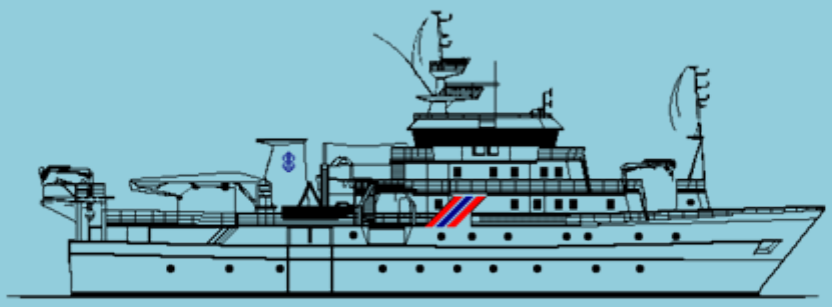

MARINE ECOSYSTEM SURVEY OF MOZAMBIQUE

11 NOVEMBER – 02 DECEMBER 2014

Cruise Report

Institute of Marine Research (IMR)
Norway

Instituto Nacional de Investigação Pesqueira (IIP)
Mozambique

CRUISE REPORT "DR. FRIDTJOF NANSEN"

MARINE ECOSYSTEM SURVEY OF MOZAMBIQUE

11 NOVEMBER – 02 DECEMBER 2014

By

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Bergen, 2015

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.

O PROJETO EAF-NANSEN

A FAO iniciou a implementação do projeto “Fortalecimento da base de conhecimento para implementação do enfoque ecossistêmico para a pesca em países em desenvolvimento (EAF-Nansen GCP/INT/003/NOR)” em dezembro de 2006, com financiamento da Agência Norueguesa para Desenvolvimento e Cooperação (Norad). O Projeto EAF-Nansen dá continuidade a projetos e programas anteriores, numa parceria que envolve a FAO, a Norad e o Instituto de Investigação Marinha (IMR), Bergen, Noruega, voltados a avaliação e gestão dos recursos pesqueiros marinhos nos países em desenvolvimento. O projeto trabalha em parceria com governos e também projetos financiados pelo programa GEF-Grandes Ecossistemas Marinhos (LME) e outros projetos que têm o potencial de contribuir para alguns componentes do projecto EAF-Nansen.

O Projecto EAF-Nansen oferece uma oportunidade para os países costeiros da África sub-saariana, trabalhando em parceria com o projeto, para receber apoio técnico da FAO para o desenvolvimento de capacidade nacional e regional para a implementação do Enfoque Ecossistêmico para a gestão das pescas e para adquirir conhecimento adicional sobre os seus ecossistemas marinhos para a sua utilização no planejamento e monitoramento. O projeto contribui para o desenvolvimento da capacidade das agências nacionais de gestão das pescas em métodos de avaliação dos riscos ecológicos para identificar as questões críticas de manejo e na preparação, operacionalização e monitoramento o progresso da implementação dos planos de gestão das pescas coerente com o enfoque ecossistêmico.

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CHAPTER 1. INTRODUCTION

This survey with the Dr. Fridtjof Nansen in Mozambique came about after a request from Ministry of Fisheries, Mozambique, to FAO. A survey-planning meeting between Instituto Nacional de Investigação Pesqueira (IIP) and staff from the EAF-Nansen project at Institute of marine Research (IMR) was held in Maputo 2-5 September to set the objectives, priorities and responsibilities for the investigations. During this meeting the participants from Mozambique were also introduced to the main software tools used during the survey (Nansis, QuickCast and ODV). The participants in the planning meeting were the local cruise leader from Mozambique and the Norwegian cruise leader including most of the survey staff.

1.1. The Survey area and planned survey track

The complete coast of Mozambique was planned covered during the 2014 ecosystem survey. The survey design was based on the design applied in 2007 to facilitate comparison. The course track of the 2007 survey is illustrated in Figure 1.1 to indicate the planned course track.

As during the 2007 survey and based on topographic characteristics and previous knowledge about the biodiversity in the waters of Mozambique the coast was, divided into three regions: a) Southern region: border of South Africa - 21°30'S; b) Central region: The bank of Sofala (21°30' S - 17°15'S); c) Northern region: 17°15'S – border of Tanzania. The southern region was furthermore divided in an inshore shelf area (20-200 m) and an offshore deep water area (200-800 m) to separate the coastal and deep water plateaus. The survey was planned carried out around the clock with the shallow region covered during day while the deep water region was covered at night. Trawl stations shallower than 150 m carried out during the dark hours were coded with validity 2, meaning that they were excluded from biomass analyses (but not for analyses of catch rates). This is done because some demersal fish species lift from the bottom at night and may therefore not be caught representatively by the bottom trawl. This is mainly a problem on shallow water stations.

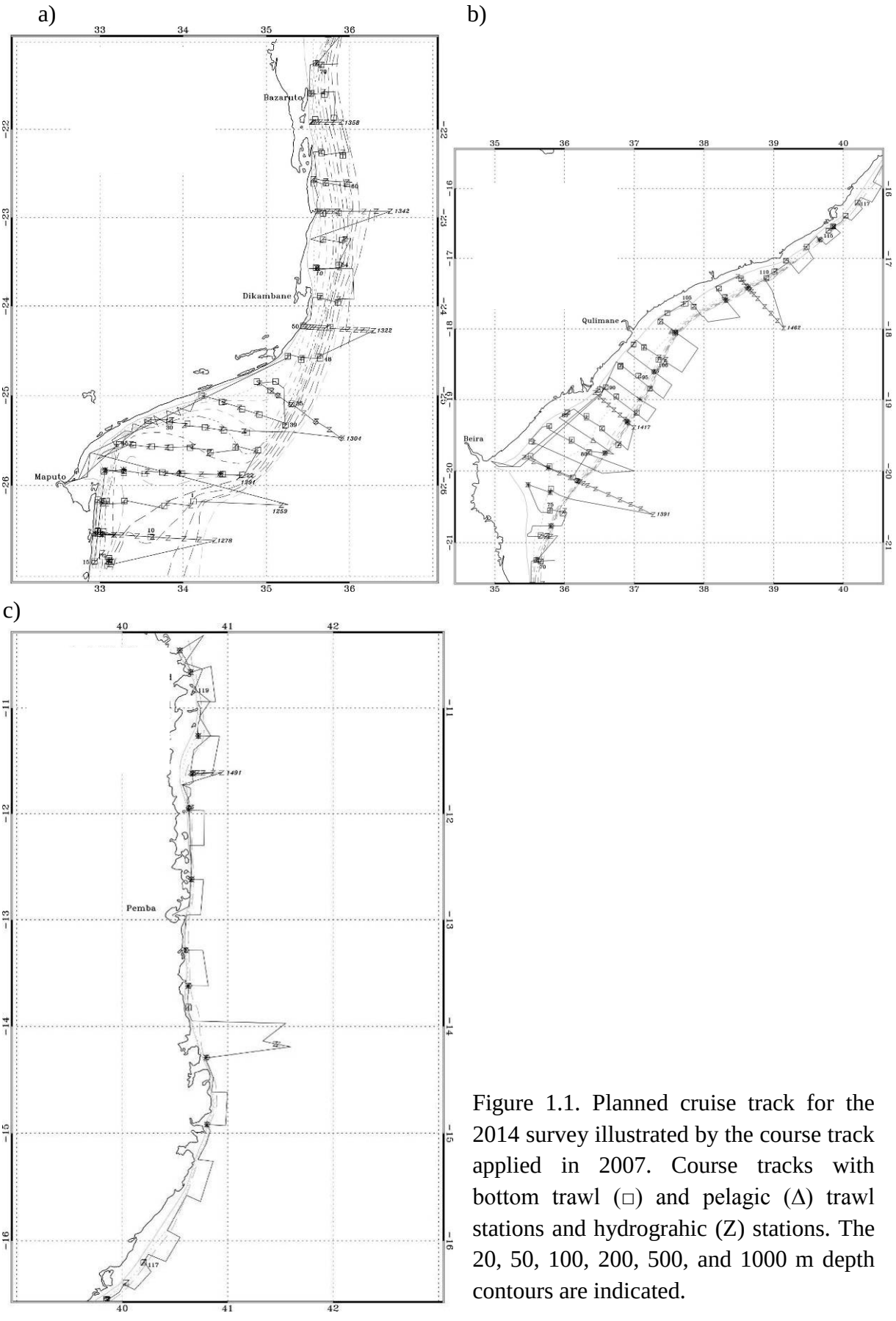


Figure 1.1. Planned cruise track for the 2014 survey illustrated by the course track applied in 2007. Course tracks with bottom trawl (□) and pelagic (Δ) trawl stations and hydrograhic (Z) stations. The 20, 50, 100, 200, 500, and 1000 m depth contours are indicated.

The survey transects was designed, as far as possible, perpendicular to depth isobaths and spaced 20 nautical miles (NM) apart. They covered the depth-interval between ~20 m depth near the coast to 800 m depth offshore (mainly 500 m). Bottom trawling was carried out within four different depth-strata on each of these transects between 20-50 m, 50-100 m, 100-200 m and between 200-800 m depth, but with a maximum distance of 20 nm between trawl stations. When time and bottom conditions permitted, occasional trawls were carried out deeper than 500 m. Pelagic trawls were made to sample acoustic targets. CTD's were deployed at each bottom-trawl station.

Every third transect was designed with a more elaborate sampling program and termed "Ecosystem transect". These transects extended to 1000 m depth. CTD's were taken at bottom-depths of 1000 m, 500 m, 200 m, 100 m, 50 m and 30 m at the coastal margin of the transect. Additionally, three stations for sampling of nutrients, chlorophyll a, phyto- and zooplankton were carried out at positions with bottom-depths of 500 m, 100 m, and 30 m. Trawling was undertaken within the same depth-regions as for all other transects.

The design also allows for sampling of acoustic data from the ER 60 echosounder (18 kHz, 38 kHz, 120 kHz and 200 kHz transducers), the multibeam bottom mapping echosounder SM710 and data from the thermosalinograph and weather station recorded continuously during the survey.

Due to an engine breakdown the planned survey was not completed. The central region was only partly covered while the northern region was not covered. Figure 1.2 show the actual area surveyed

1.2. Aims and objectives

Based on the decisions and discussions during the planning meeting the main objectives of the survey was set as follows, in order of priority:

- To obtain information on demersal fish abundance and biodiversity by bottom trawling where conditions are adequate.
- To determine the distribution and abundance of small pelagic fish resources using acoustic methods and a systematic grid survey design.
- Additional biological information from trawl catches on size distribution, maturity, growth and genetic properties from selected species.
- To establish as time would permit the distribution, abundance and composition of other taxa at lower trophic levels along the shelf (phyto- and zooplankton, fish eggs and larvae).
- Map the environmental conditions in the survey area (temperature, salinity, oxygen, chlorophyll, nutrients).
- to collect bottom sediment samples during bottom trawling to determine sediment grain size and composition.
- Capacity building of technicians and scientists.

1.3. Participation

A total of 24 scientists and technicians from Mozambique and Norway participated in the survey. The full list of the participants and their affiliations is given in Table 1.1 below.

Table 1.1 List of participants, their role, affiliation and the period they stayed on board.

PARTICIPANT:	ROLE	AFILIATION	PERIOD
Anastácia Rota Sitão	Technician	IIP	28.11-04.12
Badru Hajy	Oceanographer	IIP	11.11-04.12
Bjørn Krafft	Plankton Scientist	IMR	11.11-04.12
Carlos Ibrahimo	Technician	IIP	28.11-04.12
Dionísio Varela	Technician	IIP	11.11-04.12
Domingos Biasson	Technician	IIP	28.11-04.12
Feliciano Manjate	Technician	IIP	11.11-04.12
Francisco Zivane	Technician	IIP	11.11-28.11
Ines Bernardes	Chief technician	IMR	11.11-04.12
Jan Frode Wilhelmsen	Instrument operator	IMR	11.11-04.12
Jens-Otto Krakstad	Cruise Leader	IMR	11.11-04.12
José Cuna	Technician	IIP	11.11-04.12
Lourenço Zacarias	Scientist	IIP	11.11-04.12
Martinho Padeira	Sampling technician	IIP	11.11-04.12
Maurício Lipassula	Plankton technician	UEM	11.11-04.12
Merete Kvalsund	Chief technician	IMR	11.11-04.12
Oddgeir Alvheim	Chief technician	IMR	11.11-04.12
Osvaldo Chacate	Local cruise leader	IIP	11.11-04.12
Osvaldo Filipe	Scientist	IIP	11.11-28.11
Rui Mutombene	Scientist	IIP	11.11-28.11
Tore Mørk	Instrument chief	IMR	11.11-04.12

List of institution abbreviations:
IMR - Institute of Marine Research
IIP – Instituto Nacional de Investigação Pesqueira
UEM – Universidade Eduardo Mondlane

1.4. Narrative

The vessel left Maputo on the 11/11-14 at about 15:30 local time (UTC +2) and steamed south to the border with South Africa where the first CTD was initiated at 04:43 on the 12/11. The first transect was an ecosystem transect. However, the plankton sampling was temporarily reduced as the multinet could not be used on the first 3 transects due to a failure with the communication with the net-sampler. Furthermore, a storm and generally rough weather slowed the progress for the first 5 days of the survey. The central area was entered on the afternoon of the 24th November. From the afternoon 27th to the 28th November the vessel stayed in port in Beira for refuelling and a crew change of three local scientists. During the call the vessel was visited by the press, the general inspector from the Ministry, the deputy director of IIP and various officials of the fishing sector including IIP in Beira. The vessel then continued the planned survey track northwards. A severe engine failure on the 1st December at 18°21'S 36°54'E made it impossible to trawl and operate at low speed and the captain decided it was necessary to interrupt the survey on the early morning of 2nd December and return south for repairs in South Africa. The vessel arrived off Maputo on the 4th December and all scientists were disembarked by a small boat from shore, where after the vessel steamed for Cape Town. As a consequence of the engine failure it was not possible to survey the northern part of the Central region and the whole Northern region, a task that was planned to take an additional 7 days, with planned arrival in Pemba 9/12.

1.5. Survey effort

The cruise tracks with bottom-trawls, pelagic trawl stations can be found in Figures 1.2, while the CTD stations taken and the division between the southern and central region is illustrated in Figure 1.3. To get an overview of the planned survey coverage with what was actually covered compare Figure 1.1 with Figure 1.2. Table 1.2 summarises the survey effort in each sub-area.

Table 1.2 Number of hydrographic (CTD), plankton (PL), pelagic trawl (PT), and bottom-trawl (BT) and benthos sampling stations, as well as the distance covered (NM) during the survey by sub-areas.

*Each plankton station consists of 3 different plankton nets (see methods)

					Swept area hauls (depth in m)				Distance surveyed
Region	CTD	PL	PT	BT	20-50	51-100	101-200	201-800	
South	95	51	0	79	15	12	14	38	1910
Area (NM^2)	-	-	-	-	1194	1176	1579	11702	
Area/trawl	-	-	-	-	79.6	98.0	112.8	307.9	
Central	38	27	1	26	11	6	3	6	1002
Area (NM^2)*	-	-	-	-	6505	2516	482	2565	
Area/trawl	-	-	-	-	591	419	160	427	
North	NOT COVERED DUE TO ENGINE BREAKDOWN								
Area (NM^2)					576	212	155	0	
	-	-	-	-					
Total	133	78	1	105	26	18	17	44	2912

*The area listed for the central region is for the whole of Bazaruto shelf. Since the survey was interrupted before the coverage was completed the trawl/area is higher than what should normally be anticipated. To further add to this there is also a relatively large untrawlable area in the central region.

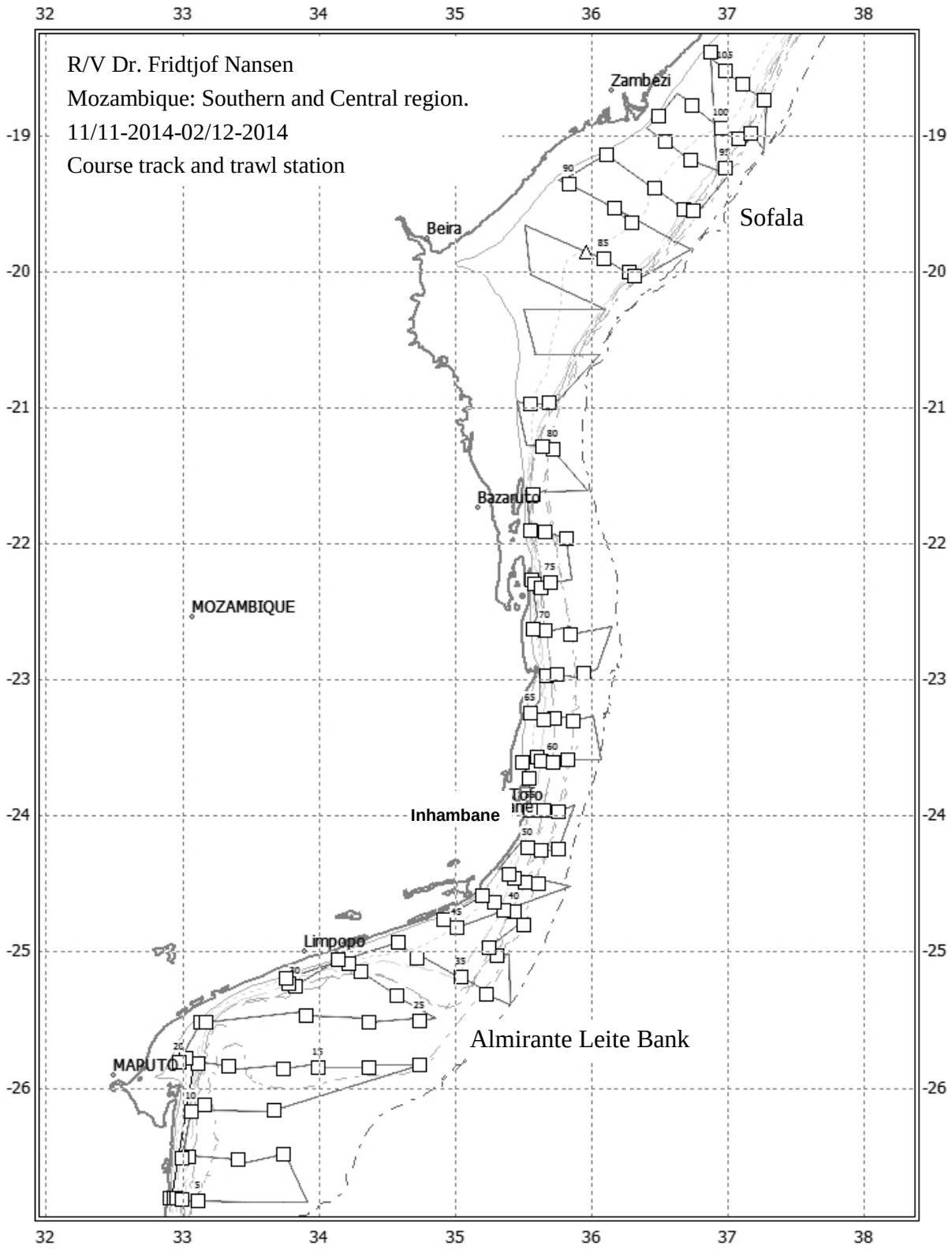


Figure 1.2. Southern and central region covering the area surveyed before the vessel breakdown. Course tracks with bottom trawl (□) and pelagic (Δ) trawl stations. The 20, 50, 100, 200, 500, and 1000 m depth contours are indicated.

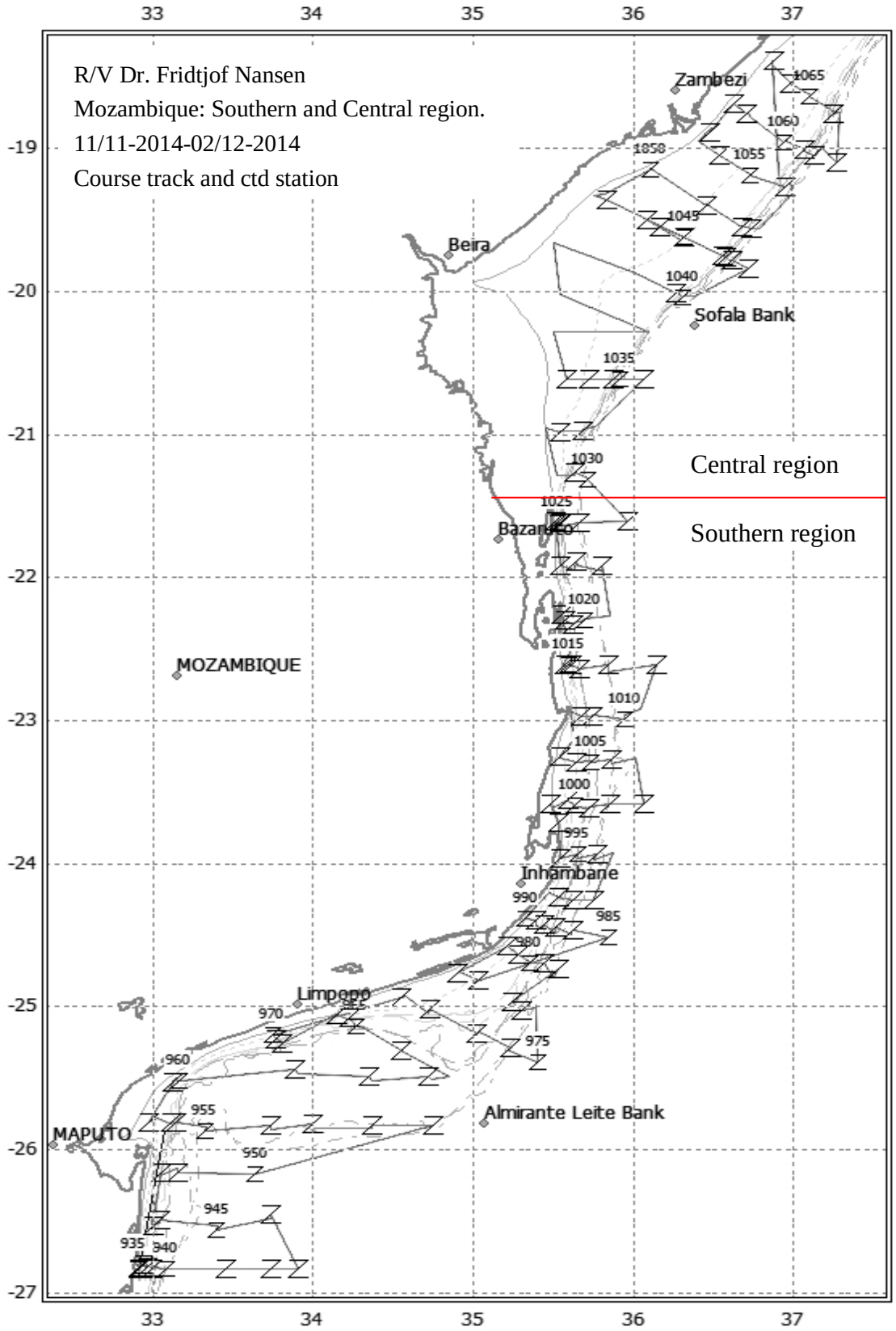


Figure 1.3. Southern and central region covering the area surveyed before the vessel breakdown. Course tracks with CTD stations (Z). The 20, 50, 100, 200, 500 depth contours are indicated. Also indicated is the division between the southern and central region.

CHAPTER 2. METHODS

2.1. Meteorological and hydrographical sampling

Meteorological observations

Wind direction and speed, air temperature, air pressure, relative humidity and sea-surface temperature (5 m depth) were logged every minute with a WIMDA meteorological logger.

CTD

Vertical profiles of temperature, salinity, fluorescence and oxygen were obtained by the Seabird 911 plus probe. The CTD was equipped with an uncalibrated Aqua Tracka MK III fluorometer, SBE 3plus temperature sensor, SBE 4C conductivity sensor, and a SBE 43 oxygen sensor. Real-time logging and plotting was done using the Seabird Seasave software installed on a PC. Above the shelf and slope the profiles ranged from the surface to within a few metres above the bottom. Offshore the maximum sampling depth was 1500 m. Figures presenting distributions of temperature (°C), salinity (PST)), oxygen (ml/l) and fluorescence (index on relative scale) for various regions of the Mozambique coastal area were made using the software Ocean Data View, interpolating by DIVA gridding (Ocean Data View, Schlitzer, R., http://odv.awi.de, 2013). Note varying colour scales among the various figures.

Nine Niskin water-bottles (10 l) attached to a CTD-mounted rosette were used to collect water at predefined depths (see below).

A Portasal salinometer (mod. 8410) was used to validate/calibrate the salinity (conductivity)-measurements from the CTD.

For validation of the oxygen-measurements from the CTD-mounted sensor, the oxygen-concentrations in sea-water samples from all nine Niskin-bottles at selected deep plankton-stations were analysed by the Winkler redox titration method following the procedures of Hagebø (2008). To calculate oxygen-concentration per weight-unit of seawater, a sea-water sample for oxygen-analyses was collected first from the Niskin-bottles, and subsequently the water temperature from the same Niskin bottle was measured. These temperature-data were used to calculate potential temperature at the time when the Winkler-reagents were added.

Seawater samples (20 ml) for nutrient analyses (nitrate, nitrite, silicate and phosphate) were taken from the Niskin water-bottles at; 25 and 5 m at the shallow plankton-stations (30 m bottom-depth), at 100, 75, 50, 25, and 5 m at the intermediately deep plankton stations (100 m bottom-depth), and at 500, 400, 300, 200, 100, 75, 50, 25, and 5 m at the deep plankton-stations (500 m bottom-depth). The seawater samples were stored in 20 ml polyethylene vials, conserved with 0.2 ml chloroform, and kept cool and dark in a refrigerator (Hagebø and Rey, 1984). Nutrient analyses were carried out at the chemical laboratory at IMR after the survey. Chlorophyll *a* is a plant pigment, which in oceanography typically is used as an indirect

measure for phytoplankton biomass. For analysis of chlorophyll *a* and phaeopigment concentrations, water-samples (263 ml) were collected from the CTD-mounted Niskin bottles at the same standardized depths as described above for the nutrients. The water-samples were filtered on Munktell fibre-glass filters (GF/C 25 mm diameter) using a custom-made filtration system. The filters were then stored in the dark at -18°C for subsequent nutrient analysis at the chemical laboratory at IMR after the survey.

Thermosalinograph

The SBE 21 Seacat thermosalinograph was running continuously during the survey obtaining samples of sea surface (5 m depth) salinity and relative temperature every 10 seconds. An attached in-line C3 Turner Design Submersible Fluorometer measured turbidity and chlorophyll *a* levels.

ADCP

The ADCP was not in operation during the survey.

2.2. Phytoplankton sampling

At each plankton-station, qualitative phytoplankton samples were collected with a net (35 cm in diameter and mesh-size of 10 µm), hauled vertically (< 0.1 ms^{-1}) from the depth of 30 m to the surface (25-0 m at the shallow stations). The samples were preserved with 2 ml 20% formalin and stored on dark 100 ml glass bottles for subsequent taxonomic analyses on shore.

In addition, mixed water-samples were collected from the Niskin-bottles representing the depths of 25 and 5 m for the 30 m stations, and 75, 50, 25, 5 m for the 100 m and 500 m stations. These samples were preserved with 2 ml lugol on dark 100 ml glass bottles for subsequent taxonomic analysis on shore.

2.3. Zooplankton sampling

Zooplankton samples were collected with a Hydro-Bios Multinet with mouth-opening area of 0.25 m^2. The Multinet was equipped with 5 nets of mesh-size 180 µm for depth-stratified sampling. The net is equipped with a pressure sensor and two electronic flow meters. The Multinet sampling was done by vertical hauls, with an average hauling speed of ~0.5 ms^{-1}. At the shallow (30 m) plankton-stations, one net was hauled in the 25-0 depth-stratum. At the medium-deep (100 m) stations, four nets sampled the strata of 100-75, 75-50, 50-25, and 25-0 m. At the deep (500 m) plankton-stations, five nets sampled the strata of 200-100, 100-75, 75-50, 50-25, and 25-0 m.

Additionally, at all plankton-stations a WP2 net (56 cm diameter, mesh size 180 µm) (Fraser 1966, Anonymous 1968) was hauled vertically from the same maximum depth as for the deepest Multinet (shallow plankton-station 25 m, medium-deep plankton-station 100 m, and deep plankton-station 200 m) to the surface – with a speed of ~ 0.5 ms^{-1}.

For all three types of plankton nets, each sample was divided into two equally large parts using a Motoda plankton splitter (Motoda 1959). Half the sample was preserved with borax-buffered formalin resulting in a final formalin concentration of 4% in a 100 ml plastic bottle for subsequent taxonomic analysis on shore. The other half of the sample was sequentially sieved through three filters to obtain the plankton biomasses representing the size-fractions >2000 µm, 2000-1000 µm, and 1000-180 µm. The biomass samples were stored on pre-weighed aluminium dishes and dried at ~70 °C for periods of at least 24 h. After drying, the samples were stored frozen at -18°C for subsequent weighing of biomass dry weight on shore (after a second drying process).

2.4. Sediment sampling

A stainless steel cylinder was mounted on the footrope of the trawl to collect bottom sediment samples at every trawl station. The samples were collected from the cylinder when the trawl was hauled on deck and stored in a plastic bag (www.eurofins.com), roughly classified according to grain size and stored frozen for further analyses of sedimentological and chemical composition. The plastic bag containing the sample was identified with the trawl station number. Samples are offloaded in Maputo and will be analysed in agreement with IIP.

2.5. Biological fish sampling

Demersal trawl hauls were taken randomly (within the depth strata described above) on the shelf while only pelagic hauls were taken due to time constrains.

Trawl hauls were sampled for species composition by weight and number. The deck sampling procedure is described in detail by Strømme (1992). Length measurements were taken for selected target species on most stations. An Electronic Fish Meter (SCANTROL) connected to a customised data acquisition system (Nansis) running on a Windows PC was used for length measurements. The total length of each fish was recorded to the 1 cm below (rounding down to nearest cm). Additionally, total weight, to the nearest gram (g), and sex was recorded from the first randomly selected 20-30 individuals of target species.

The carapace length for crustaceans was measured to the nearest 0.1 cm below using a calliper. Basic information recorded at each fishing station i.e. trawl hauls is presented in Annex I. Pooled length frequency distributions raised to catch per hour of selected species by region are shown in Annex II.

2.6. Multibeam echo sounder for bottom mapping

The EM 710 multibeam echo sounder is a high to very high-resolution seabed mapping system. Acquisition depth is approximately 3 m below the transducers and the maximum acquisition depth is limited in practice to 1000 - 1500 m on “Dr. Fridtjof Nansen”. Across track coverage (swath width) is up to 5.5 times water depth and may be limited by the operator either in angle or in swath width without reducing the number of beams. The

operating frequencies are between 70 to 100 kHz. There are 128 beams with dynamic focusing employed in the near field. The transmitting fan is divided into three sectors to maximize range capability and to suppress interference from multiples of strong bottom echoes. The sectors are transmitted sequentially within each ping and use distinct frequencies or waveforms. The along track beam width is 1 degree. Ping rate is set (manually) according to depth. The receiving beam width is 2 degrees. All raw data from the EM 710 multibeam echo sounder was stored to disk for later analyses. The data was also logged to the Olex plotting system on board.

2.7. Single beam acoustic sampling

Acoustic equipment

Acoustic data were recorded using a Simrad ER60 scientific echo sounder equipped with keel-mounted transducers at nominal operating frequencies of 18, 38, 120 and 200 kHz. All transceivers were calibrated in Elephant Bay in Angola on the 05.07.2014.

Acoustic data were logged and post-processed using the acoustic data post-processing software the “Large Scale Survey System” (LSSS) Version 1.6.1. Technical specifications and operational settings of the echo sounder used during the survey are given in Annex III.

Allocation of acoustic energy to species group

The acoustic data were scrutinized using LSSS. Back scatters were displayed at 38 kHz. The mean 5 nautical miles (NM) area backscattering coefficient s_A (m^2/NM^2) was allocated to a predefined set of species groups on the basis of established echogram features.

- PEL1 (clupeids, dussumieriids, engraulids)
- PEL2 (carangids, scombrids, barracudas, hairtail)
- mesopelagic fish
- demersal fish
- plankton

Ground truthing and estimation of mean length and weight were accomplished by means of targeted pelagic and demersal trawling. For carangids and associated species an overall average length of 23 cm was applied while for Clupeoid the average length was set to 14 cm (Table 4.1). For both groups and a condition factor of 0.88 was applied. The target groups used during the survey can be found in Table 2.1 while the complete records of fishing stations and catches are shown in Annex I.

Table 2.1 Allocation of acoustic densities to species groups. Only examples of species are given

Group	Taxon	Species
Pelagic species group 1 (Pel1)	Clupeidae[1]	
		Dussumieria acuta
		Sardinella albella
		Sardinops sp.
	Engraulididae	
		Stolephorus spp.
		Encrasicholina punctifer
		Thryssa spp.
Pelagic species group 2 (Pel2)	Carangidae[2]	
		Selar crumenophthalmus
		Carangoides spp.
		Decapterus spp.
		Megalaspis cordyla
	Scombridae	
		Auxis thazard
		Rastrelliger kanagurta
		Sarda orientalis
		Scomber japonicus
		Scomberomorus commerson
	Sphyraenidae	
		Sphyraena spp.
	Trichiuridae	
		Benthodesmus elongatus
		Lepidopus caudatus
		Trichiurus lepturus
Other demersal species	Demersal families	
Mesopelagic species	Myctophidae	
	Other mesopelagic fish	
Plankton	Calanoidae	*Calanus sp.*
	Euphausiidae	*Meganyctiphanes sp.*
	Other plankton	

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

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

or in the form

$$C_F = 1.26 \cdot 10^6 \cdot L^{-2} \quad (2)$$

where L is the total length and C_F is the reciprocal back scattering strength or the so-called fish conversion factor. Generally, in order to split and convert the allocated s_A-values (m^2/NM^2) to fish densities (number per length group per NM^2) the following formula was used

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

where: N_i = number of fish in length group i
A = area (NM^2) of fish concentration
s_A = mean integrator value (echo density) in area A (m^2/NM^2)
p_i = proportion of fish in length group i in samples from the area
C_{Fi} = fish conversion factor for length group i

Further the traditional method is to sum the number per length group (N_i) to obtain the total number of fish:

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

The length distribution of a given species within an area is computed by simple addition of the length frequencies obtained in the pelagic trawl samples within the area. In the case of co-occurrence of target species, the s_A value is split in accordance with length distribution and catch rate in numbers in the trawl catches. Biomass per length group (B_i) is estimated by applying measured weights by length (W_i) when available or theoretical weights (calculated by using condition factors) multiplied with number of fish in the same length group (N_i). The total biomass in each area is obtained by summing the biomass of each length group:

$$B = \sum_{i=1}^{n} N_i \overline{W_i} \qquad (5)$$

The number and biomass per length group in each concentration are then added to obtain totals for each region.

However, the combination of low s_A value recorded few PEL1 and PEL2 in the bottom trawl catch and few pelagic trawls made the splitting by length groups unreliable. A theoretical mean length of 14 cm for Pel1 and 23 cm for Pel2 was used to convert the s_A values by stratum (Equation 3) to number of fish. Equation 5 was used to convert the number of fish in the defined average length class to total estimated biomasses of PEL1 and PEL2.
A description of the fishing gears used and acoustic instruments with their standard settings are given in Annex III.

Swept area biomass calculations

In the bottom trawl survey, stock biomasses were estimated by the swept-area method with catch per haul as the index of abundance (see Strømme 1992). In most hauls the trawling time (with the gear at the bottom) was around 30 min. The area swept by the trawl net within 30 minutes trawl time was 0.015 NM². This corresponds to an average horizontal trawl opening of 18.5 m efficient net width, towing at 3.0 knots. Diagrams of the bottom trawl used are shown in Annex VI. The general formula to estimate biomass B, using this method is:

$$B = \frac{A}{a} \cdot \frac{\overline{X}}{q} \qquad (6)$$

A is the total area surveyed, a is the swept area of the net per haul, $\overline{X}$ is the average catch per haul (the index of abundance) and q (trawl catchability) is the proportion of fish in the path of the net that are actually caught. The density of the resource is estimated as biomass per unit area. In a stratified survey of k non-overlapping strata, if the mean catch per haul in stratum *i* and its variance are denoted by $\overline{X}_i$ and s_i^2 respectively, then an unbiased estimate of the population mean $\overline{X}$ is the stratified mean $\overline{X}_{st}$, which is given by:

$$\overline{X}_{st} = \frac{1}{N}\sum_{i=1}^{k} N_i \overline{X_i} = \sum_{i=1}^{k} W_i \overline{X_i} \qquad (7)$$

where $Wi = \frac{Ni}{N} = \frac{A_i}{A}$ is the relative size of the i^{th} stratum (A_i is the area of the i^{th} stratum and A is the total area surveyed). The variance of the stratified mean is given by:

$$\text{var}(\overline{X}_{st}) = \sum_{i=1}^{k} w_i^2 \,\text{var}\,\overline{X}_i = \sum_{i=1}^{k} w_i^2 \frac{s_i^2}{n_i} \qquad (8)$$

where n_i is number of hauls in the i^{th} stratum and n is the total number of hauls in the survey. Table 2.2 shows the areas used in the swept-area method to estimate biomass for the different regions. A stratified semi-random design was used with depth and area as stratification factors. Estimated total biomass by species/group was obtained by summing estimates for each depth stratum.

Table 2.2 Areas in nm^2 used to estimate biomass for different region and depth strata

	South	Central
0-20 m	1360	5217
20-50 m	1194	6505
50-100 m	1176	2516
100-200m	1579	482
200-300m	1732	391
300-400m	1994	371
400-500m	2427	329
500-600m	1712	413
600-700m	1474	543
700-800m	1919	518

CHAPTER 3. WIND, HYDROGRAPHY AND PLANKTON

3.1. Background

The coast of Mozambique has a length of about 2700 km. The continental shelf is at its widest at the Sofala Bank located in the central section of the coast (where the region shallower than 100 meters occupy nearly 50 000 km^2) and the ~500 m deep Almirante Leite Bank just east of Maputo. Between these banks and in the northern part of Mozambique the shelf extends only a few kilometres offshore in large areas. Mozambique is located on the western side of the Mozambique Channel separated from the island of Madagascar by 400 km at the narrowest point. The main source of the surface water masses along the Madagascar coast is the South Equatorial Current (SEC), which carries across the Indian Ocean warm and relatively low saline water sourced from the Pacific and the Indonesian Seas (Figure 3.1a). Upon reaching Madagascar the SEC diverges. One branch, called the East Madagascar Current (EMC) flows east of Madagascar and reaches the Mozambican coast at the latitude of Maputo, the other branch, the Mozambican Current (MC), enters the Mozambican Channel west of Madagascar and flows along the Northern and Central coasts of Mozambique. Just south of Maputo both branches re-join giving the beginning to the Agulhas Current. Recent satellite observations have revealed that both branches are more pathways for the southward propagating eddies rather than a continuous mean flow. As a consequence, the current velocities observed along the coast are expected to vary strongly depending on the size, direction and the speed of the passing eddy field (3.1b). During the survey (from satellite images of sea level height) we observed a number of eddies moving southwards. Most pronounced was an anti-cyclonic eddy centred north of 18°S in the beginning of November moving southwards to 21°S during the survey period. Figure 3.1b illustrate the situation at 15th November.

The local climate of the coastal ocean off Mozambique exhibits two regimes. North of 20ºS has tropical conditions dominated by the East African Monsoon and high precipitation, while south of 20ºS is subtropical with prevailing easterly winds and dryer.

a) b)

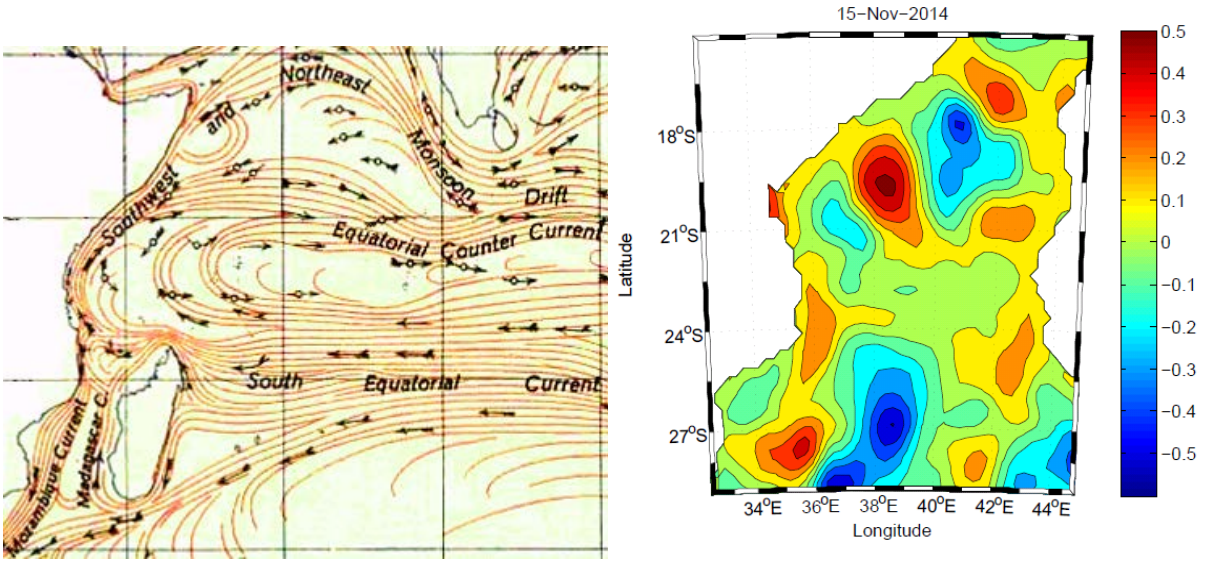


Figure 3.1 Distribution of current systems in the survey area. a) a large scale overview showing the main current patterns in the Indian ocean. b) a satellite image of sea level height showing the passing eddy fields in the Mozambique channel in the period of the survey. Red colour illustrates anti-cyclonic eddies while blue colour illustrates cyclonic eddies.

3.2. Horizontal patterns of wind

Wind speed and direction was recorded from the vessels weather station located in the mast above the wheel house and results are illustrated in Figure 3.2. The highest wind speed for the cruise was recorded in the southern region and particularly off Inhambane, and south of Maputo (wind speed south of Maputo was probably even stronger than off Inhambane but not possible to map due to a faulty instrument). The maximum wind speed recorded was 29.7 m/s (Figure 3.2). The direction was variable and changed in direction from SE and NE. Further north the wind calmed down and became stable from SE.

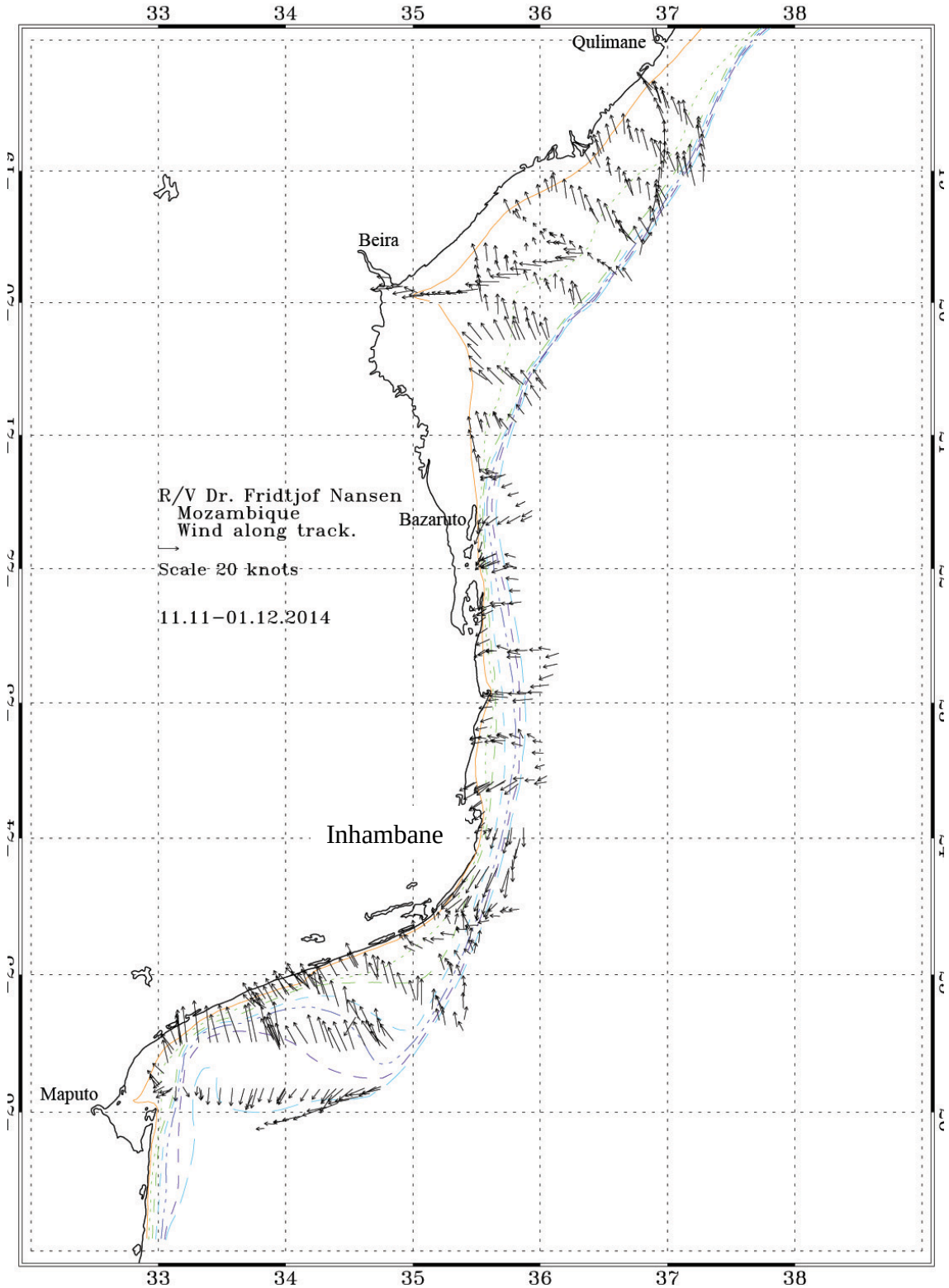


Figure 3.2 Wind directions and wind speed indicated by direction and length of arrows, from the South- and Central region of Mozambique during November-December, 2014.

3.3. Horizontal distribution of oceanographic parameters

Near-surface temperatures (5 m depth) up to 26.5ºC were observed in the northernmost and mid-parts of the Southern region, with the coolest area (23.5°C) close to the coast around 25°S (Figure 3.3). The strong wind observed in the southern part of the survey area increased the mixing of the surface waters and decreased the temperature in this zone slightly, this became particularly pronounced closer to the coast. The salinity at 5 m depth was more or less uniform throughout the survey (range: 35.3-35.4), only slightly elevated along the coast south of 25°S and off the coast between 21 - 23°S, while the region of Zambezi river showed clear fresh water influence with salinity <32.

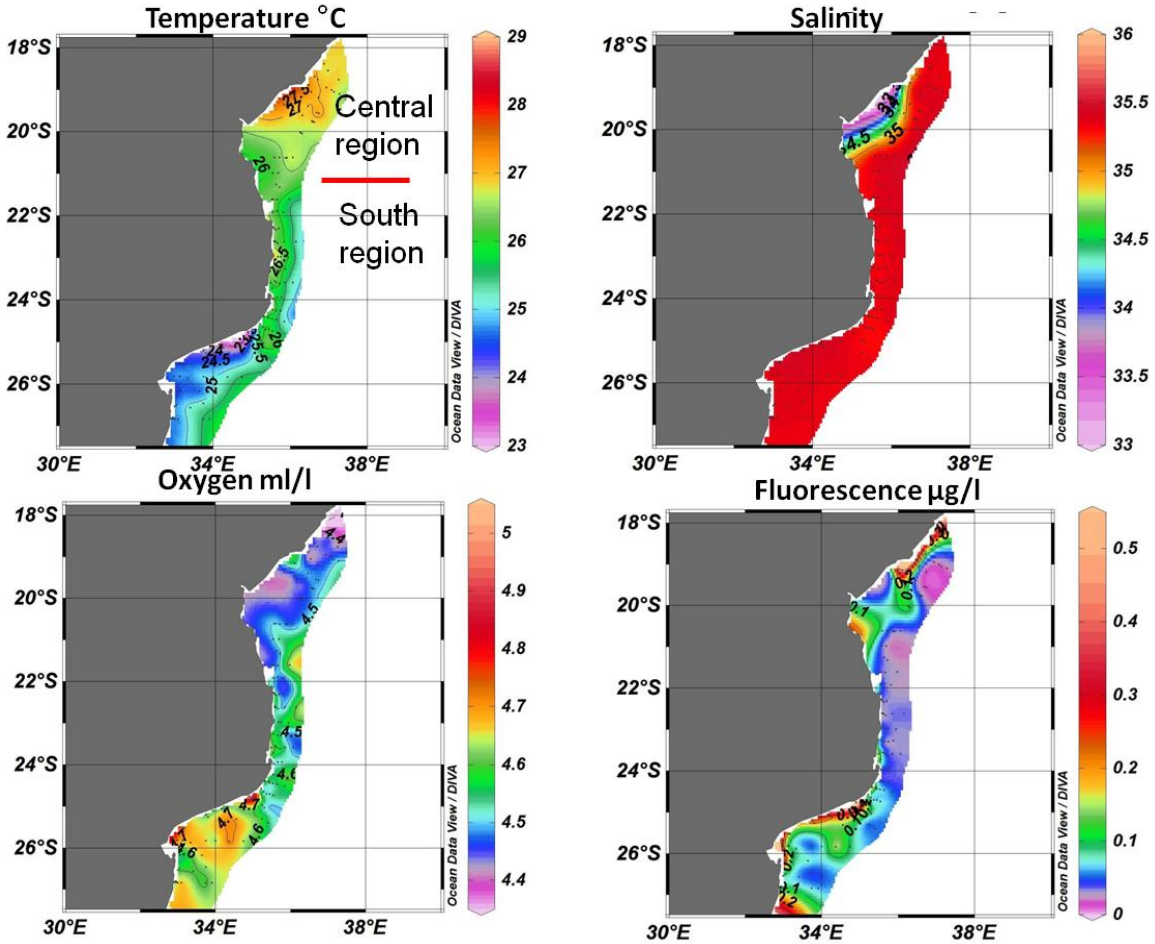


Figure 3.3 Horizontal near-surface (5 m depth) distributions of temperature, salinity, oxygen and fluorescence along the South and Central region of Mozambique (red line at 21.30°S in the temperature plot denotes the border between these two regions). Produced with the software Ocean Data View, interpolating by DIVA gridding (Ocean Data View, Schlitzer, R., **http://odv.awi.de**, 2013).

Oxygen concentrations at 5 m depths were also generally uniform (range: 4.4 - 4.8 ml/l, Figure 3.3), but with generally higher levels in the southern region compared to the Sofala bank. In the southern region slightly elevated oxygen concentrations were observed of Maputo and Limpopo. Fluorescence levels in the area surveyed ranged from >0.5, inshore and

especially associated with the areas of river discharge, to background levels of <0.05 in oligotrophic water masses offshore.

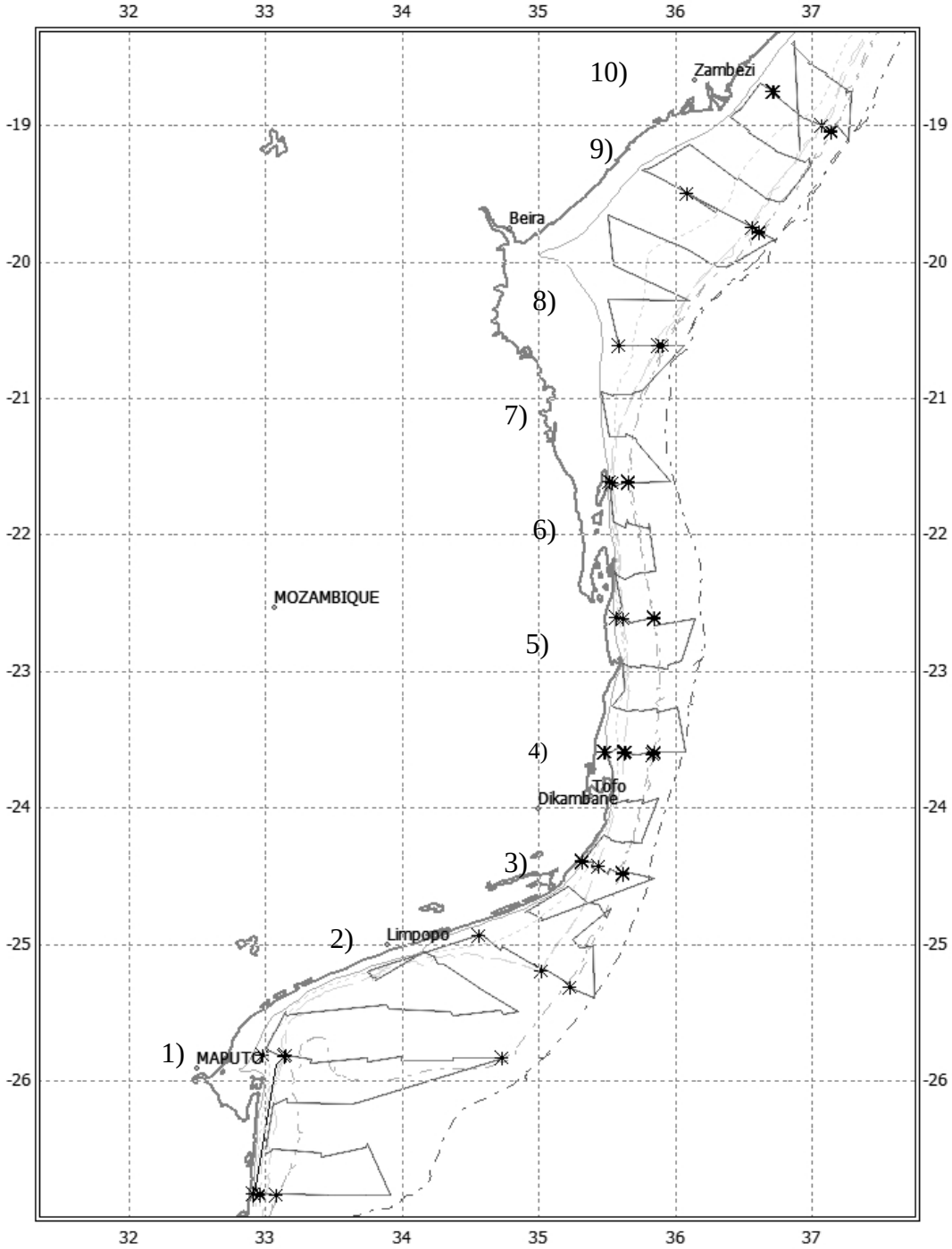


Figure 3.4. Distribution of 10 hydrographic transects along the South, and Central region of Mozambique, * refers to the positions of the plankton sampling stations at 30 m, 100 m and 500 m bottom depth. Numbers refers to the transect number in Figure 3.5

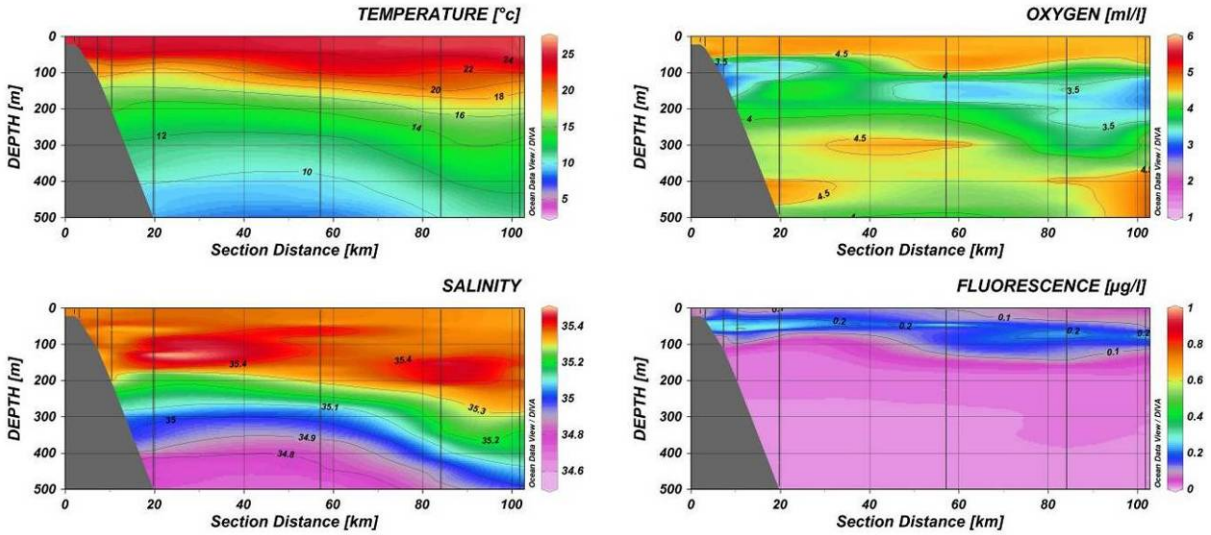
3.4. CTD cross sections

Altogether 10 of 10 hydrographic transects were carried along the South, and Central region of Mozambique before the survey was interrupted (Figure 3.4). The numbering in Figure 3.4 refer to the transect numbers in Figure 3.5.

