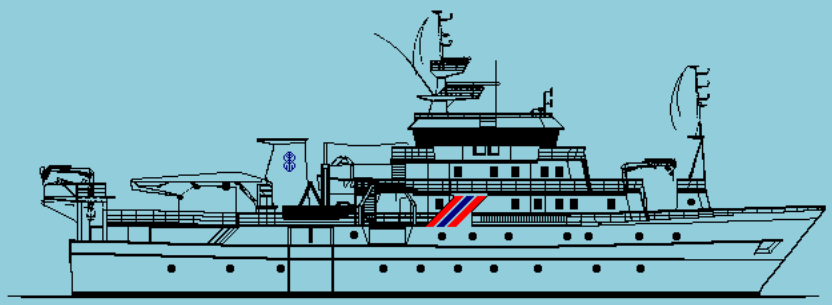


2007 SURVEYS OF THE LIVING MARINE RESOURCES OF MOZAMBIQUE

ECOSYSTEM SURVEY AND SPECIAL STUDIES

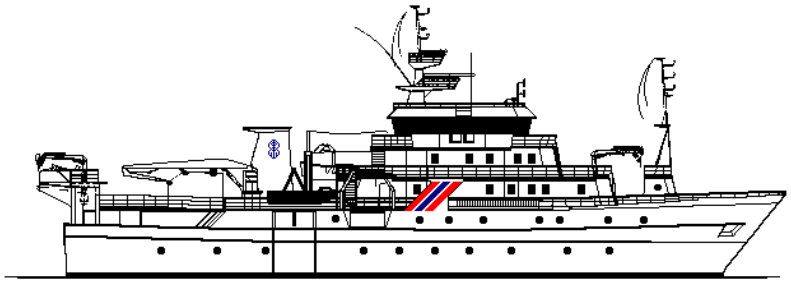
Cruise report No 8/2007

27 September – 21 December 2007

Institute of Marine Research – IMR
Norway

Instituto Nacional de Investigação Pesqueira (IIP)
Mozambique

Bergen September 2008



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CRUISE REPORTS "DR. FRIDTJOF NANSEN"

SURVEYS OF THE LIVING MARINE RESOURCES OF MOZAMBIQUE

Ecosystem Survey

and

Special Studies

27 September – 21 December 2007

by

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Bergen, 2008

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1. INTRODUCTION

In December 2006 the Ministry of Fisheries in Mozambique requested the Food and Agriculture Organization of the United Nations (FAO) for assistance to undertake an assessment of the marine living resources in Mozambican waters, using the Norwegian R/V "Dr. Fridtjof Nansen". In the request the following main objectives were listed:

- To obtain an assessment of abundance and distribution of present and potential fisheries resources - based on a trawl/acoustic survey with a modern research vessel.
- To map accompanying fauna including fish, crustaceans, marine mammals, benthos and sea birds.
- To conduct accompanying oceanographic investigations including hydrography, current measurements, plankton abundance and, if feasible, nutrients and pollution.
- To conduct 3D bottom topography mapping along the survey tracks and in selected areas.
- Training: transfer of knowledge on methods of abundance estimation from trawl/acoustic data, basic studies for an ecosystem approach to fisheries management, seabed mapping and vessel operation.
- To secure good public outreach from the survey in Mozambique and elsewhere.
- To promote co-operation within marine sciences between institutions in Mozambique as well as international co-operation.

From January 2007 the research operations of the vessel have been part of the Norwegian Agency for International Cooperation (Norad) funded EAF-Nansen project "Strengthening the knowledge Base for and Implementing an Ecosystem Approach to Marine Fisheries in Developing Countries" executed by the FAO. In the framework of a tri-partite agreement the Institute of Marine Research (IMR), Norway continues to be responsible for operation of the vessel and for co-ordinating the associated research activities.

Following the request FAO decided to make the vessel available to Mozambique for 86 days towards the end of 2007. Funding was shared between the FAO and the Norwegian Mozambique Fisheries Cooperation Programme. A planning meeting was held in Maputo in the period 13-15 June 2007 with the task to elaborate a preliminary survey plan, including:

- A preliminary survey grid, timing and start of survey – (with relation to recent survey with the Spanish "Visconde de Eza" and earlier Nansen surveys).

- A preliminary sailing plan with ports of call for change of vessel- and scientific crews.
- A preliminary list of scientific personnel for different legs of the survey, preferably with expertise covering the scientific areas given in the objectives.
- Describe alternative Special investigations (e.g. 3D bottom mapping etc) – including a request from Norsk Hydro
- A preliminary budget for costs not covered by the Nansen program.
- A preliminary plan for public outreach related to the survey
- Prepare presentation of the preliminary survey plan for a plenary seminar on the last day of the workshop.

The meeting decided to split the survey work in two parts. First an ecosystem survey covering the whole continental shelf between 20 and 1000m bottom depth from the border with South Africa in the south to the border with Tanzania in the north. This part of the survey would require 45 days. The remaining 41 days would to be used on special studies covering offshore banks, seamounts and an area in the north that has been identified for oil and gas exploration.

The former "Dr. Fridtjof Nansen", decommissioned in 1993, surveyed the Mozambican waters in 1977-78 with four full shelf coverage's using acoustic and bottom trawl survey methods. This was later followed up by special research on resources such as deep water shrimp and pelagic resources on the Sofala Bank. The previous surveys are summarized in Table 1.1.

Table 1.1 Previous surveys with Dr. Fridtjof Nansen in Mozambique waters

Survey number	Period
1977402	October 1977
1977403	November 1977
1978401	January-March 1978
1978402	April-June 1978
1978405	September 1978
1980407	Oct-Nov 1980
1982405	September 1982
1983405	May-June 1983
1990402	April-May 1990
1990404	August 1990
1990406	Oct-Nov 1990

It is more than 30 years since the first visit of the previous "Dr. Fridtjof Nansen" in Mozambique. In those days the main objective was to find new resources for a nation that had

just got its independence. Today when most of the world's fish resources are located, and in many instances overexploited, the main focus is not on finding new resources, but to monitor the ecosystem and secure that the resources exploitation does not exceed the carrying capacity of the system. Hence an ecosystem approach to the management of the resources is advocated.

Other surveys have been planned for the Southwest Indian Ocean region. For example, the GEF funded programmes "Agulhas and Somali Current Large Marine Ecosystem" (ASCLME) and the "South Western Indian Ocean Fisheries Project" (SWIOFP) were soon to start their operation with several surveys in the region including Mozambican waters. Thus the 2007 survey with "Dr. Fridtjof Nansen" was to set the standard for how ecosystem monitoring can be accomplished through a multidisciplinary approach.

In 1977-78 the former Dr. Fridtjof Nansen did an inventory of the fish resources in Mozambique and this has formed the reference since. In 2007 the more ambitious programme was to make a baseline study of the marine ecosystem, with elements as described in this cruise report. The report on the analyses of plankton and benthos samples collected during the surveys do however fall outside the scope of this report, but need to be included in the comprehensive baseline. It is expected that this study will function as the new reference for many years.

The baseline will enable Mozambique to monitor later changes in the resources and in the environment. This is especially important today as we are in a crucial period of global warming with likely heavy impact on the coastal areas over time. With the full backup from the FAO and other UN agencies such as UNEP and the IOC the new EAF-Nansen project is to assist coastal states in the SW Indian Ocean to accomplish this important task.

1.1 Objectives

1.1.1 Ecosystem survey

Following the initial requests from the Mozambican Ministry of Fisheries and the decisions taken at the planning meeting, the main objectives of the survey were:

- to map the distribution and estimate the acoustic abundance of the main pelagic species / groups in Mozambique.
- to describe the distribution, composition and estimate the abundance of the main demersal species on the shelf by the swept-area trawl method.
- to collect bottom sediment samples to record the benthic biodiversity at specific locations.
- to collect zooplankton samples for distribution and species identification.

- to map the general hydrographic regime by using a CTD and a surface salinograph to monitor the temperature, salinity, oxygen and fluorescence at bottom trawl stations and on specific hydrographical transects..
- on-the-job training on the main survey routines

1.1.2 Special studies

After the main ecosystem baseline studies several minor areas were selected for special investigations. Priorities from the Maputo Planning Workshop were as follows:

- Special studies in areas off Quirimbas and Bazaruto national parks (including detailed 3D bottom topography mapping, benthos and sediment sampling, UW photography/video).
- Baseline pollution assessments based on the above mentioned studies (sediment analyses)
- More detailed survey of the St. Lazarus Bank and other banks /sea mounts in the Mozambican channel (during return to Maputo at the end of the cruise).

Additional priorities, after internal discussions at IIP with commercial stakeholders and other partners, included also current measurements around the Saint Lazarus Bank. It was also stressed from Mozambique that the whole survey should have a broad focus on public outreach and on international cooperation.

1.2 Participation

A total of 68 scientists and technicians participated in the two phases of the survey. The majority of the participants were Mozambican nationals, however, Norwegians, Portuguese, Russian and Austrian nationals also took part in the survey, and made the survey truly international. The survey was in two parts, the ecosystem survey and the special studies. The ecosystem survey was further split in three legs: Leg 1 : 27 Sept.-10 Oct., leg 2: 11-27 Oct, leg 3: 28 Oct – 9 Nov. The special studies were undertaken in Leg 4: 10.11-28.11, leg 5: 28.11-16.12 and leg 6: 17.12-21.12. The participants, their affiliations and the stages of the survey where they participated are listed in Table 1.2 below:

Table 1.2 List of participants

	Name	affiliation	Ecosystem Survey			Special Studies		
			Leg 1	Leg	Leg 3	Leg 4	Leg 5	Leg 6
1	Sonia Nordez	IIP, Headquarter	x					
2	Afonso L. Muduze	IIP, Sofala	x					
3	José Cuna	IIP, Headquarter	x					
4	Afonso Buque	IIP, Sofala	x					
5	Nilza Dias	IIP, Headquarter	x					
6	Osvaldo J.	IIP, Inhambane	x					
7	Daniel Fernando	IIP, Headquarter	x					
8	Boavida Matavele	IIP, Headquarter	x	x				
9	Grichone Chambule	IIP, Headquarter	x	x				
10	Martinho Padera	IIP, Sofala		x	x			
11	Isaias Tembe	IIP, Headquarter		x				
12	Emidio André (local cruise leader)	IIP, Headquarter		x				
13	Neto B. Sulemane	IIP, Zambezia		x				
14	Bernardino Malawene	IIP, Headquarter		x		x		x
15	Isabel Chauca	IIP, Headquarter			x			
17	Feliciano Manjate	IIP, Headquarter			x			
18	Osvaldo Chacate	IIP, Headquarter			x			
19	Dionisio Varela	IIP, Zambezia			x			
20	Silvia Abdula (local cruise leader)	IIP, Headquarter			x			
21	Badru Hagy	IIP, Headquarter			x			
22	Jose Chamusse	IIP, Headquarter					x	
23	Alice Inacio	IIP, Headquarter			x			
24	Augusto Maciane	IIP, Headquarter			x			
25	Pedro Pires	IIP, C. Delgado				x		
26	Adriano Alfredo Manjate	IIP, Headquarter				x	x	
27	Antonio Salvador Sitoe	IIP, Headquarter				x		
28	Feliciano Manjate	IIP, Headquarter				x	x	
29	Eurico Morais	IIP, Zambezia					x	
30	Alvarenga C. Mepija	IIP, Sofala					x	
31	Lourenço Zacarias	IIP					x	
32	Edson A. Jose	MPES, AQUA			x			
33	Hermino Tembe	MPES, DNEP						x
34	Samuel Sitoe	MPES, DNAP		x				
35	Alexandre António Nhanala	EP				x	x	
36	Angelo Filipe Buramuge	EP				x	x	
37	Ivan Nerantzoulis	UEM, DCB	x	x				
38	Avelino Langa	UEM, ESCMC		x				
39	Valera Dias	UEM, ESCMC		x				
40	Valentina Vassela	UEM, ESCMC			x			
41	Mauricio J. Lipassula	UEM, DCB			x			
42	Cristina Silva	UEM, Museu			x	x		
43	Carlos Bento (local cruise leader)	UEM, Museu					x	
44	Veronica Mondlane	UEM, Fisica						x
45	Ascensão Pinto (local cruise leader)	IDPPE	x					
46	Esmeraldo Mondlane	TVM						x
47	Berto Chongo	TVM						x
48	Carolina Sá	U of Lisbon	x					
49	Miguel Leal	U of Lisbon					x	
50	Vanda Brotas	U of Lisbon						x
51	Phil Heemstra	SAIAB	x	x	x			
52	Elaine Heemstra	SAIAB	x	x	x			
53	Tore Strømme (cruise leader)	IMR	x					
54	Espen Johnsen (cruise leader)	IMR	x	x	x			
55	Oddgeir Alvheim	IMR	x	x	x			
56	Tore Mørk (Instrument Chief)	IMR	x				x	

57	Tor E. Johansson (instrument chief)	IMR		x	x	x		
58	Terje Hovland	IMR	x					
59	Ole Sverre Fossheim	IMR		x	x	x		
60	Marek Ostrowski	IMR		x				
61	Bjørn Serigstad (cruise leader)	IMR				x		
62	Franz Uiblein	IMR				x		
63	Magne Olsen	IMR				x		
64	Alexey Andrè	IMR				x	x	x
65	Diana Zaera	IMR				x		
66	Reidar Johansen	IMR					x	
67	Jens-Otto Krakstad (cruise leader)	IMR					x	x
68	Cristiane Todt	UoB						

List of institution abbreviations:

MPES, AQUA: Department of Aquacuture of Ministry of Fisheries
MPES, DNEP; Directorate of fisheries Administration of Ministry of Fisheries
MPES, DNAP; Directorate of fisheries Economy of Ministry of Fisheries
UEM, DCB: Department of Biological Sciences of University Eduardo Mondlane
UEM, ESCMC; Scholl of Coastal Marine Sciences
UEM, Museu; Museum of Natural History of University Eduardo Mondlane
EP, Fishing School
IIP; Instituto Nacional de Investigacao Pesqueira
SAIAB; South African Institute of Aquatic Biodiversity
U of Lisbon; University of Lisbon, Portugal
IMR; Institute of Marine Research, Norway
UoB; University of Bergen, Norway:

1.3 Narrative

1.3.1 Ecosystem survey

The R/V Dr. Fridtjof Nansen departed Maputo the morning of 28 September 2007, and started bottom trawling at the border with South Africa in the afternoon of 29 September. The southern area was covered up to Quissico before the vessel sailed back to Maputo to change crew and scientists on 10 October. In the afternoon of 11 October the survey work was resumed. After the Sofala Bank and central region to Chinde were completed, the vessel called at Beira to change Mozambican scientists. Due to bad weather we had to wait outside the port of Beira for about 48 h before we were permitted to enter the harbour in the afternoon of 27 October. The next morning, the vessel left Beira, and the rest of the coast off Mozambique was surveyed before R/V Dr. Fridtjof Nansen called port in Pemba in the morning of 9 November.

The shelf was surveyed during daytime (mainly 05:30 to 18:00 hrs) by transects perpendicular to the general direction of the coastline and 20 NM (nautical miles) apart. The transects and stations were chosen such that most of the shelf area was covered. The number of stations on each transect depended on the trawlability of the ground and the width of the shelf. Stratified

semi-random swept-area hauls were carried out within the depth zones. Each haul lasted for 30 minutes, occasionally shorter if the bottom was not trawlable. Continuous acoustic recording and analysis were carried out along transects throughout the survey, and if time permitted, acoustic night-time transect were carried out between the daytime transects to obtain denser acoustic coverage. Pelagic trawling was carried out during dark hours. CTD-stations were taken at all bottom trawl stations, and along selected hydrographical transects. Zooplankton samples taken with Hydrobios Multinet plankton sampler, and water and grab samples were taken at irregular intervals (see Figures 1.1- 1.3 for details).

1.3.2 Special studies

The R/V Dr. Fridtjof Nansen departed Pemba to commence the special ecosystem studies on the morning of 10th November, and started the survey coverage of the predetermined focus regions. These regions were the Quirimbas National Park, St. Lazarus Bank, Paisley Seamount, Primeiras e Segundas Archiipelago, The Zambezi river mouth, Bazaruto National Park, the Almirante Leite Bank and the Cabo Inhaca area. The first two banks were covered during the first leg of the special studies while the second leg covered the remaining areas.

After leaving Pemba on 10th November the vessel steamed to the St. Lazarus Bank where the first few days were spent taking hydrographical samples, grab and trawl samples and mapping the area. After a crew change in Pemba from the 19 to the 21 November the next days were spent in a similar way in the Quirimbas National Park before returning to Pemba on the 27th November in the afternoon. The vessel left after a change of scientific crew, and steamed to the Paisley Seamount where it arrived in the afternoon on the 29 November. The survey off the area ended on the 1st December. The vessel then continued to the Segundas archipelago where we arrived the following day after noon. The survey of this area was completed in two days. We arrived at the Sofala Bank on the 5 December in the morning and started a mini survey grid off the Zambezi river mouth. A 48 h diel station with intensive zooplakton and phytoplankton sampling was then conducted from the 6 December in the afternoon. After completing the study the vessel left and moved to the Bazaruto National Park on the morning of 9th December. After conducting a CTD line off the northern end of the Bazaruto National Park we divided the area in three smaller focal areas where we spent one day each sampling bottom fauna at different depth intervals. The night was used for bottom mapping. The vessel left the Bazaruto National Park on 12th December in the evening and steamed to the Almirante Leite Bank where we arrived the next day midday. The following 26 hours were used to map the bank before we returned to Maputo. We arrived in the port on the 15th December in the morning. After a change in crew the vessel returned to sea again in the afternoon on the 17th. Unfortunately the weather deteriorated and after staying at sea for 16 h it was decided to find shelter behind the Cabo Inhaca. Consequently no work was done in this area and the vessel returned to port at the end of the survey on 19th December 2007.

1.4 Survey effort

1.4.1 Ecosystem survey

Figures 1.1, 1.2 and 1.3 show the cruise tracks with bottom trawls, pelagic trawls and hydrographic stations, and plankton and grab stations for the southern, central and northern region respectively. Table 1.3 summarises the survey effort in each region. Based on topographic characteristics and bio-diversity the coast was divided into three regions, each with individual biomass estimate and presentation of the species distributions. Southern region: border of South Africa - 21°30'S. Central region: The bank of Sofala (21°30' S - 17°15'S). Northern region: 17°15'S – border of Tanzania. Furthermore, the southern region was divided into an inshore area (20-200 m) and an offshore area (200-800 m) to separate the coastal and deep water plateaus.

Table 1.3 Number of hydrographic (CTD), Grab stations (G), plankton (P), pelagic trawl (PT) and bottom trawl (BT) stations, valid swept-area hauls, distance surveyed (NM) and size of survey area (NM^2) during the ecosystem survey

						Swept area hauls (depth in m)				Distance surveyed (NM)
Region	CTD	P	G	PT	BT	20-50	51-100	101-200	201-800	
Southern	122	10	7	0	68	5	7	10	43	2650
Area (NM^2)						1194	1176	1579	11702	
Central	83	8	11	3	39	20	8	4	6	2250
Area (NM^2)						6505	2516	482	2565	
Northern	28	11	11	1	8	7	1	0	0	1160
Area (NM^2)						576	212	155	-	
Total	233	29	29	4	115	7699	3692	2061	14267	6060

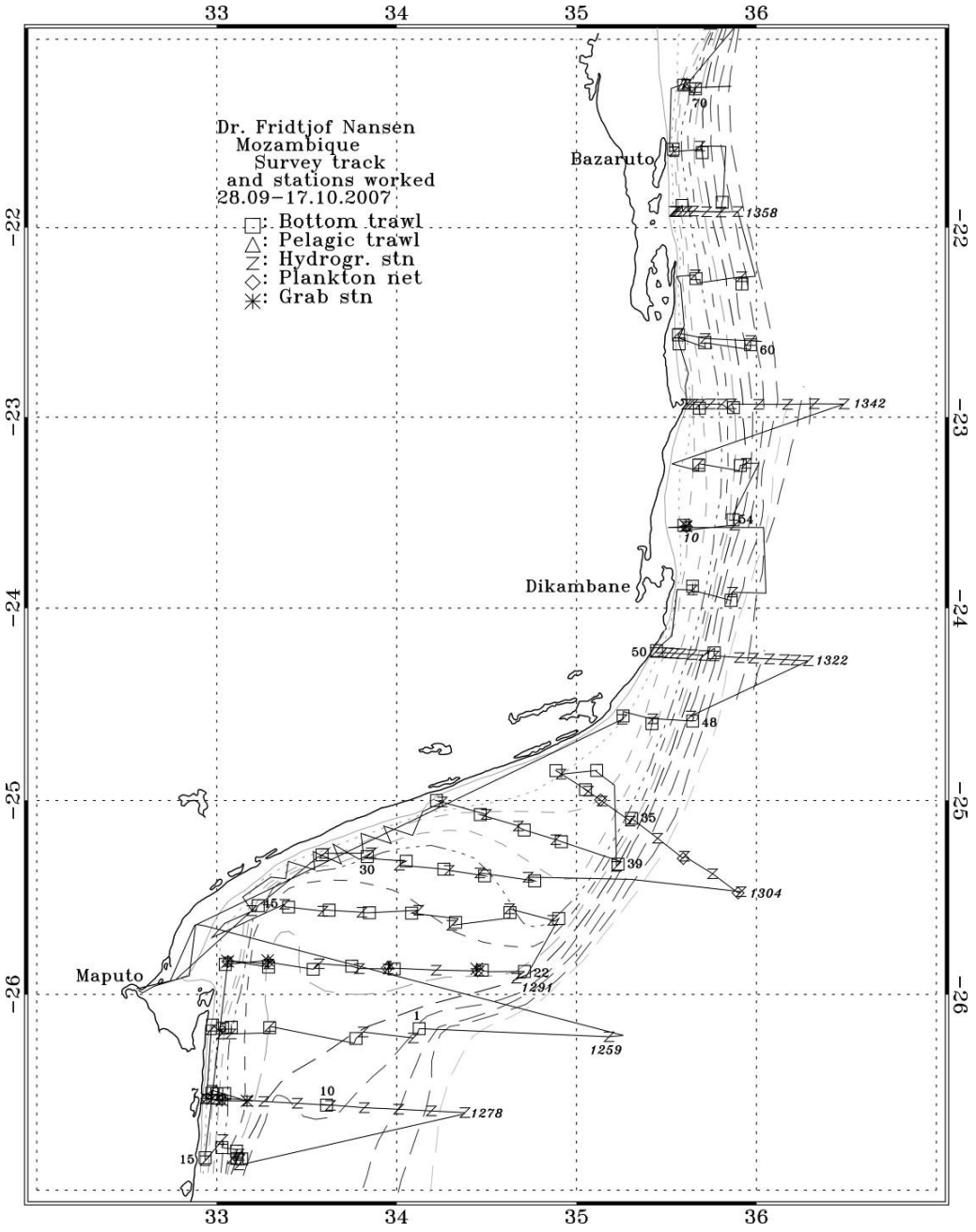


Figure 1.1. Southern region. Course tracks with bottom trawl, pelagic trawl, plankton, grab sample and hydrographic stations. The 20, 50, 100, 200, 300, 400, 500, 600, 700, 800, 900 and 1000 m depth contours are indicated.

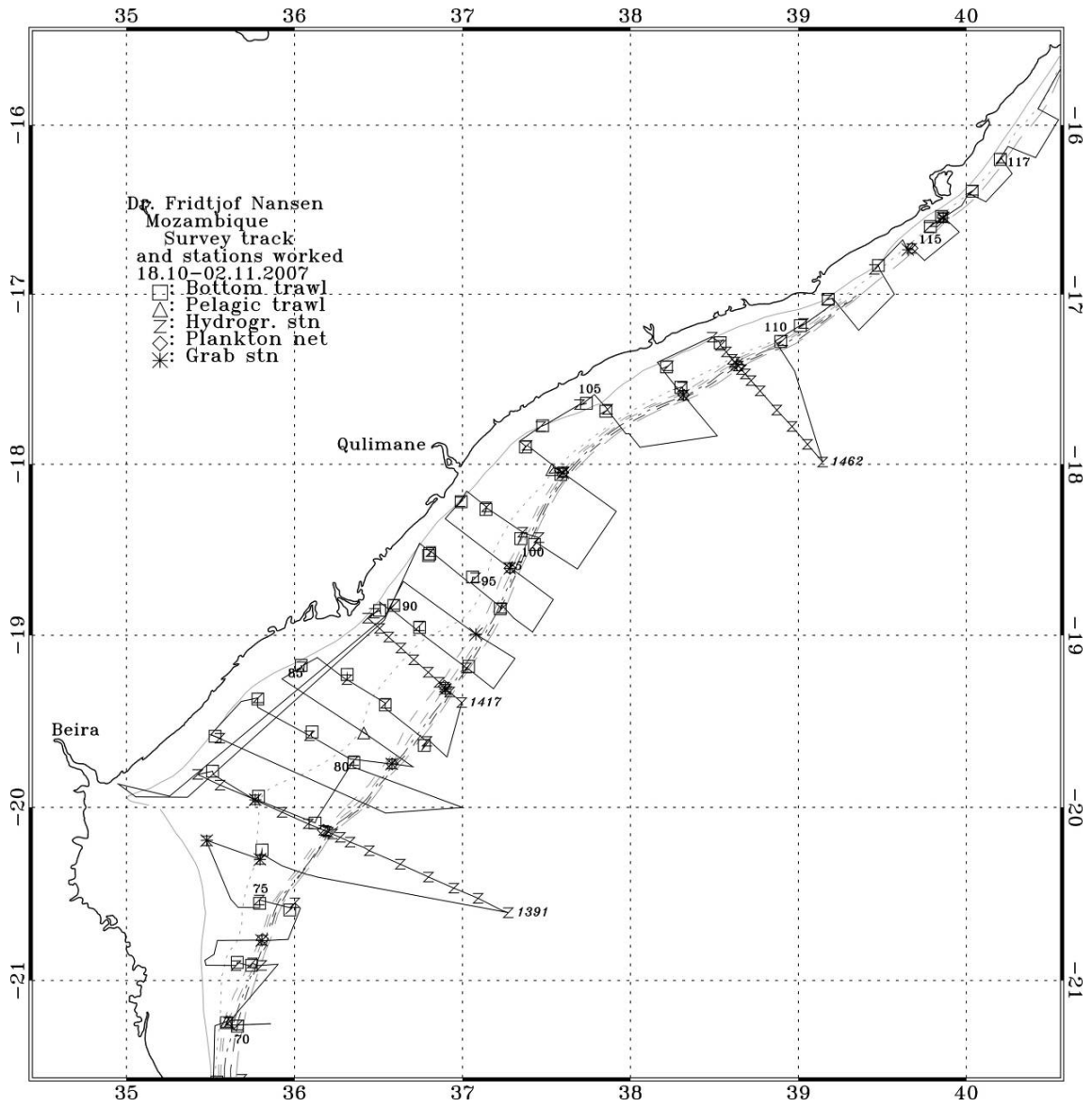


Figure 1.2. Central region. Course tracks with bottom trawl, pelagic trawl, plankton, grab sample and hydrographic stations. The 20, 50, 100, 200, 300, 400 and 500 m depth contours are indicated.

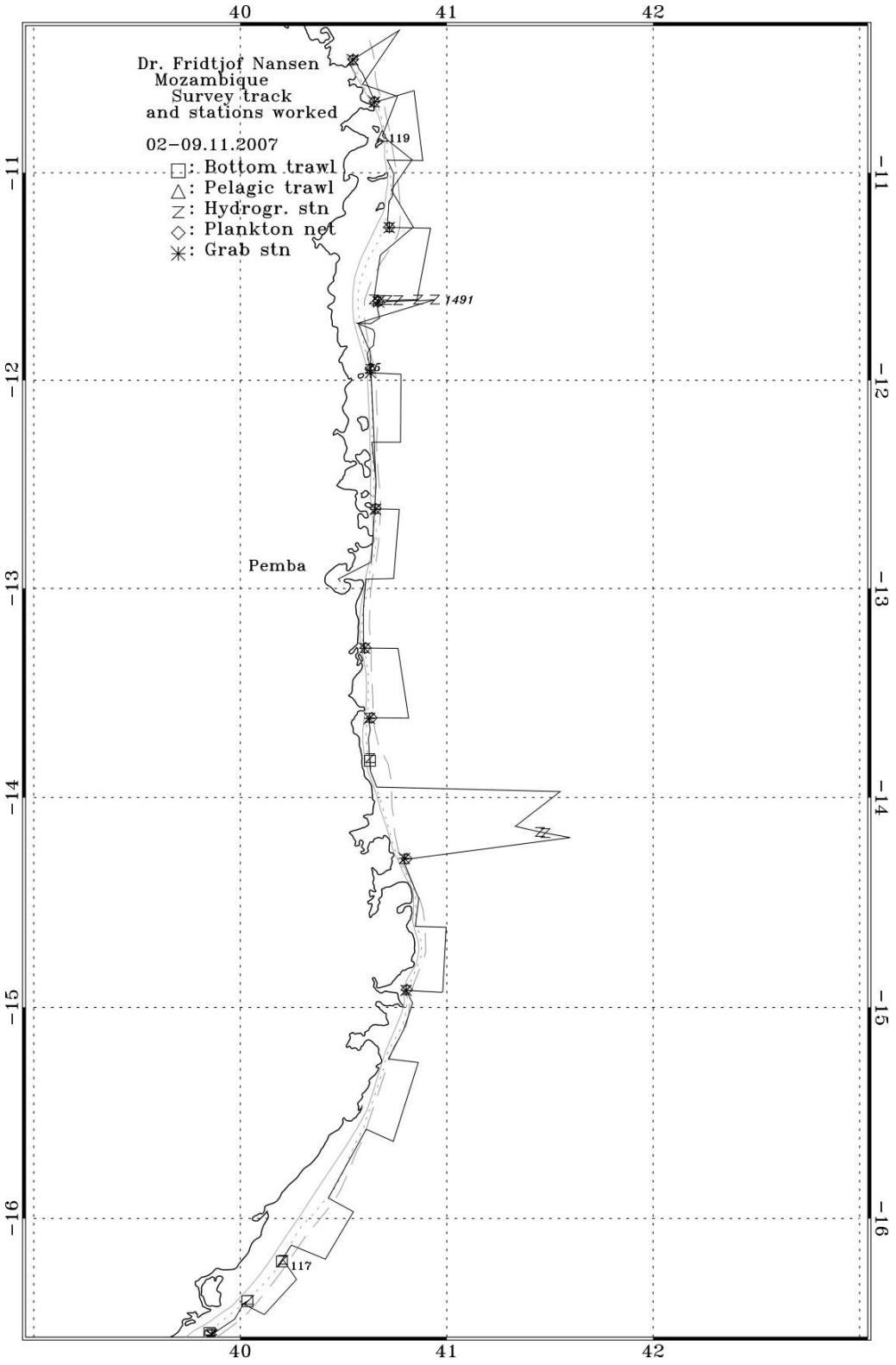


Figure 1.3. Northern region. Course tracks with bottom trawl, pelagic trawl, plankton, grab sample and hydrographic stations. The 20, 50 and 500 m depth contours are indicated.

1.4.2 Special studies

Figure 1.4 shows the cruise tracks with bottom trawls, pelagic trawls and hydrographic stations conducted during the special studies, and Figure 1.2 shows the cruise tracks with plankton and grab stations. Table 1.4 summarises the survey effort in each region.

Table 1.4 Number of hydrographic (CTD), plankton (P), zooplankton (Z), Grab stations (G), pelagic trawl (PT), bottom trawl (BT) stations, valid swept-area hauls, traps (T), hand lines (HL), photographic equipment (Focus and Campod), and distance surveyed (NM) during the special studies

					Fishing gears							
Region	**CTD**	**P**	**Z**	**G**	**PT**	**BT**	**Seccesful Trawl Stations**	**T**	**HL**	**Focus**	**Campod**	**Distance surveyed (NM)**
Quirimbas and St. Lazarus	67	0	0	8	11	6	16	4	Yes	Yes	Yes	1616.75
Paisley Seamountain	2	2		1	1	1	1	2*	yes	yes	no	1270.53
In between	3	3		3					yes	no	no	175.95
Segunda Archipélago	13	5	3	5	1	5	6	2	yes	no	yes	297.33
In between	2	2		2					no	no	no	168.12
Zambezi River's mouth	35	35	35	4		2	2		yes	no	no	336.58
Bazaruto	24	24		9		11	11	4	yes	no	yes	739.11
Admiral Leite Bank	8	8		1					no	no	no	516.47

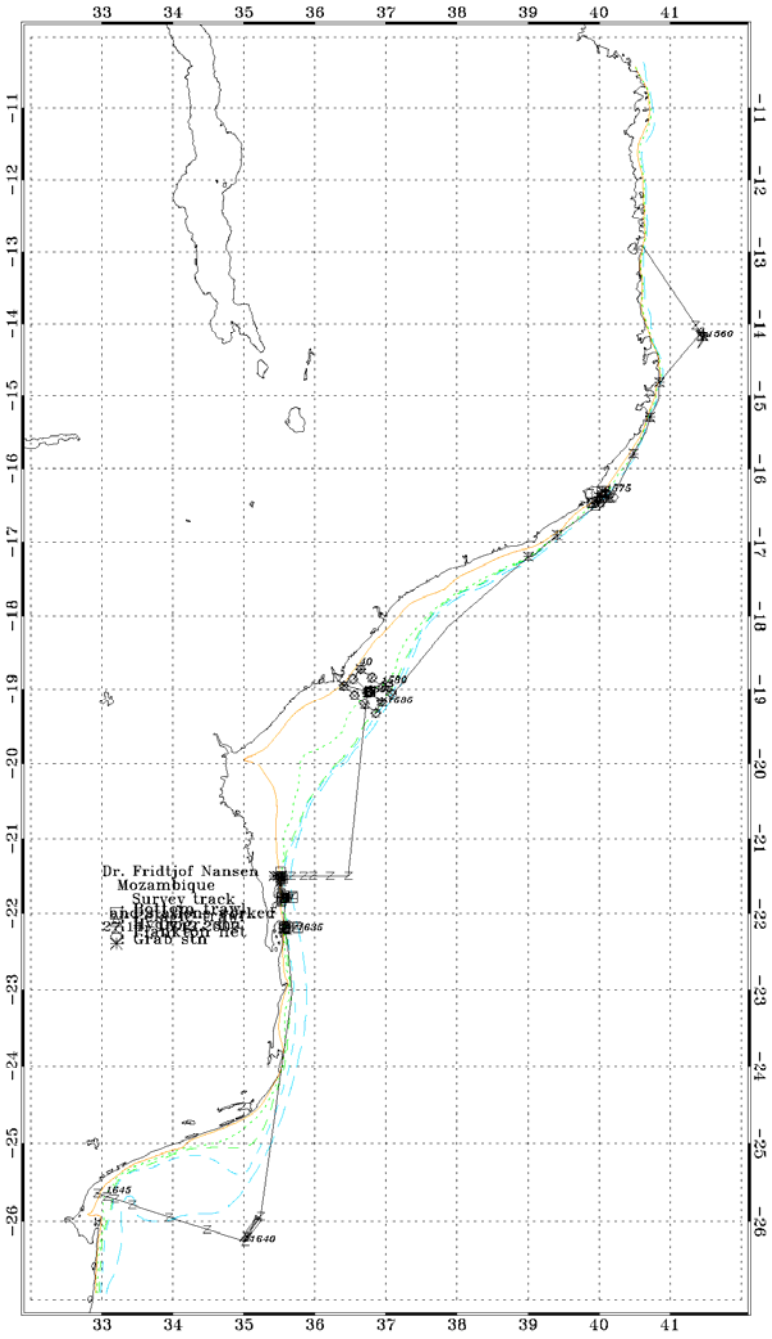


Figure 1.4. Overview of the areas visited during the special studies.

2. METHODS

2.1 Meteorological and hydrographical sampling

2.1.1 CTD profiles

CTD stations were taken in connection with swept-area bottom trawl stations and on selected hydrographical transects (Figure 1.1). A Seabird 911 CTD plus was used to obtain vertical profiles of temperature, salinity and oxygen. Real time plotting and logging was done using the Seabird Seasave software installed on a PC. The profiles were usually taken down to a few metres above the bottom, but down to maximum of 1500 m in deeper waters at the hydrographic transects. The oxygen sensor has shown to be very stable, and no calibration was conducted during the survey. The average differences between the salinometer and CTD values have also been very small in the previous surveys and the CTD values were accepted.

Attached to the CTD was also a Chelsea flourometer of the type Mk III Aquatracka. It measures chlorophyll A in microgrammes per liter with an uncertainty of 3%. Factory slope and offset was 0.921 and -0.02.

2.1.2 Thermosalinograph

The SBE 21 Seacat thermosalinograph was running routinely during the survey, obtaining samples of sea surface salinity and relative temperature and fluorescence (5 m depth) every 10 sec. An attached in-line Turner Design SCUFA Fluorometer was continuously measuring Chlorophyll levels [RFU] at -5m below the sea surface while underway during the entire cruise. The instrument was configured with a bright blue photodiode, a 420 NM Excitation filter and a 680 NM Emission filter. It was calibrated against the secondary orange standard dye. The maximum output was equivalent to 5Volt = 100%. It had a linear temperature compensation of 2.14%/°C.

2.1.3 Current speed and direction measurements (ADCP)

A vessel-mounted Acoustic Doppler Current Profiler (VMADCP) from RD Instruments was run continuously during the survey in broadband mode shallower than about 400 m and in narrow band mode in deeper waters. The frequency of the VMADCP is 150 kHz, and data were averaged and stored in 3 m or 4 m vertical bins. All data were stored on files for post survey processing.

2.1.4 Meteorological observations

Wind direction and speed, air temperature, global radiation and sea surface temperature (5 m depth) were logged automatically every nautical mile on an Aanderaa meteorological station.

2.2 Zooplankton sampling

Zooplankton samples were collected with the Hydrobios Multinet zooplankton sampler that takes up to five discrete samples at predefined depths while measuring the water flow through the net. The samples collected were rinsed into the codend and preserved with buffered formaldehyde in plastic bottles labelled with date, station number and sample depth and stored for analyses on-shore.

2.3 Sediment sampling

Sediment samples were taken by a van Veen grab with adjustable weight and a surface area of 0.1 m^2. The total volume of the grab was 21 l. At each site, 8 grab samples were taken. Five were used for biological analysis and 3 for chemical analysis (metal and oil hydrocarbons) and grain size analysis.

On deck the volume of each sample was measured. Sediment was described, and colour was recorded, as well as anomalous odour and conspicuous taxonomic groups. Samples for biological analysis were sieved through sieves with mesh size 5 mm and 1 mm round holes. Material retained in the 1 mm sieves was placed in plastic containers where formalin and borax was added. Each sample was marked and stored on board in transport containers.

Samples for chemical analysis were taken through the hatches on top of the grab from the upper 0-1 cm of the sediment. To avoid contamination an ordinary table spoon was used when taking the sediment for hydrocarbon and grain size analyses, but a plastic spoon was used when taken the sediment for metal analyses. The spoons were washed with seawater between each sample. Each sample was put into Rilsan plastic bags which were marked and immediately frozen to prevent evaporation of labile compounds. The samples were kept frozen until further analysis in the onshore laboratory.

Samples for TOM and grain size analyses were taken from the upper 0-5 cm of the sediment and put in separate plastic bag, marked and frozen immediately.

2.4 Biological fish sampling

The trawl catches were sampled for species composition by weight and numbers. The deck sampling procedure is described in more detail by Strømme (1992). Length measurements were taken for most target species on most stations. The Electronic Fish Meter (SCANTROL) coupled to windows version computer software (Nansis) was used for length measurement. The total length of each fish was recorded to the 1 cm below. The carapace length was measured to the 0.1 cm below for shrimp. Biological samples of target species were taken at some trawl stations, preferably near the zooplankton/benthos locations, and included total

length (cm), body weight (g), sex, reproductive stages and stomach samples. Reproductive stages were determined by means of macroscopic examination, scoring each fish according to a five-point classification scale. The stomach content samples were stored in 4% formaldehyde solution and the bottle labelled with the station number and fish species code. Other necessary information (e.g. station number, species code, date, sex, gonad stage and country code) was written on a piece of acetate paper and inserted into each sample bottle. In addition, at a few stations total length and body weight (g) were recorded for the target species in the acoustic survey. Basic information recorded at each fishing stations, i.e. trawl hauls, is presented in Annex I. Pooled length frequency distributions, raised to catch per hour, of selected species by area are shown in Annex II.

2.5 Multibeam echosounder 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 in practice limited to 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. The numbers of beams are 128 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 uses distinct frequencies or waveforms. The alongtrack beam width is 1 degree. Ping rate is set manually according to depth. The receiving beam width is 1 degree.

2.6 Cam-Pod and FOCUS

The FOCUS400 is a towed underwater body with a remote controlled movable light sensitive black and white camera. The towed body is suited to investigate relatively large areas of underwater habitat by towing it 2 m above bottom at around three knots of speed. The underwater recordings are stored on DV tape for further investigations on land.

The IMR Cam-Pod is a remote operated camera frame with two thrusters. The system is depth rated to 1000 m. Attached is a Sony 1080l HD Colour camera, with tilt and pan, auto/manual focus and 120 x zoom and light sources, also attached is a SAIV CTDOx sensor. Full description can be found in Annex III.

2.7 Biomass estimates

2.7.1 Acoustic abundance estimation

A SIMRAD ER 60 Echo sounder was used and the echograms were stored on files. The acoustic biomass estimates were based on the integration technique. The Large Scale Survey System (LSSS) from MAREC was used for integration and allocation of the integrated s_A-values (average area back scattering coefficient in m^2/NM^2) The splitting and allocation of the integrator outputs (s_A-values) was based on a combination of a visual scrutiny of the behaviour pattern as deduced from echo diagrams, LSSS analysis and the catch composition. The mean integrator value in each sampling unit (s_A-values) was divided between the following standard categories/groups of fish: Pel 1 (Clupeoid species), Pel 2 (Carangids, Scombrids and associated pelagic), Dem (Demersal species, Meso (Meseopelagic species), Plank (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 (sardinella, anchovy, Pel 2):

$$TS = 20 \log L - 72 \, dB \qquad (1)$$

or in the form

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

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 adding 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 up 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. Therefore, a theoretic mean length of 23.5 cm 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 (23.5 cm) to total estimated biomasses of PEL1 and PEL2.

2.7.2 Biomass estimates based on the swept-area method

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 and it 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:

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

where 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 2.1 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 2.1 Areas in nm^2 used to estimate biomass for different region and depth strata

Central	South	dep.str
2535.4	1360.0	0-20 m
1153.3	1193.9	20-50 m
757.3	1175.7	50-100 m
99.7	1578.7	100-200m
99.6	1732.0	200-300m
96.4	1993.5	300-400m
102.7	2426.5	400-500m
102.7	1711.9	500-600m
147.7	1473.6	600-700m
180.0	1918.7	700-800m
228.1	1364.7	800-900m
51.6	926.2	900-1000m

For conversion of catch rates (kg/hour) to fish densities (t/NM²), the effective fishing area was considered as the product of the wing spread and the haul length, or distance over the bottom, as measured by means of the SCANMAR® equipment based on GPS readings. The area swept for each haul was thus 18.5 m (traditionally applied wing spread for the "Nansen" bottom trawl) times the distance trawled, raised to NM²/hour. The catchability coefficient (q), i.e the

fraction of the fish encountered by the 18.5 m horizontal opening of the trawl that was actually caught, was assumed equal to 1, which leads to an estimation of the minimum biomass for comparison with previous surveys. Catchability may vary, depending on the type of gear used and the type of species (e.g. gears with bobbins are apparently less efficient for species such as flat fishes and octopus, while gears without bobbins and with footrope touching the bottom are more efficient for benthic species). Departures of q from 1 can introduce biases in biomass estimates leading to wrong fisheries management advices (David Somerton, 1996). Mean fish densities by species and strata, were calculated by the swept-area module in Nansis

A description of the fishing gears used, acoustic instruments and their standard settings is given in Annex III.

3. OCEANOGRAPHIC CONDITIONS

3.1 Background

The coast of Mozambique has a length of about 2700 km. The continental shelf is narrow rarely extending more than few kilometres offshore. The notable exceptions are 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. 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. 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 rejoin 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. In the 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.

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.

3.2 Hydrographic sections

Distribution of seawater properties across the northernmost section, located just north of Quissanga, at 11º36.6S is shown in Figure 3.1. The water column exhibits strong thermocline depressed below the 100 m depth and overlaid by the relatively homogenous layer of Tropical Surface Water (TSW). The temperature in TSW exhibits a week gradient, rising from 24ºC at the base of the thermocline to 27ºC at the surface (Figure 3.1a). TSW has a relatively low

salinity (< 35.2 $^{o}/_{oo}$) because of the local excess of precipitation and because of the direct influence of the SEC. Oxygen distribution is homogenous to about 500 m and drops to below 2 ml l^{-1} at 1000 m. Such low oxygen values in connection with relatively high salinities (> 34.9 $^{o}/_{oo}$) suggest that CTD casts at Stations 1491 and 1492 reached the level of southward spreading subsurface Red Sea Water (RSW) produced in the Gulf of Aden.

The next two sections (Figure 3.2 and 3.3) demonstrate conditions of the central western part of the Mozambican Channel and the Sofala Bank. In the deep-water part of the Macuti section (Figure 3.3), TSW is identifiable by means of temperature above 24ºC and salinity 35.2. The oxygen values near the 1000 m depth rise above 2 ml l^{-1}, suggesting a diminishing influence of the RSW. The thermocline extends from 50 to 120 m. Below the thermocline isotherms are sloping upwards, indicating the higher hydrostatic pressure on the right hand side of Figure 3.3 and as a consequence a geostrophically balanced flow southwards. The similar slope of the isolines characterizes the salinity and oxygen distributions. The observed pattern shows clearly that the dominant flow along the continental slope off the Sofala Bank was southward.

The conditions on the Sofala Bank contrast those over the deep water (Figures 3.2 and 3.3). The water column becomes well mixed, as illustrated by the vertically homogenous distributions of temperature, salinity and oxygen. The salinity distribution exhibits strong horizontal gradient with the lowest values near the coast. This reveals the impact of the terrestrial outflow from numerous rivers along this section of the coast, Zambezi and Pungué being among the largest. The terrestrial outflow, strong tidal currents, storm surges and associated strong mixing at the shallow bottom are the main factors responsible for the presence of the strongly mixed water masses over the Sofala Bank observed during the survey.

The next three sections towards the south, off Bazaruto, Ponta Pomene and Zavora (Figures 3.4, 3.5, 3.6), indicate a fundamental change in the structure of water masses south of 22ºS. At the surface, a relatively colder and more saline Subtropical Surface Water (STSW) replaces the homogenous TSW layer seen on the northerly sections. The thermocline becomes shallower. These changes manifest a transition to the subtropical climate zone where excess of evaporation raises surface salinity and intense wind mixing erodes the thermocline. A transition of water masses is also found at depths greater than 800 m where the relatively high salinity and low oxygen signature of RSW is replaced by a less saline and more aerated

waters sourced from Antarctic Intermediate Water (AAIW) of the Southern Ocean origin. The slope of isotherms is also changed (Figures 3.5 and 3.6). On the offshore side of both sections, these appear to slope upwards towards the west, thus indicating a northward flow. This is in the sharp contrast with the Macuti section (Figure 3.3) where a strong southerly flow along the continental slope was found. This suggests for an existence of a hydrographic barrier somewhere between 20º-24ºS, not resolved in the hydrographic data, which blocked the southward current seen off Macuti from entering into the more southerly regions. An analysis of altimetry data observed concurrently with this survey will be investigated to resolve the nature of this barrier (See Section 1.3).

The next hydrographic section, off Inharrime (Figure 3.7) exhibits seawater properties characteristic to the subtropical domain. The thermocline is eroded while both temperature and salinity distributions exhibit a linear increase with decreasing depth. The oxygen distribution is extremely homogenous with values close to 4 ml l^{-1} at all depths.

The southernmost section off Ponta de Ouro (Figure 3.8) is located just south of the bottom threshold terminating the Almirante Leite Bank. The seawater properties distributions are vastly different from those observed further north. The isolines of all parameters exhibit a strong upward slope towards the coast, a suggestive of a strong southward flow. As the location of this section lies within the Agulhas Current formation area it is likely that observed pattern shows an initial phase of the development of this current. The relatively low salinity values near the surface (< 35.3 $^{o}/_{oo}$, as opposed to > 34.4 $^{o}/_{oo}$ seen on the adjacent sections) suggests for an ongoing upwelling in the sub-thermocline waters. It is likely that this upwelling is caused by the vorticity adjustment of the strong flow over the complex topography in this area.

3.3 Sea Level Anomaly (SLA)

Daily satellite altimetry data were received onboard during the survey courtesy of AVISO (www.**aviso**.oceanobs.com). The results from these observations are highlighted in Figure 3.9, which shows the sea level anomaly on October 19, 2008. A cyclonic eddy, marked as B is observed between the Závora and Ponta Pomene sections. This eddy appears to be the source of the doming of the isotherms observed in the hydrographic data on the offshore ends of

these sections (Figure 3.5 and 3.6). Further north, a large counter clockwise rotating structure consisting of two anticyclones, marked as A, is observed in the vicinity of the Sofala Bank. The western limb of this eddy clearly shows the same southward current as that seen in the hydrographic data at the Macuti section occupied on October 20 (See Figure 3.3). The two eddies A and B converge just off Bazaruto. The hydrographic barrier between the subtropical and tropical water masses observed in the hydrographic data was probably related to the transport by these two eddies. The anticyclonic eddy A entrapped the tropical water in the counter clockwise motion preventing it from spreading south beyond Bazaruto while the cyclonic eddy B confined the subtropical water masses to the southern areas. From the series of satellite imagery data (not shown) it was found that similar flow pattern persisted in the same area since late August 2007. It is thus likely that the observed pattern describes a seasonal condition of separation between the tropical and subtropical water masses along the Mozambican coast.

3.4 Sea Surface Temperature

The map of the sea surface temperature is shown in Figure 3.10. Between the southern Mozambique and the northern Sofala Bank, temperature along the coast increases at a rate of 0.5ºC per one degree of latitude. Further north, the coastal temperature stabilized around 27ºC. The temperature over the Sofala Bank displays little cross-shelf gradient, thus contributing to the observation from the Macuti Section (Figure 3.3) that showed well mixed and temperature-wise homogenous water masses on the bank. The strong salinity contrasts due to the river outflow observed on that sections are not reflected in the distribution of the surface temperature.

3.5 Fluorescence

Off Mozambique light penetrates deep into the water column all year round. Primary productivity is thus mainly nutrient limited. A deep chlorophyll maximum (DCM) is typically located just above the thermocline because supply of nutrients is the highest and light quantities still sufficient. Figure 3.11 highlights the differences in the location of DCM between the open tropical and subtropical waters as well as indicates locations of high primarily productivity zones in the coastal regions.

The inshore waters on the Sofala Bank are well mixed and enriched by terrestrial nutrients from the coastal rivers. Chlorophyll concentrations are high near the coast and homogenous across the water column. They diminish rapidly offshore (Zambezi, Macuti). Over the narrow shelves chlorophyll concentrations also increase near to the coast (Ponta Pomene). In the open ocean waters in the tropical domain (Zambezi, Macuti), all chlorophyll concentrations are confined to DCM. There is practically no chlorophyll at the sea surface. In the subtropical waters, the thermocline becomes eroded (Závora, Ponta de Ouro). The highest chlorophyll concentrations are still in DCM but their vertical distribution is more spread across the water column. The highest chlorophyll concentration is found in the DCM along the Ponta Pomene section. These high values may be related to the fact that this section is located close to a frontal zone between the two counter rotating eddies separating the tropical and subtropical waters as suggested in Section 1.3.

3.6 Summary of findings

A hydrographic barrier separating the tropical and subtropical masses along the Mozambican coast was observed at about 22ºS. This barrier was maintained by the two counter rotating eddies, which entrapped the two source water masses in their circulation cells thus preventing their further spreading southwards alongshore. This condition may be seasonal, characterizing the southern spring and summer. Further investigation is required to resolve the persistence of this phenomenon and its significance to the coastal marine ecosystems along the Mozambican coast.

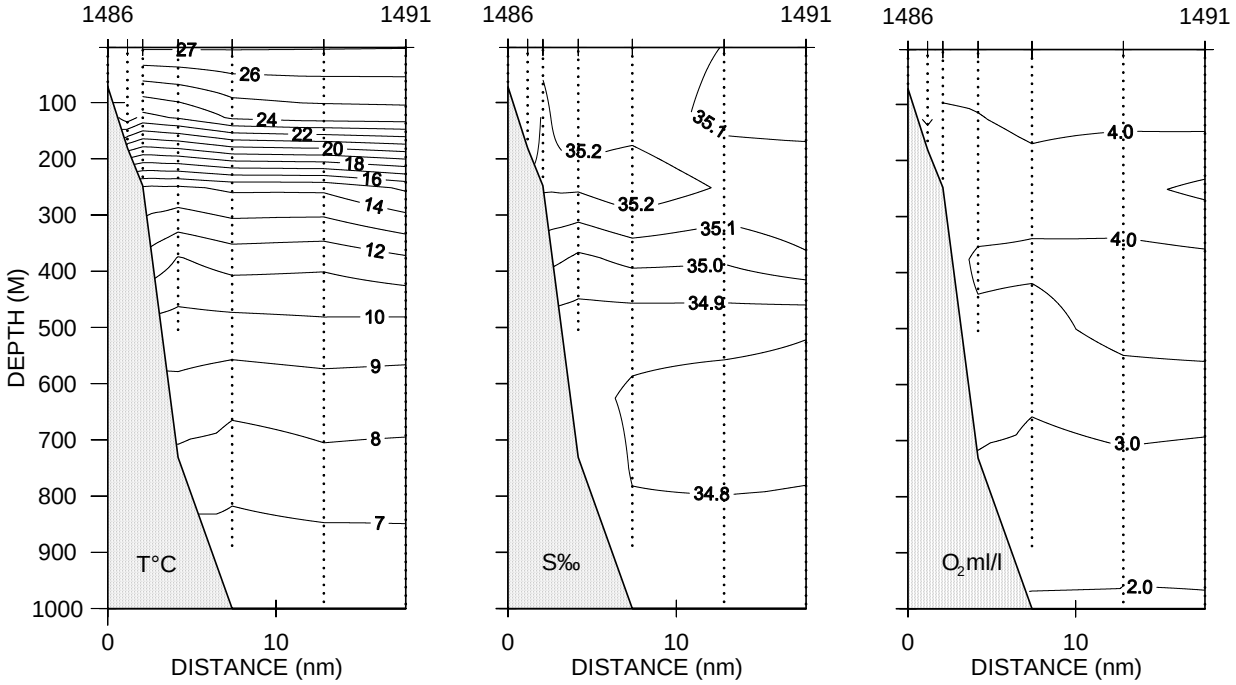


Figure 3.1 Vertical sections of temperature, salinity and oxygen just north Quissanga (Inshore station at 11º36.59' S)

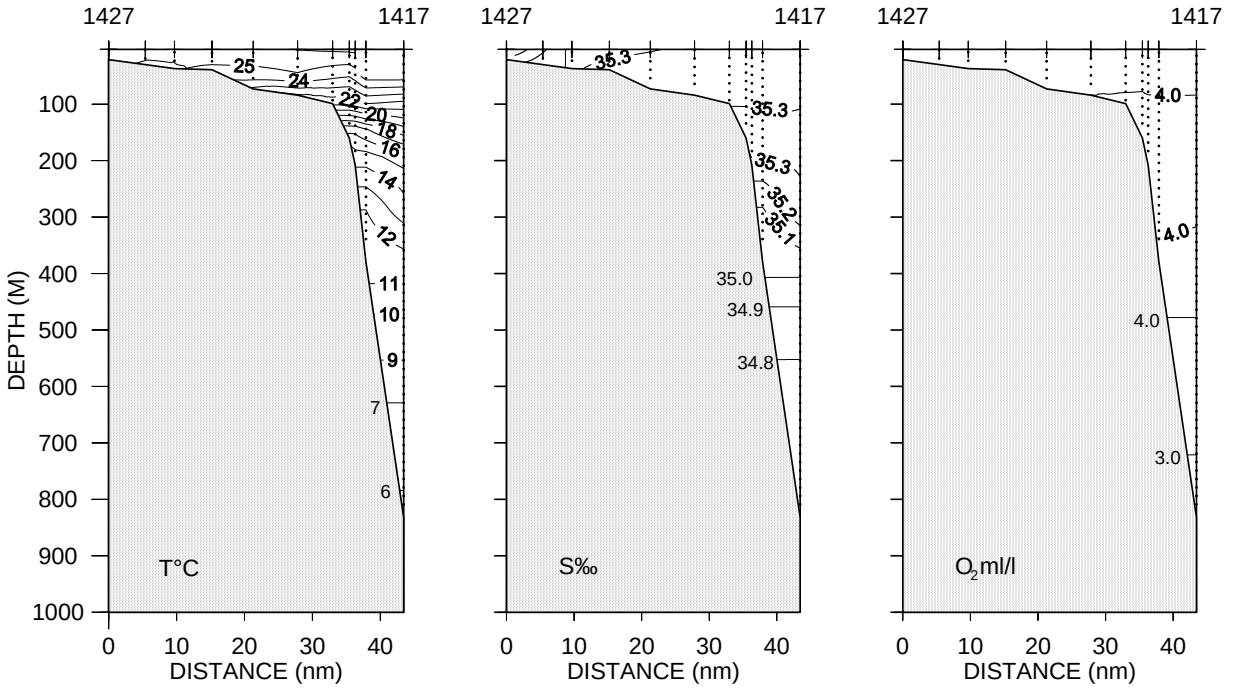


Figure 3.2 Vertical sections of temperature, salinity and oxygen just north off the Zambezi River mouth (Inshore station at 18º53.96' S)

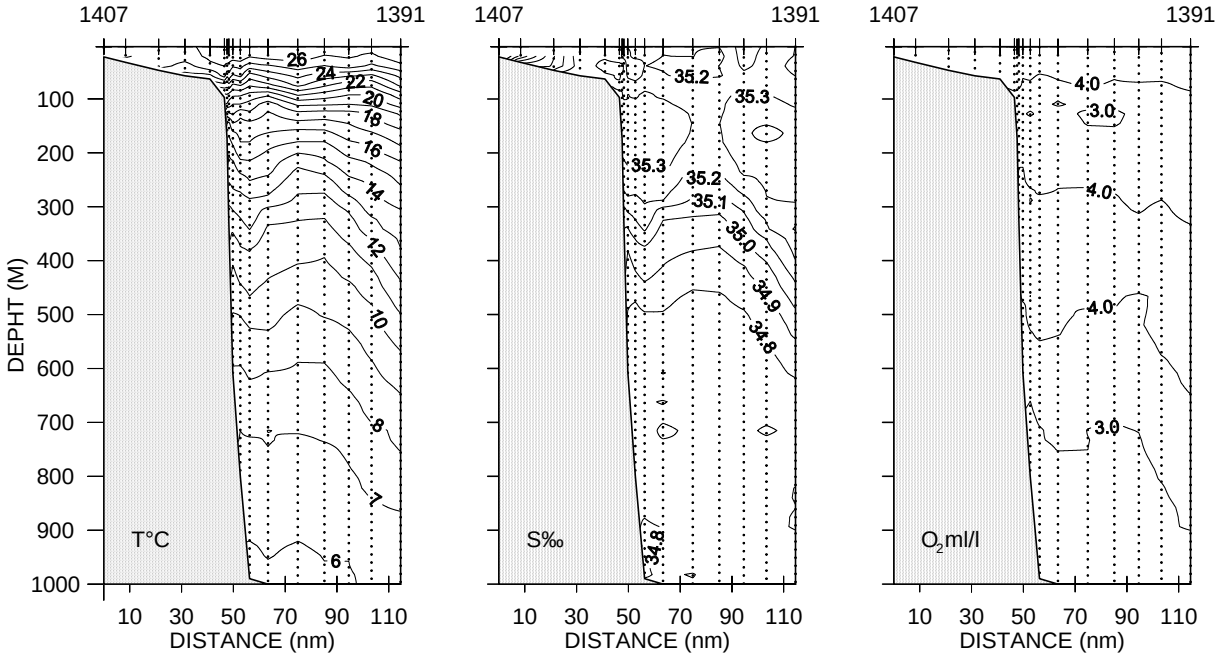


Figure 3.3 Vertical sections of temperature, salinity and oxygen off Macuti (Inshore station at 19º48.58' S)

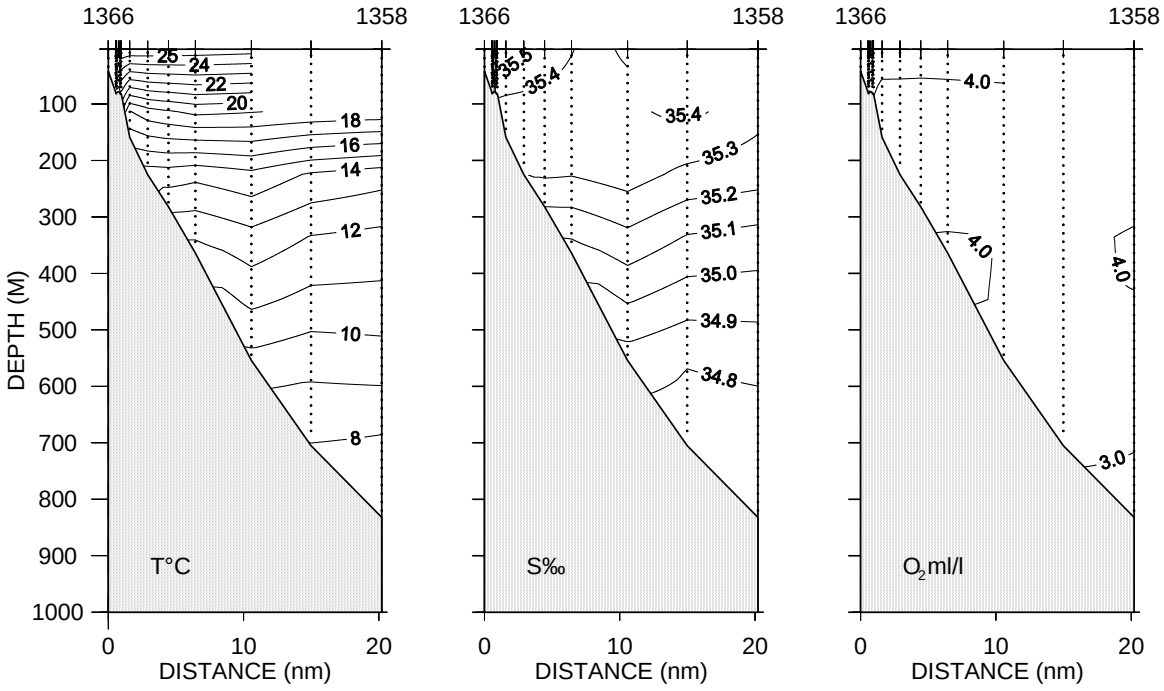


Figure 3.4 Vertical sections of temperature, salinity and oxygen off Bazaruto (Inshore station at 21º54.90' S)

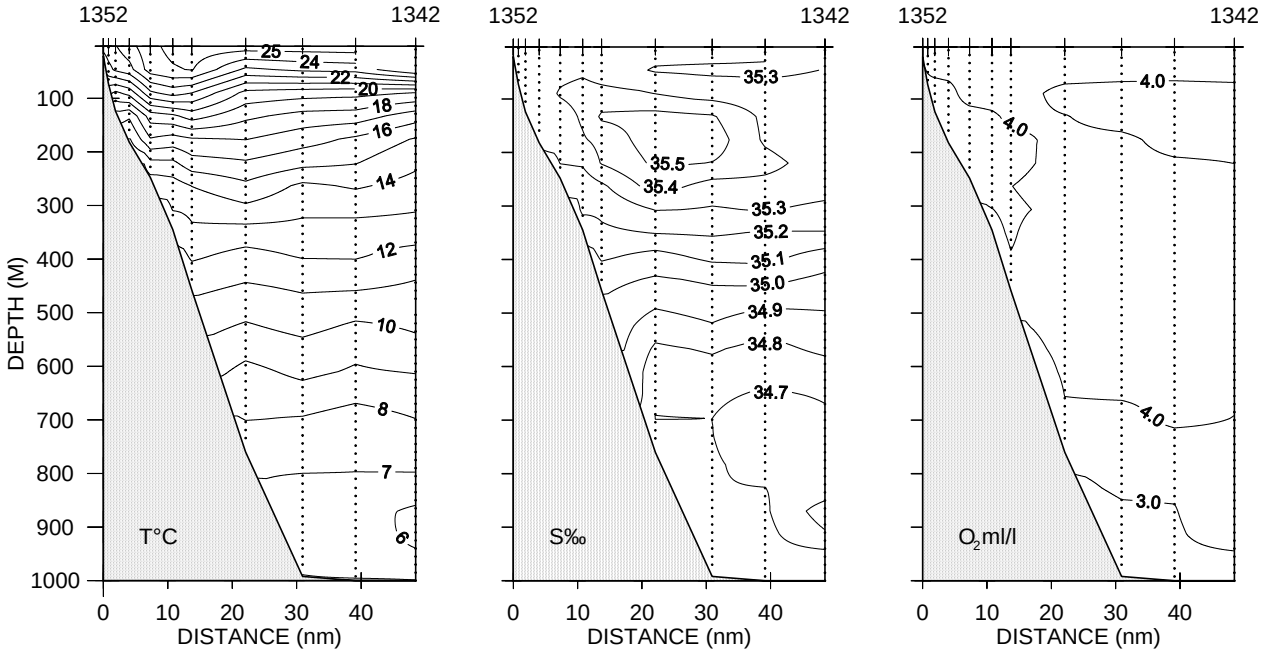


Figure 3.5 Vertical sections of temperature, salinity and oxygen off Ponta Pomene (Inshore station at 22°55.91' S)

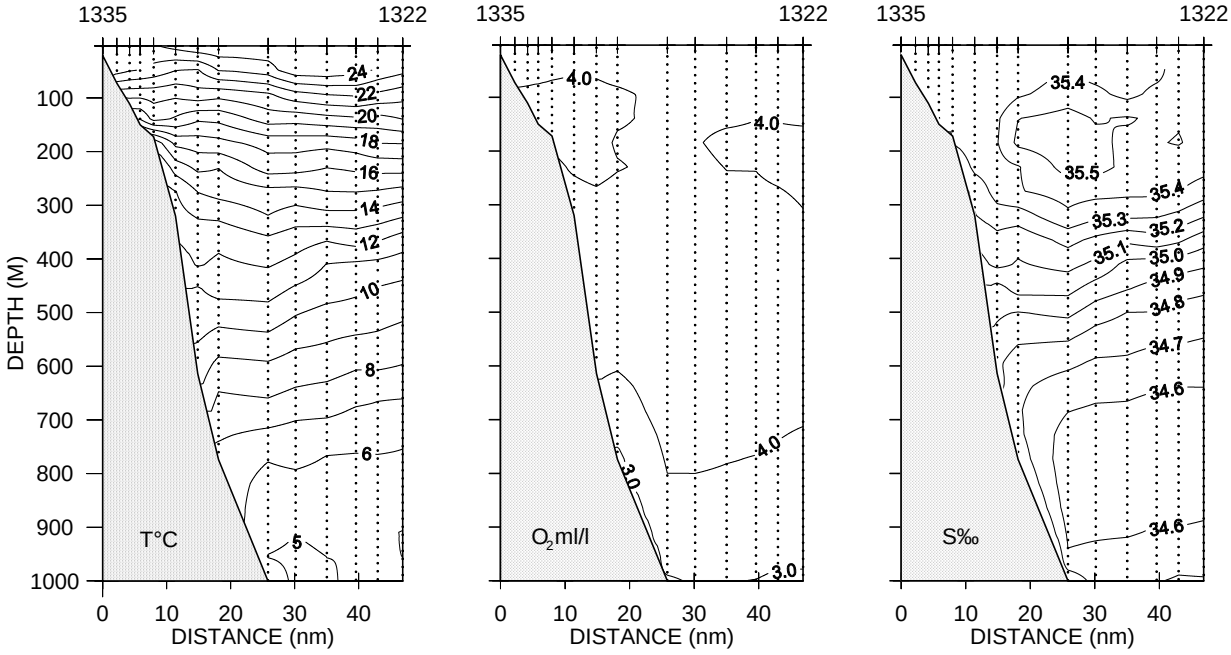


Figure 3.6 Vertical sections of temperature, salinity and oxygen off Závora (Inshore station at 24°13.98' S)

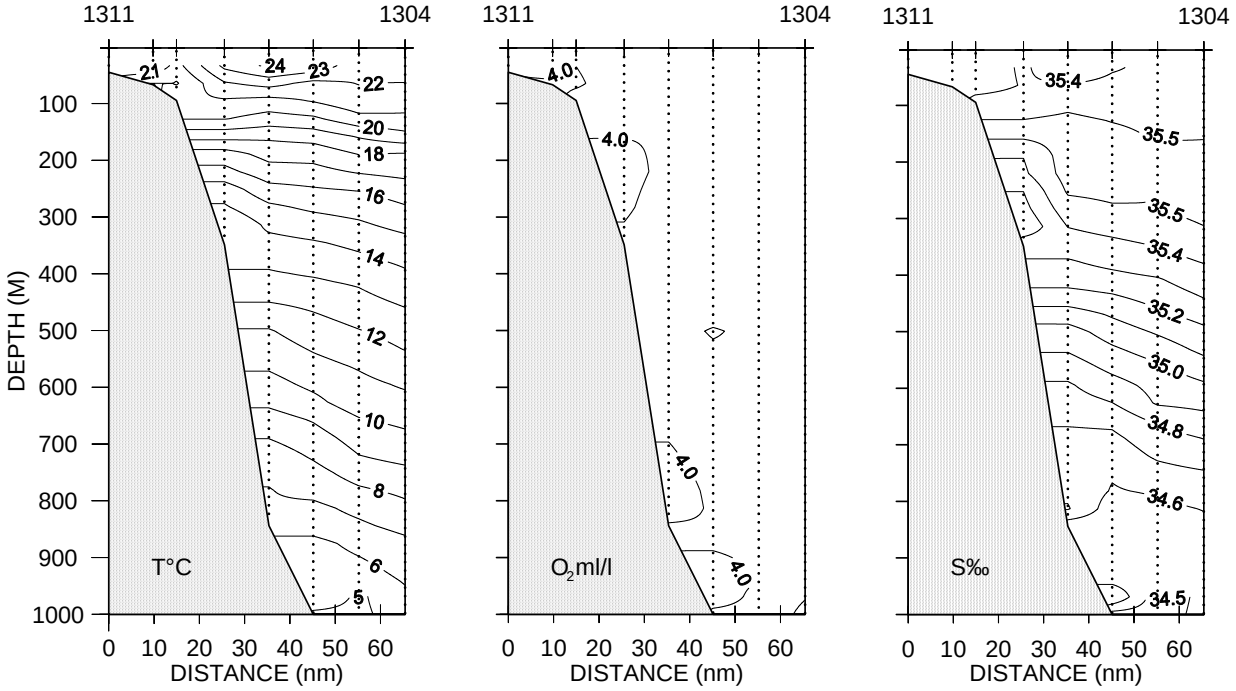


Figure 3.7 Vertical sections of temperature, salinity and oxygen off Inharrime (Inshore station at 24°51.75' S)

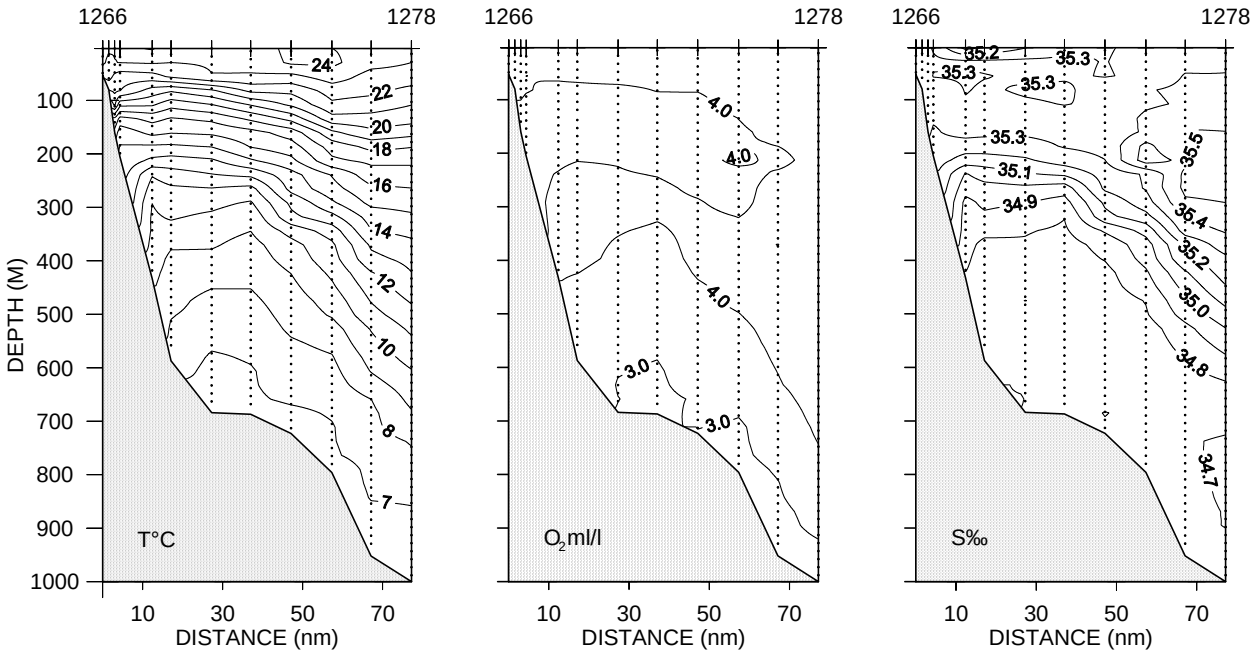


Figure 3.8 Vertical sections of temperature, salinity and oxygen off Ponta de Ouro (Inshore station at 26°32.05' S)

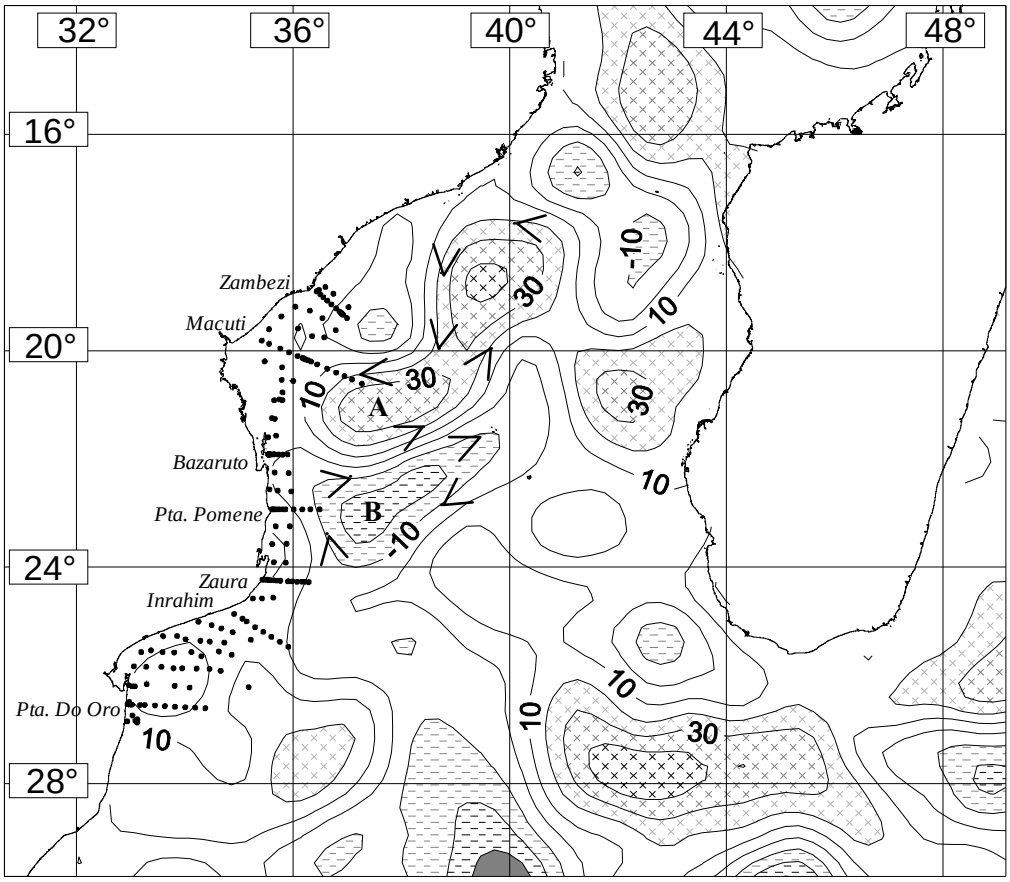


Figure 3.9 Distribution of sea level anomaly on 19th October 2007 in relation to the principal hydrographic sections. The negative anomalies (cyclonic eddies) are hatched with the dashes (-), those positive ones with the crosses (x). Sea surface anomaly expressed in centimeters. A, B denotes the anticyclonic eddy off Macuti and cyclonic eddy off Ponta Pomene-Závora, respectively. The tentative direction of the flow within these eddies marked with the arrow ('>') signs.

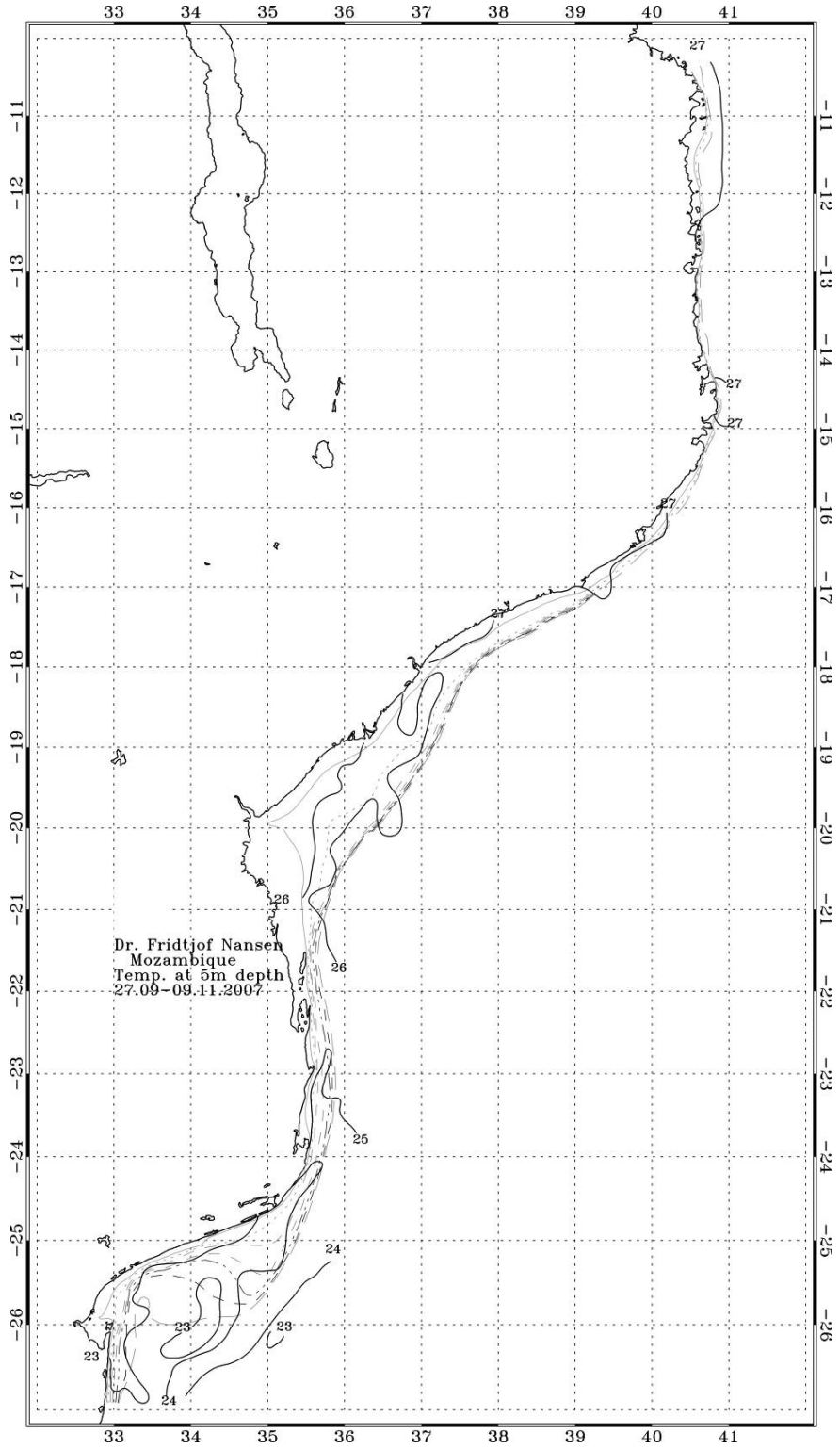


Figure 3.10 Horizontal distribution of the sea of temperature at 5 m based on data recorded underway.

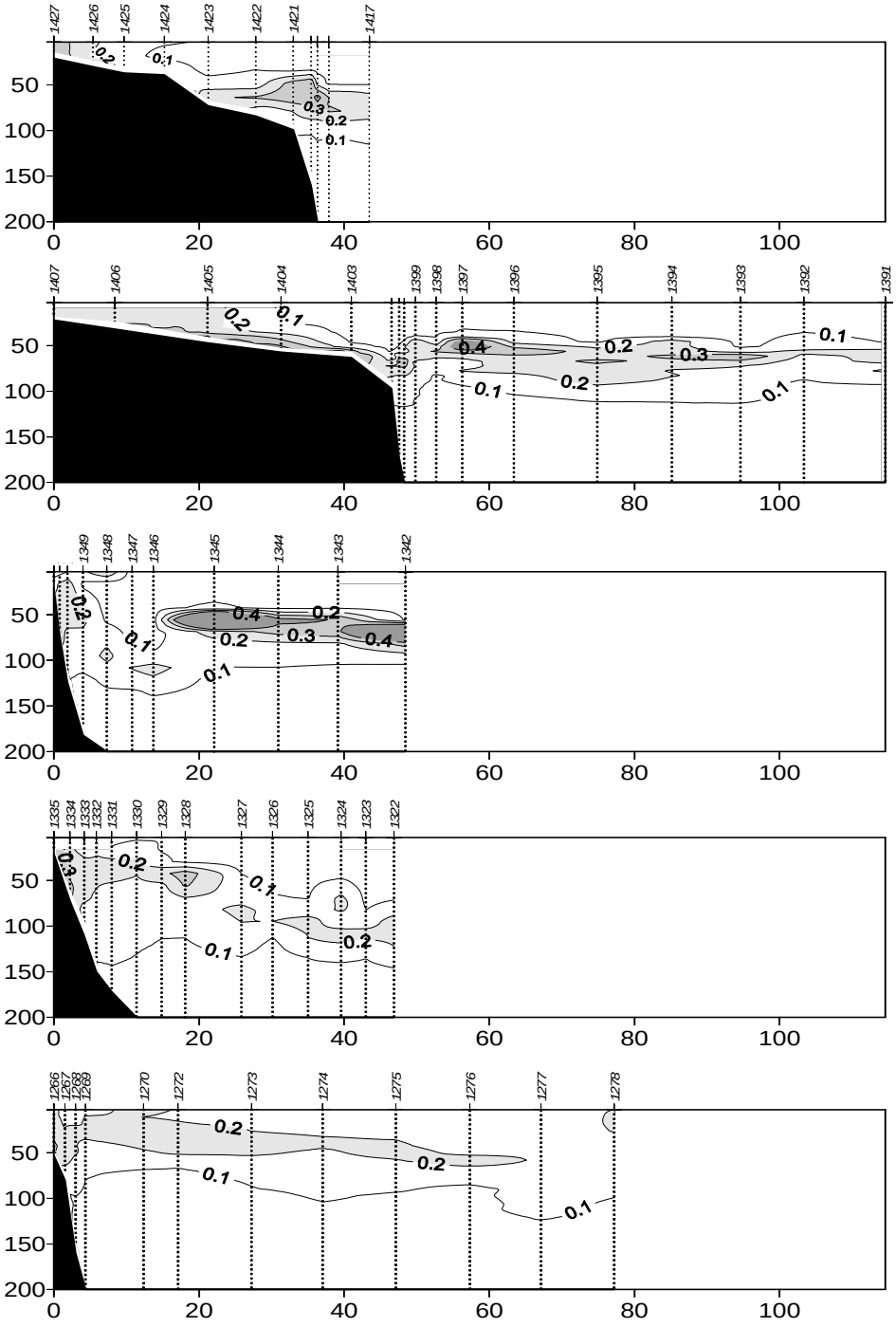


Figure 3.11 Distribution of fluorescence derived concentrations of chlorophyll a along the five principal oceanographic sections; From top to bottom: Zambezi, Macuti, Ponta Pomene, Závora and Pta do Oro. The units expressed in µg l^{-1}, but are relative because the instrument was not calibrated with *in situ* samples.

4. RESULTS OF THE ACOUSTIC SURVEY

The hydroacoustic survey covered the shelf and slope to about 1000 m bottom depth. Continuous acoustic recording and analysis was carried throughout the survey. To obtain a denser acoustic coverage, nighttime registrations were often made in between the daytime course tracks. In addition to the daylight bottom trawling, pelagic trawling was carried out for pelagic species identification, mainly during dark hours, either as random blind trawl hauls close to the surface with pelagic trawl equipped with large floats, or on registrations. Generally low to medium acoustic densities where found over most of the shelf and only plankton and mesopelagic fish was found in the water column from the shelf break and further offshore. The dispersed fish distribution and high abundance of plankton made acoustic detection and separation very difficult.

4.1 Acoustic estimates

Acoustic biomass estimates were calculated for the two species groups of pelagic fish. The first group consisted of clupeoids (Pel 1), and the second group consisted mainly of carangids, but included also barracudas, hairtails and scombrids (Pel 2). As discussed in the Methods section, the low observed acoustic densities of these groups in combination with unreliable species and length segregations made it necessary to use constant acoustic target strength and default length (23 cm). Using these settings, the estimates of number of individuals and biomass are presented in Table 4.1a, b.

Table 4.1a Acoustic estimates of clupeoids (Pel 1).

N (millions)	153.1
Biomass ('000 t)	19.9

Table 4.1b Acoustic estimates of carangids, barracudas, hairtails and scombrids (Pel 2).

N (millions)	264.5
Biomass ('000 t)	34.3

The uncertainty in the acoustic biomass estimates linked to factors such as the target strength and correct species identification. Therefore, the estimates presented here are only reliable as relative indices of abundance.

4.2 Distributions of acoustic densities

The distribution area of main groups of pelagic fish in the region, Pel 1 (Clupeoids) and Pel 2 (mainly carangids) are depicted in the Figures 4.1-4.5 using acoustic integrator values from the LSSS echo-integration system. The NASC densities (m^2/NM^2) are illustrated by a scale normally used on acoustic surveys with “Dr. Fridtjof Nansen”.

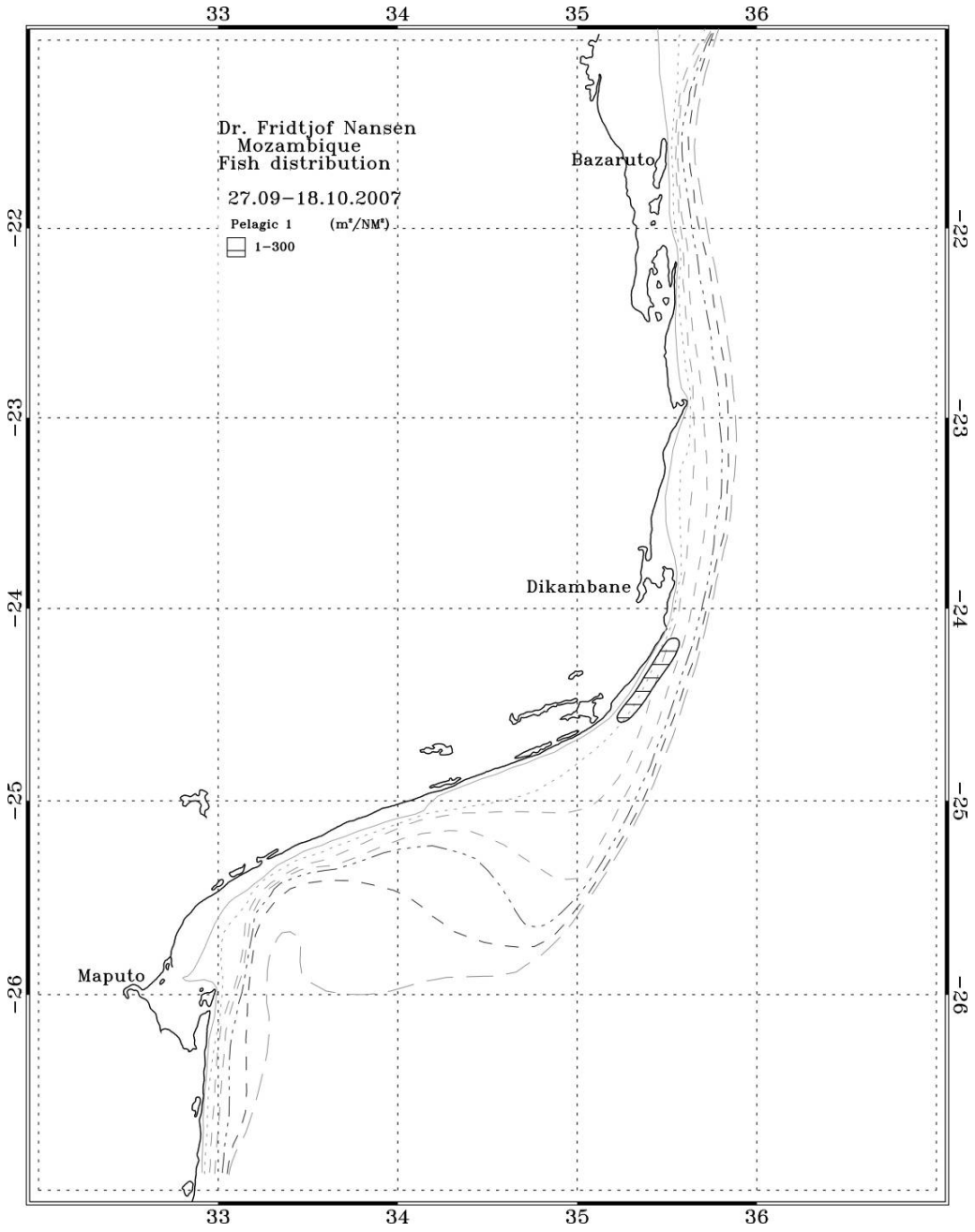


Figure 4.1 Distribution of Pel 1 (clupeoids) in the southern region.

In the southern region Clupeoids (Pel 1) were found in low densities south of Dikambane (Figure 4.1), and between Beira and Angoche (Figure 4.3). In a relatively small area off Beira higher densities of clupeoids were recorded (Figure 4.3). No acoustic recordings were observed in the northern region.

