemingi	2						33.33	0.01	0.027	0.009	
Glyphus marsupialis	1						16.67	0.01			0.02
Nematocarcinus africanus	1						16.67	0.006	0.017		
Other fish								0.063	0.085	0.056	0.051
Sum all species								24.293	20.535	55.307	16.459
Sum SNAPPERS, JOBFISHES											
Sum GROUPERS, SEABASSES											
Sum POD											
Sum CROAKERS, DRUMS, WEAKF., KOBS											
Sum PANDORAS, PORGIES, SEABREAMS,											
Sum SHARKS, CHIMAERAS								1.157	2.627	0.551	0.379
Sum BATOID FISHES, RAYS								0.097	0.031	0.439	0.027
Sum CEPHALOPODS								0.143	0.123		0.205
Numbers of stations included in analysis, total and by depth strata								6	2	1	3

## ANNEX IV Equations

### Biomass estimates

The stratified estimator of mean density in the entire area is calculated as (Cochran, 1977)

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

where

$L$  is the number of strata,

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

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

$y_{i,k}$  is the density [tonnes/NM<sup>2</sup>] by the  $k^{th}$  tow in stratum  $i$

$n_i$  is the number of tows in the  $i^{th}$  stratum.

The total biomass in the area is calculated by

$$B = \bar{y}_{st} \cdot total\ area \quad (2)$$

The estimated variance of the biomass (var(biomass)) was calculated by:

$$var(biomass) = \left( \sum \frac{W_i^2 s_i^2}{n_i} \right) A^2 \quad (3)$$

where

$$s_i^2 = \frac{\sum_{k=1}^{n_i} (y_{i,k} - \bar{y}_i)^2}{n_i - 1}, \text{ and } A \text{ is total area}$$

The standard error (SE) of the stratified mean was calculated as (Cochran 1977):

$$SE = \sqrt{var(biomass)} \quad (4)$$

The precision for the estimates (CV) was calculated by (Zar 1999<sup>1</sup>):

$$CV = \frac{SE}{biomass} \quad (5)$$

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 is in the interval (see Cochran<sup>2</sup>, 1977)

$$biomass \pm t_{(n-1)}SE \quad (6)$$

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

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<sup>1</sup> Zar JH, 1999, Biostatistical analysis. Prentice Hall, New Jersey, 4. ed., 663 pp.

<sup>2</sup> Cochran, W.G.1977. Sampling Techniques, 3<sup>rd</sup> ed. John Wiley and Sons, N.Y. 228 pp.

## ANNEX V Species codes

### NAN-SIS species codes used in defining the ‘grouped species’ tables

MAIN GROUP	Demersal	Pelagic	Shrimp	Cephalopod	Sharks
	SPA0000	ENG0000	SHR0000	SQU0000	SHA0000
	POD0000	CLU0000			
	SCI0000	CAR0000			
	ARD0000	SCM0000			
	SER0000	SPH0000			
	LUT0000	TRI0000			
	OPDAA00	STR0000			
	MERME00				
PELAGIC	Clupeoids	Carangids	Scombrids	Hairtails	Barracudas
	ENG0000	CAR0000	SCM0000	TRI0000	SPH0000
	CLU0000				
	DUS0000				
DEMERSAL	Seabream	Snappers	Groupers	Grunts	Croakers
	SPADE00	LUT0000	SER0000	HAE0000	SCI0000
	SPADI00			(all species)	
	SPALI00			HAEP000	
	SPAPA00			(commercial species)	
	SPAPR00				
	SPASA00				
	SPASP00				
DEEP-WATER	Seabream	Hake	<i>P.longirostris</i>	<i>A.varidens</i>	<i>N.africanus</i>
	SPADE00	MERME03	SHRPE31	SHRAR22	SHRNE21
	SPADI00	MERME04	(SHRPEP1)	(SHRARA1)	
	SPALI00		(SHRPEP2)	(SHRARA2)	
	SPAPA00				
	SPAPR00				
	SPASA00				
	SPASP00				

## ANNEX VI Catch rates

Families included under each group:

Demersal: Sciaenidae, Sparidae, Pomadasyidae, Ariidae, Serranidae, Lutjanidae, Merlucciidae, Ophidiidae, Lethrinidae.

Pelagic: Scombridae, Sphyrnidae, Trichiuridae, Clupeidae, Engraulidae, Carangidae.

Cephalopods: squids and octopuses.

**Angola north:** catch rates (kg/hour) by **main groups** caught in valid swept area bottom trawl hauls.

Inner shelf (20-70 m).

Number of stations: 20								
Station	Gear depth	Cephalopods	Demersal	Pelagic	Sharks	Shrimps	Other	Total
98	34	0	2060	2726.4	0	1.4	144	4931.8
99	55	8.9	420.5	347.5	11.8	0	283.9	1072.7
105	29.5	7.4	81.8	74.4	2	3.3	65.7	234.6
106	48	0.4	35.9	67.3	0	0	26.4	130
107	63.5	13.3	74.7	403.3	0	0	166.3	657.6
120	66	0.2	8.2	13.6	0	0	53.1	75
121	43	1.6	2.8	9	0	0.1	72.7	86.3
122	29.5	3.9	34.3	2.4	2.6	0.4	12.7	56.3
129	58	0.5	8.6	11.3	0	0	16.8	37.3
130	25	0	481.4	879.1	0	0	383.5	1744
131	28	0	11.7	71.5	0	0.4	113.2	196.7
138	24.5	1.1	54.5	174.3	0	0	38.7	268.6
139	42.5	0.1	183.7	21.9	0	0	11.9	217.6
140	62.5	0.7	79.6	38.6	0	0	9	127.9
155	24.5	1.1	161.4	57.8	0	1	158.2	379.5
156	47	0	64.9	11.8	0	0	28.4	105.1
157	69.5	0.3	14.2	7.7	0	0	50.4	72.6
164	54	0	215.1	18	0	0	110.3	343.4
171	33	0.5	115.1	33	0	1.3	83.9	233.7
172	44.5	2.3	227	4.8	0	0	32.3	266.4
Mean	44.1	2.1	216.8	248.7	0.8	0.4	93.1	561.9
Std dev	15.1	3.6	453.7	620.1	2.7	0.8	97.2	1107.4
% Catch		0.4	38.6	44.3	0.1	0.1	16.6	100.0

## ANNEX VI Catch rates

**Angola north:** catch rates (kg/hour) by **main groups** caught in valid swept area bottom trawl hauls.

Outer shelf (71-200 m).