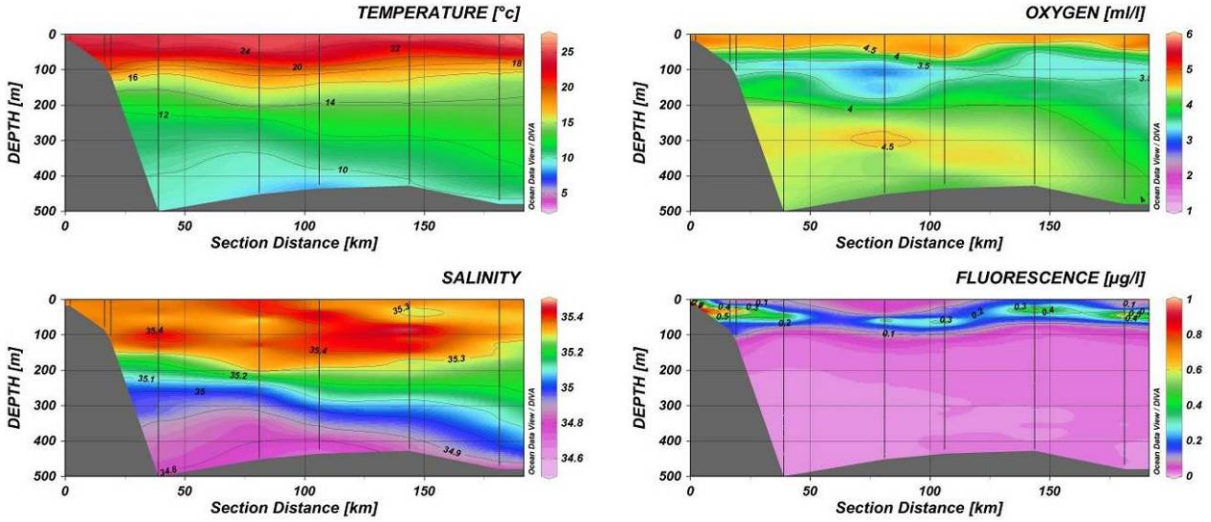
The Southern region

Seven hydrographic transects were made across the shelf of the southern region (Figure 3.5). Surface temperatures along these transects were typically varied around 25°C. The southern part of the southern region showed cooler temperatures inshore while north of 24°30'S the situation shifted with warmer temperature inshore and cooler offshore. Signs of upwelling are present especially in transect 3, 4 and 5. The temperatures decreased with depth and were typically about 20°C around 100m and with a more rapid temperature decrease below this. Temperatures at 500 m were between 10-12°C increasing northwards. Surface salinity were around 35.3 increasing southwards to a salinity maximum around 100- 200 m depth, and with a decrease below this to between 34.6 (southern part of the southern region) to 35.1 (northern part of this region) at 500 m depth. The subsurface salinity maximum corresponded with minimum concentrations of oxygen around 100-200 m depth (typically ~ 3-5 ml/l), and surrounding water masses above and below these depths displayed slightly higher concentrations (in the order of 4.0-4.5 ml/l). A fluorescence-maximum can be observed on the shelf inshore corresponding with coastal production and upwelling. Another sub-surface fluorescence maximum can be observed offshore on most transects around 50-80 m depth at the outer part of the shelf, just above the thermocline at what is probably the lower end of the euphotic zone.

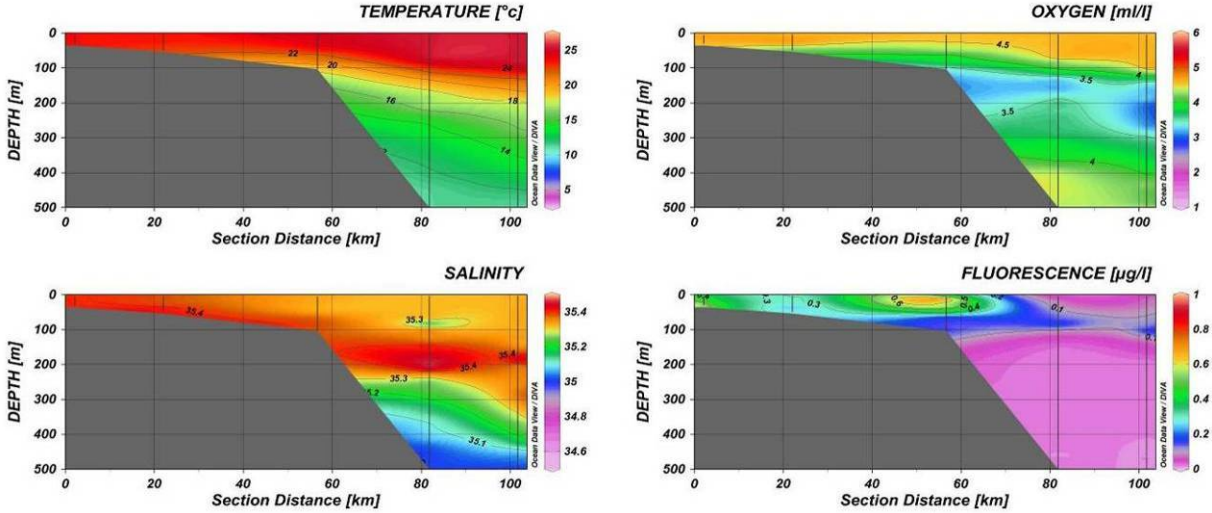
Transect 1;



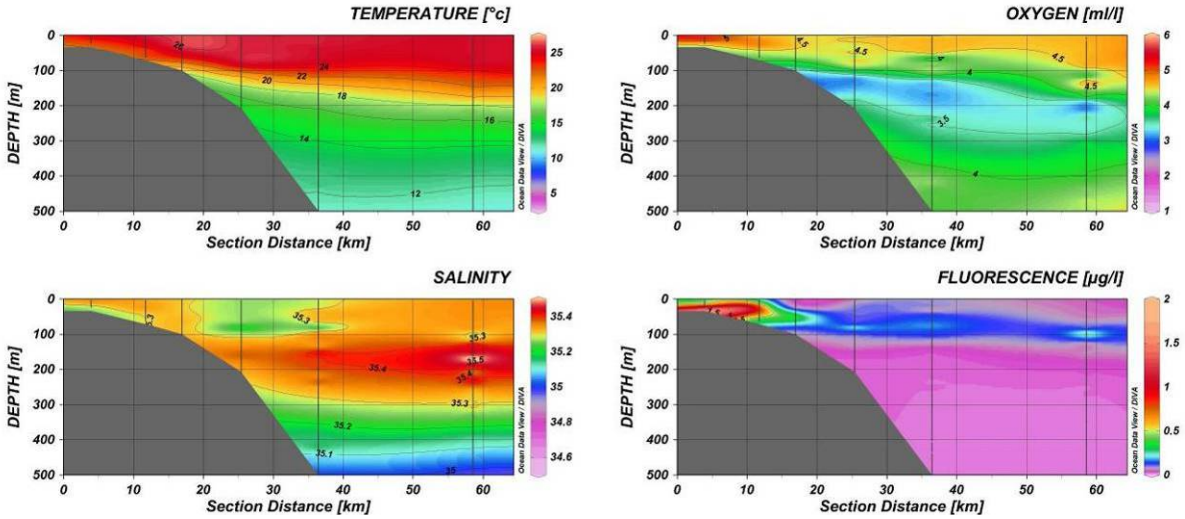
Transect 2;



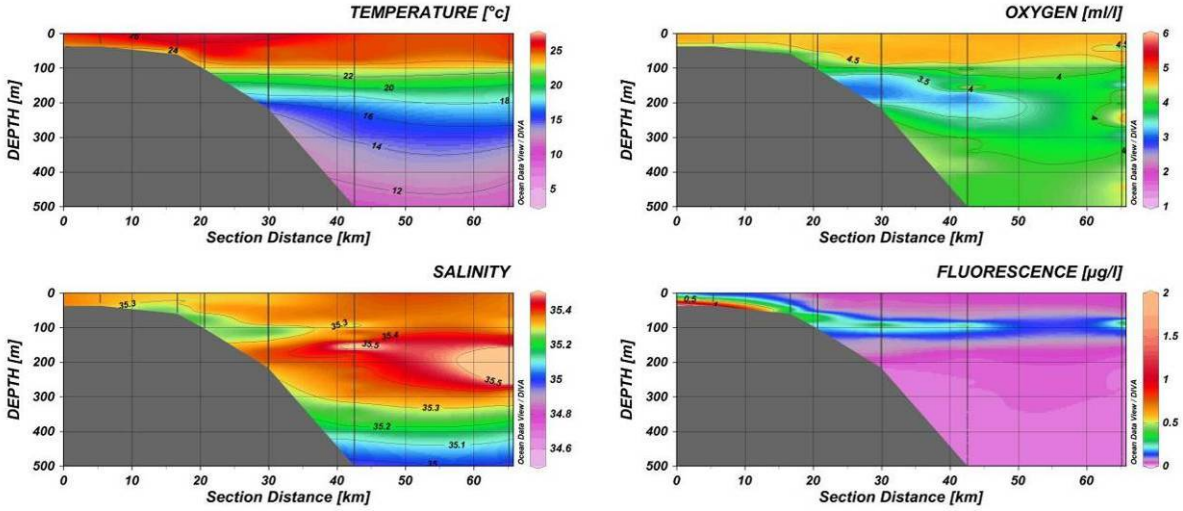
Transect 3;



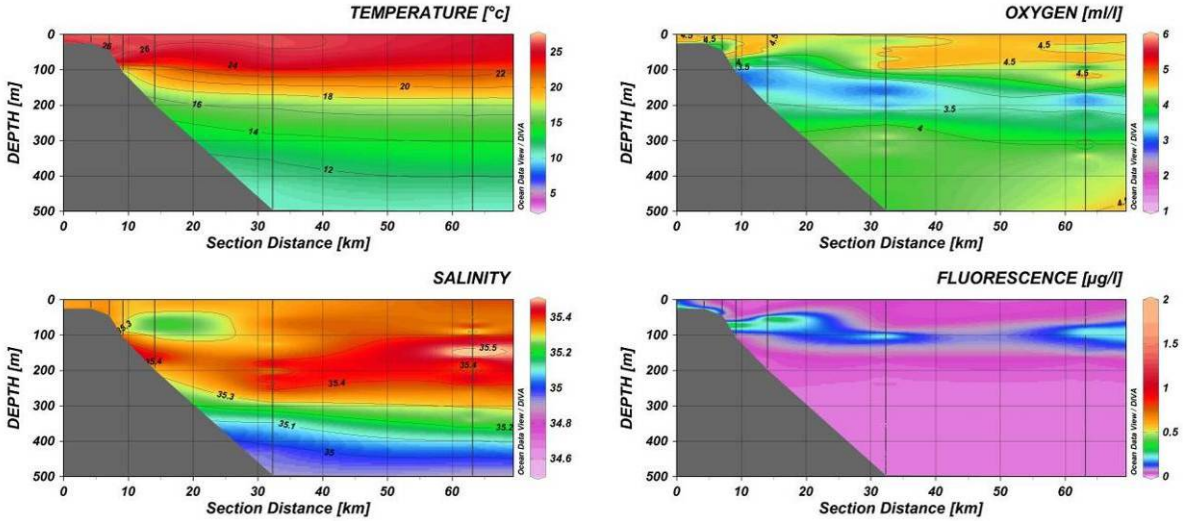
Transect 4;



Transect 5;



Transect 6;



Transect 7;

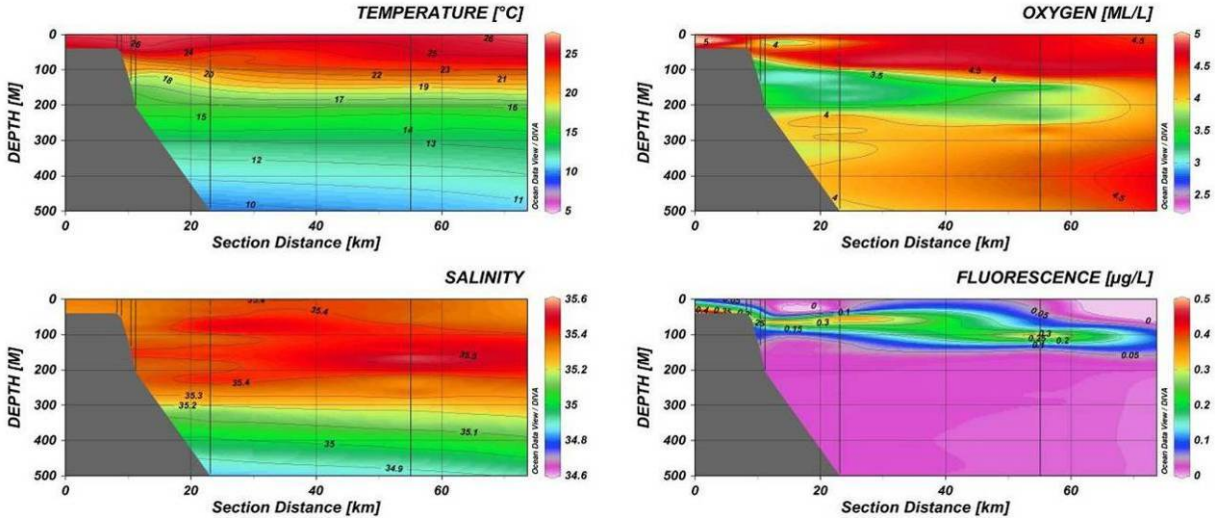
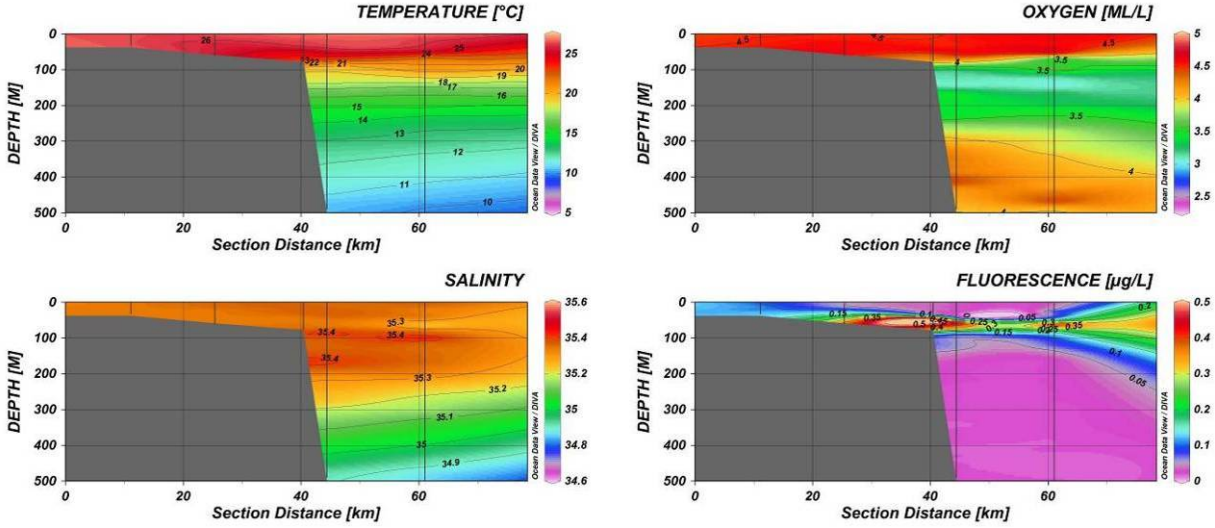


Figure 3.5. Cross-shelf distributions of temperature, oxygen, salinity and fluorescence in the South-region of Mozambique. CTD stations indicated by vertical lines. Transect numbers refer to the transect number in Figure 3.3

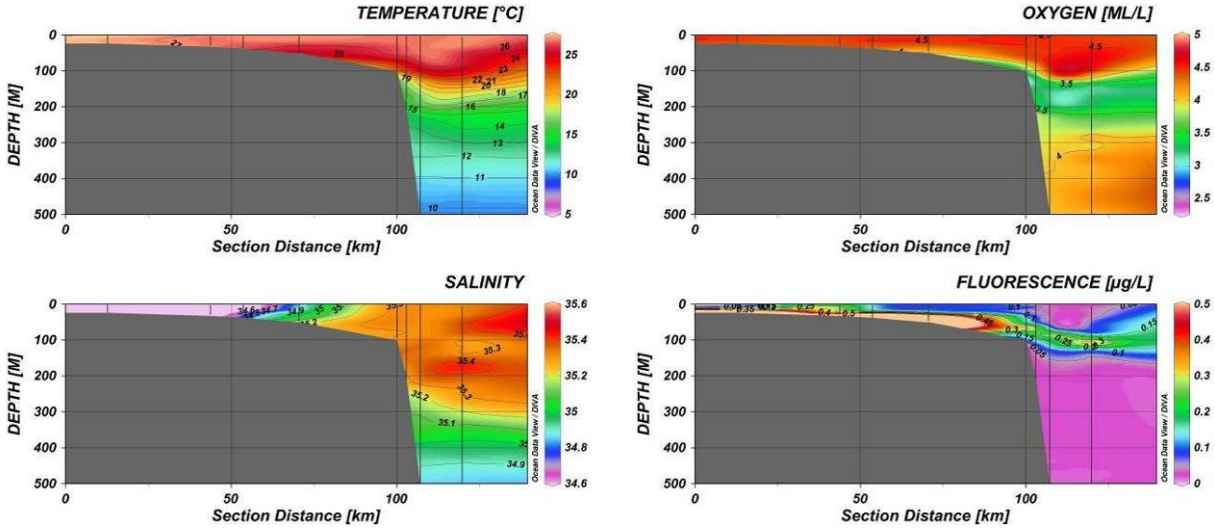
The Central-region,

Three hydrographic transects were made across the shelf in the Central-region (Figure 3.3 and 3.6). Surface temperatures along these transects were typically around 26-27°C inshore with slightly cooler waters offshore. The temperatures decreased with depth, and at 100 m depth the temperatures were typically about 22-20°C. Temperatures at 500 m were around 10°C. The salinity profiles generally displayed salinity maximum between 100-200 m depth with values around 35.4. Below this values decreased to < 34.9 at 500 m depth. The upper 100 m was stable offshore around 35.3 and with inshore waters to a variable degree influenced by river runoff. Also typical for all transects in this region, was the oxygen minimum, typically ~ 3-5 ml/l, around 100-200 m depth below the fluorescence maximum. Water masses above and below these depths displayed slightly higher concentrations (in the order of 4.0-4.5 ml/l). Transect 9 in particular show strong influence by the Zambezi river. The salinity was lowest inshore and with a pronounced fluorescence maximum inshore, along the bottom as well as closer to the surface. Offshore all transects showed a sub-surface fluorescence maximum around 50-100 m depth off the shelf break.

Transect 8;



Transect 9;



Transect 10;

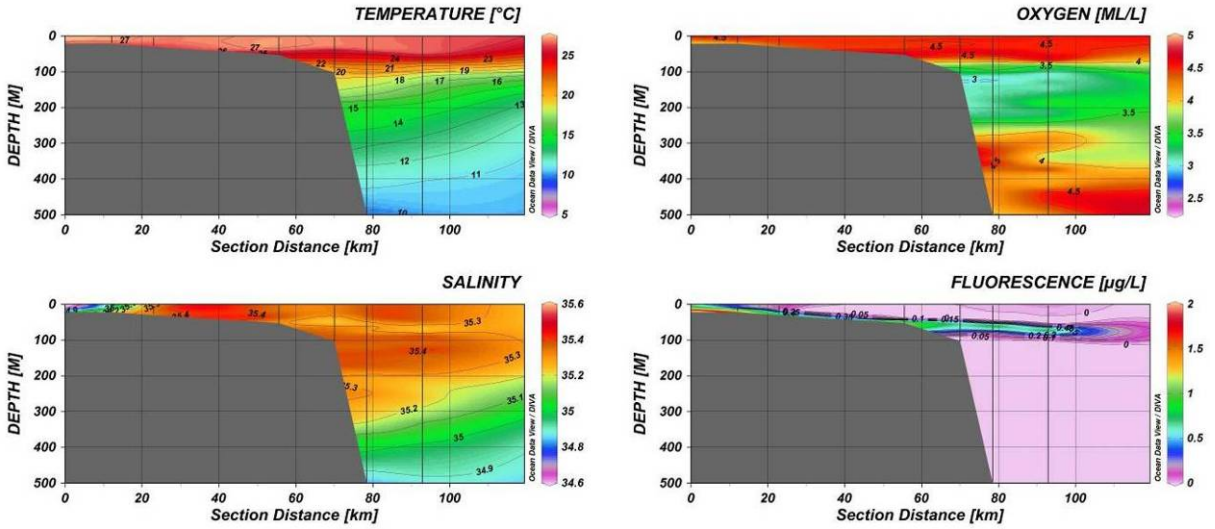


Figure 3.6. Cross-shelf distributions of temperature, oxygen, salinity and fluorescence in the Central-region of Mozambique. CTD stations indicated by vertical lines. Transect numbers refer to the transect number in Figure 3.3

3.5. Zooplankton biomass

The average zooplankton biomass for the area surveyed was 3.33 ± 2.31 (SD) g/m^2 dry weight, based on results from the WP2 net (max depth 200 m). Annex IV gives the detailed results from the laboratory analyses after the survey. The regions south of Quelimane to Bazaruto and around Inhambane displayed the highest zooplankton concentration (Figure 3.7a). The lowest levels were found in the area around Maputo, at Bazaruto and north of Quelimane. The zooplankton size fractions analyses showed that overall trough the survey 21% of the zooplankton biomass was in the size fraction > 2000 µm, 32% in the 1000-2000 µm fraction and 47% in the < 1000 µm fraction. The regions with the highest concentrations

of zooplankton show a tendency with smaller sized zooplankton closest to shore and gradually increasing zooplankton size with depth (Figure 3.7b).

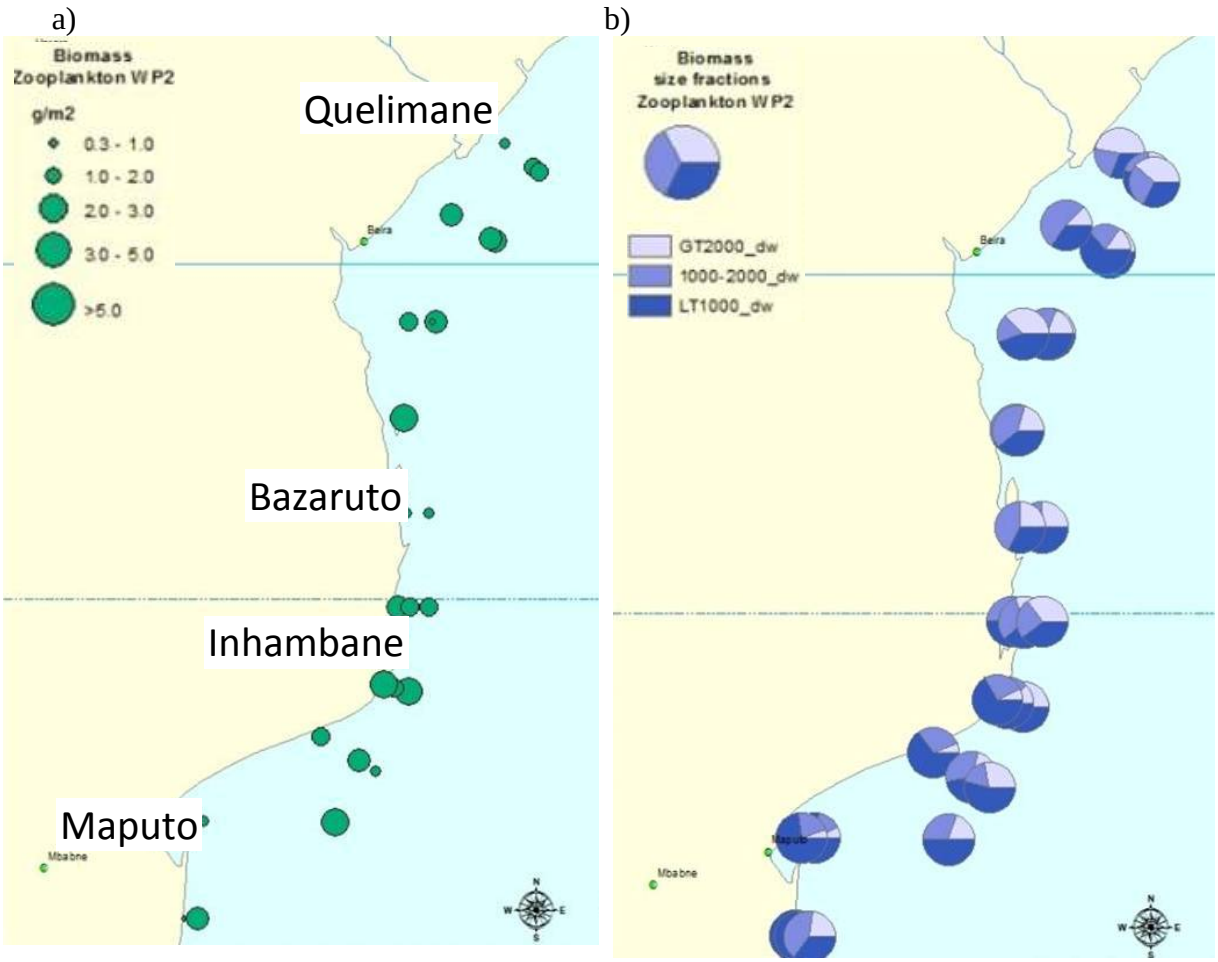
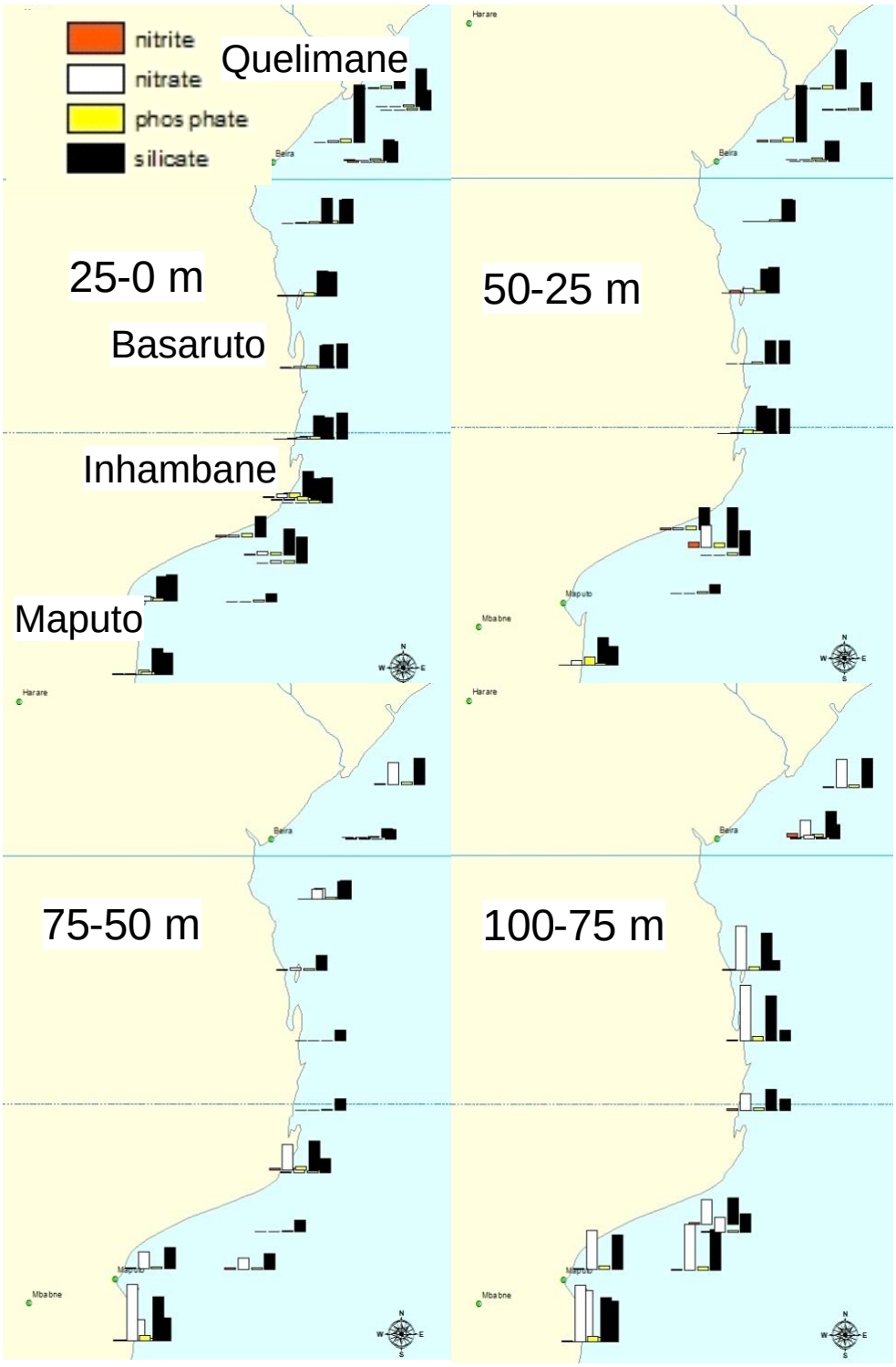


Figure 3.7. Zooplankton biomass (left) and zooplankton size fractions (right), based on results from the WP2 net sampling

3.6. Nutrients and chlorophyll

The survey area exhibited low surface chlorophyll a values and the nutrients required for phytoplankton growth (nitrite, nitrate, phosphate and silicate) in surface layer are strongly depleted (Figures 3.8, 3.9 and Table 3.1). Annex V gives the detailed results from the laboratory analyses after the survey. The results are typical for oligotrophic systems, also termed "ocean deserts". The values were highest from surface to about 75 m depth and relatively homogenous. All nutrient values increased with depths. The nitrite + nitrate vs. phosphate or silicate relationships were extremely low. Silicate concentrations were relatively high compared to the other salts, with a nutricline around 70-100 m indicative of diatom consumption of silicate above the cline. This probably explain the off- shelf sub surface fluorescence maximum at these depths seen in Figure 3.5 and 3.6.

Generally, phytoplankton communities are essential to the majority of marine ecological processes and affect the structure of food webs (e.g., primary production), nutrient cycling and the flux of particles to deep waters. The principal factors that affect horizontal distribution (i.e. latitudinal and longitudinal) of phytoplankton communities are temperature, salinity and currents, while vertical distribution (i.e. with depth) is mostly affected by irradiance, nutrients and water column stability. Some phenomena such as upwelling, which is defined as the uplift of deeper nutrient richer waters, tides and river runoff, are extremely important to explain nutrient dispersion and concentration.


nitrite
nitrate
phos phate
silicate
Quelimane
25-0 m
50-25 m
Basaruto
Inhambane
Maputo
75-50 m
100-75 m
Harare
Beira
Mbabne

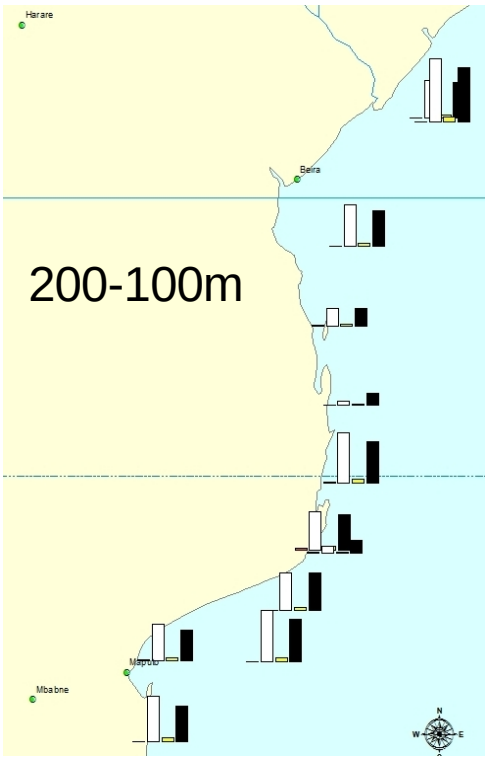
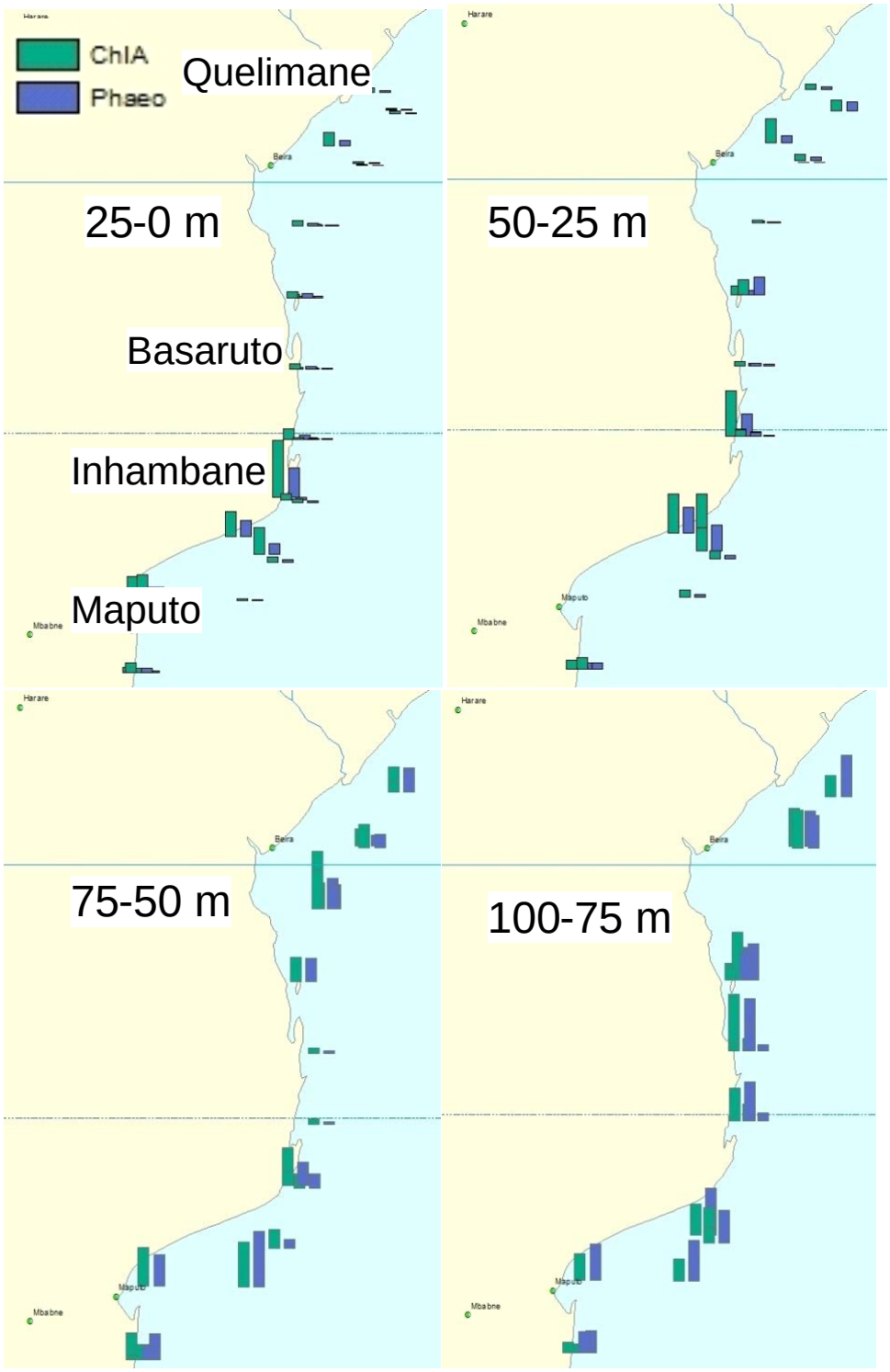


Figure 3.8. Nutrient concentrations: nitrite (red), nitrate (white), phosphate (yellow) and silicate (black) at 25-0 m, 50-25 m, 75-50 m, 100-75 m and 200-100 m depths, respectively, (only relative scale, see Table 3.1 and Annex V)

Table 3.1. Depth stratified mean (±SD) concentrations of nutrients and chlorophyll/phaeopigments found at environmental stations in Mozambique, 2014.

Nutrients/Depths	**25-0 m**	**50-25 m**	**75-50 m**	**100-75 m**	**200-100 m**
Nitrite (µmol/L)	0.03 ± 0.04	0.06 ± 0.11	0.11 ± 0.09	0.21 ± 0.19	0.11 ± 0.09
Nitrate (µmol/L)	0.10 ± 0.12	0.17 ± 0.40	1.69 ± 2.54	4.46 ± 0.19	8.32 ± 4.37
Phosphate (µmol/L)	0.23 ± 0.05	0.24 ± 0.12	0.33± 0.19	0.51 ± 3.91	0.76 ± 0.31
Silicate (µmol/L)	2.05 ± 0.58	2.24 ± 0.77	3.13 ± 1.61	4.92 ± 0.27	7.60 ± 3.13
Chlorophyll *a* (mg/m3)	0.37 ± 0.48	0.35 ± 0.41	0.40 ± 0.25	0.21 ± 2.33	0.09 ± 0.10
Phaeopigment (mg/m3)	0.18 ± 0.24	0.21 ± 0.24	0.33 ± 0.21	0.26 ± 0.11	6.17 ± 0.13


ChlA
Phaeo
Quelimane
Beira
25-0 m
50-25 m
Basaruto
Inhambane
Maputo
Mbabne
Harare
75-50 m
100-75 m

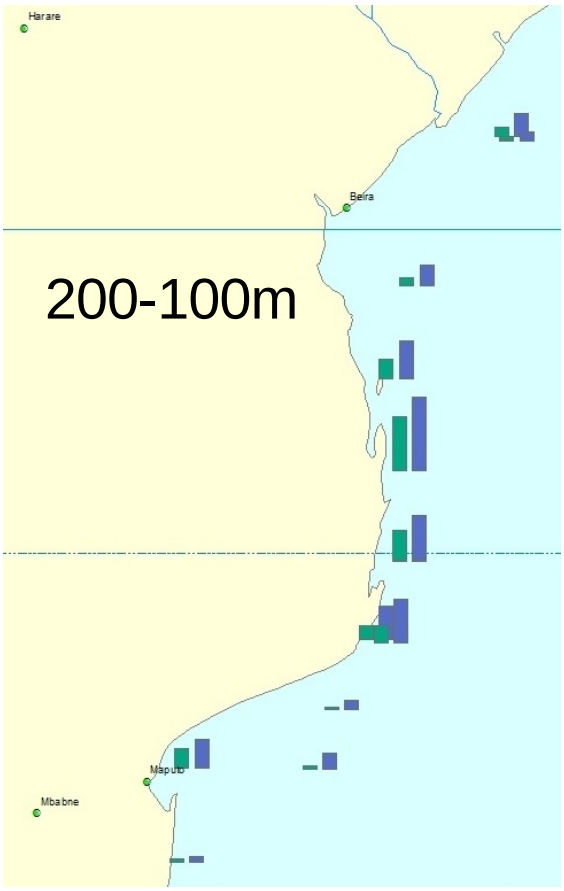


Figure 3.9. Chlorophyll *a* and phaeopigment concentrations at 25-0 m, 50-25 m, 75-50 m, 100-75 m and 200-100 m depths, respectively (only relative scale, see Table 3.1 and Annex V)

3.7. Sediment samples

All sediment samples collected were offloaded in Maputo and placed in the custody of IIP. Sediment samples will be analysed in laboratories for grain size and content of organic and metal content. Sediment grain size will be analysed by wet and dry sieving according to standard laboratory procedures.

All sediment variables analysed will be mapped using a Geographic Information System to reveal trends according to depth and latitude. The results obtained will be related with physical and biological parameters of each station to assess their influence in composition and distribution of fishing resources.

3.8. Plankton taxonomy analyses

Plankton organisms are responsible for production and transfer of most of the existing food energy at sea. Plankton is vitally important to aquatic and marine ecosystems, and represents the base of the pelagic food web of these ecosystems. Changes in its composition and

structure can cause profound changes in all subsequent trophic levels (Grahane, 1987). The planktonic community has a very dynamic character, with high reproductive rates and loss. It responding quickly to physical and chemical changes in the aquatic environment and stablishing complex relationships in the competition, use of space and resources (Valiela, 1995). Studies on the abundance and distribution of planktonic species along the Mozambican coast are very limited and scarce. This study aims to evaluate the composition and biomass of plankton, correlated with the influence of environmental factors (biotic and abiotic) in their distribution and composition. 146 samples of plankton were collected of which 58 samples will be used for qualitative and quantitative analysis of phytoplankton while 88 samples will be used for zooplankton analysis.

Analysis and identification of plankton in the samples will be made in the plankton section, Department of Oceanography, University of Lisbon.

CHAPTER 4. ACOUSTIC ABUNDANCE AND DISTRIBUTION

The hydroacoustic survey covered the shelf and slope from roughly 20 m to 500 m bottom depth (1000 m depth on the ecosystem transects). Continuous acoustic recording and analysis were carried out throughout the survey. Acoustic distribution and abundance was estimated for two species groups during the survey. These were Pelagic 1 (Pel1) and Pelagic 2 (Pel2). The Pel1 group of species consists of pelagic fish of the families Clupeidae and Engraulididae, while the Pel2 species consist of the families Carangidae, Scombridae, Barracuda and Hairtails. Table 2.1 gives an overview of the most common species belonging to each of these groups. The Pel1 species are typically separated from the Pel2 species based on the presence of the two groups in the trawl catches, and based on the acoustic signal as seen during the scrutinizing process, e.g. the fact that the Clupeidae and Engraulididae has a much stronger backscattering signal then the Carangidae and other Pel2 species. During the survey a large number of length frequency measurements were taken, however, most of them from demersal trawl catches. The average length was estimated from each of these. Based on this an average length was calculated for each taxonomic family using equal weighting (Table 4.1). Table 4.1 also show the catch of each taxonomic group in the trawl catches and the relative proportion of each family in each taxonomic category. Based on this the length used for estimating the biomass index for the two taxonomic groups was 14 cm for Pel1 and 23 cm for Pel2. It should be noted that the Hairtails were not included when estimating the mean length of Pel2 due to the fact that most of these were not identified acoustically (found in the trawl catches mainly in deep waters outside the distribution area identified for Pel 2).

Table 4.1. Number of length frequency samples recorded per species/station, average length (equal weight), avg. catch/h (kg) and the proportion of the catch within the acoustic category presented per taxonomic family.

Acoustic category	Family	# Length Freq. measurements	Avg. Length	Avg. Catch/h (kg)	% group
Pel1	Clupeidae	7	14.9	3.2	62.7
Pel1	Engraulididae	7	13.3	1.9	37.3
Pel2	Carangidae	80	19.7	36.1	69.4
Pel2	Scombridae	16	60.1	2.6	5.0
Pel2	Barracuda	14	28.4	5.9	11.3
Pel2	Hairtails	10	62.1	7.4	14.2

Data are presented for the two regions, the southern and central shelf. The coast of northern Mozambique was not covered due to the engine breakdown and the coverage of the central region was interrupted north of the Zambezi river mouth due to engine problems. The distribution of pelagic fish continued north of the survey area and the estimates presented in this report only include the geographic areas actually covered by the vessel and does not include any evaluation/quantification of how much fish is found inshore of the surveyed area.

Mozambique has relatively large shallow water areas and river mouths. Many of the species found during this survey are known to thrive in such environments and it is likely that the biomass of some of these inshore of the survey area was considerable. Summary of backscattered s_A values and biomass estimates for the two species categories can be found in Table 4.2 and 4.3 respectively.

4.1. The south coast

Pel1

The distribution of Clupeoids in the southern region of Mozambique was very low. A few encounters of Pel1 species were found especially in the vicinity of the Limpopo river around 25°S and slightly more distinct between Limpopo and Tofo (only few, not shown in Figure 4.1). A total acoustic abundance index of 6 000 tonnes of fish were estimated based on a set (average) total length of 14 cm (Table 4.2). The Clupeoid species found in the region were the *Dussumieria acuta, Sardinella albella, Encrasicholina punctifer, Thryssa vitrirostris and Thryssa setirostris*. Length frequencies of the most commonly caught species can be found in Annex II.

Pel2

Most of the Pel2 group of fish was found between 20 and 50 m depth in a more or less continuous band along the coast. Some few fish were also found offshore especially in the southern part of the region (Figure 4.1, Table 4.3). The densities were generally low. A total acoustic abundance index of 21 000 tonnes of fish was estimated based on a set (average) total length of 23 cm (Table 4.3). The most common Pel2 species found in the region was the *Selar crumenophthalmus, Decapterus russelli, Decapterus macrosoma, Sphyraena barracuda* and *Carangoides malabaricus*. Length frequencies of the most commonly caught species can be found in Annex II.

4.2. The Central coast (Sofala bank)

Pel1

The distribution of Clupeoids in the central region of Mozambique was generally very low. However, one distinct distribution was found outside Zambezi river mouth (Figure 4.1, Table 4.2). The abundance in this area was estimated to be 9 400 tonnes. A few encounters of Pel1 species were also made in other areas of the coast but the abundance and catch rates were generally low. The Clupeoid species found in the region were mainly *Sardinella albella, Encrasicholina punctifer, Thryssa vitrirostris* and *Pellona ditchela*. Length frequencies of the most commonly caught species can be found in Annex II.

Pel2

The Pel2 group of fish was found across most of the Bazaruto shelf extending from <20 m depth extending to the shelf edge around 100 m, but with lower densities mid-shelf around 50 m depth (Figure 4.2, Table 4.3). The densities were generally low. A total acoustic abundance index of 46 000 tonnes of fish was estimated based on a set (average) total length of 23 cm

(Table 4.3). However, it is important to take into consideration that the distribution of these species continued north of the area surveyed. The most common Pel2 species found in the region was the *Carangids, Decapterus russelli, Decapterus macrosoma, Selar crumenophthalmus* and *Carangoides malabaricus*, in addition to *Trichiurus lepturus*, and *Scomberomorus commerson*. Length frequencies of the most commonly caught species can be found in Annex II.

Table 4.2. The acoustic estimate of Clupeoid fish (Pel1) on the southern and central shelf of Mozambique.

Region	South	Central	
Stratum	1	2	Total:
Area	231	154	385
$<s_A>$:	231	226	
Biomass (1000 t):	6,138	9,422	15,560

Table 4.3. The acoustic estimate of Pel2 species on the southern and central shelf of Mozambique.

Region	South			Central	
Stratum	1	2	3	4	Total
Area	1379	464.51	1119.78	5588	
$<s_A>$:	45	14	3	28	
Biomass (1000 t):	17,920	1,819	974	46,133	66,847

Comparison with the 2007 survey

All together 15 000 tonnes of Pel1 species were found along the coast of Mozambique this year compared to about 20 000 tonnes in 2007. A total estimate of 67 000 tonnes were recorded of the Pel2 group during this survey, compared with 34 000 along the whole coast of Mozambique in 2007. No separation between the southern and central region was made during the biomass estimation in 2007. Due to the nature of the biomass estimation, and the fact that the survey was interrupted 2/3 into the central region of the survey the acoustic estimates this year cover a smaller geographic area and do not extrapolate into the part of the central region not covered.

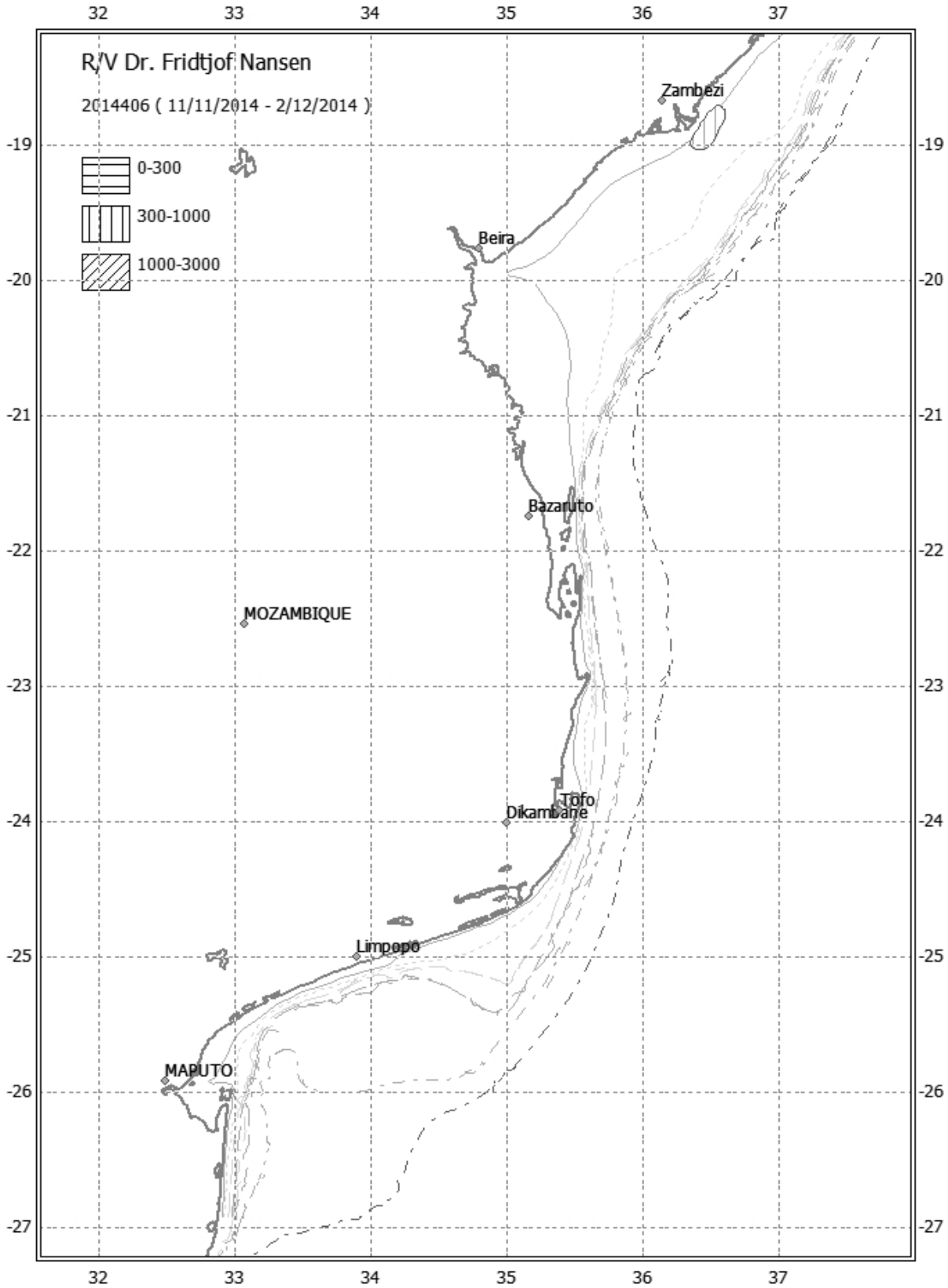


Figure 4.1. Distribution of acoustic backscattering of Pel1 species in the area covered by the survey.

