

MYANMAR  
Ecosystem Survey

28 APRIL – 02 JUNE 2015

Bergen, May 2016



MYANMAR  
Ecosystem Survey

28 APRIL – 02 JUNE 2015

by

Jens-Otto Krakstad, Bjørn Krafft, Oddgeir Alvheim  
Institute of Marine Research  
Norway

Htun Thein  
Department of fisheries,  
Ministry of Livestock, Fisheries and Rural Development  
Myanmar

Myat Thu  
Mawlamyine University  
Myanmar

Kyaw Naing oo  
Yangon University  
Myanmar

Peter Nick Psomadakis  
FAO  
Italy

Institute of Marine Research  
Bergen, 2015

## THE EAF-NANSEN PROJECT

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

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

## LE PROJET EAF-NANSEN

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

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

## Table of Contents

<b>CHAPTER 1</b>	<b>INTRODUCTION .....</b>	<b>5</b>
1.1	THE SURVEY AREA .....	6
1.2	AIMS AND OBJECTIVES .....	6
1.3	PARTICIPATION.....	7
1.4	NARRATIVE.....	7
<b>CHAPTER 2</b>	<b>METHODS.....</b>	<b>12</b>
2.1	METEOROLOGICAL AND HYDROGRAPHIC SAMPLING .....	12
2.2	PHYTOPLANKTON SAMPLING .....	13
2.3	ZOOPLANKTON SAMPLING .....	13
2.4	SEDIMENT SAMPLING .....	14
2.5	BIOLOGICAL FISH SAMPLING.....	14
2.6	MULTIBEAM ECHOSOUNDER FOR BOTTOM MAPPING .....	14
2.7	SINGLE BEAM ACOUSTIC SAMPLING .....	15
2.8	SWEPT AREA BIOMASS CALCULATIONS.....	17
<b>CHAPTER 3</b>	<b>WIND, HYDROGRAPHY AND PLANKTON.....</b>	<b>19</b>
3.1	HORIZONTAL PATTERNS OF WIND AND NEAR-SURFACE HYDROGRAPHY.....	19
3.2	CROSS SHELF VERTICAL PROFILES OF HYDROGRAPHY, OXYGEN AND FLUORESCENCE.....	24
3.3	NUTRIENTS, CHLOROPHYLL AND PLANKTON.....	31
3.4	SEDIMENT SAMPLES .....	37
<b>CHAPTER 4</b>	<b>ACOUSTIC ABUNDANCE AND DISTRIBUTION .....</b>	<b>39</b>
4.1	RAKHINE COASTAL ZONE.....	39
4.2	AYEYARWADY DELTA REGION.....	40
4.3	TANINTHARYI COASTAL REGION .....	42
<b>CHAPTER 5</b>	<b>SWEPT AREA ABUNDANCE AND DISTRIBUTION .....</b>	<b>44</b>
5.1	ANALYSES OF CATCH RATES.....	44
5.2	BIOMASS INDEX.....	49
5.3	BIODIVERSITY.....	53
5.4	TAXONOMY AND GENETICS .....	59
<b>CHAPTER 6</b>	<b>SUMMARY AND CONCLUSIONS.....</b>	<b>60</b>
6.1	ENVIRONMENT.....	60
6.2	FISH ABUNDANCE .....	60
6.3	FISH ECOLOGY AND BIODIVERSITY. ....	61
6.4	RECOMMENDED FOLLOW UP WORK.....	62
<b>REFERENCES</b>	<b>.....</b>	<b>63</b>
<b>ANNEX I.</b>	<b>RECORDS OF FISHING STATIONS</b>	
<b>ANNEX II.</b>	<b>LENGTH DISTRIBUTION OF MAIN SPECIES</b>	
<b>ANNEX III.</b>	<b>INSTRUMENTS AND FISHING GEAR USED</b>	
<b>ANNEX IV</b>	<b>EQUATIONS</b>	

## CHAPTER 1 INTRODUCTION

Myanmar is the largest fishing nation in the Bay of Bengal region. Total marine catches are uncertain but estimates range as high as 1.3 – 1.8 million tons y<sup>-1</sup>. The wild fish sector contributes around 10 % to the GDP and large part of the human population find their livelihood in this sector. The marine waters in Myanmar also display very high biodiversity, with a number of rare species that the country has special management responsibilities for. Myanmar's current growth pattern is placing pressure on its environment and, if continued, will be unsustainable given the country's continued population increase, expected rapid industrialization, increased consumption of and demand for natural resources for food production and trade, and increased energy consumption.

Fishery resources in Myanmar waters are typical of Southeast Asia with large quantities of fish and shrimps in the EEZ. However, studies on marine wildlife in their natural habitats in terms of population size, distribution, migratory patterns, threats and conservation status are rather limited. Most existing studies have been based on reported sightings and by-catch. Historically, the EAF-Nansen project carried out four surveys with the present vessel's predecessor, also named RV Dr. Fridtjof Nansen, in the period 1979-1980 in cooperation with the Burmese (today Myanmar) Government. These surveys have been used as reference points until recently. In 2013 a new survey was carried out in Myanmar by the Dr. Fridtjof Nansen. The result indicated among others that fish biomass had declined substantially and species composition dramatically changed since the surveys in 1979 and 1980. As a consequence, this second (2015) survey in Myanmar came about after a request from Ministry of Livestock, Fisheries and Rural Development, Myanmar to FAO to verify the results from the 2013 survey and to check seasonal changes in species composition and abundance. This survey is considered a critical component to identify threats to the ecosystems and to monitor the early effect of the management measures put in place. The survey will also provide capacity building of trainees and young scientists in Myanmar.

The results from the Dr. Fridtjof Nansen survey in 2013 provided up to date data on fish distribution, their population and oceanography. This information was applied by the Myanmar government in sustainable planning, management and development in relation to coastal and marine ecosystems. As a direct consequence of the 2013 survey, Myanmar has improved their fisheries management and increased their attention on fisheries resources, conservation and sustainable development. Management measures put in place by the government since 2013 include a system of partially closed season (variable period and part of fleet) for all marine waters in Myanmar, reduction in the numbers of fishing rafts in the Delta region, banning of foreign fishing vessels (all trawlers) and prohibition in respect to construction of local fishing vessels. The purpose of these measures has been to reduce the fishing pressure and the effect should be evaluated.

The cause of loss and unsustainable use of coastal and marine fisheries resources in Myanmar are related with a number of different aspects involving limited knowledge and understanding by different stakeholders; capacity constraints; lack of environmental safeguards; under-valuation of resources; lack of comprehensive land-use policies and plans; gaps in legislations and weak enforcement; poverty and subsistence needs; lack of grassroots support for conservation; and global climate change. The Department of Fisheries in Myanmar also has limited staff and budgets to regularly patrol for illegal fisheries in the offshore areas of Myanmar, except in partnership with the Myanmar Navy.

This second ecosystem survey was carried out in the pre-monsoon season and designed to be executed during the opposite season to the 2013-survey (post –monsoon season). Assessed comparatively these two surveys should identify seasonal differences in fish abundance and species composition, which is crucial for understanding the variability in fish catches on the shelf and slope. The study will cover important levels of the food chain such as the demersal and pelagic fish, zoo- and phytoplankton as well as investigate factors representing the physical environment. The survey is a co-operation between the Myanmar government, the EAF-Nansen Project of FAO, The Norwegian Embassy to Myanmar, and the BOBLME project.

### 1.1 The survey area

The BOBLME national report of Myanmar “On the Sustainable Management of the Bay of Bengal Large Marine Ecosystem” gives an overview of Myanmar and the marine sector. Myanmar is the largest country in mainland Southeast Asia comprising a land area of over 676,577 square kilometres and geographically located between latitudes 9° 32' and 28° 31' N, and longitudes 92° 10' and 101° 11' E, thus stretching over 2280 kilometres. It shares common maritime boundaries with Bangladesh in the north-east of the Bay of Bengal and with Thailand and India in the Andaman Sea which is a part of the Bay of Bengal. Myanmar continental shelf covers approximately 230,000 km<sup>2</sup>, and is relatively wider in the central and southern parts. The Exclusive Economic Zone (EEZ) is about 486,000 km<sup>2</sup>. The coastal zones of Myanmar can be subdivided into three main areas, namely the Rakhine Coast, the Ayeyarwady Delta and Tanintharyi Coast. Parts of the coast are heavily influenced by fresh water from the many rivers that flow to the coast such as the "Mayu" and "Kaladan" rivers in the Rakhine coastal area: the "Ayeyarwady", "Sittaung" and "Thanlwin" rivers in Delta coastal area and the "Ye", "Dawai", "Tanintharyi" and "Lenya" rivers on the Tanintharyi coast.

### 1.2 Aims and objectives

The purpose of the R/V ‘Dr. Fridtjof Nansen’ survey is established in the cruise plan forwarded from IMR to Department of Fisheries, Myanmar (DoF) before the survey, in the terms of reference (ToR) for the survey from FAO and in meetings between DoF representatives and the cruise leader before the onset of the survey in Yangon on the 26 and 27 April 2015. The design of the survey copy as far as possible the course track and sampling stations of the 2013 ecosystem survey to make the two surveys as comparable as possible.

Based on the sampling priorities and discussions the main objectives of the survey have been set as follows:

- To obtain information on demersal fish abundance and biodiversity by demersal trawling where conditions for bottom-trawling are adequate.
- To determine the distribution and abundance of small pelagic fish resources using acoustic methods and a systematic grid survey strategy.
- Additional biological sampling from trawl catches to collect data on size distribution, further biological information and genetic material from selected species
- To establish as far as possible, the distribution, abundance and composition of other taxa at different trophic levels along the shelf (phyto- and zooplankton, fish eggs and larvae)
- Map the environmental conditions in the survey area (temperature, salinity, oxygen, chlorophyll, nutrients and sediments)
- Capacity building of Myanmar trainees and young scientists.

- To verify the 2013 survey results and capture seasonal variability in fish catches and environment

### 1.3 Participation

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

Table 1.1 List of participants and their affiliation.

Participants:	Period:	E-mail address:	Sex:	Institution:	Country:
Jens-Otto Krakstad	27/4-02/06	<a href="mailto:jensotto@imr.no">jensotto@imr.no</a>	M	IMR	Norway
Tore Mørk	27/4-02/06	<a href="mailto:tore.moerk@imr.no">tore.moerk@imr.no</a>	M	IMR	Norway
Kåre Tveit	27/4-02/06	<a href="mailto:ktv2@online.no">ktv2@online.no</a>	M	IMR	Norway
Bjørn Krafft	27/4-02/06	<a href="mailto:bjorn.krafft@imr.no">bjorn.krafft@imr.no</a>	M	IMR	Norway
Merete Kvalsund	27/4-02/06	<a href="mailto:merete.kvalsund@imr.no">merete.kvalsund@imr.no</a>	F	IMR	Norway
Oddgeir Alvheim	27/4-02/06	<a href="mailto:oddgeir.alvheim@imr.no">oddgeir.alvheim@imr.no</a>	M	IMR	Norway
Htun Thein	27/4-02/06	<a href="mailto:htunthein.akyab@gmail.com">htunthein.akyab@gmail.com</a>	M	DOF	Myanmar
Win Ko Ko	27/4-02/06	<a href="mailto:kowinko.dof@gmail.com">kowinko.dof@gmail.com</a>	M	DOF	Myanmar
Aung Win Sein	27/4-02/06	<a href="mailto:awsein73@gmail.com">awsein73@gmail.com</a>	M	DOF	Myanmar
Zay Yar Min	27/4-02/06	<a href="mailto:zayarminjica@gmail.com">zayarminjica@gmail.com</a>	M	DOF	Myanmar
Aung Hlaing Win	27/4-02/06	<a href="mailto:aunghlaingwin12@gmail.com">aunghlaingwin12@gmail.com</a>	M	DOF	Myanmar
Min Khine	27/4-02/06	<a href="mailto:mykhinn25@gmail.com">mykhinn25@gmail.com</a>	M	DOF	Myanmar
Maung Hla	27/4-02/06	<a href="mailto:masterhla2008@gmail.com">masterhla2008@gmail.com</a>	M	DOF	Myanmar
Bhone Myint Aung	27/4-02/06	<a href="mailto:ppaing35@gmail.com">ppaing35@gmail.com</a>	M	DOF	Myanmar
Myat Thu	27/4-02/06	<a href="mailto:myatthums8@gmail.com">myatthums8@gmail.com</a>	M	MLMU	Myanmar
Kyaw Naing oo	27/4-02/06	<a href="mailto:dr.kno1971@gmail.com">dr.kno1971@gmail.com</a>	M	YGNU	Myanmar
Zar Ni Ko Ko	27/4-02/06	<a href="mailto:waizaphyo.17@gmail.com">waizaphyo.17@gmail.com</a>	M	MU	Myanmar
Kyaw Tay Za	27/4-02/06		M	Navy	Myanmar
Peter N. Psomadakis	27/4-02/06	<a href="mailto:Peter.Psomadakis@fao.org">Peter.Psomadakis@fao.org</a>	M	FAO	Italy

List of institution abbreviations:

IMR - Institute of Marine Research

DoF - Department of fisheries, Ministry of Livestock, Fisheries and Rural Development

MLMU- Mawlamyine University, Mon State

MU- Myeik University

YGNU- Yangon University

NAVY - Myanmar Navy Hydrographic office

### 1.4 Narrative

The vessel left port in Yangon, Myanmar 28. April at 10:30 local time (local time = UTC+6.5 hours) and travelled to the northern part of the survey area south of the border with Bangladesh. After completion of bunkering in Sandoway Bay on the 30. April at 15:00 the vessel continued to the start position at 19°41' N and 92°15'E, slightly further north than the start of the 2013 survey. This was reached just after midnight on the 1. May, and the first trawl was towed early that morning. The

coverage of the northern Rakhine region was completed on 8. May at 07:30 in the morning. The coverage of the next region, the Ayeyarwady delta coastal zone (Gulf of Mottama) commenced subsequently. On the 15. Mai at 15:30 it was necessary to break off the survey-grid to search medical treatment of a sick survey participant. He was offloaded onshore at 00:30 and the vessel could return to transect. The following trawl was carried out on the 16. May at 09:30. During 17. May, the vessel anchored at lunch-time for the celebration of the Norwegian constitution day. The next day the survey continued at 12:00. The Delta region was completed on 20. May at 17:00 local time. The third region, the coverage of the Tanintharyi coast commenced immediately and was completed on 30. May at 14:00. The vessel carried out acoustic bottom mapping in an area 10°12' N, 97°51' E. until the cruise terminated on the 1. June after a wrap-up meeting and offloading of samples in vicinity of the city Kaw Thong. After the Myanmar scientists left the boat, the vessel steamed to Phuket for crew change and offloading of the Norwegian scientists.

The survey followed the same design as the 2013 survey. Transects were made perpendicular to depth isobaths and spaced 20 nautical miles (NM) apart. They covered the depth-interval between 20 m depth near the coast to 500 m depth offshore. Bottom trawling was conducted within four different depth-strata on each of these transects between 20-50 m, 50-100 m, 100-200 m and between 200-500 m depth, with a maximum distance of 20 nm between trawl stations. When time and bottom conditions permitted, occasional trawls were conducted deeper than 500 m. Pelagic trawls were made to sample acoustic targets, but also on random along transects when time permitted. CTD's were taken at each bottom trawl station. The survey was carried out around the clock. As far as possible it was attempted to carry out shallow water station during the day to reduce the effect of diel migration on the estimate but due to the very long shelf in Myanmar this was not always practically possible.

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

Acoustic data from the ER 60 echosounder (18 kHz, 38 kHz, 120 kHz and 200 kHz transducers), the multibeam bottom mapping echosounder SM710, and data from the thermosalinograph and a weather station were recording continuously during the survey.

For the purpose of acoustic and swept area abundance estimation the coast was divided into three regions. The first region (the Rakhine coastal zone) included the area from the border to Bangladesh to Mawtin Point. Region two, the Ayeyarwady delta, covered the central Myanmar delta region, while region three, the Tanintharyi coast, covered the area from Htarwe to the border with Thailand. The cruise tracks with bottom-trawls and pelagic trawl station are illustrated in Figure 1.1. while the hydrographic stations and the position of the ecosystem transects are displayed in Figures 1.2. Table 1.2 summarises the survey effort in each of the sub-areas.



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

Region	Nautical miles	Bottom trawls valid per depth region						Pelagic trawls	CTD	Plankton*	Sediment
		Total	>15	>50	>100	>200	>500				
Rakhine coast	962	49	16	14	13	5	1	4	77	15	41
Ayeyarwady delta	2044	61	15	25	16	5	0	2	76	10	55
Tanintharyi coast	1496	61	10	21	10	17	3	1	78	12	58
Total	4502	171	41	60	39	27	4	7	231	37	154

\*Each plankton station consists of 4 different plankton nets (see methods)

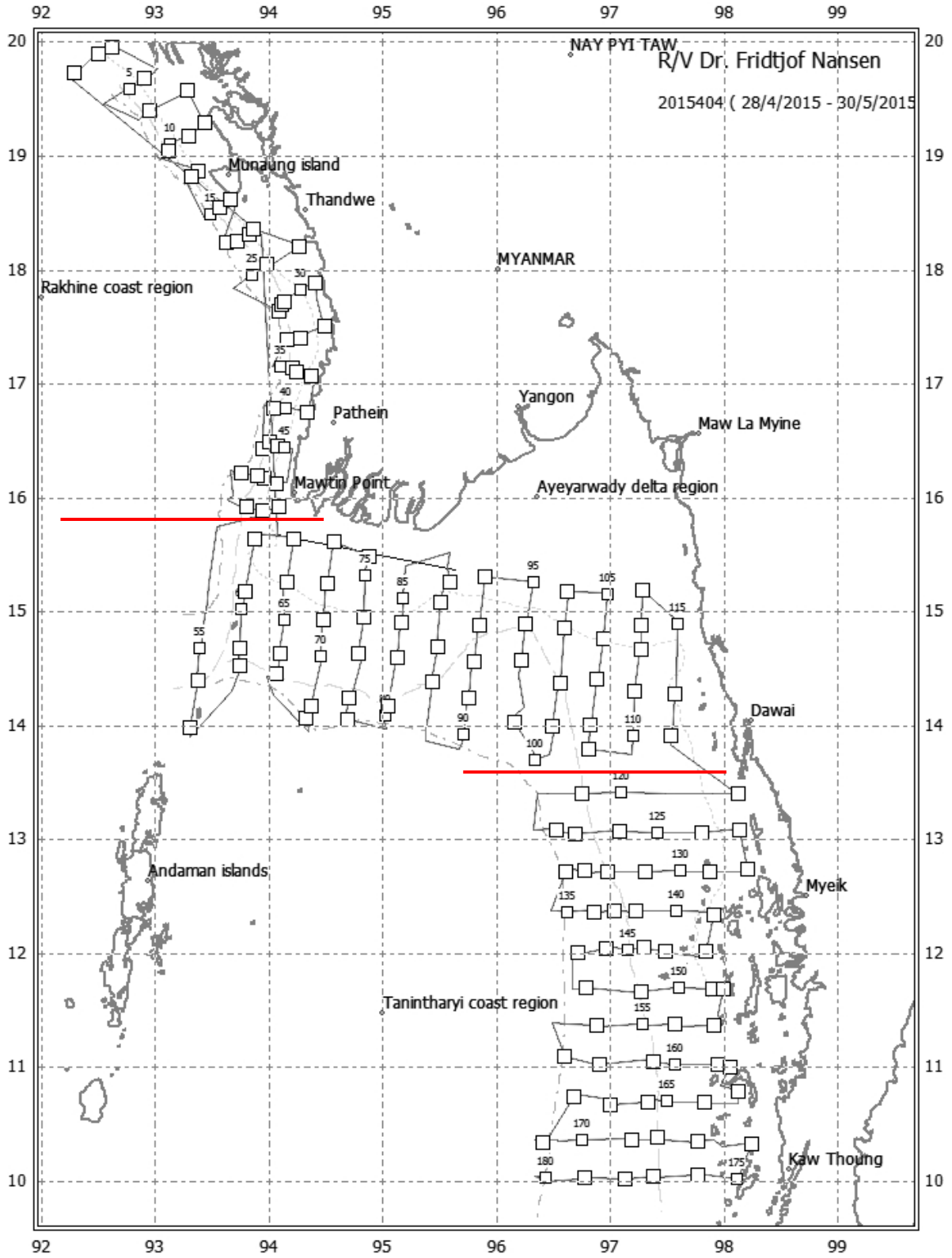


Figure 1.1. Course track with bottom (□) and pelagic (Δ) trawl stations. The 50 m, 100 m and 500 m depth contour is indicated. The red lines indicate the separation between the three main regions.

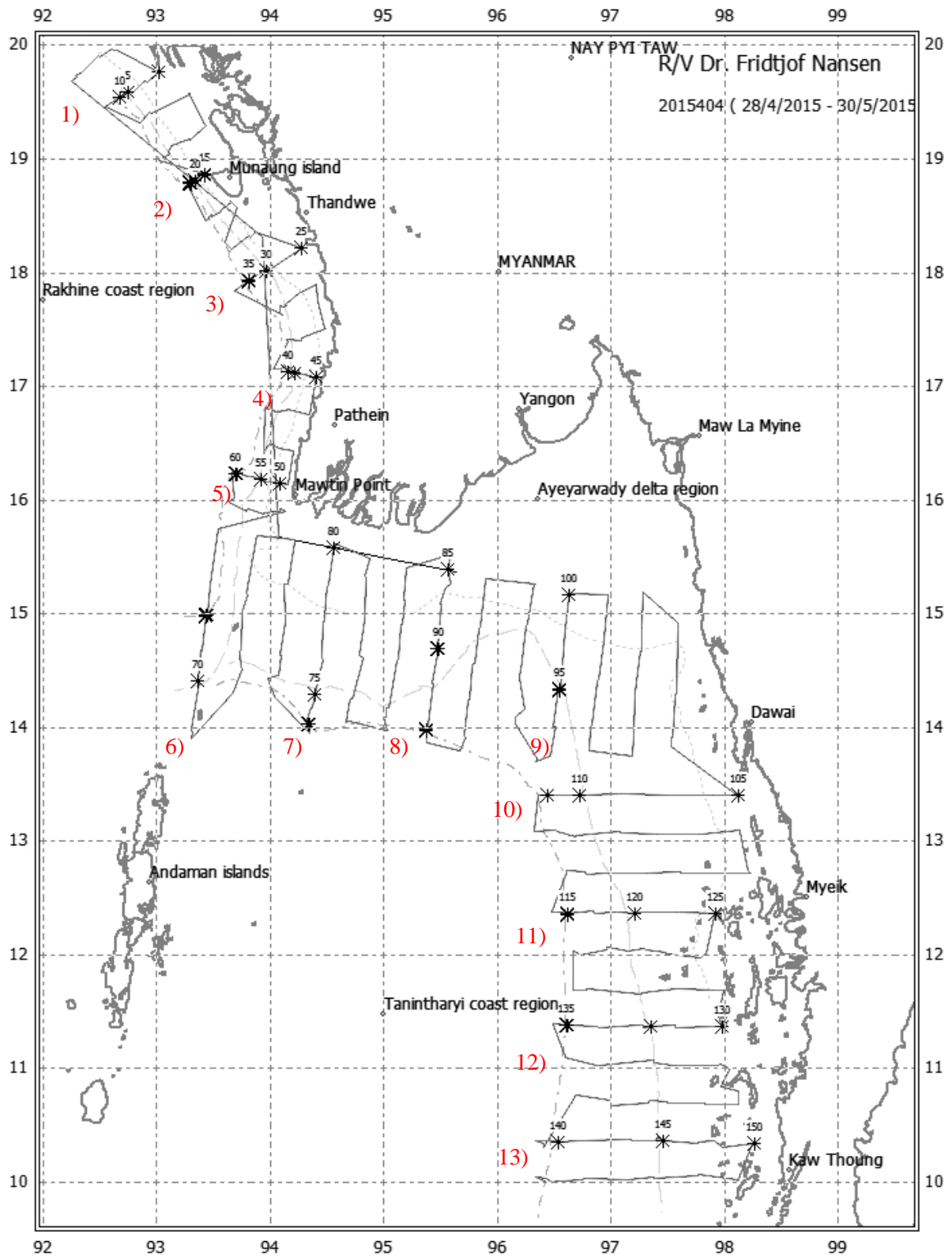


Figure 1.2 Course track with hydrographic (Z) stations. The 50 m, 100 m and 500 m depth contour is indicated. The numbers 1-13 indicate the position of the “Ecosystem transect”.

## CHAPTER 2 METHODS

### 2.1 Meteorological and hydrographic sampling

#### *Meteorological observations*

Wind direction and speed, air temperature, air pressure, relative humidity and sea-surface temperature (5 m depth) were logged automatically every 60 sec. with an DNMI meteorological weather station.

#### *CTD*

Vertical profiles of temperature, salinity, fluorescence, and oxygen were obtained by the Seabird 911 plus probe. The CTD was equipped with an uncalibrated Aqua Tracka MK III fluorometer, SBE 3plus temperature sensor, SBE 4C conductivity sensor, pressure sensor, SBE 43 oxygen sensor, Benthos PSA-916 Sonar altimeter and a Satlantic PAR sensor. Real-time logging and plotting was done using the Seabird Seasave software. Above the shelf and slope, the profiles ranged from the surface to within a few metres above the bottom. Horizontal near-surface (5 m depth) distributions of temperature (°C), salinity (PST), oxygen (ml/l) (lower left) and fluorescence (index on relative scale) for various regions of the Myanmar coastal area were made by use of the software Ocean Data View, interpolating by DIVA gridding (Ocean Data View, Schlitzer, R., <http://odv.awi.de>, 2013). Vertical distributions of the same variables for selected oceanographic transects were made the same way (see Results). Note varying colour scales between Figures.

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

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

For validation of the oxygen-measurements from the CTD-mounted sensor, the oxygen-concentrations in sea-water samples from all 9 Niskin-bottles at selected deep stations were analysed by the Winkler redox titration method following the procedures of Hagebø (2008). To calculate oxygen-concentration per weight-unit of seawater, a sea-water sample for oxygen-analyses was collected first from the Niskin-bottles, and subsequently the water temperature from the same Niskin bottle was measured. These temperature-data were used to calculate potential temperature at the time when the Winkler-reagents were added.

Seawater samples (20 ml) for nutrient analyses (nitrate, nitrite, silicate and phosphate) were taken from the Niskin water-bottles at; 25 and 5 m at the shallow plankton-stations (30 m bottom-depth), at 100, 75, 50, 25, and 5 m at the intermediately deep plankton stations (100 m bottom-depth), and at 500, 400, 300, 200, 100, 75, 50, 25, and 5 m at the deep plankton-stations (500 m bottom-depth). The seawater samples were stored in 20 ml polyethylene vials, conserved with 0.2 ml chloroform, and kept cool and dark in a refrigerator (Hagebø and Rey, 1984). The analyses were made on shore by the Institute of Marine Research, using a modified Alpkem Auto Analyser C (O I Analytical, USA) and following standard procedures (Strickland and Parsons, 1972).

Chlorophyll *a* is a plant pigment, which in oceanography typically is used as an indirect measure for phytoplankton biomass. For analysis of chlorophyll *a* and phaeopigment (non-photosynthetic pigment which is the degradation product of algal chlorophyll pigments) concentrations, water-samples (263 ml) were collected from the CTD-mounted Niskin bottles at the same standardized depths as described

above for the nutrients. The water-samples were filtered on Munktell fibre glass filters (GF/C 25 mm diameter) using a custom-made filtration system. The filters were then stored in the dark at  $-18^{\circ}\text{C}$  for subsequent analysis on shore. The analyses were made on shore by Institute of Marine Research. The pigments were extracted with 90% acetone, and the extracts centrifuged and analysed using a Turner Design fluorometer model 10 AU calibrated with pure chlorophyll *a* (Sigma Inc.) (Jeffrey and Humphrey, 1975). Fluorescence was measured before and after acidification by a drop of 5% HCl, and concentrations of chlorophyll *a* and phaeopigments estimated according to the method by Holm-Hansen et al. (1965).

### *Thermosalinograph*

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

## 2.2 Phytoplankton sampling

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

In addition, mixed water-samples were collected from Niskin-bottles representing ocean depths of 25, 5, and 0 m for the 30 m depth stations, and 75, 50, 25, 5 for the 100 m and 500 m stations. These samples were preserved with 2 ml lugol on dark 100 ml glass bottles for subsequent taxonomic analysis on shore.

## 2.3 Zooplankton sampling

Zooplankton samples were collected with a Hydro-Bios Multinet with mouth-opening area of  $0.25\text{ m}^2$ . The Multinet was equipped with 5 nets of mesh-size 180  $\mu\text{m}$  for depth-stratified sampling. The net is equipped with a pressure sensor and two electronic flowmeters. The Multinet sampling was done by oblique hauls, with an average towing speed of  $\sim 1.35 - 1.55\text{ ms}^{-1}$ . At the shallow (30 m) plankton-stations, one net was towed in the 25-0 depth-stratum. At the medium-deep (100 m) stations, four nets sampled the strata of 100-75, 75-50, 50-25, and 25-0 m. At the deep (500 m) plankton-station, five nets sampled the strata of 200-100, 100-75, 75-50, 50-25, and 25-0 m.

Additionally, at all plankton-stations a WP2 net (56 cm diameter, mesh size 180  $\mu\text{m}$ ) (Fraser 1966, Anonymous 1968) as well as a Juday net (36 cm diameter, mesh size 90  $\mu\text{m}$ ) (Juday 1916) were hauled vertically from the same maximum depth as for the deepest Multinet (shallow plankton-station 25 m, medium-deep plankton-station 100 m, and deep plankton-station 200 m) to the surface – with a speed of  $\sim 0.5\text{ ms}^{-1}$ .

For all three types of plankton nets, each sample was divided into two equally large parts using a Motoda plankton splitter (Motoda 1959). Half the sample was preserved with borax-buffered formalin resulting in a final formalin concentration of 4% in a 100 ml plastic bottle for subsequent taxonomic analysis on shore. The other half of the sample was sequentially sieved through three filters to obtain the plankton biomasses representing the size-fractions  $>2000\text{ }\mu\text{m}$ , 2000-1000  $\mu\text{m}$ , and 1000-180  $\mu\text{m}$  (and 180-90  $\mu\text{m}$  for the samples from the Juday net). The biomass samples were stored on pre-

weighed aluminium dishes and dried at -70 °C for periods of ~24 h. After drying, the samples were stored frozen at -18°C for subsequent weighing of biomass dry weight on shore (after a second time of drying).

## 2.4 Sediment sampling

A stainless steel cylinder was mounted on the footrope of the trawl to collect bottom sediment samples at every trawl station. The samples were collected from the cylinder when the trawl was hauled on deck and stored in a plastic bag ([www.eurofins.com](http://www.eurofins.com)), and stored frozen (-18°C) for further analyses of sedimentological and chemical composition after the survey at the Phuket marine Biological Centre, Thailand.

## 2.5 Biological fish sampling

Demersal trawl hauls were taken randomly within each of the depth strata between 20-50 m, 50-100 m, 100-200 m and between 200-500 m depth, while pelagic hauls were taken randomly throughout the survey at night and to catch observed acoustic targets. Annex III describes the fishing gear used during the survey.

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

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

## 2.6 Multibeam 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 limited in practice to 1000 - 1500 m on "Dr. Fridtjof Nansen". Across track coverage (swath width) is up to 5.5 times water depth and may be limited by the operator either in angle or in swath width without reducing the number of beams. The operating frequencies are between 70 to 100 kHz. There are 128 beams with dynamic focusing employed in the near field. The transmitting fan is divided into three sectors to maximize range capability and to suppress interference from multiples of strong bottom echoes. The sectors are transmitted sequentially within each ping and use distinct frequencies or waveforms. The along track beam width is 1 degree. Ping rate is set (manually) according to depth. The receiving beam width is 2 degrees. Raw data from the EM 710 multibeam echo sounder was stored to disk in selected areas for later analyses. The data was also logged to the on-board Olex plotting system.

## 2.7 Single beam acoustic sampling

### *Acoustic equipment*

Acoustic data were recorded using a Simrad ER60 scientific echo sounder equipped with keel-mounted transducers at nominal operating frequencies of 18, 38, 120 and 200 kHz. All transceivers were calibrated in Angola prior to the survey on the 21/02 2015. Technical specifications and operational settings of the echo sounder used during the survey are given in Annex III.

### *Allocation of acoustic energy to species group*

Acoustic data were post-processed and scrutinized using the latest acoustic data post-processing software the Large Scale Survey System (LSSS) Version 1.6.1. Back scatters were displayed at 38 kHz. The mean 5 nautical miles (NM) area backscattering coefficient  $sA$  ( $m^2/NM^2$ ) was allocated to a predefined set of species groups on the basis of established echogram features. Ground truthing and estimation of mean length and weight were accomplished by means of targeted pelagic and demersal trawling. The target groups used during the survey can be found in Table 2.1 while the complete records of fishing stations and catches are shown in Annex I.

Table 2.1 Allocation of acoustic densities to species groups. Note only main genera/species are listed.

Group	Taxon	Genera/Species	
Pelagic species 1	Clupeidae <sup>1</sup>	<i>Dussumieria</i> spp. <i>Ilisha</i> spp. <i>Sardinella</i> spp. <i>Anodontostoma chacunda</i>	
	Engraulidae	<i>Coilia</i> spp. <i>Stolephorus</i> spp. <i>Setipinna</i> spp. <i>Thryssa</i> spp.	
Pelagic species 2	Carangidae <sup>2</sup>	<i>Alectis</i> spp. <i>Atule mate</i> <i>Atropus atropus</i> <i>Caranx</i> spp. <i>Carangoides</i> spp. <i>Decapterus</i> spp. <i>Scomberoides</i> spp. <i>Megalaspis cordyla</i> <i>Parastromateus niger</i>	
		Scombridae	<i>Uraspis</i> spp. <i>Rastrelliger</i> spp. <i>Scomberomorus</i> spp.
			Sphyrænidae
		Trichiuridae	<i>Lepturacanthus savala</i> <i>Tentoriceps cristatus</i> <i>Trichiurus lepturus</i>
		Other demersal species*	Demersal families
Mesopelagic species	Myctophidae		
	Other mesopelagic fish		
Plankton	Calanoida		
	Euphausiidae		
	Other plankton		

\*The group "Other demersal species" contains all acoustic targets of typical demersal character. No attempt is made to separate these into different families.

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

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

or in the form

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

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

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



where:  $N_i$  = number of fish in length group  $i$

$A$  = area (NM<sup>2</sup>) of fish concentration

$sA$  = mean integrator value (echo density) in area  $A$  (m<sup>2</sup>/NM<sup>2</sup>)

$p_i$  = proportion of fish in length group  $i$  in samples from the area

$CF_i$  = 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:

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

The length distribution of a given species within an area is computed by simple addition of the length frequencies obtained in the pelagic trawl samples within the area. In the case of co-occurrence of target species, the  $sA$  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:

$$B = \sum_{i=1}^n N_i \bar{W}_i \quad (5)$$

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

The combination of low  $sA$  value recorded in Myanmar, few PEL1 and PEL2 in the bottom trawl catch and few pelagic trawls made the splitting by length groups unreliable. Therefore, a theoretic fish mean length of 10 cm was applied to convert the  $sA$  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 (10 cm) to total estimated biomasses of PEL1 and PEL2 using a condition factor of 0.88. The 10 cm mean length was chosen to make the estimates comparable with the historic estimates presented from the 1979 and 1980, however, it is likely that this underestimates somewhat the true biomass of particularly the PEL 2 species.

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

## 2.8 Swept area biomass calculations

The biomass calculation of demersal fish in the survey area was based on the swept area method. All valid stations in a region were treated as representative for the relevant depth intervals where the species or group of species were caught. All biomass calculations were done in the software program Nansis.

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

The catchability coefficient is seldom known but is assumed to be constant between surveys. The swept-area index will therefore reflect any change in population abundances between surveys.

## CHAPTER 3 WIND, HYDROGRAPHY AND PLANKTON

### 3.1 Horizontal patterns of wind and near-surface hydrography

Wind speed and direction was recorded from the vessels weather station located in the mast above the wheel house and results are illustrated in Figure 3.1. The horizontal distributions of near-surface temperature, salinity, oxygen and fluorescence, all measured at depth of 5 m, are presented in Figures 3.2-3.5. The data presented in these figures were collected by the CTD, and CTD-attached sensors.

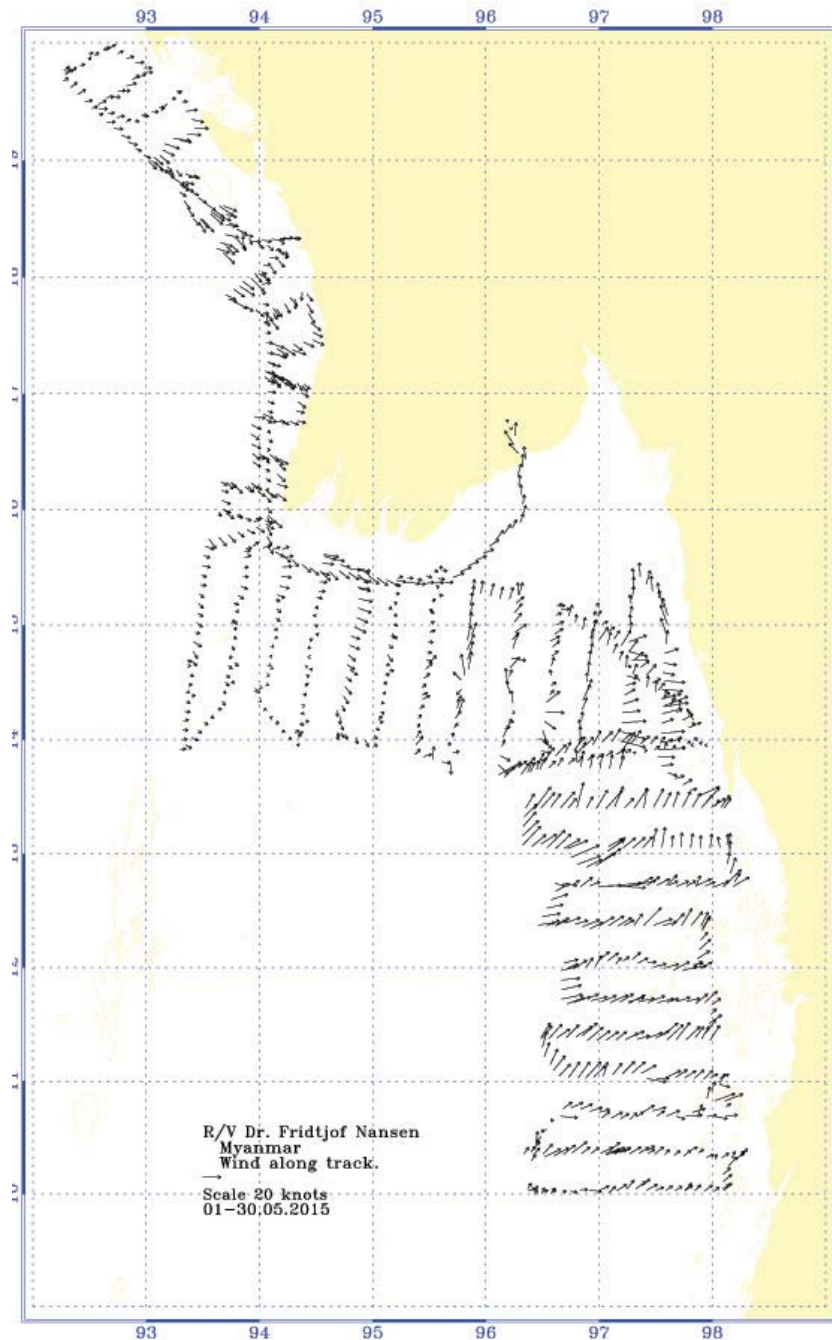


Figure 3.1. Wind speed and direction as recorded from the vessels weather station.

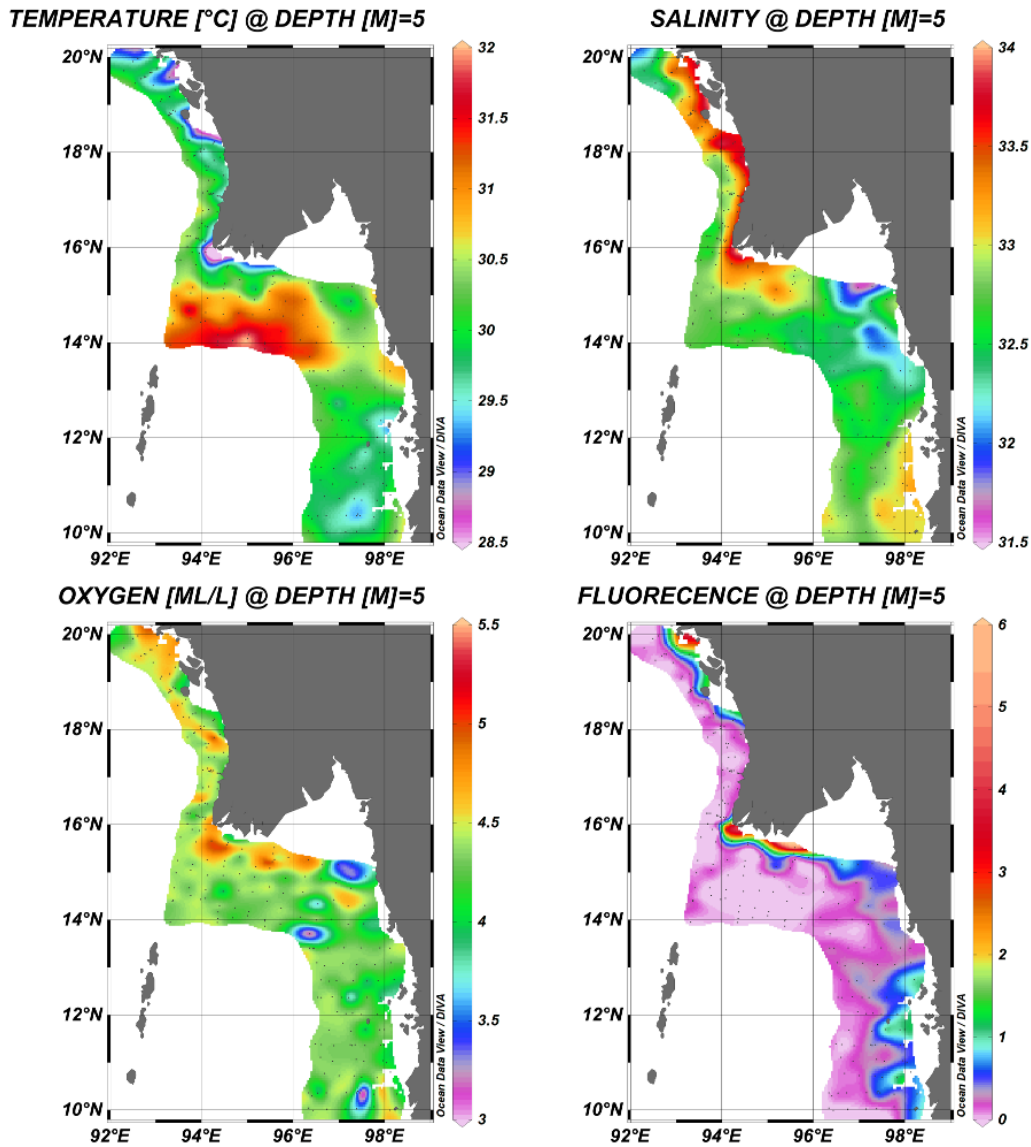


Figure 3.2. Horizontal near-surface (5 m depth) distributions of temperature, salinity, oxygen and fluorescence for the whole Myanmar coastal area. Station positions are indicated as black dots. Produced with the software Ocean Data View (v 4.7.2), interpolating by DIVA gridding (Ocean Data View, Schlitzer, R., <http://odv.awi.de>, 2015).

#### *Rakhine coastal zone*

A generally calm wind prevailed averaging  $10.1 \pm 3.4$  (SD) m/s (max:22.0 m/s) (Figure 3.1). The direction was generally from W-NW.

Near-surface temperature (5m depth) along the Rakhine coastal zone ranged from 29°C to 30.5°C. Water plumes near the coast of the boarder to Bangladesh, to the north of and around Munaung Island, the waters off Thandwe and the coastline before entering the Ayeyarwady delta region (off Mawtin point) showed the lowest temperatures (Figure 3.3).

Near-surface salinity ranged between~ 32-34, the waters furthest off the coast in the northern- and southern -most regions displayed the lowest salinity levels. The strongest salinity concentrations were found close to shore along the entire Rakhine coastline. The temperature and salinity distribution indicate upwelling (probably driven by internal waves) close to the coast in the entire region

The oxygen levels measured in the surface layer at depth of 5 m were generally quite high, between ~ 4 - 5 ml/l, and showed relatively high variability. The lowest concentrations were associated with the coldest water masses described above. Also relatively close to coast south of 18°N a small patch displayed oxygen concentrations in the upper range for the area. Data collected from the Thermosalinograph confirms high turbidity in this particular area, which could cause the elevated concentrations.

The near-surface relative fluorescence ranged from 0 to 2. The highest levels were found related to the shoreline except the part between 17-18°N.

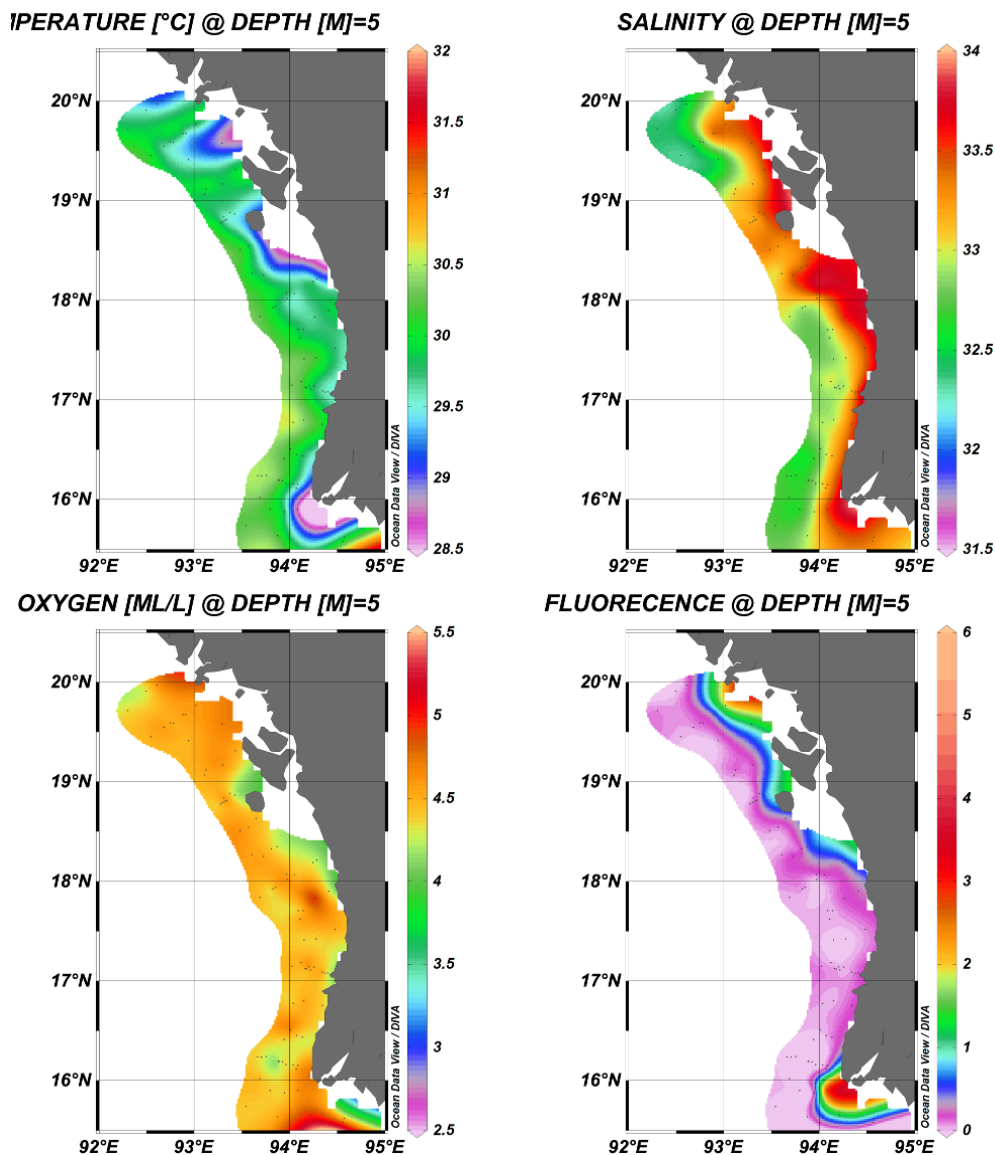


Figure 3.3. Horizontal near-surface (5m depth) distributions of temperature, salinity, oxygen and fluorescence along the Rakhine coastal region. Station positions indicated as black dots. Note variable colour scales for the different figures.