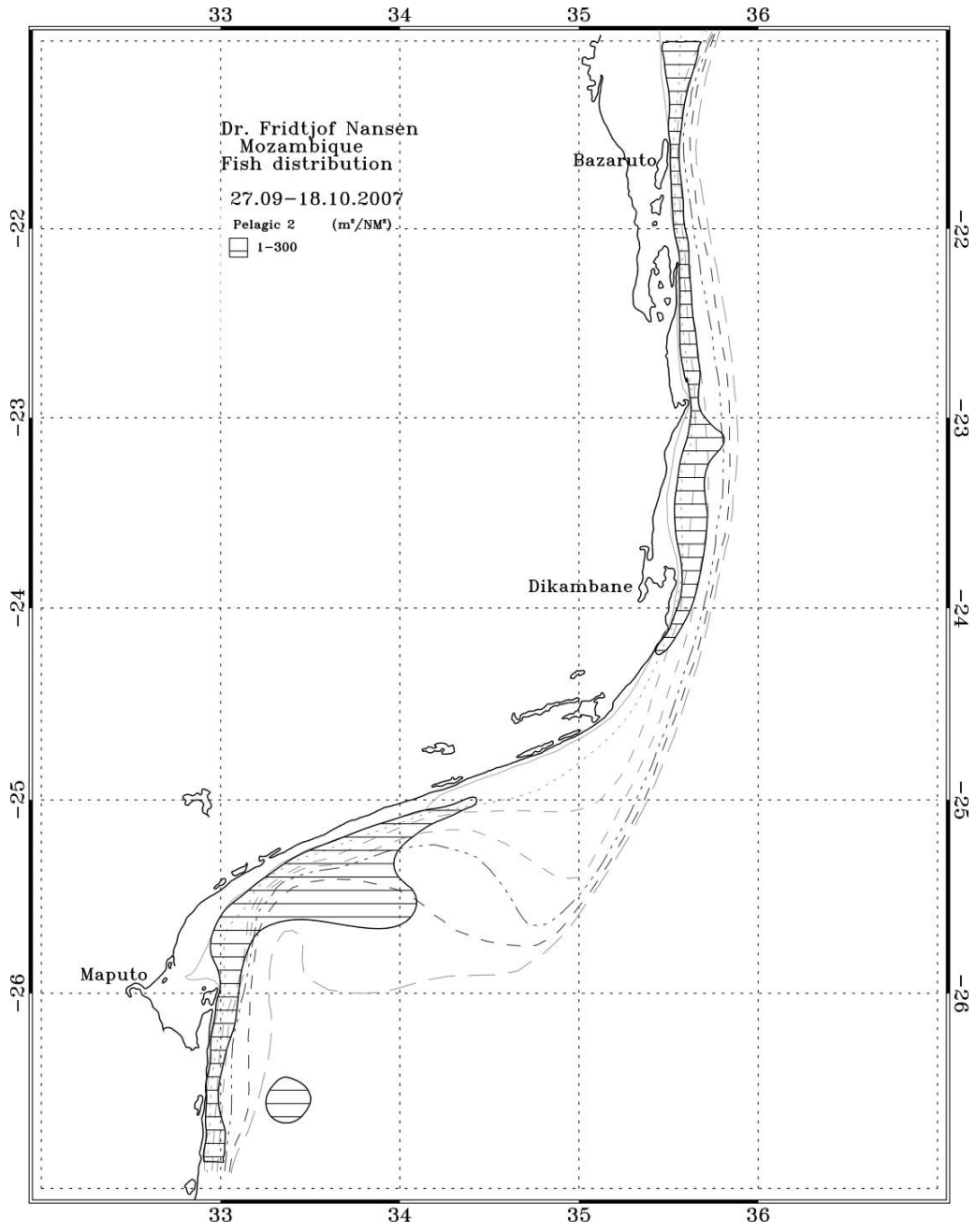


Figure 4.2 Distribution of Pel 2 (carangids, scombrids, barracudas and hairtail) in the southern region.

Low acoustic densities of the Pel 2 group (carangids, barracudas, hairtails and scombrids) were found on the Mozambican shelf from the border with South Africa up to Angoche, and in a small area south of Pemba (Figures 4.2 and 4.4). However, no acoustic densities of Pel 2 were recorded in the area between 25°S and 24 °15'S (Figure 4.2). In a small area south of Beira higher densities of Pel 2 were observed (Figure 4.4).

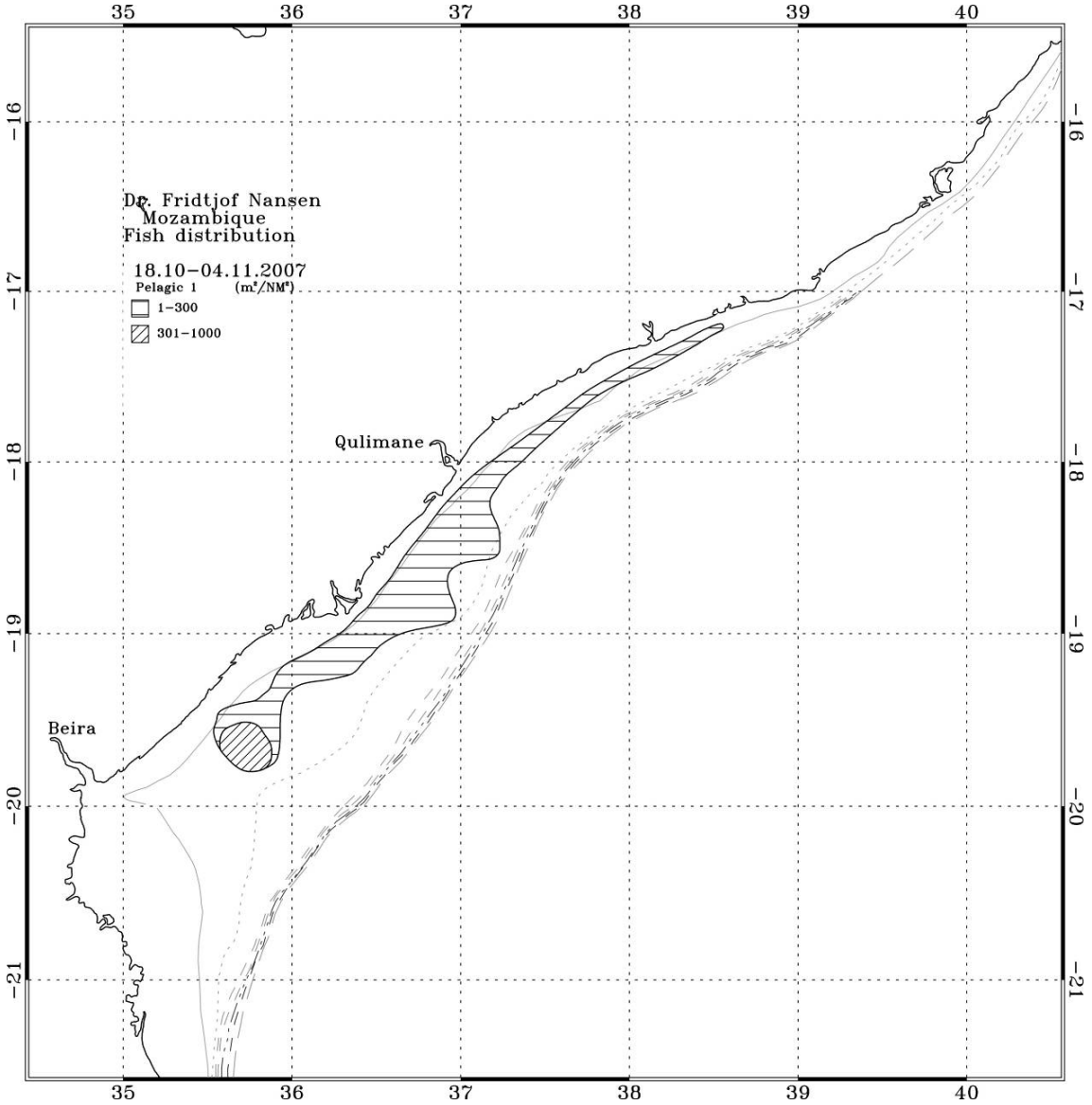


Figure 4.3 Distribution of Pel 1 (clupeoids) in the central region.

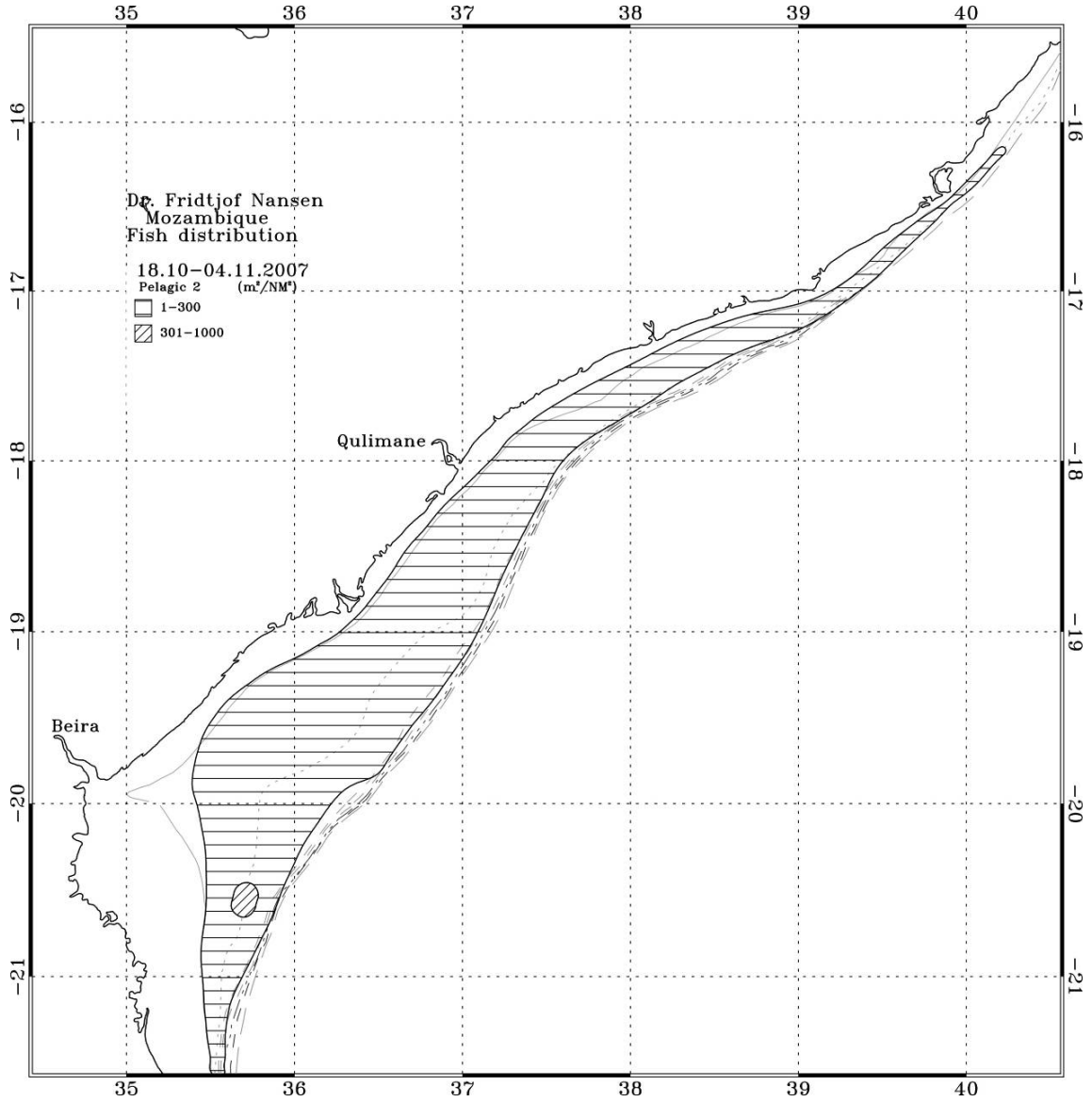


Figure 4.4 Distribution of Pel 2 (carangids, scombrids, barracudas and hairtails) in the central region.

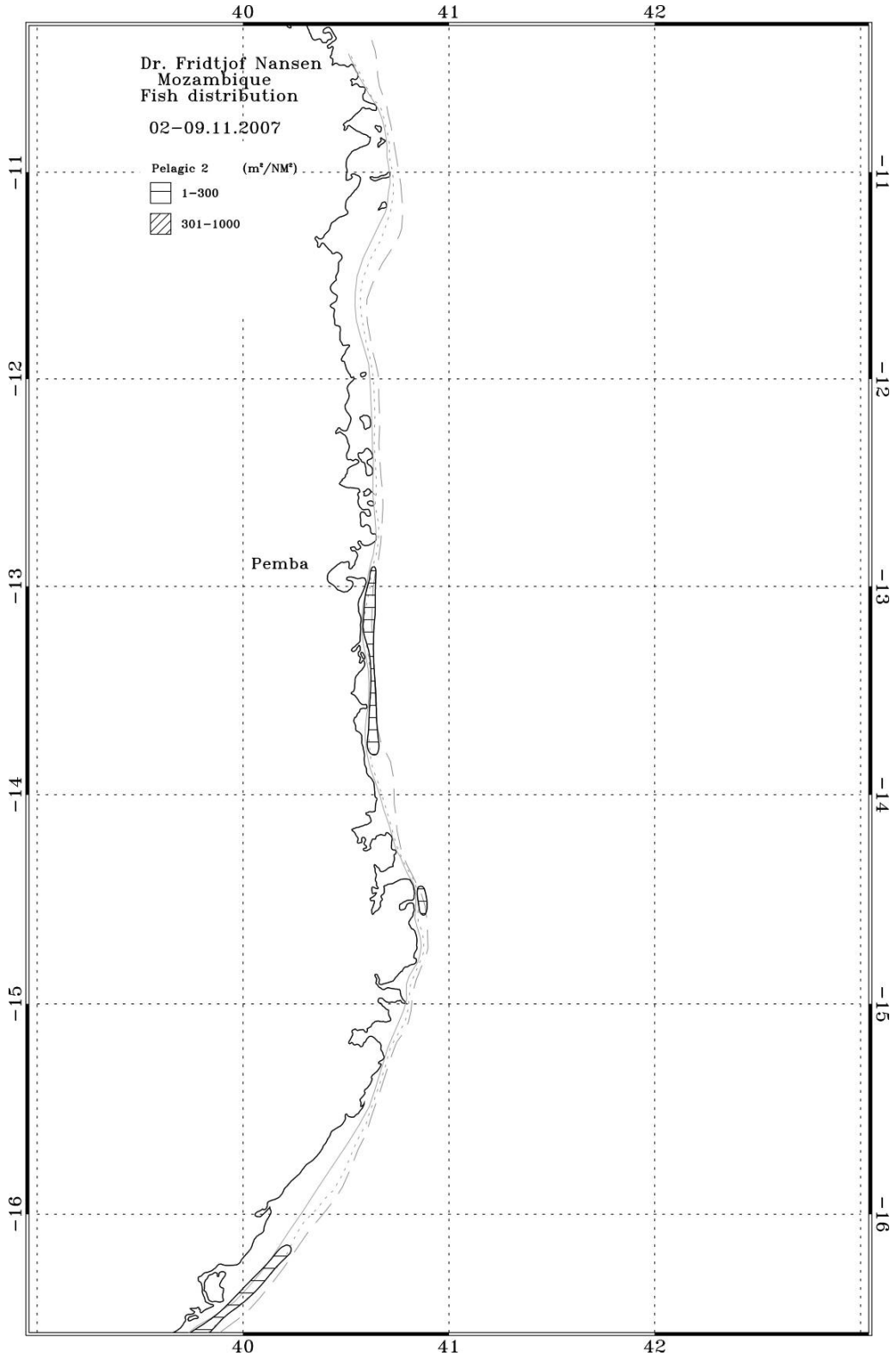


Figure 4.5 Distribution of Pel 2 (carangids, scombrids, barracudas and hairtail) in the northern region.

5. RESULTS FROM THE SWEPT AREA TRAWL SURVEY

The composition of fish and shrimp fauna differ between the continental shelf and slope, and the catch-distribution analyses were therefore performed for two depth strata on the shelf, 20-50 m (inner shelf) and 51-200 m (outer shelf) and 201-800 m depth (slope). Table 5.1 gives the main species groups with common species in the region. For the different analyses the group of "other" includes all species not included in the more detailed breakdown. Therefore, the content of "other" will change from table to table.

The locations of the trawl stations are shown in Figure 1.1. Records of fishing stations and catches are presented in Annex I and pooled length distributions (weighted by catch/hour) of main species by area are shown in Annex II.

Table 5.1 Main groups of species with common species

Main Groups	Main Families	Typical Species
Demersal	Sciaenidae (croakers)	*Argyrosomus hololepidotus*
		Argyrosomus japonicus
		Johnius dussumieri
		Johnius amblycephalus
		Otolithes ruber
		Umbrina canariensis
	Sparidae (Seabreams)	*Argyrops spinifer*
		Argyrops filamentosus
		Cheimerius nufar
		Chrysoblephus anglicus
		Chrysoblephus lophus
		Pagellus natalenses
		Pagellus bellottii natalensis
		Polysteganus coeruleopunctatus
	*Ariidae (catfish)	*Arius dussumieri*
	Serranidae (groupers)	*Epinephelus tauvina*
		Epinephelus areolatus
		Epinephelus epistictus
		Epinephelus albomarginatus
		Epinephelus andersoni
		Epinephelus poecilonotus
		Epinephelus chabaudi
		Epinephelus coioides
		Epinephelus flavocaeruleus
	*Lutjanidae (snappers)	*Aprion virescens*
		Lutjanus sp.
		Lutjanus sebae
		Lutjanus argentimaculatus

		Lutjanus sanguineus
		Lutjanus lunulatus
		Lutjanus sp. (cf malabaricus)
		Paracaesio xanthurus
	Polynemidae (Threadfins)	*Polydactylus sextarius*
		Polynemus sextarius
		Polynemus plebeius
	Haemulidae (=Pomadasyidae) (grunts)	*Diagramma centurio*
		Plectorhinchus gibbosus
		Plectorhynchus griseus
		Pomadasys jubelini
		Pomadasys multimaculatum
		Pomadasys maculatus
		Pomadasys kaakan
		Pomadasys olivaceum
		Pomadasys commersonni
	Ophidiidae (cusk eels) *Lethrinidae	*Dicrolene nigricauda*
		Glyptophidium longipes
		Hoplobrotula gnathopus
		Holcomycteronus sp.
		Monomitopus sp.
		Neobythites analis
		Neobythides kenyaensis
		Neobythides cf somaliaensis
		Selachophidium guentheri
Pelagic	Clupeidae	*Amblygaster sirm*
		Dussumieria acuta
		Herklotsichthys quadrimaculat.
		Hilsa kelee
		Pellona ditchela
		Sardinella gibbosa
		Sardinella albella
		Sardinops ocellatus
	Carangidae	*Alectis indicus*
		Alepes sp.
		Alepes djedaba
		Alepes kleinii
		Atule mate
		Caranx heberi
		Carangoides malabaricus
		Carangoides fulvoguttatus
		Carangoides chrysophrys
		Carangoides armatus
		Carangoides caeruleopinnatus
		Carangoides equula
		Carangoides cf. malabaricus

		Decapterus tabl
		Decapterus macarellus
		Decapterus macrosoma
		Decapterus kurroides
		Decapterus russelli
		Megalaspis cordyla
		Parastromateus niger
		Charybdis affinis
		Portunus sanguinolento
		Selar crumenophthalmus
		Scomberoides tol
		Scomberoides commersonianus
		Seriola lalandi
		Trachurus trachurus
	Scombridae (mackerel)	*Auxis thazard*
		Rastrelliger kanagurta
		Scomber japonicus
		Scomberomorus commerson
		Scomberomorus plurilineatus
	Trichiuridae (hairtails)	Benthodesmus sp.
		Benthodesmus elongatus
		Trichiurus lepturus
	Sphyraenidae (baracuda)	Sphyraena forsteri
		Sphyraena jello
		Sphyraena putnamie
		Sphyraena acutipinnis
		Sphyraena chrysotaenia
		Sphyraena qenie
Shrimps		*Penaeus monodon*
		Penaeus indicus
		Penaeus japonicus
		Penaeus semisulcatus
		Penaeus latisulcatus
		Penaeopsis balssi
		Metapenaeopsis andamanensis
		Metapenaeus monoceros
		Metapenaeus stebbingi
		Trachypenaeus curvirostris
		Aristeus antennatus
		Aristaeomorpha foliacea
		Plesiopenaeus edwardsianus
		Heterocarpus woodmasoni
		Heterocarpus dorsalis
		Heterocarpus tricarinatus
		Parapandulus sp.
		Plesionika sp.
		Plesionika martia

	Haliporoides triarthrus
	Sycionia sp.
Cephalopods	*Histioteuthis sp.*
	Histioteuthis dofleni
	Histioteuthis miranda
	Loligo duvauceli
	Loligo vulgaris
	Loligo forbesi
	Illex coindetti
	Todarodes sagittatus
	Todarodes filippove
	Ommastrephes bartrami
	Symplectoteuthis oualaniensis
	Sepia officinalis hierredda
	Sepia pharaonis
	Sepia australis
	Sepia prashadi
	Rossia sp.
	Octopus vulgaris
	Octopus macropus
Rays and Sharks	*Raja alba*
	Raja stenorhyncus
	Raja confundens
	Cruriraja parcomaculata
	Dasyatis brevicaudata
	Urotrygon daviesi
	Myliobatis aquila
	Narcine rierai
	Rhinobatus annulatus
	Rhinobatus holcorhynchus
	Torpedo nobiliana
	Carcharhinus sealei
	Loxodon macrorhinus
	Rhizoprionodon acutus
	Hydrolagus sp.
	Chimera sp.
	Heptranchias perlo
	Pliotrema warreni
	Halaelurus lutarius
	Centrophorus moluccensis
	Dalatias licha
	Etmopterus lucifer
	Squalus megalops
	Squatina africana

5.1 Southern region

A total of 65 valid swept-area trawl hauls were made in the southern region. Table 5.2 a-c and Figures 5.1 a-c show catch rates by main groups for the inner shelf (0-50 m), outer shelf (51-200 m) and slope (201-800 m), respectively. Average catches were around 1 323 kg/h on the inner shelf, 244 kg/h on the outer shelf and 339 kg/h on the slope. The pelagic group contributed 65% of the total catch on the inner shelf, while the demersal group accounted for 2% of the catch. On the outer shelf, demersal and pelagic species contributed 36 and 55%, respectively. On the slope the 'other' group constituted 85% of the catch. The demersal group contributed 2%, and the pelagic group to less than 1%. The average catch rates of shrimps on the shelf were less than 0.5 kg/hour, and about 9 kg/h on the slope. Hardly any sharks and rays were caught on the inner shelf, but the catch rate on the outer shelf and slope was 14 kg/h and 19 kg/h, respectively. The catch of cephalopods was relatively constant on the inner and outer shelf, and on the slope with an average catch rate of 16 kg/h, 22 kg/h and 13 kg/h, respectively.

Table 5.2 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 (200-800m).

a) Inner shelf: 20-50 m

Station	Gear depth	Demersal	Pelagic	Shrimps	Cephalopod	Sharks-Rays	Other	Total
6	44.0	84.1	0.5	0.0	17.7	0.0	81.8	184.1
37	41.5	0.2	1.4	0.0	13.2	0.0	7.2	22.0
43	47.0	0.6	1012.7	2.6	16.2	0.0	1521.2	2553.3
50	20.5	32.7	3273.0	0.0	34.6	0.0	487.9	3828.2
62	27.0	22.4	0.0	0.0	0.0	0.0	6.1	28.5
Mean	36.0	28.0	857.5	0.5	16.3	0.0	420.8	1323.2
% catch		2.1	64.8	0.0	1.2	0.0	31.8	100.0

b) Outer shelf: 50-200 m

Station	Gear depth	Demersal	Pelagic	Shrimps	Cephalopods	Sharks-Rays	Other	Total
5	107	26.7	0	0	114.5	0	18.2	159.4
7	81.5	0	0	0	9.2	0	32.6	41.8
8	153	0	0.1	0	0	81	150.8	231.8
15	56	231.5	0	0	25.1	11.5	332.7	600.8
16	56	72	76.3	0	13.4	25.8	80.8	268.3
36	66.5	0	16.8	0	0.8	14	16	47.6
40	118	29.7	62.8	0	12.2	26.4	15.5	146.6
41	128	100.4	16	1	23.6	26.6	51.5	219.2
42	100.5	3.6	83.1	0.5	4.8	0	316.5	408.6
44	56	2.9	25.9	0	13.2	24.7	58.2	124.9
46	50.5	44.7	105.2	0	13.1	0	294.2	457.3
47	157	15.9	2.4	0	18.1	10.7	87.5	134.7
51	177	2.8	189.1	0	21	0	368.4	581.2
53	62.5	0	0.2	0	1.6	0	14	15.8
56	153.5	2.2	339.7	0	18.4	0	19.2	379.4
58	176.5	2.8	8.5	0	15.8	0	58.7	85.8
68	144	79.5	10.9	0	81.1	21.8	49.3	242.6
Mean	108.4	36.2	55.1	0.1	22.7	14.3	115.5	243.9
% catch		14.8	22.6	0.0	9.3	5.8	47.4	100.0

c) Slope: 200-800 m

Station	Gear depth	Demersal	Pelagic	Shrimps	Cephalopods	Sharks-Rays	Other	Total
1	709.0	13.4	0.0	7.3	0.4	7.7	69.5	98.2
2	614.0	5.0	0.0	2.7	0.1	1.9	265.6	275.4
3	507.0	9.7	0.0	11.3	14.8	2.0	63.5	101.3
4	297.5	0.3	4.3	0.0	8.1	34.4	357.4	404.4
9	252.5	41.6	2.2	0.0	13.1	23.9	86.7	167.5
10	682.5	27.2	0.0	36.2	19.8	11.3	135.2	229.6
11	675.0	12.5	0.0	7.8	30.8	29.2	306.4	386.6
12	609.0	8.2	0.0	5.3	2.3	2.3	38.1	56.2
13	549.5	0.0	0.0	3.1	4.5	54.9	251.3	313.7
14	268.5	39.5	0.6	0.0	12.5	28.0	906.0	986.6
17	510.0	3.2	0.0	11.2	9.5	0.0	130.2	154.0
18	485.5	3.3	1.5	15.3	31.0	0.0	229.5	280.6
19	460.0	5.4	0.0	13.5	72.6	0.0	947.4	1038.9
20	458.0	1.5	0.8	24.1	24.8	0.0	444.3	495.4
21	451.5	1.4	0.0	36.1	5.1	2.0	86.1	130.6
22	560.5	42.3	3.7	17.2	1.8	4.2	25.2	94.3
23	310.5	0.0	0.7	2.5	4.7	5.5	95.3	108.7
24	316.0	0.0	0.9	6.0	14.4	171.1	240.1	432.4
25	381.5	0.0	0.3	2.4	13.3	5.6	715.4	737.0
26	402.0	0.0	1.2	7.8	10.4	0.8	591.6	611.8
27	437.5	0.6	0.0	11.8	8.5	1.5	216.6	239.1
28	465.0	0.7	0.0	10.7	14.8	6.5	271.6	304.3
29	462.5	2.9	0.0	6.2	2.5	0.0	163.3	174.9
30	286.5	5.1	3.0	4.2	4.9	16.5	229.8	263.5
31	357.5	3.7	1.7	0.0	13.7	30.6	1192.6	1242.4
32	342.5	2.9	2.1	0.1	14.2	89.7	374.3	483.3
33	312.5	3.0	0.9	0.2	23.3	68.3	374.0	469.6
34	240.5	2.9	1.4	0.5	19.8	4.6	539.5	568.8
35	350.0	0.0	0.0	0.0	8.7	45.4	133.1	187.1
39	583.0	4.6	0.0	56.4	2.3	0.0	81.9	145.2
45	260.5	4.4	3.0	6.2	35.6	13.9	529.1	592.2
48	772.0	14.0	0.0	5.7	40.8	5.9	102.3	168.7
49	762.0	10.5	1.5	9.0	30.6	5.6	58.7	115.8
54	546.0	0.0	0.0	11.0	1.9	1.6	79.8	94.4
55	560.5	6.9	0.0	17.0	8.6	10.6	121.7	164.7
57	487.5	0.0	5.3	6.3	5.7	8.1	118.9	144.2
60	758.0	0.1	1.5	11.3	1.5	1.9	26.3	42.6
61	262.5	0.0	0.0	0.0	5.8	7.7	68.5	82.0
63	267.5	0.0	1.9	0.0	7.6	4.1	206.1	219.8
64	759.0	0.7	0.0	11.3	7.4	0.0	32.3	51.8
65	236.5	9.1	77.8	0.0	11.2	2.6	1301.1	1401.8
66	750.0	4.2	0.0	6.8	7.5	95.9	116.1	230.6
67	600.0	0.0	1.4	15.6	7.4	0.0	44.4	68.8
Mean	473.5	6.8	2.7	9.3	13.4	18.7	287.6	338.6
% catch		2.0	0.8	2.7	4.0	5.5	84.9	100.0

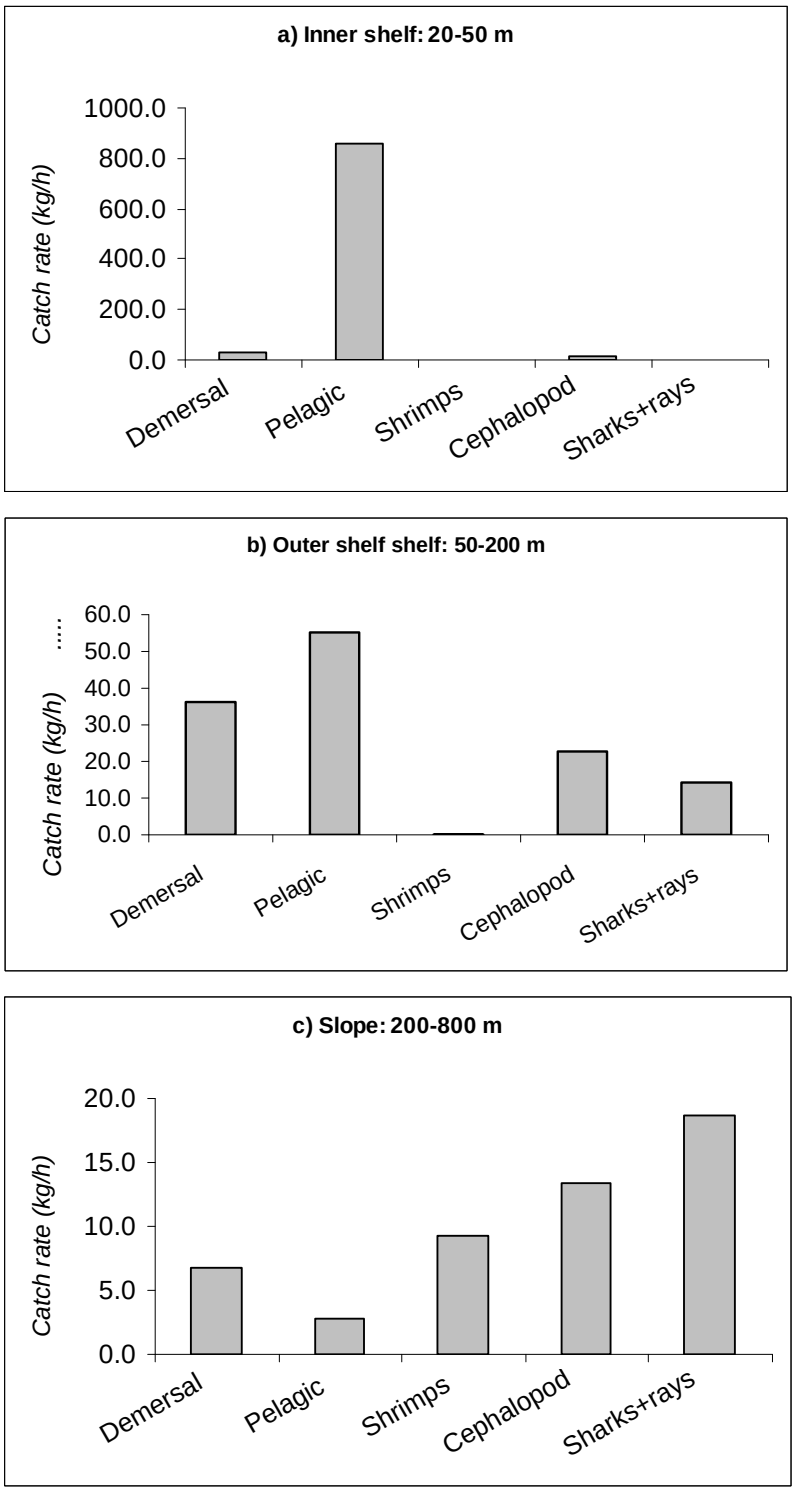


Figure 5.1. Southern region. Mean catch rates (kg/h) by main groups in swept-area bottom-trawl hauls on the a) inner shelf (20-50 m), b) outer shelf (50-200 m) and c) slope (200-800 m).

Catch rates of the commercially most important demersal fish groups on the shelf and slope are presented in Table 5.3 a-c. Corresponding mean catch rates are shown in Figures 5.2 a-c. Seabreams (sparids) dominated the inner shelf catches with an average of 16 kg/h, but only constituting about 1.2% of the total catch in this area. *Pagellus natalensis* was the most abundant seabream. Groupers (serranids), seabreams and snappers (lutjanids) were most abundant on the outer shelf with catch rates of 7.8 kg/h, 6.9 kg/h and 4.8 kg/h, respectively. Grunts (haemulids) were caught in one station on the inner shelf and in two stations on the outer shelf, and croakers (sciaenids) were caught in only on station on the inner shelf. Ophididae was caught frequently and was the most abundant demersal species group on the slope with an average catch rate of 3.5 kg/h. The other demersal groups were rarely caught on the slope, and the catch rates of groupers and hake were 1.6 kg/h and 1.0 kg/h, respectively. The catch rates of seabreams and croakers were both less than 0.5 kg/h.

Table 5.3. Southern region. Catch rates (kg/h) of 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).

a) Inner shelf: 20-50 m

Station	Gear depth	Seabream	Snappers	Groupers	Grunts	Croakers	Other	Total
6	44	47.7	0	7.5	14.3	0	114.5	184.1
37	41.5	0.2	0	0	0	0	21.7	22
43	47	0.3	0	0	0	0.3	2552.8	2553.3
50	20.5	32.7	0	0	0	0	3795.5	3828.2
62	27	0	22.4	0	0	0	6.1	28.5
Mean	36.0	16.2	4.5	1.5	2.9	0.1	1298.1	1323.2
% catch		1.2	0.3	0.1	0.2	0.0	98.1	100.0

Note: No catch of Ophididae and hake

b) Outer shelf: 50-200

Station	Gear depth	Seabream	Snappers	Groupers	Grunts	Croakers	Other	Total
5	107	0.3	0	0	0	0	159.1	159.4
7	81.5	0	0	0	0	0	41.8	41.8
8	153	0	0	0	0	0	231.8	231.8
15	56	0	82.2	29.3	8.7	0	480.6	600.8
16	56	72	0	0	0	0	196.3	268.3
36	66.5	0	0	0	0	0	47.6	47.6
40	118	0	0	24.2	0	0	122.4	146.6
41	128	0.2	0	41.8	0	0	177.2	219.2
42	100.5	0	0	0.3	0	0	408.2	408.6
44	56	0	0	2.2	0	0	122.7	124.9
46	50.5	39.1	0	0	5.6	0	412.5	457.3
47	157	0	0	0.1	0	0	134.6	134.7
51	177	2.8	0	0	0	0	578.5	581.2
53	62.5	0	0	0	0	0	15.8	15.8
56	153.5	0	0	1.7	0	0	377.7	379.4
58	176.5	2.8	0	0	0	0	83	85.8
68	144	0	0	33.6	0	0	209	242.6
Mean	108.4	6.9	4.8	7.8	0.8	0.0	223.5	243.9
% catch		2.8	2.0	3.2	0.3	0.0	91.6	100.0

Note: No catch of Ophididae and hake

c) Slope: 200-800

Station	Gear depth	Seabream	Groupers	Croakers	Hake	Ophididae	Other	Total
1	709	0	0	0	0	13.4	84.8	98.2
2	614	0	0	0	1.8	3.2	270.4	275.4
3	507	0	0	0	9.3	0.3	91.6	101.3
4	297.5	0	0	0.3	0	0	404.1	404.4
9	252.5	0	35	6.6	0	0	125.9	167.5
10	682.5	0	0	0	8.6	18.6	202.4	229.6
11	675	0	0	0	1	11.5	374.1	386.6
12	609	0	0	0	3.4	4.7	48	56.2
13	549.5	0	0	0	0	0	313.7	313.7
14	268.5	0	31.7	0	0	0.5	954.4	986.6
17	510	0	0	0	3.2	0	150.8	154
18	485.5	0	0	0	3.3	0	277.3	280.6
19	460	0	0	0	5.4	0	1033.5	1038.9
20	458	0	0	0	1.5	0	493.9	495.4
21	451.5	0	0	0	1.3	0.1	129.3	130.6
22	560.5	0	0	0	1	41.3	52.1	94.3
23	310.5	0	0	0	0	0	108.7	108.7
24	316	0	0	0	0	0	432.4	432.4
25	381.5	0	0	0	0	0	737	737
26	402	0	0	0	0	0	611.8	611.8
27	437.5	0	0	0	0.6	0	238.5	239.1
28	465	0	0	0	0	0.7	303.6	304.3
29	462.5	0	0	0	2.9	0	172	174.9
30	286.5	0	0	2	0	3.2	258.4	263.5
31	357.5	0	0	0	0	3.7	1238.7	1242.4
32	342.5	0	0	0	0	2.9	480.4	483.3
33	312.5	0	0	0	0	3	466.6	469.6
34	240.5	0	0	2.4	0	0.5	565.9	568.8
35	350	0	0	0	0	0	187.1	187.1
39	583	0	0	0	0	4.6	140.6	145.2
45	260.5	0	0	4.1	0	0.3	587.8	592.2
48	772	0	0	0	0	14	154.7	168.7
49	762	0	0	0	0	10.5	105.3	115.8
54	546	0	0	0	0	0	94.4	94.4
55	560.5	0	0	0	0	6.9	157.8	164.7
57	487.5	0	0	0	0	0	144.2	144.2
60	758	0	0	0	0	0.1	42.5	42.6
61	262.5	0	0	0	0	0	82	82
63	267.5	0	0	0	0	0	219.8	219.8
64	759	0	0	0	0	0.7	51	51.8
65	236.5	9.1	0	0	0	0	1392.7	1401.8
66	750	0	0	0	0	4.2	226.4	230.6
67	600	0	0	0	0	0	68.8	68.8
Mean	473.5	0.2	1.6	0.4	1.0	3.5	332.0	338.6
% catch		0.1	0.5	0.1	0.3	1.0	98.1	100.0

Note: No catch of Grunts and Snappers

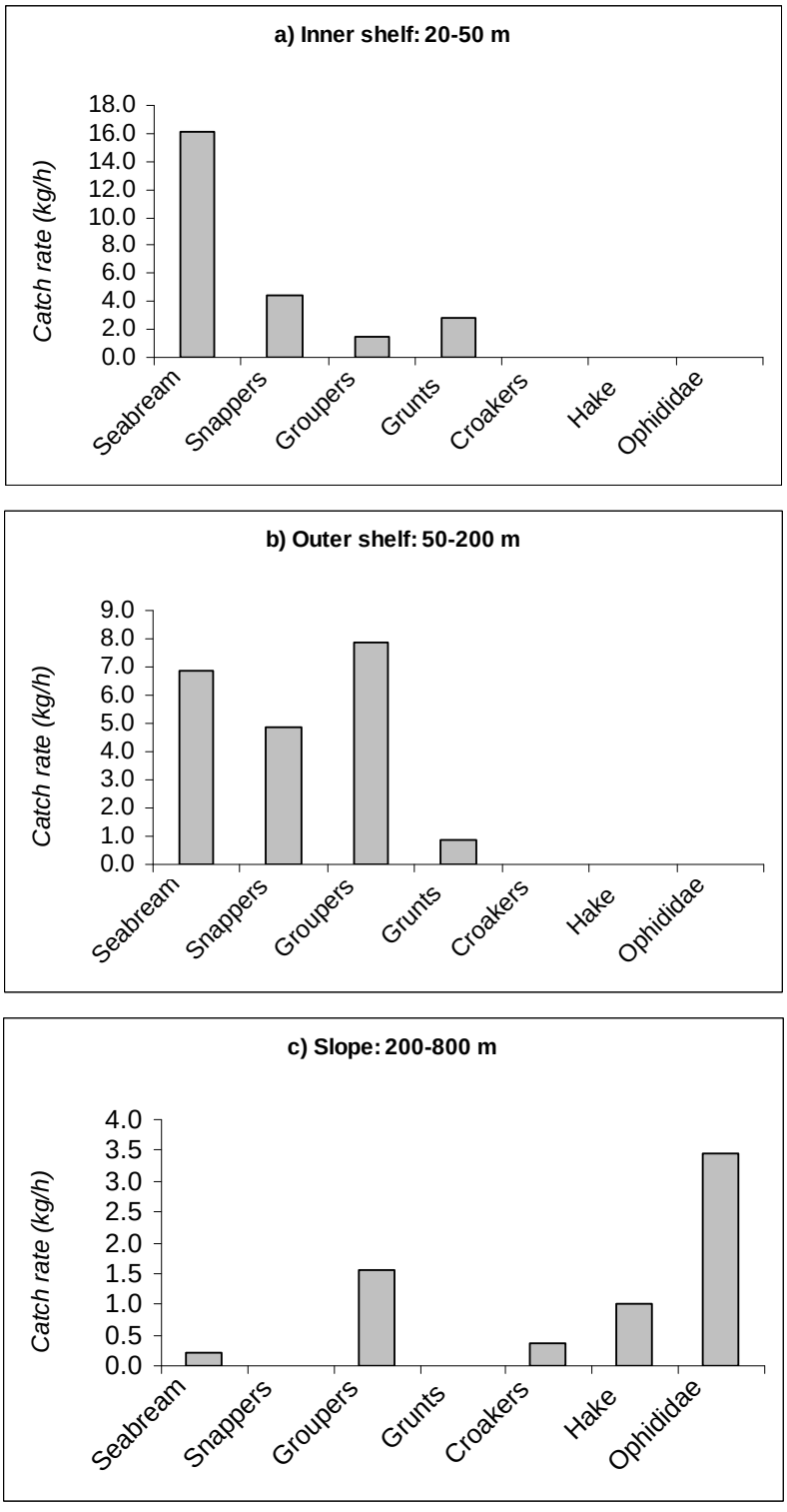


Figure 5.2. Southern region. Mean catch rates (kg/h) of main demersal species grouped by families in swept-area bottom-trawl hauls on the a) inner shelf (20-50 m), b) outer shelf (50-200 m) and c) slope (200-800 m).

Tables 5.4 a-c shows the catch rates of the main pelagic families caught in the bottom trawl in the southern region on the inner and outer shelf, and the slope, respectively. Corresponding mean catch rates are represented in Figures 5.3 a-c. The dominant species on the inner and outer shelf were carangids, mainly *Carangoides malabaricus*, *Decapterus russelli* and *Decapterus macrosoma.* Barracudas, mainly *Sphyraena acutipinnis* were the second largest group on the shelf, and hairtails (mainly *Trichiurus lepturus*) on the slope. Clupeoids were caught in only two stations on the shelf and in one station on the slope, and the catch was low (< 6 kg/h) in all three occasions. Scombrids were caught in two and three stations on the inner and outer shelf, respectively.

Table 5.4. Southern region. Catch rates (kg/h) by main pelagic 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).

a) Inner shelf: 20-50 m

Station	Gear depth	Clupeoids	Carangids	Scombrids	Hairtails	Barracuda	Other	Total
6	44,0	0,0	0,5	0,0	0,0	0,0	183,6	184,1
37	41,5	0,0	1,1	0,0	0,3	0,0	20,6	22,0
43	47,0	6,1	3,0	37,4	0,0	966,5	1540,3	2553,3
50	20,5	0,0	3170,4	48,0	0,0	54,7	555,2	3828,2
62	27,0	0,0	0,0	0,0	0,0	0,0	28,5	28,5
Mean	36,0	1,2	635,0	17,1	0,1	204,2	465,6	1323,2
% catch		0,1	48,0	1,3	0,0	15,4	35,2	100,0

b) Outer shelf: 50-200 m

Station	Gear depth	Clupeoids	Carangids	Scombrids	Hairtails	Barracuda	Other	Total
5	107	0	0	0	0	0	159,4	159,4
7	81,5	0	0	0	0	0	41,8	41,8
8	153	0	0,1	0	0	0	231,8	231,8
15	56	0	0	0	0	0	600,8	600,8
16	56	0	76,3	0	0	0	192	268,3
36	66,5	0	16,8	0	0	0	30,8	47,6
40	118	0	62,8	0	0	0	83,8	146,6
41	128	0	12,5	0	1,5	1,9	203,2	219,2
42	100,5	0	80,3	0	2,8	0	325,4	408,6
44	56	0	14	11,9	0	0	99	124,9
46	50,5	2,1	86,9	16	0	0,1	352,1	457,3
47	157	0	0	0	0	2,4	132,3	134,7
51	177	0	20,8	1	0	167,3	392,2	581,2
53	62,5	0	0,2	0	0	0	15,6	15,8
56	153,5	0	339,7	0	0	0	39,7	379,4
58	176,5	0	4,4	4,1	0	0	77,3	85,8
68	144	0	10,9	0	0	0	231,7	242,6
Mean	108,4	0,1	42,7	1,9	0,3	10,1	188,8	243,9
% catch		0,1	17,5	0,8	0,1	4,1	77,4	100,0

c) Slope: 200-800

Station	Gear depth	Clupeoids	Carangids	Scombrids	Hairtails	Barracuda	Other	Total
1	709	0	0	0	0	0	98,2	98,2
2	614	0	0	0	0	0	275,4	275,4
3	507	0	0	0	0	0	101,3	101,3
4	297,5	0	0	0	4,3	0	400,2	404,4
9	252,5	0	0	0	2,2	0	165,3	167,5
10	682,5	0	0	0	0	0	229,6	229,6
11	675	0	0	0	0	0	386,6	386,6
12	609	0	0	0	0	0	56,2	56,2
13	549,5	0	0	0	0	0	313,7	313,7
14	268,5	0	0	0	0	0,6	986	986,6
17	510	0	0	0	0	0	154	154
18	485,5	0	0	0	1,5	0	279,1	280,6
19	460	0	0	0	0	0	1038,9	1038,9
20	458	0	0	0	0,8	0	494,7	495,4
21	451,5	0	0	0	0	0	130,6	130,6
22	560,5	0	0	0	3,7	0	90,6	94,3
23	310,5	0	0	0	0,7	0	108	108,7
24	316	0	0	0	0,9	0	431,5	432,4
25	381,5	0	0	0	0,3	0	736,8	737
26	402	0	1	0	0,2	0	610,6	611,8
27	437,5	0	0	0	0	0	239,1	239,1
28	465	0	0	0	0	0	304,3	304,3
29	462,5	0	0	0	0	0	174,9	174,9
30	286,5	0	0	0	3	0	260,5	263,5
31	357,5	0	1,1	0	0,7	0	1240,7	1242,4
32	342,5	0	0	0	2,1	0	481,1	483,3
33	312,5	0	0	0	0,9	0	468,7	469,6
34	240,5	0	0	0	1,4	0	567,4	568,8
35	350	0	0	0	0	0	187,1	187,1
39	583	0	0	0	0	0	145,2	145,2
45	260,5	0	0,5	0	2,5	0	589,2	592,2
48	772	0	0	0	0	0	168,7	168,7
49	762	0	0	0	1,5	0	114,4	115,8
54	546	0	0	0	0	0	94,4	94,4
55	560,5	0	0	0	0	0	164,7	164,7
57	487,5	0	5,3	0	0	0	138,9	144,2
60	758	0	0,1	0	1,4	0	41,1	42,6
61	262,5	0	0	0	0	0	82	82
63	267,5	0	0	0	0	1,9	217,8	219,8
64	759	0	0	0	0	0	51,8	51,8
65	236,5	1,1	68,5	0	0	9,3	1322,9	1401,8
66	750	0	0	0	0	0	230,6	230,6
67	600	0	0	0	1,4	0	67,4	68,8
Mean	473,5	0,0	1,8	0,0	0,7	0,3	335,8	338,6
% catch		0,0	0,5	0,0	0,2	0,1	99,2	100,0

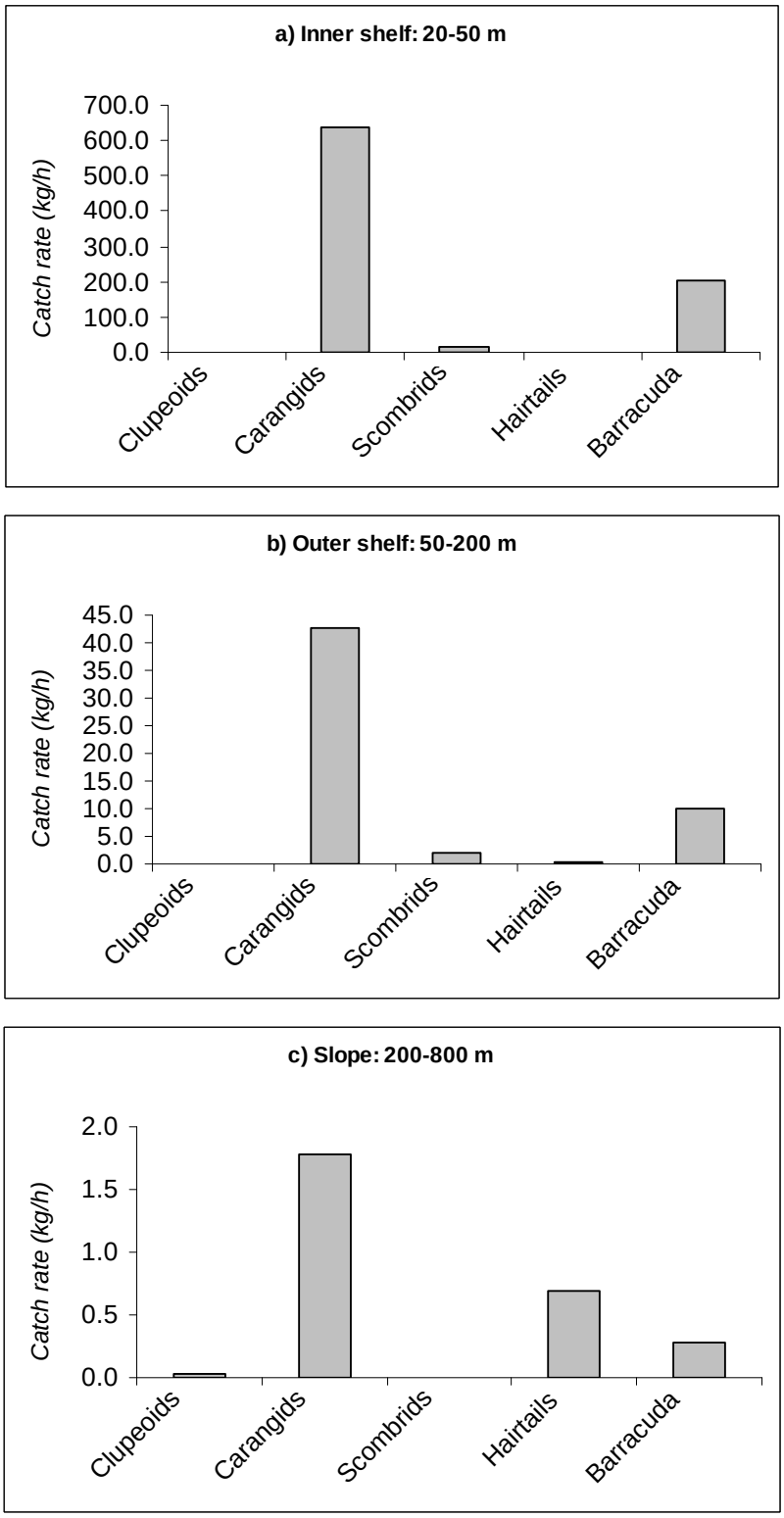


Figure 5.3. Southern region. Mean catch rates (kg/h) by main pelagic families in swept-area bottom-trawl hauls on the a) inner shelf (20-50 m), b) outer shelf (50-200 m) and c) slope (200-800 m).

5.2 Central region

A total of 38 valid swept-area trawl hauls were made in the central region. Table 5.25 a-c and Figures 5.4 a-c show catch rates by main groups for the inner shelf (0-50 m), mid shelf (51-200 m) and outer shelf and slope (201-800 m), respectively. Average catches were around 330 kg/h on the inner shelf, 265 kg/h on the outer shelf and 200 kg/h on the slope. The pelagic group contributed 31% of the total catch on the inner shelf, while the demersal group accounted for 26% of the catch. On the outer shelf, demersal and pelagic species contributed 10 and 37%, respectively. On the slope the 'other' group constituted 84% of the catch. The demersal group contributed 0.6%, and the pelagic group to 0.2%. The average catch rates of shrimps on the inner shelf were 7.7 kg/h, and 9.5 kg/h on the slope. Shrimps were only caught at one station on the outer shelf. The catch rates of sharks and rays were 8.7 kg/h and 4.0 kg/h on the inner and the outer shelves, respectively. On the slope the catch rate of sharks and rays was 6 kg/hour. The catch rates of cephalopods were 3.7 kg/h, 69 kg/h and 6.1 kg/h on the inner shelf, outer shelf and slope respectively.

Table 5.5 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).

a) Inner shelf:20-50 m

Station	Gear depth	Demersal	Pelagic	Shrimps	Cephalopod	Sharks+rays	Other	Total
77	28.5	0	77	0	22.2	0	15.4	114.7
78	48	159.9	29.3	0.4	0.1	0	61.3	251.1
81	22	170.3	850.3	10.5	3.2	0.7	74	1109.2
82	26	103.6	301.2	3.1	7.7	0.5	129.9	546.1
83	36	0	8.6	0	9.8	7	22.4	47.8
85	25	53.4	16.7	5	4.9	10.7	60.4	151
86	30.5	0	47.2	0	1.5	9.5	109.9	168.2
89	24.5	42.1	68.7	24.3	2.5	0.6	43.4	181.6
90	24.5	0	8	0	0.8	0	142.3	151.1
91	36.5	0	20.2	0	5.7	3	23	51.8
94	25.5	17.6	25.2	89.2	3.4	3.4	27.3	166
95	36.5	628.6	22.7	0	1.4	119.6	399.4	1171.7
97	22	125.4	42	296.8	2.6	0	58.3	525.1
98	34.5	1.3	247.8	0	1.5	0.6	105.6	356.8
103	28	145.4	51	36.9	1.2	3.6	179.1	417.2
104	20.5	134.7	59	14.1	0.4	0	156.3	364.5
106	29	21.3	24.1	0	0.7	6.2	76.3	128.5
108	25.5	7.7	26.4	0.3	1	0	132.4	167.9
109	24	12	34.5	1	0.3	0	144	191.8
Mean	28.8	85.4	103.2	25.3	3.7	8.7	103.2	329.6
% catch		25.9	31.3	7.7	1.1	2.6	31.3	100.0

b) Outer shelf: 50-200 m

Station	Gear depth	Demersal	Pelagic	Shrimps	Cephalopod	Sharks+rays	Other	Total
71	186.5	54.1	175.3	0	736.3	11.7	38.5	1015.8
72	107	0	0	0	14.6	0	15.5	30.1
73	60	0	1.2	0	24.9	0	79.9	106
75	62	0	34.5	0	2.1	16.4	164	216.9
76	54.5	54.5	6.1	0	2.5	9.6	299	371.6
79	67	116.9	8.2	0	0	9.8	80.7	215.7
80	71	0	289.2	0	1.4	0	30.7	321.3
87	66.5	0	309.7	0	2.1	0	82.8	394.6
99	97	0.2	5.8	0	36.8	0	3.5	46.2
102	123	15.4	310.8	0	1.3	0	14.3	341.8
107	52.5	35.9	7.2	0.2	0.6	0	1.1	45
110	111.5	37.7	26.1	0	0.3	0	13.6	77.9
Mean	88.2	26.2	97.8	0.0	68.6	4.0	68.6	265.2
% catch		9.9	36.9	0.0	25.9	1.5	25.9	100.0

c) Slope: 200-800 m

Station	Gear depth	Demersal	Pelagic	Shrimps	Cephalopod	Sharks+rays	Other	Total
70	397	4.3	0	4.8	5.4	3.9	308	326.3
74	715	1.4	0.4	15.4	14.2	10.7	138.9	181
88	703.5	1	0	21.4	1.6	7.4	47	78.4
92	448.5	0	2.6	40	4.6	12.1	269.9	329.1
96	377.5	0	0	7.5	6.2	0.8	206.1	220.7
100	544	0	0	25	4.4	1	37.5	68
Mean	530.9	1.1	0.5	19.0	6.1	6.0	167.9	200.6
% catch		0.6	0.2	9.5	3.0	3.0	83.7	100.0

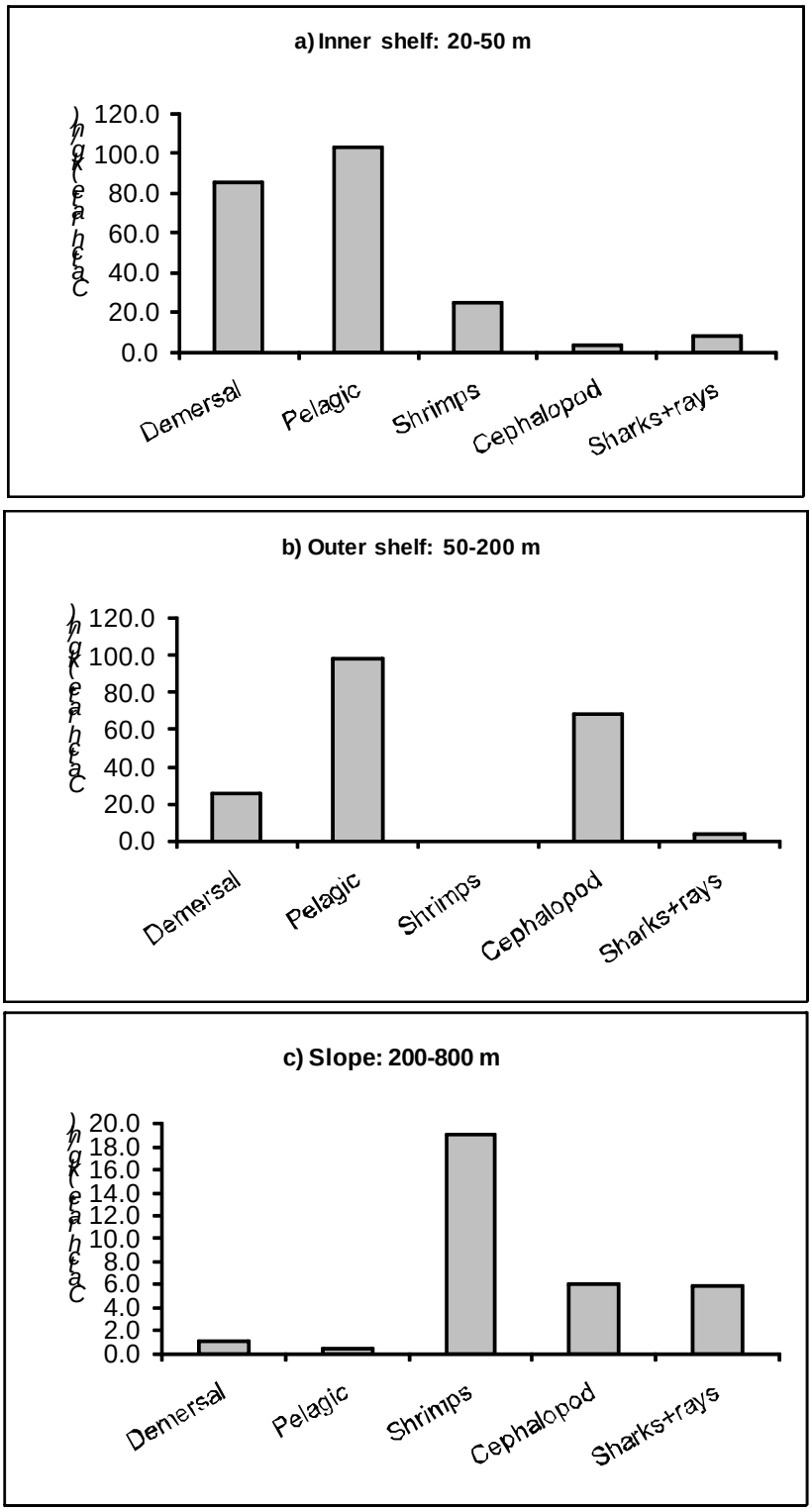


Figure 5.4. Central region. Mean catch rates (kg/h) by main groups in swept-area bottom-trawl hauls on the a) inner shelf (20-50 m), b) outer shelf (50-200 m) and c) slope (200-800m).

Catch rates of the commercially most important demersal fish groups on the central shelf and slope are presented in Table 5.37 a-c. Corresponding mean catch rates are shown in Figures 5.5 a-c. No seabreams (sparids) were caught in the central region, and snappers were most the abundant demersal group on the inner and outer shelf with average catch rates of 29.8 kg/h and 11 kg/h, respectively. Both grunts and croakers were frequently caught on the inner shelf, and their average catch rates were 20.5 kg/h and 19.2 kg/h, respectively. Groupers were caught in three stations on both the inner and outer shelves, and the average catch rates were 3.1 kg/h (inner) and 6.2 kg/h (outer). The average catch rate of Ariidae was 1.7 kg/h on the inner shelf, but neither Ariidae nor croakers were caught on the outer shelf. Grunts were caught in one station at the outer shelf, and the average catch rate was 0.2 kg/h. Ophididae was the only demersal group caught on the central slope with an average catch rate of 1.1 kg/h.

Table 5.6. Central region. Catch rates (kg/h) of 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).

a) Inner shelf: 20-50 m

Station	Gear depth	Snappers	Groupers	Grunts	Croakers	Ariidae	Other	Total
77	28.5	0	0	0	0	0	114.7	114.7
78	48	4.8	0	0	0	0	246.3	251.1
81	22	0	0	123	47.3	0	938.9	1109.2
82	26	0	0	77.8	25.7	0	442.5	546.1
83	36	0	0	0	0	0	47.8	47.8
85	25	0.9	0	43	9.5	0	97.6	151
86	30.5	0	0	0	0	0	168.2	168.2
89	24.5	0	0	0	33.6	8.4	139.6	181.6
90	24.5	0	0	0	0	0	151.1	151.1
91	36.5	0	0	0	0	0	51.8	51.8
94	25.5	0	0	1.4	16.2	0	148.5	166
95	36.5	540.2	36	0	0	0	595.5	1171.7
97	22	0	0	4.6	110.3	10.5	399.7	525.1
98	34.5	0.1	0.1	0	0	0	356.6	356.8
103	28	19.5	0	44.9	72.5	8.4	271.8	417.2
104	20.5	0	23.1	58.3	49	4.3	229.8	364.5
106	29	0	0	21.3	0	0	107.2	128.5
108	25.5	0	0	7.7	0	0	160.1	167.9
109	24	0	0	6.9	0	0	184.9	191.8
Mean	28.8	29.8	3.1	20.5	19.2	1.7	255.4	329.6
% catch		9.0	0.9	6.2	5.8	0.5	77.5	100.0

Note: No catch of Seabream and Ophididae

b) Outer shelf: 50-200 m

Station	Gear depth	Snappers	Groupers	Grunts	Other	Total
71	186.5	0	0	0	1015.8	1015.8
72	107	0	0	0	30.1	30.1
73	60	0	0	0	106	106
75	62	0	0	0	216.9	216.9
76	54.5	29	25.5	0	317.2	371.6
79	67	103.8	13.1	0	98.7	215.7
80	71	0	0	0	321.3	321.3
87	66.5	0	0	0	394.6	394.6
99	97	0	0	0	46.2	46.2
102	123	0	0	0	341.8	341.8
107	52.5	0	35.9	0	9.1	45
110	111.5	0	0	2.9	75	77.9
Mean	88.2	11.1	6.2	0.2	247.7	265.2
% catch		4.2	2.3	0.1	93.4	100.0

Note: No catch of Seabream,Ophididae, Ariidae and Croakers

c) Slope: 200-800 m

Station	Gear depth	Ophididae	Other	Total	
70	397	4.3	322.1	326.3	
74	715	1.4	179.6	181	
88	703.5	1	77.4	78.4	
92	448.5	0	329.1	329.1	
96	377.5	0	220.7	220.7	
100	544	0	68	68	
Mean	530.9	1.1	199.5	200.6	
% catch		0.6	99.5	100.0	

Note: No catch of Seabream, Snappers, Groupers, Grunts, Ariidae and Croakers

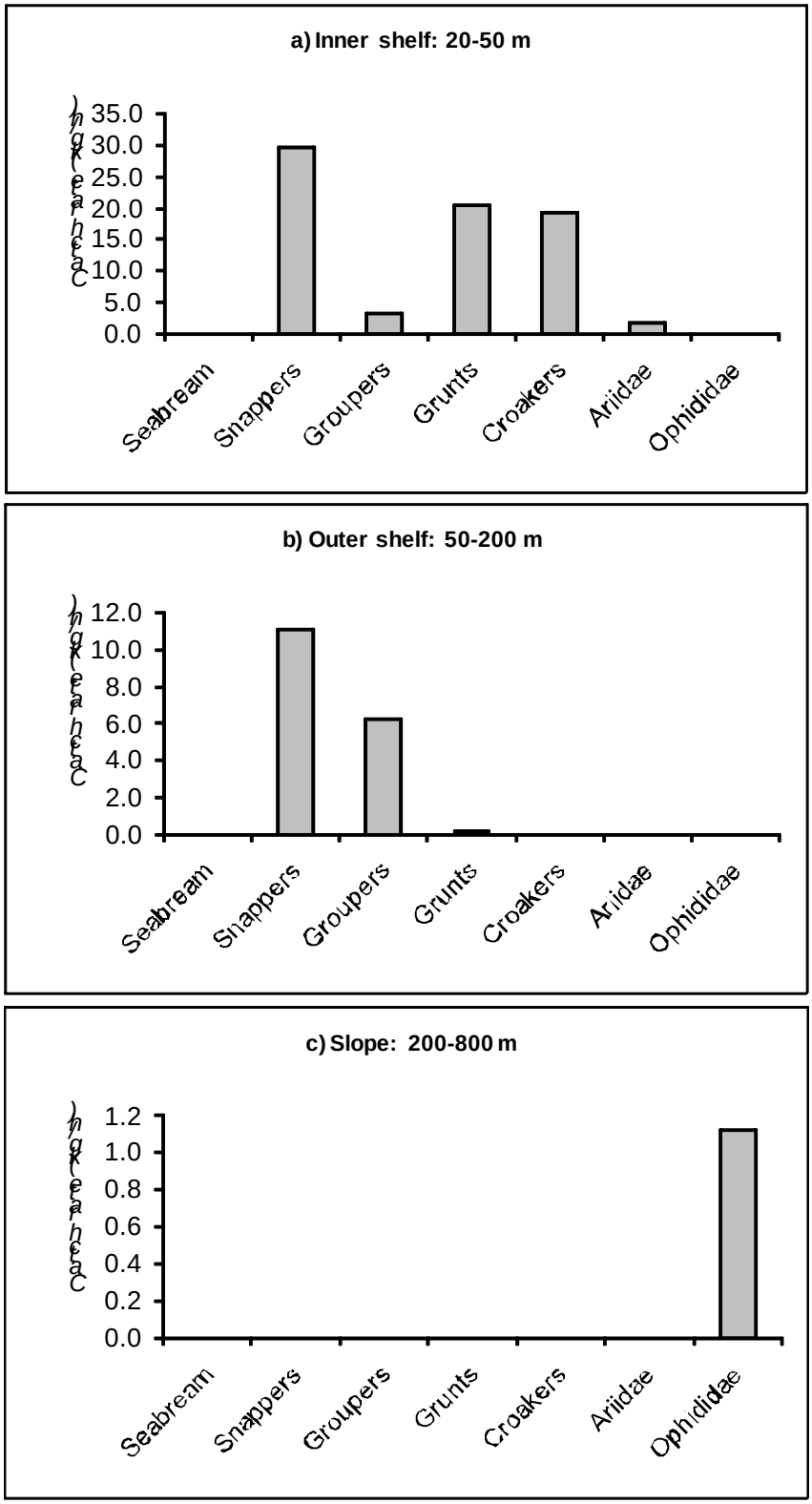


Figure 5.5. Central region. Mean catch rates (kg/h) of main demersal species grouped by families in swept-area bottom-trawl hauls on the a) inner shelf (20-50 m), b) outer shelf (50-200 m) and c) slope (200-800 m).

Tables 5.7 a-c shows the catch rates of the main pelagic families caught in the bottom trawl in the central region on the inner and outer shelf, and the slope, respectively. Corresponding mean catch rates are represented in Figure 5.6 a-c. The dominant species group on the inner shelf were clupeoids, mainly (*Pellona ditchela)* with an average of 57.6 kg/h, but no clupeoids were caught on the outer shelf. On the inner shelf, carangids were the second largest pelagic group, with an average catch rate of 25.7 kg/h. On the outer shelf, carangids constituted to 35% of the total catch, and the average catch rate was 92.7 kg/h. The average catch rates of scombrids, hairtails and barracudas were 7.5 kg/h, 11.9 kg/h and 8.4 kg/h, respectively, on the inner shelf. No hairtails were caught on the outer shelf, and the average catch rates of scombrids and barracudas were 5.2 kg/h and 0.1 kg/h, respectively. Except for catches of hairtails and scombrids in one trawl station on the slope, no pelagic species were caught on the central slope.

Table 5.7. Central region. Catch rates (kg/h) by main pelagic families in swept-area bottom-trawl hauls on the a) inner shelf (20-50 m), b) outer shelf (50-200 m), c) slope (200-800 m).

a) Inner shelf: 20-50 m

Station	Gear depth	Clupeoids	Carangids	Scombrids	Hairtails	Barracuda	Other	Total
77	28.5	0	52.1	25	0	0	37.6	114.7
78	48	0	28.6	0	0	0.7	221.8	251.1
81	22	673.1	47.9	47.5	1.8	104.1	234.8	1109.2
82	26	254.1	13.1	0	24.8	24.8	229.4	546.1
83	36	0	0.8	7.8	0	0	39.2	47.8
85	25	17.1	2	0	5	0.8	126.1	151
86	30.5	0.2	40.4	0	0	6.8	120.8	168.2
89	24.5	64.3	5	0	37	0	75.4	181.6
90	24.5	3.2	3.4	0	0.7	2.1	141.7	151.1
91	36.5	0.5	2.6	16.1	0.7	0.2	31.6	51.8
94	25.5	18.9	0	0	24.7	0	122.4	166
95	36.5	0	0	22.7	0	0	1149	1171.7
97	22	32.7	0	0	40.9	0	451.4	525.1
98	34.5	0.1	226.2	10.6	1.8	9.1	109	356.8
103	28	14.1	3.3	0	47.6	0	352.2	417.2
104	20.5	2.4	11.3	2.8	41.9	2.8	303.4	364.5
106	29	1.7	10.5	9.2	0	2.6	104.4	128.5
108	25.5	0.5	25.8	0	0	0.2	141.4	167.9
109	24	11.4	16	1.5	0	5.6	157.3	191.8
Mean	28.8	57.6	25.7	7.5	11.9	8.4	218.4	329.6
% catch		17.5	7.8	2.3	3.6	2.6	66.3	100.0

b) Outer shelf: 50-200 m

Station	Gear depth	Clupeoids	Carangids	Scombrids	Hairtails	Barracuda	Other	Total
71	186.5	0	166.3	9	0	0	840.5	1015.8
72	107	0	0	0	0	0	30.1	30.1
73	60	0	1.2	0	0	0	104.8	106
75	62	0	34.5	0	0	0	182.4	216.9
76	54.5	0	0.4	5.8	0	0	365.5	371.6
79	67	0	0	8.2	0	0	207.4	215.7
80	71	0	250	38.5	0	0.6	32.1	321.3
87	66.5	0	308.9	0.7	0	0	84.9	394.6
99	97	0	5.8	0	0	0	40.4	46.2
102	123	0	310.6	0	0	0.2	31	341.8
107	52.5	0	7.2	0	0	0	37.8	45
110	111.5	0	26	0.2	0	0	51.7	77.9
Mean	88.2	0.0	92.6	5.2	0.0	0.1	167.4	265.2
% catch		0.0	34.9	2.0	0.0	0.0	63.1	100.0

c) Slope: 200-800 m

Station	Gear depth	Clupeoids	Carangids	Scombrids	Hairtails	Barracuda	Other	Total
70	397	0	0	0	0	0	326.3	326.3
74	715	0	0	0	0.4	0	180.6	181
88	703.5	0	0	0	0	0	78.4	78.4
92	448.5	0	0	2.6	0	0	326.5	329.1
96	377.5	0	0	0	0	0	220.7	220.7
100	544	0	0	0	0	0	68	68
Mean	530.9	0.0	0.0	0.4	0.1	0.0	200.1	200.6
% catch		0.0	0.0	0.2	0.0	0.0	99.8	100.0

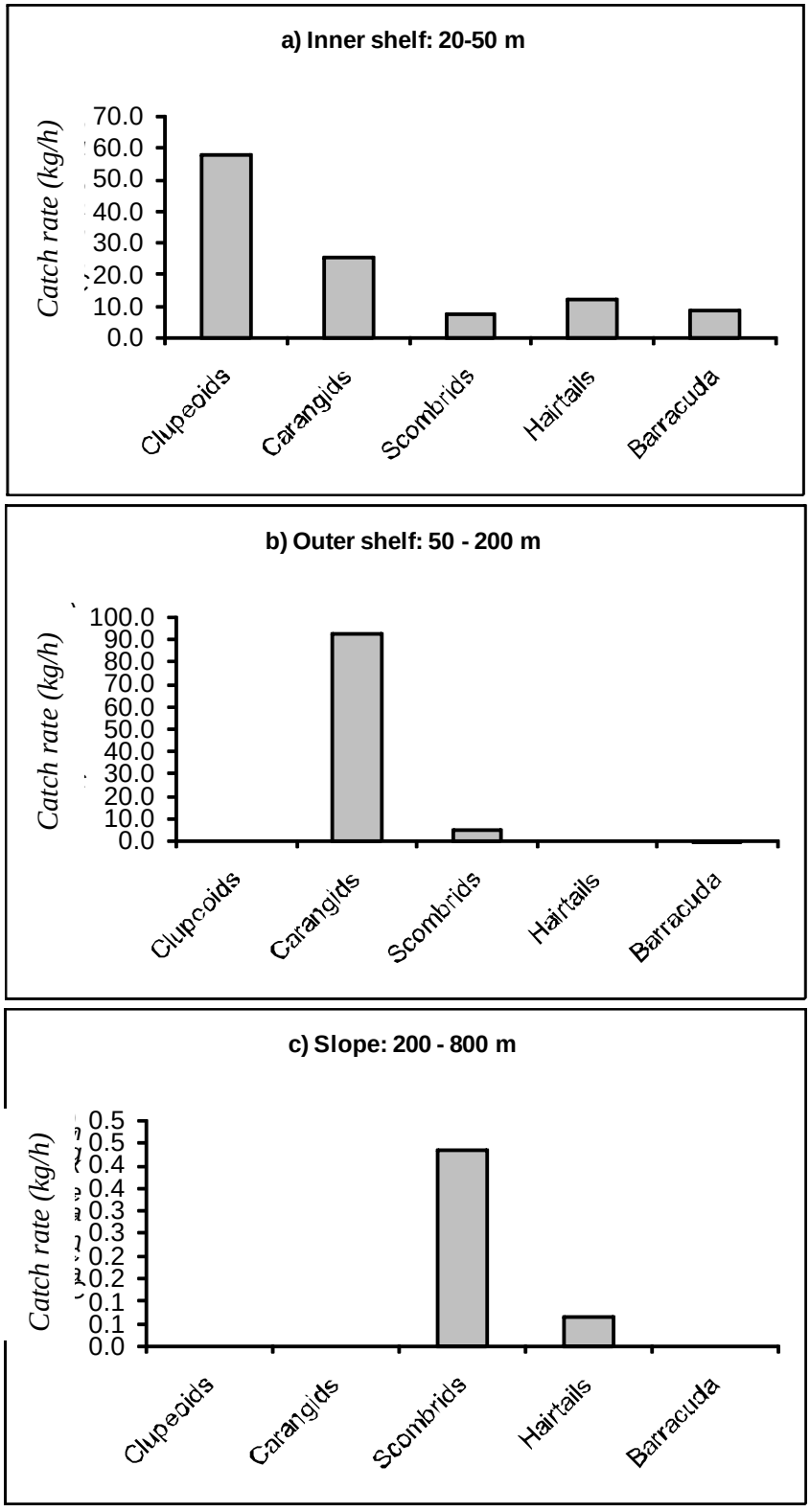


Figure 5.6. Central region. Mean catch rates (kg/h) by main pelagic families in swept-area bottom-trawl hauls on the a) inner shelf (20-50 m), b) outer shelf (50-200 m) and c) slope (200-800m).

5.3 Northern region

A total of only 8 demersal trawl hauls were made on the northern inner shelf. No bottom trawling was carried out deeper than 80 meters due to the steepness and difficult bottom condition in the region.

Table 5.8 shows catch rates by main groups for the northern shelf. Figure 5.7 shows corresponding mean catch rates. The mean catch rates of pelagic species were 4.7 kg/h or 1.8% of the total catch while demersal species contributed 26 kg/h and 9.7% of the total catch. Shrimps, cephalopods and sharks and rays contributed little to the total catch with 0.1 kg/h, 1.0 kg/h and 1.5 kg/h, respectively. The group of other species had a mean catch rate of about 232 kg/h or 88% of the total.

Table 5.8. Northern region. Catch rates (kg/h) of main groups caught on the shelf (20-200 m).

Shelf: 20-100 m

Station	Gear depth	Demersal	Pelagic	Shrimps	Cephalopod	Sharks+rays	Other	Total
111	32.5	4.4	1	0	0.1	0	2.2	7.8
112	25	0	5.5	0	0.2	4.7	5	15.4
113	24.5	0	0	0	2.2	2.4	2.7	7.4
114	23.5	0.9	3.9	0.1	1.6	0.8	187.5	194.9
115	45.5	57.2	3.4	0.2	2.2	0	419.8	482.8
116	43	10.7	0.9	0.1	1	4.2	562.7	579.6
117	28.5	26	17.3	0	0.7	0	396.7	440.7
118	80	106	5.2	0	0.3	0	279.1	390.5
Mean	37.8	25.7	4.7	0.1	1.0	1.5	232.0	264.9
% catch		9.7	1.8	0.0	0.4	0.6	87.6	100.0

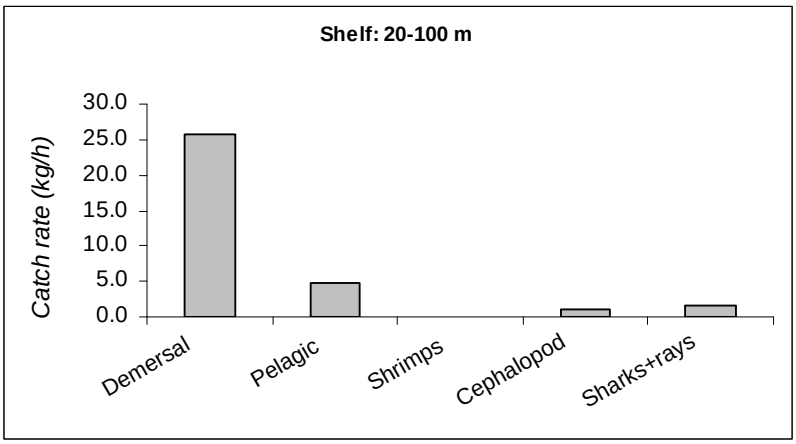


Figure 5.7. Northern region. Mean catch rates (kg/h) by main groups in swept-area bottom-trawl hauls on the shelf (20-100 m).

Catch rates of the commercially most important demersal fish groups in the northern region are presented in Table 5.3. Corresponding mean catch rates are shown in Figure 5.8. Snappers and groupers contributed to 4.2% and 2.8% of the total catch, respectively. The average catch rate of snappers was 11.2 kg/, and 7.5 kg/h for the groupers.

Table 5.9. Northern region. Catch rates (kg/h) of main demersal species grouped by families in swept-area bottom-trawl hauls on the shelf (20-100 m).

Shelf: 20-100 m

Station	Gear depth	Snappers	Groupers	Other	Total
111	32.5	0	0	7.8	7.8
112	25	0	0	15.4	15.4
113	24.5	0	0	7.4	7.4
114	23.5	0.9	0	194	194.9
115	45.5	13	39.2	430.6	482.8
116	43	1.3	0.4	577.8	579.6
117	28.5	20.2	0	420.5	440.7
118	80	53.9	20	316.7	390.5
Mean	37.8	11.2	7.5	246.3	264.9
% catch		4.2	2.8	93.0	100.0

Note: No catch of seabream, grunts, croakers, hake and ophididae

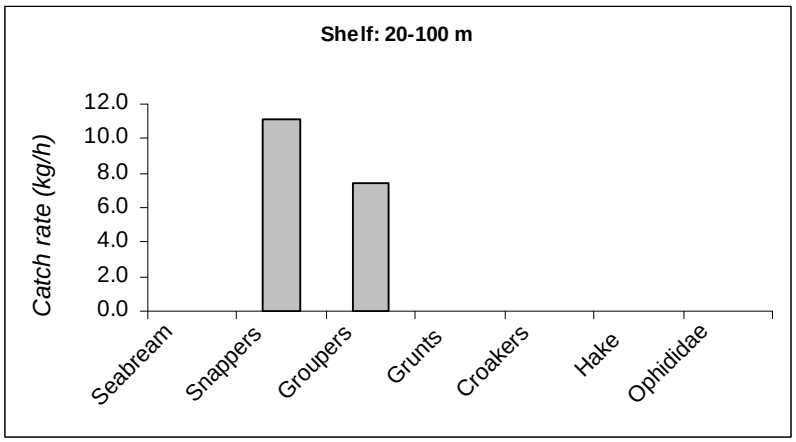


Figure 5.8. Northern region. Mean catch rates (kg/h) of main demersal species grouped by families in swept-area bottom-trawl hauls on the shelf (20-100 m).

Table 5.10 shows the catch rates of the main pelagic families caught in the bottom trawl in the northern region. Corresponding mean catch rates are represented in Figure 5.9. The dominant species group on the inner shelf were carangids, mainly (*Decapterus russelli)* with an average of 4.6 kg/. clupeoids and barracudas were only caught in one trawl station, and each group had an average catch of only 0.1 kg/h. Neither scombrids nor hairtails were caught in the northern region.

Table 5.10. Northern region. Catch rates (kg/h) by main pelagic families in swept-area bottom-trawl hauls on the shelf (20-100 m).

Shelf: 20-100 m

Station	Gear depth	Clupeoids	Carangids	Scombrids	Hairtails	Barracuda	Other	Total
111	32.5	0	1	0	0	0	6.8	7.8
112	25	0	5.5	0	0	0	9.8	15.4
113	24.5	0	0	0	0	0	7.4	7.4
114	23.5	0.8	3.4	0	0	0.5	190.1	194.9
115	45.5	0	3.4	0	0	0	479.4	482.8
116	43	0	0.9	0	0	0	578.7	579.6
117	28.5	0	17.3	0	0	0	423.4	440.7
118	80	0	5.2	0	0	0	385.3	390.5
Mean	37.8	0.1	4.6	0.0	0.0	0.1	260.1	264.9
% catch		0.0	1.7	0.0	0.0	0.0	98.2	100.0

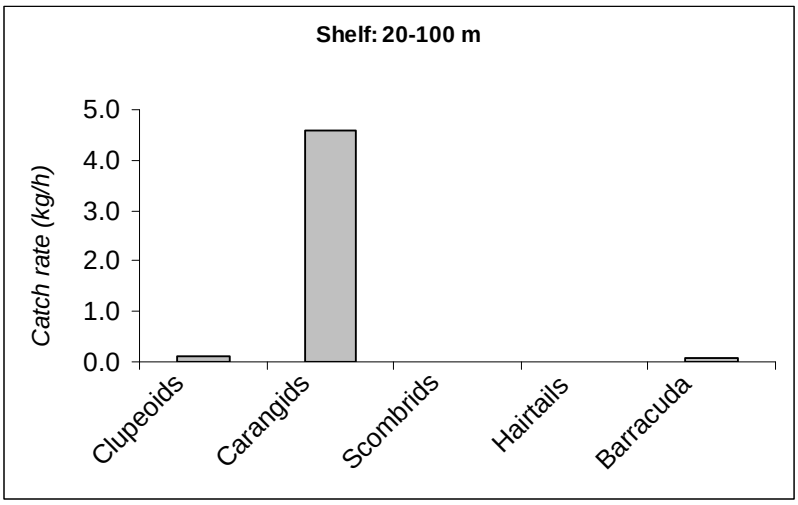


Figure 5.9. Northern region. Mean catch rates (kg/h) by main pelagic families in swept-area bottom-trawl hauls on the shelf (20-100 m).

5.4 Distribution of catch rates and length frequencies

Estimated length frequencies and geographical distributions of abundant and important fish (*Pagellus natalensis, Decapterus macrosoma, Pellona ditchela)* and shrimp (*Haliporoides triarthrus* and *Aristaeomorpha foliacea*) species are shown in Figures 5.10- 5.14.

Pagellus natalensis was mainly distributed in the shallow waters in the southern region, and the size was from 8 to 20 cm, with a peak at about 15 cm.

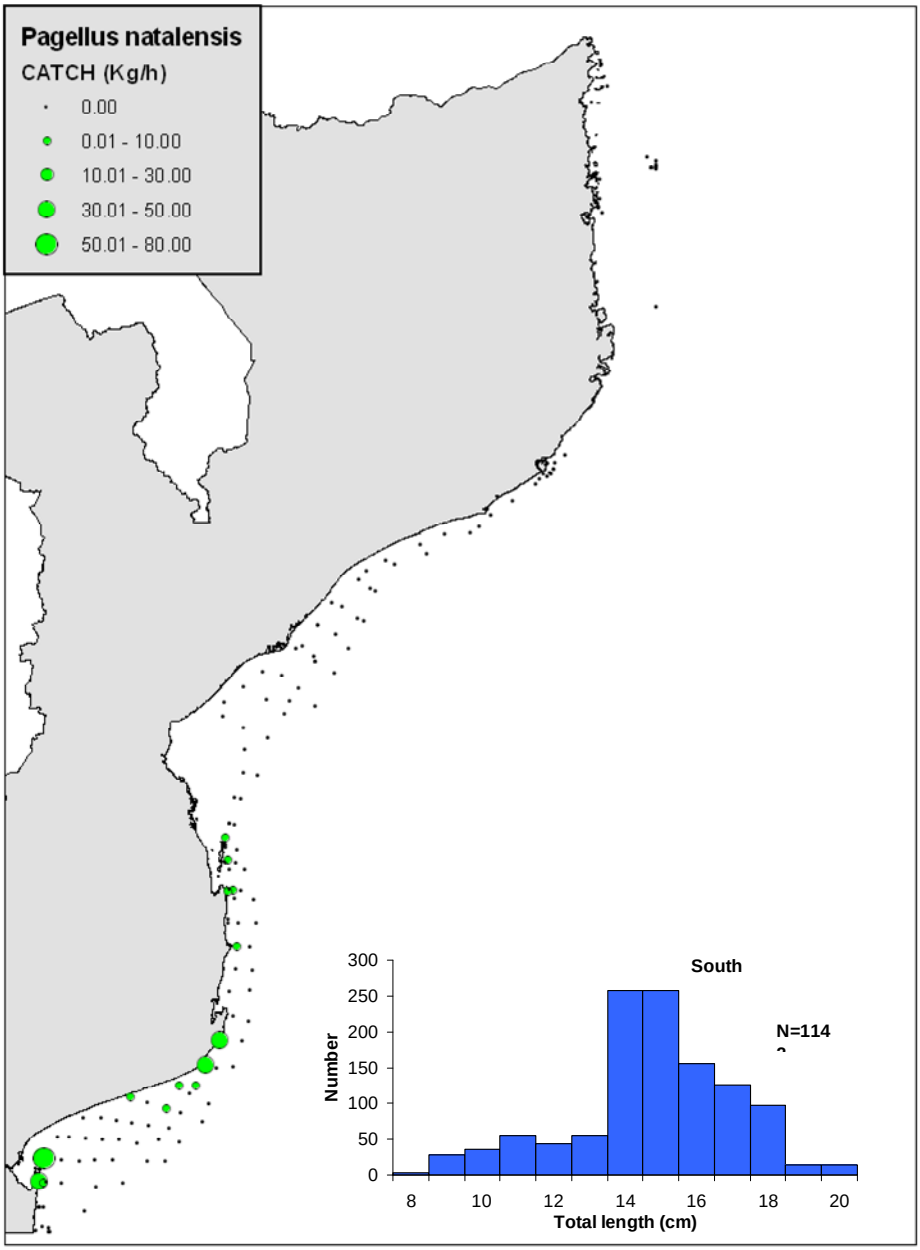


Figure 5.10. Geographical distribution of catch rates and length frequencies by region for *Pagellus natalensis.*

Decapterus macrosoma was distributed in shallow waters in both the southern and central regions, however the catch rates were highest in the south. The mode of about 12 cm in the length frequencies for *D. macrosoma* were similar for both regions, but the maximum size was 17 cm in the south and 15 cm in the central region.