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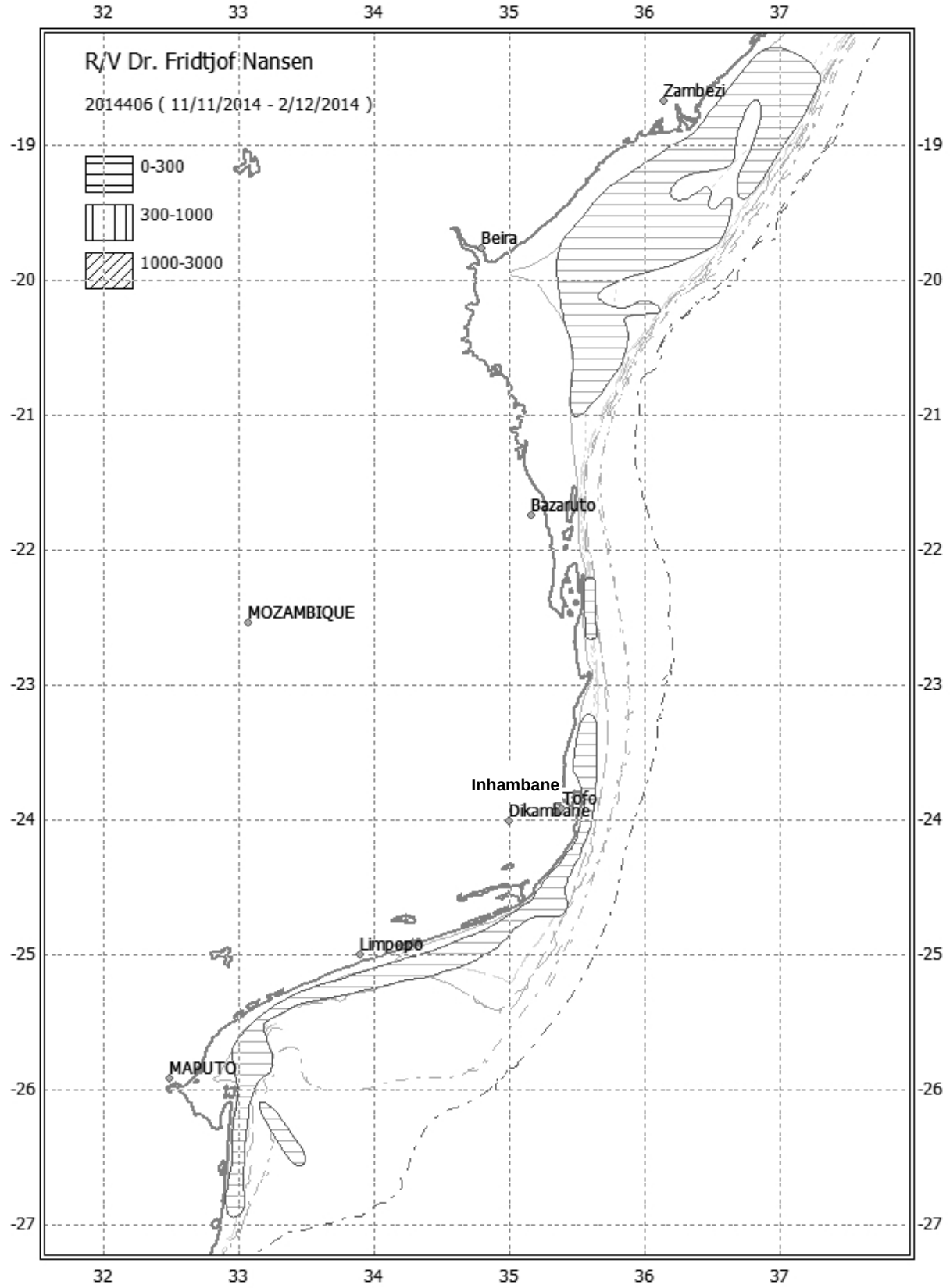

Figure 4.2. Distribution of acoustic backscattering of Pel2 species in the area covered by the survey.

CHAPTER 5. SWEPT AREA ABUNDANCE AND DISTRIBUTION

The trawl survey covered the shelf and slope from 20 m to 800 m bottom depth, but with occasional trawls in deeper waters. Catch rates in kg/hour are presented per region and depth strata for main taxonomic groups found during the survey.

Three depth strata were defined prior to the survey; 20 - 50 m depth (inner shelf), 50 - 200 m depth (outer shelf) and 200 - 800 m depth (slope). In addition, some very few trawls were taken in deep water at depths >800 m. The region between the coast and 20 m bottom depth was not covered due to safety restrictions set by the vessel. Mozambique has especially in the central region a relatively wide shelf area inshore of 20 m bottom depth (see Table 2.2). A considerable amount of fish is therefore expected inshore of the area covered by the vessel. The trawl positions are mapped in Figure 1.1. Station information and catch by species are presented in Annex I.

5.1. Analyses of catch rates

Catch rates are presented per region; 1. The southern shelf and 2. The central shelf. The mean catch rates were generally low but varied considerably throughout the survey. Highest average catch rates were found on the central shelf between 20-50 m (489 kg/h) while the lowest average catch rates were found in the same region between 200-800 m depth (113 kg/h). In the following when refereeing to pelagic species this is the sum of the catch off all species from the taxonomic groups barracuda, carangids, clupeoids (engraulids and clupeids), hairtails and scombrids. The group demersal species consists of all species in the families' croakers, groupers, grunts, hake, seabream, snappers and cusk-eels. This group summarises the catch of some of the most commercially interesting demersal species caught during the survey. The group of other species always reflect the remaining catch not listed in any of the other columns in the tables, and the content may therefore vary from table to table.

Southern region

79 bottom-trawl hauls were made between the border with South Africa and 21°30'S (Southern region of Mozambique). 73 hauls were considered valid for analyses of catch rates (kg/h). Trawls carried out at night inshore of 150 m depth where excluded from the analyses since fish especially in shallow water tend to lift at night with consequently lowered catch rates. Nearly half of the stations (35) were placed at the depth zone of 20 - 200 m, with 11 stations between 20 - 50 m and 24 between 50 – 200 m. In these regions (inner and outer shelf), the highest catch rates were of pelagic species, valuable demersal species, and rays (Table 5.1a). On the inner shelf (20-50 m depth) the pelagic group contributed with 52.9% while the contribution from demersal species was 12.4% and rays contributed with 11.9% of the average catch. No lobsters and no shark were found in this depth region, while catches of shrimp were negligible with only 0.2%.

Highest overall catch rates in the southern region were found between 50- 200 m (Table 5.1b). It was the pelagic group and the group of rays who contributed most to the total catch with 15.7% and 14% respectively. Squids had catch rates of 7.3 kg/h. This group consisted of several species but especially *Loligo forbesi*, *Sepia prashadi* and *Sepia hieronis* was commonly caught. Lobsters and shrimp both became considerably more important with 4.3 and 3.8 kg/h respectively. The most common species of these groups were the shrimps *Penaeus japonicas, P. latisulcatus, P. Semisulcatus, Penaeopsis balssi, Aristaeomorpha foliacea, Heterocarpus woodmasoni, Heterocarpus tricarinatus, Plesionika martia and Haliporoides triarthrus* and the lobsters *Palinurus delagoae* and *Metanephrops mozambicus.*

On the slope (200-800 m depth), the catch rate declined compared to the shelf but catches of cephalopods, shrimps and lobsters increased and contributed with 6.8% and 5.6% and 4.0% of the total catch (Table 5.1c). The Lobsters catch rate (7.4 kg/h) is possibly of particular interest. This increased considerably when compared to that of the outer shelf of 4.3 kg/h and inner shelf (0.0 kg/h).

The group of “others” consists of a number of species of less commercial importance. This represents a considerable proportion of the catch in all the three depth zones in Table 5.1. On the inner shelf this group contributed to 22% of the catch, while on the outer shelf and slope this increased to 58% and 69% of the total. Of all taxonomic groups found within the group of “others” the mullets are considered to be more important. The catch rates of this group was 12.8 kg/h and 17.8 kg/h respectively between 20-50 m and 50 – 200 m depth. Other taxonomic groups that contributed to the group of others (with various density depending on the depth) was Porifera (sponges), Synodontidae (Lizardfish) Mycthophids, Jellyfish, Macrouridae (grenadiers) and the Leiognathidae (ponyfishes).

Table 5.1. Southern region catch rates (kg/h) by main groups in swept-area bottom-trawl hauls on the a) inner shelf (20-50 m), b) outer shelf (50-200 m) and c) slope (200 – 800 m). The "pelagic" group consists of the taxonomic groups barracuda, carangids, clupeoids (engraulids and clupeids), hairtails and scombrids. The "demersal" group consists the families' croakers, groupers, grunts, hake, seabream, snappers and cusk-eels, while the "other" groups summarises the catch of all species groups not mentioned in any other column.

a) Inner shelf: 20-50 m

Station	Gear depth	Cephalopods	Demersal	Lobsters	Pelagic	Rays	Sharks	Shrimps	Other	Total
1	27.5	2.7	89.8	0	299.6	169	0	0	62.7	623.9
20	38	9.8	11.8	0	432.8	38.1	0	0	95.4	587.9
29	41	1.2	95.3	0	373.8	49.7	0	6.3	182.9	709.1
31	48	1.2	29.9	0	434.4	0	0	0	166.9	632.4
43	38	3.4	12.3	0	66.3	164.7	0	0	29.1	275.8
44	31	1.7	0	0	37.2	0	0	0	15.2	54.1
56	44.5	1.3	164.2	0	88	0	0	0	101.7	355.1
57	35	0	0.1	0	79.7	0	0	0	91.3	171
65	39	0	0.2	0	18.9	0	0	0	5.6	24.7
71	37.5	2.7	34.4	0	40.4	0	0	0	22.3	99.8
72	28	0.6	0	0	2.8	0	0	0	4.5	7.8
Mean	37	2.2	39.8	0	170.3	38.3	0	0.6	70.7	322
% catch		0.7	12.4	0.0	52.9	11.9	0.0	0.2	22.0	100

b) Outer shelf: 50-200 m

Station	Gear depth	Cephalopods	Demersal	Lobsters	Pelagic	Rays	Sharks	Shrimps	Other	Total
2	61	2.7	49.3	0	57.9	17.5	0	0	67.9	195.4
3	105.5	6.6	0	0	0	0	0	0	29.1	35.6
18	84.5	11.1	0	0	0	0	14.9	0	34.7	60.7
19	51	2.4	1	0	0.9	0	9.8	0	52.3	66.5
27	171.5	12.4	0.3	42.1	45.5	10.7	25.4	65.8	173.9	376
28	93.5	4.8	19.4	4.4	42.6	0	37.1	2.6	321.9	432.8
30	141.5	1.9	1.6	8.3	39.6	1.6	50.1	2	174.5	279.7
35	106	65.9	9.1	0	11.5	0	8.9	0	87.9	183.4
38	155	2.5	27.1	1.7	5	6.7	9.9	0.6	894	947.5
41	129	4.4	55.5	2.9	0	0	8.1	0	782.3	853.3
42	77	0	80.5	2.6	120	5.8	0	0	156	364.9
45	55.5	2.1	25.1	6.1	832.3	389.8	10.5	20.9	360.8	1647.6
48	106	7.3	39.3	1.9	4	0	1.3	0	836.4	890.2
49	73	0.7	1	0	106.5	0	0	0	238.9	347.1
50	125.5	7.3	59.4	2.8	2.2	0	0	0	125.9	197.5
54	195.5	7.5	3.7	25.7	25.1	0	0.6	0.4	17.9	80.7
55	73.5	1.1	0.1	0	0	706.6	0	0	45.4	753.2
58	62.5	1.3	14.3	0	0	0	0.3	0	31.1	46.9
59	104	20.2	33.2	0	0	0	0	0	8.2	61.6
64	102.5	2	72.4	0	0	0	0	0	41.5	115.9
66	165	6.1	0.6	0	0	6.2	0	0	23.2	36.1
70	197.5	3.5	0.3	4.4	0	0.1	0	0	31.8	40.1
73	68.5	0.9	2.6	0	0.9	69.8	0	0	10.5	84.6
78	51	0	31.4	0	63.3	0	20.6	0	455.1	570.4
Mean	106.5	7.3	22	4.3	56.6	50.6	8.2	3.8	208.4	361.2
% catch		2.0	6.1	1.2	15.7	14.0	2.3	1.1	57.7	100.0

c) Slope: 200 – 800 m

Station	Gear depth	Cephalopods	Demersal	Lobsters	Pelagic	Rays	Sharks	Shrimps	Other	Total
4	209.5	1.2	0.3	6.2	0	5	0	0	19.9	32.6
5	606.5	0.9	3.9	0	0.2	0	2.4	10.8	37.8	55.9
6	682.5	60.6	33.7	0	0	78	4.7	6.5	193.4	376.9
7	701.5	2	86.5	0	0	2.5	22	8.5	36.7	158.1
8	244.5	21	0	2.4	0	0	4.9	0.7	58.6	87.6
10	207	14.6	0	34.9	10.4	0	13.1	0	142.1	215
11	408	44.4	4.6	1.5	34.2	0	54.4	1.1	243.5	383.6
12	569	4.3	62	0	0	193.2	0	5.8	68.4	333.7
13	460.5	1.5	0	2.6	0	0	1.1	43.4	49.2	97.7
14	448	3.2	0	1.2	0.7	1.5	0.8	3.4	42	52.7
15	443	4.2	0	1.9	0	0	0	48.5	127.9	182.5
16	464	17.5	5.1	1.4	56.8	3.8	0	17.3	259.4	361.2
17	520.5	9.6	0	2.7	2	0	2.3	59.9	180.4	256.9
23	426	16.5	0.7	19	9.8	0	0	5.1	118.4	169.6
24	373	9.9	0	19.2	109.2	0	4.7	0	313.7	456.7
25	260	4.3	1.3	29.4	0	0	1	1.5	119.9	157.4
26	260	1.6	3.4	0	0	0	0	1.8	58.4	65.3
36	516.5	0.1	0.6	0	0	0	0	47.9	193.4	241.9
37	263	11.7	0	21.9	0	0	14.6	0	158.1	206.3
39	605.5	0	2.6	0.3	0.8	0	0.5	28.1	54.5	86.7
40	235	7	0.2	12.8	19.6	0	2.2	0	35	76.7
46	573.5	5.1	0.3	0	0	9.6	29.9	40	168.3	253.2
47	219.5	8.9	0.5	15.4	25.4	0	8.2	0	51.3	109.8
51	283	26.7	0	9.6	0	0	3.8	0	189.5	229.6
52	743	17.4	3.3	1.5	0	0	7.2	9.9	92	131.3
53	473	1	0.2	0	0.2	0	0.5	12	265.2	279
60	216.5	7.9	0.6	8.6	1.6	1.9	0	0.4	38.3	59.3
61	435.5	3.5	0.1	0	0	0	1.6	2.3	316.8	324.4
62	446	22.9	0	0.2	0	0	2.6	1	302	328.7
63	208.5	5.7	6.4	4.9	0	1	0	0	11.1	29.1
67	251	11.1	0	41.1	0	7.5	6	0	55.6	121.2
68	649.5	5.2	0.6	2.4	0	0	3.9	5.5	32.4	50.1
69	488	13.6	0	0	0.1	0	8.8	21.7	243.6	287.9
74	204	6	1.1	3.9	0	0.5	0	0.8	30.6	43
75	314.5	24.9	0	2	0	0.6	0.3	0.4	93.7	121.8
76	700.5	25.4	1.8	0.4	0	0	0	6	71	104.5
77	387.5	48.3	0	23.6	0	7.3	0	1.7	312.1	392.9
79	238	5.8	1.3	9.5	13.6	5.6	0	0	31.8	67.7
Mean	414.1	12.5	5.8	7.4	7.5	8.4	5.3	10.3	126.7	183.9
% catch		6.8	3.2	4.0	4.1	4.6	2.9	5.6	68.9	100.0

Catch rates of the demersal fish category presented in Table 5.1 are broken down do individual families and presented in Table 5.2 a-c. The commercially important demersal fish groups contributed to the total catch with 11.4%, 4.4% and 0.2% on the inner shelf, outer shelf and slope respectively.

The seabream was the most dominant group both on the inner and outer shelf with 25.3 kg/h and 14.6 kg/h respectively. The most dominant sparid on the inner shelf was the *Pagellus natalenses* while between 50 - 200 m depth *Pagellus natalenses* and *Polysteganus*

coeruleopunctatus dominated. No snappers were caught in the region between 20-50 m. Further offshore between 20-200 m no croakers and no hake were found.

On the slope from 200-800 m catches of demersal fish was generally low. Hake (*M. pararadoxus*) dominated with catch rates of 4.7 kg/h followed by cusk-eels with 0.8 kg/h and seabream with catch rates of 0.3 kg/h. Groupers, grunts and snappers was absent from the catches in this depth region. The "other" group summarises the catch of all species groups not mentioned in any other column.

Table 5.2. Southern region catch rates (kg/h) by main demersal species grouped by families in swept-area bottom-trawl hauls on a) the inner shelf (20-50 m), b) outer shelf (50-200 m) and c) slope (200–800 m). The "other" group summarises the catch of all species groups not mentioned in any other column.

a) Inner shelf: 20 – 50m

Station	Gear depth	Croakers	Groupers	Grunts	Hake	Seabream	Snappers	Cusk-eel	Other	Total
1	27.5	0	0	0	0	14.4	0	0	85.5	623.9
20	38	0	0	0	0	2	0	0	97.8	587.9
29	41	10.9	0	2.6	0	0	0	0	86.4	709.1
31	48	0	4.7	0	0	0	0	0	95.3	632.4
43	38	0	0	0	0	4.5	0	0	95.5	275.8
44	31	0	0	0	0	0	0	0	100	54.1
56	44.5	0	0	0	0	46.2	0	0	53.6	355.1
57	35	0	0	0	0	0.1	0	0	99.8	171
65	39	0	0	0	0	0.2	0	0	99.8	24.7
71	37.5	0	0	0	0	0	0	0	100	99.8
72	28	0	0	0	0	0	0	0	98.1	7.8
Mean	37	7	2.7	1.7	0	25.3	0	0	285	322
% Catch		2.2	0.8	0.5	0.0	7.9	0.0	0.0	88.6	100.0

b) Outer shelf: 50 – 200 m

Station	Gear depth	Croakers	Groupers	Grunts	Hake	Seabream	Snappers	Cusk-eel	Other	Total
2	61	0	0	0	0	4.9	20.3	0	74.8	195.4
3	105.5	0	0	0	0	0	0	0	100	35.6
18	84.5	0	0	0	0	0	0	0	100	60.7
19	51	0	0	0	0	1.6	0	0	98.4	66.5
27	171.5	0	0	0	0	0	0	0	100	376
28	93.5	0	0	0	0	4.3	0	0	95.7	432.8
30	141.5	0	0	0	0	0.6	0	0	99.4	279.7
35	106	0	0	0	0	5	0	0	94.9	183.4
38	155	0	0.1	0	0	2.8	0	0	97	947.5
41	129	0	0.1	0	0	6.4	0	0	93.5	853.3
42	77	0	0.8	0.3	0	20.9	0	0	77.8	364.9
45	55.5	0	0	0.2	0	1.4	0	0	98	1647.6
48	106	0	1.5	0	0	2.9	0	0	95.6	890.2
49	73	0	0	0	0	0.3	0	0	99.7	347.1
50	125.5	0	1.7	0	0	28.4	0	0	69.9	197.5
54	195.5	0	0	0	0	4.6	0	0	95.3	80.7
55	73.5	0	0	0	0	0	0	0	100	753.2
58	62.5	0	0	0	0	0	30.4	0	69.6	46.9
59	104	0	54	0	0	0	0	0	46	61.6
64	102.5	0	25.5	0	0	36.9	0	0	37.5	115.9
66	165	0	0	0	0	1.7	0	0	98.2	36.1
70	197.5	0	0	0	0	0.6	0	0	98.9	40.1
73	68.5	0	0	0	0	0	0	0	100	84.6
78	51	0	0	0	0	0	0	0	100	570.4
Mean	106.5	0	3.5	0.2	0	14.6	2.3	0	340.2	361.2
%Catch		0.0	1.0	0.1	0.0	4.0	0.6	0.0	94.3	100.0

c) Slope: 200 – 800 m

Station	Gear depth	Croakers	Groupers	Grunts	Hake	Seabream	Snappers	Cusk-eel	Other	Total
4	209.5	0	0	0	0	1	0	0	95.1	32.6
5	606.5	0	0	0	5.2	0	0	0.9	94.7	55.9
6	682.5	0	0	0	7.7	0	0	4.6	92.3	376.9
7	701.5	0	0	0	47.9	0	0	10.8	52.1	158.1
8	244.5	0	0	0	0	0	0	0	99.5	87.6
10	207	0	0	0	0	0	0	0	98.6	215
11	408	0	0	0	1.2	0	0	0	98	383.6
12	569	0	0	0	18.6	0	0	0	81.4	333.7
13	460.5	0	0	0	0	0	0	0	99.1	97.7
14	448	0	0	0	0	0	0	0	100	52.7
15	443	0	0	0	0	0	0	0	99.4	182.5
16	464	0	0	0	1.4	0	0	0	98.6	361.2
17	520.5	0	0	0	0	0	0	0	100	256.9
23	426	0	0	0	0	0	0	0.7	100	169.6
24	373	0	0	0	0	0	0	0	100	456.7
25	260	0	0	0	0	0	0	1.3	100	157.4
26	260	3	0	0	0	0	0	1.4	97	65.3
36	516.5	0	0	0	0.2	0	0	0	99.6	241.7
37	263	0	0	0	0	0	0	0	99.9	206.3
39	605.5	0	0	0	0	0	0	2.6	99	86.7
40	235	0	0	0	0	0.2	0	0	99.8	76.7
46	573.5	0	0	0	0	0	0	0.3	99.9	253.2
47	219.5	0	0	0	0	0.5	0	0	99.5	109.8
51	283	0	0	0	0	0	0	0	100	229.6
52	743	0	0	0	0	0	0	3.3	100	131.3
53	473	0	0	0	0	0	0	0.2	99.4	279
60	216.5	0	0	0	0	1.1	0	0	97.6	59.3
61	435.5	0	0	0	0	0	0	0.1	99.7	324.4
62	446	0	0	0	0	0	0	0	100	328.7
63	208.5	0	0	0	0	21.9	0	0	78	29.1
67	251	0	0	0	0	0	0	0	100	121.2
68	649.5	0	0	0	0	0	0	0.6	100	50.1
69	488	0	0	0	0	0	0	0	100	287.9
74	204	0	0	0	0	2.5	0	0.1	97.5	43
75	314.5	0	0	0	0	0	0	0	99.9	121.8
76	700.5	0	0	0	0	0	0	1.8	100	104.5
77	387.5	0	0	0	0	0	0	0	100	392.9
79	238	0	0	0	0	2	0	0	98	67.7
Mean	414.1	0.1	0	0	4.7	0.3	0	0.8	178.4	183.9
% Catch		0.1	0.0	0.0	2.6	0.2	0.0	2	97.0	100.0

The group of pelagic species from Table 5.1 is broken down to family level and presented in Table 5.3 a-c below. The commercially important pelagic fish groups together contributed to the total catch with 53.2%, 15.7% and 4.1% to the catch on the inner shelf, outer shelf and slope respectively. The “other” group presented in Table 5.3 summarises the remaining part of the catch.

On the inner and outer shelf carangids were the most dominant species with catch rates of 140.2 kg/h. The dominating species on the inner shelf were *Decapterus macrosoma, Selar crumenophthalmus*, *D. russelli* and *Carangoides malabaricus*. In addition, barracuda,

especially *Sphyraena flavicauda* contributed with catch rates of 17.1 kg/h and scombrids with 12.7 kg/h.

On the outer shelf carangids had catch rates of 35.6 kg/h. In this region *Selar crumenophthalmus* and *Decapterus russelli* dominated. In addition, barracudas, mainly *Sphyraena barracuda* was abundant with catch rates of 15.6 kg/h.

On the slope the hairtails, mainly *Trichiurus lepturus,* had a catch rate of 5.9 Kg/h. Few other pelagic species were found in this depth region.

Table 5.3. Southern region catch rates (kg/h) by main pelagic species grouped by families in swept-area bottom-trawl hauls on the a) inner shelf (20-50 m), b) outer shelf (50-200 m) and c) slope (200 – 800 m). The "other" group summarises the catch of all species groups not mentioned in any other columns.

a) Inner shelf: 20 – 50m

Station	Gear depth	Barracuda	Carangids	Clupeoids	Hairtails	Scombrids	Other	Total
1	27.5	0	47.8	0	0	0.2	52	623.9
20	38	0	69.6	0	0	4	26.4	587.9
29	41	17.8	32.6	0.2	0	2.2	47.3	709.1
31	48	1.4	65.6	0	0	1.7	31.3	632.4
43	38	4	7.2	0.1	0	12.8	76	275.8
44	31	1.6	61	0.1	0	6.1	31.2	54.1
56	44.5	0	22.5	0.4	0	1.8	75.2	355.1
57	35	0.7	31.2	0	0	14.7	53.4	171
65	39	0	0	0	0	76.6	23.4	24.7
71	37.5	39.8	0.6	0	0	0	59.6	99.8
72	28	0	35.5	0	0	0	64.5	7.8
Mean	37	17.1	140.2	0.3	0	12.7	151.6	322
% catch		5.3	43.5	0.1	0.0	3.9	47.1	100.0

b) Outer shelf: 50 – 200 m

Station	Gear depth	Barracuda	Carangids	Clupeoids	Hairtails	Scombrids	Other	Total
2	61	0	29.6	0	0	0	70.4	195.4
3	105.5	0	0	0	0	0	100	35.6
18	84.5	0	0	0	0	0	100	60.7
19	51	0	1.3	0	0	0	98.7	66.5
27	171.5	0	0	0	12.1	0	87.9	376
28	93.5	1	6.1	0.2	2.5	0	90.2	432.8
30	141.5	2.2	3.1	0	6.5	2.4	85.8	279.7
35	106	3.2	0.7	0	2.4	0	93.7	183.4
38	155	0	0.2	0	0.3	0	99.5	947.5
41	129	0	0	0	0	0	100	853.3
42	77	9.6	22.8	0.2	0.1	0.2	67.1	364.9
45	55.5	19.3	30.6	0.1	0	0.6	49.5	1647.6
48	106	0.5	0	0	0	0	99.5	890.2
49	73	0	30.4	0	0	0.3	69.3	347.1
50	125.5	0	1.1	0	0	0	98.9	197.5
54	195.5	1.1	0	30	0	0	68.9	80.7
55	73.5	0	0	0	0	0	100	753.2
58	62.5	0	0	0	0	0	100	46.9
59	104	0	0	0	0	0	100	61.6
64	102.5	0	0	0	0	0	100	115.9
66	165	0	0	0	0	0	100	36.1
70	197.5	0	0	0	0	0	100	40.1
73	68.5	1	0	0	0	0	99	84.6
78	51	0	11.1	0	0	0	88.9	570.4
Mean	106.5	15.6	35.6	1.1	3.4	0.7	304.6	361.2
% catch		4.3	9.9	0.3	0.9	0.2	84.3	100.0

c) Slope: 200 – 800 m

Station	Gear depth	Barracuda	Carangids	Clupeoids	Hairtails	Scombrids	Other	Total
4	209.5	0	0	0	0	0	100	32.6
5	606.5	0	0	0	0.3	0	99.7	55.9
6	682.5	0	0	0	0	0	100	376.9
7	701.5	0	0	0	0	0	100	158.1
8	244.5	0	0	0	0	0	100	87.6
10	207	0	0	0	4.8	0	95.2	215
11	408	0	0	0	8.9	0	91.1	383.6
12	569	0	0	0	0	0	100	333.7
13	460.5	0	0	0	0	0	100	97.7
14	448	0	0	0	1.3	0	98.7	52.7
15	443	0	0	0	0	0	100	182.5
16	464	0	0	0	15.7	0	84.3	361.2
17	520.5	0	0	0	0.8	0	99.2	256.9
23	426	0	0	0	5.8	0	94.2	169.6
24	373	0	0	0	23.9	0	76.1	456.7
25	260	0	0	0	0	0	100	157.4
26	260	0	0	0	0	0	100	65.3
36	516.5	0	0	0	0	0	100	241.7
37	263	0	0	0	0	0	100	206.3
39	605.5	0	0	0	0.9	0	99.1	86.7
40	235	1.3	0	24.2	0	0	74.5	76.7
46	573.5	0	0	0	0	0	100	253.2
47	219.5	11.7	11.5	0	0	0	76.8	109.8
51	283	0	0	0	0	0	100	229.6
52	743	0	0	0	0	0	100	131.3
53	473	0	0	0	0.1	0	99.9	279
60	216.5	0	0	2.6	0	0	97.4	59.3
61	435.5	0	0	0	0	0	100	324.4
62	446	0	0	0	0	0	100	328.7
63	208.5	0	0	0	0	0	100	29.1
67	251	0	0	0	0	0	100	121.2
68	649.5	0	0	0	0	0	100	50.1
69	488	0	0	0	0	0	100	287.9
74	204	0	0	0	0	0	100	43
75	314.5	0	0	0	0	0	100	121.8
76	700.5	0	0	0	0	0	100	104.5
77	387.5	0	0	0	0	0	100	392.9
79	238	0	20.1	0	0	0	79.9	67.7
Mean	414.1	0.4	0.7	0.5	5.9	0	176.4	183.9
% catch		0.2	0.4	0.3	3.2	0.0	95.9	100.0

The central region (Sofala Bank)

A total of 25 valid bottom-trawl hauls were completed before the survey was interrupted due to the engine breakdown. The vessel covered most of the Sofala Bank area (from 21º 30 S to 18º 23 S). 19 hauls were made on the shelf, 10 hauls on the inner shelf and 9 hauls on the outer shelf (Table 5.4 a-c). In general, the depth interval between 20 and 50 m had higher catch rates compared to the depth interval between 50 and 200 m.

On the inner shelf the pelagic group had a catch rate of 177.8 kg/h contributing with 36.3% of the total catch. The demersal group and squids had catch rates of 24.1 kg/h and 13.4 kg/h,

respectively. No lobsters were caught on the inner shelf and the amount of shrimp was negligible contributing with only 0.6% of the total catch in this zone.

The same pattern as on the inner shelf was also observed on the outer shelf. Pelagic species showed the highest catch rate with 44.9 kg/h followed by demersal, squids and shrimps with catch rate of 8.1 kg/h, 5.4 kg/h and 3.3 kg/h, respectively. The shrimp species dominating the catches on the shelf were *Penaeus latisulcatus, Penaeus indicus* and *Metapenaeus monoceros.*

The slope zone showed a different pattern of catch rates compared with further inshore. The catches were dominated by squids followed by lobsters and shrimps with 11.3 kg/h, 6.6 kg/h and 5.5 kg/h. The squid group consisted of *Loligo forbesi* and *Sepia sp* and seem to have the same level of importance on the slope as on the shelf while both lobsters and shrimps were better represented on the slope. The most important lobsters were *Palinurus delagoae* and *Ibacus novemdentatus*, while shrimp catches at the slope were dominated by *Aristaeomorpha foliacea* and *Plesionika martia*.

The group of “other” species with less commercial importance contributed to 44.7 %, 45.5% and 69.5% of the total catch on the inner shelf, outer shelf and slope respectively (Table 5.4). Of all taxonomic groups found within the group of “others” the mullets are considered to be particularly important because of their abundance and because they are harvested commercially. The catch rates of this group was 155.8 kg/h (34.1%) and 9.3 kg/h (7.8%) respectively between 20-50 m and 50 – 200 m depth. Other taxonomic groups that contributed to the “other” category (with various density depending on the depth) was Porifera (sponges), Synodontidae (Lizardfish) Mycthophids, Jellyfish, Macrouridae (grenadiers) and the Leiognathidae (ponyfishes).

Table 5.4. Central region catch rates (kg/h) by main groups in swept-area bottom-trawl hauls on the a) inner shelf (20-50 m), b) outer shelf (50-200 m) and c) slope (200 – 800 m). The "pelagic" group consists of the taxonomic groups barracuda, carangids, clupeoids (engraulids and clupeids), hairtails and scombrids. The "demersal" group consists the families croakers, groupers, grunts, hake, seabream, snappers and cusk-eels, while the "other" groups summarises the catch of all species groups not mentioned in any other column.

a) Inner shelf: 20 to 50 m

Station	Gear depth	Demersal	Lobsters	Pelagic	Rays	Sharks	Shrimps	Squids	Other	Total
82	49.5	23.8	0	25.1	0	0	0	0	51	110
88	48	0	0	9.6	0	79.2	0	1.3	9.9	87.7
89	36.5	0	0	30.6	0	35.4	0	2.7	31.2	106.6
90	24	0.4	0	49.4	0	2	0	2.8	45.4	252.8
91	23.5	0	0	5.5	85.8	0.1	0	0.6	7.9	417.1
97	35.5	0.3	0	31.5	0	0	0	3.4	64.8	2559.5
98	21.5	11.8	0	60	2.7	1.6	2	1.8	20.1	969.3
99	31.5	0	0	47.7	0	4.1	0	18.1	30.1	50.6
105	31.5	0	0	84.2	0	0	0	1.2	14.5	135.6
106	24	45.5	0	16.6	1.8	2.1	5.2	2.9	25.9	202.9
Mean	32.5	24.1	0	177.8	38.8	13.4	3	13.4	218.7	489.2
% Catch		4.9	0.0	36.3	7.9	2.7	0.6	2.7	44.7	100.0

b) Outer shelf: 50 to 200 m

Station	Gear depth	Demersal	Lobsters	Pelagic	Rays	Sharks	Shrimps	Squids	Other	Total
83	70.5	72.9	0	12.8	0	0	0	0	14.2	46.9
85	62	0	0.8	86.8	0	0	0.1	2.1	10.3	125.3
86	90.5	0	0	22	0	0	0	51.4	26.6	39.5
87	165	0	7.7	0	0.5	3.6	0.4	5	82.7	126.5
92	51	3.6	0.9	4.6	0	0	6	0.6	84.2	174
93	103.5	35.5	0	11.7	0	4.3	0.9	10	37.7	86.3
96	79	0	0.2	77.3	0	0	1.5	1.2	19.7	295.3
100	52.5	1.4	0.9	22.3	0	0	7.7	3.6	64.1	152.2
101	163	0	11.1	0	10.8	2.1	6	0	70.1	25.7
Mean	93	8.1	1.9	44.9	0.4	1	3.3	5.4	54.2	119.1
% Catch		6.8	1.6	37.7	0.3	0.8	2.8	4.5	45.5	100.0

c) slope: 200 to 800 m

Station	Gear depth	Demersal	Lobsters	Pelagic	Rays	Sharks	Shrimps	Squids	Other	Total
80	604.5	0.2	1.4	0	0	0	10.3	3.3	84.9	147.8
81	335	0	1.9	0	0.2	0.1	0	23.2	74.5	152.7
94	243	0	3.9	0.6	3.5	11.9	1.8	10.9	67.5	101.9
95	323	0	13.5	0	6.8	6.7	0	5.4	67.5	145.2
102	503.5	0	1.4	0.1	0	8.7	21.6	0.5	67.7	75.3
103	311	0.4	17.9	0	39.8	0	0	14.8	27.2	56.2
Mean	386.7	0.1	6.6	0.1	6	4.8	5.5	11.3	78.7	113.2
% Catch		0.1	5.8	0.1	5.3	4.2	4.9	10.0	69.5	100.0

Catch rates of the demersal fish category presented in Table 5.4 and broken down do individual families are presented in Table 5.5a-c. Three groups of commercially important

demersal fish contributed together with less than 5% of the total catch on the inner shelf. The Croakers, mainly *Otolithes ruber* and *Johnius dussumieri,* were the dominant group contributing 3.8% or 18.6 kg/h. Grunts had catch rates of 2.7 kg/h. The "other" group presented in Table 5.5 summarises the remaining part of the catch.

On the outer shelf three groups of commercially important demersal fish, seabream, snappers and groupers contributed only with 2.8 % to the total catch (Table 5.5 a-c). Croakers, grunts and hake were not caught.

Few commercially important fish species was found on the slope in the central region. Cusk-eel contributed to 0.1 % of the total catch and was the most abundant family in this category.

Table 5.5. Central region catch rates (kg/h) by main demersal species grouped by families in swept-area bottom-trawl hauls on the a) inner shelf (20-50 m), b) outer shelf (50-200 m) and c) slope (200 – 800 m). The "other" groups summarises the catch of all species groups not mentioned in any other column.

a) Inner shelf: 20 to 50 m

Station	Gear depth	Croakers	Groupers	Grunts	Hake	Seabream	Snappers	Cusk-eel	Other	Total
82	49.5	0	0	0	0	0	0	0	100	110
88	48	0	0	0	0	0	0	0	100	87.7
89	36.5	0	0	0	0	0	0	0	100	106.6
90	24	0	0	0	0	0	0.4	0	99.6	252.8
91	23.5	0	0	0	0	0	0	0	100	417.1
97	35.5	0	0	0.3	0	0	0	0	99.7	2559.5
98	21.5	10.7	0	1.1	0	0	0	0	88.2	969.3
99	31.5	0	0	0	0	0	0	0	100	50.6
105	31.5	0	0	0	0	0	0	0	100	135.6
106	24	40.5	0	4.9	0	0	0	0	54.5	202.9
Mean	32.5	18.6	0	2.7	0	0	0.1	0	467.8	489.2
% Catch		3.8	0.0	0.6	0.0	0.0	0.0	0	95.6	100.0

b) Bottom depth interval: 50 to 200 m

Station	Gear depth	Croakers	Groupers	Grunts	Hake	Seabream	Snappers	Cusk-eel	Other	Total
83	70.5	0	0	0	0	0	0	0	100	46.9
85	62	0	0	0	0	0	0	0	100	125.3
86	90.5	0	0	0	0	0	0	0	100	39.5
87	165	0	0	0	0	0	0	0	100	126.5
92	51	0	0	0	0	0	0	0	100	174
93	103.5	0	1	0	0	18.2	14	0	66.8	86.3
96	79	0	0	0	0	0	0	0	100	295.3
100	52.5	0	0	0	0	0	1.4	0	98.6	152.2
101	163	0	0	0	0	0	0	0	100	25.7
Mean	93	0	0.1	0	0	1.7	1.6	0	115.7	119.1
% Catch		0.0	0.1	0.0	0.0	1.4	1.3	0	97.1	100.0

c) Bottom depth interval: 200 to 800 m

Station	Gear depth	Croakers	Groupers	Grunts	Hake	Seabream	Snappers	Cusk-eel	Other	Total
80	604.5	0	0	0	0	0	0	0.4	100	147.8
81	335	0	0	0	0	0	0	0	100	152.7
94	243	0	0	0	0	0	0	0	100	101.9
95	323	0	0	0	0	0	0	0	100	145.2
102	503.5	0	0	0	0	0	0	0	100	75.3
103	311	0	0	0	0	0.4	0	0	99.6	56.2
Mean	386.7	0	0	0	0	0	0	0.1	113.1	113.2
% Catch		0.0	0.0	0.0	0.0	0.0	0.0	0.1	99.9	100.0

The group of pelagic species from Table 5.4 is broken down to family level and presented in Table 5.6 bellow. On the inner shelf all five groups of commercially important pelagic fish contributed to the total catch with altogether 36.3%. Three groups were more important namely: Carangids (87.5 kg/h), Hairtails (45.8 kg/h) and Clupeoids (32.5 kg/h). The dominant species were: *Scomberoides commersonianus*, *Alepes djedaba*, *Upeneus taeniopterus*, *Decapterus macrosoma, Decapterus russelli, Nemipterus bipunctatus* and *Trichiurus lepturus.*

On the outer shelf only two groups of commercially important pelagic fish were caught. These contributed with 37.7% of the total catch. The carangids were the most dominant especially the *Decapterus russelli* (Table 5.6 a-c).

On the slope only one group of pelagic fish was present. Hairtails, *Trichiurus lepturus*, contributed 0.1 % to the total catch.

Table 5.6. Central region catch rates (kg/h) by main pelagic species grouped by families in swept-area bottom-trawl hauls on the a) inner shelf (20-50 m), b) outer shelf (50-200 m) and c) slope (200 – 800 m). The "other" groups summarises the catch of all species groups not mentioned in any other column.

Bottom depth interval: 20 to 50 m

Station	Gear depth	Barracuda	Carangids	Clupeoids	Hairtails	Scombrids	Other	Total
82	49.5	0	0.7	0	0	24.4	74.9	110
88	48	0.1	9.5	0	0	0	90.4	87.7
89	36.5	0	15.5	0	0.1	15.1	69.4	106.6
90	24	0	47.2	0.7	0	1.5	50.6	252.8
91	23.5	0	2.5	0	0	3	94.5	417.1
97	35.5	0.4	22.7	6.8	0	1.7	68.5	2559.5
98	21.5	0	0.6	13.3	46.1	0.1	40	969.3
99	31.5	0	29.6	1.1	7.9	9.2	52.3	50.6
105	31.5	0	83.9	0	0	0.3	15.8	135.6
106	24	0	2.4	10.5	3.7	0	83.4	202.9
Mean	32.5	1	87.5	32.5	45.8	10.9	311.5	489.2
% Catch		0.2	17.9	6.6	9.4	2.2	63.7	100.0

Bottom depth interval: 50 to 200 m

Station	Gear depth	Barracuda	Carangids	Clupeoids	Hairtails	Scombrids	Other	Total
83	70.5	12.8	0	0	0	0	87.2	46.9
85	62	0	86.8	0	0	0	13.2	125.3
86	90.5	4.8	17.3	0	0	0	78	39.5
87	165	0	0	0	0	0	100	126.5
92	51	0	4.6	0	0	0	95.4	174
93	103.5	9.9	1.8	0	0	0	88.3	86.3
96	79	1.1	76.3	0	0	0	22.7	295.3
100	52.5	2	20.3	0	0	0	77.7	152.2
101	163	0	0	0	0	0	100	25.7
Mean	93	2.5	42.4	0	0	0	74.2	119.1
% Catch		2.1	35.6	0.0	0.0	0.0	62.3	100.0

Bottom depth interval: 200 to 800 m

Station	Gear depth	Barracuda	Carangids	Clupeoids	Hairtails	Scombrids	Other	Total
80	604.5	0	0	0	0	0	100	147.8
81	335	0	0	0	0	0	100	152.7
94	243	0	0	0	0.6	0	99.4	101.9
95	323	0	0	0	0	0	100	145.2
102	503.5	0	0	0	0.1	0	99.9	75.3
103	311	0	0	0	0	0	100	56.2
Mean	386.7	0	0	0	0.1	0	113.1	113.2
% Catch		0.0	0.0	0.0	0.1	0.0	99.9	100.0

5.2. Biomass index

For the swept-area biomass estimates, the shelf and slope in the southern and central region was stratified by depth; 20-50 m, 50-200 m and 200-800 m. The central region was not covered completely since the survey was interrupted north of Zambezi River. However, for the estimation of biomass it was assumed that the catch rate in the area not covered was the same as for the rest of the central region. Comparing catch rates to those of the 2007 survey this assumption seems to be reasonable. No biomass was of obvious reasons estimated for the northern region. The biomass estimates of the various demersal groups of fish and invertebrates can be found in Table 5.7. Note that the swept area estimate of pelagic fish is uncoupled from the acoustic estimate and measure only the biomass caught in the path of the trawl. As such it is an underestimate.

The overall biomass estimated for the survey was 212 000 tonnes. In the southern region the total estimate was 110 000 tonnes, of this 11 000 tonnes were found between 20 – 50 m depth, 31 000 tonnes between 50 - 200 m depth while 68 000 tonnes were found between 200 - 800 m depth. In the central region the total estimate was 102 000 tonnes of this 78 000 tonnes were found between 20 - 50 m depth, 15 000 tonnes between 50 – 200 m depth while 10 000 tonnes were found on the slope between 200 - 800 m depth. None of these groups, possibly with the exception of the pelagic species, are dominant. This is partly caused by the type of ecosystem found in Mozambique with high biodiversity but with relatively low production. Overfishing of some of the important target groups may possibly also be a reason. Due to the large contribution of the “other” group the biomass is broken down into different families in Table 5.8.

Comparison with the 2007 survey

During the 2007 survey a total biomass of 213 000 tonnes was found. This is similar level to the finding this year. The distribution of biomass was however shifted northwards this survey. 110 000 tonnes were found in the south and 102 000 tonnes were found in the central area compared with 189 300 tonnes and 23 600 tonnes respectively in 2007. Figure 5.1 illustrates the distribution of catch size (kg/h) for all trawls during the survey and the number of species caught per haul. The map generally shows low catches but with increasing catch sizes off Zambezi, in a very limited area off Bazaruto, off Limpopo and southwards and off Maputo continuing with relatively good catch rates eastwards down the slope. The offshore and southern part of the Sofala bank generally had low catch rates.

Table 5.7. Biomass estimates for the main functional groups found during the Mozambique survey based on the swept area method.

Region	Depth region	Area size	Param.	Demersal	Pelagic	Rays	Sharks	Lobsters	Shrimps	Squids	Other	Total
Central*	20-50	6505.1	t/nm^2	0.58	3.99	0.81	0.33	0	0.07	0.32	5.82	11.92
			Biom.	3773	25955	5269	2147	0	455	2082	37860	77541
Central*	50-200	2997.7	t/nm^2	0.26	1.44	0.02	0.08	0.16	0.11	0.23	2.75	5.05
			Biom.	779	4317	60	240	480	330	689	8244	15138
Central*	200-800	2564.7	t/nm^2	0	0	0.21	0.16	0.22	0.18	0.39	2.64	3.81
			Biom.	0	0	539	410	564	462	1000	6771	9772
South	20-50	1193.9	t/nm^2	0.94	4.07	0.9	0.01	0	0.05	0.09	3.07	9.13
			Biom.	1122	4859	1075	12	0	60	107	3665	10900
South	50-200	2754.4	t/nm^2	0.7	1.65	1.5	0.28	0.14	0.11	0.22	6.64	11.25
			Biom.	1928	4545	4132	771	386	303	606	18289	30987
South	200-800	11256.2	t/nm^2	0.18	0.23	0.27	0.18	0.25	0.34	0.41	4.14	6.01
			Biom.	2026	2589	3039	2026	2814	3827	4615	46601	67650
	Total		Biom.	9629	42265	14113	5606	4244	5437	9100	121429	211988
	Contr.		%	4.5	19.9	6.7	2.6	2.0	2.6	4.3	57.3	100.0

*Note: The biomass estimates have been calculated for the total central region to make them comparable with previous estimates. This assumes that the catch rate for the rest of the central on average will be the same as for the data already collected.

Table 5.8 show the biomass per taxonomic family and try to resolve some of the species found in the group of “other species”. In this breakdown one fish family are particularly important. The mullidae, with a biomass of almost 29 000 tonnes, show a high abundance and seems to become more dominant in Mozambique. The carangids, part of the pelagic group in Table 5.7 is the second most abundant family followed by the myctophids and Porifera (sponges) (both part of the” other” group), Trichiurids (pelagic) and Synodontids, Jellyfish and Macrourids (all part of the other group). Other taxonomic families in Table 5.8 contribute less than 2% to the total biomass.

Table 5.8. Biomass estimates for the main taxonomic groups found during the Mozambique survey based on the swept area method.

Region	Depth region	Param.	Mullidae	Carangids	Myctophids	Porifera	Trichiurids	Synodontids	Jellyfish	Macrourids	Chlorophthalmids	Sciaenids
Central*	20-50	t/nm^2	4.03	2.03	-	0.11	1.08	0.04	0.69	-	-	0.45
		Biomass	26216	13205	-	716	7026	260	4489	-	-	2927
Central*	50-200	t/nm^2	0.29	1.36	0.24	-	-	0.45	-	-	0.1	-
		Biomass	869	4077	719	-	-	1349	-	-	300	-
Central*	200-800	t/nm^2	-	-	0.59	-	-	0.34	-	0.68	0.17	-
		Biomass	-	-	1513	-	-	872	-	1744	436	-
South	20-50	t/nm^2	0.31	3.33	-	0.02	0.02	0.29	0.87	-	-	0.19
		Biomass	370	3976	-	24	24	346	1039	-	-	227
South	50-200	t/nm^2	0.51	1.03	-	3.14	0.1	0.15	0.3	-	0.02	0.02
		Biomass	1405	2837	-	8649	275	413	826	-	55	55
South	200-800	t/nm^2	0.01	0.02	1.58	-	0.18	0.29	-	0.4	0.27	-
		Biomass	113	225	17785	-	2026	3264	-	4502	3039	-
	Total	Biomass	28972	24320	20017	9388	9351	6505	6354	6246	3830	3209
	%	contribution	13.7	11.5	9.4	4.4	4.4	3.1	3.0	2.9	1.8	1.5

Table 5.7. Continued

Region	Depth region	Parameter	Engraulids	Champsodontids	Sparids	Sphyraenids	Scombrids	Gempylids	Clupeids	Leiognathids	Tetradontids	Nemipterids
Central*	20-50	t/nm^2	0.38	0	0	0.02	0.26	0	0.22	0.17	0	0.03
		Biomass	2472	0	0	130	1691	0	1431	1106	0	195
Central*	50-200	t/nm^2	0	0	0.06	0.08	0	0.27	0	0	0.31	0.17
		Biomass	0	0	180	240	0	809	0	0	929	510
Central*	200-800	t/nm^2	0	0.04	0	0	0	0.01	0	0	0.01	0
		Biomass	0	103	0	0	0	26	0	0	26	0
South	20-50	t/nm^2	0.02	0	0.53	0.4	0.29	0	0.01	0.4	0.02	0.08
		Biomass	24	0	633	478	346	0	12	478	24	96
South	50-200	t/nm^2	0.03	0.08	0.46	0.44	0.02	0.04	0.02	0.02	0.06	0.04
		Biomass	83	220	1267	1212	55	110	55	55	165	110
South	200-800	t/nm^2	0	0.17	0.01	0.01	0	0.09	0.02	0	0.02	0
		Biomass	0	1914	113	113	0	1013	225	0	225	0
	Total	Biomass	2578	2236	2192	2172	2093	1958	1723	1639	1369	910
	%		1.2	1.1	1.0	1.0	1.0	0.9	0.8	0.8	0.6	0.4

*Note: The biomass estimates have been calculated for the total central region to make them comparable with previous estimates. This assumes that the catch rate for the rest of the central on average will be the same as for the data already collected.

5.3. Taxonomy

During the survey fish and invertebrate species identification was made to the lowest taxonomic level possible by experienced taxonomists and followed FAO species identification sheets for Fishery purposes, Fishing Area 51 (Fisher et al. 1984), and Smith's Sea Fishes (Smith et al. 2003) and several online databases especially the Eschmeyer database (Eschmeyer 2014), WoRMS database (WoRMS Ed. Board 2013) and FishBase (Froese and Pauly 2013).

High resolution pictures were taken of uncommon species of both fish and some invertebrates for the photo database on board Dr. Fridtjof Nansen and for help in identification by specialists. A total of about 500 different species were recorded during the survey. Of these the biggest group was the bony fish with 365 different specimen recorded, followed by shark, rays, shrimps and lobsters (Table 5.8). In total 90 species were photographed during the survey, of these 28 images were sent to SAIAB, Grahamstown for further expert identification by specialist taxonomists. A few other images will be sent after the survey. A total of 40 specimens was conserved in formaldehyde and will be sent for expert identification from Cape Town.

Table 5.8. Count of different fish species found in Mozambique during the survey.

Group	Number of obs.	New Pictures
Bony fish	365	71
Sharks	32	3
Rays	26	5
Lobsters	14	3
Shrimps	25	3
Total	462	90

It is too early to conclude regarding the number of new records observed for Mozambique. However, it is clear that several species found during the survey must be new species for Mozambique. Three species found during the survey are still not classified and are potential new species to science. These will be handed over to expert taxonomist for identification/ description. A further 25 species have not been recorded before by the Dr. Fridtjof Nansen in this region (Table 5.9). Some of these are probably new records for Mozambique. However further verification needs to be made before this can be established.

The diversity (registered here as the number of different species recorded from the trawl catch) was generally high and varied considerably trough out the survey. It did not correlate with the areas where the abundance was high (Figure5.1). The highest species diversity was found close inshore near the Zambezi river outlet on the Sofala bank, on the deep slope in the same area, in addition to the deep waters in the most southern part of the survey region and an area off Limpopo river.

Table 5.9. List of 28 different specimens that have not before been recorded in Mozambique waters by the Dr. Fridtjof Nansen. These species need to be verified if they are new records for Mozambique.

Nansis Code	Scientific Name (preliminary)	Comments
CALAA00	*Callionymidae*	May be a new species
CARSI011	*Seriolina nigrofasciata*	Not recorded in 2007 survey
CRULY00	*Lysiosquillidae*	Possibly not recorded in MZ before
EMMEM00	*Emmelichthys sp*	?
LABAA003	*Labridae red-orange*	Fam Choerodon gymnogenys?
LABCI00	*Cirrhilabrus sp*	Not recorded in 2007
LABIN00	*Iniistius sp*	Not recorded in 2007, New species?
LOBPA41	*Linuparus somniosus*	Not recorded in 2007
MONTH011	*Thamnaconus modestoides*	Not recorded in 2007
OSTLA031	*Lactoria diaphana*	Not recorded in 2007
PLACO001	*Cociella sp*	Not recorded in 2007, *Rogadius pristiger*?
RAYRB51	*Rhynchobatus djiddensis*	Not recorded 2007, *Rhynchobatus aursaliae*?
RAYRB613	*Rhinobatos cf annulatus*	Undescribed species New species?
RAYRY21	*Rhina ancylostoma*	Not recorded in 2007
SCRAA006	*Scorpaenidae*	Not recorded in 2007
SERPS00	*Pseudanthias sp*	Not recorded 2007, *Pseudanthias gibbosus*?
SERSE16	*Serranus novemcinctus*	Not recorded in 2007
SERSE92	*Serranus sp*	Not recorded in 2007, Cheilidoperca?
SERSE93	*Serranus sp*	Not recorded in 2007, Unknown specimen
SHASC432	*Halaelurus lineatus natalensis*	Not recorded in 2007
SOLSO00	*Solea sp*	Not recorded in 2007, Unknown specimen
SYAMI021	*Minous coccineus*	Not recorded in 2007
TEROC52	*Ocosia cf zaspilota*	Not recorded in 2007
TETAR08	*Arothron firmamentum*	Not recorded in 2007
TETTO031	*Torquigener flavimaculosus*	Not recorded in 2007
TRHHO05	*Hoplostethus melanopus*	Not recorded in 2007
TRHPA01	*Paratrachichthys sajademahalensis*	Not recorded in 2007
TRHPA01	*Hoplolatilus fronticinctus*	Not recorded in 2007

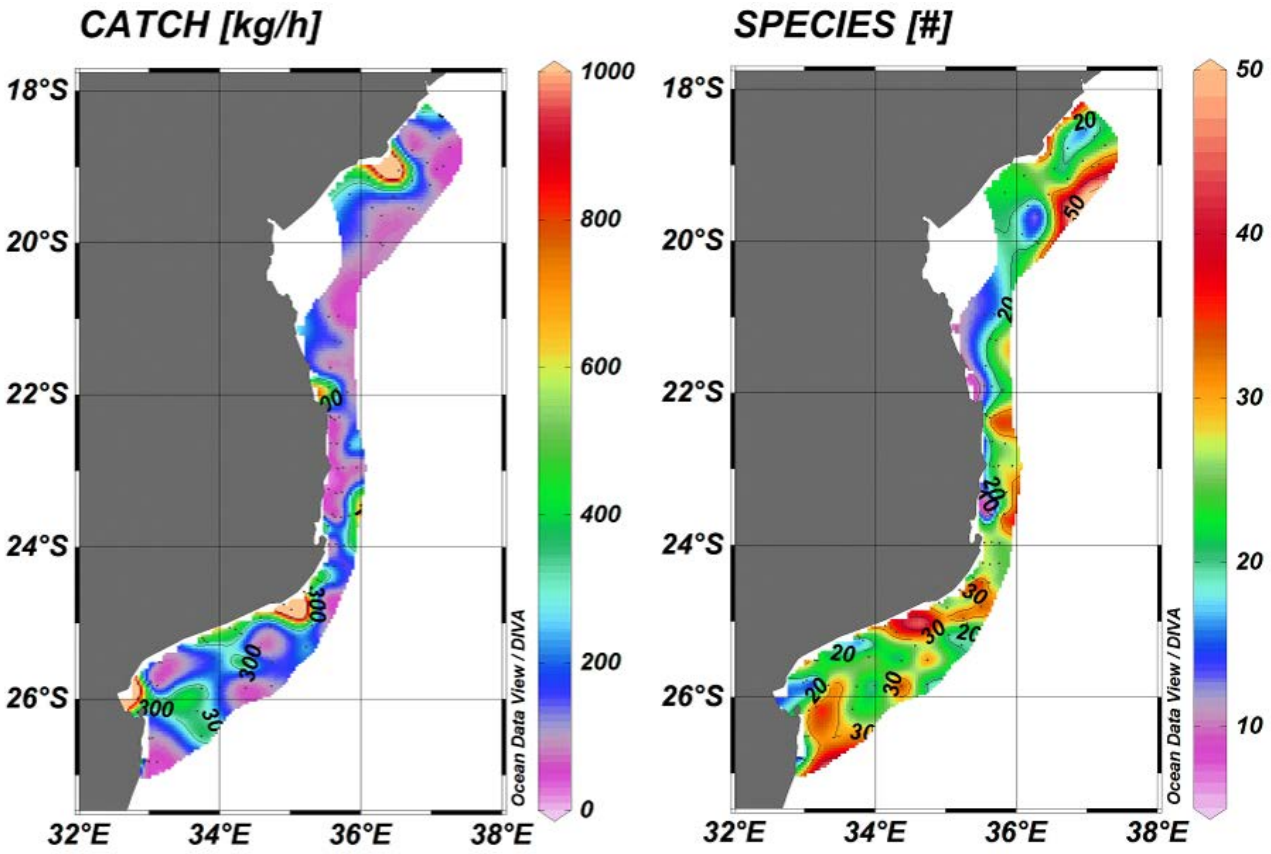

Figure 5.1 Catch rates (kg/h) (left) and number of species per haul (right). Data presented using ODV.