*Ayeyarwady Delta region*

The wind speed in this area averaged around  $9.4 \pm 4.9$  (SD) m/s and the maximum recorded speed was 39.2 m/s. The wind was calmest in the western sector and increased in strength towards the east. The prevailing wind direction was from west but occasionally also from the south. The onset of the monsoon became very evident around 15 May when the wind increased considerable in combination with heavy rain falls.

Near-surface temperatures (5 m depth) at 32°C were observed in the outer-mouth and mid-parts of the Ayeyarwady delta region, with a somewhat cooler area close to shore in the north (Figure 3.4). Furthest to the east of the Delta region, the temperatures were slightly cooler but not as cool as in the northern region. Salinity at 5 m depth, ranged from 31 to 34. The most saline water masses were associated with the cooler water in the north-western part of the region close to shore indicating some upwelling in this part. Less saline water masses were found to the east. Oxygen-concentrations at depth of 5 m in the Delta region generally ranged between 2.5 and 5.5 ml/l. The highest concentrations were found south east in this region, but also associated with the cool and highest saline water in the northern part. A relatively small plume of water located south east off the coast was found to have the lowest oxygen concentrations, possibly caused by advected waters from deeper layers along the shelf edge. This may be associated with an eddy in this area. Fluorescence (index on relative scale) varied strongly within the Delta region, with the values at 5 m spanning from near zero to a maximum of 6. The highest values were concentrated inshore in the north-eastern parts and were low for the remaining region.

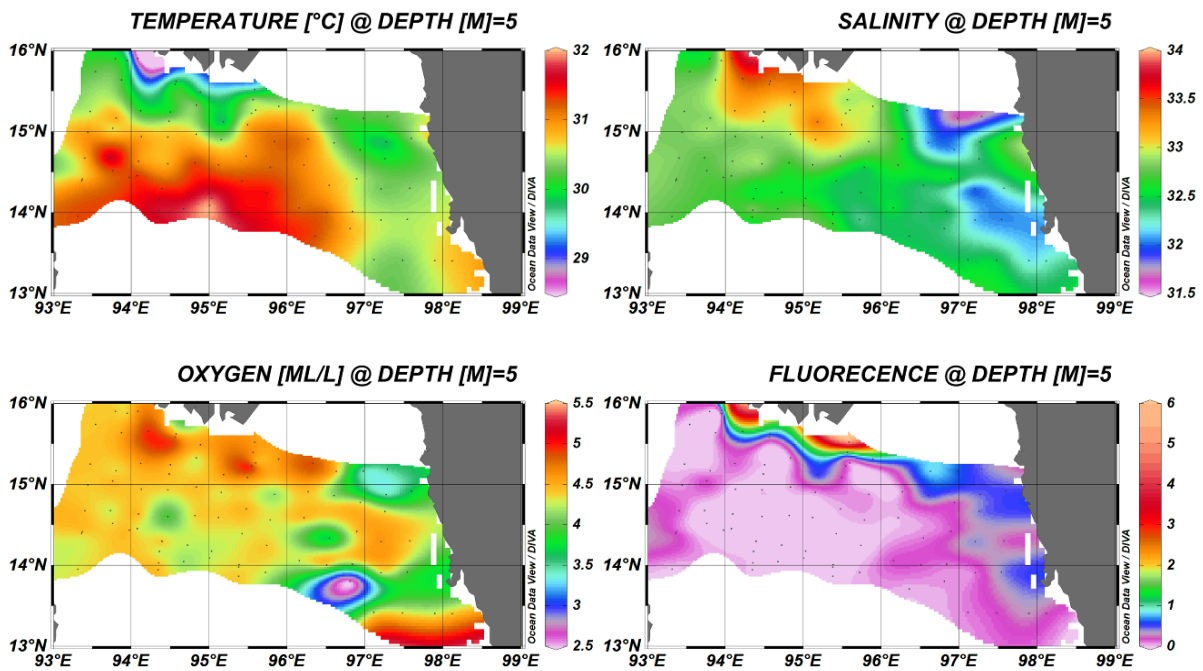


Figure 3.4. Horizontal near-surface (5m depth) distributions of temperature, salinity, oxygen and fluorescence along the Ayeyarwady Delta region. Station positions indicated as black dots. Note variable colour scales for the different figures.

#### *Tanintharyi coastal region*

The strongest wind was experienced in this region with an average at  $14.9 \pm 5.9$  (SD) m/s and a maximum recorded at 49.8 m/s. The SW wind direction was dominating.

Temperatures at depth of 5 m in the Tanintharyi coastal region tended to be slightly cooler than in the regions further north (Figs. 3.5 and 3.2). The temperatures were typically about 28-32 °C at this depth. A small plume between 11-10°N displayed the coolest water masses in this region. Oxygen concentrations were between 3 -5.5 ml/l, with the lowest concentration to the northwest and at the corresponding site (between 11-10°N) as for the cool water plume. The salinity levels were in the range 31.5-34. The lowest levels were found in the northern part of the delta region, highly influenced by river run off, but also in the region corresponding to the cool water plume and low temperature between 11-10°N, indicating a small upwelling region (wind driven). The fluorescence was ranging from 0 to about 4. It was highest near shore and island groups in the mid part of the region and decreased towards the slope and the north parts.

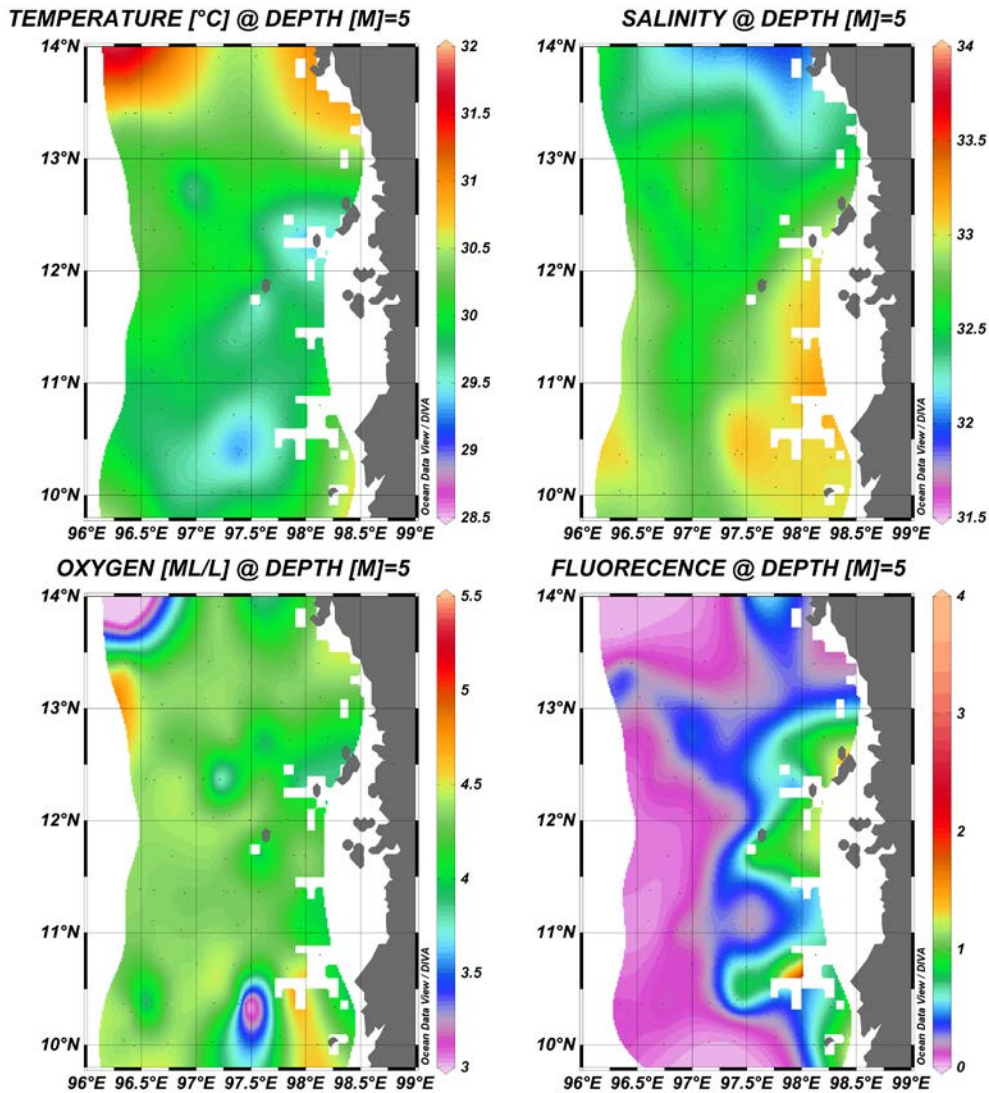


Figure 3.5. Horizontal near-surface (5m depth) distributions of temperature, salinity, oxygen and fluorescence along the Tanintharyi coastal region. Station positions indicated as black dots. Note variable colour scales for the different figures.

### 3.2 Cross shelf vertical profiles of hydrography, oxygen and fluorescence

Cross shelf CTD profiles were made for all environmental transects. Stations were taken at predefined depths with a maximum of 1000 m. Figures 3.6 - 3.8 shows vertical distributions of temperature, salinity, oxygen, and fluorescence along the ecosystem transects to 500 m depth.

#### *Rakhine coastal region*

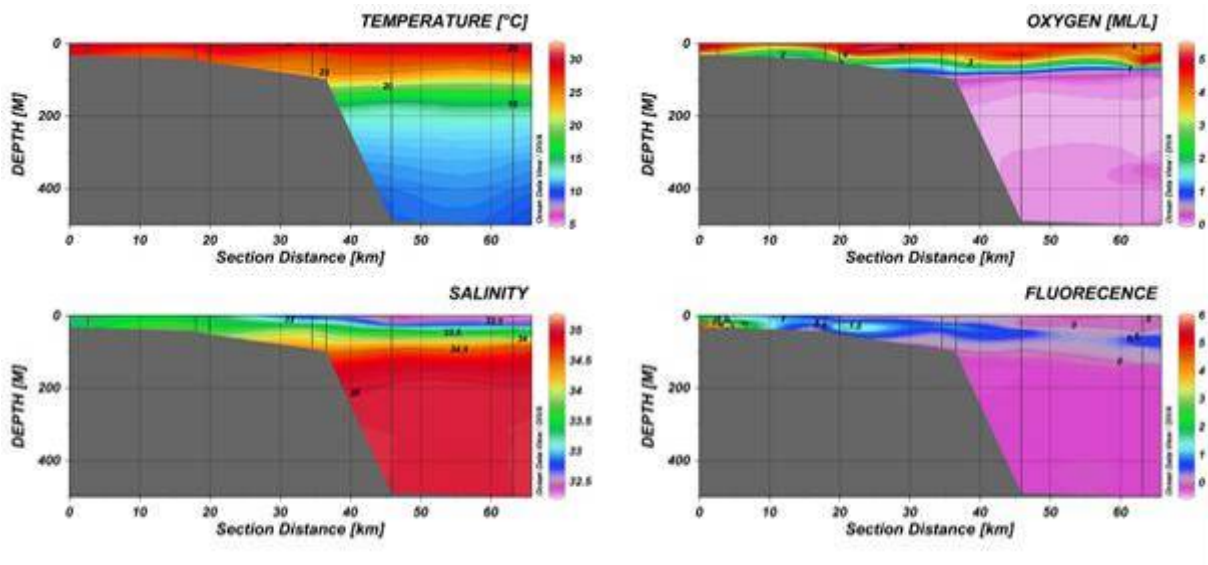
Five environmental transects were made along the Rakhine coast (Figure 3.6). The figure shows from north to south the hydrographic transects off 1. Phayonika, 2. Munaung Island, 3. Andrew Bay, 4. Dome Hill and 5. Mawtin Point (See Figure 1.2 for positions of the transects).

Common for all transect in this region was that the strongest temperature, oxygen and salinity clines were associated with the shelf edge and that the clines seems increasing in strength when steepness of the slope angle increased. The coldest water was typically  $<10^{\circ}\text{C}$  in the 400-500 m depths, increasing

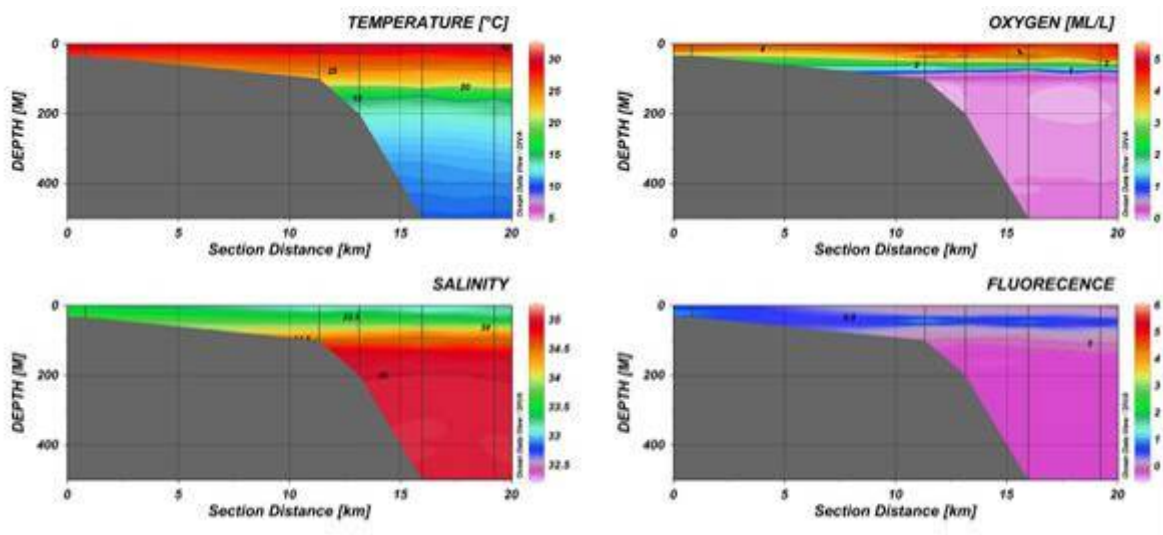


to 15°C around 200 m and the associated waters above was where the most prominent temperature clines were located. The depth of the strongest salinity- and oxy -clines seem strongly correlated at around 70-100 m depth. Below this, the water masses were typically of highest salinity and with hypoxic O<sub>2</sub> levels <0.25 to more than 500 m depth. The fluorescence-maximum was generally found along the bottom of the shelf, and continued at around 50-80 m depth. Maximum fluorescence recordings were generally made inshore on the shelf; this was especially prominent for Transect 1 (Phayonika).

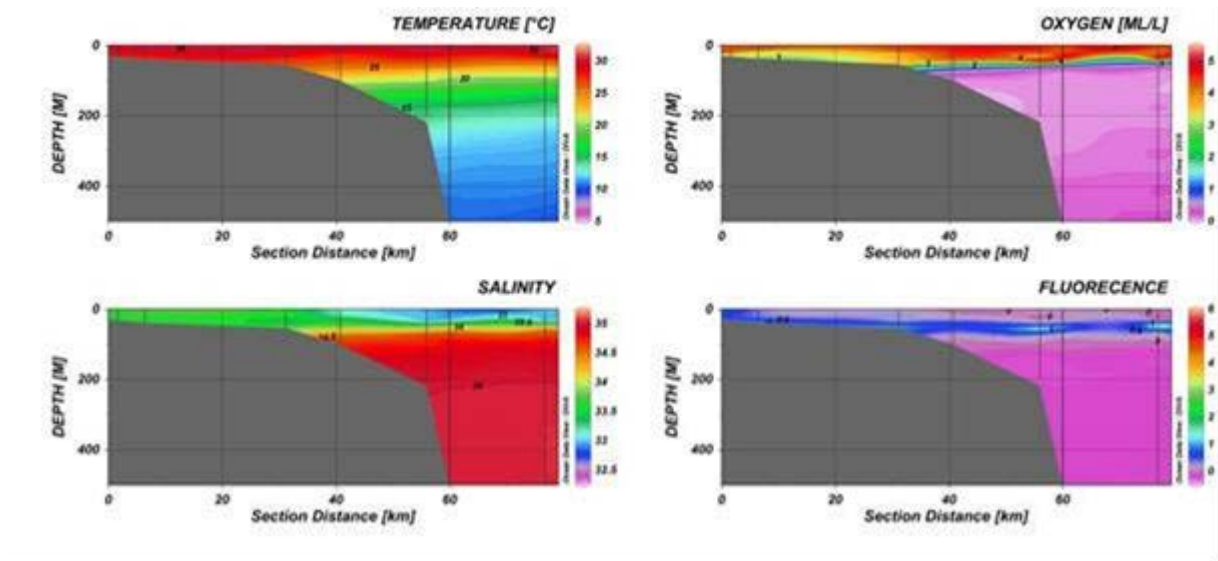
Transect Phayonika;



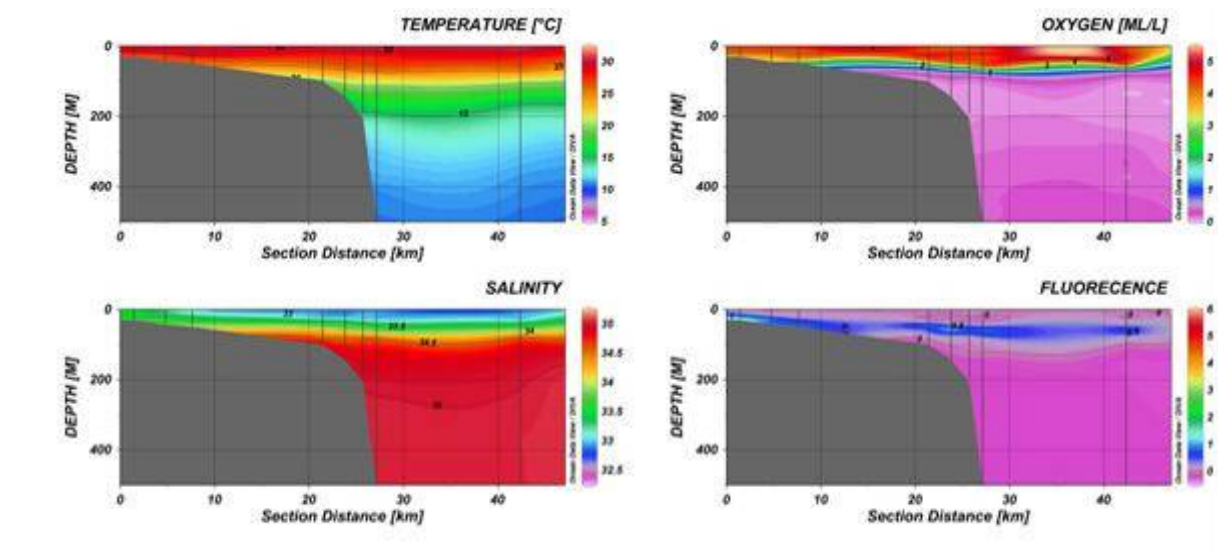
Transect Munaung;



Transect Andrew Bay;



Transect Dome Hill;



Transect Mawtin Point;

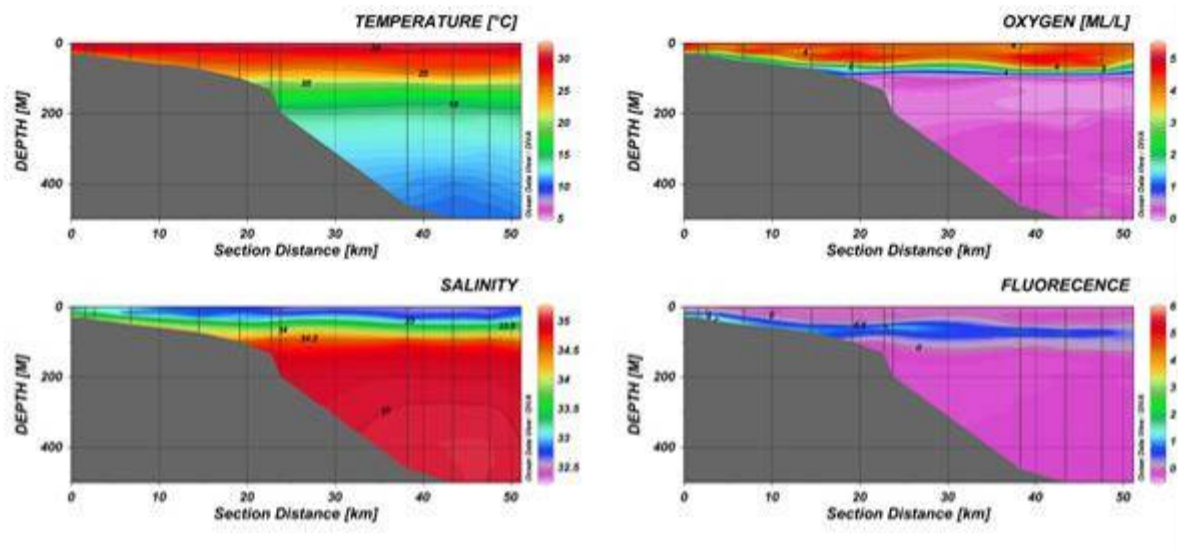
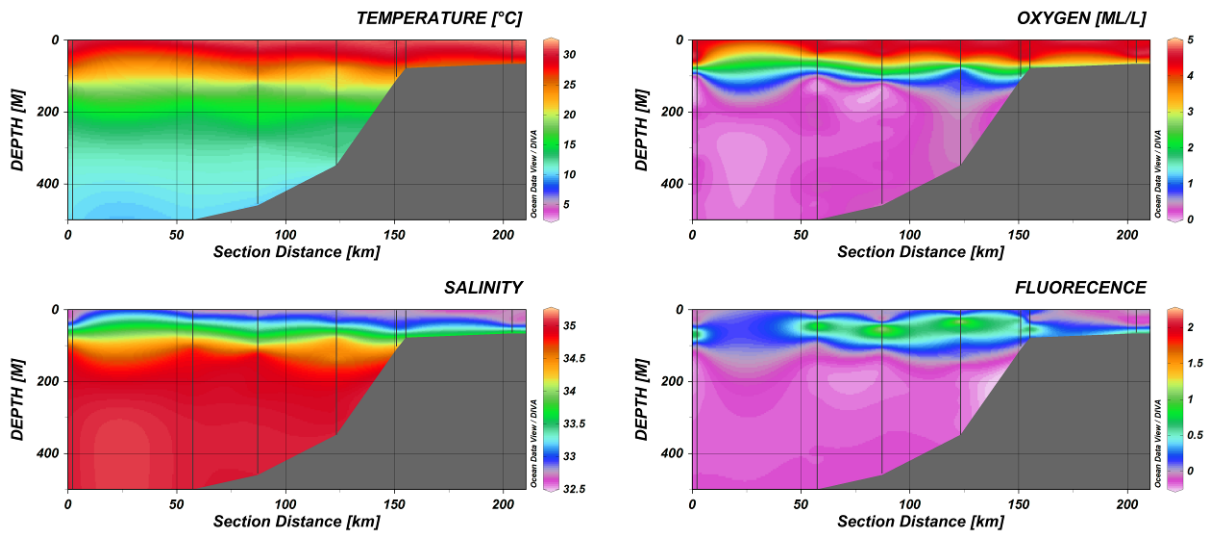


Figure 3.6. Cross-shelf distributions of temperature, salinity, oxygen and fluorescence in the Rakhine coastal region. Sections at Phayonika, Munaung, Andrew Bay, Dome Hill and Mawtin Point. CTD stations indicated by white vertical lines. Produced with the software Ocean Data View, interpolating by DIVA gridding (Ocean Data View (v 4.7.2), Schlitzer, R., <http://odv.awi.de>, 2015).

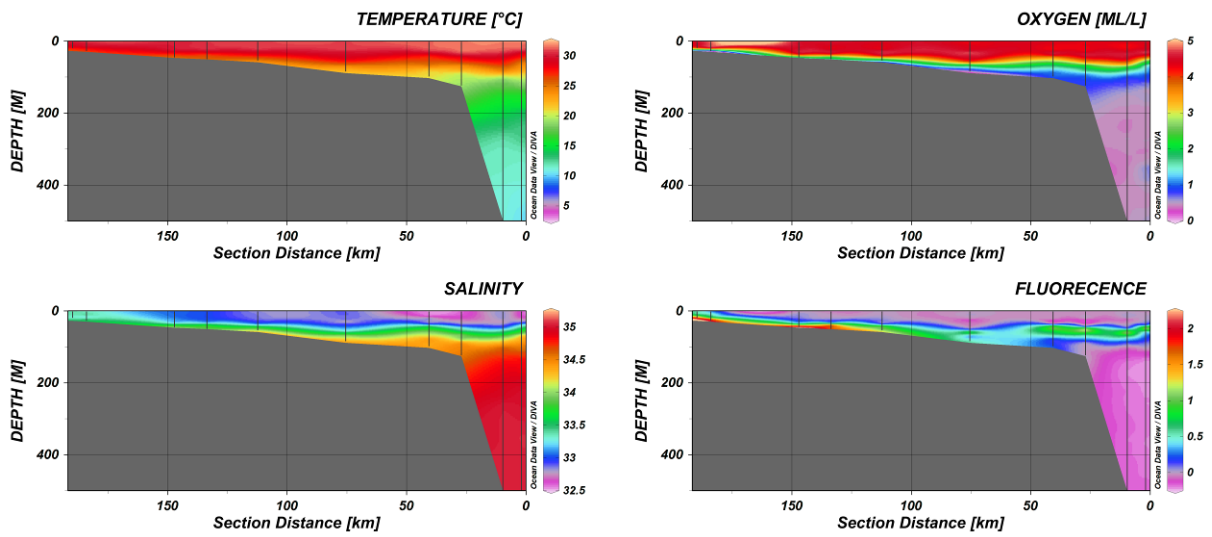
#### *Ayeyarwady Delta region*

Four hydrographic transects were made across the shelf of the Ayeyarwady Delta region (Figure 3.7). The figure shows the hydrographic transects off 6. Nicobar, 7. Patheine -west, 8. Patheine-east, and 9. Yangon (See Figure 1.2 for position of the transects). Surface temperatures along these transects were high, typically above 30°C. Also here little variation in temperature was observed between the coastal and offshore upper waters. The temperatures decreased with depth, a strong cline was located between 50- 80 m depending on location along the slope and at 100 m depth the temperatures were typically ~20°C. Temperatures at 500 m were ~ 5°C. The profiles generally showed high salinity (from 32.5 - 35), The highest salinity waters were typically deeper than 100 m and off the shelf edge. Oxygen concentrations were highest in the surface layers (typically ~ 4-5 ml/l), and decreasing with depth. A strong oxycline was found at depths of 40-150 m. Below this, the water masses were hypoxic with O<sub>2</sub> levels <0.5 down to 500 m depth. The fluorescence-maximum was in general very low but located inshore, either along the bottom of the shelf or close to the surface. The highest levels also tended to continue at around 50-80 m depth at the outer part of the shelf and into more oceanic regions.

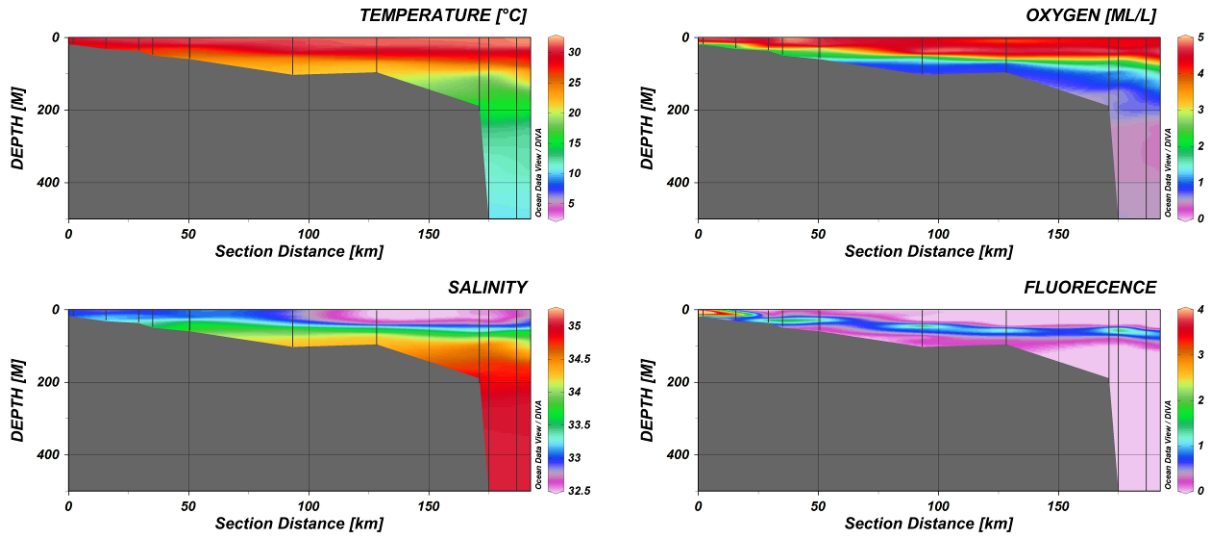
Transect Nicobar;



Transect Patheine – west;



Transect Patheine – east;



Transect Yangon;

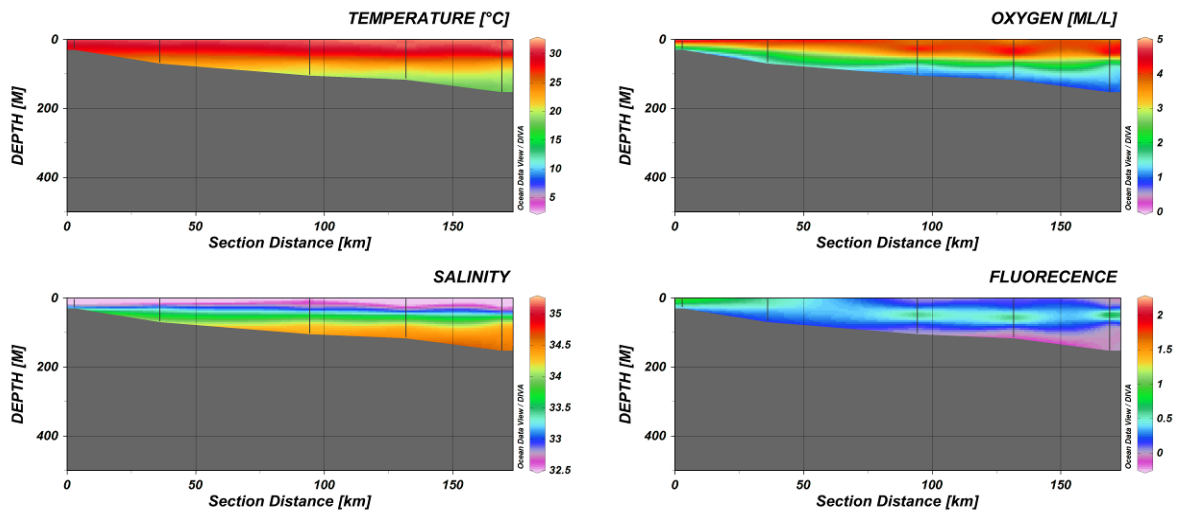


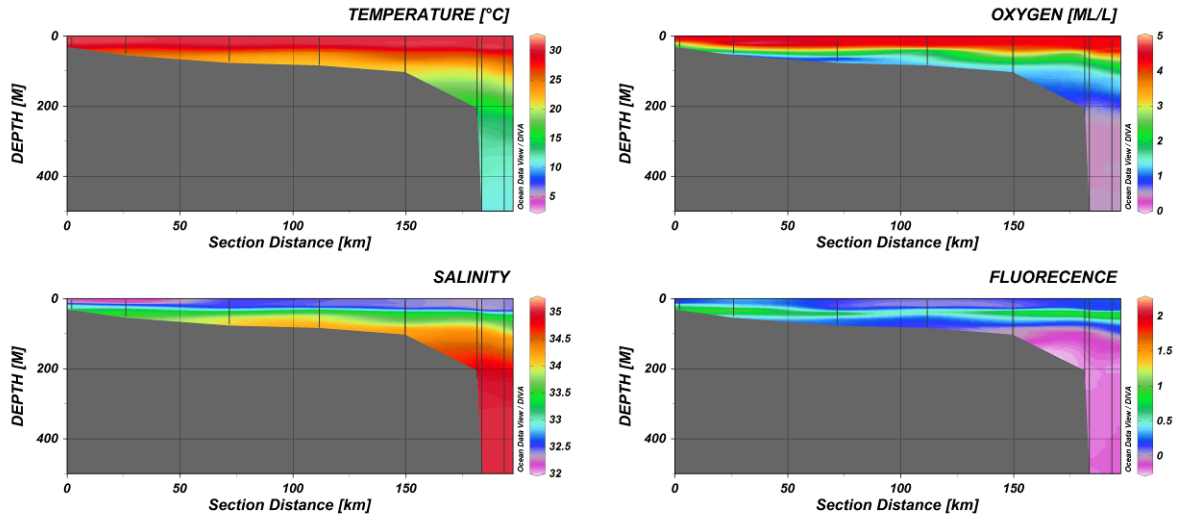
Figure 3.7. Cross-shelf distributions of temperature, salinity, oxygen and fluorescence in the Ayeyarwady delta region. Sections at Nicobar, Patheine west, Patheine east, Yangon. CTD stations indicated by white vertical lines.

#### *Tanintharyi coastal zone*

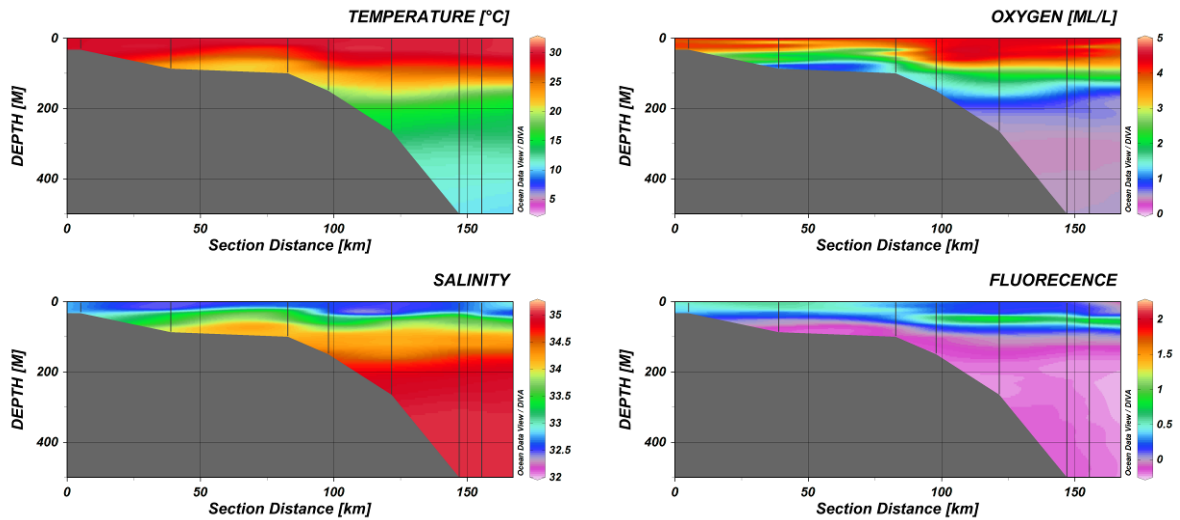
Four hydrographic transects were made across the shelf of the Tanintharyi coastal region (Figure 3.8). The figure shows the hydrographic transects off 10. Pe Det, 11. Tapo, 12. Bokpyin and 13. Kampong Lama (See Figure 1.2 for position of the transects). Surface temperatures along these transects were high, typically above ~30°C. The temperatures decreased with depth, being roughly about 20°C at 100 m. The temperatures at 500 m ranged between 5-10°C and varied considerable indicating effects of very different water masses. The profiles showed a low salinity upper layer, with values of about 31-

33 for the inner parts of the shelf areas. Down to about 100 m the salinity increased rapidly, and was rather stable around 35.0 in deeper waters. Oxygen concentrations were highest in the surface layers (typically ~ 4-5 ml/l). A strong oxycline was generally found at depths of about 40 - 120 m. Below this, the water masses were typically hypoxic with O<sub>2</sub> levels of ~0.5 or lower to more than 500 m depth. The fluorescence-maxima were typically rather low, and were observed inshore at rather shallow depths (Kampong Lama).

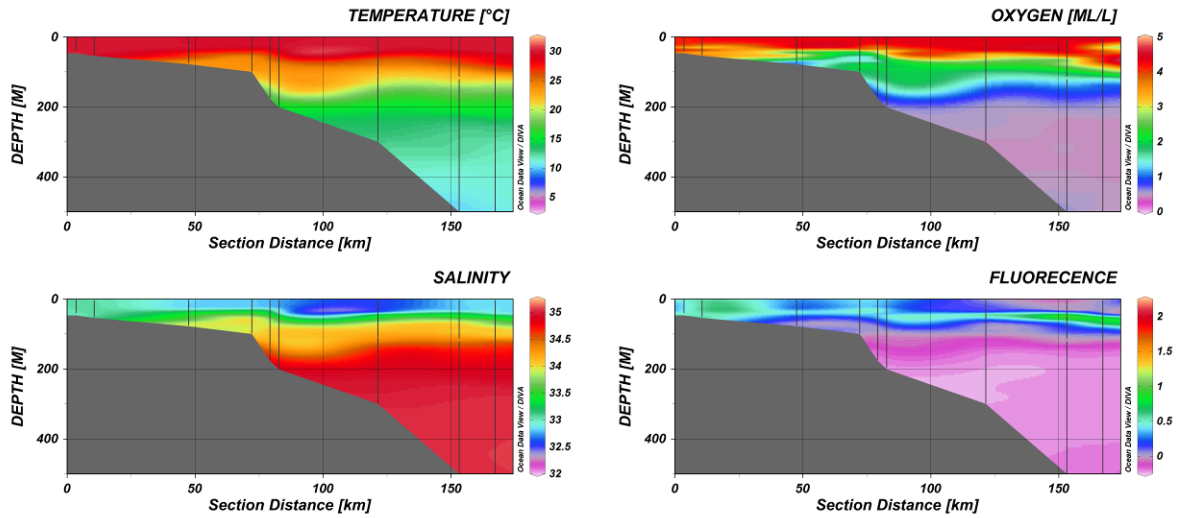
Transect Pe Det;



Transect Tapo;



Transect Bokpyin;



Transect Kampong Lama;

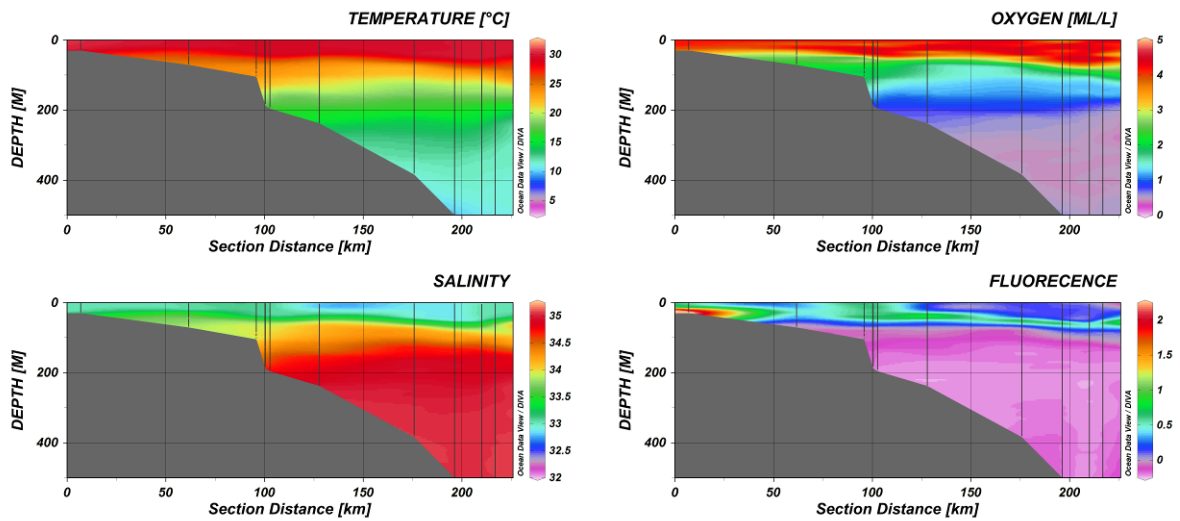


Figure 3.8. Cross-shelf distributions of temperature, salinity, oxygen and fluorescence in the Tanintharyi region. Sections at Pe Det, Tapo, Bokpyin, Kampong Lama. CTD stations indicated by white vertical lines.

### 3.3 Nutrients, chlorophyll and plankton

#### *Chlorophyll and nutrients*

The overall chlorophyll levels for the study area display levels regarded as generally low to moderate, Table 3.1, Figure 3.9. Nutrient levels required for phytoplankton growth (nitrite, nitrate, phosphate and silicate) are strongly depleted in the upper 50 meters of the water column compared to deeper waters Table 3.1, Figure 3.10. This could indicate production of phytoplankton in the upper water column,

especially by the nitrate metabolizing phytoplankton since the concentrations increase markedly at greater depths. To be noted is that the most distinct high nutrient concentrations for the system, namely silicate and nitrate are generally highest at the innermost stations near the coast, most likely as a result of river runoff. Sporadic evidence in certain areas indicate upwelling.

Table 3.1. Depth stratified mean ( $\pm$ SD) concentrations of nutrients and chlorophyll/phaeopigments found at environmental stations in Myanmar, 2015.

<b>Nutrients/Depth</b>	<b>25-0 m</b>	<b>50-25 m</b>	<b>75-50 m</b>	<b>100-75 m</b>	<b>200-100 m</b>
Nitrite ( $\mu\text{mol/L}$ )	$0.12 \pm 0.31$	$0.45 \pm 0.40$	$0.24 \pm 0.21$	$0.11 \pm 0.06$	$0.04 \pm 0.02$
Nitrate ( $\mu\text{mol/L}$ )	$0.33 \pm 1.01$	$2.82 \pm 3.35$	$15.66 \pm 5.05$	$21.36 \pm 5.19$	$33.04 \pm 1.88$
Phosphate ( $\mu\text{mol/L}$ )	$0.17 \pm 0.18$	$0.34 \pm 0.27$	$1.21 \pm 0.38$	$1.63 \pm 0.39$	$2.32 \pm 0.18$
Silicate ( $\mu\text{mol/L}$ )	$4.13 \pm 2.70$	$5.40 \pm 2.91$	$14.16 \pm 4.51$	$20.13 \pm 4.42$	$36.25 \pm 3.18$
Chlorophyll <i>a</i> ( $\text{mg/m}^3$ )	$0.40 \pm 0.41$	$0.32 \pm 0.42$	$0.12 \pm 0.06$	$0.05 \pm 0.04$	$0.00 \pm 0.00$
Paepigment ( $\text{mg/m}^3$ )	$0.26 \pm 0.25$	$0.40 \pm 0.28$	$0.33 \pm 0.12$	$0.22 \pm 0.07$	$0.06 \pm 0.03$



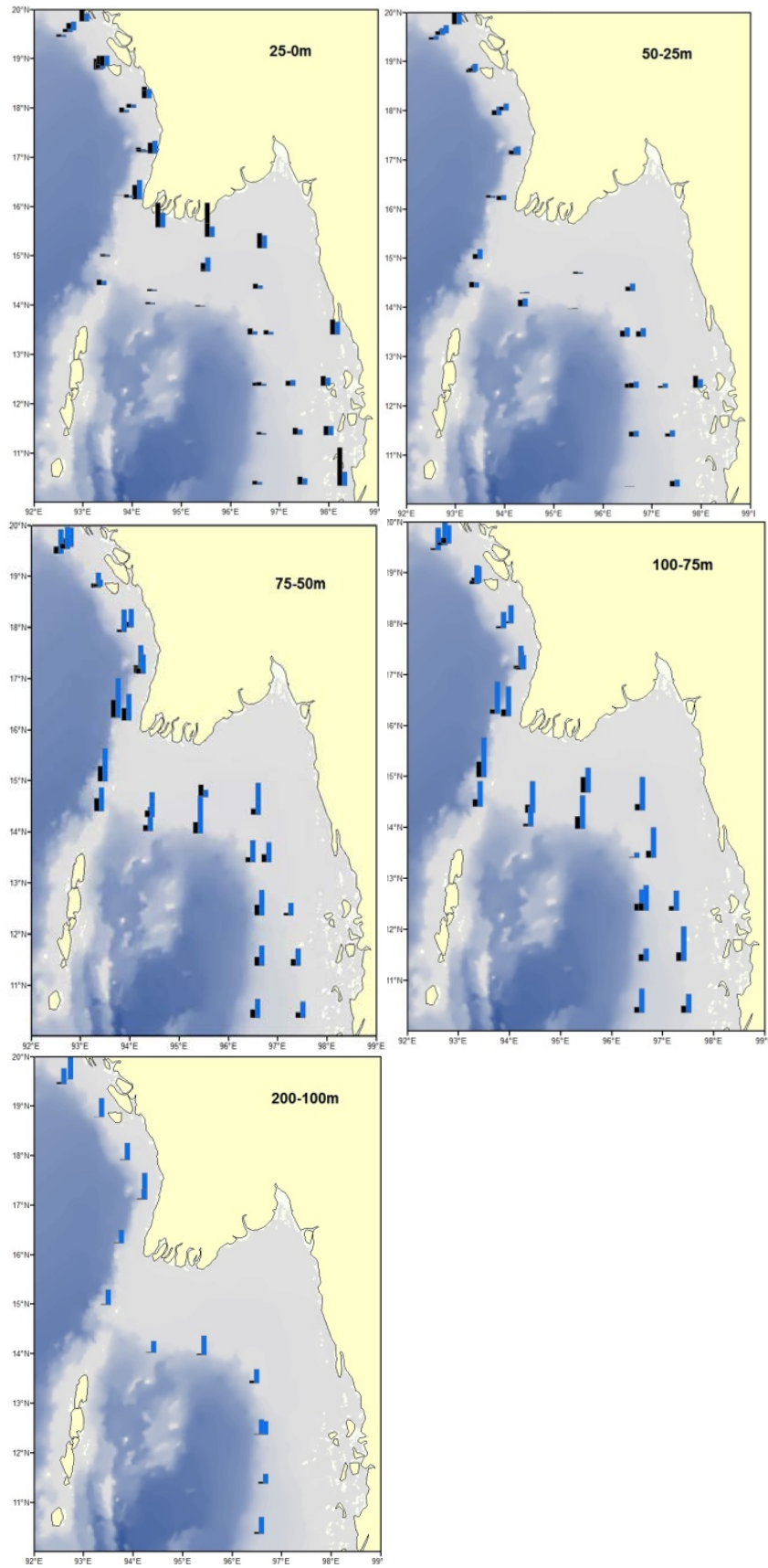


Figure 3.9. Chlorophyll a (black) and phaeopigment concentrations (blue) at 25-0 m, 50-25 m, 75-50 m, 100-75 m and 200-100 m depths, respectively.