Number of stations: 29								
Station	Gear depth	Cephalopods	Demersal	Pelagic	Sharks	Shrimps	Other	Total
100	76	2.9	761.6	805.7	0	0	144.4	1714.7
101	114	7.6	98.1	71.2	0	0.5	147.4	324.8
108	80.5	5.9	604.3	471.9	0	0	189.8	1271.8
109	160	6.2	217.6	168.3	0	6.2	1170.3	1568.8
117	142.5	32.7	95	27.8	0	0	1097.4	1252.9
118	94.5	10.1	277.8	163.2	0	0	60.7	511.8
119	71	1.3	31.4	28.2	0	0	77.1	138
125	167.5	58.7	40	54.9	0	1.5	633	788.1
126	105.5	1.8	96.4	318.5	0	0	83.3	500
127	86.5	1.2	40.5	14.8	0	0	58.4	114.9
128	71	0	0	0	0	0	0	0
132	73	2.2	95.3	10.3	0	0	22.2	130
136	118.5	1.1	272.2	567.2	0	0	137.4	977.9
137	88.5	6.8	14.7	7.5	0	0	116.6	145.6
141	87	7.8	100.3	68.2	0	0	83.4	259.6
142	118	6.2	130.2	56.1	0	0	67.6	260.2
148	120.5	7.6	232.3	209.8	0	0	358.6	808.3
149	83.5	0.8	399.8	30.6	0	0	14.2	445.4
150	120.5	3	91.3	700.1	0	0	94.1	888.6
151	152.5	3.3	56.8	7.2	0	0	111.3	178.7
158	115.5	0.3	133.7	0.2	3.2	0	31.1	168.6
159	179	11.8	117.6	18.5	0	1.2	601.3	750.3
165	82	0.1	199.1	71.4	0	0.2	28.4	299.2
166	109.5	9	237.6	55.9	4.6	0	41.4	348.6
167	123.5	1.9	50.6	22.4	0	0	13.6	88.5
173	73.5	2	73.8	1.5	0	0	16.3	93.6
174	93	1.1	51.9	41	0	0	4	98
175	110	1.8	119.2	87.8	5.7	0.1	30.6	245.1
176	118.5	3.6	78.1	28.9	0	0	20.1	130.7
Mean	108.1	6.8	162.7	141.7	0.5	0.3	188.1	500.1
Std dev	30.1	11.8	172.1	218.8	1.4	1.2	305.2	474.9
% Catch		1.4	32.5	28.3	0.1	0.1	37.6	100.0

## ANNEX VI Catch rates

**Angola north:** catch rates (kg/hour) by **main groups** caught in valid swept area bottom trawl hauls.

Slope (201-800 m).

Number of stations: 34								
Station	Gear depth	Cephalopods	Demersal	Pelagic	Sharks	Shrimps	Other	Total
78	315.5	1.9	991.2	6.4	0	5.8	301.1	1306.3
79	218.5	9.1	232.5	19.9	0	74.7	1058.6	1394.7
102	416	0	47	6.8	49.9	347.1	133.4	584.2
103	530.5	5.3	222.6	1.6	0.5	518.6	131	879.6
104	713	8.5	43.8	0	0	221.2	426	699.5
110	215.5	17.5	163.7	2.1	0	16.5	469	668.9
111	310	10.7	344.7	8	0	6.2	674.6	1044.1
112	462.5	6.4	58.2	11.4	6.4	324.9	202.2	609.4
113	598	0	69.6	11.2	0	291.5	713.3	1085.5
114	699.5	12.3	103.1	0	0	161.1	338.2	614.7
115	716	8.9	82.8	0	0	253.3	964.1	1309.1
116	418	0	903.3	0	15.2	167.5	375.2	1461.3
123	614.5	1.9	62.1	0.9	1.4	233.6	219.3	519.2
124	520	0	764.8	12.4	17.6	627.2	362.7	1784.8
133	260.5	6.8	71.3	6.9	0	16.2	166.6	267.8
134	365.5	8.1	83.9	4.4	10.5	176	217.1	499.9
135	634	8	30.4	1.1	0	181.4	195.2	416.1
143	705	5.2	7	0	0.5	4	255.5	272.4
144	428	0	47.9	0.7	26.7	64	347.4	486.8
145	529	6.3	73.7	2.8	7.8	305.5	186.4	582.6
146	437	0	22.5	8.3	1.3	22.5	403.6	458.2
147	229	59.8	540.2	0	0	43.8	629.7	1273.5
152	272	21.6	47.4	0.6	0	34.2	197	300.8
153	314	4.7	45.3	4.8	0	1.9	233.9	290.6
154	621.5	10.8	46.8	0.7	9.4	91.1	321.7	480.5
160	267.5	9.8	32.7	7.5	0	89.1	756.4	895.4
161	449.5	1.1	19	13.2	11.1	21.6	101	167
162	716	0	293.3	4.3	4.3	7.2	1095.3	1404.4
163	517	3.2	32.5	4.3	11.8	30.8	164	246.6
168	230.5	12.6	90.9	5.2	0	53	322.2	483.8
169	329	3.1	26.1	7.1	0	9.6	115.1	160.9
170	668	0	54.5	0	3.7	7.3	184.3	249.8
177	353.5	6.7	15.8	6.9	0	2.7	396.6	428.8
178	758	6.8	0.7	2.3	3.2	6.7	322.7	342.5
Mean	465.65	7.56	166.80	4.76	5.33	129.94	381.78	696.17
Std dev	177	10.5	250.9	4.8	10	156	281.5	441.2
% Catch		1.1	24.0	0.7	0.8	18.7	54.8	100.0

## ANNEX VI Catch rates

**Angola north:** catch rates (kg/hour) by main demersal groups caught in valid swept area bottom trawl hauls. Inner shelf (20-70 m).

Number of stations: 20								
Station	Gear depth	Croakers	Groupers	Grunts	Seabream	Snappers	Other	Total
98	34	0	0	0	116.8	0	4815	4931.8
99	55	0	0	193.7	204.8	0	674.2	1072.7
105	29.5	12.7	0	0	3	0	219	234.6
106	48	7.5	0	1.2	26.2	0	95.1	130
107	63.5	0	1.2	0	30.2	0	626.2	657.6
120	66	0	0	0	7.6	0	67.4	75
121	43	0	0.9	0	1	0	84.5	86.3
122	29.5	0	0	26.1	7.8	0	22.5	56.3
129	58	0	0	6.2	2.4	0	28.7	37.3
130	25	12.8	0	58.9	3.8	0	1668.6	1744
131	28	0	1.4	4.2	0.3	0	190.8	196.7
138	24.5	0.2	0	38.7	7.9	0	221.7	268.6
139	42.5	0	2.7	0.2	180.3	0	34.4	217.6
140	62.5	0	0.9	0	78.4	0	48.6	127.9
155	24.5	15.7	0	28.1	6.9	0	328.8	379.5
156	47	18.5	0	5.4	32	0	49.2	105.1
157	69.5	0	0	0	14.2	0	58.4	72.6
164	54	4.1	0	184.1	27	0	128.3	343.4
171	33	36.9	0	0	0.9	0	195.9	233.7
172	44.5	0	6.9	0	220.1	0	39.4	266.4
Mean	44.1	5.4	0.7	27.3	48.6	0	479.8	561.9
Std dev	15.1	9.6	1.6	57.6	72.3	0	1089.2	1107.4
% Catch		1.0	0.1	4.9	8.6	0.0	85.4	100.0