5.4. Genetics

Metanephrops mozambicus is considered an endemic species of the South Western Indian Ocean Region, occurring from Kenya to South Africa including Madagascar. At the same time the occurrences of the congener's species *M. andamanicus* has been reported from Kenya to Southern Tanzania, it is still unclear whether, or where, the distributions of the two species overlap, because they are similar in appearance, and distinguishing between them during field sampling is problematic.

The 47 samples of *M. mozambicus* and 37 samples of *Nephrops stewartii* collected along the Southern and Central coast of Mozambique during the survey represent incomplete coverage of the distribution area since the Northern region samples for both species still is missing. Once the Northern region samples are collected, genetic analysis will be done to assess whether the fished stocks are distributed across international boundaries, and therefore shared, or whether the stocks are endemic to Mozambique.

CHAPTER 6. SUMMARY

R/V Dr Fridtjof Nansen was made available for a 30 days' survey of the entire coast of Mozambique in 2014. A survey planning meeting was held in Maputo 3-4 September where the survey strategy and design was agreed. However, due to technical problems on the vessel the survey only started 11 November. Unfortunately, a severe engine failure on the 1st December made it necessary to interrupt the survey and return to Maputo before completing the coverage of the central region. The northern region was therefore also left completely unsurveyed. This report and summary therefore covers the findings in the southern and central region.

The ecosystem survey used standard acoustic and swept area fish stock assessment methods to estimate the size of the pelagic and demersal fish stocks in the region, collected samples of phyto and zooplankton with different plankton nets, and recorded environmental variables with CTD and thermosalinograph.

6.1. Oceanography, plankton and nutrients

During the survey period strong storm surges was experienced in the southern part of the survey area. This together with currents caused strong mixing of the upper water masses, especially on the shelf. Freshwater outflow was a dominant feature in surface waters in river dominated areas of the coast. These river openings were also linked to high primary production and higher than average abundance of pelagic fish. The surface water masses in the southernmost section of the Mozambique Channel were influenced by the subtropical climate regime. The chlorophyll maximum (DCM), was typically located deep near the coast and just above the thermocline in open sea because supply of nutrients is the highest and light quantities still sufficient. Low chlorophyll concentrations were found at the surface. In Mozambique the more productive waters are found near the coast and plankton production is likely a concomitant result of upwelling, rivers discharge, and current flows that supply nutrients to the surface layers.

6.2. Biomass estimates

Pelagic estimates

Acoustic biomass estimates were calculated for clupeoids (Pel1) and a group consisting of carangids, barracudas, hairtails and scombrids (PEL2). All together 15 000 tonnes of Pel1 species were found; of this 6 000 tonnes were found in the south while the rest was found in the central region. In 2007 about 20 000 tonnes of Pel1 species were found in along the coast of Mozambique. Of the Pel2 group a total estimate of 67 000 tonnes were recorded, compared with 34 000 along the whole coast of Mozambique in 2007. Of this the larger part (46 000 tonnes) was found in the central region while about 21 000 tonnes was found in the southern

region The distribution of Pel1 species was associated with the Limpopo and Zambezi river while the Pel2 species had a wider distribution inshore within most of the southern region and over the Sofala bank.

Demersal estimates

The overall swept area biomass estimated for the survey was 212 000 tonnes compared with 213 000 tonnes found in the south and central region in 2007. The distribution of biomass was however shifted northwards during this survey compared with 2007. This year 110 000 tonnes were found in the south and 102 000 tonnes was found in the central area compared with 189 300 tonnes and 23 600 tonnes respectively in 2007. Generally low catches were observed in most of the surveyed area but with increasing catch sizes off Zambezi, in a very limited area off Bazaruto, south of Limpopo, and off Maputo continuing eastwards down the slope (Figure 5.1a). Diversity was generally high and showed high variability with low diversity on the Bazaruto bank, typically increasing with depth. High diversity was found on the slope off the Sofala bank and on the slope offshore east of Maputo. High diversity was also found off the Limpopo River.

CHAPTER 7. RESUMO EM PORTUGUÊS

A embarcação de investigação Dr. Fridtjof Nansen foi tornada disponivel a Moçambique por via da FAO, por um período de 30 dias, inicialmente a contar a partir de um de Setembro de 2014, para realizar um cruzeiro ecossistémico ao longo de toda costa moçambicana. Todavia, devido a problemas técnicos da embarcação que forçaram a um longo período de reparação, esta apenas ficou disponível em meados de Novembro de 2014. Ao abrigo desta solicitação, foi assinado um MoU entre o Ministério das Pescas de Moçambique e a FAO-Roma. No decurso da preparação do cruzeiro, foi realizado um encontro de planificação da implementação do cruzeiro em Maputo entre 3 e 4 de Setembro com envolvimento das equipes técnicas de Moçambique e da Noroega onde discutiu-se para além de outros pontos, a estratégia e o desenho do cruzeiro.

O cruzeiro teve inicio no dia 11 de Novembro com o embarque da equipe moçambicana no porto de pesca de Maputo, tendo sido implementado no sentido Sul (Fronteira Maritima com a África do Sul) – Norte (Fronteira Maritima com a Tanzânia). Contudo, o cruzeiro foi interrompido no Banco de Sofala, foz do rio zambeze passados 21 dias devido a uma avaria grossa do motor principal. Assim, não havendo condições para o seu seguimento, o cruzeiro terminou no dia 04 de Dezembro com o desembarque dos técnicos moçambicanos no porto de pesca de Maputo.

Foi objectivo do cruzeiro, fazer a actualização da informação sobre os recursos pesqueiros ao longo da costa de Moçambique volvidos sete anos após a última actualização. Contudo, devido a avaria registada, a informação contida neste relatório cobre apenas os resultados da área abrangida (zona Sul e Parte significativa da zona Centro de Moç.).

O cruzeiro, de natureza ecossistémico usou os metódos de acústica e área varrida para a estimativa de abundância dos recursos pelágicos e demersais, respectivamente. Adicionalmente registou variavéis ambientais usando CTD e termosalinográfo, e recolheu amostras de placnton usando diferentes tipos de redes para o efeito.

7.1. Oceanografia, Placton e Nutrientes

Há um forte padrão de mistura na coluna de água da zona central do Canal de Moçambique e do Banco de Sofala. Isto é associado a influencia das descargas de vários rios existentes nesta secção da costa do País. Também, as fortes correntes tidais e *storm surges* podem ser a causa da forte mistura observada ao longo da plataforma pouco profunda, característica desta região. O índice de produtividade primária (DCM) máximo localiza-se próximo a costa e imediatamente acima da termoclina em mar aberto. Isto deve-se ao facto de nestas zonas haver uma alta concentração de nutrientes e ainda existir luz em quantidade suficiente. Baixas concentrações de clorifila são encontradas na superfície. Em Moçambique as águas mais

produtivas são encontradas próximo a costa e a produção do Placnton é provavelmente um resultado concominante do *Upwelling* ou afloramento costeiro, descargas de rios e fluxo de correntes que fornecem nutrientes `as camadas superficiais.

7.2. Estimativas de Biomassa

Biomassa de peixes pelágicos

As estimativas de biomassa através da acústica foram determindas para o grupo de clupeoides – clupeideos e engraulideos (Pelágicos tipo 1) e um grupo constituído por carangideos, barracudas, peixe-fita, e scombrideos (Pelágicos tipo 2). No total, a biomassa de peixes pelágicos estimada foi de 82000 t dos quais 15000 t (18.29%), foi Pelágicos tipo 1 e 67000 (81.71%), de Pelágicos tipo 2. A biomassa total de peixes pelágicos na zona Sul foi de 27000 t (32.93%) enquanto que na zona Centro foi de 55000 t (67.07%). A biomassa total de peixes pelágicos de 2014, que abrange somente as zonas Sul e Centro da Costa, representa um aumento em 34.15% do valor da biomassa de peixes pelágicos estimada em 2007 para toda costa que foi de 54000 t.

A distribuição dos Pelágicos tipo 1, esteve maioritariamente associada aos rios limpopos e zambeze enquanto que os pelágicos tipo 2, teve maior distribuição na zona mais costeira na parte Sul e sobre o Banco de Sofala.

Biomassa de peixes demersais

A biomassa total estimada pelo método de área varrida foi de 212000 t repartida pela metade para as duas zonas (Sul e Centro). A biomassa total foi similar aquela de 2007 (213 000 t) estimada para as mesmas zonas. Contudo, verificou-se uma mudança no padrão de distrição da biomassa por zonas. De 2007 para 2014, registou-se uma redução da abundância na zona Sul em 41.9% (de 189.300 t para 110.000 t) e uma aumento acentuado da biomassa da zona centro (de 23.600 t para 102.000 t).

A distribuição das taxas de captura (kg/h) de todos arrastos e o número de espécies por arrasto indica no geral baixas capturas.

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ANNEX I. FISHING STATIONS

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 1
DATE :12/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 26°48.30
start stop duration Lon E 32°54.17
TIME :06:33:52 06:58:43 24.9 (min) Purpose : 3
LOG : 1781.22 1782.75 1.5 Region : 7431
FDEPTH: 27 28 Gear cond.: 0
BDEPTH: 27 28 Validity : 0
Towing dir: 0° Wire out : 120 m Speed : 3.7 kn
Sorted : 79 Total catch: 258.40 Catch/hour: 623.90

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Decapterus macrosoma	298.19	21076	47.79	1
Himantura uarnak	169.01	5	27.09	
Pagellus natalenses	89.82	7067	14.40	2
Sillago sihama	34.53	2472	5.53	
Upeneus bensasi	13.40	1103	2.15	
Echeneis naucrates	7.51	10	1.20	
Lactoria cornuta	4.01	22	0.64	
Sepia pharaonis	2.70	28	0.43	
Iniistius sp.	1.69	39	0.27	
Scomber japonicus	1.45	6	0.23	
Tylerius spinosissimus	0.68	51	0.11	
Engyprosopon grandisquama	0.34	17	0.05	
Equulites elongatus	0.29	11	0.05	
Trachinocephalus myops	0.29	6	0.05	
Total	623.90		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 2
DATE :12/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 26°48.63
start stop duration Lon E 32°56.31
TIME :07:58:22 08:28:07 29.8 (min) Purpose : 3
LOG : 1787.54 1789.17 1.6 Region : 7431
FDEPTH: 63 59 Gear cond.: 0
BDEPTH: 63 59 Validity : 0
Towing dir: 0° Wire out : 170 m Speed : 3.3 kn
Sorted : 97 Total catch: 96.89 Catch/hour: 195.41

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Decapterus macrosoma	55.06	3402	28.18	3
Lutjanus sanguineus	26.62	4	13.62	
Rhinobatos cf annulatus	17.55	4	8.98	
Sea urchin	16.46	123	8.42	
Lutjanus sebae	13.11	2	6.71	
Tetrosomus concatenatus	11.09	22	5.68	
Arothron firmamentum	9.96	8	5.10	
Chrysoblephus anglicus	9.52	2	4.87	
Diodon hystrix	9.46	6	4.84	
Drepane punctata	4.80	2	2.46	
Starfish	3.97	14	2.03	
Seriola sp.	2.86	2	1.47	
Sufflamen fraenatum	2.40	2	1.23	
Ostracion cubicus	2.12	2	1.08	
Holothuria sp.	1.90	6	0.97	
Sepia sp.	1.77	12	0.91	
LABRIDAE	1.77	97	0.91	
Parupeneus cinnabaricus	1.65	46	0.85	
Lactoria cornuta	0.95	4	0.49	
Loligo forbesi	0.77	22	0.39	
Synodus sp.	0.73	28	0.37	
Parupeneus pleurostigma	0.24	2	0.12	
Sepia pharaonis	0.20	2	0.10	
Siganus sutor	0.18	8	0.09	
Parupeneus macronemus	0.12	2	0.06	
Choerodon gymnogenys	0.10	2	0.05	
SCORPAENIDAE	0.04	4	0.02	
Total	195.41		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 3
DATE :12/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 26°48.50
start stop duration Lon E 32°57.52
TIME :09:59:15 10:28:22 29.1 (min) Purpose : 3
LOG : 1794.99 1796.49 1.5 Region : 7431
FDEPTH: 106 105 Gear cond.: 0
BDEPTH: 106 105 Validity : 0
Towing dir: 0° Wire out : 250 m Speed : 2.9 kn
Sorted : 17 Total catch: 17.28 Catch/hour: 35.60

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Tetrosomus concatenatus	26.41	45	74.19	
Sepia sp.	6.55	109	18.40	
Synodus sp.	1.69	56	4.75	
Parupeneus cf. cinnabaricus	0.37	6	1.04	
Gymnothorax cf. nudivomer	0.33	2	0.93	
Upeneus bensasi	0.12	4	0.35	
Thamnaconus modestoides	0.10	10	0.29	
Antigonia rubescens	0.02	4	0.06	
Total	35.60		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 4
DATE :12/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 26°49.32
start stop duration Lon E 32°59.56
TIME :12:19:29 12:46:42 27.2 (min) Purpose : 3
LOG : 1802.69 1804.09 1.4 Region : 7432
FDEPTH: 211 208 Gear cond.: 0
BDEPTH: 211 208 Validity : 0
Towing dir: 0° Wire out : 570 m Speed : 2.9 kn
Sorted : 15 Total catch: 14.79 Catch/hour: 32.60

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Ibacus novemdentatus	5.55	51	17.04	
Rhinobatos cf annulatus	4.98	4	15.28	
Satyrichthys adeni	4.94	29	15.15	
Ariomma cf. melanum	4.78	51	14.67	
Sphoeroides pachgaster	2.18	2	6.69	
Sea urchin	2.05	46	6.29	
Taeniopsetta ocellata	1.26	31	3.85	
Loligo sp.	1.17	35	3.58	
Lepidotrigla cf alcocki	0.86	24	2.64	
Uranoscopus archionema	0.73	15	2.23	
Histiopterus typus	0.66	2	2.03	
Macrorhamphosus scolopax ***	0.64	86	1.96	
Scyllarides elisabethae	0.64	2	1.96	
Champsodon capensis	0.37	77	1.15	
Citharoides macrolepis	0.35	9	1.08	
Centroberyx druzhinini	0.33	9	1.01	
Pagellus natalenses	0.33	4	1.01	
Halieutaea sp.	0.20	4	0.61	
Tylerius spinosissimus	0.18	2	0.54	
Callionymus sp.	0.18	4	0.54	
Rexea prometheoides	0.15	2	0.47	
Thamnaconus fajardoi	0.04	2	0.14	
Fistularia commersonii	0.02	2	0.07	
Total	32.60		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 5
DATE :12/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 26°49.76
start stop duration Lon E 33°6.69
TIME :15:59:48 16:29:51 30.1 (min) Purpose : 3
LOG : 1821.41 1823.15 1.7 Region : 7432
FDEPTH: 600 613 Gear cond.: 0
BDEPTH: 600 613 Validity : 0
Towing dir: 0° Wire out : 1400 m Speed : 3.5 kn
Sorted : 28 Total catch: 28.01 Catch/hour: 55.93

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Caelorinchus braueri	10.44	142	18.67	
Malacocephalus laevis	10.10	68	18.06	
Chlorophthalmus agassizi	8.45	82	15.10	
Sicyonia sp.?	4.93	942	8.82	
Haliporoides triarthrus	4.03	214	7.21	4
Merluccius paradoxus	2.94	8	5.25	
Nansenia macrolepis**	2.70	54	4.82	
Etmopterus molleri	2.36	58	4.21	
Gonorhynchus gonorhynchus	1.44	10	2.57	
Aristeus antennatus	1.40	50	2.50	5
MYCTOPHIDAE	1.30	300	2.32	
Neoepinnula orientalis	1.16	6	2.07	
Neobythites analis	0.94	12	1.68	
Sepia sp.	0.88	12	1.57	
Synagrops japonicus	0.80	10	1.43	
Chaunax pictus	0.28	6	0.50	
Bathyclupea sp.	0.26	2	0.46	
Aristaeomorpha foliacea	0.26	32	0.46	6
Heterocarpus sp.	0.22	22	0.39	
C R A B S	0.22	4	0.39	
Kuronezumia leonis	0.18	4	0.32	
Lepidopus caudatus	0.16	2	0.29	
Synaphobranchus affinis	0.12	16	0.21	
Bathyuroconger vicinus	0.08	2	0.14	
Hoplostethus sp.	0.08	4	0.14	
Diretmus argenteus	0.06	6	0.11	
Polymetme corythaeola	0.06	2	0.11	
Taeniopsetta ocellata	0.02	2	0.04	
Thamnaconus fajardoi	0.02	2	0.04	
Macrorhamphosus scolopax ***	0.02	2	0.04	
Argyropelecus gigas	0.02	2	0.04	
Polyipnus polli	0.02	2	0.04	
Total	55.93		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 6
DATE :13/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 26°29.13
start stop duration Lon E 33°44.27
TIME :10:26:56 10:56:51 29.9 (min) Purpose : 3
LOG : 1913.99 1915.49 1.5 Region : 7432
FDEPTH: 681 684 Gear cond.: 0
BDEPTH: 681 684 Validity : 0
Towing dir: 0° Wire out : 1400 m Speed : 3.0 kn
Sorted : 80 Total catch: 188.01 Catch/hour: 376.90

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Caelorinchus trunovi	113.16	1093	30.02	
Plesiobatis daviesi	50.72	2	13.46	
Caelorinchus braueri	44.40	511	11.78	
Histioteuthis sp. *	40.90	30	10.85	
Merluccius paradoxus	29.11	28	7.72	7
Thysanoteuthis rhombus	18.74	10	4.97	
Hexatrygon brickelli	17.28	4	4.58	
Torpedo nobiliana	9.96	2	2.64	
Neoscopelus macrolepidotus	9.02	10	2.39	
Coloconger scholesi	8.92	20	2.37	
Xenodermichthys copei	5.11	301	1.36	
Hydrolagus africanus	4.71	10	1.25	
Selachophidium guentheri	4.61	70	1.22	
Nansenia macrolepis**	2.81	40	0.74	
Setarches guentheri	2.41	10	0.64	
Gymnoscopelus sp.	1.80	160	0.48	
Heterocarpus woodmasoni	1.80	291	0.48	
SERGESTIDAE	1.80	210	0.48	
Plesionika martia	1.70	331	0.45	
Hoplostethus mediterraneus	1.20	10	0.32	
Synaphobranchus affinis	1.10	10	0.29	
Ommastrephes bartrami	1.00	10	0.27	
Diaphus cf. thiollierei	1.00	10	0.27	
Nettastoma parviceps	0.90	10	0.24	
Malacosteus niger	0.60	10	0.16	
Sicyonia sp.	0.50	20	0.13	
Aristaeomorpha foliacea	0.40	20	0.11	
Aristeus antennatus	0.30	10	0.08	
Bathylagus sp.	0.30	10	0.08	
Nessorhamphosus cf ingolfianus	0.30	10	0.08	
Diaphus sp.	0.30	70	0.08	
Total	376.90		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 7
DATE :13/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 26°31.67
start stop duration Lon E 33°24.30
TIME :14:39:07 15:09:25 30.3 (min) Purpose : 3
LOG : 1943.42 1945.05 1.6 Region : 7432
FDEPTH: 706 697 Gear cond.: 0
BDEPTH: 706 697 Validity : 0
Towing dir: 0° Wire out : 1400 m Speed : 3.2 kn
Sorted : 58 Total catch: 79.86 Catch/hour: 158.14

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Merluccius paradoxus	75.76	69	47.91	8
Centrophorus moluccensis	14.42	2	9.12	
Caelorinchus braueri	12.30	107	7.78	
Selachophidium guentheri	10.75	154	6.80	
Coloconger scholesi	7.49	30	4.73	
Lithodidae	7.25	6	4.58	
Hydrolagus africanus	6.77	18	4.28	
Synaphobranchus affinis	4.22	59	2.67	
Aristaeomorpha foliacea	2.97	178	1.88	10
Dipturus springeri	2.50	6	1.58	
Histioteuthis sp.	1.96	12	1.24	
Setarches guentheri	1.90	6	1.20	
Plesionika martia	1.66	356	1.05	
Sicyonia sp.	1.49	634	0.94	
Shrimps unidentified	0.85	113	0.54	
Etmopterus molleri	0.77	18	0.49	
Caridea SA/MZ	0.71	71	0.45	
Nansenia macrolepis**	0.71	24	0.45	
Aristeus antennatus	0.59	38	0.38	11
MYCTOPHIDAE	0.59	59	0.38	
Notacanthus sexspinis	0.59	6	0.38	
Xenodermichthys copei	0.53	24	0.34	
Eustomias sp.**	0.42	12	0.26	
Halosauridae sp.**	0.42	6	0.26	
Plesiopenaeus edwardsianus	0.18	12	0.11	9
Xenolepidichthys dagleishi	0.18	6	0.11	
Nemichthys scolopaceus	0.06	6	0.04	
Argyropelecus gigas	0.06	6	0.04	
Heterocarpus laevigatus	0.04	2	0.03	
Total	158.14		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 8
DATE :13/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 26°30.51
start stop duration Lon E 33°2.60
TIME :18:12:52 18:42:28 29.6 (min) Purpose : 3
LOG : 1967.34 1968.77 1.4 Region : 7432
FDEPTH: 246 243 Gear cond.: 0
BDEPTH: 246 243 Validity : 0
Towing dir: 0° Wire out : 600 m Speed : 2.9 kn
Sorted : 0 Total catch: 43.23 Catch/hour: 87.63

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
MYCTOPHIDAE	16.38	0	18.69	
Ommastrephes bartrami	13.62	69	15.54	
Saurida undosquamis	6.97	16	7.96	
Sepia prashadi	6.04	101	6.89	
Satyrichthys adeni	5.19	36	5.92	
Squalus mitsukurii	4.93	6	5.62	
Pleuroscopus pseudodorsalis	4.18	53	4.77	
Macrorhamphosus scolopax ***	3.93	405	4.49	
Polymixia berndti	2.59	69	2.96	
Lepidotrigla alcocki	2.51	97	2.87	
Emmelichthys nitidus	2.43	4	2.78	
Ibacus novemdentatus	2.35	24	2.68	
Spicara australis	2.35	20	2.68	
Antigonia cf rubescens	2.07	49	2.36	
Halieutaea fitzsimonsi	1.91	41	2.17	
Chaunax sp.	1.46	4	1.67	
Sepia sp	1.38	20	1.57	
Synagrops japonicus	1.34	57	1.53	
Hoplichthys acanthopleurus	1.26	65	1.43	
Chelidonichthys kumu	1.18	12	1.34	
Plesionika martia	0.69	191	0.79	
Rexea prometheoides	0.65	8	0.74	
Bothus swio	0.41	12	0.46	
Cynoglossus cf lida	0.36	12	0.42	
Uroconger lepturus	0.32	8	0.37	
Kentrocapros rosapinto**	0.28	8	0.32	
Physiculus natalensis	0.28	8	0.32	
Gonorhynchus gonorhynchus	0.24	4	0.28	
Priacanthus hamrur	0.24	4	0.28	
Champsodon capensis	0.08	4	0.09	
Chlorophthamus sp. juv	0.00	0	0.00	
Total	87.63		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 9
DATE :13/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 26°31.01
start stop duration Lon E 32°59.85
TIME :19:40:29 20:10:35 30.1 (min) Purpose : 3
LOG : 1972.49 1974.44 1.9 Region : 7431
FDEPTH: 146 144 Gear cond.: 0
BDEPTH: 146 144 Validity : 2
Towing dir: 0° Wire out : 400 m Speed : 3.9 kn
Sorted : 24 Total catch: 49.70 Catch/hour: 99.07

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Squalus mitsukurii	39.15	96	39.52	
Ibacus novemdentatus	17.86	151	18.03	
Parabothus cf. coarctus	8.13	339	8.21	
Lepidotrigla alcocki	7.14	251	7.20	
Sepia prashadi	5.54	76	5.59	
Ommastrephes bartrami	3.91	24	3.94	
Halieutaea fitzsimonsi	2.67	32	2.70	
Saurida undosquamis	2.63	8	2.66	
Lophiodes mutilus	1.79	16	1.81	
Satyrichthys adeni	1.59	4	1.61	
Tylerius spinosissimus	1.40	20	1.41	
Pleuroscopus pseudodorsalis	1.08	20	1.09	
Trichiurus lepturus	1.04	4	1.05	
Ariomma indicum	1.00	12	1.01	
Thalamita crenata	0.96	8	0.97	
Priacanthus hamrur	0.80	6	0.80	
Taeniopsetta ocellata	0.72	44	0.72	
Synodus 'shortsnout'	0.68	16	0.68	
Dactyloptena peterseni	0.56	8	0.56	
Ariomma cf. melanum	0.44	8	0.44	
Total	99.07		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 10
DATE :14/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 26°10.33
start stop duration Lon E 33°3.68
TIME :00:45:34 01:13:42 28.1 (min) Purpose : 3
LOG : 2011.29 2012.70 1.4 Region : 7432
FDEPTH: 201 213 Gear cond.: 0
BDEPTH: 201 213 Validity : 0
Towing dir: 0° Wire out : 550 m Speed : 2.9 kn
Sorted : 29 Total catch: 100.80 Catch/hour: 215.00

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
MYCTOPHIDAE	80.55	9	37.47	
Ibacus novemdentatus	32.03	350	14.90	
Saurida undosquamis	15.08	68	7.01	
Squalus megalops	13.14	30	6.11	
Trichiurus lepturus	10.38	9	4.83	
Ommastrephes bartrami	7.47	60	3.47	
Satyrichthys adeni	6.94	38	3.23	
Peristedion weberi	6.42	224	2.99	
Sepia sp	6.20	158	2.88	
Lepidotrigla alcocki	4.70	149	2.19	
Uranoscopus archionema	4.70	105	2.19	
Priacanthus hamrur	3.43	45	1.60	
Scyllarides elisabethae	2.84	9	1.32	
Neoscombrops cynodon	2.69	38	1.25	
Ophichthus sp.	2.54	53	1.18	
Sphoeroides pachgaster	2.02	23	0.94	
Macrorhamphosus scolopax ***	1.64	177	0.76	
Lestrolepis intermedia	1.64	128	0.76	
Parabothus cf. coarctus	1.49	75	0.69	
Taeniopsetta ocellata	1.49	68	0.69	
Cynoglossus marleyi	1.34	38	0.63	
Gonorhynchus gonorhynchus	1.26	23	0.59	
Halieutaea sp. A	1.12	53	0.52	
Kentrocapros rosapinto	0.90	9	0.42	
Monocentris japonica	0.90	9	0.42	
Loligo sp.	0.90	9	0.42	
Rexea prometheoides	0.75	9	0.35	
Tylerius spinosissimus	0.45	9	0.21	
Total	215.00		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 11
DATE :14/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 26°7.57
start stop duration Lon E 33°9.43
TIME :02:48:06 03:17:22 29.3 (min) Purpose : 3
LOG : 2023.47 2024.96 1.5 Region : 7432
FDEPTH: 409 407 Gear cond.: 0
BDEPTH: 409 407 Validity : 0
Towing dir: 0° Wire out : 915 m Speed : 3.1 kn
Sorted : 29 Total catch: 186.73 Catch/hour: 382.90

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
MYCTOPHIDAE	131.86	0	34.44	
Ommastrephes bartrami	42.45	303	11.09	
Squalus mitsukurii	38.30	12	10.00	
Trichiurus lepturus	34.16	41	8.92	
Gonorhynchus gonorhynchus	21.22	157	5.54	
Zeus faber	17.06	14	4.46	
Chlorophthalmus agassizi	15.13	388	3.95	
Halaelurus lutarius	10.70	119	2.80	
Satyrichthys adeni	9.35	16	2.44	
Neoepinnula orientalis	9.04	211	2.36	
Zeus capensis	6.46	322	1.69	
Cynoglossus cf lida	6.09	166	1.59	
Merluccius paradoxus	4.55	10	1.19	91
Malacocephalus laevis	4.52	18	1.18	
Ateleopus natalensis	4.43	27	1.16	
Chascanopsetta lugubris	3.14	37	0.82	
Pliotrema warreni	2.99	2	0.78	
Peristedion weberi	2.77	166	0.72	
Saurida undosquamis	2.40	8	0.63	
Eridacnis radcliffei	2.40	37	0.63	
Macrorhamphosus scolopax ***	1.85	18	0.48	
Lepidotrigla multispinosa	1.66	18	0.43	
Cubiceps capensis	1.48	18	0.39	
Palinurus delagoae	1.48	8	0.39	
Sepia australis	1.20	18	0.31	
Synagrops japonicus	1.11	37	0.29	
Caelorinchus braueri	1.11	18	0.29	
Aristeus virilis	1.11	74	0.29	12
Rexea prometheoides	0.74	18	0.19	
Octopus macropus	0.74	8	0.19	
Xenolepidichthys dagleishi	0.55	8	0.14	
Poecilopsetta zanzibarensis	0.55	8	0.14	
Chaunax sp.	0.37	8	0.10	
Chlorophthamus sp. juv	0.37	8	0.10	
Argyropelecus gigas	0.18	8	0.05	
Lestrolepis intermedia	0.09	8	0.02	
Total	383.62		100.19	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 12
DATE :14/11/14 GEAR TYPE: BT NO: 27 POSITION:Lat S 26°9.55
start stop duration Lon E 33°40.46
TIME :07:50:05 08:20:10 30.1 (min) Purpose : 3
LOG : 2054.20 2055.79 1.6 Region : 7432
FDEPTH: 568 570 Gear cond.: 0
BDEPTH: 568 570 Validity : 0
Towing dir: 0° Wire out : 1150 m Speed : 3.2 kn
Sorted : 74 Total catch: 167.29 Catch/hour: 333.68

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Plesiobatis daviesi	193.16	18	57.89	
Merluccius paradoxus	62.02	104	18.59	13
Caelorinchus braueri	50.89	750	15.25	
Ommastrephes bartrami	3.73	82	1.12	
MYCTOPHIDAE	3.28	291	0.98	
Synagrops japonicus	3.23	68	0.97	
Nansenia macrolepis**	3.05	64	0.91	
Aristaeomorpha foliacea	2.87	172	0.86	14
Cubiceps whiteleggii	2.51	50	0.75	
Haliporoides triarthrus	2.47	118	0.74	15
Gonorhynchus gonorhynchus	1.80	4	0.54	
Neoepinnula orientalis	1.17	14	0.35	
Malacocephalus laevis	0.67	10	0.20	
Xenodermichthys copei	0.54	122	0.16	
Histioteuthis dofleini	0.54	10	0.16	
Paralepidae	0.40	6	0.12	
Microstomias longibarbatus	0.36	6	0.11	
Sicyonia sp.	0.36	68	0.11	
Lestrolepis intermedia	0.32	22	0.09	
Rexea prometheoides	0.23	10	0.07	
Plesionika martia	0.09	18	0.03	
Idiacanthus fasciola	0.00	2	0.00	
Caelorinchus trunovi	0.00	10	0.00	
Total	333.68		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 13
DATE :14/11/14 GEAR TYPE: BT NO: 27 POSITION:Lat S 25°49.83
start stop duration Lon E 34°44.07
TIME :16:42:48 17:13:01 30.2 (min) Purpose : 3
LOG : 2118.32 2119.57 1.3 Region : 7432
FDEPTH: 461 460 Gear cond.: 0
BDEPTH: 461 460 Validity : 0
Towing dir: 0° Wire out : 1000 m Speed : 2.5 kn
Sorted : 25 Total catch: 49.23 Catch/hour: 97.74

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Haliporoides triarthrus	23.59	1015	24.13	16
Chlorophthalmus agassizi	23.35	349	23.89	
MYCTOPHIDAE	13.94	0	14.26	
Aristaeomorpha foliacea	13.30	580	13.61	17
Synagrops japonicus	5.40	52	5.53	
Plesionika martia	3.22	667	3.29	
Heterocarpus tricarinatus	2.94	345	3.01	
Polymetme corythaeola	2.03	127	2.07	
Metanephrops andamanicus	1.99	4	2.03	
Sepia prashadi	1.47	24	1.50	
ISOPODS	1.07	71	1.10	
Pristiophorus nancyae	1.05	8	1.08	
PORTUNIDAE	0.91	4	0.93	
Chascanopsetta lugubris	0.83	8	0.85	
Polyipnus indicus	0.75	131	0.77	
Palinurus delagoae	0.60	4	0.61	
Cynoglossus cf lida	0.56	28	0.57	
Shrimps unidentified	0.40	238	0.41	
B I V A L V E S	0.36	123	0.37	
Total	97.74		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 14
DATE :14/11/14 GEAR TYPE: BT NO: 27 POSITION:Lat S 25°50.98
start stop duration Lon E 34°21.96
TIME :20:26:55 20:57:47 30.9 (min) Purpose : 3
LOG : 2142.46 2144.00 1.5 Region : 7432
FDEPTH: 439 457 Gear cond.: 0
BDEPTH: 439 457 Validity : 0
Towing dir: 0° Wire out : 950 m Speed : 3.0 kn
Sorted : 27 Total catch: 27.13 Catch/hour: 52.73

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
MYCTOPHIDAE	9.29	363	17.62	
Chlorophthalmus agassizi	8.75	109	16.59	
Cubiceps whiteleggii	3.75	130	7.11	
Chaunax sp.	3.71	187	7.04	
Polyipnus indicus	3.25	810	6.16	
Sepia sp	2.41	37	4.57	
Haliporoides triarthrus	2.29	194	4.35	18
Synagrops japonicus	2.06	19	3.91	
Neoscombrops sp.	1.79	10	3.39	
Hoplostethus mediterraneus	1.75	54	3.32	
Leucoraja wallacei	1.48	2	2.80	
Bathyclupea sp.	1.36	6	2.58	
Nansenia macrolepis**	1.19	138	2.25	
Metanephrops mozambicus	1.11	19	2.10	
Setarches guentheri	0.93	10	1.77	
Plesionika martia	0.78	293	1.47	
Pristiophorus nancyae	0.78	6	1.47	
Octopus cyaneus	0.78	4	1.47	
Lophiodes mutilus	0.74	2	1.40	
Benthodesmus elongatus	0.66	37	1.25	
Malacocephalus laevis	0.66	33	1.25	
Champsodon capensis	0.56	43	1.07	
Polymetme corythaeola	0.51	21	0.96	
Caelorinchus braueri	0.43	4	0.81	
Neoepinnula orientalis	0.23	2	0.44	
Brama orcini	0.21	2	0.41	
Heterocarpus woodmasoni	0.19	2	0.37	
Cynoglossus cf marleyi	0.19	10	0.37	
B I V A L V E S	0.17	52	0.33	
ISOPODS	0.17	16	0.33	
PALINURIDAE	0.14	6	0.26	
Peristedion weberi	0.10	4	0.18	
Aristaeomorpha foliacea	0.09	6	0.17	19
Argentina sp.	0.08	2	0.15	
Xenolepidichthys dagleishi	0.08	2	0.15	
Munida sp.	0.04	2	0.07	
Heterocarpus ensifer	0.03	4	0.05	
Total	52.73		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 15
DATE :15/11/14 GEAR TYPE: BT NO: 27 POSITION:Lat S 25°50.83
start stop duration Lon E 33°59.62
TIME :00:17:29 00:39:12 21.7 (min) Purpose : 3
LOG : 2172.24 2173.28 1.0 Region : 7432
FDEPTH: 446 440 Gear cond.: 0
BDEPTH: 446 440 Validity : 0
Towing dir: 0° Wire out : 1000 m Speed : 2.9 kn
Sorted : 26 Total catch: 66.08 Catch/hour: 182.53

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Chlorophthalmus agassizi	50.00	768	27.39	
Haliporoides triarthrus	47.24	3006	25.88	20
Chaunax sp.	28.52	442	15.63	
Polyipnus indicus	16.44	2909	9.00	
Caelorinchus braueri	6.91	97	3.78	
Malacocephalus occidentalis	6.42	133	3.52	
Synchiropus monacanthus	4.83	22	2.65	
Ommastrephes bartrami	4.21	22	2.31	
Lophiodes insidiator	3.45	8	1.89	
Malacocephalus laevis	2.83	91	1.55	
Peristedion weberi	2.21	105	1.21	
Hoplostethus mediterraneus	2.07	8	1.14	
Metanephrops mozambicus	1.86	28	1.02	
Plesionika martia	1.31	423	0.72	
Diaphus fulgens	1.31	235	0.72	
Chascanopsetta lugubris	1.04	8	0.57	
Munida sp.	0.90	50	0.49	
Nansenia macrolepis	0.62	69	0.34	
Champsodon capensis	0.35	50	0.19	
Total	182.53		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 16
DATE :15/11/14 GEAR TYPE: BT NO: 27 POSITION:Lat S 25°51.38
start stop duration Lon E 33°44.37
TIME :03:15:48 03:41:52 26.1 (min) Purpose : 3
LOG : 2190.78 2192.21 1.4 Region : 7432
FDEPTH: 461 467 Gear cond.: 0
BDEPTH: 461 467 Validity : 0
Towing dir: 0° Wire out : 1000 m Speed : 3.3 kn
Sorted : 20 Total catch: 156.96 Catch/hour: 361.24

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
MYCTOPHIDAE	94.36	11323	26.12	
Cubiceps whiteleggii	61.68	1277	17.07	
Trichiurus lepturus	56.80	53	15.72	24
Chaunax sp.	37.86	345	10.48	
Champsodon capensis	23.82	1933	6.59	
Chlorophthalmus agassizi	22.67	4	6.28	
Ommastrephes bartrami	16.92	253	4.68	
Haliporoides triarthrus	14.04	1266	3.89	
Merluccius paradoxus	5.13	7	1.42	22
Caelorinchus braueri	4.26	23	1.18	
Neoepinnula orientalis	4.14	173	1.15	
Rostroraja alba	3.80	12	1.05	
Synagrops japonicus	3.57	104	0.99	
Malacocephalus laevis	2.76	58	0.76	
Plesionika martia	2.53	690	0.70	
Neoscombrops sp.	1.61	58	0.45	
Metanephrops mozambicus	1.38	23	0.38	
Lestrolepis intermedia	0.81	69	0.22	
Munida sp.	0.69	69	0.19	
Xenolepidichthys dagleishi	0.69	12	0.19	
Aristaeomorpha foliacea	0.69	64	0.19	23
Sepia prashadi	0.58	23	0.16	
Peristedion weberi	0.35	12	0.10	
Argyropelecus gigas	0.12	58	0.03	
Total	361.24		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 17
DATE :15/11/14 GEAR TYPE: BT NO: 27 POSITION:Lat S 25°50.40
start stop duration Lon E 33°20.13
TIME :08:12:00 08:43:58 32.0 (min) Purpose : 3
LOG : 2224.93 2226.59 1.7 Region : 7432
FDEPTH: 521 520 Gear cond.: 0
BDEPTH: 521 520 Validity : 0
Towing dir: 0° Wire out : 1100 m Speed : 3.1 kn
Sorted : 27 Total catch: 136.86 Catch/hour: 256.93

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Haliporoides triarthrus	58.76	2074	22.87	25
Cubiceps whiteleggii	51.63	939	20.09	
MYCTOPHIDAE	30.98	9293	12.06	
Chaunax sp.	27.13	507	10.56	
Neoepinnula orientalis	16.90	338	6.58	
Synagrops japonicus	15.21	601	5.92	
Champsodon capensis	9.95	601	3.87	
Ommastrephes bartrami	8.92	75	3.47	
Lestrolepis intermedia	6.66	526	2.59	
Nansenia macrolepis**	5.44	122	2.12	
Malacocephalus occidentalis	4.32	75	1.68	
Chlorophthalmus agassizi	3.10	113	1.21	
Pristiophorus nancyae	2.35	9	0.91	
Astronesthes martensii	2.25	75	0.88	
Palinurus delagoae	2.16	9	0.84	
Caelorinchus trunovi	2.16	19	0.84	
Benthodesmus elongatus	1.97	47	0.77	
Beryx splendens	1.78	9	0.69	
Munida sp.	0.94	75	0.37	
Bathyclupea sp.	0.66	9	0.26	
Metanephrops mozambicus	0.56	9	0.22	
Plesionika martia	0.56	188	0.22	
Heterocarpus laevigatus	0.47	19	0.18	
Neoscombrops sp.	0.44	19	0.17	
Xenolepidichthys dagleishi	0.38	9	0.15	
Histioteuthis dofleini	0.38	9	0.15	
Sepia prashadi	0.28	9	0.11	
Nettastoma parviceps	0.28	9	0.11	
Isopod	0.09	9	0.04	
Bregmaceros sp.	0.09	38	0.04	
Sicyonia sp.	0.09	19	0.04	
Cubiceps sp.	0.04	9	0.02	
Total	256.93		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 18
DATE :15/11/14 GEAR TYPE: BT NO: 27 POSITION:Lat S 25°49.19
start stop duration Lon E 33°6.75
TIME :12:16:20 12:46:15 29.9 (min) Purpose : 3
LOG : 2247.77 2249.27 1.5 Region : 7431
FDEPTH: 85 84 Gear cond.: 0
BDEPTH: 85 84 Validity : 0
Towing dir: 0° Wire out : 220 m Speed : 3.0 kn
Sorted : 30 Total catch: 30.24 Catch/hour: 60.66

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Muraenesox bagio	21.99	4	36.24	
Carcharhinus falciformis	7.82	4	12.90	
Tetrosomus concatenatus	7.58	26	12.50	
Squatina africana	6.62	2	10.91	
Sepia sp	5.96	171	9.82	
Sepia pharaonis	4.77	6	7.87	
Saurida undosquamis	2.05	24	3.37	
Diodon sp.	1.89	2	3.11	
Synodus CF dermatogenys	1.16	46	1.92	
Halaelurus sp.	0.42	4	0.69	
Loligo sp.	0.40	54	0.66	
Total	60.66		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 19
DATE :15/11/14 GEAR TYPE: BT NO: 27 POSITION:Lat S 25°46.84
start stop duration Lon E 33°1.59
TIME :13:54:14 14:20:41 26.4 (min) Purpose : 3
LOG : 2258.32 2259.80 1.5 Region : 7431
FDEPTH: 52 50 Gear cond.: 0
BDEPTH: 52 50 Validity : 0
Towing dir: 0° Wire out : 150 m Speed : 3.3 kn
Sorted : 29 Total catch: 29.33 Catch/hour: 66.53

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Abalistes stellatus	17.22	14	25.88	
Mustelus mosis	9.84	2	14.80	
Tetrosomus concatenatus	7.33	18	11.01	
Nemipterus bipunctatus	7.08	54	10.64	27
Holothuria sp.	5.44	7	8.18	
Saurida undosquamis	5.31	52	7.98	
Equulites elongatus	3.79	315	5.69	26
Trachinocephalus myops	3.36	54	5.05	
Sepia pharaonis	1.97	16	2.97	
Fistularia petimba	1.63	34	2.46	
Pagellus natalenses	1.04	14	1.57	28
Carangoides ferdau	0.70	2	1.06	29
Lactoria cornuta	0.54	2	0.82	
Loligo sp.	0.45	25	0.68	
Sea urchin	0.25	5	0.38	
Parupeneus nansen	0.15	2	0.22	
Upeneus bensasi	0.14	2	0.21	
Decapterus russelli	0.14	2	0.20	30
Iniistius sp.	0.07	2	0.10	
Decapterus macrosoma	0.05	2	0.07	31
Sorsogona sp.	0.02	2	0.03	
Total	66.53		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 20
DATE :15/11/14 GEAR TYPE: BT NO: 27 POSITION:Lat S 25°48.70
start stop duration Lon E 32°58.59
TIME :15:14:03 15:35:22 21.3 (min) Purpose : 3
LOG : 2263.55 2264.70 1.2 Region : 7431
FDEPTH: 31 45 Gear cond.: 0
BDEPTH: 31 45 Validity : 0
Towing dir: 0° Wire out : 140 m Speed : 3.1 kn
Sorted : 33 Total catch: 208.90 Catch/hour: 587.90

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Decapterus macrosoma	222.89	4964	37.91	
Decapterus russelli	184.73	5083	31.42	33
Equulites elongatus	52.01	6248	8.85	32
Rhina ancylostoma	38.11	3	6.48	
Scomber japonicus	23.64	388	4.02	
Nemipterus bipunctatus	17.90	118	3.04	
Pagellus natalenses	11.82	51	2.01	
Parupeneus cf. cinnabaricus	10.13	17	1.72	
Loligo forbesi	9.79	84	1.67	
Lactoria cornuta	5.91	17	1.01	
Trachinocephalus myops	3.55	68	0.60	
Saurida undosquamis	2.70	34	0.46	
Trachurus delagoa	1.52	101	0.26	
Lagocephalus guntheri	1.18	34	0.20	
Lagocephalus lunaris	1.18	68	0.20	
Bothus myriaster	0.84	17	0.14	
Total	587.90		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 21
DATE :15/11/14 GEAR TYPE: BT NO: 27 POSITION:Lat S 25°30.80
start stop duration Lon E 33°8.13
TIME :18:20:12 18:46:11 26.0 (min) Purpose : 3
LOG : 2289.31 2290.88 1.6 Region : 7431
FDEPTH: 38 44 Gear cond.: 0
BDEPTH: 38 44 Validity : 2
Towing dir: 0° Wire out : 140 m Speed : 3.6 kn
Sorted : 34 Total catch: 72.72 Catch/hour: 167.94

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Abalistes stellatus	56.93	17	33.90	
Trachinocephalus myops	45.94	1679	27.35	
Parapriacanthus ransonneti	11.64	2813	6.93	
Saurida undosquamis	8.20	14	4.88	
Synodus 'yellowpectoral'	5.85	225	3.49	
Loxodon macrorhinus	5.52	2	3.29	
Loligo forbesi	5.47	149	3.26	
Bothus sp.	4.16	194	2.48	
Ophichthus sp.	3.70	24	2.20	
Penaeus latisulcatus	3.53	187	2.10	
Sepia prashadi	3.05	31	1.82	
Pagellus natalenses	2.98	225	1.77	
Apogon quadrifasciatus**	2.91	284	1.73	
Upeneus bensasi	2.36	107	1.40	
Diodon holocanthus	1.42	3	0.85	
Pterois russelii	0.97	3	0.58	
Sphyraena chrysotaenia	0.52	10	0.31	
Amanses scopas	0.52	45	0.31	
Lagocephalus guntheri	0.45	10	0.27	
Cociella crocodila	0.35	14	0.21	
Priacanthus hamrur	0.28	3	0.17	
Lagocephalus lunaris	0.28	31	0.17	
Penaeus japonicus	0.17	7	0.10	
Pterois sp.	0.17	3	0.10	
Nemipterus bipunctatus	0.17	3	0.10	
Nettastoma parviceps	0.10	3	0.06	
Hirundichthys speculiger	0.10	3	0.06	
Samaris cristatus	0.10	10	0.06	
Aesopia cornuta	0.07	7	0.04	
Bothus swio	0.03	3	0.02	
Total	167.94		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 22
DATE :15/11/14 GEAR TYPE: BT NO: 27 POSITION:Lat S 25°30.90
start stop duration Lon E 33°10.49
TIME :19:37:09 20:05:43 28.6 (min) Purpose : 3
LOG : 2296.99 2298.36 1.4 Region : 7431
FDEPTH: 50 49 Gear cond.: 0
BDEPTH: 50 49 Validity : 2
Towing dir: 0° Wire out : 150 m Speed : 3.4 kn
Sorted : 18 Total catch: 26.22 Catch/hour: 55.06

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Apogon quadrifasciatus**	12.60	3172	22.88	
Pterois miles	9.51	25	17.28	
Sepia sp	5.80	9	10.53	
Pseudorhombus cf javaicus	3.69	9	6.69	
Bothus sp.	3.65	195	6.64	
Trachinocephalus myops	3.40	176	6.18	
Abalistes stellatus	3.40	3	6.18	
Nemipterus bipunctatus	3.31	28	6.01	
Loligo forbesi	2.08	47	3.78	
Tetrosomus concatenatus	1.89	16	3.43	
Rhynchobatus djiddensis	0.85	3	1.54	
Penaeus latisulcatus	0.82	35	1.49	
Priacanthus hamrur	0.79	6	1.43	
Diodon holocanthus	0.69	3	1.26	
Parupeneus cf. cinnabaricus	0.50	3	0.92	
Bothus myriaster	0.47	25	0.86	
MYCTOPHIDAE	0.44	164	0.80	
Portunus sp.	0.38	76	0.69	
Pagellus natalenses	0.32	9	0.57	
Saurida undosquamis	0.32	6	0.57	
Aesopia cornuta	0.16	6	0.29	0
Aesopia cornuta	0.00	6	0.00	
Total	55.06		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 23
DATE :16/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 25°27.99
start stop duration Lon E 33°54.17
TIME :08:45:17 09:15:49 30.5 (min) Purpose : 3
LOG : 2356.48 2358.09 1.6 Region : 7432
FDEPTH: 426 426 Gear cond.: 0
BDEPTH: 426 426 Validity : 0
Towing dir: 0° Wire out : 950 m Speed : 3.2 kn
Sorted : 27 Total catch: 86.28 Catch/hour: 169.56

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
MYCTOPHIDAE	42.74	8293	25.21	
Champsodon capensis	31.13	2891	18.36	
Metanephrops mozambicus	19.04	254	11.23	36
Ommastrephes bartrami	15.39	171	9.08	
Cubiceps whiteleggii	13.97	389	8.24	
Trichiurus lepturus	9.79	6	5.77	
Neoepinnula orientalis	9.73	236	5.74	
Neoscombrops cynodon	5.78	218	3.41	
Haliporoides triarthrus	5.13	674	3.03	35
Malacocephalus occidentalis	4.01	206	2.36	
Chaunax sp.	2.24	47	1.32	
Parapriacanthus ransonneti	1.65	242	0.97	
Synagrops japonicus	1.59	53	0.94	
Chlorophthalmus agassizi	1.30	47	0.76	
Sepia sp	1.12	47	0.66	
Neobythites analis	0.71	6	0.42	
Lestrolepis intermedia	0.59	35	0.35	
Gonorhynchus gonorhynchus	0.53	6	0.31	
Nansenia macrolepis**	0.53	53	0.31	
Xenolepidichthys dagleishi	0.41	12	0.24	
Hoplostethus mediterraneus	0.41	18	0.24	
Pecten sp.	0.35	41	0.21	
Synchiropus monacanthus	0.35	18	0.21	
Argentina sp.	0.35	18	0.21	
Cynoglossus cf marleyi	0.35	6	0.21	
Rexea prometheoides	0.35	6	0.21	
Total	169.56		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 24
DATE :16/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 25°31.01
start stop duration Lon E 34°21.96
TIME :13:50:24 14:20:38 30.2 (min) Purpose : 3
LOG : 2385.01 2386.74 1.7 Region : 7432
FDEPTH: 373 373 Gear cond.: 0
BDEPTH: 373 373 Validity : 0
Towing dir: 0° Wire out : 850 m Speed : 3.4 kn
Sorted : 89 Total catch: 230.12 Catch/hour: 456.73

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Cubiceps whiteleggii	127.54	2073	27.93	
Trichiurus lepturus	109.20	105	23.91	37
MYCTOPHIDAE	98.92	37025	21.66	
Champsodon capensis	30.98	3309	6.78	
Xiphias gladius	20.40	2	4.47	
Neoepinnula orientalis	11.95	375	2.62	
Neoscombrops cynodon	9.86	167	2.16	
Metanephrops mozambicus	9.86	125	2.16	38
Palinurus delagoae	9.38	28	2.05	39
Ommastrephes bartrami	9.03	97	1.98	
Halaelurus lutarius	4.72	56	1.03	
Chaunax sp.	4.58	167	1.00	
Polymixia berndti	3.61	56	0.79	
Synagrops japonicus	1.81	28	0.40	
Ateleopus natalensis	1.81	14	0.40	
Lestrolepis intermedia	1.11	56	0.24	
Sepia sp	0.83	28	0.18	
Chlorophthalmus agassizi	0.56	28	0.12	
Synchiropus monacanthus	0.28	14	0.06	
Rexea prometheoides	0.28	14	0.06	
Total	456.73		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 25
DATE :16/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 25°30.59
start stop duration Lon E 34°44.27
TIME :17:47:25 18:18:58 31.6 (min) Purpose : 3
LOG : 2410.99 2411.34 1.4 Region : 7432
FDEPTH: 259 261 Gear cond.: 0
BDEPTH: 259 261 Validity : 0
Towing dir: 0° Wire out : 600 m Speed : 2.8 kn
Sorted : 30 Total catch: 82.77 Catch/hour: 157.41