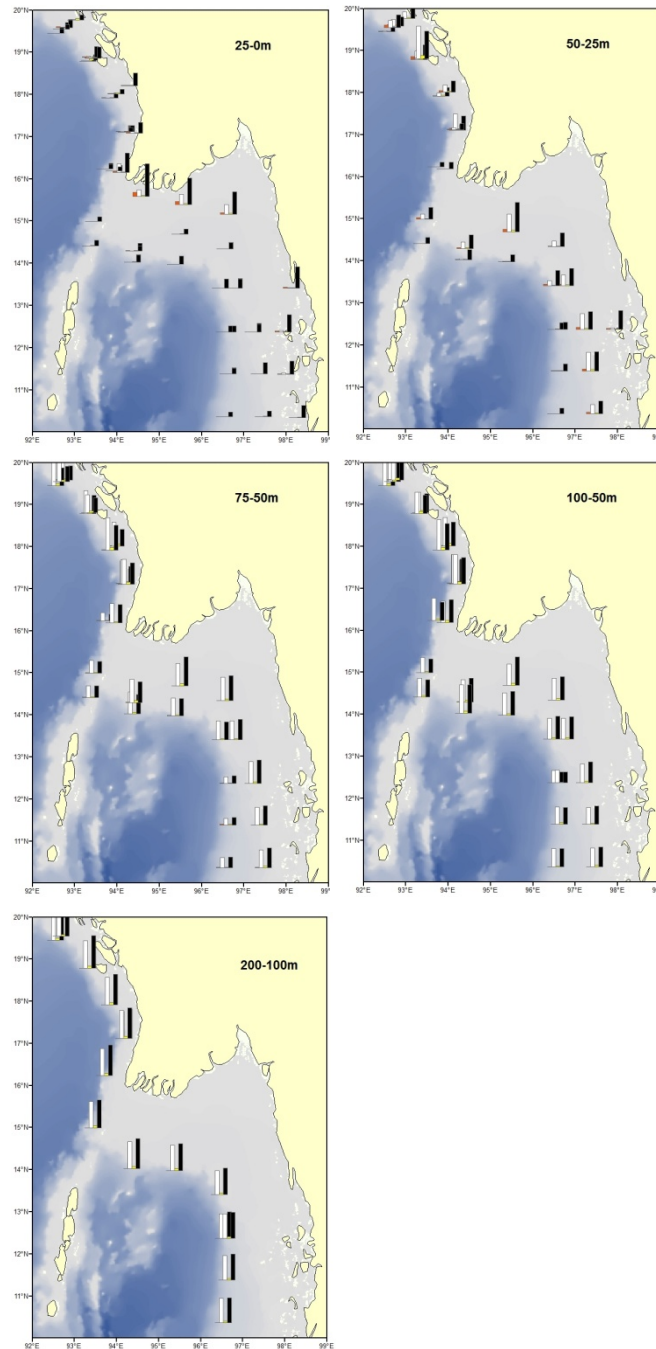


Figure 3.10. Nutrient concentrations: nitrite (red), nitrate (white), phosphate (yellow) and silicate (black) at 25-0 m, 50-25 m, 75-50 m, 100-75 m and 200-100 m depths, respectively.

### *Phytoplankton*

Phytoplankton taxonomic samples collected was analysed at Mawlamyine University and Yangon University in Myanmar. This cruise report only gives an overview of the results while the detailed report will be presented separately. The numbers of different phytoplankton taxa found per station is presented in Figure 3.11. The results show a distribution with highest diversity close to the coast and in the areas with higher chlorophyll and nutrient concentrations, Figure 3.9 and 3.10. The phytoplankton can be separated in the following groups; Diatoms, 191 different taxa, Dinoflagellates, 116 different taxa and silicoflagellates and Cyanobacteria 8 different taxa. The Rakhine coast showed

the highest number of different species with 101 different taxa, in the Ayeyarwady delta 80 different species were found while on the Tanintharyi coast 90 different taxa were found. The 2015 Pre monsoon survey generally have higher diversity of plankton than the 2013 post monsoon survey.

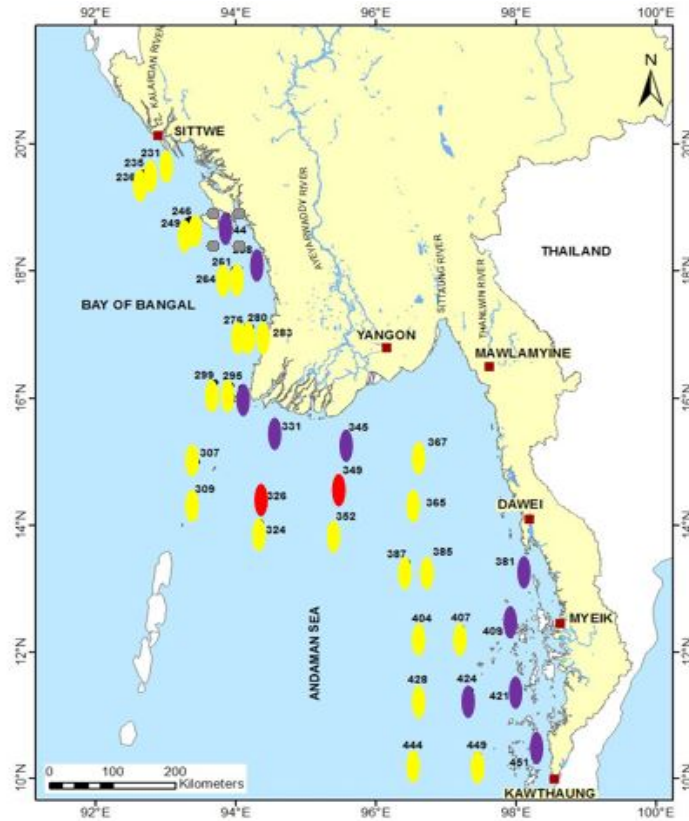


Figure 3.11. Numbers of phytoplankton taxa at different stations during the survey. Red colour – 20-50 different taxa, Yellow – 50-100 different taxa and Violet >100 different taxa.

### *Zooplankton*

All analysed samples for size-fractionated zooplankton biomass were completed at the IMR laboratory facilities during August of 2015. Initial exploration of the results from the WP2 net samples show that the stations with the largest biomass are positively correlated with areas of high fluorescence, nutrient levels and frontal zones with high rates of mixing water masses, Figures 3.9, 3.10 and 3.12).

The overall average zooplankton biomass for the surveyed area was  $9.62 \pm 3.38$  (SD) g/m<sup>2</sup> dry weight, based on results from the WP2 net. Overall, the g/m<sup>2</sup> biomass distribution was represented with 29% at the 30 m bottom depth stations, 35% at the 100 m bottom depth stations and 35% at the 500 m bottom depth stations. On the Rakhine coast largest biomass concentrations were associated with the shelf break. This pattern differed from the Ayeyarwady Delta area and the Tanintharyi region. The Ayeyarwady Delta displayed the highest concentrations closer to shore, while biomass concentrations were more uniform over the shelf in the Tanintharyi region.

Macro-zooplankton biomass size distribution comprised of 20% >2000  $\mu\text{m}$ , 29% between 2000-1000  $\mu\text{m}$  and 54% between 1000-180  $\mu\text{m}$ . In the >2000  $\mu\text{m}$  fraction amphipods, arrow worms, jellyfish,

krill, fish larvae and crab larvae occurred frequently and copepods occurred in a few samples. In the 2000-1000 $\mu\text{m}$  fraction the most common taxonomic groups were copepods, but also amphipods, krill, arrow worms, fish larvae, and some jellyfish occurred. In the 1000-180  $\mu\text{m}$  fraction; copepods occurred in all samples and amphipods occurred in 17% of the samples.

All formalin-preserved zooplankton samples from the Multinet, Juday and WP2 has been analysed to the lowest taxonomic level at the Mawlamyine and Yangon Universities. This cruise report only gives an overview of the results while the detailed report will be presented separately. The numbers of different zooplankton taxa found per station is presented in Figure 3.13. There seems not to be any direct correlation between the numbers of different taxa found and the zooplankton biomass, Figure 3.12. The overall highest species diversity was found on the Tanintharyi coast, with 104 different zooplankton taxa, and 16 different zooplankton larvae taxa observed. Lowest diversity was found in the Ayeyarwaddy delta with 83 different zooplankton taxa, and 8 zooplankton larvae taxa while on the Rakhine coast 94 different zooplankton taxa, and 11 zooplankton larvae taxa was observed. Especially calanoid copepod species were common, as this species group were found at every study station throughout the survey, but with highest number of species on the Tanintharyi coast. Especially the taxa *Canthocalanus pauper*, *Eucalanus subcrassus* and *Acartia erythraea* dominated. These were found at all stations.

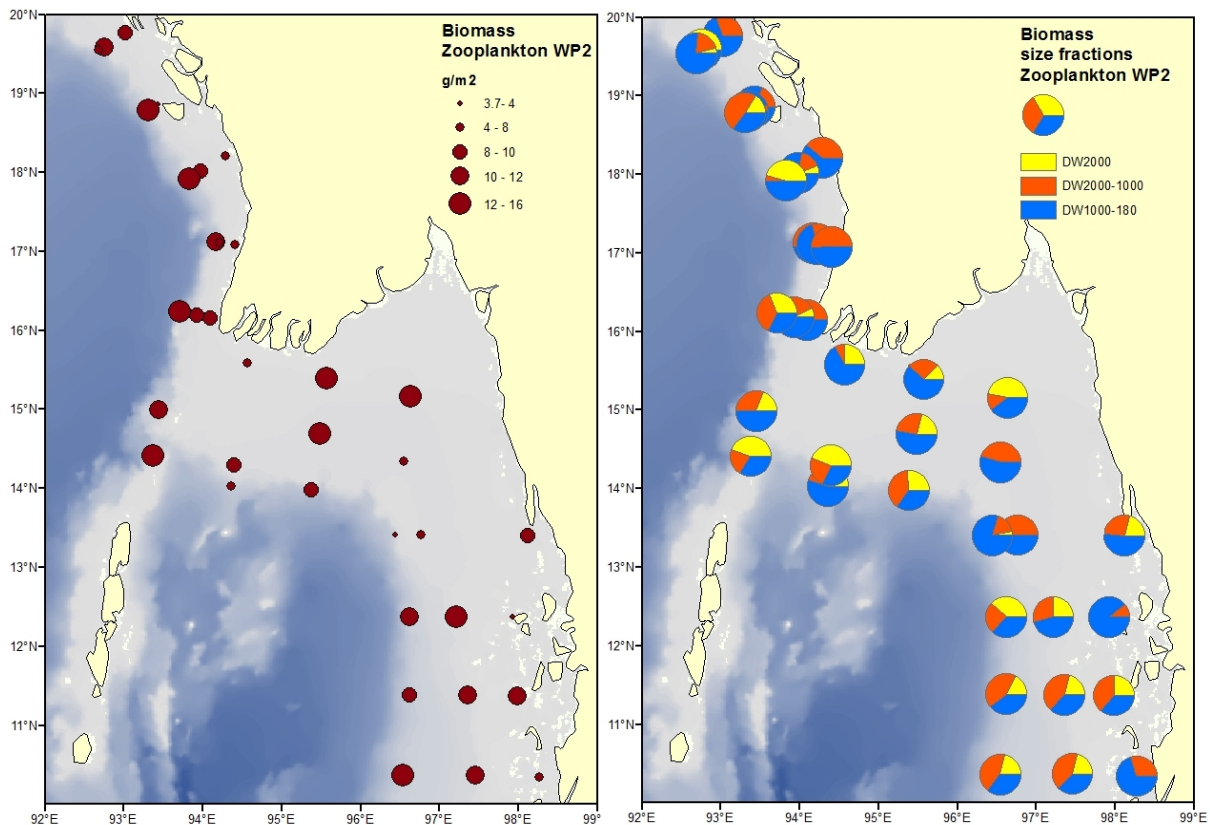


Figure 3.12. Zooplankton biomass (left) and zooplankton size fractions (right), based on analysed WP2 net samples.

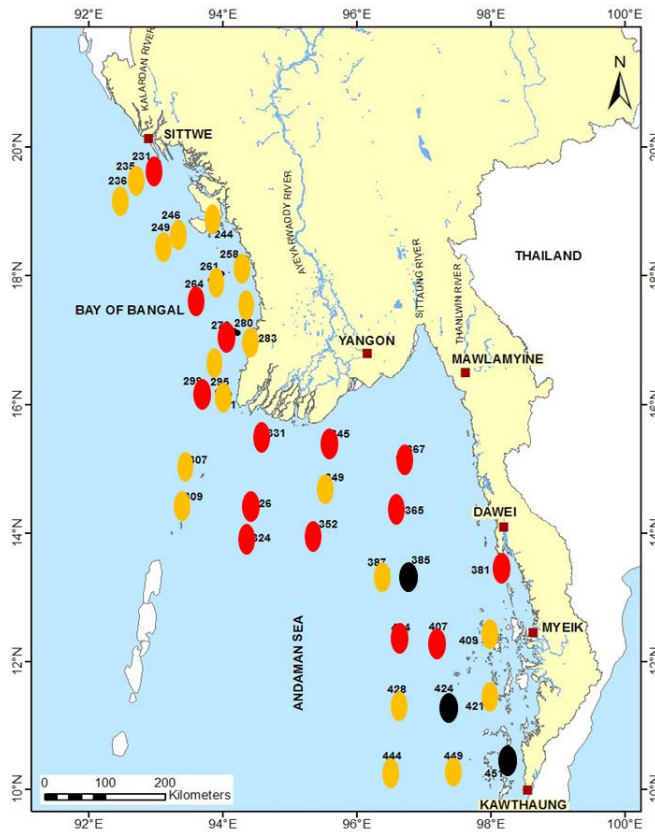


Figure 3.13. Number of different zooplankton taxa observed during the survey. Red – 50-60 different taxa, Black – 60-80 different taxa and Orange – 80-100 different taxa.

### 3.4 Sediment samples

All sediment samples were offloaded in Phuket and delivered to BOBLME for arrangement of further analyses. Dr. Somkiat, head of the Oceanography and Marine Environmental Unit at the Phuket Marine Biological Centre, was responsible for analyses of the material. The sedimentological analyses are presented in Figure 3.14 and generally corresponds with previous, and more detailed, investigation, especially the India-Myanmar Joint Oceanographic 16 April – 22 May, 2002. The results will contribute to the understanding of fish distribution in relation to habitat.

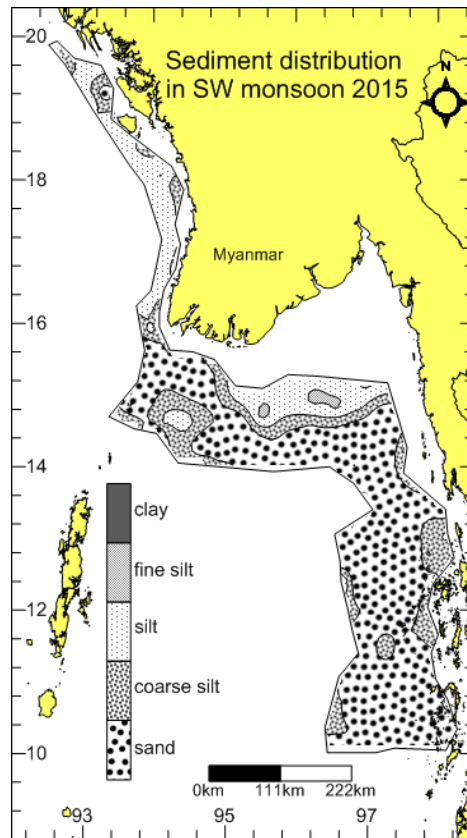


Figure 3.14. Results from the sediment analyses from the bottom trawl sediment samples.

## CHAPTER 4 ACOUSTIC ABUNDANCE AND DISTRIBUTION

The hydro acoustic survey covered the shelf and slope from roughly 20 m depth to 500 m bottom depth (1000 m depth on the ecosystem transects). Continuous acoustic recording and analysis were carried out throughout the survey. The survey was not a dedicated acoustic survey and spacing between transects was 20 NM. Acoustic registrations of pelagic fish were more widely distributed than in 2013 but of low density.

Acoustic distribution and abundance were estimated for two species groups during the survey. These were Pelagic 1 (Pel 1) and Pelagic 2 (Pel 2). The Pel 1 group of species consists of pelagic fish of the families Clupeidae and Engraulidae, while the Pel 2 species belong to the families Carangidae, Scombridae, Sphyraenidae and Trichiuridae. Table 2.1 gives an overview of the most common genera/species belonging to each of these families. The Pel 1 species are typically separated from the Pel 2 species based on the presence of the two groups in the trawl catches, and the fact that the Clupeidae and Engraulidae have a much stronger backscattering signal than e.g. the Carangidae and other Pel 2 species.

The data are presented for three main regions: 1. Rakhine coast, 2. the Deltaic coast and 3. the Tanintharyi coast. The estimates presented in this report include the geographic region covered by the vessel and do not include any quantification of fish inshore of the surveyed area. Myanmar has relatively large shallow water areas and river mouths. Many of the species found during this survey are known to thrive in such environments and it is likely that the biomass inshore of the survey area is considerable. Summary of backscattered  $s_A$  values and biomass estimates for the two species groups per region can be found in Table 4.1.

### 4.1 Rakhine coastal zone

#### *Pelagic1*

The most common Pel 1 species on the Rakhine coast was the engraulid *Stolephorus indicus*, no other clupeoids were frequent in the catches in this region. The distribution of this species were found in 3 separate low density concentrations close to the coast, mainly shallower than 50 m, in the northern central and southern part of the Rakhine coast. It is likely that the distribution of these species continued inshore of the surveyed area (Figure 4.1). A total acoustic abundance index of 21 000 tonnes of fish was estimated based on a set (average) total length of 10 cm (Table 4.1), this is about double of the estimate in 2013 of 10 000 tonnes, but is considered well within the range these species can fluctuate in abundance. Length frequencies of commonly caught species can be found in Annex II.

#### *Pelagic2*

The distribution of these species was, as during the 2013 survey, found in low density over most of the Rakhine coast, with the main concentration inshore but with occasional catches also close to the shelf break. (Figure 4.1). A total acoustic abundance index of 19 000 tonnes was found compared with 23 000 tonnes of fish in 2013. The estimates are based on a set (average) total length of 10 cm (Table 4.1). The most common Pel 2 species found in the region were the hairtails; *Trichiurus lepturus* and *Lepturacanthus savala* and the carangids; *Selar crumenophthalmus* and *Decapterus russelli*. It is notable that the species composition of pelagic species was considerably different from the November-

December 2013 survey. During that survey, the trichiurid *Lepturacanthus savala*, the carangids *Megalaspis cordyla*, *Carangoides malabaricus* and the scombrids *Scomberomorus guttatus* and *Rastrelliger kanagurta* dominated. Length frequencies of commonly caught species can be found in Annex II.

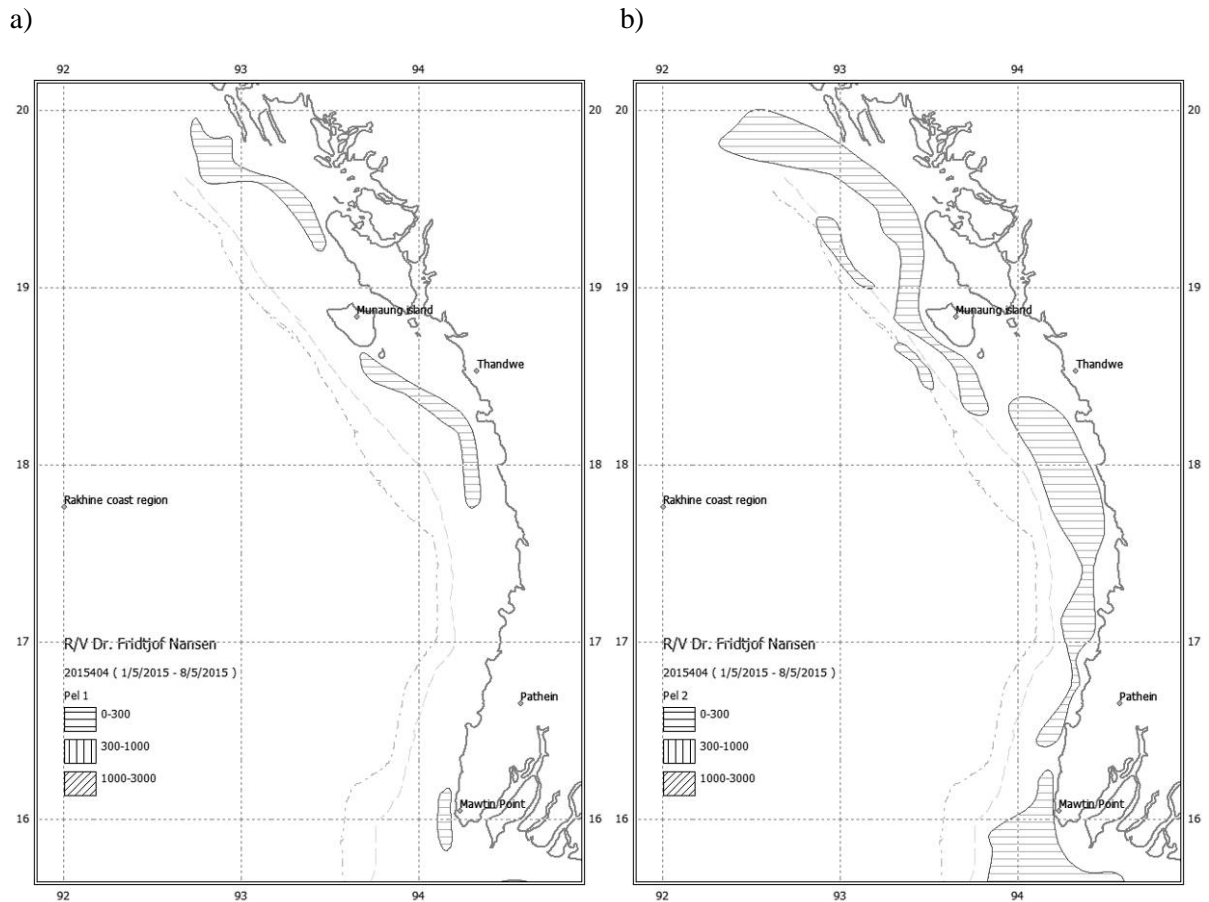


Figure 4.1. Distribution of acoustic backscattering of a) Pel 1 and b) Pel 2 species along the Rakhine coast

#### 4.2 Ayeyarwady Delta region

Generally juvenile forms of many pelagic and demersal species were found in the Delta area, particularly inshore and in the east. These species were mixed with small shrimps and plankton in a dense layer very prominent in the acoustic recordings. Separation of species in this layer was impossible and these very small fish < 5 cm has been characterised as plankton and not included in the estimates. From the trawl catches it is noticeable that the species composition found differs considerably from the findings in the 2013 survey. This is expected to be related to the period of the surveys pre monsoon (2015) and post monsoon (2013) respectively. Of the pelagic targets that was possible to separate the following was found.



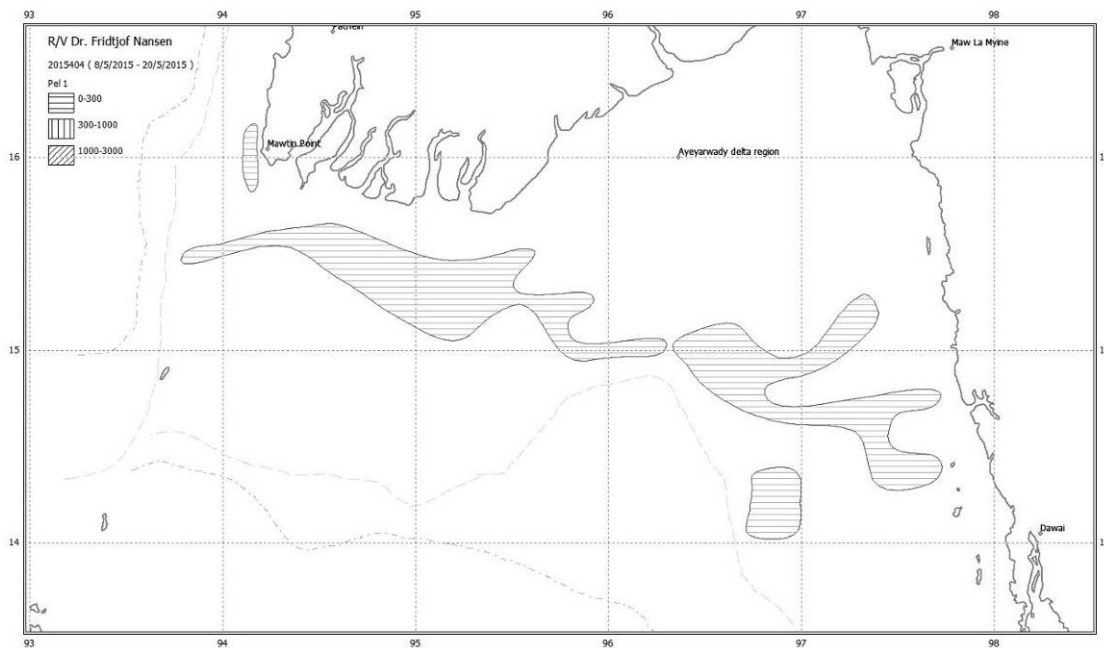
### *Pelagic1*

Low densities of Pel 1 were found widely distributed on the inner shelf in this region (Figure 4.2). A total acoustic abundance index of 36 000 tonnes of fish was estimated based on a set (average) total length of 10 cm (Table 4.1). In 2013 18 000 tonnes were estimated in the same region. The anchovies, especially *Stolephorus indicus* and *Coilia dussumieri* were by far the most common species found in the region. Length frequencies of commonly caught species can be found in Annex II.

### *Pelagic2*

The distribution of these species was found in low density over most of the Deltaic area (Figure 4.2). A total acoustic abundance index of 50 000 tonnes were found compared with 34 000 tonnes in 2013. The abundance in the Delta region was the highest estimate of the three regions during the surveys. Abundance of fish was estimated based on a set (average) total length of 10 cm (Table 4.1). The most common Pel2 species found in the region was the yellowstripe scad, *Selaroides leptolepis*, followed by *Trichiurus lepturus* and *Selar crumenophthalmus*. Length frequencies commonly caught species can be found in Annex II.

a)



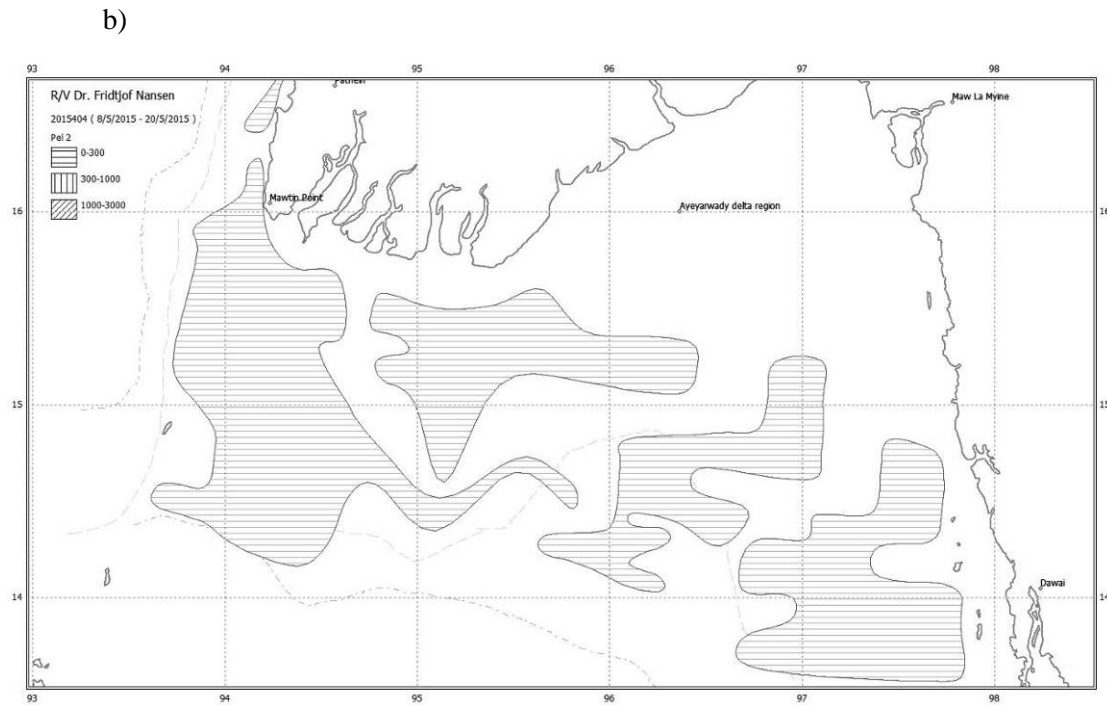


Figure 4.2. Distribution of acoustic backscattering of a) Pel 1 and b) Pel 2 species in the Delta region

#### 4.3 Tanintharyi coastal region

##### *Pelagic1*

A total of six different distribution areas were defined in this region. Two of them were of medium density while four were of low density. A large part of the distribution was found close to the inshore border of the survey area at < 50 m depth and it is expected that more fish were distributed further inshore. (Figure 4.3). The Tanintharyi region had the highest estimate of pelagic fish of any of the three regions during this survey. A total acoustic abundance index of 52 000 tonnes was considerably more than the estimate of 7 000 tonnes of fish found during the 2013 survey (Table 4.1). The biomass was estimated based on a set (average) total length of 10 cm. The main clupeoid species found in this region was the Indian anchovy *Stolephorus indicus*. Length frequencies can be found in Annex II.

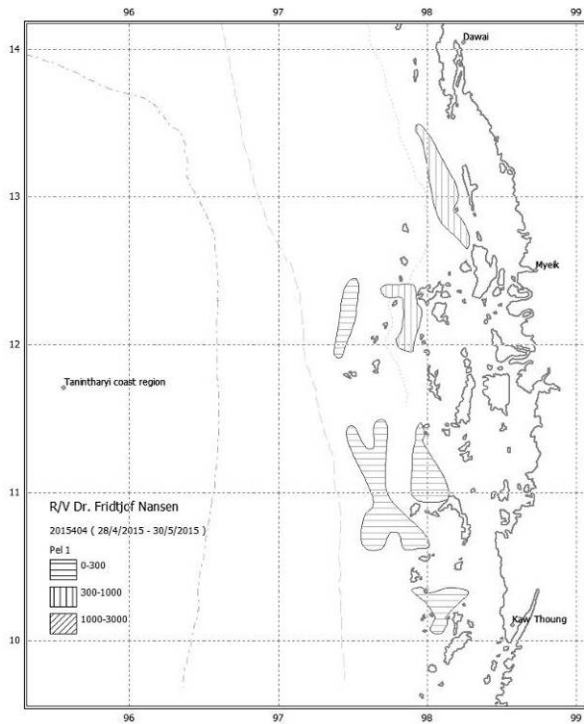
##### *Pelagic2*

The distribution of these species was found in three wide but low density areas (Figure 4.3). The densities decreased southwards from the Deltaic area. A total acoustic abundance index of 15 000 tonnes was lower than the 17 000 tonnes of fish estimated in 2013. The estimates were based on a set (average) total length of 10 cm. The most common Pel2 species found in the region were *Trichiurus lepturus*, *Selaroides leptolepis*, *Scomberomorus commerson* and *Rastrelliger brachysoma*. Length frequencies of commonly caught species can be found in Annex II.

Table 4.1. Biomass estimates of pelagic fish during the survey, Pel 1- clupeid and engraulid species, and Pel 2- carangid, scombrid, sphyraenid and trichiurid species.

	Pel 1				Pel 2			
	Rakhine	Delta	Tanintharyi	Total	Rakhine	Delta	Tanintharyi	Total
Area (NM <sup>2</sup> )	820	3648	1831	6300	2623	12779	3944	19345
Stratums	3	3	6	12	4	4	3	11
Avg. $\langle s_A \rangle$ :	224	69	258	203	78	29	33	48
Biomass:	20680	36313	51763	108756	19315	49897	14628	83839

a)



b)

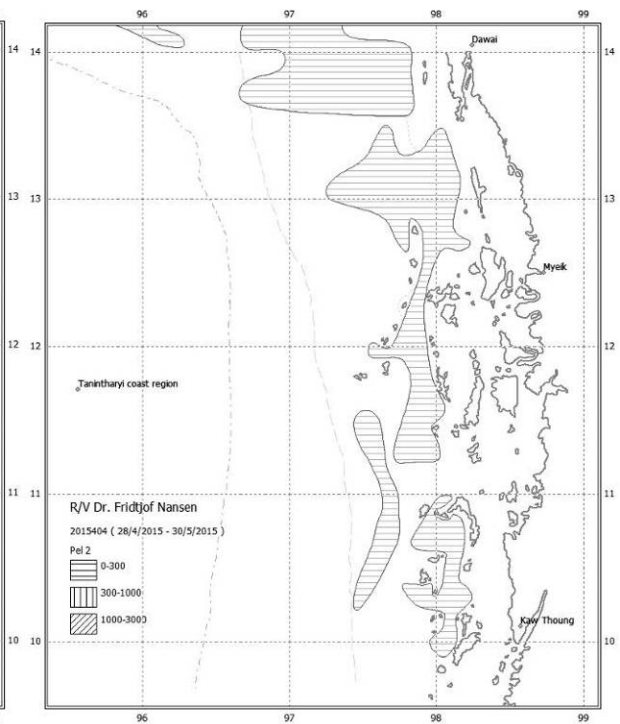


Figure 4.3. Distribution of acoustic backscattering of a) Pel 1 and b) Pel 2 species in the Tanintharyi region

## CHAPTER 5 SWEPT AREA ABUNDANCE AND DISTRIBUTION

The trawl survey used for swept area abundance estimation covered the shelf and slope from 20 m to 500 m bottom depth. Catch rates in kg/hour and Std. Dev () are presented per region and depth strata for main taxonomic groups found during the survey, English name with scientific name in (). These are; sea catfishes (Ariidae), cusk-eels (Ophidiidae), carangids (Carangidae), cephalopods (Cephalopoda), clupeids (Clupeidae), crabs (Brachyura), croakers (Sciaenidae), anchovies (Engraulidae), groupers (Serranidae), grunts (Haemulidae), hairtails (Trichiuridae), ponyfishes (Leiognathidae), lobsters (Nephropidae, Palinuridae and Scyllaridae), goatfishes (Mullidae), pike congers (Muraenesocidae), rays (Batoidea), mackerels (Scombridae), sea snakes (Elapidae), sharks (Selachii), shrimps (Caridea and Dendrobranchiata), snappers (Lutjanidae), flatfishes (Bothidae, Cynoglossidae, Psettodidae, Soleidae, Citharidae), butterfishes (Stromateidae), lizardfishes (Synodontidae), threadfins (Polynemidae), threadfin breams (Nemipteridae), ariommas (Ariommatidae), jellyfish (Scyphozoa), bigeyes (Priacanthidae), gurnards (Triglidae), other species and Total in Table 5.1. The group of other species are considered non-commercial and comprises all species not defined within any of the previously mentioned groups.

Four depth strata were defined prior to the survey; 20 - 50 m depth (inner shelf) 50 - 100 m depth (outer shelf) 100 - 200 m depth (upper slope) and 200 – 500 m depth (lower slope). In addition, some very few trawls were taken in deep water at depths >500 m. The region between the coast and 20 m bottom depth was not covered due to safety restrictions set by the vessel. As Myanmar has a relatively wide shelf a considerable amount of fish can be found inshore of the area covered by the vessel.

The trawl positions are mapped in Figures 1.1. Station information and catch per trawl and species are presented in Annex I.

### 5.1 Analyses of catch rates

Catch rates are presented per region; 1. Rakhine coast 2. The Deltaic coast and 3. The Tanintharyi coast. The mean catch rates were generally low but varied considerably throughout the survey. Highest catch rates were found on the Rakhine coast between 50- 100 m depth (579 kg/h). In the Delta region it was the deep water that gave the largest catches with 216 kg/h, while on the Tanintharyi coast the depth stratum between 50-100 m had highest catch rates with 299 kg/h. Lowest catch rates were experienced in the Rakhine coast between 100-200 m depth with catch rates of 126 kg/h.

In the following paragraphs we will look more in detail at each of the regions and the species groups dominating in each of them.

#### *Rakhine coastal zone*

A total of 49 valid trawl stations were analysed along the Rakhine coast. of these 16 stations were between 20 -50 m depth, 14 between 50 - 100 m depth, 13 between 100 - 200 m depth, 5 between 200 – 500 m depth and 1 > 500 m. Table 5.1 shows the average catch rates of the main groups caught during the survey.

The most dominant group on the Rakhine inner shelf between 20-50 m bottom depth was jellyfish (79 kg/h). Leiognathids (53 kg/h) were the dominant fish family followed by a number of pelagic groups such as engraulids (17 kg/h), hairtails (13 kg/h), and carangids (11 kg/h). All other groups gave catch rates < 10kg/h and were of lesser importance. In order of appearance in the catches were Haemulidae

(9.4 kg/h), Nemipteridae (7.2 kg/h), Ariidae (6.1 kg/h), Synodontidae (5.6 kg/h), Sciaenidae (5.3 kg/h), Cephalopoda (5.0 kg/h), Batoidea (4.6 kg/h) and Lutjanidae (2.8 kg/h). Although dominated by pelagic species, both catch composition and catch rates differed substantially from 2013 when catches were generally higher. The dominating groups during that survey were trichiurids (129 kg/h), clupeids (42 kg/h), carangids (33 kg/h), engraulids (25 kg/h) and scombrids (12 kg/h). The typical demersal species, with exception of leiognathids (74 kg/h), gave low catch rates also in 2013.

Further from the coast, at the outer shelf (50-100 m bottom depth) pelagic species became considerably more important. Carangids gave catch rates of 348 kg/h and were particularly abundant on the central part of the Rakhine coast, followed by trichiurids (88.6 kg/h). Synodontidae (lizardfishes) were the most abundant of the demersal families with 33.8 kg/h. Jellyfish was still frequent in the catches with 29 kg/h followed by Nemipteridae (22.6 kg/h), Priacanthidae (12.6 kg/h), and Cephalopoda (5.1 kg/h). The overall catch rate in this depth region was considerably higher than in 2013, particularly because of the comparably higher catches of carangids (14.5 kg/h in 2013), and hairtails (42.5 kg/h in 2013) during this (2015) survey.

On the upper slope (100-200 m), anoxic water masses prevailed from about 80 m water depth and deeper into the water column, and catch rates were relatively poor. Priacanthids (80.3 kg/h) were by far the most dominant group followed by a mixed group of other (19.5 kg/h) taxa. Crabs gave catch rates of 7.0 kg/h, followed by Triglidae (6.1 kg/h), jellyfish (3.8 kg/h), Synodontidae (2.7 kg/h), shrimps (2.4 kg/h) and Nemipteridae (2.0 kg/h). In 2013, crabs gave catch rates of 24 kg/h while Synodontidae were also considerably more important with catches of 20.5 kg/h.

On the lower slope catch rates increased slightly again. The mixed group of other taxa dominated with 89.8 kg/h. Sharks were relatively important with catches of 47.3 kg/h followed by Ophidiidae (32.3 kg/h), Muraenesocidae (27.1 kg/h), jellyfish (6.9 kg/h), shrimps (5.1 kg/h), Triglidae (4.8 kg/h), Cephalopoda (4.6 kg/h), and crabs (2.5 kg/h). Other species groups were of less importance. Also in this depth zone, there is a visible difference in the species composition compared to 2013. During that survey ophidiids were the most important group with catch rates of 17.7 kg/h. crustaceans, mainly crabs and shrimps gave catches of 15.8 kg/h and 2.5 kg/h respectively, while elasmobranchs (sharks and rays), gave catch rates of 9.1 kg/h and 1.6 kg/h, respectively.

#### *Ayeyarwady Delta region*

A total of 61 valid trawl stations were analysed in the Delta region. Among these, 15 stations were between 20 -50 m depth, 25 between 50 - 100 m depth, 16 between 100 - 200 m depth and 5 between 200 – 500 m depth. Table 5.1 shows the average catch rates of the main groups caught during the survey.

In the Delta region catches declined slightly compared to the Rakhine region. The most common species group on the inner shelf (20-50 m depth) were engraulids with catch rates of 25.5 kg/h followed by synodontids (16.5 kg/h), sciaenids (16.1 kg/h), shrimps (9.7 kg/h), leiognathids (9.3 kg/h), lutjanids (7.0 kg/h) and carangids (5.8 kg/h). In 2013, carangids were considerably more abundant in this depth zone with 11.7 kg/h while engraulids were less abundant with catch rates of 5.3 kg/h. The most abundant demersal groups in 2013 were sciaenids (8.4 kg/h), synodontids (8.3 kg/h), shrimps (7.1 kg/h) and mullids (3.1 kg/h).

On the outer shelf, the pelagic families Carangidae (33.5 kg/h) and Trichiuridae (10.2 kg/h) were dominant, followed by the demersal groups Synodontidae (12.9 kg/h), Nemipteridae (10.9 kg/h), Sciaenidae (8.6 kg/h) and Cephalopoda (6.8 kg/h). Also in 2013, carangids were the most dominant

species group with 18 kg/h, while Cephalopoda (10.2 kg/h), Mullidae (9.4 kg/h), and Nemipteridae (10.4 kg/h) yielded higher catch rates in 2013.

On the upper slope, demersal groups were the most important. Priacanthids (33.0 kg/h) were dominant in the catches in this depth region followed by Synodontidae (22.7 kg/h). Also Cephalopoda, (13.7 kg/h) were abundant. The pelagic family Carangidae (5.1 kg/h) was still relatively present in catches particularly on the shallower stations in this depth region, while shrimps gave catch rates of 4.5 kg/h. In 2013, synodontids (16.1 kg/h) were the most dominant group in this depth zone followed by the threadfin breams (9.9 kg/h), while shrimps gave catches of 8.2 kg/h.

Crustaceans resulted very important on the lower slope. Shrimps gave catch rates of 57.0 kg/h, while lobsters also showed relatively high catch rates with 10.8 kg/h. Ophidiids (18.2 kg/h) were the only c bony fishes of some importance in the catches. Sharks and rays resulted more important than further inshore, with catch rates of 8.4 kg/h and 7.9 kg/h, respectively. In 2013, catches of shrimps and lobsters were also good, with 33.3 kg/h and 7 kg/h, respectively. Among bony fishes, Ophidiidae showed catches of 2.9 kg/h, while sharks and rays were even more important with respect to the present survey with catch rates of 21.3 and 34.7, respectively.

#### *Tanintharyi coastal region*

A total of 61 valid trawl stations were analysed in the Tanintharyi coast. Among these, 10 stations were between 20 -50 m depth, 21 between 50 - 100 m depth, 10 between 100 - 200 m depth, 17 between 200 – 500 m depth and 3 >500 m depth. Table 5.1 shows the average catch rates of the main groups caught during the survey.

On the Tanintharyi coast, catch rates were higher than in the Delta region but lower than on the shelf of the Rakhine coast, while on the slope catch rates were higher compared with both regions further north.

On the inner shelf, leiognathids were the most important group with catch rates of 34.4 kg/h, followed by cephalopods (28.8 kg/h) which showed the highest catch rates in this region. Other important groups were Synodontidae (14.6 kg/h), Carangidae (14.4 kg/h), Scombridae (6.8kg/h), Trichiuridae (6.1kg/h), Haemulidae (5.9 kg/h) and Engraulidae (5.6 kg/h). Also, in 2013, cephalopods yielded the highest catch rates (16.1 kg/h) in this depth region, while Synodontidae showed catches of 17.2 kg/h.

On the outer shelf, jellyfish became very abundant in the catches with a catch rate of 158 kg/h, which resulted the highest for the whole surveyed area. Of the other groups, Synodontidae yielded catch rates of 30.2 kg/h in this depth region, followed by Cephalopoda and Nemipteridae with 19.7 kg/h and 15.6 kg/h, respectively. Of lesser importance were Engraulidae (6.5kg/h), Priacanthidae (5.3 kg/h) and Mullidae (5.3 kg/h). In 2013, pelagic species showed relatively good catch rates, mainly consisting of carangids with catch rates of 76.5 kg/h. Cephalopods yielded catch rates of 9.6 kg/h, while among demersal fishes synodontids dominated with 15.3 kg/h.

On the upper slope, catch rates were relatively high. The dominant group was the “other group” with catches of 77 kg/h or more than 50% of the total in this depth region. This group consisted of a number of lesser commercially important species (e.g. myctophids). Other important groups were Synodontidae and Nemipteridae with catch rates of 21.6 kg/h, 14.5 kg/h, respectively. Catches of both rays (9.7 kg/h) and sharks (5.6 kg/h) were higher on the southern slope than in all other areas further north and increased in abundance towards deeper water. Also flatfishes (6 kg/h) showed higher catch

rates compared to other regions covered by the survey. In the 2013 survey, rays (27 kg/h), synodontids (10 kg/h) and lobsters (9.5 kg/h) dominated in the catches.

As for the upper slope, the most dominant group on the deep slope (200-500 m depth) was the “other species” with 61% (137 kg/h) of the average total catch. Catch rates of the “other species” group was dominated by only a few groups; crustaceans were represented by shrimps, with 31.9 kg/h and lobsters with 11.6 kg/h, while cartilaginous fishes were represented, with high catch rates, of both rays (21.4 kg/h) and sharks (9.2 kg/h). All other species were considerably less important. In 2013, the group of “other species” made up approximately half of the average total catch with 109.5 kg/h. Shrimps, lobsters and cephalopods all resulted important groups with 39.8 kg/h, 12.2 kg/h and 6.9 kg/h, respectively. Among fishes, only rays and sharks were of some importance with catch rates of 34.9 and 8.1 kg/h respectively.

During the present survey, three stations were made deeper than 500 m in this region. The dominating groups in the catches were rays and sharks with catch rates of 82.9 kg/h and 32.8 kg/h respectively, and shrimps (15.7 kg/h).

Table 5.1. Mean catch rates in (kg/hour) and Std. Dev () of main species groups caught in valid swept area bottom trawl hauls, per region and depth zone.