## ANNEX VI Catch rates

**Angola north:** catch rates (kg/hour) by main demersal groups caught in valid swept area bottom trawl hauls.

B. Outer shelf (71-200 m).

Number of stations: 29								
Station	Gear depth	Croakers	Groupers	Grunts	Seabream	Snappers	Other	Total
100	76	16	0	274	66.3	0	1358.3	1714.7
101	114	17.1	0.2	0	53.1	0	254.4	324.8
108	80.5	16.3	16.2	0	60.4	0	1179	1271.8
109	160	27	26.7	0	76.6	0	1438.5	1568.8
117	142.5	0	0	0	16	0	1236.9	1252.9
118	94.5	0	0	0	32.4	0	479.4	511.8
119	71	0	1.3	0	16.6	0	120	138
125	167.5	1.1	0	0	7.3	0	779.7	788.1
126	105.5	0	0	0	78.1	0	421.9	500
127	86.5	0	0	14.2	26.4	0	74.4	114.9
128	71	0	0	0	0	0	0	0
132	73	5.9	1	66.6	21.7	0	34.8	130
136	118.5	0	0	0	263.5	0	714.4	977.9
137	88.5	0	0	1.2	12.8	0	131.6	145.6
141	87	0	0	0	100.3	0	159.3	259.6
142	118	24.2	1.1	0	80.4	0	154.4	260.2
148	120.5	82.1	0	0	79.9	0	646.3	808.3
149	83.5	6	0	0.9	392.9	0	45.6	445.4
150	120.5	0	0	0	89.8	0	798.8	888.6
151	152.5	1	0	0	41.6	0	136.1	178.7
158	115.5	31.3	0	0	100.7	0	36.5	168.6
159	179	43.4	0	0	20.9	0	686	750.3
165	82	1.1	0	1.3	70.7	0	226.1	299.2
166	109.5	7.4	0	0	16.5	0	324.7	348.6
167	123.5	1	0	0	39.3	0	48.2	88.5
173	73.5	3.4	3	0	59.3	0	28	93.6
174	93	0	15.5	0	34.9	0	47.6	98
175	110	0	17.8	0	75	0	152.3	245.1
176	118.5	30.5	0	0	40.9	0	59.3	130.7
Mean	108.1	10.9	2.9	12.4	68.1	0	405.9	500.1
Std dev	30.1	18.3	6.8	51.9	79.6	0	442	474.9
% Catch		2.2	0.6	2.5	13.6	0.0	81.2	100.0

## ANNEX VI Catch rates

**Angola north:** catch rates (kg/hour) by main pelagic groups caught in valid swept area bottom trawl hauls.

Inner shelf (20-70 m).

Number of stations: 20								
Station	Gear depth	Barracuda	Carangids	Clupeoids	Hairtails	Scombrids	Other	Total
98	34	59	1390.5	1274.6	0.3	2	2205.4	4931.8
99	55	118.7	222.1	6.7	0	0	725.2	1072.7
105	29.5	8.4	64.3	1.8	0	0	160.2	234.6
106	48	0.7	66.5	0.1	0	0	62.7	130
107	63.5	0	345.2	1.4	0	0	311	657.6
120	66	0.2	13	0.3	0	0	61.4	75
121	43	0	9	0	0	0	77.3	86.3
122	29.5	0	2.4	0	0	0	53.9	56.3
129	58	0	11.1	0.2	0	0	26	37.3
130	25	56.5	796.3	26.3	0	0	864.9	1744
131	28	4.4	4.4	62.5	0.1	0	125.3	196.7
138	24.5	28.8	54.8	89	1.7	0	94.3	268.6
139	42.5	8.8	11.5	0	0	1.6	195.7	217.6
140	62.5	0.5	38.1	0	0	0	89.4	127.9
155	24.5	31.4	8.9	1.4	5.2	10.9	321.7	379.5
156	47	4.9	4.9	0	2	0	93.3	105.1
157	69.5	0	4.1	0	3.6	0	64.9	72.6
164	54	0	14.5	0	3.4	0	325.4	343.4
171	33	5.9	19.9	1.5	5	0	201.3	233.7
172	44.5	0	3.4	0	0	0	263	266.4
Mean	44.1	16.4	154.3	73.3	1.1	0.7	316.1	561.9
Std dev	15.1	30.3	346	283.7	1.8	2.4	496.4	1107.4
% Catch		2.9	27.5	13.0	0.2	0.1	56.3	100.0

## ANNEX VI Catch rates

**Angola north:** catch rates (kg/hour) by main pelagic groups caught in valid swept area bottom trawl hauls.

Outer shelf (71-200 m).

Number of stations: 29								
Station	Gear depth	Barracuda	Carangids	Clupeoids	Hairtails	Scomberids	Other	Total
100	76	1.9	796.5	0	7.3	0	909	1714.7
101	114	0	0	0	71.2	0	253.6	324.8
108	80.5	14.9	451.2	0	2.6	0	803	1271.8
109	160	0	4.7	0	163.6	0	1400.4	1568.8
117	142.5	0	0	0	27.8	0	1225.1	1252.9
118	94.5	0	148.4	0.1	14.8	0	348.6	511.8
119	71	1.1	27	0.1	0	0	109.8	138
125	167.5	0	7.4	0	47.5	0	733.2	788.1
126	105.5	0	309.9	0.5	8.1	0	181.5	500
127	86.5	0	13.4	0	1.4	0	100.1	114.9
128	71	0	0	0	0	0	0	0
132	73	6.1	1.1	3.1	0	0	119.7	130
136	118.5	0	567.2	0	0	0	410.7	977.9
137	88.5	0	6.9	0.6	0	0	138.1	145.6
141	87	0	66.2	2	0	0	191.4	259.6
142	118	0	55.7	0.5	0	0	204	260.2
148	120.5	0	122.3	0	87.5	0	598.5	808.3
149	83.5	1.5	29	0.1	0	0	414.8	445.4
150	120.5	0	700.1	0	0	0	188.5	888.6
151	152.5	0	0	0	7.2	0	171.4	178.7
158	115.5	0	0.2	0	0	0	168.4	168.6
159	179	0	0	0	18.5	0	731.8	750.3
165	82	0	32.3	0.6	38.6	0	227.8	299.2
166	109.5	0	36.7	0	19.2	0	292.7	348.6
167	123.5	0	14.8	0	7.7	0	66.1	88.5
173	73.5	0	1.5	0	0	0	92.1	93.6
174	93	0	40.9	0.1	0	0	57	98
175	110	0	85.1	0	2.7	0	157.3	245.1
176	118.5	0	2.6	0	26.4	0	101.8	130.7
190	118.5	0	45.8	0	0	0	113.3	159.1
Mean	108.5	0.9	118.9	0.3	18.4	0	350.3	488.7
Std dev	29.6	2.9	218.3	0.7	35.1	0	355.8	470.8
% Catch		0.2	24.3	0.1	3.8	0.0	71.7	100.0

## ANNEX VI Catch rates

**Angola north:** catch rates (kg/hour) by main deep-water groups caught in valid swept area bottom trawl hauls.

Slope (200-800 m).