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Saurida undosquamis	68.01	262	43.20	
Palinurus delagoae	27.96	91	17.76	
Champsodon capensis	10.61	1044	6.74	
Chlorophthamus sp. juv	8.44	565	5.36	
Uranoscopus archionema	8.22	0	5.22	
MYCTOPHIDAE	5.93	3052	3.77	
Sepia prashadi	4.28	55	2.72	
Parazen pacificus	2.57	103	1.63	
Lithodidae	2.28	17	1.45	
Chelidonichthys kumu	2.23	11	1.41	
Citharoides macrolepis	1.83	11	1.16	
Uroconger lepturus	1.65	29	1.05	
Solenocera sp.	1.54	148	0.98	
Isopod	1.54	165	0.98	
Cynoglossus sp.	1.43	40	0.91	
Puerulus angulatus	1.37	6	0.87	
Neobythites analis	1.26	23	0.80	
Hoplichthys acanthopleurus	1.14	160	0.72	
Halieutaea fitzsimonsi	1.03	23	0.65	
Squalus mitsukurii	0.97	2	0.62	
Gonorhynchus gonorhynchus	0.51	6	0.33	
Neoscombrops sp.	0.46	80	0.29	
Synchiropus monacanthus	0.40	23	0.25	
Chaunax sp.	0.40	6	0.25	
Macrorhamphosus scolopax ***	0.23	23	0.14	
Caelorinchus trunovi	0.23	11	0.14	
Poecilopsetta natalensis	0.23	6	0.14	
Chlorophthalmus agassizi	0.23	6	0.14	
Ateleopus natalensis	0.11	11	0.07	
TRIGLIDAE	0.11	6	0.07	
Peristedion weberi	0.11	23	0.07	
Parribacus antarcticus	0.11	6	0.07	
Total	157.41		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 26
DATE :16/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 25°19.12
start stop duration Lon E 34°33.94
TIME :22:18:48 22:52:45 33.9 (min) Purpose : 3
LOG : 2441.61 2443.11 1.5 Region : 7432
FDEPTH: 257 263 Gear cond.: 0
BDEPTH: 191 263 Validity : 0
Towing dir: 0° Wire out : 610 m Speed : 2.6 kn
Sorted : 18 Total catch: 36.96 Catch/hour: 65.34

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Uranoscopus archionema	18.10	103	27.71	
Branchiostegus doliatus	10.64	49	16.29	
Saurida undosquamis	7.74	21	11.85	
Spicara australis	3.68	32	5.63	
Citharoides macrolepis	3.61	49	5.52	
Acropoma japonicum	3.54	4	5.41	0
Satyrichthys adeni	2.65	18	4.06	
Umbrina canariensis	1.98	7	3.03	
Sepia pharaonis	1.63	14	2.49	
Scombrops boops	1.63	4	2.49	
GECARCINIDAE	1.59	39	2.44	
SOLENOCERIDAE	1.41	110	2.16	
Neobythites analis	1.41	35	2.16	
OPHICHTHIDAE	1.17	7	1.79	
Lepidotrigla alcocki	0.88	7	1.35	
Chaunax pictus	0.57	4	0.87	
**	0.57	4	0.87	
Acropoma japonicum	0.49	14	0.76	
Isopod	0.49	35	0.76	
Halieutaea sp. A	0.49	14	0.76	
PENAEIDAE	0.42	42	0.65	
SCORPAENIDAE	0.42	4	0.65	
Hoplichthys cf. acanthopleurus	0.11	7	0.16	
Malthopsis tiarella	0.07	4	0.11	
Scyllarides elisabethae	0.04	11	0.05	
Total	65.34		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 27
DATE :17/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 25°8.33
start stop duration Lon E 34°18.18
TIME :03:17:39 03:46:24 28.7 (min) Purpose : 3
LOG : 2472.95 2474.61 1.7 Region : 7431
FDEPTH: 174 169 Gear cond.: 0
BDEPTH: 174 169 Validity : 0
Towing dir: 0° Wire out : 440 m Speed : 3.5 kn
Sorted : 57 Total catch: 180.05 Catch/hour: 376.02

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Acropoma japonicum	88.34	5313	23.49	
Plesionika martia	55.64	20863	14.80	
Champsodon capensis	41.35	4135	11.00	
Ibacus novemdentatus	39.97	501	10.63	
Trichiurus lepturus	30.32	31	8.06	40
Carcharhinus leucas	15.91	2	4.23	
Trichiurus lepturus	15.16	800	4.03	41
Citharoides macrolepis	9.90	125	2.63	
Parapenaeus sp.	9.90	990	2.63	
Squatina africana	9.44	4	2.51	
Myliobatis aquila	9.31	2	2.48	
Saurida undosquamis	6.64	38	1.77	
Sepia hieronis	6.39	263	1.70	
Histioteuthis dofleini	6.01	138	1.60	
Uranoscopus archionema	4.76	50	1.27	
Hoplichthys acanthopleurus	4.26	526	1.13	
Neoscombrops cynodon	3.38	175	0.90	
Lophiodes sp.	2.88	13	0.77	
Parribacus antarcticus	2.13	213	0.57	
Satyrichthys adeni	2.00	25	0.53	
Caelorinchus trunovi	1.88	163	0.50	
Torpedo nobiliana	1.40	2	0.37	
Monocentris japonica	1.38	13	0.37	
Synchiropus monacanthus	1.25	75	0.33	
Tylerius spinosissimus	1.00	25	0.27	
Triglidae 'PectSemicircBlue'	0.88	25	0.23	
Macrorhamphosus scolopax ***	0.88	175	0.23	
Fistularia commersonii	0.75	13	0.20	
PORTUNIDAE	0.63	188	0.17	
Triglidae 'RedDorsalFinSpot'	0.63	13	0.17	
Citharichthys sp.	0.50	13	0.13	
Antigonia cf rubescens	0.38	38	0.10	
Haliporoides triarthrus	0.25	213	0.07	
Neobythites analis	0.25	13	0.07	
Chlorophthalmus agassizi	0.13	13	0.03	
Halieutaea fitzsimonsi	0.13	13	0.03	
Total	376.02		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 28
DATE :17/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 25°5.12
start stop duration Lon E 34°13.04
TIME :06:27:51 06:58:15 30.4 (min) Purpose : 3
LOG : 2486.64 2488.09 1.4 Region : 7431
FDEPTH: 96 91 Gear cond.: 0
BDEPTH: 96 91 Validity : 0
Towing dir: 0° Wire out : 260 m Speed : 2.9 kn
Sorted : 82 Total catch: 219.35 Catch/hour: 432.80

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
J E L L Y F I S H	211.36	163	48.84	
Muraenesox bagio	69.65	6	16.09	
Carcharhinus leucas	37.05	5	8.56	
Pagellus natalenses	18.79	1164	4.34	44
Nemipterus japonicus	17.36	306	4.01	46
Carangoides chrysophrys	14.01	5	3.24	47
Decapterus macrosoma	11.05	237	2.55	42
Trichiurus lepturus	10.90	626	2.52	45
Starfish	6.81	335	1.57	
Ariomma indicum	4.83	74	1.12	
PALINURIDAE	4.34	2	1.00	
Ommastrephes bartrami	4.34	163	1.00	
Sphyraena jello	4.29	59	0.99	
Psettodes erumei	2.66	5	0.62	
Saurida undosquamis	2.61	89	0.60	
Upeneus moluccensis	2.37	59	0.55	
Penaeus latisulcatus	1.48	35	0.34	
Bathyuroconger vicinus	1.43	20	0.33	
Decapterus russelli	1.28	15	0.30	43
Metapenaeus monoceros	1.13	39	0.26	
Thryssa vitrirostris	0.79	20	0.18	
Priacanthus hamrur	0.74	25	0.17	
Gymnocranius sp.	0.64	20	0.15	
Gazza minuta	0.59	10	0.14	
Amblyrhynchotes honkenii	0.59	79	0.14	
Sepia prashadi	0.49	10	0.11	
Portunidae	0.39	5	0.09	
Branchiostegus doliatus	0.35	5	0.08	
Thryssa setirostris	0.25	5	0.06	
Parribacus antarcticus	0.10	5	0.02	
Fistularia petimba	0.05	5	0.01	
Diagramma pictum	0.05	5	0.01	
Total	432.80		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 29
DATE :17/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 25°3.52
start stop duration Lon E 34°8.52
TIME :08:27:41 08:56:54 29.2 (min) Purpose : 3
LOG : 2496.61 2498.13 1.5 Region : 7431
FDEPTH: 41 41 Gear cond.: 0
BDEPTH: 41 41 Validity : 0
Towing dir: 0° Wire out : 150 m Speed : 3.1 kn
Sorted : 50 Total catch: 345.34 Catch/hour: 709.11

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Selar crumenophthalmus	124.74	884	17.59	
Sphyraena flavicauda	109.68	1386	15.47	
Argyrosomus inodorus	77.00	4	10.86	101
Ariomma indicum	59.24	891	8.35	
Carangoides malabaricus	54.24	990	7.65	55
Decapterus russelli	48.14	805	6.79	54
J E L L Y F I S H	36.96	29	5.21	
Himantura gerrardi	26.08	2	3.68	
Gymnura natalensis	23.57	2	3.32	
Saurida undosquamis	21.62	222	3.05	
Upeneus taeniopterus	20.33	1415	2.87	
Pomadasys maculatus	18.30	305	2.58	49
Sphyraena forsteri	16.54	232	2.33	
Rastrelliger kanagurta	15.43	129	2.18	50
Polynemus sextarius**	9.89	296	1.39	
Upeneus sulphureus	7.30	177	1.03	
Leiognathus equulus	6.28	55	0.89	48
Gazza minuta	4.99	121	0.70	
Torquigener flavimaculosus	3.70	29	0.52	
Upeneus bensasi	3.60	83	0.51	
Decapterus macrosoma	2.86	66	0.40	51
CARIDEA	2.40	435	0.34	
Apistus carinatus	2.31	129	0.33	
Penaeus latisulcatus	2.01	12	0.28	97
Cynoglossus lida	1.85	29	0.26	
Lagocephalus guntheri	1.39	29	0.20	
Loligo sp.	1.20	29	0.17	
Trachinocephalus myops	1.11	37	0.16	
Alepes djedaba	0.92	10	0.13	
Penaeus japonicus	0.89	27	0.13	99
Equulites elongatus	0.83	306	0.12	
Bothus sp.	0.74	47	0.10	
Thryssa vitrirostris	0.65	29	0.09	53
Thryssa setirostris	0.55	47	0.08	52
Penaeus semisulcatus	0.51	14	0.07	98
Metapenaeus monoceros	0.50	21	0.07	100
Bothus myriaster	0.37	55	0.05	
Secutor insidiator	0.28	10	0.04	
BOTHIDAE	0.09	29	0.01	
Total	709.11		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 30
DATE :17/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 25°15.03
start stop duration Lon E 33°49.28
TIME :12:13:03 12:41:23 28.3 (min) Purpose : 3
LOG : 2520.50 2522.03 1.5 Region : 7431
FDEPTH: 140 143 Gear cond.: 0
BDEPTH: 140 143 Validity : 0
Towing dir: 0° Wire out : 370 m Speed : 3.1 kn
Sorted : 41 Total catch: 132.05 Catch/hour: 279.67

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Ariomma indicum	125.55	1169	44.89	
Squatina africana	45.83	8	16.39	
Champsodon capensis	24.23	2745	8.66	
Trichiurus lepturus	18.26	23	6.53	
Saurida undosquamis	12.20	110	4.36	
Selar crumenophthalmus	8.64	51	3.09	57
Ibacus novemdentatus	8.30	119	2.97	
Acropoma japonicum	8.05	364	2.88	
Sarda orientalis	6.61	2	2.36	
Sphyraena forsteri	6.10	51	2.18	
Carcharhinus falciformis	4.28	2	1.53	
Uranoscopus archionema	2.37	51	0.85	
Parapenaeus sp.	1.97	169	0.71	69
Loligo sp.	1.95	51	0.70	
Rhinobatos holcorhynchus	1.61	2	0.58	
Pagellus natalenses	1.61	25	0.58	
Priacanthus hamrur	1.10	8	0.39	
Branchiostegus doliatus	1.02	17	0.36	
Total	279.67		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 31
DATE :17/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 25°13.58
start stop duration Lon E 33°46.43
TIME :14:38:52 15:10:39 31.8 (min) Purpose : 3
LOG : 2530.89 2532.66 1.8 Region : 7431
FDEPTH: 48 48 Gear cond.: 0
BDEPTH: 48 48 Validity : 0
Towing dir: 0° Wire out : 210 m Speed : 3.3 kn
Sorted : 51 Total catch: 334.99 Catch/hour: 632.44

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Selar crumenophthalmus	302.11	2067	47.77	59
Decapterus russelli	86.23	1328	13.63	
Gazza minuta	83.85	1466	13.26	
Ariomma indicum	56.30	892	8.90	
Epinephelus tauvina	29.94	2	4.73	
Carangoides malabaricus	26.37	178	4.17	
Upeneus moluccensis	24.78	561	3.92	61
Scomberomorus commerson	10.76	2	1.70	60
Sphyraena barracuda	8.92	119	1.41	
Loligo forbesi	1.19	20	0.19	
Starfish	0.99	238	0.16	
Nemipterus japonicus	0.79	20	0.13	
Cociella crocodila	0.20	20	0.03	
Total	632.44		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 32
DATE :17/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 25°11.73
start stop duration Lon E 33°45.44
TIME :16:45:34 17:15:48 30.2 (min) Purpose : 3
LOG : 2539.20 2541.01 1.8 Region : 7431
FDEPTH: 48 47 Gear cond.: 0
BDEPTH: 48 47 Validity : 2
Towing dir: 0° Wire out : 160 m Speed : 3.6 kn
Sorted : 67 Total catch: 224.28 Catch/hour: 445.15

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Carangoides malabaricus	136.47	1439	30.66	65
Polynemus sextarius**	102.65	1804	23.06	
Himantura cf gerrardi	53.39	4	11.99	
Leiognathus equulus	45.97	429	10.33	67
Epinephelus tauvina	16.04	2	3.60	
Saurida undosquamis	14.89	71	3.34	
Trichiurus lepturus	11.08	167	2.49	66
Trachinocephalus myops	9.88	381	2.22	
Auxis thazard thazard	8.34	24	1.87	
Upeneus cf vittatus	8.34	214	1.87	
Thryssa vitrirostris	5.95	107	1.34	64
Nemipterus bipunctatus	3.81	24	0.86	
Pomadasys maculatus	3.22	36	0.72	62
Sepia hieronis	2.62	36	0.59	
Alepes kleinii	2.50	12	0.56	
Dussumieria acuta	2.26	191	0.51	68
Apistus carinatus	2.26	119	0.51	
Upeneus moluccensis	1.79	24	0.40	
Sphyraena barracuda	1.79	12	0.40	
Carybdis sp.	1.67	12	0.37	
Penaeus japonicus	1.67	36	0.37	
Acropoma japonicum	1.43	405	0.32	
Gazza minuta	1.43	36	0.32	
Thryssa setirostris	1.31	60	0.29	63
Pagellus natalenses	1.19	36	0.27	
Upeneus bensasi	1.19	36	0.27	
Triglidae 'PectSemicircBlue'	1.07	36	0.24	
Cociella crocodila	0.36	12	0.08	
Penaeus latisulcatus	0.24	24	0.05	
Lagocephalus lunaris	0.12	12	0.03	
LYSIOSQUILLIDAE	0.12	12	0.03	
Calappidae sp.	0.12	12	0.03	
Total	445.15		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 33
DATE :17/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 24°55.57
start stop duration Lon E 34°34.51
TIME :23:10:43 23:37:30 26.8 (min) Purpose : 3
LOG : 2589.05 2590.49 1.4 Region : 7431
FDEPTH: 36 36 Gear cond.: 0
BDEPTH: 36 36 Validity : 2
Towing dir: 0° Wire out : 120 m Speed : 3.2 kn
Sorted : 0 Total catch: 186.28 Catch/hour: 417.35

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
J E L L Y F I S H	346.29	197	82.97	
Cynoglossus lida	13.76	246	3.30	
Otolithes ruber	10.93	336	2.62	74
Penaeus indicus	7.39	117	1.77	77
Portunus sanguinolento	4.12	130	0.99	
Plicofollis dussumieri	3.23	9	0.77	71
Torpedo sinuspersici	3.23	2	0.77	
Polynemus sextarius**	3.02	170	0.72	
Penaeus japonicus	2.80	74	0.67	78
Pomadasys maculatus	2.46	60	0.59	70
Johnius amblycephalus	2.06	76	0.49	75
Apistus carinatus	1.88	356	0.45	
Aesopia cornuta	1.79	45	0.43	
Ophichthus sp.	1.79	2	0.43	
Thryssa vitrirostris	1.46	125	0.35	72
Bothus sp.	1.32	173	0.32	
Himantura uarnak	1.28	2	0.31	
Shrimps unidentified	1.28	569	0.31	
Teragon theraps	1.25	16	0.30	
Penaeus semisulcatus	1.06	25	0.25	79
Sphyraena flavicauda	1.03	11	0.25	
Saurida undosquamis	0.85	11	0.20	
Sepia sp	0.43	9	0.10	
Trichiurus lepturus	0.40	16	0.10	76
Pomadasys olivaceus	0.40	4	0.10	
Upeneus sulphureus	0.36	7	0.09	73
Rhinobatos rhinobatos	0.31	7	0.08	
Metapenaeus monoceros	0.27	9	0.06	80
Psettodes erumei	0.16	2	0.04	
Loligo sp.	0.16	7	0.04	
Lepidotrigla alcocki	0.11	4	0.03	
Trachinocephalus myops	0.09	9	0.02	
Plotosus lineatus	0.09	2	0.02	
Secutor insidiator	0.09	7	0.02	
Callionymus marleyi	0.07	7	0.02	
Lagocephalus wheeleri	0.07	2	0.02	
Cociella crocodila	0.02	2	0.01	
Synaptura sp.	0.02	2	0.01	
Carangoides ferdau	0.01	2	0.00	
Total	417.35		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 34
DATE :18/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 25°2.54
start stop duration Lon E 34°42.97
TIME :02:17:44 02:47:26 29.7 (min) Purpose : 3
LOG : 2608.38 2610.05 1.7 Region : 7431
FDEPTH: 60 55 Gear cond.: 0
BDEPTH: 60 55 Validity : 2
Towing dir: 0° Wire out : 170 m Speed : 3.4 kn
Sorted : 0 Total catch: 64.45 Catch/hour: 130.20

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Muraenesox bagio	22.22	4	17.07	
Dussumieria acuta	20.61	5723	15.83	87
Otolithes ruber	16.36	105	12.57	81
Psettodes erumei	8.28	8	6.36	
Upeneus taeniopterus	7.19	265	5.52	
Nemipterus japonicus	7.05	125	5.42	
Sphyraena barracuda	6.75	103	5.18	84
J E L L Y F I S H	5.66	8	4.34	
Metapenaeus monoceros	3.96	176	3.04	
Saurida undosquamis	3.70	85	2.84	
Trichiurus lepturus	2.44	4	1.88	
Decapterus russelli	2.02	28	1.55	85
Thenus orientalis	1.86	16	1.43	
Parapenaeus sp.	1.82	242	1.40	
Penaeus semisulcatus	1.62	36	1.24	
Portunidae	1.60	675	1.23	
Uroconger lepturus	1.58	42	1.21	
Polynemus sextarius**	1.35	26	1.04	
Thryssa vitrirostris	1.09	46	0.84	83
Minous coccineus	0.95	34	0.73	
Starfish	0.93	75	0.71	
Upeneus moluccensis	0.93	14	0.71	82
Priacanthus hamrur	0.89	6	0.68	
Umbrina canariensis	0.87	28	0.67	
Sarda orientalis	0.77	2	0.59	
Sepia hieronis	0.71	16	0.54	
Cynoglossus sp.	0.69	44	0.53	
Decapterus macrosoma	0.67	16	0.51	88
Terapon theraps	0.67	8	0.51	
Apogon quadrifasciatus**	0.63	61	0.48	
Apistus carinatus	0.61	48	0.47	
Ariomma indicum	0.59	10	0.45	
Gazza minuta	0.51	10	0.39	
Aesopia cornuta	0.40	18	0.31	
Taeniopsetta ocellata	0.32	69	0.25	
Pomadasys olivaceus	0.30	4	0.23	
Penaeus latisulcatus	0.30	18	0.23	
Ommastrephes bartrami	0.28	8	0.22	
Pagellus natalenses	0.26	8	0.20	
Carangoides malabaricus	0.26	2	0.20	
Penaeus japonicus	0.20	2	0.16	
Dussumieria acuta	0.12	2	0.09	86
Cociella crocodila	0.10	4	0.08	
Halieutaea fitzsimonsi	0.04	6	0.03	
Octopus sp.	0.04	2	0.03	
Diagramma pictum	0.02	2	0.02	
Total	130.20		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 35
DATE :18/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 25°10.76
start stop duration Lon E 35°2.57
TIME :06:58:20 07:29:47 31.4 (min) Purpose : 3
LOG : 2634.49 2636.27 1.8 Region : 7431
FDEPTH: 106 106 Gear cond.: 0
BDEPTH: 106 106 Validity : 0
Towing dir: 0° Wire out : 280 m Speed : 3.4 kn
Sorted : 0 Total catch: 96.14 Catch/hour: 183.41

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Loligo forbesi	64.86	1	35.37	
Ariomma indicum	62.48	782	34.06	
Saurida undosquamis	22.89	1	12.48	
Squatina africana	8.93	2	4.87	
Pagellus acarne	8.66	86	4.72	
Sphyraena barracuda	5.82	44	3.17	89
Trichiurus lepturus	4.39	10	2.39	
Lagocephalus guntheri	1.13	17	0.61	
Champsodon capensis	0.76	162	0.42	
Octopus sp.	0.72	2	0.40	
Decapterus russelli	0.72	6	0.40	90
Selar crumenophthalmus	0.59	2	0.32	
Pterogymnus laniarius	0.44	2	0.24	
Sepia hieronis	0.31	4	0.17	
Taeniopsetta ocellata	0.27	15	0.15	
Portunus sanguinolentus	0.19	2	0.10	
Uranoscopus archionema	0.11	4	0.06	
Lepidotrigla alcocki	0.10	4	0.05	
Ibacus novemdentatus	0.04	4	0.02	
Total	183.41		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 36
DATE :18/11/14 GEAR TYPE: BT NO: 27 POSITION:Lat S 25°18.69
start stop duration Lon E 35°13.30
TIME :11:31:38 12:01:37 30.0 (min) Purpose : 3
LOG : 2658.49 2660.21 1.7 Region : 7432
FDEPTH: 519 514 Gear cond.: 0
BDEPTH: 519 514 Validity : 0
Towing dir: 0° Wire out : 1230 m Speed : 3.4 kn
Sorted : 30 Total catch: 120.77 Catch/hour: 241.70

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Diaphus effulgens	136.41	7565	56.44	
Haliporoides triarthrus	22.66	881	9.37	92
Aristaeomorpha foliacea	10.89	384	4.50	93
Shrimps unidentified	10.57	2570	4.37	
Champsodon capensis	9.05	680	3.74	
Neoepinnula orientalis	8.81	112	3.64	
Diaphus sp.	8.73	2193	3.61	
Synagrops japonicus	8.65	224	3.58	
Lestrolepis intermedia	8.57	552	3.54	
Neoscombrops cynodon	7.04	120	2.91	
C R A B S	4.08	16	1.69	
Plesionika martia	3.52	1161	1.46	
Chlorophthalmus agassizi	0.64	24	0.26	
Merluccius paradoxus	0.60	2	0.25	
Cubiceps whiteleggii	0.48	8	0.20	
NOTOSUDIDAE	0.32	8	0.13	
Chascanopsetta lugubris	0.32	8	0.13	
Cynoglossus attenuatus	0.22	24	0.09	
Caelorinchus trunovi	0.08	8	0.03	
CRANCHIIDAE	0.08	8	0.03	
Total	241.70		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 37
DATE :18/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 25°1.48
start stop duration Lon E 35°18.05
TIME :18:52:54 19:23:39 30.8 (min) Purpose : 3
LOG : 2707.44 2708.91 1.5 Region : 7432
FDEPTH: 262 264 Gear cond.: 0
BDEPTH: 262 264 Validity : 0
Towing dir: 0° Wire out : 700 m Speed : 2.9 kn
Sorted : 0 Total catch: 105.73 Catch/hour: 206.30

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Champsodon capensis	55.32	6741	26.81	
Maurolicus muelleri	34.44	14341	16.69	
Palinurus delagoae	21.89	84	10.61	
Squatina armata	14.32	2	6.94	
Macrorhamphosus scolopax ***	11.71	1024	5.67	
Halieutaea sp. A	11.32	137	5.49	
Neoscombrops cynodon	9.17	254	4.45	
Sepia hieronis	8.98	117	4.35	
Saurida undosquamis	8.00	917	3.88	
Peristedion weberi	6.83	410	3.31	
Cynoglossus capensis	4.68	185	2.27	
Uranoscopus archionema	4.29	39	2.08	
Citharoides macrolepis	3.12	39	1.51	
Ommastrephes bartrami	2.73	20	1.32	
Chelidonichthys kumu	2.44	20	1.18	
Triglidae 'PectSemicircBlue'	2.05	78	0.99	
Uroconger lepturus	1.46	39	0.71	
Satyrichthys adeni	1.46	10	0.71	
Parapriacanthus ransonneti	1.07	39	0.52	
Lagocephalus guntheri	0.39	10	0.19	
Laeops pectoralis	0.29	10	0.14	
Holohalaelurus grennian	0.23	2	0.11	
Hoplichthys acanthopleurus	0.10	10	0.05	
Total	206.30		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 38
DATE :18/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 24°58.06
start stop duration Lon E 35°14.73
TIME :20:50:52 21:21:10 30.3 (min) Purpose : 3
LOG : 2716.51 2717.95 1.4 Region : 7431
FDEPTH: 154 156 Gear cond.: 0
BDEPTH: 154 156 Validity : 0
Towing dir: 0° Wire out : 420 m Speed : 2.9 kn
Sorted : 17 Total catch: 478.34 Catch/hour: 947.52

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
PORIFERA (Sponges)	792.34	0	83.62	
Rexea prometheoides	30.82	578	3.25	
Pagellus natalenses	17.67	198	1.86	
Monocentris japonica	12.04	103	1.27	
Acropoma japonicum	11.01	753	1.16	
Mustelus palumbes	9.86	2	1.04	
Saurida undosquamis	9.35	119	0.99	
Polysteganus coeruleopunctatus	8.48	103	0.89	
Halieutaea sp.	7.53	55	0.79	
Rhinobatos cf annulatus	6.66	2	0.70	
Tylerius spinosissimus	5.23	151	0.55	
Triodon macropterus	4.64	2	0.49	
SEA URCHINS	3.25	151	0.34	
Trichiurus lepturus	3.21	2	0.34	
Pristigenys niphonia	2.61	8	0.28	
Sepia sp	2.54	158	0.27	
Lepidotrigla alcocki	2.22	79	0.23	
Scorpaena scrofa	2.22	24	0.23	
Lophiodes mutilus	2.06	16	0.22	
Trachurus delagoa	1.82	16	0.19	
Zeus faber	1.66	8	0.18	
Ibacus novemdentatus	1.66	32	0.18	
Thamnaconus fajardoi	1.51	8	0.16	
Champsodon capensis	1.43	364	0.15	
Serranus sp.	0.95	40	0.10	
Taeniopsetta ocellata	0.95	48	0.10	
Peristedion cf weberi	0.63	63	0.07	
Penaeus latisulcatus	0.48	16	0.05	
Lagocephalus guntheri	0.48	8	0.05	
Uranoscopus archionema	0.40	8	0.04	
BOTHIDAE	0.32	8	0.03	0
Ariomma indicum	0.32	8	0.03	
Macrorhamphosus scolopax ***	0.32	24	0.03	
LYSIOSQUILLIDAE	0.24	16	0.03	
Cynoglossus lida	0.24	8	0.03	
Physiculus natalensis	0.24	16	0.03	
Haliporoides triarthrus	0.16	24	0.02	
Total	947.52		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 39
DATE :19/11/14 GEAR TYPE: BT NO: 27 POSITION:Lat S 24°48.08
start stop duration Lon E 35°29.97
TIME :00:56:07 01:26:25 30.3 (min) Purpose : 3
LOG : 2742.42 2744.30 1.9 Region : 7432
FDEPTH: 608 603 Gear cond.: 0
BDEPTH: 608 603 Validity : 0
Towing dir: 0° Wire out : 1400 m Speed : 3.7 kn
Sorted : 18 Total catch: 43.80 Catch/hour: 86.73

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Caelorinchus trunovi	27.64	430	31.87	
Haliporoides triarthrus	18.85	782	21.74	96
MYCTOPHIDAE	6.32	1057	7.28	
Lithodidae	6.26	299	7.21	
Plesionika martia	6.12	2111	7.05	
Neoscombrops cynodon	3.23	22	3.72	
Neobythites analis	2.61	38	3.01	
Aristaeomorpha foliacea	2.57	111	2.97	94
Diaphus sp.	2.14	87	2.47	
Chlorophthalmus agassizi	1.50	20	1.74	
Symphurus ocellatus	1.37	131	1.58	
Malacocephalus laevis	1.31	14	1.51	
Chascanopsetta lugubris	0.89	6	1.03	
Synagrops japonicus	0.85	20	0.98	
Benthodesmus elongatus	0.81	14	0.94	
Champsodon capensis	0.77	59	0.89	
Neoepinnula orientalis	0.69	6	0.80	
Etmopterus pusillus**	0.46	8	0.53	
Aristeus antennatus	0.46	32	0.53	95
NEPHROPIDAE	0.30	8	0.34	
ISOPODS	0.28	22	0.32	
Polyipnus indicus	0.26	53	0.30	
Lestrolepis intermedia	0.24	16	0.27	
Nettastoma parviceps	0.22	8	0.25	
Chaunax pictus	0.20	2	0.23	
Uroconger lepturus	0.08	4	0.09	
Laemonema globiceps	0.06	2	0.07	
Laemonema sp.	0.06	2	0.07	
Sicyonia sp.	0.06	18	0.07	
Polymetme corythaeola	0.04	2	0.05	
Argyropelecus aculeatus	0.04	2	0.05	
Argyropelecus gigas	0.02	2	0.02	
Macrorhamphosus scolopax ***	0.02	2	0.02	
Xenolepidichthys dagleishi	0.02	2	0.02	
Total	86.73		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 40
DATE :19/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 24°42.04
start stop duration Lon E 35°26.08
TIME :06:15:51 06:45:50 30.0 (min) Purpose : 3
LOG : 2765.68 2767.13 1.4 Region : 7432
FDEPTH: 235 235 Gear cond.: 0
BDEPTH: 235 235 Validity : 0
Towing dir: 0° Wire out : 0 m Speed : 2.9 kn
Sorted : 0 Total catch: 38.34 Catch/hour: 76.73

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Dussumieria acuta	18.59	412	24.23	105
Parazen pacificus	13.35	795	17.40	
Ibacus novemdentatus	10.49	124	13.67	
Saurida undosquamis	6.84	56	8.92	104
Satyrichthys adeni	4.84	12	6.31	
Ommastrephes bartrami	3.16	38	4.12	103
Sepia hieronis	3.12	50	4.07	
Peristedion cf weberi	2.64	150	3.44	
Scyllarides elisabethae	2.28	6	2.97	
Pliotrema warreni	1.32	2	1.72	
Rexea prometheoides	1.16	16	1.51	
Sphyraena jello	1.00	8	1.30	102
Citharoides macrolepis	0.96	10	1.25	
Lagocephalus guntheri	0.92	18	1.20	
Squalus megalops	0.80	2	1.04	
Tylerius spinosissimus	0.80	16	1.04	
PORTUNIDAE	0.64	2	0.83	
ECHINOMETRIDAE	0.62	38	0.81	
Champsodon capensis	0.52	84	0.68	
Loligo forbesi	0.48	10	0.63	
Lophiodes sp.	0.42	2	0.55	
Uranoscopus archionema	0.32	6	0.42	
Ariomma indicum	0.28	4	0.37	
Sepia prashadi	0.24	2	0.31	
Halieutaea sp. A	0.22	2	0.29	
Cynoglossus capensis	0.18	6	0.23	
Pagellus natalenses	0.16	2	0.21	0
Lithodidae	0.16	2	0.21	
Chlorophthamus sp. juv	0.12	16	0.16	0
Holohalaelurus grennian	0.08	2	0.10	
Chlorophthamus sp. juv	0.00	0	0.00	
Total	76.73		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 41
DATE :19/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 24°41.68
start stop duration Lon E 35°21.44
TIME :08:01:33 08:31:35 30.0 (min) Purpose : 3
LOG : 2774.96 2776.41 1.4 Region : 7431
FDEPTH: 128 130 Gear cond.: 0
BDEPTH: 128 130 Validity : 0
Towing dir: 0° Wire out : 320 m Speed : 2.9 kn
Sorted : 427 Total catch: 427.24 Catch/hour: 853.34

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
PORIFERA (Sponges)	719.04	0	84.26	
**	58.16	0	6.82	
Polysteganus coeruleopunctatus	47.14	200	5.52	107
Squatina africana	8.15	2	0.95	
Cheimerius nufar	6.61	12	0.77	106
Scyllarides elisabethae	2.92	6	0.34	
Octopus cyaneus	2.06	4	0.24	
Lophiodes sp.	1.50	2	0.18	
Monocentris japonica	1.30	12	0.15	
Sepia prashadi	1.20	14	0.14	
Pagellus natalenses	0.98	12	0.11	
Loligo forbesi	0.90	10	0.11	
Epinephelus poecilonotus	0.72	2	0.08	
Priacanthus hamrur	0.72	4	0.08	
Gymnothorax sp.**	0.68	2	0.08	
Ocosia cf zaspilota	0.58	4	0.07	
Sepia hieronis	0.24	2	0.03	
LABRIDAE	0.18	2	0.02	
Tylerius spinosissimus	0.12	2	0.01	
Epinephelus radiatus	0.10	2	0.01	
Uroconger lepturus	0.06	2	0.01	
Total	853.34		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 42
DATE :19/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 24°38.04
start stop duration Lon E 35°17.17
TIME :09:46:30 10:16:38 30.1 (min) Purpose : 3
LOG : 2784.49 2785.97 1.5 Region : 7431
FDEPTH: 77 77 Gear cond.: 0
BDEPTH: 77 77 Validity : 0
Towing dir: 0° Wire out : 210 m Speed : 2.9 kn
Sorted : 55 Total catch: 183.22 Catch/hour: 364.86

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Upeneus taeniopterus	93.20	1800	25.54	113
Pagellus natalenses	73.91	1237	20.26	112
Decapterus russelli	40.71	558	11.16	110
Sphyraena forsteri	32.75	311	8.98	
Ariomma indicum	30.42	325	8.34	
Carangoides malabaricus	24.40	161	6.69	111
Selar crumenophthalmus	18.25	117	5.00	109
Priacanthus hamrur	12.23	46	3.35	
Saurida undosquamis	10.94	187	3.00	108
Torpedo cf. panthera	3.62	6	0.99	
Cheimerius nufar	2.52	6	0.69	
Epinephelus areolatus	2.49	4	0.68	
Scorpaena scrofa	2.46	6	0.67	
Sphyraena putnamie	2.23	2	0.61	
Torpedo sinuspersici	2.14	6	0.59	
Panulirus ornatus	2.13	2	0.58	
Lophius indicator	1.55	6	0.43	
Nemipterus sp.	1.36	6	0.37	
Pomadasys stridens	1.10	14	0.30	
Scomber japonicus	0.84	6	0.23	
Solea sp.	0.65	155	0.18	
Lepidotrigla alcocki	0.65	26	0.18	
Sardinops sp.	0.58	6	0.16	
SEA URCHINS	0.52	6	0.14	
Bothus swio	0.52	26	0.14	
Epinephelus albomarginatus	0.52	2	0.14	
Ibacus novemdentatus	0.45	20	0.12	
Champsodon capensis	0.45	123	0.12	
Lagocephalus guntheri	0.26	6	0.07	
Minous coccineus	0.26	6	0.07	
Trichiurus lepturus	0.24	2	0.07	
Cociella crocodila	0.19	6	0.05	
Saurida gracilis	0.13	6	0.04	
C R A B S	0.13	6	0.04	
Uranoscopus archionema	0.06	6	0.02	
Total	364.86		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 43
DATE :19/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 24°35.16
start stop duration Lon E 35°11.89
TIME :11:34:03 11:57:44 23.7 (min) Purpose : 3
LOG : 2795.00 2796.43 1.4 Region : 7431
FDEPTH: 37 39 Gear cond.: 0
BDEPTH: 37 39 Validity : 0
Towing dir: 0° Wire out : 120 m Speed : 3.6 kn
Sorted : 109 Total catch: 108.86 Catch/hour: 275.83

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Aetomylaeus sp.	164.70	3	59.71	
Scomberomorus commerson	35.17	13	12.75	118
Rachycentron canadum	17.23	5	6.25	119
Carangoides malabaricus	14.14	106	5.13	116
Pagellus natalenses	12.34	193	4.47	115
Sphyraena putnamie	10.19	3	3.69	
J E L L Y F I S H	6.61	3	2.40	
Loligo forbesi	3.37	56	1.22	
Alepes djedaba	2.89	25	1.05	
Upeneus taeniopterus	2.20	66	0.80	114
Decapterus russelli	1.93	25	0.70	117
Lophiodes insidiator	1.42	3	0.51	
Sphyraena forsteri	0.89	3	0.32	
Saurida undosquamis	0.81	10	0.29	
Selar crumenophthalmus	0.41	3	0.15	
Seriolina nigrofasciata	0.38	3	0.14	
ECHENEIDIDAE	0.30	3	0.11	
Engraulis cf capensis	0.30	8	0.11	
Secutor insidiator	0.28	8	0.10	
Lagocephalus guntheri	0.18	3	0.06	
Thamnaconus fajardoi	0.10	3	0.04	
Serranus novemcinctus	0.00	0	0.00	
Total	275.83		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 44
DATE :19/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 24°45.40
start stop duration Lon E 34°54.54
TIME :14:18:36 14:49:13 30.6 (min) Purpose : 3
LOG : 2818.81 2820.52 1.7 Region : 7431
FDEPTH: 32 30 Gear cond.: 0
BDEPTH: 32 30 Validity : 0
Towing dir: 0° Wire out : 130 m Speed : 3.4 kn
Sorted : 0 Total catch: 27.57 Catch/hour: 54.05

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Carangoides malabaricus	27.87	159	51.57	122
J E L L Y F I S H	11.02	10	20.38	
Atule mate	3.98	43	7.36	124
Scomberomorus commerson	3.04	4	5.62	123
Loligo forbesi	1.55	82	2.86	
Saurida undosquamis	1.37	29	2.54	
Secutor insidiator	1.10	35	2.03	
B I V A L V E S	1.08	0	1.99	
Sphyraena putnamie	0.88	4	1.63	
Alepes djedaba	0.84	6	1.56	
Rastrelliger kanagurta	0.27	2	0.51	
Lagocephalus guntheri	0.25	2	0.47	
Portunus sanguinolento	0.25	2	0.47	
C R A B S	0.20	4	0.36	
Sepia sp	0.12	2	0.22	
Aesopia cornuta	0.10	2	0.18	
Sardinops sp.	0.04	2	0.07	
Apistus carinatus	0.02	2	0.04	
Starfish	0.02	2	0.04	
Equulites elongatus	0.02	4	0.04	
Thryssa setirostris	0.02	2	0.04	
Cubiceps sp.	0.01	2	0.02	
Total	54.05		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 45
DATE :19/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 24°49.45
start stop duration Lon E 35°0.86
TIME :16:09:28 16:31:01 21.6 (min) Purpose : 3
LOG : 2830.29 2831.51 1.2 Region : 7431
FDEPTH: 57 54 Gear cond.: 0
BDEPTH: 57 54 Validity : 0
Towing dir: 0° Wire out : 150 m Speed : 3.4 kn
Sorted : 0 Total catch: 591.76 Catch/hour: 1647.59

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Dasyatis thetidis	389.79	3	23.66	
Sphyraena barracuda	318.24	3745	19.32	125
Upeneus sulphureus	316.57	9965	19.21	126
Decapterus russelli	280.65	4569	17.03	128
Selar crumenophthalmus	211.32	1971	12.83	127
Pagellus natalenses	22.55	292	1.37	
Penaeus semisulcatus	19.21	334	1.17	
Ariomma indicum	12.11	84	0.74	
Carangoides malabaricus	11.69	167	0.71	
Carcharhinus sealei	10.52	3	0.64	
Rastrelliger kanagurta	9.19	84	0.56	
Pomatomus saltatrix	8.35	42	0.51	
Gazza minuta	8.35	125	0.51	
Engyprosopon grandisquama	6.68	752	0.41	
Panulirus ornatus	6.07	3	0.37	
Plotosus lineatus	3.34	84	0.20	
Pomadasys olivaceus	2.51	42	0.15	
Polynemus sextarius**	2.09	42	0.13	
Loligo forbesi	2.09	42	0.13	
Penaeus japonicus	1.67	42	0.10	
Apistus carinatus	1.25	209	0.08	
Thryssa vitrirostris	1.25	42	0.08	
Cynoglossus capensis	0.84	84	0.05	
Bothus swio	0.84	42	0.05	
Fistularia petimba	0.42	42	0.03	
Total	1647.59		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 46
DATE :20/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 24°29.76
start stop duration Lon E 35°36.67
TIME :02:40:21 03:13:07 32.8 (min) Purpose : 3
LOG : 2902.07 2903.54 1.5 Region : 7432
FDEPTH: 576 571 Gear cond.: 0
BDEPTH: 576 571 Validity : 0
Towing dir: 0° Wire out : 1400 m Speed : 2.7 kn
Sorted : 33 Total catch: 138.31 Catch/hour: 253.15

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
MYCTOPHIDAE	144.27	24049	56.99	
Squalus mitsukurii	29.29	37	11.57	
Haliporoides triarthrus	25.50	1032	10.07	129
Plesionika martia	13.90	3351	5.49	
Torpedo nobiliana	9.63	2	3.80	
Ommastrephes bartrami	5.13	7	2.02	
Neoepinnula orientalis	4.91	38	1.94	
Caelorinchus braueri	3.52	38	1.39	
Chlorophthalmus agassizi	3.08	51	1.21	
LITHODIDAE	2.69	205	1.06	
Polyipnus indicus	2.24	416	0.89	
Neoscombrops cynodon	2.05	13	0.81	
Lestrolepis intermedia	1.54	77	0.61	
Synagrops japonicus	1.35	38	0.53	
Uroconger lepturus	0.64	6	0.25	
Polymetme corythaeola	0.64	26	0.25	
Etmopterus sp.**	0.62	5	0.25	
Aristaeomorpha foliacea	0.59	38	0.23	130
Xenolepidichthys dagleishi	0.42	13	0.17	
Neobythites cf somaliaensis	0.26	6	0.10	
Lophiodes mutilus	0.21	6	0.08	0
Cynoglossus capensis	0.19	13	0.08	
Physiculus natalensis	0.19	6	0.08	
ISOPODS	0.13	6	0.05	
Chascanopsetta lugubris	0.13	6	0.05	
Malacocephalus laevis	0.06	6	0.03	
Total	253.15		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 47
DATE :20/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 24°29.37
start stop duration Lon E 35°30.53
TIME :06:06:52 06:37:20 30.5 (min) Purpose : 3
LOG : 2920.11 2921.51 1.4 Region : 7432
FDEPTH: 222 217 Gear cond.: 0
BDEPTH: 222 217 Validity : 0
Towing dir: 0° Wire out : 550 m Speed : 2.8 kn
Sorted : 56 Total catch: 55.78 Catch/hour: 109.84

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Saurida undosquamis	18.29	201	16.65	132
Satyrichthys adeni	14.77	26	13.45	
Ibacus novemdentatus	14.10	169	12.84	
Sphyraena barracuda	12.84	104	11.69	131
Selar crumenophthalmus	10.32	81	9.39	134
Squalus megalops	6.06	2	5.52	
Peristedion cf weberi	5.20	504	4.73	
Sepia hieronis	4.77	55	4.34	
Sepia prashadi	3.31	43	3.01	
Lagocephalus guntheri	2.84	49	2.58	
Rexea prometheoides	2.23	33	2.03	
Decapterus kurroides	2.21	16	2.01	
Squalus megalops	2.17	14	1.97	0
Tylerius spinosissimus	1.69	33	1.54	
Champsodon capensis	1.52	274	1.38	
Scyllarides elisabethae	1.18	4	1.08	
Cynoglossus cf lida	0.79	28	0.72	
Uranoscopus archionema	0.77	2	0.70	
E C H I N O D E R M A T A	0.63	69	0.57	
Citharoides macrolepis	0.59	8	0.54	
Loligo forbesi	0.43	8	0.39	
Ommastrephes bartrami	0.43	6	0.39	
Branchiostegus doliatus	0.37	2	0.34	
Halieutaea sp. A	0.35	4	0.32	
Upeneus sulphureus	0.32	10	0.29	133
Polysteganus coeruleopunctatus	0.30	2	0.27	
Calappidae indetCV4	0.24	2	0.22	
Pagellus natalenses	0.24	2	0.22	
Chelidonichthys kumu	0.22	4	0.20	
Kentrocapros rosapinto**	0.18	4	0.16	
Zeus sp.	0.12	10	0.11	
Scyllarus batei	0.10	2	0.09	
Decapterus russelli	0.08	2	0.07	
Zeus faber	0.06	4	0.05	
Calappidae sp.	0.06	2	0.05	
Macrorhamphosus scolopax ***	0.06	4	0.05	
Antigonia cf rubescens	0.02	2	0.02	
Engyprosopon grandisquama	0.02	2	0.02	
Total	109.84		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 48
DATE :20/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 24°27.42
start stop duration Lon E 35°26.06
TIME :08:45:32 09:15:47 30.2 (min) Purpose : 3
LOG : 2933.86 2935.20 1.3 Region : 7431
FDEPTH: 106 106 Gear cond.: 0
BDEPTH: 106 106 Validity : 0
Towing dir: 0° Wire out : 260 m Speed : 2.7 kn
Sorted : 449 Total catch: 448.68 Catch/hour: 890.24

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
PORIFERA (Sponges)	674.60	0	75.78	
CORAL	79.37	0	8.92	
Starfish	59.52	0	6.69	
Polysteganus coeruleopunctatus	24.56	167	2.76	135
Epinephelus albomarginatus	13.25	2	1.49	
Sepia sp	5.28	73	0.59	
Scorpaena scrofa	4.42	8	0.50	
Sphyraena forsteri	4.03	28	0.45	136
Parupeneus cf. cinnabaricus	3.85	34	0.43	137
Tetrosomus concatenatus	3.51	12	0.39	
Monocentris japonica	2.32	22	0.26	
Histiopterus typus	2.14	6	0.24	
Scyllarides delfosi	1.83	2	0.21	
Squalus megalops	1.33	4	0.15	
Octopus sp.	1.29	4	0.14	
Saurida undosquamis	1.25	6	0.14	138
G A S T R O P O D S	1.19	2	0.13	
Fistularia petimba	0.79	8	0.09	
Pagellus natalenses	0.71	8	0.08	139
C E P H A L O P O D A	0.69	105	0.08	
Thamnaconus modestoides	0.67	4	0.08	
Peristedion weberi	0.65	42	0.07	
Argyrops filamentosus	0.44	2	0.05	
Dactyloptena orientalis	0.40	2	0.04	
Cephalopholis cyanostigma	0.28	14	0.03	
Halieutaea sp.	0.26	2	0.03	
Anthias cooperi**	0.24	12	0.03	
Lactoria diaphana	0.22	4	0.02	
Parupeneus indicus	0.20	2	0.02	
Pristigenys niphonia	0.20	2	0.02	
Tylerius spinosissimus	0.18	2	0.02	
Thamnaconus fajardoi	0.16	2	0.02	
Pterois russelii	0.14	4	0.02	
Paramonacanthus pusillus	0.08	2	0.01	
Ibacus novemdentatus	0.08	2	0.01	
Lagocephalus sp.	0.08	2	0.01	
Pseudanthias sp.	0.02	2	0.00	
Total	890.24		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 49
DATE :20/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 24°25.89
start stop duration Lon E 35°23.30
TIME :10:19:41 10:48:52 29.2 (min) Purpose : 3
LOG : 2942.03 2943.41 1.4 Region : 7431
FDEPTH: 74 72 Gear cond.: 0
BDEPTH: 74 72 Validity : 0
Towing dir: 0° Wire out : 180 m Speed : 2.8 kn
Sorted : 169 Total catch: 168.83 Catch/hour: 347.15

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Dead coral & starfish	113.09	0	32.58	0
Lepidochelys olivacea	102.81	2	29.62	
Selar crumenophthalmus	89.28	485	25.72	140
Dead coral & starfish	11.43	0	3.29	
Carangoides malabaricus	11.39	51	3.28	143
Decapterus russelli	4.91	82	1.42	141
Torquigener hypselogenion	4.63	1028	1.33	
Saurida undosquamis	3.58	62	1.03	144
Champsodon capensis	1.89	644	0.54	
Pagellus natalenses	0.99	23	0.28	142
Sarda orientalis	0.90	2	0.26	
Trachinocephalus myops	0.76	31	0.22	
Loligo forbesi	0.70	4	0.20	146
Nemipterus bipunctatus	0.39	10	0.11	145
Priacanthus hamrur	0.12	6	0.04	
Pseudorhombus elevatus	0.12	16	0.04	
Lethrinus rubrioperculatus	0.06	2	0.02	
Peristedion weberi	0.04	6	0.01	
Saurida tumbil	0.02	14	0.01	
Lepidotrigla alcocki	0.02	8	0.01	
Total	347.15		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 50
DATE :20/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 24°13.94
start stop duration Lon E 35°31.61
TIME :15:02:20 15:32:42 30.4 (min) Purpose : 3
LOG : 2970.94 2972.32 1.4 Region : 7431
FDEPTH: 127 124 Gear cond.: 0
BDEPTH: 127 124 Validity : 0
Towing dir: 0° Wire out : 350 m Speed : 2.7 kn
Sorted : 100 Total catch: 99.99 Catch/hour: 197.54

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Sponges - yellow	90.29	0	45.70	
Polysteganus coeruleopunctatus	34.93	271	17.68	147
Pagellus natalenses	21.10	373	10.68	
Saurida undosquamis	9.05	63	4.58	
Monocentris japonica	7.63	65	3.86	
CORAL	4.66	0	2.36	
Loligo forbesi	3.34	298	1.69	
Epinephelus poecilonotus	3.16	2	1.60	
Parupeneus cf. cinnabaricus	2.96	32	1.50	
Scyllarides elisabethae	2.81	4	1.42	
Octopus sp.	2.69	4	1.36	
Gymnothorax sp.	2.31	6	1.17	
Selar crumenophthalmus	2.21	12	1.12	148
Lophiodes mutilus	1.84	4	0.93	
SCORPAENIDAE	1.70	2	0.86	
Thamnaconus fajardoi	1.46	6	0.74	
Priacanthus hamrur	1.34	8	0.68	
Sepia sp	1.24	16	0.63	
Tylerius spinosissimus	1.13	14	0.57	
Zeus faber	0.41	4	0.21	
Thamnaconus modestoides	0.28	2	0.14	
Tetrosomus concatenatus	0.20	2	0.10	
Serranus sp. Heemstra	0.20	4	0.10	
Fistularia commersonii	0.20	2	0.10	
Choridactylus natalensis	0.20	2	0.10	
Kentrocapros rosapinto	0.14	2	0.07	
Pseudorhombus elevatus	0.08	4	0.04	
Total	197.54		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 51
DATE :20/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 24°15.01
start stop duration Lon E 35°37.43
TIME :17:16:40 17:47:27 30.8 (min) Purpose : 3
LOG : 2982.53 2984.11 1.6 Region : 7432
FDEPTH: 286 280 Gear cond.: 0
BDEPTH: 286 280 Validity : 0
Towing dir: 0° Wire out : 800 m Speed : 3.1 kn
Sorted : 33 Total catch: 117.81 Catch/hour: 229.57

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Saurida undosquamis	90.26	1076	39.32	
Diaphus effulgens	33.13	1582	14.43	
Neoscombrops cynodon	20.89	475	9.10	
Sepia hieronis	18.55	234	8.08	
MYCTOPHIDAE	11.61	2736	5.06	
Peristedion weberi	8.18	390	3.57	
Ommastrephes bartrami	6.55	47	2.85	
Palinurus delagoae	6.24	23	2.72	
Halieutaea sp. A	4.44	62	1.94	
CHLOROPHTHALMIDAE	4.29	3	1.87	
Pliotrema warreni	3.78	6	1.65	
Cynoglossus capensis	3.43	94	1.49	
Ibacus novemdentatus	3.35	23	1.46	
Uranoscopus archionema	2.65	23	1.15	
PORTUNIDAE	2.49	8	1.09	
Citharoides macrolepis	2.18	23	0.95	
Sepia prashadi	1.56	23	0.68	
Lepidotrigla multispinosa	1.09	62	0.48	
Chelidonichthys kumu	1.01	8	0.44	
Macrorhamphosus scolopax ***	1.01	86	0.44	
Chaunax sp.	0.78	8	0.34	
Thamnaconus fajardoi	0.62	8	0.27	
Champsodon capensis	0.62	55	0.27	
Rexea prometheoides	0.39	8	0.17	
Uroconger lepturus	0.23	8	0.10	
Hoplichthys acanthopleurus	0.16	8	0.07	
Synagrops japonicus	0.06	8	0.03	
Total	229.57		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 52
DATE :20/11/14 GEAR TYPE: BT NO: 27 POSITION:Lat S 24°14.43
start stop duration Lon E 35°45.18
TIME :19:56:25 20:26:34 30.1 (min) Purpose : 3
LOG : 2995.89 2997.32 1.4 Region : 7432
FDEPTH: 744 742 Gear cond.: 0
BDEPTH: 744 742 Validity : 0
Towing dir: 0° Wire out : 1550 m Speed : 2.8 kn
Sorted : 66 Total catch: 65.97 Catch/hour: 131.27

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Caelorinchus trunovi	68.40	5224	52.10	
Symplectoteuthys oualaniensis	17.41	21	13.26	
Malacocephalus laevis	11.07	28	8.44	
Squalus megalops	7.16	6	5.46	
Coloconger scholesi	6.34	28	4.83	
Neobythites analis	3.28	60	2.50	
Plesiopenaeus edwardsianus	2.79	60	2.12	
Plesionika martia	2.16	265	1.64	
Chaeceon macphersoni	1.79	2	1.36	
Nephropsis stewarti	1.53	28	1.17	
Chauliodus sloani	1.53	306	1.17	
Haliporoides triarthrus	1.53	98	1.17	
Lithodidae	1.11	56	0.85	
Aristaeomorpha foliacea	0.98	56	0.74	
Aristeus antennatus	0.84	28	0.64	
Heterocarpus laevigatus	0.70	63	0.53	
Shrimps unidentified	0.63	139	0.48	
Nansenia macrolepis**	0.56	12	0.42	
Diaphus effulgens	0.42	98	0.32	
Sicyonia sp.	0.28	28	0.21	
Neoscopelus macrolepidotus	0.28	70	0.21	
Xenolepidichthys dagleishi	0.21	7	0.16	
Lestrolepis intermedia	0.14	7	0.11	
Peristedion weberi	0.07	7	0.05	
Polyipnus indicus	0.07	14	0.05	
Total	131.27		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 53
DATE :21/11/14 GEAR TYPE: BT NO: 27 POSITION:Lat S 23°58.35
start stop duration Lon E 35°45.51
TIME :00:20:14 00:50:08 29.9 (min) Purpose : 3
LOG : 3027.49 3029.06 1.6 Region : 7432
FDEPTH: 475 471 Gear cond.: 0
BDEPTH: 475 471 Validity : 0
Towing dir: 0° Wire out : 1150 m Speed : 3.2 kn
Sorted : 35 Total catch: 139.04 Catch/hour: 279.01