Region	Depth	Stat.	Gear depth	Ariidae	Ariommatidae	Brachyura	Carangidae	Cephalopoda	Clupeidae	Engraulidae	Haemulidae	Jellyfish			
Rakhine Coast	0-50	16	37.4 (7.2)	6.1 (13.9)	-	-	0.4 (0.6)	10.8 (17.3)	5 (6.2)	0.5 (2.0)	16.7 (57.5)	9.4 (30.2)	79.4 (296.1)		
Rakhine Coast	50-100	14	75.7 (8.6)	-	-	3.2 (8.3)	0.6 (1.3)	348.2 (1241.8)	5.1 (5.5)	-	-	0.1 (0.4)	0.4 (1.1)	29.2 (109.2)	
Rakhine Coast	100-200	13	136.5 (20.6)	-	-	0.1 (0.3)	7 (18.7)	0.2 (0.6)	0.2 (0.6)	-	-	-	-	3.8 (11.6)	
Rakhine Coast	200-500	5	395.7 (107.8)	-	-	-	-	2.5 (5.3)	-	-	-	-	-	6.9 (15.5)	
Ayeyarwady Delta	0-50	15	32.8 (8.2)	1.5 (3.8)	-	-	2.7 (3.2)	5.8 (14.5)	4.1 (5.4)	0.3 (1.0)	25.5 (34.1)	0.6 (1.3)	-	-	
Ayeyarwady Delta	50-100	25	70.9 (13.2)	0.4 (1.4)	-	-	0.8 (1.6)	33.5 (88.4)	6.8 (5.3)	0.2 (0.8)	3.2 (12.7)	0.2 (0.3)	-	-	
Ayeyarwady Delta	100-200	16	126.1 (22.5)	-	-	0.2 (0.9)	0.9 (2.0)	5.1 (16.3)	13.7 (22.1)	-	-	-	-	-	
Ayeyarwady Delta	200-500	5	367.8 (87.5)	0.8 (1.8)	-	-	0.4 (0.8)	-	-	1 (1.1)	-	-	-	(0.1)	
Tanintharyi Coast	0-50	10	37.5 (6.9)	-	-	-	-	0.5 (0.6)	14.4 (19.0)	28.8 (18.3)	0.8 (1.9)	5.6 (8.9)	5.9 (12.1)	1.7 (4.0)	
Tanintharyi Coast	50-100	21	77.9 (13.0)	-	-	-	-	1 (1.8)	2.5 (3.1)	19.7 (44.3)	-	-	6.5 (29.7)	1.2 (3.8)	158.4 (702.8)
Tanintharyi Coast	100-200	10	138.6 (33.4)	-	-	-	-	0.5 (0.8)	0.1 (0.2)	3.6 (4.5)	-	-	-	-	-
Tanintharyi Coast	200-500	17	330.6 (71.6)	-	-	-	-	(0.1)	-	-	3.5 (3.9)	-	-	-	-
Tanintharyi Coast	500-1000	3	616 (170.2)	-	-	-	-	-	-	-	1 (0.9)	-	-	-	-

Cont.

Region	Leiognathidae	Lobsters	Lutjanidae	Mullidae	Muraenesocidae	Nemipteridae	Ophidiidae	Polynemidae	Priacanthidae	Rays	Sciaenidae						
Rakhine Coast	53.4 (50.8)	0.1 (0.3)	2.8 (4.5)	1.4 (2.9)	0.1 (0.1)	7.2 (9.0)	-	-	1.4 (5.5)	1.6 (3.5)	4.6 (11.7)	5.3 (20.1)					
Rakhine Coast	2 (4.1)	-	-	0.3 (1.0)	2.8 (6.1)	(0.1)	22.5 (31.8)	-	-	-	12.6 (21.2)	(0.2)	0.6 (1.3)				
Rakhine Coast	-	-	-	0.8 (2.8)	(0.1)	0.6 (1.5)	2 (7.2)	-	-	-	80.3 (174.1)	-	-				
Rakhine Coast	-	-	-	1.1 (2.5)	-	-	27.1 (30.0)	-	-	32.3 (18.5)	-	-	0.3 (0.8)	0.1 (0.3)			
Ayeyarwady Delta	9.3 (16.7)	0.4 (1.4)	7 (27.0)	0.2 (0.5)	4.1 (6.4)	3.7 (5.3)	-	-	1.1 (1.8)	0.1 (0.4)	3.6 (10.6)	16.1 (29.2)					
Ayeyarwady Delta	1.5 (3.8)	-	-	4.2 (18.8)	2.2 (3.9)	0.6 (1.9)	10.9 (12.1)	(0.2)	0.6 (1.9)	2 (4.8)	2.3 (7.2)	8.6 (23.1)					
Ayeyarwady Delta	(0.2)	0.1 (0.4)	0.3 (1.1)	0.3 (1.3)	0.1 (0.4)	8.7 (8.1)	0.3 (1.0)	-	-	33 (114.2)	2.4 (4.8)	0.5 (2.1)					
Ayeyarwady Delta	-	-	10.8 (14.3)	-	-	-	(0.1)	18.2 (17.0)	-	-	0.7 (0.9)	7.9 (9.3)	-	-			
Tanintharyi Coast	34.4 (42.0)	0.1 (0.4)	0.8 (2.2)	3.9 (4.1)	(0.1)	4.6 (7.3)	-	-	-	-	(0.1)	-	-	0.3 (0.7)			
Tanintharyi Coast	2.3 (9.3)	0.5 (2.0)	1.9 (5.3)	5.3 (6.7)	0.5 (1.3)	15.6 (18.8)	-	-	-	-	5.3 (11.2)	0.9 (1.5)	0.4 (1.9)				
Tanintharyi Coast	-	-	0.5 (1.0)	1.8 (4.0)	0.9 (2.6)	-	-	14.5 (31.9)	0.1 (0.2)	-	-	5 (8.0)	9.7 (24.5)	-	-		
Tanintharyi Coast	-	-	11.6 (20.4)	-	-	-	-	0.2 (0.9)	-	-	4.1 (6.4)	-	-	1.9 (2.3)	21.4 (40.1)	-	-
Tanintharyi Coast	-	-	0.2 (0.4)	-	-	-	-	0.8 (1.4)	-	-	1 (1.5)	-	-	-	82.9 (94.0)	-	-



## 5.2 Biomass index

For the calculation of biomass index, a calculation of the areas of the different depth strata and regions covered by the survey was made for the 2013 survey (Table 5.2). This also included the area between the coast and 20 m depth to illustrate the ocean area not covered by the survey. The area calculations were used also for this survey.

Table 5.2. Calculated areas in NM<sup>2</sup> of the different depth strata regions covered by the survey, and the percentage of each depth strata to the total for each region

Depth range	North (nm <sup>2</sup> )	Central (nm <sup>2</sup> )	South (nm <sup>2</sup> )	North (%)	Central (%)	South (%)
0-20	3991	10581	4629	29.9	26.9	15.8
20-50	2677	8849	5245	20.1	22.5	17.9
50-100	2862	10054	8081	21.4	25.5	27.6
100-200	1204	5394	2716	9.0	13.7	9.3
200-500	1114	1767	6207	8.3	4.5	21.2
500-1000	1497	2727	2394	11.2	6.9	8.2
Total	13346	39372.75	29272.8	100.0	100.0	100.0

The biomass estimates of the various demersal groups of fish and invertebrates can be found in Table 5.3 while a summary can be found in Table 7.1 and Figure 5.1. The individual species groups are not covered further in the text as a description of the most common groups (in kg/h) has been presented above. Pelagic species groups are not reported as these are considered not to be sampled representatively in the bottom trawl catches. Note that due to the nature of these surveys these estimates must be considered indexes (or relative). It is not a true reflection of the absolute biomass of all species in the survey area.

The total swept area biomass (t) estimated from the survey was approximately 420 000 tonnes, of this 105 000 tonnes were found on the Rakhine coast, 126 000 tonnes were found in the Ayeyarwady Delta region and 190 000 tonnes was found on the Tanintharyi coast. However, during the survey as much as 54 000 tonnes of jellyfish was found. These must be excluded from the estimate leaving the total at 367 000 tonnes. Jellyfish is found throughout the water column and are caught by the trawl on the way down and up from the bottom (in addition to what is caught on the bottom). This means that the figures reported here represent an index only, and the trough abundance of jellyfish in the water column is considerably higher than reported.

On the Rakhine coast about 10 000 tonnes of jellyfish was recorded (most biomass closest to the coast). Excluding these the shelf showed the highest abundance with 16 000 tonnes registered on the inner shelf and 51 000 tonnes found on the outer shelf. Carangids had their highest abundance in any region of the survey on the other shelf. On the slope the depth zone between 100-200 m is hypoxic and

only specialised animals thrive in such conditions, the biomass in this area was the lowest for the whole survey. A biomass of 5000 tonnes, dominated by Priacanthidae was found. Further offshore on the deeper slope the biomass increased to 23 000 tonnes.

Further south in the Ayeyarwady Delta region the inner shelf had a biomass of 41 000 tonnes while the outer shelf showed a biomass of 46 000 tonnes. On the upper slope the biomass decreased to 26 000 tonnes, and even further on the lower slope, to 13 000 tonnes.

The southern region of the survey, the Tanintharyi coast had the highest jellyfish density in the trawl, altogether 44 000 tonnes. Excluding these from the estimate, 28 000 tonnes of biomass was registered on the inner shelf. On the outer shelf the biomass increased to 38 000 tonnes. In this area about 43 000 tonnes of jellyfish was also recorded. It is often hypothesised that jellyfish are associated with overfished areas but little concrete evidence exists. Also the slope in this region showed higher biomass figures compared to these depth regions further north. On the upper slope the biomass decreased to about 31 000 tonnes while at the lower slope a biomass estimate of 48 000 was estimated. Particularly crustaceans and cartilaginous fish contributed to this high biomass.

In 2013 the total biomass estimate was 273 000 tonnes. Of this the Rakhine coastal zone had an estimate of 60 000 tonnes, while the Deltaic cost gave a total biomass estimate of 101 000 tonnes, and the Tanintharyi coast showed an estimate of 112 000 tonnes, Figure 5.1.

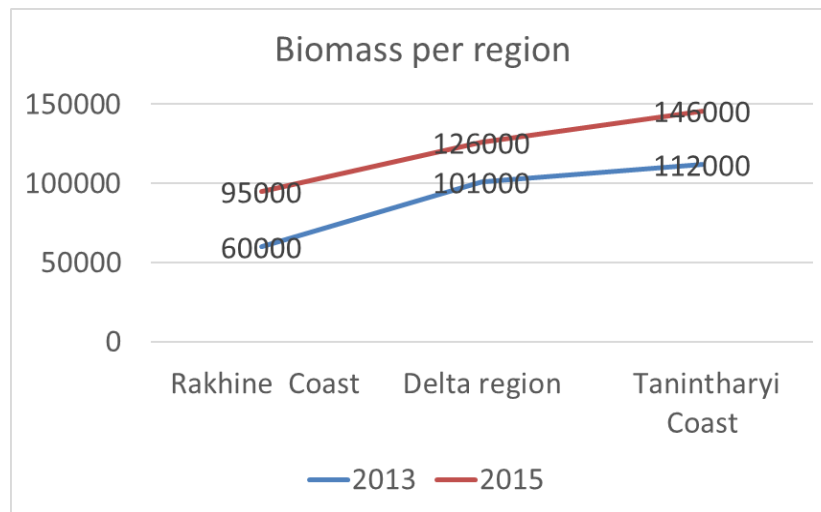


Figure 5.1. Swept area biomass estimates for the three regions in Myanmar in 2013 and 2015. Note that all jellyfish has been subtracted from the estimates (see text).

Table 5.3. Biomass estimates for the main species groups found during the survey.

Region	Depth int.	Ariidae		Ariommatidae		Brachyura		Carangidae		Cephalopoda		Haemulidae		Jellyfish		Leiognathidae		Lobsters		
		t/nm <sup>2</sup>	Biom. (t)	t/nm <sup>2</sup>	Biom. (t)	t/nm <sup>2</sup>	Biom. (t)	t/nm <sup>2</sup>	Biom. (t)	t/nm <sup>2</sup>	Biom. (t)	t/nm <sup>2</sup>	Biom. (t)	t/nm <sup>2</sup>	Biom. (t)	t/nm <sup>2</sup>	Biom. (t)	t/nm <sup>2</sup>	Biom. (t)	
Rakhine Coast	0-50	0.20	527	-	-	0.01	35	0.37	985	0.17	442	0.31	827	2.50	6703	1.79	4800	0.00	8	
	50-100	-	-	0.10	289	0.02	54	11.31	32355	0.17	484	0.01	31	0.96	2750	0.06	183	-	-	
	100-200	-	-	0.00	2	0.23	279	0.01	8	0.01	10	-	-	0.12	144	-	-	-	-	
	200-500	-	-	-	-	0.08	229	-	-	0.15	432	-	-	0.23	647	-	-	-	-	
Gulf of Mottama	0-50	0.05	425	-	-	0.10	858	0.20	1796	0.13	1159	0.02	159	-	-	0.31	2708	0.01	115	
	50-100	0.02	151	-	-	0.03	251	1.09	10969	0.23	2282	0.01	60	-	-	0.05	483	-	-	
	100-200	-	-	0.01	43	0.03	167	0.17	890	0.43	2309	-	-	-	-	0.00	5	0.00	16	
	200-500	0.03	48	-	-	0.01	25	-	-	0.03	58	0.00	2	-	-	-	-	0.37	647	
Tanintharyi Coast	0-50	-	-	-	-	0.02	84	0.47	2476	0.96	5025	0.20	1028	0.06	299	1.15	6021	0.00	21	
	50-100	-	-	-	-	0.03	267	0.09	687	0.66	5325	0.04	323	5.37	43403	0.08	606	0.02	121	
	100-200	-	-	-	-	0.02	99	0.00	25	0.13	776	-	-	-	-	-	-	0.02	112	
	200-500	-	-	-	-	0.00	6	-	-	0.12	745	-	-	-	-	-	-	0.42	2588	
Sum				1151		335		2355		50191		19046		2431		53947		14806		3628

Table 5.3 cont.

Region	Depth int.	Lutjanidae		Mullidae		Muraenesocidae		Nemipteridae		Ophidiidae		Polynemidae		Priacanthidae		Rays		Sciaenidae		
		t/nm <sup>2</sup>	Biom. (t)	t/nm <sup>2</sup>	Biom. (t)	t/nm <sup>2</sup>	Biom. (t)	t/nm <sup>2</sup>	Biom. (t)	t/nm <sup>2</sup>	Biom. (t)	t/nm <sup>2</sup>	Biom. (t)	t/nm <sup>2</sup>	Biom. (t)	t/nm <sup>2</sup>	Biom. (t)	t/nm <sup>2</sup>	Biom. (t)	
Rakhine Coast	0-50	0.09	241	0.05	137	0.00	5	0.23	624	-	-	0.05	120	0.05	139	0.15	402	0.18	468	
	50-100	0.01	29	0.09	266	0.00	3	0.72	2058	-	-	-	-	0.41	1182	0.00	3	0.02	54	
	100-200	0.03	30	0.00	1	0.02	23	0.07	78	-	-	-	-	2.57	3097	-	-	-	-	
	200-500	0.05	129	-	-	1.00	2848	-	-	1.12	3200	-	-	-	-	0.01	40	0.01	14	
Gulf of Mottama	0-50	0.25	2177	0.01	62	0.12	1097	0.13	1106	-	-	0.05	469	0.01	44	0.09	832	0.51	4486	
	50-100	0.14	1438	0.07	734	0.02	211	0.36	3619	0.00	10	0.02	211	0.07	664	0.08	784	0.27	2755	
	100-200	0.01	59	0.01	59	0.00	16	0.28	1532	0.01	59	-	-	1.07	5745	0.08	426	0.02	97	
	200-500	-	-	-	-	-	-	0.00	2	0.61	1081	-	-	0.02	41	0.27	468	-	-	
Tanintharyi Coast	0-50	0.03	142	0.13	671	0.00	5	0.15	802	-	-	-	-	0.00	5	-	-	0.01	47	
	50-100	0.06	501	0.18	1430	0.02	129	0.52	4210	-	-	-	-	0.18	1430	0.03	251	0.01	105	
	100-200	0.06	354	0.03	186	-	-	0.47	2905	0.00	19	-	-	0.16	1006	0.35	2141	-	-	
	200-500	-	-	-	-	0.01	50	-	-	0.14	894	-	-	0.07	403	0.74	4593	-	-	
Sum				5099		3547		4388		16937		5263		801		13756		9940		8028

Table 5.3 cont.

Region	Depth int.	Serranidae		Sharks		Shrimps		Flatfishes		Stromateidae		Synodontidae		Triglidae		Total		Region total
		t/nm <sup>2</sup>	Biom. (t)	t/nm <sup>2</sup>	Biom. (t)	t/nm <sup>2</sup>	Biom. (t)	t/nm <sup>2</sup>	Biom. (t)	t/nm <sup>2</sup>	Biom. (t)	t/nm <sup>2</sup>	Biom. (t)	t/nm <sup>2</sup>	Biom. (t)	t/nm <sup>2</sup>	Biom. (t)	Biom. (t)
Rakhine Coast	0-50	0.01	13	-	-	0.04	118	0.01	21	0.01	19	0.19	506	-	-	8.65	23143	
	50-100	0.00	3	0.01	26	0.04	106	0.00	11	-	-	1.09	3128	0.01	31	18.69	53494	
	100-200	0.00	1	0.01	12	0.08	90	0.00	4	-	-	0.09	102	0.20	236	4.04	4867	
	200-500	-	-	1.74	4977	0.17	489	-	-	-	-	0.02	46	0.16	449	8.17	23394	104897
Gulf of Mottama	0-50	-	-	0.08	726	0.33	2938	0.00	27	0.01	97	0.70	6159	-	-	4.64	41024	
	50-100	0.02	151	0.03	251	0.09	855	0.03	302	0.00	20	0.43	4313	0.00	30	4.54	45595	
	100-200	0.04	205	0.05	254	0.15	831	0.02	119	-	-	0.74	3981	0.02	102	4.85	26172	
	200-500	-	-	0.29	512	2.00	3530	0.01	16	-	-	0.04	78	-	-	7.53	13307	126098
Tanintharyi Coast	0-50	0.00	21	-	-	0.11	551	0.01	58	-	-	0.49	2570	-	-	5.41	28370	
	50-100	0.02	137	0.03	234	0.10	816	0.08	614	-	-	1.01	8146	0.01	48	10.11	81691	
	100-200	0.03	205	0.19	1161	0.07	447	0.21	1297	-	-	0.75	4643	-	-	5.06	31420	
	200-500	-	-	0.32	1955	1.11	6859	0.11	683	-	-	0.01	74	0.01	68	7.78	48278	189759
Sum				736		10108		17630		3151		136		33746		966		420754

### 5.3 Biodiversity

The most commonly used definition of biodiversity is that of the Convention on Biological Diversity 1992. 'Biological diversity' means the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species and of ecosystems.

The term biodiversity encompasses variety of biological life at more than one scale. It is not only the variety of species (both plant and animal) but also the variety of genes within those species and the variety of ecosystems in which the species reside. Biodiversity does in other words not exclusively refer to species richness. It also encompasses diversity at a wider scale meaning that differences in the genetic makeup of populations is important. Endemism has a key role to play in this context because endemic species are restricted to small areas and provide pockets of particularly high genetic diversity. In this report we refer mainly to species variation, and ecosystem variation, and this chapter will try to highlight the main trends in fish diversity from the vessel trawl catches.

A total of 587 teleost species belonging to 145 families were recorded during the survey. With regard to the cartilaginous fishes, 26 shark species belonging to 12 families, 24 ray species from 10 families, and 3 chimaera species from two families were identified. A total of 372 different taxonomic entities were recorded in the Rakhine Coast, while 504 and 501 entities were identified in the delta area and Tanintharyi coast, respectively. Table 5.4 shows the number of different entities caught by bottom trawl in each depth region. The table shows that the most species rich area was the 50-100 m depth stratum in the Delta area.

Table 5.4. Number of different species entities caught by bottom trawl in each depth stratum.

Depth/region	Rakhine coast	Ayeyarwady Delta	Tanintharyi coast
20-50	200	153	138
50-100	129	229	190
100-200	76	159	144
200-500	48	99	183
<b>Total</b>	<b>372</b>	<b>504</b>	<b>501</b>

As a measure of the importance of each species in the trawl catches within each depth stratum and region, an index of relative importance (%IRI) was used to rank the most common species:

$$\text{Equation 1: } \%IRI = \frac{(\%N_i + \%W_i) * \%F_i}{\sum_{j=1}^s (\%N_j + \%W_j) * \%F_j} * 100 \quad (\text{Kolding 1989})$$

Where:

%Ni = number individuals of each species i divided by the total number of individuals per stratum and region, expressed as a percentage

$\%W_i$  = weight of each species  $i$  divided by the total weight of individuals per stratum and region, expressed as a percentage

$\%F_i$  = number of hauls in which each species  $i$  occurs divided by the total number of hauls per stratum and region, expressed as a percentage

$S$  is the total number of species  $j$  in all trawl hauls in a given stratum or region

This index is based on the IRI index that combines and represents simultaneously the three above mentioned indexes.

Equation 2: 
$$IRI = (\%N + \%W) * \%F \quad (\text{Pinkas et al. 1971, Caddy \& Sharp 1986})$$

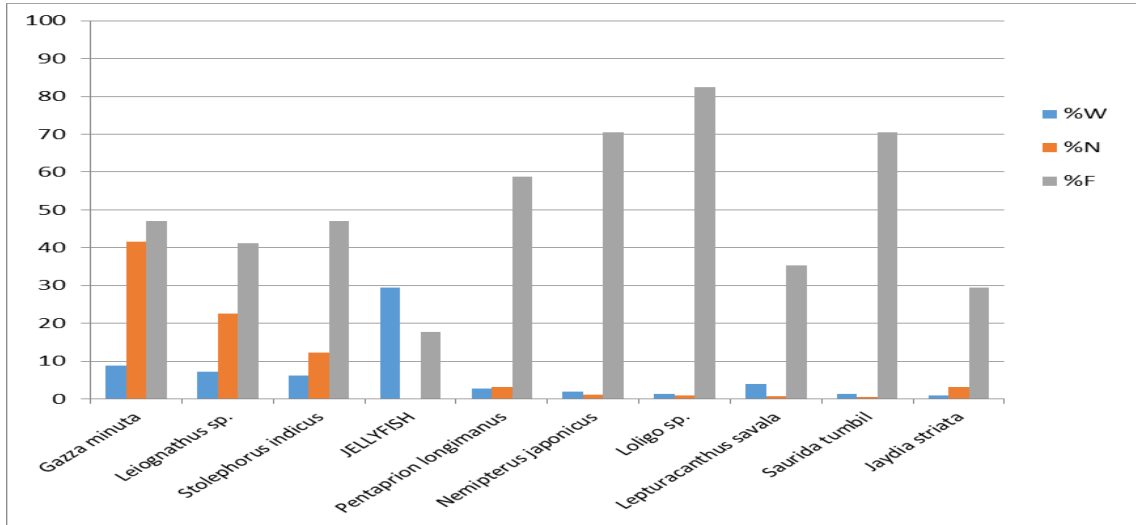
The results of the analysis by region showed that the most common species (groups) in the Rakhine coastal zone were *Trichiurus lepturus*, *Priacanthus hamrur*, jellyfish, *Saurida tumbil*, *Gazza minuta*, *Nemipterus japonicus*, *Benthosema cf. fibulatum*, *Decapterus sp.*, and *Stolephorus indicus*.

In the Ayeyarwady Delta region the most common species (groups) were *Saurida undosquamis*, shrimps, *Loligo sp.*, *Nemipterus japonicus*, small shrimps, *Stolephorus indicus*, *Acropoma japonicum*, *Coilia dussumieri*, and *Priacanthus hamrur*.

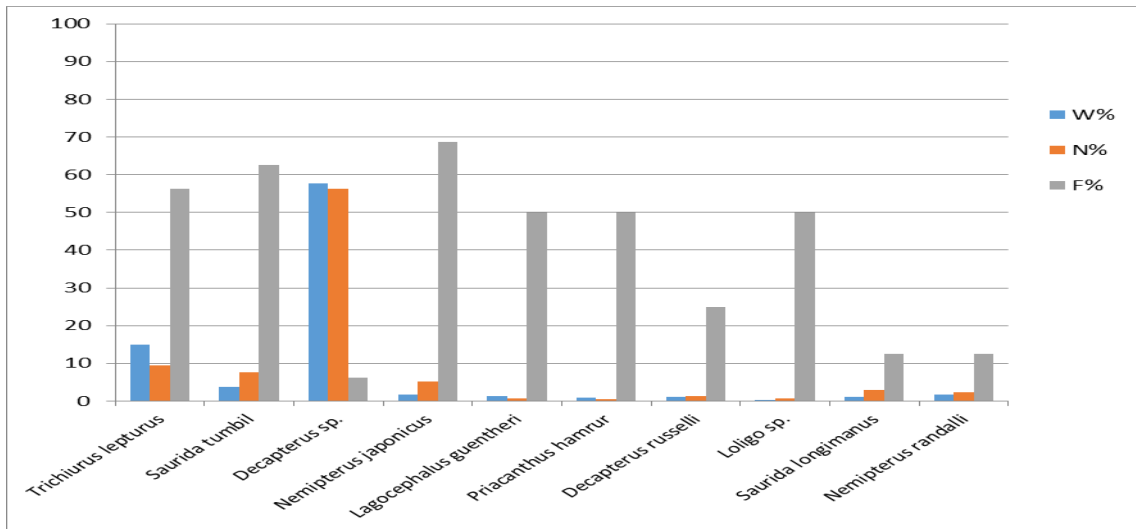
On the Tanintharyi coast the most common species (groups) were Shrimps, *Loligo sp.*, jellyfish, *Saurida undosquamis*, Myctophidae, *Synagrops adeni*, small shrimps, *Satyrichthys sp.*, *Nemipterus bipunctatus*, *Siganus canaliculatus*.

The relative numeric abundance (N), the relative weight (W) and the commonness (F) of the 10 most important species (%IRI) for each stratum were extracted and are shown in the following figures. The figures illustrate the substantial change in species composition between the different strata for each region.

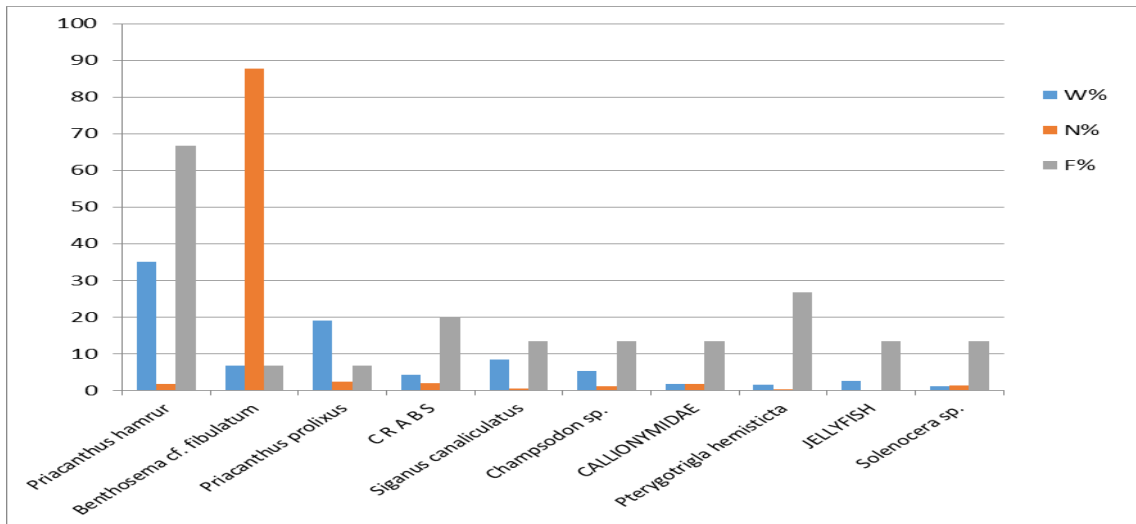
a) Rakhine coast  
0-50 m



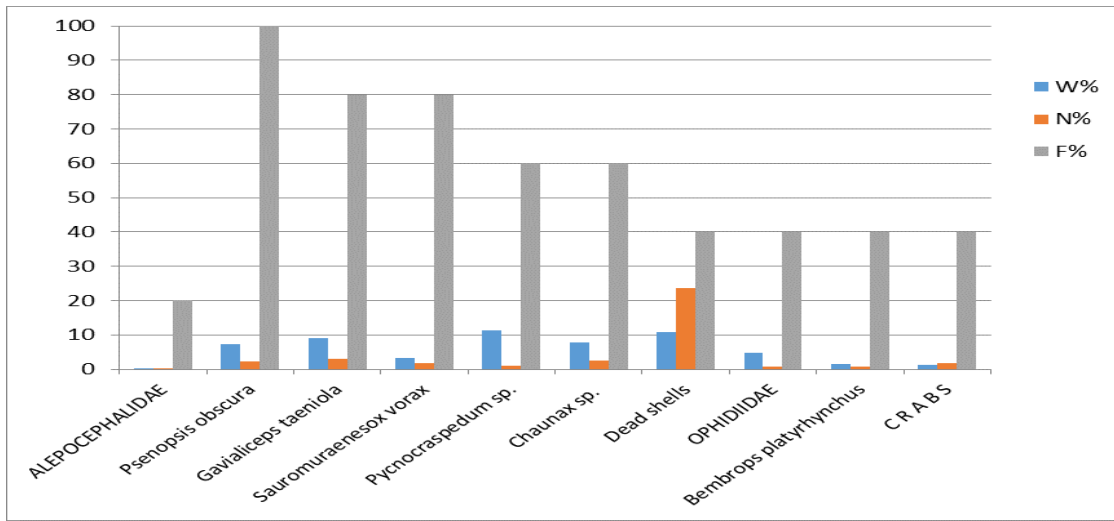
50-100 m



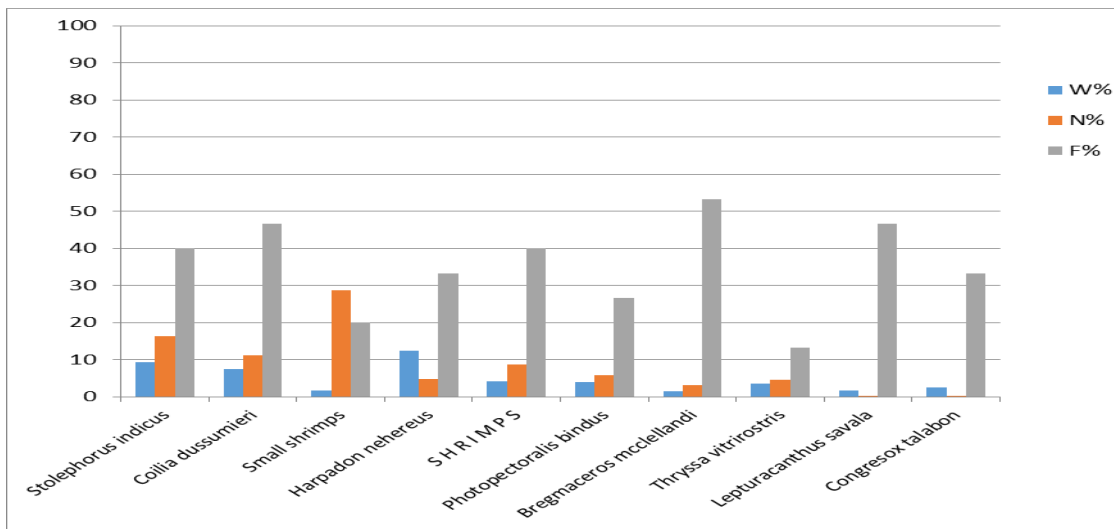
100-200 m



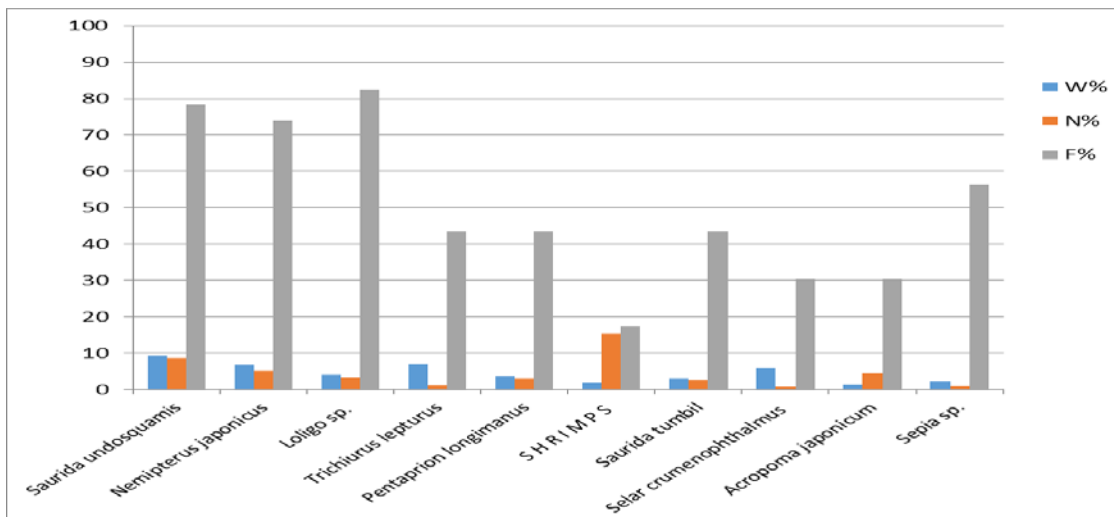
200-500 m



b) Deltaic coastal region  
0-50 m

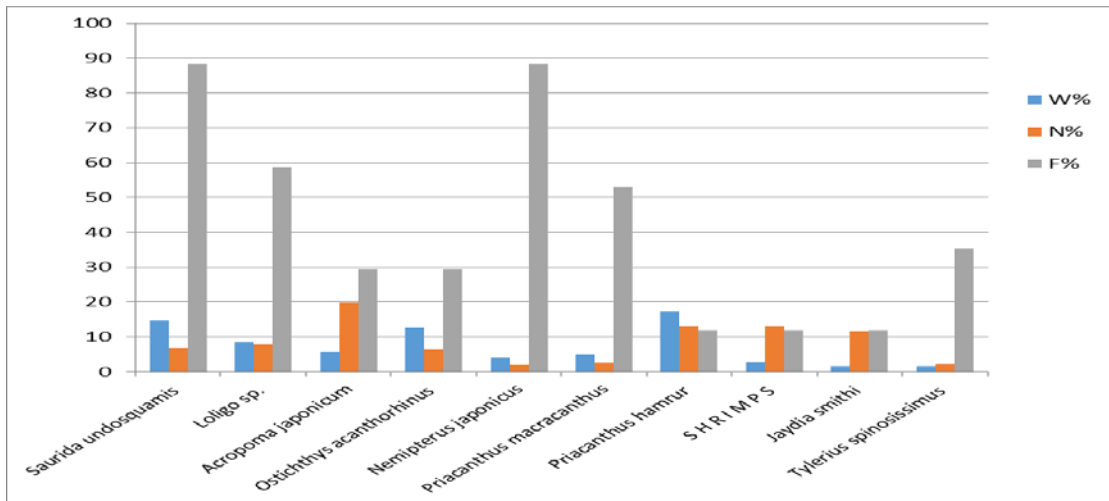


50-100 m

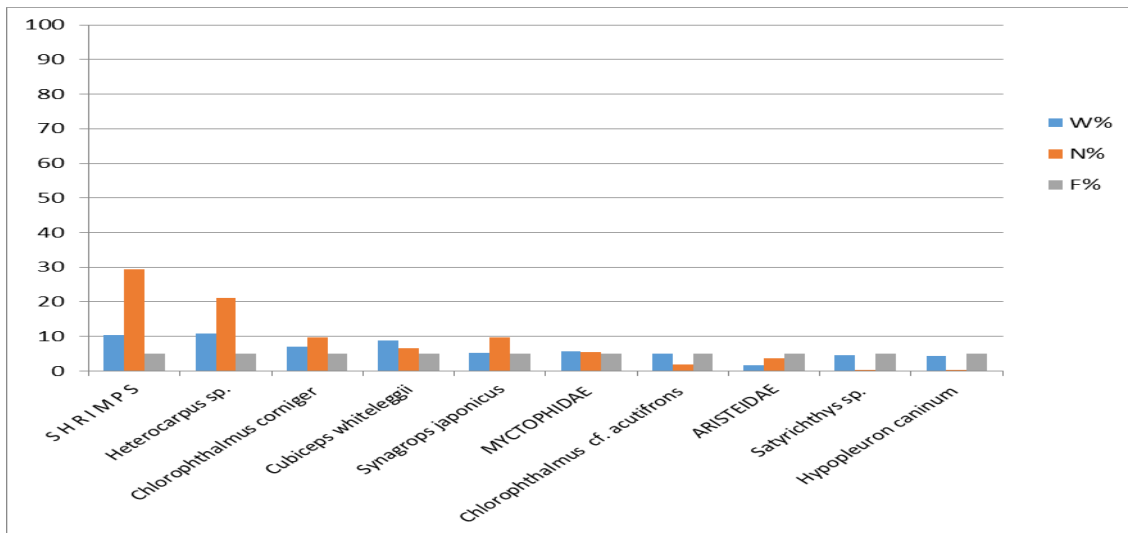




100-200 m

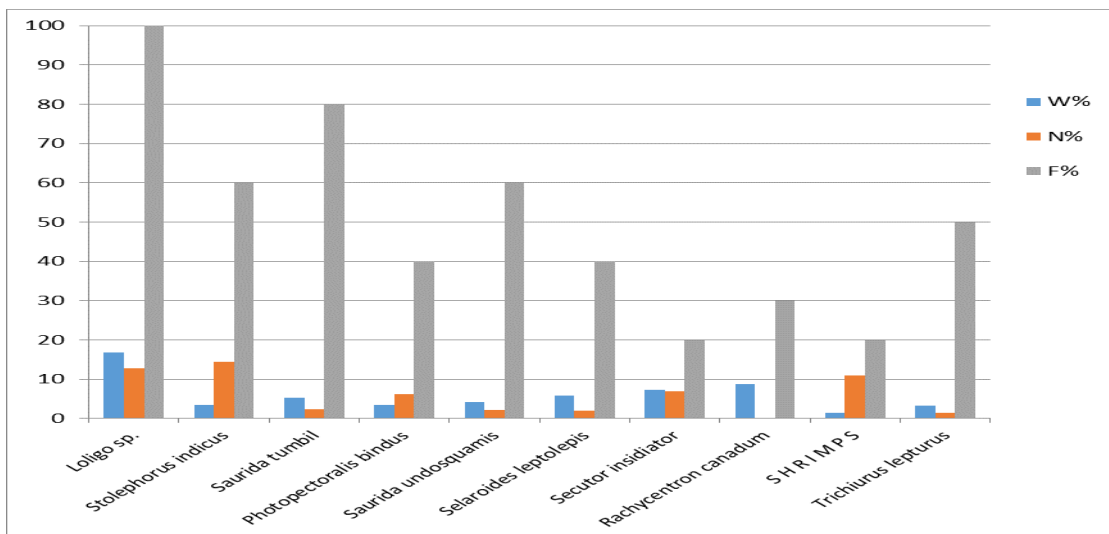


200-500 m

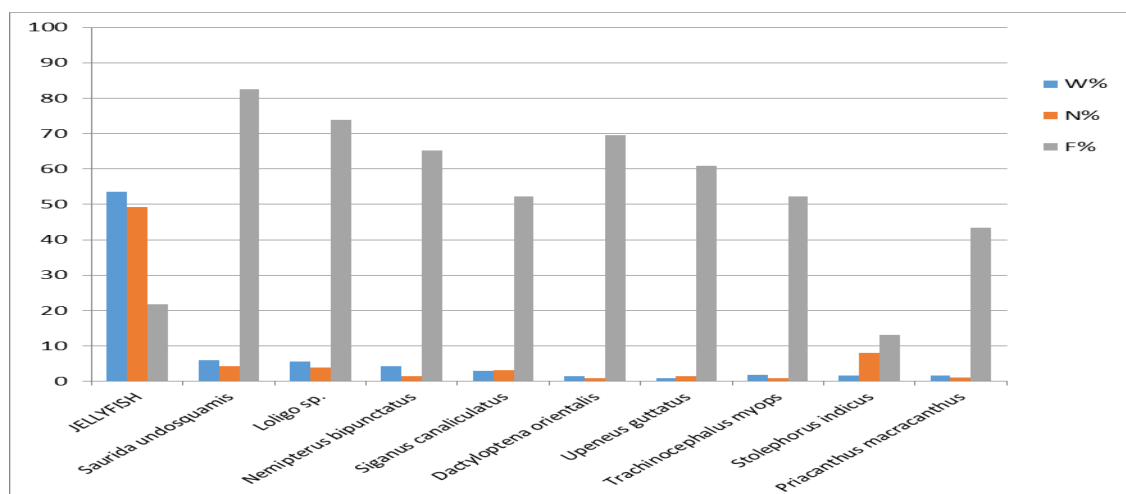


c) Tanintharyi coastal region

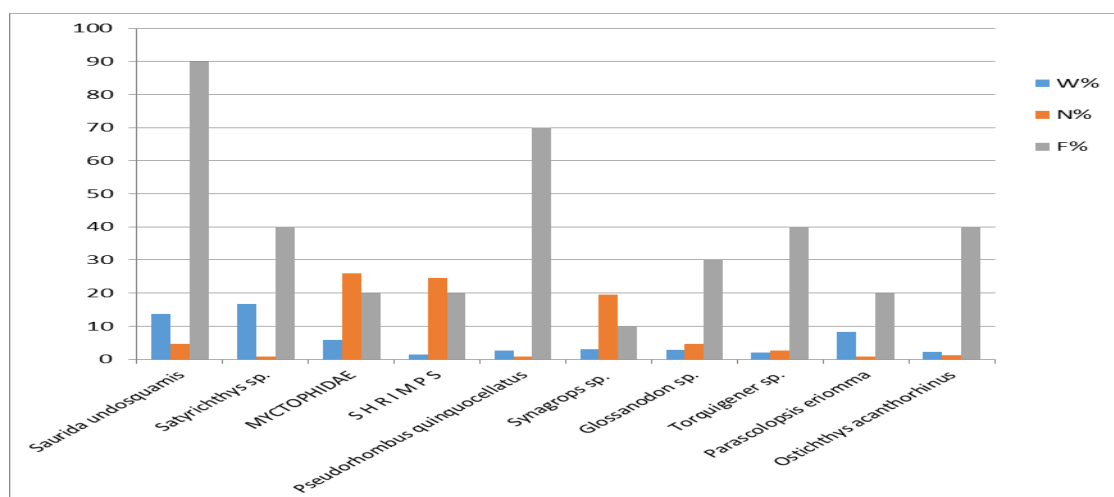
0-50 m



## 50-100 m



## 100-200 m



## 200-500 m

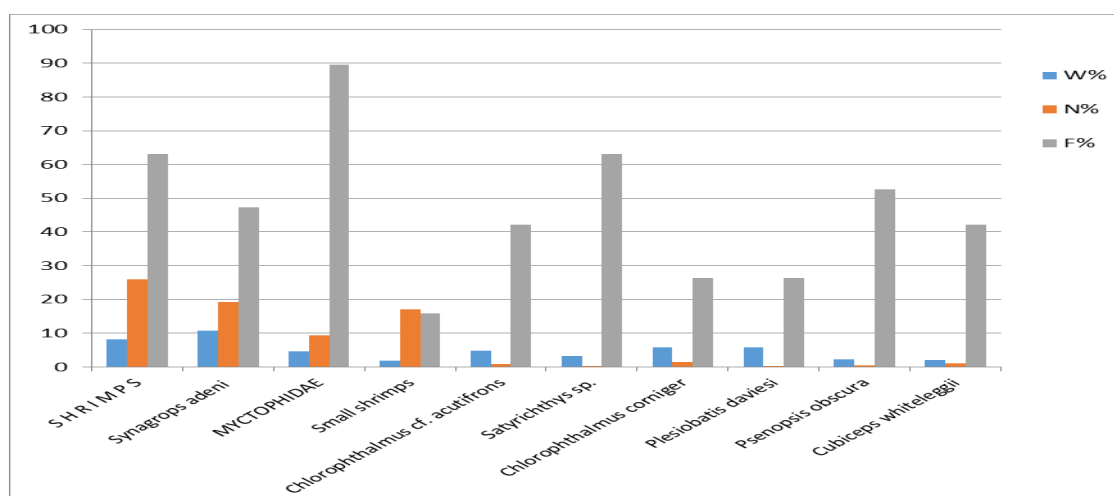


Figure 5.1. Index of relative importance for the 10 most important species or species groups for the depth strata 20-50 m, 50-100 m, 100-200 m and 200-500 m in the Rakhine coastal region (a), the Deltaic coast (b) and the Tanintharyi coast (c).

Comparison between the 2013 and 2015 surveys (Figure 5.2) show some differences in the percentage in weight of families/groups in the catches. The most remarkable difference is the increase of jellyfish and carangids in the catches during the 2015 pre monsoon survey. A marked decrease of trichiurids, clupeoids and species grouped under the category “others” is also notable. Looking more into the species composition of the catches (data not shown), fewer large sized pelagic fish species were found during the 2013 post monsoon survey. This might be a seasonal signal indicating that large pelagic fishes move out of the surveyed area when the salinity decreases during the monsoon due to heavy rain.

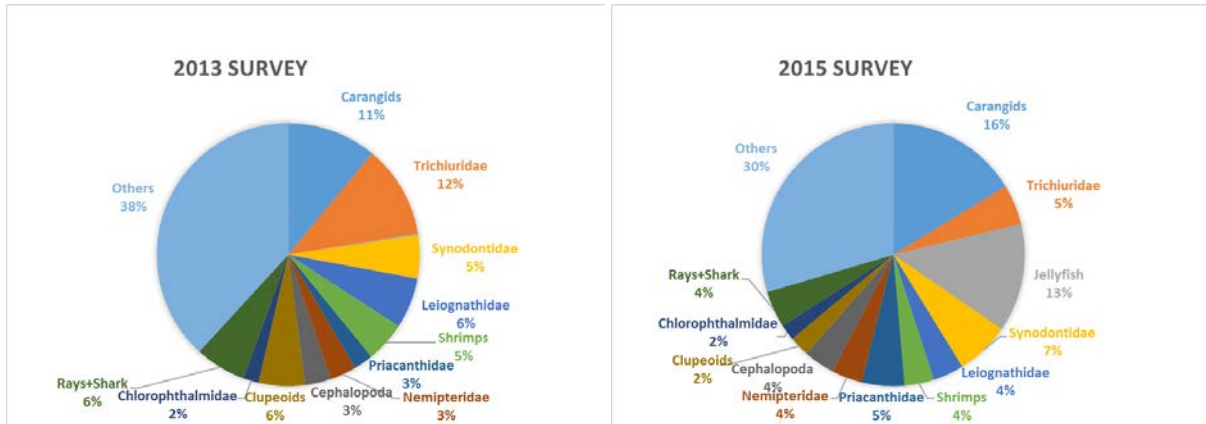


Figure 5.2. Differences in percentage in weight of families/groups in the catches between the 2013 survey and the 2015 survey (all regions combined). Figure based on catches in kg/h.

#### 5.4 Taxonomy and genetics

A number of specimens belonging to various taxonomic groups (ca. 800) were collected during the survey. The latter have been photographed, tissue sampled, fixed and shipped to specialists around the globe for more detail study. The information derived from the survey as well as feedback from the specialists will serve as baseline data to produce a species identification guide to the marine and brackish water resources of Myanmar. The guide will be prepared under the direction of the FishFinder Programme, Marine and Inland Fisheries Services (FIRF) of the Food and Agriculture Organization of the United Nations (FAO).

## CHAPTER 6 SUMMARY AND CONCLUSIONS

The cruise results demonstrate marked spatial patterns in near-surface temperature, salinity, oxygen-levels and relative fluorescence within the Myanmar coastal region. All four variables display clear spatial dynamics, and in some areas also strong horizontal gradients. Most notable are the comparatively warmer upper water-masses along the Rakhine coast, the more saline upper water masses in the southern part of Myanmar coastal area, as well as the high-fluorescence area in the Ayeyarwady Delta coastal region. Our results also show low-oxygen waters with especially (but not exclusively) in the northern region with concentrations as low as about 1 ml/l dissolved oxygen in many cases reaching shelf-depths as shallow as ca. 100 m.