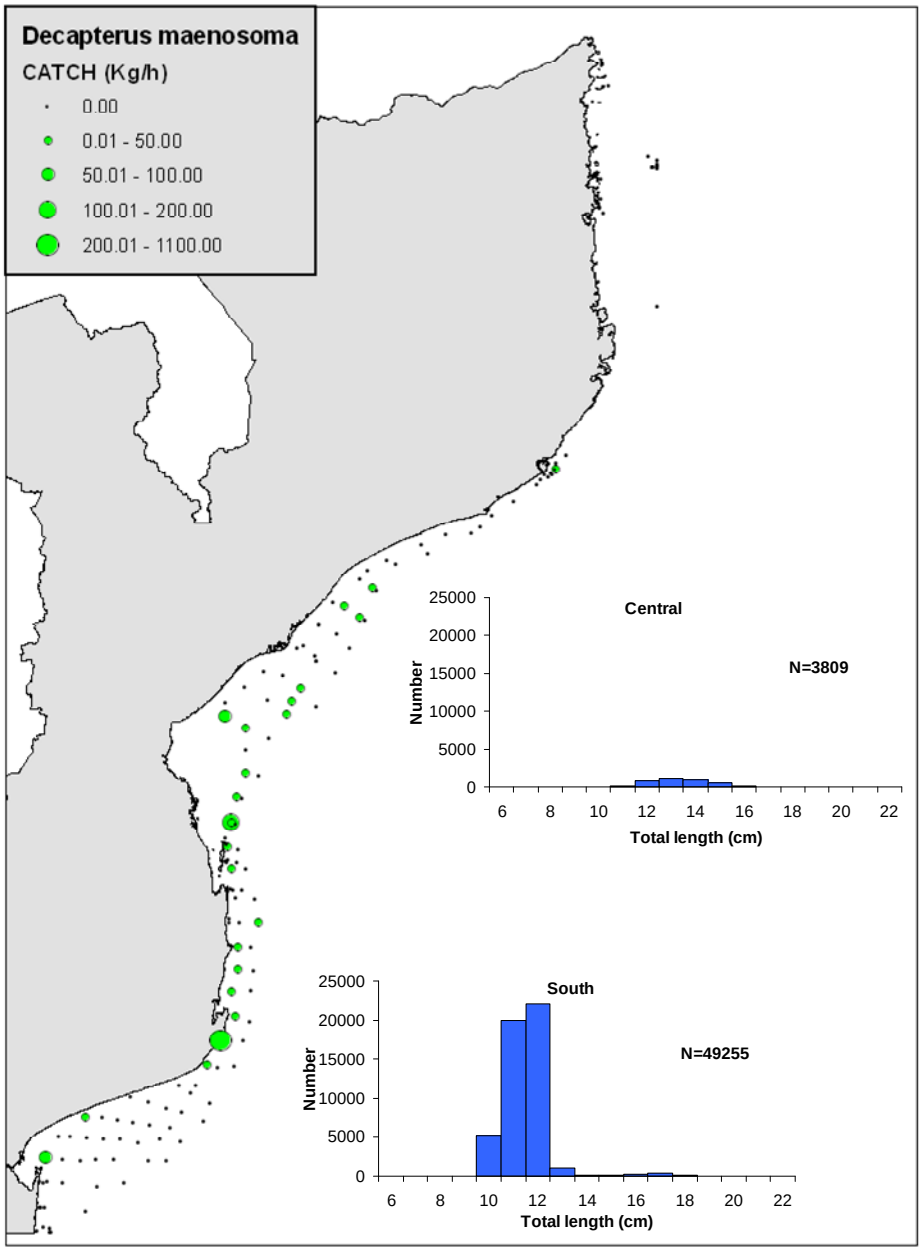


Figure 5.11. Geographical distribution of catch rates and length frequencies by region for *Decapterus macrosoma.*

Pellona ditchela was found in the shallow waters on the northern Sofala bank, with the highest densities off the Zambezi River. The length ranges in the catches were from 7 cm to 13 cm with the mode of the length distribution was 9 cm.

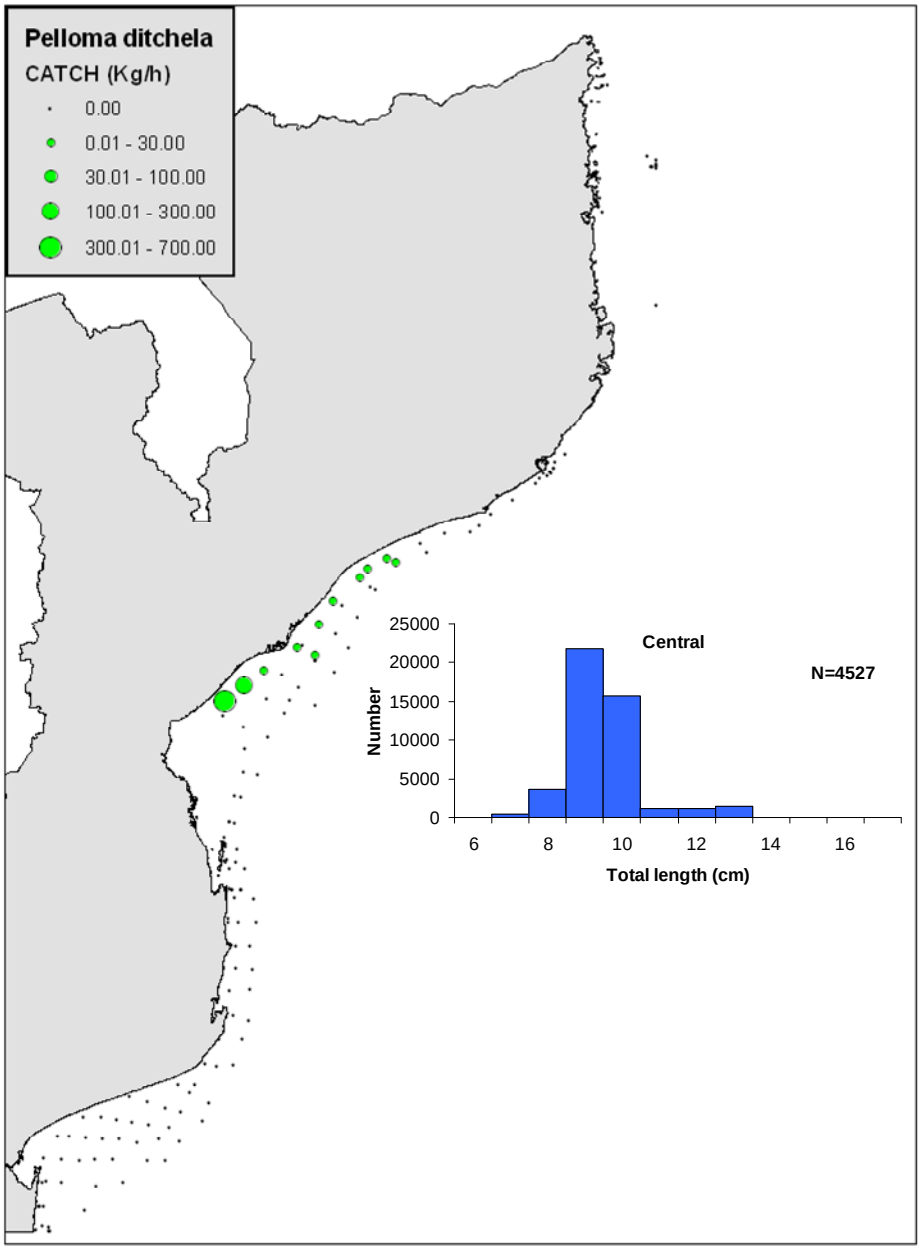


Figure 5.12. Geographical distribution of catch rates and length frequencies by region for *Pellona ditchela.*

Haliporoides triarthrus was found along the coast of Mozambique, with highest catches in the southern region and off Bazarutu. However, the species identification in the northern may be wrong as the species is not expected to be distributed so far north. The length range was from 10 mm to 48 mm carapace length and the average size seemed to change with latitude, where the largest individuals were found in the north. As expected the females were in general larger than the males.

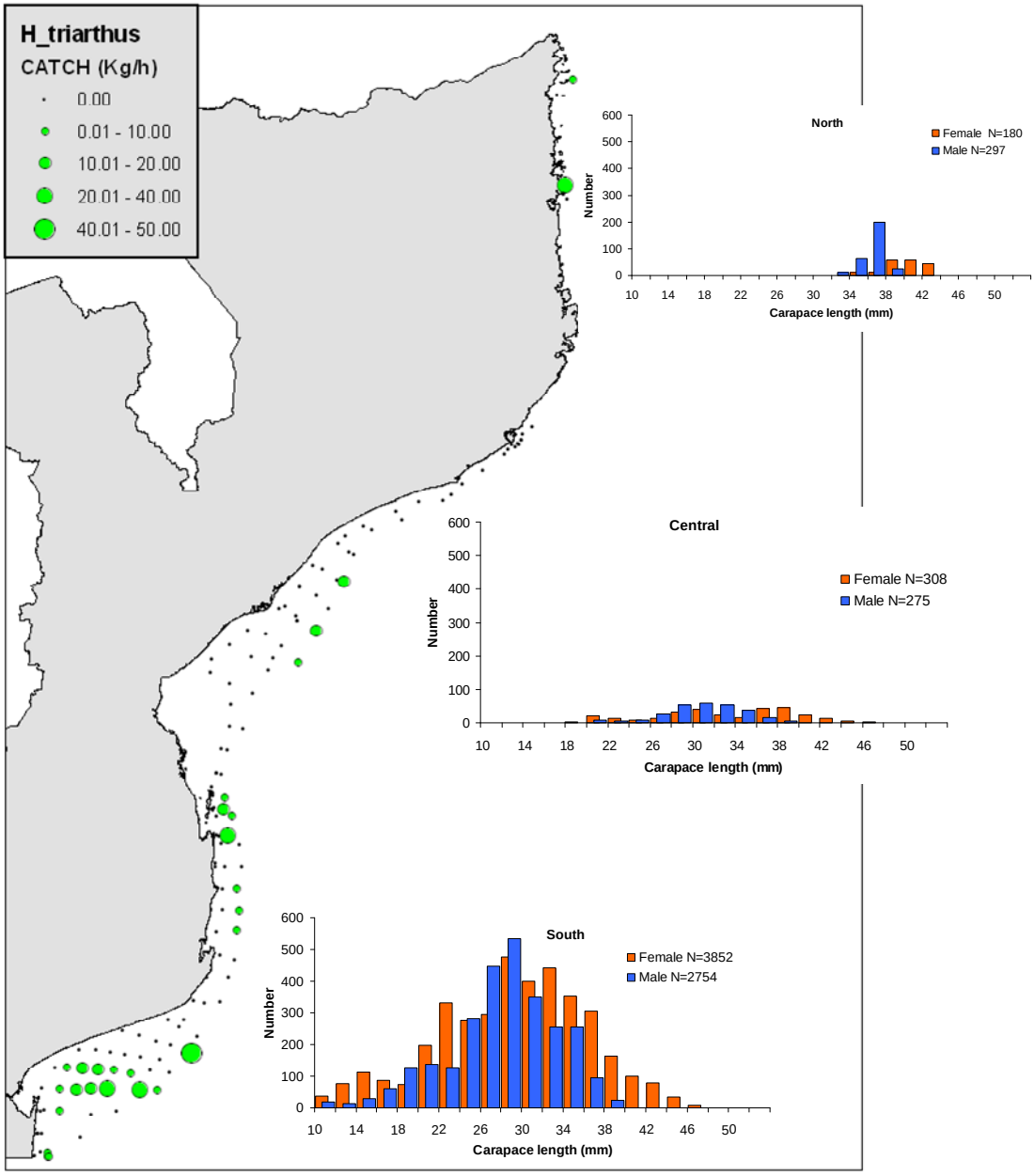


Figure 5.13. Geographical distribution of catch rates and length frequencies by region for *Haliporoides triarthrus*.

The shallow water shrimp *Aristaeomorpha foliacea* was distributed in shallow waters along the coast of Mozambique, with highest catches in the far south. The length range was from 8 mm to 56 mm carapace length, with larger average size towards north. The females covered a larger size range than males in the southern region, but were markedly larger in the central and northern regions.

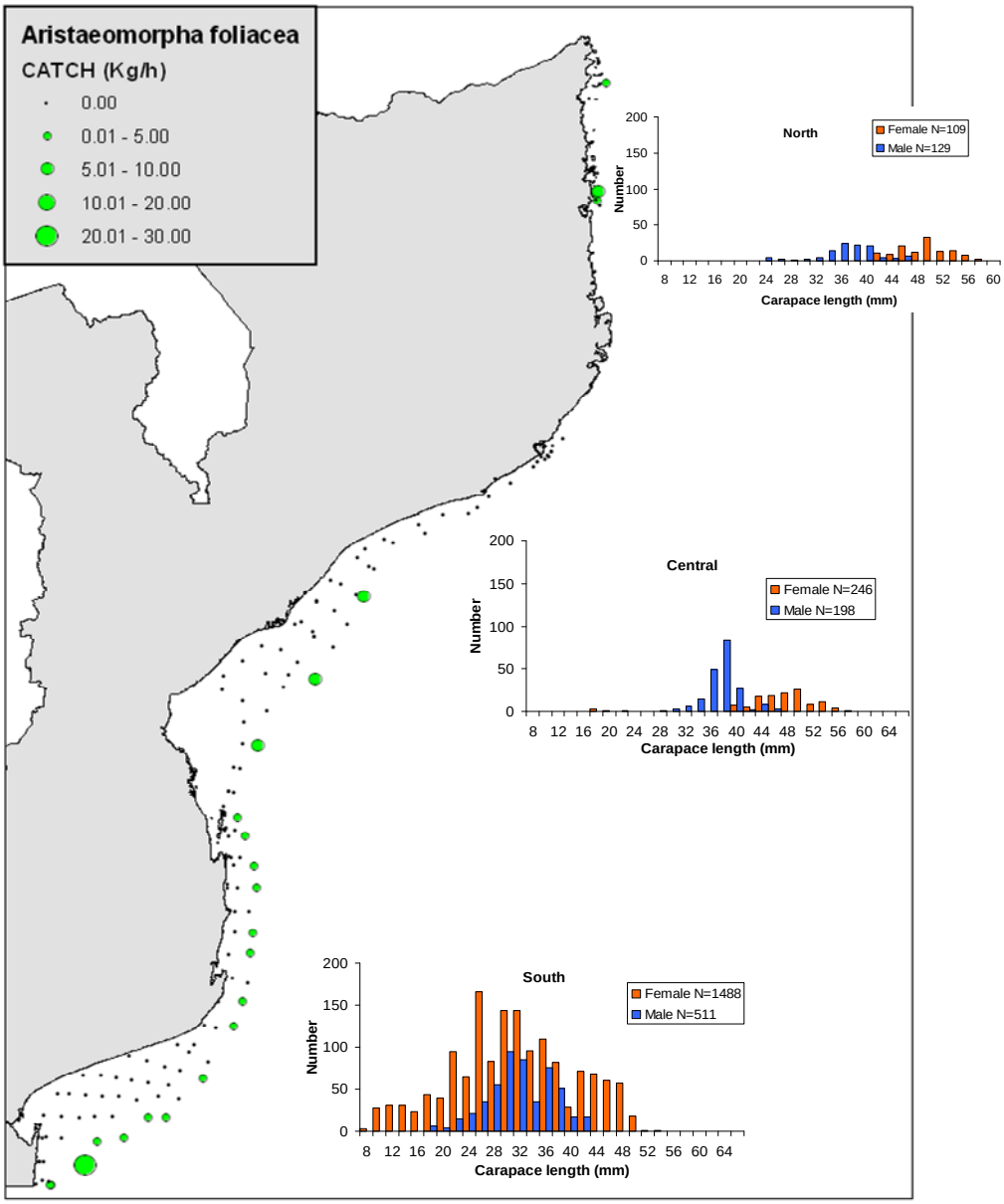


Figure 5.14. Geographical distribution of catch rates and length frequencies by region for *Aristaeomorpha foliacea*.

5.5 Swept area biomass estimates

In the swept-area biomass estimates, the shelf and slope in the southern region was stratified by depth; 20-50 m, 50-100 m, 100-200 m, 200-300 m, 300-400 m, 400-500 m, 500-600 m, 600-700 m, and 700-800 m. The same depth strata were used for the central shelf, but the rocky and steep bottom on the central slope (200-800 m) made trawling difficult and prevented a high trawling effort, and the slope was therefore stratified in two; 200-400 m and 400-800 m. No biomass was estimated for the northern region as the trawl sampling effort was too low to establish any reliable estimates. Swept area biomass estimates for some important groups based on the demersal trawl data are presented in Tables 5.11-5.13.

The biomass estimates for the main groups are presented in Table 5.11.The total biomass of fish and shrimps on the southern slope, southern shelf and central region were 121 300 t (tonnes) , 68 000 t and 22 200 t, respectively. The biomass of demersal groups were similar for the central region and the southern shelf with 4 100 t and 4 500 t, respectively. The southern shelf had also the highest swept-area biomass estimate of pelagic species with 33 600 t. The highest abundance of shrimps was found on the southern slope with a biomass estimate of 3 700 t.

Table 5.11 Total swept area estimates in tonnes by region (main groups)

Region	Demersal	Pelagic	Shrimps	Cephalopods	Sharks	Other
Central	4 087	6 714	1 195	1 074	560	8 550
Southern slope	2 454	807	3 664	5 202	7 107	102 044
Southern shelf	4 476	33 589	27	2 811	1 415	25 653

The swept-area biomass estimates for the demersal groups are presented in Table 5.12. Hake (*Merluccius paradoxus*) was only found in southern slope, and the biomass estimate was about 410 t. Seabreams only caught in the southern region, and the biomass estimates on the slope and shelf were 60 t and 1 100 t, respectively. Highest abundance of snappers was in the central region with an estimate of about 1800 t, whilst the biomass on the southern shelf was about 530t. Groupers were relatively abundant on the southern slope and shelf, and in the central region with estimates of 230 t, 440 t and 790 t, respectively. The biomass estimate of grunts was 670 t in the central region, and about 150 t on the southern shelf. The biomass estimate of croakers in the central region was 630 t, and the estimate on the southern slope was 100 t. Ariidaes were only caught in the central region, and here the biomass estimate was 50 t. Ophididaes were frequently caught on the southern slope, with a biomass estimate of 1 400 t.

Table 5.12 Total swept area estimates in tonnes by region (demersal groups)

Region	Seabream	Snappers	Groupers	Grunts	Croakers	Hake	Ariidae	Ophididae	Other
Central	-	1 817	233	670	629	-	50	13	19 794
Southern slope	59	-	441	-	101	409	-	1 399	118 872
Southern shelf	1 086	528	793	153	2	-	-	-	57 814

The biomass estimates of the most abundant shrimp species are presented in Table 5.13.

Table 5.13 Total swept area estimates in tonnes by region (shrimp species)

Region	*Penaeus indicus*	*Metapenaeus monoceros*	*Penaeus semisulcatus*	*Penaeus monodon*	*Penaeus japonicus*	*Penaeus latisulcatus*
Central	16.9	39.8	2.1	2.8	9.5	1.1
Southern slope	0.0	0.0	0.0	0.0	0.0	0.0
Southern shelf	0.0	17.8	0.0	0.0	0.0	0.0

Region	*Haliporoides triarthrus*	*Aristaeomorpha foliacea*	*Aristeus antennatus*	*Plesiopenaeus edwardsianus*	*Penaeopsis balssi*
Central	42.9	29.8	16.1	25.3	13.8
Southern slope	912.7	398.7	143.7	88.8	32.1
Southern shelf	0.0	0.0	0.0	0.0	0.0

The biomass estimates of the pelagic groups are presented in Table 5.14. Clupeids were mainly caught in the central region, and the biomass of clupeoids was in this region about 2 900t. The highest biomass of carangids was on the southern shelf with an estimate of about 25 000t. However, the biomass estimates of carangids were also relatively high on the southern slope and in the central region with estimates of 500t and 3 700t. The biomass estimates of scombrids were 550t and 770t in the central region and on the southern shelf, respectively. No scombrids were caught on the southern slope. Hairtails and barracudas were caught in all three areas, and the biomass estimates of hairtails were about 430t, 220t and 30t in the central region, southern slope and shelf, respectively. The highest biomass of barracudas was on the southern shelf with an estimate of 7 900t, whilst the biomass estimates on the southern slope and in central region were about 80t and 410t, respectively.

Table 5.14 Total swept area estimates in tonnes by region (pelagic groups)

Region	Clupeoids	Carangids	Scombrids	Hairtails	Barracuda	Other
Central	2 873	3 665	550	434	407	15 789
Southern slope	7	510	-	220	76	120 467
Southern shelf	56	24 877	773	27	7 858	34 380

6. RESULTS FROM SPECIAL STUDY

6.1 Quirimbas National Park and St. Lazarus Bank

The Quirimbas National Park is located in six central districts of the Cabo Delgado Province, northern Mozambique. It encompasses an area of approximately 7,506 square kilometres, 5,984 on the mainland continent and 1,522 being made up of ocean, inter-tidal, and island habitats. The park is between latitudes12º00'00" and 12º55'04" S, and longitudes 39º10'00" E and 40º39'44" E. The marine section of the Park contains the 11 southernmost islands of the Quirimbas Archipelago.

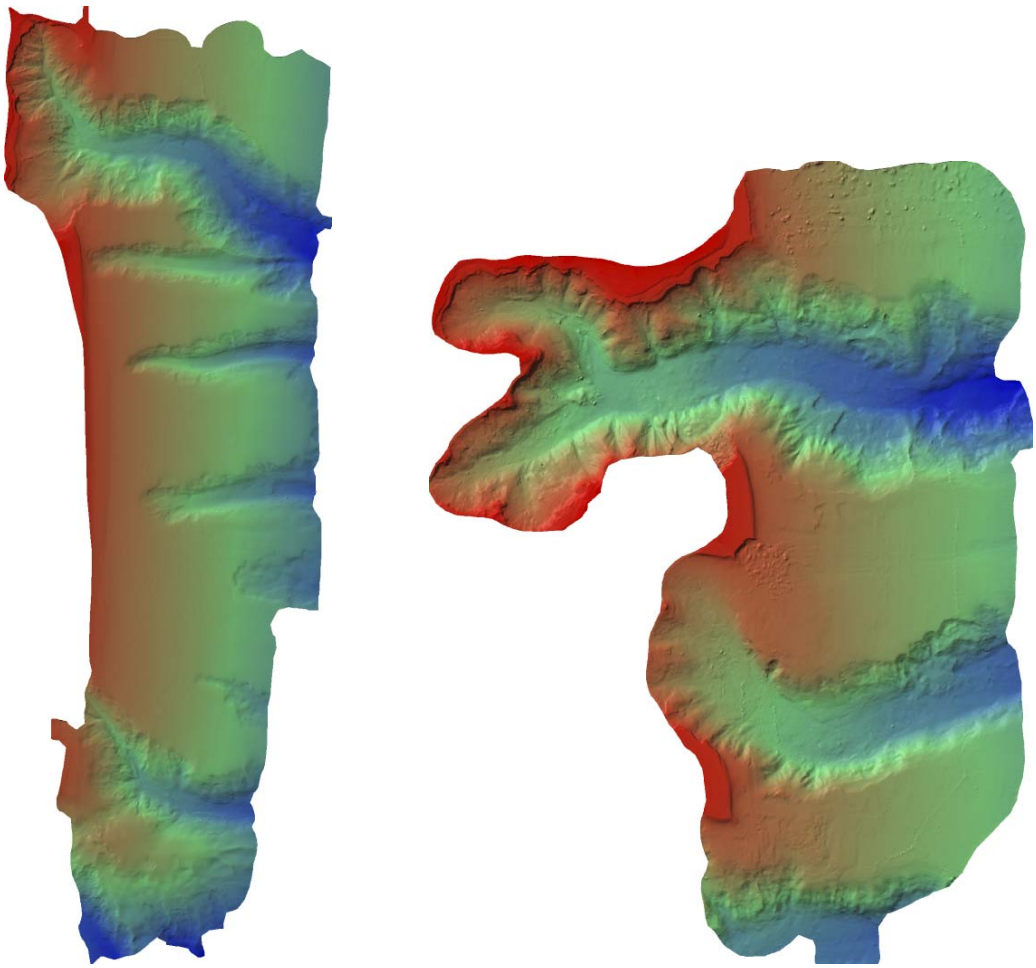


Figure 6.1. Birds eye view of two different areas between Pemba and the border with Tanzania; a) an area of the Quirimbas National Park and b) the Vamizi mapped with the EM710.

The underwater topography is characterised by a series of deep, east-west running channels which cut through the continental shelf and support a diverse coral growth Figure 6.1. These channels begin at depths of > 1000 m, cutting between the islands before petering out in sand flats or seagrass beds to the west of the main line of islands. Coral beds are found in the more exposed sections of the chanels while more sheltered areas support extensive sand and mudflats.

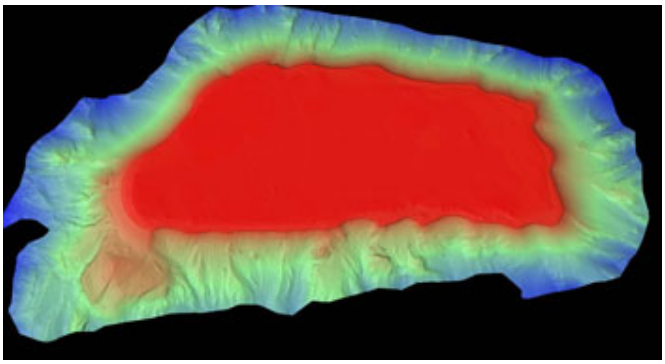


Figure 6.2 Birds eye view of the areas of the St. Lazarus Bank mapped with the EM710. The red areas have a depth of <20 m while the maximum depth (dark blue) is around 1500 m

The St. Lazarus Bank is a shallow seamount situated in the Mozambique channel, Western Indian Ocean, about 70 NM east of the northern Mozambique coast. It has some unique physical and biological characteristics making it a very peculiar place on earth, a biodiversity hotspot, and a paradise for both the organisms living there and those having the possibility to study them.

Overgrown with corals on the top close to the surface the St. Lazarus Bank has been specified sometimes as an atoll. But the reefs do not reach the surface and back-reef lagoons typical for atolls are lacking. The central, table-like platform of the seamount has a diameter of ca. 15 x 8 NM, ranging from 6 to about 60 m depth on the margins and falling down rapidly to more than 2000 m on all sides. This abrupt topography is being hit in the north by the powerful Mozambique current creating eddies and a circulation system (at a speed of about 1 m sec^{-1}) that may contribute to retain pelagic eggs and larvae on the platform. And indeed in each of the pelagic trawls performed in the area of this seamount a number of larvae or juveniles belonging to at least seven fish species were collected, among them also typical reef dwellers.

Examples of large predatory fish species that wereobserved by campod or collected by various fishing methods include snappers (*Lutjanidae*, e.g., the red snapper *Lutjanus bohar*, collected both by trap and handline), jacks (*Carangidae*, e.g., bigeye trevally, *Caranx*

sexfasciatus, collected by handline), or murray eels (*Muraenidae*; e.g., the laced murray), *Gymnothorax favagineus* (attains three m in length, males are often territorial and aggressive) observed with the campod.

Figure 6.3 Illustration of a typical habitat on the St. Lazarus Bank. The murray eel, *Gymnothorax favagineus*, is common on the reef

Pelagic trawling during night resulted in collection of a considerable number of lanternfishes (Myctophidae) over the plateau and on its flanks down to 500 m depth (e.g., *Myctophum spinosum*) with several species being collected in this area for the second time after the 1978 cruise. The identification of these mesopelagic fishes is challenging, more than 25 species were collected in one deep trawl haul.

6.1.1 Environmental sampling

Three cross shelf environmental transects were conducted in the areas of the Quirimbas National Park and St. Lazarus bank. In addition to this one north – south and one east- west transect were conducted across the St. Lazarus bank. The section figures are accompanied by a survey track/station distribution plot shown on top of a realistic bathymetry (Figure 6.3). Without such information it is very difficult to orientate what part of the bank has been covered and what are the differences in the hydrographic conditions around its perimeter.

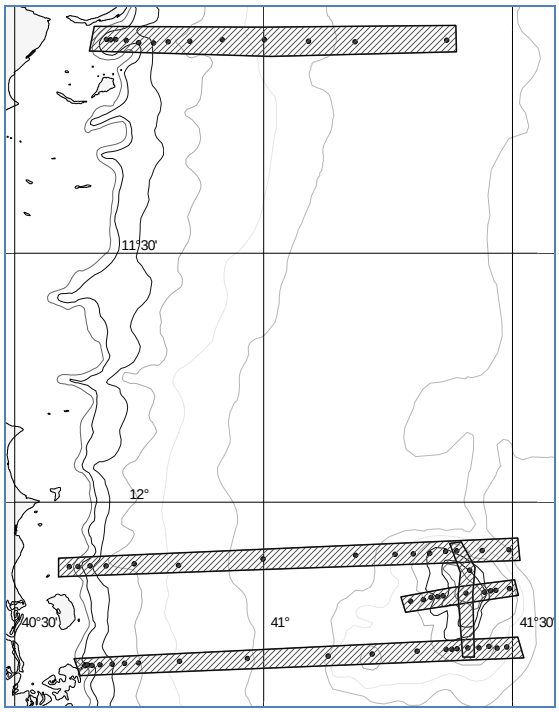


Figure 6.4 Overview of the environmental transects carried out at Quirimbas National Park and St. Lazarus Bank

The cross shelf environmental transects show seawater property distributions typical for the northern Mozambican Channel with a strong thermocline below 100 meters and relatively low salinity top layer caused by the excess of precipitation over evaporation, characteristic of tropical waters. Also observed is a dip in O_2 at the thermocline, probably due to the high productivity and decomposition rates in this region (the fluorescence is likely to be high in this layer) and an oxygen and salinity signature of Red Sea Water (RSW) seen below some 800 meters (See the oceanographic description from the main survey).

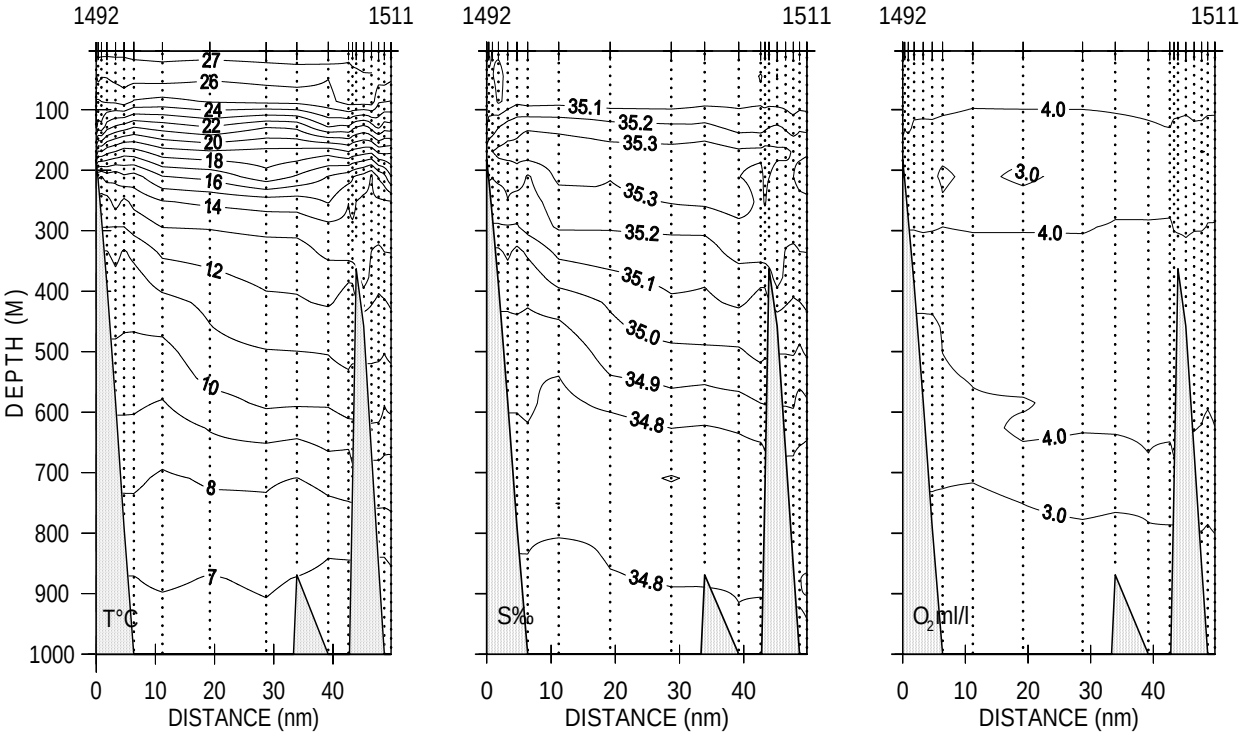


Figure 6.5 Vertical sections of temperature, salinity and oxygen at St. Lazarus South transect

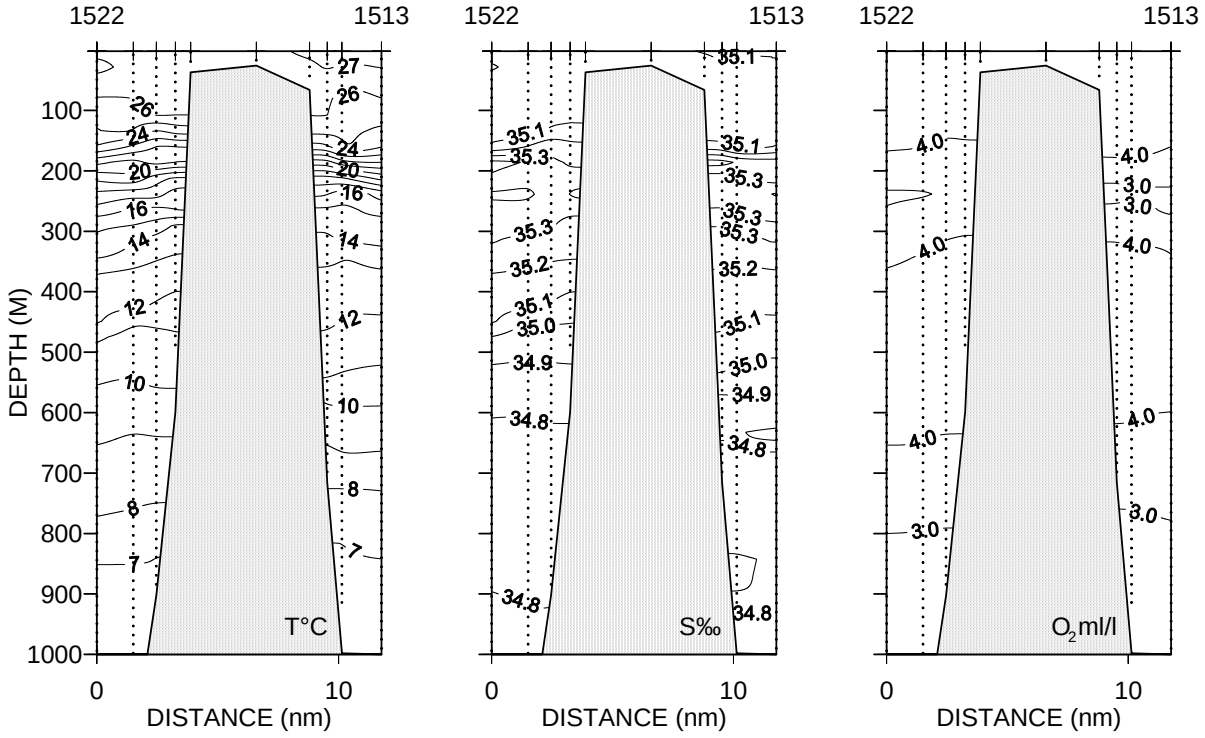


Figure 6.6 Vertical sections of temperature, salinity and oxygen at St. Lazarus East-West transect

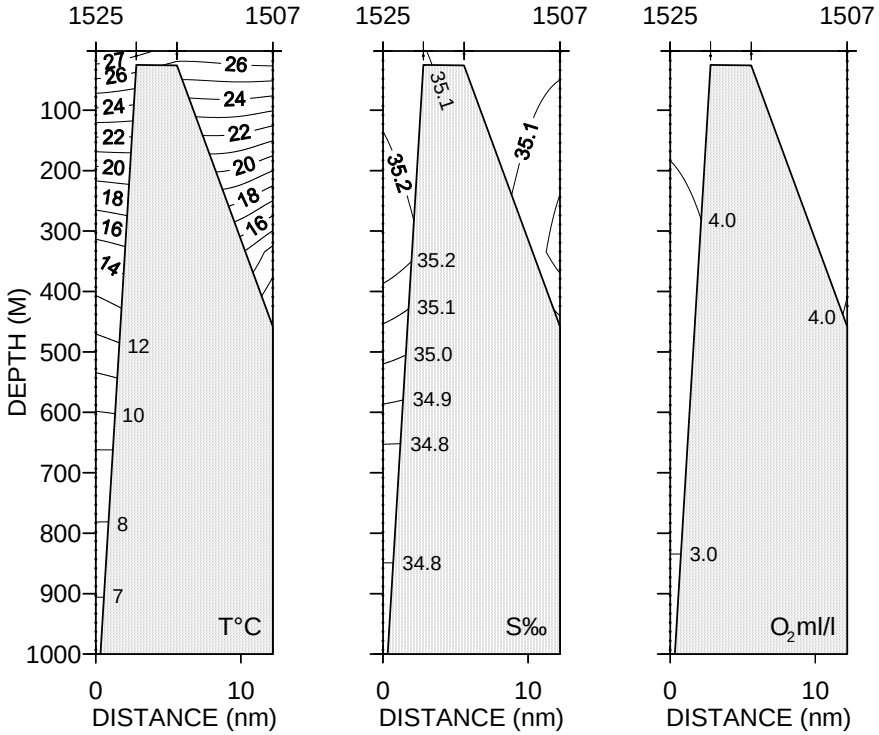


Figure 6.7 Vertical sections of temperature, salinity and oxygen at St. Lazarus North-South transect

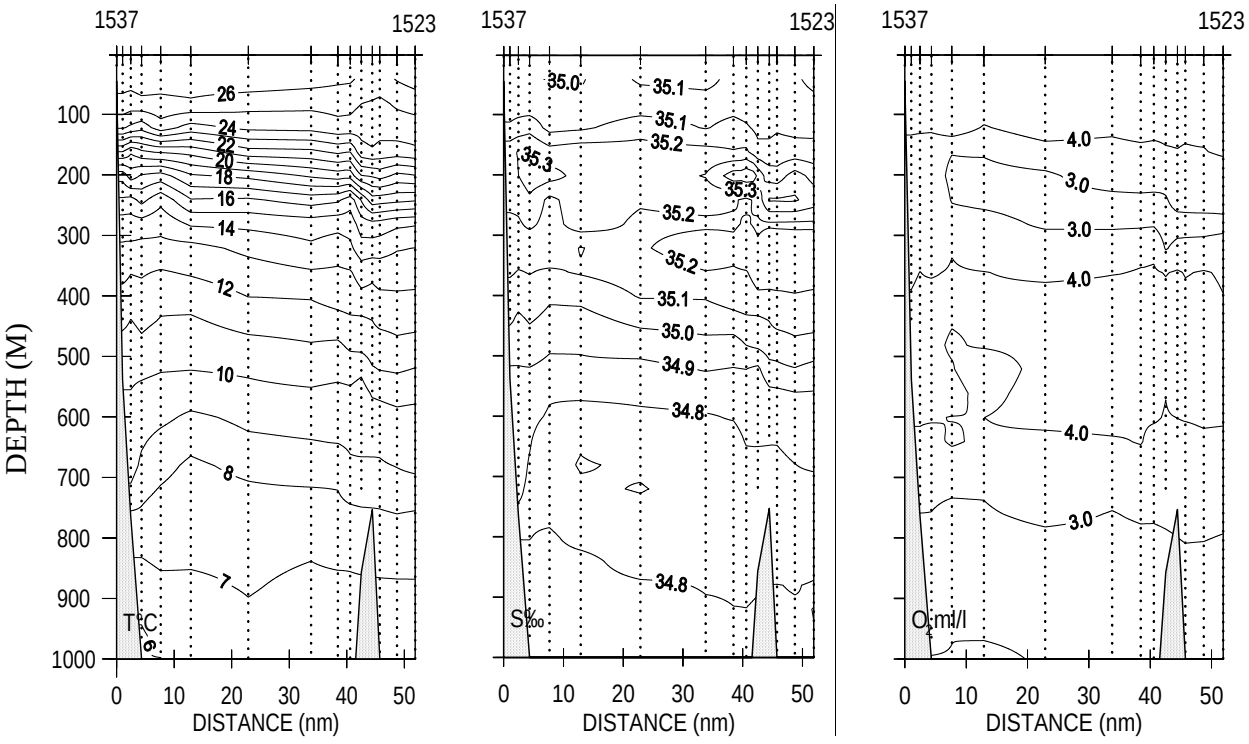


Figure 6.8 Vertical sections of temperature, salinity and oxygen at St. Lazarus North

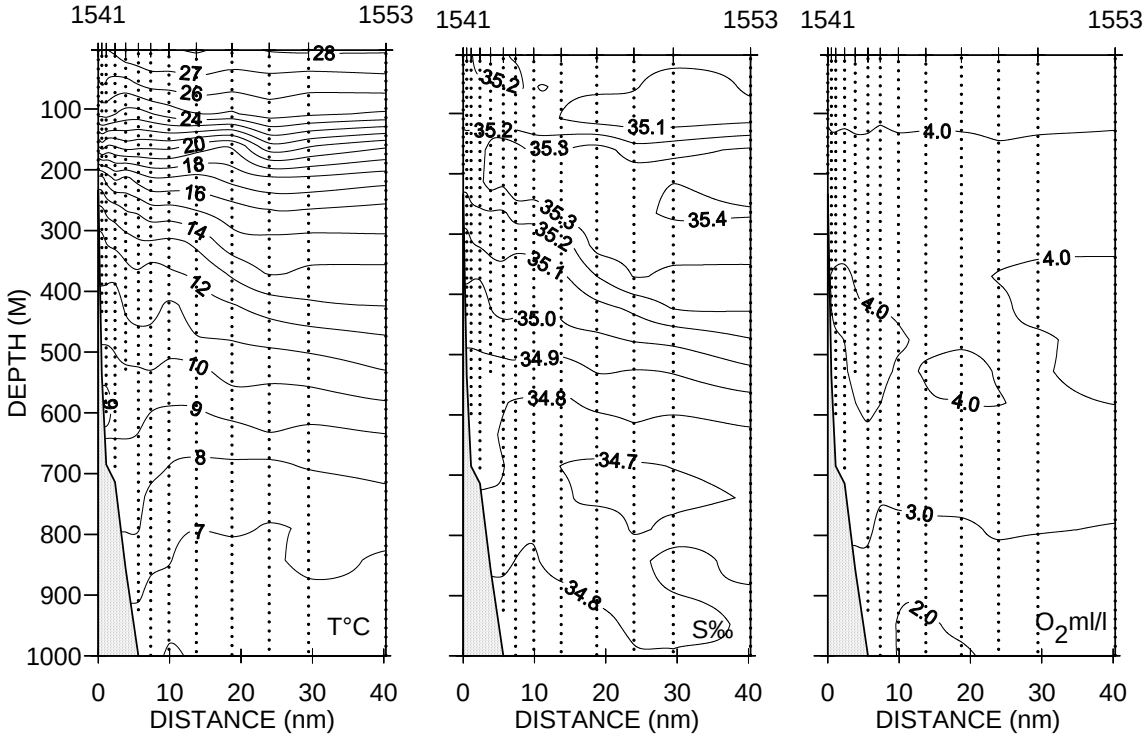


Figure 6.9 Vertical sections of temperature, salinity and oxygen at Vamizi

6.2 Paisley Seamount

Little is generally known about the Paisley Seamount 50 NM off Nacala in the Nampula Province in northern Mozambique. Surveys with the former R/V Dr. Fridtjof Nansen in 1977 only mentions that there are strong currents around the seamount and that they may be involved in the formation of eddies. In the present survey two nights and two days were spent surveying this area.

6.2.1 Environmental sampling

Two CTD's were deployed on the reef. Results from these were very similar and station 1559 was chosen to represent the environmental profiles during the survey. The temperature profile at the seamount showed surface values around 28.5°C decreasing to less than 4.3°C at 1500 m. Temperature at the salinity maximum (and oxygen minimum) at 279 m was 15.9°C. The salinity profiles showed surface salinities of 35.06 $^{o}/_{oo}$. The salinity increased to an initial maximum of 35.22 $^{o}/_{oo}$ at 34 m before declining to 35.06 at 47 m. The profile thereafter increased to a maximum of 35.28 $^{o}/_{oo}$ at 279 m before a new minimum of 34.74 $^{o}/_{oo}$ was reached at 700 m before stabilising in the deep with a recorded salinity of 34.81 at 1500 m. The oxygen profile showed surface values of 4.44 ml O_2/l. These initially increased to 4.6 ml O_2/l at 40 m depth before declining to an oxygen minimum of 2.92 ml O_2/l at 279 m. Another

maximum of 4.29 ml O_2/l was reached at 496 m depth before the profile sloped of to the absolute minimum of 2.01 ml O_2/l at 1044 m. The oxygen level at maximum depth of 1524 m was 2.47 ml O_2/l. Fluorescence maximum corresponded with a salinity low around 96 m with recorded value of 0.18 with values declining steeply towards 0 on each side of this maximum.

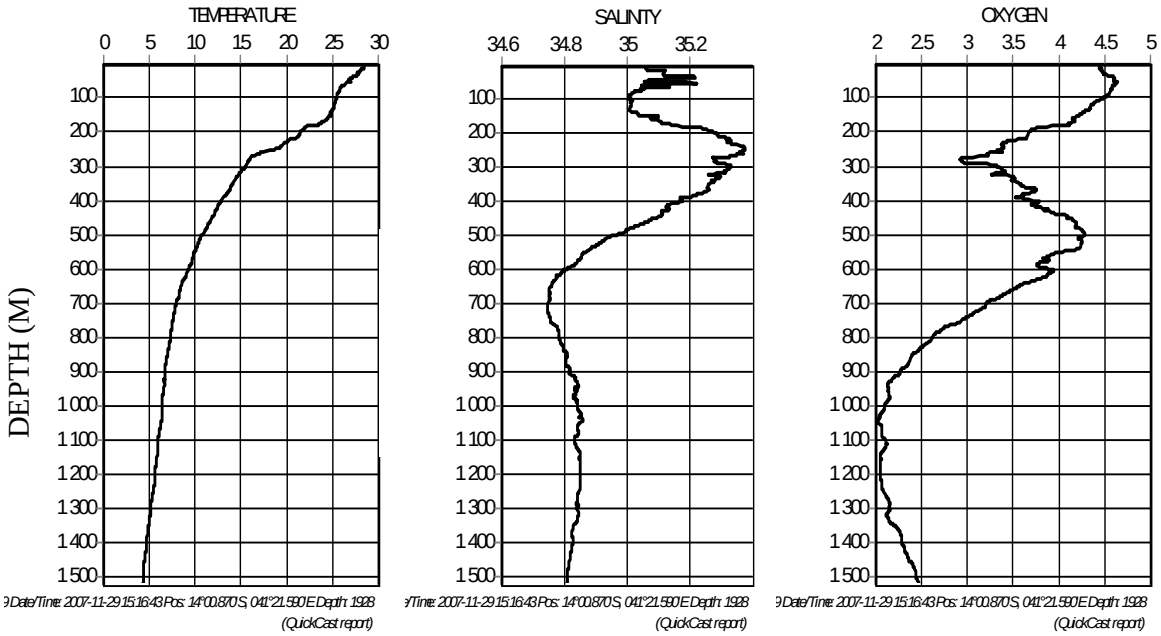


Figure 6.10. Temperature, salinity and oxygen recorded on the Pailsley seamount

The thermosalinograph recorded surface chlorophyll temperature and salinity. However recordings from the salinity sensor were not trusted during the first day due to an operation failure. The temperature data are therefore the only shown here. SST increased slightly (average of 0.2 °C) from the deepest towards the more shallow parts of the seamount. There was also a similar increase in temperature from the day when we arrived on the seamount to we left the area.

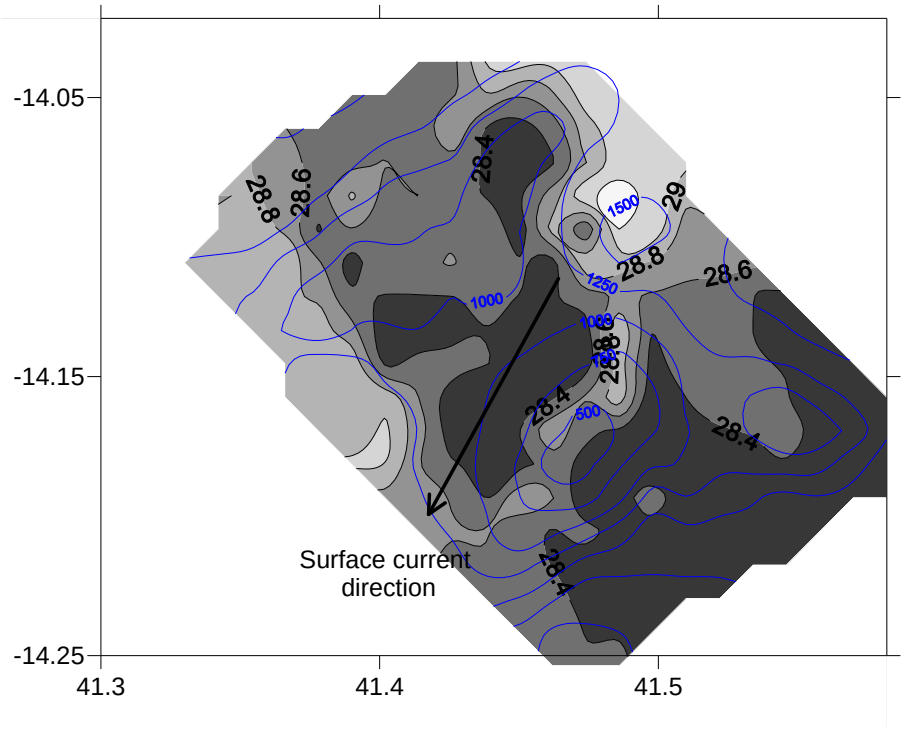


Figure 6.11 Illustrating the bottom topography (blue lines) and the overlying SST observed at 5 m depth. Surface current direction is also indicated

6.2.2 Plankton sampling

Samples of phytoplankton were collected with eight Niskin bottles attached to the CTD. The samples were collected for the following purposes

1. Nutrient Analysis – two replicates of 100ml are collected and preserved at -20°C for later analysis (University of Lisbon, Portugal)
2. Phytoplankton taxonomic identification – 125 ml are collected and preserved with formaldehyde (2,5%) for later analysis (University of Lisbon, Portugal)
3. Pigment Analysis – 5L are filtered and the filter is stored at -20°C for later HPLC analysis (high performance liquid chromatography) (University of Lisbon, Portugal)

Water samples from a seawater tap were collected 3 times per day for calibration of the chlorophyll data recorded with the thermosalinograph. The water samples are filtered and the filters are stored at -20°C. The data will be analysed at the University of Lisbon, Portugal with HPLC.

6.2.3 Seabed mapping

Seabed mapping was conducted with the multibeam echosounder (Kongsberg EM 710) to reveal the bottom topography and to find suitable trawlable grounds.

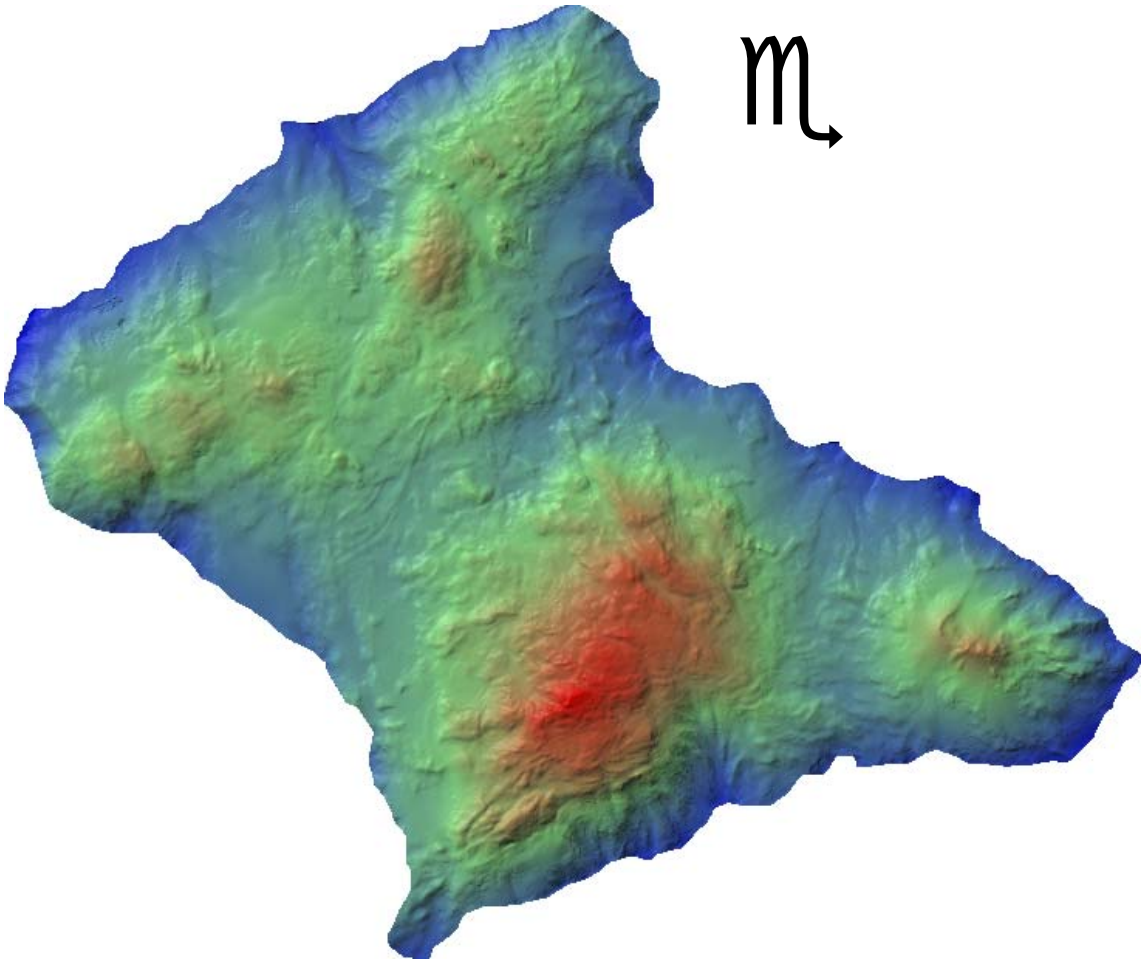


Figure 6.12. Birds eye view of the areas of the seamount mapped with the EM710. The read areas have a minimum dept of 300 m while the maximum depth (dark blue) is around 1500 m depth.

6.2.4 Trawling and other fishing operations

It was difficult to find trawlable ground, and the only bottom trawl conducted was a failure. As an alternative hand lines with different hook types were used, but again with no success, probably due to the prevailing strong current. Baited fish traps were also set at around 400 m depth. However the traps were lost, probably due to a combination of strong current and not enough dead weight.

Only one pelagic haul with a very small catch (around 1kg) was made. The main species caught were Myctophids (probably two different species, identified as *Myctophum* and *Symbolophorus*) and squids (*Ommastrephens bartrami*). Some fish post larva of Bothidae and Fistularidae were also identified from the catch.

6.2.5 Underwater observations

Focus, a remotely operated towed underwater vehicle, was deployed two times. A low light sensitive black and white camera was mounted on the FOCUS the quality of underwater recordings were relatively low due to the deep depth and the steepness of the hills that made it necessary to keep some distance from the bottom.

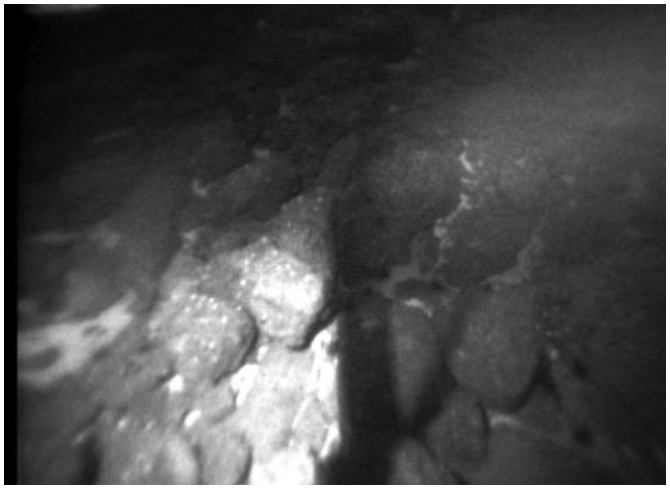


Figure 6.13 illustrating the type of observations made with the FOCUS. The bottom is rocky possibly with some sand between the larger rocks.

6.3 Segundas Archipelago

The Primeiras and Segunda Archipelagos are located in the central-northern zone of Mozambique, between Zambézia and Nampula Provinces, some 10 NM from shore. They comprise of ten islands, five for each archipelago. During this survey our effort was concentrated during the northern most of these two sites, The Segunda Archipelago, where we spent 2 days mapping the sea bottom to from 1000 m- 20 m depth, conducting 6 trawls in various positions of the reef and collecting environmental data by means of CTD and thermosalinograph.

6.3.1 Environmental sampling

One CTD-transect was conducted from 1500 m depth to 15 m depth off the Segunda Archipelago. The results showed relatively stable water masses. The shelf edge was shallow, at around 25 m depth and close to land, with surface temperatures in this depth region around 27°C declining to 19°C at 100 m depth and declining further to <10° at 500 m. Small turbulence on the shelf edge cased upwelling with lifting of slightly cooler water masses to the surface at the edge. Salinity was stable in the surface waters <35.2 $^{o}/_{oo}$. A maximum of 35.3 $^{o}/_{oo}$ was observed off the shelf at 100 m depth declining again to <34.9 $^{o}/_{oo}$ at 500m depth. The fluorescence recordings showed surface values of <0.2 ug/l in surface waters increasing

at the shelf edge in the same way as the temperature. Maximum concentrations were found further offshore at 50 m depth, with values around 0.5 ug/l. Minimum values of < 0.1 ug/l was recorded at 100m depth with no fluorescence in deeper depths. The surface waters were well oxygenised with recorded values >4.5 ml O_2/l. A minimum of 3 ml O_2/l was recorded around 150 m depth before the oxygen increased to > 4ml/l in depths greater than 300 m.

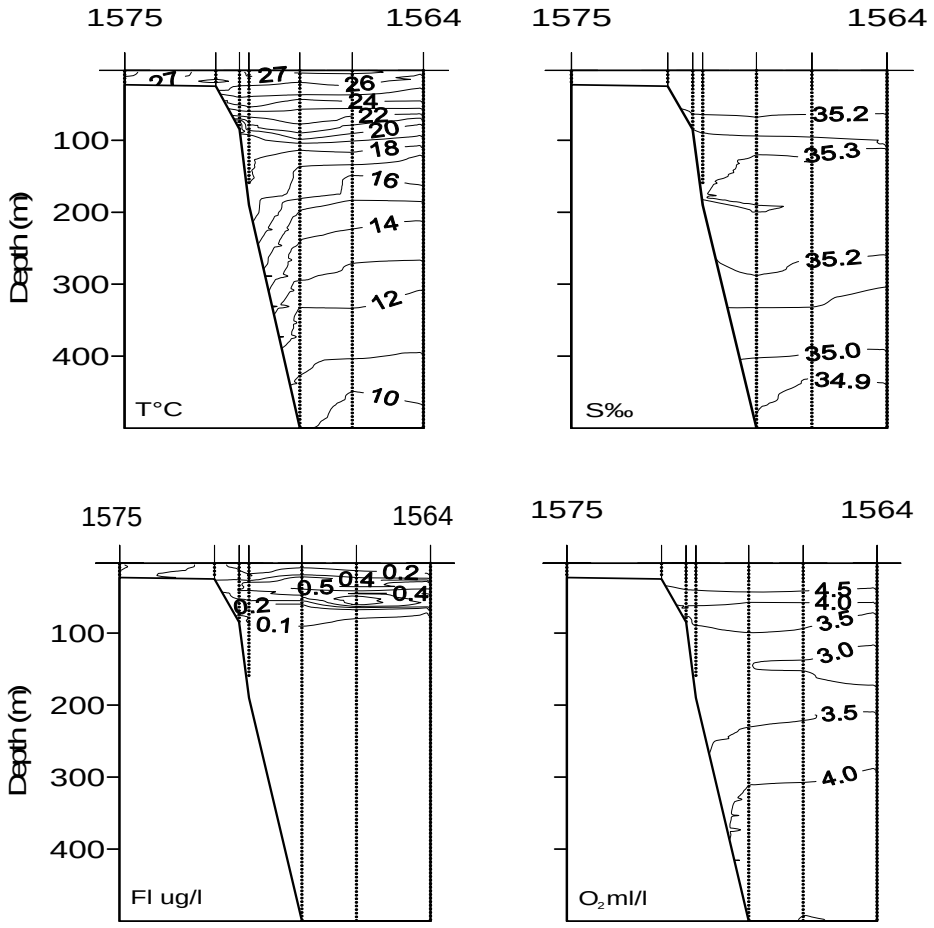


Figure 6.14. Temperature, Salinity Fluorescence and Oxygen recorded of the Segunda archipelago

The Segundas Archipelago was characterised with strong currents. Preliminary data analyses suggest that the general direction of the current was south-eastwards offshore following the shelf with a speed of around 4 knots. The current changed northwards on the shelf around 100 –150 m depth with similar speeds as were recorded offshore. However there was also large local variability on the shelf probably due to tidal waves and topographical features on the bottom. Turbulence was caused on the narrow shelf edge affecting SST, SSS and fluorescence. The SST was around 27.5°C on the outer slope increasing slightly closer to shore to >28°C. Temperatures decreased slightly again to less than 27.5°C immediately inside

of the shelf break before increasing again in the lagoon inside the barrier islands. The SSS showed similar features like the temperature. Salinity over most of the shelf was around 34.7 $^{o}/_{oo}$. The short shelf before the barrier islands was associated with slightly less saline waters than further offshore. The fluorescence also showed the same trend, increased recordings of fluorescence was associated with the narrow shelf, with decreasing values outside and inside of this area.

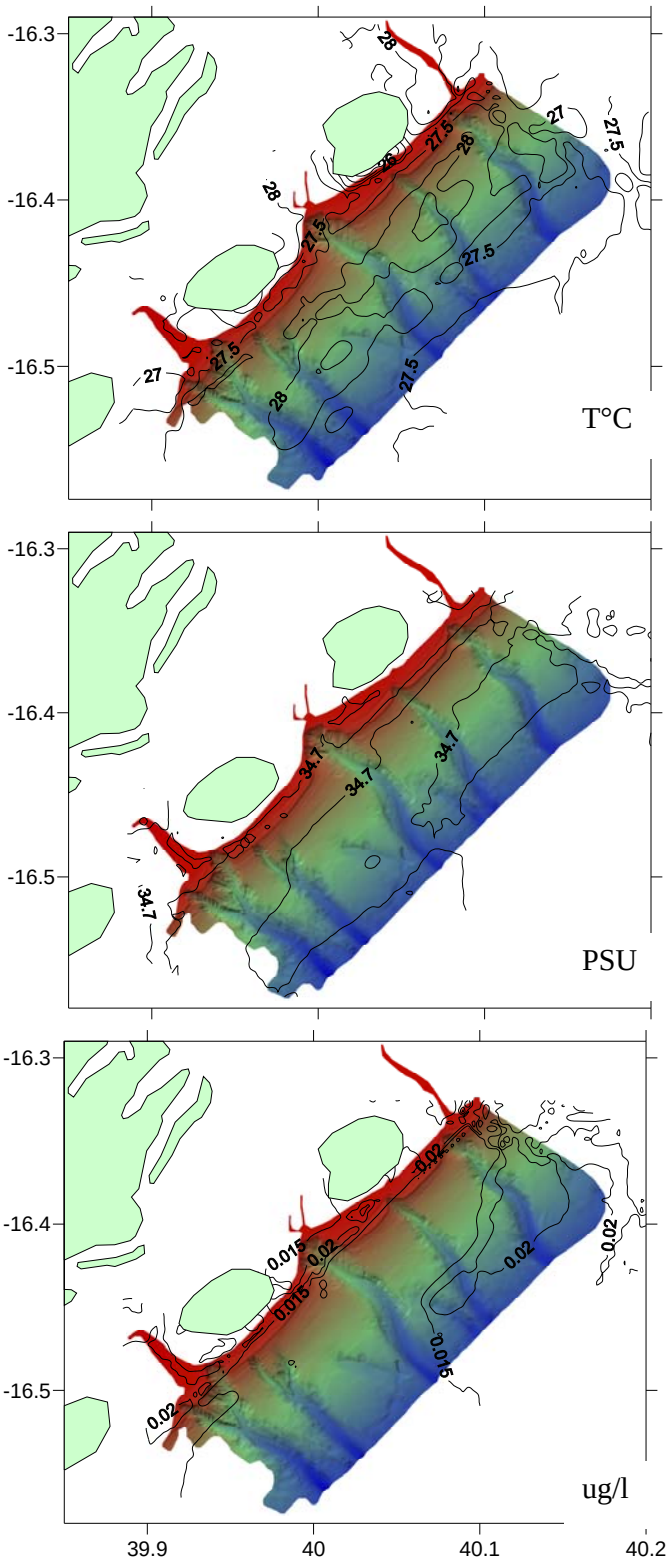


Figure 6.15. SST, SSS and fluorescence on the Segunda Archipelago. All plots are overlaid on bottom contours.

6.3.2 Seabed mapping

Figure 6.16 illustrates the shelf and slope of the Segundas Archipelago from 20 –1500 m depth. The most characteristic feature is the narrow shelf edge cut through by a number of underwater canyons. The lagoons inside of the barrier islands and reefs were not covered by bottom mapping due to the shallow depths.

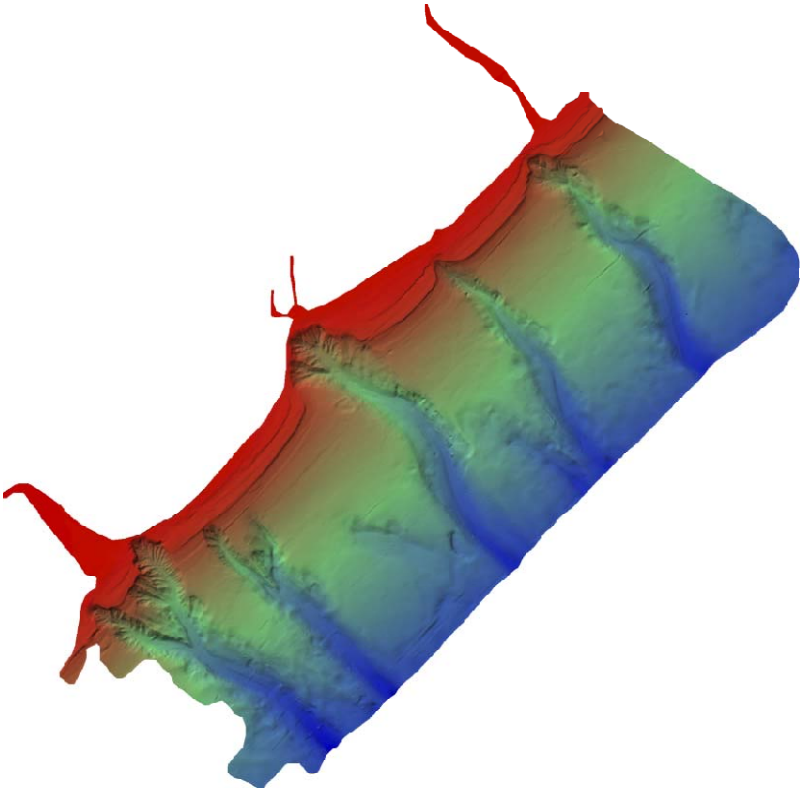


Figure 6.16. Birdseye view of the shelf and slope of the Segundas Archipelago from 20 –1500 m depth.

6.3.3 Plankton sampling

Phytoplankton samples were collected from the seawater tap, for HPLC analysis, 3 times per day. Additional water samples were collected with the CTD from surface and DCM. These samples will be used to describe the phytoplankton assemblages in the focus areas, by pigments and species identification.

The neuston net was successfully used. Three zooplankton samples were collected with this net, which collects only the plankton (>335 µm) from the first few centimetres of water surface. Due to the diurnal vertical migrations, exhibited by the majority of zooplankton specimens, the night samples contained the highest diversity and biomass (fish eggs and larvae, crustacean larvae, etc.)

6.3.4 Trawling and other fishing operations

A total of 5 successful bottom and one pelagic trawl hauls were made in the area. Table 6.1 shows the catch rates of the main groups. Sharks were the group that contributed the most to the total catch (6%), due to the capture of a big specimen of *Dalatias licha* and two *Centrophorus moluccensis* (24.1 and 9.9 kg respectively). The group of pelagic fish and shrimps had a higher relative contribution to the total catch than the demersal fish group (3.5%, 3.4% and 2.5% respectively). Cephalopods had a low contribution to the total catch (less than 1%).

Catches were small in weight but with a high diversity of species with an average of 15 (22 including trawls conducted during the regular survey) species per haul

Two baited traps were also deployed, which were in the water around 12 hours. The traps were almost empty when picked up. The southernmost one had a small catch of four squids (0.33 kg) belonging to the species *Sepia pharaonis*, one swimming crab (0.01 kg) from the family Portunidae and a gastropod. The bait seemed to be untouched.

Table 6.1. Summary of catch rates (Kg/hour) of main groups in bottom and pelagic trawl hauls. Segunda Archipélago.

Station	Gear depth	Demersal	Pelagic	Shrimps	Cephalopods	Sharks	Other	Total
138	20.5		1.0		0.4		3.7	5.2
139	78.5						48.9	48.9
140	402.5	1.2	1.3	36.1	2.3	66.7	821.3	929
141	38.5	25.9	8.0		0.4		19.3	53.7
142	5.0		0.8		0.4		0.8	2
143	23.0		26.3		2.6		9.5	38.3
Mean	14.0	4.5	6.2	6.0	1.0	11.1	150.6	179.5
%Catch		2.5	3.5	3.4	0.6	6.2	83.9	100.0

6.3.5 Underwater observations

The underwater camera malfunctioned during deployment and no observations could be made during the stay at the Segunda Archipelago.

6.4 The Zambezi River mouth

The Zambezi is the fourth-longest river in Africa and the largest flowing into the Sofala Bank in the Indian Ocean. The work conducted in the area consisted of a plankton study with the intention of understanding processes generating high primary productivity on the bank. The data will be analysed at the University of Lisbon as part of a Master of Science thesis.

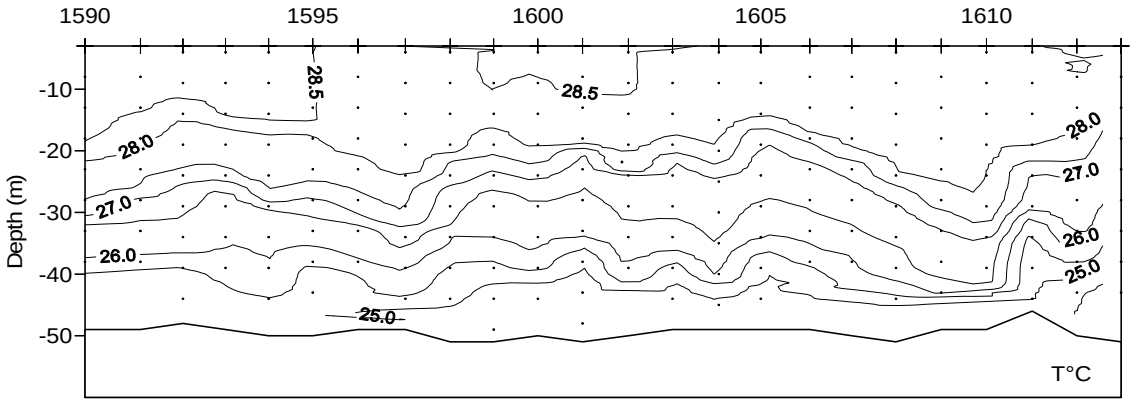
Three parallel transects with 10 NM interdistance ranging from 20 to 100 m depth were worked off the Zambezi river mouth. CTD and Plankton sampling stations were located at regular intervals. Sampling was conducted with a Hydrobios multinet at fixed depth intervals (0-5, 5-10, 10-20, 20-30 and 30-40), with a neuston net in the surface waters, and from sieved water samples collected at fixed intervals with NISKIN bottles attached to the CTD for phytoplankton and nutrient analysis. See annex V for further details on this study.

Five sampling stations were also worked with the benthos grab, one at each side of the river mouth, one mid shelf and one at the outer end of the transects.

After the transects were completed a two day fixed diel station with intense plankton sampling was commenced. During this a sampling station was worked every two hours. One cycle consisted of deployment of a CTD, a neuston net and the multinet.

6.4.1 Hydrographical observations.

Observations of temperature, salinity, oxygen and fluorescence (Figure 6.17) during the diel cycle show that the water masses were relatively stable during the experiment with minor variations in day and night values observed. The surface temperature was around 28.5°C declining to 25.0°C in bottom waters. Salinity showed values around 35.1 $^{o}/_{oo}$ increasing slightly in deeper waters. While oxygen showed relatively high values around 4.4 ml/l in the surface declining to 4.2 ml/l near the bottom in the fluorescence maximum layer of 0.4 ug/l. Fluorescence declined rapidly upwards keeping below 0.1 ug/l from 30 m depth to the surface.



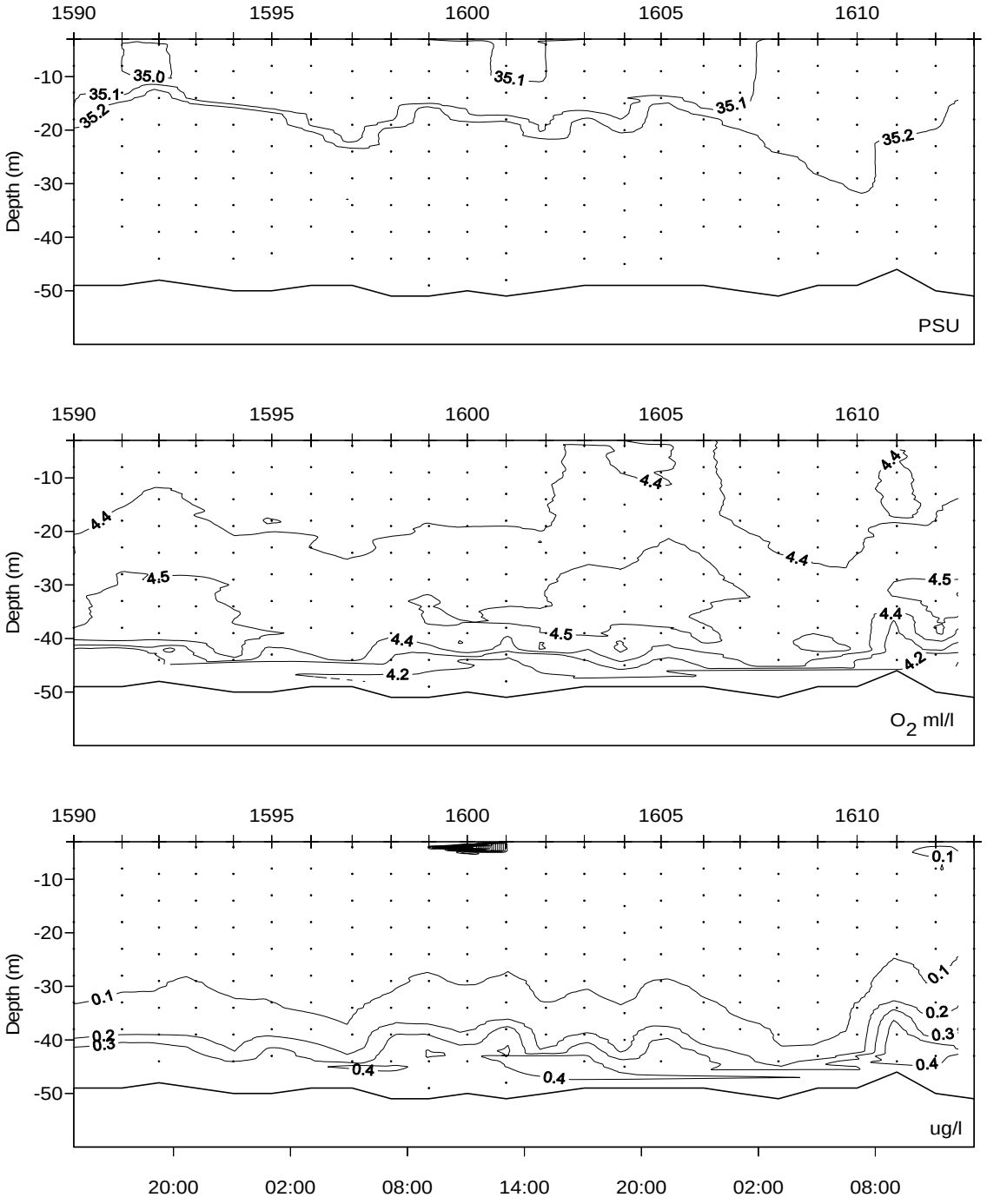


Figure 6.17. Temperature, salinity, oxygen and fluorescence during the 48h diel cycle

6.4.2 Plankton sampling

This location had the greatest sampling effort of plankton during the special studies. The main goal of this study was the Dial Vertical Migration (DVM) exhibited by shrimp larvae (mostly *Penaeus monodon* and *Metapenaeus monoceros*). Despite the great abundance of these

shrimp species in this region, and their importance for local fisheries (Sofala Bank), the scientific knowledge about their life cycle, mainly the larval stages, is very poor.

The samples collected during the study at the Sofala Bank will be analysed at the University of Lisbon, preliminary results are reported in Annex V. The nets for zooplankton sampling caught a high diversity and abundance of various organisms: copepods, decapod larvae, fish larvae, fish eggs, and jellyfishes including juveniles of Portuguese Man o'War (*Physalia physalis*) that were present in almost all samples. Some small pelagic fish were caught in neuston samples, as well as a few pelagic shrimps and pelagic snails. As expected, the night samples had more organisms at the surface than daylight samples. The DVM exhibited by plankton was roughly verified by the abundance of organisms during the sampling, as well as with the Echo sounder.

6.4.3 Trawling and other fishing operations

Although the main type of study conducted in the area was directed to the study of the plankton and the diel cycle of shrimp larva, two successful bottom trawl stations were worked out, one at the beginning of the plankton study and the other at the end. Although the two stations were taken almost at the same position, depth and time of the day there was big difference in the size of the catch (910 and 90 kg). The number of species caught at the stations were similar in terms of number of families and species (21 species belonging to 14 families at one station, and 24 species belonging to 14 families at the other).

Table 6.2 shows the catch rates of the main groups. Pelagic fish was the group contributing the most to the total catch (77%). Looking close into this group (Table 6.3) the clupeoids formed the biggest group (68%) due to good catches of the blue stripe herring (*Herklotsichthys quadrimaculatus)* and the white sardinella (*Sardinella albella)*. The carangids contributed only 7% and the main species were bigeye scad (*Selar crumenophthalmus*) and malabar trevally (*Carangoides malabaricus*). Within the demersal group the main species were from the family Mullidae (fin-stripe goatfish (*Upeneus taeniopterus*) and goldband goatfish (*U. moluccensis*) and the pugnose ponyfish (*Secutor insidiator*).

The commercially important shrimps were represented in the sample by two specimens of speckled shrimp (*Metapenaeus monoceros*)

Table 6.2. Summary of catch rates (Kg/hour) of main groups in bottom and pelagic trawl hauls. The Zambezi's River's mouth

Station	Gear depth	Demersal	Pelagic	Shrimps	Cephalopods	Sharks	Other	Total
144	52.5	27.8	1434.5			5.4	337	1804.7
145	52	3.1	87.7	0.1			90.7	181.6
Mean	52.2	15.5	761.1			2.7	213.8	993.1
%Catch		1.6	76.6			0.3	21.5	0

Table 6.3. Summary of catch rates (Kg/hour) of main pelagic groups in bottom and pelagic trawl hauls. The Zambezi's River's mouth

Station	Gear depth	Clupeids	Carangids	Scombrids	Hairtails	Barracuda	Other	Total
144	52.5	1315.7	109	1.2	1.5	7.1	370.2	1804.7
145	52	44.1	38.5	0.5	1.4	3.2	93.9	181.6
Mean	52.2	679.9	73.7	0.9	1.5	5.2	232	993.1
%Catch		68.5	7.4	0.1	0.2	0.5	23.4	100.0

Hand lines were tried, but did not give any catch.

6.5 Bazaruto National Park

The Bazaruto Archipelago is a chain of four islands mainly arranged from South to North, with an exception of Santa Carolina Island. The main islands toward the north are Magaruque, Benguera and Bazaruto. The islands support some fresh water coastal lakes. The national park was set up by the Portuguese colonial regime in 1971 and expanded in 2001 by the government of Mozambique to cover the entire archipelago and the surrounding seas. Today the park covers some 700 nm^2. These are the habitat for a rich variety of marine life, including turtles, dolphins and the dugong, a rare marine mammal.

The SE wind is predominant and entrust annually tonnes of sand at the eastern end of each island. This sand is dragged on the days of strong wind to maintain the sandbanks inside the bay. The strong waves from the Indian Ocean are quieted by the rocky barrier reef protecting the east of the archipelago before reaching the beach. From the São Sebastião Cape to North of Bazaruto, the area shelter around 65 km of the shallow area against the direct waves impact from the open sea. Inside the bay, the protected area is characterized by shallow water and numerous sand banks with channel networks separating them. During the low tide these banks are mostly exposed. These are perfect conditions for seagrass development. Seven species had previously been identified for the area and the sea grass beds extend several hectares. Sea grass is the main food source for dugongs and Bazaruto supports one of the largest population of this endangered species in East Africa.

The rocky barrier supports coral reefs predominantly made by soft corals, with some hard coral species represented within. The Northern part of the archipelago is influenced by Save River Estuary, which brings a massive sediment load into the archipelago. Therefore, no reef is found on this side. This river system brings nutrients into the sea, and the important mangrove community located at Save River mouth therefore also supports the fish and invertebrates communities further out. The mainly local people economic activity is fishing and the area has been largely protected from oil and gas exploration.

The sampling in the area was focused in three smaller sites, the southern part, the opening at the central part of the park and the southernmost extension of the park. Within each of these sites bottom mapping was conducted to identify topographical features,

6.5.1 Environmental sampling

A CTD transect from 60 NM off the coast was conducted at the northern tip of the Bazaruto National Park to describe the hydrographical features in the area. Another CTD line was conducted along the coast at <50 m depth to describe local variations in hydrographical regimes on the shelf on the eastern coast of the National Park.

Surface temperatures on the northern end of the National park were around 27°C rising slightly on the outer part of the shelf indicating some minor mixing going on. At 100 m depth the temperature declined to 22°C offshore, rising slightly closer to the shelf edge. Temperature at 500 m was >11°C. The salinity ranged from <35 $^{o}/_{oo}$ in surface waters on the shelf edge extending inshore, off the edge and in deeper waters, to 300 m depth the salinity increased to 35.2 $^{o}/_{oo}$ before decreasing to <35.0 $^{o}/_{oo}$ in waters of more than 400 m depth. A body of water with salinity >35.4 $^{o}/_{oo}$ was found 40 NM offshore between 100 and 300 depth extending towards the surface at the eastern extremity of the transect. Highest primary production illustrated as recordings of fluorescence of 0.5 ug/l was observed on the shelf edge extending offshore to 100 m depth with declining values further from the coast. Values <0.1 ug/l was observed deeper than 100m and in the offshore surface waters. The oxygen content in the surface was around 4.5 ml/l declining to 3.5 ml/l around 100 – 200 m and increasing to 4.5 ml/l offshore at 500 m depth.

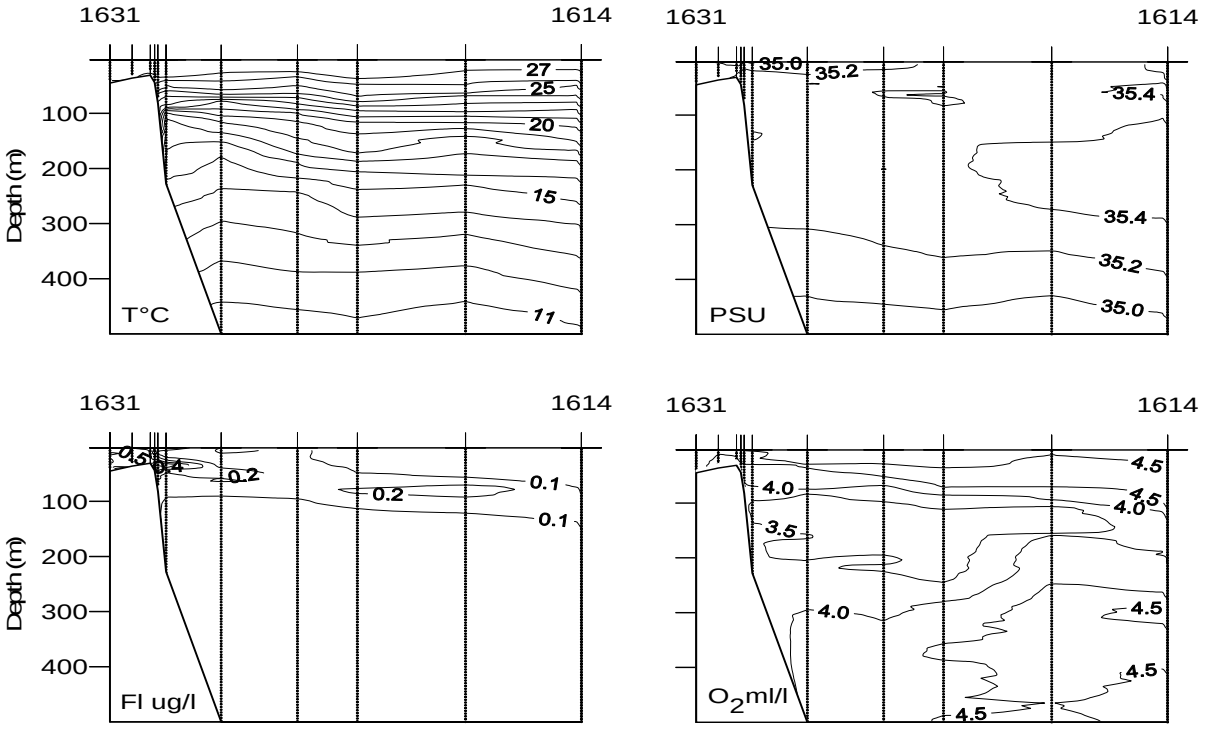


Figure 6.18 temperature, salinity, oxygen and fluorescence at the Bazaruto National Park

The SST at the Bazaruto National Park showed temperatures around 27.5°C on the outer slope increasing slightly closer to shore to >28°C. Temperatures decreased slightly again to around <27.5°C immediately inside of the shelf break before increasing again in the lagoon inside the barrier islands. The SSS showed similar features to the temperature. Salinity over most of the shelf was around 34.7 $^{o}/_{oo}$. The short shelf before the barrier islands was associated with slightly less saline waters than further offshore. The fluorescence also showed the same trend. High recordings of fluorescence were associated with the narrow shelf, with decreasing values outside and inside of this area.

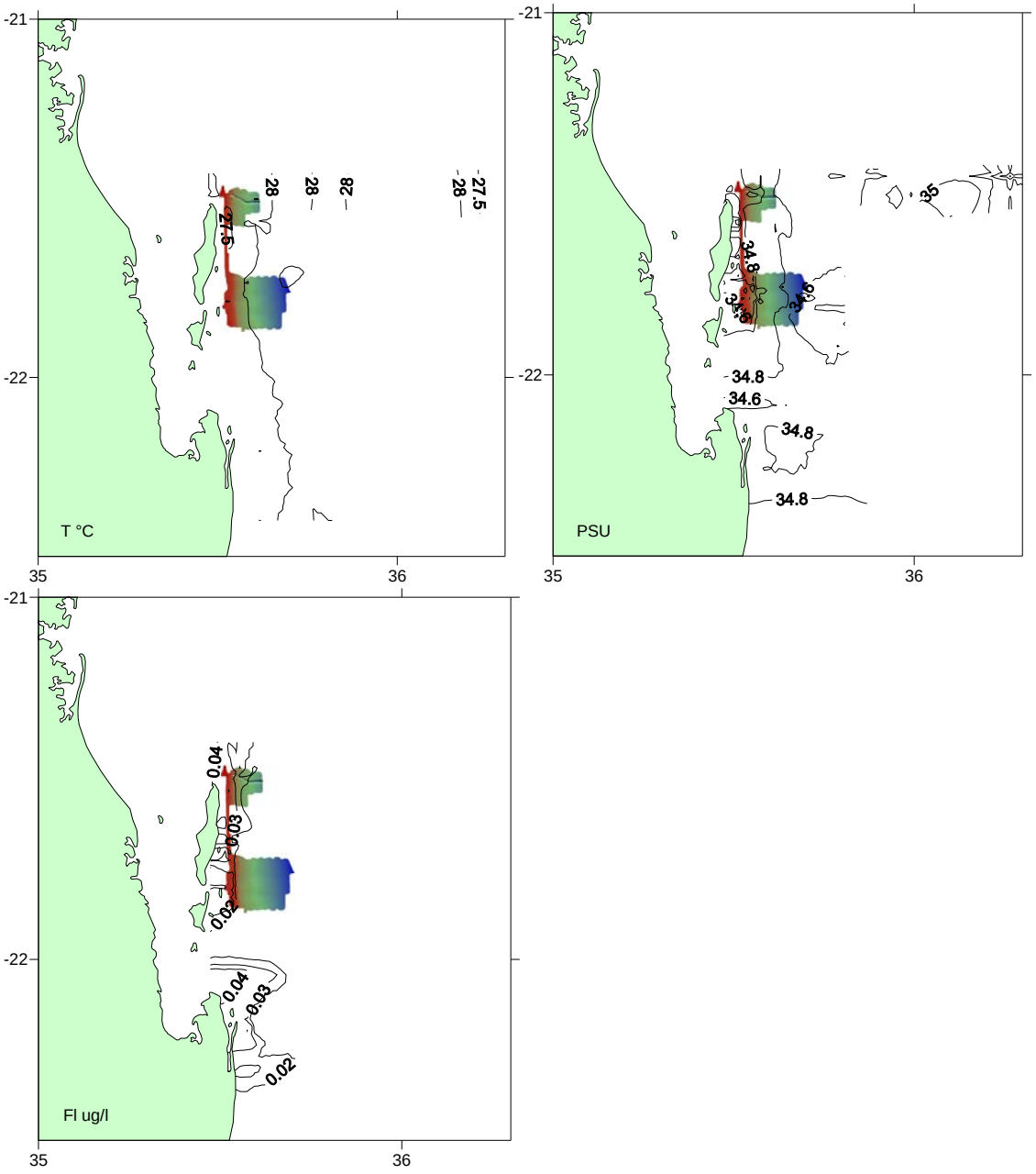


Figure 6.19. SST, SSS and fluorescence on the Bazaruto National Park. All plots are overlaid on bottom contours.

6.5.2 Plankton sampling

Plankton samples will be analysed at the University of Lisbon after the survey.

6.5.3 Seabed mapping

The seabed mapping of the area was incomplete due to the time needed to cover the relatively large slope at the eastern end of the national park. The lagoon inside of the park was not

covered due to the very shallow depths making it inaccessible for a large research vessel. The multibeam recordings outside of the lagoon show that the shelf is narrow and sand covered with a shelf break at approximately 100 m and a steep rocky slope towards 150-200 m before the slope flattens out towards the deep. A small cavern extending from the shelf break and into the deep cuts across the northern end of the national park.

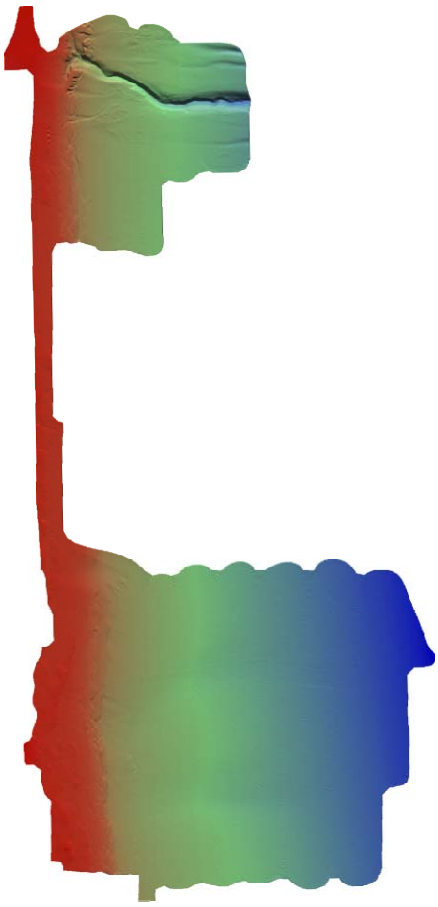


Figure 6.20. Multibeam recordings of the Bazaruto National Park. The area has a narrow sand covered shelf with a shelf break at approximately 100 m and a steep rocky slope towards 150-200 m before the slope flattens out towards the deep.