Number of stations: 34								
Station	Gear depth	A.varidens	Hake	N.africana	P.longirostris	Seabream	Other	Total
78	315.5	0	991.2	0	5.8	0	309.4	1306.3
79	218.5	0	71.8	0	74.7	66.6	1181.6	1394.7
102	416	10.3	47	335.3	0	0	191.7	584.2
103	530.5	17.8	0	497	0	0	364.7	879.6
104	713	1	0	217.4	0	0	481.1	699.5
110	215.5	0	44.8	0	16.5	59.8	547.9	668.9
111	310	0	344.7	0	6.2	0	693.2	1044.1
112	462.5	13.2	1.8	309.3	0	0	285.1	609.4
113	598	5.5	0	278.8	0	0	801.3	1085.5
114	699.5	1.3	0	158.7	0	0	454.7	614.7
115	716	0.9	0	250.2	0	0	1058.1	1309.1
116	418	1.9	900.4	162.9	0	0	396.1	1461.3
123	614.5	5.5	0	228.1	0	0	285.6	519.2
124	520	63.3	2.9	552.5	0	0	1166.1	1784.8
133	260.5	0.2	65	0	11.6	0	191	267.8
134	365.5	7.6	83.9	159.6	5.4	0	243.6	499.9
135	634	4.1	3.2	176.6	0	0	232.2	416.1
143	705	2.6	0	0.7	0	0	269	272.4
144	428	1.8	47.9	49.1	1.3	0	386.7	486.8
145	529	12.4	0	287.8	0	0	282.4	582.6
146	437	5.3	22.5	11.1	4.8	0	414.5	458.2
147	229	0	10.1	0	43.8	313.5	906.1	1273.5
152	272	0	24.9	0	34.2	7.5	234.2	300.8
153	314	0.2	45.3	0	1.7	0	243.4	290.6
154	621.5	7.1	0.0	80.9	0.0	0.0	392.5	480.5
160	267.5	0	16.2	0	89.1	1.1	789	895.4
161	449.5	13.5	17.1	7.1	0	0	129.4	167
162	716	1.9	5.2	0	0	0	1397.3	1404.4
163	517	12	1.9	17.2	0	0	215.4	246.6
168	230.5	0	13.6	0	52.8	25.7	391.6	483.8
169	329	0	26.1	0	9.4	0	125.4	160.9
170	668	4.1	7.9	0	0	0	237.8	249.8
177	353.5	2.7	15.8	0	0	0	410.3	428.8
178	758	4	0	1.1	0	0	337.5	342.5
Mean	465.65	5.89	82.68	111.22	10.51	13.95	471.94	696.17
Std dev	177.0	11.1	224.2	152.6	21.9	54.3	338	441.2
% Catch		0.8	11.9	16.0	1.5	2.0	67.8	100.0

## ANNEX VI Catch rates

**Angola central:** Catch rates (kg/hour) by main groups caught in valid swept area bottom trawl hauls.

Inner shelf (20-70 m)

Number of stations: 20								
Station	Gear depth	Cephalopods	Demersal	Pelagic	Sharks	Shrimps	Other	Total
32	66	0	81.4	17.5	0	0	1.1	2248.9
36	56	1.9	59.7	28	0	0	10.3	3449.1
38	58.5	0.3	16.2	77.3	0	0	6.2	1956
42	32	0	52.9	34.4	0	0.1	12.7	1734.6
43	62	0	1.7	97.8	0	0	0.4	511.7
51	62	10.6	58.6	20.4	0	0	10.4	605.2
52	28	0	30.6	59.2	0	0	10.2	2344.6
53	24	0.1	62.1	23	0	0	14.7	1606.7
54	66.5	0	72.5	21.7	0	0	5.8	1824.7
62	51.5	1.8	38.4	26	0	0	33.9	456.4
63	36.5	0.4	63	17.6	0	0	19	587
64	31	0	47	26.1	0	0.6	26.4	663.7
72	51.5	6.1	49.2	13.5	0	0	31.2	207.4
73	49.5	0	69	15.8	0	0	15.3	393.1
84	62	7.6	10.1	13.1	7	0	62.1	190.2
85	33	0.1	7.9	66.2	0	0	25.7	251.7
86	32	3	12	22.8	0	0	62.2	83.3
94	28	0	53.4	30	0	0	16.7	394.2
96	51.5	0.5	13.9	69.3	0	0	16.3	360.2
97	26.5	0	56.1	20.7	0	0	23.1	593.6
Mean	45.4	9	520	371.6	0.7	0.3	121.6	1023.1
Std dev		15.1	19.9	607.9	437.4	3	0.9	87.6
% Catch		0.9	50.8	36.3	0.1	0.0	11.9	100.0

## ANNEX VI Catch rates

**Angola central:** Catch rates (kg/hour) by main groups .

Outer shelf (71-200 m).

Number of stations: 23								
Station	Gear depth	Cephalopods	Demersal	Pelagic	Sharks	Shrimps	Other	Total
31	111	3.6	42.7	27.8	0	0	26	578.5
33	108.5	0	9.6	82.6	0	0	7.8	715
34	97.5	0	5.4	93.3	0	0	1.3	1688.6
35	75.5	2.4	32.6	43.1	0	0	21.8	532
39	72.5	5.4	22.8	26.9	0	0	45	219.7
40	102	0	9.5	80.1	0	0	10.4	1305.7
44	106.5	0.3	50.2	35	0	0	14.5	337.1
50	104	1.9	31.7	2.8	0	0	63.6	273.1
55	152.5	0.9	18.9	0.3	0	0.2	79.7	620.8
61	115	0	3.4	11.3	0	0	85.4	3752.2
65	87.5	0.8	9.2	72.9	0	0	17.1	219.6
66	147	0.3	4.5	2.8	0	0	92.4	1226
67	132	15.1	23.1	0	0	0	61.8	320.6
71	93.5	0.3	5.4	84.7	0	0	9.6	2138.6
74	97	0	35.2	57.1	0	0	7.6	2573.7
75	174.5	0.4	0.2	0	0	0	99.4	2240.2
76	107	2.1	18.8	69.6	0	0	9.5	680.3
83	85	4.9	7.3	61.9	0	0	25.8	751.1
87	94	0.8	7.7	89.7	0	0	1.8	612.1
88	124	0.1	27.7	57.1	0	0	15.1	765.7
92	116.5	0	44.3	0	0	0	55.7	4047.1
93	78.5	1.7	17.7	72.7	0	1.4	6.5	203.9
95	112.5	3.3	5.3	36.8	0	0	54.6	1099.4
Mean	108.4	9.7	207	441.9	0	0.2	510.7	1169.6
Std dev		25	13.5	389.5	534.9	0	0.6	865
% Catch		0.8	17.7	37.8	0.0	0.0	43.7	100.0

## ANNEX VI Catch rates

**Angola central:** Catch rates (kg/hour) by main groups .

Slope (201-800 m).