### 6.1 Environment

Chlorophyll a levels were generally low to moderate, depending on location and depth. Chlorophyll concentrations in surface-near layers were generally highest at the stations near the coast.

Nutrient concentrations varied strongly with depth, and particularly nitrate and silicate concentrations spanned great ranges. Nitrate and silicate levels were typically very low in the surface, and increased with depth. Nutrient concentrations in the surface-near layers were mostly higher at near-shore stations. Mixing processes are important factors limiting primary production by nutrients. Nitrate, phosphate and silicate are necessary for phytoplankton to grow. Because of gravitation sinking of particulate material (such as plankton, dead or faecal material), the nutrients are removed from the euphotic zone, but can be replenished by mixing by e.g. river run off or upwelling of deeper water. During the season the survey was carried out, and as pointed out in the results section of this report, river run-off likely is an important contributor to supply primary growth during this season in addition to upwelling caused by internal waves and wind. Copepods dominate in the overall picture from the zooplankton biomass samples, contributing as a major food organism for small fish in the Myanmar waters.

### 6.2 Fish abundance

Abundance of pelagic and demersal fish is reported from the region covered by the survey- generally the depth region between 20- 500 m depth covering the shelf of Myanmar from approx. 20°00' N in the north to the border with Thailand at 10°00' N in the south, see Figure 1.1. This is slightly further north than during the 2013 survey. The survey was not, as was the cases in 2013, hindered by presence of bamboo rafts in the shallow part of the survey area in the Ayeyarwady coastal zone, and the vessel was therefore able specially in this region, to cover slightly closer to the coast. Regions inshore 20 m depth was not covered, and the reported abundance estimates does not include those areas even though we are aware that these are important fishing grounds. However, experience give reason to believe that the catch rates reported for the survey is also reflected in more shallow regions.

The acoustic biomass estimates of pelagic fish were separated into two species groups, Pelagic 1 (Clupeoids species) and Pelagic 2 (carangids and associated species). These estimates were based on an average fish length of 10 cm used to make comparison with historical data easier. Based on this a total estimate of 193 000 tonnes were estimated compared with 109 000 in 2013. 108 000 tonnes were estimated to be Pelagic 1 species while 84 000 was estimated to be Pelagic 2 species. This can be compared with 35 000 tonnes of Pelagic 1 species and 74 000 tonnes of Pelagic 2 species in 2013. The results show as with the demersal survey results a small but clear increase for both species groups, it is

however some of this change must be attributed to seasonal change in abundance. Historically the pre-monsoon season has shown better catch rates offshore than in the post monsoon period. As during 2013 the highest abundance of pelagic fish was found in the Tanintharyi delta region.

The total swept area biomass estimate (Table 7.1) based on valid bottom trawl hauls was estimated to be 367 000 tonnes compared with 280 000 tonnes in 2013, an increase of 87 000 tonnes (Figure 5.1, table 7.1). This is a considerable increase within the 1.5 years from our previous survey, and the increase is consistent in all regions of Myanmar. The Rakhine coastal zone had an estimate of 95 000 compared with 60 000 tonnes in 2013. The Deltaic coast gave a total biomass estimate of 126 000 compared with 101 000 tonnes in 2013 and the Tanintharyi coast showed the highest overall biomass estimate of 146 000 compared with 112 000 tonnes in 2013 (Excluding jellyfish). As with the pelagic estimate some of this change must be attributed to seasonal change in abundance. Historically the pre-monsoon season has shown better catch rates offshore than in the post monsoon period. It is worth noticing that the amount of jellyfish included in the 2015 is high (excluded from the reported figures here. It increased from almost 0 (<1000 tonnes) to 54 000 tonnes. High jellyfish population is a concern several places in the world as this is considered a “dead-end” since the jellyfish have few predators and are also not (with some exceptions) useful for human consumption.

Table 7.1. Summary of biomass estimates from the different regions and depth strata estimated during the 2013, and the present survey.

Depth/Region	Rakhine coast		The Deltaic coast		The Tanintharyi coast	
	2013	Present	2013	Present	2013	Present
20-50 m	31 000	16 000	31 000	41 000	12 000	28 000
50-100 m	19 000	51 000	40 000	46 000	47 000	38 000
100-200 m	4 900	4 700	19 000	26 000	10 000	31 000
200-500 m	5 200	23 000	11 000	13 000	43 000	48 000
Total	60 000	95 000	101 000	126 000	112 000	146 000

It is encouraging to see that the estimates in general are higher than in 2013. Most of this increase is attributed to seasonal variations in fish abundance. However, as mentioned in the introduction to this report a number of management measures have been put in place by the Myanmar government since the 2013 survey, it is not possible to separate the effect of these to the seasonal effect of increased available biomass in the pre monsoon season, especially since the landing statistics for the fishery is so unreliable. Nevertheless, it may well be that some of the increase are a first signs that the management measures are having a positive effect on the resource situation.

### 6.3 Fish Ecology and biodiversity.

There is evidence from the survey of strong separation between three main ecological regions separating the coastal shelf of Myanmar both in relation to oceanographic characteristics and fish distribution. A strong depth separation in relation to the same is also observed. The ecosystem in

general still show strong signs of overfishing / other changes indicated by a general lack of long lived species and considerable lower biomass estimates compared with the findings from the four surveys in 1979 and 1980. The introduction of relatively large biomass of jellyfish in some areas may be seen as signs of the same. These results should be corroborated by any additional information that may be available as regards trends in catch and effort statistics.

#### 6.4 Recommended follow up work

The present survey together with the 2013 survey has provided valuable insights and information on the state of Myanmar marine ecosystems and resources. In particular, there seems to be evidence that fish stocks may be overfished. With the completion of this second survey we have gained new and important information also on how productivity and fish abundance may be subject to seasonal cycles and migrations.

*Key recommendations in relation to the scientific work include:*

Complement the information obtained through the surveys with other knowledge (including fishers' knowledge). It is important that the information obtained through the surveys is put into context in relation to fisheries management objectives and related knowledge needs.

All data collected during the survey belong to Myanmar (these were handed over by the end of the survey). Efforts should be made to further explore the data collected. These could be used to further characterize marine ecosystems and resources of Myanmar, become the basis for several scientific papers, Master and PhD studies. It is strongly recommended that FAO (including BOBLME) and IMR initiate a dialogue with relevant institutions in Myanmar to further explore possible scientific activities based on the data collected by the Dr. F. Nansen.

The data collected during this survey should be used for additional analyses to contribute to building an ecosystem characterization, including identification of sensitive/critical habitats or to develop indicators for future resources and ecosystem monitoring.

FAO has taken initiative to prepare a fish identification guide for Myanmar. The book will when completed improve species identification for both official and recreational use in this country. The work will be carried out in close cooperation with national institutions in Myanmar.

Likewise, fish taxonomic and genetic samples collected are in the process of being analysed and results will be presented to Department of Fisheries separately from this report.

The post survey meeting held in Yangon from 29. February to 4 March 2016 made a series of recommendations both on interpretation of the survey results; recommendations on measures to rebuild the stocks; institutional capacity building and other follow up work in relation to the survey results. These recommendations are not repeated in this report but can be found in the minutes from the Post Survey Meeting.

## REFERENCES

- Anonymous 1968. Smaller zooplankton. Report of Working Party No. 2. Pp. 153-159 in: Tranter DJ. (ed.). Zooplankton sampling. Monographs on oceanographic zooplankton methodology 2., UNESCO, Paris, 174 pp.
- BOBLME “National Report of Myanmar On the Sustainable Management of The Bay of Bengal Large Marine Ecosystem” [http://www.boblme.org/documentRepository/Nat\\_Myanmar.pdf](http://www.boblme.org/documentRepository/Nat_Myanmar.pdf)
- Buckland S.T. Anderson D.R. Burnham K.P. Laake J.L. Borchers D.L. & Thomas L. 2001. Introduction to distance sampling: estimating abundance of biological populations. Oxford University Press.
- Caddy JF, Sharp GD. 1986. An ecological framework for marine fishery investigations. FAO Fisheries Technical Paper No 283: 1-151.
- Fraser JH. 1966. Zooplankton sampling. *Nature*, 211: 915-916.
- Hagebø M, Rey F. 1984. Lagring av sjøvann til analyse av næringssalter. (Storage of seawater for nutrients analysis.) (in Norwegian). *Fisken og Havet* 4, 1-12.
- Hagebø M. 2008. Bestemmelse av oppløst oksygen i sjøvann v.h.a. Winklermetoden redoks titrering. Kvalitetshåndbok for Havforskningsinstituttet Kjemilaboratoriet. In Norwegian, 9 pp.
- Holm-Hansen O, Lorenzen CJ, Holmes RW, Strickland JDH. 1965. Fluorometric determination of chlorophyll. *Conseil International pour l'Exploration de la Mer*, 301: 3-15.
- Jeffrey SW, Humphrey GF. 1975. New spectrophotometric equations for determining chlorophyll a, b, c1 and c2 in higher plants, algae and natural phytoplankton. *Biochimie und Physiologie der Pflanzen*, 167: 191-194.
- Juday C. 1916. Limnological apparatus. *Trans. Wis. Acad. Sci. Arts. Lett.*, 18:566-592.
- Kolding J. 1989. The fish resources of Lake Turkana and their environment - Thesis for the Cand. Scient degree in Fisheries Biology and Final Report of KEN 043 Trial Fishery 1986-1987. University of Bergen, 262 p.
- Motoda S. 1959. Devices of simple plankton apparatus. *Memoirs of the Faculty of Fisheries, Hokkaido University* 7, 73-94.
- Pinkas L, Oliphant MS, Iverson ILK. 1971. Food habits of albacore, bluefin tuna and bonito in Californian waters. *California Department of Fish and Wildlife Fish Bulletins* 152:1-105.
- Stehmann M. (1987). Quick and dirty tabulation of stomach contents and maturity stages for skates (Rajidae) squaloids and other ovoviviparous species of sharks. *AES Newsl.* 1987 (3): 5-9; modified and improved during EU-FAIR Deep-water Fisheries (1999).
- Strickland, JDH, Parsons, TR, 1972. A practical handbook of seawater analysis (2nd edn). *Bulletin of the Fisheries and Research Board of Canada* 167, 1-310.
- Strømme T. 1992. NAN-SIS: Software for fishery survey data logging and analysis. User's manual. *FAO Computerized Information Series (Fisheries)*. No. 4. Rome FAO. 1992. 103.
- Strømme, T. Nakken, O., Sann Aung and Sætersdal, G., 1981. Surveys of the marine fish resources of Burma, September-November 1979 and March-April 1980: Bergen, Norway, Institute of Marine Research, Reports on surveys with the R/V Dr. Fridtjof Nansen, 89 p.

## ANNEX I. RECORDS OF FISHING STATIONS

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 1  
 DATE : 01/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 19° 44. 18  
 Lon E 92° 17. 52  
 TIME : start stop duration Purpose : 3  
 : 00: 44: 57 01: 15: 27 30. 5 (min) Region : 10310  
 LOG : 4618. 21 4619. 79 1. 6 Gear cond.: 0  
 FDEPTH: 140 135 Validity : 0  
 BDEPTH: 140 135 Speed : 3. 1 kn  
 Towing dir: 0° Wire out : 350 m Catch/hour: 362. 07  
 Sorted : 26 Total catch: 184. 05

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Priacanthus prolixus	360.51	28849	99.57	
Neopeinnula orientalis	0.67	110	0.19	
Synagrops adenii	0.37	234	0.10	
Champsodon cf. vorax	0.28	138	0.08	
Decapterus smithvani zi	0.14	41	0.04	
Bregmaceros sp.	0.10	83	0.03	
Plastic	0.00	4	0.00	
Total	362.07		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 2  
 DATE : 01/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 19° 54. 02  
 Lon E 92° 30. 10  
 TIME : start stop duration Purpose : 3  
 : 04: 03: 24 04: 33: 37 30. 2 (min) Region : 10310  
 LOG : 4641. 10 4642. 63 1. 5 Gear cond.: 0  
 FDEPTH: 77 78 Validity : 0  
 BDEPTH: 77 78 Speed : 3. 0 kn  
 Towing dir: 0° Wire out : 200 m Catch/hour: 59. 36  
 Sorted : 30 Total catch: 29. 90

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Rastrelliger brachysoma	36.45	627	61.40	
Gazza minuta	11.91	1453	20.07	
Tentoriiceps cristatus	1.83	81	3.08	
Lagocephalus guentheri	1.63	23	2.74	
Acropoma cf. argenti stigma	1.19	101	2.01	
Decapterus russelli	1.19	20	2.01	
Saurida undosquamis	1.11	22	1.87	
Seriolina nigrofasciata	1.03	4	1.74	
Saurida tumbil	0.75	40	1.27	
Nemipterus japonicus	0.48	28	0.80	
Sepia sp.	0.40	4	0.67	
Loligo sp.	0.40	10	0.67	
Pinjalo pinjalo	0.28	4	0.47	
Lutjanus vitta	0.20	4	0.33	
Ariomma indicum	0.16	4	0.27	
Sphyræna putnamae	0.16	2	0.27	
Pomadasys maculatus	0.10	2	0.17	
Metapenaeus sp.	0.10	6	0.17	
Total	59.36		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 3  
 DATE : 01/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 19° 57. 47  
 Lon E 92° 37. 12  
 TIME : start stop duration Purpose : 3  
 : 06: 15: 08 06: 46: 01 30. 9 (min) Region : 10310  
 LOG : 4653. 93 4655. 49 1. 6 Gear cond.: 0  
 FDEPTH: 42 46 Validity : 0  
 BDEPTH: 42 46 Speed : 3. 0 kn  
 Towing dir: 0° Wire out : 125 m Catch/hour: 23. 61  
 Sorted : 12 Total catch: 12. 15

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Loligo sp.	5.75	472	24.36	
Aurigequula fasciata	5.05	394	21.40	
JELLYFISH	2.68	6	11.36	
Rachycentron canadum	2.41	2	10.21	
Stolephorus indicus	1.67	284	7.08	
Scomberomorus koreanus	1.63	2	6.91	
Saurida tumbil	1.55	31	6.58	
Nemipterus japonicus	1.32	27	5.60	
Saurida undosquamis	0.97	23	4.12	
Tentoriiceps cristatus	0.33	12	1.40	
Pentapinnis longimanus	0.12	10	0.49	
Dussumieria elopsoides	0.12	12	0.49	
Total	23.61		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 4  
 DATE : 01/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 19° 40. 84  
 Lon E 92° 54. 13  
 TIME : start stop duration Purpose : 3  
 : 11: 49: 39 12: 19: 45 30. 1 (min) Region : 10310  
 LOG : 4692. 02 4693. 52 1. 5 Gear cond.: 0  
 FDEPTH: 45 45 Validity : 0  
 BDEPTH: 45 45 Speed : 3. 0 kn  
 Towing dir: 0° Wire out : 125 m Catch/hour: 106. 21  
 Sorted : 4 Total catch: 53. 30

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Gazza minuta	40.61	3166	38.24	
Saurida undosquamis	13.67	628	12.87	
Selar crumenophthalmus	9.92	267	9.34	
Loligo sp.	9.64	414	9.08	
Jaydia striata	9.29	3065	8.74	
Nemipterus japonicus	3.07	52	2.89	
Saurida tumbil	1.99	24	1.88	
Pentapinnis longimanus	1.87	110	1.76	
Scomberoides commersonianus	1.59	2	1.50	
Trichurus lepturus	1.59	54	1.50	
Scomberoides tol	1.08	2	1.01	
Penaeus monodon	1.08	14	1.01	
Small shrimps	0.96	126	0.90	
Sphyræna forsteri	0.92	18	0.86	
Pseudorhombus duplicioellatus	0.90	2	0.84	
Upeneus sp.	0.80	26	0.75	
Charybdis feriata	0.68	2	0.64	
Pomadasys maculatus	0.68	14	0.64	
Chi rocentrus nudus	0.68	2	0.64	
Jaydia queketti	0.64	50	0.60	
Stolephorus indicus	0.60	92	0.56	
Mene maculata	0.48	2	0.45	
Atropus atropus	0.48	4	0.45	
Sea snakes	0.48	2	0.45	
Lagocephalus lunaris	0.48	2	0.45	
Lagocephalus guentheri	0.48	2	0.45	
Metapenaeus tenuipes	0.32	14	0.30	
Pomadasys argyreus	0.28	10	0.26	
Priacanthus tayenus	0.20	6	0.19	
Portunus sanguinolentus	0.16	2	0.15	
Uroconger lepturus	0.12	2	0.11	
Pennahia anea	0.12	2	0.11	
Harpiosquilla harpax	0.12	0.12	2	0.11
Upeneus guttatus	0.10	2	0.09	
Siganus canaliculatus	0.08	2	0.08	
Upeneus sulphureus	0.08	4	0.08	
Apogon sp.	0.00	0	0.00	
Total	106.21		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 5  
 DATE : 01/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 19° 35. 69  
 Lon E 92° 46. 12  
 TIME : start stop duration Purpose : 3  
 : 14: 11: 52 14: 41: 54 30. 0 (min) Region : 10310  
 LOG : 4705. 72 4707. 24 1. 5 Gear cond.: 0  
 FDEPTH: 92 93 Validity : 0  
 BDEPTH: 92 93 Speed : 3. 0 kn  
 Towing dir: 0° Wire out : 220 m Catch/hour: 527. 97  
 Sorted : 76 Total catch: 264. 25

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
JELLYFISH	408.67	0	77.40	
Saurida longimanus	32.31	1259	6.12	
Decapterus smithvani zi	29.09	154	5.51	
Champsodon sp.	12.31	979	2.33	
Priacanthus hamrur	11.89	168	2.25	
Nemipterus randalli	10.35	1343	1.96	
Acropoma cf. argenti stigma	9.37	755	0.87	
Pennahia anea	4.62	20	0.34	
Uroconger sp.	1.82	76	0.29	
Ariomma sp.	1.54	76	0.29	
Lagocephalus guentheri	1.54	28	0.29	
Rhynchoconger squaliceps	1.40	14	0.26	
Jaydia queketti	1.12	210	0.21	
Rhinobatos lionotus	0.60	2	0.11	
Ariomma indicum	0.36	2	0.07	
Atropus atropus	0.28	2	0.05	
Parapercis alboguttata	0.28	14	0.05	
Gazza minuta	0.20	18	0.04	
Tentoriiceps cristatus	0.16	2	0.03	
Lepidotrigla sp. C	0.06	2	0.01	
Acanthoepola sp.	0.02	2	0.00	
Pristipomoides cf. argyrogrammus	0.00	2	0.00	
Total	527.97		100.00	



R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 6  
 DATE : 02/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 19°24.06  
 start stop duration Lon E 92°56.92  
 TIME : 01:27:00 01:57:01 30.0 (min) Purpose : 3  
 LOG : 4757.91 4759.36 1.4 Region : 10310  
 FDEPTH: 71 71 Gear cond.: 0  
 BDEPTH: 71 71 Validity : 0  
 Towing dir: 0° Wire out : 180 m Speed : 2.9 kn  
 Sorted : 27 Total catch: 26.99 Catch/hour: 53.94

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Saurida undosquamis	12.19	316	22.60	
Loligo sp.	7.20	274	13.34	
Nemipterus japonicus	7.08	480	13.12	
Sepia sp.	6.80	48	12.60	
Saurida tumbil	5.80	220	10.74	
Upeneus moluccensis	2.84	92	5.26	7
Lagocephalus guentheri	2.52	50	4.67	
Sea snakes	1.36	2	2.52	
Champsodon sp.	1.12	296	2.07	
Octopus sp.	1.04	6	1.93	
Fistularia petimba	0.88	26	1.63	
Siganus canaliculatus	0.88	26	1.63	
Pentapriion longimanus	0.76	26	1.41	
Sphyræna forsteri	0.64	4	1.19	
Seriolina nigrofasciata	0.40	2	0.74	
Trichurus lepturus	0.36	8	0.67	
Haliutæa sp.	0.36	2	0.67	
Secutor insidiator	0.32	50	0.59	
Priacanthus hamrur	0.28	6	0.52	
Jaydia queketti	0.28	24	0.52	
Rastrelliger faughni	0.22	2	0.41	
Rastrelliger brachysoma	0.22	2	0.41	
Ariosoma gnanadosi	0.16	12	0.30	
Upeneus guttatus	0.12	4	0.22	
Trachinocephalus myops	0.12	2	0.22	
Parapercis alboguttata	0.02	2	0.04	
Jaydia striata	0.00	8	0.00	
Rogadius pristiger	0.00	4	0.00	
Total	53.94		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 9  
 DATE : 02/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 19°10.71  
 start stop duration Lon E 93°17.49  
 TIME : 10:14:57 10:45:00 30.1 (min) Purpose : 3  
 LOG : 4820.66 4822.23 1.6 Region : 10310  
 FDEPTH: 40 41 Gear cond.: 0  
 BDEPTH: 40 41 Validity : 0  
 Towing dir: 0° Wire out : 110 m Speed : 3.1 kn  
 Sorted : 0 Total catch: 28.41 Catch/hour: 56.73

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Gazza minuta	32.83	50152	57.87	
Pomadasy kaakan	7.91	12	13.94	
Saurida tumbil	3.51	174	6.20	
Nemipterus japonicus	3.23	30	5.70	
Lagocephalus lunaris	2.32	22	4.08	
Lagocephalus guentheri	2.00	18	3.52	
Loligo sp.	1.52	106	2.68	0
Lepturacanthus savala	1.24	26	2.18	
Netuma bilineata	0.64	2	1.13	
Aurigequula longispi na	0.44	2	0.77	
Loligo sp.	0.36	14	0.63	
Fistularia petimba	0.24	8	0.42	
Pentapriion longimanus	0.16	10	0.28	
Sauriades leptolepis	0.12	2	0.21	
Priacanthus tayenus	0.12	2	0.21	
Siganus canaliculatus	0.08	0	0.14	
Ostorhinchus fasciatus	0.02	4	0.04	
Total	56.73		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 10  
 DATE : 02/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 19°6.31  
 start stop duration Lon E 93°7.89  
 TIME : 12:16:28 12:46:30 30.0 (min) Purpose : 3  
 LOG : 4833.54 4834.98 1.4 Region : 10310  
 FDEPTH: 78 77 Gear cond.: 0  
 BDEPTH: 78 77 Validity : 0  
 Towing dir: 0° Wire out : 190 m Speed : 2.9 kn  
 Sorted : 33 Total catch: 134.97 Catch/hour: 269.67

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Lagocephalus guentheri	74.33	1271	27.56	
Priacanthus hamrur	36.44	631	13.51	
Sphyræna pinguis	30.21	615	11.20	
Saurida tumbil	28.29	599	10.49	
Upeneus sp.	19.34	599	7.17	
Nemipterus japonicus	16.78	1119	6.22	
Saurida undosquamis	14.87	192	5.51	
Decapterus russelli	12.15	232	4.50	
Sepia sp.	8.47	48	3.14	
Trachinocephalus myops	5.27	40	1.96	
Metapenæus tenuipes	4.48	200	1.66	
Upeneus guttatus	2.88	104	1.07	
Jaydia queketti	2.72	240	1.01	
Octopus sp.	2.72	64	1.01	
Aluterus monoceros	2.56	8	0.95	
Fistularia petimba	1.60	8	0.59	
Rastrelliger brachysoma	1.60	6	0.59	
Selar crumenophthalmus	1.44	24	0.53	
Brachypterois serrulata	1.00	2	0.37	
Rogadius asper	0.80	48	0.30	
Parapercis alboguttata	0.64	16	0.24	
Pomadasy kaakan	0.64	8	0.24	
Saurida sp.	0.24	8	0.09	
Antennarius hispidus	0.10	2	0.04	
Uraspis sp.	0.08	148	0.03	
Rastrelliger faughni	0.04	2	0.01	
Jaydia striata	0.00	2	0.00	
Jaydia smithi	0.00	2	0.00	
Total	269.67		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 11  
 DATE : 02/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 19°3.15  
 start stop duration Lon E 93°6.87  
 TIME : 13:41:13 14:11:13 30.0 (min) Purpose : 3  
 LOG : 4839.26 4840.86 1.6 Region : 10310  
 FDEPTH: 109 114 Gear cond.: 0  
 BDEPTH: 109 114 Validity : 0  
 Towing dir: 0° Wire out : 270 m Speed : 3.2 kn  
 Sorted : 26 Total catch: 79.26 Catch/hour: 158.52

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Champsodon sp.	84.12	13626	53.07	
CALLIONYMIDAE	34.80	22620	21.95	
Spider crab	9.24	1542	5.83	
Priacanthus hamrur	8.16	168	5.15	
Metapenæus tenuipes	7.32	1902	4.62	
Saurida longimanus	4.32	216	2.73	
Cynoglossus sp.	3.36	138	2.12	
Bathymyrus echi onorhynchus	1.08	66	0.68	
Pterygotrigla hemisticta	0.60	12	0.38	
Sphyræna putnameae	0.60	36	0.30	
Acropoma japonicum	0.36	12	0.23	
Decapterus smithvani zi	0.24	6	0.15	
Upeneus moluccensis	0.06	6	0.04	
Neomerinthe sp.	0.06	6	0.04	
Arnoglossus sp.	0.06	6	0.04	
Total	158.52		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 8  
 DATE : 02/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 19°17.94  
 start stop duration Lon E 93°25.89  
 TIME : 08:20:10 08:50:12 30.0 (min) Purpose : 3  
 LOG : 4808.52 4810.01 1.5 Region : 10310  
 FDEPTH: 21 23 Gear cond.: 0  
 BDEPTH: 21 23 Validity : 0  
 Towing dir: 0° Wire out : 60 m Speed : 3.0 kn  
 Sorted : 22 Total catch: 66.48 Catch/hour: 132.83

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
JELLYFISH	79.92	0	60.17	
Lepturacanthus savala	35.10	494	26.43	
Scomberomorus koreanus	3.24	18	2.44	
Chirocentrus nudus	2.08	12	1.56	
Alpes djedaba	1.90	124	1.43	
Scomberomorus commerson	1.84	4	1.38	
Lagocephalus guentheri	1.68	28	1.26	
Siganus javus	0.92	56	0.69	
Sepioteuthis lessoniana			0.84	12
Stolephorus indicus	0.82	232	0.62	
Osteogeneiosus militaris	0.72	2	0.54	
Saurida tumbil	0.64	2	0.48	
Leiognathus sp.	0.60	28	0.45	
Pomadasy argenteus	0.48	4	0.36	
Ilisha striatula	0.44	8	0.33	
Pampus argenteus	0.40	2	0.30	
Nemipterus japonicus	0.36	4	0.27	
Nuchequula sp.	0.30	18	0.23	
Loligo sp.	0.28	14	0.21	
Calappa lophos	0.16	2	0.12	
Terapon jarbua	0.12	2	0.09	
Total	132.83		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 12  
DATE : 02/05/15 GEAR TYPE: PT NO: 1 POSITION: Lat N 18°55.93  
start stop duration duration Lon E 93°10.05  
TIME : 16:34:41 16:56:17 21.6 (min) Purpose : 1  
LOG : 4860.81 4862.08 1.3 Region : 10310  
FDEPTH: 40 40 Gear cond.: 0  
BDEPTH: 215 181 Validity : 0  
Towing dir: 0° Wire out : 0 m Speed : 3.5 kn  
Sorted : 6 Total catch: 141.38 Catch/hour: 392.72

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
<i>Siganus canaliculatus</i>	212.17	54.02	8
<i>Benthoosema fibulatum</i>	180.56	45.98	9
Total	392.72	100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 13  
DATE : 02/05/15 GEAR TYPE: BT NO: 27 POSITION: Lat N 18°52.27  
start stop duration duration Lon E 93°22.72  
TIME : 20:26:19 20:56:28 30.1 (min) Purpose : 3  
LOG : 4884.44 4886.06 1.6 Region : 10310  
FDEPTH: 47 49 Gear cond.: 0  
BDEPTH: 47 49 Validity : 0  
Towing dir: 0° Wire out : 130 m Speed : 3.2 kn  
Sorted : 30 Total catch: 113.06 Catch/hour: 225.00

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
<i>Gazza minuta</i>	74.03	32.90	
<i>Bregmaceros mcclellandi</i>	44.90	19.35	
<i>Penaeus longimanus</i>	27.38	12.17	
<i>Nemipterus japonicus</i>	20.86	9.27	
<i>Jaydia striata</i>	15.60	6.93	
<i>Priacanthus sp.</i>	13.61	6.05	
<i>Lutjanus madras</i>	6.37	2.83	
<i>Saurida undosquamis</i>	4.30	1.91	
<i>Small shrimps</i>	2.71	1.20	
<i>Small crabs</i>	1.91	0.85	
<i>CALLIONYMPHAE</i>	1.75	0.78	
<i>Upeneus moluccensis</i>	1.75	0.78	
<i>Lepturacanthus savala</i>	1.67	0.74	
<i>Mene maculata</i>	1.51	0.67	
<i>Pseudorhombus duplicicellatus</i>	1.43	0.64	
<i>Sepia sp.</i>	1.39	0.62	
<i>Metapenaeus sp.</i>	0.84	0.37	
<i>Octopus sp.</i>	0.72	0.32	
<i>Penaeus monodon</i>	0.72	0.32	
<i>Ariosoma sp.</i>	0.60	0.27	
<i>SQUILLIDAE</i>	0.48	0.21	
<i>Sea snakes</i>	0.32	0.14	
<i>Fistularia petimba</i>	0.16	0.07	
<i>Lethrinus lentjan</i>	0.00	0.00	
<i>Pseudorhombus argus</i>	0.00	0.00	
<i>Upeneus sulphureus</i>	0.00	0.00	
Total	225.00	100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 14  
DATE : 02/05/15 GEAR TYPE: BT NO: 27 POSITION: Lat N 18°49.64  
start stop duration duration Lon E 93°19.06  
TIME : 23:00:48 23:30:33 29.7 (min) Purpose : 3  
LOG : 4894.12 4895.62 1.5 Region : 10310  
FDEPTH: 109 109 Gear cond.: 0  
BDEPTH: 109 109 Validity : 0  
Towing dir: 0° Wire out : 275 m Speed : 3.0 kn  
Sorted : 14 Total catch: 13.95 Catch/hour: 28.14

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
<i>Jaydia striata</i>	25.90	92.04	
<i>Bregmaceros mcclellandi</i>	0.85	3.01	
<i>Priacanthus hamurur</i>	0.44	1.58	
<i>Saurida undosquamis</i>	0.32	1.15	
<i>Small crabs</i>	0.16	0.57	
<i>CALLIONYMPHAE</i>	0.16	0.57	
<i>Bathymyrus echionorhynchus</i>	0.12	0.43	
<i>Upeneus moluccensis</i>	0.08	0.29	
<i>Upeneus sulphureus</i>	0.08	0.29	
<i>Sepioida sp.</i>	0.02	0.07	
Total	28.14	100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 15  
DATE : 03/05/15 GEAR TYPE: BT NO: 27 POSITION: Lat N 18°29.75  
start stop duration duration Lon E 93°28.79  
TIME : 06:50:33 07:20:37 30.1 (min) Purpose : 3  
LOG : 4930.44 4932.00 1.6 Region : 10310  
FDEPTH: 161 167 Gear cond.: 0  
BDEPTH: 161 167 Validity : 0  
Towing dir: 0° Wire out : 440 m Speed : 3.1 kn  
Sorted : 22 Total catch: 303.80 Catch/hour: 606.19

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
<i>Priacanthus hamurur</i>	560.37	92.44	10
<i>JELLYFISH</i>	41.90	6.91	
<i>Decapterus smithvani</i>	2.23	0.37	
<i>Neopinnularia orientalis</i>	0.56	0.09	
<i>Small non comm.</i>	0.56	0.09	
<i>UNIDENTIFIED FISH</i>	0.56	0.09	
Total	606.19	100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 16  
DATE : 03/05/15 GEAR TYPE: BT NO: 27 POSITION: Lat N 18°33.18  
start stop duration duration Lon E 93°33.82  
TIME : 08:46:22 09:16:32 30.2 (min) Purpose : 3  
LOG : 4940.79 4942.40 1.6 Region : 10310  
FDEPTH: 89 88 Gear cond.: 0  
BDEPTH: 89 88 Validity : 0  
Towing dir: 0° Wire out : 250 m Speed : 3.2 kn  
Sorted : 0 Total catch: 729.01 Catch/hour: 1449.80

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
<i>Trichiurus lepturus</i>	1169.69	80.68	13
<i>Nemipterus randalli</i>	127.28	8.78	11
<i>Saurida tumbil</i>	64.91	4.48	12
<i>Decapterus smithvani</i>	26.73	1.84	
<i>Tentoriopsis cristatus</i>	16.55	1.14	
<i>Acropoma cf. argenti stigma</i>	13.36	0.92	
<i>Priacanthus tayenus</i>	12.73	0.88	
<i>Ariomma indicum</i>	8.27	0.57	
<i>Lagocephalus guentheri</i>	7.00	0.48	
<i>Lepidotrigla cf. alcocki</i>	1.91	0.13	
<i>Acanthopoma indica</i>	1.27	0.09	
<i>Pristipomoides sp.</i>	0.10	0.01	
Total	1449.80	100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 17  
DATE : 03/05/15 GEAR TYPE: BT NO: 27 POSITION: Lat N 18°37.61  
start stop duration duration Lon E 93°39.53  
TIME : 10:46:49 11:17:01 30.2 (min) Purpose : 3  
LOG : 4953.27 4954.90 1.6 Region : 10310  
FDEPTH: 30 29 Gear cond.: 0  
BDEPTH: 30 29 Validity : 0  
Towing dir: 0° Wire out : 90 m Speed : 3.2 kn  
Sorted : 33 Total catch: 81.03 Catch/hour: 160.99

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
<i>Lepturacanthus savala</i>	61.29	38.07	14
<i>Gazza minuta</i>	34.85	21.65	
<i>Arius venosus</i>	15.14	9.40	
<i>Pomadourus kaakan</i>	14.94	9.28	
<i>Lutjanus johnii</i>	4.77	2.96	
<i>Chirocentrus dorab</i>	4.25	2.64	
<i>Mene maculata</i>	3.77	2.34	
<i>Metapenaeus sp.</i>	3.38	2.10	
<i>Plotosus canius</i>	2.74	1.70	
<i>Pennahia anea</i>	2.38	1.48	
<i>Lutjanus quinquelineatus</i>	2.19	1.36	
<i>Moolgarda buchanani</i>	2.07	1.28	
<i>Loligo sp.</i>	1.47	0.91	
<i>Himantura walga</i>	1.23	0.77	
<i>Nemipterus japonicus</i>	1.23	0.77	
<i>Panulirus polyphagus</i>	0.83	0.52	
<i>SQUILLIDAE</i>	0.72	0.44	
<i>Stolephorus indicus</i>	0.64	0.39	
<i>Terapon theraps</i>	0.60	0.37	
<i>Upeneus sp.</i>	0.52	0.32	
<i>Charybdis feriata</i>	0.40	0.25	
<i>Nemipterus mesoprius</i>	0.40	0.25	
<i>Portunus sanguinolentus</i>	0.36	0.22	
<i>Thryssa setirostris</i>	0.32	0.20	
<i>Antennarius hispidus</i>	0.16	0.10	
<i>Plotosus lineatus</i>	0.12	0.07	
<i>Apogon smithi</i>	0.12	0.07	
<i>Upeneus guttatus</i>	0.06	0.04	
<i>Lophomus setigerus</i>	0.02	0.01	
<i>Upeneus sp.</i>	0.02	0.01	
<i>Parachaeturiichthys polynema</i>	0.02	0.01	
<i>Uranoscopus affinis</i>	0.00	0.00	
Total	160.99	100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 18  
DATE : 03/05/15 GEAR TYPE: BT NO: 27 POSITION: Lat N 18°14.25  
start stop duration duration Lon E 93°37.86  
TIME : 14:50:47 15:10:15 19.5 (min) Purpose : 3  
LOG : 4980.89 4981.69 0.8 Region : 10310  
FDEPTH: 469 463 Gear cond.: 0  
BDEPTH: 469 463 Validity : 0  
Towing dir: 0° Wire out : 1080 m Speed : 2.5 kn  
Sorted : 40 Total catch: 169.07 Catch/hour: 521.02

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
<i>Echinorhinus cf. brucus</i>	92.70	3	17.79
<i>Dead shells</i>	77.53	14.88	0
<i>Gavialiceps taeniola</i>	53.71	10.31	
<i>Chaunax sp.1</i>	53.59	10.29	
<i>Pycnocraspedum sp.</i>	31.16	5.98	0
<i>Psenopsis obscura</i>	24.59	4.72	
<i>Psenopsis obscura</i>	24.59	4.72	
<i>Sauromuraenesox vorax</i>	12.39	2.38	
<i>Iago omanensis</i>	9.71	1.86	
<i>Lutjanus johnii</i>	5.49	1.05	
<i>Terapon theraps</i>	2.06	0.40	
<i>Dasyatris sp.</i>	0.86	0.17	
<i>Himantura walga</i>	0.86	0.17	
<i>Pennahia anea</i>	0.65	0.12	
Total	521.02	100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 19  
DATE : 03/05/15 GEAR TYPE: BT NO: 27 POSITION: Lat N 18°15.60  
start stop duration duration Lon E 93°42.96  
TIME : 16:44:26 17:13:41 29.3 (min) Purpose : 3  
LOG : 4989.56 4991.07 1.5 Region : 10310  
FDEPTH: 127 132 Gear cond.: 0  
BDEPTH: 127 132 Validity : 0  
Towing dir: 0° Wire out : 300 m Speed : 3.1 kn  
Sorted : 0 Total catch: 13.90 Catch/hour: 28.51

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
<i>Siganus canaliculatus</i>	9.15	32.09	
<i>Solenocera sp.</i>	8.41	29.50	
<i>Priacanthus tayenus</i>	6.07	21.29	
<i>Bregmaceros mcclellandi</i>	4.88	17.12	
Total	28.51	100.00	