6.5.4 Trawling and other fishing operations

Traps

Two types of fish traps were deployed, all baited. They were deployed on the outer side between the islands of Bazaruto and Benguera, near the coral reef, at around 10 to 20 m depth. Deployment period was from evening to the next morning for all traps, approxiumately 10 h. The traditional fish trap caught only some small crabs, while the other two (‘ruse’ type)

had a shark each (juveniles of *Carcharhinus amblyrhynchos*) together with some small grunt fish (*Diagramma pictum*).

No catches were made on the hand lines. The effort was not recorded.

Trawl stations

The region was divided in three areas: north of Bazaruto island (3 trawl stations), central (between Bazaruto and Benguera island with 4 trawl stations) and south of Magaruque island (4 trawl stations), covering a depth range of about 20 m to 520 m.

Table 6.4 shows the catch rates of the main groups in each area (N, C, and S), for the inner shelf (0-100 m), the slope (101-200 m) and the outer shelf (>200 m).

Table 6.4. Summary of catch rates (Kg/hour) of main groups in successful bottom trawl hauls at the inner shelf (0–100m), slope (101-200m) and outer shelf (>200m) by areas. (N) North of Bazaruto island, (C) Central (between Bazaruto and Benguera islands), (S) South of Magaruque island.

Station	Area	Gear depth	Demersal	Pelagic	Shrimps	Cephalopods	Sharks	Other	Total
146	C	214.5	3.1	0.1	0.0	3.3	25.6	76.0	108.2
147	C	58.0	428.0	7.4	0.0	0.0	34.7	277.0	746.9
148	C	45.5	39.9	42.1	0.0	2.1	36.8	309.5	430.4
149	C	506.5	0.8	0.0	20.8	15.9	0.8	121.3	159.6
150	N	46.5	62.2	23.5	0.0	0.4	27.5	80.2	193.9
151	N	180.0	0.0	9.6	0.0	0.0	1.4	219.5	230.4
152	N	26.0	0.1	25.8	0.4	2.0	108.7	35.3	172.3
153	S	54.5	13.8	0.0	0.0	17.2	0.0	60.9	91.9
154	S	159.5	0.0	0.0	0.0	2.5	1.7	16.4	20.6
155	S	220.5	2.2	2.9	0.0	6.4	1.6	20.7	33.8
156	S	502.5	0.0	0.0	32.7	22.3	4.3	101.1	160.3
Mean		183.1	50.0	10.1	4.9	6.6	22.1	119.8	213.5
%Catch			23.4	4.7	2.3	3.1	18.4	56.1	100.0

The central area rendered the highest catches and showed the highest diversity of species, Table 6.5 shows the catch rates of the main commercial demersal groups. In all three areas, the red snappers (family Lutjanidae) were the most important group with species like *Lutjanus sanguineus*, *L. bohar*, *L. sebae* and *Aprion virescens*. Other important species were *Diagramma pictum* (family Pomadasyidae), several emperors species from the genus *Lethrinus*, the triggerfish *Abalistes stellatus*, and the unicorn leatherjacket *Aluterus monoceros*. In the northernmost area a big catch of the finstripe goatfish (*Upeneus taeniopterus*) was made.

Table 6.5. Summary of catch rates (Kg/hour) of main commercial demersal groups in successful bottom trawl hauls at the inner shelf (0–100 m), by areas. (N) North of Bazaruto island, (C) Central (between Bazaruto and Benguera islands), (S) South of Magaruque island.

Station	Area	Gear depth	Seabream	Snappers	Groupers	Grunts	Other	Total
146	C	214.5	2.3	0.0	0.0	0.0	105.9	108.2
147	C	58.0	0.0	280.2	31.1	30.6	405.1	746.9
148	C	45.5	0.0	18.0	0.0	0.0	412.4	430.4
149	C	506.5	0.0	0.0	0.0	0.0	158.8	159.6
150	N	46.5	0.0	62.2	0.0	0.0	131.7	193.9
151	N	180	0.0	0.0	0.0	0.0	230.4	230.4
152	N	26.0	0.1	0.0	0.0	0.0	172.3	172.3
153	S	54.5	0.3	13.5	0.0	0.0	78.1	91.9
154	S	159.5	0.0	0.0	0.0	0.0	20.6	20.6
155	S	220.5	2.2	0.0	0.0	0.0	31.6	33.8
156	S	502.5	0.0	0.0	0.0	0.0	160.3	160.3
Mean		183.1	0.4	34.0	2.8	2.8	173.4	213.5
%Catch			0.2	15.9	1.3	1.3	81.2	100.0

In waters deeper than 200 m, seabreams (Sparidae) was the only demersal commercially important group caught.

Different lobster species were caught: Natal spiny lobster (*Palinurus delagoae)* (caught between 60 and 220 m depth), ornate spiny lobster (*P. ornatus*, found around 50 m), smooth fan lobster (*Ibacus novemdentatus*, 160-220 m) and Cape locust lobster (*Scyllarides elisabethae* (60-220 m). The most abundant deepwater shrimps were knife shrimp (*Haliporoides triarthrus*) and golden shrimp (*Plesionika martia*). Among the squids, the family Loliginidae was the most abundant at all depths.

Table 6.6 shows the main pelagic groups caught with bottom trawls in the three areas. The areas were different in their pelagic species composition. In the northern area the most common species were golden trevally (*Caranx speciosus*), roughear scad (*Decapteurs tabl*) and narrow-barred Spanish mackerel (*Scomberomorus commerson*). No barracudas were caught. In the central area the catches included: Malabar trevally (*Carangoides malabaricus*), coastal trevally (*C. caeruleopinnatus*), bigeye scad *Selar crumenophthalmus* and yellowstrip barracuda *Sphyraena chrysotaenia*. Some barracudas were also caught at depths deeper than 200 m. In the southern most area the only pelagic catch on the inner shelf, was represented by one individual of Indian scad (*Decapterus russelli*, not shown). In waters deeper than 200 m yellowtail barracuda *Sphyraena flavicuda*) were the only pelagic species caught.

No clupeoids or engraulids were caught in this area.

Table 6.6. Summary of catch rates (Kg/hour) of main commercial pelagic groups in successful bottom trawl hauls at the inner shelf (0-100m), by areas. Bazaruto: (N) North of Bazaruto island, (C) Central (between Bazaruto and Benguera islands, (S) South of Magaruque island.

Station	Area	Gear depth	Carangids	Scombrids	Hairtails	Barracuda	Other	Total
146	C	214.5	0.0	0.0	0.0	0.1	108.1	108.2
147	C	58.0	7.4	0.0	0.0	0.0	739.6	746.9
148	C	45.5	31.4	0.0	0.0	10.8	388.3	430.4
149	C	506.5	0.0	0.0	0.0	0.0	159.6	159.6
150	N	46.5	8.1	15.4	0.0	0.0	170.4	193.9
151	N	180	9.6	0.0	0.0	0.0	220.9	230.4
152	N	26.0	0.0	25.8	0.0	0.0	146.5	172.3
153	S	54.5	0.0	0.0	0.0	0.0	91.9	91.9
154	S	159.5	0.0	0.0	0.0	0.0	20.6	20.6
155	S	220.5	0.0	0.0	0.0	2.9	30.9	33.8
156	S	502.5	0.0	0.0	0.0	0.0	160.3	160.3
Mean		183.1	5.1	3.7	0.0	1.3	203.4	213.5
%Catch			2.4	1.8	0.0	0.6	95.3	100.0

The group of sharks and rays were found in all stations but one, in the three regions. The most common species were shortnose spurdog shark *Squalus megalops*, African angel shark *Squatina africana*, sliteye shark *Loxodon macrorhinus* and different species of the family Rajidae

The stations deeper than 200 m gave small catches by weight but with a high diversity (up to 36 different species in one trawl).

When analysing the region as a whole, the stations were grouped in three; inner shelf (0-100 m), slope (101-200 m), and outer shelf (>200 m). In the inner shelf the demersal group (mainly represented by red snappers) was the dominant group, followed by the sharks, while at the outer shelf shrimps (*H. triarhrus*) and cephalopods (various squids, mainly of the genus *Loligo*) were more important.

A closer look on the demersal commercially important species reveals that the group of red snapper was dominant on the inner shelf. The hauls on the slope did not result in catches of any important demersal group, while on the outer shelf seabreams were the only commercial species caught, represented by the Natal Pandora seabream (*Pagellus natalensis*).

As for the main commercial pelagic species, the Carangidae family were the most common and abundant. Scombrids, although not very common, rendered good catches. No members of the families Clupeidae or Engraulidae were caught within the area.

At deeper depths (>100 m) barracudas (Sphyraenidae) was the only pelagic group caught.

6.5.5 Underwater observations

The FOCUS was used for underwater observations of the seabed on the central part of the shelf at a depth of around 50 m. The bottom consisted of sand mainly without vegetation, but with minor patches with sea grass or courser sand / gravel / peaces of corals.

6.6 Almirante Leite Bank

The Almirante Leite bank is situated 110 NM off the coast of Mozambique directly east of Maputo. The bank consist of a number of seamounts varying from 80 m depth down do several hundred m, surrounded with areas of more than 1100 m bottom depth.

6.6.1 Environmental sampling

Three CTDs were deployed on the Almirante Leite bank for sound velocity measurements and for phytoplankton sampling. A CTD line was also conducted from the sea mount to the coast. Figure 6.21 shows the vertical profile section from the bank towards the coastline of Maputo. The temperature has a vertical negative gradient, it decreases toward the bottom, falling from 27˚C at the surface to 7˚C at bottom over the bank. Near the coast the results show the typical donwwelling of Mozambique east coast due to the dominating SE wind; the thermocline is between 50 m and 200 m depth. The salinity increases from the surface (about 35.3 $^{o}/_{oo}$) to 200 m (35.5 $^{o}/_{oo}$) and then decreases towards the bottom (34.7 $^{o}/_{oo}$). The maxim of 35.5 $^{o}/_{oo}$ was at 200 m depth at stations 1640 and 1641. The halocline is not well defined; near the shore it has a horizontal gradient due to land and topography influence. The fluorescence gives the indicative primary production distribution along the section, the higher values of fluorescence occur near the coast from the surface to 300 m depth and offshore at about 100 m depth. Over the bank the primary production is low (0.1 ug/l). The dissolved oxygen values had a minimum of 3.5 ml/l around 100 m depth, the same depth as the thermocline and fluorescence maximum.

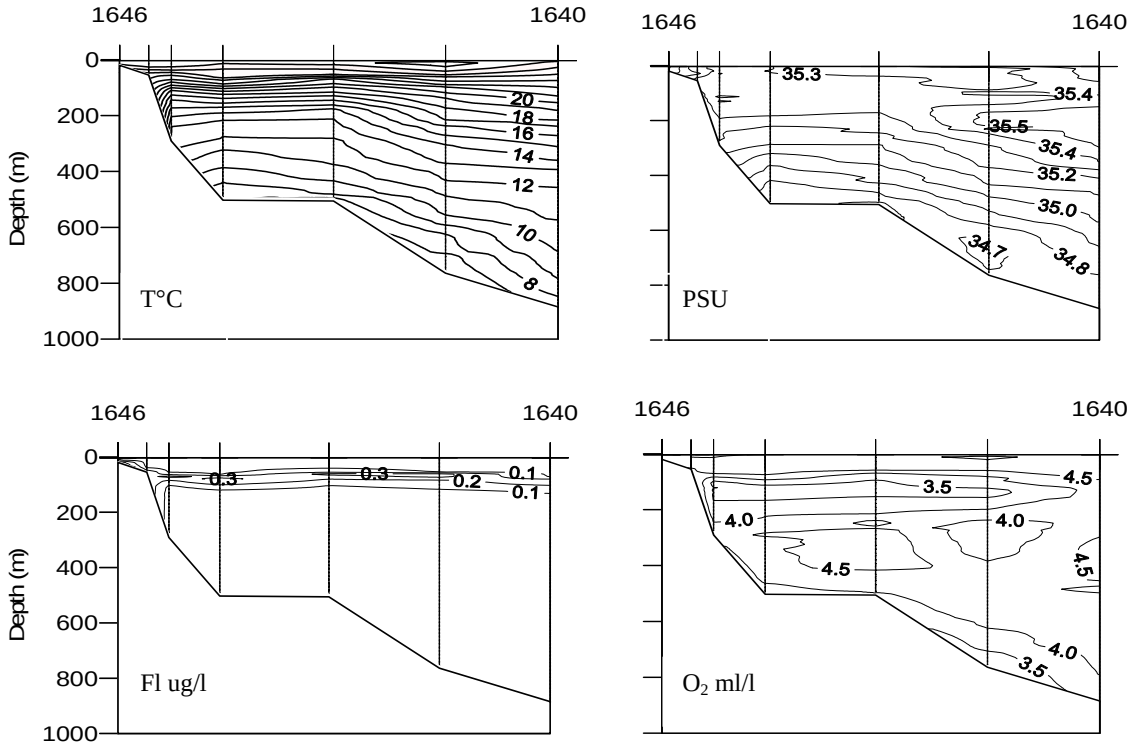


Figure 6.21. Temperature, salinity, oxygen and fluorescence at the transect from the Almirante Leite bank to Maputo

6.6.2 Plankton sampling

Plankton samples collected will be analysed at the University of Lisbon.

6.6.3 Seabed mapping

Figure 6.22 shows a bird's eye view of the areas of the Almirante Leite Bank mapped with the EM710. The red areas have a minimum dept of 80 m while the maximum depth (dark blue) is around 1100 m depth. The recordings revealed that the areas are of volcanic origin and several craters are visible in the figure.

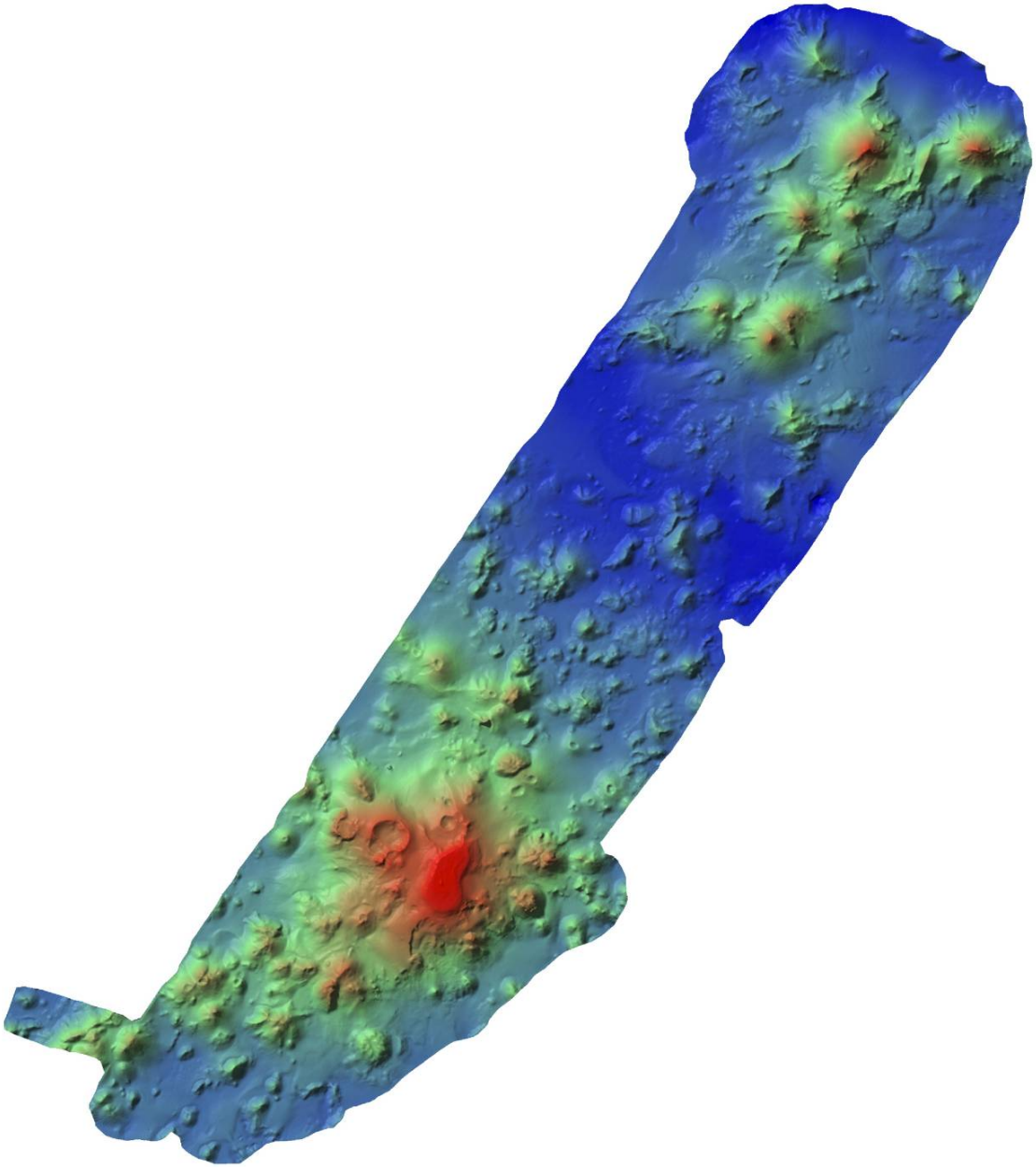


Figure 6.22. Birds eye view of the areas of the Almirante Leite Bank mapped with the EM710. The read areas have a minimum dept of 80 m while the maximum depth (dark blue) is around 1100 m depth

6.6.4 Trawling and other fishing operations

No fishing operations conducted in this area. The area was considered untrawlable.

6.7 Cabo Inhaca area

The Cabo Inhaca area was not covered due to very strong wind in the area during the last three days of the survey.

7. SUMMARY

In December 2006 the Ministry of Fisheries in Mozambique requested the Food and Agriculture Organization (FAO) of the United Nations for assistance to undertake a a review of the marine living resources in Mozambican waters. Consequently R/V Dr Fridtjof Nansen was made available to Mozambique for 86 days towards the end of 2007. In a pre-survey meeting held in Maputo 13-15 June 2007 it was decided to divide the allocated time of 86 days in two main parts; a main ecosystem survey of the living marine resources of Mozambique, and special studies of areas of particular interest off the Mozambican coast. The ecosystem survey, in addition to recording environmental variables with CTD and thermosalinograph, and collecting samples with grabs and plankton multinet, used standard acoustic and swept area fish stock assessment methods to estimate the size of the pelagic and demersal fish stocks in the region. In the special studies a video camera and bottom mapping sonar were used to collect data on the bottom habitat, benthos grabs to investigate benthos biodiversity and chemical composition of bottom sediments, and bottom trawl, traps and hand line for fishing trials. Environmental data were recorded by means of CTD and thermosalinograph.

Of the allocated time 45 days were used for the ecosystem survey while the remaining 41 days were used for special studies. A total of 6060 NM was covered during part I while 5120 NM was covered during the 2nd part.

7.1 Oceanography

In the northernmost section of the Mozambican Chanel the water column exhibits a strong thermocline between 100 and 250m, overlaid by the relatively homogenous layer of Tropical Surface Water (TSW). The temperature increased from 24°C at the base of the thermocline to 27°C at the surface. Oxygen distribution drops to below 2 ml l^{-1} at 1000 m, and this indicated presence of Subsurface Red Sea Water (RSW).

The Central Mozambique Channel and the Sofala Bank, TSW is identifiable at the surface by means of temperature above 24°C and salinity around 35.2 $^{o}/_{oo}$. Slight increase in oxygen concentration near 1000 m above 2 ml l^{-1}compared to the northern section of the channel indicated diminished influence of the RSW. Upward sloping pattern of isotherms indicated clearly that the dominant flow along the continental slope off the Sofala Bank was southward. Significant contrast was observed between shelf and open ocean conditions. The water column is well mixed and salinity distribution exhibits strong horizontal gradient with the lowest values near the coast. This was found to be related to the terrestrial outflow from

numerous rivers along this section of the coast and strong tidal currents, storm surges associated strong mixing at the shallow bottom.

Predominant features of the surface water masses in the southernmost section of the Mozambique Channel manifested influence of subtropical climate regime. Excess of evaporation raises surface salinity and intense wind mixing erodes the thermocline. A relatively colder (approximately 24°C) and more saline Subtropical Surface Water (STSW) replace the homogenous TSW layer seen at the surface on the northerly sections. A transition of water masses is also found at depths greater than 800 m where the relatively high salinity and low oxygen signature of RSW is replaced by a less saline and more aerated waters sourced from Antarctic Intermediate Water (AAIW) of the Southern Ocean origin.

Satellite altimetry revealed occurrence during the cruise of cyclonic eddies between Zavora and Pomene and two anticyclonic eddies in the vicinity of Sofala Bank. The anticyclonic eddies seemed to trap the tropical water masses in the northern Mozambique Channel preventing them from spreading south, and the cyclonic eddies confined the subtropical water masses south.

A deep chlorophyll maximum (DCM), a measure of primary productivity, was typically located near the coast and just above the thermocline in open sea because supply of nutrients is the highest and light quantities still sufficient. In the open sea of tropical water the chlorophyll maximum is only located in the thermocline. Low chlorophyll concentrations were found at the surface. In the subtropical waters, the highest chlorophyll concentrations are still found in the thermocline but they are more vertically spread across the water column, often reaching the surface.

7.2 Biomass estimates

Biomass estimates were calculated using the swept-area method stratified by region and depth. No biomass was estimated for the northern region as the trawl sampling effort was too low to establish any reliable estimates. The total biomass of fish, cephalopods and shrimps on the southern and central regions were 189 300t and 23 600t respectively. In the southern region, the biomass of the pelagic groups was 33 000t and 6 900t in the central region. In both regions the dominant families for the pelagic groups were carangids followed by sardines in the central region and barracuda in the southern region. For the demersal fish groups, the biomass estimates were 6 900t and 4 000t in the southern and northern regions, respectively. In the central region the dominant families for the demersal groups were snappers followed by grunts and croakers, and in the southern region the main families were cusk eels followed by groupers and seabreams. The highest abundance of shrimps was found in deep waters, and the

most abundant deep water shrimp species were *Haliporoides triarthrus, Aristaeomorpha foliacea and Aristeus antennatus,* which inhabited the southern slope and in the deeper waters of the central region. *Plesiopenaeus edwardsianus* and *Penaeopsis balssi* had a similar depth distribution with the highest biomass on the southern slope. All the shallow water shrimp species; *Penaeus indicus, Metapenaeus monoceros, Penaeus semisulcatus, Penaeus monodon, Penaeus japonicus and Penaeus latisulcatus* were found in the central region, whilst *Metapenaeus monoceros* were also caught on the southern shelf.

The acoustic recordings revealed low to medium acoustic densities over most of the shelf, and only plankton and mesopelagic fish were found in the water column from the shelf break and further offshore. Acoustic biomass estimates were calculated for clupeoids and a group (PEL2) consisting of carangids, barracudas, hairtails and scombrids. Low densities of clupeoids were found in the southern region south of Dikambane and between Beira and Angoche. In a relatively small area off Beira higher densities of clupeoids were recorded, and no acoustic recordings were observed in the northern region. The PEL2-group was found on the Mozambican shelf from the South African border up to Angoche, and in a small area south of Pemba. No acoustic densities of PEL2 were recorded in the area between 25°S and 24°15’S, but in a small area south of Beira higher densities of PEL2 were observed.

7.3 Special studies

The special studies focused on seven locations of special interest. These were the Quirimbas National Park, St. Lazarus Bank, Paisley Seamount, Primeiras e Segundas Arquipelago, The Zambezi river mouth, Bazaruto National Park and the Almirante Leite Bank. The Cabo Inhaca area was not visited during this survey because of rough weather conditions that made it impossible to survey the area. For all areas a detailed program with sampling of oceanographic parameters, recording of bottom topography, fishing trials and sampling of sediments and plankton were executed. Data on bentic biodiversity and chemical composition as well as from the plankton sampling program are analysed on-shore and are not reported here.

The study areas can roughly be divided in four distinct habitats. The Quirimbas National Park, St. Lazarus Bank and the Primeiras e Segundas Archipelago are typical coral habitats with corals fringing the more exposed parts of the shallow water areas and sand and mud dominating the more sheltered areas. Each of the three areas have distinct features that are described further in each respective chapter. Generally fishing trials in these areas had variable success. Trawling was difficult and resulted in a number of broken trawls. Catches were low, but with high diversity of species and relatively high catch rates of high quality fish species. The fourth habitat type is made up of the Paisley Seamount and the Almirante Leite

Bank which are typical deep water sea mounts. The bottom on these seamounts consisted of volcanic rocks and was untrawlable. Mesopelagic fish were observed in both habitats. Particularly the Almirante Leite bank revealed a striking underwater topography with clear volcanic cones rising more than 1000 m towards the surface from the ocean floor. The Zambezi river mouth is a typical shelf habitat with strong freshwater influence. Pelagic fish were dominant in the region and catch rates were relatively high. Sediments were of river origin with high content of organic matter. The east end of Bazaruto National Park was dominated by sandy substrate with smaller areas of seagrass. Hard bottom exposed by tidal currents supported small coral reefs predominantly made by soft corals, with some hard coral species represented within.

8. SUMÁRIO PORTUGÊSE

Em Dezembro de 2006, o Ministério das Pescas do Governo de Moçambique solicitou assistência à FAO para a actualização do conhecimento sobre a ocorrência dos recursos marinhos vivos nas suas águas jurisdicionais. Como consequência, o navio de investigação norueguês "Dr. Fridtjof Nansen" foi posto à disposição de Moçambique por um período de 86 dias no final de 2007. Na reunião de planificação desta expedição, realizada em Maputo, entre 13 a 15 de Junho de 2007, ficou decidido que a expedição seria dividida em duas partes, sendo a primeira dedicada à avaliação e prospecção de recursos marinhos vivos do ecossistema marinho e a segunda dedicada à realização de estudos específicos em algumas áreas de interesse ao longo da costa moçambicana. Na primeira fase da expedição, para além do registo de parâmetros ambientais com o uso de CTD e do termosalinógrafo e colheita de amostras de sedimentos e de plâncton com uso de dragueta e de "multinet", foram usados métodos acústicos e de arrasto para a estimação do tamanho de estoques de peixes pelágicos e demersais. Durante os estudos específicos foram feitas filmagens e mapeamento do fundo usando sonar para o estudo dos habitates bêntonicos: amostragem do sedimento usando draguetas para o estudo da biodiversidade bêntonica e composição química dos sedimentos do fundo; arrastos demersais, gaiolas e linhas de mão como operações de pesca. A caracterização ambiental desses locais foi feita através de uso de CTD e termosalinógrafo.

Do total de 86 dias da expedição, 45 foram dedicados à avaliação e prospecção de recursos e do ambiente de todo o ecossistema marinho, enquanto que os restantes 41 foram restritos aos estudos específicos, tendo-se navegado cerca de 6,060 milhas náuticas durante a primeira fase contra 5,120 milhas navegadas na segunda fase.

8.1 Oceanografia

Na região norte do canal de Moçambique, a coluna de água exibiu uma forte termoclina entre 100 a 250m, sobreposta por uma camada relativamente homogênea de massas de água superficiais tropicais (TSW). Nesta camada a temperatura variou de 24ºC na base da termoclina até 27ºC a superfície. A concentração de oxigênio diminuiu até abaixo de 2 ml l^{-1} abaixo dos 1000m de profundidade dando indicação de prevalência de massas de água sub-superficiais do Mar Vermelho.

A região central do canal de Moçambique, a região do Banco de Sofala, as massas de águas superficiais tropicais (TSW) foram identificadas ocorrerem pela prevalência de temperaturas acima dos 24 ºC e salinidades a cerca dos 35.2 $^{o}/_{oo}$. Ligeiro aumento na concentração de Oxigênio a 1000m de profundidade bem acima dos 2 mll^{-1} com relação a região norte, indicou a baixa prevalência de massas de água sub-superficiais do Mar Vermelho. Padrão ascendente das isotermas observado ao longo da talude continental indicou claramente que a corrente

marítima predominante no Banco de Sofala era dirigida para o sul. Um contraste significativo foi observado entre as condições prevalecentes na plataforma continental e o mar aberto. A coluna de água apresentou-se verticalmente misturada e a distribuição da salinidade exibiu um forte gradiente horizontal com valores mais baixos junto a costa. Esta caracterização foi encontrada estar relacionada com o escoamento fluvial dos vários rios localizados nesta região, as fortes correntes das marés, e aos freqüentes eventos turbulentos associados a forte mistura da coluna de água a baixas profundidades.

Características predominantes das massas de água superficiais da região sul do canal de Moçambique claramente manifestaram a influencia do regime climático subtropical. Excesso de evaporação característica desta região climática elevou a salinidade superficial e o intenso vento causou erosão da termoclina. A fria e mais salina massa de água sub-tropical (STSW) aparece a substituir a massa de água homogênea tropical (TSW) observada a superfície das regiões a norte do canal de Moçambique. A substituição é também observada nas estratos profundos (>800 m) onde as massas de água de relativamente alta salinidade e baixa concentração de oxigênio características do mar Vermelho são substituídas pelas massas de água menos salinas e mais oxigenadas da Antártica (AAIW).

Dados de altimetria colhidas durante o período do cruzeiro revelaram a ocorrência de vórtices ciclônicos entre Závora e Pomene e dois vórtices anticiclónicos na vizinhança do Banco de Sofala. Estes dados deram indicação de aparentemente os vórtices ciclônicos confinarem as massas de água tropicais (TSW) nas regiões a norte do canal de Moçambique impedindo seu fluxo para as regiões a sul. Por outro lado os vórtices anticiclónicos aparentemente confinaram as massas de água subtropicais (STSW) a sul.

O máximo de clorofila profundo (DCM), índice de produtividade primaria, foi tipicamente observado nas regiões costeiras e ligeiramente acima da termoclina no mar aberto, devido a disponibilidade de nutrientes e a existência de luz em intensidade suficientes. No mar aberto com predominância de massas de água tropicais, o máximo de clorofila continua ser observado na termoclina. Todavia, concentrações altas de clorofila estão verticalmente distribuídos na coluna de água, freqüentemente atingindo a superfície.

8.2 Estimativas de Biomassa

As estimativas de biomassa foram efectuadas usando o método da área varrida sendo a área estratificada por região geográfica e profundidade. As estimativas de biomassa para a região norte não foram determinadas, por não ter sido possível realizar um número suficiente de arrastos que pudesse garantir estimativas fiáveis para esta região. A biomassa total de peixes, cefalópodes e crustáceos na região sul e centro foi de 189,300 e 23,000 toneladas, respectivamente. Na região sul a biomassa dos pelágicos foi de 33,000 e 6,900 toneladas para a região central. Em ambas regiões, as famílias dominantes de entre os recursos pelágicos

foram os carangídeos, seguidos pelas sardinhas na região central e barracudas na região sul. Para os recursos demersais foram estimadas 6,900 e 4000 toneladas para as regiões norte e sul, respectivamente. As espécies demersais dominantes na região central foram os pargos, seguidos dos peixes pedra e corvinas. Na região sul dominaram as abrótias, seguidas pelas garoupas e besugos. Os camarões foram mais abundantes nas zonas mais profundas da plataforma, tendo-se destacado *Haliporoides triarthrus, Aristaeomorpha foliacea e Aristeus antennatus*. Estas espécies ocorreram particularmente no talude continental da região sul e zonas profundas da região central. *Plesiopenaeus edwardsianus* e *Penaeopsis balssi* apresentaram uma distribuição de profundidade semelhante, tendo ocorrido em maior abundância no talude continental da costa sul. Todas as espécies de camarão de superfície; *Penaeus indicus, Metapenaeus monoceros, Penaeus semisulcatus, Penaeus monodon, Penaeus japonicus and Penaeus latisulcatus* ocorreram na região central, todavia *Metapenaeus monoceros* foi também capturada na plataforma continental da região sul.

Os registos acústicos revelaram densidades entre baixas a médias relativos aos recursos pelágicos na maior parte da plataforma continental. Apenas foram observados plâncton e peixes mesopelágicos na coluna de água do talude continental ao mar aberto. Foram determinadas estimativas acústicas de biomassa para clupeídeos e um grupo de espécies denominado PEL2 constituído por carangídeos, barracudas, peixe fita e scombrídeos. Foram observadas baixas densidades de clupeídeos a sul de Inhambane e entre Beira e Angoche. Numa área relativamente pequena ao largo da Beira, foram registadas densidades relativamente elevadas de clupeídeos. Não foi observado nenhum registo acústico significativo na costa norte. O grupo de pelágicos PEL2 foi observado na plataforma continental desde a fronteira com a África do Sul até Angoche e numa pequena área a sul de Pemba. Não foram observados registos acústicos dos pelágicos PEL2 na área entre os paralelos 25ºS e 24º15S, mas foram observadas elevadas densidades deste grupo numa pequena área a sul da Beira.

8.3 Estudos específicos

Os estudos específicos focalizaram-se em sete locais com interesse especial, nomeadamente o Parque Nacional das Quirimbas, o Banco de São Lázaro, o Monte marinho Paisley, o Arquipélago das Primeiras e Segundas, a boca do Rio Zambeze, o Parque Nacional do Arquipélago do Bazaruto e o Banco de Almirante Leite. A área do Cabo Inhaca não foi visitada por causa do mau tempo. As metodologias para a abordagem destes estudos contemplavam a amostragem de parâmetros oceanográficos, mapeamento da topografia do fundo, operações de pesca, amostragem de sedimentos e plâncton. Dados sobre a biodiversidade bentónica e composição química de sedimentos bênticos assim como de plâncton não são abordados neste relatório, mas serão analisados à posteriori.

As áreas de estudo podem ser divididas em quatro tipos de acordo com tipo de habitates: o Parque Nacional das Quirimbas, o Banco de São Lázaro e o Arquipélago das Primeiras e Segundas são habitates típicamente de coral com orla coralina mais exposta nas partes de águas pouco profundas e areia e lama dominando as áreas mais abrigadas. As três áreas têm características distintas que são apresentadas separadamente no relatório. Nestas áreas foi muito difícil realizar arrastos demersais, tendo resultado em grande número de redes danificadas. As capturas eram baixas, mas com grande diversidade de espécies e relativamente elevadas capturas de espécies de peixe de grande qualidade. O monte marinho Paisley e o Banco de Almirante Leite são típicos montes marinhos de águas profundas. O fundo desses montes marinhos é constituído de rochas vulcânicas e não é arrastável. Foram observados peixes mesopelágicos em ambos habitates. Específicamente, o Banco Almirante Leite revelou uma topografia submersa com cones vulcânicos claramente subindo mais de 1000m para a superfície a partir do fundo oceânico. A boca do Rio Zambeze é um habitate típico da plataforma com forte influência de água doce. Os peixes pelágicos dominam nesta região e as capturas foram relativamente altas. Os sedimentos eram originários do rio com grande concentração de matéria orgânica. A extremidade Este do Parque Nacional de Bazaruto era dominado por substrato arenoso com pequenas áreas de ervas marinhas. O fundo rochoso exposto pelas correntes de maré suportam um pequeno recife de coral predominantemente constituído por coral mole, com algumas espécies de coral duro no interior do recife.

Annex I Records of fishing station

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 1
DATE :29/09/2007 GEAR TYPE: BT NO: 15 POSITION:Lat S 26°10.53
start stop duration Lon E 34°7.52
TIME :15:15:32 15:49:22 33.8 (min) Purpose : 3
LOG : 5834.01 5835.79 1.8 Region : 7400
FDEPTH: 708 710 Gear cond.: 0
BDEPTH: 708 710 Validity : 0
Towing dir: 0° Wire out : 1550 m Speed : 3.2 kn
Sorted : 55 Total catch: 55.40 Catch/hour: 98.22

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Caelorinchus trunovi	57.36	0	58.40	
Monomitopus sp.	13.30	0	13.54	
Hydrolagus sp.	6.28	18	6.39	
Aristaeomorpha foliacea	2.71	349	2.76	7
Coloconger scholesi	1.91	5	1.95	
Aristeus antennatus	1.74	165	1.77	1
Chaeceon macphersoni	1.72	2	1.75	6
Plesionika martia	1.51	470	1.53	
Argentina sphyraena	1.40	30	1.43	
Setarches guentheri	1.06	4	1.08	
Chaeceon macphersoni	0.99	4	1.01	5
Nettastoma parviceps	0.99	18	1.01	
Hoplostethus cadenati	0.87	7	0.88	
Etmopterus CF brachyurus	0.76	32	0.78	
Dalatias licha *	0.62	2	0.63	
Notacanthus sexspinis	0.60	5	0.61	
Synagrops japonicus	0.57	5	0.58	
Aristaeomorpha foliacea	0.44	39	0.45	8
Sicyonia sp.	0.44	202	0.45	
Ventrifossa sp.	0.35	5	0.36	
Gymnoscopelus sp.	0.32	39	0.32	
Aristeus antennatus	0.30	27	0.31	2
C R A B S	0.28	16	0.29	
Kuronezumia leonis	0.25	4	0.25	
Malacocephalus laevis	0.25	2	0.25	
Todarodes sagittatus	0.25	2	0.25	
GEMPYLIDAE	0.23	2	0.23	
Cranchia scabra	0.18	5	0.18	
MYCTOPHIDAE	0.14	39	0.14	
CONGRIDAE	0.11	2	0.11	
Dicrolene nigricauda	0.07	2	0.07	
Plesiopenaeus edwardsianus	0.06	2	0.06	4
Plesiopenaeus edwardsianus	0.04	2	0.05	3
Polymetme corythaeola	0.04	2	0.04	
Heterocarpus dorsalis	0.04	2	0.04	
Bathypterois phenax	0.03	2	0.03	
Total	98.22		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 2
DATE :30/09/2007 GEAR TYPE: BT NO: 15 POSITION:Lat S 26°13.54
start stop duration Lon E 33°46.42
TIME :03:59:25 04:28:59 29.6 (min) Purpose : 3
LOG : 5874.30 5875.88 1.6 Region : 7400
FDEPTH: 610 618 Gear cond.: 0
BDEPTH: 610 618 Validity : 0
Towing dir: 0° Wire out : 1380 m Speed : 3.2 kn
Sorted : 136 Total catch: 135.71 Catch/hour: 275.36

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Caelorinchus trunovi	241.46	2703	87.69	9
Argentina sphyraena	4.73	79	1.72	
Neoepinnula orientalis	4.57	61	1.66	10
Coloconger scholesi	4.38	24	1.59	
Selachophidium guentheri	3.08	45	1.12	
Raja confundens	2.58	6	0.94	
Malacocephalus laevis	2.52	8	0.91	
Chaeceon macphersoni	2.19	2	0.80	
Merluccius paradoxus	1.79	2	0.65	
Aristaeomorpha foliacea	1.72	213	0.63	12
Dalatias licha *	1.54	4	0.56	
Nettastoma parviceps	1.10	16	0.40	
MYCTOPHIDAE	0.61	41	0.22	
Setarches guentheri	0.49	2	0.18	
Etmopterus sp.	0.41	4	0.15	
Aristaeomorpha foliacea	0.37	30	0.13	13
Hoplostethus cadenati	0.28	4	0.10	
Heterocarpus dorsalis	0.24	6	0.09	
C R A B S	0.22	10	0.08	
Aristeus antennatus	0.16	6	0.06	
Synagrops japonicus	0.12	2	0.04	
Holcomycteronus sp.	0.12	2	0.04	
Plesionika martia	0.12	34	0.04	
Nansenia macrolepis	0.10	2	0.04	
Halieutaea sp.	0.09	2	0.03	
Lepidion natalensis	0.08	4	0.03	
Sicyonia sp.	0.08	26	0.03	
Loligo sp.	0.08	4	0.03	
Cubiceps whitleggi	0.04	4	0.01	
Polymetme corythaeola	0.04	2	0.01	
Todarodes sagittatus	0.02	2	0.01	
Champsodon capensis	0.01	2	0.00	
Polyipnus indicus	0.01	2	0.00	
Total	275.35		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 3
DATE :30/09/2007 GEAR TYPE: BT NO: 15 POSITION:Lat S 26°10.22
start stop duration Lon E 33°17.65
TIME :08:22:28 08:54:03 31.6 (min) Purpose : 3
LOG : 5907.60 5909.18 1.6 Region : 7400
FDEPTH: 509 505 Gear cond.: 0
BDEPTH: 509 505 Validity : 0
Towing dir: 0° Wire out : 1150 m Speed : 3.0 kn
Sorted : 52 Total catch: 51.98 Catch/hour: 98.78

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
MYCTOPHIDAE	19.48	0	19.72	
Octopus sp.	11.92	21	12.06	
Chlorophthalmus agassizi	10.36	144	10.49	14
Merluccius paradoxus	9.31	30	9.43	
Neoscopelus macrolepidotus	8.08	194	8.18	
Caelorinchus trunovi	7.41	120	7.50	15
Plesionika martia	5.06	0	5.12	
Haliporoides triarthrus	4.43	661	4.48	18
Neoepinnula orientalis	3.34	38	3.39	16
Nansenia macrolepis	3.33	74	3.37	
Dalatias licha *	2.00	2	2.02	
Gonorhynchus gonorhynchus	1.79	10	1.81	
Synagrops japonicus	1.75	21	1.77	
MACROURIDAE	1.50	139	1.52	
Cynoglossus cf marleyi	1.48	51	1.50	
Satyrichthys adeni	1.43	61	1.44	
Chascanopsetta lugubris	1.22	29	1.23	
OMMASTREPHIDAE	1.20	6	1.21	
Histioteuthis sp.	0.93	10	0.94	
Sicyonia sp.	0.89	369	0.90	
Haliporoides triarthrus	0.82	76	0.83	17
Rossia sp.	0.70	8	0.71	
Lophiodes mutilus	0.60	2	0.61	
Malacocephalus laevis	0.55	10	0.56	
OPHIDIIDAE	0.34	2	0.35	
Chaunax pictus	0.32	29	0.33	
Psenes whitleggi *	0.29	2	0.29	
GEMPYLIDAE	0.19	11	0.19	
PARALEPIDIDAE	0.17	10	0.17	
Heterocarpus sp.	0.11	10	0.12	
STERNOPTYCHIDAE	0.11	8	0.12	
Sepia sp.	0.10	4	0.10	
Halieutaea fitzsimonsi	0.09	2	0.09	
Total	101.29		102.54	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 4
DATE :30/09/2007 GEAR TYPE: BT NO: 15 POSITION:Lat S 26°10.12
start stop duration Lon E 33°4.90
TIME :11:13:09 11:43:18 30.2 (min) Purpose : 3
LOG : 5925.49 5927.07 1.6 Region : 7400
FDEPTH: 296 299 Gear cond.: 0
BDEPTH: 296 299 Validity : 0
Towing dir: 0° Wire out : 680 m Speed : 3.1 kn
Sorted : 203 Total catch: 203.23 Catch/hour: 404.44

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
MYCTOPHIDAE	87.56	0	21.65	
Nesiarchus nasutus	62.29	0	15.40	20
Argentina sphyraena	27.36	1099	6.77	
Puerulus angulatus	26.87	76	6.64	22
Saurida undosquamis	26.17	109	6.47	19
Synagrops japonicus	22.29	281	5.51	
Satyrichthys adeni	21.39	808	5.29	
Squatina africana	19.60	2	4.85	
Rexea prometheoides	18.81	141	4.65	
Puerulus angulatus	16.82	46	4.16	21
Squalus megalops	14.83	38	3.67	
Priacanthus hamrur	9.25	137	2.29	
OMMASTREPHIDAE	7.46	0	1.85	
Uranoscopus archionema	4.78	40	1.18	
Zeus capensis	4.38	2	1.08	
Trichiurus lepturus	4.28	20	1.06	
Ateleopus natalensis	3.98	52	0.98	
Cynoglosus cf marlei	3.68	259	0.91	
Macrorhamphosus scolopax	2.79	318	0.69	
Chlorophthalmus agassizi	2.69	50	0.66	
Ophisurus serpens	2.69	18	0.66	
Chaunax sp.	2.49	10	0.62	
Citharoides macrolepis	1.99	28	0.49	
Chelidonichthyes capensis	1.89	14	0.47	
Zenopsis conchifer	1.89	2	0.47	
Gonorhynchus gonorhynchus	1.49	24	0.37	
Cubiceps whitleggi	1.39	14	0.34	
Scyllarides elisabethae	0.74	2	0.18	
Ibacus novemdentatus	0.60	2	0.15	
Sepia sp.	0.60	6	0.15	
Antigonia rubescens	0.40	12	0.10	
Umbrina canariensis	0.30	2	0.07	
CRAXX10	0.26	2	0.06	
CONGRIDAE	0.22	4	0.05	
Polymixia berndti	0.14	4	0.03	
Champsodon capensis	0.10	10	0.02	
Eridacnis sinuans	0.00	0	0.00	
Total	404.44		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 5
DATE :30/09/2007 GEAR TYPE: BT NO: 20 POSITION:Lat S 26°10.38
start stop duration Lon E 33°1.91
TIME :12:58:51 13:29:08 30.3 (min) Purpose : 3
LOG : 5934.35 5935.88 1.5 Region : 7400
FDEPTH: 106 108 Gear cond.: 0
BDEPTH: 106 108 Validity : 0
Towing dir: 0° Wire out : 300 m Speed : 3.0 kn
Sorted : 81 Total catch: 81.10 Catch/hour: 160.75

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Ommastrephes bartrami	114.47	4856	71.21	
Chrysoblephus anglicus	26.36	6	16.40	
Fistularia petimba	7.93	67	4.93	
Lophiomus setigerus	3.07	2	1.91	
SQUILLIDAE	2.68	2	1.66	
Platycephalus indicus	1.39	36	0.86	
Parupeneus cinnabarinus *	1.09	16	0.68	
Dactyloptena orientalis	0.89	8	0.55	
Saurida undosquamis	0.79	10	0.49	
Tetrosomus concatenatus	0.40	2	0.25	
Pagellus natalenses	0.30	10	0.18	
Total	159.37		99.14	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 6
DATE :30/09/2007 GEAR TYPE: BT NO: 20 POSITION:Lat S 26°9.43
start stop duration Lon E 32°58.57
TIME :14:25:28 14:43:45 18.3 (min) Purpose : 3
LOG : 5943.21 5944.17 1.0 Region : 7400
FDEPTH: 43 45 Gear cond.: 0
BDEPTH: 43 45 Validity : 0
Towing dir: 0° Wire out : 150 m Speed : 3.2 kn
Sorted : 63 Total catch: 63.49 Catch/hour: 208.28

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Pagellus natalenses	47.73	548	22.92	23
Priacanthus hamrur	23.62	492	11.34	
Diodon sp.	17.71	89	8.51	
Upeneus moluccensis	15.25	279	7.32	
Chrysoblephus anglicus	14.57	0	6.99	24
Pomadasys jubelini	14.27	3	6.85	
Symplectoteuthys oualaniensis	11.45	134	5.50	
Epinephelus andersoni	7.55	3	3.62	
Upeneus vittatus	6.89	276	3.31	
Loligo sp.	6.23	39	2.99	
Parupeneus rubescens	3.61	13	1.73	
Upeneus sp.	2.79	72	1.34	
Siganus sutor	2.69	20	1.29	
Sufflamen chrysopterum	2.30	3	1.10	
Lethrinus nebulosus	2.30	10	1.10	
Pterois miles	1.28	3	0.61	
Parupeneus sp.	1.15	7	0.55	
Chaerodon gymnogenys	0.82	20	0.39	
Parupeneus sp.	0.43	7	0.20	0
Selar crumenophthalmus	0.33	10	0.16	
Chaetodon dolosus	0.33	10	0.16	
Siganus luridus	0.30	13	0.14	
Decapterus russelli	0.16	7	0.08	
Chaetodon kleinii	0.16	3	0.08	
Zanclus cornutus *	0.16	7	0.08	
Total	184.07		88.38	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 7
DATE :01/10/2007 GEAR TYPE: BT NO: 20 POSITION:Lat S 26°30.38
start stop duration Lon E 32°58.35
TIME :03:52:27 04:21:42 29.3 (min) Purpose : 3
LOG : 6000.01 6001.48 1.5 Region : 7400
FDEPTH: 82 81 Gear cond.: 0
BDEPTH: 82 81 Validity : 0
Towing dir: 0° Wire out : 240 m Speed : 3.0 kn
Sorted : 20 Total catch: 20.40 Catch/hour: 41.85

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Torquigener hypselogenion	19.18	62	45.83	
Loligo forbesi	6.52	353	15.59	
Tetrosomus concatenatus	3.75	10	8.97	
Upeneus bensasi	3.14	148	7.50	11
Trachinocephalus myops	2.36	62	5.64	
Dactyloptena peterseni	2.07	2	4.95	
Sepia australis	1.97	4	4.71	
Sepia sp.	0.74	8	1.76	
Saurida undosquamis	0.51	8	1.23	
Upeneus sp.	0.45	8	1.08	
Synodus sp.	0.39	10	0.93	
Parupeneus heptacanthus	0.23	2	0.54	
Chaerodon gymnogenys	0.18	2	0.44	
TRIODONTIDAE	0.14	8	0.34	
Chelidonichthys queketti	0.10	4	0.25	
Pseudorhombus elevatus	0.06	2	0.15	
Crossorhombus valderostratus	0.02	2	0.05	
Total	41.83		99.95	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 8
DATE :01/10/2007 GEAR TYPE: BT NO: 20 POSITION:Lat S 26°30.53
start stop duration Lon E 33°0.01
TIME :05:17:43 05:47:50 30.1 (min) Purpose : 3
LOG : 6006.83 6008.34 1.5 Region : 7400
FDEPTH: 151 155 Gear cond.: 0
BDEPTH: 151 155 Validity : 0
Towing dir: 0° Wire out : 430 m Speed : 3.0 kn
Sorted : 116 Total catch: 116.38 Catch/hour: 231.84

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Thenus orientalis	132.07	1271	56.97	
Carcharhinus sp.	80.98	38	34.93	
Zeus faber	5.56	2	2.40	
Fistularia petimba	5.30	52	2.29	
Dactyloptena peterseni	2.69	56	1.16	
Arothron incognitus	2.06	2	0.89	
Chelidonichthys queketti	1.63	56	0.70	
Cubiceps whitleggi	1.16	18	0.50	
Peristedion weberi	0.28	2	0.12	
Bothus swio	0.06	4	0.03	
Carangoides equula	0.06	4	0.03	
Total	231.84		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 9
DATE :01/10/2007 GEAR TYPE: BT NO: 20 POSITION:Lat S 26°30.47
start stop duration Lon E 33°2.69
TIME :06:53:21 07:23:48 30.4 (min) Purpose : 3
LOG : 6014.64 6016.01 1.4 Region : 7400
FDEPTH: 252 253 Gear cond.: 0
BDEPTH: 252 253 Validity : 0
Towing dir: 0° Wire out : 600 m Speed : 2.7 kn
Sorted : 85 Total catch: 84.98 Catch/hour: 167.50

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Epinephelus chabaudi	34.99	2	20.89	
Priacanthus hamrur	20.99	201	12.53	
Mustelus palumbes	12.71	6	7.59	
Neoscombrops annectens	11.96	150	7.14	29
Squalus megalops	11.18	18	6.67	
Loligo sp.	11.18	221	6.67	
Saurida undosquamis	10.62	67	6.34	
Ariomma indica	9.28	63	5.54	26
Spicara australis	7.08	37	4.22	28
Umbrina canariensis	6.58	53	3.93	27
Macrorhamphosus scolopax	4.18	479	2.49	
Peristedion adeni	3.53	168	2.11	
Antigonia cf rubescens	2.74	51	1.64	
Zeus capensis	2.56	2	1.53	
Chaunax pictus	2.48	6	1.48	
Scorpaena scrofa	2.31	4	1.38	
Trichiurus lepturus	2.21	12	1.32	
Sepia australis	1.93	37	1.15	
Citharoides macrolepis	1.66	43	0.99	
Rexea prometheoides	1.42	14	0.85	
Chelidonichthys queketti	1.36	47	0.81	
Peristedion weberi	1.26	8	0.75	
Argentina sp.	1.08	73	0.65	
Gonorhynchus gonorhynchus	0.85	12	0.51	
Paracitharus macrolepis	0.39	12	0.24	
Bothus swio	0.37	12	0.22	0
Synagrops japonicus	0.28	16	0.16	
Chelidonichthys kumu	0.20	2	0.12	
Hoplichthys acanthopleurus	0.12	6	0.07	
Total	167.50		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 10
DATE :01/10/2007 GEAR TYPE: BT NO: 15 POSITION:Lat S 26°34.00
start stop duration Lon E 33°36.61
TIME :13:35:25 14:05:29 30.1 (min) Purpose : 3
LOG : 6060.88 6062.45 1.6 Region : 7400
FDEPTH: 684 681 Gear cond.: 0
BDEPTH: 684 681 Validity : 0
Towing dir: 0° Wire out : 1590 m Speed : 3.1 kn
Sorted : 115 Total catch: 115.02 Catch/hour: 229.66

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Caelorinchus trunovi	112.51	1462	48.99	30
Aristaeomorpha foliacea	22.22	1691	9.68	36
Selachophidium guentheri	18.57	116	8.09	
Symplectoteuthys oualaniensis	13.74	16	5.98	
Hydrolagus sp.	9.38	30	4.09	
Coloconger scholesi	8.87	24	3.86	
Merluccius paradoxus	8.59	6	3.74	
Aristaeomorpha foliacea	7.63	597	3.32	35
Xenodermichthys copei	4.29	80	1.87	
Ommastrephes bartrami	3.93	6	1.71	
Cruriraja parcomaculata	3.45	6	1.50	
Plesionika martia	2.84	403	1.23	
Octopus sp.	2.10	2	0.91	
Etmopterus lucifer	1.96	34	0.85	
C R A B S	1.80	110	0.78	
Aristeus antennatus	1.66	136	0.72	34
CONGRIDAE	1.64	14	0.71	
Synagrops japonicus	1.00	8	0.43	
Raja stenorhyncus	0.92	2	0.40	
Plesiopenaeus edwardsianus	0.46	66	0.20	32
Aristeus antennatus	0.40	54	0.17	33
Argentina woodmasoni	0.36	144	0.16	
Heterocarpus dorsalis	0.36	14	0.16	
Nettastoma parviceps	0.32	2	0.14	
Plesiopenaeus edwardsianus	0.32	30	0.14	31
Sicyonia sp.	0.30	122	0.13	
Total	229.60		99.97	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 11
DATE :02/10/2007 GEAR TYPE: BT NO: 15 POSITION:Lat S 26°50.48
start stop duration Lon E 33°8.32
TIME :04:02:13 04:34:32 32.3 (min) Purpose : 3
LOG : 6183.44 6185.21 1.8 Region : 7400
FDEPTH: 672 678 Gear cond.: 0
BDEPTH: 672 678 Validity : 0
Towing dir: 0° Wire out : 1580 m Speed : 3.3 kn
Sorted : 208 Total catch: 208.31 Catch/hour: 386.72

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Unid. stingray	185.64	2	48.00	
Caelorinchus trunovi	50.59	652	13.08	42
Ateleopus natalensis	38.61	7	9.98	
Histioteuthis dofleini	26.36	19	6.82	
Centrophorus granulosus	21.16	4	5.47	
Coloconger scholesi	16.43	74	4.25	
Selachophidium guentheri	10.12	136	2.62	37
Etmopterus lucifer	5.11	58	1.32	
Malacocephalus laevis	4.46	0	1.15	
Avocettina acuticeps	3.79	13	0.98	
Aristeus antennatus	3.30	219	0.85	39
Ommastrephes bartrami	3.25	7	0.84	
Hydrolagus sp.	2.32	7	0.60	
Argentina sphyraena	1.71	26	0.44	
Sicyonia sp.	1.52	108	0.39	
Loligo sp.	1.23	2	0.32	
Chaunax pictus	1.11	4	0.29	
Helicolenus dactylopterus	1.04	2	0.27	
Merluccius paradoxus	0.98	2	0.25	
Hoplobrotula gnathopus	0.95	2	0.25	
Gonorhynchus gonorhynchus	0.80	2	0.21	
Plesionika martia	0.78	152	0.20	
Synagrops japonicus	0.65	6	0.17	
Aristeus antennatus	0.65	65	0.17	38
Hydrolagus sp.	0.57	2	0.15	0
Nettastoma parviceps	0.50	7	0.13	
OPHIDIIDAE	0.46	2	0.12	
Heterocarpus tricarinatus	0.41	15	0.11	
Aristaeomorpha foliacea	0.33	37	0.09	
Diaphus elucens	0.32	32	0.08	
Shrimps, small, non comm.	0.30	26	0.08	
Synaphobranchus affinis	0.29	6	0.08	
Plesiopenaeus edwardsianus	0.24	6	0.06	41
Physiculus natalensis	0.21	2	0.05	
Haliporoides triarthrus	0.19	22	0.05	40
Oreosoma atlanticum	0.10	2	0.03	
Xenodermichthys copei	0.07	6	0.02	
Cruriraja parcomaculata	0.04	4	0.01	
Shrimps, small, non comm.	0.04	6	0.01	0
C R A B S	0.02	4	0.00	
Total	386.65		99.98	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 12
DATE :02/10/2007 GEAR TYPE: BT NO: 15 POSITION:Lat S 26°50.31
start stop duration Lon E 33°6.77
TIME :07:07:47 07:37:57 30.2 (min) Purpose : 3
LOG : 6198.63 6200.03 1.4 Region : 7400
FDEPTH: 606 612 Gear cond.: 0
BDEPTH: 606 612 Validity : 0
Towing dir: 0° Wire out : 1500 m Speed : 2.8 kn
Sorted : 28 Total catch: 28.25 Catch/hour: 56.18

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Caelorinchus trunovi	24.46	957	43.54	43
Malacocephalus laevis	5.31	14	9.45	
Selachophidium guentheri	4.71	70	8.39	44
Merluccius paradoxus	3.44	8	6.12	
Aristeus antennatus	3.00	50	5.35	46
Gonorhynchus gonorhynchus	1.87	8	3.33	
UNIDENTIFIED FISH	1.81	66	3.22	
Etmopterus CF brachyurus	1.69	42	3.01	
Symplectoteuthys oualaniensis	1.53	2	2.73	
Synagrops japonicus	1.33	10	2.37	
Nettastoma parviceps	1.23	8	2.19	
Sicyonia sp.	0.95	169	1.70	
Nansenia macrolepis	0.84	16	1.49	
Sepia australis	0.76	8	1.35	
Holohalaelurus regani	0.64	2	1.13	
Ruvettus pretiosus	0.54	2	0.96	
Haliporoides triarthrus	0.52	20	0.92	48
Gymnoscopelus sp.	0.42	50	0.74	
Aristeus antennatus	0.42	20	0.74	45
Oreosoma atlanticum	0.20	4	0.35	
Plesionika martia	0.18	52	0.32	
Heterocarpus tricarinatus	0.12	8	0.21	
Aristaeomorpha foliacea	0.08	8	0.14	49
Haliporoides triarthrus	0.08	4	0.14	47
Palinurus delagoae	0.04	2	0.06	
Chascanopsetta sp.	0.02	4	0.04	
Total	56.18		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 13
DATE :02/10/2007 GEAR TYPE: BT NO: 15 POSITION:Lat S 26°48.07
start stop duration Lon E 33°6.62
TIME :09:58:08 10:08:06 9.9 (min) Purpose : 3
LOG : 6212.80 6213.32 0.5 Region : 7400
FDEPTH: 551 548 Gear cond.: 0
BDEPTH: 551 548 Validity : 0
Towing dir: 0° Wire out : 1240 m Speed : 3.1 kn
Sorted : 52 Total catch: 52.02 Catch/hour: 313.69

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Unid. stingray	180.90	6	57.67	
Heptranchias perlo	28.94	12	9.23	
Gymnoscopelus sp.	26.35	1381	8.40	
Centrophorus moluccensis	23.22	12	7.40	
Malacocephalus laevis	10.55	193	3.36	
GALATHEIDAE	8.14	507	2.60	
Caelorinchus trunovi	8.14	223	2.60	
Synagrops japonicus	6.03	48	1.92	
Helicolenus dactylopterus	4.22	12	1.35	
Euprotomicrus bispinatus	2.71	60	0.87	
Sepia sp.	2.29	30	0.73	
Loligo sp.	2.17	12	0.69	
Cubiceps whitleggi	1.81	6	0.58	
Haliporoides triarthrus	1.33	175	0.42	
Aristeus antennatus	0.96	24	0.31	
Gonorhynchus gonorhynchus	0.90	6	0.29	
Polymetme corythaeola	0.90	6	0.29	
Polymixia berndti	0.72	6	0.23	
PORTUNIDAE	0.66	36	0.21	
Chaunax pictus	0.54	30	0.17	
BELONIDAE	0.42	30	0.13	
Sicyonia sp.	0.42	96	0.13	
Plesionika martia	0.36	109	0.12	
Lophiomus sp.	0.30	6	0.10	
Synaphobranchus affinis	0.30	6	0.10	
ARGENTINIDAE	0.24	6	0.08	
PARALEPIDIDAE	0.12	6	0.04	
Total	313.69		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 14
DATE :02/10/2007 GEAR TYPE: BT NO: 20 POSITION:Lat S 26°47.01
start stop duration Lon E 33°1.75
TIME :11:41:27 12:10:49 29.4 (min) Purpose : 3
LOG : 6223.74 6225.28 1.5 Region : 7400
FDEPTH: 269 268 Gear cond.: 0
BDEPTH: 269 268 Validity : 0
Towing dir: 0° Wire out : 650 m Speed : 3.1 kn
Sorted : 175 Total catch: 482.92 Catch/hour: 986.55

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Rexea prometheoides	711.60	6876	72.13	
Polymixia berndti	79.53	1826	8.06	51
Epinephelus chabaudi	31.66	2	3.21	50
Squalus megalops	27.17	61	2.75	
Saurida undosquamis	18.89	55	1.92	
Zeus capensis	16.14	6	1.64	
Chaunax pictus	15.14	35	1.53	
Ommastrephes bartrami	12.36	229	1.25	
Ariomma indica	11.81	76	1.20	
Cubiceps sp.	11.18	76	1.13	
Polysteganus coeruleopunctatus	7.35	6	0.75	
Scyllarides elisabethae	7.29	20	0.74	
Spicara australis	6.03	45	0.61	
PORTUNIDAE	4.51	41	0.46	
Palinurus delagoae	3.25	4	0.33	52
Glossanodon sp.	2.57	215	0.26	
Zenopsis conchifer	2.43	4	0.25	
Macrorhamphosus scolopax	2.29	347	0.23	
Histiopterus typus	2.22	20	0.23	
Ophisurus serpens	2.12	2	0.22	
Peristedion adeni	1.81	29	0.18	
Antigonia cf rubescens	1.59	25	0.16	
Puerulus angulatus	1.37	8	0.14	53
Synagrops japonicus	1.32	35	0.13	
Uranoscopus archionema	1.02	4	0.10	
Heptranchias perlo	0.82	2	0.08	
Cynoglossus acaudatus	0.69	14	0.07	
Sphyraena chrysotaenia	0.55	6	0.06	
Priacanthus hamrur	0.53	4	0.05	
Selachophidium guentheri	0.49	6	0.05	
Pseudorhombus natalensis	0.37	6	0.04	
Cynoglossus attenuatus	0.31	6	0.03	
Loligo sp.	0.11	6	0.01	
Total	986.55		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 15
DATE :02/10/2007 GEAR TYPE: BT NO: 20 POSITION:Lat S 26°50.09
start stop duration Lon E 32°56.13
TIME :13:57:40 14:22:15 24.6 (min) Purpose : 3
LOG : 6236.95 6238.19 1.2 Region : 7400
FDEPTH: 56 56 Gear cond.: 0
BDEPTH: 56 56 Validity : 0
Towing dir: 0° Wire out : 170 m Speed : 3.0 kn
Sorted : 246 Total catch: 246.24 Catch/hour: 600.83

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Diodon holocanthus	160.19	800	26.66	
Chrysoblephus anglicus	111.26	34	18.52	55
Lethrinus crocineus	95.77	46	15.94	54
Lutjanus sebae	41.90	7	6.97	58
Epinephelus flavocaeruleus	29.28	2	4.87	60
Sepia sp.	25.13	46	4.18	
Aprion virescens	21.96	2	3.65	59
Abalistes stellatus	21.59	20	3.59	
Lactoria sp.	18.79	44	3.13	
Lutjanus sanguineus	18.37	2	3.06	57
Lethrinus nebulosus	16.45	5	2.74	56
Carcharhinus sealei	9.52	2	1.58	
Plectorhynchus griseus	8.71	2	1.45	61
Tetrosomus concatenatus	6.34	10	1.06	
Arothron hispidus	5.93	5	0.99	
Arothron stellatus	4.76	2	0.79	
Squalus acanthias	1.95	2	0.32	
Parupeneus cinnabarinus *	1.46	2	0.24	
Ostracion cubicus	1.46	2	0.24	
Total	600.83		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 16
DATE :03/10/2007 GEAR TYPE: BT NO: 20 POSITION:Lat S 25°50.79
start stop duration Lon E 33°2.83
TIME :03:37:12 04:07:53 30.7 (min) Purpose : 3
LOG : 6332.55 6334.04 1.5 Region : 7400
FDEPTH: 54 58 Gear cond.: 0
BDEPTH: 54 58 Validity : 0
Towing dir: 0° Wire out : 150 m Speed : 2.9 kn
Sorted : 137 Total catch: 137.15 Catch/hour: 268.31

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Decapterus macrosoma	76.30	1571	28.44	63
Pagellus natalenses	71.99	1387	26.83	62
Leiognathus elongatus	58.20	4818	21.69	
Rhizoprionodon acutus	25.82	10	9.62	
Rhinobatos annulatus	8.12	2	3.03	
Loligo vulgaris	6.85	192	2.55	
Sepia officinalis hierredda	6.55	16	2.44	
Lethrinus crocineus	3.52	2	1.31	
Nemipterus bipunctatus	3.05	14	1.14	
Siganus luridus	2.25	2	0.84	
Fistularia petimba	1.78	39	0.66	
Diodon holocanthus	1.60	10	0.60	
Trachinocephalus myops	0.92	20	0.34	
Saurida undosquamis	0.70	6	0.26	
Upeneus bensasi	0.43	18	0.16	
Bothus myriaster	0.14	2	0.05	
Teixeirichthys jordani	0.10	6	0.04	
Total	268.33		100.01	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 17
DATE :03/10/2007 GEAR TYPE: BT NO: 15 POSITION:Lat S 25°51.55
start stop duration Lon E 33°17.25
TIME :06:11:37 06:42:08 30.5 (min) Purpose : 3
LOG : 6350.91 6352.45 1.6 Region : 7400
FDEPTH: 511 509 Gear cond.: 0
BDEPTH: 511 509 Validity : 0
Towing dir: 0° Wire out : 1180 m Speed : 3.0 kn
Sorted : 78 Total catch: 78.29 Catch/hour: 154.01

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Diaphus elucens	43.77	9197	28.42	
Chaunax pictus	23.21	822	15.07	
Nansenia macrolepis	17.11	431	11.11	
Neoepinnula orientalis	16.64	279	10.81	65
Synagrops japonicus	7.44	191	4.83	66
Cubiceps whitleggi	6.67	90	4.33	64
Loligo forbesi	5.47	31	3.55	
Haliporoides triarthrus	5.33	230	3.46	68
Stemonosudis macrurus	5.10	321	3.31	
Octopus sp.	3.99	16	2.59	
Merluccius paradoxus	3.19	10	2.07	
Ateleopus natalensis	2.75	2	1.79	
Haliporoides triarthrus	2.52	138	1.63	67
Chlorophthalmus agassizi	1.97	35	1.28	
Plesionika martia	1.59	0	1.03	
GALATHEIDAE	1.48	224	0.96	
Heterocarpus tricarinatus	1.24	55	0.80	
Nezumia micronychodon	0.73	31	0.47	
Ophichthus sp.	0.67	6	0.43	
Helicolenus dactylopterus	0.65	2	0.42	
Metanephrops andamanicus	0.63	24	0.41	69
Caelorinchus trunovi	0.63	10	0.41	
Sicyonia sp.	0.47	132	0.31	
Malacocephalus laevis	0.43	10	0.28	
Yarrella corythaeola	0.33	16	0.22	
Total	154.01		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 18
DATE :03/10/2007 GEAR TYPE: BT NO: 20 POSITION:Lat S 25°52.26
start stop duration Lon E 33°32.17
TIME :09:10:18 09:41:07 30.8 (min) Purpose : 3
LOG : 6371.10 6372.73 1.6 Region : 7400
FDEPTH: 489 482 Gear cond.: 0
BDEPTH: 489 482 Validity : 0
Towing dir: 0° Wire out : 1100 m Speed : 3.2 kn
Sorted : 144 Total catch: 144.13 Catch/hour: 280.59

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Bolanichthys indicus	125.37	31273	44.68	
Chaunax pictus	33.10	292	11.79	
Neoepinnula orientalis	19.86	424	7.08	73
Cubiceps whitleggi	16.26	308	5.79	70
Ommastrephes bartrami	14.89	152	5.31	
Octopus sp.	13.47	35	4.80	
Haliporoides triarthrus	9.97	442	3.55	72
Caelorinchus trunovi	7.01	64	2.50	
Nansenia macrolepis	6.62	152	2.36	
Synagrops japonicus	5.26	119	1.87	
Malacocephalus laevis	4.87	99	1.73	
Haliporoides triarthrus	4.81	263	1.71	71
Merluccius paradoxus	3.31	6	1.18	
Chaeceon macphersoni	1.95	4	0.69	
Ruvettus pretiosus	1.95	6	0.69	
Histioteuthis dofleini	1.77	21	0.63	
GALATHEIDAE	1.46	214	0.52	
Benthodesmus elongatus	1.46	21	0.52	
Chlorophthalmus agassizi	1.27	25	0.45	74
Helicolenus dactylopterus	1.27	4	0.45	
Lestrolepis intermedia	0.97	21	0.35	
Sepia sp.	0.90	21	0.32	
Neoscombrops annectens	0.88	19	0.31	
Champsodon capensis	0.60	31	0.22	
Sicyonia sp.	0.49	113	0.17	
Gonorhynchus gonorhynchus	0.43	4	0.15	
Hoplostethus mediterraneus	0.43	16	0.15	
Total	280.59		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 19
DATE :03/10/2007 GEAR TYPE: BT NO: 20 POSITION:Lat S 25°51.31
start stop duration Lon E 33°45.00
TIME :11:37:14 12:07:41 30.5 (min) Purpose : 3
LOG : 6383.94 6385.42 1.5 Region : 7400
FDEPTH: 460 460 Gear cond.: 0
BDEPTH: 460 460 Validity : 0
Towing dir: 0° Wire out : 1090 m Speed : 2.9 kn
Sorted : 213 Total catch: 532.95 Catch/hour: 1050.15

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Champsodon capensis	373.89	37316	35.60	83
Cubiceps whitleggi	334.24	18065	31.83	84
MYCTOPHIDAE	115.27	24118	10.98	75
Sepia sp.	68.47	804	6.52	
Dasyatis brevicaudata	29.56	6	2.81	
Chlorophthalmus agassizi	26.40	361	2.51	77
Neoepinnula orientalis	21.43	814	2.04	76
Haliporoides triarthrus	11.03	729	1.05	78
Chaunax pictus	10.54	404	1.00	
Neoscombrops annectens	9.06	203	0.86	
Synagrops japonicus	8.03	252	0.76	
Merluccius paradoxus	5.37	16	0.51	
Octopus sp.	4.14	10	0.39	
Metanephrops andamanicus	4.06	18	0.39	80
Caelorinchus trunovi	3.69	35	0.35	
Chaeceon macphersoni	2.96	4	0.28	82
Haliporoides triarthrus	2.46	173	0.23	79
Ruvettus pretiosus	1.82	6	0.17	
Malacocephalus laevis	1.82	39	0.17	
GALATHEIDAE *	1.28	138	0.12	
Brama orcini	1.23	26	0.12	
Gonorhynchus gonorhynchus	0.99	6	0.09	
Chaeceon macphersoni	0.47	2	0.05	81
Symphurus ocellatus	0.30	20	0.03	
Xenolepidichthys dagleishi	0.20	6	0.02	
Hoplostethus mediterraneus	0.10	6	0.01	
Callionymus marleyi	0.05	6	0.00	
Heterocarpus tricarinatus	0.05	10	0.00	
Total	1038.92		98.93	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 20
DATE :03/10/2007 GEAR TYPE: BT NO: 20 POSITION:Lat S 25°52.14
start stop duration Lon E 33°59.19
TIME :14:27:29 14:59:18 31.8 (min) Purpose : 3
LOG : 6400.00 6401.68 1.7 Region : 7400
FDEPTH: 458 458 Gear cond.: 0
BDEPTH: 458 458 Validity : 0
Towing dir: 0° Wire out : 1100 m Speed : 3.2 kn
Sorted : 263 Total catch: 262.75 Catch/hour: 495.44

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Psenes whitleggi *	217.90	4935	43.98	85
Champsodon capensis	95.22	8938	19.22	
Chlorophthalmus agassizi	31.58	424	6.37	86
Bolanichthys indicus	25.55	6353	5.16	
Chaunax pictus	20.36	0	4.11	
Neoepinnula orientalis	19.42	539	3.92	93
Ommastrephes bartrami	15.97	113	3.22	
Haliporoides triarthrus	13.29	860	2.68	87
Synagrops japonicus	11.13	371	2.25	94
Haliporoides triarthrus	9.39	692	1.90	88
OCTOPODIDAE	8.84	21	1.78	
Nansenia macrolepis	7.09	213	1.43	
GALATHEIDAE *	2.94	283	0.59	
Torpedo nobiliana	2.75	2	0.56	
Ruvettus pretiosus	2.11	6	0.43	
Caelorinchus trunovi	1.53	26	0.31	
Merluccius paradoxus	1.51	4	0.30	
Plesionika martia	1.41	383	0.29	
Malacocephalus laevis	1.38	32	0.28	
Chaeceon macphersoni	1.24	2	0.25	91
Yarella corythaeola *	0.98	74	0.20	
Benthodesmus elongatus	0.75	13	0.15	
Chaeceon macphersoni	0.66	2	0.13	92
Xenolepidichthys dagleishi	0.60	15	0.12	
Gonorhynchus gonorhynchus	0.47	6	0.10	
Metanephrops andamanicus	0.47	8	0.10	90
Chascanopsetta lugubris	0.36	2	0.07	
Stemonosudis macrurus	0.32	19	0.06	
Metanephrops andamanicus	0.19	2	0.04	89
Total	495.44		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 21
DATE :04/10/2007 GEAR TYPE: BT NO: 20 POSITION:Lat S 25°52.53
start stop duration Lon E 34°28.57
TIME :03:49:16 04:20:53 31.6 (min) Purpose : 3
LOG : 6450.33 6451.93 1.6 Region : 7400
FDEPTH: 449 454 Gear cond.: 0
BDEPTH: 449 454 Validity : 0
Towing dir: 0° Wire out : 1080 m Speed : 3.0 kn
Sorted : 69 Total catch: 68.83 Catch/hour: 130.60

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Chlorophthalmus agassizi	33.59	520	25.72	101
Haliporoides triarthrus	17.02	708	13.03	96
Chaunax pictus	15.28	751	11.70	
Haliporoides triarthrus	13.15	710	10.07	95
Diaphus elucens	13.09	3046	10.03	
Bolanichthys indicus	8.82	393	6.76	
Histioteuthis dofleini	2.98	30	2.28	
Aristaeomorpha foliacea	2.71	144	2.08	97
Plesionika martia	2.62	116	2.01	
Psenes whitleggi *	2.56	38	1.96	
Champsodon capensis	2.14	199	1.64	
Squalus megalops	1.78	2	1.37	
Polyipnus spinosus	1.44	400	1.10	
Neoscombrops annectens	1.42	13	1.09	
Loligo sp.	1.31	23	1.00	
Merluccius paradoxus	1.27	2	0.97	
Neoepinnula orientalis	1.20	15	0.92	
Helicolenus dactylopterus	1.20	15	0.92	
Synagrops sp.	1.08	23	0.83	
Sepia sp.	0.80	15	0.61	
Metanephrops andamanicus	0.68	9	0.52	99
Aristaeomorpha foliacea	0.57	53	0.44	98
ISOPODS	0.47	55	0.36	
Caelorinchus trunovi	0.47	25	0.36	
Lophiodes insidiator	0.46	2	0.35	
Synagrops japonicus	0.40	8	0.31	
Yarrella sp.	0.36	15	0.28	
Ateleopus natalensis	0.28	2	0.22	
Nansenia macrolepis	0.27	11	0.20	
Chascanopsetta lugubris	0.25	6	0.19	
Pliotrema warreni	0.21	11	0.16	
Gonorhynchus gonorhynchus	0.19	2	0.15	
Stereomastis sp.	0.17	4	0.13	
MACROURIDAE	0.13	4	0.10	
Selachophidium guentheri	0.09	2	0.07	
Metanephrops andamanicus	0.08	2	0.06	100
Satyrichthys adeni	0.08	4	0.06	
Zenion hololepis	0.01	2	0.01	
Total	130.64		100.03	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 22
DATE :04/10/2007 GEAR TYPE: BT NO: 20 POSITION:Lat S 25°52.92
start stop duration Lon E 34°42.65
TIME :06:36:12 07:07:06 30.9 (min) Purpose : 3
LOG : 6467.95 6469.87 1.9 Region : 7400
FDEPTH: 557 564 Gear cond.: 0
BDEPTH: 557 564 Validity : 0
Towing dir: 0° Wire out : 1250 m Speed : 3.7 kn
Sorted : 49 Total catch: 48.57 Catch/hour: 94.34

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Selachophidium guentheri	41.28	645	43.75	
Plesionika martia	10.22	1966	10.83	
Caelorinchus trunovi	7.58	260	8.03	
Chaeceon macphersoni	4.66	6	4.94	104
Benthodesmus elongatus	3.73	62	3.95	
Polyipnus spinosus	3.17	633	3.36	
Squalus megalops	2.35	2	2.49	
Bolanichthys indicus	2.25	115	2.39	
Aristaeomorpha foliacea	1.94	87	2.06	107
Haliporoides triarthrus	1.90	93	2.02	102
Polymetme corythaeola	1.38	49	1.46	
Pliotrema warreni	1.15	6	1.21	
Neoscombrops annectens	1.09	10	1.15	
Merluccius paradoxus	1.01	2	1.07	
Chlorophthalmus agassizi	0.99	47	1.05	
Histioteuthis dofleini	0.97	31	1.03	
Plesionika sp.	0.84	344	0.89	
LITHODIDAE	0.82	31	0.86	
Sicyonia sp.	0.72	324	0.76	
Etmopterus lucifer	0.66	39	0.70	
Ateleopus natalensis	0.60	2	0.64	
ISOPODS	0.58	45	0.62	
Aristaeomorpha foliacea	0.56	43	0.60	108
Ommastrephes bartrami	0.43	14	0.45	
Malacocephalus laevis	0.41	10	0.43	
Haliporoides triarthrus	0.41	29	0.43	103
Loligo sp.	0.41	6	0.43	
Diaphus elucens	0.33	70	0.35	
Physiculus natalensis	0.31	2	0.33	
Heterocarpus tricarinatus	0.31	23	0.33	
Synagrops japonicus	0.23	2	0.25	
Malacocephalus sp.	0.21	23	0.23	
Gonorhynchus gonorhynchus	0.19	2	0.21	
POLYCHAELIDAE	0.16	10	0.16	
Aristeus antennatus	0.14	12	0.14	106
Ophichthus sp.	0.12	2	0.12	
Aristeus antennatus	0.12	8	0.12	105
Nettastoma parviceps	0.08	2	0.08	
Myxine capensis	0.06	2	0.06	
Total	94.34		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 23
DATE :04/10/2007 GEAR TYPE: BT NO: 20 POSITION:Lat S 25°36.58
start stop duration Lon E 34°54.09
TIME :10:59:51 11:25:51 26.0 (min) Purpose : 3
LOG : 6499.32 6500.67 1.4 Region : 7400
FDEPTH: 311 310 Gear cond.: 0
BDEPTH: 311 310 Validity : 0
Towing dir: 0° Wire out : 750 m Speed : 3.1 kn
Sorted : 47 Total catch: 47.10 Catch/hour: 108.73

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Diaphus elucens	23.22	6896	21.36	
Satyrichthys adeni	17.08	62	15.71	
Saurida undosquamis	10.00	44	9.19	109
PORTUNIDAE	8.93	44	8.22	
Cubiceps whitleggi	8.08	99	7.43	111
Neoscombrops annectens	7.85	192	7.22	
Lestrolepis intermedia	4.69	279	4.31	
Symplectoteuthis sp.	4.52	72	4.16	
Uranoscopus archionema	4.29	18	3.95	
Ateleopus natalensis	3.00	42	2.76	
Squatina africana	2.68	7	2.46	
Penaeopsis balssi	2.38	208	2.19	
Squalus megalops	2.15	2	1.97	
Neoepinnula orientalis	1.50	21	1.38	110
Palinurus delagoae	1.39	2	1.27	
Priacanthus hamrur	1.39	21	1.27	
Sphoeroides pachgaster	0.78	2	0.72	
Pliotrema warreni	0.72	2	0.66	
Trichiurus lepturus	0.69	7	0.64	
Chascanopsetta lugubris	0.60	7	0.55	
Cynoglosus cf marlei	0.58	7	0.53	
Zenopsis conchifer	0.51	2	0.47	
Cynoglossus capensis	0.35	16	0.32	
Halieutaea fitzsimonsi	0.25	2	0.23	
Chelidonichthys capensis	0.25	5	0.23	
Macrorhamphosus scolopax	0.21	18	0.19	
Gonorhynchus gonorhynchus	0.18	2	0.17	
Sepia sp.	0.16	5	0.15	
LITHODIDAE	0.14	7	0.13	
Plesionika sp.	0.09	32	0.08	
Heterocarpus woodmasoni	0.05	5	0.04	
Sicyonia sp.	0.02	5	0.02	
Total	108.73		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 24
DATE :04/10/2007 GEAR TYPE: BT NO: 20 POSITION:Lat S 25°34.75
start stop duration Lon E 34°37.75
TIME :14:06:56 14:36:59 30.1 (min) Purpose : 3
LOG : 6518.96 6520.56 1.6 Region : 7400
FDEPTH: 316 316 Gear cond.: 0
BDEPTH: 316 316 Validity : 0
Towing dir: 0° Wire out : 780 m Speed : 3.2 kn
Sorted : 217 Total catch: 216.56 Catch/hour: 432.40

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Squalus megalops	144.50	341	33.42	
Champsodon capensis	95.58	7010	22.10	
Bolanichthys indicus	79.57	20460	18.40	
Neoscombrops annectens	19.57	409	4.53	
Squatina africana	17.07	34	3.95	
Ommastrephes bartrami	14.38	214	3.32	
Lestrolepis intermedia	8.61	565	1.99	
Halaelurus lutarius	8.49	86	1.96	
Torpedo nobiliana	8.13	4	1.88	
Saurida undosquamis	5.73	18	1.33	
Citharoides macrolepis	3.79	26	0.88	
Parapandalus sp.	3.51	74	0.81	
Chlorophthalmus agassizi	3.25	52	0.75	
Cubiceps whitleggi	2.58	98	0.60	112
PANDALIDAE	2.50	34	0.58	
Argentina sp.	1.84	72	0.42	
Chelidonichthyes capensis	1.70	52	0.39	
Palinurus delagoae	1.62	4	0.37	
Neoepinnula orientalis	1.60	44	0.37	
Chaunax pictus	1.56	22	0.36	
Ateleopus natalensis	1.36	14	0.31	
Antigonia rubescens	1.28	40	0.30	
PORTUNIDAE	1.22	4	0.28	
Eridacnis sinuans	1.00	4	0.23	
Trichiurus lepturus	0.90	4	0.21	
Ophisurus serpens	0.72	2	0.17	
Bathyuroconger vicinus	0.38	10	0.09	
Total	432.40		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 25
DATE :05/10/2007 GEAR TYPE: BT NO: 20 POSITION:Lat S 25°37.74
start stop duration Lon E 34°19.64
TIME :03:35:33 04:05:22 29.8 (min) Purpose : 3
LOG : 6558.62 6560.02 1.4 Region : 7400
FDEPTH: 382 381 Gear cond.: 0
BDEPTH: 382 381 Validity : 0
Towing dir: 0° Wire out : 950 m Speed : 2.8 kn
Sorted : 366 Total catch: 366.31 Catch/hour: 737.05

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Cubiceps whitleggi	527.97	8344	71.63	113
Diaphus effulgens	93.34	24473	12.66	
Champsodon capensis	27.67	2167	3.75	
Chaunax pictus	17.00	290	2.31	
Bolanichthys indicus	15.45	684	2.10	
Neoepinnula orientalis	9.68	306	1.31	114
Loligo vulgaris	9.68	103	1.31	
Halaelurus lutarius	4.33	76	0.59	
Zeus faber	4.23	2	0.57	
Lepidotrigla multispinosus	3.72	101	0.51	
Octopus sp.	3.66	28	0.50	
C R A B S	3.56	12	0.48	
POLYCHAELIDAE	2.60	191	0.35	
C R A B S	1.97	8	0.27	0
Neoscombrops annectens	1.79	50	0.24	115
Plesionika martia	1.13	433	0.15	
Metanephrops andamanicus	1.01	20	0.14	118
Lophiodes insidiator	1.01	2	0.14	
Cynoglossus capensis	0.97	70	0.13	
Penaeopsis balssi	0.97	50	0.13	119
Synagrops japonicus	0.91	32	0.12	116
Squalus megalops	0.85	2	0.11	
Metanephrops andamanicus	0.80	8	0.11	117
Priacanthus hamrur	0.70	12	0.10	
Hydrolagus sp.	0.40	2	0.05	
Caelorinchus trunovi	0.30	8	0.04	
Penaeopsis balssi	0.30	22	0.04	120
Benthodesmus elongatus	0.28	10	0.04	
Synchiropus monacanthus	0.22	12	0.03	
Argentina sp.	0.20	8	0.03	
Chlorophthalmus agassizi	0.12	10	0.02	
Polymetme corythaeola	0.12	4	0.02	
Unidentified fish	0.10	6	0.01	
Haliporoides triarthrus	0.02	4	0.00	
Total	737.05		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 26
DATE :05/10/2007 GEAR TYPE: BT NO: 20 POSITION:Lat S 25°34.89
start stop duration Lon E 34°4.99
TIME :06:25:58 06:55:59 30.0 (min) Purpose : 3
LOG : 6578.46 6580.08 1.6 Region : 7400
FDEPTH: 401 403 Gear cond.: 0
BDEPTH: 401 403 Validity : 0
Towing dir: 0° Wire out : 950 m Speed : 3.2 kn
Sorted : 159 Total catch: 306.09 Catch/hour: 611.76

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Urotrygon daviesi	299.80	2	49.01	
Cubiceps whitleggi	116.52	1727	19.05	121
Diaphus effulgens	100.53	36152	16.43	
Stereomastis sp.	16.39	1267	2.68	
Champsodon capensis	14.79	849	2.42	
Bolanichthys indicus	9.61	308	1.57	
Neoepinnula orientalis	8.03	218	1.31	122
Malacocephalus laevis	6.70	162	1.09	
Loligo vulgaris	6.62	72	1.08	
Chlorophthalmus agassizi	5.42	192	0.89	
Metanephrops andamanicus	3.38	34	0.55	128
Haliporoides triarthrus	3.26	344	0.53	125
Metanephrops andamanicus	2.78	28	0.45	127
Haliporoides triarthrus	2.32	322	0.38	126
Plesionika martia	2.24	744	0.37	
Synagrops japonicus	1.84	56	0.30	
Octopus sp.	1.80	4	0.29	
Chaeceon macphersoni	1.66	2	0.27	124
C E P H A L O P O D A	1.08	10	0.18	
CARANGIDAE	1.04	4	0.17	
Sepia sp.	0.86	32	0.14	
Squalus megalops	0.82	2	0.13	
Synchiropus monacanthus	0.68	52	0.11	
Caelorinchus trunovi	0.66	10	0.11	
Chaeceon macphersoni	0.58	2	0.09	123
Unidentified fish	0.50	24	0.08	
Neoscombrops annectens	0.34	6	0.06	
Nansenia macrolepis	0.32	30	0.05	
Cynoglossus capensis	0.30	14	0.05	
Priacanthus hamrur	0.26	2	0.04	
GALATHEIDAE *	0.16	4	0.03	
Benthodesmus elongatus	0.16	4	0.03	
Cynoglossus marleyi	0.14	2	0.02	
Hoplostethus atlanticus	0.14	16	0.02	
Xenolepidichthys dagleishi	0.04	2	0.01	
Polyipnus spinosus	0.01	4	0.00	
Total	611.76		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 27
DATE :05/10/2007 GEAR TYPE: BT NO: 20 POSITION:Lat S 25°34.80
start stop duration Lon E 33°50.92
TIME :09:32:48 10:03:01 30.2 (min) Purpose : 3
LOG : 6596.63 6598.08 1.5 Region : 7400
FDEPTH: 436 439 Gear cond.: 0
BDEPTH: 436 439 Validity : 0
Towing dir: 0° Wire out : 1040 m Speed : 2.9 kn
Sorted : 120 Total catch: 120.43 Catch/hour: 239.10

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Bolanichthys indicus	103.94	26103	43.47	
Champsodon capensis	26.41	1443	11.04	
Lestrolepis intermedia	21.24	1890	8.89	
Cubiceps whitleggi	17.37	284	7.27	129
Neoepinnula orientalis	15.59	387	6.52	130
Chlorophthalmus agassizi	11.10	244	4.64	131
Haliporoides triarthrus	10.07	808	4.21	132
Ommastrephes bartrami	5.90	54	2.47	
Chaunax pictus	3.77	42	1.58	
Malacocephalus laevis	2.98	105	1.25	
Synagrops japonicus	2.78	71	1.16	
Astronesthes martensii	2.16	103	0.91	
Metanephrops andamanicus	2.10	36	0.88	134
Octopus sp.	1.83	4	0.76	
Heptranchias perlo	1.55	2	0.65	
Haliporoides triarthrus	1.45	97	0.61	133
Metanephrops andamanicus	1.43	40	0.60	135
Nansenia macrolepis	1.29	62	0.54	
Chaeceon macphersoni	1.15	2	0.48	137
Regalecus glesne	0.79	2	0.33	
Merluccius paradoxus	0.62	2	0.26	
Chaeceon macphersoni	0.58	2	0.24	136
Neoscombrops annectens	0.44	8	0.18	
Histioteuthis dofleini	0.36	6	0.15	
Synchiropus monacanthus	0.32	34	0.13	
Ophichthus sp.	0.32	4	0.13	
Plesionika martia	0.32	95	0.13	
Sepia sp.	0.32	10	0.13	
Polymetme corythaeola	0.18	4	0.07	
Brama orcini	0.16	4	0.07	
Cynoglossus attenuatus	0.14	12	0.06	
Satyrichthys adeni	0.12	16	0.05	
Chascanopsetta lugubris	0.10	2	0.04	
Hoplostethus mediterraneus	0.08	4	0.03	
Caelorinchus trunovi	0.06	6	0.02	
Sepia australis	0.06	4	0.02	
Xenolepidichthys dagleishi	0.04	2	0.02	
Bregmaceros sp.	0.01	2	0.00	
Total	239.10		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 28
DATE :05/10/2007 GEAR TYPE: BT NO: 20 POSITION:Lat S 25°34.02
start stop duration Lon E 33°37.51
TIME :12:00:12 12:30:09 30.0 (min) Purpose : 3
LOG : 6609.19 6610.62 1.4 Region : 7400
FDEPTH: 464 466 Gear cond.: 0
BDEPTH: 464 466 Validity : 0
Towing dir: 0° Wire out : 1120 m Speed : 2.9 kn
Sorted : 152 Total catch: 151.91 Catch/hour: 304.32