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
MYCTOPHIDAE	222.34	46314	79.69	
Chlorophthalmus agassizi	20.79	698	7.45	
Haliporoides triarthrus	11.00	562	3.94	149
Caelorinchus trunovi	4.33	104	1.55	
Neoscombrops cynodon	4.33	40	1.55	
Neoepinnula orientalis	2.89	24	1.04	
Polyipnus indicus	2.09	377	0.75	
Champsodon capensis	1.85	136	0.66	
Chascanopsetta lugubris	1.77	8	0.63	
Saurida undosquamis	1.44	8	0.52	
C R A B S	1.20	8	0.43	
Sepia sp	1.04	16	0.37	
Synagrops japonicus	0.80	32	0.29	
Plesionika martia	0.80	257	0.29	
Xenolepidichthys dagleishi	0.48	24	0.17	
Etmopterus sentosus**	0.48	8	0.17	
Peristedion cf weberi	0.24	8	0.09	
Cynoglossus monodi	0.24	8	0.09	
Benthodesmus elongatus	0.16	8	0.06	
Diplophos taenia	0.16	8	0.06	
Neobythites analis	0.16	8	0.06	
Aristaeomorpha foliacea	0.16	48	0.06	
Chauliodus sloani	0.16	8	0.06	
Hoplostethus mediterraneus	0.08	8	0.03	
Total	279.01		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 54
DATE :21/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 23°57.53
start stop duration Lon E 35°38.90
TIME :02:54:17 03:25:34 31.3 (min) Purpose : 3
LOG : 3041.42 3043.05 1.6 Region : 7431
FDEPTH: 193 198 Gear cond.: 0
BDEPTH: 193 198 Validity : 0
Towing dir: 0° Wire out : 500 m Speed : 3.1 kn
Sorted : 0 Total catch: 42.09 Catch/hour: 80.71

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Encrasicholina punctifer	24.20	1210	29.98	
Ibacus novemdentatus	23.97	270	29.70	
Peristedion cf weberi	6.67	378	8.27	
Sepia hieronis	4.30	48	5.32	
Pagellus natalenses	3.70	48	4.59	
Ommastrephes bartrami	2.17	15	2.68	
Tylerius spinosissimus	2.15	58	2.66	
Triglidae 'PectSemicircBlue'	1.42	25	1.76	
Saurida undosquamis	1.32	23	1.64	
Zeus faber	1.30	2	1.62	
Cynoglossus cf lida	1.13	35	1.40	
Sphyraena barracuda	0.88	10	1.09	150
Lagocephalus guntheri	0.86	19	1.07	
Scyllarus batei	0.86	33	1.07	
Scyllarides elisabethae	0.82	2	1.02	
Halieutaea sp. A	0.82	6	1.02	
Sepia prashadi	0.71	8	0.88	
Macrorhamphosus scolopax ***	0.61	56	0.76	
Pliotrema warreni	0.58	2	0.71	
Stichopus sp.	0.58	4	0.71	
Chelidonichthys kumu	0.42	6	0.52	
Penaeus latisulcatus	0.38	8	0.48	151
Loligo forbesi	0.29	21	0.36	
Uranoscopus archionema	0.23	2	0.29	
Ariomma melanum	0.21	4	0.26	
Chascanopsetta lugubris	0.08	2	0.10	
Taeniopsetta ocellata	0.04	2	0.05	
Total	80.71		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 55
DATE :21/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 23°57.80
start stop duration Lon E 35°32.79
TIME :05:59:30 06:30:28 31.0 (min) Purpose : 3
LOG : 3057.95 3059.49 1.5 Region : 7431
FDEPTH: 74 73 Gear cond.: 0
BDEPTH: 74 73 Validity : 0
Towing dir: 0° Wire out : 210 m Speed : 3.0 kn
Sorted : 0 Total catch: 388.65 Catch/hour: 753.20

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Dasyatis thetidis	697.67	6	92.63	
Tetrosomus concatenatus	16.20	54	2.15	
Rhinobatos annulatus	8.95	2	1.19	
Saurida undosquamis	7.58	132	1.01	152
Upeneus bensasi	4.59	196	0.61	153
J E L L Y F I S H	4.09	14	0.54	
Trachinocephalus myops	3.26	87	0.43	
Satyrichthys adeni	2.44	2	0.32	
Lactoria cornuta	2.33	8	0.31	
ECHINOMETRIDAE	1.32	17	0.17	
Synodus 'yellowpectoral'	1.24	25	0.16	
Peristedion weberi	1.01	56	0.13	
Loligo forbesi	0.74	12	0.10	
Starfish	0.64	8	0.08	
Sepia hieronis	0.35	4	0.05	
Bothus sp.**	0.21	12	0.03	
Nemipterus bipunctatus	0.21	8	0.03	
Halieutaea sp. A	0.17	4	0.02	
Pagellus natalenses	0.10	2	0.01	
Torquigener hypselogenion	0.04	2	0.01	
Callionymus cf persicus	0.04	2	0.01	
Bothus myriaster	0.02	2	0.00	
Total	753.20		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 56
DATE :21/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 23°43.39
start stop duration Lon E 35°32.22
TIME :08:45:44 09:15:45 30.0 (min) Purpose : 3
LOG : 3077.24 3079.02 1.8 Region : 7431
FDEPTH: 47 42 Gear cond.: 0
BDEPTH: 47 42 Validity : 0
Towing dir: 0° Wire out : 160 m Speed : 3.6 kn
Sorted : 88 Total catch: 177.68 Catch/hour: 355.12

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Pagellus natalenses	164.17	4477	46.23	156
Decapterus russelli	76.91	2223	21.66	157
URCHINS	32.22	1491	9.07	
Saurida undosquamis	25.02	480	7.05	158
Upeneus sp.	14.67	252	4.13	160
Nemipterus bipunctatus	9.11	84	2.57	155
Upeneus bensasi	6.68	356	1.88	159
Scomber japonicus	6.44	88	1.81	161
J E L L Y F I S H	5.16	48	1.45	
Starfish	4.76	2	1.34	
Decapterus macrosoma	2.92	76	0.82	154
Tetrosomus concatenatus	1.96	4	0.55	
Sepia pharaonis	1.32	4	0.37	
Parupeneus nansen	1.20	8	0.34	
Sardinella albella	1.08	24	0.30	
Bothus sp.	0.48	24	0.14	
Sardinops sp.	0.48	8	0.14	
Trachinocephalus myops	0.28	12	0.08	
Sphyraena forsteri	0.16	4	0.05	
Sillago sihama	0.12	4	0.03	
Total	355.12		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 57
DATE :21/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 23°36.46
start stop duration Lon E 35°29.54
TIME :11:32:17 11:52:13 19.9 (min) Purpose : 3
LOG : 3093.51 3094.59 1.1 Region : 7431
FDEPTH: 33 37 Gear cond.: 0
BDEPTH: 33 37 Validity : 0
Towing dir: 0° Wire out : 120 m Speed : 3.3 kn
Sorted : 35 Total catch: 56.81 Catch/hour: 171.04

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Decapterus macrosoma	53.29	2478	31.15	164
Upeneus bensasi	36.43	2165	21.30	167
Scomberomorus commerson	25.11	3	14.68	162
Abalistes stellatus	15.75	9	9.21	
J E L L Y F I S H	11.20	15	6.55	
URCHINS	8.50	325	4.97	
Starfish	4.58	3	2.68	
J E L L Y F I S H	3.76	38	2.20	0
Holothuria spp.	2.71	3	1.58	
Saurida undosquamis	2.11	53	1.23	166
Nemipterus bipunctatus	1.96	23	1.14	163
Sphyraena forsteri	1.28	38	0.75	168
Torquigener hypselogenion	0.90	90	0.53	
PORIFERA (Sponges)	0.90	3	0.53	
PORIFERA (Sponges)	0.60	8	0.35	0
Trachinocephalus myops	0.38	8	0.22	
Lactoria cornuta	0.38	8	0.22	
Plotosus lineatus	0.38	15	0.22	
Bothus sp.	0.30	23	0.18	
Ariomma indicum	0.15	8	0.09	
Priacanthus hamrur	0.15	8	0.09	
Equulites elongatus	0.15	15	0.09	
Pagellus natalenses	0.09	30	0.05	165
Total	171.04		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 58
DATE :21/11/14 GEAR TYPE: BT NO: 27 POSITION:Lat S 23°33.95
start stop duration Lon E 35°35.85
TIME :13:44:25 14:09:37 25.2 (min) Purpose : 3
LOG : 3109.03 3110.84 1.8 Region : 7431
FDEPTH: 62 63 Gear cond.: 0
BDEPTH: 62 63 Validity : 0
Towing dir: 0° Wire out : 190 m Speed : 4.3 kn
Sorted : 20 Total catch: 19.71 Catch/hour: 46.91

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Lagocephalus sceleratus	26.04	7	55.50	
Aprion virescens	14.28	2	30.44	
Tetrosomus concatenatus	5.05	10	10.76	
Sepia pharaonis	0.88	2	1.88	
Sepia sp	0.40	5	0.86	
Pristiophorus sp.	0.26	2	0.56	
Total	46.91		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 59
DATE :21/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 23°35.92
start stop duration Lon E 35°37.74
TIME :15:33:20 15:54:47 21.4 (min) Purpose : 3
LOG : 3115.05 3116.10 1.1 Region : 7431
FDEPTH: 102 106 Gear cond.: 0
BDEPTH: 102 106 Validity : 0
Towing dir: 0° Wire out : 270 m Speed : 2.9 kn
Sorted : 22 Total catch: 22.02 Catch/hour: 61.59

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Epinephelus albomarginatus	33.23	6	53.95	
Loligo forbesi	17.06	1650	27.70	
Abalistes stellatus	4.64	3	7.54	
Tetrosomus concatenatus	3.55	8	5.77	
Sepia hieronis	3.10	109	5.04	
Total	61.59		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 60
DATE :21/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 23°36.31
start stop duration Lon E 35°43.21
TIME :17:11:06 17:41:11 30.1 (min) Purpose : 3
LOG : 3123.85 3125.38 1.5 Region : 7432
FDEPTH: 217 216 Gear cond.: 0
BDEPTH: 217 216 Validity : 0
Towing dir: 0° Wire out : 550 m Speed : 3.1 kn
Sorted : 0 Total catch: 29.74 Catch/hour: 59.32

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Palinurus delagoae	6.58	8	11.10	
Tylerius spinosissimus	6.30	136	10.63	
Satyrichthys adeni	5.31	12	8.94	
Sepia hieronis	4.89	84	8.24	
Uranoscopus archionema	4.09	38	6.89	
Lagocephalus guntheri	2.69	48	4.54	
Lophiodes mutilus	2.59	6	4.37	
Halieutaea sp.	2.15	24	3.63	
Saurida undosquamis	1.95	40	3.30	170
Narcine rierai	1.88	8	3.16	
Sepia prashadi	1.70	18	2.86	
Encrasicholina punctifer	1.56	106	2.62	
Lepidotrigla alcocki	1.48	54	2.49	
Ommastrephes bartrami	1.36	8	2.29	
Scyllarus batei	1.32	2	2.22	
Cynoglossus cf marleyi	1.16	42	1.95	
Uroconger lepturus	1.08	20	1.82	
Citharoides macrolepis	1.06	22	1.78	
Chaunax sp.	1.04	2	1.75	
Neoscombrops cynodon	1.02	6	1.71	
Antigonia cf rubescens	0.86	42	1.45	
Macrorhamphosus scolopax ***	0.80	84	1.34	
Taeniopsetta ocellata	0.78	16	1.31	
Synodus sp.	0.78	14	1.31	
Ibacus novemdentatus	0.66	8	1.11	
Polysteganus coeruleopunctatus	0.64	4	1.08	169
SEA URCHINS	0.60	16	1.01	
Citharichthys sp.	0.54	14	0.91	
Spicara australis	0.54	4	0.91	
Zeus faber	0.52	2	0.87	
Solenocera sp.	0.44	34	0.74	
Chelidonichthys kumu	0.34	2	0.57	
Ocosia cf zaspilota	0.20	2	0.34	
Calappidae sp.	0.10	4	0.17	
Physiculus natalensis	0.08	2	0.13	
Peristedion weberi	0.06	6	0.10	
Ostracion cubicus	0.06	4	0.10	
Parapagurus cf pilosimanus	0.06	6	0.10	
Synagrops japonicus	0.06	4	0.10	
Scorpaena scrofa	0.04	2	0.07	
Total	59.32		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 61
DATE :21/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 23°35.19
start stop duration Lon E 35°49.64
TIME :20:43:57 21:14:46 30.8 (min) Purpose : 3
LOG : 3136.76 3138.28 1.5 Region : 7432
FDEPTH: 436 435 Gear cond.: 0
BDEPTH: 436 435 Validity : 0
Towing dir: 0° Wire out : 900 m Speed : 3.0 kn
Sorted : 33 Total catch: 166.62 Catch/hour: 324.37

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
MYCTOPHIDAE	122.65	25318	37.81	
Chlorophthalmus agassizi	111.94	1986	34.51	
Saurida undosquamis	37.38	253	11.52	171
Neoscombrops cynodon	9.34	117	2.88	
Maurolicus muelleri	8.76	6210	2.70	
PORTUNIDAE	5.84	58	1.80	
Polyipnus indicus	5.84	68	1.80	
Macrorhamphosus scolopax ***	5.84	49	1.80	
Halieutaea sp. A	2.24	29	0.69	
Caelorinchus trunovi	2.24	204	0.69	
Sepia hieronis	2.14	39	0.66	
Champsodon capensis	1.85	165	0.57	
Pliotrema warreni	1.60	2	0.49	
Haliporoides triarthrus	1.56	49	0.48	
Sepia pharaonis	1.36	39	0.42	
Laeops nigromaculatus	1.07	39	0.33	
Penaeopsis balssi	0.78	58	0.24	
Synagrops japonicus	0.58	29	0.18	
Xenolepidichthys dagleishi	0.39	19	0.12	
Zenion hololepis	0.19	58	0.06	
Tylerius spinosissimus	0.19	10	0.06	
Lepidotrigla sp. 'black/orange	0.19	10	0.06	
Neobythites analis	0.10	10	0.03	
Hoplichthys acanthopleurus	0.10	10	0.03	
Chaunax sp.	0.10	19	0.03	
Calappidae sp. 2	0.10	10	0.03	
Total	324.37		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 62
DATE :22/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 23°18.05
start stop duration Lon E 35°51.67
TIME :03:05:45 03:35:51 30.1 (min) Purpose : 3
LOG : 3186.98 3188.52 1.5 Region : 7432
FDEPTH: 442 450 Gear cond.: 0
BDEPTH: 442 450 Validity : 0
Towing dir: 0° Wire out : 1000 m Speed : 3.1 kn
Sorted : 31 Total catch: 164.92 Catch/hour: 328.74

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
MYCTOPHIDAE	210.70	27014	64.09	
Neoscombrops cynodon	57.81	5	17.58	
Ommastrephes bartrami	22.52	136	6.85	
Saurida undosquamis	13.08	80	3.98	172
Zeus faber	6.86	2	2.09	
Neoepinnula orientalis	4.47	54	1.36	
Cubiceps capensis	3.31	44	1.01	
Portunidae	1.85	14	0.56	
Squalus megalops	1.79	2	0.55	
Penaeopsis balssi	0.98	91	0.30	185
Xenolepidichthys dagleishi	0.98	34	0.30	
Heptranchias perlo	0.84	4	0.25	
Champsodon capensis	0.70	49	0.21	
Triacanthodes ethiops	0.63	28	0.19	
Peristedion weberi	0.49	21	0.15	
Halieutaea sp.	0.28	7	0.08	
Sepia hieronis	0.28	4	0.08	
Palinurus delagoae	0.24	2	0.07	
Citharichthys sp.	0.21	7	0.06	
Lestrolepis intermedia	0.14	7	0.04	
Cynoglossus capensis	0.14	7	0.04	
Synagrops japonicus	0.12	4	0.04	
Sepia prashadi	0.07	7	0.02	
Argyropelecus aculeatus	0.07	7	0.02	
Heterocarpus sp.	0.07	7	0.02	
Caelorinchus trunovi	0.07	7	0.02	
Zenion sp.	0.07	7	0.02	
Total	328.74		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 63
DATE :22/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 23°16.77
start stop duration Lon E 35°43.76
TIME :06:51:53 07:22:00 30.1 (min) Purpose : 3
LOG : 3210.07 3211.68 1.6 Region : 7432
FDEPTH: 209 208 Gear cond.: 0
BDEPTH: 209 208 Validity : 0
Towing dir: 0° Wire out : 500 m Speed : 3.2 kn
Sorted : 0 Total catch: 14.62 Catch/hour: 29.13

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Satyrichthys adeni	9.72	14	33.37	
Polysteganus coeruleopunctatus	6.37	2	21.88	173
Sepia hieronis	4.70	64	16.14	
Scyllarides elisabethae	4.00	8	13.75	
Narcine rierai	1.04	6	3.56	
Ibacus novemdentatus	0.88	10	3.01	
Ommastrephes bartrami	0.52	12	1.78	
Synodus sp.	0.50	14	1.71	
Sepia prashadi	0.32	4	1.09	
Paratriacanthodes retrospinis	0.24	4	0.82	
Kentrocapros rosapinto	0.16	2	0.55	
Lophiodes sp.	0.16	2	0.55	
Loligo forbesi	0.16	8	0.55	
Parapagurus cf pilosimanus	0.14	2	0.48	
Halieutaea sp.	0.08	2	0.27	
Grammatonotus sp. 'plaintail'	0.04	2	0.14	
Peristedion weberi	0.04	2	0.14	
Chascanopsetta lugubris	0.02	2	0.07	
Cynoglossus capensis	0.02	2	0.07	
Emmelichthys sp.	0.02	2	0.05	
CALLIONYMIDAE	0.01	2	0.03	
Total	29.13		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 64
DATE :22/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 23°17.42
start stop duration Lon E 35°38.72
TIME :08:39:45 09:07:15 27.5 (min) Purpose : 3
LOG : 3220.39 3221.85 1.4 Region : 7431
FDEPTH: 103 102 Gear cond.: 0
BDEPTH: 103 102 Validity : 0
Towing dir: 0° Wire out : 270 m Speed : 3.2 kn
Sorted : 0 Total catch: 53.10 Catch/hour: 115.85

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Chrysoblephus anglicus	39.40	9	34.01	
Epinephelus albomarginatus	29.59	4	25.54	
Starfish	26.40	0	22.79	
PORIFERA (Sponges)	5.13	0	4.43	
Tetrosomus concatenatus	5.08	20	4.39	
Cheimerius nufar	3.40	2	2.94	174
Sepia prashadi	1.96	79	1.69	
CORAL	1.46	0	1.26	
URCHINS	1.29	31	1.11	
Cirrhilabrus sp.	0.85	7	0.73	
Halieutaea sp.	0.41	2	0.36	
Chaetodon dolosus	0.33	7	0.28	
Lactoria fornasini	0.26	4	0.23	
Parupeneus cf. cinnabaricus	0.17	2	0.15	
Upeneus bensasi	0.04	2	0.04	
Thamnaconus fajardoi	0.02	2	0.02	
Emmelichthys sp.	0.02	2	0.02	
Symphysanodon typus	0.02	2	0.02	
Unidentified purple fish	0.01	2	0.01	
Total	115.85		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 65
DATE :22/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 23°14.42
start stop duration Lon E 35°32.66
TIME :11:27:37 11:54:31 26.9 (min) Purpose : 3
LOG : 3241.67 3243.19 1.5 Region : 7431
FDEPTH: 40 38 Gear cond.: 0
BDEPTH: 40 38 Validity : 0
Towing dir: 0° Wire out : 120 m Speed : 3.4 kn
Sorted : 11 Total catch: 11.06 Catch/hour: 24.68

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Scomberomorus commerson	18.91	2	76.64	179
Nemipterus bipunctatus	1.43	22	5.78	175
Saurida undosquamis	1.12	25	4.52	176
Coral	0.91	0	3.71	
Diodon holocanthus	0.89	2	3.62	
Lactoria cornuta	0.58	2	2.35	
Upeneus bensasi	0.27	13	1.08	177
Trachinocephalus myops	0.18	4	0.72	180
SEA URCHINS	0.13	4	0.54	
Gymnocranius griseus	0.11	2	0.45	181
P O L Y C H A E T A	0.09	0	0.36	
Pagellus natalenses	0.04	2	0.18	178
B I V A L V E S	0.01	9	0.05	
Total	24.68		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 66
DATE :22/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 22°57.96
start stop duration Lon E 35°40.22
TIME :14:53:56 15:23:52 29.9 (min) Purpose : 3
LOG : 3267.03 3268.57 1.5 Region : 7431
FDEPTH: 163 167 Gear cond.: 0
BDEPTH: 163 167 Validity : 0
Towing dir: 0° Wire out : 420 m Speed : 3.1 kn
Sorted : 0 Total catch: 18.00 Catch/hour: 36.07

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Satyrichthys adeni	10.18	16	28.22	
Rhinobatos formosensis	6.17	2	17.11	
Sponges - yellow	3.83	0	10.61	
URCHINS	2.69	96	7.44	
Loligo sp.	2.69	72	7.44	
Sepia sp	2.40	22	6.67	
Saurida undosquamis	2.40	26	6.67	182
Synodus CF dermatogenys	1.14	36	3.17	
Sea cucumber	1.02	4	2.83	
Lactoria cornuta	0.82	2	2.28	
Polysteganus coeruleopunctatus	0.62	2	1.72	183
Octopus sp.	0.54	2	1.50	
Ommastrephes bartrami	0.42	2	1.17	
Priacanthus hamrur	0.34	2	0.94	
Nemipterus bipunctatus	0.32	2	0.89	184
Tylerius spinosissimus	0.12	2	0.33	
Champsodon capensis	0.10	4	0.28	
Parapagurus cf pilosimanus	0.08	4	0.22	
Macrorhamphosus scolopax	0.08	8	0.22	
Halieutaea sp. A	0.06	2	0.17	
Bothus swio	0.04	2	0.11	
Total	36.07		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 67
DATE :22/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 22°57.37
start stop duration Lon E 35°44.69
TIME :16:39:04 17:09:12 30.1 (min) Purpose : 3
LOG : 3276.16 3277.58 1.4 Region : 7432
FDEPTH: 249 253 Gear cond.: 0
BDEPTH: 249 253 Validity : 0
Towing dir: 0° Wire out : 650 m Speed : 2.8 kn
Sorted : 19 Total catch: 60.90 Catch/hour: 121.27

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Palinurus delagoae	37.82	96	31.18	
Peristedion cf weberi	11.83	627	9.75	
Ommastrephes bartrami	10.28	66	8.47	
Chelidonichthys kumu	7.77	84	6.40	
Narcine rierai	7.47	48	6.16	
Mustelus manazo	5.97	2	4.93	
Citharoides macrolepis	5.62	72	4.63	
Lepidotrigla alcocki	5.14	191	4.24	
Satyrichthys adeni	4.90	18	4.04	
Uranoscopus archionema	4.90	42	4.04	
Cynoglossus lida	3.64	114	3.00	
Ibacus novemdentatus	3.29	48	2.71	
Halieutaea sp. A	2.33	48	1.92	
Macrorhamphosus scolopax	2.09	197	1.72	
Hoplichthys acanthopleurus	1.37	60	1.13	
Sepia hieronis	0.84	12	0.69	
Antigonia cf rubescens	0.78	30	0.64	
Tylerius spinosissimus	0.72	6	0.59	
Lagocephalus guntheri	0.72	12	0.59	
Kentrocapros rosapinto	0.60	6	0.49	
Lophiodes mutilus	0.60	6	0.49	
Chlorophthamus sp. juv	0.54	42	0.44	
PORTUNIDAE	0.48	6	0.39	
URCHINS	0.48	12	0.39	
Neoscombrops cynodon	0.42	6	0.34	
Uroconger lepturus	0.30	12	0.25	
Gonorhynchus gonorhynchus	0.30	6	0.25	
Brama orcini	0.07	2	0.06	
Total	121.23		99.96	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 68
DATE :22/11/14 GEAR TYPE: BT NO: 27 POSITION:Lat S 22°57.30
start stop duration Lon E 35°56.40
TIME :19:42:40 20:12:33 29.9 (min) Purpose : 3
LOG : 3294.24 3295.72 1.5 Region : 7432
FDEPTH: 651 648 Gear cond.: 0
BDEPTH: 651 648 Validity : 0
Towing dir: 0° Wire out : 1350 m Speed : 3.0 kn
Sorted : 12 Total catch: 24.94 Catch/hour: 50.06

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Lithodidae	11.16	546	22.29	
Malacocephalus laevis	9.51	24	19.01	
Ommastrephes bartrami	5.06	4	10.10	
Caelorinchus trunovi	4.14	48	8.26	
Hydrolagus sp.	3.17	8	6.34	
Haliporoides triarthrus	2.97	132	5.93	189
Polyipnus indicus	2.45	414	4.89	
Nephropsis stewarti	2.41	56	4.81	
Chaeceon macphersoni	2.37	4	4.73	
MYCTOPHIDAE	0.96	145	1.92	
Plesionika martia	0.80	233	1.60	
Etmopterus sentosus**	0.72	24	1.44	
Aristeus antennatus	0.72	16	1.44	186
Chlorophthalmus agassizi	0.68	8	1.36	
Neobythites analis	0.64	8	1.28	
Synaphobranchus affinis	0.64	8	1.28	
Plesiopenaeus edwardsianus	0.40	8	0.80	187
Heterocarpus tricarinatus	0.32	16	0.64	
Argyropelecus aculeatus	0.28	4	0.56	
Sepia hieronis	0.16	8	0.32	
Sicyonia sp.	0.16	44	0.32	
Polymetme corythaeola	0.12	4	0.24	
Aristaeomorpha foliacea	0.08	8	0.16	188
Polyipnus spinosus	0.04	4	0.08	
Symphurus ocellatus	0.04	4	0.08	
Hoplostethus melanopterus	0.04	4	0.08	
Total	50.06		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 69
DATE :23/11/14 GEAR TYPE: BT NO: 27 POSITION:Lat S 22°39.69
start stop duration Lon E 35°50.53
TIME :02:36:46 03:07:08 30.4 (min) Purpose : 3
LOG : 3345.89 3347.49 1.6 Region : 7432
FDEPTH: 484 492 Gear cond.: 0
BDEPTH: 484 492 Validity : 0
Towing dir: 0° Wire out : 1150 m Speed : 3.2 kn
Sorted : 29 Total catch: 145.71 Catch/hour: 287.87

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
MYCTOPHIDAE	176.42	1008	61.29	
Neoepinnula orientalis	25.98	257	9.02	
Haliporoides triarthrus	17.19	632	5.97	191
Diaphus sp.	10.57	346	3.67	
Squalus megalops	8.81	6	3.06	
Ommastrephes bartrami	8.06	2	2.80	0
Lestrolepis intermedia	6.62	3112	2.30	
Ommastrephes bartrami	5.14	30	1.78	
Polyipnus indicus	4.64	879	1.61	
Lithodidae	4.25	217	1.48	
Plesionika martia	4.05	1620	1.41	0
Champsodon capensis	2.96	30	1.03	
Cubiceps capensis	2.57	30	0.89	
Chlorophthalmus agassizi	2.57	30	0.89	
Saurida undosquamis	2.09	10	0.73	
Citharichthys sp.	1.78	30	0.62	
Neoscombrops cynodon	1.68	30	0.58	
Caelorinchus trunovi	0.59	10	0.21	
Aristeus virilis	0.49	59	0.17	192
Lophiodes sp.	0.47	2	0.16	
Sepia hieronis	0.43	4	0.15	
Synagrops japonicus	0.20	10	0.07	
Xenolepidichthys dagleishi	0.10	40	0.03	
Cynoglossus lida	0.10	10	0.03	
Benthodesmus elongatus	0.10	10	0.03	
Total	287.87		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 70
DATE :23/11/14 GEAR TYPE: BT NO: 27 POSITION:Lat S 22°38.29
start stop duration Lon E 35°39.65
TIME :06:55:51 07:26:00 30.1 (min) Purpose : 3
LOG : 3364.26 3365.82 1.6 Region : 7431
FDEPTH: 198 197 Gear cond.: 0
BDEPTH: 198 197 Validity : 0
Towing dir: 0° Wire out : 560 m Speed : 3.1 kn
Sorted : 0 Total catch: 20.14 Catch/hour: 40.08

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Chlorophthamus sp. juv	15.12	2750	37.73	
Peristedion cf weberi	6.05	316	15.09	
Satyrichthys adeni	4.62	12	11.52	
Ibacus novemdentatus	3.10	24	7.75	
Sepia hieronis	2.43	36	6.06	
Palinurus delagoae	1.31	2	3.28	
Halieutaea sp. A	1.15	20	2.88	
Loligo forbesi	1.11	32	2.78	
Starfish	0.76	24	1.89	
Lepidotrigla multispinosa	0.68	10	1.69	
Tylerius spinosissimus	0.68	14	1.69	
Chelidonichthys kumu	0.62	2	1.54	
Hoplichthys acanthopleurus	0.58	6	1.44	
Cynoglossus lida	0.34	10	0.84	
Synodus 'yellowpectoral'	0.30	6	0.74	
Pagellus natalenses	0.26	4	0.65	
Bothus swio	0.20	8	0.50	
PORTUNIDAE	0.16	4	0.40	
Antigonia cf rubescens	0.14	6	0.35	
Champsodon capensis	0.14	42	0.35	
Macrorhamphosus scolopax ***	0.14	12	0.35	
Narcine rierai	0.08	2	0.20	
Citharichthys sp.	0.06	2	0.15	
Kentrocapros rosapinto**	0.06	2	0.15	
Acanthurus - juvenile	0.00	2	0.00	
Total	40.08		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 71
DATE :23/11/14 GEAR TYPE: BT NO: 27 POSITION:Lat S 22°37.92
start stop duration Lon E 35°34.41
TIME :09:19:46 09:45:18 25.5 (min) Purpose : 3
LOG : 3373.70 3375.07 1.4 Region : 7431
FDEPTH: 39 36 Gear cond.: 0
BDEPTH: 39 36 Validity : 0
Towing dir: 0° Wire out : 130 m Speed : 3.2 kn
Sorted : 42 Total catch: 42.46 Catch/hour: 99.79

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Sphyraena forsteri	39.72	155	39.80	193
Gymnocranius grandoculis	34.41	5	34.48	194
PORIFERA (Sponges)	10.20	0	10.22	
Lactoria cornuta	8.58	24	8.60	
Sepia prashadi	2.59	38	2.59	
Equulites elongatus	1.65	2945	1.65	
Bleekeria sp.	1.36	259	1.37	
Selar crumenophthalmus	0.63	2	0.64	195
Halieutaea fitzsimonsi	0.19	2	0.19	
Sepia cf latimanus	0.16	2	0.16	
Trachinocephalus myops	0.14	7	0.14	
Callionymus marleyi	0.09	5	0.09	
Nemipterus bipunctatus	0.05	38	0.05	196
Fistularia petimba	0.02	5	0.02	
Total	99.79		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 72
DATE :23/11/14 GEAR TYPE: BT NO: 27 POSITION:Lat S 22°16.14
start stop duration Lon E 35°33.36
TIME :13:18:58 13:42:43 23.8 (min) Purpose : 3
LOG : 3398.01 3399.56 1.6 Region : 7431
FDEPTH: 25 31 Gear cond.: 0
BDEPTH: 25 31 Validity : 0
Towing dir: 0° Wire out : 130 m Speed : 3.9 kn
Sorted : 3 Total catch: 3.10 Catch/hour: 7.83

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Starfish	4.04	18	51.61	
Decapterus macrosoma	2.78	111	35.48	197
Loligo sp.	0.51	8	6.45	
Trachinocephalus myops	0.20	13	2.58	
Bothus myriaster	0.13	8	1.61	
Torquigener hypselogenion	0.05	3	0.65	
Sepia sp	0.05	5	0.65	
Upeneus taeniopterus	0.03	3	0.32	198
Lagocephalus sceleratus	0.03	3	0.32	
Parabothus cf. coarctus	0.03	3	0.32	
Total	7.83		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 73
DATE :23/11/14 GEAR TYPE: BT NO: 27 POSITION:Lat S 22°17.62
start stop duration Lon E 35°34.60
TIME :14:44:28 15:14:33 30.1 (min) Purpose : 3
LOG : 3406.39 3407.83 1.4 Region : 7431
FDEPTH: 70 67 Gear cond.: 0
BDEPTH: 70 67 Validity : 0
Towing dir: 0° Wire out : 210 m Speed : 2.9 kn
Sorted : 42 Total catch: 42.42 Catch/hour: 84.61

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Himantura uarnak	69.81	2	82.51	
Abalistes stellatus	3.09	2	3.65	
Gymnocranius griseus	2.55	8	3.02	
Lactoria cornuta	2.35	8	2.78	
Pterois russelii	1.78	4	2.10	
Sufflamen fraenatum	1.38	2	1.63	
Sphyraena forsteri	0.86	4	1.01	200
Loligo forbesi	0.56	52	0.66	
Upeneus bensasi	0.42	18	0.50	202
Parupeneus 'roundhead-yellow'	0.40	12	0.47	201
Sepia hieronis	0.34	12	0.40	
Synodus sp.	0.24	16	0.28	
Nemipterus zysron	0.20	6	0.24	199
Apogon quadrifasciatus**	0.18	18	0.21	
Lagocephalus sceleratus	0.12	4	0.14	
Heniochus diphreutes	0.11	2	0.13	
RANINIDAE	0.10	2	0.12	
Trachinocephalus myops	0.08	6	0.09	
Dipterygonotus balteatus	0.04	8	0.05	
Total	84.61		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 74
DATE :23/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 22°19.33
start stop duration Lon E 35°37.66
TIME :16:26:24 16:56:39 30.3 (min) Purpose : 3
LOG : 3415.41 3416.86 1.4 Region : 7432
FDEPTH: 203 205 Gear cond.: 0
BDEPTH: 203 205 Validity : 0
Towing dir: 0° Wire out : 460 m Speed : 2.9 kn
Sorted : 22 Total catch: 21.67 Catch/hour: 42.98

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Peristedion cf weberi	5.67	280	13.20	
Abalistes stellatus	3.73	2	8.68	
Ommastrephes bartrami	2.94	20	6.83	
Lepidotrigla multispinosa	2.40	91	5.58	
Kentrocapros rosapinto	2.38	42	5.54	
Chlorophthalmus sp.	2.32	343	5.40	
Chelidonichthys kumu	2.26	24	5.26	
Sepia hieronis	2.16	48	5.03	
Cynoglossus lida	1.90	73	4.43	
Scyllarides elisabethae	1.75	4	4.06	
Ibacus novemdentatus	1.67	24	3.88	
Macrorhamphosus scolopax ***	1.65	196	3.83	
Uranoscopus archionema	1.43	40	3.32	
Antigonia rubescens	1.39	46	3.23	
Pagellus natalenses	1.07	14	2.49	203
Neoscombrops sp.	1.01	16	2.35	
Saurida undosquamis	0.77	8	1.80	
Solenocera sp.	0.75	24	1.75	
OCTOPODIDAE	0.71	6	1.66	
Lophiodes sp.	0.67	2	1.57	
Uroconger sp.	0.60	14	1.38	
Lagocephalus guntheri	0.56	8	1.29	
Narcine rierai	0.54	6	1.25	
Halieutaea sp.	0.52	4	1.20	
Thenus sp.	0.46	28	1.06	
Citharoides macrolepis	0.44	14	1.02	
Tylerius spinosissimus	0.36	8	0.83	
Ariomma indicum	0.30	4	0.69	
Loligo forbesi	0.24	8	0.55	
Pontinus nigerimum	0.12	2	0.28	
Parazen pacificus	0.08	4	0.18	
UNIDENTIFIED FISH	0.06	4	0.14	
Ophidion sp.	0.06	4	0.14	
Zeus faber	0.04	2	0.09	
Total	42.98		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 75
DATE :23/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 22°17.24
start stop duration Lon E 35°41.57
TIME :18:23:55 18:53:59 30.1 (min) Purpose : 3
LOG : 3423.71 3425.14 1.4 Region : 7432
FDEPTH: 313 316 Gear cond.: 0
BDEPTH: 313 316 Validity : 0
Towing dir: 0° Wire out : 700 m Speed : 2.9 kn
Sorted : 31 Total catch: 61.04 Catch/hour: 121.80

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
MYCTOPHIDAE	27.34	12052	22.44	
Ommastrephes bartrami	13.93	88	11.44	
Sepia sp	10.93	247	8.98	
Uranoscopus archionema	10.77	68	8.85	
Neoscombrops cynodon	10.70	204	8.78	
Cynoglossus cf lida	8.30	303	6.82	
Chlorophthamus sp. juv	5.43	279	4.46	
Peristedion weberi	4.83	208	3.96	
Citharoides macrolepis	4.31	44	3.54	
Halieutaea sp. A	4.15	32	3.41	
Ateleopus natalensis	3.51	36	2.88	
Satyrichthys adeni	3.51	8	2.88	
Maurolicus muelleri	3.35	0	2.75	
Saurida undosquamis	2.67	20	2.20	204
Palinurus delagoae	2.04	8	1.67	
Lepidotrigla multispinosa	1.48	84	1.21	
Macrorhamphosus scolopax ***	0.96	116	0.79	
Champsodon capensis	0.76	76	0.62	
Narcine rierai	0.56	4	0.46	
Hoplichthys acanthopleurus	0.52	36	0.43	
Solenocera agoensis	0.36	40	0.29	
Eridacnis radcliffei	0.32	4	0.26	
Nesiarchus sp.	0.28	4	0.23	
LITHODIDAE	0.28	4	0.23	
Antigonia cf rubescens	0.16	8	0.13	
Cynoglossus gilchristi	0.16	8	0.13	
Laeops pectoralis	0.08	4	0.07	
Polymixia berndti	0.08	8	0.07	
Nettastoma parviceps	0.04	4	0.03	
Total	121.80		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 76
DATE :23/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 21°57.61
start stop duration Lon E 35°48.56
TIME :23:21:27 23:52:03 30.6 (min) Purpose : 3
LOG : 3459.20 3460.94 1.7 Region : 7432
FDEPTH: 703 698 Gear cond.: 0
BDEPTH: 703 698 Validity : 0
Towing dir: 0° Wire out : 1600 m Speed : 3.4 kn
Sorted : 27 Total catch: 53.30 Catch/hour: 104.48

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Caelorinchus trunovi	39.59	329	37.90	
Ommastrephes bartrami	25.40	12	24.32	209
Howella sherborni**	9.33	39	8.93	
Lithodidae	7.06	337	6.75	
Malacocephalus laevis	5.21	35	4.99	
Nettastoma parviceps	3.76	24	3.60	
Haliporoides triarthrus	3.02	98	2.89	205
Lophiodes insidiator	2.63	4	2.51	
Neobythites analis	1.80	20	1.73	
Nansenia macrolepis**	1.49	31	1.43	
Plesionika martia	1.10	204	1.05	
Synaphobranchus affinis	0.90	16	0.86	
Aristaeomorpha foliacea	0.67	27	0.64	206
Satyrichthys adeni	0.59	4	0.56	
Heterocarpus woodmasoni	0.47	16	0.45	
Chlorophthalmus agassizi	0.39	4	0.38	
Aristeus antennatus	0.39	24	0.38	207
Nephropsis stewarti	0.35	16	0.34	
Plesiopenaeus edwardsianus	0.31	8	0.30	208
Total	104.48		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 77
DATE :24/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 21°54.74
start stop duration Lon E 35°39.30
TIME :02:45:50 03:15:52 30.0 (min) Purpose : 3
LOG : 3482.99 3484.57 1.6 Region : 7432
FDEPTH: 382 393 Gear cond.: 0
BDEPTH: 382 393 Validity : 0
Towing dir: 0° Wire out : 900 m Speed : 3.2 kn
Sorted : 39 Total catch: 196.67 Catch/hour: 392.95

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Diaphus sp.	109.49	35	27.86	
MYCTOPHIDAE	102.80	23367	26.16	
Ommastrephes bartrami	44.76	240	11.39	
Saurida undosquamis	34.87	320	8.87	210
Lestrolepis intermedia	24.78	1339	6.30	
Neoscombrops cynodon	14.99	440	3.81	
Champsodon capensis	14.49	13	3.69	
Palinurus delagoae	14.27	16	3.63	
Metanephrops mozambicus	9.35	76	2.38	
Narcine rierai	7.29	70	1.86	
Caelorinchus trunovi	5.49	40	1.40	
Sepia hieronis	3.50	70	0.89	
Lithodidae	2.60	170	0.66	
Cynoglossus lida	1.60	60	0.41	
Aristeus virilis	0.70	130	0.18	
SICYONIIDAE	0.60	60	0.15	
Chlorophthalmus agassizi	0.50	30	0.13	
Physiculus natalensis	0.50	10	0.13	
Parapandalus spinifer	0.40	20	0.10	
Total	392.95		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 78
DATE :24/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 21°54.04
start stop duration Lon E 35°32.76
TIME :07:05:02 07:35:07 30.1 (min) Purpose : 3
LOG : 3509.87 3511.44 1.6 Region : 7431
FDEPTH: 52 50 Gear cond.: 0
BDEPTH: 52 50 Validity : 0
Towing dir: 0° Wire out : 150 m Speed : 3.1 kn
Sorted : 286 Total catch: 285.85 Catch/hour: 570.36

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Albula neoguinaica	413.54	70	72.50	
Carangoides sp.	63.26	92	11.09	217
Abalistes stellatus	30.13	22	5.28	
Gymnocranius elongatus	24.34	20	4.27	
Rhizoprionodon acutus	13.57	6	2.38	
Lethrinus sp.	7.08	2	1.24	
Carcharhinus sealei	6.98	2	1.22	
Pseudalutarius nasicornis	3.81	82	0.67	
Diodon hystrix	3.15	2	0.55	
Lactoria cornuta	2.63	6	0.46	
Ostracion cubicus	1.86	2	0.33	
Total	570.36		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 79
DATE :24/11/14 GEAR TYPE: BT NO: 27 POSITION:Lat S 21°38.12
start stop duration Lon E 35°33.86
TIME :13:03:50 13:32:53 29.1 (min) Purpose : 3
LOG : 3536.86 3538.36 1.5 Region : 7432
FDEPTH: 238 238 Gear cond.: 0
BDEPTH: 238 238 Validity : 0
Towing dir: 0° Wire out : 650 m Speed : 3.1 kn
Sorted : 33 Total catch: 32.77 Catch/hour: 67.68

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Upeneus taeniopterus	13.78	316	20.35	221
Decapterus kurroides	13.43	81	19.84	218
Satyrichthys adeni	13.05	27	19.29	
Narcine rierai	5.62	43	8.30	
Scyllarides elisabethae	5.06	10	7.48	
Ibacus novemdentatus	4.44	39	6.56	
Sepia sp	3.61	62	5.34	
Saurida undosquamis	2.52	14	3.72	220
Ommastrephes bartrami	2.17	58	3.20	223
Pagellus natalenses	1.34	19	1.98	219
Priacanthus hamrur	1.20	4	1.77	
Sphoeroides pachgaster	0.48	8	0.70	
Uranoscopus archionema	0.27	2	0.40	
Decapterus macrosoma	0.19	2	0.27	222
Kentrocapros rosapinto	0.19	2	0.27	
Peristedion cf weberi	0.14	4	0.21	
Antigonia rubescens	0.10	4	0.15	
Tylerius spinosissimus	0.10	4	0.15	
Total	67.68		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 80
DATE :24/11/14 GEAR TYPE: BT NO: 27 POSITION:Lat S 21°18.18
start stop duration Lon E 35°42.81
TIME :21:22:50 21:54:41 31.9 (min) Purpose : 3
LOG : 3590.86 3592.39 1.5 Region : 7420
FDEPTH: 607 602 Gear cond.: 0
BDEPTH: 607 602 Validity : 0
Towing dir: 0° Wire out : 1250 m Speed : 2.9 kn
Sorted : 78 Total catch: 78.46 Catch/hour: 147.76

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Caelorinchus trunovi	97.74	911	66.15	
Haliporoides triarthrus	9.06	269	6.13	224
'Undidentified crab'	7.34	294	4.97	
Howella sherborni**	5.73	75	3.87	
Aristaeomorpha foliacea	4.86	205	3.29	225
Ommastrephes bartrami	4.80	23	3.25	
Nezumia sp.	4.27	53	2.89	
Coloconger scholesi	3.15	23	2.13	
Malacocephalus laevis	2.18	85	1.48	
Nephropsis stewarti	1.34	23	0.90	227
MYCTOPHIDAE	1.30	203	0.88	
Aristeus antennatus	0.79	43	0.54	226
Chlorophthalmus agassizi	0.77	8	0.52	
Stereomastis sp.	0.68	26	0.46	
Nansenia macrolepis**	0.66	11	0.45	
Ateleopus natalensis	0.53	2	0.36	
Nettastoma parviceps	0.49	8	0.33	
LOPHIIDAE	0.47	2	0.32	
Heterocarpus woodmasoni	0.41	30	0.28	
Glyptophidium longipes	0.36	6	0.24	
Hoplostethus melanopterus	0.34	4	0.23	
Neoscombrops cynodon	0.30	2	0.20	
Peristedion cf weberi	0.11	6	0.08	
Sicyonia sp.	0.06	34	0.04	
Polyipnus indicus	0.02	2	0.01	
Total	147.76		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 81
DATE :25/11/14 GEAR TYPE: BT NO: 27 POSITION:Lat S 21°16.97
start stop duration Lon E 35°38.08
TIME :00:14:54 00:44:54 30.0 (min) Purpose : 3
LOG : 3606.35 3607.85 1.5 Region : 7420
FDEPTH: 326 344 Gear cond.: 0
BDEPTH: 326 344 Validity : 0
Towing dir: 0° Wire out : 750 m Speed : 3.3 kn
Sorted : 29 Total catch: 76.35 Catch/hour: 152.70

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Diaphus sp.	56.40	3348	36.94	
Ommastrephes bartrami	33.50	156	21.94	229
Maurolicus muelleri	26.20	18012	17.16	
Saurida undosquamis	12.68	76	8.30	228
Neoscombrops cynodon	6.72	132	4.40	
Palinurus delagoae	2.88	6	1.89	230
Cynoglossus sp.	2.56	104	1.68	
Champsodon capensis	2.12	192	1.39	
SEPIIDAE	2.00	32	1.31	
Argentina euchus	1.80	32	1.18	
Halieutaea sp.	1.32	4	0.86	
Chaunax sp.	1.24	8	0.81	
Hoplichthys acanthopleurus	0.96	68	0.63	
Triglidae 'PectSemicircBlue'	0.88	20	0.58	
Citharoides macrolepis	0.36	4	0.24	
Narcine rierai	0.36	4	0.24	
Neoepinnula orientalis	0.32	4	0.21	
Eridacnis sinuans	0.20	4	0.13	
Lestrolepis intermedia	0.12	4	0.08	
Macrorhamphosus scolopax	0.08	8	0.05	
Total	152.70		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 82
DATE :25/11/14 GEAR TYPE: BT NO: 27 POSITION:Lat S 20°58.24
start stop duration Lon E 35°32.67
TIME :06:22:49 06:51:32 28.7 (min) Purpose : 3
LOG : 3651.28 3652.93 1.7 Region : 7420
FDEPTH: 50 49 Gear cond.: 0
BDEPTH: 50 49 Validity : 0
Towing dir: 0° Wire out : 150 m Speed : 3.5 kn
Sorted : 0 Total catch: 52.67 Catch/hour: 110.04

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Abalistes stellatus	43.56	46	39.59	
Scomberomorus commerson	26.85	8	24.40	231
Haemulopsis elongatus	26.22	2403	23.83	232
Echeneis naucrates	7.73	6	7.02	
Nemipterus bipunctatus	2.99	29	2.71	234
Decapterus russelli	0.79	94	0.72	235
Lactoria cornuta	0.73	2	0.66	
Upeneus bensasi	0.36	23	0.32	236
Starfish	0.36	13	0.32	
Tetrosomus concatenatus	0.25	2	0.23	
Trachinocephalus myops	0.15	2	0.13	
PORIFERA (Sponges)	0.02	0	0.02	
Decapterus macrosoma	0.02	6	0.02	233
Bothus sp.	0.02	10	0.02	
Total	110.04		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 83
DATE :25/11/14 GEAR TYPE: BT NO: 27 POSITION:Lat S 20°57.80
start stop duration Lon E 35°41.13
TIME :08:15:01 08:42:13 27.2 (min) Purpose : 3
LOG : 3663.59 3665.09 1.5 Region : 7420
FDEPTH: 73 68 Gear cond.: 0
BDEPTH: 73 68 Validity : 0
Towing dir: 0° Wire out : 210 m Speed : 3.3 kn
Sorted : 0 Total catch: 21.26 Catch/hour: 46.90

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Gymnocranius grandoculis	34.19	13	72.91	
Sphyraena barracuda	6.02	26	12.84	237
URCHINS	2.43	77	5.17	
Tetrosomus concatenatus	1.76	7	3.76	
Abalistes stellatus	1.26	2	2.68	
Starfish	0.84	2	1.79	
Nemipterus bipunctatus	0.11	9	0.24	238
Trachinocephalus myops	0.07	2	0.14	
Nemipterus zysron	0.04	2	0.09	
Cociella sp.	0.04	4	0.09	
Synodus sp.**	0.04	4	0.09	
Sepia hieronis	0.02	2	0.05	
Lepidotrigla alcocki	0.02	2	0.05	
Bothus swio	0.02	4	0.05	
Upeneus bensasi	0.02	2	0.05	
Total	46.90		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 84
DATE :26/11/14 GEAR TYPE: PT NO: 1 POSITION:Lat S 19°51.16
start stop duration Lon E 35°57.61
TIME :09:55:25 10:24:48 29.4 (min) Purpose : 3
LOG : 3880.59 3882.39 1.8 Region : 7420
FDEPTH: 25 25 Gear cond.: 0
BDEPTH: 46 52 Validity : 0
Towing dir: 0° Wire out : 110 m Speed : 3.7 kn
Sorted : 47 Total catch: 46.81 Catch/hour: 95.60

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
J E L L Y F I S H	95.47	3182	99.86	
Decapterus russelli	0.06	35	0.07	239
Thamnaconus fajardoi	0.04	39	0.04	
Alepes djedaba	0.01	22	0.01	240
Decapterus macrosoma	0.01	4	0.01	241
Parastromateus niger	0.00	2	0.00	
Balistididae juvenile	0.00	2	0.00	
Total	95.60		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 85
DATE :26/11/14 GEAR TYPE: BT NO: 27 POSITION:Lat S 19°54.22
start stop duration Lon E 36°5.06
TIME :11:58:27 12:26:15 27.8 (min) Purpose : 3
LOG : 3892.80 3894.41 1.6 Region : 7420
FDEPTH: 62 62 Gear cond.: 0
BDEPTH: 62 62 Validity : 0
Towing dir: 0° Wire out : 155 m Speed : 3.5 kn
Sorted : 58 Total catch: 58.04 Catch/hour: 125.26

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Decapterus russelli	106.83	4083	85.29	242
Abalistes stellatus	5.03	4	4.01	
Saurida undosquamis	3.19	76	2.55	244
Loligo sp.	2.63	138	2.10	
Decapterus macrosoma	1.86	78	1.48	243
Urchin	1.45	9	1.15	
Nemipterus bipunctatus	1.18	19	0.94	245
Upeneus bensasi	0.97	41	0.78	246
Thenus orientalis	0.76	6	0.60	
Fistularia petimba	0.28	15	0.22	
SCYLLARIDAE	0.28	30	0.22	
Priacanthus hamrur	0.26	9	0.21	
Lagocephalus sceleratus	0.11	4	0.09	
Halieutaea sp.	0.11	9	0.09	
Paramonacanthus pusillus	0.11	6	0.09	
Dactyloptena orientalis	0.06	2	0.05	
Penaeus latisulcatus	0.06	2	0.05	
Sorsogona sp.	0.05	2	0.04	
Synodus sp.	0.04	4	0.03	
Total	125.26		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 86
DATE :26/11/14 GEAR TYPE: BT NO: 27 POSITION:Lat S 20°0.08
start stop duration Lon E 36°16.63
TIME :14:45:59 15:10:27 24.5 (min) Purpose : 3
LOG : 3913.10 3914.45 1.4 Region : 7420
FDEPTH: 90 91 Gear cond.: 0
BDEPTH: 90 91 Validity : 0
Towing dir: 0° Wire out : 250 m Speed : 3.3 kn
Sorted : 0 Total catch: 16.11 Catch/hour: 39.52

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Loligo forbesi	18.50	1403	46.80	
Decapterus russelli	5.84	231	14.77	247
Synodus sp.	3.53	260	8.94	
Dactyloptena peterseni	1.94	5	4.90	
Sphyraena forsteri	1.89	10	4.78	249
Sepia hieronis	1.82	64	4.59	
Torquigener flavimaculosus	1.23	216	3.10	
Champsodon capensis	1.15	275	2.92	
Starfish	1.01	17	2.55	
Decapterus macrosoma	0.98	39	2.48	248
URCHINS	0.86	17	2.17	
Equulites elongatus	0.66	98	1.68	250
Platycephalus indicus	0.12	5	0.31	
Total	39.52		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 87
DATE :26/11/14 GEAR TYPE: BT NO: 27 POSITION:Lat S 20°1.83
start stop duration Lon E 36°18.77
TIME :16:17:26 16:46:07 28.7 (min) Purpose : 3
LOG : 3921.01 3921.41 0.4 Region : 7420
FDEPTH: 165 165 Gear cond.: 0
BDEPTH: 165 165 Validity : 0
Towing dir: 0° Wire out : 450 m Speed : 0.8 kn
Sorted : 0 Total catch: 60.49 Catch/hour: 126.55