R/V Dr. Fridtjof Nansen DATE : 03/05/15 TIME : 18:01:43 LOG : 4994.34 FDEPTH: 10 BDEPTH: 107 Towing dir: 0° Sorted : 0	SURVEY: 2015404 GEAR TYPE: PT No: 1 duration: 34.0 (min) 1.8 70 m 0.38 m	STATION: 20 POSITION: Lat N 18°17.05 Lon E 93°44.10 Purpose : 1 Region : 10310 Gear cond.: 0 Validity : 0 Speed : 3.1 kn Catch/hour: 0.67	R/V Dr. Fridtjof Nansen DATE : 04/05/15 TIME : 02:36:10 LOG : 5043.31 FDEPTH: 36 BDEPTH: 36 Towing dir: 0° Sorted : 36	SURVEY: 2015404 GEAR TYPE: BT No: 27 duration: 30.7 (min) 1.5 125 m 218.16 m	STATION: 23 POSITION: Lat N 18°12.25 Lon E 94°16.21 Purpose : 3 Region : 10310 Gear cond.: 0 Validity : 0 Speed : 3.0 kn Catch/hour: 426.93																																																																																																																																																
<table border="1"> <thead> <tr><th>SPECIES</th><th>CATCH/HOUR</th><th>% OF TOT. C</th><th>SAMP</th></tr> <tr><th>weight</th><th>numbers</th><td></td><td></td></tr> </thead> <tbody> <tr><td>Chirolechthys nudus</td><td>0.49</td><td>2</td><td>73.68</td></tr> <tr><td>Selar crumenophthalmus</td><td>0.14</td><td>4</td><td>21.05</td></tr> <tr><td>Stolephorus indicus</td><td>0.04</td><td>2</td><td>5.26</td></tr> <tr><td>Total</td><td>0.67</td><td></td><td>100.00</td></tr> </tbody> </table>			SPECIES	CATCH/HOUR	% OF TOT. C	SAMP	weight	numbers			Chirolechthys nudus	0.49	2	73.68	Selar crumenophthalmus	0.14	4	21.05	Stolephorus indicus	0.04	2	5.26	Total	0.67		100.00	<table border="1"> <thead> <tr><th>SPECIES</th><th>CATCH/HOUR</th><th>% OF TOT. C</th><th>SAMP</th></tr> <tr><th>weight</th><th>numbers</th><td></td><td></td></tr> </thead> <tbody> <tr><td>Stolephorus indicus</td><td>231.55</td><td>25444</td><td>54.24</td></tr> <tr><td>Gazza minuta</td><td>83.84</td><td>24305</td><td>19.64</td></tr> <tr><td>Trichiurus lepturus</td><td>19.49</td><td>164</td><td>4.57</td></tr> <tr><td>Megalaspis cordyla</td><td>18.79</td><td>35</td><td>4.40</td></tr> <tr><td>Lutjanus erythropterus</td><td>11.04</td><td>12</td><td>2.59</td></tr> <tr><td>Nemipterus japonicus</td><td>8.22</td><td>106</td><td>1.93</td></tr> <tr><td>Mene maculata</td><td>7.75</td><td>188</td><td>1.82</td></tr> <tr><td>Sepia sp.</td><td>7.75</td><td>12</td><td>1.82</td></tr> <tr><td>Parastromateus niger</td><td>7.28</td><td>47</td><td>1.71</td></tr> <tr><td>Saurida tumbil</td><td>6.58</td><td>23</td><td>1.54</td></tr> <tr><td>Scomberomorus guttatus</td><td>5.40</td><td>12</td><td>1.27</td></tr> <tr><td>Pomadasy argyreus</td><td>3.52</td><td>23</td><td>0.83</td></tr> <tr><td>Chirolechthys nudus</td><td>2.58</td><td>12</td><td>0.61</td></tr> <tr><td>Carangoides hedlandensis</td><td>2.35</td><td>12</td><td>0.55</td></tr> <tr><td>Selaroides leptolepis</td><td>2.35</td><td>12</td><td>0.55</td></tr> <tr><td>Rachycentron canadum</td><td>1.64</td><td>12</td><td>0.39</td></tr> <tr><td>Sargocentron rubrum</td><td>1.64</td><td>12</td><td>0.39</td></tr> <tr><td>Saurida undosquamis</td><td>1.41</td><td>35</td><td>0.33</td></tr> <tr><td>Upeneus sundalcus</td><td>1.17</td><td>12</td><td>0.28</td></tr> <tr><td>Terapon theraps</td><td>1.17</td><td>12</td><td>0.28</td></tr> <tr><td>Lagocephalus guentheri</td><td>0.70</td><td>12</td><td>0.17</td></tr> <tr><td>Aurigequula fasciata</td><td>0.70</td><td>12</td><td>0.17</td></tr> <tr><td>Eubleekeria jonesi</td><td>0.00</td><td>2</td><td>0.00</td></tr> <tr><td>Carangoides hedlandensis</td><td>0.00</td><td>2</td><td>0.00</td></tr> <tr><td>Pomadasy argenteus</td><td>0.00</td><td>2</td><td>0.00</td></tr> <tr><td>Equulites leuciscus</td><td>0.00</td><td>2</td><td>0.00</td></tr> <tr><td>Carangoides malabariensis</td><td>0.00</td><td>2</td><td>0.00</td></tr> <tr><td>Total</td><td>426.93</td><td></td><td>100.00</td></tr> </tbody> </table>			SPECIES	CATCH/HOUR	% OF TOT. C	SAMP	weight	numbers			Stolephorus indicus	231.55	25444	54.24	Gazza minuta	83.84	24305	19.64	Trichiurus lepturus	19.49	164	4.57	Megalaspis cordyla	18.79	35	4.40	Lutjanus erythropterus	11.04	12	2.59	Nemipterus japonicus	8.22	106	1.93	Mene maculata	7.75	188	1.82	Sepia sp.	7.75	12	1.82	Parastromateus niger	7.28	47	1.71	Saurida tumbil	6.58	23	1.54	Scomberomorus guttatus	5.40	12	1.27	Pomadasy argyreus	3.52	23	0.83	Chirolechthys nudus	2.58	12	0.61	Carangoides hedlandensis	2.35	12	0.55	Selaroides leptolepis	2.35	12	0.55	Rachycentron canadum	1.64	12	0.39	Sargocentron rubrum	1.64	12	0.39	Saurida undosquamis	1.41	35	0.33	Upeneus sundalcus	1.17	12	0.28	Terapon theraps	1.17	12	0.28	Lagocephalus guentheri	0.70	12	0.17	Aurigequula fasciata	0.70	12	0.17	Eubleekeria jonesi	0.00	2	0.00	Carangoides hedlandensis	0.00	2	0.00	Pomadasy argenteus	0.00	2	0.00	Equulites leuciscus	0.00	2	0.00	Carangoides malabariensis	0.00	2	0.00	Total	426.93		100.00
SPECIES	CATCH/HOUR	% OF TOT. C	SAMP																																																																																																																																																		
weight	numbers																																																																																																																																																				
Chirolechthys nudus	0.49	2	73.68																																																																																																																																																		
Selar crumenophthalmus	0.14	4	21.05																																																																																																																																																		
Stolephorus indicus	0.04	2	5.26																																																																																																																																																		
Total	0.67		100.00																																																																																																																																																		
SPECIES	CATCH/HOUR	% OF TOT. C	SAMP																																																																																																																																																		
weight	numbers																																																																																																																																																				
Stolephorus indicus	231.55	25444	54.24																																																																																																																																																		
Gazza minuta	83.84	24305	19.64																																																																																																																																																		
Trichiurus lepturus	19.49	164	4.57																																																																																																																																																		
Megalaspis cordyla	18.79	35	4.40																																																																																																																																																		
Lutjanus erythropterus	11.04	12	2.59																																																																																																																																																		
Nemipterus japonicus	8.22	106	1.93																																																																																																																																																		
Mene maculata	7.75	188	1.82																																																																																																																																																		
Sepia sp.	7.75	12	1.82																																																																																																																																																		
Parastromateus niger	7.28	47	1.71																																																																																																																																																		
Saurida tumbil	6.58	23	1.54																																																																																																																																																		
Scomberomorus guttatus	5.40	12	1.27																																																																																																																																																		
Pomadasy argyreus	3.52	23	0.83																																																																																																																																																		
Chirolechthys nudus	2.58	12	0.61																																																																																																																																																		
Carangoides hedlandensis	2.35	12	0.55																																																																																																																																																		
Selaroides leptolepis	2.35	12	0.55																																																																																																																																																		
Rachycentron canadum	1.64	12	0.39																																																																																																																																																		
Sargocentron rubrum	1.64	12	0.39																																																																																																																																																		
Saurida undosquamis	1.41	35	0.33																																																																																																																																																		
Upeneus sundalcus	1.17	12	0.28																																																																																																																																																		
Terapon theraps	1.17	12	0.28																																																																																																																																																		
Lagocephalus guentheri	0.70	12	0.17																																																																																																																																																		
Aurigequula fasciata	0.70	12	0.17																																																																																																																																																		
Eubleekeria jonesi	0.00	2	0.00																																																																																																																																																		
Carangoides hedlandensis	0.00	2	0.00																																																																																																																																																		
Pomadasy argenteus	0.00	2	0.00																																																																																																																																																		
Equulites leuciscus	0.00	2	0.00																																																																																																																																																		
Carangoides malabariensis	0.00	2	0.00																																																																																																																																																		
Total	426.93		100.00																																																																																																																																																		
R/V Dr. Fridtjof Nansen DATE : 03/05/15 TIME : 19:37:35 LOG : 5001.28 FDEPTH: 68 BDEPTH: 72 Towing dir: 0° Sorted : 27	SURVEY: 2015404 GEAR TYPE: BT No: 27 duration: 30.6 (min) 1.6 190 m 106.12 m	STATION: 21 POSITION: Lat N 18°19.05 Lon E 93°49.32 Purpose : 3 Region : 10310 Gear cond.: 0 Validity : 0 Speed : 3.1 kn Catch/hour: 208.08	R/V Dr. Fridtjof Nansen DATE : 04/05/15 TIME : 07:04:01 LOG : 5068.64 FDEPTH: 88 BDEPTH: 88 Towing dir: 0° Sorted : 55	SURVEY: 2015404 GEAR TYPE: BT No: 27 duration: 30.4 (min) 1.6 250 m 2510.68 m	STATION: 24 POSITION: Lat N 18°3.07 Lon E 93°58.96 Purpose : 3 Region : 10310 Gear cond.: 0 Validity : 0 Speed : 3.1 kn Catch/hour: 4950.40																																																																																																																																																
<table border="1"> <thead> <tr><th>SPECIES</th><th>CATCH/HOUR</th><th>% OF TOT. C</th><th>SAMP</th></tr> <tr><th>weight</th><th>numbers</th><td></td><td></td></tr> </thead> <tbody> <tr><td>Nemipterus japonicus</td><td>35.45</td><td>5851</td><td>17.04</td></tr> <tr><td>Saurida undosquamis</td><td>27.14</td><td>1467</td><td>13.04</td></tr> <tr><td>Lagocephalus guentheri</td><td>23.53</td><td>424</td><td>11.31</td></tr> <tr><td>Pentaprius longimanus</td><td>18.35</td><td>275</td><td>8.82</td></tr> <tr><td>Priacanthus tayenus</td><td>14.43</td><td>361</td><td>6.94</td></tr> <tr><td>Bregmaceros mcllellandi</td><td>13.65</td><td>4369</td><td>6.56</td></tr> <tr><td>Aurigequula longispina</td><td>11.14</td><td>776</td><td>5.35</td></tr> <tr><td>Cantherhines sp.</td><td>9.57</td><td>24</td><td>4.60</td></tr> <tr><td>Sepia sp.</td><td>9.41</td><td>149</td><td>4.52</td></tr> <tr><td>Upeneus sulphureus</td><td>8.63</td><td>604</td><td>4.15</td></tr> <tr><td>Jaydia striata</td><td>8.00</td><td>1035</td><td>3.84</td></tr> <tr><td>Sphyræna obtusata</td><td>7.84</td><td>212</td><td>3.77</td></tr> <tr><td>Decapterus macrossoma</td><td>4.24</td><td>102</td><td>2.04</td></tr> <tr><td>Lutjanus lutjanus</td><td>3.61</td><td>102</td><td>1.73</td></tr> <tr><td>Loligo sp.</td><td>3.29</td><td>78</td><td>1.58</td></tr> <tr><td>Fistularia petimba</td><td>2.59</td><td>35</td><td>1.24</td></tr> <tr><td>Octopus sp.</td><td>2.20</td><td>35</td><td>1.06</td></tr> <tr><td>Shrimps, small, non comm.</td><td>1.41</td><td>384</td><td>0.68</td></tr> <tr><td>C R A B S</td><td>1.25</td><td>125</td><td>0.60</td></tr> <tr><td>Trichiurus lepturus</td><td>1.25</td><td>24</td><td>0.60</td></tr> <tr><td>Metapenaeus tenuipes</td><td>1.10</td><td>39</td><td>0.53</td></tr> <tr><td>Total</td><td>208.08</td><td></td><td>100.00</td></tr> </tbody> </table>			SPECIES	CATCH/HOUR	% OF TOT. C	SAMP	weight	numbers			Nemipterus japonicus	35.45	5851	17.04	Saurida undosquamis	27.14	1467	13.04	Lagocephalus guentheri	23.53	424	11.31	Pentaprius longimanus	18.35	275	8.82	Priacanthus tayenus	14.43	361	6.94	Bregmaceros mcllellandi	13.65	4369	6.56	Aurigequula longispina	11.14	776	5.35	Cantherhines sp.	9.57	24	4.60	Sepia sp.	9.41	149	4.52	Upeneus sulphureus	8.63	604	4.15	Jaydia striata	8.00	1035	3.84	Sphyræna obtusata	7.84	212	3.77	Decapterus macrossoma	4.24	102	2.04	Lutjanus lutjanus	3.61	102	1.73	Loligo sp.	3.29	78	1.58	Fistularia petimba	2.59	35	1.24	Octopus sp.	2.20	35	1.06	Shrimps, small, non comm.	1.41	384	0.68	C R A B S	1.25	125	0.60	Trichiurus lepturus	1.25	24	0.60	Metapenaeus tenuipes	1.10	39	0.53	Total	208.08		100.00	<table border="1"> <thead> <tr><th>SPECIES</th><th>CATCH/HOUR</th><th>% OF TOT. C</th><th>SAMP</th></tr> <tr><th>weight</th><th>numbers</th><td></td><td></td></tr> </thead> <tbody> <tr><td>Decapterus sp.</td><td>4661.98</td><td>139859</td><td>94.17</td></tr> <tr><td>Saurida tumbil</td><td>170.52</td><td>12789</td><td>3.44</td></tr> <tr><td>Priacanthus blochii</td><td>78.00</td><td>1360</td><td>1.58</td></tr> <tr><td>Acropoma cf. argentistigma</td><td>15.42</td><td>1542</td><td>0.31</td></tr> <tr><td>Nemipterus japonicus</td><td>14.51</td><td>726</td><td>0.29</td></tr> <tr><td>Small crabs</td><td>4.53</td><td>363</td><td>0.09</td></tr> <tr><td>Champsodon sp.</td><td>2.72</td><td>363</td><td>0.05</td></tr> <tr><td>Lepidotrigla alcocki</td><td>2.72</td><td>272</td><td>0.05</td></tr> <tr><td>Total</td><td>4950.40</td><td></td><td>100.00</td></tr> </tbody> </table>			SPECIES	CATCH/HOUR	% OF TOT. C	SAMP	weight	numbers			Decapterus sp.	4661.98	139859	94.17	Saurida tumbil	170.52	12789	3.44	Priacanthus blochii	78.00	1360	1.58	Acropoma cf. argentistigma	15.42	1542	0.31	Nemipterus japonicus	14.51	726	0.29	Small crabs	4.53	363	0.09	Champsodon sp.	2.72	363	0.05	Lepidotrigla alcocki	2.72	272	0.05	Total	4950.40		100.00				
SPECIES	CATCH/HOUR	% OF TOT. C	SAMP																																																																																																																																																		
weight	numbers																																																																																																																																																				
Nemipterus japonicus	35.45	5851	17.04																																																																																																																																																		
Saurida undosquamis	27.14	1467	13.04																																																																																																																																																		
Lagocephalus guentheri	23.53	424	11.31																																																																																																																																																		
Pentaprius longimanus	18.35	275	8.82																																																																																																																																																		
Priacanthus tayenus	14.43	361	6.94																																																																																																																																																		
Bregmaceros mcllellandi	13.65	4369	6.56																																																																																																																																																		
Aurigequula longispina	11.14	776	5.35																																																																																																																																																		
Cantherhines sp.	9.57	24	4.60																																																																																																																																																		
Sepia sp.	9.41	149	4.52																																																																																																																																																		
Upeneus sulphureus	8.63	604	4.15																																																																																																																																																		
Jaydia striata	8.00	1035	3.84																																																																																																																																																		
Sphyræna obtusata	7.84	212	3.77																																																																																																																																																		
Decapterus macrossoma	4.24	102	2.04																																																																																																																																																		
Lutjanus lutjanus	3.61	102	1.73																																																																																																																																																		
Loligo sp.	3.29	78	1.58																																																																																																																																																		
Fistularia petimba	2.59	35	1.24																																																																																																																																																		
Octopus sp.	2.20	35	1.06																																																																																																																																																		
Shrimps, small, non comm.	1.41	384	0.68																																																																																																																																																		
C R A B S	1.25	125	0.60																																																																																																																																																		
Trichiurus lepturus	1.25	24	0.60																																																																																																																																																		
Metapenaeus tenuipes	1.10	39	0.53																																																																																																																																																		
Total	208.08		100.00																																																																																																																																																		
SPECIES	CATCH/HOUR	% OF TOT. C	SAMP																																																																																																																																																		
weight	numbers																																																																																																																																																				
Decapterus sp.	4661.98	139859	94.17																																																																																																																																																		
Saurida tumbil	170.52	12789	3.44																																																																																																																																																		
Priacanthus blochii	78.00	1360	1.58																																																																																																																																																		
Acropoma cf. argentistigma	15.42	1542	0.31																																																																																																																																																		
Nemipterus japonicus	14.51	726	0.29																																																																																																																																																		
Small crabs	4.53	363	0.09																																																																																																																																																		
Champsodon sp.	2.72	363	0.05																																																																																																																																																		
Lepidotrigla alcocki	2.72	272	0.05																																																																																																																																																		
Total	4950.40		100.00																																																																																																																																																		
R/V Dr. Fridtjof Nansen DATE : 03/05/15 TIME : 21:06:48 LOG : 5008.03 FDEPTH: 41 BDEPTH: 41 Towing dir: 0° Sorted : 26	SURVEY: 2015404 GEAR TYPE: BT No: 27 duration: 30.1 (min) 1.6 110 m 83.62 m	STATION: 22 POSITION: Lat N 18°21.49 Lon E 93°51.65 Purpose : 3 Region : 10310 Gear cond.: 0 Validity : 0 Speed : 3.2 kn Catch/hour: 166.41	R/V Dr. Fridtjof Nansen DATE : 04/05/15 TIME : 08:56:30 LOG : 5080.20 FDEPTH: 157 BDEPTH: 154 Towing dir: 0° Sorted : 0	SURVEY: 2015404 GEAR TYPE: BT No: 27 duration: 30.1 (min) 1.6 410 m 9.21 m	STATION: 25 POSITION: Lat N 17°57.75 Lon E 93°51.29 Purpose : 3 Region : 10310 Gear cond.: 0 Validity : 0 Speed : 3.1 kn Catch/hour: 18.38																																																																																																																																																
<table border="1"> <thead> <tr><th>SPECIES</th><th>CATCH/HOUR</th><th>% OF TOT. C</th><th>SAMP</th></tr> <tr><th>weight</th><th>numbers</th><td></td><td></td></tr> </thead> <tbody> <tr><td>Pentaprius longimanus</td><td>71.64</td><td>4299</td><td>43.05</td></tr> <tr><td>Nemipterus japonicus</td><td>31.28</td><td>750</td><td>18.80</td></tr> <tr><td>Leiognathus sp.</td><td>22.21</td><td>430</td><td>13.35</td></tr> <tr><td>Jaydia striata</td><td>13.01</td><td>107</td><td>7.82</td></tr> <tr><td>Lethrinus lentjan</td><td>7.08</td><td>16</td><td>4.26</td></tr> <tr><td>Priacanthus tayenus</td><td>5.25</td><td>209</td><td>3.16</td></tr> <tr><td>Lutjanus lutjanus</td><td>2.43</td><td>20</td><td>1.46</td></tr> <tr><td>Loligo sp.</td><td>2.15</td><td>36</td><td>1.29</td></tr> <tr><td>Upeneus guttatus</td><td>1.79</td><td>84</td><td>1.08</td></tr> <tr><td>Saurida tumbil</td><td>1.71</td><td>60</td><td>1.03</td></tr> <tr><td>Selaroides leptolepis</td><td>1.55</td><td>36</td><td>0.93</td></tr> <tr><td>Sepia sp.</td><td>1.31</td><td>8</td><td>0.79</td></tr> <tr><td>Metapenaeus affinis</td><td>1.19</td><td>46</td><td>0.72</td></tr> <tr><td>Sargocentron rubrum</td><td>1.00</td><td>8</td><td>0.60</td></tr> <tr><td>Epinephelus sexfasciatus</td><td>0.96</td><td>6</td><td>0.57</td></tr> <tr><td>Penaeus monodon</td><td>0.80</td><td>12</td><td>0.48</td></tr> <tr><td>Stolephorus indicus</td><td>0.60</td><td>24</td><td>0.36</td></tr> <tr><td>Fistularia petimba</td><td>0.24</td><td>6</td><td>0.14</td></tr> <tr><td>Pomadasy argenteus</td><td>0.20</td><td>2</td><td>0.12</td></tr> <tr><td>Epinephelus radiatus</td><td>0.00</td><td>2</td><td>0.00</td></tr> <tr><td>Carangoides malabariensis</td><td>0.00</td><td>2</td><td>0.00</td></tr> <tr><td>Pterocaesio digramma</td><td>0.00</td><td>2</td><td>0.00</td></tr> <tr><td>Dipterygnotus balteatus</td><td>0.00</td><td>2</td><td>0.00</td></tr> <tr><td>Xiphochellus typus</td><td>0.00</td><td>2</td><td>0.00</td></tr> <tr><td>Total</td><td>166.41</td><td></td><td>100.00</td></tr> </tbody> </table>			SPECIES	CATCH/HOUR	% OF TOT. C	SAMP	weight	numbers			Pentaprius longimanus	71.64	4299	43.05	Nemipterus japonicus	31.28	750	18.80	Leiognathus sp.	22.21	430	13.35	Jaydia striata	13.01	107	7.82	Lethrinus lentjan	7.08	16	4.26	Priacanthus tayenus	5.25	209	3.16	Lutjanus lutjanus	2.43	20	1.46	Loligo sp.	2.15	36	1.29	Upeneus guttatus	1.79	84	1.08	Saurida tumbil	1.71	60	1.03	Selaroides leptolepis	1.55	36	0.93	Sepia sp.	1.31	8	0.79	Metapenaeus affinis	1.19	46	0.72	Sargocentron rubrum	1.00	8	0.60	Epinephelus sexfasciatus	0.96	6	0.57	Penaeus monodon	0.80	12	0.48	Stolephorus indicus	0.60	24	0.36	Fistularia petimba	0.24	6	0.14	Pomadasy argenteus	0.20	2	0.12	Epinephelus radiatus	0.00	2	0.00	Carangoides malabariensis	0.00	2	0.00	Pterocaesio digramma	0.00	2	0.00	Dipterygnotus balteatus	0.00	2	0.00	Xiphochellus typus	0.00	2	0.00	Total	166.41		100.00	<table border="1"> <thead> <tr><th>SPECIES</th><th>CATCH/HOUR</th><th>% OF TOT. C</th><th>SAMP</th></tr> <tr><th>weight</th><th>numbers</th><td></td><td></td></tr> </thead> <tbody> <tr><td>Solenocera sp.</td><td>14.37</td><td>10057</td><td>78.18</td></tr> <tr><td>Priacanthus tayenus</td><td>3.23</td><td>168</td><td>17.59</td></tr> <tr><td>Bathylupea sp.</td><td>0.44</td><td>96</td><td>2.39</td></tr> <tr><td>Small crabs</td><td>0.28</td><td>24</td><td>1.52</td></tr> <tr><td>Pterygotrigla arabica</td><td>0.06</td><td>2</td><td>0.33</td></tr> <tr><td>Total</td><td>18.38</td><td></td><td>100.00</td></tr> </tbody> </table>			SPECIES	CATCH/HOUR	% OF TOT. C	SAMP	weight	numbers			Solenocera sp.	14.37	10057	78.18	Priacanthus tayenus	3.23	168	17.59	Bathylupea sp.	0.44	96	2.39	Small crabs	0.28	24	1.52	Pterygotrigla arabica	0.06	2	0.33	Total	18.38		100.00				
SPECIES	CATCH/HOUR	% OF TOT. C	SAMP																																																																																																																																																		
weight	numbers																																																																																																																																																				
Pentaprius longimanus	71.64	4299	43.05																																																																																																																																																		
Nemipterus japonicus	31.28	750	18.80																																																																																																																																																		
Leiognathus sp.	22.21	430	13.35																																																																																																																																																		
Jaydia striata	13.01	107	7.82																																																																																																																																																		
Lethrinus lentjan	7.08	16	4.26																																																																																																																																																		
Priacanthus tayenus	5.25	209	3.16																																																																																																																																																		
Lutjanus lutjanus	2.43	20	1.46																																																																																																																																																		
Loligo sp.	2.15	36	1.29																																																																																																																																																		
Upeneus guttatus	1.79	84	1.08																																																																																																																																																		
Saurida tumbil	1.71	60	1.03																																																																																																																																																		
Selaroides leptolepis	1.55	36	0.93																																																																																																																																																		
Sepia sp.	1.31	8	0.79																																																																																																																																																		
Metapenaeus affinis	1.19	46	0.72																																																																																																																																																		
Sargocentron rubrum	1.00	8	0.60																																																																																																																																																		
Epinephelus sexfasciatus	0.96	6	0.57																																																																																																																																																		
Penaeus monodon	0.80	12	0.48																																																																																																																																																		
Stolephorus indicus	0.60	24	0.36																																																																																																																																																		
Fistularia petimba	0.24	6	0.14																																																																																																																																																		
Pomadasy argenteus	0.20	2	0.12																																																																																																																																																		
Epinephelus radiatus	0.00	2	0.00																																																																																																																																																		
Carangoides malabariensis	0.00	2	0.00																																																																																																																																																		
Pterocaesio digramma	0.00	2	0.00																																																																																																																																																		
Dipterygnotus balteatus	0.00	2	0.00																																																																																																																																																		
Xiphochellus typus	0.00	2	0.00																																																																																																																																																		
Total	166.41		100.00																																																																																																																																																		
SPECIES	CATCH/HOUR	% OF TOT. C	SAMP																																																																																																																																																		
weight	numbers																																																																																																																																																				
Solenocera sp.	14.37	10057	78.18																																																																																																																																																		
Priacanthus tayenus	3.23	168	17.59																																																																																																																																																		
Bathylupea sp.	0.44	96	2.39																																																																																																																																																		
Small crabs	0.28	24	1.52																																																																																																																																																		
Pterygotrigla arabica	0.06	2	0.33																																																																																																																																																		
Total	18.38		100.00																																																																																																																																																		
R/V Dr. Fridtjof Nansen DATE : 04/05/15 TIME : 14:47:25 LOG : 5105.23 FDEPTH: 68 BDEPTH: 1524 Towing dir: 0° Sorted : 0	SURVEY: 2015404 GEAR TYPE: PT No: 1 duration: 21.5 (min) 1.1 0 m 4.44 m	STATION: 26 POSITION: Lat N 17°46.68 Lon E 93°48.56 Purpose : 1 Region : 10310 Gear cond.: 0 Validity : 0 Speed : 2.9 kn Catch/hour: 12.40	R/V Dr. Fridtjof Nansen DATE : 04/05/15 TIME : 14:47:25 LOG : 5105.23 FDEPTH: 68 BDEPTH: 1524 Towing dir: 0° Sorted : 0	SURVEY: 2015404 GEAR TYPE: PT No: 1 duration: 21.5 (min) 1.1 0 m 4.44 m	STATION: 26 POSITION: Lat N 17°46.68 Lon E 93°48.56 Purpose : 1 Region : 10310 Gear cond.: 0 Validity : 0 Speed : 2.9 kn Catch/hour: 12.40																																																																																																																																																
<table border="1"> <thead> <tr><th>SPECIES</th><th>CATCH/HOUR</th><th>% OF TOT. C</th><th>SAMP</th></tr> <tr><th>weight</th><th>numbers</th><td></td><td></td></tr> </thead> <tbody> <tr><td>Psenes cyanophrys</td><td>4.63</td><td>6257</td><td>37.39</td></tr> <tr><td>JELLYFISH</td><td>3.74</td><td>0</td><td>30.18</td></tr> <tr><td>Loligo sp.</td><td>1.51</td><td>329</td><td>12.16</td></tr> <tr><td>MYCTOPHIDAE</td><td>1.12</td><td>413</td><td>9.01</td></tr> <tr><td>Leptocephalus</td><td>0.95</td><td>154</td><td>7.66</td></tr> <tr><td>Decapterus sp., juvenile</td><td>0.34</td><td>117</td><td>2.70</td></tr> <tr><td>PARALEPIDIDAE</td><td>0.11</td><td>17</td><td>0.90</td></tr> <tr><td>Auxis sp., juvenile</td><td>0.00</td><td>3</td><td>0.00</td></tr> <tr><td>Argonauta sp.</td><td>0.00</td><td>3</td><td>0.00</td></tr> <tr><td>Schedophilus sp., juvenile</td><td>0.00</td><td>6</td><td>0.00</td></tr> <tr><td>Xiphasia cf. matsubari</td><td>0.00</td><td>3</td><td>0.00</td></tr> <tr><td>CARANGIDAE, juvenile</td><td>0.00</td><td>11</td><td>0.00</td></tr> <tr><td>Priacanthus sp., juvenile</td><td>0.00</td><td>28</td><td>0.00</td></tr> <tr><td>Total</td><td>12.40</td><td></td><td>100.00</td></tr> </tbody> </table>			SPECIES	CATCH/HOUR	% OF TOT. C	SAMP	weight	numbers			Psenes cyanophrys	4.63	6257	37.39	JELLYFISH	3.74	0	30.18	Loligo sp.	1.51	329	12.16	MYCTOPHIDAE	1.12	413	9.01	Leptocephalus	0.95	154	7.66	Decapterus sp., juvenile	0.34	117	2.70	PARALEPIDIDAE	0.11	17	0.90	Auxis sp., juvenile	0.00	3	0.00	Argonauta sp.	0.00	3	0.00	Schedophilus sp., juvenile	0.00	6	0.00	Xiphasia cf. matsubari	0.00	3	0.00	CARANGIDAE, juvenile	0.00	11	0.00	Priacanthus sp., juvenile	0.00	28	0.00	Total	12.40		100.00	<table border="1"> <thead> <tr><th>SPECIES</th><th>CATCH/HOUR</th><th>% OF TOT. C</th><th>SAMP</th></tr> <tr><th>weight</th><th>numbers</th><td></td><td></td></tr> </thead> <tbody> <tr><td>Psenes cyanophrys</td><td>4.63</td><td>6257</td><td>37.39</td></tr> <tr><td>JELLYFISH</td><td>3.74</td><td>0</td><td>30.18</td></tr> <tr><td>Loligo sp.</td><td>1.51</td><td>329</td><td>12.16</td></tr> <tr><td>MYCTOPHIDAE</td><td>1.12</td><td>413</td><td>9.01</td></tr> <tr><td>Leptocephalus</td><td>0.95</td><td>154</td><td>7.66</td></tr> <tr><td>Decapterus sp., juvenile</td><td>0.34</td><td>117</td><td>2.70</td></tr> <tr><td>PARALEPIDIDAE</td><td>0.11</td><td>17</td><td>0.90</td></tr> <tr><td>Auxis sp., juvenile</td><td>0.00</td><td>3</td><td>0.00</td></tr> <tr><td>Argonauta sp.</td><td>0.00</td><td>3</td><td>0.00</td></tr> <tr><td>Schedophilus sp., juvenile</td><td>0.00</td><td>6</td><td>0.00</td></tr> <tr><td>Xiphasia cf. matsubari</td><td>0.00</td><td>3</td><td>0.00</td></tr> <tr><td>CARANGIDAE, juvenile</td><td>0.00</td><td>11</td><td>0.00</td></tr> <tr><td>Priacanthus sp., juvenile</td><td>0.00</td><td>28</td><td>0.00</td></tr> <tr><td>Total</td><td>12.40</td><td></td><td>100.00</td></tr> </tbody> </table>			SPECIES	CATCH/HOUR	% OF TOT. C	SAMP	weight	numbers			Psenes cyanophrys	4.63	6257	37.39	JELLYFISH	3.74	0	30.18	Loligo sp.	1.51	329	12.16	MYCTOPHIDAE	1.12	413	9.01	Leptocephalus	0.95	154	7.66	Decapterus sp., juvenile	0.34	117	2.70	PARALEPIDIDAE	0.11	17	0.90	Auxis sp., juvenile	0.00	3	0.00	Argonauta sp.	0.00	3	0.00	Schedophilus sp., juvenile	0.00	6	0.00	Xiphasia cf. matsubari	0.00	3	0.00	CARANGIDAE, juvenile	0.00	11	0.00	Priacanthus sp., juvenile	0.00	28	0.00	Total	12.40		100.00																
SPECIES	CATCH/HOUR	% OF TOT. C	SAMP																																																																																																																																																		
weight	numbers																																																																																																																																																				
Psenes cyanophrys	4.63	6257	37.39																																																																																																																																																		
JELLYFISH	3.74	0	30.18																																																																																																																																																		
Loligo sp.	1.51	329	12.16																																																																																																																																																		
MYCTOPHIDAE	1.12	413	9.01																																																																																																																																																		
Leptocephalus	0.95	154	7.66																																																																																																																																																		
Decapterus sp., juvenile	0.34	117	2.70																																																																																																																																																		
PARALEPIDIDAE	0.11	17	0.90																																																																																																																																																		
Auxis sp., juvenile	0.00	3	0.00																																																																																																																																																		
Argonauta sp.	0.00	3	0.00																																																																																																																																																		
Schedophilus sp., juvenile	0.00	6	0.00																																																																																																																																																		
Xiphasia cf. matsubari	0.00	3	0.00																																																																																																																																																		
CARANGIDAE, juvenile	0.00	11	0.00																																																																																																																																																		
Priacanthus sp., juvenile	0.00	28	0.00																																																																																																																																																		
Total	12.40		100.00																																																																																																																																																		
SPECIES	CATCH/HOUR	% OF TOT. C	SAMP																																																																																																																																																		
weight	numbers																																																																																																																																																				
Psenes cyanophrys	4.63	6257	37.39																																																																																																																																																		
JELLYFISH	3.74	0	30.18																																																																																																																																																		
Loligo sp.	1.51	329	12.16																																																																																																																																																		
MYCTOPHIDAE	1.12	413	9.01																																																																																																																																																		
Leptocephalus	0.95	154	7.66																																																																																																																																																		
Decapterus sp., juvenile	0.34	117	2.70																																																																																																																																																		
PARALEPIDIDAE	0.11	17	0.90																																																																																																																																																		
Auxis sp., juvenile	0.00	3	0.00																																																																																																																																																		
Argonauta sp.	0.00	3	0.00																																																																																																																																																		
Schedophilus sp., juvenile	0.00	6	0.00																																																																																																																																																		
Xiphasia cf. matsubari	0.00	3	0.00																																																																																																																																																		
CARANGIDAE, juvenile	0.00	11	0.00																																																																																																																																																		
Priacanthus sp., juvenile	0.00	28	0.00																																																																																																																																																		
Total	12.40		100.00																																																																																																																																																		



R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 34  
 DATE : 05/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 17°23.56  
 start stop duration duration  
 TIME : 09:52:27 10:22:35 30.1 (min) Purpose : 3  
 LOG : 5219.74 5221.20 1.5 Region : 10310  
 FDEPTH: 173 171 Gear cond.: 0  
 BDEPTH: 173 171 Validity : 0  
 Towing dir: 0° Wire out : 430 m Speed : 2.9 kn  
 Sorted : 15 Total catch: 45.12 Catch/hour: 89.85

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
C R A B S	68.22	23197	75.93	
Priacanthus hamrur	21.63	514	24.07	30
Total	89.85		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 35  
 DATE : 05/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 17°8.96  
 start stop duration duration  
 TIME : 16:11:17 16:41:32 30.2 (min) Purpose : 3  
 LOG : 5265.62 5267.06 1.4 Region : 10310  
 FDEPTH: 767 777 Gear cond.: 0  
 BDEPTH: 767 777 Validity : 0  
 Towing dir: 0° Wire out : 1600 m Speed : 2.9 kn  
 Sorted : 24 Total catch: 100.21 Catch/hour: 198.90

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Gaviliceps taeniola	53.19	637	26.74	
Ophiuroidea	42.67	0	21.45	
Sea cucumber	30.57	89	15.37	
Lamprogrammus sp.			18.06	169

0				
Allocephalus sp.	14.09	139	7.09	
Physiculus sp.	11.71	208	5.89	
Centroscyllium cf. ornatum			10.32	30
Coryphaenoides sp.		9.92	79	4.99
Aristeus alcocki	5.68	510	2.85	
NETTASTOMATIDAE	0.99	4	0.50	
Cruriraja andamanica	0.89	2	0.45	
Apristurus cf. investigatoris		0.79	0.00	4
Fishing gears	0.00	2	0.00	0
Bathypterois cf. phenax	0.00	0	0.00	0
JELLYFISH	0.00	0	0.00	
MURAENESOCIDAE	0.00	0	0.00	
Avocettina infans	0.00	0	0.00	
Notacanthus sp.	0.00	0	0.00	
PARALEPIDIDAE	0.00	0	0.00	
Hydroagus sp.	0.00	0	0.00	
Plastic	0.00	0	0.00	
Total	198.90		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 36  
 DATE : 05/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 17°8.38  
 start stop duration duration  
 TIME : 21:27:58 21:58:12 30.2 (min) Purpose : 3  
 LOG : 5280.32 5281.98 1.6 Region : 10310  
 FDEPTH: 136 136 Gear cond.: 0  
 BDEPTH: 136 136 Validity : 0  
 Towing dir: 0° Wire out : 360 m Speed : 3.3 kn  
 Sorted : 1 Total catch: 0.86 Catch/hour: 1.71

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Iago omanensis	1.67	2	97.67	
Priacanthus hamrur	0.04	6	2.33	
Total	1.71		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 37  
 DATE : 05/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 17°6.54  
 start stop duration duration  
 TIME : 22:44:10 23:14:32 30.4 (min) Purpose : 3  
 LOG : 5286.44 5288.07 1.6 Region : 10310  
 FDEPTH: 76 78 Gear cond.: 0  
 BDEPTH: 76 78 Validity : 0  
 Towing dir: 0° Wire out : 210 m Speed : 3.2 kn  
 Sorted : 26 Total catch: 52.14 Catch/hour: 103.01

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Saurida longimanus	58.03	6257	57.31	32
Nemipterus japonicus	20.07	944	19.49	31
Priacanthus prolixus	4.35	95	4.22	
Iago omanensis	4.31	36	4.18	
Lepturacanthus savala	3.95	12	3.84	3.22
GOBIIDAE sp. 1		3.32	367	
Parapterois heterura	2.57	482	2.49	
Portunus sp.	1.90	146	1.84	
Shrimps, small, non comm.	1.78	126	1.73	
Rhynchoconger sp.	0.99	28	0.96	
Acanthoecopola sp.	0.47	43	0.46	
Apogon sp.	0.28	24	0.27	
Sea snakes	0.00	2	0.00	
Total	103.01		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 38  
 DATE : 06/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 17°4.50  
 start stop duration duration  
 TIME : 04:20:37 04:50:37 30.0 (min) Purpose : 3  
 LOG : 5306.47 5307.93 1.5 Region : 10310  
 FDEPTH: 42 44 Gear cond.: 0  
 BDEPTH: 42 44 Validity : 0  
 Towing dir: 0° Wire out : 120 m Speed : 2.9 kn  
 Sorted : 0 Total catch: 112.38 Catch/hour: 224.76

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Leiognathus sp.	149.60	1424	66.56	
Loligo sp.	13.60	480	6.05	
Alectis indica	9.12	8	4.06	
Pentapriion longimanus	7.36	336	3.27	
Saurida tumbil	7.16	64	3.19	33
Saurida undosquami	5.92	72	2.63	34
Trichiurus lepturus	5.76	80	2.56	
Leiognathus cf. berbis	4.48	904	1.99	
Carangoides malabariensis	4.00	16	1.78	
Secutor sp.	3.68	744	1.64	
Nemipterus randalli	2.88	40	1.28	
Sea snakes	2.80	2	1.25	
Aurigequala longispina	2.06	32	0.93	
Alectis ciliaris	1.60	8	0.71	
C R A B S	1.60	128	0.71	
Priacanthus hamrur	1.20	16	0.53	
Stolephorus indicus	0.72	24	0.32	
Fistularia petimba	0.64	16	0.28	
Lutjanus quinquelineatus	0.48	8	0.21	
Small crabs	0.08	8	0.04	
9.08 Total	224.76		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 39  
 DATE : 06/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 16°45.24  
 start stop duration duration  
 TIME : 07:51:18 08:21:27 30.1 (min) Purpose : 3  
 LOG : 5331.43 5333.09 1.6 Region : 10310  
 FDEPTH: 24 30 Gear cond.: 0  
 BDEPTH: 24 30 Validity : 0  
 Towing dir: 0° Wire out : 90 m Speed : 3.3 kn  
 Sorted : 4 Total catch: 97.22 Catch/hour: 193.47

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Leiognathus sp.	124.94	49974	64.58	
Scomberomorus commerson	16.88	6	8.72	
Saurida tumbil	14.69	529	7.59	
Secutor sp.	12.24	2529	6.33	
Stolephorus indicus	6.53	1755	3.37	
Megalaspis cordyla	4.18	4	2.16	
Gerres filamentosus	2.63	8	1.36	
Leiognathus cf. berbis	2.45	287	1.27	
Nemipterus japonicus	1.95	22	1.01	35
Aurigequala longispina	1.67	24	0.86	
Alectis ciliaris	1.11	2	0.58	
Upeneus sulphureus	0.82	40	0.42	
Trichiurus lepturus	0.64	10	0.33	
Epinephelus coioides	0.60	2	0.31	
Lutjanus lutjanus	0.48	10	0.25	
Lagocephalus guentheri	0.40	8	0.21	
Lutjanus malabariensis	0.32	2	0.16	
Epinephelus latifasciatus	0.24	2	0.12	
Atropus atropus	0.20	2	0.10	
Loligo sp.	0.18	6	0.09	
Priacanthus sp.	0.12	8	0.06	
Cynoglossus sp.	0.08	2	0.04	
Sardinella gibbosa	0.08	2	0.04	
Pomadasys sp.	0.08	2	0.04	
Plastic cans-jars etc	0.00	2	0.00	
Total	193.47		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 40  
 DATE : 06/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 16°47.18  
 start stop duration duration  
 TIME : 09:49:22 10:19:28 30.1 (min) Purpose : 3  
 LOG : 5343.53 5344.95 1.4 Region : 10310  
 FDEPTH: 69 68 Gear cond.: 0  
 BDEPTH: 69 68 Validity : 0  
 Towing dir: 0° Wire out : 180 m Speed : 2.8 kn  
 Sorted : 29 Total catch: 29.32 Catch/hour: 58.45

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichiurus lepturus	19.22	116	32.88	
Nemipterus japonicus	13.40	353	22.92	37
Nemipterus nematophorus	5.50	136	9.41	38
Ariomma indicum	5.42	50	9.28	
Loligo sp.	3.55	128	6.07	
Fistularia petimba	1.99	16	3.41	
Secutor sp.	1.83	151	3.14	
Sepia sp.	1.63	8	2.80	
Saurida tumbil	1.55	0	2.66	
Saurida undosquami	1.12	46	1.91	
Lagocephalus guentheri	1.04	10	1.77	
Nemipterus sp.	0.76	58	1.30	39
Upeneus guttatus	0.56	16	0.95	
Stolephorus indicus	0.36	106	0.61	
LEIognATHIDAE	0.36	58	0.61	
Cynoglossus sp.	0.16	18	0.27	
Pomadasys argyreus	0.00	2	0.00	
Total	58.45		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 41  
 DATE : 06/05/15 GEAR TYPE: BT NO: 27 POSITION: Lat N 16° 47.24  
 start stop duration Lon E 94° 2.15  
 TIME : 11:31:40 12:01:45 30.1 (min) Purpose : 3  
 LOG : 5352.34 5353.94 1.6 Region : 10310  
 FDEPTH: 155 161 Gear cond.: 0  
 BDEPTH: 155 161 Validity : 0  
 Towing dir: 0° Wire out : 370 m Speed : 3.2 kn  
 Sorted : 26 Total catch: 25.54 Catch/hour: 50.94

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Priacanthus hamrur	21.06	1053	41.35	41
Champsodon sp.	17.55	1316	34.46	42
Pterygotrigla arabica	5.35	136	10.49	40
Dysomma bucephalus	3.39	34	6.66	
Sea snakes	1.08	2	2.11	
Ariomma indicum	0.92	8	1.80	
Bathymyrus echi onorhynchus	0.84	28	1.64	
Saurida undosquams	0.20	4	0.39	
Cynoglossus carpenteri	0.16	4	0.31	
Lagocephalus guentheri	0.16	2	0.31	
Decapterus kurroi des	0.12	4	0.23	
Nemipterus japonicus	0.12	2	0.23	
Total	50.94		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 42  
 DATE : 06/05/15 GEAR TYPE: BT NO: 27 POSITION: Lat N 16° 25.88  
 start stop duration Lon E 93° 56.91  
 TIME : 16:07:24 16:37:26 30.0 (min) Purpose : 3  
 LOG : 5386.18 5387.65 1.5 Region : 10310  
 FDEPTH: 274 280 Gear cond.: 0  
 BDEPTH: 274 280 Validity : 0  
 Towing dir: 0° Wire out : 670 m Speed : 2.9 kn  
 Sorted : 20 Total catch: 120.28 Catch/hour: 240.32

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Neoharriotta pinnata	81.12	20	33.75	
Acentrogobius sp.1			35.64	2531
Psenopsis obscura	24.94	432	10.38	
Pycnocraspedum sp.	23.18	72	9.64	
Uroconger sp.	20.94	823	8.71	
Bythaelurus hispidus	18.54	328	7.72	44
Solenocera chopral	14.07	913	5.85	
Eridacnis radcliffei	7.19	176	2.99	45
Pterygotrigla arabica	6.55	104	2.73	46
Bembrops caudimaculata	4.80	88	2.00	
Bembrops platyrhynchus	3.04	56	1.26	
Chlorophthalmus corniger	0.32	16	0.13	
Ammodiodes zanthrops	0.00	0	0.00	
Total	240.32		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 43  
 DATE : 06/05/15 GEAR TYPE: BT NO: 27 POSITION: Lat N 16° 29.63  
 start stop duration Lon E 94° 0.32  
 TIME : 17:54:08 18:24:52 30.7 (min) Purpose : 3  
 LOG : 5394.28 5395.94 1.7 Region : 10310  
 FDEPTH: 125 121 Gear cond.: 0  
 BDEPTH: 125 121 Validity : 0  
 Towing dir: 0° Wire out : 340 m Speed : 3.2 kn  
 Sorted : 0 Total catch: 11.22 Catch/hour: 21.91

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
SYNAPHOBRANCHI DAE	6.05	254	27.63	
Pterygotrigla hemisticta	5.12	338	23.35	
Cynoglossus lingua	2.38	62	10.87	
Psenopsis obscura	2.03	33	9.27	
Priacanthus hamrur	1.64	62	7.49	
Loligo sp.	1.09	4	4.99	
Iago omanensis	0.98	21	4.46	
Saurida tumbil	0.74	18	3.39	
Sauromaenax vorax	0.66	41	3.03	
Chelidoperca sp.	0.43	18	1.96	
Octopus sp.	0.31	4	1.43	
Callionymus sp.	0.31	14	1.43	
Parasclopiopsis boesemani	0.12	4	0.53	
Synagrops adeni	0.04	8	0.18	
Total	21.91		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 44  
 DATE : 06/05/15 GEAR TYPE: BT NO: 27 POSITION: Lat N 16° 27.58  
 start stop duration Lon E 94° 4.61  
 TIME : 19:31:06 20:01:25 30.3 (min) Purpose : 3  
 LOG : 5402.02 5403.69 1.7 Region : 10310  
 FDEPTH: 67 67 Gear cond.: 0  
 BDEPTH: 67 67 Validity : 0  
 Towing dir: 0° Wire out : 170 m Speed : 3.3 kn  
 Sorted : 4 Total catch: 27.84 Catch/hour: 55.09

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Nemipterus japonicus	25.82	2840	46.88	
Saurida tumbil	9.20	685	16.70	
S H R I M P S	4.49	303	8.15	
Priacanthus hamrur	3.36	101	6.11	
Tri ch i u r u s l e p t u r u s	2.73	16	4.96	
APOGONIDAE	2.47	596	4.49	
Pennahia anea	2.30	16	4.17	
Sepia sp.	1.46	4	2.66	
SYNAPHOBRANCHI DAE	1.35	146	2.44	
Nemipterus bipunctatus	1.11	133	2.01	
Brachypterois serrulata	0.46	12	0.83	
Antennariu s s t r i a t u s	0.16	2	0.29	
Terapon jarbua	0.16	2	0.29	
Cantherhines multilineatus	0.02	2	0.04	
Total	55.09		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 45  
 DATE : 06/05/15 GEAR TYPE: BT NO: 27 POSITION: Lat N 16° 27.00  
 start stop duration Lon E 94° 8.23  
 TIME : 20:58:04 21:28:24 30.3 (min) Purpose : 3  
 LOG : 5409.20 5410.81 1.6 Region : 10310  
 FDEPTH: 40 41 Gear cond.: 0  
 BDEPTH: 40 41 Validity : 0  
 Towing dir: 0° Wire out : 120 m Speed : 3.2 kn  
 Sorted : 0 Total catch: 34.84 Catch/hour: 68.92

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Nemipterus nematophorus	16.46	285	23.88	47
Lutjanus lutjanus	13.77	427	19.98	
Terapon jarbua	4.75	32	6.89	
Nemipterus bipunctatus	3.88	59	5.63	
Sphyræna obtusata	3.88	59	5.63	
Leiognathus sp.	2.85	657	4.13	
Priacanthus tayenus	2.61	87	3.79	
Saurida tumbil	2.45	16	3.56	
Sepia sp.	2.29	12	3.33	
Parupeneus heptacanthus	2.22	158	3.21	
Siganus canaliculatus	2.06	44	2.99	
Cantherhines multilineatus	1.50	8	2.18	
Abalistes stellatus	1.35	8	1.95	
Pennahia anea	1.19	8	1.72	
Pentapriou longimanus	1.11	103	1.61	
Uranoscopus sp.	0.79	14	1.15	
SYNAPHOBRANCHI DAE	0.79	4	1.15	
Carangoides plagiotaenia	0.73	16	1.06	
Lutjanus qui nuelineatus	0.63	16	0.92	
S H R I M P S	0.59	28	0.86	
Congrosx talabon	0.47	4	0.69	
Charybdis feriata	0.38	2	0.55	
APOGONIDAE	0.36	51	0.52	
Lagocephalus lunaris	0.36	4	0.52	
Pterois russelli	0.28	20	0.40	
Pistularia petimba	0.28	12	0.40	
Hali et a e t a s p .	0.26	2	0.37	
Pterocasio tessellata	0.24	40	0.34	
Grammolites sp.	0.24	8	0.34	
Plotosus canius	0.12	79	0.17	
Tri x i p h i c h t h y s w e b e r i	0.06	2	0.09	
Total	68.92		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 46  
 DATE : 07/05/15 GEAR TYPE: BT NO: 27 POSITION: Lat N 16° 7.38  
 start stop duration Lon E 94° 4.12  
 TIME : 01:40:34 02:10:36 30.0 (min) Purpose : 3  
 LOG : 5442.86 5444.36 1.5 Region : 10310  
 FDEPTH: 36 35 Gear cond.: 0  
 BDEPTH: 36 35 Validity : 0  
 Towing dir: 0° Wire out : 120 m Speed : 3.0 kn  
 Sorted : 48 Total catch: 47.56 Catch/hour: 95.02

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Rhinoptera javanica	20.78	2	21.87	
Stolephorus indicus	18.26	647	19.22	51
Leiognathus sp.	19.42	10,222		
Saurida tumbil	6.11	56	6.43	49
Mene maculata	5.63	24	5.93	
Nemipterus japonicus	5.43	76	5.72	50
Eubla ekeria jones	3.72	22	3.91	
Megalaspis cordyla	3.56	18	3.74	
Chirocentrus nudus	3.00	10	3.15	
Caranx ignobilis	2.64	26	2.78	
Lutjanus lutjanus	2.40	70	2.52	52
Sphyræna jello	2.08	22	2.19	48
Loligo sp.	1.64	60	1.72	
Abalistes stellatus	1.40	2	1.47	
Parastromateus niger	1.40	2	1.47	
Octopus sp. B	1.24	6	1.30	
Pentapriou longimanus	0.96	52	1.01	
Psettodes erumei	0.88	2	0.93	
Fanulirus polyphagus	0.84	2	0.67	
Sepia sp.	0.60	2	0.63	
Tri ch i u r u s l e p t u r u s	0.48	4	0.50	
Pomadasy s k a a k a n	0.44	4	0.46	
Dipterygonotus sp.	0.32	72	0.34	
Pomadasy s m a c u l a t u s	0.28	8	0.29	
Bothidae - juvenile	0.24	22	0.25	
Priacanthus macracanthus	0.24	8	0.25	
Pomadasy s a r g y r e u s	0.20	0	0.21	
Jaydia striata	0.16	32	0.17	
Terapon jarbua	0.16	2	0.17	
Penaeus monodon	0.12	2	0.13	
Ryllari des sp.	0.12	4	0.13	
Pistularia petimba	0.04	2	0.04	
Rastrelliger kanagurta	0.04	2	0.04	
Siganus canaliculatus	0.04	8	0.04	
Total	95.02		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 47  
 DATE : 07/05/15 GEAR TYPE: BT NO: 27 POSITION: Lat N 16° 10.24  
 start stop duration Lon E 93° 57.69  
 TIME : 03:26:02 03:56:57 30.9 (min) Purpose : 3  
 LOG : 5451.99 5453.06 1.7 Region : 10310  
 FDEPTH: 74 76 Gear cond.: 0  
 BDEPTH: 74 76 Validity : 0  
 Towing dir: 0° Wire out : 180 m Speed : 3.2 kn  
 Sorted : 46 Total catch: 46.39 Catch/hour: 90.02

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Selar crumenophthalmus	39.16	586	43.50	53
Tri ch i u r u s l e p t u r u s	14.79	60	16.43	
Loligo sp.	6.44	644	7.16	
Rastrelliger faughni	5.63	64	6.25	57
Mene maculata	5.16	25	5.73	
Saurida tumbil	4.93	268	5.48	54
Aluterus monoceros	2.83	2	3.15	
Sepia sp.	2.17	2	2.41	
Nemipterus japonicus	2.13	60	2.37	55
Stolephorus indicus	1.40	50	1.55	
Urapsi s s p .	1.20	10	1.34	
Sphyræna forsteri	0.82	4	0.91	
Photopectoralis aureus	0.76	82	0.84	
Photopectoralis bindus	0.74	78	0.82	
Megalaspis cordyla	0.62	2	0.69	
Upeneus moluccensis	0.43	4	0.47	
Decapterus russelli	0.43	6	0.47	
Siganus canaliculatus	0.35	6	0.39	
Penaeus monodon	0.04	2	0.04	
Total	90.02		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 48  
 DATE : 07/05/15 GEAR TYPE: BT NO: 27 POSITION: Lat N 16° 11.80  
 start stop duration Lon E 93° 53.63  
 TIME : 06:18:08 06:48:23 30.3 (min) Purpose : 3  
 LOG : 5464.40 5465.98 1.6 Region : 10310  
 FDEPTH: 136 140 Gear cond.: 0  
 BDEPTH: 136 140 Validity : 0  
 Towing dir: 0° Wire out : 330 m Speed : 3.1 kn

Sorted : 12 Total catch: 27.67 Catch/hour: 54.88

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Pterygotrigla arabica	25.96	516	47.31	
Pterygotrigla hemisticta	15.25	337	27.79	56
Priacanthus hamrur	8.59	125	15.65	
Bathymyrus echi onorhynchus	1.80	52	3.29	
Acropoma japonicum	1.39	83	2.53	
Saurida tumbil	0.83	38	1.52	
Iago omanensis	0.63	10	1.16	
Sauromuraenesox vorax	0.38	52	0.69	
Chelidoperca sp.	0.04	2	0.07	
Total	54.88		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 51  
 DATE : 07/05/15 GEAR TYPE: BT NO: 26 POSITION: Lat N 15° 55.23  
 start stop duration Lon E 93° 47.99  
 TIME : 19:01:02 19:31:21 30.3 (min) Purpose : 3  
 LOG : 5533.36 5534.93 1.6 Region : 10310  
 FDEPTH: 114 112 Gear cond.: 0  
 BDEPTH: 114 112 Validity : 0  
 Towing dir: 0° Wire out : 270 m Speed : 3.1 kn  
 Sorted : 24 Total catch: 76.67 Catch/hour: 151.72