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Champsodon capensis	95.86	5313	31.50	
Bolanichthys indicus	43.47	4045	14.29	
Neoepinnula orientalis	34.36	851	11.29	
Cubiceps whitleggi	27.05	381	8.89	138
Synagrops japonicus	21.94	503	7.21	
Octopus sp.	14.02	50	4.61	
Malacocephalus laevis	8.71	142	2.86	
Haliporoides triarthrus	8.41	413	2.76	141
Chaunax pictus	7.99	315	2.63	
Nansenia macrolepis	7.81	198	2.57	
Centrophorus moluccensis	5.61	4	1.84	
Metanephrops andamanicus	4.81	82	1.58	139
Astronesthes martensii	4.37	196	1.44	
Raja wallacei	3.51	2	1.15	
Metanephrops andamanicus	2.60	38	0.86	140
Lestrolepis intermedia	2.38	172	0.78	
Haliporoides triarthrus	2.10	120	0.69	142
Lophiodes insidiator	1.56	2	0.51	
Heptranchias perlo	0.90	2	0.30	
GALATHEIDAE	0.84	136	0.28	
Chaeceon macphersoni	0.82	2	0.27	
Hoplobrotula gnathopus	0.72	2	0.24	
Synchiropus monacanthus	0.60	14	0.20	
Ruvettus pretiosus	0.56	2	0.18	
Helicolenus dactylopterus	0.54	4	0.18	
Neoscombrops annectens	0.44	8	0.14	
Caelorinchus trunovi	0.42	10	0.14	
Histioteuthis dofleini	0.38	10	0.13	
Hoplostethus mediterraneus	0.32	8	0.11	
Sepia australis	0.26	14	0.09	
Chlorophthalmus agassizi	0.22	8	0.07	
Cynoglossus marleyi	0.16	10	0.05	
Ophichthus sp.	0.16	2	0.05	
Sepia sp.	0.14	4	0.05	
Plesionika martia	0.12	38	0.04	
Polymetme corythaeola	0.04	4	0.01	
Benthodesmus elongatus	0.04	2	0.01	
Rexea prometheoides	0.02	2	0.01	
Polymixia berndti	0.02	4	0.01	
Heterocarpus woodmasoni	0.02	6	0.01	
Total	304.32		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 29
DATE :05/10/2007 GEAR TYPE: BT NO: 20 POSITION:Lat S 25°33.04
start stop duration Lon E 33°23.96
TIME :14:26:16 14:54:24 28.1 (min) Purpose : 3
LOG : 6621.98 6623.32 1.3 Region : 7400
FDEPTH: 465 460 Gear cond.: 0
BDEPTH: 465 460 Validity : 0
Towing dir: 0° Wire out : 1125 m Speed : 2.9 kn
Sorted : 82 Total catch: 81.99 Catch/hour: 174.94

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Bolanichthys indicus	61.88	2524	35.37	
Cubiceps whitleggi	32.86	452	18.78	144
Champsodon capensis	16.64	945	9.51	
Neoepinnula orientalis	11.10	201	6.34	143
Urotrygon daviesi	7.00	2	4.00	
Metanephrops andamanicus	6.27	45	3.59	147
Synagrops japonicus	5.65	75	3.23	146
Lestrolepis intermedia	5.10	292	2.91	
Chlorophthalmus agassizi	4.37	79	2.50	
Metanephrops andamanicus	4.18	38	2.39	148
Haliporoides triarthrus	4.12	228	2.35	149
Merluccius paradoxus	2.94	9	1.68	
Loligo vulgaris	2.45	28	1.40	
Haliporoides triarthrus	1.92	109	1.10	150
Neoscombrops annectens	1.69	38	0.96	145
Xenolepidichthys dagleishi	1.15	81	0.66	
Astronesthes martensii	1.02	41	0.59	
Cynoglossus capensis	0.94	51	0.54	
Chaunax pictus	0.73	28	0.41	
Gonorhynchus gonorhynchus	0.64	6	0.37	
Ateleopus natalensis	0.55	2	0.32	
Malacocephalus laevis	0.55	17	0.32	
Malacocephalus sp.	0.49	19	0.28	
Priacanthus hamrur	0.26	2	0.15	
Plesionika martia	0.19	53	0.11	
Caelorinchus trunovi	0.17	4	0.10	
Sepia sp.	0.04	19	0.02	
Synchiropus monacanthus	0.02	11	0.01	
Total	174.94		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 30
DATE :06/10/2007 GEAR TYPE: BT NO: 20 POSITION:Lat S 25°17.41
start stop duration Lon E 33°50.23
TIME :03:39:23 04:02:38 23.3 (min) Purpose : 3
LOG : 6738.75 6739.87 1.1 Region : 7400
FDEPTH: 286 287 Gear cond.: 0
BDEPTH: 286 287 Validity : 0
Towing dir: 0° Wire out : 680 m Speed : 2.9 kn
Sorted : 102 Total catch: 102.12 Catch/hour: 263.54

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Ateleopus natalensis	43.74	0	16.60	
Bolanichthys indicus	26.84	2397	10.18	
Neoscombrops annectens	26.71	1399	10.14	153
Champsodon capensis	22.06	2292	8.37	
Satyrichthys adeni	18.58	65	7.05	
Mustelus manazo	16.52	5	6.27	
Malacocephalus sp.	13.65	637	5.18	
Pteromylaeus bovinus	11.87	3	4.50	
Urotrygon daviesi	8.52	3	3.23	
Neoepinnula orientalis	8.23	446	3.12	154
Acropoma japonicum	7.35	707	2.79	
Rexea prometheoides	5.24	219	1.99	155
Physiculus natalensis	4.95	106	1.88	
Loligo vulgaris	4.85	75	1.84	
POLYCHAELIDAE	4.80	289	1.82	
Scyllarides elisabethae	4.62	359	1.75	
Uranoscopus archionema	3.56	39	1.35	
Cynoglossus capensis	3.33	124	1.26	
Selachophidium guentheri	3.17	90	1.20	
Trichiurus lepturus	3.05	57	1.16	
Saurida undosquamis	2.81	10	1.07	
SOLENOCERIDAE	2.71	299	1.03	
SCIAENIDAE	1.95	3	0.74	
Synagrops japonicus	1.94	165	0.73	152
Cubiceps whitleggi	1.81	23	0.69	151
Conger cinereus	1.57	3	0.60	
PENAEIDAE	1.34	129	0.51	
Bregmaceros sp.	1.21	405	0.46	
Thenus orientalis	0.85	10	0.32	
Branchiostegus doliatus	0.77	5	0.29	
Parabembras robinsoni	0.65	10	0.24	
Chlorophthalmus agassizi	0.62	83	0.24	
Lepidotrigla multispinosus	0.54	10	0.21	
Hoplichthys acanthopleurus	0.46	57	0.18	
Diaphus effulgens	0.46	119	0.18	
Priacanthus hamrur	0.46	8	0.18	
Halieutaea fitzsimonsi	0.44	3	0.17	
Lophiodes insidiator	0.28	3	0.11	
Argentina sp.	0.26	10	0.10	
GECARCINIDAE	0.23	10	0.09	
SCORPAENIDAE	0.21	13	0.08	
Penaeopsis balssi	0.15	5	0.06	
Torquigener hypselogenion	0.08	26	0.03	
Sphoeroides pachgaster	0.04	3	0.01	
Pelagocephalus marki	0.02	3	0.01	
Caelorinchus trunovi	0.00	0	0.00	
Total	263.54		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 31
DATE :06/10/2007 GEAR TYPE: BT NO: 20 POSITION:Lat S 25°18.80
start stop duration Lon E 34°3.21
TIME :06:19:02 06:49:06 30.1 (min) Purpose : 3
LOG : 6758.28 6759.85 1.6 Region : 7400
FDEPTH: 352 363 Gear cond.: 0
BDEPTH: 352 363 Validity : 0
Towing dir: 0° Wire out : 880 m Speed : 3.1 kn
Sorted : 623 Total catch: 622.65 Catch/hour: 1242.40

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Cubiceps whitleggi	936.81	14919	75.40	156
Champsodon capensis	77.12	5932	6.21	
Diaphus effulgens	54.97	9478	4.42	
Urotrygon daviesi	25.54	4	2.06	
Squalus megalops	25.24	32	2.03	
Neoepinnula orientalis	23.35	505	1.88	158
Lestrolepis intermedia	13.47	666	1.08	
Loligo vulgaris	10.28	122	0.83	
Ateleopus natalensis	6.07	64	0.49	
Physiculus natalensis	5.57	94	0.45	
Pliotrema warreni	5.39	4	0.43	
Malacocephalus laevis	5.29	82	0.43	
Peristedion weberi	5.13	10	0.41	
Neoscombrops annectens	4.19	164	0.34	157
Sepia sp.	3.45	170	0.28	
Bolanichthys indicus	3.31	120	0.27	
Selachophidium guentheri	3.01	90	0.24	
Metanephrops andamanicus	2.49	34	0.20	162
Saurida undosquamis	2.23	24	0.18	
Chascanopsetta lugubris	2.19	2	0.18	
Synagrops japonicus	2.17	66	0.18	159
Priacanthus hamrur	2.17	38	0.18	
Metanephrops andamanicus	2.00	24	0.16	161
GERYONIDAE	1.92	6	0.15	
Palinurus delagoae	1.90	4	0.15	163
Rexea prometheoides	1.78	98	0.14	160
Torpedo nobiliana	1.60	2	0.13	
Halieutaea fitzsimonsi	1.40	2	0.11	
Palinurus delagoae	1.28	4	0.10	164
Chaunax pictus	1.18	2	0.09	
Trachurus trachurus	1.06	8	0.09	
Parabembras robinsoni*	1.02	0	0.08	
ARGENTINIDAE	0.94	36	0.08	
OCYPODIDAE	0.94	10	0.08	
Bathymyrus smithi	0.90	2	0.07	
Chlorophthalmus agassizi	0.76	30	0.06	
Cynoglossus capensis	0.76	26	0.06	
Hoplobrotula gnathopus	0.72	2	0.06	
Benthodesmus elongatus	0.66	30	0.05	
Chelidonichthys queketti	0.56	8	0.04	
Gonorhynchus gonorhynchus	0.46	2	0.04	
Polymixia nobilis	0.40	6	0.03	
Synchiropus monacanthus	0.24	10	0.02	
Peristedion adeni	0.22	20	0.02	
Poecilopsetta zanzibarensis	0.16	16	0.01	
Astronesthes martensii	0.14	8	0.01	
Malacocephalus sp.	0.00	0	0.00	
Lepidotrigla multispinosus	0.00	0	0.00	
Total	1242.40		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 32
DATE :06/10/2007 GEAR TYPE: BT NO: 20 POSITION:Lat S 25°21.29
start stop duration Lon E 34°15.76
TIME :09:05:03 09:35:15 30.2 (min) Purpose : 3
LOG : 6774.64 6776.17 1.5 Region : 7400
FDEPTH: 344 341 Gear cond.: 0
BDEPTH: 344 341 Validity : 0
Towing dir: 0° Wire out : 880 m Speed : 3.0 kn
Sorted : 243 Total catch: 243.17 Catch/hour: 483.27

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
Bolanichthys indicus	169.63	24952	35.10	
Squalus blainvillei	79.89	103	16.53	
Cubiceps whitleggi	72.14	1636	14.93	165
Champsodon capensis	40.34	2814	8.35	
Ateleopus natalensis	16.10	72	3.33	
Ommastrephes bartrami	13.42	135	2.78	
Neoscombrops annectens	13.32	191	2.76	
Lestrolepis intermedia	13.12	127	2.71	
Urotrygon daviesi	9.24	2	1.91	
Saurida undosquamis	8.86	42	1.83	167
Neoepinnula orientalis	8.74	233	1.81	166
Pliotrema warreni	6.56	6	1.36	
Malacocephalus laevis	4.15	147	0.86	
Physiculus natalensis	3.72	52	0.77	
Halaelurus lutarius	3.28	24	0.68	
Palinurus delagoae	2.21	6	0.46	169
Neobythites analis	2.13	107	0.44	
Benthodesmus elongatus	2.09	87	0.43	
Lepidotrigla multispinosus	1.89	26	0.39	
Synagrops japonicus	1.85	40	0.38	
LITHODIDAE	1.49	12	0.31	
Chelidonichthys capensis	1.09	14	0.23	
Priacanthus hamrur	0.97	16	0.20	
Metanephrops andamanicus	0.91	10	0.19	170
Hoplobrotula gnathopus	0.74	6	0.15	
Chlorophthalmus agassizi	0.64	20	0.13	
Lophiodes insidiator	0.60	2	0.12	
Palinurus delagoae	0.56	2	0.12	168
CONGRIDAE	0.52	2	0.11	
Sepia australis	0.52	14	0.11	
Chaunax pictus	0.50	4	0.10	
Metanephrops andamanicus	0.48	8	0.10	171
Sepia sp.	0.22	8	0.05	
Argentina sp.	0.20	8	0.04	
Rexea prometheoides	0.16	8	0.03	
Satyrichthys adeni	0.16	2	0.03	
Poecilopsetta zanzibarensis	0.16	6	0.03	
Halieutaea fitzsimonsi	0.10	2	0.02	
Polymixia berndti	0.10	4	0.02	
Penaeopsis balssi	0.10	14	0.02	
Acropoma japonicum	0.08	2	0.02	
Gonorhynchus gonorhynchus	0.08	2	0.02	
Nettastoma parviceps	0.08	2	0.02	
Trichiurus lepturus	0.06	2	0.01	
Synchiropus monacanthus	0.04	4	0.01	
Cynoglossus capensis	0.03	16	0.01	
Astronesthes martensii	0.02	2	0.00	
Xenolepidichthys dagleishi	0.02	2	0.00	
Total	483.27		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 33
DATE :06/10/2007 GEAR TYPE: BT NO: 20 POSITION:Lat S 25°23.33
start stop duration Lon E 34°29.34
TIME :11:43:11 12:13:33 30.4 (min) Purpose : 3
LOG : 6790.45 6792.00 1.6 Region : 7400
FDEPTH: 311 314 Gear cond.: 0
BDEPTH: 311 314 Validity : 0
Towing dir: 0° Wire out : 780 m Speed : 3.1 kn
Sorted : 238 Total catch: 237.71 Catch/hour: 469.64

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
Champsodon capensis	113.11	11905	24.08	
Bolanichthys indicus	82.98	17816	17.67	
Urotrygon daviesi	71.64	4	15.25	
Squalus megalops	54.13	83	11.53	
Ommastrephes bartrami	18.18	373	3.87	
Neoepinnula orientalis	15.81	3266	3.37	172
Saurida undosquamis	12.45	36	2.65	173
Pliotrema warreni	10.87	14	2.31	
Ateleopus natalensis	8.42	47	1.79	
Uranoscopus archionema	7.15	30	1.52	
Synagrops japonicus	6.82	247	1.45	
Cubiceps whitleggi	6.54	99	1.39	174
Parabembras robinsoni*	6.52	99	1.39	
Satyrichthys adeni	6.32	253	1.35	
Lepidotrigla multispinosus	6.14	79	1.31	
Citharoides macrolepis	5.75	41	1.22	
Sepia australis	4.80	122	1.02	
Physiculus natalensis	4.01	51	0.85	
Squatina africana	2.96	2	0.63	
Lestrolepis intermedia	2.94	190	0.63	
Chlorophthalmus agassizi	2.79	138	0.59	
Chaunax pictus	2.73	12	0.58	
Zenopsis conchifer	2.03	2	0.43	
Neobythites analis	1.84	53	0.39	
Argentina sp.	1.56	75	0.33	
C R A B S	1.54	18	0.33	
Hoplobrotula gnathopus	1.19	8	0.25	
Cynoglossus marleyi	1.11	30	0.24	
Trichiurus lepturus	0.89	10	0.19	
Hoplichthys acanthopleurus	0.81	47	0.17	
Palinurus delagoae	0.75	2	0.16	175
Helicolenus dactylopterus	0.75	2	0.16	
Poecilopsetta zanzibarensis	0.71	18	0.15	
CONGRIDAE	0.59	2	0.13	
Branchiostegus doliatus	0.49	4	0.11	
Halaelurus lutarius	0.34	2	0.07	
Chascanopsetta lugubris	0.32	2	0.07	
Sepia sp.	0.32	6	0.07	
Priacanthus hamrur	0.30	4	0.06	
Gonorhynchus gonorhynchus	0.28	6	0.06	
Synchiropus monacanthus	0.20	10	0.04	
Anacanthobatis marmorata	0.20	2	0.04	
PENAEIDAE	0.16	10	0.03	
Acropoma japonicum	0.08	2	0.02	
Owstonia webesi	0.08	2	0.02	
Parazen pacificus	0.05	2	0.01	
Malthopsis tiarella	0.04	4	0.01	
Total	469.64		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 34
DATE :06/10/2007 GEAR TYPE: BT NO: 20 POSITION:Lat S 25°24.92
start stop duration Lon E 34°46.05
TIME :14:41:19 15:14:04 32.8 (min) Purpose : 3
LOG : 6811.61 6813.38 1.8 Region : 7400
FDEPTH: 233 248 Gear cond.: 0
BDEPTH: 233 248 Validity : 0
Towing dir: 0° Wire out : 620 m Speed : 3.2 kn
Sorted : 160 Total catch: 310.44 Catch/hour: 568.75

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
Diaphus effulgens	134.75	25913	23.69	
Neoscombrops annectens	117.53	3045	20.66	
Saurida undosquamis	117.34	1059	20.63	179
Cubiceps whitleggi	45.80	573	8.05	176
Peristedion weberi	33.62	507	5.91	
Citharoides macrolepis	19.24	295	3.38	
Uranoscopus archionema	18.69	123	3.29	
Sepia australis	11.91	178	2.09	
Cynoglossus capensis	9.05	522	1.59	178
Loligo vulgaris	7.90	143	1.39	
Argentina sp.	7.80	639	1.37	
Squalus megalops	4.58	7	0.81	
Lepidotrigla multispinosus	4.42	106	0.78	
Synagrops japonicus	4.23	161	0.74	177
Chelidonichthys kumu	3.24	18	0.57	
Lestrolepis intermedia	3.15	180	0.55	
Acropoma japonicum	2.86	103	0.50	
Hoplichthys acanthopleurus	2.47	315	0.43	
Argyrosomus sp.	2.40	4	0.42	
Priacanthus hamrur	2.00	37	0.35	
Malacocephalus laevis	1.72	55	0.30	
Champsodon capensis	1.70	114	0.30	
Halieutaea fitzsimonsi	1.58	33	0.28	
Thenus orientalis	1.45	18	0.25	
Trichiurus lepturus	1.39	16	0.24	
Scyllarides elisabethae	1.34	70	0.24	
Ateleopus natalensis	1.28	5	0.23	
Ariomma indica	1.14	11	0.20	
Palinurus delagoae	0.84	2	0.15	
Chaunax pictus	0.64	5	0.11	
Plesionika martia	0.53	242	0.09	
Cynoglossus marleyi	0.49	11	0.09	
Selachophidium guentheri	0.49	13	0.09	
C R A B S	0.37	7	0.06	
Peristedion adeni	0.27	27	0.05	
Neoepinnula orientalis	0.21	9	0.04	
Parabembras robinsoni	0.18	2	0.03	
Synchiropus monacanthus	0.15	4	0.03	
Torpedo nobiliana	0.00	0	0.00	
Total	568.75		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 35
DATE :07/10/2007 GEAR TYPE: BT NO: 20 POSITION:Lat S 25°5.53
start stop duration Lon E 35°18.35
TIME :06:24:38 06:54:59 30.4 (min) Purpose : 3
LOG : 6931.39 6933.22 1.8 Region : 7400
FDEPTH: 347 353 Gear cond.: 0
BDEPTH: 347 353 Validity : 0
Towing dir: 0° Wire out : 840 m Speed : 3.6 kn
Sorted : 102 Total catch: 94.66 Catch/hour: 187.14

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
Saurida undosquamis	51.70	196	27.62	182
Squalus megalops	45.27	53	24.19	
Peristedion weberi	27.70	109	14.80	
PORTUNIDAE	15.62	103	8.35	
Synagrops japonicus	13.19	0	7.05	181
Loligo vulgaris	8.34	103	4.46	
Neoscombrops annectens	7.00	0	3.74	180
Chaunax pictus	3.16	32	1.69	
Satyrichthys adeni	1.46	69	0.78	
Gonorhynchus gonorhynchus	1.30	20	0.70	
Acropoma japonicum	1.29	2	0.69	
Rexea prometheoides	1.29	22	0.69	
Antigonia cf rubescens	1.19	42	0.63	
Uranoscopus archionema	1.01	10	0.54	
Ophisurus serpens	0.85	4	0.45	
Citharoides macrolepis	0.83	6	0.44	
Chlorophthalmus agassizi	0.81	20	0.43	
Hoplichthys acanthopleurus	0.79	40	0.42	
Cynoglossus capensis	0.77	55	0.41	
Cynoglossus marleyi	0.67	8	0.36	
Halieutaea fitzsimonsi	0.67	12	0.36	
Cubiceps caerulus	0.63	8	0.34	
Lophiodes insidiator	0.59	4	0.32	
Macrorhamphosus scolopax	0.42	26	0.22	
Sepia australis	0.34	2	0.18	
Poecilopsetta zanzibarensis	0.12	4	0.06	
Holohalaelurus punctatus	0.10	2	0.06	
Malthopsis tiarella	0.04	4	0.02	
Total	187.14		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 36
DATE :07/10/2007 GEAR TYPE: BT NO: 20 POSITION:Lat S 24°56.65
start stop duration Lon E 35°2.99
TIME :10:11:48 10:41:53 30.1 (min) Purpose : 3
LOG : 6954.87 6956.22 1.4 Region : 7400
FDEPTH: 65 68 Gear cond.: 0
BDEPTH: 65 68 Validity : 0
Towing dir: 0° Wire out : 220 m Speed : 2.7 kn
Sorted : 24 Total catch: 23.89 Catch/hour: 47.65

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
Carangoides malabaricus	16.85	110 35.36	183
Sphyrna zygaena	13.96	2 29.30	
Tetrosomus concatenatus	4.99	12 10.46	
Saurida undosquamis	4.59	48 9.63	184
Lagocephalus guntheri	1.69	36 3.56	
PORTUNIDAE	1.30	10 2.72	
Torquigener hypselogenion	1.28	367 2.68	
Abalistes stellatus	0.90	2 1.88	
Ommastrephes bartrami	0.76	20 1.59	
Lophodiodon calori	0.44	2 0.92	
Starfish	0.40	12 0.84	
Pseudorhombus elevatus	0.26	16 0.54	
Trachinocephalus myops	0.10	2 0.21	
Sepia sp.	0.08	2 0.17	
Canthigaster rivulata	0.05	2 0.10	
Nemipterus bipunctatus	0.02	2 0.04	
Total	47.65	100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 37
DATE :07/10/2007 GEAR TYPE: BT NO: 20 POSITION:Lat S 24°50.72
start stop duration Lon E 34°53.13
TIME :12:20:32 12:49:16 28.7 (min) Purpose : 3
LOG : 6970.28 6971.70 1.4 Region : 7400
FDEPTH: 40 43 Gear cond.: 0
BDEPTH: 40 43 Validity : 0
Towing dir: 0° Wire out : 150 m Speed : 3.0 kn
Sorted : 11 Total catch: 10.52 Catch/hour: 21.98

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
Loligo sp.	11.53	127 52.47	
Saurida undosquamis	3.09	36 14.07	186
Abalistes stellatus	2.09	2 9.51	
Sepia pharaonis	1.65	6 7.51	
Carangoides malabaricus	1.04	8 4.75	185
Satyrichthys adeni	0.96	2 4.37	
Thenus orientalis	0.75	2 3.42	
Trichiurus lepturus	0.27	6 1.24	
Pagellus natalenses	0.23	2 1.05	
Nemipterus bipunctatus	0.15	2 0.67	
Leiognathus elongatus	0.06	2 0.29	
Macrorhamphosus scolopax	0.06	2 0.29	
Decapterus russelli	0.04	2 0.19	
Upeneus bensasi	0.04	2 0.19	
Total	21.98	100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 38
DATE :07/10/2007 GEAR TYPE: BT NO: 20 POSITION:Lat S 24°50.60
start stop duration Lon E 35°6.70
TIME :14:32:50 14:36:29 4.0 (min) Purpose : 3
LOG : 6984.47 6984.82 0.3 Region : 7400
FDEPTH: 67 67 Gear cond.: 9
BDEPTH: 67 67 Validity : 4
Towing dir: 0° Wire out : 200 m Speed : 5.7 kn
Sorted : 3 Total catch: 2.90 Catch/hour: 43.50

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
Tetrosomus concatenatus	17.70	45 40.69	
Abalistes stellatus	13.65	15 31.38	
Lophodiodon calori	5.40	15 12.41	
Pagellus natalenses	3.45	30 7.93	
Starfish	1.80	45 4.14	
Parupeneus heptacanthus	0.90	15 2.07	
Upeneus bensasi	0.60	15 1.38	
Total	43.50	100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 39
DATE :08/10/2007 GEAR TYPE: BT NO: 20 POSITION:Lat S 25°19.77
start stop duration Lon E 35°13.85
TIME :03:53:27 04:23:10 29.7 (min) Purpose : 3
LOG : 7036.87 7037.96 1.1 Region : 7400
FDEPTH: 584 582 Gear cond.: 0
BDEPTH: 584 582 Validity : 0
Towing dir: 0° Wire out : 1350 m Speed : 2.2 kn
Sorted : 72 Total catch: 71.92 Catch/hour: 145.20

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
Haliporoides triarthrus	28.10	1343 19.35	193
Lestrolepis intermedia	20.79	1332 14.32	
Haliporoides triarthrus	18.73	701 12.90	192
Diaphus effulgens	17.06	3281 11.75	
Chlorophthalmus agassizi	9.49	133 6.53	188
Caelorinchus trunovi	8.38	248 5.77	189
Bolanichthys indicus	8.10	321 5.58	
Plesionika martia	6.76	1878 4.66	
Selachophidium guentheri	4.56	83 3.14	
Nettastoma parviceps	4.22	91 2.91	
Cubiceps whitleggi	3.11	40 2.14	190
Neoepinnula orientalis	2.81	24 1.93	191
Malacocephalus laevis	2.54	46 1.75	
Loligo vulgaris	2.10	16 1.45	
Aristaeomorpha foliacea	2.00	77 1.38	194
Synagrops japonicus	1.76	38 1.21	187
Neoscombrops annectens	1.37	10 0.95	
Polyipnus indicus	0.63	129 0.43	
Aristaeomorpha foliacea	0.57	32 0.39	195
Chaunax pictus	0.36	18 0.25	
Beryx splendens	0.35	2 0.24	
Sepia sp.	0.24	4 0.17	
Xenolepidichthys dagleishi	0.20	4 0.14	
Cynoglosus cf marlei	0.18	4 0.13	
C R A B S	0.16	8 0.11	
Satyrichthys adeni	0.14	8 0.10	
Polymetme corythaeola	0.14	4 0.10	
Heterocarpus tricarinatus	0.14	8 0.10	
Sicyonia sp.	0.10	65 0.07	
Symphurus ocellatus	0.07	8 0.05	
Symphurus strictus	0.03	4 0.02	
Total	145.20	100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 40
DATE :08/10/2007 GEAR TYPE: BT NO: 20 POSITION:Lat S 25°12.78
start stop duration Lon E 34°54.94
TIME :07:09:39 07:40:02 30.4 (min) Purpose : 3
LOG : 7059.85 7061.41 1.6 Region : 7400
FDEPTH: 116 120 Gear cond.: 0
BDEPTH: 116 120 Validity : 0
Towing dir: 0° Wire out : 330 m Speed : 3.1 kn
Sorted : 74 Total catch: 74.27 Catch/hour: 146.62

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
Carangoides malabaricus	62.78	91 42.82	196
Epinephelus epistictus	24.19	16 16.49	
Squatina africana	14.02	4 9.56	
Loligo vulgaris	12.14	1556 8.28	
Parageleus leucolomatus	6.48	2 4.42	
Saurida undosquamis	6.30	41 4.30	197
Loxodon macrorhinus	5.92	2 4.04	
Polysteganus coeruleopunctatus	5.53	4 3.77	
Nemipterus japonicus	2.70	24 1.84	
Branchiostegus sawakinensis	2.11	2 1.44	
Rhinobatos holcorhynchus	2.05	2 1.40	
Setarches guentheri	1.09	4 0.74	
Halieutaea fitzsimonsi	0.41	2 0.28	
Lagocephalus guntheri	0.39	10 0.27	
Champsodon capensis	0.26	47 0.18	
Cynoglossus marleyi	0.12	8 0.08	
Citharichthys sp.	0.06	4 0.04	
Uranoscopus archionema	0.04	4 0.03	
Sepia sp.	0.03	4 0.02	
Total	146.62	100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 41

DATE :08/10/2007 GEAR TYPE: BT NO: 20 POSITION:Lat S 25°9.14
start stop duration Lon E 34°42.53
TIME :09:10:06 09:40:13 30.1 (min) Purpose : 3
LOG : 7071.91 7073.48 1.6 Region : 7400
FDEPTH: 129 127 Gear cond.: 0
BDEPTH: 129 127 Validity : 0
Towing dir: 0° Wire out : 360 m Speed : 3.1 kn
Sorted : 110 Total catch: 110.04 Catch/hour: 219.20

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Polysteganus coeruleopunctatus	58.37	108	26.63	202
Epinephelus epistictus	41.83	10	19.08	201
Loligo sp.	22.91	1285	10.45	
Mustelus mustelus	18.92	10	8.63	
Ariomma indica	18.33	183	8.36	200
Carangoides malabaricus	12.55	4	5.73	
Saurida undosquamis	10.02	88	4.57	198
Lagocephalus guntheri	6.14	255	2.80	
Loxodon macrorhinus	4.46	2	2.04	
Torpedo sinuspersici	4.24	4	1.94	
Nemipterus japonicus	3.59	28	1.64	
Heterodontus ramalheira	3.25	4	1.48	
Rhinobatos annulatus	3.01	2	1.37	
Sphyraena chrysotaenia	1.93	16	0.88	199
Priacanthus hamrur	1.77	10	0.81	
Acropoma japonicum	1.55	542	0.71	
Trichiurus lepturus	1.53	24	0.70	
PENAEIDAE	1.04	143	0.47	
Halieutaea fitzsimonsi	0.84	6	0.38	
Sepia pharaonis	0.70	8	0.32	
Apogon queketti	0.38	28	0.17	
Branchiostegus doliatus	0.36	4	0.16	
Raja alba	0.36	2	0.16	
Lepidotrigla multispinosus	0.34	10	0.15	
Uranoscopus archionema	0.32	2	0.15	
Pagellus natalenses	0.22	2	0.10	
Tylerius spinosissimus	0.14	6	0.06	
Hoplichthys acanthopleurus	0.10	14	0.05	
Upeneus sp.	0.02	2	0.01	
Total	219.20		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 42
DATE :08/10/2007 GEAR TYPE: BT NO: 20 POSITION:Lat S 25°4.38
start stop duration Lon E 34°27.94
TIME :11:30:52 12:00:54 30.0 (min) Purpose : 3
LOG : 7087.53 7088.96 1.4 Region : 7400
FDEPTH: 99 102 Gear cond.: 0
BDEPTH: 99 102 Validity : 0
Towing dir: 0° Wire out : 270 m Speed : 2.8 kn
Sorted : 205 Total catch: 204.55 Catch/hour: 408.56

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Dasyatis thetidis	239.68	4	58.67	
Carangoides malabaricus	77.90	362	19.07	
Saurida undosquamis	30.56	314	7.48	203
Nemipterus japonicus	15.78	194	3.86	
Upeneus taeniopterus	10.27	152	2.51	
MURAENESOCIDAE	9.99	2	2.44	
Upeneus vittatus	4.45	56	1.09	
Sepia australis	4.27	38	1.05	
Psettodes erumei	3.22	2	0.79	
Argyrops filamentosus	3.22	2	0.79	
Trichiurus lepturus	2.84	36	0.69	
Selar crumenophthalmus	2.42	12	0.59	204
Upeneus moluccensis	0.74	12	0.18	
Halieutaea fitzsimonsi	0.72	4	0.18	
Ariomma indica	0.58	4	0.14	
PENAEIDAE	0.54	68	0.13	
Loligo sp.	0.54	12	0.13	
Lophiodes insidiator	0.52	2	0.13	
Epinephelus andersoni	0.34	2	0.08	
Total	408.56		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 43
DATE :08/10/2007 GEAR TYPE: BT NO: 20 POSITION:Lat S 25°0.02
start stop duration Lon E 34°13.29
TIME :14:02:44 14:33:11 30.5 (min) Purpose : 3
LOG : 7106.14 7107.64 1.5 Region : 7400
FDEPTH: 46 48 Gear cond.: 0
BDEPTH: 46 48 Validity : 0
Towing dir: 0° Wire out : 150 m Speed : 2.9 kn
Sorted : 400 Total catch: 1295.81 Catch/hour: 2553.33

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Ariomma indica	1517.10	28757	59.42	207
Sphyraena acutipinnis	966.50	20634	37.85	206
Rastrelliger kanagurta	19.29	242	0.76	
Scomberomorus commerson	18.13	2	0.71	
Loligo sp.	16.22	227	0.64	
Dussumieria acuta	5.82	164	0.23	
Metapenaeus monoceros	2.62	71	0.10	
Lagocephalus guntheri	2.03	71	0.08	
Selar crumenophthalmus	1.18	8	0.05	
Carangoides malabaricus	0.92	57	0.04	
Megalaspis cordyla	0.64	14	0.03	
Secutor ruconius	0.61	22	0.02	
Apogon queketti	0.57	35	0.02	
Gazza minuta	0.35	14	0.01	
Umbrina canariensis	0.29	8	0.01	
Engraulis cf capensis	0.28	8	0.01	
Pagellus natalenses	0.28	8	0.01	
Carangoides caeruleopinnatus	0.21	8	0.01	
Acanthocepola indica	0.14	8	0.01	
Upeneus taeniopterus	0.12	8	0.00	
Total	2553.33		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 44
DATE :09/10/2007 GEAR TYPE: BT NO: 20 POSITION:Lat S 25°16.88
start stop duration Lon E 33°35.09
TIME :03:14:38 03:44:53 30.3 (min) Purpose : 3
LOG : 7204.73 7206.19 1.5 Region : 7400
FDEPTH: 56 56 Gear cond.: 0
BDEPTH: 56 56 Validity : 0
Towing dir: 0° Wire out : 190 m Speed : 2.9 kn
Sorted : 63 Total catch: 62.97 Catch/hour: 124.90

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Himantura uarnak	49.88	2	39.94	
Carcharhinus brachyurus	17.36	2	13.90	
Carangoides malabaricus	13.98	87	11.20	208
Scomberomorus commerson	11.90	2	9.53	
Loligo sp.	7.48	184	5.99	
Rhizoprionodon acutus	7.34	2	5.88	
Saurida undosquamis	6.35	75	5.08	209
Sepia australis	5.59	8	4.48	
Epinephelus tauvina	2.16	2	1.73	
Nemipterus japonicus	0.75	10	0.60	
Argyrops spinifer	0.71	2	0.57	
Nemipterus sp.	0.48	2	0.38	
Trachinocephalus myops	0.38	30	0.30	
Octopus sp.	0.12	2	0.10	
Sorsogona sp.	0.10	4	0.08	
Pseudorhombus elevatus	0.08	2	0.06	
Fistularia petimba	0.06	2	0.05	
Upeneus taeniopterus	0.06	2	0.05	
Decapterus macrosoma	0.04	2	0.03	
Priacanthus hamrur	0.04	2	0.03	
Apogon quadrifasciatus	0.02	2	0.02	
Cynoglossus marleyi	0.02	4	0.02	
Total	124.90		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 45
DATE :09/10/2007 GEAR TYPE: BT NO: 20 POSITION:Lat S 25°32.59
start stop duration Lon E 33°13.83
TIME :06:29:24 07:00:27 31.1 (min) Purpose : 3
LOG : 7229.87 7231.48 1.6 Region : 7400
FDEPTH: 261 260 Gear cond.: 0
BDEPTH: 261 260 Validity : 0
Towing dir: 0° Wire out : 630 m Speed : 3.1 kn
Sorted : 306 Total catch: 306.47 Catch/hour: 592.22

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Diaphus effulgens	285.80	109921	48.26	
Argentina sp.	90.63	4120	15.30	
Palinurus delagoae	61.03	182	10.30	212
Loligo vulgaris	34.01	495	5.74	
Palinurus delagoae	31.97	100	5.40	213
Saurida undosquamis	21.53	220	3.63	
Squalus megalops	12.75	8	2.15	
Macrorhamphosus scolopax	6.45	800	1.09	
Rexea prometheoides	6.34	100	1.07	211
Trachypenaeus curvirostris	6.22	118	1.05	
Neoscombrops annectens	6.11	104	1.03	210
Uranoscopus archionema	4.33	43	0.73	
Acropoma japonicum	4.14	116	0.70	
Argyrosomus hololepidotus	4.06	4	0.69	
Ateleopus natalensis	3.48	23	0.59	
Trichiurus lepturus	2.51	19	0.42	
Sepia australis	1.62	31	0.27	
Citharoides macrolepis	1.47	19	0.25	
Chaunax pictus	1.28	12	0.22	
Centrophorus moluccensis	1.12	4	0.19	
Chelidonichthys kumu	1.12	8	0.19	
Satyrichthys adeni	1.04	31	0.18	
Ibacus novemdentatus	0.70	12	0.12	
Lestrolepis intermedia	0.70	58	0.12	
Carangoides malabaricus	0.46	4	0.08	
Selachophidium guentheri	0.35	12	0.06	
Chlorophthalmus agassizi	0.31	8	0.05	
Priacanthus hamrur	0.27	8	0.05	
Triacanthodes ethiops	0.20	6	0.03	
Lepidotrigla multispinosus	0.12	4	0.02	
Cynoglossus marleyi	0.08	4	0.01	
Malacocephalus laevis	0.04	4	0.01	
Total	592.22		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 46
DATE :12/10/2007 GEAR TYPE: BT NO: 20 POSITION:Lat S 24°33.71
start stop duration Lon E 35°15.55
TIME :08:30:33 09:00:00 29.5 (min) Purpose : 3
LOG : 7464.89 7466.29 1.4 Region : 7400
FDEPTH: 51 50 Gear cond.: 0
BDEPTH: 51 50 Validity : 0
Towing dir: 0° Wire out : 150 m Speed : 2.9 kn
Sorted : 224 Total catch: 224.44 Catch/hour: 457.25

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
Upeneus vittatus	248.35	4364 54.31	215
Decapterus russelli	44.82	970 9.80	214
Carangoides malabaricus	39.83	249 8.71	222
Pagellus natalenses	39.12	501 8.55	217
Secutor insidiator	16.81	880 3.68	220
Scomberomorus commerson	14.87	2 3.25	
Saurida undosquamis	13.06	175 2.86	223
Loligo vulgaris	12.88	232 2.82	
Ariomma indica	5.44	153 1.19	
Pomadasys maculatus	4.89	35 1.07	218
Nemipterus bipunctatus	3.67	0 0.80	
Upeneus bensasi	2.38	102 0.52	221
Echeneis naucrates	2.16	2 0.47	
Decapterus macrosoma	2.00	37 0.44	216
Sardinella gibbosa	1.81	39 0.40	
Thenus orientalis	0.98	6 0.21	
Scomber japonicus	0.92	14 0.20	219
Pomadasys olivaceum	0.73	8 0.16	
Polydactylus sextarius	0.34	2 0.07	
Sardinella gibbosa	0.32	6 0.07	0
Upeneus taeniopterus	0.28	6 0.06	
Selar crumenophthalmus	0.26	4 0.06	
Rastrelliger kanagurta	0.24	4 0.05	
Sepia pharaonis	0.24	2 0.05	
Parupeneus cf nansen	0.20	4 0.04	
Stephanolepis auratus	0.12	12 0.03	
Pseudalutarius nasicornis	0.10	2 0.02	
Sphyraena acutipinnis	0.08	4 0.02	
Gazza minuta	0.06	2 0.01	
Stephanolepis auratus	0.05	6 0.01	0
Crossorhombus valderostratus	0.04	2 0.01	
Trachinocephalus myops	0.04	6 0.01	
Pseudorhombus elevatus	0.04	2 0.01	
Samaris cristatus	0.04	2 0.01	
Lagocephalus sceleratus	0.03	2 0.01	
Mene maculata	0.03	2 0.01	
Paramonacanthus sp.	0.00	2 0.00	
Total	457.25	100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 47
DATE :12/10/2007 GEAR TYPE: BT NO: 20 POSITION:Lat S 24°36.09
start stop duration Lon E 35°25.20
TIME :10:45:29 11:16:14 30.8 (min) Purpose : 3
LOG : 7479.30 7480.90 1.6 Region : 7400
FDEPTH: 161 153 Gear cond.: 0
BDEPTH: 161 153 Validity : 0
Towing dir: 0° Wire out : 370 m Speed : 3.1 kn
Sorted : 69 Total catch: 69.01 Catch/hour: 134.66

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
Ariomma indica	29.17	599 21.66	
Ommastrephes bartrami	18.15	605 13.48	
Polysteganus coeruleopunctatus	15.80	70 11.74	227
Saurida undosquamis	14.44	131 10.72	224
Squatina africana	10.73	2 7.97	229
Acropoma japonicum	6.56	847 4.87	
Upeneus vittatus	6.26	133 4.65	226
Rhinobatos annulatus	5.66	2 4.20	228
SCORPAENIDAE	5.29	14 3.93	
Scyllarides elisabethae	4.53	10 3.36	
Monocentris japonicus	4.27	35 3.17	
Arothron incognitus	3.69	2 2.74	
Histiopterus typus	3.30	10 2.45	
Priacanthus hamrur	2.54	14 1.88	
Sphyraena acutipinnis	2.40	14 1.78	225
Pristigenys niphonia	0.66	2 0.49	
Dactyloptena peterseni	0.65	6 0.48	
Thamnaconus fajardoi	0.47	2 0.35	
SERCH11	0.09	4 0.07	
Total	134.66	100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 48
DATE :12/10/2007 GEAR TYPE: BT NO: 15 POSITION:Lat S 24°35.27
start stop duration Lon E 35°38.71
TIME :13:40:56 14:12:14 31.3 (min) Purpose : 3
LOG : 7498.01 7499.29 1.3 Region : 7400
FDEPTH: 774 770 Gear cond.: 0
BDEPTH: 774 770 Validity : 0
Towing dir: 0° Wire out : 1700 m Speed : 2.5 kn
Sorted : 88 Total catch: 88.01 Catch/hour: 168.71

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
Caelorinchus trunovi	78.50	663 46.53	230
Histioteuthis miranda	27.51	25 16.31	
Selachophidium guentheri	13.99	155 8.29	233
Todarodes filippove	13.32	4 7.90	
Coloconger scholesi	7.19	40 4.26	
Chaunax pictus	5.52	4 3.27	
Nansenia macrolepis	4.18	67 2.48	0
Malacocephalus laevis	3.07	21 1.82	
Centrophorus moluccensis	3.03	2 1.80	231
Squalus megalops	2.49	2 1.48	232
Synagrops japonicus	1.88	13 1.11	
Plesionika martia	1.51	433 0.90	
Aristeus antennatus	1.07	77 0.64	236
Heterocarpus tricarinatus	1.07	33 0.64	
C R A B S	1.04	44 0.61	
Aristeus antennatus	1.04	50 0.61	235
Sicyonia sp.	0.38	58 0.23	
Hydrolagus sp.	0.35	2 0.20	
Ophichthus sp.	0.29	2 0.17	
Aristaeomorpha foliacea	0.27	12 0.16	238
Plesiopenaeus edwardsianus	0.21	4 0.12	234
Polymetme corythaeola	0.19	13 0.11	
Nettastoma parviceps	0.17	2 0.10	
Notacanthus sexspinis	0.17	4 0.10	
Aristaeomorpha foliacea	0.10	8 0.06	237
Physiculus sp.	0.08	2 0.05	
Polyipnus indicus	0.08	19 0.05	
Etmopterus sp.	0.02	2 0.01	
Total	168.71	100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 49
DATE :13/10/2007 GEAR TYPE: BT NO: 15 POSITION:Lat S 24°14.01
start stop duration Lon E 35°45.92
TIME :04:10:00 04:40:53 30.9 (min) Purpose : 3
LOG : 7582.36 7583.80 1.4 Region : 7400
FDEPTH: 767 757 Gear cond.: 0
BDEPTH: 767 757 Validity : 0
Towing dir: 0° Wire out : 1650 m Speed : 2.8 kn
Sorted : 60 Total catch: 59.63 Catch/hour: 115.83

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
Caelorinchus trunovi	50.50	466 43.60	239
Todarodes sagittatus	30.59	23 26.41	
Selachophidium guentheri	10.49	80 9.06	
Centrophorus moluccensis	5.24	2 4.53	246
Polymetme corythaeola	2.56	49 2.21	
Aristaeomorpha foliacea	1.81	97 1.56	240
Plesionika martia	1.59	359 1.38	
Nansenia macrolepis	1.55	16 1.34	
Bathymyrus smithi	1.52	6 1.31	
Benthodesmus sp.	1.46	2 1.26	247
Aristeus antennatus	1.42	23 1.22	242
Plesiopenaeus edwardsianus	1.36	8 1.17	244
C R A B S	1.26	39 1.09	
Aristaeomorpha foliacea	1.24	37 1.07	241
Photichthys sp.	1.00	8 0.87	
Plesiopenaeus edwardsianus	0.84	6 0.72	245
Aristeus antennatus	0.76	8 0.65	243
Etmopterus sp.	0.31	2 0.27	249
Neoraja stehmanni	0.24	2 0.21	250
Nemichthys scolopaceus	0.08	2 0.07	248
Ruvettus pretiosus	0.00	16 0.00	
Total	115.83	100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 50
DATE :13/10/2007 GEAR TYPE: BT NO: 15 POSITION:Lat S 24°13.31
start stop duration Lon E 35°26.68
TIME :08:49:56 09:21:39 31.7 (min) Purpose : 3
LOG : 7606.93 7608.56 1.6 Region : 7400
FDEPTH: 21 20 Gear cond.: 0
BDEPTH: 21 20 Validity : 0
Towing dir: 0° Wire out : 120 m Speed : 3.1 kn
Sorted :2024 Total catch: 2023.86 Catch/hour: 3828.23

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
Decapterus russelli	2102.16	210216 54.91	254
Decapterus macrosoma	1068.20	90995 27.90	253
Chelonia mydas	453.97	6 11.86	252
Sphyraena acutipinnis	54.68	3889 1.43	255
Scomberomorus commerson	45.40	9 1.19	251
Loligo vulgaris	34.60	1600 0.90	
Pagellus natalenses	32.74	7627 0.86	
Leiognathus elongatus	19.35	9229 0.51	
Thamnaconus fajardoi	14.28	74 0.37	
Scomber japonicus	2.59	74 0.07	
Torquigener hypselogenion	0.26	36 0.01	
Total	3828.23	100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 51
DATE :13/10/2007 GEAR TYPE: BT NO: 20 POSITION:Lat S 23°53.15
start stop duration Lon E 35°38.66
TIME :12:35:29 13:05:42 30.2 (min) Purpose : 3
LOG : 7636.10 7637.68 1.6 Region : 7400
FDEPTH: 174 180 Gear cond.: 0
BDEPTH: 174 180 Validity : 0
Towing dir: 0° Wire out : 430 m Speed : 3.1 kn
Sorted : 293 Total catch: 292.74 Catch/hour: 581.22

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers		SAMP
Macrorhamphosus scolopax	194.04	15524	33.38	
Sphyraena acutipinnis	167.27	1342	28.78	257
Ariomma indica	150.75	1561	25.94	258
Loligo vulgaris	21.05	145	3.62	
Decapterus macrosoma	14.67	596	2.52	260
Rhinobatos annulatus	6.25	2	1.08	
Ateleopus natalensis	5.94	26	1.02	
Decapterus kurroides	4.94	83	0.85	259
Saurida undosquamis	3.14	24	0.54	256
Pagellus bellottii natalensis	2.76	26	0.47	
Satyrichthys adeni	2.56	2	0.44	
Scyllarides elisabethae	2.08	4	0.36	
Priacanthus hamrur	1.25	6	0.22	
Decapterus russelli	1.19	46	0.20	261
Scomber japonicus	0.97	6	0.17	
Lagocephalus guntheri	0.79	14	0.14	
Lepidotrigla alcocki	0.75	34	0.13	
Antigonia cf rubescens	0.46	20	0.08	
Kentrocapros rosapinto	0.34	6	0.06	
Total	581.22		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 52
DATE :13/10/2007 GEAR TYPE: BT NO: 15 POSITION:Lat S 23°57.58
start stop duration Lon E 35°51.55
TIME :15:11:58 15:45:54 33.9 (min) Purpose : 3
LOG : 7653.23 7654.85 1.6 Region : 7400
FDEPTH: 831 814 Gear cond.: 0
BDEPTH: 831 814 Validity : 0
Towing dir: 0° Wire out : 1730 m Speed : 2.9 kn
Sorted : 67 Total catch: 66.83 Catch/hour: 118.14

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers		SAMP
Caelorinchus trunovi	49.15	725	41.60	262
Loligo forbesi	16.44	9	13.92	
Coloconger scholesi	10.20	32	8.63	
Nansenia macrolepis	6.97	92	5.90	
Plesiopenaeus edwardsianus	6.84	175	5.79	267
Laemonema globiceps	6.17	117	5.22	
Hoplobrotula gnathopus	4.38	53	3.71	
Deania quadrispinosum	4.01	2	3.40	265
Selachophidium guentheri	3.98	46	3.37	263
LITHODIDAE	1.96	2	1.66	
Aristeus antennatus	1.96	148	1.66	269
Raja stenorhyncus	1.56	2	1.32	266
Plesiopenaeus edwardsianus	1.47	140	1.24	268
Nettastoma parviceps	1.27	9	1.08	
Bathypterois phenax	0.67	18	0.57	264
Aristeus antennatus	0.62	72	0.52	270
Heterocarpus tricarinatus	0.25	14	0.21	
Sicyonia sp.	0.09	14	0.07	
Bathypterois guentheri	0.08	2	0.07	
C R A B S	0.07	7	0.06	
Notacanthus sexspinis	0.04	2	0.03	
Total	118.18		100.03	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 53
DATE :14/10/2007 GEAR TYPE: BT NO: 20 POSITION:Lat S 23°34.03
start stop duration Lon E 35°35.79
TIME :03:31:28 04:01:45 30.3 (min) Purpose : 3
LOG : 7740.27 7741.85 1.6 Region : 7400
FDEPTH: 61 64 Gear cond.: 0
BDEPTH: 61 64 Validity : 0
Towing dir: 0° Wire out : 160 m Speed : 3.1 kn
Sorted : 8 Total catch: 7.92 Catch/hour: 15.70

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers		SAMP
Echeneis naucrates	8.23	4	52.40	
Macrorhamphosus scolopax	2.68	190	17.05	
Unidentified fish	1.47	12	9.34	
Loligo vulgaris	1.17	119	7.45	
Tetrosomus concatenatus	1.09	2	6.94	
Sepia australis	0.44	10	2.78	
Diodon sp.	0.40	2	2.53	
Decapterus macrosoma	0.20	10	1.26	
Trachinocephalus myops	0.08	6	0.51	
Upeneus bensasi	0.02	2	0.13	
Total	15.76		100.38	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 54
DATE :14/10/2007 GEAR TYPE: BT NO: 15 POSITION:Lat S 23°32.33
start stop duration Lon E 35°52.19
TIME :06:46:16 07:18:03 31.8 (min) Purpose : 3
LOG : 7761.36 7762.80 1.4 Region : 7400
FDEPTH: 553 539 Gear cond.: 0
BDEPTH: 553 539 Validity : 0
Towing dir: 0° Wire out : 1400 m Speed : 2.7 kn
Sorted : 50 Total catch: 50.16 Catch/hour: 94.67

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers		SAMP
Neoepinnula orientalis	19.35	143	20.44	275
Myctophum sp.	16.99	504	17.94	
Synagrops japonicus	16.68	45	17.62	273
Chlorophthalmus agassizi	11.32	177	11.96	277
Haliporoides triarthrus	4.34	342	4.59	279
Plesionika martia	3.83	1112	4.05	
Gonorhynchus gonorhynchus	3.81	42	4.03	272
Neoscombrops annectens	3.55	32	3.75	274
Haliporoides triarthrus	2.62	123	2.77	280
C R A B S	2.15	102	2.27	
Poecilopsetta zanzibarensis	1.81	11	1.91	
Ommastrephes bartrami	1.64	13	1.73	
Squalus mitsukurii	1.44	6	1.52	278
Cynoglossus cf marleyi	1.04	68	1.10	
Caelorinchus trunovi	0.74	6	0.78	271
Cubiceps sp.	0.55	8	0.58	276
Lestrolepis intermedia	0.42	26	0.44	
Setarches guentheri	0.34	4	0.36	
Aristaeomorpha foliacea	0.25	8	0.26	281
Xenolepidichthys dagleishi	0.23	4	0.24	
Sepia pharaonis	0.23	2	0.24	
Bathyuroconger vicinus	0.21	2	0.22	
Etmopterus lucifer	0.19	4	0.20	
Satyrichthys adeni	0.13	6	0.13	
Bathymyrus smithi	0.11	4	0.12	
Peristedion weberi	0.11	4	0.12	
Malacocephalus laevis	0.09	8	0.10	
Polymetme corythaeola	0.09	2	0.09	
Satyrichthys investigatoris	0.07	2	0.07	
Chaunax pictus	0.02	4	0.02	
Polyipnus indicus	0.02	2	0.02	
Total	94.35		99.67	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 55
DATE :14/10/2007 GEAR TYPE: BT NO: 15 POSITION:Lat S 23°15.24
start stop duration Lon E 35°54.59
TIME :10:51:25 11:24:31 33.1 (min) Purpose : 3
LOG : 7787.82 7789.52 1.7 Region : 7400
FDEPTH: 564 557 Gear cond.: 0
BDEPTH: 564 557 Validity : 0
Towing dir: 0° Wire out : 1250 m Speed : 3.1 kn
Sorted : 91 Total catch: 90.86 Catch/hour: 164.70

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers		SAMP
Neoepinnula orientalis	42.69	277	25.92	282
Polymetme corythaeola	33.72	1031	20.47	
Squalus sp.	10.15	33	6.16	
Plesionika martia	8.19	1430	4.97	
Chlorophthalmus agassizi	7.94	114	4.82	284
Ommastrephes bartrami	7.65	47	4.64	
Selachophidium guentheri	6.87	98	4.17	286
Caelorinchus trunovi	6.22	24	3.78	288
Synagrops japonicus	4.86	45	2.95	285
Malacocephalus laevis	4.51	47	2.74	287
LITHODIDAE	4.44	199	2.70	
Haliporoides triarthrus	3.90	118	2.37	298
Cynoglossus sp.	3.79	199	2.30	
Gonorhynchus gonorhynchus	3.57	36	2.17	283
Aristaeomorpha foliacea	3.15	100	1.92	300
Chaeceon macphersoni	1.81	2	1.10	
Poecilopsetta zanzibarensis	1.70	9	1.03	
Haliporoides triarthrus	1.38	67	0.84	299
Setarches guentheri	1.34	11	0.81	
Chaunax sp.	0.94	7	0.57	
Sepia pharaonis	0.92	16	0.56	
Satyrichthys adeni	0.69	15	0.42	
Polyipnus indicus	0.67	96	0.41	
Symphurus ocellatus	0.62	56	0.37	
PORTUNIDAE	0.56	16	0.34	
Etmopterus lucifer	0.42	11	0.25	
Aristeus antennatus	0.38	22	0.23	
Beryx splendens	0.34	2	0.21	
Halieutaea fitzsimonsi	0.34	2	0.21	
Lestrolepis intermedia	0.31	33	0.19	
Xenolepidichthys dagleishi	0.29	5	0.18	
Physiculus natalensis	0.22	5	0.13	
Nephropsis stewarti	0.11	2	0.07	
Total	164.70		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 56
DATE :14/10/2007 GEAR TYPE: BT NO: 20 POSITION:Lat S 23°15.18
start stop duration Lon E 35°40.78
TIME :13:27:58 14:03:13 35.3 (min) Purpose : 3
LOG : 7803.96 7805.68 1.7 Region : 7400
FDEPTH: 156 151 Gear cond.: 0
BDEPTH: 156 151 Validity : 0
Towing dir: 0° Wire out : 360 m Speed : 2.9 kn
Sorted : 223 Total catch: 222.91 Catch/hour: 379.42

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Seriola lalandi	339.57	34	89.50	
Loligo vulgaris	18.38	701	4.85	
Rhinobatos annulatus	9.70	3	2.56	
Emmelichthys nitidus	4.19	419	1.10	
Myliobatis aquila	2.74	2	0.72	
Epinephelus poecilonotus	1.74	2	0.46	
Ibacus novemdentatus	1.14	2	0.30	
Polysteganus coeruleopunctatus	0.43	2	0.11	
Monocentris japonicus	0.37	3	0.10	
Synodus sp.	0.31	5	0.08	
Saurida undosquamis	0.27	5	0.07	
Callanthias sp.	0.15	3	0.04	
Fistularia petimba	0.15	2	0.04	
Decapterus kurroides	0.10	3	0.03	
Kentrocapros rosapinto	0.10	2	0.03	
Ariomma indica	0.03	2	0.01	
Decapterus macrosoma	0.03	2	0.01	
Total	379.42		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 57
DATE :15/10/2007 GEAR TYPE: BT NO: 15 POSITION:Lat S 22°57.04
start stop duration Lon E 35°52.35
TIME :03:04:08 03:34:14 30.1 (min) Purpose : 3
LOG : 7909.77 7911.38 1.6 Region : 7400
FDEPTH: 486 489 Gear cond.: 0
BDEPTH: 486 489 Validity : 0
Towing dir: 0° Wire out : 1350 m Speed : 3.2 kn
Sorted : 72 Total catch: 72.34 Catch/hour: 144.20

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Neoepinnula orientalis	28.50	409	19.77	293
Saurida undosquamis	17.94	70	12.44	295
Chlorophthalmus agassizi	12.16	275	8.43	294
Lestrolepis intermedia	11.10	528	7.70	
Myctophum sp.	9.93	1411	6.88	
Squalus mitsukurii	7.08	6	4.91	
Polyipnus indicus	7.08	2456	4.91	
Zenopsis conchifer	6.88	2	4.77	
Decapterus tabl	5.30	6	3.68	
Loligo vulgaris	4.98	40	3.46	
Chascanopsetta lugubris	4.03	34	2.79	
Synagrops japonicus	3.49	56	2.42	291
Cubiceps sp.	3.11	42	2.16	289
Tydemania navigatoris	2.33	4	1.62	
Cynoglossus cf marleyi	2.25	76	1.56	
Haliporoides triarthrus	2.23	203	1.55	296
Neoscombrops annectens	2.09	14	1.45	290
Haliporoides triarthrus	2.09	0	1.45	
Haliporoides triarthrus	1.93	114	1.34	297
Xenolepidichthys dagleishi	1.67	50	1.16	
Satyrichthys sp.	1.50	52	1.04	
Satyrichthys investigatoris	1.30	8	0.90	
Caelorinchus trunovi	1.28	26	0.88	292
Centrophorus granulosus	0.98	2	0.68	
Champsodon capensis	0.82	46	0.57	
Sepia australis	0.54	4	0.37	
Polymetme corythaeola	0.50	36	0.35	
Lophiodes mutilus	0.36	2	0.25	
Gonorhynchus gonorhynchus	0.32	4	0.22	
Symphurus sp.	0.24	24	0.17	
SEPIIDAE	0.20	8	0.14	
Total	144.20		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 58
DATE :15/10/2007 GEAR TYPE: BT NO: 20 POSITION:Lat S 22°57.16
start stop duration Lon E 35°40.96
TIME :06:17:16 06:49:46 32.5 (min) Purpose : 3
LOG : 7926.22 7927.88 1.7 Region : 7400
FDEPTH: 178 175 Gear cond.: 0
BDEPTH: 178 175 Validity : 0
Towing dir: 0° Wire out : 500 m Speed : 3.1 kn
Sorted : 46 Total catch: 46.45 Catch/hour: 85.78

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Satyrichthys adeni	38.04	111	44.35	
Loligo vulgaris	13.85	493	16.15	
Lepidotrigla alcocki	10.03	417	11.69	
Auxis thazard	4.14	4	4.82	306
Decapterus kurroides	3.19	44	3.72	304
Pagellus natalenses	2.81	37	3.27	302
Saurida undosquamis	2.79	17	3.25	301
Macrorhamphosus scolopax	1.59	153	1.85	
Dactyloptena peterseni	1.09	7	1.27	
Sepia australis	0.74	4	0.86	
Myliobatis aquila	0.69	2	0.80	
Decapterus macrosoma	0.68	22	0.80	303
Argentina sp.	0.66	113	0.78	
Sepia sp.	0.66	7	0.78	
Kentrocapros rosapinto	0.61	7	0.71	
LOPHIIDAE	0.61	2	0.71	
Trachinocephalus myops	0.57	13	0.67	
Ommastrephes bartrami	0.55	2	0.65	
Uranoscopus archionema	0.54	2	0.62	
Decapterus macarellus	0.50	9	0.58	305
Fistularia petimba	0.39	2	0.45	
Narcine rierai	0.33	2	0.39	
Ariomma indica	0.17	6	0.19	
Satyrichthys investigatoris	0.13	4	0.15	
Synodus CF dermatogenys	0.09	2	0.11	
Citharoides macrolepis	0.07	2	0.09	
Cynoglossus cf marleyi	0.07	2	0.09	
Ariosoma sp.	0.07	2	0.08	
Narkidae sp.	0.06	2	0.08	
BOTHIDAE	0.03	2	0.03	
Samaris costae	0.02	2	0.02	
Total	85.78		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 59
DATE :15/10/2007 GEAR TYPE: BT NO: 20 POSITION:Lat S 22°36.87
start stop duration Lon E 35°34.23
TIME :10:13:38 10:33:52 20.2 (min) Purpose : 3
LOG : 7954.82 7955.59 0.8 Region : 7400
FDEPTH: 32 27 Gear cond.: 9
BDEPTH: 32 27 Validity : 9
Towing dir: 0° Wire out : 110 m Speed : 2.3 kn
Sorted : 1 Total catch: 1.42 Catch/hour: 4.21

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Parupeneus indicus	2.61	6	61.97	
Parupeneus barberinus	0.86	3	20.42	
Loligo vulgaris	0.42	98	9.86	
Priacanthus hamrur	0.24	3	5.63	
Macrorhamphosus scolopax	0.09	9	2.11	
Total	4.21		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 60
DATE :16/10/2007 GEAR TYPE: BT NO: 15 POSITION:Lat S 22°37.16
start stop duration Lon E 35°58.05
TIME :02:34:42 03:05:26 30.7 (min) Purpose : 3
LOG : 8026.32 8027.85 1.5 Region : 7400
FDEPTH: 760 756 Gear cond.: 0
BDEPTH: 760 756 Validity : 0
Towing dir: 0° Wire out : 1540 m Speed : 3.0 kn
Sorted : 22 Total catch: 21.80 Catch/hour: 42.57

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Caelorinchus trunovi	21.00	256	49.32	307
Plesionika martia	3.89	646	9.13	
Plesiopenaeus edwardsianus	2.85	33	6.70	308
Coloconger scholesi	2.07	10	4.86	
Chimera sp.	1.66	4	3.90	
Aristeus antennatus	1.58	51	3.72	310
Benthodesmus sp.	1.37	2	3.21	
Sepia sp.	1.19	2	2.80	
Aristaeomorpha foliacea	1.15	59	2.71	313
Nansenia macrolepis	1.11	16	2.62	
Aristaeomorpha foliacea	1.09	35	2.57	312
Plesiopenaeus edwardsianus	0.45	10	1.06	309
Lophiodes mutilus	0.41	2	0.96	
Echelus myrus	0.38	59	0.90	
Scombrolabrax heterolepis	0.36	2	0.85	
Aristeus antennatus	0.33	20	0.78	311
Satyrichthys adeni	0.27	12	0.64	
Loligo vulgaris	0.27	4	0.64	
Neoscombrops annectens	0.21	2	0.50	
Etmopterus lucifer	0.21	4	0.50	
Nettastoma parviceps	0.18	4	0.41	
Neoscopelus macrolepidotus	0.13	4	0.29	
Decapterus macrosoma	0.10	4	0.23	
Antigonia rubescens	0.09	4	0.20	
Malacosteus sp.	0.08	2	0.20	
Neobythites analis	0.07	4	0.17	
Argentina euchus	0.03	2	0.07	
MYCTOPHIDAE	0.02	2	0.05	
Total	42.57		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 61
DATE :16/10/2007 GEAR TYPE: BT NO: 18 POSITION:Lat S 22°36.48
start stop duration Lon E 35°42.77
TIME :05:12:11 05:40:34 28.4 (min) Purpose : 3
LOG : 8043.85 8045.34 1.5 Region : 7400
FDEPTH: 264 261 Gear cond.: 0
BDEPTH: 264 261 Validity : 0
Towing dir: 0° Wire out : 650 m Speed : 3.1 kn
Sorted : 39 Total catch: 38.78 Catch/hour: 82.01

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Narcine rierai	21.71	125	26.47	
Satyrichthys adeni	18.51	40	22.57	
Saurida undosquamis	7.55	61	9.21	314
Squalus mitsukurii	4.53	6	5.52	
Sepia prashadi	4.10	57	5.00	
Gonorhynchus gonorhynchus	3.81	262	4.64	
Peristedion weberi	3.53	182	4.31	
Pliotrema warreni	3.17	4	3.87	
Lepidotrigla alcocki	2.14	97	2.60	
Uranoscopus archionema	1.95	19	2.37	
Priacanthus hamrur	1.76	30	2.14	
Loligo vulgaris	1.67	17	2.04	
Scyllarides elisabethae	1.29	2	1.57	
Cynoglossus cf marleyi	1.21	34	1.47	
Citharoides macrolepis	1.10	17	1.34	
Dactyloptena peterseni	1.08	8	1.32	
Scorpaena scrofa	0.78	2	0.96	
Macrorhamphosus scolopax	0.74	66	0.90	
Parribacus antarcticus	0.49	4	0.59	
Champsodon capensis	0.34	40	0.41	
Hoplichthys acanthopleurus	0.32	19	0.39	
Cubiceps sp.	0.19	2	0.23	
Rexea prometheoides	0.06	2	0.08	
Total	82.01		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 62
DATE :16/10/2007 GEAR TYPE: BT NO: 18 POSITION:Lat S 22°34.00
start stop duration Lon E 35°34.02
TIME :07:15:07 07:42:19 27.2 (min) Purpose : 3
LOG : 8057.46 8058.81 1.4 Region : 7400
FDEPTH: 26 28 Gear cond.: 0
BDEPTH: 26 28 Validity : 0
Towing dir: 0° Wire out : 100 m Speed : 3.0 kn
Sorted : 13 Total catch: 12.91 Catch/hour: 28.48

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Aprion virescens	22.40	2	78.65	315
Bleekeria sp.	3.09	463	10.85	
Leiognathus elongatus	1.54	658	5.42	
Trachinocephalus myops	0.55	29	1.94	
Peristedion weberi	0.51	29	1.78	
Minilabrus sp.	0.28	46	0.97	
Hoplichthys acanthopleurus	0.11	7	0.39	
Total	28.48		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 63
DATE :16/10/2007 GEAR TYPE: BT NO: 18 POSITION:Lat S 22°16.16
start stop duration Lon E 35°39.84
TIME :11:12:02 11:42:19 30.3 (min) Purpose : 3
LOG : 8088.00 8089.49 1.5 Region : 7400
FDEPTH: 265 270 Gear cond.: 0
BDEPTH: 265 270 Validity : 0
Towing dir: 0° Wire out : 620 m Speed : 2.9 kn
Sorted : 111 Total catch: 110.83 Catch/hour: 219.68

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Satyrichthys adeni	90.78	212	41.32	
Ariomma indica	26.46	285	12.05	317
Argentina euchus	24.68	1796	11.23	
Palinurus delagoae	15.70	40	7.15	319
Saurida undosquamis	12.98	91	5.91	316
Palinurus delagoae	10.56	30	4.81	320
Citharoides macrolepis	5.75	75	2.62	
Sepia pharaonis	4.90	93	2.23	
Narcine rierai	4.10	34	1.87	
Pliotrema warreni	4.10	4	1.87	
Raja cf lanceorostrata	3.03	2	1.38	
Illex coindetii	2.70	24	1.23	
Priacanthus hamrur	2.00	36	0.91	
Sphyraena acutipinnis	1.92	14	0.88	318
Arothron incognitus	1.78	2	0.81	
Neoepinnula orientalis	1.59	24	0.72	
Lepidotrigla alcocki	1.33	52	0.60	
Chelidonichthys kumu	1.13	6	0.51	
Scyllarides elisabethae	0.81	2	0.37	
PORTUNIDAE	0.73	6	0.33	
Uranoscopus archionema	0.56	4	0.25	
Macrorhamphosus scolopax	0.54	46	0.24	
Cynoglossus capensis	0.50	16	0.23	
Champsodon capensis	0.44	79	0.20	
Halieutaea fitzsimonsi	0.20	2	0.09	
Tylerius spinosissimus	0.18	4	0.08	
Hoplichthys acanthopleurus	0.14	6	0.06	
Laeops nigromaculatus	0.11	2	0.05	
Laeops pectoralis	0.06	2	0.03	
Total	219.76		100.04	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 64
DATE :16/10/2007 GEAR TYPE: BT NO: 15 POSITION:Lat S 22°17.90
start stop duration Lon E 35°55.18
TIME :14:24:56 14:54:57 30.0 (min) Purpose : 3
LOG : 8106.80 8108.24 1.4 Region : 7400
FDEPTH: 764 754 Gear cond.: 0
BDEPTH: 764 754 Validity : 0
Towing dir: 0° Wire out : 1500 m Speed : 2.9 kn
Sorted : 26 Total catch: 25.90 Catch/hour: 51.76

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Caelorinchus trunovi	21.19	222	40.93	321
Histioteuthis miranda	6.92	6	13.36	
Plesionika martia	4.86	851	9.38	
Nansenia macrolepis	4.26	64	8.23	
Plesiopenaeus edwardsianus	3.94	30	7.61	322
Coloconger scholesi	3.82	14	7.38	
Synagrops japonicus	1.40	2	2.70	
Aristaeomorpha foliacea	0.86	44	1.66	324
Nettastoma parviceps	0.74	8	1.43	
Selachophidium guentheri	0.74	40	1.43	
Plesiopenaeus edwardsianus	0.58	10	1.12	323
Aristeus antennatus	0.50	16	0.97	326
Polymetme corythaeola	0.38	8	0.73	
Aristaeomorpha foliacea	0.34	18	0.66	325
Chauliodus sloani	0.31	12	0.60	
Ommastrephes bartrami	0.28	2	0.54	
Sicyonia sp.?	0.26	14	0.50	
Octopus sp.	0.16	2	0.31	
MYCTOPHIDAE	0.12	2	0.22	
Laemonema globiceps	0.10	2	0.19	
Hoplostethus mediterraneus	0.03	4	0.05	
Total	51.76		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 65
DATE :17/10/2007 GEAR TYPE: BT NO: 18 POSITION:Lat S 21°52.95
start stop duration Lon E 35°35.16
TIME :05:10:16 05:40:43 30.4 (min) Purpose : 3
LOG : 8172.31 8173.82 1.5 Region : 7400
FDEPTH: 237 236 Gear cond.: 0
BDEPTH: 237 236 Validity : 0
Towing dir: 0° Wire out : 550 m Speed : 3.0 kn
Sorted : 711 Total catch: 711.20 Catch/hour: 1401.84

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Ariomma indica	1173.19	11653	83.69	328
Ibacus novemdentatus	63.86	536	4.56	
Decapterus macarellus	45.73	473	3.26	331
Cookeolus boops	25.43	6	1.81	327
Decapterus kurroides	20.11	154	1.43	330
Satyrichthys adeni	9.93	568	0.71	
Sphyraena acutipinnis	9.30	79	0.66	
Pagellus bellottii natalensis	9.15	126	0.65	
Sepia pharaonis	7.73	173	0.55	
Priacanthus hamrur	5.14	87	0.37	
Scorpaena scrofa	4.89	16	0.35	
Lepidotrigla multispinosus	4.42	16	0.31	
Loligo duvauceli	3.47	79	0.25	
Narcine rierai	3.31	32	0.24	
Decapterus macrosoma	2.68	32	0.19	329
Centrophorus uyato	2.60	2	0.19	332
Antigonia cf rubescens	2.52	79	0.18	
Saurida undosquamis	2.37	32	0.17	
Scyllarides elisabethae	2.23	6	0.16	
Cynoglossus cf marleyi	2.05	79	0.15	
Engraulis cf capensis	1.10	142	0.08	
Chelidonichthys kumu	0.63	16	0.04	
Total	1401.84		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 66
DATE :17/10/2007 GEAR TYPE: BT NO: 15 POSITION:Lat S 21°51.97
start stop duration Lon E 35°48.56
TIME :07:58:32 08:29:32 31.0 (min) Purpose : 3
LOG : 8189.12 8190.58 1.5 Region : 7400
FDEPTH: 742 758 Gear cond.: 0
BDEPTH: 742 758 Validity : 0
Towing dir: 0° Wire out : 1600 m Speed : 2.8 kn
Sorted : 119 Total catch: 119.14 Catch/hour: 230.58

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Centrophorus moluccensis	51.00	8	22.12	
Centrophorus lusitanicus	41.61	2	18.05	
Dasyatis brevicaudata	38.90	6	16.87	
Caelorinchus trunovi	28.45	77	12.34	334
Nansenia macrolepis	28.16	137	12.21	
Histioteuthis miranda	7.53	8	3.27	
Coloconger scholesi	6.74	23	2.92	
Selachophidium guentheri	4.22	45	1.83	
Chimera sp.	3.33	8	1.44	
Bathyclupea sp. A	2.85	14	1.23	
Synagrops japonicus	2.13	15	0.92	333
Nettastoma parviceps	1.82	19	0.79	
Chaunax sp.	1.74	2	0.76	
Plesiopenaeus edwardsianus	1.59	10	0.69	
Aristaeomorpha foliacea	1.55	75	0.67	335
Plesionika martia	1.47	228	0.64	
Parapagurus cf pilosimanus	1.12	23	0.49	
Laemonema globiceps	1.06	39	0.46	
Polymetme corythaeola	0.89	27	0.39	
Haliporoides triarthrus	0.87	19	0.38	337
Malacocephalus laevis	0.81	6	0.35	
Aristeus antennatus	0.54	17	0.24	338
Bathyuroconger vicinus	0.41	10	0.18	
Aristaeomorpha foliacea	0.41	12	0.18	336
Chauliodus sloani	0.39	14	0.17	
Sicyonia sp.?	0.35	17	0.15	
Synaphobranchus affinis	0.35	4	0.15	
Polyipnus indicus	0.21	15	0.09	
Bathypterois sp.	0.09	2	0.04	
Total	230.58		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 67
DATE :17/10/2007 GEAR TYPE: BT NO: 15 POSITION:Lat S 21°36.11
start stop duration Lon E 35°41.95
TIME :12:24:04 12:54:09 30.1 (min) Purpose : 3
LOG : 8218.36 8219.90 1.5 Region : 7400
FDEPTH: 601 599 Gear cond.: 0
BDEPTH: 601 599 Validity : 0
Towing dir: 0° Wire out : 1210 m Speed : 3.1 kn
Sorted : 34 Total catch: 34.49 Catch/hour: 68.82

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Diaphus effulgens	17.76	1393	25.80	
Caelorinchus trunovi	8.78	100	12.76	339
Cubiceps sp.	4.99	66	7.25	342
Haliporoides triarthrus	4.83	174	7.02	344
Haliporoides triarthrus	4.81	126	6.99	343
Illex coindetii	3.05	30	4.44	
Histioteuthis miranda	3.01	4	4.38	
Synagrops japonicus	2.77	30	4.03	341
Plesionika martia	2.10	591	3.04	
Nephropsis stewarti	1.98	52	2.87	
Ateleopus natalensis	1.60	10	2.32	
Trichiurus lepturus	1.42	26	2.06	
Heterocarpus tricarinatus	1.34	46	1.94	
Bathypterois sp.	1.28	20	1.86	
LITHODIDAE	1.20	48	1.74	
Aristaeomorpha foliacea	1.04	30	1.51	345
Neoepinnula orientalis	0.92	10	1.33	340
Aristeus antennatus	0.78	28	1.13	347
Malacocephalus laevis	0.62	14	0.90	
Ommastrephes bartrami	0.58	6	0.84	
Chascanopsetta lugubris	0.56	6	0.81	
Lestrolepis intermedia	0.46	28	0.67	
Histioteuthis dofleini	0.44	4	0.64	
Nettastoma parviceps	0.34	8	0.49	
Aristaeomorpha foliacea	0.32	16	0.46	346
Aristeus antennatus	0.30	18	0.43	348
Sepia pharaonis	0.30	4	0.43	
Nansenia macrolepis	0.24	6	0.35	
Chlorophthalmus agassizi	0.24	2	0.35	
Tydemania sp.	0.17	2	0.25	
Hoplostethus mediterraneus	0.11	2	0.16	
Cynoglossus capensis	0.10	10	0.14	
Laemonema globiceps	0.08	2	0.12	
Sicyonia sp.	0.08	24	0.12	
Polyipnus indicus	0.08	8	0.12	
Pentaceros capensis	0.07	2	0.10	
Etmopterus lucifer	0.04	2	0.06	
Epigonus robustus	0.04	2	0.06	
Cantherhines dumerilii	0.03	6	0.04	
Total	68.82		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 68
DATE :17/10/2007 GEAR TYPE: BT NO: 18 POSITION:Lat S 21°35.03
start stop duration Lon E 35°32.27
TIME :14:54:40 15:25:16 30.6 (min) Purpose : 3
LOG : 8233.92 8235.33 1.4 Region : 7400
FDEPTH: 153 135 Gear cond.: 0
BDEPTH: 153 135 Validity : 0
Towing dir: 0° Wire out : 410 m Speed : 2.8 kn
Sorted : 124 Total catch: 123.72 Catch/hour: 242.59

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Loligo vulgaris	81.08	2559	33.42	
Epinephelus poecilonotus	33.63	8	13.86	350
Cheimerius nufar	28.73	10	11.84	
Cookeolus boops	28.53	10	11.76	349
Centrophorus moluccensis	21.76	4	8.97	351
Polysteganus coeruleopunctatus	17.16	45	7.07	
Decapterus macrosoma	8.35	80	3.44	
Callanthias sp.	5.45	318	2.25	
Gymnothorax sp.	5.14	4	2.12	
Histiopterus typus	4.35	14	1.79	
Panulirus penicillatus	3.25	2	1.34	
Decapterus kurroides	2.57	78	1.06	
Parascolopsis eriomma	2.18	20	0.90	
Peristedion adeni	0.22	12	0.09	
Bodianus trilineatus	0.20	2	0.08	
Total	242.59		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 69
DATE :17/10/2007 GEAR TYPE: PT NO: 2 POSITION:Lat S 21°14.16
start stop duration Lon E 35°35.86
TIME :19:05:45 19:34:43 29.0 (min) Purpose : 3
LOG : 8264.55 8265.93 1.4 Region : 7400
FDEPTH: 0 63 Gear cond.: 0
BDEPTH: 186 195 Validity : 0
Towing dir: 0° Wire out : 190 m Speed : 2.9 kn
Sorted : 8 Total catch: 8.40 Catch/hour: 17.41

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Diaphus splendidus	9.35	3461	53.69	
Decapterus macrosoma	2.69	39	15.48	
Rexea prometheoides	1.89	89	10.83	
Ariomma indica	1.45	15	8.33	
Loligo vulgaris	0.73	41	4.17	
Decapterus russelli	0.68	17	3.93	
Argentina euchus	0.25	15	1.43	
Ariomma melanum	0.23	21	1.31	
Decapterus kurroides	0.08	4	0.48	
Astronesthes martensii	0.06	4	0.36	
Total	17.41		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 70
DATE :18/10/2007 GEAR TYPE: BT NO: 18 POSITION:Lat S 21°15.76
start stop duration Lon E 35°39.69
TIME :03:18:55 03:49:08 30.2 (min) Purpose : 3
LOG : 8309.33 8310.99 1.7 Region : 7400
FDEPTH: 400 394 Gear cond.: 0
BDEPTH: 400 394 Validity : 0
Towing dir: 0° Wire out : 910 m Speed : 3.3 kn
Sorted : 164 Total catch: 164.37 Catch/hour: 326.34

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Chaunax sp.	180.77	284	55.40	
Saurida undosquamis	78.42	522	24.03	352
Lestrolepis intermedia	17.77	1026	5.45	
Synagrops japonicus	6.59	127	2.02	354
Neoscombrops annectens	5.90	121	1.81	353
Illex coindetii	4.17	32	1.28	
Eridacnis sinuans	3.51	75	1.08	
Zenion sp.	3.40	530	1.04	
Chlorophthalmus agassizi	2.86	75	0.88	
Cubiceps sp.	2.68	58	0.82	355
Metapenaeopsis andamanensis	1.69	18	0.52	359
Aristeus antennatus	1.59	135	0.49	356
Neobythites kenyaensis	1.57	6	0.48	
Polymetme corythaeola	1.55	50	0.47	
Selachophidium guentheri	1.35	42	0.41	
Rexea prometheoides	1.23	81	0.38	
Synchiropus marmoratus	0.99	2	0.30	
Aristeus antennatus	0.95	109	0.29	357
Hoplobrotula gnathopus	0.91	2	0.28	
Citharoides macrolepis	0.89	6	0.27	
Cynoglossus cf marleyi	0.89	20	0.27	
Sepia sp.	0.83	8	0.26	
Synodus CF dermatogenys	0.79	36	0.24	
Narcine rierai	0.71	6	0.22	
Metapenaeopsis andamanensis	0.58	8	0.18	358
Neobythides cf somaliaensis	0.44	6	0.13	
Sepia nueva sp.	0.38	6	0.12	
Polyipnus indicus	0.36	38	0.11	
Halaelurus lutarius	0.35	2	0.11	
Poecilopsetta zanzibarensis	0.28	10	0.09	
Calappa sp.	0.26	6	0.08	
Halieutaea fitzsimonsi	0.26	2	0.08	
Thamnaconus fajardoi	0.24	2	0.07	
Scorpaenoid sp.	0.23	2	0.07	
Chaunax sp.	0.22	6	0.07	0
Synaphobranchus affinis	0.20	2	0.06	
Chlorophthalmus agassizi	0.18	6	0.05	0
Argentina euchus	0.16	10	0.05	
Gonorhynchus gonorhynchus	0.10	2	0.03	
Xenolepidichthys dalgleishi *	0.08	8	0.02	
Xenolepidichthys dagleishi	0.08	8	0.02	
Total	326.41		100.02	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 71
DATE :18/10/2007 GEAR TYPE: BT NO: 18 POSITION:Lat S 21°14.61
start stop duration Lon E 35°35.72
TIME :05:52:22 06:22:56 30.6 (min) Purpose : 3
LOG : 8326.76 8328.29 1.5 Region : 7400
FDEPTH: 187 186 Gear cond.: 0
BDEPTH: 187 186 Validity : 0
Towing dir: 0° Wire out : 440 m Speed : 3.0 kn
Sorted : 517 Total catch: 517.39 Catch/hour: 1015.82

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Loligo vulgaris	736.26	25421	72.48	
Decapterus macrosoma	137.24	5692	13.51	360
Polysteganus coeruleopunctatus	54.07	118	5.32	375
Decapterus russelli	28.27	695	2.78	361
Dactyloptena peterseni	9.90	35	0.97	
Scomber japonicus	8.95	224	0.88	362
Squatina africana	8.95	12	0.88	
Narcine rierai	8.13	47	0.80	
Uranoscopus archionema	5.54	12	0.55	
Ibacus novemdentatus	4.69	41	0.46	
Ateleopus natalensis	4.01	12	0.39	
Lepidotrigla alcocki	3.30	200	0.32	
Parageleus leucolomatus	2.71	12	0.27	
Halieutaea fitzsimonsi	1.53	24	0.15	
Scyllarides elisabethae	1.22	2	0.12	
Decapterus kurroides	0.82	12	0.08	
Xenolepidichthys dagleishi	0.24	12	0.02	
Total	1015.82		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 72
DATE :18/10/2007 GEAR TYPE: BT NO: 18 POSITION:Lat S 20°54.80
start stop duration Lon E 35°44.63
TIME :12:33:24 12:43:15 9.9 (min) Purpose : 3
LOG : 8377.62 8378.19 0.6 Region : 7400
FDEPTH: 107 107 Gear cond.: 0
BDEPTH: 107 107 Validity : 0
Towing dir: 0° Wire out : 250 m Speed : 3.4 kn
Sorted : 5 Total catch: 4.94 Catch/hour: 30.09

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Rhinobatos holcorhynchus	15.29	6	50.81	
Loligo vulgaris	11.88	353	39.47	
Sepia pharaonis	2.74	6	9.11	
Fistularia petimba	0.12	12	0.40	
Lophiomus setigerus	0.06	6	0.20	
Total	30.09		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 73
DATE :18/10/2007 GEAR TYPE: BT NO: 18 POSITION:Lat S 20°53.77
start stop duration Lon E 35°39.56
TIME :13:40:42 13:54:04 13.4 (min) Purpose : 3
LOG : 8385.69 8386.40 0.7 Region : 7400
FDEPTH: 59 61 Gear cond.: 0
BDEPTH: 59 61 Validity : 0
Towing dir: 0° Wire out : 170 m Speed : 3.2 kn
Sorted : 24 Total catch: 23.63 Catch/hour: 106.02

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Abalistes stellatus	66.87	63	63.07	
Loligo vulgaris	24.91	3891	23.49	
Nemipterus bipunctatus	4.76	85	4.49	363
Leiognathus elongatus	2.56	310	2.41	
Dactyloptena peterseni	2.20	4	2.07	
Lophodiodon calori	2.11	9	1.99	
Decapterus macrosoma	0.76	22	0.72	
Upeneus bensasi	0.45	18	0.43	
Trachinocephalus myops	0.45	18	0.42	
Carangoides malabaricus	0.41	9	0.39	
Pseudalutarius nasicornis	0.25	9	0.23	
Lagocephalus sceleratus	0.18	4	0.17	
Amanses cf. scopas	0.09	9	0.08	
Synodus hoshinonis	0.04	4	0.03	
Total	106.02		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 74
DATE :19/10/2007 GEAR TYPE: BT NO: 15 POSITION:Lat S 20°35.62
start stop duration Lon E 35°58.31
TIME :03:51:04 04:21:22 30.3 (min) Purpose : 3
LOG : 8476.21 8477.75 1.6 Region : 7400
FDEPTH: 721 709 Gear cond.: 0
BDEPTH: 721 709 Validity : 0
Towing dir: 0° Wire out : 1450 m Speed : 3.1 kn
Sorted : 91 Total catch: 91.39 Catch/hour: 181.02

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Caelorinchus trunovi	49.52	283	27.36	364
Polymetme corythaeola	26.64	715	14.72	
Coloconger scholesi	19.51	32	10.78	
Bathyclupea sp. A	15.55	53	8.59	
Sepia pharaonis	12.32	10	6.81	
Centrophorus granulosus	5.51	2	3.04	
Aristaeomorpha foliacea	5.13	261	2.83	370
Nansenia macrolepis	4.44	67	2.45	
Chaeceon macphersoni	3.76	6	2.08	
Aristaeomorpha foliacea	3.13	107	1.73	369
Chimera sp.	3.09	8	1.71	
Notacanthus sexspinis	2.34	12	1.29	
Synagrops japonicus	2.26	18	1.25	365
Synaphobranchus affinis	2.18	44	1.20	
Sicyonia sp.?	2.12	137	1.17	
Lithodidae	2.06	2	1.14	
Heterocarpus laevigatus	1.68	55	0.93	
Nephropsis stewarti	1.58	28	0.88	372
Deania quadrispinosum	1.57	4	0.87	
Aristeus antennatus	1.51	50	0.83	367
Neobythites analis	1.43	38	0.79	
Plesiopenaeus edwardsianus	1.41	12	0.78	373
Malacocephalus laevis	1.13	10	0.62	
Nettastoma parviceps	1.05	10	0.58	
Raja springeri	0.99	2	0.55	
Illex coindetii	0.95	4	0.53	
C R A B S	0.93	160	0.51	
Bathypterois phenax	0.89	30	0.49	
Nephropsis stewarti	0.81	26	0.45	371
Laemonema globiceps	0.63	14	0.35	
Loligo vulgaris	0.59	2	0.33	
Cataetyx cf niki	0.57	2	0.31	
Etmopterus lucifer	0.53	6	0.30	
Chauliodus sloani	0.50	18	0.27	
Halosauridae sp.	0.46	8	0.25	
Trichiurus lepturus	0.44	2	0.24	
Aristeus antennatus	0.38	18	0.21	368
Histioteuthis dofleini	0.38	4	0.21	
Bathyuroconger vicinus	0.34	8	0.19	
Ophichtys marginatus	0.25	2	0.14	
Epigonus robustus	0.22	4	0.12	
Argyropelecus gigas	0.12	2	0.07	
Black Paralepididae	0.06	2	0.03	
Ectreposebastes sp.	0.04	2	0.02	
Xenodermichthys copei	0.04	2	0.02	
Total	181.02		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 75
DATE :19/10/2007 GEAR TYPE: BT NO: 15 POSITION:Lat S 20°33.34
start stop duration Lon E 35°47.55
TIME :07:00:45 07:28:36 27.9 (min) Purpose : 3
LOG : 8497.49 8498.98 1.5 Region : 7400
FDEPTH: 62 62 Gear cond.: 0
BDEPTH: 62 62 Validity : 0
Towing dir: 0° Wire out : 180 m Speed : 3.2 kn
Sorted : 101 Total catch: 100.69 Catch/hour: 216.92

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Abalistes stellatus	77.67	67	35.80	
Bleekeria sp.	42.83	5983	19.74	
Leiognathus elongatus	41.28	6853	19.03	
Decapterus macrosoma	34.51	1252	15.91	
Carcharhinus sealei	16.37	4	7.55	
Loligo vulgaris	2.07	50	0.95	
Trachinocephalus myops	1.66	13	0.76	
Nemipterus bipunctatus	0.52	37	0.24	
Synodus binotatus	0.02	2	0.01	
Total	216.92		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 76
DATE :19/10/2007 GEAR TYPE: BT NO: 15 POSITION:Lat S 20°14.83
start stop duration Lon E 35°48.42
TIME :14:31:05 15:02:11 31.1 (min) Purpose : 3
LOG : 8557.09 8558.56 1.5 Region : 7400
FDEPTH: 55 54 Gear cond.: 0
BDEPTH: 55 54 Validity : 0
Towing dir: 0° Wire out : 155 m Speed : 2.8 kn
Sorted : 193 Total catch: 192.57 Catch/hour: 371.63