Number of stations: 22								
Station	Gear depth	Cephalopods	Demersal	Pelagic	Sharks	Shrimps	Other	Total
37	715.5	2.6	5.9	0	1	3.4	87.2	295.1
41	264.5	0.3	25.7	0	0	2	72.1	2159
45	467	1	1.4	4	5	13.5	75.1	227.7
46	647.5	1.4	24.9	1	0.7	5.6	66.4	309.8
47	658	0.5	8.9	0.9	0.3	35.4	54	417.7
48	347	0	70	0.2	1.4	2.5	26	1198.8
49	374	0	15.6	0	5.9	33.5	45	846.5
56	528	0	5.4	2.4	1	61.9	29.3	814
57	490	0	8.6	9.3	1.5	49.5	31.1	538.3
58	333.5	0	44.8	0.1	0	3.7	51.4	1838.5
59	386.5	0	8.9	0	4.4	52.6	34.1	408.3
60	508	1.7	10.5	0.6	0.9	35.3	51.1	653.7
68	340.5	1	5.4	0	0	3.8	89.8	923.7
69	729.5	1.1	48.7	0	0	1.1	49.1	551.3
70	511	0	11.8	0.3	0	77.6	10.4	769
77	380.5	0	65.2	0.8	2.1	10.5	21.4	1667.8
80	240.5	0.6	10.8	4.2	0	10.2	74.2	658
81	519	0	8.9	1.7	4.5	40.5	44.5	429.3
82	610.5	1.7	31.3	0.3	1	7.1	58.6	532.8
89	208.5	0.7	7.2	5	0	0.6	86.5	1311.2
90	721	0	11.7	0	0	21.8	66.5	264.9
91	437	0.5	0.4	0.7	2.1	55.4	40.8	323.1
Mean	473.5	3.3	208.1	9.7	8.7	144.6	404.7	779
Std dev	dev	158.2	3.8	314.8	17.3	12.9	159.5	375.6
% Catch		0.4	26.7	1.2	1.1	18.6	52.0	100.0

## ANNEX VI Catch rates

### Angola central

Catch rates (kg/hour) by main demersal groups caught in valid swept area bottom trawl hauls.

Inner shelf (20-70 m).

Number of stations: 20									
Station	Gear depth	Croakers	Groupers	Grunts	Hake	Seabream	Snappers	Other	Total
32	66	2.4	0	46.1	0	1.8	0	49.6	2248.9
36	56	1.9	0	11.2	0	6.3	0	80.7	3449.1
38	58.5	0.5	0	6.2	0	8.7	0	84.6	1956
42	32	2.8	0	36.9	0	0.5	0	59.9	1734.6
43	62	0	0	0.2	0	1.5	0	98.3	511.7
51	62	0.3	0.1	36.6	0	20	0	43.1	605.2
52	28	3.7	0	3.4	0	0	0	92.9	2344.6
53	24	7.1	0	25.1	0	0.9	0	66.9	1606.7
54	66.5	0	0	0	0	1.1	0	98.9	1824.7
62	51.5	2.8	0.1	0.8	0	11.5	0	84.8	456.4
63	36.5	13.9	0	7	0	0	0	79	587
64	31	10.7	0	0.6	0	0	0	88.7	663.7
72	51.5	6.4	0.8	19.3	0	10.4	0	63.2	207.4
73	49.5	0	0	51.1	0	0.7	0	48.2	393.1
84	62	0	0.1	0	0	9.8	0	90.1	190.2
85	33	0	0.6	3.8	0	2.6	0	93	251.7
86	32	0	0	8.5	0	3.6	0	88	83.3
94	28	0	0.3	0.4	0	4.4	0	94.9	394.2
96	51.5	0	0	0.7	0	13.2	0	86.1	360.2
97	26.5	0	1.8	6.7	0	47.1	0	44.5	593.6
Mean	45.4	27.8	0.9	162.1	0	52.3	0	780	1023.1
Std dev	15.1	37.3	2.3	270.3	0	80.1	0	770.2	941
% Catch		2.7	0.1	15.8		5.1	0.0	76.2	100



## ANNEX VI Catch rates

**Angola central** Catch rates (kg/hour) by main demersal groups:.

Outer shelf (71-200 m).

Number of stations: 23									
Station	Gear depth	Croakers	Groupers	Grunts	Hake	Seabream	Snappers	Other	Total
31	111	3	0	0	0	39.7	0	57.3	578.5
33	108.5	0.8	0	0.4	0	8.2	0	90.6	715
34	97.5	0.6	0	0	0	4.8	0	94.6	1688.6
35	75.5	1	0	24.7	0	5.9	0	68.3	532
39	72.5	0.5	0	2.7	0	19.6	0	77.2	219.7
40	102	0.5	0	0	0	9	0	90.5	1305.7
44	106.5	14.7	2.1	0	0	33.5	0	49.8	337.1
50	104	0	0	0	0	22.2	0	77.8	273.1
55	152.5	0	0	0	10.1	2.3	0	87.7	620.8
61	115	0.5	0	0	0.3	0.9	0	98.4	3752.2
65	87.5	0	0	0	0	5	0	95	219.6
66	147	0.2	0	0	0.4	2.8	0	96.7	1226
67	132	1.9	0	0	0	12.7	0	85.4	320.6
71	93.5	0	0	0	0	0.9	0	99.1	2138.6
74	97	7.4	0	0	0	4.9	0	87.8	2573.7
75	174.5	0	0	0	0	0.2	0	99.8	2240.2
76	107	1.9	0	0	0	16.7	0	81.4	680.3
83	85	0	0	0	0	2.8	0	97.2	751.1
87	94	1.1	0	0	0	6.4	0	92.5	612.1
88	124	0.5	0	0	0	27.2	0	72.3	765.7
92	116.5	0.4	0	0	0	6.2	0	93.4	4047.1
93	78.5	3.2	0	0	0	5.6	0	91.1	203.9
95	112.5	0.8	0	0	0	3.2	0	95.9	1099.4
Mean	108.4	16	0.3	6.1	3.4	73.7	0	1070.1	1169.6
Std dev	25	39.3	1.4	27.3	13.1	71.7	0	1072.6	1095.6
% Catch		1.4	0.0	0.5	0.3	6.3	0.0	91.5	100

## ANNEX VI Catch rates

**Angola central** Catch rates (kg/hour) by main **deep-water groups** caught in valid swept area bottom trawl hauls .

Slope (201-800 m).