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Rexea prometheoides	20.67	289	16.33	
MYCTOPHIDAE	17.11	787	13.52	
Tylerius spinosissimus	15.65	268	12.37	
Saurida undosquamis	11.21	142	8.86	251
Muraenesox bagio	8.58	2	6.78	
Halieutaea sp. A	7.32	113	5.79	
Chlorophthamus sp. juv	7.32	586	5.79	
Lepidotrigla multispinosa	4.94	230	3.90	
Squalus megalops	4.60	2	3.64	
Ibacus novemdentatus	3.93	209	3.11	
Lophiodes sp.	3.64	29	2.88	
Scyllarides elisabethae	3.60	8	2.84	
Loligo forbesi	3.39	84	2.68	
Uranoscopus archionema	2.34	17	1.85	
Thenus orientalis	2.22	188	1.75	
Cynoglossus lida	2.01	96	1.59	
Sepia hieronis	1.92	33	1.52	
Citharoides macrolepis	1.26	42	0.99	
Crustacea Decapoda	1.13	25	0.89	
Octopus sp.	1.05	8	0.83	
TORPEDINIDAE	0.63	25	0.50	
Parapenaeus fissurus	0.56	59	0.45	
Hoplichthys cf. acanthopleurus	0.42	38	0.33	
Neoscombrops cynodon	0.19	8	0.15	
Priacanthus hamrur	0.19	4	0.15	
Citharichthys sp.	0.17	17	0.13	
Uroconger lepturus	0.17	4	0.13	
Pisodonophis boro	0.13	4	0.10	
Macrorhamphosus scolopax ***	0.13	21	0.10	
Bothus sp.	0.08	13	0.07	
Total	126.55		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 88
DATE :29/11/14 GEAR TYPE: BT NO: 27 POSITION:Lat S 19°38.43
start stop duration Lon E 36°17.60
TIME :03:13:42 03:41:00 27.3 (min) Purpose : 3
LOG : 4184.84 4186.40 1.6 Region : 7420
FDEPTH: 47 49 Gear cond.: 0
BDEPTH: 47 49 Validity : 0
Towing dir: 0° Wire out : 130 m Speed : 3.4 kn
Sorted : 40 Total catch: 39.91 Catch/hour: 87.71

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Stegostoma fasciatum	65.93	2	75.17	
Decapterus russelli	8.31	4334	9.47	254
Equulites elongatus	6.92	7429	7.89	253
Loxodon macrorhinus	3.52	2	4.01	
Nemipterus bipunctatus	0.95	9	1.08	252
Loligo sp.	0.95	119	1.08	
Echeneis naucrates	0.53	2	0.60	
Thelenota anax	0.31	2	0.35	
Sepia pharaonis	0.18	2	0.20	
Sphyraena barracuda	0.11	2	0.13	
Trachinocephalus myops	0.02	2	0.03	
Total	87.71		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 89
DATE :29/11/14 GEAR TYPE: BT NO: 27 POSITION:Lat S 19°32.16
start stop duration Lon E 36°9.72
TIME :06:07:02 06:37:25 30.4 (min) Purpose : 3
LOG : 4204.57 4206.15 1.6 Region : 7420
FDEPTH: 37 36 Gear cond.: 0
BDEPTH: 37 36 Validity : 0
Towing dir: 0° Wire out : 130 m Speed : 3.1 kn
Sorted : 54 Total catch: 53.97 Catch/hour: 106.55

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Loxodon macrorhinus	37.71	26	35.39	
Abalistes stellatus	20.43	20	19.18	
Scomberoides tol	16.29	10	15.29	260
Scomberomorus commerson	16.09	8	15.10	261
Saurida undosquamis	3.61	65	3.39	257
J E L L Y F I S H	2.94	172	2.76	
Nemipterus bipunctatus	2.55	38	2.39	255
Sepia pharaonis	1.99	18	1.87	
PORIFERA (Sponges)	1.16	12	1.09	
Lactoria cornuta	1.16	4	1.09	
Upeneus bensasi	1.13	53	1.06	256
Loligo forbesi	0.93	49	0.87	
Priacanthus hamrur	0.12	4	0.11	
Decapterus macrosoma	0.10	4	0.09	258
Trachinocephalus myops	0.08	4	0.07	
Trichiurus lepturus	0.08	2	0.07	
Decapterus russelli	0.06	4	0.06	259
Torquigener hypselogenion	0.06	4	0.06	
Atropus atropos	0.04	2	0.04	
Fistularia petimba	0.02	4	0.02	
Total	106.55		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 90
DATE :29/11/14 GEAR TYPE: BT NO: 27 POSITION:Lat S 19°21.53
start stop duration Lon E 35°50.22
TIME :09:05:40 09:35:53 30.2 (min) Purpose : 3
LOG : 4228.61 4230.53 1.9 Region : 7420
FDEPTH: 24 24 Gear cond.: 0
BDEPTH: 24 24 Validity : 0
Towing dir: 0° Wire out : 110 m Speed : 3.8 kn
Sorted : 31 Total catch: 127.33 Catch/hour: 252.81

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Upeneus taeniopterus	97.98	9955	38.76	265
Scomberoides commersonianus	47.79	14	18.90	316
Alepes djedaba	45.57	2555	18.02	264
J E L L Y F I S H	14.71	71	5.82	
Caranx sexfasciatus	11.61	2	4.59	262
Decapterus russelli	9.71	328	3.84	267
Loligo forbesi	7.15	185	2.83	
Rhizoprionodon acutus	4.96	2	1.96	
Scomberomorus commerson	3.67	2	1.45	263
Carangoides ferdau	2.86	18	1.13	
Stolephorus sp.	1.79	1471	0.71	
Carangoides malabaricus	1.73	30	0.68	266
Lutjanus sanguineus	1.13	18	0.45	
Secutor insidiator	0.42	36	0.16	
Matuta cf lunaris	0.42	48	0.16	
Saurida undosquamis	0.36	0	0.14	
Saurida tumbil	0.30	6	0.12	
Portunus sanguinolentus	0.24	12	0.09	
Apogon quadrifasciatus**	0.24	71	0.09	
Parastromateus niger	0.06	6	0.02	
Alectis indica	0.06	6	0.02	
Ariomma indicum	0.06	6	0.02	
Total	252.81		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 91
DATE :29/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 19°8.38
start stop duration Lon E 36°6.38
TIME :13:06:42 13:35:27 28.8 (min) Purpose : 3
LOG : 4262.85 4264.79 1.9 Region : 7420
FDEPTH: 23 24 Gear cond.: 0
BDEPTH: 23 24 Validity : 0
Towing dir: 0° Wire out : 110 m Speed : 4.1 kn
Sorted : 200 Total catch: 199.88 Catch/hour: 417.14

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Rhina ancylostoma	208.70	2	50.03	
Himantura uarnak	125.22	4	30.02	
Rhinoptera javanica	24.10	2	5.78	
Rachycentron canadum	13.98	2	3.35	269
Scomberomorus plurilineatus	11.27	2	2.70	268
J E L L Y F I S H	8.93	38	2.14	
Equulites elongatus	7.60	7849	1.82	
Scomberoides commersonianus	6.89	2	1.65	273
Carangoides malabaricus	2.71	42	0.65	274
Loligo sp.	2.53	40	0.61	
Rastrelliger kanagurta	1.36	15	0.33	270
Atule mate	0.86	15	0.21	271
Secutor insidiator	0.73	79	0.18	
Saurida undosquamis	0.58	23	0.14	272
Rhizoprionodon acutus	0.52	2	0.13	
Matuta cf lunaris	0.48	44	0.12	
Ariomma indicum	0.21	25	0.05	
Lagocephalus guntheri	0.19	4	0.05	
Gerres filamentosus	0.10	2	0.03	
Sepia pharaonis	0.08	4	0.02	
Echeneis naucrates	0.06	2	0.02	
Parastromateus niger	0.02	4	0.01	
Carangoides ferdau	0.02	2	0.01	
Total	417.14		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 92
DATE :29/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 19°23.00
start stop duration Lon E 36°27.59
TIME :16:57:08 17:27:12 30.1 (min) Purpose : 3
LOG : 4294.26 4295.86 1.6 Region : 7420
FDEPTH: 51 51 Gear cond.: 0
BDEPTH: 51 51 Validity : 0
Towing dir: 0° Wire out : 160 m Speed : 3.2 kn
Sorted : 29 Total catch: 87.24 Catch/hour: 174.02

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Upeneus bensasi	42.29	1410	24.30	279
Nemipterus bipunctatus	22.74	271	13.07	275
Coral - mixed	19.95	20	11.46	
Trachinocephalus myops	19.15	495	11.00	
Torquigener hypselogenion	14.68	718	8.44	
Penaeus latisulcatus	10.45	399	6.01	
LETHRINIDAE	6.30	160	3.62	
Decapterus russelli	5.66	152	3.26	278
Saurida undosquamis	5.59	80	3.21	281
Teixeirichthys jordani	5.11	255	2.93	
Apistus carinatus	4.79	359	2.75	
Bothus sp.	2.79	168	1.60	
Parupeneus cinnabaricus	2.07	32	1.19	280
Stephanolepis auratus	1.91	128	1.10	
Pterois russelii	1.76	8	1.01	
Selar crumenophthalmus	1.60	16	0.92	276
Thenus orientalis	1.60	8	0.92	
Cociella crocodila	1.20	48	0.69	
Decapterus macrosoma	0.80	24	0.46	277
Lagocephalus guntheri	0.80	32	0.46	
Loligo forbesi	0.64	16	0.37	
Aesopia cornuta	0.40	16	0.23	
Sepia sp	0.40	8	0.23	
Fistularia petimba	0.32	16	0.18	
Matuta cf lunaris	0.24	24	0.14	
Priacanthus hamrur	0.24	8	0.14	
Cynoglossus lida	0.24	16	0.14	
Samaris cristatus	0.16	8	0.09	
Minous coccineus	0.08	8	0.05	
Callionymus cf persicus	0.08	8	0.05	
Total	174.02		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 93
DATE :29/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 19°32.38
start stop duration Lon E 36°40.72
TIME :19:51:30 20:21:39 30.1 (min) Purpose : 3
LOG : 4315.86 4317.28 1.4 Region : 7420
FDEPTH: 104 103 Gear cond.: 0
BDEPTH: 104 103 Validity : 0
Towing dir: 0° Wire out : 260 m Speed : 2.8 kn
Sorted : 43 Total catch: 43.38 Catch/hour: 86.33

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Argyrops spinifer	15.72	60	18.21	
Lutjanus sebae	12.04	2	13.95	
CORAL	9.95	0	11.53	
Sphyraena barracuda	8.54	78	9.89	282
Priacanthus hamrur	5.07	72	5.88	
Heterodontus ramalheira	3.74	2	4.33	
Upeneus taeniopterus	3.38	183	3.92	
Sepia pharaonis	2.71	68	3.13	
Parupeneus cinnabaricus	2.53	28	2.93	
Sepia sp	2.35	60	2.72	
Parascolopsis eriomma	2.17	34	2.51	
Pristigenys niphonia	2.15	8	2.49	
Gymnocranius griseus	1.93	6	2.24	
Tetrosomus concatenatus	1.89	6	2.19	
Beryx splendens	1.85	173	2.14	
Loligo forbesi	1.61	8	1.87	
Loligo sp.	1.59	2	1.84	
Selar crumenophthalmus	1.43	14	1.66	
Saurida undosquamis	0.92	70	1.06	
CARIDEA	0.74	336	0.85	
Epinephelus areolatus	0.72	4	0.83	
MYCTOPHIDAE	0.58	231	0.67	
Cociella sp.	0.38	24	0.44	
Scorpaena scrofa	0.36	2	0.41	
Sepia pharaonis	0.34	6	0.39	0
Monocentris japonica	0.34	4	0.39	
Erythrocles schlegelii	0.20	12	0.23	
Ariomma indicum	0.12	2	0.14	
Chaetodon dolosus	0.10	2	0.12	
Minous coccineus	0.10	2	0.12	
Pristipomoides filamentosus	0.08	4	0.09	
Synodus binotatus	0.08	2	0.09	
Decapterus macrosoma	0.08	2	0.09	284
Decapterus russelli	0.08	6	0.09	283
Serranus sp.	0.06	6	0.07	
Fistularia petimba	0.06	8	0.07	
C R U S T A C E A N S	0.06	2	0.07	
Trachinocephalus myops	0.06	4	0.07	
Torquigener hypselogenion	0.06	6	0.07	
Serranus sp.	0.06	6	0.07	
Hippocampus sp.	0.04	2	0.05	
Lepidotrigla alcocki	0.04	2	0.05	
Starfish	0.03	12	0.03	
Serranus novemcinctus	0.01	2	0.01	
Hoplostethus melanopterus	0.01	2	0.01	
Rastrelliger kanagurta	0.00	14	0.00	285
Nemipterus bipunctatus	0.00	44	0.00	286
Total	86.33		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 94
DATE :29/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 19°33.19
start stop duration Lon E 36°44.51
TIME :21:35:25 22:06:04 30.6 (min) Purpose : 3
LOG : 4323.68 4324.94 1.3 Region : 7420
FDEPTH: 241 245 Gear cond.: 0
BDEPTH: 241 245 Validity : 0
Towing dir: 0° Wire out : 600 m Speed : 2.5 kn
Sorted : 52 Total catch: 52.05 Catch/hour: 101.89

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Diaphus sp.	26.43	1057	25.94	
Neoscombrops cynodon	13.27	237	13.03	
Saurida undosquamis	12.98	133	12.74	288
Centrophorus moluccensis	11.26	6	11.05	
Sepia sp	10.26	247	10.07	
Narcine rierai	2.96	20	2.90	
Scyllarides elisabethae	2.84	6	2.79	
Chlorophthalmus agassizi	1.94	190	1.90	
Argentina sphyraena	1.74	100	1.71	
Pristigenys niphonia	1.72	4	1.69	
Citharoides macrolepis	1.17	20	1.15	
Ibacus novemdentatus	1.14	33	1.11	
Champsodon capensis	1.02	198	1.00	
Coelorinchus denticulatus	0.88	57	0.86	
Peristedion weberi	0.86	37	0.85	
Lepidotrigla alcocki	0.86	35	0.85	
Haliporoides triarthrus	0.74	20	0.73	287
MYCTOPHIDAE	0.72	143	0.71	
Holohalaelurus sp.	0.65	2	0.63	
Loligo forbesi	0.65	39	0.63	
Sphoeroides pachgaster	0.63	14	0.61	
Halieutaea fitzsimonsi	0.63	6	0.61	
Aristaeomorpha foliacea	0.63	33	0.61	294
Atlantoraja cyclophora	0.61	2	0.60	
Trichiurus lepturus	0.57	4	0.56	
Cynoglossus lida	0.51	20	0.50	
SEA URCHINS	0.49	29	0.48	
Neoepinnula orientalis	0.47	6	0.46	
CARIDEA	0.45	204	0.44	
Antigonia rubescens	0.41	29	0.40	
Uranoscopus archionema	0.37	2	0.37	
Chascanopsetta lugubris	0.27	16	0.27	
Polymixia nobilis	0.25	14	0.25	
Zeus faber	0.25	12	0.25	
Tylerius spinosissimus	0.23	4	0.23	
Etmopterus sentosus	0.23	4	0.23	
Monocentris japonica	0.18	2	0.17	
Octopus vulgaris	0.16	2	0.15	
ISOPODS	0.14	8	0.13	
Beryx splendens	0.14	14	0.13	
Emmelichthys nitidus	0.12	4	0.12	
Macrorhamphosus scolopax ***	0.06	6	0.06	
Borostomias mononema	0.02	2	0.02	
Total	101.89		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 95
DATE :30/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 19°14.16
start stop duration Lon E 36°58.79
TIME :01:45:15 02:12:48 27.6 (min) Purpose : 3
LOG : 4355.19 4356.77 1.6 Region : 7420
FDEPTH: 323 323 Gear cond.: 0
BDEPTH: 323 323 Validity : 0
Towing dir: 0° Wire out : 750 m Speed : 3.4 kn
Sorted : 27 Total catch: 66.66 Catch/hour: 145.18

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Saurida undosquamis	32.58	231	22.44	295
Neoscombrops cynodon	14.64	209	10.08	
Diaphus sp.	12.89	449	8.88	
Palinurus delagoae	12.04	24	8.30	289
Chaunax sp.	7.75	17	5.34	
Narcine rierai	7.36	57	5.07	
Centrophorus squamosus	6.82	9	4.70	
Puerulus angulatus	6.25	48	4.31	305
Lepidotrigla sp.	5.58	83	3.84	
Sepia pharaonis	5.44	78	3.75	
**	3.62	9	2.49	
Coelorinchus denticulatus	3.48	170	2.40	
Polymixia nobilis	2.96	105	2.04	
Maurolicus muelleri	2.92	1799	2.01	
Halieutaea fitzsimonsi	2.57	30	1.77	
Antigonia rubescens	2.09	48	1.44	
Chlorophthalmus agassizi	1.79	126	1.23	
Etmopterus sentosus**	1.74	13	1.20	
Dipturus cf lanceorostratus	1.57	4	1.08	
Opisthoteuthis sp.	1.39	9	0.96	
Raja sp.	1.00	2	0.69	
Zeus faber	0.96	440	0.66	
Linuparus somniosus	0.91	4	0.63	306
Citharoides macrolepis	0.91	9	0.63	
Eridacnis radcliffei	0.87	13	0.60	
Ommastrephes bartrami	0.81	4	0.56	0
Argentina sphyraena	0.74	44	0.51	
Lophiodes insidiator	0.61	4	0.42	
Tripterophycis gilchristi	0.52	4	0.36	
Ibacus novemdentatus	0.35	4	0.24	
Cubiceps whiteleggii	0.35	4	0.24	
Ommastrephes bartrami	0.26	4	0.18	
Holohalaelurus punctatus	0.26	4	0.18	
Peristedion weberi	0.22	13	0.15	
Cynoglossus capensis	0.22	9	0.15	
E C H I N O D E R M A T A	0.17	4	0.12	
Isopod	0.17	9	0.12	
MYCTOPHIDAE	0.09	57	0.06	
Macrorhamphosus scolopax	0.09	4	0.06	
Lestrolepis intermedia	0.09	4	0.06	
Neobythites analis	0.04	4	0.03	
Champsodon capensis	0.04	4	0.03	
Total	145.18		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 96
DATE :30/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 19°10.76
start stop duration Lon E 36°43.53
TIME :05:59:08 06:29:31 30.4 (min) Purpose : 3
LOG : 4378.93 4380.42 1.5 Region : 7420
FDEPTH: 79 79 Gear cond.: 0
BDEPTH: 79 79 Validity : 0
Towing dir: 0° Wire out : 220 m Speed : 2.9 kn
Sorted : 63 Total catch: 149.51 Catch/hour: 295.28

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Decapterus russelli	214.43	5441	72.62	360
Saurida undosquamis	24.59	292	8.33	
Carangoides malabaricus	8.79	43	2.98	290
Fistularia petimba	7.26	46	2.46	
Abalistes stellatus	6.28	10	2.13	
Priacanthus hamrur	5.78	109	1.96	
Penaeus semisulcatus	4.44	6	1.50	
Asteroidea indetCV1	4.10	10	1.39	
Loligo forbesi	3.31	49	1.12	
Sphyraena barracuda	3.11	16	1.05	
Psettodes erumei	2.73	2	0.92	
Lagocephalus guntheri	2.57	79	0.87	
Ariomma indicum	1.73	20	0.59	
Nemipterus bipunctatus	1.28	14	0.43	291
Selar crumenophthalmus	1.23	10	0.42	359
Nemipterus japonicus	1.09	14	0.37	292
Decapterus macrosoma	0.74	20	0.25	361
Thenus orientalis	0.59	6	0.20	
Upeneus moluccensis	0.54	10	0.18	293
Octopus sp.	0.35	6	0.12	
Halieutaea sp. A	0.35	6	0.12	
Total	295.28		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 97
DATE :30/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 19°2.57
start stop duration Lon E 36°32.35
TIME :08:18:31 08:41:37 23.1 (min) Purpose : 3
LOG : 4396.54 4397.90 1.4 Region : 7420
FDEPTH: 36 35 Gear cond.: 0
BDEPTH: 36 35 Validity : 0
Towing dir: 0° Wire out : 130 m Speed : 3.5 kn
Sorted : 98 Total catch: 985.42 Catch/hour: 2559.54

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Upeneus taeniopterus	1599.84	59714	62.51	303
Decapterus russelli	478.88	13190	18.71	297
Alepes kleinii	95.24	5	3.72	
Sardinella albella	87.75	2382	3.43	304
Loligo forbesi	85.88	1792	3.36	
Encrasicholina punctifer	84.27	19397	3.29	
Rastrelliger kanagurta	25.95	374	1.01	300
J E L L Y F I S H	25.15	81	0.98	
Secutor insidiator	19.80	803	0.77	298
Scomberomorus commerson	18.05	5	0.71	296
Sphyraena putnamie	8.49	26	0.33	
Saurida undosquamis	8.29	268	0.32	301
Pomadasys maculatus	6.69	55	0.26	
Terapon jarbua	5.62	55	0.22	
Carangoides malabaricus	4.01	106	0.16	302
Sphyraena jello	1.87	26	0.07	
Decapterus macrosoma	1.34	26	0.05	
Carangoides armatus	0.80	106	0.03	
Dussumieria acuta	0.80	55	0.03	299
Ariomma indicum	0.54	55	0.02	
Fistularia petimba	0.27	26	0.01	
Total	2559.54		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 98
DATE :30/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 18°51.48
start stop duration Lon E 36°29.22
TIME :10:53:18 11:21:10 27.9 (min) Purpose : 3
LOG : 4418.33 4419.98 1.6 Region : 7420
FDEPTH: 22 21 Gear cond.: 0
BDEPTH: 22 21 Validity : 0
Towing dir: 0° Wire out : 110 m Speed : 3.6 kn
Sorted : 0 Total catch: 450.22 Catch/hour: 969.26

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Trichiurus lepturus	446.39	21578	46.06	307
J E L L Y F I S H	116.71	280	12.04	
Otolithes ruber	96.00	2519	9.90	
Pellona ditchela	72.77	3890	7.51	
Thryssa vitrirostris	52.34	4898	5.40	
Gazza minuta	28.31	980	2.92	
Himantura gerrardi	26.48	4	2.73	
Sepia pharaonis	17.63	644	1.82	
Terapon theraps	16.23	196	1.67	
Krill	11.19	24629	1.15	
Polynemus sextarius**	10.91	532	1.13	
Pomadasys kaakan	10.57	13	1.09	
Carcharhinus sealei	9.92	22	1.02	
Johnius dussumieri	7.84	504	0.81	
Penaeus indicus	7.08	181	0.73	308
Metapenaeus monoceros	6.16	560	0.64	
Metapenaeus monoceros	4.61	267	0.48	309
Ariomma indicum	4.20	28	0.43	
Rhizoprionodon acutus	3.92	9	0.40	
Parastromateus niger	3.75	9	0.39	
Hilsa kelee	3.64	56	0.38	
Drepane longimana	1.96	112	0.20	
Portunus sanguinolento	1.68	28	0.17	
Mugil cephalus	1.40	28	0.14	
CARIDEA	1.40	560	0.14	
Sphyrna lewini	1.36	2	0.14	
Apogon quadrifasciatus**	1.12	84	0.12	
Cynoglossus lida	1.12	56	0.12	
Scylla serrata	0.95	2	0.10	
Scomberomorus plurilineatus	0.86	6	0.09	
Charybdis feriata	0.54	4	0.06	
Penaeus monodon	0.24	2	0.02	
Total	969.26		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 99
DATE :30/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 18°46.62
start stop duration Lon E 36°43.79
TIME :15:20:40 15:40:42 20.0 (min) Purpose : 3
LOG : 4450.03 4451.18 1.1 Region : 7420
FDEPTH: 30 33 Gear cond.: 0
BDEPTH: 30 33 Validity : 0
Towing dir: 0° Wire out : 110 m Speed : 3.4 kn
Sorted : 17 Total catch: 16.90 Catch/hour: 50.62

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Megalaspis cordyla	14.71	54	29.05	313
Loligo forbesi	5.69	186	11.24	
Scomberomorus commerson	4.64	3	9.17	
Terapon theraps	4.55	69	8.99	
J E L L Y F I S H	4.22	6	8.34	
Chirocentrus nudus	4.01	6	7.93	
Trichiurus lepturus	3.98	39	7.87	315
Sepia sp	3.47	63	6.86	
Carcharhinus sealei	2.10	3	4.14	
Saurida undosquamis	0.96	6	1.89	312
Pellona ditchela	0.87	60	1.72	310
Hilsa kelee	0.54	9	1.07	311
Lagocephalus guntheri	0.39	9	0.77	
Portunus sanguinolento	0.27	6	0.53	
Upeneus bensasi	0.15	6	0.30	314
Charybdis feriata	0.03	3	0.06	
Drepane punctata	0.03	3	0.06	
Total	50.62		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 100
DATE :30/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 18°56.69
start stop duration Lon E 36°56.69
TIME :18:06:27 18:36:40 30.2 (min) Purpose : 3
LOG : 4470.47 4472.09 1.6 Region : 7420
FDEPTH: 53 52 Gear cond.: 0
BDEPTH: 53 52 Validity : 0
Towing dir: 0° Wire out : 160 m Speed : 3.2 kn
Sorted : 26 Total catch: 76.61 Catch/hour: 152.15

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Decapterus russelli	24.43	628	16.06	325
Trachinocephalus myops	24.43	691	16.06	
Upeneus bensasi	21.09	655	13.86	321
Nemipterus bipunctatus	20.06	226	13.18	317
Penaeus latisulcatus	11.68	465	7.68	326
Upeneus taeniopterus	9.35	262	6.15	322
Torquigener hypselogenion	6.49	310	4.27	
Lactoria cornuta	5.36	18	3.52	
Loligo forbesi	5.30	149	3.49	
Selar crumenophthalmus	5.12	54	3.37	324
Sphyraena barracuda	3.04	36	2.00	319
Saurida undosquamis	2.32	24	1.53	320
Lutjanus vitta	2.09	71	1.37	
Lagocephalus guntheri	1.91	66	1.25	
Upeneus moluccensis	1.55	48	1.02	318
Apistus carinatus	1.49	119	0.98	
Thenus orientalis	1.31	12	0.86	
Bothus sp.	1.31	125	0.86	
Ostorhinchus apogonoides	1.01	310	0.67	
Decapterus macrosoma	0.89	18	0.59	327
Priacanthus hamrur	0.48	6	0.31	
Carangoides malabaricus	0.48	6	0.31	323
Octopus vulgaris	0.24	6	0.16	
Fistularia petimba	0.24	18	0.16	
Cociella crocodila	0.18	6	0.12	
Dactyloptena orientalis	0.12	6	0.08	
Halieutaea sp. A	0.12	6	0.08	
Samaris cristatus	0.06	6	0.04	
Total	152.15		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 101
DATE :30/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 19°1.42
start stop duration Lon E 37°4.57
TIME :20:54:32 21:24:40 30.1 (min) Purpose : 3
LOG : 4483.47 4485.03 1.6 Region : 7420
FDEPTH: 163 163 Gear cond.: 0
BDEPTH: 163 163 Validity : 0
Towing dir: 0° Wire out : 450 m Speed : 3.1 kn
Sorted : 13 Total catch: 12.93 Catch/hour: 25.75

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
MYCTOPHIDAE	3.05	257	11.83	
Ibacus novemdentatus	2.85	58	11.06	
Myliobatis aquila	2.77	2	10.75	
Monocentris japonica	2.55	24	9.90	
Uranoscopus archionema	2.29	28	8.89	
Citharichthys sp.	1.89	104	7.35	
Pseudorhombus arsius	1.57	44	6.11	
PORTUNIDAE	1.55	98	6.03	
Laemonema globiceps	1.04	74	4.02	
Parabothus cf. coarctus	0.94	36	3.63	
Caridea SA/MZ	0.82	82	3.17	
S H R I M P S	0.64	165	2.47	
Neoscombrops cynodon	0.54	14	2.09	
Squatina africana	0.54	2	2.09	
Bothus swio	0.42	24	1.62	
Tylerius spinosissimus	0.36	12	1.39	
Lepidotrigla alcocki	0.28	16	1.08	
Parascolopsis eriomma	0.28	2	1.08	
Paratrachichthys sajademahalensis	0.28	46	1.08	
Ariomma indicum	0.18	2	0.70	
Cubiceps whiteleggii	0.18	2	0.70	
Champsodon capensis	0.16	34	0.62	
Ariosoma cf mauritianum	0.16	2	0.62	
Cynoglossus cf lida	0.16	8	0.62	
Penaeus latisulcatus	0.10	6	0.39	
Synagrops japonicus	0.08	2	0.31	
Polymixia nobilis	0.06	6	0.23	
Rexea prometheoides	0.04	2	0.15	
Total	25.75		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 102
DATE :01/12/14 GEAR TYPE: BT NO: 27 POSITION:Lat S 18°59.34
start stop duration Lon E 37°10.12
TIME :00:51:42 01:25:59 34.3 (min) Purpose : 3
LOG : 4499.81 4501.70 1.9 Region : 7420
FDEPTH: 503 504 Gear cond.: 0
BDEPTH: 503 504 Validity : 0
Towing dir: 0° Wire out : 1200 m Speed : 3.3 kn
Sorted : 43 Total catch: 43.00 Catch/hour: 75.26

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Chlorophthalmus agassizi	27.93	576	37.12	
Haliporoides triarthrus	12.43	432	16.51	329
Caelorinchus trunovi	10.33	60	13.72	
Diaphus effulgens	4.76	119	6.33	
Squalus megalops	4.59	2	6.09	
Lophiodes insidiator	2.77	4	3.67	
Plesionika martia	2.73	91	3.63	
Lophiodes kempi	2.31	2	3.07	
Halaelurus lutarius	1.61	9	2.14	
Nephropsis stewarti	0.75	21	1.00	332
Aristaeomorpha foliacea	0.60	18	0.79	328
Malacocephalus laevis	0.54	23	0.72	
ISOPODS	0.54	53	0.72	
Ommastrephes pteropus	0.39	2	0.51	
Etmopterus sentosus**	0.37	5	0.49	
Neoscombrops cynodon	0.33	2	0.44	
Saurida undosquamis	0.32	2	0.42	
Metanephrops mozambicus	0.30	5	0.40	330
Aristeus antennatus	0.26	5	0.35	331
Penaeopsis balssi	0.18	16	0.23	
Peristedion cf weberi	0.16	9	0.21	
Chaunax sp.	0.16	2	0.21	
Laemonema globiceps	0.16	4	0.21	
MYCTOPHIDAE	0.16	70	0.21	
Polymetme corythaeola	0.16	9	0.21	
Hoplostethus mediterraneus	0.12	5	0.16	
Heterocarpus woodmasoni	0.09	9	0.12	
Benthodesmus elongatus	0.07	2	0.09	
Astronesthes martensii	0.05	4	0.07	
Zenion hololepis	0.04	2	0.05	
Ophichthus marginatus	0.04	2	0.05	
Malacocephalus occidentalis	0.04	4	0.05	
Champsodon capensis	0.02	2	0.02	
Total	75.26		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 103
DATE :01/12/14 GEAR TYPE: BT NO: 27 POSITION:Lat S 18°44.43
start stop duration Lon E 37°15.48
TIME :06:36:51 07:06:56 30.1 (min) Purpose : 3
LOG : 4539.93 4541.30 1.4 Region : 7420
FDEPTH: 308 314 Gear cond.: 0
BDEPTH: 308 314 Validity : 0
Towing dir: 0° Wire out : 700 m Speed : 2.7 kn
Sorted : 28 Total catch: 28.19 Catch/hour: 56.23

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Narcine rierai	22.18	168	39.45	
Palinurus delagoae	5.66	8	10.07	334
Sepia sp	5.01	106	8.90	0
Ibacus novemdentatus	3.67	46	6.53	
Saurida undosquamis	3.43	38	6.10	333
Loligo forbesi	3.29	52	5.85	
Champsodon capensis	2.85	247	5.07	
Citharoides macrolepis	2.25	24	4.01	
Chaunax sp.	1.70	8	3.02	
Antigonia rubescens	1.62	94	2.87	
Rexea prometheoides	1.18	16	2.09	0
Scyllarides elisabethae	0.72	2	1.28	
Tylerius spinosissimus	0.64	8	1.14	
Zenion sp.	0.46	162	0.82	0
Chlorophthamus sp. juv	0.38	18	0.67	
Cynoglossus lida	0.30	12	0.53	
Anacanthobatis marmoratus	0.20	2	0.35	
Polysteganus coeruleopunctatus	0.20	2	0.35	
Ophididae 'spot nose'	0.14	4	0.25	
Halieutaea sp. A	0.12	2	0.21	
Zenion sp.	0.10	10	0.18	
Laeops sp.	0.10	2	0.18	
Hoplichthys acanthopleurus	0.02	2	0.04	
BRAMIDAE, juvenile	0.02	2	0.04	
Total	56.23		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 104
DATE :12/11/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 18°37.40
start stop duration Lon E 37°6.60
TIME :15:31:50 16:00:15 28.4 (min) Purpose : 3
LOG : 4558.81 4560.54 1.7 Region : 7420
FDEPTH: 40 42 Gear cond.: 0
BDEPTH: 40 42 Validity : 0
Towing dir: 0° Wire out : 120 m Speed : 3.6 kn
Sorted : 61 Total catch: 61.37 Catch/hour: 129.55

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Rachycentron canadum	55.10	8	42.53	
PORIFERA (Sponges)	47.38	0	36.57	
Teixeirichthys jordani	8.51	654	6.57	
Equulites elongatus	7.87	737	6.08	340
Nemipterus bipunctatus	2.24	23	1.73	335
Decapterus russelli	1.67	228	1.29	339
Parupeneus cinnabaricus	1.48	21	1.14	336
Parupeneus nansen	1.35	27	1.04	
Letrinidae sp. ***	0.89	17	0.68	
Thenus sp.	0.72	4	0.55	
Gymnocranius griseus	0.51	6	0.39	
Lagocephalus guntheri	0.46	19	0.36	
Tetrosomus concatenatus	0.42	2	0.33	
Priacanthus hamrur	0.27	6	0.21	
Saurida undosquamis	0.23	2	0.18	337
Octopus vulgaris	0.17	2	0.13	
Loligo forbesi	0.11	6	0.08	
Upeneus bensasi	0.08	6	0.07	338
Trachinocephalus myops	0.04	2	0.03	
Amblyrhynchotes honkenii	0.04	2	0.03	
Epinephelus areolatus	0.01	2	0.01	
Total	129.55		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 105
DATE :01/12/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 18°31.73
start stop duration Lon E 36°58.93
TIME :17:30:11 17:50:43 20.5 (min) Purpose : 3
LOG : 4573.16 4574.46 1.3 Region : 7420
FDEPTH: 31 32 Gear cond.: 0
BDEPTH: 31 32 Validity : 0
Towing dir: 0° Wire out : 110 m Speed : 3.8 kn
Sorted : 46 Total catch: 46.40 Catch/hour: 135.61

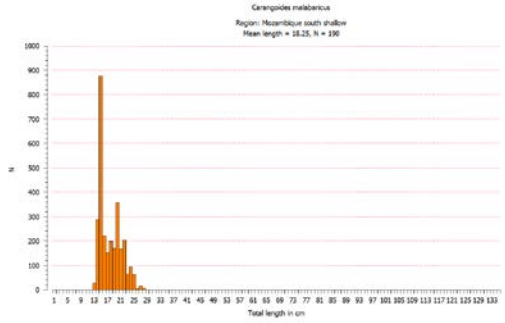
SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Decapterus macrosoma	57.40	0	42.33	344
Decapterus russelli	56.41	1566	41.59	342
Upeneus bensasi	8.10	424	5.97	343
Nemipterus bipunctatus	6.02	73	4.44	341
Trachinocephalus myops	4.06	170	3.00	
Sepia sp	1.43	20	1.06	
Priacanthus hamrur	0.56	6	0.41	
Lactoria cornuta	0.53	3	0.39	
Rastrelliger kanagurta	0.41	6	0.30	345
Bothus sp.	0.26	18	0.19	
Loligo forbesi	0.20	3	0.15	
Cheilopogon pinnatibarbatus	0.12	3	0.09	
Penaeus latisulcatus	0.06	3	0.04	346
Portunus pelagicus	0.06	3	0.04	
Total	135.61		100.00	

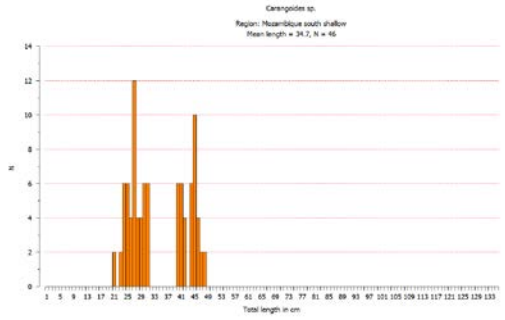
R/V Dr. Fridtjof Nansen SURVEY:2014406 STATION: 106
DATE :01/12/14 GEAR TYPE: BT NO: 26 POSITION:Lat S 18°23.00
start stop duration Lon E 36°52.24
TIME :19:59:11 20:26:04 26.9 (min) Purpose : 3
LOG : 4589.18 4590.68 1.5 Region : 7420
FDEPTH: 24 24 Gear cond.: 0
BDEPTH: 24 24 Validity : 0
Towing dir: 0° Wire out : 110 m Speed : 3.3 kn
Sorted : 25 Total catch: 90.88 Catch/hour: 202.86

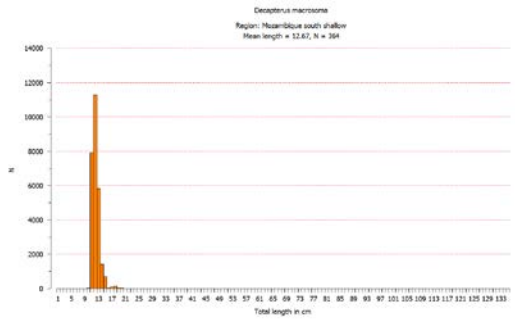
SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Otolithes ruber	80.36	1614	39.61	353
J E L L Y F I S H	28.88	13	14.24	
Thryssa vitrirostris	21.16	2089	10.43	349
Polynemus sextarius**	12.86	556	6.34	
Pomadasys kaakan	7.70	33	3.80	352
Trichiurus lepturus	7.43	174	3.66	355
Sepia sp	5.96	469	2.94	
Penaeus indicus	5.22	223	2.57	356
Portunus sanguinolento	4.96	80	2.44	
Metapenaeus monoceros	4.15	321	2.05	357
Rhynchobatus djiddensis	3.66	2	1.80	
Upeneus sulphureus	3.21	94	1.58	347
Carcharhinus sp.	2.46	4	1.21	
Pomadasys maculatus	2.28	228	1.12	354
Johnius dussumieri	1.88	107	0.92	348
Mustelus manazo	1.79	4	0.88	
Drepane punctata	1.74	127	0.86	
Portunus pelagicus	1.34	7	0.66	
Penaeus japonicus	1.27	67	0.63	358
Cociella crocodila	0.87	54	0.43	
Cynoglossus cf lida	0.80	40	0.40	
Leiognathus equulus	0.67	7	0.33	
Sillago sihama	0.60	27	0.30	
Upeneus taeniopterus	0.54	13	0.26	351
Apogon quadrifasciatus**	0.40	154	0.20	
Matuta cf lunaris	0.40	40	0.20	
Pellona ditchela	0.07	7	0.03	350
Trypauchen microcephalus	0.07	47	0.03	
Charybdis feriata	0.07	7	0.03	
Callionymus sp.	0.07	13	0.03	
Total	202.86		100.00	

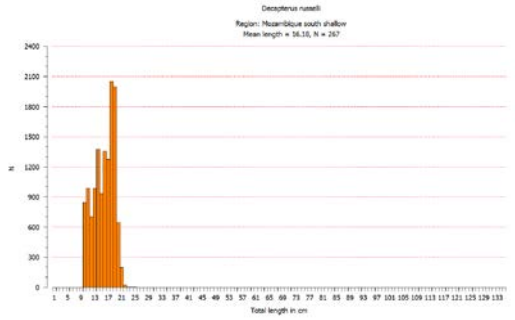
ANNEX II LENGTH FREQUENCY PER REGION

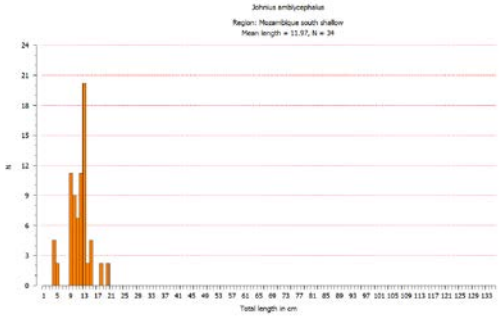
South

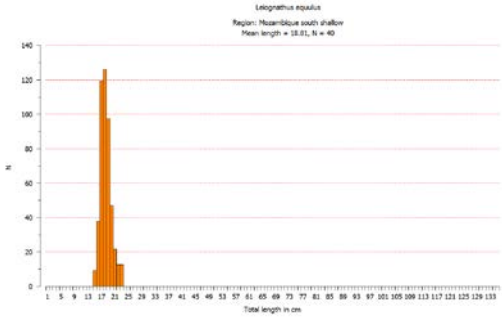


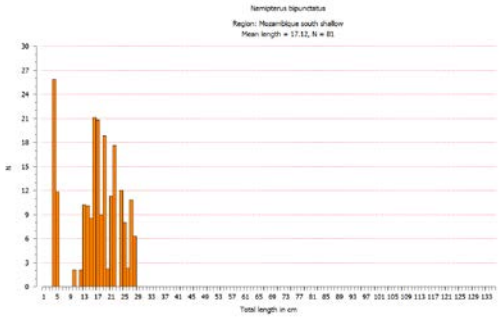


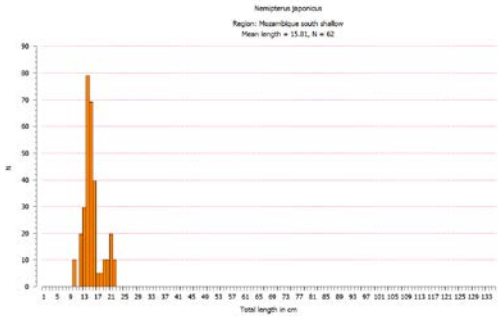


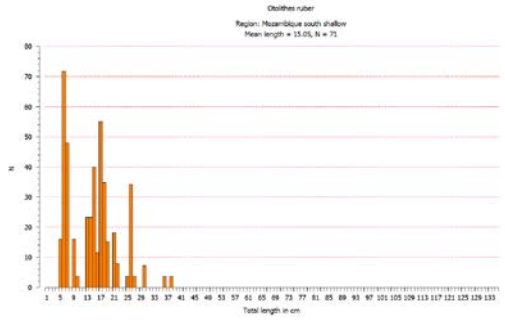


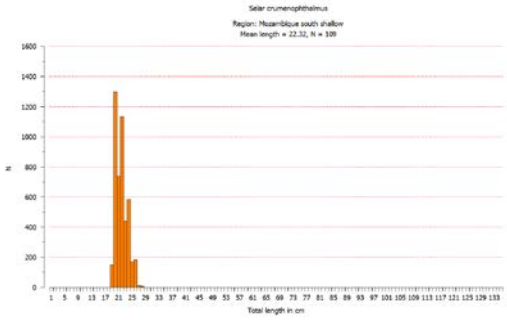


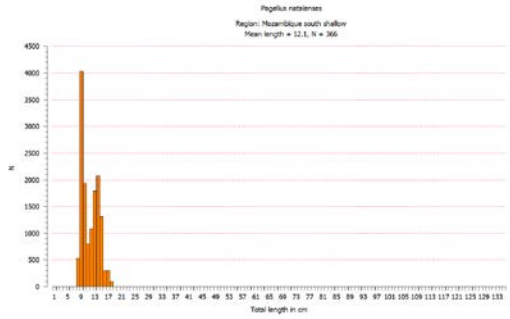


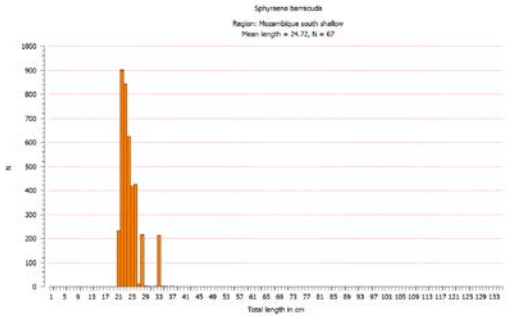


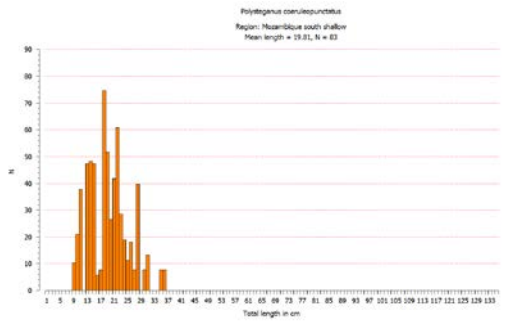


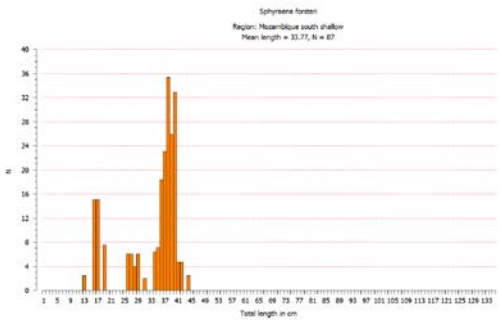

Otolithes ruber
Region: Mozambique south shallow
Mean length = 15.05, N = 71
N
Total length in cm

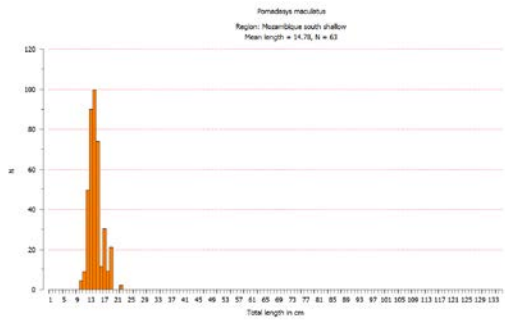

Selar crumenophthalmus
Region: Mozambique south shallow
Mean length = 22.32, N = 109
N
Total length in cm

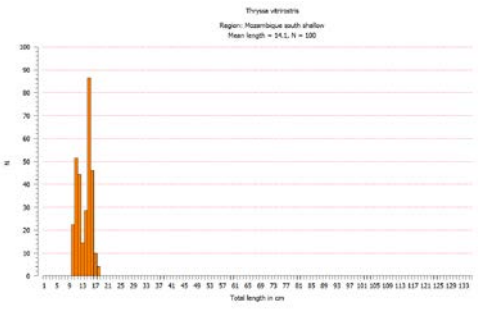

Pegelus natalensas
Region: Mozambique south shallow
Mean length = 12.1, N = 366
N
Total length in cm

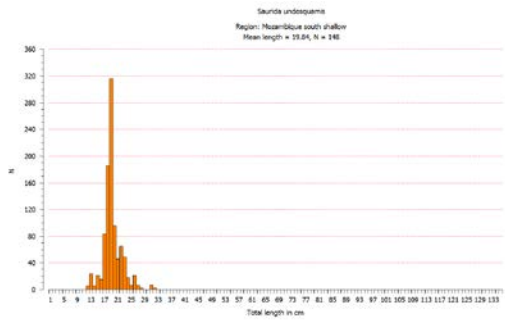

Sphyraena barracuda
Region: Mozambique south shallow
Mean length = 24.72, N = 67
N
Total length in cm

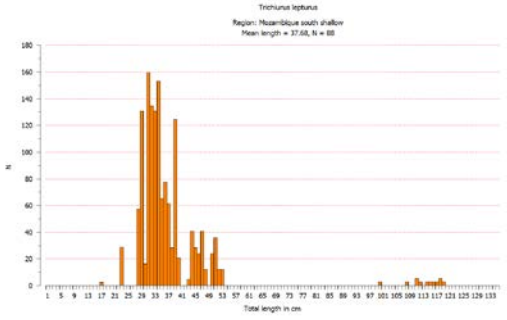

Polyteganus coeruleopunctatus
Region: Mozambique south shallow
Mean length = 19.81, N = 83
N
Total length in cm

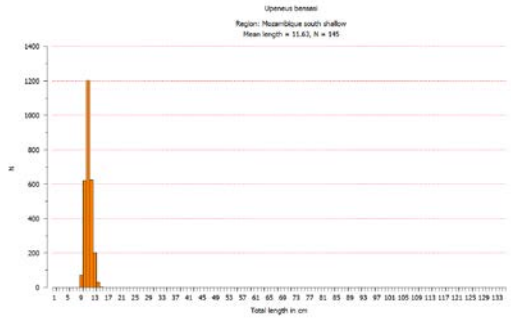

Sphyraena forsteri
Region: Mozambique south shallow
Mean length = 33.77, N = 87
N
Total length in cm

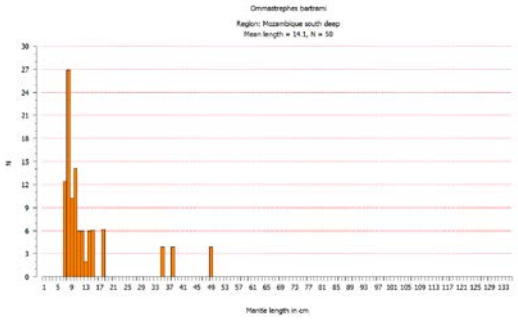

Pomadasys maculatus
Region: Mozambique south shallow
Mean length = 14.78, N = 63
N
Total length in cm

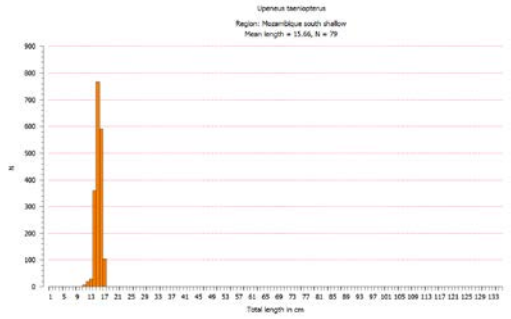

Thrysa vitrirostris
Region: Mozambique south shallow
Mean length = 14.1, N = 100
N
Total length in cm

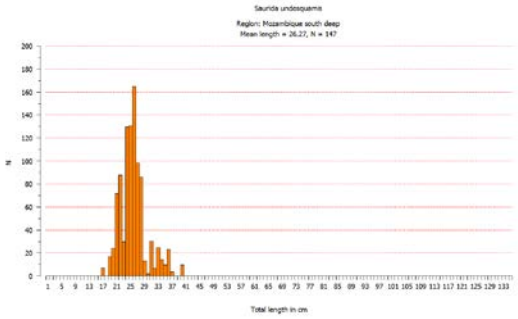

Saurida undosquamis
Region: Mozambique south shallow
Mean length = 19.84, N = 146
N
Total length in cm

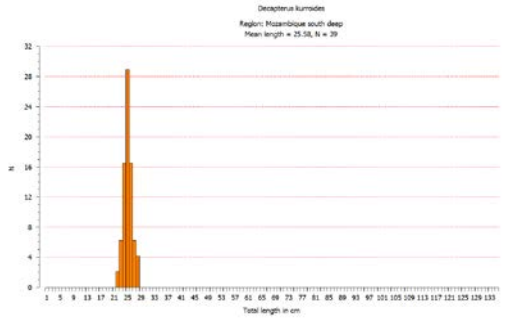

Trichiurus lepturus
Region: Mozambique south shallow
Mean length = 37.68, N = 88
N
Total length in cm

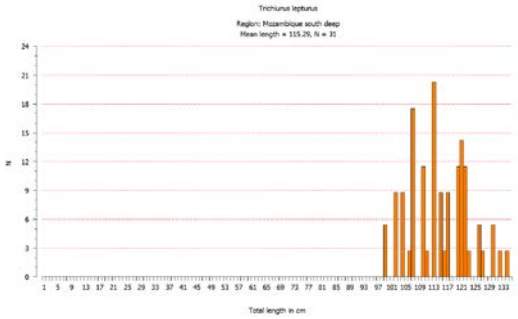

Upeneus bensasi
Region: Mozambique south shallow
Mean length = 11.63, N = 145
N
Total length in cm

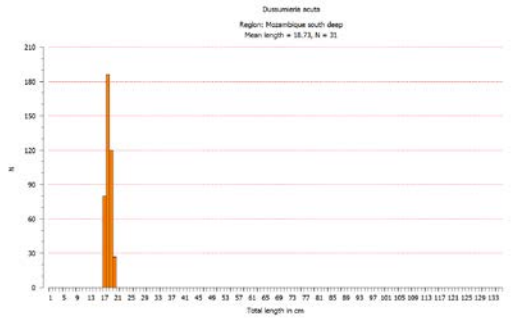

Ommastrephes bartrami
Region: Mozambique south deep
Mean length = 14.1, N = 50
N
Mantle length in cm


Upeneus taeniopterus
Region: Mozambique south shallow
Mean length = 15.66, N = 79
N
Total length in cm

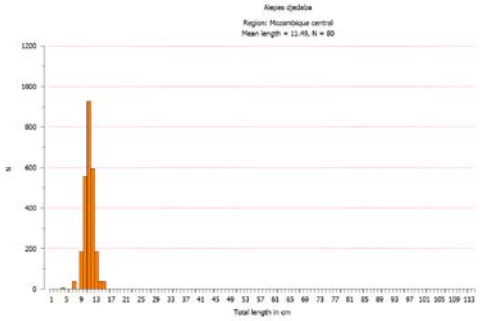

Saurida undosquamis
Region: Mozambique south deep
Mean length = 26.27, N = 147
N
Total length in cm

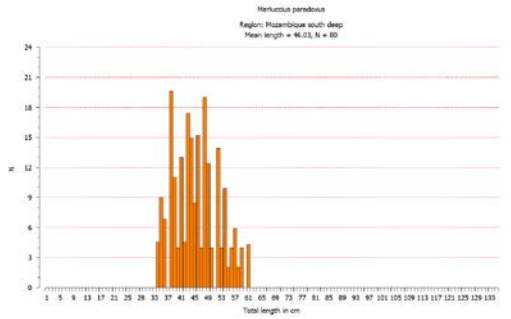

Decapterus kurroides
Region: Mozambique south deep
Mean length = 25.58, N = 39
N
Total length in cm

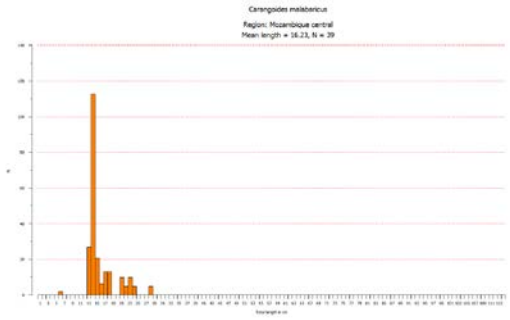

Trichiurus lepturus
Region: Mozambique south deep
Mean length = 115.29, N = 31
N
Total length in cm

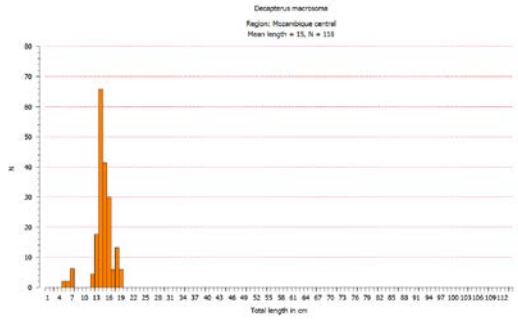

Dussumieria acuta
Region: Mozambique south deep
Mean length = 18.73, N = 31
N
Total length in cm