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP	
	weight	numbers			
Saurida tumbil	19.95	28.02	1734	18.47	59
Lepidotrigla sp. D		356	13	15	
Nemipterus japonicus		19.59	570	12.91	60
Acropoma sp.		16.86	0	11.11	
Rhynchoconger sp.		10.33	184	6.81	
Pristipomoides sp.		10.21	101	6.73	
Pterygotrigla hemisticta		7.01	332	4.62	
Parascopopsis aspimosa		6.53	83	4.30	
Uranoscopus sp.	6.17	77	4.07		
Congresox talabon	5.34	2	3.52		
Ostichthys acanthorhinus		3.09	71	2.03	
Grammolites sp.		2.73	59	1.80	
C R A B S		2.49	148	1.64	
Priacanthus hamrur		2.37	42	1.57	
Haliutaea sp.		2.02	89	1.33	
Lophomus setigerus		2.02	4	1.33	
Octopus sp.		1.66	71	1.10	
Laeops sp.		1.19	190	0.78	
Iago omanensis		1.01	2	0.57	67
Calappa sp.		0.87	4	0.57	
Trichurus lepturus		0.53	2	0.35	
Acanthocepola sp.		0.47	12	0.31	
Bregmaceros mccllellandi		0.47	107	0.31	
Paraperis albuguttata		0.42	18	0.27	
Psettodes erumei		0.36	12	0.23	
Total		151.72		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 49  
 DATE : 07/05/15 GEAR TYPE: BT NO: 27 POSITION: Lat N 16° 13.15  
 start stop duration Lon E 93° 45.08  
 TIME : 09:22:00 09:52:09 30.1 (min) Purpose : 3  
 LOG : 5483.94 5485.45 1.5 Region : 10310  
 FDEPTH: 453 461 Gear cond.: 0  
 BDEPTH: 453 461 Validity : 0  
 Towing dir: 0° Wire out : 920 m Speed : 3.0 kn  
 Sorted : 22 Total catch: 47.50 Catch/hour: 94.53

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Pycnocrasedum sp.	63.20	191	66.86	
Histioteuthis sp.		6.89	20	7.28
Aristeus virilis		6.37	330	6.74
Chaunax sp.		3.50	32	3.71
Munidopsis sp.		3.18	163	3.37
Hoplostethus sp.		2.11	32	2.23
Sauromuraenesox vorax		1.63	16	1.73
ALEPOCEPHALDAE		1.27	8	1.35
Neopinnula orientalis		1.23	24	1.31
Gavialiceps taeniola		1.11	24	1.18
Malacocephalus laevis		1.00	40	1.05
Iago omanensis		0.84	4	0.88
Starfish		0.48	119	0.51
Satyrichthys milleri	0.44	4	0.46	
C R A B S		0.40	28	0.42
Neoscopelus microchir		0.36	8	0.38
Lestrolepis intermedia		0.36	28	0.38
Coloconger raniiceps		0.16	4	0.17
Coryphaenoides sp.		0.00	4	0.00
Total		94.53		100.00

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 52  
 DATE : 07/05/15 GEAR TYPE: BT NO: 26 POSITION: Lat N 15° 53.25  
 start stop duration Lon E 93° 56.88  
 TIME : 21:10:39 21:41:07 30.5 (min) Purpose : 3  
 LOG : 5547.24 5548.80 1.6 Region : 10310  
 FDEPTH: 71 67 Gear cond.: 0  
 BDEPTH: 71 67 Validity : 0  
 Towing dir: 0° Wire out : 175 m Speed : 3.1 kn  
 Sorted : 10 Total catch: 28.09 Catch/hour: 55.31

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Nemipterus nematophorus	23.22	626	41.97	61
Priacanthus hamrur	7.80	104	14.10	
Saurida tumbil	6.05	177	10.93	
Upeneus sp.	3.66	132	6.62	
Octopus sp.	1.54	20	2.78	
Sepia sp.	1.30	14	2.35	
BOTHIDAE	1.28	205	2.31	
Pennahia anea	1.26	10	2.28	
S H R I M P S	1.18	445	2.14	
Bembrops sp.	0.91	32	1.64	
Penaeus monodon	0.91	8	1.64	
UNIDENTIFIED FISH	0.73	77	1.32	
Haliutaea sp.	0.73	8	1.32	
Pseudorhombus qui nquocellatus	0.63	2	1.14	
Lagocephalus lunaris	0.59	6	1.07	
Decapterus tabl	0.55	8	1.00	
C R A B S	0.55	55	1.00	
Epinephelus heni oculus	0.45	4	0.82	
Trichurus lepturus	0.39	4	0.71	
Rhynchoconger sp.	0.39	12	0.71	
Decapterus sp.	0.35	2	0.64	
Terapon jarbua	0.35	2	0.64	
Uranoscopus sp.	0.28	2	0.50	
Haliutaea sp.	0.14	4	0.25	0
Fistularia petimba	0.08	2	0.14	
Total		55.31		100.00

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 50  
 DATE : 07/05/15 GEAR TYPE: BT NO: 27 POSITION: Lat N 16° 0.23  
 start stop duration Lon E 93° 41.18  
 TIME : 16:01:24 16:22:57 21.6 (min) Purpose : 3  
 LOG : 5514.77 5515.92 1.1 Region : 10310  
 FDEPTH: 40 42 Gear cond.: 6  
 BDEPTH: 40 42 Validity : 5  
 Towing dir: 0° Wire out : 110 m Speed : 3.2 kn  
 Sorted : 15 Total catch: 29.42 Catch/hour: 81.91

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sea cucumber	16.04	28	19.58	
Diodon holocanthus	15.70	11	19.17	
Lethrinus lentjan	14.09	123	17.20	58
Aluterus monoceros	8.46	6	10.33	
Aluterus scriptus	6.68	6	8.16	
Sepia sp.	4.34	11	5.30	
Gymnocranius griseus	4.34	6	5.30	
Carangoides bajad	3.73	11	4.55	
Arothron immaculatus	2.56	11	3.13	
Lactoria diaphana		1.95	6	2.38
Octopus sp.		1.11	6	1.36
Ablabys cf. taeni notus		0.95	6	1.16
Lutjanus bengalensis		0.89	11	1.09
Siganus luridus		0.33	6	0.41
Parupeneus macronemus		0.22	6	0.27
Nemichthys scolopaceus		0.17	6	0.20
Ostorhynchus gularis		0.11	17	0.14
Naso sp.		0.11	6	0.14
Scorpaenopsis obtusa		0.01	6	0.12
Apogoniidae - juvenile		0.01	6	0.01
Total		81.91		100.00

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 53  
 DATE : 07/05/15 GEAR TYPE: PT NO: 1 POSITION: Lat N 15° 55.22  
 start stop duration Lon E 93° 58.59  
 TIME : 22:14:58 22:45:25 30.4 (min) Purpose : 1  
 LOG : 5550.50 5551.95 1.4 Region : 10310  
 FDEPTH: 10 12 Gear cond.: 0  
 BDEPTH: 62 57 Validity : 0  
 Towing dir: 0° Wire out : 75 m Speed : 2.9 kn  
 Sorted : 0 Total catch: 4.23 Catch/hour: 8.33

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Parastromateus niger	6.11	8	73.29	
Loligo sp.	1.02	30	12.29	
Rastrelliger brachysoma	0.75	8	8.98	
Chirocentrus sp.	0.45	2	5.44	
Total		8.33		100.00

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 54  
 DATE : 07/05/15 GEAR TYPE: BT No: 26 POSITION: Lat N 15°55.12  
 start stop duration Lon E 94°5.03  
 TIME : 23:51:27 00:23:28 32.0 (min)  
 LOG : 5558.00 5559.65 1.6  
 FDEPTH: 37 38  
 BDEPTH: 37 38  
 Towing dir: 0° Wire out : 100 m  
 Sorted : 46 Total catch: 139.05  
 Purpose : 3  
 Region : 10310  
 Gear cond.: 0  
 Validity : 0  
 Speed : 3.1 kn  
 Catch/hour: 260.64

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 56  
 DATE : 08/05/15 GEAR TYPE: BT No: 26 POSITION: Lat N 14°23.52  
 start stop duration Lon E 93°22.51  
 TIME : 19:05:51 19:36:30 30.6 (min)  
 LOG : 5692.47 5694.06 1.6  
 FDEPTH: 77 77  
 BDEPTH: 77 77  
 Towing dir: 0° Wire out : 200 m  
 Sorted : 5 Total catch: 34.21  
 Purpose : 3  
 Region : 10320  
 Gear cond.: 0  
 Validity : 0  
 Speed : 3.1 kn  
 Catch/hour: 66.97

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Gazza munita	83.90	2952	32.19	
Netuma thalassina	41.05	39	15.75	
Gymnothorax dorsalis	23.67	6	9.08	
Loligo sp.	19.12	517	7.34	
Aurigequula fasciata	15.63	4049	6.00	
Triichurus lepturus	7.65	56	2.93	
Metapenaeus tenuipes	7.54	281	2.89	
Lagocephalus guentheri	7.54	34	2.89	
Rhinoptera jakakari	7.09	6	2.72	
Selar crumenophthalmus	6.19	79	2.37	
Selaroides leptolepis	5.62	56	2.16	
Octopus sp.	4.50	17	1.73	
Saurida tumbil	4.16	28	1.60	63
Nemipterus japonicus	4.16	51	1.60	64
Chirocentrus nudus	3.26	6	1.25	
Priacanthus hamrur	2.92	124	1.12	
Congrex talabon	2.59	6	0.99	
Jaydi striata	2.14	478	0.82	
Saurida undosquamis	1.91	39	0.73	62
Siganus canaliculatus	1.91	17	0.73	
Atule mate	1.46	11	0.56	
Terapon theraps	1.46	11	0.56	
Sphyrna pinguis	1.35	22	0.52	
Brachyplura novaezeelandiae	1.24	146	0.47	
Pennahia aenea	0.73	6	0.28	
Lagocephalus lunaris	0.67	6	0.28	
Haliutaea fumosa	0.56	11	0.22	
Upeneus sulphureus	0.34	11	0.13	
Photopectoralis bindus	0.17	11	0.06	
Aurigequula fasciata	0.11	6	0.04	0
Total	260.64		100.00	

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Lethrinus rubrioperculatus	14.25	110	21.28	
Sepia sp.	6.54	4	9.76	
Priacanthus macracanthus	6.26	235	9.35	69
Acropoma japonicum	6.26	423	9.35	
Dactyloptena orientalis	5.91	6	8.83	
Lutjanus vitta	4.11	70	6.14	
Arothron sp.	3.45	2	5.14	
Loligo sp.	3.13	125	4.68	
APOGONIDAE	2.66	689	3.98	
Ammodytoides cf. rennei	2.35	658	3.51	
Abalistes filamentosus	2.31	4	3.45	
Synodus indicus	1.72	227	2.57	
Heterocarpus sp.	1.70	1.87		
Pseudobalistes fuscus	1.10	2	1.64	
Ostorhynchus gularis	0.94	117	1.40	
Sea cucumber	0.86	2	1.29	
Gymnocranius griseus	0.78	47	1.17	
Decapterus macrosoma	0.78	31	1.17	
Octopus sp.	0.63	8	0.94	
Pristigaster sp.	0.47	16	0.70	
Satyricthys sp.	0.47	16	0.70	
Parapenaeus sp.	0.31	8	0.47	
Parapercis cf. sexfasciata	0.31	23	0.47	
Parupeneus heptacanthus	0.06	2	0.09	
Ammodytoides sp.	0.04	4	0.06	
Fishing gears	0.00	0	0.00	
Total	66.97		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 55  
 DATE : 08/05/15 GEAR TYPE: BT No: 26 POSITION: Lat N 14°40.97  
 start stop duration Lon E 93°23.08  
 TIME : 14:39:44 15:09:51 30.1 (min)  
 LOG : 5668.69 5670.14 1.4  
 FDEPTH: 374 376  
 BDEPTH: 374 376  
 Towing dir: 0° Wire out : 880 m  
 Sorted : 50 Total catch: 118.14  
 Purpose : 3  
 Region : 10320  
 Gear cond.: 0  
 Validity : 0  
 Speed : 2.9 kn  
 Catch/hour: 235.34

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 57  
 DATE : 08/05/15 GEAR TYPE: BT No: 26 POSITION: Lat N 13°58.76  
 start stop duration Lon E 93°18.55  
 TIME : 22:38:58 23:09:14 30.3 (min)  
 LOG : 5721.19 5722.53 1.3  
 FDEPTH: 62 68  
 BDEPTH: 62 68  
 Towing dir: 0° Wire out : 170 m  
 Sorted : 0 Total catch: 18.56  
 Purpose : 3  
 Region : 10320  
 Gear cond.: 0  
 Validity : 0  
 Speed : 2.7 kn  
 Catch/hour: 36.79

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Heterocarpus chani	90.44	11743	38.43	
Byppolurion caninum	34.86	94	14.81	66
Physiculus cf. yoshidae	30.84	422	13.10	67
Aristeus cf. mabahiise		15.06	2120	6.40
MYCTOPHIDAE	14.44	1301	6.14	
Chlorophthalmus cf. acutifrons	13.35	211	5.67	68
Dipturus sp.		6.97	2	2.96
Bythaelurus hispidus	6.35	68	2.70	65
Chlorophthalmus corniger	4.94	189	2.10	
Netuma bilineata	3.94	4	1.68	
Chaunax sp.2	2.69	4	1.14	
Lophomus setigerus	1.89	4	0.80	
Ophidiion	1.35	18	0.58	
Scallicus serrulatus	1.12	22	0.47	
Benthotatis moresbyi	1.08	4	0.46	
Tydemania navigatoris	1.00	4	0.42	
Neobythites sp.	1.00	4	0.42	
Neoscopelus microchir	0.80	58	0.34	
Histioteuthis sp.*	0.60	10	0.25	
Octopus sp. A	0.50	10	0.21	
Bembrotus roseum	0.40	14	0.17	
Psenopsis obscura	0.28	4	0.12	
Astronesthes sp.	0.28	46	0.12	
Macrorhamphosodes cf. uradoi	0.22	18	0.09	
Pomadourus maculatus	0.18	4	0.08	
OMMASTREPHIDAE	0.18	4	0.08	
Setarches longimanus	0.14	4	0.06	
Plectrogeneium nanum	0.10	10	0.04	
Coelorrhinus cf. argentatus	0.10	10	0.04	
Rexea bengalensis	0.10	4	0.04	
Ostracoberyx dorygenus	0.10	4	0.04	
PLEURONECTI FORMES	0.04	4	0.02	
Malthopsis sp.	0.02	14	0.01	
Polypnus cf. asper	0.00	0.00	28	0.00
Peristedion sp.	0.00	0	0.00	0.00
Total	235.34		100.00	

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Loligo sp.	11.77	511	32.00	
Loxodon macrorhinus	9.28	4	25.22	
Lutjanus griseus	5.47	18	14.87	
Parageus cf. tengi	5.43	2	14.76	
Dactyloptena orientalis	4.12	4	11.21	
Priacanthus hamrur	0.32	2	0.86	
Ammodytoides zanthrops	0.14	26	0.38	
Decapterus macrosoma	0.10	8	0.27	
Lutjanus lutjanus	0.08	2	0.22	
Selaroides leptolepis	0.06	4	0.16	
Synodus randalli	0.02	4	0.05	
Total	36.79		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 58  
 DATE : 09/05/15 GEAR TYPE: BT No: 26 POSITION: Lat N 14°31.35  
 start stop duration Lon E 93°44.43  
 TIME : 05:17:56 05:48:30 30.6 (min)  
 LOG : 5776.40 5777.77 1.4  
 FDEPTH: 265 272  
 BDEPTH: 265 272  
 Towing dir: 0° Wire out : 620 m  
 Sorted : 0 Total catch: 201.65  
 Purpose : 3  
 Region : 10320  
 Gear cond.: 0  
 Validity : 0  
 Speed : 2.7 kn  
 Catch/hour: 395.79

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
S H R I M P S	90.68	12247	22.91	
Chlorophthalmus corniger	69.72	6006	17.61	
Synagrops japonicus	53.94	6253	13.63	
Satyricthys sp.	48.05	177	12.14	
Chlorophthalmus cf. acutifrons	31.56	824	7.97	
Neopiplus orientalis	17.19	624	4.34	
Puerulus sewelli	16.92	273	4.27	
Peristedion liorhynchus	15.54	71	3.93	
Cubirops whitleggi	13.74	550	3.47	
Saurida undosquamis	5.89	47	1.49	
Lophodes nutillus	4.71	24	1.19	
Squalus hemipinnis	4.00	12	1.01	
Zenopsis nebulosa	3.53	4	0.89	
Plesiobatis davisii	3.49	2	0.88	
Hypoplurion caninum	2.83	12	0.71	
Pleisacantha pungens	1.88	12	0.48	
Owstonia sp.	1.49	6	0.38	
Priacanthus macracanthus	1.41	10	0.36	
Chascanopsetta lugubris	1.22	18	0.31	
Rexea bengalensis	0.94	82	0.24	
Bembrops caudimaculata	0.94	12	0.24	
Eridacnis radcliffei	0.94	26	0.24	
Bathymyrus echiatorrhynchus	0.94	24	0.24	
Rhynchoconger sp.	0.79	2	0.20	
Lestrolepis sp.	0.71	12	0.18	
Cynoglossus sp.	0.71	12	0.18	
Setarches longimanus	0.71	35	0.18	
Owstonia sp.	0.47	24	0.12	
Erythrodes schlegelii	0.29	4	0.07	
Xyrias revulus	0.20	2	0.05	
Parascolopsis boesemani	0.16	2	0.04	
Haliomochirus centriscoides	0.12	12	0.03	
Tydemania navigatoris	0.04	4	0.01	
Malthopsis cf. annulifera	0.04	4	0.01	0.01
Total	395.78		100.00	



R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 59										R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 62																																							
DATE : 09/05/15					GEAR TYPE: BT NO: 27					POSITION: Lat N 14° 40. 56					DATE : 09/05/15					GEAR TYPE: BT NO: 27					POSITION: Lat N 15° 38. 49																								
start stop duration										start stop duration										start stop duration																													
TIME : 07:24:06 07:55:34 31.5 (min)					Purpose : 3					Region : 10320					TIME : 16:49:45 17:14:53 25.1 (min)					Purpose : 3					Region : 10320																								
LOG : 5788.02 5789.69 1.7					Gear cond.: 0					Validity : 0					LOG : 5859.94 5861.16 1.2					Gear cond.: 0					Validity : 0																								
FDEPTH: 89 87					Speed : 3.2 kn					FDEPTH: 53 56					Speed : 150 m					FDEPTH: 53 56					Speed : 2.9 kn																								
BDEPTH: 89 87					Catch/hour: 51.23					BDEPTH: 53 56					Catch/hour: 192.30					BDEPTH: 53 56					Catch/hour: 459.13																								
Towing dir: 0°					Wire out : 270 m					Towing dir: 0°					Wire out : 150 m					Towing dir: 0°					Wire out : 2.9 kn																								
Sorted : 27					Total catch: 26.86					Sorted : 27					Total catch: 192.30					Sorted : 29					Total catch: 459.13																								
SPECIES										SPECIES										SPECIES																													
weight					CATCH/HOUR					% OF TOT. C					weight					CATCH/HOUR					% OF TOT. C					SAMP																			
numbers															numbers																																		
Loligo sp.					11.63					477					22.71					Lethrinus lentjan					108.30					21					23.59														
Saurida undosquamis					7.32					219					14.30					Abalistes stellatus					83.37					100					18.16														
Decapterus macrossoma					6.45					97					12.58					Lutjanus lutjanus					60.17					1561.13					10.10														
Rhynchobates amandalei										6.10					2					Nemipterus bipunctatus					34.09					487					7.43														
Pentapriion longimanus					4.69					235					9.16					Gymnocranius elongatus					22.06					72					4.80														
Priacanthus hamrur					4.04					124					7.89					Gymnura poecilura					19.10					2					4.16														
Sepia pharaonis					2.90					10					5.66					Sargocentron rubrum					17.19					115					3.74														
Nemipterus japonicus					2.21					57					4.32					Pinjalo pinjalo					16.90					158					3.68														
Uraspis sp.					1.56					8					3.05					Neotrygon kuhlii					16.62					17					3.62														
Nemipterus bipunctatus					1.14					21					2.23					Rhinchostracion nasus					15.76					43					3.43														
Fistularia petimba					0.80					36					1.56					Nemipterus zysron					10.31					143					2.25														
Abalistes stellatus					0.69					2					1.34					Tetrosomus gibbosus					9.45					57					2.06														
Upeneus sp.					0.50					34					0.97					Lutjanus madras					8.60					72					1.87														
Nemipterus zysron					0.42					11					0.82					Lutjanus quinquelineatus					8.45					86					1.40														
Lophomus setigerus					0.31					2					0.60					Parupeneus heptacanthus					6.02					43					1.31														
Seriolina nigrofasciata					0.23					2					0.45					Saurida undosquamis					5.16					143					1.12														
Selar sp.					0.15					4					0.30					Pterocaesio sp.					4.01					186					0.87														
Parupeneus heptacanthus					0.08					2					0.15					Sphyraena forsteri					3.87					14					0.84														
Total					51.23					100.00					Total					459.13					100.00					Total					459.13					100.00									
R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 60										R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 63																																							
DATE : 09/05/15					GEAR TYPE: BT NO: 27					POSITION: Lat N 15° 1. 63					DATE : 09/05/15					GEAR TYPE: BT NO: 27					POSITION: Lat N 15° 38. 31																								
start stop duration										start stop duration										start stop duration																													
TIME : 10:59:56 11:26:04 26.1 (min)					Purpose : 3					Region : 10320					TIME : 20:19:39 20:34:16 14.6 (min)					Purpose : 3					Region : 10320																								
LOG : 5815.44 5816.72 1.3					Gear cond.: 0					Validity : 0					LOG : 5886.95 5887.64 0.7					Gear cond.: 0					Validity : 0																								
FDEPTH: 77 74					Speed : 2.9 kn					FDEPTH: 40 40					Speed : 120 m					FDEPTH: 40 40					Speed : 2.8 kn																								
BDEPTH: 77 74					Catch/hour: 287.62					BDEPTH: 40 40					Catch/hour: 150.98					BDEPTH: 40 40					Catch/hour: 233.84																								
Towing dir: 0°					Wire out : 200 m					Towing dir: 0°					Wire out : 120 m					Towing dir: 0°					Wire out : 150 m																								
Sorted : 25					Total catch: 125.26					Sorted : 25					Total catch: 125.26					Sorted : 12					Total catch: 56.98																								
SPECIES										SPECIES										SPECIES																													
weight					CATCH/HOUR					% OF TOT. C					weight					CATCH/HOUR					% OF TOT. C					SAMP																			
numbers															numbers																																		
Saurida undosquamis					112.24					7483					39.02					Selaroides leptolepis					425.51					6169					73.38														
Abalistes stellatus					91.85					1929					31.93					Trichurus lepturus					49.09					100					8.47														
Decapterus russelli					41.33					69					14.37					Chiroleutes nudus					28.67					107					4.94														
Nemipterus japonicus					13.78					211					4.79					Saurida tumbil					18.81					161					3.24														
Sepia pharaonis					7.35					37					2.55					Scomberomorus guttatus					12.90					18					2.22														
Rhynchobates sp. A (blotched)					4.18					2					1.45					Nemipterus nematophorus					9.50					125					1.64														
Nemipterus zysron					3.67					9					1.28					Sepia sp.					5.75					573					0.99														
Cyclichthys spilostylus					2.99					2					1.04					Loligo sp.					4.30					269					0.74														
Loligo sp.					1.84					110					0.64					Dussumeria acuta					3.76					46					0.65														
Decapterus smithvani zi					1.47					28					0.51					Sphyraena pinguis					3.22					36					0.56														
Rastrelliger faughni					1.19					18					0.42					Photopteralis bialbus					3.05					223					0.53														
Total					287.62					100.00					Total					233.84					100.00					Total					579.91					100.00									
R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 61										R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 64																																							
DATE : 09/05/15					GEAR TYPE: BT NO: 27					POSITION: Lat N 15° 10. 42					DATE : 09/05/15					GEAR TYPE: BT NO: 27					POSITION: Lat N 15° 15. 64																								
start stop duration										start stop duration										start stop duration																													
TIME : 12:56:11 13:26:13 30.0 (min)					Purpose : 3					Region : 10320					TIME : 22:59:39 23:29:48 30.1 (min)					Purpose : 3					Region : 10320																								
LOG : 5828.30 5829.82 1.5					Gear cond.: 0					Validity : 0					LOG : 5910.25 5911.86 1.6					Gear cond.: 0					Validity : 0																								
FDEPTH: 80 80					Speed : 3.1 kn					FDEPTH: 53 54					Speed : 150 m					FDEPTH: 53 54					Speed : 3.2 kn																								
BDEPTH: 80 80					Catch/hour: 118.38					BDEPTH: 53 54					Catch/hour: 291.31					BDEPTH: 53 54					Catch/hour: 579.91																								
Towing dir: 0°					Wire out : 210 m					Towing dir: 0°					Wire out : 150 m					Towing dir: 0°					Wire out : 180 m																								
Sorted : 27					Total catch: 59.27					Sorted : 27					Total catch: 118.38					Sorted : 65					Total catch: 291.31					Sorted : 65					Total catch: 579.91														
SPECIES										SPECIES										SPECIES																													
weight					CATCH/HOUR					% OF TOT. C					weight					CATCH/HOUR					% OF TOT. C					SAMP																			
numbers															numbers																																		
Priacanthus hamrur					23.97					671					20.25					Selaroides leptolepis					425.51					6169					73.38														
Saurida undosquamis					18.30					439					15.45					Trichurus lepturus					49.09					100					8.47														
Nemipterus japonicus					12.94					471					10.93					Chiroleutes nudus					28.67					107					4.94														
Dactyloptena orientalis					10.95					232					9.25					Saurida tumbil					18.81					161					3.24														
Upeneus guttatus					9.11					419					7.69					Scomberomorus guttatus					12.90					18					2.22														
Abalistes stellatus					7.11					12					6.01					Nemipterus nematophorus					9.50					125					1.64														
Sepia sp.					6.23					48					5.26					Sepia sp.					5.75					573					0.99														
Octopus sp. B					5.99					360					5.06					Loligo sp.					4.30					269					0.74														
Rogadion pristiger					3.28					208					2.77					Dussumeria acuta					3.76					46					0.65														
Nemipterus zysron					3.04					84					2.56					Sphyraena pinguis					3.22					36					0.56														
Trachinocephalus myops					2.80					88					2.36					Photopteralis bialbus					3.05					223					0.53														
Lepidotrigla sp. C					2.08					88					1.75					Pentapriion longimanus					1.97					107					0.34														
Paraperis alboguttata					1.60					60					1.35					Metapenaeus tenuipes					1.71					54					0.30														
S H R I M P S					1.44					220					1.21					Stolephorus indicus					1.27					36					0.22														
Photopteralis aureus					1.20					288					1.01					Brachyplura novaezeelandiae					1.17					169					0.20														
Saurida tumbil					1.12					4					0.94					Pomadasyss maculatus					0.98					10					0.17														
Rhynchobates sp.					2					0.88					0.88					Rastrelliger kanagurta					0.84					8					0.14														
Ariosoma sp.					1.04					40					0.88					Sea snakes					0.56					2					0.10														
Loligo sp.					0.88					24					0.74					Pterois russelii					0.25					4					0.11														
Parupeneus heptacanthus					0.88					16					0.74					Total					233.84					100.00					Total					233.84					100.00				
Bregmaceros mcllelandi					0.80					2197					0.67					R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 65					DATE : 10/05/15					GEAR TYPE: BT NO: 27					POSITION: Lat N 14° 55. 50														
Pseudorhombus elevatus					0.40					4					0.34					start stop duration										start stop duration										start stop duration									
Sea snakes					0.40					2					0.34					TIME : 02:23:22 02:54:18 30.9 (min)					Purpose : 3					Region : 10320																			
Samaris cristatus					0.28					12					0.24					LOG : 5933.13 5934.66 1.5					Gear cond.: 0					Validity : 0																			
Small crabs					0.24					72					0.20					FDEPTH: 71 73					Speed : 180 m					Speed : 3.0 kn																			
Parascalopsis eriomma					0.24					4					0.20					BDEPTH: 71 73					Catch/hour: 180 m					Catch/hour: 579.91																			
Halieutaea sp.					0.20					4					0.17					Towing dir: 0°					Wire out : 180 m					Wire out : 180 m																			
Saurechelvis sp.					0.18					12					0.15					Sorted : 65					Total catch: 291.31					Sorted : 65					Total catch: 579.91														
Callionymus cf. gardineri					0.16					4					0.13					SPECIES					weight					CATCH/HOUR					% OF TOT. C					SAMP									
Gymnotherax reticularis					0.16					4					0.13					Selaroides leptolepis					425.51					6169					73.38														
Synodus indicus					0.16					4					0.13					Trichurus lepturus					49.09					100					8.47														
Cynoglossus puncticeps					0.12					12					0.10					Chiroleutes nudus					28.67					107					4.94														
Lagocephalus sceleratus					0.08					4					0.07					Saurida tumbil					18.81					161					3.24														
Total					118.38					100.00					Total					233.84					100.00					Total					579.91					100.00									

Sorted : 30 Total catch: 30.17 Catch/hour: 58.53

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Upeneus moluccensis	10.28	233	17.57	89
Rastrelliger brachysoma	8.54	66	14.58	
Trichurus lepturus	6.40	12	10.94	
Selar crumenophthalmus	5.35	52	9.15	91
Saurida tumbi	5.35	54	9.15	94
Sepia pharaonis	4.97	10	8.49	
Nemipterus nematophorus	2.56	29	4.38	92
Pentaprion longimanus	2.41	130	4.11	
Saurida undosquamis	2.13	58	3.65	93
Priacanthus hamur	1.75	12	2.98	
Nemipterus japonicus	1.40	6	2.39	
Parupeneus heptacanthus	1.26	17	2.15	
Sphyræna forsteri	1.20	14	2.06	
Loligo sp.	1.09	43	1.86	
Sea snakes	0.93	2	1.59	
Fistularia petimba	0.89	8	1.52	
Decapterus sp.	0.50	6	0.86	
Siganus canaliculatus	0.47	6	0.80	
Saurida longimanus	0.35	19	0.60	
Priacanthus macracanthus	0.23	4	0.40	
Nemipterus peroni	0.19	2	0.33	
Epinephelus areolatus	0.19	4	0.33	
Parascolopsis aspinosa	0.06	6	0.10	
Lagocephalus cf. scleratus	0.02	2	0.03	
Total	58.53		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 66  
 DATE : 10/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 14°37.72  
 start stop duration Lon E 94°6.30  
 TIME : 04:59:48 05:30:09 Purpose : 3  
 LOG : 5951.90 5953.43 Region : 10320  
 FDEPTH: 89 90 Gear cond.: 0  
 BDEPTH: 89 90 Validity : 0  
 Towing dir: 0° Wire out : 210 m Speed : 3.0 kn  
 Sorted : 28 Total catch: 55.52 Catch/hour: 109.80

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Decapterus macrostoma	50.15	566	45.68	96
Decapterus kurroides	18.19	376	16.57	95
Loligo sp.	9.49	455	8.65	
Nemipterus japonicus	6.80	127	6.20	97
Trichurus lepturus	6.64	8	6.05	
Saurida undosquamis	5.38	486	4.90	98
Tentoriopsis cristatus	3.40	47	3.10	
Priacanthus macracanthus	2.69	36	2.45	
Haliutaea sp.	1.62	8	1.48	
Decapterus russelli	1.07	24	0.97	
Rastrelliger faughni	0.95	12	0.86	
Parupeneus heptacanthus	0.71	8	0.65	
Acropoma japonicum	0.63	55	0.58	
Epinephelus heniocnus	0.53	2	0.49	
Parascolopsis aspinosa	0.47	8	0.43	
Epinephelus areolatus	0.44	2	0.40	
Cyclichthys sp.	0.28	4	0.25	
Fortunus sp.	0.20	4	0.18	
Kumococius rodericensis	0.14	2	0.13	
Total	109.80		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 67  
 DATE : 10/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 14°27.29  
 start stop duration Lon E 94°3.79  
 TIME : 07:19:51 07:50:07 Purpose : 3  
 LOG : 5967.29 5968.94 Region : 10320  
 FDEPTH: 115 117 Gear cond.: 0  
 BDEPTH: 115 117 Validity : 0  
 Towing dir: 0° Wire out : 290 m Speed : 3.3 kn  
 Sorted : 17 Total catch: 34.29 Catch/hour: 67.97

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Saurida undosquamis	52.80	579	77.69	100
Nemipterus japonicus	5.47	79	8.05	99
Decapterus macrostoma	2.85	32	4.20	
Sepia sp.	2.30	36	3.38	
Parascolopsis aspinosa	1.19	16	1.75	
Satrychthys sp.	0.95	4	1.40	
Cyclichthys orbicularis	0.79	2	1.17	
Ostichthys archiepiscopus	0.48	8	0.70	
Ebosi a falcata	0.44	16	0.64	
Lepidotrigla cf. alcocki	0.44	20	0.64	
Chelonodotops sp.	0.12	2	0.17	
Torquigener sp.	0.10	2	0.15	
Malthopsis sp.	0.04	12	0.06	
Total	67.97		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 68  
 DATE : 10/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 14°3.73  
 start stop duration Lon E 94°19.09  
 TIME : 18:29:12 19:00:06 Purpose : 3  
 LOG : 6027.38 6028.86 Region : 10320  
 FDEPTH: 455 459 Gear cond.: 0  
 BDEPTH: 455 459 Validity : 0  
 Towing dir: 0° Wire out : 980 m Speed : 2.9 kn  
 Sorted : 0 Total catch: 41.91 Catch/hour: 81.38

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Heterocarpus chani	16.78	1006	20.62	
Bythaelurus hispidus	13.20	330	16.23	
S H R I M P S	12.66	3417	15.56	
MYCTOPHIDAE	8.00	559	9.83	
Hypopleuron caninum	4.43	8	5.44	
Benthobatis moresbyi	4.31	8	5.30	
Neoharriotta pinnata	4.31	2	5.30	
Alepocephalus sp.	2.72	23	3.34	
Acanthephyra fimbriata		2.49	307	3.05
Polymixia cf. berndti	2.41	27	2.96	
Chlorophthalmus cf. acutifrons	2.02	27	2.48	
Glyptophidium sp.	1.55	47	1.91	
Neoscopelus microchir	1.32	47	1.62	
Histioteuthis sp.	0.85	4	1.05	
Nephropsis stewarti	0.54	27	0.67	
Chaunax sp.	0.47	8	0.57	
Ateleopus sp.	0.47	4	0.57	
Metanephrops andamanicus		0.43	8	0.52
Photonetes sp.	0.39	8	0.48	
Coelotrachus sp.	0.39	31	0.48	
Synagrops adenii	0.31	8	0.38	
Diceratias bispinosus		0.31	19	0.38
Benthodesmus sp.	0.19	2	0.23	
Pasiphaea sp.	0.16	16	0.19	
Bathyclupea sp.	0.16	8	0.19	
Setarches longimanus	0.16	4	0.19	
Ophichthus sp.	0.12	4	0.14	
Polychaetes typhlops.	0.12	4	0.14	
Coloconger raniiceps	0.10	4	0.13	
SI CYONIIDAE	0.04	4	0.05	
Total	81.38		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 69  
 DATE : 10/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 14°10.09  
 start stop duration Lon E 94°22.58  
 TIME : 20:40:40 21:11:10 Purpose : 3  
 LOG : 6038.01 6039.60 Region : 10320  
 FDEPTH: 127 127 Gear cond.: 0  
 BDEPTH: 127 127 Validity : 0  
 Towing dir: 0° Wire out : 330 m Speed : 3.1 kn  
 Sorted : 16 Total catch: 31.25 Catch/hour: 61.50

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Saurida undosquamis	10.39	173	16.90	101
Parascolopsis eriomma	8.89	35	14.46	
Ostichthys sp.	8.42	87	13.70	
Lophomus setigerus	5.20	8	8.45	
Snyderina yamanokami	4.33	55	7.04	
Lipochelilus carnolabrum	4.33	24	7.04	
Roa jayakari	3.38	75	5.50	
Pterygotrigla arabica	2.76	87	4.48	
Parascolopsis sp.	2.52	43	4.10	
Satrychthys sp.	2.36	12	3.84	
Nemipterus japonicus	2.36	31	3.84	
Centroberyx druzhinini	2.13	8	3.46	
Hapalogenys sp.	0.87	4	1.41	
BOTHIDAE	0.71	55	1.15	
Histioporus typus	0.55	4	0.90	
Loligo sp.	0.55	12	0.90	
Lestrolepis intermedia	0.47	47	0.77	
Erythrocles schlegelii	0.31	4	0.51	
CALLIONYMIIDAE	0.31	31	0.51	
Neomerinthe sp.	0.24	4	0.38	
Torquigener sp.	0.24	8	0.38	
Neomerinthe sp.	0.12	2	0.19	
Dipturus cf. johanni sdravesi	0.06	2	0.10	
Total	61.50		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 70  
 DATE : 11/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 14°36.43  
 start stop duration Purpose : 3  
 TIME : 01:42:54 02:12:58 30.1 (min) Region : 10320  
 LOG : 6071.94 6073.40 1.5 Gear cond.: 0  
 FDEPTH: 89 88 Validity : 0  
 BDEPTH: 89 88 Speed : 2.9 kn  
 Towing dir: 0° Wire out : 220 m Catch/hour: 79.24  
 Sorted : 40 Total catch: 39.70

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Haliteuta sp.	16.49	8	20.81	
Cantherhines multineatus	7.64	8	9.65	
Nemipterus japonicus	7.23	166	9.12	102
Selar crumenophthalmus	7.19	96	9.07	104
Epinephelus heneochus	5.11	2	6.45	
Saurida undosquamis	4.27	82	5.39	105
Charybdis feriata	3.71	4	4.69	
Fistularia petimba	3.47	10	4.38	
Loligo sp.	3.35	190	4.23	
Nemipterus nematophorus	3.31	44	4.18	103
Saurida tumbl	3.27	523	4.13	106
Dactyloptena orientalis	2.79	2	3.53	
Acropoma japonicum	2.20	200	2.77	
Champsodon sp.	1.56	279	1.96	
Octopus sp.	1.00	2	1.26	
Gazza minuta	0.90	307	1.13	
Snyderia yamanokami	0.72	16	0.91	
Brachypleura novaezeelandiae	0.64	82	0.81	
Parasclopsis aspinnosa	0.64	12	0.81	
Siganus canaliculatus	0.62	2	0.78	
Decapterus macrosoma	0.60	20	0.76	
Uraspis helvola	0.48	2	0.60	
Saurida longimanus	0.40	36	0.50	107
Tentoriopsis cristatus	0.40	4	0.50	
Epinephelus areolatus	0.24	2	0.30	
Portunus sp.	0.24	4	0.30	
Pterois russellii	0.16	2	0.20	
Upeneus moluccensis	0.12	4	0.15	
Okameji cf. powelli	0.12	2	0.15	
Narcine cf. brevisabata	0.12	4	0.15	
Roa jayakari	0.12	4	0.15	
Lophomus setigerus	0.08	2	0.10	
Pterygopigia arabica	0.04	2	0.05	
Erythrocles schlegelii	0.02	2	0.03	
Total		79.24	100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 71  
 DATE : 11/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 14°55.94  
 start stop duration Purpose : 3  
 TIME : 04:36:35 05:07:27 30.9 (min) Region : 10320  
 LOG : 6093.47 6095.10 1.6 Gear cond.: 0  
 FDEPTH: 58 58 Validity : 0  
 BDEPTH: 58 58 Speed : 3.2 kn  
 Towing dir: 0° Wire out : 160 m Catch/hour: 97.75  
 Sorted : 0 Total catch: 50.29

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Mene maculata	37.61	150	38.48	
Pentapiron longimanus	12.17	851	12.45	
Saurida tumbl	9.52	295	9.74	109
Photopectoralis bindus	7.58	910	7.76	
Trichurus lepturus	5.05	58	5.17	
Lagocephalus inermis	4.31	2	4.41	
Loligo sp.	3.81	159	3.90	
Selar crumenophthalmus	3.03	17	3.10	
Nemipterus japonicus	2.22	17	2.27	
Saurida undosquamis	2.18	62	2.23	110
Carangoides melabariensis	1.75	12	1.79	
Nemipterus nematophorus	1.48	19	1.51	
SNAKE	1.32	2	1.35	
Megalaspis cordyla	1.09	4	1.11	
Lagocephalus guentheri	0.93	8	0.95	
Chirocentrus nudus	0.93	4	0.95	
Stolephorus indicus	0.58	21	0.60	
Platyrhina sp.	0.51	2	0.52	108
Fistularia petimba	0.27	8	0.28	
Siganus canaliculatus	0.23	2	0.24	
Brachypleura novaezeelandiae	0.19	29	0.20	
Zebrias sp.	0.17	2	0.18	
Cantherhines multineatus	0.16	2	0.16	
Dactyloptena orientalis	0.16	2	0.16	
Pomadasyus maculatus	0.16	2	0.16	
Upeneus moluccensis	0.16	6	0.16	
Photopectoralis aureus	0.10	31	0.10	
Decapterus sp.	0.08	2	0.08	
Plastic	0.00	2	0.00	
Total		97.75	100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 72  
 DATE : 11/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 15°14.79  
 start stop duration Purpose : 3  
 TIME : 07:38:00 08:08:08 30.1 (min) Region : 10320  
 LOG : 6115.61 6117.21 1.6 Gear cond.: 0  
 FDEPTH: 47 46 Validity : 0  
 BDEPTH: 47 46 Speed : 3.2 kn  
 Towing dir: 0° Wire out : 135 m Catch/hour: 43.89  
 Sorted : 0 Total catch: 22.04

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Parastromateus niger	16.13	20	36.75	
Megalaspis cordyla	10.95	54	24.95	113
Saurida tumbl	3.70	20	8.44	111
Nemipterus japonicus	2.99	28	6.81	112
Siganus canaliculatus	2.39	88	5.44	
Loligo sp.	1.75	100	3.99	
Pomadasyus maculatus	1.45	26	3.31	
Scomberoides commersonianus	1.39	2	3.18	
Saurida undosquamis	0.60	10	1.36	
Nemipterus sp.	0.56	6	1.27	
Nemipterus nematophorus	0.54	6	1.23	
Nemipterus peronii	0.44	2	1.00	
Lagocephalus lunaris	0.30	4	0.68	
Fistularia petimba	0.22	4	0.50	
Stolephorus indicus	0.18	6	0.41	
Pentapiron longimanus	0.10	12	0.23	
Brachypleura novaezeelandiae	0.10	10	0.23	
Ostorhynchus fasciatus	0.10	40	0.23	
Total		43.89	100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 73  
 DATE : 11/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 15°37.11  
 start stop duration Purpose : 3  
 TIME : 11:26:37 11:56:38 30.0 (min) Region : 10320  
 LOG : 6141.17 6142.76 1.6 Gear cond.: 0  
 FDEPTH: 22 26 Validity : 0  
 BDEPTH: 22 26 Speed : 3.2 kn  
 Towing dir: 0° Wire out : 60 m Catch/hour: 142.09  
 Sorted : 34 Total catch: 71.09

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Stolephorus indicus	59.64	2107	41.97	116
Photopectoralis bindus	28.54	3825	20.09	
Secutor insidiator	9.91	851	6.98	
Loligo sp.	6.40	4	4.60	
Pomadasyus maculatus	5.20	344	3.56	
Lagocephalus guentheri	4.96	80	3.49	
Saurida tumbl	4.48	40	3.15	114
Megalaspis cordyla	4.04	14	2.84	115
Nemipterus japonicus	3.84	76	2.70	117
Lagocephalus cf. scleratus	2.40	4	1.69	
Lactarius lactarius	2.00	32	1.41	
Pennahia anea	1.64	44	1.15	
Siganus canaliculatus	1.52	72	1.07	
Lepturacanthus savala	1.28	20	0.90	
Lagocephalus lunaris	1.24	28	0.87	
Carangoides coeruleopinnatus	0.98	2	0.69	
Scomberomorus commerson	0.88	16	0.62	
Sphyræna pinguis	0.72	24	0.51	
Drepane punctata	0.48	4	0.34	
Alectis ciliaris	0.44	2	0.31	
Thryssa mystax	0.40	20	0.28	
Dussumeria acuta	0.32	20	0.23	
Rastrelliger brachysoma	0.32	4	0.23	
Caesio caerulea	0.24	4	0.17	
Apogon smithi	0.16	36	0.11	
Rastrelliger faughni	0.08	8	0.06	
Total		142.09	100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 74  
 DATE : 11/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 15°29.31  
 start stop duration Purpose : 3  
 TIME : 14:40:51 15:11:04 30.2 (min) Region : 10320  
 LOG : 6166.69 6168.20 1.5 Gear cond.: 0  
 FDEPTH: 22 23 Validity : 0  
 BDEPTH: 22 23 Speed : 3.0 kn  
 Towing dir: 0° Wire out : 60 m Catch/hour: 240.46  
 Sorted : 40 Total catch: 121.11

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Stolephorus indicus	31.33	12747	46.17	118
Photopectoralis bindus	17.04	167	7.08	
Secutor insidiator	8.22	762	3.42	
Nemipterus japonicus	8.10	292	3.37	120
Metapnaeus sp.	7.62	322	3.17	
Octopus sp.	7.62	77	3.17	
Gazza minuta	7.03	774	2.92	
Muraenox cinereus	6.55	18	2.72	
Jaydia poecilopterus	5.24	1882	2.18	
Pennahia cf. ovata	4.77	0	1.98	
Squilla sp.	4.77	167	1.98	
Pennahia anea	4.05	60	1.68	
Johnius borneensis	2.92	12	1.21	
Small shrimps	2.50	399	1.04	
Siganus canaliculatus	2.03	101	0.84	
Upeneus sulphureus	1.73	36	0.72	
Harpisquilla harpax	1.43	48	0.59	
Thryssa vittirostris	1.31	208	0.54	
Gymnothorax dorsalis	1.19	6	0.50	
Saurida undosquamis	1.09	18	0.25	119
Thryssa mystax	0.48	18	0.20	
Sepia sp.	0.48	30	0.20	
Psettodes erumei	0.36	6	0.15	
Thryssa setirostris	0.30	24	0.12	
Lactarius lactarius	0.30	6	0.12	
Polydactylus sextarius	0.30	6	0.12	
Dussumeria acuta	0.30	24	0.12	
Zebrias sp.	0.24	12	0.10	
Scomberomorus commerson	0.24	12	0.10	
Cynoglossus avel	0.18	6	0.07	
Bregmaceros mcllellandi	0.12	36	0.05	
Coccella punctata	0.12	12	0.05	
Total		240.46	100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 75  
 DATE : 11/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 15°19.44  
 start stop duration Purpose : 3  
 TIME : 17:03:21 17:33:29 30.1 (min) Region : 10320  
 LOG : 6183.06 6184.64 1.6 Gear cond.: 0  
 FDEPTH: 36 36 Validity : 0  
 BDEPTH: 36 36 Speed : 3.1 kn  
 Towing dir: 0° Wire out : 110 m Catch/hour: 51.10  
 Sorted : 13 Total catch: 25.68