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Abalistes stellatus	223.09	222	60.03	
Lophodiodon calori	26.73	66	7.19	
Lophodiodon calori	26.73	66	7.19	
Epinephelus coioides	25.47	4	6.85	
Aprion virescens	19.59	2	5.27	
Starfish	12.87	37	3.46	
Carcharhinus sealei	9.55	4	2.57	
Lutjanus sanguineus	9.36	2	2.52	
Lethrinus nebulosus	8.11	2	2.18	
Dipterygonotus balteatus	6.33	5066	1.70	
Scomberomorus commerson	5.79	2	1.56	
Diodon hystrix	3.26	2	0.88	
Arothron stellatus	3.17	4	0.85	
Pterois miles	2.80	4	0.75	
Sepia pharaonis	2.49	12	0.67	
Ostracion cubicus	1.89	2	0.51	
Nemipterus bipunctatus	1.56	23	0.42	374
Lagocephalus sceleratus	1.52	4	0.41	
Lactoria cornuta	1.49	4	0.40	
Arothron hispidus	1.37	2	0.37	
Diodon liturosus	1.16	2	0.31	
Sea cucumber	1.16	2	0.31	
Fistularia petimba	0.60	4	0.16	
Gymnocranius grandoculis	0.54	2	0.15	
Carangoides malabaricus	0.35	2	0.10	
Nemipterus zysron	0.31	8	0.08	
Cyclichthys orbicularis	0.23	4	0.06	
Cociella sp.	0.17	12	0.05	
Canthigaster coronata	0.14	2	0.04	
Canthigaster jantinoptera	0.14	2	0.04	
Parupeneus heptacanthus	0.09	2	0.02	
Upeneus sulphureus	0.08	2	0.02	
Lactoria fornasini	0.07	4	0.02	
Epinephelus areolatus	0.04	2	0.01	
Sebastapistes mauritiana	0.04	8	0.01	
Oxycheilinus bimaculatus	0.02	2	0.01	
Synodus jaculum	0.02	2	0.01	
Apogon sp.	0.02	2	0.00	
Paracaesio xanthurus	0.01	2	0.00	
Total	398.36		107.19	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 77
DATE :21/10/2007 GEAR TYPE: BT NO: 18 POSITION:Lat S 19°47.44
start stop duration Lon E 35°30.72
TIME :03:16:20 03:42:23 26.1 (min) Purpose : 3
LOG : 8794.61 8795.90 1.3 Region : 7400
FDEPTH: 28 29 Gear cond.: 0
BDEPTH: 28 29 Validity : 0
Towing dir: 0° Wire out : 100 m Speed : 3.0 kn
Sorted : 50 Total catch: 49.79 Catch/hour: 114.67

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Decapterus macrosoma	51.94	4095	45.29	
Scomberomorus commerson	24.99	9	21.79	392
Loligo vulgaris	22.23	1575	19.38	
Upeneus bensasi	7.39	481	6.45	
Nemipterus bipunctatus	4.31	83	3.76	377
Lethrinus harak	1.91	51	1.67	376
Priacanthus cruentatus	0.50	23	0.43	
Plotosus lineatus	0.33	39	0.29	
Trachinocephalus myops	0.32	16	0.28	
Lethrinus rubrioperculatus	0.22	7	0.19	
Stephanolepis auratus	0.14	9	0.12	
Carangoides malabaricus	0.12	2	0.10	
Abalistes stellatus	0.11	2	0.10	
Scolopsis vosmeri	0.06	2	0.05	
Engyprosopon macrolepis	0.04	2	0.04	
Saurida grandisquamis	0.04	2	0.03	
Torquigener hypselogenion	0.03	2	0.02	
Total	114.67		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 78
DATE :21/10/2007 GEAR TYPE: BT NO: 18 POSITION:Lat S 19°56.17
start stop duration Lon E 35°47.16
TIME :06:17:55 06:50:31 32.6 (min) Purpose : 3
LOG : 8816.68 8818.09 1.4 Region : 7400
FDEPTH: 47 49 Gear cond.: 0
BDEPTH: 47 49 Validity : 0
Towing dir: 0° Wire out : 150 m Speed : 2.6 kn
Sorted : 136 Total catch: 136.43 Catch/hour: 251.09

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Diagramma centurio	155.15	31	61.79	393
Apogon'pale-stripe'	30.18	915	12.02	
Decapterus macrosoma	26.87	2779	10.70	
Upeneus bensasi	12.33	690	4.91	
Abalistes stellatus	9.02	6	3.59	
Lutjanus lunulatus	4.78	202	1.91	
Saurida undosquamis	4.44	121	1.77	
Upeneus moluccensis	2.41	133	0.96	
Decapterus macarellus	1.77	6	0.70	
Diodon hystrix	1.36	7	0.54	
Dipterygonotus balteatus	0.90	226	0.36	
Sphyraena acutipinnis	0.70	83	0.28	
Penaeus latisulcatus	0.42	2	0.17	
Synodus CF dermatogenys	0.24	7	0.10	
Leiognathus elongatus	0.13	17	0.05	
Cociella sp.	0.09	4	0.04	
Lethrinus harak	0.07	2	0.03	
Loligo vulgaris	0.07	6	0.03	
Sufflamen fraenatus	0.07	2	0.03	
Paramonacanthus pusillus	0.05	4	0.02	
Plotosus lineatus	0.02	2	0.01	
Engyprosopon sp.	0.01	2	0.00	
Total	251.09		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 79
DATE :21/10/2007 GEAR TYPE: BT NO: 18 POSITION:Lat S 20°5.44
start stop duration Lon E 36°7.34
TIME :09:49:32 10:21:19 31.8 (min) Purpose : 3
LOG : 8841.28 8842.81 1.5 Region : 7400
FDEPTH: 68 66 Gear cond.: 0
BDEPTH: 68 66 Validity : 0
Towing dir: 0° Wire out : 200 m Speed : 2.9 kn
Sorted : 114 Total catch: 114.26 Catch/hour: 215.65

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Aprion virescens	40.30	6	18.69	385
Lutjanus sebae	31.90	4	14.79	382
Lutjanus sanguineus	31.61	8	14.66	381
Gymnocranius grandoculis	16.61	8	7.70	386
Epinephelus flavocaeruleus	13.12	2	6.08	387
Lethrinus nebulosus	11.89	4	5.51	383
Loxodon macrorhinus	9.81	4	4.55	
Scomberomorus commerson	8.23	4	3.82	380
Cercamia cf. eremia	7.66	2284	3.55	
Upeneus bensasi	7.66	613	3.55	378
Lethrinus crocineus	6.74	2	3.12	384
Aluterus monoceros	6.08	2	2.82	
Leiognathus elongatus	5.55	1153	2.57	
Abalistes stellatus	4.06	28	1.88	
Lophodiodon calori	4.02	11	1.86	
Ostracion cubicus	3.17	4	1.47	
Sufflamen fraenatus	3.02	2	1.40	
Tetrosomus concatenatus	1.53	6	0.71	
Lactoria cornuta	1.42	2	0.66	
Parupeneus heptacanthus	0.89	21	0.41	379
Ibacus novemdentatus	0.26	2	0.12	
Dipterygonotus balteatus	0.13	28	0.06	
Total	215.65		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 80
DATE :21/10/2007 GEAR TYPE: BT NO: 18 POSITION:Lat S 19°44.42
start stop duration Lon E 36°21.21
TIME :13:57:29 14:28:35 31.1 (min) Purpose : 3
LOG : 8871.46 8873.01 1.6 Region : 7400
FDEPTH: 70 72 Gear cond.: 0
BDEPTH: 70 72 Validity : 0
Towing dir: 0° Wire out : 200 m Speed : 3.0 kn
Sorted : 166 Total catch: 166.46 Catch/hour: 321.25

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Decapterus russelli	242.97	7627	75.63	388
Scomber japonicus	32.42	895	10.09	
Abalistes stellatus	12.08	8	3.76	
Upeneus bensasi	10.04	372	3.12	391
Scomberomorus commerson	6.06	2	1.89	
Decapterus macrosoma	5.56	172	1.73	389
Nemipterus bipunctatus	2.97	48	0.93	390
Pseudobalistes fuscus	2.53	2	0.79	
Parupeneus heptacanthus	0.99	8	0.31	
Sepia pharaonis	0.91	4	0.28	
Carangoides malabaricus	0.83	6	0.26	
Saurida undosquamis	0.73	15	0.23	
Sphyraena acutipinnis	0.64	10	0.20	
Tetrosomus concatenatus	0.60	2	0.19	
Bothus sp.	0.44	2	0.14	
Carangoides cf. malabaricus	0.44	4	0.14	
Loligo vulgaris	0.44	8	0.14	
Carangoides caeruleopinnatus	0.24	2	0.08	
Lagocephalus sceleratus	0.19	8	0.06	
Fistularia petimba	0.06	2	0.02	
Halieutaea fitzsimonsi	0.06	4	0.02	
Lepidotrigla alcocki	0.05	2	0.02	
Total	321.25		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 81
DATE :22/10/2007 GEAR TYPE: BT NO: 18 POSITION:Lat S 19°35.30
start stop duration Lon E 35°31.62
TIME :04:57:26 05:27:43 30.3 (min) Purpose : 3
LOG : 9005.81 9007.22 1.4 Region : 7400
FDEPTH: 22 22 Gear cond.: 0
BDEPTH: 22 22 Validity : 0
Towing dir: 0° Wire out : 80 m Speed : 2.8 kn
Sorted : 0 Total catch: 559.11 Catch/hour: 1107.52

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Pellona ditchela	643.78	88237	58.13	404
Sphyraena jello	84.19	1095	7.60	402
Pomadasys kaakan	66.66	24	6.02	407
Pomadasys maculatus	53.48	1076	4.83	396
Otolithes ruber	38.57	388	3.48	397
Carangoides malabaricus	30.64	553	2.77	394
Rastrelliger kanagurta	29.30	34	2.65	
Thryssa vitrirostris	23.91	5523	2.16	405
Sphyraena qenie	19.91	2	1.80	410
Scomberomorus commerson	12.38	2	1.12	408
Secutor insidiator	11.45	1095	1.03	399
Scomberoides commersonianus	10.30	2	0.93	411
Polynemus sextarius	10.26	420	0.93	400
Leiognathus equulus	8.76	168	0.79	395
Johnius dussumieri	7.75	355	0.70	401
Pelates quadrilineatus	5.90	153	0.53	398
Metapenaeus stebbingi	5.77	1359	0.52	423
Sardinops ocellatus	4.89	202	0.44	
Decapterus russelli	4.38	135	0.40	403
Scomberomorus plurilineatus	4.28	52	0.39	
Metapenaeus stebbingi	3.74	339	0.34	422
Sillago sihama	3.29	50	0.30	
Sepia pharaonis	3.25	236	0.29	
Pomadasys kaakan	2.87	18	0.26	406
Terapon theraps	2.29	52	0.21	
Ariomma indica	2.02	85	0.18	
Trichiurus lepturus	1.84	52	0.17	
Scomberomorus commerson	1.60	18	0.14	409
Alepes djedaba	1.53	18	0.14	
Upeneus vittatus	1.49	50	0.13	413
Pterois russelii	1.35	18	0.12	
Gerres sp.	1.33	16	0.12	
Johnius amblycephalus	1.07	18	0.10	414
Upeneus sulphureus	1.01	34	0.09	412
Loxodon macrorhinus	0.73	2	0.07	
Scomberoides tol	0.67	10	0.06	415
Penaeus indicus	0.60	8	0.05	416
Alepes sp.	0.37	18	0.03	
Dussumieria acuta	0.37	18	0.03	
Apistus carinatus	0.32	18	0.03	
Engyprosopon grandisquama	0.29	18	0.03	
Cociella heemstrai	0.18	18	0.02	
Thryssa setirostris	0.17	34	0.02	
Metapenaeus monoceros	0.15	4	0.01	418
Penaeus japonicus	0.07	4	0.01	421
Penaeus semisulcatus	0.07	2	0.01	420
Metapenaeus monoceros	0.06	4	0.01	419
Penaeus latisulcatus	0.04	6	0.00	
Penaeus indicus	0.04	2	0.00	417
Total	1109.33		100.16	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 82
DATE :22/10/2007 GEAR TYPE: BT NO: 18 POSITION:Lat S 19°22.30
start stop duration Lon E 35°46.94
TIME :09:01:27 09:31:25 30.0 (min) Purpose : 3
LOG : 9036.92 9038.37 1.5 Region : 7400
FDEPTH: 25 27 Gear cond.: 0
BDEPTH: 25 27 Validity : 0
Towing dir: 0° Wire out : 100 m Speed : 2.9 kn
Sorted : 273 Total catch: 272.78 Catch/hour: 546.11

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Pellona ditchela	238.30	20208	43.64	
Upeneus sulphureus	80.63	2482	14.76	424
Pomadasys maculatus	40.99	811	7.51	426
Pomadasys kaakan	36.86	12	6.75	
Sphyraena acutipinnis	24.77	350	4.54	425
Trichiurus lepturus	24.77	785	4.54	
Otolithes ruber	23.24	270	4.26	
Thryssa vitrirostris	15.50	3055	2.84	
Ariomma indica	13.78	306	2.52	
Sepia pharaonis	7.75	402	1.42	
Terapon theraps	6.85	1712	1.25	
Parastromateus niger	6.66	20	1.22	
Polynemus sextarius	5.05	180	0.92	
Megalaspis cordyla	3.22	4	0.59	
Carangoides malabaricus	2.70	54	0.49	
Johnius amblycephalus	2.43	803	0.45	
Secutor insidiator	2.07	172	0.38	
Drepane longimana	1.70	2	0.31	
Himantura gerrardi	1.13	2	0.21	
Penaeus indicus	0.93	18	0.17	428
Psettodes erumei	0.92	2	0.17	
Saurida undosquamis	0.72	18	0.13	
Metapenaeus monoceros	0.71	48	0.13	434
Alepes djedaba	0.54	10	0.10	
Cociella heemstrai	0.54	18	0.10	
Loxodon macrorhinus	0.52	2	0.10	
Pterois russelii	0.46	4	0.08	
Penaeus semisulcatus	0.39	16	0.07	429
Metapenaeus monoceros	0.38	36	0.07	433
Arothron hispidus	0.36	36	0.07	
Hilsa kelee	0.23	6	0.04	
Penaeus semisulcatus	0.22	4	0.04	430
Metapenaeus stebbingi	0.17	14	0.03	436
Leiognathus equulus	0.14	2	0.03	
Penaeus indicus	0.14	6	0.03	427
Penaeus japonicus	0.06	4	0.01	431
Metapenaeus stebbingi	0.06	10	0.01	435
Johnius dussumieri	0.05	2	0.01	
Penaeus japonicus	0.04	4	0.01	432
Dussumieria acuta	0.04	46	0.01	
Apistus carinatus	0.02	2	0.00	
Thryssa setirostris	0.01	2	0.00	
Apogon quadrifasciatus	0.01	2	0.00	
Total	546.11		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 83
DATE :22/10/2007 GEAR TYPE: BT NO: 18 POSITION:Lat S 19°33.74
start stop duration Lon E 36°6.28
TIME :12:44:51 13:00:13 15.4 (min) Purpose : 3
LOG : 9062.71 9063.49 0.8 Region : 7400
FDEPTH: 36 36 Gear cond.: 0
BDEPTH: 36 36 Validity : 0
Towing dir: 0° Wire out : 115 m Speed : 3.0 kn
Sorted : 12 Total catch: 12.26 Catch/hour: 47.84

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Leiognathus elongatus	18.82	6117	39.33	
Loligo vulgaris	8.78	703	18.36	
Scomberomorus commerson	7.85	4	16.40	
Loxodon macrorhinus	7.03	4	14.69	
Nemipterus bipunctatus	1.64	35	3.43	439
Upeneus bensasi	1.48	90	3.10	438
Sepia pharaonis	1.01	8	2.12	
Decapterus russelli	0.78	39	1.63	437
Matuta cf lunaris	0.23	8	0.49	
Trachinocephalus myops	0.08	4	0.16	
Lagocephalus sceleratus	0.08	8	0.16	
Fistularia petimba	0.04	4	0.08	
Engyprosopon grandisquama	0.02	4	0.05	
Total	47.84		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 84
DATE :22/10/2007 GEAR TYPE: PT NO: 5 POSITION:Lat S 19°34.11
start stop duration Lon E 36°24.74
TIME :20:45:30 21:05:18 19.8 (min) Purpose : 1
LOG : 9124.17 9125.26 1.1 Region : 7400
FDEPTH: 0 0 Gear cond.: 0
BDEPTH: 57 64 Validity : 0
Towing dir: 0° Wire out : 80 m Speed : 3.3 kn
Sorted : 16 Total catch: 16.18 Catch/hour: 49.03

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Decapterus russelli	33.03	539	67.37	440
Scomberomorus commerson	13.97	3	28.49	441
Loligo vulgaris	1.67	45	3.40	
Scomberoides commersonianus	0.24	6	0.49	
Decapterus macrosoma	0.12	6	0.25	
Total	49.03		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 85
DATE :23/10/2007 GEAR TYPE: BT NO: 18 POSITION:Lat S 19°10.50
start stop duration Lon E 36°2.40
TIME :03:04:52 03:35:57 30.0 (min) Purpose : 3
LOG : 9177.65 9179.20 1.5 Region : 7400
FDEPTH: 25 25 Gear cond.: 0
BDEPTH: 25 25 Validity : 0
Towing dir: 0° Wire out : 90 m Speed : 2.8 kn
Sorted : 73 Total catch: 75.53 Catch/hour: 151.06

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Pomadasys maculatus	34.40	728	22.77	460
Drepane longimana	27.22	88	18.02	456
Carcharhinus sealei	9.77	6	6.47	
Upeneus sulphureus	9.70	286	6.42	457
Otolithes ruber	8.60	122	5.69	459
Pomadasys kaakan	8.58	6	5.68	449
Pellona ditchela	8.10	660	5.36	694
Thryssa vitrirostris	8.02	1210	5.31	458
Trichiurus lepturus	5.02	114	3.32	
Sepia pharaonis	4.70	272	3.11	
Abalistes stellatus	3.44	2	2.28	
Upeneus taeniopterus	2.40	86	1.59	
Penaeus japonicus	2.24	114	1.48	690
Terapon jarbua	1.91	16	1.27	450
Leiognathus lineolatus	1.50	600	0.99	
Polynemus sextarius	1.46	64	0.97	451
Psettodes erumei	1.22	4	0.81	
Mustelus cf mosis	0.97	2	0.64	
Parastromateus niger	0.94	2	0.62	
Johnius dussumieri	0.93	58	0.61	452
Lutjanus sp. (cf malabaricus)	0.89	2	0.59	
Penaeus japonicus	0.84	34	0.56	442
Trachinocephalus myops	0.76	60	0.50	453
Terapon theraps	0.76	12	0.50	
Metapenaeus monoceros	0.67	36	0.45	445
Dussumieria acuta	0.61	28	0.40	455
Sphyraena chrysotaenia	0.58	14	0.38	
Alepes djedaba	0.54	14	0.36	
Penaeus indicus	0.50	14	0.33	443
Carangoides malabaricus	0.38	6	0.25	
Cynoglossus lida	0.32	8	0.21	
Metapenaeus monoceros	0.31	32	0.21	446
Stolephorus commersonii	0.30	250	0.20	
Sphyraena acutipinnis	0.21	4	0.14	
Engyprosopon grandisquama	0.18	2	0.12	
Decapterus russelli	0.18	12	0.12	454
Cynoglossus marleyi	0.18	4	0.12	
Penaeus indicus	0.18	8	0.12	444
Sorsogona sp.	0.16	8	0.11	
Loligo vulgaris	0.16	8	0.11	
Lagocephalus lunaris	0.14	2	0.09	
Metapenaeus stebbingi	0.12	12	0.08	447
Metapenaeus stebbingi	0.12	22	0.08	448
Hilsa kelee	0.10	2	0.07	
Leiognathus equulus	0.10	8	0.07	
Secutor insidiator	0.10	8	0.07	
Samaris cristatus	0.10	2	0.07	
Cociella heemstrai	0.10	4	0.06	
Nemipterus bipunctatus	0.08	2	0.05	
Cynoglossus cf lida	0.08	2	0.05	
Sillago sihama	0.07	2	0.05	
Callionymus sp.	0.06	6	0.04	
Gazza minuta	0.04	4	0.03	
Total	151.05		99.99	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 86
DATE :23/10/2007 GEAR TYPE: BT NO: 18 POSITION:Lat S 19°13.71
start stop duration Lon E 36°18.83
TIME :06:27:04 06:59:45 32.7 (min) Purpose : 3
LOG : 9203.33 9204.83 1.5 Region : 7400
FDEPTH: 29 32 Gear cond.: 0
BDEPTH: 29 32 Validity : 0
Towing dir: 0° Wire out : 100 m Speed : 2.8 kn
Sorted : 90 Total catch: 91.58 Catch/hour: 168.19

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Secutor insidiator	52.71	2907	31.34	
Upeneus taeniopterus	46.65	1875	27.73	
Scomberoides tol	26.91	6	16.00	
Decapterus russelli	7.51	195	4.47	
Sphyraena qenie	6.80	2	4.04	
Loxodon macrorhinus	6.70	4	3.99	
Saurida undosquamis	4.81	68	2.86	
Upeneus bensasi	4.11	220	2.45	
Hemipristis elongatus	2.83	2	1.68	
Carangoides malabaricus	2.61	61	1.55	
Megalaspis cordyla	2.08	2	1.24	
Loligo vulgaris	1.54	246	0.92	
Selar crumenophthalmus	1.16	18	0.69	
Polynemus sextarius	0.42	7	0.25	
Nemipterus bipunctatus	0.26	4	0.15	
Synodus CF dermatogenys	0.18	11	0.11	
Terapon jarbua	0.18	2	0.11	
Paramonacanthus nematophorus	0.17	2	0.10	
Carangoides fulvoguttatus	0.14	2	0.08	
Thryssa vitrirostris	0.11	15	0.07	
Engraulis cf capensis	0.09	31	0.05	
Lactoria cornuta	0.09	2	0.05	
Upeneus taeniopterus	0.08	4	0.05	0
Penaeus japonicus	0.03	2	0.02	
Encrasicholina punctifer	0.03	6	0.02	
Stolephorus punctifer *	0.03	6	0.02	
Total	168.22		100.02	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 87
DATE :23/10/2007 GEAR TYPE: BT NO: 18 POSITION:Lat S 19°24.35
start stop duration Lon E 36°32.42
TIME :09:45:55 10:09:04 23.2 (min) Purpose : 3
LOG : 9225.04 9226.15 1.1 Region : 7400
FDEPTH: 64 69 Gear cond.: 0
BDEPTH: 64 69 Validity : 0
Towing dir: 0° Wire out : 180 m Speed : 2.9 kn
Sorted : 152 Total catch: 152.25 Catch/hour: 394.60

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Decapterus russelli	279.52	8981	70.84	461
Decapterus macrosoma	25.92	1656	6.57	462
Upeneus moluccensis	25.27	599	6.40	464
Abalistes stellatus	15.68	18	3.97	
Upeneus bensasi	15.58	594	3.95	463
Nemipterus bipunctatus	11.14	130	2.82	465
Parupeneus heptacanthus	7.36	145	1.87	466
Carangoides malabaricus	3.50	41	0.89	467
Lactoria cornuta	2.28	3	0.58	
Loligo vulgaris	2.13	44	0.54	
Lophodiodon calori	1.45	3	0.37	
Lagocephalus sceleratus	0.98	31	0.25	
Starfish	0.80	3	0.20	
Saurida undosquamis	0.78	10	0.20	
Priacanthus hamrur	0.75	16	0.19	
Scomber japonicus	0.39	10	0.10	
Rastrelliger kanagurta	0.34	5	0.09	
Fistularia petimba	0.23	13	0.06	
Pseudalutarius nasicornis	0.16	5	0.04	
LABRIDAE	0.14	3	0.04	
Labridae sp.	0.14	3	0.04	
Hippocampus sp.	0.08	3	0.02	
Hippocampus kuda	0.08	3	0.02	
Hippocampus kuda	0.08	3	0.02	0
Canthigaster jantinoptera	0.07	3	0.02	
Paramonacanthus pusillus	0.05	3	0.01	
Total	394.90		100.08	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 88
DATE :23/10/2007 GEAR TYPE: BT NO: 15 POSITION:Lat S 19°38.49
start stop duration Lon E 36°46.34
TIME :13:30:54 14:01:05 30.2 (min) Purpose : 3
LOG : 9250.17 9251.77 1.6 Region : 7400
FDEPTH: 697 710 Gear cond.: 0
BDEPTH: 697 710 Validity : 0
Towing dir: 0° Wire out : 1600 m Speed : 3.2 kn
Sorted : 39 Total catch: 39.45 Catch/hour: 78.40

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Caelorinchus trunovi	25.14	209	32.07	468
Plesiopenaeus edwardsianus	7.49	493	9.56	478
Centrophorus moluccensis	7.06	2	9.00	
Coloconger scholesi	6.38	46	8.14	
Aristaeomorpha foliacea	5.58	284	7.12	476
Malacocephalus laevis	5.05	54	6.44	
Aristeus antennatus	3.62	137	4.61	470
Synagrops sp.	2.52	22	3.22	469
Nephropsis stewarti	2.38	40	3.04	474
Sicyonia sp.?	1.85	129	2.36	
Histioteuthis dofleini	1.55	16	1.98	
Haliporoides triarthrus	1.15	28	1.47	472
Aristaeomorpha foliacea	0.85	32	1.09	477
Aristeus antennatus	0.83	87	1.06	471
Bathyuroconger vicinus	0.76	12	0.96	
Selachophidium guentheri	0.76	18	0.96	
Xenodermichthys copei	0.73	38	0.93	
Promethichthys prometheus	0.73	12	0.93	
Chaunax sp.	0.68	2	0.86	
Gonorhynchus gonorhynchus	0.57	6	0.73	
Etmopterus lucifer	0.38	4	0.48	
ISOPODS	0.36	20	0.46	
Nephropsis stewarti	0.34	14	0.43	475
Glyptophidium longipes	0.28	6	0.36	
LITHODIDAE	0.26	14	0.33	
Laemonema globiceps	0.20	2	0.25	
Neoscopelus microchir	0.19	10	0.24	
Polymetme corythaeola	0.18	20	0.23	
Cubiceps pauciradiatus	0.14	12	0.18	
Hoplostethus mediterraneus	0.14	2	0.18	
Melanonus sp.	0.10	2	0.12	
PARALEPIDIDAE	0.06	2	0.07	
Phosichthyidae sp.	0.04	2	0.05	
Haliporoides triarthrus	0.03	2	0.04	473
Polyipnus indicus	0.02	6	0.03	
Total	78.40		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 89
DATE :24/10/2007 GEAR TYPE: BT NO: 18 POSITION:Lat S 18°51.29
start stop duration Lon E 36°30.42
TIME :03:30:22 03:49:46 19.4 (min) Purpose : 3
LOG : 9348.90 9349.99 1.1 Region : 7400
FDEPTH: 24 25 Gear cond.: 0
BDEPTH: 24 25 Validity : 0
Towing dir: 0° Wire out : 90 m Speed : 3.4 kn
Sorted : 59 Total catch: 58.73 Catch/hour: 181.65

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Thryssa vitrirostris	37.11	6455	20.43	
Trichiurus lepturus	36.96	891	20.35	
Otolithes ruber	17.35	504	9.55	692
Pellona ditchela	16.39	1076	9.02	691
Johnius dussumieri	15.93	962	8.77	693
Hilsa kelee	10.34	235	5.69	479
Metapenaeus monoceros	9.28	940	5.11	480
Arius dussumieri	8.43	6	4.64	
Metapenaeus monoceros	8.10	1076	4.46	481
Portunus sanguinolento	4.82	43	2.66	
Portunus sanguinolentus	4.82	43	2.66	
Abalistes stellatus	2.63	3	1.45	
Sepia pharaonis	2.41	133	1.33	
Penaeus japonicus	1.92	22	1.06	
Penaeus indicus	1.76	43	0.97	482
Penaeus indicus	1.39	77	0.77	483
Plesionika martia	1.05	888	0.58	
Acetes sp.	0.84	297	0.46	
Heptranchias perlo	0.65	3	0.36	
Solea turbynei	0.59	56	0.32	
Upeneus sulphureus	0.53	22	0.29	
Terapon jarbua	0.46	3	0.26	
Solea solea *	0.43	37	0.24	
Johnius amblycephalus	0.35	9	0.19	
Thryssa vitrirostris	0.33	15	0.18	0
Cynoglossus acaudatus	0.31	31	0.17	
Leiognathus equulus	0.25	15	0.14	
Mugil cephalus	0.22	9	0.12	
Polynemus sextarius	0.22	22	0.12	
Charybdis affinis	0.15	3	0.09	
Charybdis affinis	0.15	3	0.09	
Thryssa setirostris	0.13	6	0.07	
Aesopia cornuta	0.10	3	0.05	
Upeneus taeniopterus	0.09	3	0.05	
Loligo vulgaris	0.09	6	0.05	
Cynoclossus gilchristi	0.09	9	0.05	
Cynoglossus cf lida	0.09	3	0.05	
Cynoglossus cf lida	0.09	3	0.05	
Mugilidae sp.	0.07	3	0.04	
portunus pelagicus	0.06	3	0.03	
Portunus pelagicus	0.06	3	0.03	
Mene maculata	0.06	3	0.03	
Apogon quadrifasciatus	0.03	3	0.02	
Trypauchen microcephalus	0.03	22	0.02	
Parachaeturichthys ploynema	0.02	3	0.01	
Drepane longimana	0.01	3	0.01	
Total	187.21		103.06	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 90
DATE :24/10/2007 GEAR TYPE: BT NO: 18 POSITION:Lat S 18°49.55
start stop duration Lon E 36°35.44
TIME :05:27:28 05:58:01 30.6 (min) Purpose : 3
LOG : 9362.07 9363.58 1.5 Region : 7400
FDEPTH: 25 24 Gear cond.: 0
BDEPTH: 25 24 Validity : 0
Towing dir: 0° Wire out : 90 m Speed : 3.0 kn
Sorted : 77 Total catch: 77.03 Catch/hour: 151.29

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Upeneus sulphureus	96.35	3576	63.69	487
Secutor insidiator	17.17	1536	11.35	485
Upeneus vittatus	17.11	670	11.31	486
Polynemus sextarius	4.95	92	3.27	
Carangoides malabaricus	3.44	57	2.27	484
Ariomma indica	3.20	73	2.12	
Leiognathus equulus	2.06	61	1.36	
Sphyraena qenie	2.06	31	1.36	
Dussumieria acuta	1.75	73	1.16	
Thryssa vitrirostris	1.43	112	0.95	488
Loligo vulgaris	0.82	82	0.55	
Trichiurus lepturus	0.73	31	0.48	
Total	151.07		99.86	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 91
DATE :24/10/2007 GEAR TYPE: BT NO: 18 POSITION:Lat S 18°57.29
start stop duration Lon E 36°44.69
TIME :07:57:57 08:30:00 32.1 (min) Purpose : 3
LOG : 9379.68 9381.25 1.6 Region : 7400
FDEPTH: 35 38 Gear cond.: 0
BDEPTH: 35 38 Validity : 0
Towing dir: 0° Wire out : 110 m Speed : 2.9 kn
Sorted : 28 Total catch: 27.68 Catch/hour: 51.82

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Rachycentron canadum	16.66	2	32.15	
Scomberomorus commerson	16.10	6	31.07	
Loligo vulgaris	5.67	743	10.95	
Hemipristis elongatus	3.00	2	5.78	
Upeneus sulphureus	2.30	82	4.44	494
Saurida undosquamis	1.83	21	3.54	489
Carangoides malabaricus	1.16	22	2.24	491
Selar crumenophthalmus	1.05	19	2.02	495
Nemipterus bipunctatus	0.92	11	1.77	
Trichiurus lepturus	0.75	7	1.44	
Pellona ditchela	0.47	51	0.90	496
Lactoria cornuta	0.43	2	0.83	
Decapterus russelli	0.41	11	0.79	490
Upeneus bensasi	0.41	17	0.79	492
Sphyraena qenie	0.24	4	0.47	
Secutor insidiator	0.21	22	0.40	
Upeneus vittatus	0.15	7	0.29	493
Crossorhombus sp.	0.06	4	0.12	
Total	51.82		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 92
DATE :24/10/2007 GEAR TYPE: BT NO: 18 POSITION:Lat S 19°10.87
start stop duration Lon E 37°2.19
TIME :11:49:00 12:19:22 30.4 (min) Purpose : 3
LOG : 9406.77 9408.44 1.7 Region : 7400
FDEPTH: 453 444 Gear cond.: 0
BDEPTH: 453 444 Validity : 0
Towing dir: 0° Wire out : 1100 m Speed : 3.3 kn
Sorted : 167 Total catch: 166.58 Catch/hour: 329.10

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Diaphus effulgens	198.81	7000	60.41	
Plesionika martia	21.93	5848	6.66	
Chaetodon kleinii	20.42	1492	6.21	
Nealotus tripes	18.97	304	5.76	
Etmopterus sentosus	10.35	174	3.15	
C R A B S	9.88	20	3.00	
Haliporoides triarthrus	9.48	405	2.88	501
Chlorophthalmus agassizi	5.57	93	1.69	499
Haliporoides triarthrus	5.26	249	1.60	500
Caelorinchus trunovi	3.85	16	1.17	497
Scomberomorus commerson	2.57	2	0.78	
Poecilopsetta zanzibarensis	2.23	12	0.68	
Saurida undosquamis	1.98	10	0.60	
Octopus vulgaris	1.90	4	0.58	
Illex coindetii	1.82	24	0.55	
Heterocarpus woodmasoni	1.80	136	0.55	503
Polymetme corythaeola	1.58	63	0.48	
Heterocarpus woodmasoni	1.52	93	0.46	502
Parabembras robinsoni	1.41	14	0.43	
Cubiceps sp.	1.40	26	0.43	498
Lestrolepis intermedia	1.30	85	0.40	
Halaelurus lutarius	1.13	10	0.34	
Squalus mitsukurii	0.65	2	0.20	
Metanephrops andamanicus	0.53	6	0.16	
Zenion sp.	0.43	69	0.13	
Sepia pharaonis	0.43	24	0.13	
Ateleopus natalensis	0.41	4	0.13	
Histioteuthis dofleini	0.41	8	0.13	0
Malacocephalus laevis	0.40	6	0.12	
Cynoglossus capensis	0.30	30	0.09	
Chaunax sp.	0.26	4	0.08	
Antigonia rubescens	0.08	4	0.02	
Paratriacanthodes retrospinus	0.04	2	0.01	
SCORPAENIDAE	0.01	2	0.00	
Total	329.10		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 93
DATE :29/10/2007 GEAR TYPE: BT NO: 18 POSITION:Lat S 18°31.43
start stop duration Lon E 36°48.33
TIME :06:16:11 06:35:10 19.0 (min) Purpose : 3
LOG : 9834.50 9835.47 1.0 Region : 7400
FDEPTH: 27 27 Gear cond.: 8
BDEPTH: 27 27 Validity : 4
Towing dir: 0° Wire out : 100 m Speed : 3.1 kn
Sorted : 62 Total catch: 61.55 Catch/hour: 194.47

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
PENAEIDAE	89.73	81719	46.14	
Thryssa vitrirostris	27.33	1940	14.05	504
Trichiurus lepturus	18.64	1289	9.59	
Johnius dussumieri	16.75	2250	8.61	505
Otolithes ruber	9.89	395	5.09	
Arius dussumieri	3.82	3	1.97	
Sepia sp.	3.70	171	1.90	
Metapenaeus monoceros	2.91	382	1.49	506
Metapenaeus monoceros	2.56	427	1.32	507
Sphyrna lewini	2.46	3	1.27	
Penaeus indicus	2.21	209	1.14	509
Penaeus indicus	2.15	136	1.10	508
Portunus sanguinolentus	1.86	19	0.96	
Cynoglossus cf lida	1.83	92	0.94	
Loxodon macrorhinus	1.23	3	0.63	
Solea turbynei	1.23	95	0.63	
Rhizoprionodon acutus	1.11	3	0.57	
SQUILLIDAE	1.07	294	0.55	
Pomadasys kaakan	0.88	6	0.45	
Johnius amblycephalus	0.86	16	0.44	
Leiognathus equulus	0.63	82	0.32	
Upeneus bensasi	0.44	28	0.23	
Cynoclossus gilchristi	0.22	32	0.11	
Ophichthus sp.	0.18	3	0.09	
Polydactylus sextarius	0.13	41	0.06	
Echeneis naucrates	0.10	3	0.05	
Gazza minuta	0.09	19	0.05	
Upeneus vittatus	0.09	6	0.05	
Metapenaeus stebbingi	0.09	19	0.05	
Thryssa setirostris	0.09	3	0.05	
Drepane punctata	0.06	13	0.03	
Antennarius hispidus	0.06	9	0.03	
Sillago sihama	0.03	3	0.02	
Total	194.47		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 94
DATE :29/10/2007 GEAR TYPE: BT NO: 15 POSITION:Lat S 18°32.08
start stop duration Lon E 36°47.93
TIME :07:08:03 07:39:33 31.5 (min) Purpose : 3
LOG : 9837.13 9838.78 1.7 Region : 7400
FDEPTH: 26 25 Gear cond.: 0
BDEPTH: 26 25 Validity : 0
Towing dir: 0° Wire out : 100 m Speed : 3.1 kn
Sorted : 87 Total catch: 87.20 Catch/hour: 166.04

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
CARIDEA	81.31	106760	48.97	
Trichiurus lepturus	24.66	562	14.85	
Thryssa vitrirostris	18.38	2091	11.07	510
Johnius dussumieri	10.15	893	6.11	
Otolithes ruber	6.02	244	3.62	
Sepia sp.	3.35	162	2.02	
Metapenaeus monoceros	2.48	251	1.49	517
Portunus sanguinolentus	2.11	27	1.27	
Penaeus indicus	1.79	156	1.08	516
Rhizoprionodon acutus	1.54	4	0.93	
Metapenaeus monoceros	1.50	293	0.91	518
Pomadasys kaakan	1.39	10	0.84	
Penaeus indicus	1.26	84	0.76	515
Sphyrna lewini	1.12	2	0.68	
Cynoglossus sp.	1.01	91	0.61	
Portunus sp.	0.86	482	0.52	
Upeneus vittatus	0.84	34	0.50	511
Scylla serrata	0.76	2	0.46	
Loxodon macrorhinus	0.73	2	0.44	
Penaeus monodon	0.59	6	0.36	512
Pellona ditchela	0.48	25	0.29	
Solea turbynei	0.46	50	0.28	
Cynoclossus gilchristi	0.44	44	0.26	
Pisodonophis boro	0.43	2	0.26	
Squilla sp.	0.42	89	0.25	
Sillago sihama	0.40	4	0.24	
Leiognathus equulus	0.21	21	0.13	
Upeneus sulphureus	0.19	4	0.11	
Polydactylus sextarius	0.15	21	0.09	
Drepane longimana	0.11	10	0.07	
Mugil cephalus	0.11	6	0.07	
Penaeus japonicus	0.11	2	0.07	514
Metapenaeus stebbingi	0.11	2	0.07	
Callionymus sp.	0.10	2	0.06	
Gazza minuta	0.10	13	0.06	
Penaeus monodon	0.10	4	0.06	513
Thryssa setirostris	0.08	4	0.05	
Terapon jarbua	0.08	2	0.05	
Apogon quadrifasciatus	0.07	10	0.04	
Scomberomorus commerson	0.04	6	0.02	
Loligo sp.	0.02	4	0.01	
Total	166.04		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 95
DATE :29/10/2007 GEAR TYPE: BT NO: 15 POSITION:Lat S 18°39.60
start stop duration Lon E 37°3.31
TIME :10:01:49 10:32:36 30.0 (min) Purpose : 3
LOG : 9859.95 9861.55 1.6 Region : 7400
FDEPTH: 36 37 Gear cond.: 0
BDEPTH: 36 37 Validity : 0
Towing dir: 0° Wire out : 110 m Speed : 3.4 kn
Sorted : 586 Total catch: 585.83 Catch/hour: 1171.65

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Lutjanus sanguineus	459.48	108	39.22	521
Carcharhinus sealei	116.60	34	9.95	
PORIFERA (Sponges)	100.00	0	8.53	
Upeneus vittatus	67.02	4960	5.72	
Diagramma centurio	52.40	10	4.47	
Lethrinus sp.	50.52	1026	4.31	519
Lethrinus nebulosus	46.60	10	3.98	523
Lutjanus sebae	39.50	4	3.37	525
Diodon holocanthus	29.86	58	2.55	
Lethrinus microdon	29.30	4	2.50	524
Aprion virescens	28.60	4	2.44	522
Rachycentron canadum	27.70	4	2.36	
Scomberomorus commerson	22.70	12	1.94	520
Epinephelus flavocaeruleus	19.70	4	1.68	
Ostracion cubicus	16.88	16	1.44	
Epinephelus tauvina	16.30	4	1.39	
Pseudobalistes fuscus	15.30	6	1.31	
Lutjanus sp.	12.60	2	1.08	
Abalistes stellatus	6.60	6	0.56	
Mulloides vanicolensis	4.44	86	0.38	
Loxodon macrorhinus	2.96	2	0.25	
Upeneus bensasi	2.40	154	0.20	
Lactoria cornuta	2.08	6	0.18	
Sepia sp.	1.38	6	0.12	
Parupeneus heptacanthus	0.30	2	0.03	
Coris caudimacula	0.14	4	0.01	
Fistularia petimba	0.10	6	0.01	
Rhinopias eschmeyeri	0.10	2	0.01	
Stephanolepis auratus	0.04	2	0.00	
Dascyllus trimaculatus	0.03	2	0.00	
Cyprinocirrhites polyactis	0.03	2	0.00	
Total	1171.65		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 96
DATE :29/10/2007 GEAR TYPE: BT NO: 15 POSITION:Lat S 18°50.73
start stop duration Lon E 37°13.51
TIME :14:21:56 14:55:49 33.9 (min) Purpose : 3
LOG : 9883.32 9884.79 1.5 Region : 7400
FDEPTH: 390 365 Gear cond.: 0
BDEPTH: 390 365 Validity : 0
Towing dir: 0° Wire out : 1000 m Speed : 2.6 kn
Sorted : 125 Total catch: 124.65 Catch/hour: 220.68

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Diaphus effulgens	70.82	7	32.09	
Chlorophthalmus agassizi	30.42	460	13.78	
Scorpaena scrofa	23.02	18	10.43	
Chaeceon macphersoni	13.37	19	6.06	
Neoscombrops annectens	12.27	89	5.56	
MYCTOPHIDAE	10.62	2351	4.81	
Saurida undosquamis	10.09	41	4.57	
Penaeopsis balssi	7.51	652	3.40	
Synagrops japonicus	7.13	138	3.23	
Nephropsis stewarti	4.43	42	2.01	
Neoepinnula orientalis	3.77	14	1.71	
DIRETMIDAE	3.10	32	1.40	
Loligo sp.	3.10	67	1.40	
Polymixia nobilis	3.06	32	1.39	
Chaunax pictus	2.71	5	1.23	
Sepia sp.	2.04	23	0.92	
Cubiceps whitleggi	1.90	27	0.86	
Lestrolepis intermedia	1.64	103	0.74	
Palinurus delagoae	1.58	4	0.71	
Chascanopsetta lugubris	1.50	14	0.68	
Champsodon capensis	1.38	97	0.63	
Scorpaena plumieri	1.36	9	0.62	
Histioteuthis sp.	1.11	32	0.50	
Etmopterus sentosus	0.71	23	0.32	
Lophius piscatorius	0.66	5	0.30	
Physiculus natalensis	0.61	5	0.28	
Parazen pacificus	0.31	5	0.14	
Halaelurus lutarius	0.14	5	0.06	
Grammatonectus cf macrocephalu	0.13	5	0.06	
Paratriacanthodes retrospinus	0.12	5	0.06	
Poecilopsetta zanzibarensis	0.08	5	0.04	
Total	220.68		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 97
DATE :30/10/2007 GEAR TYPE: BT NO: 18 POSITION:Lat S 18°13.15
start stop duration Lon E 36°59.53
TIME :03:12:19 03:42:31 30.2 (min) Purpose : 3
LOG : 9982.94 9984.87 1.9 Region : 7400
FDEPTH: 22 22 Gear cond.: 0
BDEPTH: 22 22 Validity : 0
Towing dir: 0° Wire out : 85 m Speed : 3.8 kn
Sorted : 264 Total catch: 264.31 Catch/hour: 525.11

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers		SAMP
CARIDEA	288.77	408046	54.99	
Otolithes ruber	65.26	1162	12.43	
Johnius dussumieri	44.40	3374	8.46	526
Trichiurus lepturus	40.95	656	7.80	
Thryssa vitrirostris	31.65	3950	6.03	527
Himantura gerrardi	11.62	2	2.21	
Arius dussumieri	10.51	6	2.00	
Muraenesox bagio	5.66	2	1.08	
Cynoglossus lida	4.83	459	0.92	
Pomadasys kaakan	4.53	18	0.86	
Sepia sp.	2.62	125	0.50	
Metapenaeus monoceros	2.50	340	0.48	530
Penaeus indicus	1.91	89	0.36	528
Penaeus indicus	1.25	95	0.24	529
Metapenaeus monoceros	1.19	268	0.23	531
Pellona ditchela	0.89	54	0.17	
Squilla sp.	0.89	280	0.17	
Polynemus sextarius	0.83	107	0.16	
Upeneus sulphureus	0.66	24	0.12	
Penaeus monodon	0.66	6	0.12	532
Johnius amblycephalus	0.60	12	0.11	
Matuta cf lunaris	0.48	83	0.09	
Cynoclossus gilchristi	0.48	60	0.09	
Penaeus monodon	0.48	6	0.09	533
OPHICHTHIDAE	0.36	4	0.07	
Leiognathus equulus	0.30	24	0.06	
Hilsa kelee	0.18	12	0.03	
Drepane punctata	0.18	36	0.03	
Mugil cephalus	0.12	6	0.02	
Pomadasys maculatus	0.12	18	0.02	
Portunus sanguinolentus	0.11	30	0.02	
Charybdis feriata	0.06	6	0.01	
Portunus sp.	0.06	66	0.01	
Total	525.11		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 98
DATE :30/10/2007 GEAR TYPE: BT NO: 18 POSITION:Lat S 18°15.86
start stop duration Lon E 37°8.38
TIME :05:39:21 06:10:28 31.1 (min) Purpose : 3
LOG : 4.86 6.45 1.6 Region : 7400
FDEPTH: 36 33 Gear cond.: 0
BDEPTH: 36 33 Validity : 0
Towing dir: 0° Wire out : 110 m Speed : 3.1 kn
Sorted : 185 Total catch: 185.06 Catch/hour: 356.79

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers		SAMP
Caranx heberi	203.02	39	56.90	535
Upeneus taeniopterus	93.22	6841	26.13	534
Scomberoides commersonianus	12.15	2	3.40	536
Scomberomorus commerson	9.93	4	2.78	537
Sphyraena putnamie	9.13	31	2.56	
Carangoides malabaricus	7.29	137	2.04	
Echeneis naucrates	2.89	2	0.81	538
Saurida undosquamis	2.74	23	0.77	
Decapterus macrosoma	2.47	60	0.69	
Trachinocephalus myops	2.16	12	0.61	
Trichiurus lepturus	1.79	10	0.50	
Loligo sp.	1.29	31	0.36	
Argyrops spinifer	1.10	6	0.31	
Abalistes stellatus	0.93	2	0.26	
Selar crumenophthalmus	0.87	10	0.24	
Nemipterus bipunctatus	0.83	13	0.23	
Holothuria sp.	0.77	4	0.22	
Rastrelliger kanagurta	0.67	8	0.19	
Galeorhinus galeus	0.60	2	0.17	
Lagocephalus lunaris	0.54	8	0.15	
Atule mate	0.37	2	0.10	
Matuta cf lunaris	0.33	54	0.09	
Thenus orientalis	0.27	2	0.08	
Sepia sp.	0.17	6	0.05	
Pseudorhombus elevatus	0.16	4	0.05	
Upeneus bensasi	0.15	6	0.04	
Lutjanus sanguineus	0.14	2	0.04	
Uroconger lepturus	0.13	2	0.04	
Portunus sanguinolentus	0.13	4	0.04	
Crossorhombus valderostratus	0.12	12	0.03	
Amblygaster sirm	0.10	2	0.03	
Cynoclossus gilchristi	0.10	13	0.03	
Epinephelus areolatus	0.09	2	0.03	
Scyllarides sp.	0.08	10	0.02	
Cynoglossus lida	0.04	4	0.01	
Diagramma centurio	0.02	2	0.01	
Taenioides esquivel	0.01	2	0.00	
Total	356.79		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 99
DATE :30/10/2007 GEAR TYPE: BT NO: 18 POSITION:Lat S 18°26.10
start stop duration Lon E 37°20.86
TIME :08:34:04 09:05:38 31.6 (min) Purpose : 3
LOG : 26.73 28.53 1.8 Region : 7400
FDEPTH: 95 99 Gear cond.: 0
BDEPTH: 95 99 Validity : 0
Towing dir: 0° Wire out : 300 m Speed : 3.4 kn
Sorted : 24 Total catch: 24.31 Catch/hour: 46.21

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers		SAMP
Loligo sp.	34.97	3385	75.68	
Decapterus russelli	5.70	243	12.34	
Sepia sp.	1.81	146	3.91	
Saurida gracilis	0.91	13	1.97	
Lophius piscatorius	0.76	2	1.65	
Tetrosomus concatenatus	0.74	2	1.60	
Leiognathus equulus	0.29	105	0.63	
Cociella sp.	0.17	6	0.37	
Argyrops filamentosus	0.16	2	0.34	
Upeneus taeniopterus	0.15	6	0.33	
Fistularia petimba	0.13	6	0.29	
Dactyloptena peterseni	0.10	2	0.21	
Upeneus bensasi	0.08	4	0.16	
Decapterus macrosoma	0.06	42	0.13	
Dactyloptena peterseni	0.06	2	0.12	0
Lagocephalus sceleratus	0.06	2	0.12	
Citharoides macrolepis	0.04	2	0.08	
Synodus CF dermatogenys	0.04	2	0.08	
Total	46.21		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 100
DATE :30/10/2007 GEAR TYPE: BT NO: 15 POSITION:Lat S 18°28.18
start stop duration Lon E 37°25.70
TIME :11:30:57 12:01:18 30.4 (min) Purpose : 3
LOG : 44.69 46.48 1.8 Region : 7400
FDEPTH: 558 530 Gear cond.: 0
BDEPTH: 558 530 Validity : 0
Towing dir: 0° Wire out : 1300 m Speed : 3.5 kn
Sorted : 34 Total catch: 34.40 Catch/hour: 68.00

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers		SAMP
Haliporoides triarthrus	9.47	332	13.92	541
Malacocephalus laevis	7.73	109	11.37	
Bathyclupea sp. A	7.63	91	11.22	
Chlorophthalmus agassizi	5.73	69	8.43	
Neoepinnula orientalis	5.12	67	7.53	
Plesionika martia	4.01	890	5.90	
Histioteuthis sp.	3.76	20	5.52	
Gonorhynchus gonorhynchus	3.44	32	5.06	
Aristaeomorpha foliacea	3.44	97	5.06	539
Chaeceon macphersoni	2.99	4	4.39	
Haliporoides triarthrus	2.73	136	4.01	542
Aristaeomorpha foliacea	2.47	99	3.63	540
Aristeus antennatus	1.58	55	2.33	
Heterocarpus woodmasoni	1.29	43	1.89	
Diaphus effulgens	1.07	30	1.57	
Synagrops japonicus	0.93	8	1.37	
Nettastoma parviceps	0.79	4	1.16	
Nephropsis stewarti	0.69	4	1.02	
Sepia sp.	0.67	0	0.99	
Etmopterus sentosus	0.61	10	0.90	
Etmopterus molleri	0.43	4	0.63	
Bathyclupea sp. A	0.41	2	0.60	0
Metanephrops andamanicus	0.24	8	0.35	
Tydemania navigatoris	0.23	4	0.34	
Coloconger scholesi	0.14	4	0.20	
Cubiceps whitleggi	0.14	2	0.20	
Physiculus natalensis	0.12	2	0.17	
Halosauridae sp.	0.10	10	0.15	
Nansenia macrolepis *	0.06	2	0.09	
Nansenia macrolepis	0.06	2	0.09	
Total	68.06		100.09	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 101
DATE :30/10/2007 GEAR TYPE: PT NO: 5 POSITION:Lat S 18°1.85
start stop duration Lon E 37°31.95
TIME :21:48:21 22:18:06 29.8 (min) Purpose : 1
LOG : 122.60 124.23 1.6 Region : 7400
FDEPTH: 10 10 Gear cond.: 0
BDEPTH: 43 46 Validity : 0
Towing dir: 0° Wire out : 100 m Speed : 3.3 kn
Sorted : 36 Total catch: 35.62 Catch/hour: 71.84

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers		SAMP
Scomberomorus commerson	25.51	4	35.51	543
Decapterus russelli	14.92	426	20.77	544
Sphyraena forsteri	10.71	115	14.91	
Decapterus macrosoma	8.63	367	12.02	545
Selar crumenophthalmus	7.58	97	10.56	
Ariomma indica	2.44	28	3.40	
Engraulis cf capensis	1.07	186	1.49	
Amblygaster sirm	0.58	18	0.81	
Loligo sp.	0.20	12	0.28	
Carangoides malabaricus	0.14	2	0.20	
Rastrelliger kanagurta	0.04	4	0.06	
Total	71.84		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 102
DATE :31/10/2007 GEAR TYPE: BT NO: 18 POSITION:Lat S 18°3.51
start stop duration Lon E 37°35.16
TIME :03:41:02 03:54:52 13.8 (min) Purpose : 3
LOG : 140.05 140.91 0.9 Region : 7400
FDEPTH: 119 127 Gear cond.: 0
BDEPTH: 119 127 Validity : 0
Towing dir: 0° Wire out : 330 m Speed : 3.7 kn
Sorted : 79 Total catch: 78.84 Catch/hour: 341.81

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Decapterus russelli	310.62	7882	90.88	546
Argyrops spinifer	12.53	9	3.67	
Priacanthus hamrur	5.77	117	1.69	
Tetrosomus concatenatus	3.77	0	1.10	
Nemipterus japonicus	3.60	56	1.05	
Chrysoblephus lophus	1.78	4	0.52	
Loligo sp.	1.26	91	0.37	
Argyrops filamentosus	1.08	13	0.32	
Lepidotrigla alcocki	0.65	43	0.19	
Sphyraena acutipinnis	0.19	4	0.06	
Bothus swio	0.17	13	0.05	
Synodus hoshinonis	0.13	9	0.04	
Acanthocepola indica	0.10	4	0.03	
Upeneus sulphureus	0.04	4	0.01	
Upeneus taeniopterus	0.04	4	0.01	
Sepia sp.	0.04	4	0.01	
Aulostomus chinensis	0.03	4	0.01	
Total	341.81		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 103
DATE :31/10/2007 GEAR TYPE: BT NO: 18 POSITION:Lat S 17°53.96
start stop duration Lon E 37°22.50
TIME :06:15:39 06:45:30 29.9 (min) Purpose : 3
LOG : 160.07 161.67 1.6 Region : 7400
FDEPTH: 27 29 Gear cond.: 0
BDEPTH: 27 29 Validity : 0
Towing dir: 0° Wire out : 115 m Speed : 3.2 kn
Sorted : 208 Total catch: 207.58 Catch/hour: 417.24

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Himantura gerrardi	65.33	10	15.66	560
Himantura uarnak	52.26	2	12.53	561
Trichiurus lepturus	47.62	842	11.41	
CARIDEA	34.21	38237	8.20	
Johnius dussumieri	32.68	2062	7.83	553
Argyrosomus japonicus	26.53	20	6.36	549
Lutjanus argentimaculatus	15.67	4	3.76	
Pomadasys multimaculatum	14.47	6	3.47	551
Muraenesox bagio	14.17	2	3.40	
Thryssa vitrirostris	14.05	1522	3.37	555
Sillago sihama	13.59	205	3.26	
Pomadasys kaakan	13.27	20	3.18	547
Otolithes ruber	9.17	60	2.20	548
Arius dussumieri	8.42	8	2.02	
Pomadasys maculatus	7.63	117	1.83	554
Pomadasys commersonni	6.63	6	1.59	550
Tripterodon orbis	5.49	2	1.32	
Johnius amblycephalus	4.16	786	1.00	
Lutjanus sanguineus	3.86	4	0.92	552
Carcharhinus sealei	3.56	2	0.85	
Drepane longimana	3.44	12	0.82	
Plectorhinchus gibbosus	2.93	2	0.70	
Upeneus sulphureus	2.73	117	0.65	
Caranx heberi	1.85	4	0.44	
Leiognathus equulus	1.66	50	0.40	
Upeneus vittatus	1.62	60	0.39	
Polynemus sextarius	1.62	199	0.39	
Megalaspis cordyla	1.47	2	0.35	
Metapenaeus monoceros	1.37	84	0.33	558
Arothron immaculatus	1.31	4	0.31	
Sepia sp.	1.25	28	0.30	
Metapenaeus monoceros	0.58	78	0.14	559
Cynoglossus lida	0.51	42	0.12	
Penaeus indicus	0.50	30	0.12	557
Apogon quadrifasciatus	0.46	50	0.11	
Gazza minuta	0.28	14	0.07	
Muraenesox bagio	0.23	4	0.06	0
Penaeus indicus	0.20	10	0.05	556
Cynoglossus sp.	0.18	18	0.04	
Pellona ditchela	0.09	4	0.02	
Matuta cf lunaris	0.09	24	0.02	
Charybdis feriata	0.09	4	0.02	
Total	417.24		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 104
DATE :31/10/2007 GEAR TYPE: BT NO: 18 POSITION:Lat S 17°46.43
start stop duration Lon E 37°28.63
TIME :08:42:59 09:13:05 30.1 (min) Purpose : 3
LOG : 176.60 178.11 1.5 Region : 7400
FDEPTH: 20 21 Gear cond.: 0
BDEPTH: 20 21 Validity : 0
Towing dir: 0° Wire out : 110 m Speed : 3.0 kn
Sorted : 184 Total catch: 183.59 Catch/hour: 365.97

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Himantura uarnak	99.67	2	27.23	
Pomadasys kaakan	57.99	36	15.84	571
Himantura gerrardi	47.84	6	13.07	
Trichiurus lepturus	41.86	271	11.44	
Epinephelus albomarginatus	22.92	6	6.26	566
Johnius dussumieri	17.44	1453	4.77	563
Argyrosomus japonicus	15.75	8	4.30	565
Otolithes ruber	15.45	78	4.22	564
CARIDEA	12.46	25118	3.40	
Caranx heberi	10.29	2	2.81	
Arius dussumieri	4.35	8	1.19	
Sphyraena jello	2.81	4	0.77	
Scomberomorus plurilineatus	2.79	4	0.76	
Polynemus plebeius	2.25	2	0.62	
Drepane longimana	2.11	6	0.58	
Thryssa vitrirostris	2.05	146	0.56	562
Metapenaeus monoceros	1.63	148	0.45	569
Parastromateus niger	0.98	2	0.27	
Metapenaeus monoceros	0.98	124	0.27	570
Panulirus ornatus	0.74	2	0.20	
Polynemus sextarius	0.54	18	0.15	
Loligo sp.	0.42	14	0.11	
Leiognathus equulus	0.38	10	0.10	
Penaeus indicus	0.38	22	0.10	568
Pomadasys multimaculatum	0.32	6	0.09	
Johnius amblycephalus	0.32	4	0.09	
Pellona ditchela	0.24	16	0.07	
Epinephelus coioides	0.19	2	0.05	
Penaeus indicus	0.14	6	0.04	567
Gerres filamentosus	0.12	2	0.03	
Upeneus sulphureus	0.12	6	0.03	
Gazza minuta	0.10	40	0.03	
Oxycheilinus bimaculatus	0.10	2	0.03	
Cynoglossus lida	0.08	6	0.02	
Arothron immaculatus	0.07	2	0.02	
Thryssa setirostris	0.06	2	0.02	
Cynoclossus gilchristi	0.04	6	0.01	
Total	365.97		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 105
DATE :31/10/2007 GEAR TYPE: BT NO: 18 POSITION:Lat S 17°38.53
start stop duration Lon E 37°44.28
TIME :11:09:12 11:39:24 30.2 (min) Purpose : 3
LOG : 194.50 196.30 1.8 Region : 7400
FDEPTH: 17 17 Gear cond.: 0
BDEPTH: 17 17 Validity : 0
Towing dir: 0° Wire out : 85 m Speed : 3.6 kn
Sorted : 137 Total catch: 137.23 Catch/hour: 272.64

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Pomadasys kaakan	73.57	89	26.98	575
CARIDEA	39.24	29632	14.39	
Johnius dussumieri	38.74	2247	14.21	573
Himantura gerrardi	32.88	6	12.06	581
Trichiurus lepturus	21.95	193	8.05	
Otolithes ruber	19.37	89	7.10	572
Thryssa vitrirostris	16.79	2154	6.16	574
Metapenaeus monoceros	4.63	433	1.70	578
Arius dussumieri	3.50	4	1.28	
Penaeus indicus	2.98	135	1.09	576
Metapenaeus monoceros	2.62	379	0.96	579
Drepane longimana	2.46	18	0.90	
Cynoglossus attenuatus	2.01	165	0.74	
Caranx heberi	1.91	2	0.70	
Terapon theraps	1.87	34	0.68	
Penaeus indicus	1.81	101	0.66	577
Polynemus sextarius	1.59	64	0.58	
Panulirus homarus	0.79	2	0.29	
Penaeus monodon	0.64	4	0.23	580
Leiognathus equulus	0.60	14	0.22	
Gazza minuta	0.58	256	0.21	
Pomadasys maculatus	0.50	8	0.18	
Sepia sp.	0.40	12	0.15	
Drepane punctata	0.36	2	0.13	
Johnius amblycephalus	0.28	2	0.10	
Upeneus sulphureus	0.20	6	0.07	
Alepes djedaba	0.19	2	0.07	
Gerres filamentosus	0.18	2	0.07	
Pellona ditchela	0.02	2	0.01	
Total	272.64		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 106
DATE :31/10/2007 GEAR TYPE: BT NO: 18 POSITION:Lat S 17°41.33
start stop duration Lon E 37°51.21
TIME :13:40:00 14:11:59 32.0 (min) Purpose : 3
LOG : 211.32 213.07 1.8 Region : 7400
FDEPTH: 29 29 Gear cond.: 0
BDEPTH: 29 29 Validity : 0
Towing dir: 0° Wire out : 110 m Speed : 3.3 kn
Sorted : 68 Total catch: 68.47 Catch/hour: 128.50

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
Upeneus taeniopterus	46.45	2004 36.15	582
Pomadasys maculatus	15.39	362 11.98	583
Secutor insidiator	9.89	708 7.70	
Scomberomorus commerson	8.73	2 6.79	587
Leiognathus equulus	8.45	186 6.57	
Upeneus sulphureus	7.23	306 5.62	584
Loxodon macrorhinus	6.17	8 4.80	
Pomadasys kaakan	5.91	21 4.60	585
Carangoides malabaricus	4.30	47 3.34	
Megalaspis cordyla	3.40	8 2.64	
Sphyraena chrysotaenia	2.63	39 2.04	
Selar crumenophthalmus	2.23	26 1.74	
Drepane longimana	1.35	8 1.05	
Gerres mozambiquensis	1.14	17 0.89	
Pellona ditchela	1.09	49 0.85	586
Terapon jarbua	0.83	0 0.64	
Amblygaster sirm	0.66	11 0.51	
Saurida tumbil	0.54	4 0.42	
Loligo vulgaris	0.53	9 0.41	
Alepes kleinii	0.45	4 0.35	
Rastrelliger kanagurta	0.43	4 0.34	
Polynemus sextarius	0.24	8 0.19	
Sepia sp.	0.17	6 0.13	
Alectis indicus	0.15	2 0.12	
Cynoclossus gilchristi	0.08	4 0.06	
Cynoglossus lida	0.06	4 0.04	
Echeneis naucrates	0.02	2 0.02	
Total	128.50	100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 107
DATE :01/11/2007 GEAR TYPE: BT NO: 18 POSITION:Lat S 17°32.88
start stop duration Lon E 38°18.02
TIME :03:27:54 03:58:28 30.6 (min) Purpose : 3
LOG : 324.70 326.45 1.8 Region : 7400
FDEPTH: 53 52 Gear cond.: 0
BDEPTH: 53 52 Validity : 0
Towing dir: 0° Wire out : 150 m Speed : 3.4 kn
Sorted : 23 Total catch: 22.94 Catch/hour: 45.03

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
Epinephelus coioides	35.92	4 79.77	588
Carangoides chrysophrys	6.56	2 14.56	
Loligo vulgaris	0.61	14 1.35	
Carangoides caeruleopinnatus	0.49	4 1.09	
Abalistes stellatus	0.45	2 1.00	
Bothus pantherinus	0.24	12 0.52	
Penaeus semisulcatus	0.22	6 0.48	589
Nemipterus japonicus	0.18	14 0.39	
Saurida undosquamis	0.18	6 0.39	
Carangoides malabaricus	0.16	6 0.35	
Apogon quadrifasciatus	0.04	6 0.09	
Total	45.03	100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 108
DATE :01/11/2007 GEAR TYPE: BT NO: 18 POSITION:Lat S 17°25.66
start stop duration Lon E 38°12.87
TIME :05:38:23 06:09:19 30.9 (min) Purpose : 3
LOG : 339.71 341.32 1.6 Region : 7400
FDEPTH: 25 26 Gear cond.: 0
BDEPTH: 25 26 Validity : 0
Towing dir: 0° Wire out : 105 m Speed : 3.1 kn
Sorted : 87 Total catch: 86.56 Catch/hour: 167.86

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
Upeneus taeniopterus	55.85	2542 33.27	590
Secutor insidiator	37.91	2684 22.59	
Aetobatus narinari	29.77	2 17.73	
Scomberoides commersonianus	15.51	4 9.24	591
Carangoides malabaricus	6.92	48 4.12	
Pomadasys kaakan	5.72	2 3.41	
Leiognathus equulus	3.39	60 2.02	
Abalistes stellatus	2.64	2 1.57	
Pomadasys maculatus	2.02	17 1.20	
Carangoides armatus	1.38	10 0.82	
Scomberoides tol	1.20	4 0.72	
Loligo vulgaris	0.91	54 0.54	
Pseudorhombus javanicus	0.67	2 0.40	
Gerres filamentosus	0.64	10 0.38	
Saurida tumbil	0.64	4 0.38	
Carangoides caeruleopinnatus	0.58	4 0.35	
Dussumieria acuta	0.47	19 0.28	
Gazza minuta	0.35	8 0.21	
Upeneus vittatus	0.16	2 0.10	
Selar crumenophthalmus	0.16	2 0.09	
Sphyraena chrysotaenia	0.16	2 0.09	
Sepia sp.	0.14	4 0.08	
Metapenaeus monoceros	0.12	4 0.07	594
Gerres mozambiquensis	0.10	2 0.06	
Lagocephalus lunaris	0.10	2 0.06	
Cynoglossus lida	0.08	6 0.05	
Decapterus russelli	0.06	2 0.03	
Penaeus japonicus	0.06	2 0.03	592
Leiognathus elongatus	0.04	19 0.02	
Penaeus semisulcatus	0.04	2 0.02	593
Metapenaeus stebbingi	0.04	4 0.02	
Apogon quadrifasciatus	0.02	2 0.01	
Metapenaeus monoceros	0.02	2 0.01	595
Trichonotus marleyi	0.01	2 0.00	
Total	167.86	100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 109
DATE :01/11/2007 GEAR TYPE: BT NO: 18 POSITION:Lat S 17°17.15
start stop duration Lon E 38°32.09
TIME :09:17:13 09:47:40 30.5 (min) Purpose : 3
LOG : 369.45 370.92 1.5 Region : 7400
FDEPTH: 26 22 Gear cond.: 0
BDEPTH: 26 22 Validity : 0
Towing dir: 0° Wire out : 110 m Speed : 2.9 kn
Sorted : 97 Total catch: 97.37 Catch/hour: 191.80

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
Upeneus taeniopterus	69.14	3028 36.05	596
Secutor insidiator	53.68	4038 27.99	
Invertebrate	17.53	0 9.14	
Sardinella albella	11.31	410 5.90	597
Carangoides malabaricus	6.15	63 3.20	600
Pomadasys kaakan	5.71	2 2.98	605
Sphyraena putnamie	5.63	8 2.94	
Carangoides chrysophrys	5.16	14 2.69	
Argyrops filamentosus	5.10	4 2.66	
Decapterus russelli	4.31	140 2.25	598
Saurida tumbil	1.99	8 1.04	
Rastrelliger kanagurta	1.48	16 0.77	
Pomadasys maculatus	1.16	12 0.61	599
Metapenaeus monoceros	0.59	26 0.31	601
Saurida undosquamis	0.47	4 0.25	
Upeneus moluccensis	0.41	22 0.22	
Carangoides armatus	0.35	2 0.18	
Loligo sp.	0.33	20 0.17	
Gerres filamentosus	0.32	6 0.16	
Metapenaeus monoceros	0.32	32 0.16	602
Leiognathus equulus	0.18	8 0.09	
Upeneus vittatus	0.10	2 0.05	
Herklotsichthys quadrimaculat.	0.08	2 0.04	
Amblygaster sirm	0.06	2 0.03	
Charybdis feriata	0.06	2 0.03	
Cynoglossus lida	0.06	6 0.03	
Penaeus semisulcatus	0.06	2 0.03	603
Matuta cf lunaris	0.02	4 0.01	
Cynoclossus gilchristi	0.02	2 0.01	
Penaeus semisulcatus	0.02	2 0.01	604
Total	191.80	100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 110
DATE :02/11/2007 GEAR TYPE: BT NO: 18 POSITION:Lat S 17°16.70
start stop duration Lon E 38°53.66
TIME :04:49:29 05:19:30 30.0 (min) Purpose : 3
LOG : 490.57 492.01 1.4 Region : 7400
FDEPTH: 114 109 Gear cond.: 0
BDEPTH: 114 109 Validity : 0
Towing dir: 0° Wire out : 0 m Speed : 2.9 kn
Sorted : 39 Total catch: 38.96 Catch/hour: 77.87

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
Argyrops spinifer	34.88	16 44.79	608
Carangoides malabaricus	25.22	146 32.39	607
Upeneus moluccensis	13.25	344 17.02	606
Pomadasys maculatus	2.30	22 2.95	
Carangoides caeruleopinnatus	0.75	6 0.97	
Pomadasys kaakan	0.56	2 0.72	
Drepane longimana	0.36	4 0.46	
Loligo vulgaris	0.34	18 0.44	
Rastrelliger kanagurta	0.16	2 0.20	
Metapenaeus monoceros	0.03	2 0.03	609
Metapenaeus monoceros	0.02	2 0.03	610
Total	77.87	100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 111
DATE :02/11/2007 GEAR TYPE: BT NO: 18 POSITION:Lat S 17°11.07
start stop duration Lon E 39°0.69
TIME :07:10:10 07:47:00 36.8 (min) Purpose : 3
LOG : 505.83 507.09 1.3 Region : 7400
FDEPTH: 32 33 Gear cond.: 0
BDEPTH: 32 33 Validity : 0
Towing dir: 0° Wire out : 110 m Speed : 2.1 kn
Sorted : 5 Total catch: 4.76 Catch/hour: 7.75

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
Argyrops spinifer	4.40	2 56.72	611
Invertebrate	2.15	0 27.73	
Carangoides malabaricus	0.98	2 12.61	
Loligo vulgaris	0.15	29 1.89	
Bothus swio	0.05	5 0.63	
Echeneis naucrates	0.03	2 0.42	
Total	7.75	100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 112
DATE :02/11/2007 GEAR TYPE: BT NO: 18 POSITION:Lat S 17°1.79
start stop duration Lon E 39°10.65
TIME :09:57:59 10:28:09 30.2 (min) Purpose : 3
LOG : 527.96 529.52 1.6 Region : 7400
FDEPTH: 26 24 Gear cond.: 0
BDEPTH: 26 24 Validity : 0
Towing dir: 0° Wire out : 115 m Speed : 3.1 kn
Sorted : 8 Total catch: 7.73 Catch/hour: 15.37

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
Carangoides chrysophrys	5.53	6 35.99	
Psettodes erumei	4.68	2 30.42	
Loxodon macrorhinus	4.68	4 30.42	
Saurida undosquamis	0.26	2 1.68	
Octopus macropus	0.19	2 1.23	
Pseudorhombus elevatus	0.04	2 0.26	
Total	15.37	100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 113
DATE :02/11/2007 GEAR TYPE: BT NO: 18 POSITION:Lat S 16°49.84
start stop duration Lon E 39°28.56
TIME :15:10:16 15:41:54 31.6 (min) Purpose : 3
LOG : 575.71 577.25 1.5 Region : 7400
FDEPTH: 25 24 Gear cond.: 0
BDEPTH: 25 24 Validity : 0
Towing dir: 0° Wire out : 115 m Speed : 2.9 kn
Sorted : 4 Total catch: 3.91 Catch/hour: 7.42

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers		SAMP
Carcharhinus sp.	2.43	2	32.73	
Abalistes stellatus	2.41	2	32.47	
Sepia sp.	1.67	13	22.50	
Loligo vulgaris	0.55	150	7.41	
Trachinocephalus myops	0.15	15	2.05	
Invertebrate	0.08	4	1.02	
Lagocephalus sceleratus	0.08	2	1.02	
Sphyraena sp.	0.05	6	0.64	
Bothus sp.	0.01	8	0.08	
Apogon quadrifasciatus	0.00	2	0.05	
Cynoclossus gilchristi	0.00	2	0.03	
Total	7.42		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 114
DATE :03/11/2007 GEAR TYPE: BT NO: 18 POSITION:Lat S 16°32.46
start stop duration Lon E 39°51.06
TIME :03:31:00 03:57:03 25.3 (min) Purpose : 3
LOG : 647.48 649.74 2.3 Region : 7400
FDEPTH: 24 23 Gear cond.: 0
BDEPTH: 24 23 Validity : 0
Towing dir: 0° Wire out : 110 m Speed : 5.4 kn
Sorted : 82 Total catch: 82.24 Catch/hour: 194.88

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers		SAMP
Rhinoptera javanica	149.29	5	76.61	614
Mobula sp.	30.81	2	15.81	612
Abalistes stellatus	3.06	2	1.57	
Carangoides malabaricus	1.94	19	1.00	
Loligo vulgaris	1.18	45	0.61	
Caranx heberi	1.14	2	0.58	
Lutjanus sanguineus	0.90	2	0.46	
Apogon quadrifasciatus	0.85	443	0.44	
Stolephorus indicus	0.83	31	0.43	
Carcharhinus limbatus	0.81	2	0.41	
Leiognathus elongatus	0.78	230	0.40	
Sphyraena sp.	0.52	45	0.27	
Trachinocephalus sp.	0.47	2	0.24	
Sepia sp.	0.43	7	0.22	
Upeneus vittatus	0.40	9	0.21	
Decapterus russelli	0.31	12	0.16	
Apogon apogonides	0.30	218	0.15	
Gerres filamentosus	0.19	2	0.10	
Secutor insidiator	0.17	12	0.09	
Nemipterus bipunctatus	0.14	2	0.07	
Metapenaeus monoceros	0.09	9	0.05	613
Fistularia commersonii	0.07	2	0.04	
Trachinocephalus myops	0.07	9	0.04	
Pterocaesio marri	0.03	2	0.01	
Cynoglossus lida	0.02	2	0.01	
Mene maculata	0.02	2	0.01	
Upeneus moluccensis	0.02	2	0.01	
Rastrelliger kanagurta	0.02	2	0.01	
Bothus sp.	0.00	0	0.00	
Total	194.88		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 115
DATE :03/11/2007 GEAR TYPE: BT NO: 18 POSITION:Lat S 16°36.02
start stop duration Lon E 39°47.13
TIME :06:33:30 06:57:22 23.9 (min) Purpose : 3
LOG : 661.48 662.74 1.3 Region : 7400
FDEPTH: 34 57 Gear cond.: 0
BDEPTH: 34 57 Validity : 0
Towing dir: 0° Wire out : 150 m Speed : 3.2 kn
Sorted : 192 Total catch: 192.06 Catch/hour: 482.75

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers		SAMP
Invertebrate	388.48	0	80.47	
Epinephelus coioides	39.21	5	8.12	615
Lutjanus lutjanus	7.26	131	1.50	618
Acanthurus dussumieri	5.03	3	1.04	
Argyrops filamentosus	5.03	10	1.04	
Balistoides viridescens	4.85	3	1.00	
Abalistes stellatus	4.50	3	0.93	
Lethrinus crocineus	4.40	3	0.91	620
Lutjanus notatus	2.94	28	0.61	
Ostracion cubicus	2.89	3	0.60	
Lutjanus sanguineus	2.74	3	0.57	617
Mulloides vanicolensis	2.26	30	0.47	
Loligo vulgaris	2.04	70	0.42	
Carangoides chrysophrys	1.83	5	0.38	
Parupeneus heptacanthus	1.56	23	0.32	
Cyclichthys sp	1.29	3	0.27	
Decapterus russelli	1.18	141	0.24	619
Upeneus moluccensis	0.96	10	0.20	616
Lethrinus conchyliatus	0.55	3	0.11	
Apogon quadrifasciatus	0.40	302	0.08	
Fistularia commersonii	0.40	45	0.08	
Carangoides malabaricus	0.38	3	0.08	
Parupeneus indicus	0.33	3	0.07	
Pseudorhombus elevatus	0.30	13	0.06	
Crossorhombus valderostratus	0.28	58	0.06	
Priacanthus hamrur	0.25	3	0.05	
Saurida gracilis	0.18	23	0.04	
Sepia sp.	0.18	15	0.04	
Fistularia petimba	0.15	5	0.03	
Sebastapistes mauritiana	0.14	3	0.03	
Choridactylus natalensis	0.13	3	0.03	
Scorpaenodes paruipinis	0.13	13	0.03	
Heniochus acuminatus	0.08	3	0.02	
Penaeus semisulcatus	0.08	5	0.02	621
Penaeus semisulcatus	0.08	5	0.02	622
Synodus hoshinonis	0.06	8	0.01	
Canthigaster smithae	0.05	5	0.01	
Paracaesio xanthurus	0.04	3	0.01	
Synodus jaculum	0.03	3	0.01	
Antennarius striatus	0.02	3	0.00	
Cociella sp.	0.02	3	0.00	
Pterocaesio marri	0.02	3	0.00	
Labroides dimidiatus	0.02	3	0.00	
Chaetodon dolosus	0.01	3	0.00	
Cyprinocirrhites polyactis	0.01	3	0.00	
Total	482.75		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 116
DATE :04/11/2007 GEAR TYPE: BT NO: 18 POSITION:Lat S 16°23.45
start stop duration Lon E 40°2.05
TIME :10:21:29 10:51:32 30.1 (min) Purpose : 3
LOG : 699.57 701.27 1.7 Region : 7400
FDEPTH: 41 45 Gear cond.: 0
BDEPTH: 41 45 Validity : 0
Towing dir: 0° Wire out : 130 m Speed : 3.4 kn
Sorted : 290 Total catch: 290.30 Catch/hour: 579.63

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
Invertebrate	299.50	0 51.67	
Chelonia mydas	239.60	2 41.34	623
Diagramma pictum	6.85	2 1.18	626
Arothron stellatus	6.81	2 1.17	
Loxodon macrorhinus	4.21	2 0.73	
Pseudobalistes fuscus	4.15	2 0.72	
Ostracion cubicus	3.79	4 0.65	
Argyrops filamentosus	2.06	8 0.35	625
Parupeneus heptacanthus	1.96	46 0.34	624
HOLUTHUROIDEA	1.42	4 0.24	
Chilomycterus reticulatus	1.10	2 0.19	
Lutjanus lutjanus	1.04	26 0.18	
Carangoides fulvoguttatus	0.92	4 0.16	
Arothron immaculatus	0.62	2 0.11	
Pterois antennata	0.58	2 0.10	
Loligo sp.	0.52	32 0.09	
Sepia sp.	0.46	12 0.08	
Cyprinocirrhites polyactis	0.38	42 0.07	
Nemipterus zysron	0.36	10 0.06	
Scorpaena scrofa	0.28	2 0.05	
Fistularia petimba	0.26	28 0.04	
Crossorhombus valderostratus	0.24	38 0.04	
Pseudanthias cooperi	0.23	30 0.04	
Bothus pantherinus	0.18	2 0.03	
Pterocaesio marri	0.17	22 0.03	
Lutjanus sebae	0.17	2 0.03	
Bothus sp.	0.16	2 0.03	
Epinephelus areolatus	0.16	2 0.03	
Rhinopias frondosa	0.15	2 0.03	
Chaetodon dolosus	0.14	8 0.02	
Lutjanus bengalensis	0.14	12 0.02	
Calappa hepatica	0.12	4 0.02	
Nemipterus bipunctatus	0.12	2 0.02	
Synodus jaculum	0.12	6 0.02	
Labroides dimidiatus	0.06	12 0.01	
Upeneus bensasi	0.06	4 0.01	
Trachinocephalus myops	0.06	2 0.01	
Epinephelus coeruleopunctatus	0.05	4 0.01	
Lepidozygus tapeinosoma	0.05	4 0.01	
Pterois mombasae	0.05	2 0.01	
Apogon apogonides	0.04	6 0.01	
Cociella crocodila	0.04	6 0.01	
Metapenaeus monoceros	0.04	2 0.01	629
Canthigaster rivulata	0.04	8 0.01	
Onuxodon parvibrachium	0.03	6 0.01	
Thalamita crenata	0.02	2 0.00	
Etisus laevimanus	0.02	2 0.00	
Penaeus semisulcatus	0.02	2 0.00	627
Metapenaeus monoceros	0.02	2 0.00	628
Synodus variegatus	0.02	10 0.00	
Erythrocles schlegeli	0.02	2 0.00	
Oxyurichthys petersi	0.02	2 0.00	
Decapterus macrosoma	0.01	2 0.00	
Callionymus cf persicus	0.01	2 0.00	
Decapterus russelli	0.01	2 0.00	
Total	579.63	100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 117
DATE :04/11/2007 GEAR TYPE: BT NO: 18 POSITION:Lat S 16°12.21
start stop duration Lon E 40°12.11
TIME :14:26:42 14:58:57 32.2 (min) Purpose : 3
LOG : 732.34 734.09 1.8 Region : 7400
FDEPTH: 28 29 Gear cond.: 0
BDEPTH: 28 29 Validity : 0
Towing dir: 0° Wire out : 115 m Speed : 3.3 kn
Sorted : 237 Total catch: 236.82 Catch/hour: 440.73

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
Eretmochelys imbricata	130.27	2 29.56	632
Naso tanganus	95.84	33 21.75	
Dasyatis thetidis	93.05	2 21.11	631
Lactoria cornuta	21.12	37 4.79	
Aprion virescens	20.19	6 4.58	630
Gnathanodon speciosus *	17.31	2 3.93	
Ostracion cubicus	12.26	4 2.78	
Acanthurus xanthopterus	9.55	4 2.17	
Diagramma pictum	5.84	2 1.33	
Naso tuberosus	5.45	2 1.24	
Naso unicornis	5.40	2 1.22	
Diodon hystrix	5.40	4 1.22	
Pseudobalistes sp.	5.21	2 1.18	
Pseudobalistes fuscus	4.82	4 1.09	
Naso brachycentron	4.43	2 1.00	
Tripterodon orbis	3.93	2 0.89	
Sepia sp.	0.65	2 0.15	
Total	440.73	100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 118
DATE :06/11/2007 GEAR TYPE: BT NO: 18 POSITION:Lat S 13°49.49
start stop duration Lon E 40°37.71
TIME :08:33:55 09:03:59 30.1 (min) Purpose : 3
LOG : 1070.64 1072.08 1.4 Region : 7400
FDEPTH: 72 88 Gear cond.: 0
BDEPTH: 72 88 Validity : 0
Towing dir: 0° Wire out : 110 m Speed : 2.9 kn
Sorted : 196 Total catch: 195.71 Catch/hour: 390.51

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
Invertebrate	209.51	0 53.65	
Lutjanus sebae	38.61	4 9.89	633
Acanthurus mata	33.22	24 8.51	
Diagramma pictum	32.13	6 8.23	634
Arothron stellatus	22.95	8 5.88	
Epinephelus coioides	19.95	2 5.11	635
Lutjanus argentimaculatus	15.26	2 3.91	636
Carangoides fulvoguttatus	5.17	2 1.32	
Chilomycterus reticulatus	3.95	4 1.01	
Gymnocranius robinsoni	2.99	8 0.76	
Tetrosomus concatenatus	2.79	6 0.72	
Lactoria cornuta	2.29	6 0.59	
Nemipterus zysron	1.04	32 0.27	
Sepia sp.	0.34	6 0.09	
Fistularia petimba	0.16	6 0.04	
Dactyloptena orientalis	0.07	4 0.02	
Dactyloptena orientalis	0.07	4 0.02	
Calappa hepatica	0.06	4 0.02	
Canthigaster rivulata	0.02	2 0.01	
Total	390.58	100.02	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 119
DATE :08/11/2007 GEAR TYPE: PT NO: 2 POSITION:Lat S 10°49.29
start stop duration Lon E 40°41.25
TIME :13:24:17 13:42:19 18.0 (min) Purpose : 1
LOG : 1464.53 1465.67 1.1 Region : 7400
FDEPTH: 40 40 Gear cond.: 0
BDEPTH: 181 219 Validity : 0
Towing dir: 0° Wire out : 40 m Speed : 3.8 kn
Sorted : 0 Total catch: 0.00 Catch/hour: 0.00

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
N O C A T C H	0.00	0 0.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 120
DATE :13/11/2007 GEAR TYPE: PT NO: 7 POSITION:Lat S 12°55.68
start stop duration Lon E 40°29.50
TIME :17:58:45 18:28:25 29.7 (min) Purpose : 1
LOG : 1677.11 1678.84 1.7 Region : 7400
FDEPTH: 0 0 Gear cond.: 0
BDEPTH: 53 149 Validity : 0
Towing dir: 0° Wire out : 100 m Speed : 3.5 kn
Sorted : 0 Total catch: 36.16 Catch/hour: 73.11

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
J E L L Y F I S H	39.94	28 54.63	
Sphyraena acutipinnis	9.22	138 12.61	
Stolephorus holodon	8.31	3458 11.37	
Sphyraena putnamie	7.20	18 9.85	
Gazza minuta	4.83	188 6.61	
Rastrelliger kanagurta	0.85	40 1.16	
Decapterus kurroides	0.73	16 1.00	
Amblygaster sirm	0.65	14 0.89	
Loligo vulgaris	0.36	67 0.50	
Decapterus russelli	0.34	198 0.47	
ENGRAULIDIDAE	0.26	10 0.36	
Alepes djedaba	0.20	14 0.28	
Parupeneus macronema	0.06	2 0.08	
MYCTOPHIDAE	0.06	51 0.08	
Rexea bengalensis	0.03	2 0.04	
Pterocaesio sp.	0.02	2 0.03	
Lethrinus sp.	0.02	2 0.03	
Loligo sp.	0.02	2 0.03	
Total	73.11	100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 121
DATE :14/11/2007 GEAR TYPE: PT NO: 7 POSITION:Lat S 12°14.66
start stop duration Lon E 41°26.55
TIME :17:34:05 18:03:50 29.8 (min) Purpose : 1
LOG : 1787.44 1789.01 1.6 Region : 7400
FDEPTH: 0 0 Gear cond.: 0
BDEPTH: 35 39 Validity : 0
Towing dir: 0° Wire out : 100 m Speed : 3.1 kn
Sorted : 0 Total catch: 12.62 Catch/hour: 25.44

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
Symbolophorus evermanni	17.04	6585 66.98	
Caesio xanthonota	4.92	14 19.34	
Sphyraena flavicauda	2.46	4 9.67	
Sphyraena sp.	0.87	2 3.41	
Ommastrephes bartrami	0.10	14 0.40	
Promethichthys prometheus	0.03	2 0.12	
Parupeneus macronema	0.01	2 0.05	
MULLIDAE	0.01	2 0.03	
UNIDENTIFIED FISH	0.00	2 0.01	
Total	25.44	100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 122
DATE :14/11/2007 GEAR TYPE: PT NO: 7 POSITION:Lat S 12°17.30
start stop duration Lon E 41°27.00
TIME :18:38:27 19:07:49 29.4 (min) Purpose : 1
LOG : 1790.54 1792.01 1.5 Region : 7400
FDEPTH: 0 0 Gear cond.: 0
BDEPTH: 734 1402 Validity : 0
Towing dir: 0° Wire out : 120 m Speed : 3.0 kn
Sorted : 0 Total catch: 0.99 Catch/hour: 2.02

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
Sphyraena flavicauda	0.92	2 45.45	
Caesio xanthonota	0.80	2 39.39	
Ommastrephes bartrami	0.16	25 8.08	
Symbolophorus evermanni	0.14	47 7.07	
Total	2.02	100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 123
DATE :15/11/2007 GEAR TYPE: PT NO: 2 POSITION:Lat S 12°13.25
start stop duration Lon E 41°27.00
TIME :02:03:54 02:34:45 30.9 (min) Purpose : 1
LOG : 1827.69 1828.76 1.1 Region : 7400
FDEPTH: 15 15 Gear cond.: 0
BDEPTH: 293 151 Validity : 0
Towing dir: 0° Wire out : 150 m Speed : 2.1 kn
Sorted : 0 Total catch: 0.00 Catch/hour: 0.00

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
N O C A T C H	0.00	0 0.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 124
DATE :15/11/2007 GEAR TYPE: PT NO: 7 POSITION:Lat S 12°9.90
start stop duration Lon E 41°26.16
TIME :18:03:12 18:32:37 29.4 (min) Purpose : 1
LOG : 1924.57 1925.48 0.9 Region : 7400
FDEPTH: 0 0 Gear cond.: 0
BDEPTH: 46 33 Validity : 0
Towing dir: 0° Wire out : 120 m Speed : 1.8 kn
Sorted : 0 Total catch: 0.00 Catch/hour: 0.00

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
N O C A T C H	0.00	0 0.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 125
DATE :16/11/2007 GEAR TYPE: PT NO: 1 POSITION:Lat S 12°16.15
start stop duration Lon E 41°22.71
TIME :02:35:06 03:06:37 31.5 (min) Purpose : 1
LOG : 1989.34 1991.10 1.8 Region : 7400
FDEPTH: 5 5 Gear cond.: 0
BDEPTH: 328 44 Validity : 8
Towing dir: 0° Wire out : 140 m Speed : 3.4 kn
Sorted : 0 Total catch: 0.00 Catch/hour: 0.00

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
N O C A T C H	0.00	0 0.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 126
DATE :16/11/2007 GEAR TYPE: PT NO: 7 POSITION:Lat S 12°16.41
start stop duration Lon E 41°23.08
TIME :17:02:34 17:32:18 29.7 (min) Purpose : 1
LOG : 2083.01 2084.59 1.6 Region : 7400
FDEPTH: 0 0 Gear cond.: 0
BDEPTH: 34 71 Validity : 0
Towing dir: 0° Wire out : 120 m Speed : 3.2 kn
Sorted : 0 Total catch: 0.21 Catch/hour: 0.42