Number of stations: 22								
Station	Gear depth	A.varidens	Hake	N.africana	P.longirostris	Seabream	Other	Total
37	715.5	1.4	0	0	0	0	98.6	295.1
41	264.5	0	14	0	2	11.2	72.8	2159
45	467	10.7	1.4	2.5	0	0	85.3	227.7
46	647.5	3.6	2.2	1.2	0	0	93	309.8
47	658	4	0	30.7	0	0	65.4	417.7
48	347	0.8	70	0	1.6	0	27.5	1198.8
49	374	1.7	12.5	29.1	0.4	0	56.3	846.5
56	528	13.3	0	48.5	0	0	38.1	814
57	490	2.3	0	46.8	0	0	50.9	538.3
58	333.5	2.2	44.8	0	1.5	0	51.5	1838.5
59	386.5	6.4	5.4	46	0.2	0	42	408.3
60	508	2.8	0	32.1	0	0	65.1	653.7
68	340.5	3.1	5.4	0.1	0.5	0	91	923.7
69	729.5	0.8	0	0	0	0	99.2	551.3
70	511	1.4	0	76.2	0	0	22.4	769
77	380.5	0.8	65.2	9.7	0	0	24.3	1667.8
80	240.5	0	3.3	0	10.2	3.3	83.2	658
81	519	1.6	2.1	37.9	0	0	58.4	429.3
82	610.5	2.5	0	4.1	0	0	93.3	532.8
89	208.5	0	0.1	0	0.6	2.7	96.6	1311.2
90	721	2.1	0	19.6	0	0	78.4	264.9
91	437	5	0.4	49.4	0	0	45.2	323.1
Mean	473.5	17.5	148.8	117	7.9	13.6	474.3	779
Std dev	158.2	22.7	322.4	154.2	17.2	51.8	371.3	540
% Catch		2.2	19.1	15.0	1.0	1.7	60.9	100

## ANNEX VI Catch rates

**Angola south:** Catch rates (kg/hour) by main groups caught in valid swept area bottom trawl hauls.

Inner shelf (20-70 m).

Number of stations: 9								
Station	Gear depth	Demersal	Pelagic	Rays	Sharks	Squids	Other	Total
1	25.5	340.9	135	21.8	741.2	3.4	649.5	1891.8
10	60.5	262.6	147.7	2	0	27.1	84.8	524.1
11	23.5	10.4	25.7	40.5	14.9	7.6	382.9	482.1
17	25.5	6.9	184.1	19.2	98.8	51.4	80.9	441.3
22	21.5	89.9	0	8.8	31.4	67.5	14.1	211.7
23	53	3807.2	5194.3	0	0	163.1	55.1	9219.8
25	55	222.4	4.6	65.8	28.8	0.9	2.4	324.8
26	37	1726.7	7401.9	136.2	0	156.3	175.9	9596.9
27	42	331.5	43	36.3	18.1	37	32.4	498.4
Mean	38.2	755.4	1459.6	36.7	103.7	57.2	164.2	2576.8
Std dev	15.1	1259.6	2798.9	42.7	241	62.3	216.4	3905.6
% Catch		29.3	56.6	1.4	4.0	2.2	6.4	100

Outer shelf (71-200)

Number of stations: 10									
Station	Gear depth	Demersal	Pelagic	Rays	Sharks	Shrimps	Squids	Other	Total
3	134.5	1935.4	11.6	0	3.2	0	2.6	381.2	2334
4	174	225.9	2.5	0	1.7	6.8	0.1	84.6	321.6
7	143.5	310	286.8	32.4	3.1	0	7.3	288.8	928.4
8	115	529.9	270.6	54.8	23.9	0	0.9	24.4	904.5
9	96	633.3	4562	0	0	0	25.2	5.5	5225.9
16	95.5	1615.7	7763	0	0	0	39.9	35.5	9454
18	78	1278	6566.4	54.3	147.9	0	201.6	63.4	8311.7
19	121.5	34.7	409.6	0	0	0	15.3	9.3	468.8
20	125.5	42.9	215.2	0.6	0	0	10.1	21.5	290.4
24	73	7	0	1.3	96.3	0	0	36.7	141.4
Mean	115.7	661.3	2008.8	14.3	27.6	0.7	30.3	95.1	2838.1
Std dev	31.1	703.1	3058.9	23.5	51.8	2.1	61.6	130.5	3540
% Catch		23.3	70.8	0.5	1.0	0.0	1.1	3.4	100.0

Slope (201-800 m).

Number of stations: 6									
Station	Gear depth	Demersal	Pelagic	Rays	Sharks	Shrimps	Squids	Other	Total
5	361.5	23.8	11	0	24.3	42.4	5.5	213	319.9
6	581.5	234.7	8.3	1.9	1.6	0	18.4	83.8	348.7
13	454.5	110	1.2	14	17.5	0	0	1616.9	1759.5
14	650	87	17.9	0	27.6	0	4	197.5	334.1
15	367	2.3	0	1.8	128.9	28.6	1.8	717.9	881.3
21	606.5	372.2	0	1	4.9	21	0	499.4	898.5
Mean	503.5	138.3	6.4	3.1	34.1	15.3	5	554.7	757
Std dev	126	140.7	7.3	5.4	47.6	18.1	7	569.9	561.6
% Catch		18.3	0.8	0.4	4.5	2.0	0.7	73.3	100

## ANNEX VI Catch rates

**Angola south:** Catch rates (kg/hour) by main demersal groups caught in valid swept area bottom trawl hauls.

Inner shelf (20-70 m).

Number of stations: 9										
Station	Gear depth	Croakers	Groupers	Grunts	Hake	Mullidae	Seabream	Snappers	Other	Total
1	25.5	259.2	0	5.1	0	0	0	0	1627.4	1891.8
10	60.5	60.5	0	0	2.1	0	200	0	261.5	524.1
11	23.5	7.6	0	0	0	0	0.7	0	473.8	482.1
17	25.5	0	0	0	0	0	6.9	0	434.3	441.3
22	21.5	0	0	0	0	0	89.9	0	121.9	211.7
23	53	22.1	0	0	0	0	3785.1	0	5412.5	9219.8
25	55	222.2	0	0	0	0	0.2	0	102.3	324.8
26	37	59.2	0	24.3	0	0	1643.2	0	7870.2	9596.9
27	42	3.2	0	0	0	0	328.3	0	166.9	498.4
Mean	38.2	70.5	0	3.3	0.2	0	672.7	0	1830.1	2576.8
Std dev	15.1	99.8	0	8.1	0.7	0	1280.1	0	2834.5	3905.6
% Catch		2.7	0.0	0.1	0.0	0.0	26.1	0.0	71.0	100

Outer shelf (71-200 m).

Number of stations: 10										
Station	Gear depth	Croakers	Groupers	Grunts	Hake	Mullidae	Seabream	Snappers	Other	Total
3	134.5	7.1	0	0	396.8	0	1520	0	410.2	2334
4	174	0	0	0	223.4	0	1.6	0	96.6	321.6
7	143.5	9.8	0	0	226	0	65.5	0	627.2	928.4
8	115	0	0	0	134.9	0	390.6	0	379	904.5
9	96	16	0	0	107.9	0	509.5	0	4592.6	5225.9
16	95.5	46.5	0	0	164	0	1405.1	0	7838.3	9454
18	78	137.6	0	0	0	0	1140.4	0	7033.7	8311.7
19	121.5	24.4	0	0	4.8	0	5.5	0	434.1	468.8
20	125.5	11.3	0	0	10.4	0	20.1	0	248.6	290.4
24	73	4.2	0	0	0	0	2.8	0	134.3	141.4
Mean	115.7	25.7	0	0	126.8	0	506.1	0	2179.5	2838.1
Std dev	31.1	41.7	0	0	131	0	618.3	0	3082	3540
% Catch		0.9	0.0	0.0	4.5	0.0	17.8	0.0	76.8	100