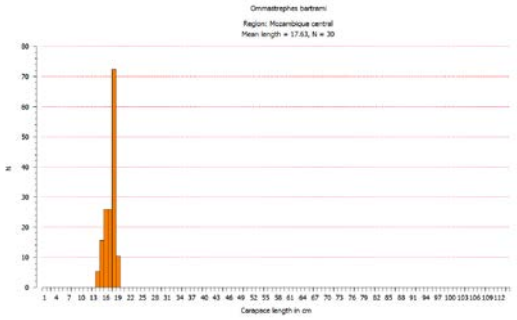
Central

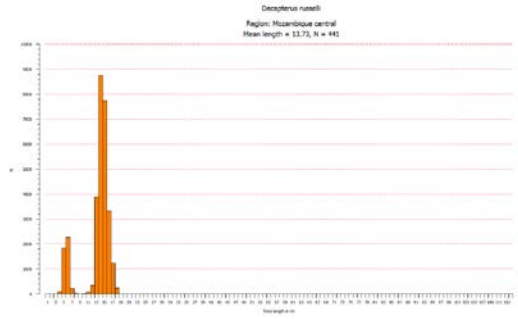

Alepes djedaba
Region: Mozambique central
Mean length = 11.49, N = 80
N
Total length in cm

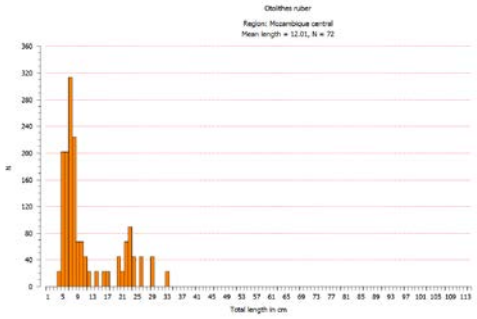

Herklotsichthys punctatus
Region: Mozambique south deep
Mean length = 46.03, N = 80
N
Total length in cm

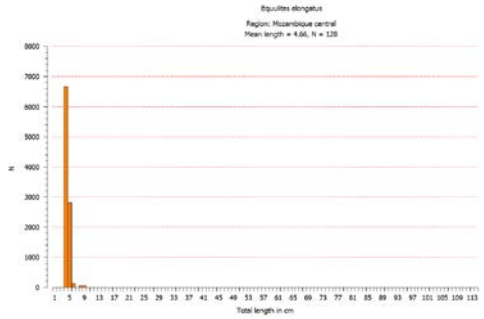

Carangoides malabaricus
Region: Mozambique central
Mean length = 16.23, N = 39

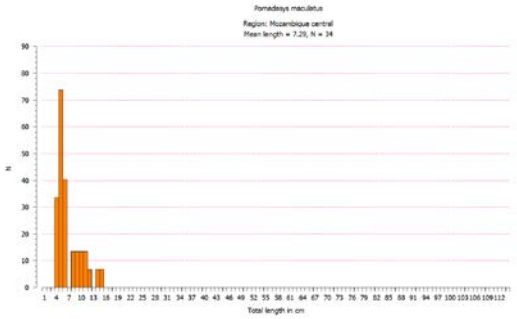

Decapterus macrosoma
Region: Mozambique central
Mean length = 15, N = 110
N
Total length in cm

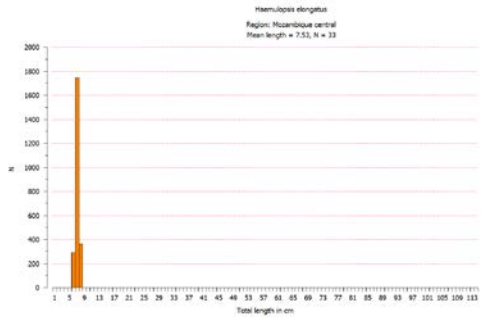

Ommastrephes bartrami
Region: Mozambique central
Mean length = 17.63, N = 30
N
Carapace length in cm

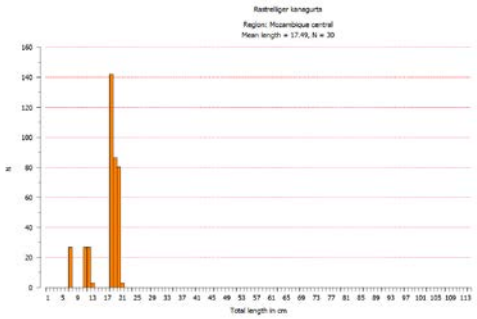

Decapterus russelli
Region: Mozambique central
Mean length = 13.73, N = 441

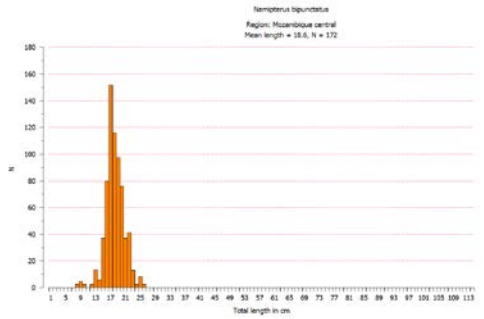

Otolithes ruber
Region: Mozambique central
Mean length = 12.01, N = 72
N
Total length in cm

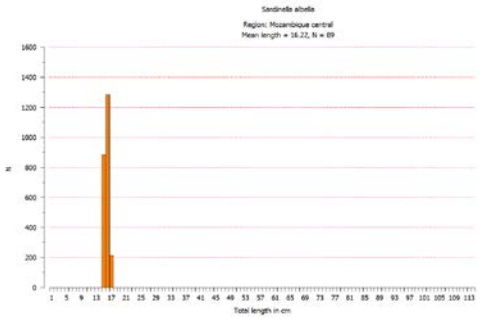

Etquilites elongatus
Region: Mozambique central
Mean length = 4.66, N = 128
N
Total length in cm

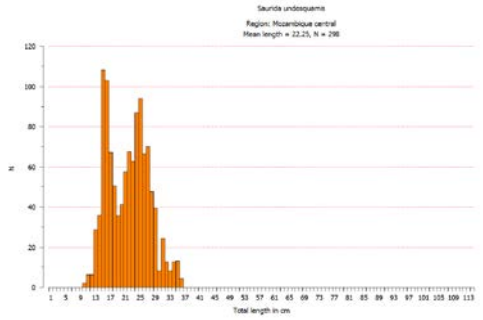

Pomadasys maculatus
Region: Mozambique central
Mean length = 7.29, N = 34
N
Total length in cm

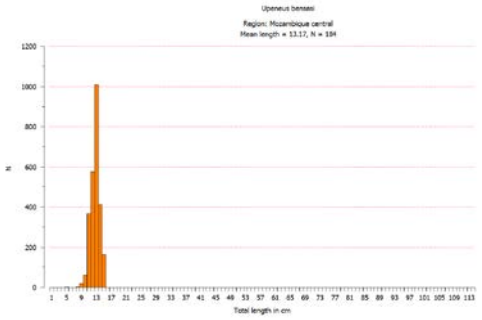

Haemulopsis elongatus
Region: Mozambique central
Mean length = 7.53, N = 33
N
Total length in cm

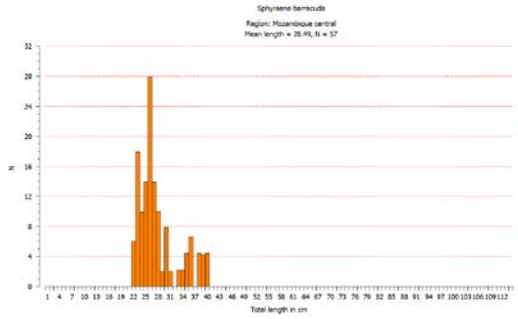

Rastrelliger kanagurta
Region: Mozambique central
Mean length = 17.49, N = 30
N
Total length in cm

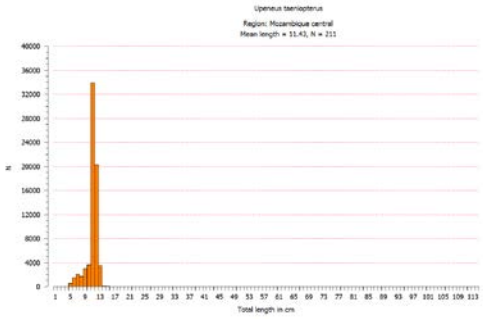

Nemipterus bipunctatus
Region: Mozambique central
Mean length = 18.6, N = 172
N
Total length in cm

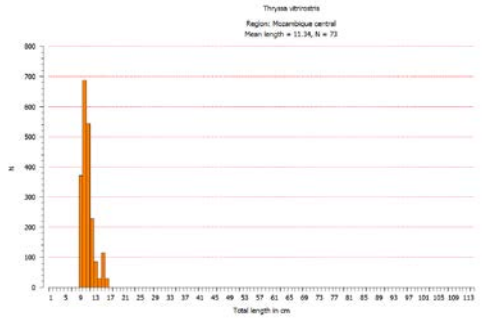

Sardinella albella
Region: Mozambique central
Mean length = 16.22, N = 89
N
Total length in cm

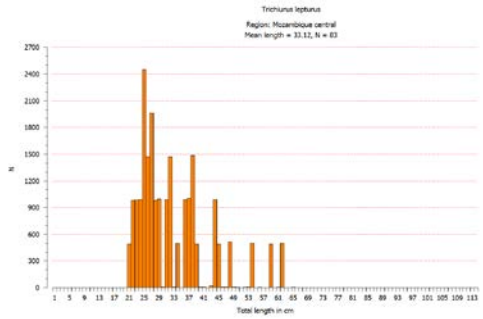

Saurida undosquamis
Region: Mozambique central
Mean length = 22.25, N = 298
N
Total length in cm


Upeneus bensasi
Region: Mozambique central
Mean length = 13.17, N = 194
N
Total length in cm


Sphyraena barracuda
Region: Mozambique central
Mean length = 28.49, N = 57
N
Total length in cm


Upeneus taeniopterus
Region: Mozambique central
Mean length = 11.43, N = 211
N
Total length in cm


Thryssa vitrirostris
Region: Mozambique central
Mean length = 11.34, N = 73
N
Total length in cm


Trichiurus lepturus
Region: Mozambique central
Mean length = 33.12, N = 83
N
Total length in cm

ANNEX III. INSTRUMENTS AND FISHING GEAR USED

Echo sounder

The SIMRAD ER60/38 kHz scientific sounder was used during the survey for fish abundance estimation. The LSSS Integrator system was used to scrutinise the acoustic records. Last calibration date of the 38 kHz ER60 echosounder was 05.07.2014 in Angola and the calibration results were as follows:

Vessel :	R/V Dr. Fridtjof Nansen		Date :	05.07.2014	
Transducer:	DFNer60-2		Area :	Elefant bay, Angola	
Sphere :	CU-60	TS_{sphere}: -33.60 dB	Depth :	28	m

Calibration Version 2.1.0.12

Comments:

Reference Target:

TS	-33.60 dB	Min. Distance	16.00 m
TS Deviation	3.0 dB	Max. Distance	21.00 m

Transducer: ES38B Serial No. 38

Frequency	38000 Hz	Beamtype	Split
Gain	26.13 dB	Two Way Beam Angle	-20.6 dB
Athw. Angle Sens.	21.90	Along. Angle Sens.	21.90
Athw. Beam Angle	6.95 deg	Along. Beam Angle	6.75 deg
Athw. Offset Angle	0.05 deg	Along. Offset Angl	0.11 deg
SaCorrection	-0.71 dB	Depth	5.50 m

Transceiver: GPT 38 kHz 009072057b8a 2-1 ES38B

Pulse Duration	1.024 ms	Sample Interval	0.194 m
Power	2000 W	Receiver Bandwidth	2.43 kHz

Sounder Type:

EK60 Version 2.4.3

TS Detection:

Min. Value	-50.0 dB	Min. Spacing	100 %
Max. Beam Comp.	6.0 dB	Min. Echolength	80 %
Max. Phase Dev.	8.0	Max. Echolength	180 %

Environment:

Absorption Coeff.	9.6 dB/km	Sound Velocity	1517.0 m/s

Beam Model results:

Transducer Gain =	25.83 dB	SaCorrection =	-0.56 dB
Athw. Beam Angle =	6.66 deg	Along. Beam Angle =	6.60 deg
Athw. Offset Angle =	0.04 deg	Along. Offset Angle=	0.11 deg

Data deviation from beam model:

RMS = 0.21 dB
Max = 0.56 dB No. = 315 Athw. = 3.0 deg Along = 2.6 deg
Min = -0.66 dB No. = 377 Athw. = -0.2 deg Along = 3.7 deg

Data deviation from polynomial model:

RMS = 0.19 dB
Max = 0.44 dB No. = 376 Athw. = -0.1 deg Along = 3.7 deg
Min = -0.63 dB No. = 377 Athw. = -0.2 deg Along = 3.7 deg

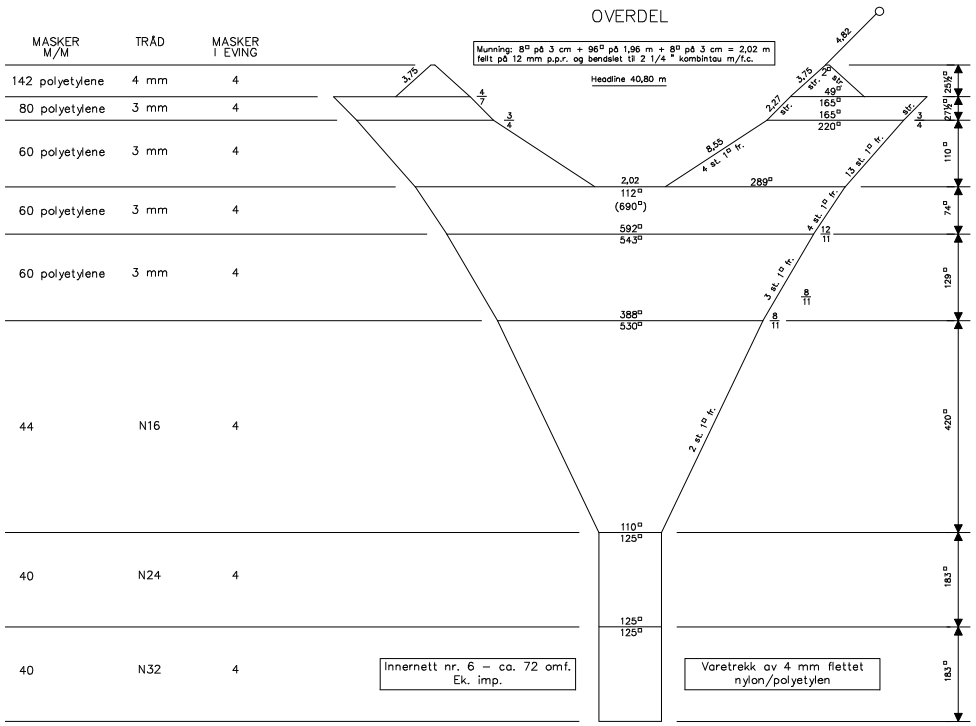
Fishing gear
The vessel has both “Harstad” and "Åkrahamn" pelagic trawls and a "Gisund super bottom trawl".

The bottom trawl has a headline of 31 m, footrope 47 m and 20 mm mesh size in the cod end with an inner net of 10 mm mesh size (see drawings below). The estimated opening is 6 m (observed 5.7) and distance between wings during towing about 18 m. The sweeps are 40 m long. The trawl is equipped with a 12" rubber bobbins gear. The doors are of 'Thyborøn' combi type, 7.81 m^2, 1670 kg, their distance while trawling about 45 - 55 m on average, depending on the depth (least distance at low depths). This distance can be kept constant (about 50 m) at all depths by the use of a 9.5 m strap between the wires at 130 m distance from the doors, normally applied at depths greater than 80 m.

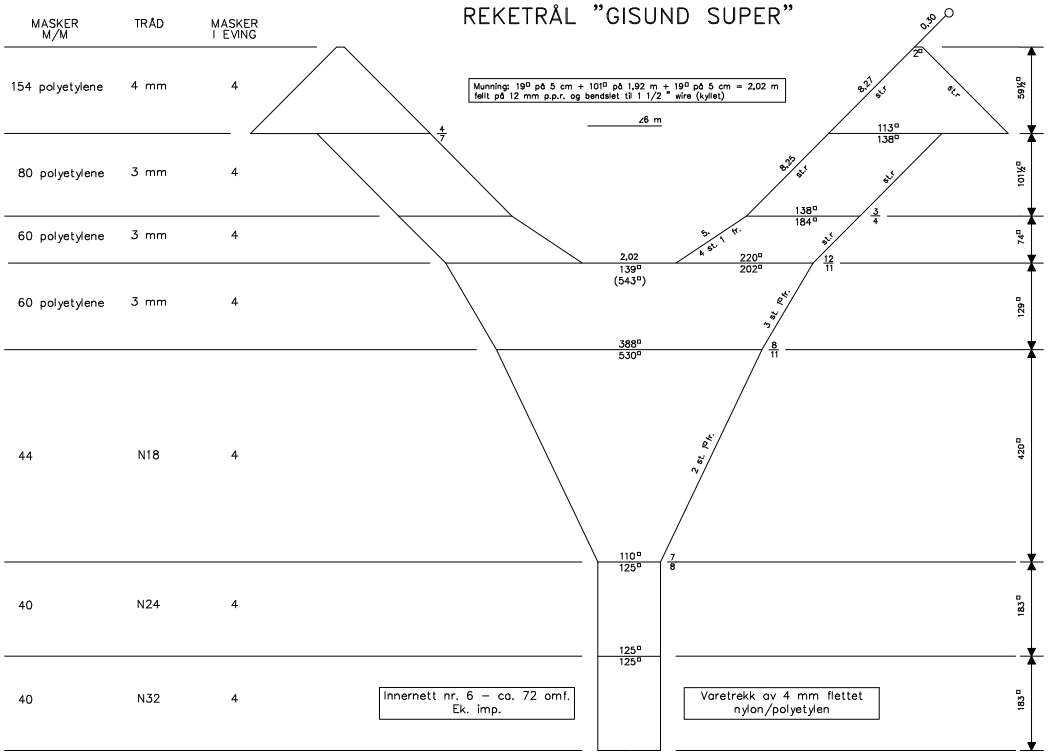
The SCANBAS system was used on all trawl hauls. This equipment consists of sensors, a hydrophone, a receiver, a display unit and a battery charger. Communication between sensors and ship is based on acoustic transmission. The doors are fitted with sensors to provide information on their distance and the trawl with a trawl eye that provides information on the trawl opening, the distance of the footrope to the bottom, bottom contact and fish entering the trawl.

REKETRÅL "GISUND SUPER"

OVERDEL



REKETRÅL "GISUND SUPER"



ANNEX IV ZOOPLANKTON BIOMASS

Results from the laboratory measurements of the zooplankton size fractions.

Sta.	Year	Mo.	Day	Time	Lat.	Long.	Equip	Bottom Depth	Upper Depth	Lower Depth	Vol.	GT2000 dw	1000-2000 dw	LT1000 dw	Sum dw	Unit
936	2014	11	12	525	-26.8278	32.9105	WP II-	32	0	25	6.25	0.008	0.0272	0.2832	0.3184	g/m2
938	2014	11	12	920	-26.8288	32.9588	WP II-	113	0	100	25	0.1024	0.0568	0.4544	0.6136	g/m2
940	2014	11	12	1400	-26.834	33.081	WP II-	512	0	200	50	0.864	1.5048	1.336	3.7048	g/m2
951	2014	11	14	1535	-25.8305	34.7477	WP II-	480	0	200	50	1.5704	2.2744	3.8632	7.708	g/m2
956	2014	11	15	1040	-25.8148	33.1405	WP II-	117	0	100	25	0.1056	0.2432	1.1552	1.504	g/m2
958	2014	11	15	1500	-25.8125	32.973	WP II-	18	0	15	3.75	0.1304	0.5944	1.9352	2.66	g/m2
971	2014	11	17	2230	-24.9358	34.5545	WP II-	36	0	30	7.5	0.1704	0.8336	1.848	2.852	g/m2
973	2014	11	18	555	-25.1875	35.02	WP II-	104	0	100	25	0.6496	0.9872	1.4512	3.088	g/m2
974	2014	11	18	945	-25.2933	35.2308	WP II-	507	0	200	50	0.3232	0.1992	0.612	1.1344	g/m2
986	2014	11	20	40	-24.464	35.6242	WP II-	587	0	200	50	2.604	4.392	3.0552	10.0512	g/m2
988	2014	11	20	745	-24.4217	35.4403	WP II-	100	0	100	25	0.2768	1.0672	1.0256	2.3696	g/m2
990	2014	11	20	1215	-24.3893	35.3163	WP II-	34	0	25	6.25	0.4792	1.9064	4.7888	7.1744	g/m2
998	2014	11	21	1103	-23.585	35.4822	MultiN	37	0	25.3	6.325	0.013913	0.036174	0.146024	0.196111	g/m3
998	2014	11	21	1050	-23.585	35.4822	WP II-	37	0	30	7.5	0.3592	1.4336	1.852	3.6448	g/m2
1000	2014	11	21	1510	-23.588	35.6303	MultiN	103	75.5	87.5	3	0.013067	0.011	0.037	0.061067	g/m3
1000	2014	11	21	1512	-23.588	35.6303	MultiN	103	50.1	75.5	6.35	0.00611	0.017134	0.00926	0.032504	g/m3
1000	2014	11	21	1513	-23.588	35.6303	MultiN	103	25.4	49.7	6.075	0.002996	0.00372	0.009317	0.016033	g/m3
1000	2014	11	21	1514	-23.588	35.6303	MultiN	103	0.7	25.2	6.125	0.001078	0.001894	0.010416	0.013388	g/m3
1000	2014	11	21	1445	-23.588	35.6303	WP II-	103	0	100	25	0.78	0.7592	0.9816	2.5208	g/m2
1002	2014	11	21	2006	-23.5842	35.8492	MultiN	512	100.5	201	25.125	0.001504	0.002754	0.001282	0.00554	g/m3
1002	2014	11	21	2008	-23.5842	35.8492	MultiN	512	75.4	100.4	6.25	0.000864	0.001792	0.009472	0.012128	g/m3
1002	2014	11	21	2010	-23.5842	35.8492	MultiN	512	49.9	75.5	6.4	0.001219	0.001656	0.009313	0.012188	g/m3
1002	2014	11	21	2012	-23.5842	35.8492	MultiN	512	25.5	49.8	6.075	0.00665	0.00823	0.009778	0.024658	g/m3
1002	2014	11	21	2014	-23.5842	35.8492	MultiN	512	1.1	25.4	6.075	0.010305	0.0133	0.010206	0.033811	g/m3

1002	2014	11	21	1900	-23.5842	35.8492	WP II-	512	0	200	50	0.8328	0.5944	0.9408	2.368	g/m2
1012	2014	11	23	459	-22.6105	35.8397	MultiN	496	100.6	198.8	24.55	0.000521	0.002257	0.001556	0.004334	g/m3
1012	2014	11	23	500	-22.6105	35.8397	MultiN	496	75.2	100.2	6.25	0.001664	0.0056	0.01152	0.018784	g/m3
1012	2014	11	23	501	-22.6105	35.8397	MultiN	496	49.8	74.9	6.275	0.004653	0.008414	0.012876	0.025943	g/m3
1012	2014	11	23	504	-22.6105	35.8397	MultiN	496	0	25	6.25	0.001088	0.006976	0.01648	0.024544	g/m3
1012	2014	11	23	400	-22.6105	35.8397	WP II-	496	0	200	50	0.3968	0.336	0.8424	1.5752	g/m2
1014	2014	11	23	830	22.6115	35.6128	MultiN	106	76.4	90.6	3.55	0.005803	0.004282	0.016958	0.027043	g/m3
1014	2014	11	23	831	22.6115	35.6128	MultiN	106	52.8	76.5	5.925	0.0027	0.011004	0.01043	0.024134	g/m3
1014	2014	11	23	832	22.6115	35.6128	MultiN	106	24.7	52.3	6.9	0.001652	0.002406	0.012058	0.016116	g/m3
1014	2014	11	23	833	22.6115	35.6128	MultiN	106	0.2	23.8	5.9	0.000542	0.001966	0.013797	0.016305	g/m3
1014	2014	11	23	810	22.6115	35.6128	WP II-	106	0	100	25	0.3216	0.7656	0.8632	1.9504	g/m2
1016	2014	11	23	1024	-22.608	35.5695	MultiN	25	0.5	21.7	5.3	0.010377	0.046792	0.02683	0.083999	g/m3
1016	2014	11	23	1010	-22.608	35.5695	WP II-	25	0	25	6.25	0.4208	0.7112	0.5416	1.6736	g/m2
1024	2014	11	24	1023	-21.6093	35.5147	MultiN	40	0.7	25.7	6.25	3.20E-05	0.00384	0.013024	0.016896	g/m3
1024	2014	11	24	1000	-21.6093	35.5147	WP II-	40	0	30	7.5	0.5968	0.74	0.98	2.3168	g/m2
1026	2014	11	24	1138	-21.6123	35.5385	MultiN	145	77.4	98.4	5.25	0.02579	0.1224	0.033943	0.182133	g/m3
1026	2014	11	24	1140	-21.6123	35.5385	MultiN	145	50.7	76.8	6.525	0.011096	0.08564	0.022038	0.118774	g/m3
1026	2014	11	24	1142	-21.6123	35.5385	MultiN	145	26.8	50.3	5.875	0.017055	0.051132	0.066826	0.135013	g/m3
1026	2014	11	24	1143	-21.6123	35.5385	MultiN	145	0.2	26.6	6.6	0.050545	0.048424	0.115545	0.214514	g/m3
1026	2014	11	24	1105	-21.6123	35.5385	WP II-	145	0	100	25	1.2944	2.5504	2.4576	6.3024	g/m2
1028	2014	11	24	1528	21.6093	35.66	MultiN	502	99.7	201.8	25.525	0.000329	8.60E-05	0.001371	0.001786	g/m3
1028	2014	11	24	1529	21.6093	35.66	MultiN	502	75.3	99.3	6	6.70E-05	0.000567	0.0068	0.007434	g/m3
1028	2014	11	24	1531	21.6093	35.66	MultiN	502	50.5	75.4	6.225	0.000482	0.000675	0.008032	0.009189	g/m3
1028	2014	11	24	1533	21.6093	35.66	MultiN	502	25.5	50.3	6.2	0.002355	0.000516	0.011903	0.014774	g/m3
1028	2014	11	24	1535	21.6093	35.66	MultiN	502	0.2	25.4	6.3	0.015079	0.000603	0.014032	0.029714	g/m3
1028	2014	11	24	1440	21.6093	35.66	WP II-	502	0	200	50	1.2336	2.328	3.3176	6.8792	g/m2
1035	2014	11	25	1420	-20.6157	35.9078	MultiN	502	100.5	202.4	25.475	0.003745	0.004075	0.016031	0.023851	g/m3
1035	2014	11	25	1421	-20.6157	35.9078	MultiN	502	76.5	100.2	5.925	0.002025	0.003004	0.005806	0.010835	g/m3
1035	2014	11	25	1422	-20.6157	35.9078	MultiN	502	51.7	75.9	6.05	0.004066	0.012496	0.009256	0.025818	g/m3

1035	2014	11	25	1423	-20.6157	35.9078	MultiN	502	25.9	51.4	6.375	0.017506	0.039435	0.012016	0.068957	g/m3
1035	2014	11	25	1424	-20.6157	35.9078	MultiN	502	0.3	25.7	6.35	0.003055	0.002646	0.011496	0.017197	g/m3
1035	2014	11	25	1325	-20.6157	35.9078	WP II-	502	0	200	50	0.9408	1.292	1.3144	3.5472	g/m2
1036	2014	11	25	1547	-20.6155	35.871	MultiN	78	51	76.5	6.375	0.000533	3.10E-05	0.00662	0.007184	g/m3
1036	2014	11	25	1549	-20.6155	35.871	MultiN	78	26.6	50.9	6.075	0.000757	0.000296	0.01521	0.016263	g/m3
1036	2014	11	25	1550	-20.6155	35.871	MultiN	78	0.8	26.4	6.4	0.003062	0.001125	0.010781	0.014968	g/m3
1036	2014	11	25	1455	-20.6155	35.871	WP II-	78	0	70	17.5	0.1528	0.1528	0.5024	0.808	g/m2
1038	2014	11	25	1843	-20.6132	35.583	MultiN	38	0.1	25.7	6.4	0.002969	0.011562	0.015094	0.029625	g/m3
1038	2014	11	25	1825	-20.6132	35.583	WP II-	38	0	30	7.5	1.0408	0.492	1.2488	2.7816	g/m2
1042	2014	11	26	2231	-19.7742	36.6137	MultiN	508	101.7	201	24.825	0.001394	0.002707	0.001265	0.005366	g/m3
1042	2014	11	26	2232	-19.7742	36.6137	MultiN	508	77.7	101.1	5.85	0.006427	0.017504	0.013333	0.037264	g/m3
1042	2014	11	26	2234	-19.7742	36.6137	MultiN	508	25.4	52	6.65	0.020782	0.057684	0.048271	0.126737	g/m3
1042	2014	11	26	2236	-19.7742	36.6137	MultiN	508	25.4	52	6.65	0.006346	0.01209	0.013444	0.03188	g/m3
1042	2014	11	26	2237	-19.7742	36.6137	MultiN	508	0.3	25.5	6.3	0.026286	0.056381	0.043365	0.126032	g/m3
1042	2014	11	26	2140	-19.7742	36.6137	WP II-	508	0	200	50	1.5672	1.1208	2.204	4.892	g/m2
1044	2014	11	27	23	-19.7455	36.5565	MultiN	101	76.5	89.3	3.2	0.003563	0.004312	0.018188	0.026063	g/m3
1044	2014	11	27	25	-19.7455	36.5565	MultiN	101	51.1	76.6	6.375	0.001098	0.002761	0.016094	0.019953	g/m3
1044	2014	11	27	27	-19.7455	36.5565	MultiN	101	26.4	51.4	6.25	0.004928	0.014112	0.00896	0.028	g/m3
1044	2014	11	27	29	-19.7455	36.5565	MultiN	101	0.8	26.9	6.525	0.014069	0.004966	0.011249	0.030284	g/m3
1044	2014	11	26	2345	-19.7455	36.5565	WP II-	101	0	100	25	0.5768	0.8064	2.4	3.7832	g/m2
1046	2014	11	27	411	-19.4952	36.0845	MultiN	33	0.3	25.1	6.2	0.005419	0.020613	0.046452	0.072484	g/m3
1046	2014	11	27	355	-19.4952	36.0845	WP II-	33	0	30	7.5	0.6168	2.5264	1.6816	4.8248	g/m2
1059	2014	11	30	1429	-18.7512	36.7132	MultiN	31	1	21.8	5.2	0.008923	0.071308	0.051885	0.132116	g/m3
1059	2014	11	30	1415	-18.7512	36.7132	WP II-	31	0	25	6.25	0.5696	0.272	0.3776	1.2192	g/m2
1061	2014	11	30	2014	-19.0025	37.0672	MultiN	103	73.7	101.2	6.875	0.000378	0.008145	0.014807	0.02333	g/m3
1061	2014	11	30	2015	-19.0025	37.0672	MultiN	103	50.3	73.7	5.85	0.002256	0.003316	0.011419	0.016991	g/m3
1061	2014	11	30	2016	-19.0025	37.0672	MultiN	103	24.2	50.2	6.5	0.010677	0.034862	0.010738	0.056277	g/m3
1061	2014	11	30	2017	-19.0025	37.0672	MultiN	103	0.3	23.6	5.825	0.018506	0.05624	0.042506	0.117252	g/m3
1061	2014	11	30	1945	-19.0025	37.0672	WP II-	103	0	100	25	0.7304	0.5656	1.5696	2.8656	g/m2

1062	2014	11	30	2327	-19.0497	37.1322	MultiN	506	101.7	202.3	25.15	0.004294	0.000875	0.0033	0.008469	g/m3
1062	2014	11	30	2329	-19.0497	37.1322	MultiN	506	76.3	101.6	6.325	0.002372	0.00253	0.010561	0.015463	g/m3
1062	2014	11	30	2331	-19.0497	37.1322	MultiN	506	49.1	76	6.725	0.004312	0.010498	0.012223	0.027033	g/m3
1062	2014	11	30	2332	-19.0497	37.1322	MultiN	506	25.2	48.2	5.75	0.0248	0.049635	0.046783	0.121218	g/m3
1062	2014	11	30	2334	-19.0497	37.1322	MultiN	506	1.6	25.1	5.875	0.035949	0.110604	0.05794	0.204493	g/m3
1062	2014	11	30	2225	-19.0497	37.1322	WP II-	506	0	200	50	1.0104	0.7616	0.8656	2.6376	g/m2

ANNEX V. LABORATORY MEASUREMENTS OF NUTRIENTS

Cruice number = 2014407
Lab journal entry = 1707

Year	Month	Day	Time	Station	Lat	Long	Bottle	Pressure	Echo Depth	Nitrite	Nitrate	Phosphate	Silicate	CTD sigmaT	ChlA	Phaeo
integer	integer	integer	integer	integer	Decimal degrees	decimal degrees	integer	dB	decimal	umol/L	umol/L	umol/L	umol/L	kg/m3	mg/m3	mg/m3
2014	11	12	514	936	-26,828	32.91	1	25.42	32	0.02	0.367	0.688	2,409	23,788	0.238	0.173
2014	11	12	514	936	-26,828	32.91	2	4,324	32	0.025	0.071	0.379	2,203	23,643	0.244	0.161
2014	11	12	904	938	-26,829	32,959	1	98,388	113	0.082	10,953	1,009	8,622	25,294	0.086	0.173
2014	11	12	904	938	-26,829	32,959	2	74.48	113	0.098	10,761	0.948	8.47	25,081	0.085	0.232
2014	11	12	904	938	-26,829	32,959	3	50,026	113	0.055	0.352	0.277	1,164	24,061	0.478	0.262
2014	11	12	904	938	-26,829	32,959	4	24,199	113	0.002	0.03	0.251	1,504	23,832	0.417	0.2
2014	11	12	904	938	-26,829	32,959	5	3,852	113	0.003	0.024	0.244	1,628	23,768	0.35	0.145
2014	11	12	1348	940	-26,834	33,081	1	490,306	512	0.007	20,368	1.85	16,927	26,937	0	0.023
2014	11	12	1348	940	-26,834	33,081	2	400,431	512	0.011	16,925	1,452	9,373	26,801	0	0.019
2014	11	12	1348	940	-26,834	33,081	3	302.18	512	0.017	15,878	1,346	9,844	26,722	0.002	0.029
2014	11	12	1348	940	-26,834	33,081	4	202,314	512	0.016	14,295	1,225	10,269	26,475	0.004	0.043
2014	11	12	1348	940	-26,834	33,081	5	101,614	512	0.025	11,163	0.931	8,859	25,768	0.026	0.038
2014	11	12	1348	940	-26,834	33,081	6	76.81	512	0.083	9,903	0.842	7,946	25,171	0.078	0.184
2014	11	12	1348	940	-26,834	33,081	7	51,506	512	0.23	4,069	0.5	4,387	24,255	0.274	0.467
2014	11	12	1348	940	-26,834	33,081	8	25,649	512	0	0.025	0.211	1,687	23,808	0.346	0.191
2014	11	12	1348	940	-26,834	33,081	9	5,062	512	0.003	0.029	0.232	1,828	23,736	0.222	0.087
2014	11	14	1519	951	-25.83	34,748	1	467,476	480	0.02	19,567	1,759	17,404	26,915	0.003	0.032
2014	11	14	1519	951	-25.83	34,748	2	403,503	480	0.02	16,707	1,395	11,525	26,716	0.004	0.014
2014	11	14	1519	951	-25.83	34,748	3	302,051	480	0.007	15,561	1,269	11,184	26,575	0	0.033
2014	11	14	1519	951	-25.83	34,748	4	204,538	480	0.01	15,454	1,224	11,532	26,443	0.001	0.036
2014	11	14	1519	951	-25.83	34,748	5	100.14	480	0.031	12.7	1.03	10,459	25,918	0.025	0.106
2014	11	14	1519	951	-25.83	34,748	6	76,874	480	0.171	8.96	0.79	7.87	25,302	0.19	0.344

2014	11	14	1519	951	-25.83	34,748	7	50,835	480	0.302	2,171	0.44	3	24,099	0.801	0.988
2014	11	14	1519	951	-25.83	34,748	8	26,654	480	0.021	0.047	0.183	0.765	23,496	0.197	0.088
2014	11	14	1519	951	-25.83	34,748	9	6,621	480	0.011	0.02	0.184	0.72	23,427	0.08	0.044
2014	11	15	1036	956	-25,815	33.14	1	101,219	117	0.153	8,993	0.842	7,436	25,271	0.125	0.188
2014	11	15	1036	956	-25,815	33.14	2	75,758	117	0.197	7,588	0.69	6,604	24,895	0.221	0.301
2014	11	15	1036	956	-25,815	33.14	3	50,144	117	0.18	3,206	0.414	3,978	24,344	0.685	0.551
2014	11	15	1036	956	-25,815	33.14	4	24,512	117	0.036	0.39	0.252	2,211	23,937	1,095	0.564
2014	11	15	1036	956	-25,815	33.14	5	4,625	117	0.005	0.037	0.225	1,658	23,721	0.22	0.106
2014	11	15	1448	958	-25,812	32,973	1	15,264	18	0.007	0.051	0.28	1,947	23,847	1,008	0.542
2014	11	15	1448	958	-25,812	32,973	2	6,553	18	0.005	0.266	0.258	2,085	23.74	0.775	0.369
2014	11	17	2222	971	-24,936	34,555	1	29,011	36	0.169	0.201	0.353	1,948	24,106	1,115	0.724
2014	11	17	2222	971	-24,936	34,555	2	6,521	36	0.164	0.199	0.283	1,788	24,107	1,112	0.698
2014	11	18	551	973	-25,188	35.02	1	100,121	104	0.172	9,174	0.89	9,267	25,346	0.015	0.066
2014	11	18	551	973	-25,188	35.02	2	75,167	104	0.364	4,838	0.59	5,279	24,687	0.26	0.397
2014	11	18	551	973	-25,188	35.02	3	48,316	104	0.528	1,942	0.395	3,507	24,155	0.656	0.735
2014	11	18	551	973	-25,188	35.02	4	25,673	104	0.146	0.691	0.299	2,305	23,849	1,614	0.667
2014	11	18	551	973	-25,188	35.02	5	6,035	104	0.1	0.373	0.256	2,265	23,692	1.2	0.471
2014	11	18	939	974	-25,293	35,231	1	495,777	507	0.029	15,996	1,368	10,478	26,728	0.007	0.057
2014	11	18	939	974	-25,293	35,231	2	399,502	507	0.022	15,112	1,213	9,326	26,667	0.004	0.043
2014	11	18	939	974	-25,293	35,231	3	297,573	507	0.021	15,102	1,237	11,218	26,461	0.007	0.049
2014	11	18	939	974	-25,293	35,231	4	205,533	507	0.02	10,433	0.876	8,399	25,947	0.008	0.032
2014	11	18	939	974	-25,293	35,231	5	98,734	507	0.16	2,878	0.396	3.59	24,092	0.123	0.275
2014	11	18	939	974	-25,293	35,231	6	75,489	507	0.022	0	0.204	2,215	23,483	0.298	0.153
2014	11	18	939	974	-25,293	35,231	7	50,685	507	0.027	0	0.217	2,202	23,473	0.328	0.163
2014	11	18	939	974	-25,293	35,231	8	28,321	507	0.011	0	0.218	2,189	23,467	0.236	0.11
2014	11	18	939	974	-25,293	35,231	9	7,427	507	0.014	0.22	0.24	2,188	23,468	0.224	0.108
2014	11	20	24	986	-24,464	35,624	1	498,834	587	0.018	17,307	1,437	12,234	26,723	0.006	0.025
2014	11	20	24	986	-24,464	35,624	2	399,441	587	0.014	14,536	1,181	9,241	26,601	0	0.024
2014	11	20	24	986	-24,464	35,624	3	300,827	587	0.014	13,864	1,108	10,079	26,397	0.003	0.019

2014	11	20	24	986	-24,464	35,624	4	200,678	587	0.019	11,691	0.956	9,576	25,883	0.006	0.016
2014	11	20	24	986	-24,464	35,624	5	102,672	587	0.264	1,612	0.31	3,034	24,111	0.112	0.288
2014	11	20	24	986	-24,464	35,624	6	73,394	587	0.2	0.853	0.304	2,756	23,547	0.248	0.256
2014	11	20	24	986	-24,464	35,624	7	50,411	587	0.023	0	0.204	2,229	23,493	0.239	0.183
2014	11	20	24	986	-24,464	35,624	8	24,378	587	0.013	0	0.194	2,158	23,378	0.145	0.068
2014	11	20	24	986	-24,464	35,624	9	7,308	587	0.016	0	0.191	2,172	23,368	0.15	0.068
2014	11	20	731	988	-24,422	35.44	1	100,208	100	0.273	9,351	0.889	8,712	25,366	0.086	0.214
2014	11	20	731	988	-24,422	35.44	2	74,709	100	0.231	4.82	0.601	5,408	24,456	0.264	0.244
2014	11	20	731	988	-24,422	35.44	3	51,071	100	0.138	0.897	0.333	2,789	23,618	0.663	0.405
2014	11	20	731	988	-24,422	35.44	4	24,177	100	0.016	0.035	0.265	1,781	23,205	0.243	0.122
2014	11	20	731	988	-24,422	35.44	5	5,168	100	0.014	0.547	0.268	1,773	23,182	0.195	0.077
2014	11	20	1205	990	-24,389	35,316	1	23,021	34	0.106	0.265	0.357	2,218	24,169	2,522	1,293
2014	11	20	1205	990	-24,389	35,316	2	6,161	34	0.005	0.052	0.243	1,467	23,918	0.913	0.412
2014	11	21	1039	998	-23,585	35,482	1	26,741	37	0.019	0.084	0.288	2,393	23,623	1,285	0.635
2014	11	21	1039	998	-23,585	35,482	2	6,081	37	0.001	0.047	0.239	1,972	23,452	0.467	0.21
2014	11	21	1434	1000	-23,588	35.63	1	98,811	103	0.369	3,289	0.505	4.19	24,128	0.276	0.331
2014	11	21	1434	1000	-23,588	35.63	2	76,769	103	0.322	1,352	0.379	3,218	23.72	0.23	0.243
2014	11	21	1434	1000	-23,588	35.63	3	49,746	103	0.021	0	0.221	2,097	23,361	0.196	0.105
2014	11	21	1434	1000	-23,588	35.63	4	26,972	103	0.009	0.018	0.218	2,191	23,285	0.21	0.123
2014	11	21	1434	1000	-23,588	35.63	5	6,941	103	0.008	0.198	0.221	1,873	23,098	0.107	0.04
2014	11	21	1849	1002	-23,584	35,849	1	501,421	512	0.02	18,155	1,553	14,218	26,784	0	0.036
2014	11	21	1849	1002	-23,584	35,849	2	402,479	512	0.017	14,009	1,136	8,792	26,602	0	0.032
2014	11	21	1849	1002	-23,584	35,849	3	298,828	512	0.057	11,663	0.971	8,008	26,358	0.011	0.013
2014	11	21	1849	1002	-23,584	35,849	4	199,613	512	0.017	12,206	1,008	10.22	25,772	0.009	0.021
2014	11	21	1849	1002	-23,584	35,849	5	101,422	512	0.13	2,501	0.314	3.3	24,271	0.201	0.302
2014	11	21	1849	1002	-23,584	35,849	6	75,331	512	0.01	0.009	0.153	2,177	23,599	0.137	0.069
2014	11	21	1849	1002	-23,584	35,849	7	50,545	512	0.008	0.034	0.153	2,161	23,597	0.088	0.053
2014	11	21	1849	1002	-23,584	35,849	8	25,385	512	0.051	0.022	0.151	2,171	23,592	0.087	0.026
2014	11	21	1849	1002	-23,584	35,849	9	5,534	512	0.012	0.021	0.177	2,181	23,549	0.069	0.023

2014	11	23	347	1012	-22,611	35.84	1	492,058	496	0.099	18,485	1,536	14,268	26,805	0.004	0.058
2014	11	23	347	1012	-22,611	35.84	2	402,197	496	0.017	16,483	1,354	11,651	26,702	0.022	0.068
2014	11	23	347	1012	-22,611	35.84	3	301,895	496	0.019	13,193	1,054	8,996	26,527	0.004	0.027
2014	11	23	347	1012	-22,611	35.84	4	201,039	496	0.02	12,796	1,041	11,074	25,974	0.011	0.047
2014	11	23	347	1012	-22,611	35.84	5	100,113	496	0.187	1,077	0.249	2,912	23,978	0.354	0.48
2014	11	23	347	1012	-22,611	35.84	6	75.38	496	0.008	0.019	0.123	2,161	23,467	0.108	0.053
2014	11	23	347	1012	-22,611	35.84	7	50,201	496	0.004	0.024	0.135	2,159	23,374	0.098	0.054
2014	11	23	347	1012	-22,611	35.84	8	25,449	496	0.004	0.02	0.142	2,072	23,251	0.098	0.06
2014	11	23	347	1012	-22,611	35.84	9	4.28	496	0.044	0.018	0.158	2,075	23.25	0.105	0.055
2014	11	23	753	1014	-22,611	35,613	1	99,767	106	0.17	10,843	0.892	8,829	25,467	0.074	0.187
2014	11	23	753	1014	-22,611	35,613	2	75,192	106	0.257	1,461	0.343	3,033	23,779	0.473	0.436
2014	11	23	753	1014	-22,611	35,613	3	49,626	106	0.01	0.026	0.189	2,036	23,245	0.126	0.088
2014	11	23	753	1014	-22,611	35,613	4	26,011	106	0.015	0.038	0.185	2,048	23,243	0.108	0.058
2014	11	23	753	1014	-22,611	35,613	5	5,472	106	0.012	0.035	0.204	2,045	23,221	0.093	0.053
2014	11	23	1002	1016	-22,608	35,569	1	20,067	25	0.077	0	0.281	1,967	23.25	0.247	0.131
2014	11	23	1002	1016	-22,608	35,569	2	6,421	25	0.009	0.148	0.225	1,922	23,193	0.234	0.112
2014	11	24	946	1024	-21,609	35,515	1	24,593	40	0.03	0.052	0.264	2,127	23.31	0.275	0.195
2014	11	24	946	1024	-21,609	35,515	2	5,185	40	0.016	0.008	0.242	2,036	23,213	0.151	0.061
2014	11	24	1058	1026	-21,612	35,539	1	99,763	145	0.059	8,571	0.737	7.19	24,888	0.098	0.225
2014	11	24	1058	1026	-21,612	35,539	2	75,918	145	0.075	7,021	0.614	6,294	24,748	0.141	0.269
2014	11	24	1058	1026	-21,612	35,539	3	50,908	145	0.066	0.483	0.26	2,811	23,926	0.429	0.415
2014	11	24	1058	1026	-21,612	35,539	4	25,379	145	0.012	0.025	0.221	2,092	23,299	0.243	0.111
2014	11	24	1058	1026	-21,612	35,539	5	5,811	145	0.018	0.024	0.225	2,076	23,174	0.157	0.072
2014	11	24	1427	1028	-21,609	35.66	1	491,549	502	0.024	19.48	1,683	17,188	26,883	0.004	0.06
2014	11	24	1427	1028	-21,609	35.66	2	400,125	502	0.023	16,909	1,367	11,853	26,728	0.004	0.053
2014	11	24	1427	1028	-21,609	35.66	3	297,899	502	0.018	14,062	1,126	10,037	26,517	0.005	0.037
2014	11	24	1427	1028	-21,609	35.66	4	201,018	502	0.022	12,114	0.98	10,034	26.06	0.006	0.054
2014	11	24	1427	1028	-21,609	35.66	5	100,398	502	0.07	4,262	0.48	4,314	24,627	0.121	0.243
2014	11	24	1427	1028	-21,609	35.66	6	76,742	502	0.071	0.012	0.176	1,814	24,324	0.394	0.303

2014	11	24	1427	1028	-21,609	35.66	7	48,906	502	0.167	0.331	0.205	2,246	24,156	0.41	0.506
2014	11	24	1427	1028	-21,609	35.66	8	25,881	502	0.034	0.015	0.153	2,123	23,612	0.081	0.045
2014	11	24	1427	1028	-21,609	35.66	9	4,498	502	0.025	0.046	0.201	2,013	23,206	0.071	0.056
2014	11	25	1317	1035	-20,616	35,908	1	488,157	502	0.076	15,572	1,267	8,898	26,808	0.001	0.062
2014	11	25	1317	1035	-20,616	35,908	2	400,091	502	0.029	15,462	1,254	8,914	26,708	0.003	0.053
2014	11	25	1317	1035	-20,616	35,908	3	299,873	502	0.058	14,709	1,186	9,692	26,561	0.006	0.074
2014	11	25	1317	1035	-20,616	35,908	4	201,619	502	0.026	13,443	1,142	10,938	26,188	0.005	0.061
2014	11	25	1317	1035	-20,616	35,908	5	101,521	502	0.064	10,153	0.844	8,843	25,261	0.059	0.14
2014	11	25	1317	1035	-20,616	35,908	6	74,974	502	0.103	2,117	0.339	3,553	24,154	0.463	0.431
2014	11	25	1317	1035	-20,616	35,908	7	50,614	502	0.031	0.347	0.222	2.49	23.63	0.435	0.209
2014	11	25	1317	1035	-20,616	35,908	8	25,688	502	0.013	0.018	0.186	1,933	23,227	0.053	0.03
2014	11	25	1317	1035	-20,616	35,908	9	5,559	502	0.021	0.129	0.203	2,084	23,114	0.075	0.06
2014	11	25	1448	1036	-20,615	35,871	1	74,985	78	0.064	1,897	0.322	3,483	24,083	0.692	0.419
2014	11	25	1448	1036	-20,615	35,871	2	51,107	78	0.131	0.479	0.24	2,635	23,694	1,013	0.54
2014	11	25	1448	1036	-20,615	35,871	3	26,184	78	0.012	0.015	0.166	1,954	23,248	0.09	0.042
2014	11	25	1448	1036	-20,615	35,871	4	6,593	78	0.043	0.022	0.235	1.98	23.11	0.086	0.037
2014	11	25	1448	1036	-20,615	35,871	5	-999	78	-999	-999	-999	-999	-999	0	0.01
2014	11	25	1815	1038	-20,613	35,583	1	23,739	38	0.023	0.015	0.166	2,151	23,199	0.236	0.13
2014	11	25	1815	1038	-20,613	35,583	2	4,426	38	0.017	0.071	0.171	2,152	23,201	0.225	0.127
2014	11	26	2126	1042	-19,774	36,614	1	503,536	508	0.114	20,292	1.7	17,775	26,891	0.009	0.036
2014	11	26	2126	1042	-19,774	36,614	2	399,829	508	0.036	18,424	1,456	13,281	26,766	0.001	0.035
2014	11	26	2126	1042	-19,774	36,614	3	299,801	508	0.022	15,401	1,263	11,101	26,598	0.004	0.032
2014	11	26	2126	1042	-19,774	36,614	4	200,331	508	0.185	12,826	1,041	10,763	26,125	0.015	0.062
2014	11	26	2126	1042	-19,774	36,614	5	99,562	508	0.232	0.794	0.189	2,823	23,815	0.323	0.278
2014	11	26	2126	1042	-19,774	36,614	6	73,817	508	0.237	0.034	0.16	1,889	23,239	0.421	0.24
2014	11	26	2126	1042	-19,774	36,614	7	51,178	508	0.02	0.186	0.148	1,751	23,012	0.098	0.05
2014	11	26	2126	1042	-19,774	36,614	8	26,933	508	0.02	0.012	0.168	1,786	23,015	0.013	0.023
2014	11	26	2126	1042	-19,774	36,614	9	5,138	508	0.202	0.013	0.167	1,779	23,017	0.066	0.019
2014	11	26	2336	1044	-19,746	36,556	1	93,413	101	0.663	3,283	0.567	4.95	24,173	0.199	0.25

2014	11	26	2336	1044	-19,746	36,556	2	76,158	101	0.685	1.81	0.4	4,089	23,839	0.323	0.295
2014	11	26	2336	1044	-19,746	36,556	3	51,582	101	0.04	0.045	0.232	1,758	23,182	0.306	0.191
2014	11	26	2336	1044	-19,746	36,556	4	26,697	101	0.035	0.016	0.198	1,666	23,078	0.181	0.095
2014	11	26	2336	1044	-19,746	36,556	5	5,206	101	0.08	0.033	0.188	1,739	23,015	0.085	0.03
2014	11	27	345	1046	-19,495	36,084	1	27,933	33	0.136	0.158	0.378	4,965	22.27	0.688	0.211
2014	11	27	345	1046	-19,495	36,084	2	4,529	33	0.023	0.176	0.297	4.9	22,253	0.605	0.229
2014	11	30	1402	1059	-18,751	36,713	1	26.14	31	0.065	0.085	0.282	3,372	23,214	0.142	0.08
2014	11	30	1402	1059	-18,751	36,713	2	6,246	31	0.016	0.043	0.249	2,509	23,032	0.199	0.058
2014	11	30	1935	1061	-19,003	37,067	1	102,424	103	0.076	9.35	0.839	8,696	25.07	0.063	0.15
2014	11	30	1935	1061	-19,003	37,067	2	73,766	103	0.157	4.19	0.497	5,167	24,317	0.217	0.4
2014	11	30	1935	1061	-19,003	37,067	3	50,191	103	0.135	0.25	0.26	2,521	23,569	0.446	0.43
2014	11	30	1935	1061	-19,003	37,067	4	24,404	103	0.045	0.05	0.195	3.21	23	0.045	0.037
2014	11	30	1935	1061	-19,003	37,067	5	4,566	103	0.018	0.042	0.193	2,001	23,003	0.07	0.047
2014	11	30	2218	1062	-19.05	37,132	1	495.85	506	0.043	19,995	1,744	16.76	26,881	0.022	0.032
2014	11	30	2218	1062	-19.05	37,132	2	400,603	506	0.034	16.46	1,362	10,637	26,718	0.002	0.028
2014	11	30	2218	1062	-19.05	37,132	3	301,041	506	0.026	12.57	1,052	7,612	26,547	0.006	0.035
2014	11	30	2218	1062	-19.05	37,132	4	199.18	506	0.041	15,469	1,262	13,216	26,212	0.005	0.05
2014	11	30	2218	1062	-19.05	37,132	5	100.01	506	0.067	8,511	0.749	7,093	24,845	0.028	0.059
2014	11	30	2218	1062	-19.05	37,132	6	77.03	506	0.201	5,537	0.587	5,597	24,336	0.179	0.347
2014	11	30	2218	1062	-19.05	37,132	7	49,811	506	0.043	0.052	0.194	2,438	23,627	0.3	0.253
2014	11	30	2218	1062	-19.05	37,132	8	26,069	506	0.021	0	0.125	1,649	23,071	0.104	0.055
2014	11	30	2218	1062	-19.05	37,132	9	5,812	506	0.027	0	0.143	1,652	23,074	0.101	0.059