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
Symbolophorus evermanni	0.41	351 0.00	
Myctophum obtusirostre	0.01	8 0.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 127
DATE :16/11/2007 GEAR TYPE: PT NO: 5 POSITION:Lat S 12°15.60
start stop duration Lon E 41°22.71
TIME :18:18:55 18:48:50 29.9 (min) Purpose : 1
LOG : 2086.61 2088.09 1.5 Region : 7400
FDEPTH: 0 10 Gear cond.: 0
BDEPTH: 205 240 Validity : 0
Towing dir: 0° Wire out : 120 m Speed : 3.0 kn
Sorted : 0 Total catch: 2.59 Catch/hour: 5.20

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
Sphyraena flavicauda	3.29	4 63.25	
Symbolophorus evermanni	1.50	977 28.92	
Ommastrephes bartrami	0.32	26 6.17	
FISH LARVAE	0.06	54 1.16	
Lestrolepis intermedia	0.02	2 0.39	
MULLIDAE	0.00	4 0.08	
Leptocephalus	0.00	2 0.04	
Total	5.20	100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 128
DATE :17/11/2007 GEAR TYPE: PT NO: 5 POSITION:Lat S 12°15.04
start stop duration Lon E 41°26.90
TIME :18:56:04 19:27:43 31.7 (min) Purpose : 1
LOG : 2191.48 2193.01 1.5 Region : 7400
FDEPTH: 0 10 Gear cond.: 0
BDEPTH: 71 64 Validity : 0
Towing dir: 0° Wire out : 120 m Speed : 2.9 kn
Sorted : 0 Total catch: 7.00 Catch/hour: 13.27

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
Symbolophorus evermanni	11.43	3008 86.14	
Sphyraena flavicauda	1.14	2 8.57	
Ommastrephes bartrami	0.17	2 1.29	
Promethichthys prometheus	0.15	9 1.14	
FISH LARVAE	0.09	148 0.71	
Myctophum obtusirostre	0.09	19 0.71	
Diaphus garmani	0.08	63 0.57	
Lestrolepis intermedia	0.08	4 0.57	
Leptocephalus	0.04	11 0.29	
Total	13.27	100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 129
DATE :18/11/2007 GEAR TYPE: PT NO: 2 POSITION:Lat S 12°6.82
start stop duration Lon E 41°18.79
TIME :20:49:30 21:19:46 30.3 (min) Purpose : 1
LOG : 2273.67 2275.14 1.5 Region : 7400
FDEPTH: 510 510 Gear cond.: 0
BDEPTH: 950 1437 Validity : 0
Towing dir: 0° Wire out : 1310 m Speed : 2.9 kn
Sorted : 0 Total catch: 2.28 Catch/hour: 4.51

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
Symbolophorus evermanni	1.59	912 35.16	
Setarches guentheri	0.79	2 17.58	
ARISTEIDAE	0.28	238 6.15	
Chauliodus sloani	0.26	28 5.71	
Loligo sp.	0.24	56 5.27	
SERGESTIDAE	0.22	123 4.84	
Howella sherborni	0.10	2 2.20	
Gonostoma sp.	0.10	8 2.20	
MICROSTOMIDAE *	0.10	2 2.20	
Argyropelecus aculeatus	0.10	30 2.20	
Melanostomias sp.	0.08	4 1.76	
Melanostigma gelatinosum	0.08	2 1.76	
Bregmaceros mcclellandi	0.06	24 1.32	
Eustomias sp.	0.06	8 1.32	
Myctophum spinosum	0.06	8 1.32	
STERNOPTYCHIDAE	0.06	4 1.32	
Leptocephalus	0.04	8 0.88	
Chiasmodon sp.	0.04	14 0.88	
FISH LARVAE	0.04	42 0.88	
Nesiarchus sp	0.04	12 0.88	
Diaphus garmani	0.04	16 0.88	
Scopelarchoides signifer	0.03	4 0.66	
Diretmoides parini	0.02	2 0.44	
EVERMANNELLIDAE	0.02	2 0.44	
Diplophos taenia	0.02	4 0.44	
Idiacanthus sp.	0.02	2 0.44	
MELAMPHAIDAE	0.02	2 0.44	
Argyropelecus affinis	0.02	4 0.44	
Total	4.51	100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 130
DATE :21/11/2007 GEAR TYPE: BT NO: 15 POSITION:Lat S 12°56.04
start stop duration Lon E 40°30.03
TIME :14:45:05 15:01:15 16.2 (min) Purpose : 1
LOG : 2387.48 2388.30 0.8 Region : 7400
FDEPTH: 60 73 Gear cond.: 0
BDEPTH: 60 73 Validity : 0
Towing dir: 0° Wire out : 210 m Speed : 3.0 kn
Sorted : 0 Total catch: 5009.65 Catch/hour: 18588.68

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
J E L L Y F I S H	18552.88	10019 99.81	
Cyclichthys spilostylus	12.47	4 0.07	
Loxodon macrorhinus	9.28	4 0.05	
Aluterus monoceros	6.72	4 0.04	
Nemipterus metopias	2.97	74 0.02	
Upeneus moluccensis	2.23	74 0.01	
Saurida undosquamis	2.15	7 0.01	
Total	18588.68	100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 131
DATE :21/11/2007 GEAR TYPE: PT NO: 2 POSITION:Lat S 12°52.32
start stop duration Lon E 40°41.91
TIME :17:13:44 17:44:07 30.4 (min) Purpose : 1
LOG : 2401.67 2403.83 2.2 Region : 7400
FDEPTH: 500 500 Gear cond.: 0
BDEPTH: 1288 1211 Validity : 0
Towing dir: 0° Wire out : 1300 m Speed : 4.3 kn
Sorted : 0 Total catch: 0.00 Catch/hour: 0.00

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
Diaphus nielseni	0.00	2 0.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 132
DATE :21/11/2007 GEAR TYPE: BT NO: 15 POSITION:Lat S 12°48.00
start stop duration Lon E 40°39.06
TIME :20:33:52 20:40:28 6.6 (min) Purpose : 1
LOG : 2417.48 2417.78 0.3 Region : 7400
FDEPTH: 239 243 Gear cond.: 9
BDEPTH: 239 243 Validity : 0
Towing dir: 0° Wire out : 650 m Speed : 2.7 kn
Sorted : 0 Total catch: 0.00 Catch/hour: 0.00

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

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 133
DATE :21/11/2007 GEAR TYPE: BT NO: 15 POSITION:Lat S 12°48.60
start stop duration Lon E 40°38.80
TIME :21:43:55 22:12:29 28.6 (min) Purpose : 1
LOG : 2421.96 2423.23 1.3 Region : 7400
FDEPTH: 208 249 Gear cond.: 0
BDEPTH: 208 249 Validity : 0
Towing dir: 0° Wire out : 620 m Speed : 2.7 kn
Sorted : 0 Total catch: 89.50 Catch/hour: 188.09

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
Epinephelus chabaudi	30.37	2	16.15
Narcine rierai	23.54	187	12.51
MYCTOPHIDAE	20.70	6210	11.01
Saurida undosquamis	16.04	65	8.53
Raja stenorhyncus	15.66	2	8.32
Heterodontus ramalheira	14.08	2	7.49
Centrophorus moluccensis	11.45	2	6.09
Diaphus effulgens	6.66	286	3.54
Squalus mitsukurii	5.88	4	3.13
Beryx splendens	4.81	101	2.56
Monocentris japonicus	4.18	19	2.22
Aristaeomorpha foliacea	4.16	324	2.21
Rexea prometheoides	3.76	34	2.00
Argyrosomus hololepidotus	3.26	13	1.73
Satyrichthys adeni	2.23	4	1.18
Lepidotrigla faueri	1.93	82	1.03
Neoscombrops annectens	1.83	23	0.97
Scyllarides elisabethae	1.51	2	0.80
Neoepinnula orientalis	1.37	11	0.73
Sepia sp.	1.26	19	0.67
Squatina africana	0.99	4	0.53
Physiculus natalensis	0.97	32	0.51
Synagrops japonicus	0.95	11	0.50
Uranoscopus archionema	0.86	4	0.46
Promethichthys prometheus	0.84	13	0.45
Aristeus antennatus	0.69	34	0.37
Chlorophthalmus agassizi	0.57	8	0.30
Torpedo nobiliana	0.50	2	0.27
Trachypenaeus curvirostris	0.50	345	0.27
Loligo forbesi	0.46	2	0.25
BOTHIDAE	0.44	23	0.23
Lophiodes sp.	0.42	6	0.22
Sea urchins (waek spines)	0.38	4	0.20
Priacanthus hamrur	0.38	2	0.20
Polyipnus polli	0.38	198	0.20
Lepidopus sp.	0.38	17	0.20
PORTUNIDAE	0.36	6	0.19
Ibacus novemdentatus	0.34	2	0.18
APOGONIDAE	0.29	284	0.16
Ariosoma mauritianum	0.25	6	0.13
Tylerius spinosissimus	0.25	4	0.13
RHINOBATIDAE	0.23	4	0.12
Hoplostethus mediterraneus	0.23	55	0.12
Taeniopsetta ocellata	0.19	4	0.10
Antigonia rubescens	0.19	19	0.10
Astronesthes martensii	0.17	15	0.09
Scyllarides sp.	0.15	8	0.08
Paracitharus macrolepis	0.11	2	0.06
Ilyophis sp	0.11	2	0.06
Solenocera agoensis	0.11	19	0.06
Starfish	0.08	2	0.04
PANDALIDAE	0.08	40	0.04
Champsodon capensis	0.06	25	0.03
Polymixia nobilis	0.06	2	0.03
Serranus africana	0.06	4	0.03
Saurida sp.	0.06	2	0.03
Poecilopsetta natalensis	0.05	2	0.03
GECARCINIDAE	0.04	2	0.02
Halieutaea sp.	0.04	2	0.02
Penaeus latisulcatus	0.04	4	0.02
ISOPODS	0.02	2	0.01
Halieutaea hancocki	0.02	2	0.01
Lestrolepis intermedia	0.02	2	0.01
PLATYCEPHALIDAE	0.02	2	0.01
Symphysanodon sp.	0.02	2	0.01
Gephyroberyx darwini	0.02	6	0.01
Diaphus perspicillatus	0.00	2	0.00
Diaphus nielseni	0.00	2	0.00
Diaphus garmani	0.00	2	0.00
Total	188.09		100.00

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 134
DATE :23/11/2007 GEAR TYPE: BT NO: 15 POSITION:Lat S 12°25.70
start stop duration Lon E 40°40.50
TIME :08:30:00 08:37:00 7.0 (min) Purpose : 1
LOG : 2611.60 2611.80 0.2 Region : 7400
FDEPTH: 408 402 Gear cond.: 0
BDEPTH: 408 402 Validity : 0
Towing dir: 0° Wire out : 1200 m Speed : 8.5 kn
Sorted : 0 Total catch: 8.02 Catch/hour: 68.73

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
Sea urchins (waek spines)	23.74	34	34.55
Zenion hololepis	15.43	1243	22.45
Squalus mitsukurii	14.49	9	21.08
Polymixia berndti	2.91	86	4.24
Chaunax pictus	2.57	77	3.74
Sepia sp.	2.23	26	3.24
Chlorophthalmus agassizi	0.94	26	1.37
Heterocarpus woodmasoni	0.94	69	1.37
Argentina euchus	0.86	34	1.25
Neobythites trifilis	0.69	17	1.00
Antigonia cf rubescens	0.60	26	0.87
Starfish	0.60	60	0.87
Calappa sp.	0.51	17	0.75
Malacocephalus laevis	0.51	9	0.75
Polyipnus polli	0.43	240	0.62
SEPIOLIDAE	0.34	51	0.50
Synagrops japonicus	0.26	9	0.37
Bembrops platyrhynchus	0.26	9	0.37
ANTHOZOA (Sea anemones)	0.09	34	0.12
Echelus uropterus	0.09	9	0.12
PENAEIDAE	0.09	77	0.12
Diaphus garmani	0.05	17	0.07
'Mole crab'	0.04	9	0.06
Benthosema fibulatum	0.03	17	0.05
Diaphus taaningi	0.03	17	0.04
Total	68.73		100.00

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 135
DATE :23/11/2007 GEAR TYPE: BT NO: 18 POSITION:Lat S 12°41.71
start stop duration Lon E 40°40.02
TIME :19:04:48 19:34:47 30.0 (min) Purpose : 1
LOG : 2666.09 2667.46 1.4 Region : 7400
FDEPTH: 292 296 Gear cond.: 0
BDEPTH: 292 296 Validity : 0
Towing dir: 0° Wire out : 840 m Speed : 2.7 kn
Sorted : 0 Total catch: 56.54 Catch/hour: 113.11

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
Squatina africana	17.31	2	15.30	
Haliporoides triarthrus	14.38	594	12.72	638
Haliporoides triarthrus	10.12	360	8.95	637
Diaphus effulgens	7.64	294	6.76	
Aristaeomorpha foliacea	7.60	234	6.72	639
Centrophorus moluccensis	7.00	2	6.19	
Chaunax pictus	6.80	12	6.01	
Uranoscopus archionema	5.90	24	5.22	
Aristeus antennatus	4.58	390	4.05	
Saurida undosquamis	4.50	16	3.98	
Chlorophthalmus agassizi	3.56	60	3.15	
Synagrops japonicus	2.24	28	1.98	
Neoepinnula orientalis	2.20	20	1.95	
Physiculus natalensis	1.72	28	1.52	
Aristaeomorpha foliacea	1.70	106	1.50	640
Solenocera agoensis	1.62	196	1.43	
Tylerius spinosissimus	1.46	22	1.29	
Raja cf lanceorostrata	1.20	6	1.06	
Narcine rierai	0.98	12	0.87	
Starfish	0.78	24	0.69	
Satyrichthys adeni	0.74	2	0.65	
Ommastrephes bartrami	0.62	8	0.55	
Etmopterus sentosus	0.60	12	0.53	
Champsodon capensis	0.58	158	0.51	
Malacocephalus laevis	0.50	10	0.44	
Heterocarpus tricarinatus	0.46	52	0.41	
PLATYCEPHALIDAE	0.44	18	0.39	
Arnoglossus dalgleishi	0.42	38	0.37	
Antigonia cf rubescens	0.42	48	0.37	
E C H I N O D E R M A T A	0.42	2	0.37	
Plesionika martia	0.42	76	0.37	
Loligo sp.	0.42	42	0.37	
Calappa sp.	0.40	10	0.35	
Cynoglossus marleyi	0.32	6	0.28	
Polyipnus spinosus	0.32	136	0.28	
LITHODIDAE	0.30	8	0.27	
ISOPODS	0.30	38	0.27	
Malthopsis tiarella	0.22	20	0.19	
Neenchelys sp	0.22	10	0.19	
MYCTOPHIDAE	0.20	90	0.18	
APOGONIDAE	0.16	72	0.14	
Laeops pectoralis	0.12	10	0.11	
OCTOPODIDAE	0.12	2	0.11	
Argentina euchus	0.10	6	0.09	
Astronesthes martensii	0.08	6	0.07	
Squilla sp.	0.08	2	0.07	
Heterocarpus woodmasoni	0.08	4	0.07	
Neolithodes sp.	0.06	2	0.05	
Neobythides kenyaensis	0.06	4	0.05	
Bembrops platyrhynchus	0.06	6	0.05	
Polymixia berndti	0.06	6	0.05	
Heterocarpus sp.	0.06	4	0.05	
Sepia sp.	0.06	4	0.05	
PYCNOCRASPEDUM	0.05	6	0.05	
Neobythides vityazi	0.05	2	0.04	
Epigonus sp.	0.04	14	0.04	
PORTUNIDAE	0.04	2	0.04	
G A S T R O P O D S	0.04	6	0.04	
Halieutaea sp.	0.04	4	0.04	
Benthenchelys sp	0.04	4	0.04	
Parazen pacificus	0.04	4	0.04	
C R A B S	0.02	6	0.02	
Lestrolepis intermedia	0.02	2	0.02	
Triacanthodes ethiops	0.00	2	0.00	
Benthosema fibulatum	0.00	2	0.00	
Diaphus nielseni	0.00	2	0.00	
Diaphus garmani	0.00	2	0.00	
Total	113.13		100.01	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 136
DATE :24/11/2007 GEAR TYPE: BT NO: 18 POSITION:Lat S 11°8.05
start stop duration Lon E 40°46.17
TIME :21:21:52 21:37:15 15.4 (min) Purpose : 1
LOG : 2873.84 2874.53 0.7 Region : 7400
FDEPTH: 391 412 Gear cond.: 8
BDEPTH: 391 412 Validity : 4
Towing dir: 0° Wire out : 0 m Speed : 2.7 kn
Sorted : 0 Total catch: 9.00 Catch/hour: 35.10

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
Aristaeomorpha foliacea	3.39	218 9.66	642
Malacocephalus laevis	2.85	16 8.11	
Zenion sp.	2.81	195 8.00	
Squilla sp.	2.73	4 7.78	
Chlorophthalmus agassizi	2.14	160 6.11	
Physiculus natalensis	1.99	12 5.66	
Diaphus effulgens	1.64	58 4.67	
Haliporoides triarthrus	1.52	58 4.33	
Aristaeomorpha foliacea	1.40	39 4.00	641
Beryx splendens	1.25	8 3.55	
Pyramodon ventralis	1.17	23 3.33	
Pontinus nigerimum	0.97	4 2.78	
Argentina euchus	0.94	39 2.67	
Starfish	0.94	19 2.67	
Neobythides cf somaliaensis	0.86	27 2.44	
Parapandalus spinifer	0.78	74 2.22	
MYCTOPHIDAE	0.74	191 2.11	
Neoepinnula orientalis	0.70	4 2.00	
Chaunax pictus	0.58	39 1.67	
Polyipnus polli	0.58	207 1.67	
Lithodidae	0.55	4 1.56	
Rexea prometheoides	0.55	8 1.56	
ISOPODS	0.47	39 1.33	
Gephyroberyx darwini	0.47	8 1.33	
Epigonus robustus	0.43	12 1.22	
Heterocarpus tricarinatus	0.43	55 1.22	
Aristeus antennatus	0.35	43 1.00	
Etmopterus sentosus	0.27	4 0.78	
Neenchelys sp	0.19	4 0.56	
Polymixia nobilis	0.19	19 0.56	
Plesionika martia	0.19	51 0.56	
Benthenchelys sp	0.16	8 0.44	
Solenocera agoensis	0.16	16 0.44	
Antigonia cf rubescens	0.12	8 0.33	
Neolithodes sp.	0.12	4 0.33	
Parazen pacificus	0.12	8 0.33	
Polymetme corythaeola	0.12	16 0.33	
Astronesthes martensii	0.08	4 0.22	
PYCNOCRASPEDUM	0.08	4 0.22	
Nephropsis stewarti	0.04	8 0.11	
Neobythides kenyaensis	0.04	4 0.11	
Benthosema fibulatum	0.00	4 0.01	
Diaphus garmani	0.00	4 0.01	
Symbolophorus evermanni	0.00	4 0.01	
Total	35.10	100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 137
DATE :30/11/2007 GEAR TYPE: PT NO: 5 POSITION:Lat S 14°10.24
start stop duration Lon E 41°26.64
TIME :17:31:53 18:02:02 30.2 (min) Purpose : 1
LOG : 3520.72 3521.84 1.1 Region : 7400
FDEPTH: 5 5 Gear cond.: 0
BDEPTH: 898 980 Validity : 0
Towing dir: 0° Wire out : 120 m Speed : 2.2 kn
Sorted : 1 Total catch: 1.37 Catch/hour: 2.73

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
Ommastrephes bartrami	0.96	36 35.04	
Symbolophorus sp.	0.74	121 27.01	
J E L L Y F I S H	0.58	0 21.17	
Myctophum sp.	0.44	66 16.06	
PORIFERA (Sponges)	0.02	24 0.73	
BOTHIDAE	0.00	18 0.00	
C R U S T A C E A N S	0.00	8 0.00	
FISH LARVAE	0.00	8 0.00	
POSTLARVAL FISH	0.00	2 0.00	
Total	2.73	100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 138
DATE :03/12/2007 GEAR TYPE: BT NO: 19 POSITION:Lat S 16°28.00
start stop duration Lon E 39°54.06
TIME :09:21:47 09:39:13 22.4 (min) Purpose : 1
LOG : 3972.46 3973.81 1.4 Region : 7400
FDEPTH: 18 23 Gear cond.: 0
BDEPTH: 18 23 Validity : 0
Towing dir: 0° Wire out : 90 m Speed : 3.6 kn
Sorted : 2 Total catch: 1.93 Catch/hour: 5.16

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
Leiognathus elongatus	1.23	88 23.83	
Upeneus bensasi	1.04	45 20.21	
Decapterus russelli	0.94	29 18.13	
MISCELLANEOUS	0.56	0 10.88	
PORIFERA (Sponges)	0.45	0 8.81	
Loligo sp.	0.40	56 7.77	
HOLUTHUROIDEA	0.35	0 6.74	
Amblygaster sirm	0.05	11 1.04	
Apogon quadrifasciatus	0.03	3 0.52	
Carangoides uii	0.03	3 0.52	
Metapenaeus monoceros	0.03	3 0.52	
Synodus sp.	0.03	11 0.52	
Canthigaster jantinoptera	0.03	3 0.52	
Decapterus macrosoma	0.00	3 0.00	
FISH LARVAE	0.00	3 0.00	
Fish small non. comm.	0.00	16 0.00	
J E L L Y F I S H	0.00	3 0.00	
Total	5.16	100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 139
DATE :03/12/2007 GEAR TYPE: BT NO: 19 POSITION:Lat S 16°27.22
start stop duration Lon E 39°59.00
TIME :10:52:16 11:13:45 11.5 (min) Purpose : 1
LOG : 3981.28 3981.76 0.5 Region : 7400
FDEPTH: 82 75 Gear cond.: 0
BDEPTH: 82 75 Validity : 0
Towing dir: 0° Wire out : 245 m Speed : 2.5 kn
Sorted : 9 Total catch: 9.37 Catch/hour: 48.93

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
PORIFERA (Sponges)	23.34	0 47.71	
Ephippus orbis	17.49	5 35.75	
Molluscs	5.80	0 11.85	
Abalistes stellatus	1.67	5 3.42	
Parupeneus heptacanthus	0.63	10 1.28	
Total	48.93	100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 140
DATE :03/12/2007 GEAR TYPE: BT NO: 19 POSITION:Lat S 16°27.55
start stop duration Lon E 40°0.34
TIME :12:06:56 12:37:34 30.6 (min) Purpose : 1
LOG : 3986.34 3987.75 1.4 Region : 7400
FDEPTH: 398 407 Gear cond.: 0
BDEPTH: 398 407 Validity : 0
Towing dir: 0° Wire out : 1200 m Speed : 2.8 kn
Sorted : 155 Total catch: 474.67 Catch/hour: 929.51

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
Chlorophthalmus agassizi	663.70	6842 71.40	
Dalatias licha *	47.19	2 5.08	
Peristedion weberi	44.26	43 4.76	
Neoscombrops sp.	43.51	633 4.68	
Penaeopsis balssi	35.62	5201 3.83	
Diretmus argenteus	24.38	74 2.62	
Centrophorus moluccensis	19.48	4 2.10	
Chascanopsetta lugubris	10.55	33 1.14	
Chaeceon macphersoni	8.32	49 0.90	
Cubiceps whitleggi	7.48	92 0.80	
Nephropsis stewarti	4.82	108 0.52	
Lepidotrigla sp.	3.51	25 0.38	
Polymixia nobilis	3.49	117 0.37	
Loligo forbesi	2.33	8 0.25	
Xenolepidichthys dagleishi	2.15	133 0.23	
PLATYCEPHALIDAE	1.82	18 0.20	
Synagrops japonicus	1.41	25 0.15	
Trichiurus lepturus	1.33	25 0.14	
OPHIDIIDAE	1.16	33 0.12	
BOTHIDAE	1.00	67 0.11	
Laemonema globiceps	0.49	8 0.05	
Heterocarpus woodmasoni	0.49	25 0.05	
UNIDENTIFIED FISH	0.33	25 0.04	
MACROURIDAE	0.23	8 0.03	
Promethichthys prometheus	0.16	8 0.02	
Caelorinchus braueri	0.16	8 0.02	
OPHIDIIDAE	0.08	8 0.01	0
Etmopterus sentosus	0.06	10 0.01	
Total	929.51	100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 141
DATE :03/12/2007 GEAR TYPE: BT NO: 19 POSITION:Lat S 16°23.30
start stop duration Lon E 40°2.17
TIME :15:13:53 15:45:16 31.4 (min) Purpose : 1
LOG : 3997.04 3998.77 1.7 Region : 7400
FDEPTH: 37 40 Gear cond.: 0
BDEPTH: 37 40 Validity : 0
Towing dir: 0° Wire out : 120 m Speed : 3.3 kn
Sorted : 28 Total catch: 28.10 Catch/hour: 53.71

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
Diagramma pictum	15.67	4 29.18	645
Lutjanus sebae	9.48	2 17.65	643
Sphyraena jello	8.03	2 14.95	644
Acanthurus dussumieri	7.28	4 13.56	
Aluterus monoceros	4.82	2 8.97	
Ostracion cubicus	2.56	2 4.77	
Parupeneus heptacanthus	1.43	19 2.67	
Lethrinus mahsena	1.38	10 2.56	
Gymnocranius grandoculis	1.05	6 1.96	
Argyrops filamentosus	0.46	2 0.85	
Loligo forbesi	0.42	8 0.78	
Raja cf lanceorostrata	0.40	2 0.75	
Lutjanus lutjanus	0.29	6 0.53	
Caesio xanthonota	0.25	21 0.46	
Cyprinocirrhites polyactis	0.06	6 0.11	
C R A B S	0.06	2 0.11	
Lutjanus sp.	0.04	2 0.07	
Chaetodon sp.	0.02	2 0.04	
Siganus sp.	0.02	2 0.04	
Total	53.71	100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 142
DATE :03/12/2007 GEAR TYPE: PT NO: 5 POSITION:Lat S 16°30.02
start stop duration Lon E 39°57.12
TIME :17:34:21 18:35:44 61.4 (min) Purpose : 1
LOG : 4012.06 4017.90 5.9 Region : 7400
FDEPTH: 5 5 Gear cond.: 0
BDEPTH: 461 774 Validity : 0
Towing dir: 0° Wire out : 120 m Speed : 5.7 kn
Sorted : 2 Total catch: 2.03 Catch/hour: 1.98

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
Auxis rochei	0.78	2 39.41	
MYCTOPHIDAE	0.61	531 30.54	
Small squids	0.39	111 19.70	
FISH LARVAE	0.14	18 6.90	
PORIFERA (Sponges)	0.04	0 1.97	
Loligo sp.	0.02	4 0.99	
Trichiurus lepturus	0.01	2 0.49	
Fish small non. comm.	0.00	10 0.00	
Total	1.98	100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 143
DATE :04/12/2007 GEAR TYPE: BT NO: 19 POSITION:Lat S 16°18.23
start stop duration Lon E 40°2.74
TIME :12:54:08 13:17:18 23.2 (min) Purpose : 1
LOG : 4123.21 4124.40 1.2 Region : 7400
FDEPTH: 23 23 Gear cond.: 0
BDEPTH: 23 23 Validity : 0
Towing dir: 0° Wire out : 85 m Speed : 3.1 kn
Sorted : 15 Total catch: 14.79 Catch/hour: 38.33

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
Scomberomorus commerson	19.83	5 51.72	646
Parupeneus heptacanthus	8.55	842 22.31	
Sphyraena obtusata	5.03	145 13.12	
Loligo sp.	2.59	93 6.76	
Decapterus kurroides	1.11	70 2.91	
Scyllarides sp.	0.52	3 1.35	
Leiognathus elongatus	0.29	96 0.74	
Decapterus russelli	0.21	21 0.54	
Carangoides uii	0.08	13 0.20	
Trachinocephalus myops	0.08	8 0.20	
Teixeirichthys jordani	0.05	5 0.14	
Total	38.33	100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 144
DATE :06/12/2007 GEAR TYPE: BT NO: 19 POSITION:Lat S 19°1.27
start stop duration Lon E 36°46.47
TIME :13:48:06 14:18:21 30.3 (min) Purpose : 1
LOG : 4524.60 4526.48 1.9 Region : 7400
FDEPTH: 54 51 Gear cond.: 0
BDEPTH: 54 51 Validity : 0
Towing dir: 0° Wire out : 170 m Speed : 3.7 kn
Sorted : 112 Total catch: 909.87 Catch/hour: 1804.70

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
Herklotsichthys quadrimaculat.	1130.58	18417 62.65	
Sardinella albella	185.12	5679 10.26	647
Upeneus taeniopterus	139.24	3277 7.72	649
Selar crumenophthalmus	80.93	1035 4.48	652
Secutor insidiator	64.86	508 3.59	
Ariomma indica	61.88	916 3.43	651
Rhynchobatus djeddensis	33.32	2 1.85	
Pomadasys maculatus	27.85	417 1.54	653
Upeneus moluccensis	27.25	952 1.51	650
Caranx (Caranx) lugubris	16.36	2 0.91	648
Carangoides malabaricus	9.16	226 0.51	
Sphyraena flavicauda	7.14	119 0.40	
Hemipristis elongatus	5.36	2 0.30	
Terapon jarbua	2.62	24 0.15	
Decapterus russelli	2.50	83 0.14	
Upeneus vittatus	2.38	48 0.13	
Abalistes stellatus	2.30	4 0.13	
Saurida undosquamis	1.90	24 0.11	
Trichiurus lepturus	1.55	71 0.09	
Psettodes erumei	1.21	4 0.07	
Rastrelliger kanagurta	1.19	12 0.07	
Total	1804.70	100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 145
DATE :08/12/2007 GEAR TYPE: BT NO: 19 POSITION:Lat S 19°1.54
start stop duration Lon E 36°45.91
TIME :14:09:29 14:39:14 29.7 (min) Purpose : 1
LOG : 4629.20 4630.89 1.7 Region : 7400
FDEPTH: 54 50 Gear cond.: 0
BDEPTH: 54 50 Validity : 0
Towing dir: 0° Wire out : 170 m Speed : 3.4 kn
Sorted : 90 Total catch: 90.01 Catch/hour: 181.59

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
Upeneus moluccensis	40.95	1190 22.55	656
Carangoides malabaricus	33.89	841 18.66	654
Herklotsichthys quadrimaculat.	33.49	1081 18.44	662
Secutor insidiator	15.64	682 8.61	
Ariomma indica	11.16	149 6.14	655
Sardinella albella	10.59	375 5.83	659
Saurida undosquamis	8.78	127 4.83	663
Abalistes stellatus	4.82	8 2.66	
Nemipterus bipunctatus	4.42	50 2.43	660
Upeneus taeniopterus	3.39	129 1.87	657
Pomadasys maculatus	2.80	36 1.54	661
Decapterus russelli	2.72	71 1.50	658
Sphyraena putnamie	2.30	8 1.27	
Selar crumenophthalmus	1.90	22 1.04	
Trichiurus lepturus	1.43	46 0.79	
Sphyraena flavicauda	0.87	14 0.48	
Upeneus vittatus	0.71	10 0.39	
Rastrelliger kanagurta	0.52	6 0.29	
Terapon jarbua	0.40	4 0.22	
Argyrops filamentosus	0.28	6 0.16	
Leiognathus equulus	0.22	2 0.12	
Mene maculata	0.14	2 0.08	
Lagocephalus sceleratus	0.10	4 0.06	
Metapenaeus monoceros	0.06	4 0.03	
Total	181.59	100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 146
DATE :10/12/2007 GEAR TYPE: BT NO: 19 POSITION:Lat S 21°45.37
start stop duration Lon E 35°33.77
TIME :04:50:56 05:20:46 29.8 (min) Purpose : 1
LOG : 4945.27 4947.12 1.9 Region : 7400
FDEPTH: 205 224 Gear cond.: 0
BDEPTH: 205 224 Validity : 0
Towing dir: 0° Wire out : 600 m Speed : 3.7 kn
Sorted : 54 Total catch: 53.83 Catch/hour: 108.24

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
Antigonia rubescens	41.82	1015 38.64	
Squalus megalops	23.83	60 22.01	
Macrorhamphosus scolopax	4.58	416 4.24	
Zeus faber	4.42	10 4.09	
Scorpaena scrofa	3.48	74 3.21	
Chaunax pictus	2.77	6 2.56	
Tylerius spinosissimus	2.59	72 2.40	0
Lophius piscatorius	2.57	4 2.38	
Pagellus natalenses	2.33	30 2.15	
Loligo sp.	2.13	22 1.97	
Chascanopsetta lugubris	1.85	46 1.71	
Squatina africana	1.81	2 1.67	
Ostracion sp.	1.41	28 1.30	
Saurida undosquamis	1.41	10 1.30	
Narcine rierai	1.35	10 1.24	
Priacanthus hamrur	1.09	20 1.00	
Monocentris japonicus	1.07	8 0.98	
TRIACANTHIDAE	1.01	113 0.93	0
Argyrops spinifer	0.80	14 0.74	
PLEURONECTIDAE	0.76	12 0.71	
Sepia sp.	0.64	12 0.59	
Acropoma japonicum	0.60	40 0.56	
C E P H A L O P O D A	0.52	2 0.48	
Ogcocephalus sp.	0.50	8 0.46	
Lepidotrigla multispinosus	0.50	30 0.46	
Gonorhynchus gonorhynchus	0.42	6 0.39	
Rexea prometheoides	0.40	4 0.37	
Champsodon capensis	0.24	38 0.22	
Histiopterus typus	0.22	4 0.20	
Uranoscopus sp.	0.22	2 0.20	
Cynoglossus lida	0.18	4 0.17	
ANTENNARIIDAE	0.14	2 0.13	
Upeneus tragula	0.14	4 0.13	
Poecilopsetta zanzibarensis	0.14	4 0.13	
Sphyraena chrysotaenia	0.14	4 0.13	
PLATYCEPHALIDAE	0.12	2 0.11	
Total	108.24	100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 147
DATE :10/12/2007 GEAR TYPE: BT NO: 19 POSITION:Lat S 21°47.33
start stop duration Lon E 35°32.12
TIME :06:45:15 07:15:12 30.0 (min) Purpose : 1
LOG : 4953.88 4955.77 1.9 Region : 7400
FDEPTH: 62 54 Gear cond.: 0
BDEPTH: 62 54 Validity : 0
Towing dir: 0° Wire out : 175 m Speed : 3.8 kn
Sorted : 373 Total catch: 372.85 Catch/hour: 746.94

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
Lutjanus sanguineus	108.08	22 14.47	664
Diagramma pictum	84.14	16 11.26	671
Aprion virescens	78.33	20 10.49	667
Aluterus monoceros	64.61	30 8.65	
Lethrinus crocineus	50.28	14 6.73	673
Gymnocranius grandoculis	45.48	52 6.09	
Lutjanus bohar	39.27	4 5.26	665
Lutjanus sebae	28.55	4 3.82	666
Epinephelus albomarginatus	26.34	30 3.53	
Lutjanus rivulatus	25.94	4 3.47	672
Loxodon macrorhinus	24.04	14 3.22	
Acanthurus dussumieri	17.63	8 2.36	
Abalistes stellatus	17.53	14 2.35	
Plectorhinchus schotaf	16.33	2 2.19	670
Lethrinus microdon	15.23	4 2.04	
Plectorhinchus flavomaculatus	14.22	6 1.90	669
Palinurus delagoae	13.62	12 1.82	674
Scarus tricolor	12.72	2 1.70	
Carcharhinus sealei	7.01	2 0.94	
Acanthurus mata	5.81	4 0.78	
Carangoides caeruleopinnatus	5.45	6 0.73	
Ostracion sp.	4.63	4 0.62	
Variola louti	3.97	2 0.53	
Echeneis naucrates	3.69	8 0.49	
Hemipristis elongatus	3.61	2 0.48	
Pseudalutarius nasicornis	3.55	68 0.47	
Sufflamen fraenatus	2.86	4 0.38	
Aluterus sp.	2.50	2 0.34	
Ostracion cubicus	2.12	2 0.28	
Nemipterus metopias	2.00	22 0.27	
Argyrops filamentosus	2.00	2 0.27	
Gymnocaesio gymnoptera	1.98	238 0.27	0
Carangoides malabaricus	1.90	4 0.25	
Tetrosomus concatenatus	1.40	4 0.19	
Pterois miles	1.30	2 0.17	
Parupeneus cinnabarinus *	1.26	8 0.17	
Heniochus acuminatus	1.08	4 0.14	
Scolopsis bimaculatus	0.98	4 0.13	
Nemipterus bipunctatus	0.90	4 0.12	
Bodianus sp.	0.84	2 0.11	
Lactoria cornuta	0.82	2 0.11	
Scyllarides elisabethae	0.80	2 0.11	675
Pseudanthias cooperi	0.78	58 0.10	
Myripristis murdjan	0.68	2 0.09	
LABRIDAE	0.64	4 0.09	
UNIDENTIFIED FISH	0.02	2 0.00	0
Total	746.94	100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 148
DATE :10/12/2007 GEAR TYPE: BT NO: 19 POSITION:Lat S 21°46.30
start stop duration Lon E 35°31.24
TIME :11:18:31 11:48:38 30.1 (min) Purpose : 1
LOG : 4966.02 4967.68 1.7 Region : 7400
FDEPTH: 46 45 Gear cond.: 0
BDEPTH: 46 45 Validity : 0
Towing dir: 0° Wire out : 150 m Speed : 3.3 kn
Sorted : 216 Total catch: 216.06 Catch/hour: 430.40

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
RAJIDAE	119.52	2 27.77	
Abalistes stellatus	85.04	58 19.76	
Gymnocranius grandoculis	66.53	50 15.46	
Loxodon macrorhinus	23.31	14 5.42	
Diagramma pictum	21.91	12 5.09	
Carangoides malabaricus	21.61	74 5.02	
Aprion virescens	18.03	4 4.19	677
Lethrinus crocineus	15.94	4 3.70	676
Sphyraena chrysotaenia	10.76	2 2.50	678
Aluterus monoceros	9.86	4 2.29	
Selar crumenophthalmus	9.74	80 2.26	679
Rhizoprionodon acutus	8.86	2 2.06	
Negaprion acutidens	4.58	2 1.06	
Leiognathus elongatus	4.54	4044 1.06	
Lactoria cornuta	3.75	10 0.87	
Loligo sp.	2.09	727 0.49	
Nemipterus metopias	1.53	22 0.36	
Nemipterus bipunctatus	1.49	22 0.35	
Echeneis naucrates	1.29	18 0.30	
Total	430.40	100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 149
DATE :10/12/2007 GEAR TYPE: BT NO: 19 POSITION:Lat S 21°47.16
start stop duration Lon E 35°40.95
TIME :17:03:35 17:34:27 30.9 (min) Purpose : 1
LOG : 4988.83 4990.32 1.5 Region : 7400
FDEPTH: 503 510 Gear cond.: 0
BDEPTH: 503 510 Validity : 0
Towing dir: 0° Wire out : 1300 m Speed : 2.9 kn
Sorted : 41 Total catch: 82.11 Catch/hour: 159.59

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
Polyipnus polli	91.35	15712 57.24	
Loligo forbesi	15.32	82 9.60	
Plesionika martia	10.22	2573 6.41	
Chlorophthalmus agassizi	7.19	194 4.51	
Haliporoides triarthrus	5.83	288 3.65	680
MYCTOPHIDAE	5.56	1050 3.48	
Caelorinchus parallelus	5.40	47 3.39	
Haliporoides triarthrus	4.63	198 2.90	681
Diaphus sp.	2.88	97 1.80	
Chascanopsetta lugubris	1.94	8 1.22	
Saurida undosquamis	1.44	4 0.90	
Chaeceon macphersoni	1.26	2 0.79	
Nephropsis sp.	1.17	27 0.73	
Eridacnis sinuans	0.82	12 0.51	
Lophiodes insidiator	0.78	4 0.49	
PLATYCEPHALIDAE	0.66	4 0.41	
Sepia sp.	0.54	16 0.34	
Brotula sp.	0.51	4 0.32	
Neoscombrops annectens	0.47	4 0.29	
Yarella corythaeola *	0.43	19 0.27	
Neobythides cf somaliaensis	0.31	19 0.19	
Peristedion adeni	0.31	12 0.19	
Xenolepidichthys dagleishi	0.27	8 0.17	
Chaunax pictus	0.12	12 0.07	
Heterocarpus woodmasoni	0.12	12 0.07	
Malacocephalus laevis	0.08	12 0.05	
Total	159.59	100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 150
DATE :11/12/2007 GEAR TYPE: BT NO: 19 POSITION:Lat S 21°31.82
start stop duration Lon E 35°31.16
TIME :09:13:32 09:44:41 31.2 (min) Purpose : 1
LOG : 5105.91 5107.67 1.8 Region : 7400
FDEPTH: 43 50 Gear cond.: 0
BDEPTH: 43 50 Validity : 0
Towing dir: 0° Wire out : 150 m Speed : 3.4 kn
Sorted : 101 Total catch: 100.69 Catch/hour: 193.95

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
Aprion virescens	62.22	13 32.08	682
Abalistes stellatus	34.09	17 17.58	
Loxodon macrorhinus	20.80	10 10.73	
Scomberomorus commerson	15.41	2 7.95	683
Lagocephalus sceleratus	13.68	4 7.05	
Aluterus monoceros	9.73	4 5.02	
Gymnocranius robinsoni	9.53	2 4.92	684
Caranx (Gnathanodon) speciosus	8.09	2 4.17	
Carcharhinus sealei	6.74	4 3.48	
Lactoria cornuta	4.31	8 2.22	
Echeneis naucrates	4.04	10 2.09	
Ostracion cubicus	2.89	2 1.49	
Thenus orientalis	1.02	4 0.53	
Leiognathus elongatus	0.48	258 0.25	
Loligo sp.	0.44	108 0.23	
Upeneus bensasi	0.40	114 0.21	
Nemipterus sp.	0.06	12 0.03	
Total	193.95	100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 151
DATE :11/12/2007 GEAR TYPE: BT NO: 19 POSITION:Lat S 21°32.04
start stop duration Lon E 35°32.48
TIME :12:02:30 12:32:15 29.7 (min) Purpose : 1
LOG : 5118.29 5119.68 1.4 Region : 7400
FDEPTH: 182 178 Gear cond.: 0
BDEPTH: 182 178 Validity : 0
Towing dir: 0° Wire out : 500 m Speed : 2.8 kn
Sorted : 43 Total catch: 114.22 Catch/hour: 230.44

SPECIES	CATCH/HOUR weight	% OF TOT. C numbers	SAMP
Upeneus taeniopterus	183.99	14792 79.85	
Peristedion weberi	13.44	36 5.83	
Decapterus tabl	9.56	617 4.15	
Ibacus novemdentatus	5.95	50 2.58	
Raja alba	3.21	4 1.39	
DACTYLOPTERIDAE	3.03	6 1.31	
Narcine rierai	2.93	18 1.27	
Scyllarides elisabethae	1.78	2 0.77	
Squatina africana	1.41	6 0.61	
Champsodon capensis	1.27	399 0.55	
Synodus CF dermatogenys	1.27	48 0.55	
Saurida undosquamis	0.85	18 0.37	
Citharoides macrolepis	0.54	6 0.24	
Tylerius spinosissimus	0.48	6 0.21	
Chelidonichthys capensis	0.48	6 0.21	
Laeops pectoralis	0.24	6 0.11	
Total	230.44	100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 152
DATE :11/12/2007 GEAR TYPE: BT NO: 19 POSITION:Lat S 21°26.82
start stop duration Lon E 35°30.93
TIME :16:12:25 16:43:14 30.8 (min) Purpose : 1
LOG : 5139.19 5140.78 1.6 Region : 7400
FDEPTH: 26 26 Gear cond.: 0
BDEPTH: 26 26 Validity : 0
Towing dir: 0° Wire out : 130 m Speed : 3.1 kn
Sorted : 89 Total catch: 88.52 Catch/hour: 172.33

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Loxodon macrorhinus	108.71	55	63.08	
Scomberomorus commerson	25.79	6	14.97	685
Echeneis naucrates	20.54	14	11.92	
Rhinobatos sp.	8.86	4	5.14	
Leiognathus elongatus	3.70	2319	2.15	
Loligo sp.	1.75	154	1.02	
Ammodytes sp.	1.17	78	0.68	
Trachinocephalus myops	0.68	45	0.40	
Penaeus sp.	0.31	127	0.18	
Sepia sp.	0.27	2	0.16	
Lagocephalus sceleratus	0.19	14	0.11	
Penaeus latisulcatus	0.12	14	0.07	
Upeneus vittatus	0.10	2	0.06	
Pagellus natalenses	0.08	10	0.05	
Nemipterus bipunctatus	0.06	6	0.03	
Total	172.33		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 153
DATE :12/12/2007 GEAR TYPE: BT NO: 19 POSITION:Lat S 22°11.05
start stop duration Lon E 35°33.89
TIME :06:23:18 06:55:03 31.8 (min) Purpose : 1
LOG : 5270.33 5272.11 1.8 Region : 7400
FDEPTH: 55 54 Gear cond.: 0
BDEPTH: 55 54 Validity : 0
Towing dir: 0° Wire out : 170 m Speed : 3.4 kn
Sorted : 49 Total catch: 48.63 Catch/hour: 91.90

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Abalistes stellatus	46.20	28	50.28	
Loligo vulgaris	17.20	1242	18.71	
Aprion virescens	13.51	2	14.70	687
Lactoria cornuta	3.87	9	4.22	
Leiognathus elongatus	3.02	1911	3.29	
Panulirus ornatus	2.65	2	2.88	686
Aluterus sp.	2.46	2	2.67	
Echeneis naucrates	2.36	8	2.57	
Pagellus natalenses	0.30	15	0.33	
Nemipterus metopias	0.15	4	0.16	
Nemipterus bipunctatus *	0.13	6	0.14	
Decapterus russelli	0.04	2	0.04	
Total	91.90		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 154
DATE :12/12/2007 GEAR TYPE: BT NO: 19 POSITION:Lat S 22°9.37
start stop duration Lon E 35°35.71
TIME :08:56:55 09:28:47 31.9 (min) Purpose : 1
LOG : 5278.06 5280.04 2.0 Region : 7400
FDEPTH: 160 159 Gear cond.: 0
BDEPTH: 160 159 Validity : 0
Towing dir: 0° Wire out : 470 m Speed : 3.7 kn
Sorted : 11 Total catch: 10.93 Catch/hour: 20.58

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Scyllarides elisabethae	5.42	8	26.35	
Myliobatis aquila	3.71	2	18.02	
Ibacus novemdentatus	2.60	23	12.63	
Loligo sp.	2.24	181	10.89	
Squatina africana	1.68	4	8.14	
Monocentris japonicus	1.49	13	7.23	
Fistularia petimba	1.39	4	6.77	
Synodus CF dermatogenys	0.98	23	4.76	
Saurida undosquamis	0.49	9	2.38	
Sepia sp.	0.24	2	1.19	
Champsodon capensis	0.13	28	0.64	
Lepidotrigla alcocki	0.11	8	0.55	
Cynoglossus sp.	0.08	4	0.37	
Lagocephalus guntheri	0.02	2	0.09	
Total	20.58		100.00	

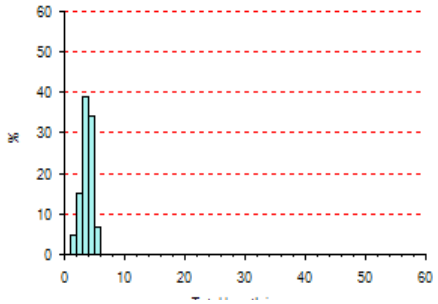
R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 155
DATE :12/12/2007 GEAR TYPE: BT NO: 19 POSITION:Lat S 22°10.41
start stop duration Lon E 35°37.41
TIME :10:52:30 11:23:05 30.6 (min) Purpose : 1
LOG : 5287.13 5288.59 1.5 Region : 7400
FDEPTH: 223 218 Gear cond.: 0
BDEPTH: 223 218 Validity : 0
Towing dir: 0° Wire out : 620 m Speed : 2.9 kn
Sorted : 17 Total catch: 17.22 Catch/hour: 33.78

SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
Satyrichthys adeni	6.06	6	17.94	
Palinurus delagoae	5.45	12	16.14	
Loligo sp.	5.30	218	15.68	
Sphyraena flavicauda	2.90	29	8.59	
Ibacus novemdentatus	2.26	18	6.68	
Pagellus natalenses	2.20	29	6.50	
Squalus megalops	1.57	4	4.65	
Dactyloptena peterseni	1.26	6	3.72	
Sepia sp.	1.12	18	3.31	
Scyllarides elisabethae	0.92	2	2.73	
Argentina sp.	0.78	86	2.32	
Peristedion weberi	0.67	29	1.97	
Lepidotrigla sp.	0.61	4	1.80	
Lagocephalus guntheri	0.59	8	1.74	
Uranoscopus archionema	0.47	6	1.39	
Champsodon capensis	0.31	59	0.93	
Tylerius spinosissimus	0.31	4	0.93	
Ostracion sp.	0.29	4	0.87	
Chelidonichthys sp.	0.27	2	0.81	
Monocentris japonicus	0.24	2	0.70	
Cynoglossus cf lida	0.08	2	0.23	
Citharichthys sp.	0.08	2	0.23	
Macrorhamphosus scolopax	0.04	4	0.12	
Total	33.78		100.00	

R/V "DR. FRIDTJOF NANSEN" SURVEY:2007409 STATION: 156
DATE :12/12/2007 GEAR TYPE: BT NO: 19 POSITION:Lat S 22°10.76
start stop duration Lon E 35°45.51
TIME :13:32:45 14:03:36 30.9 (min) Purpose : 1
LOG : 5302.47 5303.92 1.5 Region : 7400
FDEPTH: 498 507 Gear cond.: 0
BDEPTH: 498 507 Validity : 0
Towing dir: 0° Wire out : 1400 m Speed : 2.8 kn
Sorted : 42 Total catch: 82.44 Catch/hour: 160.34

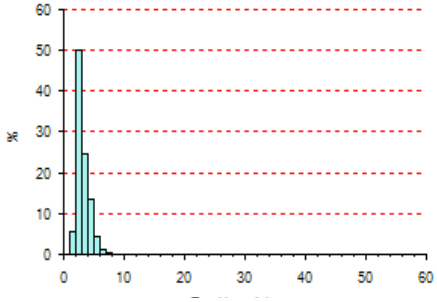
SPECIES	CATCH/HOUR weight	CATCH/HOUR numbers	% OF TOT. C	SAMP
MYCTOPHIDAE	23.77	5082	14.82	
Loligo sp.	20.65	121	12.88	
Diaphus sp.	17.58	405	10.97	
Promethichthys prometheus	15.17	136	9.46	
Haliporoides triarthrus	11.51	463	7.18	689
Haliporoides triarthrus	10.74	338	6.70	688
Plesionika martia	10.35	1480	6.45	
Zeus capensis	9.80	4	6.11	
Cubiceps whitleggi	7.27	62	4.54	
Chlorophthalmus agassizi	5.68	303	3.54	
Squalus megalops	3.89	6	2.43	
Lophius piscatorius	3.62	4	2.26	
Neoscombrops annectens	3.35	39	2.09	
Rexea prometheoides	2.80	136	1.75	
Lestrolepis intermedia	2.53	148	1.58	
Cynoglossus lida	1.83	121	1.14	
Champsodon capensis	1.67	101	1.04	
Saurida undosquamis	1.52	4	0.95	
Sepia sp.	1.40	12	0.87	
Polymixia nobilis	1.32	16	0.82	
Xenolepidichthys dagleishi	0.78	35	0.49	
Synagrops japonicus	0.51	12	0.32	
Caelorinchus braueri	0.51	12	0.32	
Satyrichthys adeni	0.51	19	0.32	
Astronesthes martensii	0.39	12	0.24	
Eridacnis sinuans	0.39	6	0.24	
Nephropsis sp.	0.23	4	0.15	
Sepiola sp.	0.23	4	0.15	
Polyipnus polli	0.16	31	0.10	
Heterocarpus woodmasoni	0.12	8	0.07	
Tydemania navigatoris	0.08	4	0.05	
Total	160.34		100.00	

Annex II Length distribution of main species



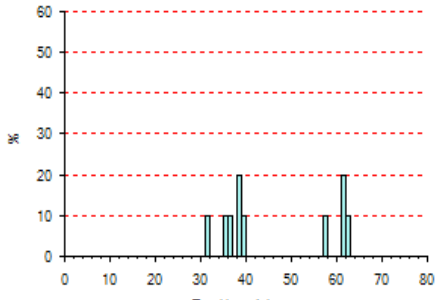
Aristaeomorpha foliacea Mozambique

Mean length = 3.73 N = 1219



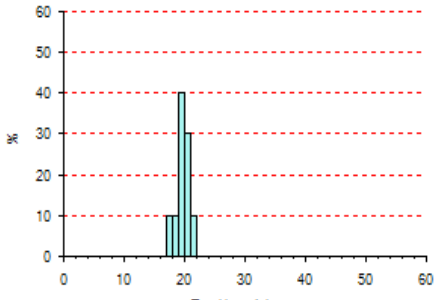
Aristeus antennatus Mozambique

Mean length = 3.16 N = 909



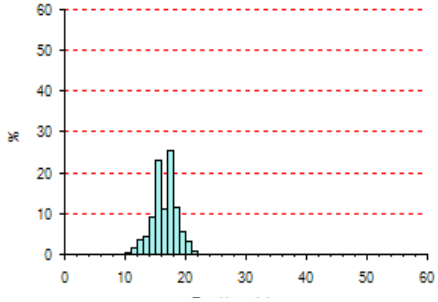
Argyrosomus japonicus Mozambique

Mean length = 46.30 N = 10



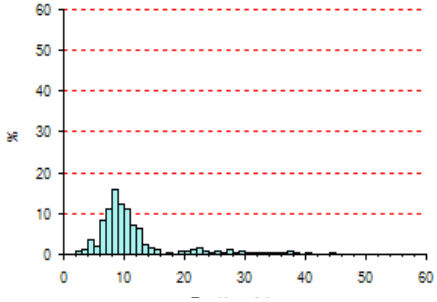
Bathypterois phenax Mozambique

Mean length = 19.70 N = 10



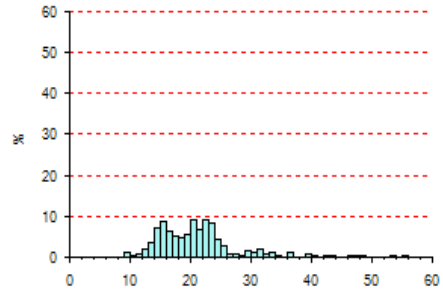
Ariomma indica Mozambique

Mean length = 16.53 N = 527



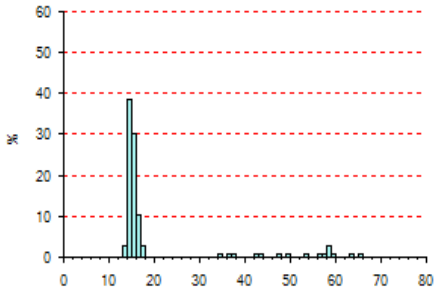
Caelorinchus trunovi Mozambique

Mean length = 12.01 N = 752



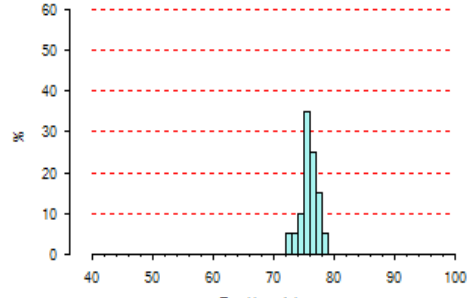
Carangoides malabaricus Mozambique

Mean length = 21.12 N = 387



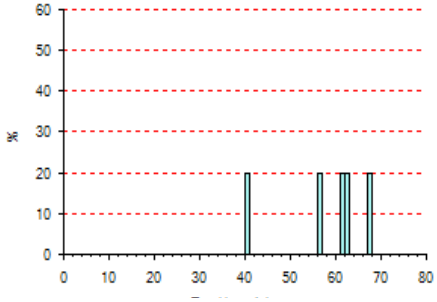
Chrysoblephus anglicus Mozambique

Mean length = 20.64 N = 106



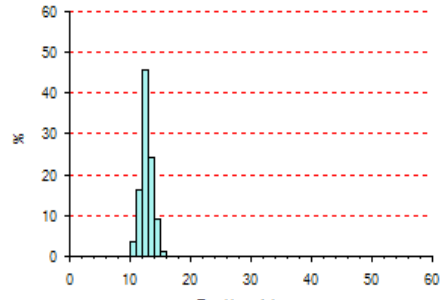
Caranx heberi Mozambique

Mean length = 75.85 N = 20



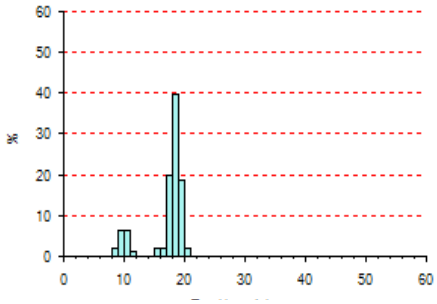
Cookeolus boops Mozambique

Mean length = 57.70 N = 5



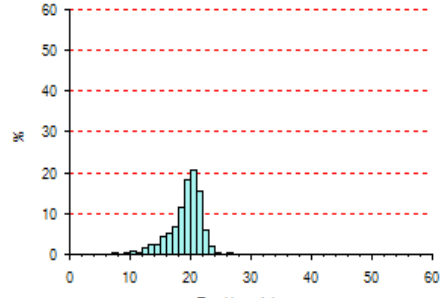
Champsodon capensis Mozambique

Mean length = 12.72 N = 201



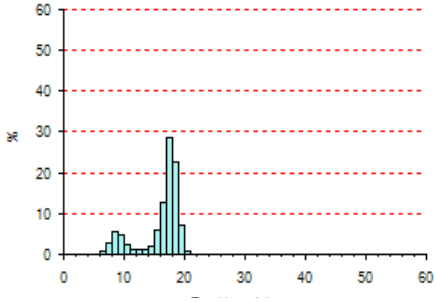
Cubiceps sp. Mozambique

Mean length = 17.08 N = 96



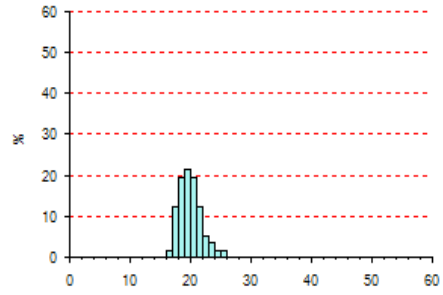
Chlorophthalmus agassizi Mozambique

Mean length = 19.12 N = 697



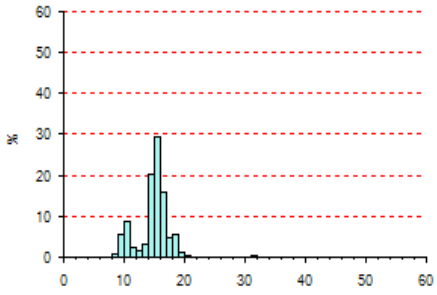
Cubiceps whitleggi Mozambique

Mean length = 15.96 N = 1228



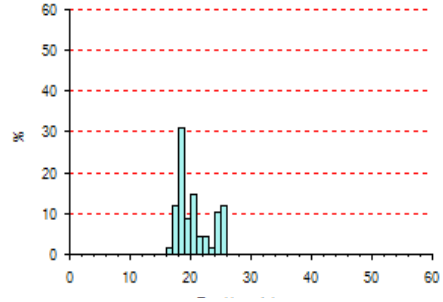
Cynoglossus capensis Mozambique

Mean length = 19.95 N = 56



Decapterus russelli Mozambique

Mean length = 14.80 N = 786



Decapterus kurroides Mozambique

Mean length = 20.56 N = 68

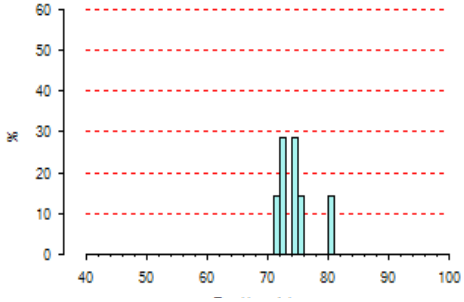
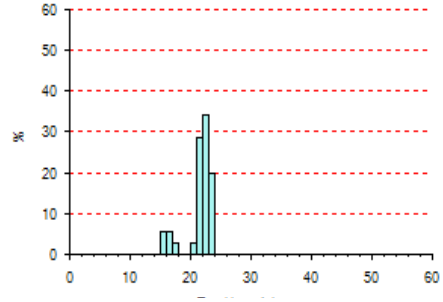


Diagramma centurio Mozambique

Mean length = 74.50 N = 7



Decapterus macarellus Mozambique

Mean length = 21.47 N = 35

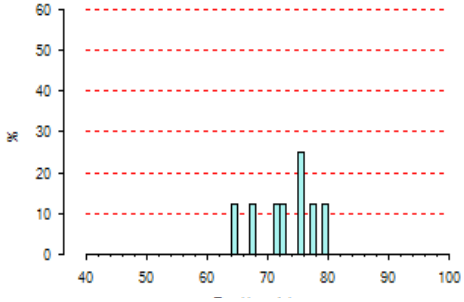
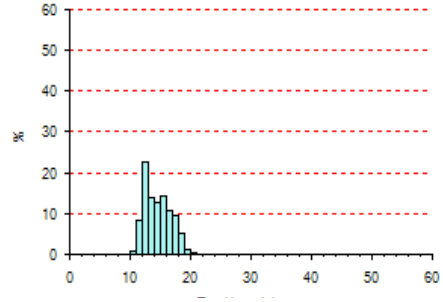


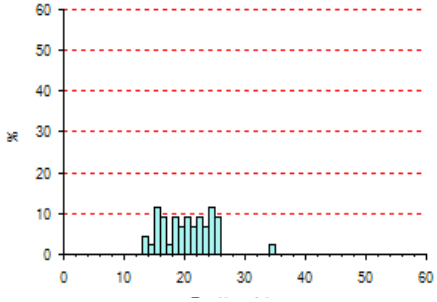
Diagramma pictum Mozambique

Mean length = 73.00 N = 8



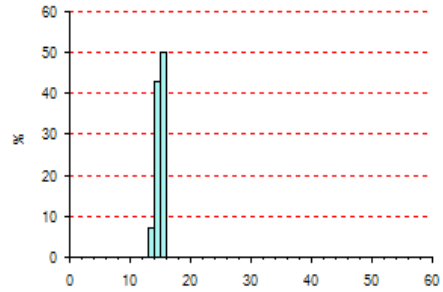
Decapterus macrosoma Mozambique

Mean length = 14.53 N = 663



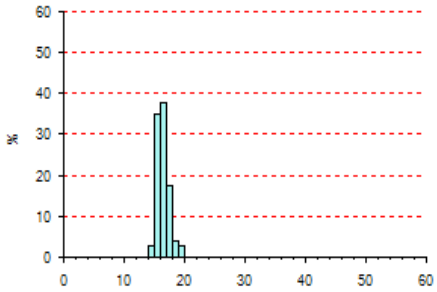
Drepane longimana Mozambique

Mean length = 20.48 N = 44



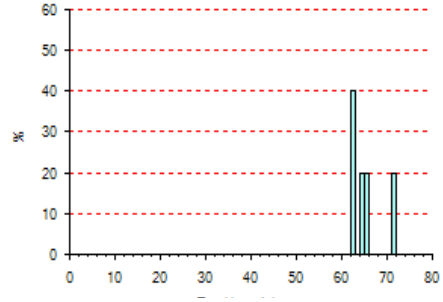
Dussumieria acuta Mozambique

Mean length = 14.93 N = 14



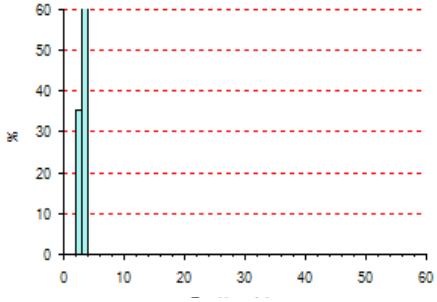
Herklotsichthys quadrimacul Mozambique

Mean length = 16.43 N = 74



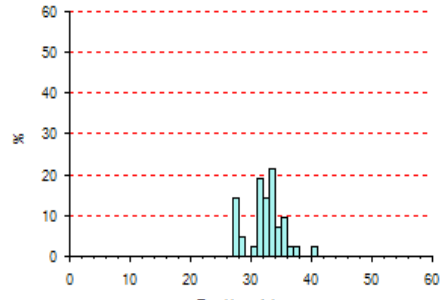
Epinephelus epistictus Mozambique

Mean length = 65.30 N = 5



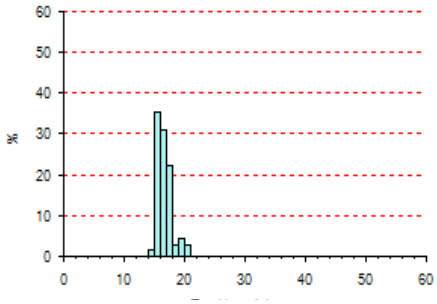
Heterocarpus woodmasoni Mozambique

Mean length = 3.15 N = 116



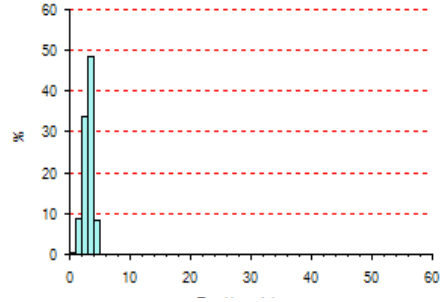
Gonorhynchus gonorhynchu Mozambique

Mean length = 32.40 N = 42



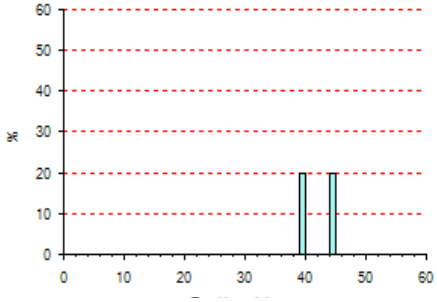
Hilsa kelee Mozambique

Mean length = 16.65 N = 68



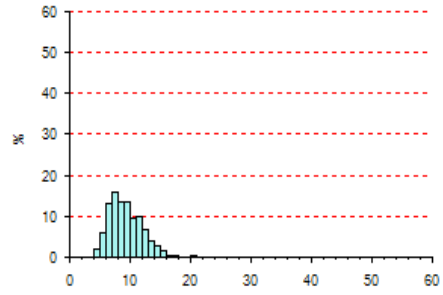
Haliporoides triarthrus Mozambique

Mean length = 3.06 N = 3560



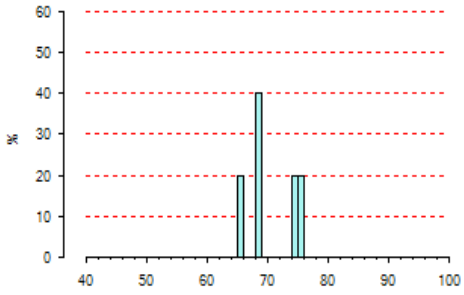
Himantura gerrardi Mozambique

Mean length = 57.70 N = 5



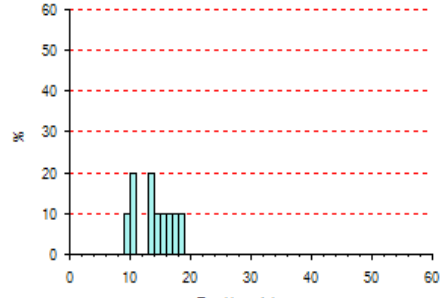
Johnius dussumieri Mozambique

Mean length = 9.31 N = 706



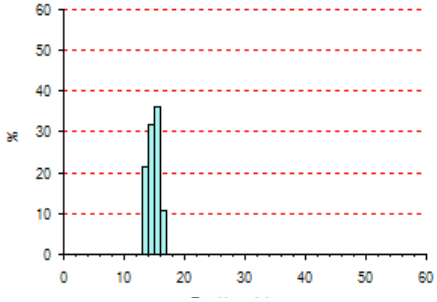
Lethrinus nebulosus Mozambique

Mean length = 70.50 N = 5



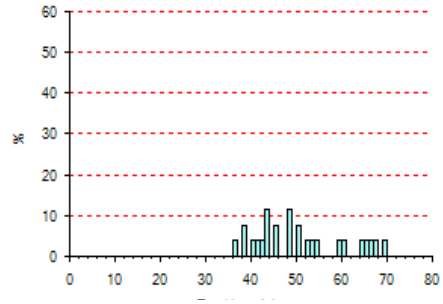
Leiognathus equulus Mozambique

Mean length = 14.00 N = 10



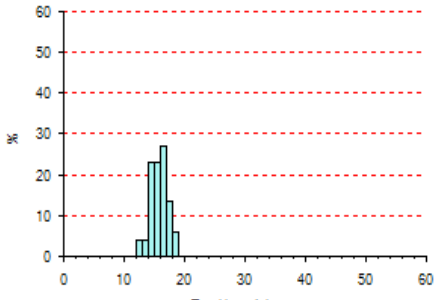
Lethrinus sp. Mozambique

Mean length = 14.86 N = 47



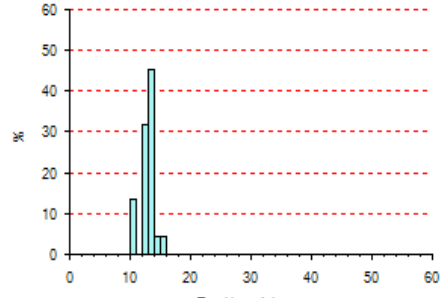
Lethrinus crocineus Mozambique

Mean length = 50.77 N = 26



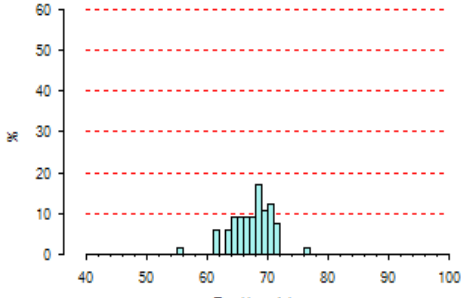
Lutjanus lutjanus Mozambique

Mean length = 15.79 N = 52



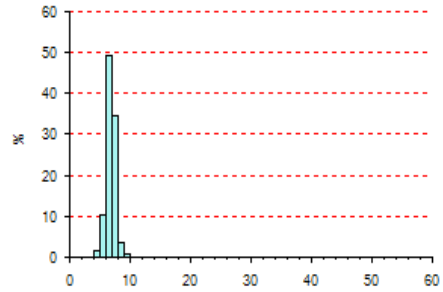
Lethrinus harak Mozambique

Mean length = 12.91 N = 22



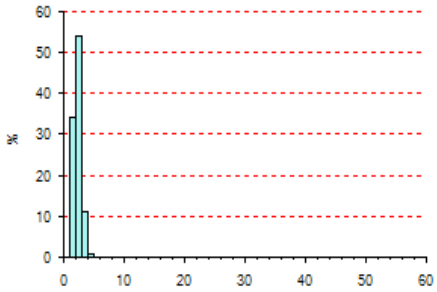
Lutjanus sanguineus Mozambique

Mean length = 67.35 N = 65



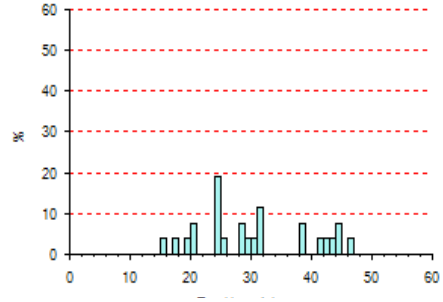
MYCTOPHIDAE Mozambique

Mean length = 6.81 N = 136



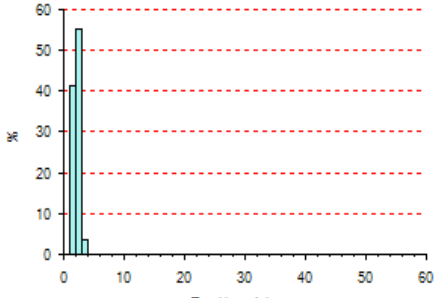
Metapenaeus monoceros Mozambique

Mean length = 2.29 N = 1549



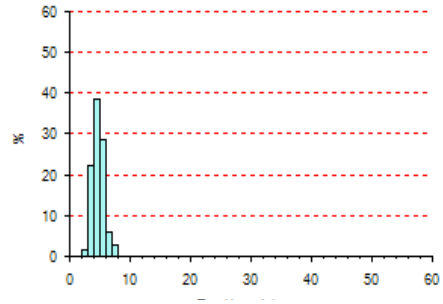
Malacocephalus laevis Mozambique

Mean length = 30.50 N = 26



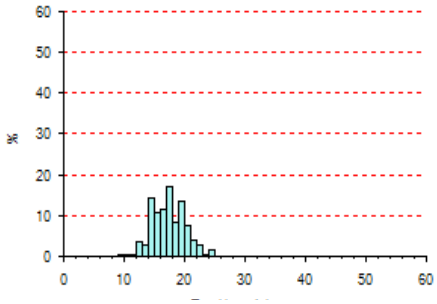
Metapenaeus stebbingi Mozambique

Mean length = 2.12 N = 29



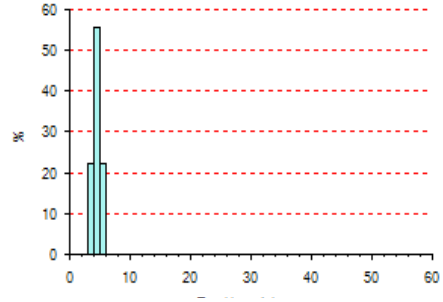
Metanephrops andamanicus Mozambique

Mean length = 4.74 N = 238



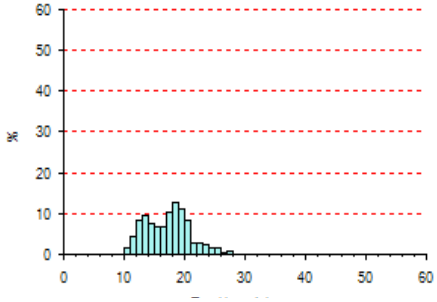
Nemipterus bipunctatus Mozambique

Mean length = 17.38 N = 176



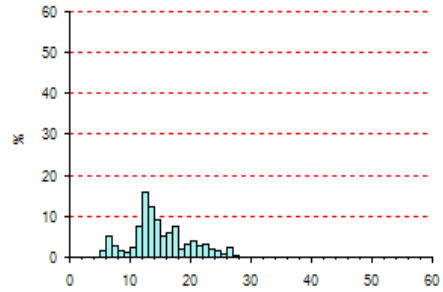
Metapenaeopsis andamanen Mozambique

Mean length = 4.50 N = 9



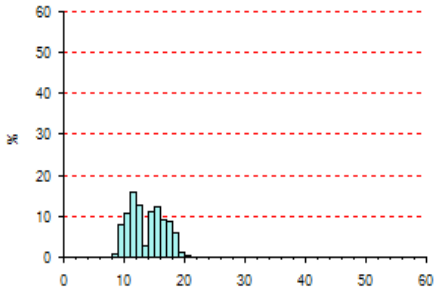
Neoepinnula orientalis Mozambique

Mean length = 17.25 N = 1259



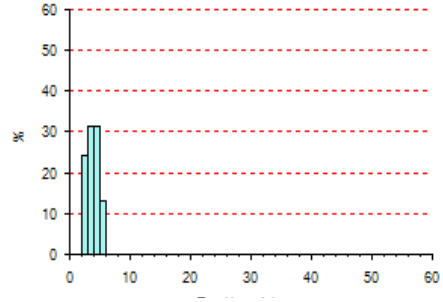
Neoscombrops annectens Mozambique

Mean length = 14.88 N = 458



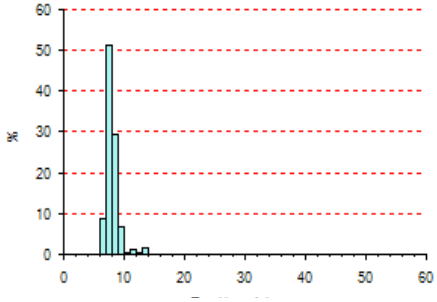
Pagellus natalenses Mozambique

Mean length = 13.75 N = 337



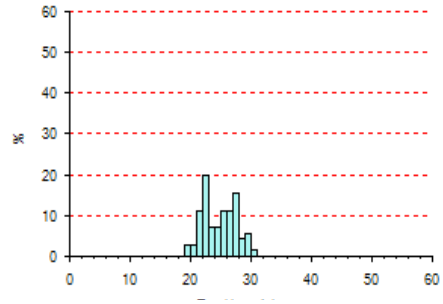
Nephropsis stewarti Mozambique

Mean length = 3.83 N = 54



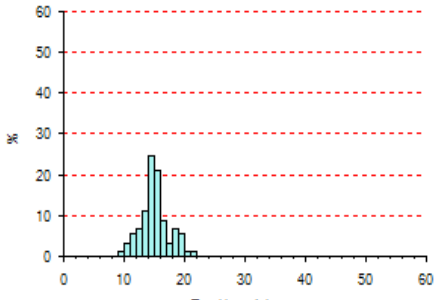
Palinurus delagoae Mozambique

Mean length = 8.03 N = 187



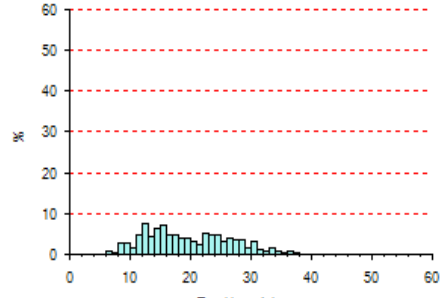
Nesiarchus nasutus Mozambique

Mean length = 24.78 N = 71



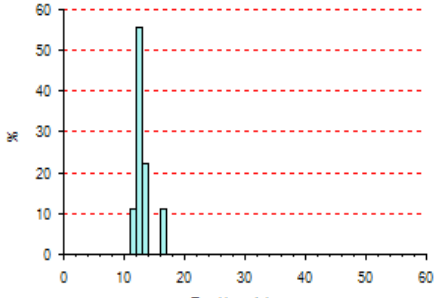
Parupeneus heptacanthus Mozambique

Mean length = 15.08 N = 90



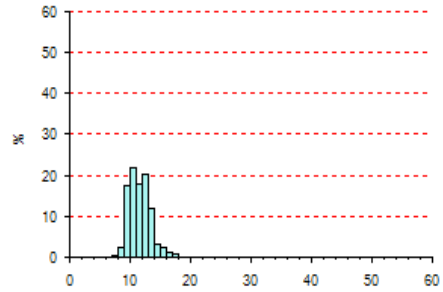
Otolithes ruber Mozambique

Mean length = 19.60 N = 262



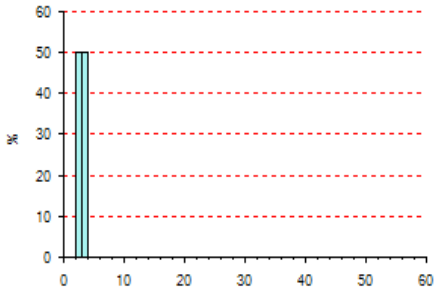
Pelates quadrilineatus Mozambique

Mean length = 13.06 N = 9



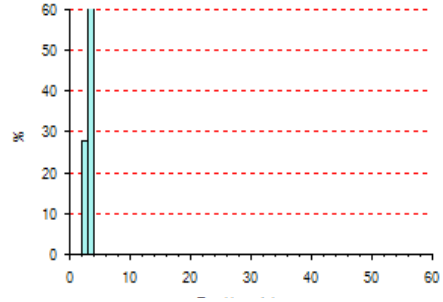
Pellona ditchela Mozambique

Mean length = 11.60 N = 313



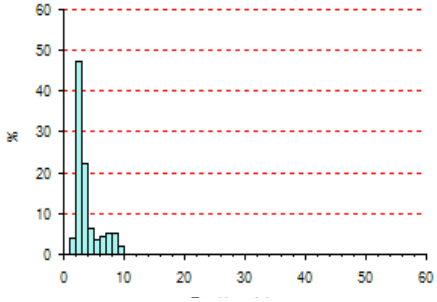
Penaeus semisulcatus Mozambique

Mean length = 3.00 N = 8



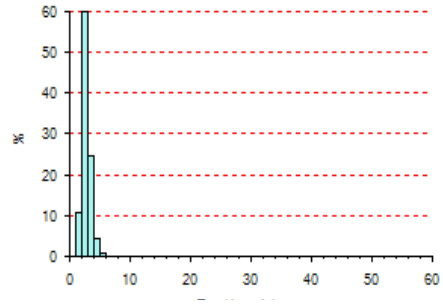
Penaeopsis balssi Mozambique

Mean length = 3.22 N = 36



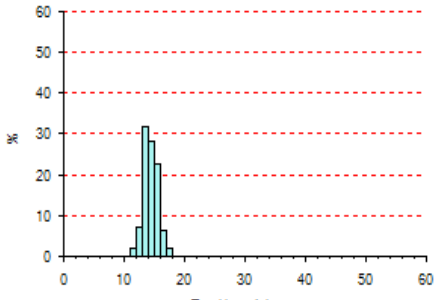
Plesiopenaeus edwardsianus Mozambique

Mean length = 3.81 N = 378



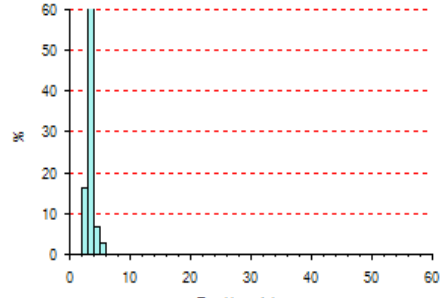
Penaeus indicus Mozambique

Mean length = 2.74 N = 471



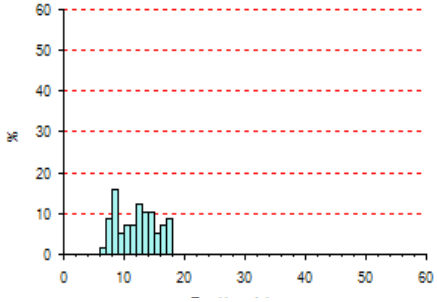
Polymixia berndti Mozambique

Mean length = 14.39 N = 110



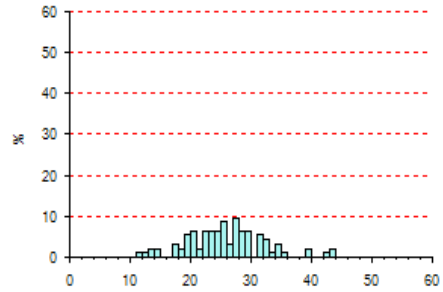
Penaeus japonicus Mozambique

Mean length = 3.46 N = 74



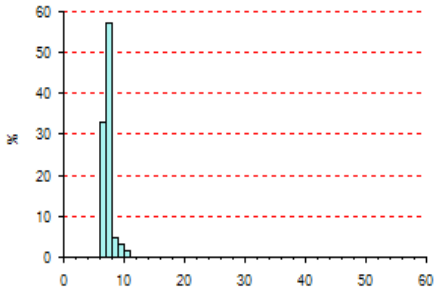
Polynemus sextarius Mozambique

Mean length = 12.15 N = 57



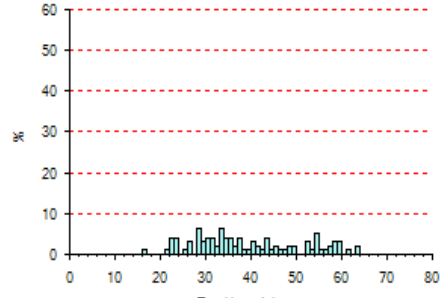
Polysteganus coeruleopunct Mozambique

Mean length = 25.84 N = 93



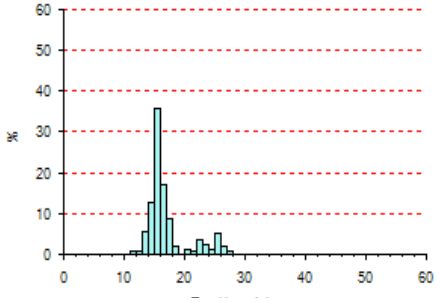
Puerulus angulatus Mozambique

Mean length = 7.34 N = 61



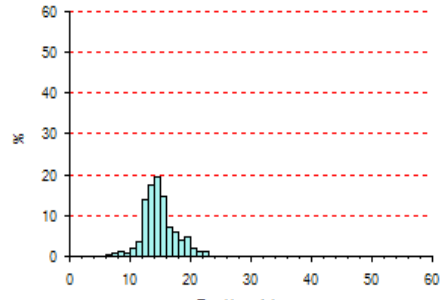
Pomadasys kaakan Mozambique

Mean length = 39.39 N = 96



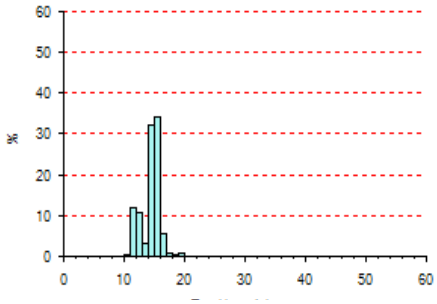
Rexea prometheoides Mozambique

Mean length = 17.08 N = 159



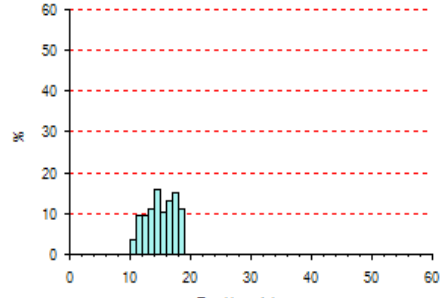
Pomadasys maculatus Mozambique

Mean length = 14.81 N = 325



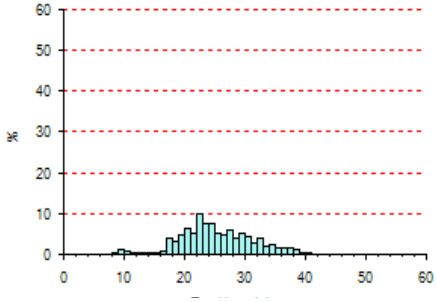
Sardinella albella Mozambique

Mean length = 14.40 N = 367



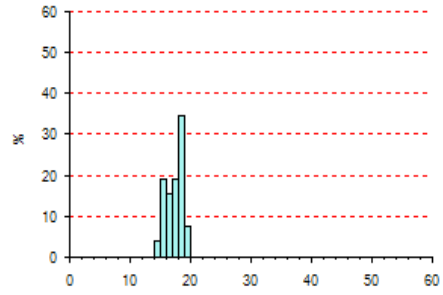
Psenes whitleggi * Mozambique

Mean length = 15.04 N = 106



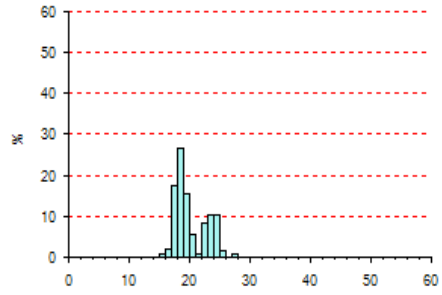
Saurida undosquamis Mozambique

Mean length = 25.34 N = 862



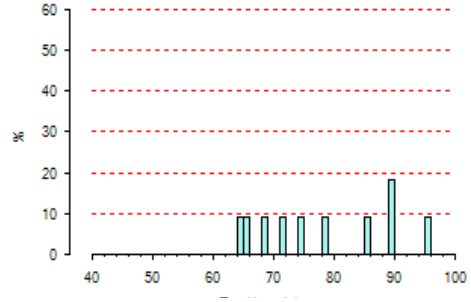
Scomber japonicus Mozambique

Mean length = 17.35 N = 26



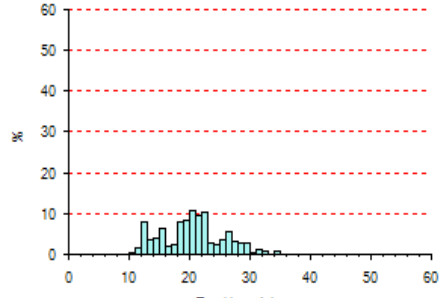
Selar crumenophthalmus Mozambique

Mean length = 20.20 N = 143



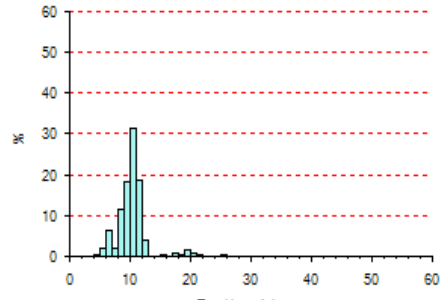
Scomberomorus commerson Mozambique

Mean length = 81.68 N = 11



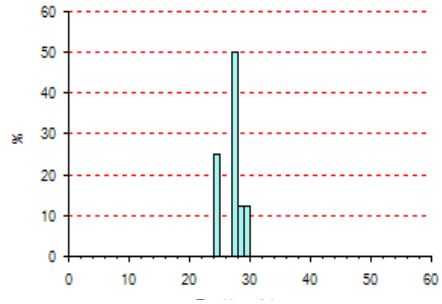
Sphyraena acutipinnis Mozambique

Mean length = 20.55 N = 255



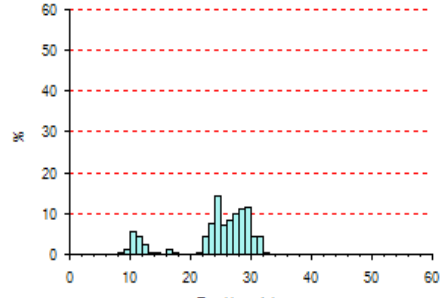
Secutor insidiator Mozambique

Mean length = 10.36 N = 235



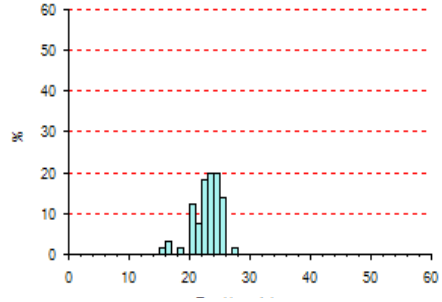
Sphyraena chrysotaenia Mozambique

Mean length = 27.13 N = 8



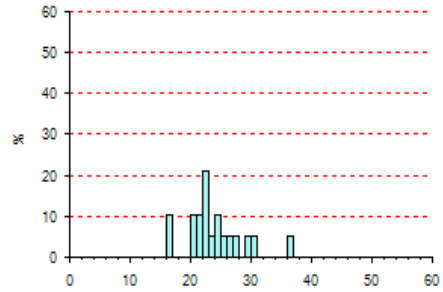
Selachophidium guentheri Mozambique

Mean length = 24.39 N = 183



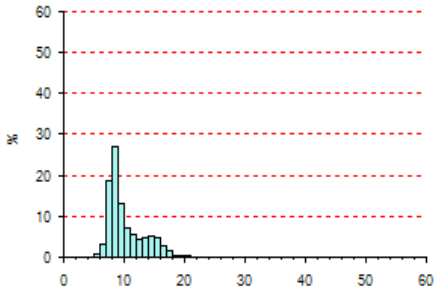
Sphyraena jello Mozambique

Mean length = 22.92 N = 65



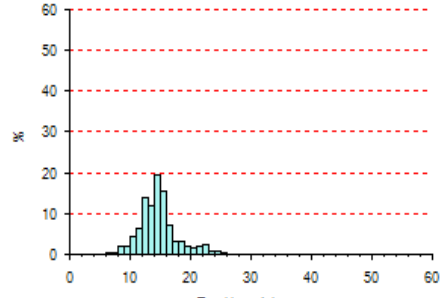
Spicara australis Mozambique

Mean length = 23.97 N = 19



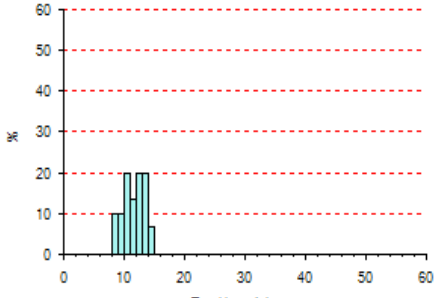
Thryssa vitrirostris Mozambique

Mean length = 10.22 N = 948



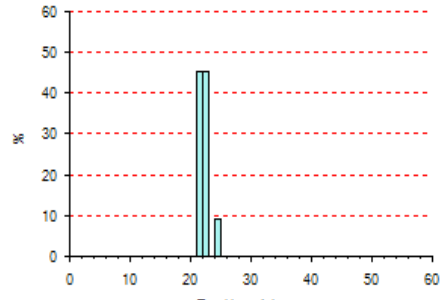
Synagrops japonicus Mozambique

Mean length = 14.69 N = 835



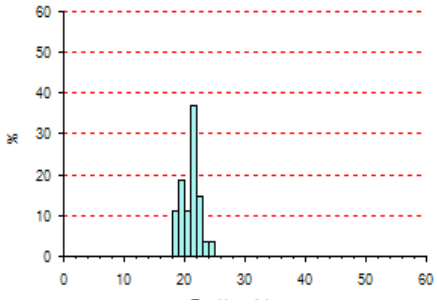
Trachinocephalus myops Mozambique

Mean length = 11.60 N = 30



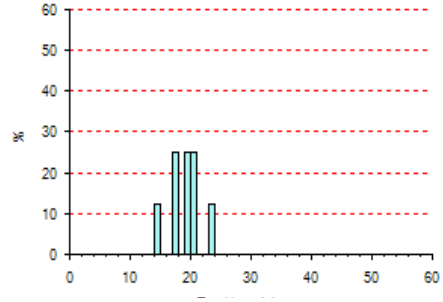
Synagrops sp. Mozambique

Mean length = 22.23 N = 11



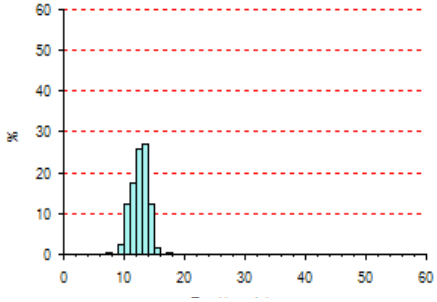
Umbrina canariensis Mozambique

Mean length = 21.02 N = 27



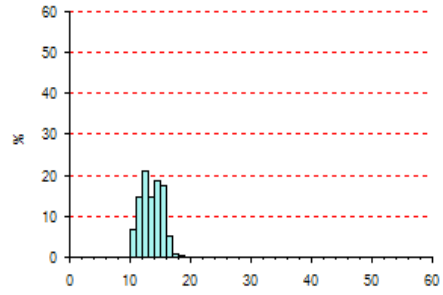
Terapon jarbua Mozambique

Mean length = 19.13 N = 8



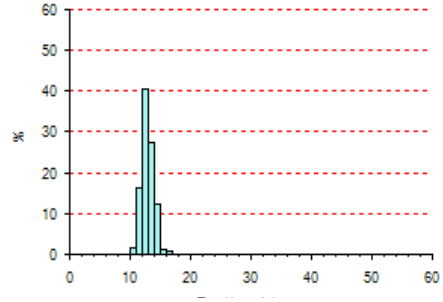
Upeneus bensasi Mozambique

Mean length = 12.57 N = 360



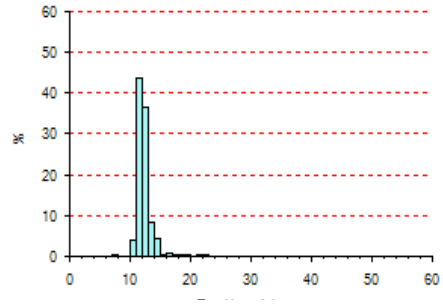
Upeneus moluccensis Mozambique

Mean length = 13.54 N = 218



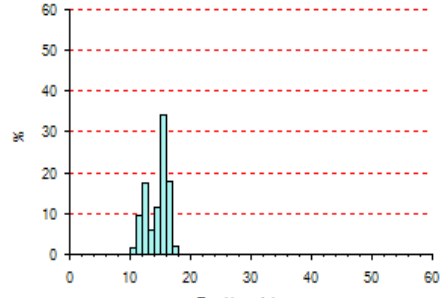
Upeneus sulphureus Mozambique

Mean length = 12.89 N = 304



Upeneus taeniopterus Mozambique

Mean length = 12.29 N = 448



Upeneus vittatus Mozambique

Mean length = 14.50 N = 235

Annex III Instruments and fishing gir used

Echo sounder

The SIMRAD ER60/38 kHz scientific sounder was used during the survey for fish abundance estimation. The lowering keel was not submerged during the survey. The LSSS Integrator system was used to scrutinise the acoustic records. System calibration experiment using a standard copper sphere was performed 06.10.2006. The settings of 38 kHz echo sounder were as follows:

Transceiver-1 menu (38 kHz lowering keel)

Transducer depth	5.50 m
Absorbtion coeff.	8.7 dB/km
Pulse length	medium (1.02ms)
Bandwidth	wide (2.43 kHz)
Max power	4000 Watt
2-way beam angle	-20.6 dB
SV transducer gain	25.87 dB
TS transducer gain	26.50 dB
Angle sensitivity	21.9
3 dB beamwidth	6.9º alongship
	6.9º athwardship
Alongship offset	0.11º
Athwardship offset	0.03º

Display menu

Echogram	1 (38 kHz)
Bottom range	15 m
Bottom range start	10 m

Fishing gear

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

The bottom trawl has a headline of 31 m, footrope 47 m and 20 mm meshsize in the codend with an innernet of 10 mm meshsize (Figure A1). 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 in 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 SCANMAR system was used on all trawl hauls. This equipment consists of sensors, a hydrophone, a receiver, a display unit and a battery charger. Communication between sensors and ship is based on acoustic transmission. The doors are fitted with sensors to provide information on their distance and a height sensor is fitted to the bottom trawl to measure the trawl opening and provide information on clearance and bottom contact.