Slope (201-800m)

Number of stations: 6									
Station	Gear depth	A.varidens	Hake	N.africana	P.longirostris	Seabream	Other	Total	
5	361.5	0.7	23.8	0	0	0	295.4	319.9	
6	581.5	0	231.5	0	0	0	117.2	348.7	
13	454.5	0	110	0	0	0	1649.6	1759.5	
14	650	0	82.4	0	0	0	251.7	334.1	
15	367	21.8	1.3	1	0	0	857.1	881.3	
21	606.5	13.4	334	0	0	0	551.1	898.5	
Mean	503.5	6	130.5	0.2	0	0	620.3	757	
Std dev	126	9.4	128.4	0.4	0	0	568.3	561.6	
% Catch		0.8	17.2	0.0	0.0	0.0	81.9	100	

## **ANNEX VII Instruments and fishing gear used**

The Simrad ER-60 scientific echo sounder is equipped with keel-mounted transducers with nominal operating frequencies of 18, 38, 120 and 200 kHz. All frequencies were run during the survey only for observation of fish and bottom conditions. No scrutinizing of the recordings was done.

Last standard sphere calibrations were carried out 14.12.2013 in Kyunn Phi Lar, MynMar, using Cu-64, Cu-60, WC-38.1 and WC-38.1 spheres for 18, 38,120 and 200 kHz, respectively. The details of the settings of the 38 kHz echo sounder where as follows:

Transceiver-2 menu (38 kHz)	
Transducer depth	5.50 m
Absorbtion coeff.	9,5 dB/km
Pulse duration	medium (1,024ms)
Bandwidth	2,43 kHz
Max power	2000 Watt
2-way beam angle	-20,6dB
gain	26.13 dB
SA correction	-0,71 dB
Angle sensitivity	21.9
3 dB beamwidth	6,75° along ship
6,95° athwardship	
Alongship offset	-0.11°
Athwardship offset	0.05°

Bottom detection menu      Minimum level -40 dB

### **Fishing gear**

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

The bottom trawl has a headline of 31 m, footrope 47 m and 20 mm mesh size in the codend with an inner net of 10 mm mesh size. The trawl height was about 4.5 m and distance between wings during towing about 21 m. The sweeps are 40 m long. The trawl is equipped with a 12" rubber bobbins gear. Since 19.02.08 new and heavier "Thyborøn" combi trawl doors (7.41 m<sup>2</sup>, 1720 kg) have been in used. During the present survey the door distance was kept nearly constant at about 50 m at all depths by the use of a 9 m strap between the wires at 120 m distance from the doors (normally applied at depths greater than 80 m). At depths greater than 300 m the trawl was equipped with a tickler chain, which improves the catchability of bottom living and borrowing species, particularly shrimps.

The SCANMAR system was used on all trawl hauls. This equipment consists of sensors, a hydrophone, a receiver, a display unit and a battery charger. Communication between sensors and ship is based on acoustic transmission. The doors are fitted with sensors to provide information on their distance, and the trawl was equipped with a trawl eye that provides information about the trawl opening. A catch sensor on the cod-end indicated the size of the catch.

## ANNEX VIII Hydrographic / monitoring line stations

### Cunene line

Long	Lat	Depth	Sample	Comments			
				Vannprøver - phyto	Vannprøver - kalibrering	WP2	Multinet
11,44064	-17,1225	23	CTD, WP2,	5,15,25,50,75 m	-----		
11,41256	-17,1226	52	CTD, WP2,	5,15,25,50,75 m	-----		
11,38916	-17,1223	78	CTD, WP2,Multinet	5,15,25,50,75 m	-----		
11,36018	-17,1208	100	CTD, WP2,	5,15,25,50,75 m	-----		
11,33408	-17,1205	114	CTD, WP2,	5,15,25,50,75 m	-----		
11,28242	-17,1202	148	CTD, WP2,	5,15,25,50,75 m	-----		
11,23532	-17,1219	201	CTD, WP2,Multinet	5,15,25,50,75 m	-----	max 200m	max 200m
11,22284	-17,1207	255	CTD, WP2	5,15,25,50,75 m	-----	max 200m	
11,20502	-17,1217	366	CTD, WP2,	5,15,25,50,75 m	-----	max 200m	
11,18504	-17,1218	500	CTD, WP2,	5,15,25,50,75 m	-----	max 200m	
11,1407	-17,121	732	CTD, WP2,Multinet	5,15,25,50,75 m	-----	max 200m	max 200m
11,10602	-17,1222	993	CTD, WP2,	5,15,25,50,75 m	-----	max 200m	
11,04164	-17,1237	1496	CTD, WP2,	5,15,25,50,75 m	-----	max 200m	
10,59874	-17,1199	2078	CTD, WP2,Multinet	5,15,25,50,75 m	-----	max 200m	max 200m

### Namibe line

Long	Lat	Depth	Sample	Comments			
				Vannprøver - phyto	Vannprøver - kalibrering	WP2	Multinet
11,1731	-15,0901	2550	CTD, WP2, multinet	5,15,25,50,75 m	-----	max 200m	max 200m
11,3906	-15,0934	1751	CTD, WP2,	5,15,25,50,75 m	-----	max 200m	
11,49194		1121	CTD, WP2, multinet	5,15,25,50,75 m	-----	max 200m	max 200m
11,597	-15,0946	134	CTD, WP2,	5,15,25,50,75 m	-----		
12,04788	-15,0938	331	CTD, WP2,	5,15,25,50,75 m	-----	max 200m	max 200m
12,07776	-15,0937	138	CTD, WP2, multinet	5,15,25,50,75 m	-----		

### Lobito Line

Long	Lat	Depth	Sample	Comments			
				Vannprøver - phyto	Vannprøver - kalibrering	WP2	multinet
12,36654	-11,5489	1782	CTD, WP2, multinet	5,15,25,50,75 m	0, 800m , 1700m	max 200m	max 200m
12,45432	-11,5945	1789	CTD, WP2,	5,15,25,50,75 m	-----	max 200m	
12,54792	-12,0416	1454	CTD, WP2,	5,15,25,50,75 m	-----	max 200m	
13,04008	-12,0884	1234	CTD, WP2, multinet	5,15,25,50,75 m	-----	max 200m	max 200m
13,13068	-12,1303	973	CTD, WP2,	5,15,25,50,75 m	0, 500m ,900m	max 200m	
13,22134	-12,1792	372	CTD, WP2,	5,15,25,50,75 m	-----	max 200m	
13,27174	-12,2019	89	CTD, WP2, multinet	5,15,25,50,75 m	0, 40m ,80m		
13,28584	-12,2108	81	CTD, WP2	5,15,25,50,75 m	-----		

## ANNEX VIII Hydrographic / monitoring line stations continued

### Luanda Line

Long	Lat	Depth	Sample	Comments			
				Vannprøver - phyto	Vannprøver - kalibrering	WP2	multinet
12,11448	-9,04968	1736	CTD, WP2, multinet	5,15,25,50,75 m	-----	max 200m	max 200m
12,21678	-9,04986	1325	CTD, WP2,	5,15,25,50,75 m	-----	max 200m	
12,31836	-9,05076	938	CTD, WP2, multinet	5,15,25,50,75 m	-----	max 200m	max 200m
12,4158	-9,04962	427	CTD, WP2,	5,15,25,50,75 m	-----	max 200m	
12,51246	-9,05256	55	CTD, WP2, multinet	5,15,25,50,75 m	-----		
12,5673	-9,0519	33	CTD, WP2,	5,15,25,50,75 m	-----		
12,58296	-9,04884	22	CTD, WP2,	5,15,25,50,75 m	-----		

### Congo River Line

Long	Lat	Depth	Sample	Comments			
				Vannprøver - phyto	Vannprøver - kalibrering	WP2	multinet
12,0799	-6,1244	34	CTD, WP2,	5,15,25,50,75 m	-----		
12,0463	-6,1339	44	CTD, WP2,	5,15,25,50,75 m	-----		
11,5553	-6,1545	77	CTD, WP2, MULTINET	5,15,25,50,75 m	0, 40, 70		
11,4586	-6,1780	111	CTD, WP2,	5,15,25,50,75 m	-----		
11,3615	-6,1984	171	CTD, WP2,	5,15,25,50,75 m	-----		
11,2651	-6,2180	391	CTD, WP2, MULTINET	5,15,25,50,75 m	0, 200, 380	max 200m	max 200m
11,1644	-6,2428	755	CTD, WP2,	5,15,25,50,75 m	-----	max 200m	
10,5655	-6,2866	1525	CTD, WP2, MULTINET	5,15,25,50,75 m	0, 700, 1500	max 200m	max 200m
10,4600	6,3000	2085	CTD, WP2,	5,15,25,50,75 m	-----	max 200m	

## ANNEX IX Station allocation by survey and depth strata

Numbers of valid bottom trawl stations by depth strata. Angolan demersal surveys 2000-2014.

	1985	1985.2	1985.3	1985.4	1986.1	1986.2	1989.1	1989.2	1989.3	1991.1	1991.2	1992	1993	1994	1995.1	1995.2	1996	1997	1997.2	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
OUTSIDE	11	13	13	11	28	24	31	23	10	30	56	55	1	17	16	0	5	1	62	0	0	1	0	0	1	0	3	0	1	0	0	0	0	0	0	0	0
20-50south	0	2	0	0	6	3	5	2	3	6	2	4	3	0	0	0	0	0	0	0	0	8	0	2	4	8	7	8	5	6	9	8	0	6	10	8	
50-100south	0	1	0	0	8	6	8	8	1	14	12	20	11	0	0	0	0	0	4	0	0	9	0	5	7	7	5	5	8	8	6	6	0	8	11	8	
100-200south	0	0	0	0	8	3	9	8	6	10	12	7	9	0	0	0	0	0	6	0	0	7	0	3	7	5	7	7	7	7	7	7	0	7	10	5	
200-300south	0	0	0	0	1	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	1	0	0	0	0	0	0	1	0	1
300-400south	0	0	0	0	1	0	0	0	0	2	0	1	0	0	0	0	0	0	1	0	0	1	0	1	2	2	1	1	1	2	2	2	2	0	1	2	1
400-500south	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
500-600south	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	2	0
600-700south	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	2	3	1	2	2	1	1	1	1	0	2	1	0
700-800south	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1	2	2	2	0	1	0	0	
20-50central	0	0	0	3	8	11	17	24	5	17	13	15	0	9	14	0	10	6	1	9	14	23	12	16	16	17	16	16	15	17	16	16	11	18	16	14	
50-100central	0	0	0	4	15	14	21	29	4	26	13	16	0	12	13	0	12	9	10	17	19	27	18	18	19	18	20	18	20	18	18	18	15	19	19	18	
100-200central	0	0	0	2	2	4	13	11	3	15	10	12	0	14	15	12	12	8	13	12	14	22	16	15	13	14	14	16	15	14	14	13	9	16	15	14	
200-300central	0	0	0	4	3	1	4	3	3	10	6	8	0	8	9	21	9	7	11	8	8	12	4	2	3	2	6	3	2	2	1	2	2	2	5	8	
300-400central	0	0	0	2	4	1	0	7	1	7	3	9	0	9	11	15	10	7	1	6	6	10	4	6	4	6	6	6	6	6	6	6	3	6	8	7	
400-500central	0	0	0	4	5	0	3	4	3	6	3	7	0	8	9	18	9	7	0	4	6	8	6	2	3	3	4	3	2	3	3	3	2	4	6	6	
500-600central	0	0	0	1	2	0	1	2	4	1	0	9	0	5	7	14	8	7	0	7	5	9	3	5	3	3	5	4	5	4	4	4	4	5	8	7	
600-700central	0	0	0	0	0	0	0	0	0	0	0	6	0	1	3	10	3	0	0	5	1	6	3	4	4	4	6	4	4	3	1	3	0	4	4	3	
700-800central	0	0	0	0	0	0	0	0	0	0	0	4	0	2	4	1	4	0	0	3	0	7	4	4	4	4	6	4	5	5	6	4	4	4	3	4	
20-50north	5	4	7	6	14	13	3	14	3	7	8	12	0	9	9	0	9	8	0	0	14	11	11	16	13	15	14	14	17	17	17	19	13	11	18	19	
50-100north	9	8	7	7	25	28	19	33	14	20	19	17	0	9	12	0	12	10	4	0	24	24	14	23	20	24	20	18	21	19	20	20	18	14	20	20	
100-200north	5	5	3	6	5	20	6	6	4	11	12	10	0	11	11	0	12	11	8	0	29	24	18	23	20	21	21	17	23	23	20	19	17	13	21	19	
200-300north	1	0	1	5	5	6	8	6	4	4	14	9	0	8	7	0	10	9	3	0	12	11	7	7	7	8	7	6	7	7	7	5	7	4	5	9	
300-400north	0	0	5	6	15	4	2	4	4	6	6	5	0	9	8	0	9	8	2	0	12	10	11	6	6	6	6	5	5	4	5	6	4	4	8	9	
400-500north	0	0	1	2	3	6	5	4	4	6	2	6	0	6	4	0	8	7	0	0	7	8	5	6	6	6	6	5	6	6	6	6	6	6	5	6	7
500-600north	0	0	3	3	3	3	3	6	0	1	0	5	0	5	5	0	10	8	0	0	6	7	8	6	6	6	7	4	6	6	7	5	6	3	5	6	
600-700north	0	0	0	0	0	1	0	0	1	0	0	3	0	2	3	0	0	0	0	0	1	7	5	6	6	7	8	4	8	6	6	5	4	5	5	5	
700-800north	0	0	0	0	0	0	1	0	0	0	0	4	0	3	2	0	5	5	0	0	0	8	3	9	9	8	9	7	6	7	7	8	6	7	7	4	
TOTAL	31	33	40	66	161	148	159	194	77	200	193	245	24	147	162	91	157	118	126	71	178	264	152	186	185	200	208	179	198	193	191	188	131	171	215	203	