The pelagic trawl can be equipped with a trawleye that provides information on the trawl opening and the distance of the footrope to the bottom.
Figure A1. Design of the trawl used

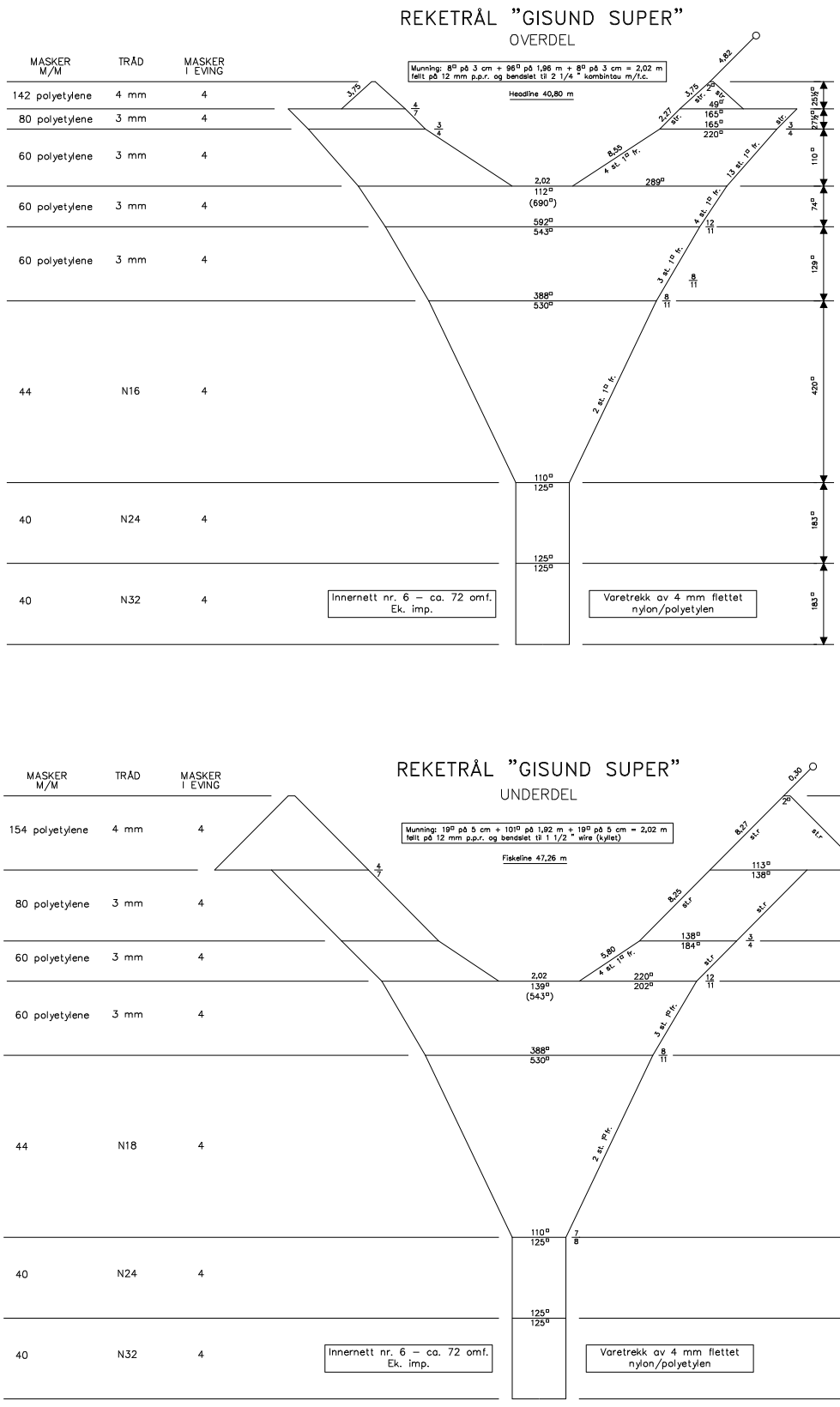
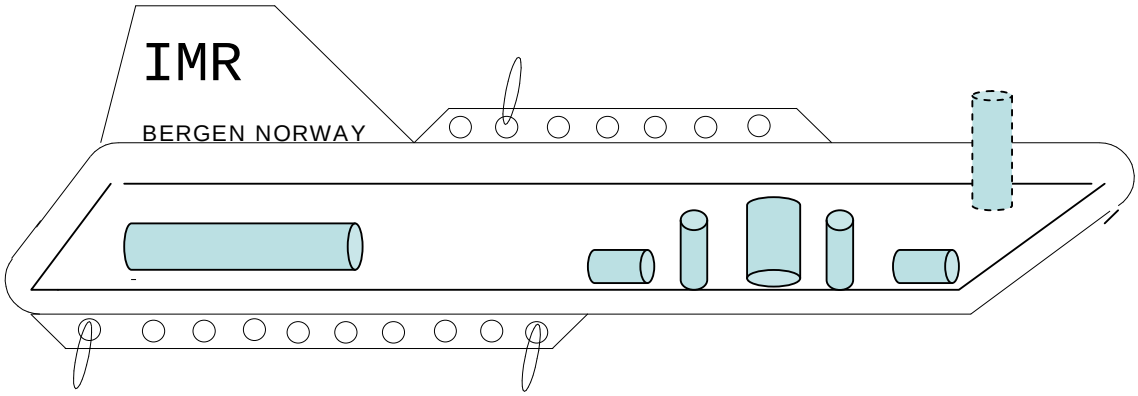


Figure A1. Design of the trawl used.

IMR Cam-Pod Specifications



Vehicle description

- Vehicle dimension: Length 2.8m, Height 05m, With 0.8m
- 1000 m depth rated system
- Aluminium frame (tube)
- Divinycell (floatation)
- 2 x 250 W Halogen light (Dimmable)
- 2 x Gas Arc HID 150 W (Daylight 6500 Lumen)
- 2 video lines on fiber, possible to switch two and two camera
- Sony 1080l HD Colour camera, auto/manual focus with 120 x zoom
- 1 ea. B/W camera CCD lowlights
- Tilt for colour camera
- Pan/Tilt
- Depth sensor on video monitor
- Fluxgate compass
- Digital depth sensor
- SAIV CTDOx sensors
- 2 Thrusters each 750 W

Power unit

- Surface power unit with Groundfault Detect Interrupt
- Voltage and Current view
- Vehicle on/off
- Transport case

Monitor console 19 ” rack

- PC based control system
- Video overlay of depth, heading, CTD , date and time.
- Control cable
- Switch for light and camera controls
- 1 HD Colour Monitor 21"
- 2 B/W monitor 9"
- Delivered in transport case
- Single joystick (fwd/rew, sideways right/left,

Annex IV Benthos sampling and station overview

Benthos Collection:
Short facts, benthos samples 18.11. - 14.12.2007:

Number of grab stations: 28
Number of grab samples taken: 166
Number of bottom trawls with benthos samples: 10
Number of jars for biological samples:
Bulk sediment samples: ca. 300 flasks (0.5 l – 1 l) from 26 stations
Presorted samples: ca. 165 different jars, flasks, or plastic bags
(volume 10 ml - 2 l, according to specimens, and containing 1-30 specimens each)

Grab samples came from depths between 17 m and 98 m, bottom trawl samples from depths between 18 m and 408 m.
Samples covered many different sediment types: coral sands of varying grain sizes and coral rubble mixed with sand were most common, but there were also clay, mud and quarz sands. Bottom trawling brought in some hard bottom fauna.

St. Lazarus Bank and Quirimbas National Parc: Coral reefs down to ca. 25m, all of the sediments sampled were of biogenous origin (coral rubble and sand).

Sofala Bank: Sampled sediments were of terrestrial origin (Zambesi River).

Bazaruto National Park: Coral reef in very shallow waters; sampled sediments were coral sands or very fine quartz sands mixed with shells; no coral rubble.

All samples were handed over to the Instituto de Investigação Pesquera, Maputo, 15th of December 2007.

Sediment samples for geochemistry:

Bags marked with “geology” for sedimentology, pooled from 3 grab samples from each grab station, sediment from surface to 10cm deep

Bags marked HM 1-3 are for heavy metal analyses, 3 replicates (from different grab samples) per grab station, sediment from surface

Bags marked C 1-3 are for hydrocarbon analyses, 3 replicates (from different grab samples) per grab station, sediment from surface

A detailed list of samples collected during the whole survey is available upon request to IIP

For further information, please contact Dr. Christiane Todt, University of Bergen, Norway: Christiane.Todt@bio.uib.no

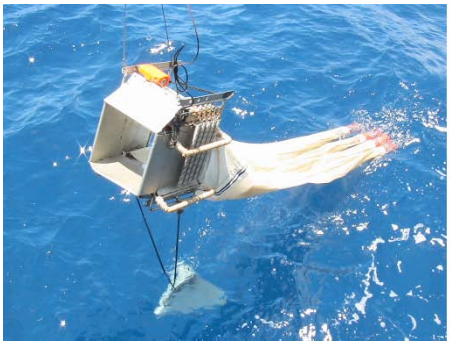
Annex V Plankton sampling

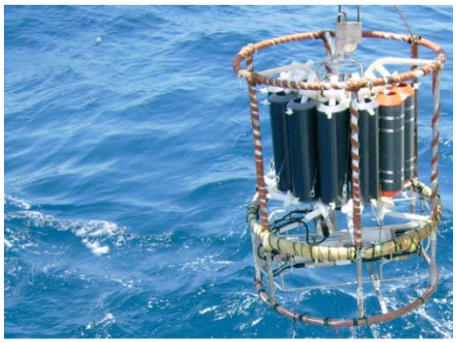
“Dr Fridtjof Nansen”

Ecosystem Survey Mozambique

27 Sept -21 Dec 2007

cruise report





SPECIAL STUDIES

1) RELATION OF SPECTRAL ANALYSIS BY REMOTE SENSING AND PHYTOPLANKTON ABUNDANCE AND TAXONOMIC COMPOSITION ALONG THE MOZAMBICAN LATITUDINAL AND CROSS SHELF GRADIENTS

2) VERTICAL DYNAMICS OF PRIMARY PRODUCTION AND SHRIMP LARVAE AT SOFALA BANK

Lisbon

April, 2008

INDEX

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I. Introduction

The current report describes activities and current analytic status of Special Studies developed at the R/V "Dr. Fridtjof Nansen", Ecosystem Survey Mozambique, 27 Sept-21 Dec, 2007. In particular it focuses on the studies:

1) RELATION OF SPECTRAL ANALYSIS BY REMOTE SENSING AND PHYTOPLANKTON ABUNDANCE AND TAXONOMIC COMPOSITION ALONG THE MOZAMBICAN LATITUDINAL AND CROSS SHELF GRADIENTS

2) VERTICAL DYNAMICS OF PRIMARY PRODUCTION AND SHRIMP LARVAE AT SOFALA BANK

The report includes a description of activities and methodologies used onboard the Fridtjof Nansen during the cruise, as well as the analysis of samples carried out at the Centre of Oceanography of the Faculty of Sciences of University of Lisbon.

The work was developed along the Mozambican coast (see Figure 1), in the case of the Special Study 1, whereas the Special Study 2 targeted in particular the Sofala Bank. In the respective sections is presented a detailed description of methods employed. The analysis of the samples obtained is under process and preliminary results are presented briefly.

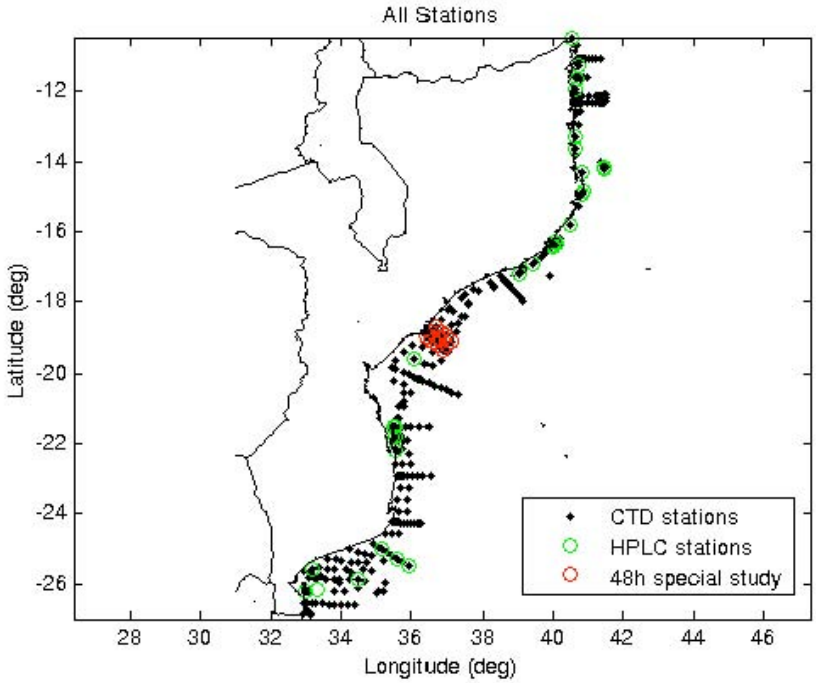


Figure 1 – Sampling stations at the Mozambican coast, with location of sampling points for CTD, phytopigments (HPLC) and the fixed station for plankton dynamics.

II. Description of Activities

2.1. Phytoplankton Spatial survey

2.1.1. Rationale

This cruise allowed a good survey of Phytoplankton abundance and taxonomic composition, which is poorly known, along Mozambique channel. This study intended to provide a spatial assessment of phytoplankton abundance and community composition along the Mozambican latitudinal gradient. It involves the analysis of phytoplankton photosynthetic pigments collected *in situ*, and its use for remote sensing calibration.

The sensitivity of the spectral bands of ocean colour sensors (MODIS, MERIS) for phytoplankton abundance will be used, in order to obtain biomass estimation and the determination of the composition of major taxonomic classes. It includes not only different latitudes but also different water masses (oceanic, clear coastal, turbid coastal).

The performance of existing chlorophyll algorithms (for other regions of the ocean) can be analysed by comparison of satellite imagery with *in situ* data. This study would be a valuable tool for monitoring proposes. The quantification of phytoplankton biomass is essential to understand the ecosystems and fisheries, the screening of potential harmful algae species will also be a relevant output of this program.

2.1.2. Methods

The study of communities was done by biochemical analysis of the diagnostic photosynthetic pigments (by high precision liquid chromatography, HPLC). Surface seawater samples (2-3 L) were filtered onto a Whatman GF/F filters (nominal pore size 0.7 μm and 25 mm diameter), under vacuum pressure lower than 500 mbA. The filters were kept frozen at -20ºC from collecting time till being processed at the laboratory in Lisbon, Portugal. Extraction was performed with 2 ml of 95% cold-buffered methanol (2% ammonium acetate) for 30 min at 20ºC in the dark. Samples were sonicated for 1 min. in the beginning of the extraction period. The samples were centrifuged at 4000 rpm for 15 min., at 4ºC. Extracts were filtered (Millipore membrane filters, 0.2 μm) immediately before injection in the HPLC to remove cell and filter debris. Pigment extracts were analyzed using a Shimadzu HPLC comprised of a solvent delivery module (lC-10ADVP) with system controller (SCL-10AVP), a photodiode array (SPD-M10ADVP). The chromatographic separation of pigments was achieved using C8

method (Zapata et al 2000) that allows the separation of Divinyl-chlorophyll a (Div-Chla) from chlorophyll a (Chla) in order to identify the presence of picoplankton, which is dominated by Div-Chla containing cyanobacteria: the prochlorophytes .

The pigments chlorophyll a (Chla), Divinyl-chlorophyll *a* (D.Chla), fucoxanthin (Fuco), peridinin (Per), zeaxanthin (Zeax) and 19'hexanoyloxyfucoxanthin (19´Hexa) were quantified.

2.1.3. Preliminary results

The samples were divided geographically in three main areas (south, central and north) and cruise leg/ sampling period was considered (see Figure 2).

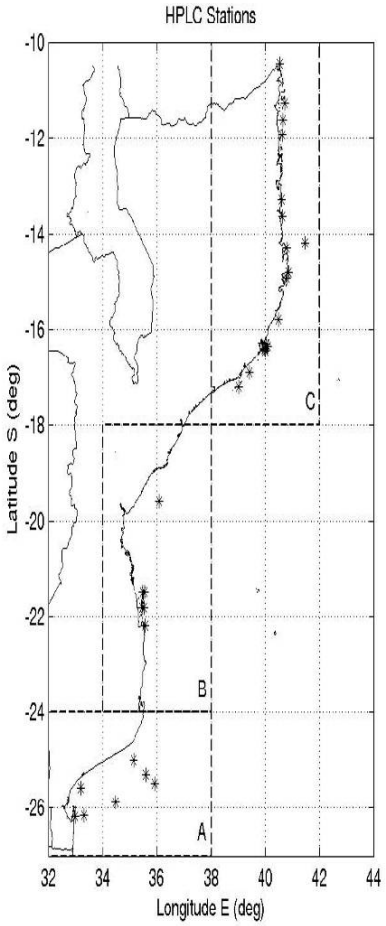


Figure 2 – Phytoplankton -HPLC sampling stations divided in three areas (A, B and C1 and C2) considering the sampling periods.

The pigment information allows inferring on the biomass distribution (Chl *a*) and the presence of specific phytoplankton groups: *Prochlorophytes* (D.Chla), *Haptophytes* (19'Hexa), *Bacilariophytes* (Fuco), *Cianophytes* (Zeax) and *Dinophytes* (Per). Peridinin was absent in all the samples analysed.

The analysis of the samples collected in Area A (between the 30th September-and 09th October) reveal that more inshore stations (#1, #2, #9, and #10) have greater Chla

concentrations and that fucoxanthin is predominant in stations #2 and #9, indicating the presence of diatoms. The more offshore stations (#7 and #8) appear to be dominated by cyanophytes (zeaxantin) and prochorophytes.

Phytoplankton samples in B area are dominated by fucoxanthin, D.Chla was not detected. The highest Chla values are lower than the highest values in area A. However the lower Chla values are found in C area where northern stations (#26 -#34) are rich in zeaxanthin.

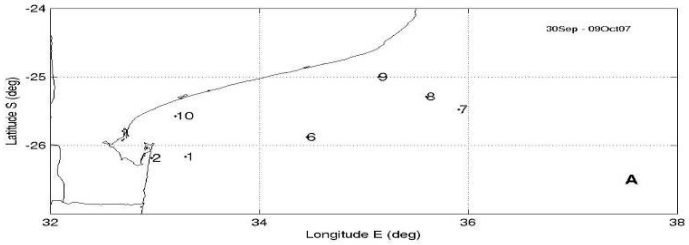


Figure 3 – HPLC sampling stations in area A.

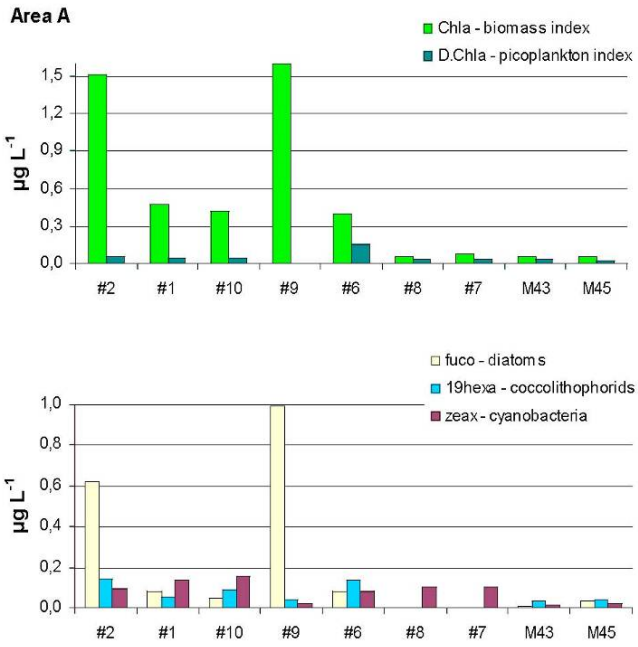
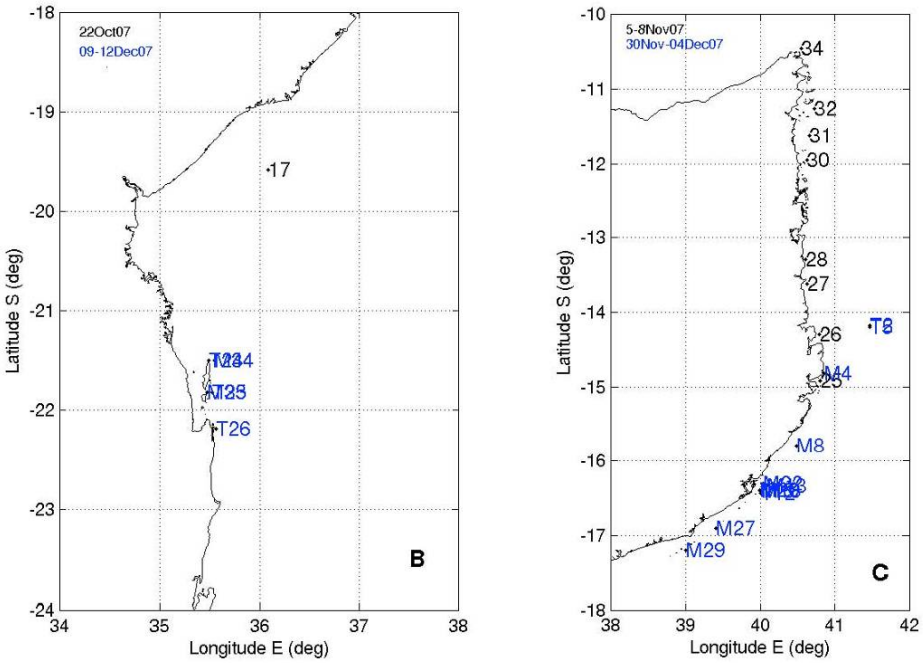


Figure 4 – Major pigment concentrations in area A. **Figure 5** – HPLC sampling stations in areas B and C.



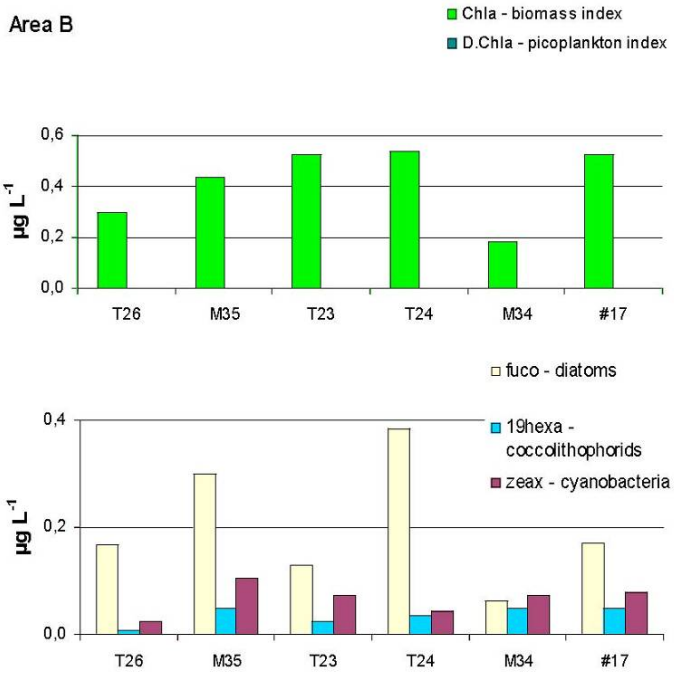
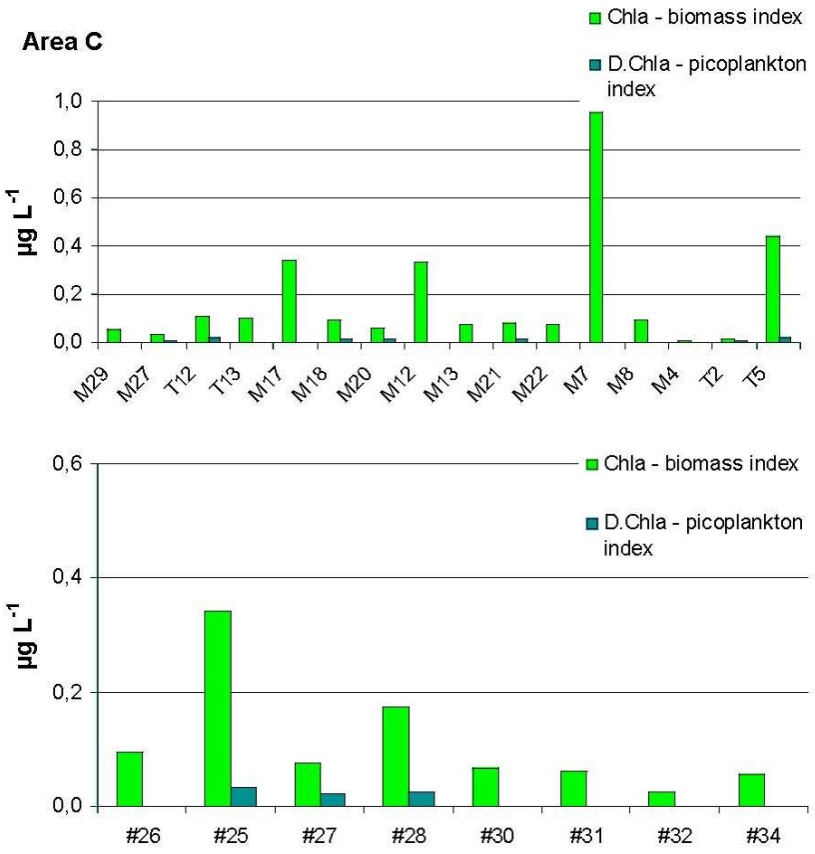
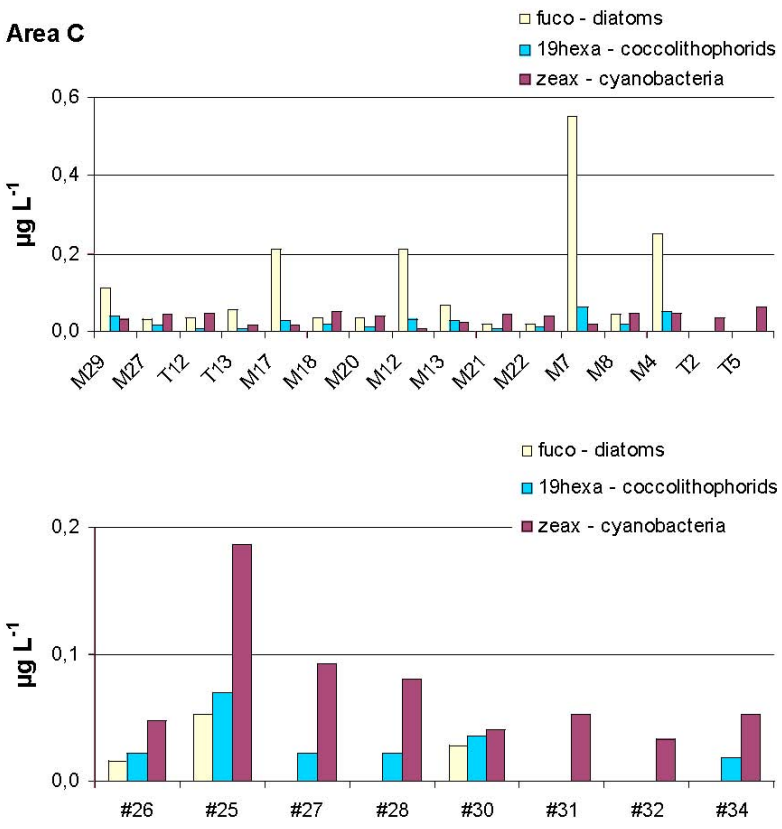


Figure 6 – Major pigment concentrations at collecting stations in area B. **Figure 7 –** Chla and D. Chla concentrarions at collecting stations in area C. **Figure 8** – Fucoxanthin, 19hexaxanthin and zeaxanthin concentrarions at collecting stations in area C.


Area C
Chla - biomass index
D.Chla - picoplankton index
µg L-1
1,0
0,8
0,6
0,4
0,2
0,0
M29
M27
T12
T13
M17
M18
M20
M12
M13
M21
M22
M7
M8
M4
T2
T5
Chla - biomass index
D.Chla - picoplankton index
µg L-1
0,6
0,4
0,2
0,0
#26
#25
#27
#28
#30
#31
#32
#34


Area C
fuco - diatoms
19hexa - coccolithophorids
zeax - cyanobacteria
µg L-1
0,6
0,4
0,2
0,0
M29
M27
T12
T13
M17
M18
M20
M12
M13
M21
M22
M7
M8
M4
T2
T5
fuco - diatoms
19hexa - coccolithophorids
zeax - cyanobacteria
µg L-1
0,2
0,1
0,0
#26
#25
#27
#28
#30
#31
#32
#34

Chla Data

Table I – *In-situ* chlorophyll a concentration (surface samples).

Sample	latitude	longitude	Chla (ugL-1)
#2	-26,181	32,969	1,514
#1	-26,164	33,295	0,477
#10	-25,569	33,194	0,416
#9	-25,003	35,142	1,6
#6	-25,879	34,458	0,394
#8	-25,289	35,6	0,051
#7	-25,472	35,915	0,076
M43	-25,94	35,233	0,05
M45	-26,201	35,048	0,06
T26	-22,184	35,565	0,299
M35	-21,818	35,47	0,433
T23	-21,818	35,523	0,525
T24	-21,497	35,491	0,54
M34	-21,496	35,548	0,182
#17	-19,585	36,089	0,526
M29	-17,198	39,004	0,052
M27	-16,907	39,407	0,035
T12	-16,432	40,004	0,109
T13	-16,403	39,994	0,099
M17	-16,401	40,016	0,341
M18	-16,401	40,016	0,093
M20	-16,385	39,992	0,061
M12	-16,34	40,097	0,336
M13	-16,34	40,097	0,075
M21	-16,301	40,042	0,078
M22	-16,301	40,042	0,071
M7	-15,792	40,485	0,953
M8	-15,792	40,485	0,094
M4	-14,814	40,853	0,005
T2	-14,175	41,469	0,012
T5	-14,194	41,465	0,443
#26	-14,294	40,794	0,094
#25	-14,917	40,803	0,342
#27	-13,619	40,626	0,076
#28	-13,286	40,603	0,173
#30	-11,945	40,629	0,068
#31	-11,62	40,662	0,061
#32	-11,264	40,723	0,026
#34	-10,456	40,547	0,056

Ocean Coulour data (MODIS Aqua)

Modis Aqua data were downloaded from NASA website, for the dates and geographical positions of the cruise. Chlorophyll product was processed for the period of the cruise in a total of 256 images. Figure 9 presents two images for the study period. Sensor data will be compared with coincident pigments *in situ* data.

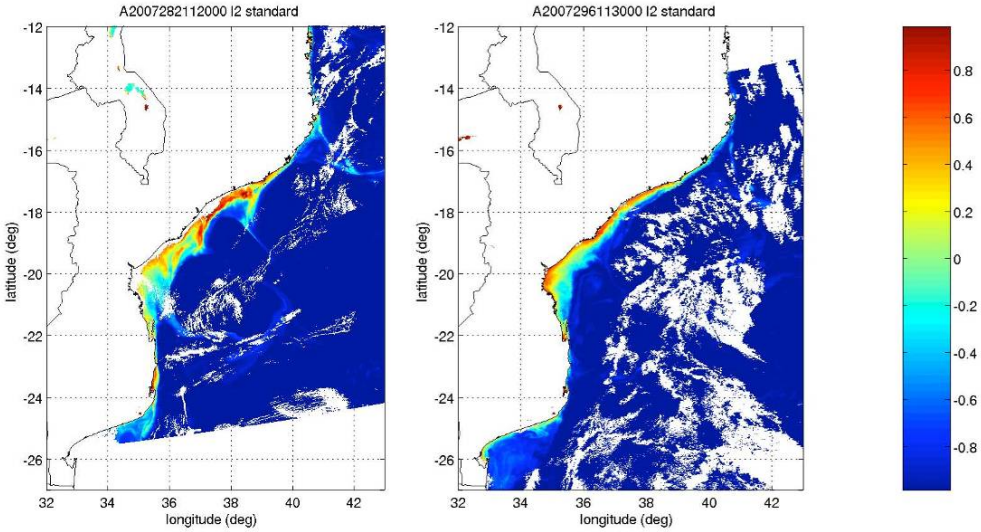


Figure 9 – Modis Aqua chlorophyll product. Examples shown for the 9th October (left) and the 23rd October (right). Both images are in logarithmic scale.

2.2. Planktonic Dynamics at Sofala Bank

2.2.1. Rationale

This study intends to understand fundamental ecological processes that act in generating primary productivity and modulate recruitment of resources such as the shrimp fisheries. It targets to assess the vertical position of phytoplankton (responsible for primary productivity), as well the stratification of shrimp larval and post-larval stages. The newly-hatched stages, herbivorous, are likely to be related to phytoplankton distribution, and later stages, carnivorous and responsible for the return recruitment migration, most probably will have stronger vertical movements and more dependent of the surface layers for transport. Understanding these processes is fundamental for a sound knowledge of productivity and its variability, and a complementary tool for scientifically based management.

2.2.2. Methods

Larval distribution

In order to assess the position of the sampling cycles in relation to the larval shrimp patches, a grid of 3 radials per 4x3x4 stations was defined (equidistant between the bathymetries of 20 and 100), and sampled before the fixed station.
At each station:

- CTD plus Fluorometer with vertical profiles (sampling at 5m, 10m, and then every 10m until 40m, or down to possible operational depth in the most inner shelf). Salinity, temperature, depth, oxygen and Chlorophyll a fluorescence, were registered.

- Measurement of water transparency with Secchi Disk.

- Water samples were collected, with Niskin bottles attached to CTD, at 0, 5, 10, 20, 30 and 40m. Immediately after collection, the water was filtered (2L) through fiberglass filters (GF/F 0.7 μm pore) and the filters were stored at -20 ºC for posterior pigment analysis. From each depth, two replicates of 125ml were also collected and stored at -20 ºC for posterior nutrient analysis. From surface and bottom sample (0 and 40m, usually the deep chlorophyll maximum) 125 ml of water were preserved in buffered

formalin (2.5%) for posterior phytoplankton specific identification (in the fixed station, sampling for phytoplankton species identification was made every 6 hours).

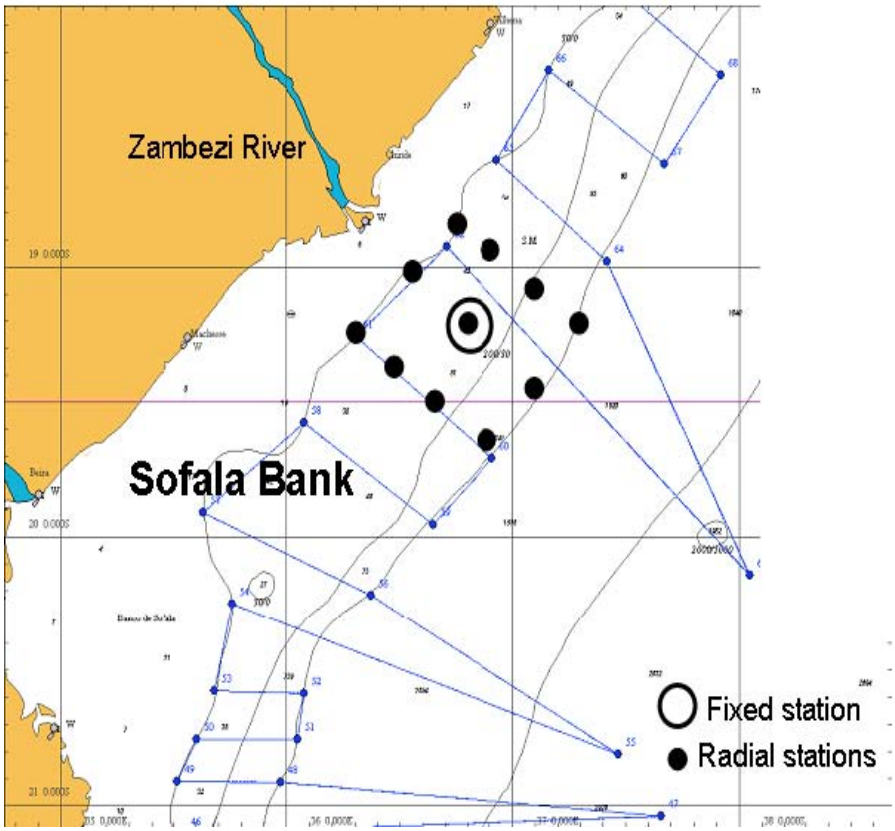
- Sampling of stratified zooplankton (0-5, 5-10, 10-20, 20-30 and 30-40m) with the Hydrobios multinet with 405µm mesh, and surface neuston using same mesh size during 15min.

Fixed station sampling

The vessel was positioned in fixed station mode, in the middle of the shelf (bottom at 50m depth) within the mid middle radial transect. Sampling was done with 2-hour interval, for 48 consecutive hours.

- Every 2 hours in sequence:
- CTD as used for the radial sampling.
- Collection of sample water as for the radial sampling.
- Measurement of water transparency.
- Sampling of stratified zooplankton as for radial sampling.

Phytoplankton samples were filtered immediately after collection through filters GF/F 0,7 µm pore, placed in eppendorfs, and preserved immediately at -20ºC. Zooplankton samples were preserved in buffered 4% formalin, to be sorted and animals identified and enumerated in the laboratory.


Zambezi River
Sofala Bank
Fixed station
Radial stations

2.2.3. Preliminary results

At the moment, only the oceanographic data (except the ADCP currents data) is available. Below find some examples.

Radial stations

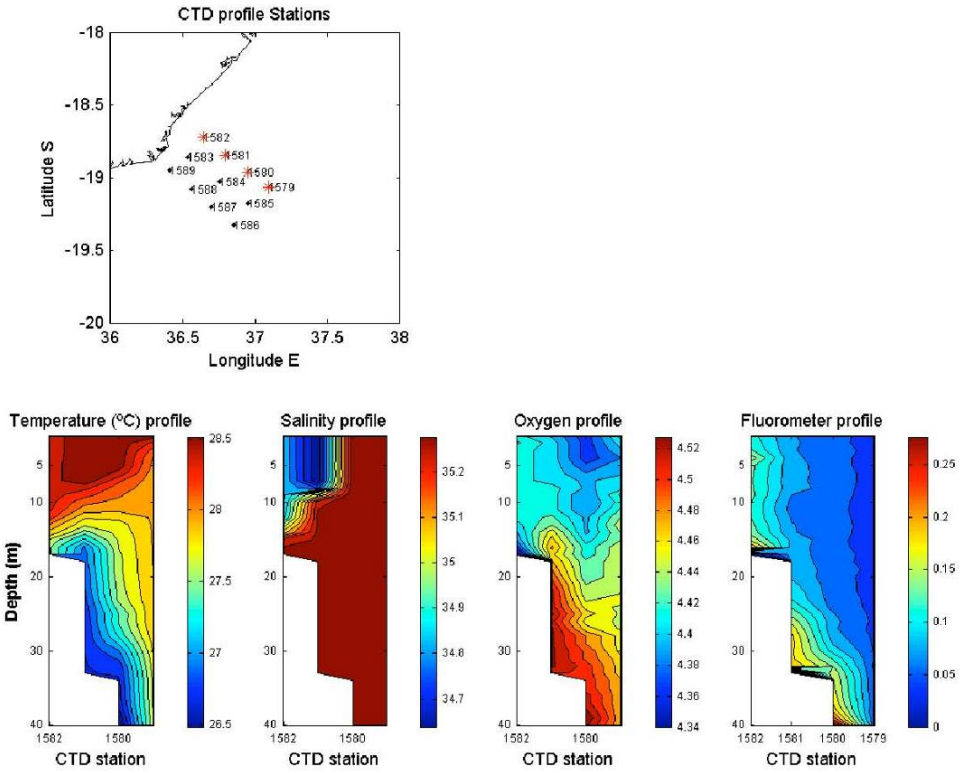


Figure 11 – Temperature, salinity, oxygen and fluorometer data obtained during the radial stations sampling. The stations represented are from the Northern radial.

Both temperature and salinity profiles (Figs. 11, 12 and 13) denote warmer and brackish waters in the middle of the radial sampled, until 10 to 15 meters deep.

The oxygen profile indicates surface waters less oxygenated than deeper ones. The fluorometer profiles observation indicates extremely low phytoplankton abundance, except near the sampling maximum depth.

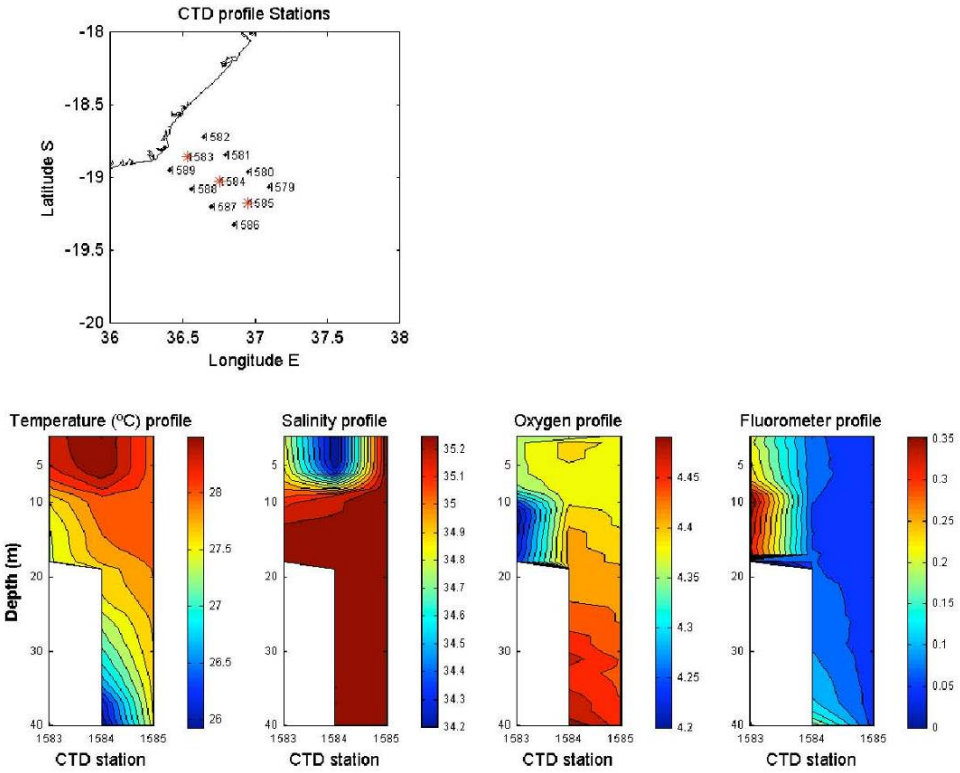


Figure 12 – Temperature, salinity, oxygen and fluorometer data obtained during the radial stations sampling. The stations represented are from the central radial.

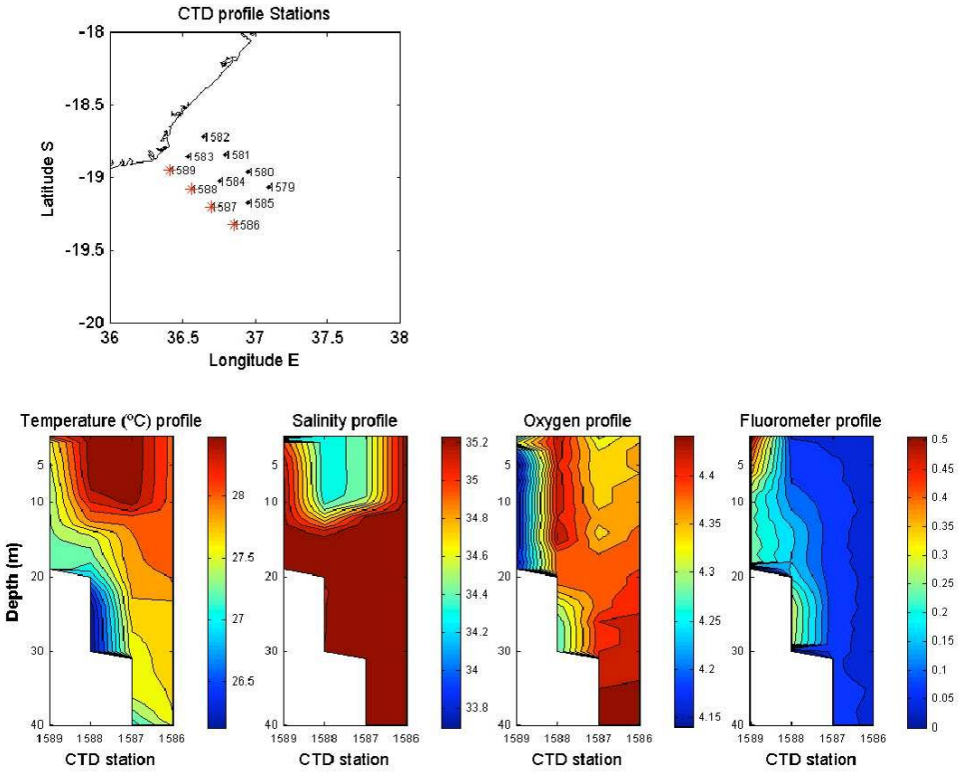


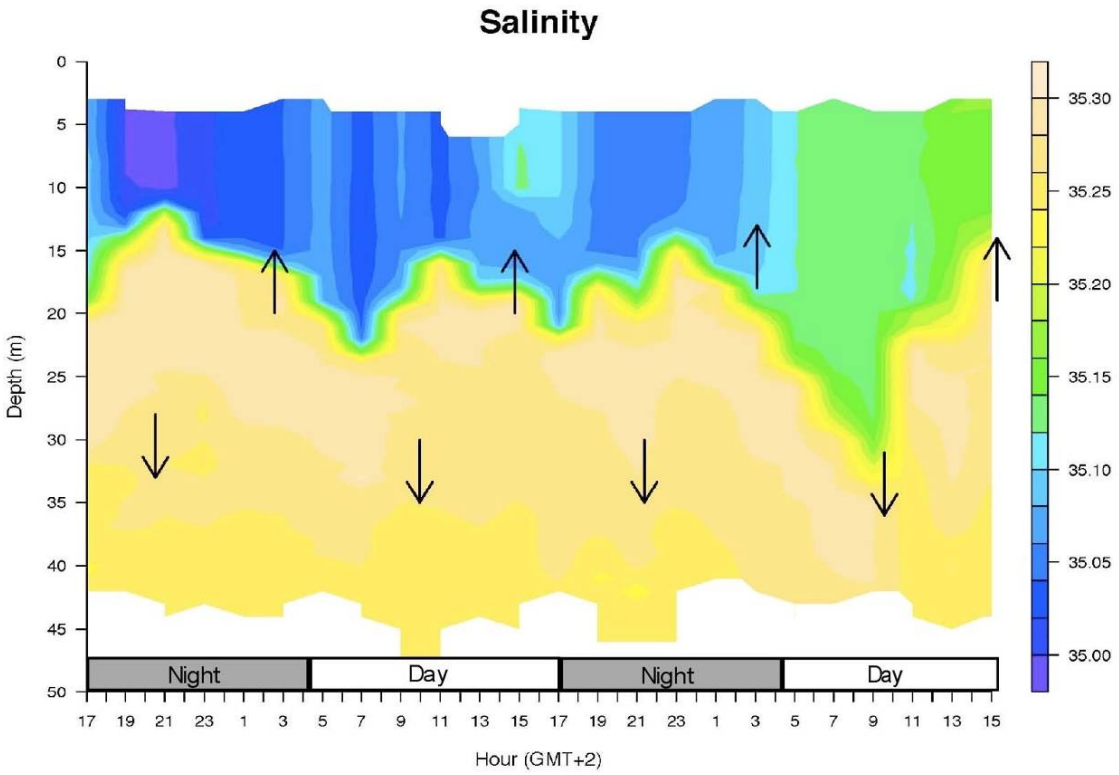
Figure 13 – Temperature, salinity, oxygen and fluorometer data obtained during the radial stations sampling. The stations represented are from the Southern radial.

Fixed station

Table II presents the tidal height for Chinde (Zambezi mouth) for the sampling period.

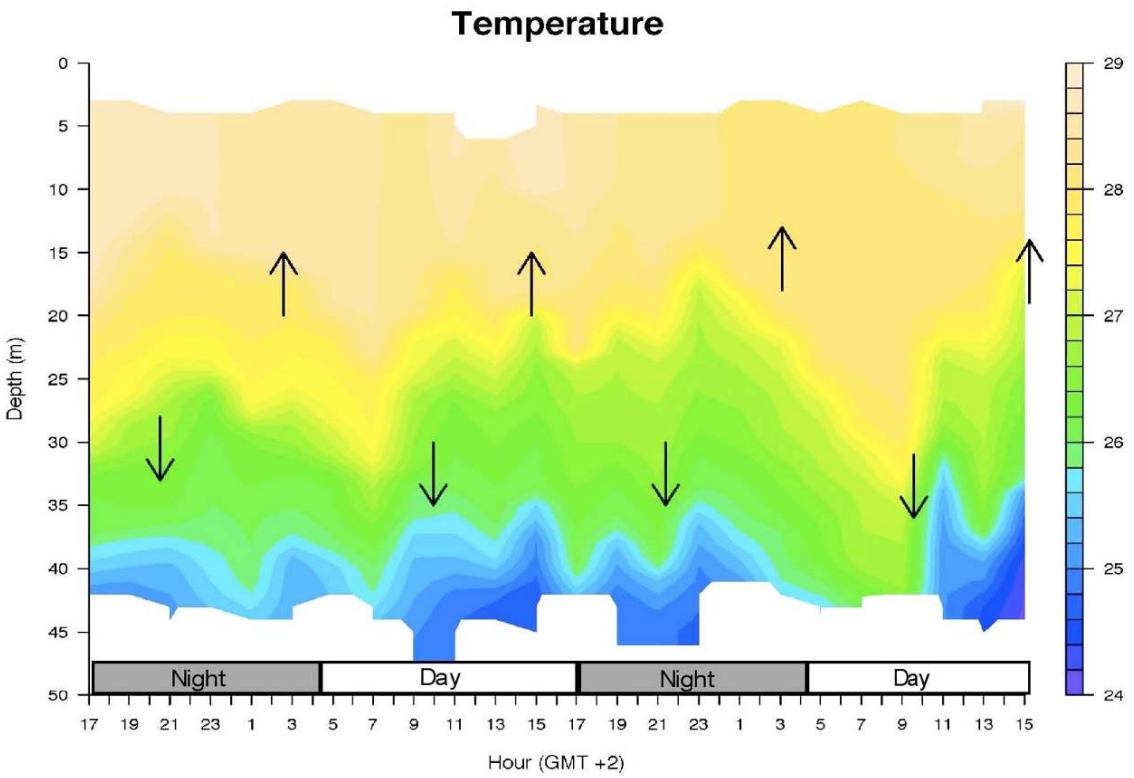
Table II – Height and hour (GMT +2) for local tides (Chinde, 6 to 8 December)

Day	Hour	Height (m)
6	20:29	1.2
7	2:21	3.1
7	9:54	1.0
7	14:39	3.1
7	21:06	1.0
8	2:54	3.3
8	9:30	0.9
8	15:11	3.2

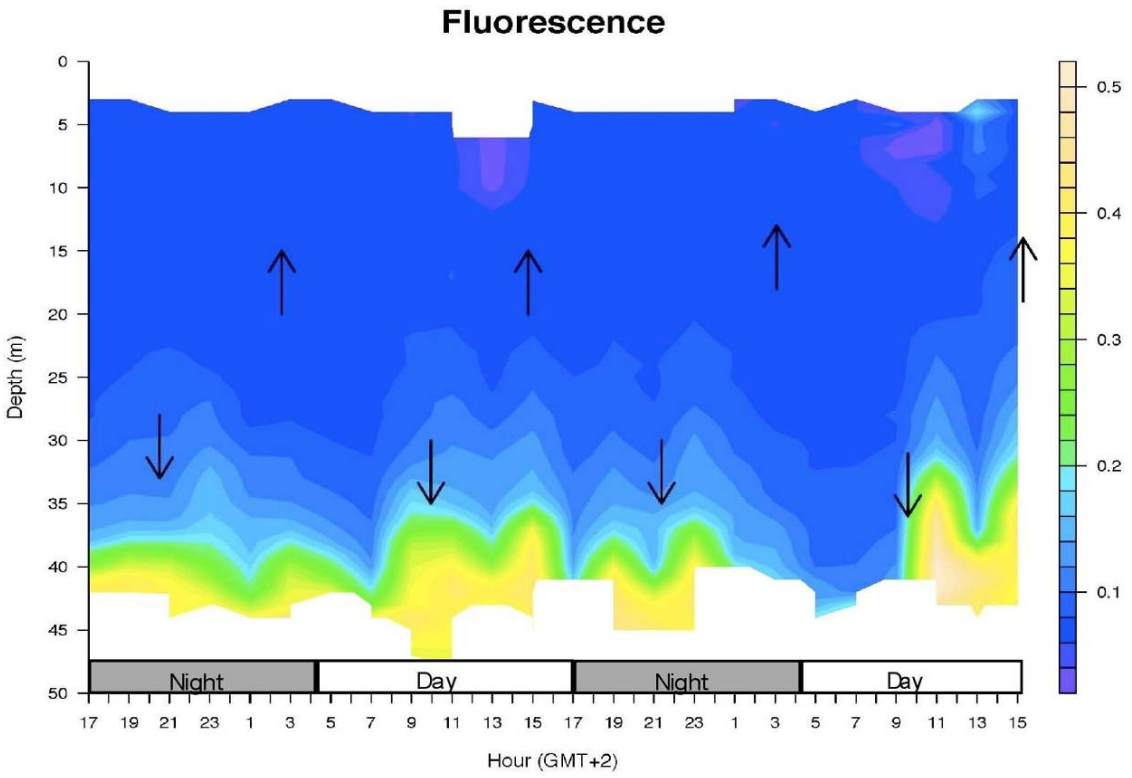


During low tides the freshwater from the Zambezi delta enters into coastal waters. This water mass reduces water column salinity values as shown in Fig. 14. The darker colours represented at the surface, also demonstrate the freshwater influence in the coastal water mass surface layer.

The halocline depth variation is noticeable in the present Figure 14, demonstrating the tidal influence during the 48-hour cycle, although somewhat irregularly. The mean halocline depth is about 20 meters and its variation is generally around 10 meters.

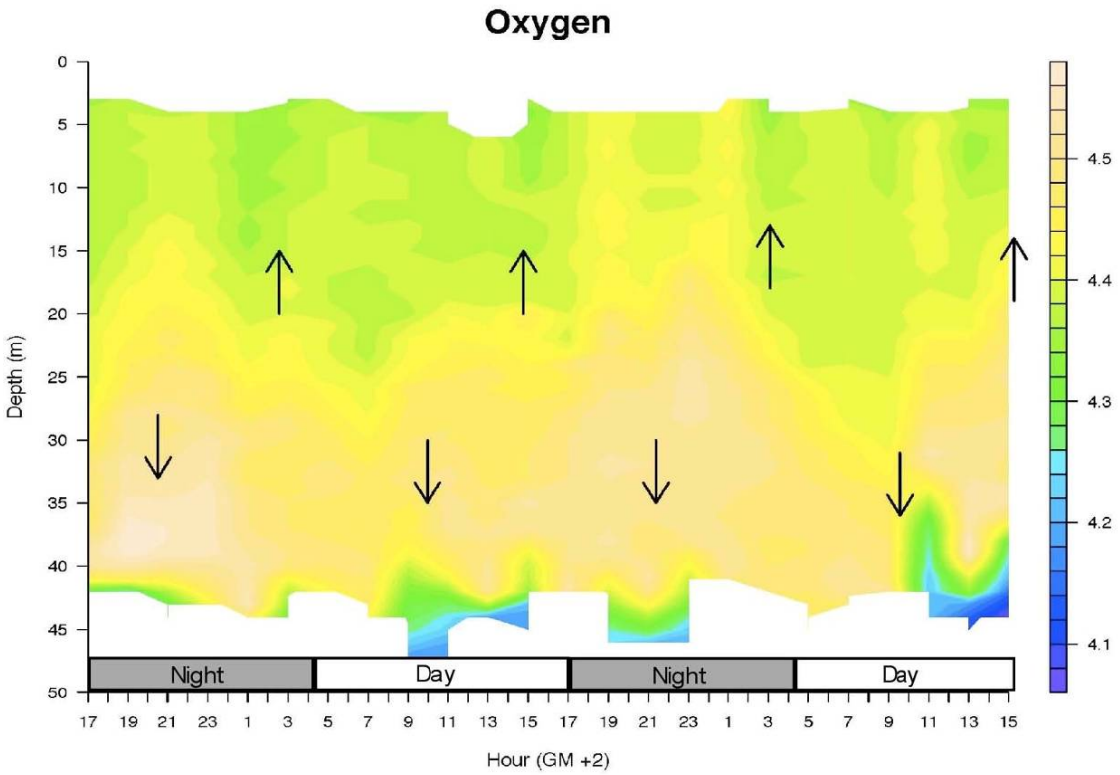


As expected, cold temperatures are found near bottom while warmer temperatures are found in surface waters, and follows the salinity variations. The thermocline variation has the same pattern of the halocline. The mean thermocline depth is 25 meters, having around 15 meters of depth variation during the sampling period.



Fluorescence is an indirect measurement of chlorophyll *a* levels, hence phytoplankton abundance. As Fig. 16 reveals, the deep chlorophyll maximum (DCM) is generally under 40 meters deep.

Further information from nutrient and HPLC pigment analysis will help to understand the fluorescence variation. Another hypothesis yet to be confirmed is grazing by zooplankton. This hypothesis may only be confirmed after zooplankton identification and counting.


Oxygen
Depth (m)
0
5
10
15
20
25
30
35
40
45
50
4.5
4.4
4.3
4.2
4.1
Night
Day
Night
Day
17 19 21 23 1 3 5 7 9 11 13 15 17 19 21 23 1 3 5 7 9 11 13 15
Hour (GM +2)

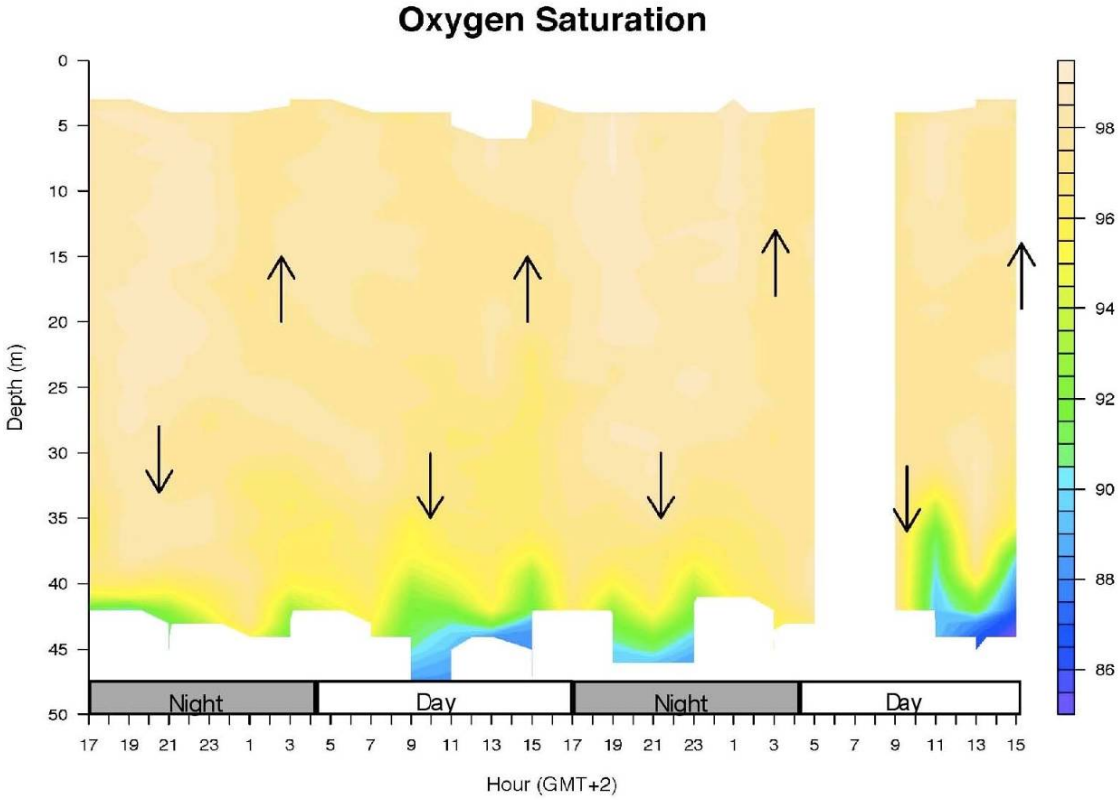

Oxygen Saturation
Depth (m)
0
5
10
15
20
25
30
35
40
45
50
98
96
94
92
90
88
86
Night
Day
Night
Day
17 19 21 23 1 3 5 7 9 11 13 15 17 19 21 23 1 3 5 7 9 11 13 15
Hour (GMT+2)

Fig. 17 presents the oxygen concentration variation, which is generally higher in mid-water depths. The lowest surface oxygen concentrations seem to occur during the night (between 18:00 and 5:00 hours). This might be due to plankton diel vertical migrations, which will probably be confirmed with zooplankton posterior analysis.

The variations observed near the bottom might also be related to zooplankton vertical migrations, as well as phytoplankton vertical migrations, which also contribute to oxygen variation.

The oxygen saturation variation (Fig 18) is higher near the maximum depth, where lower levels are found. Some vertical stratification is present along the water column, being stronger below 40 meters depth.

III. Follow up activities

Currently the team involved in these two Special Studies is fully engaged in the analyses of the samples collected during the cruise. These include:

i) Nutrients from both Special Studies. These include the samples from the spatial survey at 2 depths, and from the Sofala cycle at several depths. In total over 400 samples are being analysed for nitrates, phosphates and silicates. It is expected to complete this component by the end of May 2008.

ii) Phytoplankton pigments from Sofala bank. Around 300 samples are being analysed. It is expected to complete by the end of June 2008.

iii) Zooplankton samples. More than 220 samples were collected. The main interest is the crustacean larval and post-larval stages. Depending on the possibility of collaborative work with IIP personnel, other taxonomic groups may be included, such as fish larval stages and general plankton counts. This component is very time consuming, involving sorting out organisms from samples, identification and counts. It should be noted that many planktonic forms are virtually unknown in the region, increasing the uncertainty of the required timeframe for analysis. The basic work is expected to be finished by mid 2009.

iv) Treatment of data ADCP.

v) Production of final results (reports and scientific publications), expected in the second half of 2009.

A number of formative actions are ongoing and foreseen, deriving from the material collected. Currently 1 PHD thesis is involved (phytoplankton) and 1 MSC (shrimp larval dynamics). The involved Portuguese team expects to develop further collaboration with IIP researchers and students, in order to expand the analyses of the material (especially zooplankton). This will involve formative actions (periods of analyses by Mozambican staff at University of Lisbon), as well as the production of scientific output in co-authorship.

Annex VI Preliminary report from fish biodiversity study

PRELIMINARY REPORT ON FISH COLLECTIONS OF THE MOZAMBIQUE ECOSYSTEM SURVEY September 27 to November 6 / 2007

By P.C. Heemstra, E. Heemstra and O. Alvheim

New distribution records are indicated with an asterisk (*).

Family Hexanchidae

Heptranchias perlo: several specimens of this near threatened species were taken.

Family Carcharhinidae

Carcharhinus leucas: one juvenile of this 'near threatened' species was collected at 153 m.

Carcharhinus sealei: about 20 + specimens of this distinctive 'near threatened' species were collected to depths of 62 m. Previously known to 40 m.

Loxodon macrorhinus: several specimens collected. Maximum depth 118 m, previously known to 80 m.

Family Hemigaleidae

Hemipristis elongatus: one specimen of this 'vulnerable' species was collected from a shallow (31 metre) trawl station.

Family Proscylliidae

Eridacnis sp.: The specimens collected do not agree with any of the *Eridacnis* species illustrated in Compagno *et al*. 2005.

Family Pristiophoridae

Pristiophorus sp. D: This un-named species was illustrated and described by Compagno *et al*. 2005. Known only from the coast of Mozambique, Pakistan and possibly Somalia. Previously known from 286 – 500 m, our specimens were caught at 546 m.

Family Scylliorhinidae

Bythaelurus sp: Our specimens differ significantly in colour pattern from *Bythaelurus clevai* in Compagno et al. 2005.

Holohalaelurus regani: The unique colour pattern of our 43 cm specimen contributes to our understanding of the intraspecific variation of colour patterns within this species.

Family Centrophoridae

Centrophorus moluccensis : Not common in this survey; this shark is endangered off the east coast of Australia.

Centrophorus granulosus: Several specimens of this 'vulnerable' species were caught.

Family Etmopteridae

**Etmopterus molleri*: Our 34 cm specimen may be the first verifiable record from Mozambique.

Family Triakidae

Mustelus cf *manazo*: A few specimens of a species of *Mustelus* with faint white spots similar to *Mustelus manazo* and different from *M. palumbes* of South Africa.

Family Heterodontidae

Heterodontus ramalheira: The colour pattern of our 37cm specimen contributes to our understanding of intraspecific variation.

Family Torpedinidae

**Torpedo nobiliana*: New record. Previously known from South Africa (Algoa Bay to Cape Town) & Eastern Atlantic.

Family Narkidae

A narkid ray with 2 dorsal fins and round circular disc was collected at 177 m. The dorsal surface was a nondescript brown with irregular faint dark spots.

Family Rajidae

**Cruriraja parcomaculata*: New record for Mozambique, previously known from Namibia to Durban.

**Neoraja stehmanni*: New record for Mozambique.

**Dipturus lanceorostratus*: New distribution record from Limpopo River to central Mozambique south of Beira. Our 35 cm female specimen was collected from 750 m a new depth record, previously known from 435 m.

**Dipturus* cf *lanceorostratus*: Our 22 cm disc width female dorsal surface with several distinct yellow-edged dark brown ocelli.

Dipturus stenorhynchus: Rare. Previously known from the female holotype; our adult male (DW 105 cm) was caught in 452 m.

Family Rhinobatidae

**Rhinobatos* cf *annulatus*: New record. This undescribed dark-spotted guitarfish was known from South Africa.

Rhinobatos holcorhynchus: Our 98 cm female guitarfish is noteworthy as the dorsal surface shows several pale greyish-blue spots contrary to the species description in *Smiths' Sea Fishes*. This specimen keyed directly to *holcorhynchus* as the nasal fold ends at the medial end of the nostril and it has a distinctive black blotch on the underside of tip of the snout.

Family Dasyatidae

Plesiobatis daviesi: Several specimens of this rare deep-water giant stingray were collected.

Family Hexatrygonidae

**Hexatrygon bickelli*: New record for Mozambique. A live specimen of this rare deepwater sixgill stingray was collected from a depth of 683 m. It was measured (68 cm DW), photographed and released.

Family Mobulidae

**Mobula japanica*: Our specimen appears to be *Mobula japanica* which has not previously been reported from Mozambique.

Family Chimaeridae

**Hydrolagus* sp: Several specimens of this rare chimaera (previously known only from South Africa) were taken in trawls.

Family Congridae

Bathymyrus smithi: Our 55 cm specimen was trawled at 358 m. The species was previously known from 470-490 m.

Coloconger scholesi: This species was common in some trawls. It was reported in *Smiths' Sea Fishes*' from deep water which we now know to be at least 822 m

Family Muraenidae

Gymnothorax sp. The only moray eel caught in the trawls was an 88 cm specimen (from 144 m) with an unfamiliar colour pattern: pale brown with wrinkles lined with black on the rear of the head and a irregular blackish blotch on the gill opening.

Family Ophichthidae

Ophichthus marginatus: Our identification of this species is tentative, pending comparison with specimens in Grahamstown. Depth of collection (715 m) is much greater than recorded for this species. Usually occurs in shallow sandy and rubble areas.

Pisodonophis boro: Our 67 cm specimen was taken at a depth of 26 m. This species is usually found in lagoons and estuaries.

Family Notacanthidae

**Notacanthus sexspinis*: Our 33 cm specimen represents a new record for Mozambique. Known from Walvis Bay to Durban.

Family Clupeidae

Dussumiera acuta: Our identification of this species is tentative pending comparison with specimens at SAIAB. The species is not known south of the Gulf of Aden but was fairly common on several trawls.

Herklotsichthys quadrimaculatus: The 'two gold spots on the shoulder' reported for this species are ephemeral and most fish had only one faint gold spot. A distinctive post-mortem feature of the colour pattern is a pale blue shield with a red cross on the occiput.

Family Engraulidae

Engraulis cf *capensis*: The current name for the species is currently unsettled. We have taken specimens for DNA analysis.

Family Gonorhynchidae

Gonorhynchus gonorhynchus: Spent specimens are pale salmon on the ventral parts of the head and body, anterior margin of the anal fin and tip of caudal fin lobes.

Family Malacosteidae

Malacosteus sp.: The 13 cm specimen does not match the literature available to us at present.

Family Sternoptychidae

Polyipnus indicus: Our 66 mm specimen was taken at 561 m, previously known to 500 m.

Family Chlorophthalmidae

**Bathypterois phenax*: New record for the Western Indian Ocean, previously known from Atlantic Ocean and Cape Point.

Family Paralepididae

A completely black paralepidid, 30 cm TL, was collected in 715 m. No completely black paralepidids are known from the Western Indian Ocean.

Family Moridae

**Guttigadus globiceps*: A 28 cm specimen similar to *Guttigadus globiceps* was taken at 675 m. Species of *Guttigadus* have not been reported from Mozambique.

**Physiculus natalensis*: New record for Mozambique. Previously known from KwaZulu-Natal, South Africa.

Family Ophidiidae

Holcomycteronus sp: Identification of our 20 cm specimen is problematic pending a revision of the genus.

**Neobythites kenyaensis*: Our 15 cm specimen is the first record for Mozambique. Previously known from Kenya and Tanzania.

**Neobythites* cf *somaliaensis*: This 18 cm specimen keys to *somaliaensis* which was previously only known from a single specimen but our specimen has numerous dark spots on the dorsal fin and dorsal part of the body that were not present on the holotype.

Family Bythitidae

**Cataetyx* cf *niki*: Our 35 cm specimen is a new record for Mozambique, previously known from Eastern Cape, South Africa, and Australia.

Family Chaunacidae

Two different species were collected in this survey. Identification of these species is problematic pending a revision of the genus.

Family Ogcocephalidae

**Malthopsis tiarella*: Our 10 cm specimen is 2 cm larger than all previously known specimens of the species and is a new record for Mozambique. Previously reported from KwaZulu-Natal, South Africa and Japan.illustr

Family Himantolophidae

A 48 mm SL black female *Himantolophus* anglerfish was caught at trawl station 11. Identification of this species requires further study at SAIAB (M.E. Anderson, personal communication).

Family Regalecidae

**Regalecus glesne*: The anterior fragment of a 60+ cm oarfish is probably a new record from Mozambique of this bizarre species.

Family Grammicolepididae

**Xenolepidichthys dalgleishi*: We collected several specimens of this tinselfish. Not previously reported from Mozambique.

Family Aulostomidae

Aulostomus chinensis: Our 16 cm pelagic juvenile shows a strikingly different colour pattern of red bars on a translucent background , compared with the colour patterns of benthic juveniles and adults.

Family Scorpaenidae

Choridactylus natalensis: Our 13 cm specimen shows a distinctive aposematic colour pattern on the inside of the pectoral fin this has not been mentioned or illustrated in the literature.

**Pontinus nigerimum*: Not previously reported from Mozambique. Several specimens trawled north of Beira at 378 m.

**Pterois mombasae*: Our 12 cm specimen was collected in 43 m north of Beira. A new record for Mozambique.

**Rhinopias eschmeyeri*: Our 13 cm specimen from north of Beira in 37 m represents a new record for Mozambique.

**Scorpaena scrofa*: Our 27 cm specimen is a new record for Mozambique. Known from South Africa.

**Snyderina* sp: Our 3 specimens represent an undescribed species (Stuart Poss, personal communication).

**Ectreposebastes imus*: Our 60 mm juvenile and a 76 mm adult collected off Beira in 25 m are a new record for Mozambique (Stuart Poss, personal communication). Previously known in the Western Indian Ocean from Kenya.

Family Bembridae

**Parabembras robinsoni*: New record for northern Mozambique.

Family Platycephalidae

**Cociella heemstrai*: We collected several specimens of this recently described flathead. New record for Mozambique; previously known from Kenya.

Family Triglidae

**Lepidotrigla alcocki*: Our 14 cm fish is a new record for Mozambique. Previously known in the Western Indian Ocean from Saya da Malha Bank.

Family Peristediidae

Satyrichthys sp: Our 17 cm specimen differs significantly in colour pattern from our 18 cm specimen of *Satyrichthys investigatoris* and 25 cm specimen of *Satyrichthys adeni*.

Family Hoplichthyidae

**Hoplichthys acanthopleurus*: We collected several specimens of this supposedly rare species. New record for Mozambique.

Family Serranidae

Serranus sp: The colour pattern of our 15 cm fish is different to that of *Serranus knysnaensis* and *Serranus novemcinctus*.

Family Callanthiidae

**Callanthias* sp: Two specimens from 156 m. Identification is pending comparison with other specimens in Grahamstown.

**Grammatonotus* sp: Identification of our 105 mm fish is pending comparison with specimens at SAIAB.

Family Priacanthidae

Pristigenys niphonia: Our 22 cm specimen was collected in 157 m, previously known from 80-100 m.

Family Apogonidae

Apogon queketti: Our 10 cm specimen was collected in 128 m, previously known from 50-92 m.

Family Epigonidae

**Epigonus robustus*: New record for the Western Indian Ocean.

Family Acropomatidae

Synagrops japonicus: New depth record (458 m); previously known from 180-400 m .

Family Lutjanidae

**Lutjanus bengalensis*: First verified record for Mozambique. Previous records are based on misidentifications in FAO fisheries guides.

Family Caesionidae

**Dipterygonotus balteatus*: A new record for Mozambique.

Family Symphysanodontidae

**Symphysanodon* sp: New record for Mozambique.

Family Centracanthidae

**Spicara australis*: Our 19 cm specimen, collected in 253 m is a new record for Mozambique; previously known from South Africa.

Family Nemipteridae

Nemipterus japonicus: Our 16 cm specimen was caught at 118 m; previously known from 5-80 m.

Family Ephippidae

Tripterodon orbis: The dorsal fin spines of our 43 cm specimen are not elongated as usually illustrated in the literature.

Family Gerreidae

Gerres mozambiquensis Iwatsuki & Heemstra 2007. Our 2 fish from off Beira are the 3rd and 4th known specimens of this species.

Family Mullidae

We collected 10 goatfish species. Goatfishes are potential indicator species for monitoring benthic ecosystems (Ublein 2007).

Upeneus bensasi: The colour pattern of our fish is similar to Randall's photo of *U. guttatus* from Madras and differs from photos of *U. japonicus* illustrated in the CSIRO book by Gloerfelt-Tarp and Kailola with which *U. bensasi* has been synonymized.

Family Sillaginidae

**Sillago arabica*: Our specimen represents the first record outside the Persian Gulf.

Family Sciaenidae

**Atrobucca nibe*: Our 39 cm specimen from 287 m is a new depth record.

Family Pentacerotidae

Pentaceros capensis : New depth record from 600 m, previously known from 70-300 m

Family Chaetodontidae

**Roa* sp: our specimen from 144 m, is probably the same undescribed species that occurs in the coelacanth habitats at Grand Comoro Island and off Sodwana Bay in South Africa (Heemstra et al. 2005).

Family Bramidae

**Brama orcini*: Our 18 cm specimen is a new record for Mozambique; previously known off South Africa.

Family Caristiidae

**Caristius groenlandicus*: Our 81 mm SL specimen is a new record from Mozambique.

Family Carangidae

**Alepes kleinii*: new record for Mozambique.

Carangoides malabaricus: Our 52 cm fish from 118 m is the deepest record for the species.

Family Bathyclupeidae

**Bathyclupea.* sp. new record for this family from Mozambique.

Family Labridae

**Choerodon gymnogenys*: trawled in 82 m; rare in collections and the Western Indian Ocean colour patterns are known only from paintings in and copied from 'Fishes of Zanzibar' by Playfair & Gunther 1866. We collected both male and female forms of this species.

*Halichoeres leptotaenia: Our 80 mm SL specimen appears to be the male of this recently described species (J.E. Randall, personal communication), previously known from Oman and Saudi Arabia.

Minilabrus sp. We collected about 20 specimens of this apparently undescribed species of Minilabrus.

Family Sphyraenidae

Sphyraena acutipinnis: most common barracuda in our trawls. It has an intricate pattern of dark grooves on the dorsal surface of the head.

Family Cepolidae

Acanthecepola indica: Our 30 cm specimen from 123 m is a new depth record.

Family Uranoscopidae

Uranoscopus archionema: Our 16 cm fish from 37 m differs from the other *Uranoscopus* that we collected in having the body with fewer white spots on the dorsal surface and two dark bars, one at mid body and one on peduncle; and the head has an intricate pattern of grooves and ridges below the eye.

Family Pinguipedidae

**Parapercis maritzi*: Our 146 mm SL specimen is a new record for Mozambique. Stn 14

Family Ammodytidae

**Bleekeria* sp. Our 12 cm specimen is a new record from Mozambique.

Family Callionymidae

In addition to *Synchiropus monacanthus*, the most common dragonet in the trawls, four species of *Callionymus* are represented in our collection. Identification of these species is pending comparison with specimens at SAIAB.

Family Gobiidae

**Oxyurichthys petersi*: New record for Mozambique.

Taenioides esquivel: New range extension from Maputo Bay to just north of Beira.

Family Acanthuridae

**Naso tonganus*: New record for Mozambique.

Family Scombrolabracidae

Scombrolabrax heterolepis: Our 27 cm specimen from 758 m is the first adult known from Mozambique.

Family Scombridae

Scomberomorus plurilineatus: Our 12 cm FL specimen has a bright yellow tip on the soft dorsal fin lobe, pectoral fin dusky yellow with a black tip, and black tips on the dusky tallow caudal fin.

Family Nomeidae

**Cubiceps whiteleggi*: new record for Mozambique.

Family Citharidae

Citharoides macrolepis: New depth of 298 m, previously known to 200 m.

Family Bothidae

Bothus swio: described from a male holotype, our female 8.5 cm SL specimen was caught south of Beira in 123 m.

**Laeops natalensis*: New record for Mozambique, previously known from 330-420 m but also collected in 33 m.

**Taeniopsetta ocellata*: New record for Mozambique, a male and a female specimen was collected.

**Samaris costae*: Our 11 cm specimen was collected in 177 m, a new record for Mozambique.

Family Cynoglossidae

Cynogossus cf *marleyi*: Our 17 cm specimen shows a distinct series of white spots along the bases of the dorsal and anal fins.

Family Balistidae

Abalistes stellatus was common throughout the survey.

Monacanthidae

**Paramonacanthus nematophorus:* New record for Mozambique; previously known from Red Sea, Zanzibar and Seychelles.

Family Tetraodontidae

**Arothron inconditus*: New record for Mozambique.

**Lagocephalus guentheri*: New record for Mozambique.

**Lagocephalus sceleratus*: New record for Mozambique.

**Pelagocephalus marki*: New record for Mozambique.

Family Diodontidae

Cyclichthys sp. Our 23 cm specimen does not match descriptions of known species of *Cyclichthys*.

SUMMARY

This survey provided the opportunity to collect rare and poorly known fishes of the Western Indian Ocean ecosystem. The specimens and photographs will be accessioned into fish collections of the South African Institute for Aquatic Biodiversity, South African Museum and the Institute for Marine Research in Bergen, Norway and will be accessible, with related information, to the Instituto Nacional de Investigacao Pesqueira of Mozambique. Otoliths and tissue samples for DNA analyses were also collected from several specimens. Photographs were taken from most species as a record of fresh colouration.

During the on-board fish identification process, several manuscript keys and texts for our forthcoming book on fishes of the Western Indian Ocean were tested and improved in the light of the new information provided by these fresh specimens.

We are grateful to the teams of Mozambican scientists for their assistance in sorting and identifying the catch.

Annex VII The First Marine Bird Survey of Mozambique Channel

Objectives:

- Initiate a marine bird's checklist of the Mozambique Channel.
- Understand the bird's distribution according to the distance from the coast.

Methodology:

The marine bird survey was held from 29-November-2007 to 13-November-2007, covering the Mozambique Channel from Pemba to Maputo. The distance from the shore was variable according to the locations of other scientific activities detached for the vessel. The most of the observations were made from Captain Cabin which was the highest point of the ship from 6:00 am to 17:00 pm with one hour break (from 12:00 to 13:00). The observation angle was approximately 180º and the birds were observed as far as 2 km using binnacles or telescope on extreme cases. All birds observed were identified to the species level using the combination of Newman's Birds book of Southern Africa (Newman 1996), Birds of Eastern Africa (Perlo 1995) and Birds of Africa (2003). For each individual or flock observed were counted and the GPS reading taken. Each individual were plotted on the Mozambique Channel map.

Preliminary Results:

During the survey 7 331 individuals were counted represented by 20 species. The most frequent and numerous bird was the *Sterna fuscata* 6 396 individuals observed followed by *Puffnus Ilherminieri* with 303 indivíduals, *Sterna albifrons* with 142 indivíduals and *Fregetta tropica* with 113 indivíduals. The rest of the species the counts were below hundred individuals. The *Pterodroma mollis* was conspicuousness because was receded at further Northern Mozambique considerate out of the normal range.

During the survey was notorious the association between *Sterna bergii*, *Sterna bengalensis* and *Sterna albifrons* with *Fregetta minor*. Usually *Fregetta minor* doesn't hunt for its food, steal from the previous spec species. Other interesting associations were between schools of dolphins and *Sterna fuscata*.

Surprise was the appearance of *Numenius phaepus* considerate a intertidal bird few kilometers away from the shore.

Table 1: Checklist of marine birds and the number of individuals observed during the survey

	Species Name	Number of Individuals
1	Catharacta antarctica	2
2	Colonectis diomendia	1
3	Diomenda exulans	70
4	Fregetta minor	26
5	Fregetta tropica	87
6	Macronectes giganteus	1
7	Numenius phaepus	1
8	Pterodroma macroptera	26
9	Pterodroma mollis	2
10	Puffinus griseus	31
11	Puffnus Ilherminieri	303
12	Stercorarius pomarinus	20
13	Sterna albifrons	142
14	Sterna bengalensis	31
15	Sterna bergii	115
16	Sterna caspia	5
17	Sterna dongallii	51
18	Sterna fuscata	6 396
19	Sterna saudersi	10
	Sula sula	11

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- Perlo, B. V. (1995). Birds of Eastern Africa. Harper Collins Publishers, Wijichen
- Newman, K. (1996). Birds of Southern Africa. Southern Book Publishers, Western Cape
- Sinclair, I and P. Ryan (2003). Birds of Africa. Struik, Cape Town

Annex VIII Samples collected and storage location

Fish samples collected during the survey are in the custody of the SA Museum, Cape Town and the South African Institute for Aquatic Biodiversity. Contact persons are listed below:

Michael Bougaardt
SA Museum, Cape Town

South Africa
phone: 021 481 3800

Dr P.C. Heemstra, Curator Emeritus
South African Institute for Aquatic Biodiversity
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Grahamstown 6140
SOUTH AFRICA
P 046 603 5827; F 046 622 2403

Benthos samples were handed over from R/V Dr. Fridtjof Nansen to IIP. Altogether the samples amounted to:

1 wooden container (ca. 110x70x50cm) with 4% formalin fixed samples
1 wooden container (ca. 110x70x50cm) with 90% ethanol and 4% formalin fixed samples
1 plastic transport container (ca. 60x40x40cm) with 4% formalin and 90% ethanol fixed samples
1 carton box (ca 90x40x40cm) with frozen sediment samples for geochemistry

Contact person and responsible for samples is
Emidio Andre
IIP Survey Coordinator
Instituto Nacional de Investigação Pesqueria, Mozambique

Plankton samples collected during the survey was handed over and stored at the FCUL - Faculdade de Ciências da Universidade de Lisboa
Departamento de Biologia Vegetal
NIF. 502 618 418

Responsible contact person is

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