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Apogon sp.	7.48	5612	14.64	
Shrimps, small, non comm.	6.69	533	13.08	
Nemipterus bipunctatus	5.73	131	11.21	121
Pennahia anea	3.34	20	6.54	
Sepia sp.	3.18	135	6.23	
Lepturacanthus savala	3.06	36	6.00	
Thryssa mystax	2.95	382	5.76	
Sardinella gibbosa	2.63	72	5.14	
Siganus canaliculatus	2.23	127	4.36	
Charybdis feriata	1.83	24	3.58	
SQUILLIDAE	1.83	346	3.58	
Metapnaeus tenuipes	1.83	92	3.58	
C R A B S	1.75	334	3.43	
Stolephorus indicus	1.59	478	3.12	
Dussumeria acuta	1.43	28	2.80	
Octopus sp.	1.27	4	2.49	
Myrophis sp.	0.84	4	1.64	
Pomadasyus maculatus	0.64	32	1.25	
Upeneus guttatus	0.40	8	0.78	
Portunus sanguinolentus	0.24	4	0.47	
Polydactylus sextarius	0.16	4	0.31	
Total		51.10	100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 76  
 DATE : 11/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 14° 57. 03  
 start stop duration Lon E 94° 49. 68  
 TIME : 20: 14: 38 20: 44: 46 30. 1 (min) Purpose : 3  
 LOG : 6207. 19 6208. 78 1. 6 Region : 10320  
 FDEPTH: 58 59 Gear cond.: 0  
 BDEPTH: 58 59 Validity : 0  
 Towing dir: 0° Wire out : 155 m Speed : 3. 2 kn  
 Sorted : 11 Total catch: 56. 14 Catch/hour: 111. 76

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Nemipterus japonicus	37. 43	1362	33. 49	122
Pentapriion longimanus	27. 07	191	24. 23	
Photopectoralis aureus	11. 94	2867	10. 69	
Pennahia anea	9. 56	80	8. 55	
Photopectoralis bindus	6. 05	1083	5. 42	
Shrimps, small, non comm.	3. 66	311	3. 28	
Bregmaceros mcllellandii	3. 03	183	2. 71	
Saurida undosquamis	2. 39	119	2. 14	
APOGONIDAE	1. 43	438	1. 28	
Acenrogobius sp. 2	1. 43	16	1. 28	1. 28
Sea snakes	1. 31	2	1. 18	
Sepia sp.	1. 11	16	1. 00	
Pomadasy s maculatus	0. 96	16	0. 86	
Epinephelus henochus	0. 96	4	0. 86	
BOTHIDAE	0. 80	104	0. 71	
Lepturacanthus savaia	0. 48	16	0. 43	
Neomerinthe sp.	0. 48	64	0. 43	
Charybdis feriata	0. 48	4	0. 43	
Cynoglossus lingua	0. 40	4	0. 36	
Mionus coelestis	0. 32	16	0. 29	
Lagocephalus lunaris	0. 32	8	0. 29	
Siganus canaliculatus	0. 08	4	0. 07	
Liagore sp	0. 08	16	0. 07	
Total	111. 76		100. 00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 77  
 DATE : 11/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 14° 37. 73  
 start stop duration Lon E 94° 47. 01  
 TIME : 22: 49: 12 23: 19: 29 30. 3 (min) Purpose : 3  
 LOG : 6227. 07 6228. 68 1. 6 Region : 10320  
 FDEPTH: 73 75 Gear cond.: 0  
 BDEPTH: 73 75 Validity : 0  
 Towing dir: 0° Wire out : 190 m Speed : 3. 2 kn  
 Sorted : 35 Total catch: 34. 58 Catch/hour: 68. 52

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Selaroides leptolepis	17. 28	174	25. 22	
Upeneus moluccensis	6. 06	162	8. 85	127
Pentapriion longimanus	5. 55	337	8. 10	
Nemipterus nematophorus	4. 32	69	6. 30	124
Saurida undosquamis	4. 08	91	5. 96	128
Saurida tumbil	3. 41	166	4. 97	125
Nemipterus japonicus	3. 01	22	4. 40	123
Loligo sp.	2. 85	109	4. 16	
Priacanthus macracanthus	2. 46	28	3. 59	
BOTHIDAE	1. 98	218	2. 89	
Haliutaea sp.	1. 66	10	2. 43	
Pennahia anea	1. 62	12	2. 37	
Seriolina nigrofasciata	1. 39	4	2. 02	
Dactyloptena orientalis	1. 19	14	1. 74	
Rastrelliger kanagurta	1. 03	12	1. 50	126
Saurida longimanus	0. 99	12	1. 45	
Decapterus macrosoma	0. 99	14	1. 45	
Sphyrna forsteri	0. 99	14	1. 45	
Megalaspis cordyla	0. 87	4	1. 27	
Parupeneus heptacanthus	0. 81	6	1. 19	
Pomadasy s maculatus	0. 67	2	0. 98	
Narcine cf. brevilabiata	0. 63	2	0. 93	
Uraspis helvola	0. 59	2	0. 87	
Siganus canaliculatus	0. 44	12	0. 64	
Rastrelliger faughni	0. 44	28	0. 64	
Epinephelus bleekeri	0. 44	2	0. 64	
Sea snakes	0. 44	2	0. 64	
Fistularia petimba	0. 40	14	0. 58	
Apogon smithi	0. 40	50	0. 58	
Champsodon sp.	0. 38	266	0. 55	
Sepia sp.	0. 30	2	0. 43	
Pomadasy s maculatus	0. 28	2	0. 40	0
Synodus cf. macrops	0. 18	2	0. 26	0. 26
Zebrias sp.	0. 08	2	0. 12	
Kumococus rodericensis	0. 08	2	0. 12	
Acanthoepola sp.	0. 08	2	0. 12	
Uranoscopus affinis	0. 04	2	0. 06	
Trixiptichthys weberi	0. 02	2	0. 03	
Total	68. 52		100. 00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 78  
 DATE : 12/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 14° 14. 94  
 start stop duration Lon E 94° 42. 37  
 TIME : 02: 24: 53 02: 55: 51 31. 0 (min) Purpose : 3  
 LOG : 6253. 87 6255. 48 1. 6 Region : 10320  
 FDEPTH: 105 105 Gear cond.: 0  
 BDEPTH: 105 105 Validity : 0  
 Towing dir: 0° Wire out : 250 m Speed : 3. 1 kn  
 Sorted : 40 Total catch: 40. 12 Catch/hour: 77. 70

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Saurida undosquamis	29. 36	413	37. 79	129
Loligo sp.	14. 76	1269	18. 99	
Sepia sp.	13. 17	17	16. 95	
Rachycentron canadum	8. 64	2	11. 12	131
Nemipterus japonicus	8. 56	223	11. 02	130
Haliutaea sp.	1. 43	8	1. 84	
Pterygotrigla hemisticta	0. 77	27	1. 00	
Dactyloptena orientalis	0. 43	6	0. 55	
Parascopopsis aspinosa	0. 43	10	0. 55	
Tylerius spinosissimus	0. 08	8	0. 10	
Ebosi a falcata	0. 04	2	0. 05	
Synodus macrops	0. 02	2	0. 02	
Fistularia petimba	0. 02	2	0. 02	
Lepidotrigla sp. C	0. 00	2	0. 00	
Total	77. 70		100. 00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 79  
 DATE : 12/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 14° 2. 97  
 start stop duration Lon E 94° 41. 27  
 TIME : 06: 13: 23 06: 44: 51 31. 5 (min) Purpose : 3  
 LOG : 6279. 93 6281. 49 1. 6 Region : 10320  
 FDEPTH: 445 453 Gear cond.: 0  
 BDEPTH: 445 453 Validity : 0  
 Towing dir: 0° Wire out : 950 m Speed : 3. 0 kn  
 Sorted : 24 Total catch: 52. 96 Catch/hour: 100. 97

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
MICTOPHIDAE	34. 55	1554	34. 21	
Atelopus sp.	12. 20	34	12. 08	
Chlorophthalmus cf. acutifrons	9. 61	118	9. 52	
S H R I M P S	7. 63	3051	7. 55	
Aristeus virillis	5. 53	227	5. 48	
Hypopleuron caninum	4. 80	11	4. 76	
Bythaelurus hispidus	3. 43	38	3. 40	
Metanephrops andamanicus	2. 67	48	2. 64	
Ophiidion sp.	2. 44	61	2. 42	
Synagrops japonicus	2. 21	34	2. 19	
C E P H A L O P O D A	2. 14	27	2. 11	
Lestrolepis sp.	1. 98	221	1. 96	
Priacanthus cf. prolixus	1. 91	19	1. 89	
Arius sp.	1. 49	19	1. 47	
Coelornichus quadricristatus	1. 30	19	1. 28	
Satyricthys milleri	1. 22	11	1. 21	
Heterocarpus sp.	1. 14	61	1. 13	
Pycnocraspedum sp.	0. 99	4	0. 98	
Malacocephalus laevis	0. 76	4	0. 76	
Rhynchoconger sp.	0. 53	11	0. 53	
Loligo sp.	0. 53	19	0. 53	
Astronesthes sp.	0. 53	42	0. 53	
Neobythites sp.	0. 46	50	0. 45	
Coryphaenoides sp.	0. 38	4	0. 38	
Chauliodus sp.	0. 31	38	0. 30	
Coloconger raniceps	0. 23	8	0. 23	
Total	100. 97		100. 00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 80  
 DATE : 12/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 14° 5. 74  
 start stop duration Lon E 95° 1. 53  
 TIME : 10: 33: 30 11: 03: 37 30. 1 (min) Purpose : 3  
 LOG : 6309. 64 6311. 19 1. 6 Region : 10320  
 FDEPTH: 291 288 Gear cond.: 0  
 BDEPTH: 291 288 Validity : 0  
 Towing dir: 0° Wire out : 660 m Speed : 3. 1 kn  
 Sorted : 37 Total catch: 133. 04 Catch/hour: 265. 11

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Cubiiceps whitteleggi	82. 70	3716	31. 19	
Pycnocraspedum sp.	36. 07	100	3. 60	
Metanephrops andamanicus	33. 20	365	12. 52	132
Heterocarpus triaristatus	26. 10	1933	9. 85	
Plesiobatis daviesi	17. 50	2	6. 60	
Aristeus virillis	16. 14	1475	6. 09	
Scaliscus investigatoris	15. 94	20	6. 01	
Bythaelurus hispidus	9. 96	60	3. 76	
Rexea prometheoides	7. 97	60	3. 61	
Torpedo sp.	6. 18	10	2. 33	
Neopipecten orientalis	3. 99	70	1. 50	
Satyricthys sp.	2. 99	40	1. 13	
MICTOPHIDAE	2. 99	130	1. 13	
Rhynchoconger sp.	1. 79	20	0. 68	
Astronesthes sp.	1. 59	707	0. 60	
Waste General	0. 00	6	0. 00	
Total	265. 11		100. 00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 81  
 DATE : 12/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 14° 10. 26  
 start stop duration Lon E 95° 2. 55  
 TIME : 12: 30: 55 13: 00: 56 30. 0 (min) Purpose : 3  
 LOG : 6319. 35 6320. 81 1. 5 Region : 10320  
 FDEPTH: 116 116 Gear cond.: 0  
 BDEPTH: 116 116 Validity : 0  
 Towing dir: 0° Wire out : 300 m Speed : 2. 9 kn  
 Sorted : 27 Total catch: 54. 28 Catch/hour: 108. 49

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Saurida undosquamis	68. 20	1633	61. 02	133
Okameji cf. powelli	12. 55	76	11. 57	
Priacanthus macracanthus	6. 92	12	6. 37	
Ostichthys sp.	3. 64	4	3. 35	
Siganus canaliculatus	2. 76	48	2. 54	
Scorpaenopsis sp.	2. 76	8	2. 54	
Dactyloptena orientalis	2. 44	82	2. 25	
Monocentris japonica	1. 24	12	1. 14	
Laeops sp.	1. 12	88	1. 03	
Parascopopsis aspinosa	1. 08	16	0. 99	
Lophomus setigerus	0. 96	4	0. 88	
Satyricthys sp.	0. 88	4	0. 81	
Sepia sp.	0. 80	24	0. 74	
Roa jakyari	0. 80	16	0. 74	
Pseudorhombus elevatus	0. 64	8	0. 59	
Grammolites scaber	0. 56	8	0. 52	
Nemipterus japonicus	0. 56	12	0. 52	
Trachinocephalus myops	0. 56	4	0. 52	
Neocentropogon affinis	0. 48	28	0. 44	
Haliutaea sp.	0. 28	16	0. 26	
Synodus macrops	0. 28	12	0. 26	
Aseraggodes sp.	0. 28	24	0. 26	
Ebosi a falcata	0. 20	12	0. 18	
Mionus pictus	0. 16	12	0. 15	
Torquigener sp.	0. 16	12	0. 15	
Benbras macrolepis	0. 08	28	0. 07	
Dactyloptena orientalis	0. 08	4	0. 07	
Cynoglossus puncticeps	0. 04	4	0. 04	0
Cocellia sp.	0. 00	2	0. 00	
Total	108. 49		100. 00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 82  
 DATE : 12/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 14°35.59  
 start stop duration Lon E 95°7.76  
 TIME : 16:04:06 16:34:07 30.0 (min) Purpose : 3  
 LOG : 6347.45 6348.92 1.5 Region : 10320  
 FDEPTH: 78 84 Gear cond.: 0  
 BDEPTH: 78 84 Validity : 0  
 Towing dir.: 0° Wire out : 210 m Speed : 2.9 kn  
 Sorted : 26 Total catch: 51.80 Catch/hour: 103.53

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Pentaplon longimanus	23.10	1731	22.32
Nemipterus nematophorus	22.39	480	21.62
Saurida undosquams	12.47	220	12.05
Upeneus moluccensis	11.11	204	10.73
Dactyloptena orientalis	6.24	88	6.02
Neocentropogon affinis	5.36	364	5.17
Brachypleura novaezeelandiae	3.80	568	3.67
Seriolina nigrofasciata	2.96	4	2.86
Sepia sp.	2.32	60	2.24
Zebrias sp.	1.60	12	1.54
Uroconger sp.	1.36	64	1.31
Octopus sp.	1.20	68	1.16
Jaydia smithi	1.12	112	1.08
Terapon jarbua	1.08	4	1.04
C R A B S	0.80	16	0.77
Uranoscopus affinis	0.80	4	0.77
Pennahia anea	0.80	16	0.77
Fistularia petimba	0.64	24	0.62
Sirenno jerdoni	0.60	36	0.58
Narctine cf. brevifasciata	0.56	4	0.54
Monocentris japonica	0.48	4	0.46
Upeneus guttatus	0.40	20	0.39
Cyclichthys orbicularis	0.40	4	0.39
Pterois russelli	0.36	4	0.35
Neobythites sp.	0.32	20	0.31
Pseudorhombus duplicitocellatus	0.32	4	0.31
Hoplichthys citrinus	0.32	16	0.31
Trixiphichthys weberi	0.24	12	0.23
Cynoglossus sp.	0.24	32	0.23
CALLIONYMI DA E	0.16	16	0.15
Total	103.53		100.00

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 83  
 DATE : 12/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 14°54.11  
 start stop duration Lon E 95°10.06  
 TIME : 19:20:47 19:51:05 30.3 (min) Purpose : 3  
 LOG : 6370.41 6372.00 1.6 Region : 10320  
 FDEPTH: 61 62 Gear cond.: 0  
 BDEPTH: 61 62 Validity : 0  
 Towing dir.: 0° Wire out : 170 m Speed : 3.1 kn  
 Sorted : 22 Total catch: 64.32 Catch/hour: 127.32

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Pennahia anea	46.20	325	36.29
Nemipterus japonicus	35.04	1366	27.52
Acropoma japonicum	13.30	3326	10.45
Bregmaceros mcllellandi	6.89	2684	5.41
Saurida undosquams	4.99	291	3.92
S H R I M P S	4.75	3183	3.73
Trichurus lepturus	4.69	172	3.68
Sepia sp.	2.38	107	1.87
Lagocephalus guentheri	2.38	36	1.87
Rhynchoconger sp.	1.54	107	1.21
Uroconger lepturus	1.07	30	0.84
Haliutaea sp.	0.71	6	0.56
Leiognathus equulus	0.71	101	0.56
Decapterus russelli	0.59	6	0.47
Neomerinthe sp.	0.48	42	0.37
Neocentropogon affinis	0.36	36	0.28
Brachypleura novaezeelandiae	0.36	36	0.28
Fistularia petimba	0.36	30	0.28
Charybdis feriata	0.32	2	0.25
Siganus canaliculatus	0.12	6	0.09
Acanthocephala sp.	0.06	6	0.05
Antennarius hispidus	0.04	2	0.03
Total	127.32		100.00

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 84  
 DATE : 12/05/15 GEAR TYPE: PT No: 1 POSITION: Lat N 14°58.63  
 start stop duration Lon E 95°10.73  
 TIME : 20:45:54 21:17:22 31.5 (min) Purpose : 1  
 LOG : 6378.14 6380.02 1.9 Region : 10320  
 FDEPTH: 12 12 Gear cond.: 0  
 BDEPTH: 52 49 Validity : 0  
 Towing dir.: 0° Wire out : 70 m Speed : 3.6 kn  
 Sorted : 0 Total catch: 16.32 Catch/hour: 31.12

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Loligo sp.	13.38	963	43.01
Dussumieria acuta	9.38	290	30.15
Stolephorus indicus	3.32	465	10.66
Decapterus kurroides	2.48	27	7.97
Lepturacanthus savala	1.53	10	4.90
Rastrelliger brachysoma	1.03	8	3.31
Total	31.12		100.00

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 85  
 DATE : 12/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 15°7.37  
 start stop duration Lon E 95°10.29  
 TIME : 22:24:17 22:54:23 30.1 (min) Purpose : 3  
 LOG : 6387.64 6389.15 1.5 Region : 10320  
 FDEPTH: 38 37 Gear cond.: 0  
 BDEPTH: 38 37 Validity : 0  
 Towing dir.: 0° Wire out : 110 m Speed : 3.0 kn  
 Sorted : 20 Total catch: 77.02 Catch/hour: 153.53

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Thryssa vitrirostris	65.06	18339	42.38
Pennahia anea	20.41	702	13.30
Octopus sp.	7.77	8	5.06
Bregmaceros mcllellandi	7.50	2177	4.88
Metapenaeus tenuipes	6.54	518	4.26
SQUILLIDAE	6.46	1116	4.21
S H R I M P S	5.74	1515	3.74
Apogon sp.	5.74	817	3.74
Photopectoralis bindus	5.10	1228	3.32
Nemipterus japonicus	4.94	112	3.22
Sepia sp.	3.83	207	2.49
Lagocephalus lunaris	2.87	24	1.87
Lepturacanthus savala	2.71	72	1.77
Ostorhynchus fasciatus	2.39	319	1.56
Loligo sp.	1.28	40	0.83
Polydactylus sextarius	0.96	48	0.62
Portunus sanguinolentus	0.96	8	0.62
Lactarius lactarius	0.96	64	0.62
Pomadasys maculatus	0.80	40	0.52
Lophionis setigerus	0.48	8	0.31
Stolephorus indicus	0.48	48	0.31
Saurida tumbil	0.24	8	0.16
Siganus canaliculatus	0.16	8	0.10
Uranoscopus affinis	0.16	8	0.10
Total	153.53		100.00

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 86  
 DATE : 13/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 15°15.60  
 start stop duration Lon E 95°35.31  
 TIME : 06:15:43 06:40:57 25.2 (min) Purpose : 3  
 LOG : 6454.85 6456.27 1.4 Region : 10320  
 FDEPTH: 38 41 Gear cond.: 0  
 BDEPTH: 38 41 Validity : 0  
 Towing dir.: 0° Wire out : 110 m Speed : 3.4 kn  
 Sorted : 10 Total catch: 96.70 Catch/hour: 229.96

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Johnius sp.	78.48	1046	34.13
Pennahia anea	36.62	4114	15.93
Congressox talabono	22.59	17	9.82
Cynoglossus arel	16.17	214	7.03
Sepia sp.	15.22	2283	6.62
Photopectoralis bindus	11.41	6159	4.96
Jaydia striata	8.09	2426	3.52
Portunus sanguinolentus	6.66	24	2.90
HARPIOSQUILLIDAE	5.23	4356	2.28
Nemipterus japonicus	4.99	71	2.17
S H R I M P S	4.52	595	1.96
Lagocephalus guentheri	3.33	48	1.45
Uruconger sp.	3.09	95	1.34
Lactarius lactarius	2.38	24	1.03
Polydactylus sextarius	2.14	143	0.93
Lepturacanthus savala	1.90	190	0.83
Loligo sp.	1.90	48	0.83
Jaydia smithi	1.66	95	0.72
Amblyotrypauchen arctocephalus	0.72		1.66
Pomadasys maculatus	0.71	24	0.31
Parachaeturiichthys polynema	0.71	71	0.31
Strophodon sp.	0.48	2	0.21
Total	229.96		100.00

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 87  
 DATE : 13/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 15°5.12  
 start stop duration Lon E 95°30.19  
 TIME : 08:22:09 08:52:18 30.1 (min) Purpose : 3  
 LOG : 6468.43 6469.95 1.5 Region : 10320  
 FDEPTH: 60 64 Gear cond.: 0  
 BDEPTH: 60 64 Validity : 0  
 Towing dir.: 0° Wire out : 180 m Speed : 3.0 kn  
 Sorted : 19 Total catch: 41.24 Catch/hour: 82.07

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight	numbers		
Megalaspis cordyla	34.95	199	42.58
Nemipterus japonicus	12.02	203	14.65
Lepturacanthus savala	10.99	179	13.39
Sphyræna obtusata	6.53	6	7.95
Saurida tumbil	5.81	641	7.08
Acropoma japonicum	2.39	716	2.91
Photopectoralis aureus	1.75	299	2.13
Lagocephalus guentheri	1.43	12	1.75
Loligo sp.	1.35	68	1.65
Selar crumenophthalmus	1.35	8	1.65
Aluterus monoceros	1.03	2	1.26
Terapon jarbua	0.88	4	1.07
Pomadasys maculatus	0.48	4	0.58
Siganus canaliculatus	0.40	8	0.48
Brachypleura novaezeelandiae	0.32	24	0.39
Cynoglossus cynoglossus	0.24	12	0.29
HARPIOSQUILLIDAE	0.16	16	0.19
Total	82.07		100.00

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 88			
DATE : 13/05/15	GEAR TYPE: BT NO: 27	POSITION: Lat N 14°41.49	Lon E 95°29.32
TIME : 12:55:52	start stop duration	Purpose : 3	Region : 10320
LOG : 6497.44 6498.98	30.0 (min)	Gear cond.: 0	Validity : 0
FDEPTH: 106	103	Speed : 3.1 kn	Catch/hour: 158.15
BDEPTH: 106	103	Wire out : 260 m	
Towing dir: 0°	Wire out : 260 m	Speed : 3.1 kn	
Sorted : 0	Total catch: 79.13	Catch/hour: 158.15	

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight numbers			
Apogon smithi	32.80	9458	20.74
S H R I M P S	20.99	600	13.27
Nemipterus japonicus	17.67	228	11.17
Nemipterus nematophorus	13.19	248	8.34
Rhinobatos cf. schlegelii	10.79	4	6.82
Tylerius spinosissimus	6.00	120	3.79
Saurida tumbil	6.00	60	3.79
Narcine cf. breviliabata	4.88	28	3.08
Megalaspis cordyla	4.16	24	2.63
GOBIIDAE sp. 1	3.32	364	2.10
Brachypterois serrulata	3.00	32	1.90
Cynoglossus arel	3.00	420	1.90
SQUILLIDAE	3.00	92	1.90
Jaydia striata	3.00	60	1.90
Bregmaceros mcclellandi	3.00	200	1.90
Priacanthus macracanthus	2.80	4	1.77
Lophomus setigerus	2.48	4	1.57
Hapalogenys sp.	2.32	8	1.47
Brachyptera novaezeelandiae	2.24	68	1.42
Parascolopsis aspinnosa	2.00	44	1.26
Halieutaea sp.	1.92	8	1.21
Gymnathorax dorsalis	1.92	4	1.21
Muraenesox bagio	1.60	4	1.01
Trachipterus trachipterus	1.44	8	0.91
Brotula multibarbata	0.96	8	0.61
Uranoscopus affinis	0.80	4	0.51
Neocentropogon affinis	0.68	64	0.43
Octopus sp.	0.60	60	0.38
Bathycyprus sp.	0.48	8	0.30
Portunus sp.	0.48	4	0.30
Ophiichthys sp.	0.20	4	0.13
Pseudorhombus elevatus	0.16	8	0.10
Bathymyrus sp.	0.08	4	0.05
Saurechelys sp.	0.04	4	0.03
Total	158.15		100.00

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 89			
DATE : 13/05/15	GEAR TYPE: BT NO: 27	POSITION: Lat N 14°23.39	Lon E 95°26.47
TIME : 16:04:12	start stop duration	Purpose : 3	Region : 10320
LOG : 6520.20 6521.69	30.0 (min)	Gear cond.: 0	Validity : 0
FDEPTH: 101	105	Speed : 3.0 kn	Catch/hour: 47.75
BDEPTH: 101	105	Wire out : 270 m	
Towing dir: 0°	Wire out : 270 m	Speed : 3.0 kn	
Sorted : 0	Total catch: 23.89	Catch/hour: 47.75	

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight numbers			
Nemipterus japonicus	11.45	346	23.98
Neocentropogon affinis	8.45	1267	17.71
Saurida undosquams	6.72	160	14.06
Upeneus moluccensis	5.10	86	10.67
Tylerius spinosissimus	2.82	845	5.90
Cynoglossus puncticeps	1.38	78	4.02
Saurida longimanus	1.32	12	2.76
Priacanthus macracanthus	1.14	314	2.39
Chirotepus sp.	1.02	400	2.13
Acropoma japonicum	0.96	24	2.01
Dactyloptena orientalis	0.90	18	1.88
Synodus macrops	0.72	314	1.51
Ariosoma sp.	0.68	2	1.42
Sea snakes	0.56	28	1.17
Laeops sp.	0.48	4	1.00
Cyclichthys sp.	0.30	36	0.63
Fistularia petimba	0.30	12	0.63
Pterygotrigla hemisticta	0.30	4	0.63
Uranoscopus affinis	0.30	4	0.63
Halieutaea sp.	0.26	6	0.54
Small crabs	0.24	6	0.50
Suggirundus macracanthus	0.24	22	0.50
Lophomus setigerus	0.20	4	0.42
Champsodon sp.	0.10	16	0.21
BOTHIDAE	0.10	16	0.21
Gymnathorax dorsalis	0.06	6	0.13
Aseraggodes sp.	0.04	4	0.08
Total	47.75		100.00

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 90			
DATE : 14/05/15	GEAR TYPE: BT NO: 27	POSITION: Lat N 13°55.22	Lon E 95°42.27
TIME : 01:54:06	start stop duration	Purpose : 3	Region : 10320
LOG : 6582.69 6584.16	30.6 (min)	Gear cond.: 0	Validity : 0
FDEPTH: 176	173	Speed : 2.9 kn	Catch/hour: 270.26
BDEPTH: 176	173	Wire out : 420 m	
Towing dir: 0°	Wire out : 420 m	Speed : 2.9 kn	
Sorted : 35	Total catch: 137.74	Catch/hour: 270.26	

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight numbers			
Ostichthys acanthorhinus	158.46	2849	58.63
Scallicus sp.	39.40	86	14.58
Saurida undosquams	23.78	290	8.80
Antigonia sp.	5.49	102	2.03
Squalus hemipinnis	4.71	4	1.74
Chelidoperca investigatoris	4.40	94	1.63
Odontanthias rhodopeplus	4.24	8	1.57
Pseudanthias cf. huchtil	3.92	24	1.45
Glyptophtidum sp.	3.92	16	1.45
Epinephelus radiatus	3.77	6	1.39
Hapalogenys merguensis	3.45	24	1.28
Snyderina yamanokami	2.83	31	1.05
Histiogobius typus	2.51	24	0.93
Parascolopsis boesemani	2.20	63	0.81
Nemipterus japonicus	1.88	24	0.70
Gymnathorax cf. sokotrensis	1.88	8	0.70
Lipohelilus carnolabrum	1.10	8	0.41
Pseudorhombus elevatus	0.94	8	0.35
Neomerinthe sp.	0.63	16	0.23
Cynoglossus cf. marlei	0.63	31	0.23
Total	270.26		99.96

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 91			
DATE : 14/05/15	GEAR TYPE: BT NO: 27	POSITION: Lat N 14°14.73	Lon E 95°45.47
TIME : 04:58:43	start stop duration	Purpose : 3	Region : 10320
LOG : 6604.67 6606.17	30.3 (min)	Gear cond.: 0	Validity : 0
FDEPTH: 164	149	Speed : 3.0 kn	Catch/hour: 105.01
BDEPTH: 164	149	Wire out : 390 m	
Towing dir: 0°	Wire out : 390 m	Speed : 3.0 kn	
Sorted : 26	Total catch: 53.03	Catch/hour: 105.01	

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight numbers			
Ostichthys acanthorhinus	62.97	1323	59.97
Nemipterus japonicus	8.32	135	7.92
Loligo sp.	6.26	349	5.96
Priacanthus macracanthus	6.10	59	5.81
Saurida undosquams	4.99	40	4.75
Atelopus sp.	4.48	6	4.26
Satyricthys sp.	2.30	4	2.19
Lophomus setigerus	2.22	6	2.11
Pterygotrigla hemisticta	1.90	44	1.81
Priacanthus hamrur	1.35	36	1.28
Parascolopsis aspinnosa	1.27	20	1.21
Okamejei cf. powelli	0.99	4	0.94
Chelidoperca investigatoris	0.55	16	0.53
Chelonodontops sp.	0.53	8	0.51
Halieutaea sp.	0.32	8	0.30
Lepidotrigla sp.	0.24	6	0.23
Snyderina yamanokami	0.20	2	0.19
Roajayakari	0.04	2	0.04
Total	105.01		100.00

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 92			
DATE : 14/05/15	GEAR TYPE: BT NO: 27	POSITION: Lat N 14°33.96	Lon E 95°48.29
TIME : 08:38:42	start stop duration	Purpose : 3	Region : 10320
LOG : 6629.38 6630.94	30.3 (min)	Gear cond.: 0	Validity : 0
FDEPTH: 122	122	Speed : 3.1 kn	Catch/hour: 614.16
BDEPTH: 122	122	Wire out : 330 m	
Towing dir: 0°	Wire out : 330 m	Speed : 3.1 kn	
Sorted : 26	Total catch: 310.46	Catch/hour: 614.16	

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight numbers			
Priacanthus hamrur	410.21	12724	66.79
Decapterus smithianzi	50.60	1045	8.89
Priacanthus macracanthus	49.85	1092	8.12
Saurida undosquams	44.63	309	7.27
Acropoma japonicum	9.50	3608	1.55
Lophomus setigerus	9.26	24	1.51
Nemipterus japonicus	9.02	214	1.47
Decapterus kurroides	8.07	142	1.31
Ostichthys acanthorhinus	4.04	71	0.66
Suggirundus macracanthus	3.09	24	0.50
Decapterus tabl	2.93	6	0.48
Parascolopsis aspinnosa	2.37	24	0.39
Portunus sp.	2.37	47	0.39
Champsodon sp.	1.90	427	0.31
Ostichthys cf. kaianus	1.19	24	0.19
Halieutaea sp.	0.71	24	0.12
Tylerius spinosissimus	0.24	71	0.04
Pseudorhombus duplici ocellatus	0.20	2	0.03
Total	614.16		100.00

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 93			
DATE : 14/05/15	GEAR TYPE: BT NO: 27	POSITION: Lat N 14°52.85	Lon E 95°51.16
TIME : 11:36:54	start stop duration	Purpose : 3	Region : 10320
LOG : 6651.45 6652.98	30.0 (min)	Gear cond.: 0	Validity : 0
FDEPTH: 109	113	Speed : 3.1 kn	Catch/hour: 43.63
BDEPTH: 109	113	Wire out : 260 m	
Towing dir: 0°	Wire out : 260 m	Speed : 3.1 kn	
Sorted : 22	Total catch: 21.83	Catch/hour: 43.63	

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight numbers			
Uraspis helvola	7.16	30	16.40
Saurida undosquams	7.12	420	16.31
Apogon smithi	4.88	1951	11.18
Loligo sp.	4.40	158	10.08
Saurida longimanus	3.56	192	8.15
Ariomma indicum	3.44	18	7.88
Trachipterus trachipterus	2.80	6	6.41
Nemipterus japonicus	1.80	14	3.66
Nemipterus nematophorus	1.20	22	2.75
Champsodon sp.	1.12	166	2.57
Pisiphaea sp.	0.92	202	2.11
Portunus sp.	0.88	24	2.02
Neocentropogon affinis	0.64	84	1.47
Gazza minuta	0.64	96	1.47
Saurida tumbil	0.56	56	1.28
Uranoscopus affinis	0.52	14	1.19
Egglestonichthys melanoptera	0.44	4	0.46
Lagocephalus guentheri	0.44	2	1.01
Halieutaea sp.	0.26	2	0.60
Jaydia striata	0.24	38	0.55
Brachypterois serrulata	0.20	12	0.46
Cynoglossus puncticeps	0.16	12	0.37
Bathycyprus sp.	0.12	6	0.27
Sepiella sp.	0.10	2	0.23
Parascolopsis aspinnosa	0.10	2	0.23
Jaydia queketti	0.08	30	0.18
Bathymyrus sp.	0.04	2	0.09
Amblyotrypaucaen arctocepalus	0.04	2	0.09
Total	43.63		100.00

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 94  
 DATE : 14/05/15 GEAR TYPE: BT NO: 27 POSITION: Lat N 15°18.38  
 start stop duration Lon E 95°53.50  
 TIME : 15:00:39 15:30:41 30.0 (min) Purpose : 3  
 LOG : 6679.30 6680.63 1.3 Region : 10320  
 FDEPTH: 24 25 Gear cond.: 0  
 BDEPTH: 24 25 Validity : 0  
 Towing dir: 0° Wire out : 80 m Speed : 2.6 kn  
 Sorted : 13 Total catch: 34.24 Catch/hour: 68.41

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Coilia dussumieri	19.98	21978	29.21	
Bregmaceros mcclellandi	9.99	7992	14.60	
SCIÆNIIDAE	9.99	699	14.60	
Jaydia smitthi	7.99	1998	11.68	
Johni us sp.	5.15	76	7.54	167
Congresox talabon	4.84	6	7.07	168
Johni us dussumieri	4.24	54	6.19	
Lepturacanthus savala	2.12	24	3.10	
Charybdis feriata	1.20	8	1.75	
Pampus argenteus	0.80	6	1.17	
Scomberomorus koreanus	0.72	2	1.05	
Sepiella sp.	0.40	16	0.58	
Lagocephalus guentheri	0.32	8	0.47	
Chrysochir aureus	0.28	6	0.41	
Setipinna sp.	0.16	8	0.23	
Leptomelanosoma indicum	0.12	2	0.18	
Polydactylus sextarius	0.12	4	0.18	
Total	68.41		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 95  
 DATE : 14/05/15 GEAR TYPE: BT NO: 27 POSITION: Lat N 15°15.64  
 start stop duration Lon E 96°19.25  
 TIME : 18:41:26 19:12:31 31.1 (min) Purpose : 3  
 LOG : 6708.39 6710.13 1.7 Region : 10320  
 FDEPTH: 26 26 Gear cond.: 0  
 BDEPTH: 26 26 Validity : 0  
 Towing dir: 0° Wire out : 80 m Speed : 3.3 kn  
 Sorted : 7 Total catch: 58.92 Catch/hour: 113.75

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
S H R I M P S	29.19	2919	25.66	
Johni us dussumieri	19.92	1193	17.52	
Otholithoides pama	16.87	60	14.83	
Coilia dussumieri	16.22	3568	14.26	
Congresox talabonoides	9.77	19	8.59	
Lepturacanthus savala	5.33	127	4.68	
Bregmaceros mcclellandi	4.63	46	4.07	
HARPISQUILLIDAE	3.47	371	3.05	
Osteogenezosus militaris	2.90	8	2.55	
C R A B S	2.08	208	1.83	
Leptomelanosoma indicum	1.85	23	1.63	
Polydactylus sextarius	0.58	104	0.51	
Gymnothorax dorsalis	0.46	2	0.41	
Cynoglossus sp.	0.23	46	0.20	
Terapon jarbua	0.23	12	0.20	
Total	113.75		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 96  
 DATE : 14/05/15 GEAR TYPE: PT NO: 1 POSITION: Lat N 14°59.57  
 start stop duration Lon E 96°15.24  
 TIME : 21:09:15 21:27:59 18.8 (min) Purpose : 1  
 LOG : 6726.93 6728.15 1.2 Region : 10320  
 FDEPTH: 12 12 Gear cond.: 0  
 BDEPTH: 68 76 Validity : 0  
 Towing dir: 0° Wire out : 65 m Speed : 3.9 kn  
 Sorted : 9 Total catch: 8.57 Catch/hour: 27.42

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
MYCTOPHIDAE	13.44	11200	49.01	
JELLYFISH	9.60	3	35.01	
Chirocentrus nudus	1.66	6	6.07	
Loligo sp.	1.66	205	6.07	
Siganus canaliculatus	0.51	16	1.87	
Atule mate	0.45	51	1.63	
Leiognathus sp.	0.06	16	0.23	
Terapon thersaps	0.03	3	0.12	
Cubiiceps whitelleggi	0.00	3	0.00	
Total	27.42		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 97  
 DATE : 14/05/15 GEAR TYPE: BT NO: 27 POSITION: Lat N 14°53.91  
 start stop duration Lon E 96°15.43  
 TIME : 22:21:08 22:51:17 30.1 (min) Purpose : 3  
 LOG : 6732.94 6734.40 1.4 Region : 10320  
 FDEPTH: 116 114 Gear cond.: 0  
 BDEPTH: 116 114 Validity : 0  
 Towing dir: 0° Wire out : 290 m Speed : 2.9 kn  
 Sorted : 25 Total catch: 123.56 Catch/hour: 245.89

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Acropoma japonicum	121.99	14637	49.61	
S H R I M P S	48.56	12139	19.75	
Saurida undosquamis	18.31	896	7.45	169
Sphyræna pinguis	14.13	149	5.75	
Lepturacanthus savala	12.70	249	5.16	
Pennahia anea	8.36	40	3.40	
C R A B S	7.56	139	3.08	
Cynoglossus arel	6.37	30	2.59	
Acentrogobius sp.	3.58	338	1.46	
Loligo sp.	1.19	40	0.49	
Ariosoma sp.	0.80	60	0.32	
Grammolites scaber	0.80	40	0.32	
Bregmaceros mcclellandi	0.80	577	0.32	
Mene maculata	0.44	2	0.18	
Ariomma indicum	0.32	2	0.13	
Total	245.89		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 98  
 DATE : 15/05/15 GEAR TYPE: BT NO: 27 POSITION: Lat N 14°34.20  
 start stop duration Lon E 96°12.75  
 TIME : 01:41:21 02:12:27 31.1 (min) Purpose : 3  
 LOG : 6754.09 6755.42 1.3 Region : 10320  
 FDEPTH: 129 130 Gear cond.: 0  
 BDEPTH: 129 130 Validity : 0  
 Towing dir: 0° Wire out : 290 m Speed : 2.6 kn  
 Sorted : 0 Total catch: 32.11 Catch/hour: 61.95

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Tylerius spinosissimus	27.20	1144	43.91	
Priacanthus macracanthus	8.87	39	14.33	171
Nemipterus japonicus	6.02	79	9.72	170
Loligo sp.	4.71	941	7.60	
Saurida undosquamis	4.59	60	7.41	172
Lophomus setigerus	3.24	10	5.23	
Acropoma japonicum	3.09	205	4.98	
Satyriichthys sp.	1.50	10	2.43	
Parascolopsis aspinosa	1.12	14	1.81	
Uranoscopus affinis	0.58	2	0.93	
Sphyræna pinguis	0.44	6	0.72	
Okamejei cf. powelli	0.39	2	0.62	
Halieutaea sp.	0.10	2	0.16	
Jaydia queketti	0.06	4	0.09	
Fistularia petimba	0.04	2	0.06	
Fistularia petimba	0.04	2	0.06	0
Total	61.99		100.06	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 99  
 DATE : 15/05/15 GEAR TYPE: BT NO: 27 POSITION: Lat N 14°1.86  
 start stop duration Lon E 96°9.21  
 TIME : 06:04:26 06:36:30 32.1 (min) Purpose : 3  
 LOG : 6789.59 6791.29 1.7 Region : 10320  
 FDEPTH: 156 147 Gear cond.: 0  
 BDEPTH: 156 147 Validity : 0  
 Towing dir: 0° Wire out : 390 m Speed : 3.2 kn  
 Sorted : 32 Total catch: 110.90 Catch/hour: 207.48

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Ostiichthys acanthorhinus	68.48	1779	33.00	
Loligo sp.	57.47	180	27.70	
Saurida undosquamis	33.12	438	15.96	173
Squalus cf. hemipinnis	11.30	34	5.45	6.89
Satyriichthys sp.	5.84	51	2.81	
Priacanthus macracanthus	2.92	6	1.41	
Echeneis naucratis	2.36	22	1.14	
Uranoscopus sp.	2.13	22	1.03	
Nemipterus japonicus	1.95	4	0.94	
Okamejei cf. powelli	1.91	28	0.92	
Parascolopsis aspinosa	1.87	4	0.90	
Lophomus setigerus	1.35	28	0.65	
Pseudorhombus duplicioellatus	1.23	28	0.60	
Torquigener sp.	0.45	11	0.22	
C R A B S	0.22	45	0.11	
Mephisto fraserbrunneri	0.22	11	0.11	
Halieutaea sp.	0.15	4	0.07	
Chelidoperca investigatoris	0.11	11	0.05	
Neocentropogon affinis	0.11	6	0.05	
Parascolopsis boesemani	0.11	6	0.05	
Total	207.48		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 100  
 DATE : 16/05/15 GEAR TYPE: BT NO: 27 POSITION: Lat N 13°42.21  
 start stop duration Lon E 96°20.38  
 TIME : 04:13:29 04:43:33 30.1 (min) Purpose : 3  
 LOG : 7023.48 7025.12 1.6 Region : 10320  
 FDEPTH: 157 165 Gear cond.: 0  
 BDEPTH: 157 165 Validity : 0  
 Towing dir: 0° Wire out : 390 m Speed : 3.3 kn  
 Sorted : 33 Total catch: 64.40 Catch/hour: 128.50

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Loligo sp.	71.83	2514	55.90	
Priacanthus macracanthus	33.60	1177	26.15	
Squalus cf. hemipinnis	4.67	4	3.63	174
Saurida undosquamis	3.43	40	2.67	
Okamejei cf. powelli	2.31	4	1.80	
Synagrops japonicus	2.15	818	1.68	
Ibacus novemdentatus	1.76	16	1.37	
Torquigener sp.	1.36	68	1.06	
Ammodioides zanthrops	1.20	8	0.93	
Pseudorhombus qui nguocellatus	0.88	8	0.68	
Nemipterus japonicus	0.72	12	0.56	
Ostiichthys acanthorhinus	0.72	16	0.56	
Hapalogenys merguensis	0.72	4	0.56	
Decapterus smithvianzi	0.56	12	0.43	
Benbrás macrolepis	0.52	8	0.40	
Zenopsis nebulosa	0.48	4	0.37	
Cubiiceps whitelleggi	0.48	20	0.37	
Small shrimps	0.40	287	0.31	
Satyriichthys laticeps	0.40	8	0.31	
Parascolopsis boesemani	0.32	16	0.25	
Total	128.50		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 101  
 DATE : 16/05/15 GEAR TYPE: BT NO: 27 POSITION: Lat N 14°0.02  
 start stop duration Lon E 96°29.57  
 TIME : 07:55:42 08:26:30 30.8 (min) Purpose : 3  
 LOG : 7052.20 7053.88 1.7 Region : 10320  
 FDEPTH: 117 119 Gear cond.: 0  
 BDEPTH: 117 119 Validity : 0  
 Towing dir: 0° Wire out : 280 m Speed : 3.3 kn  
 Sorted : 0 Total catch: 35.35 Catch/hour: 68.86

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Loligo sp.	29.61	1599	43.00	
Cantherhines multineatus	16.21	146	23.54	
Saurida undosquamis	10.56	62	15.33	175
Nemipterus japonicus	5.42	113	7.86	176
Fistularia petimba	1.95	2	2.83	
Bleekeria kallilepis	1.64	92	2.38	
Uranoscopus sp.	1.01	2	1.47	
Torquigener sp.	0.55	6	0.79	
Epinephelus areolatus	0.43	2	0.62	
Pseudorhombus qui nguocellatus	0.35	4	0.51	
Trachinocephalus myops	0.35	6	0.51	
Starfish	0.27	8	0.40	
Engyprosopon cf. cocoensis	0.18	4	0.25	
Cephalopsetta ventrocellatus	0.16	2	0.23	
Hapalogenys merguensis	0.08	2	0.11	
Synodus macrops	0.06	4	0.08	
Histiogaster typus	0.04	2	0.06	
Matuta planipes	0.02	2	0.03	
Total	68.86		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 102  
 DATE : 16/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 14°22.28  
 start stop duration Lon E 96°33.85  
 TIME : 12:04:17 12:34:22 30.1 (min) Purpose : 3  
 LOG : 7078.73 7080.36 1.6 Region : 10320  
 FDEPTH: 111 104 Gear cond.: 0  
 BDEPTH: 111 104 Validity : 0  
 Towing dir: 0° Wire out : 260 m Speed : 3.3 kn  
 Sorted : 49 Total catch: 49.45 Catch/hour: 98.60

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Saurida undosquams	32.46	1039	32.92	178
Nemipterus japonicus	17.15	325	17.39	179
Loligo sp.	8.30	459	8.41	
Sorsogona melanoptera	3.51	249	3.56	
Acropoma japonicum	3.31	497	3.36	
Lophomus setigerus	3.11	26	3.15	177
Lepidotrigla sp. C	2.79	8	2.83	
Okamejei cf. powelli	2.75	604	2.79	
Pasiptera sp.	1.67	12	1.70	
Uranoscopus affinis				
Narce cf. brevilabata	1.64	6	1.66	
Priacanthus macracanthus	1.64	6	1.66	
Sertolina nigrofasciata	1.56	10	1.58	
Synodus macrops	1.52	189	1.54	
Portunus sp.	1.52	435	1.54	0
Sepia prashadi				
Parascloopsis aspinosa	1.22	62	1.23	
Arnoglossus sp.	1.20	162	1.21	
Diodon holocanthus	1.12	2	1.13	
Dactyloptena orientalis	0.94	12	0.95	
Octopus sp.	0.92	12	0.93	
Portunus sp.	0.80	8	0.81	
Charybdis cf. miles				
Cephalopsetta ventrocellatus	0.46	8	0.47	0.73
Histiogaster typus	0.40	4	0.40	
Siganus canaliculatus	0.40	10	0.40	
Upeneus guttatus	0.32	12	0.32	
Fistularia petimba	0.28	14	0.28	
Gymnotherax reticularis	0.26	4	0.26	
Callionymus kotthausi				
Cantherhines multineatus	0.24	2	0.24	0.26
Aselegodes sp.	0.24	2	0.24	
Neocentropogon affinis	0.22	16	0.22	
Pseudorhombus quiuocellatus	0.20	2	0.20	
Tylerius spinosissimus	0.20	16	0.20	
Champsodon sp.	0.20	76	0.20	
Aesoplia comuta	0.14	4	0.14	
Jaydia queketti	0.08	6	0.08	
Ashtoret lunaris	0.08	6	0.08	
Cociella sp.	0.08	4	0.08	0.08
Trachinocephalus myops	0.08	4	0.08	
Upeneus moluccensis	0.04	4	0.04	
Total	98.60		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 103  
 DATE : 16/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 14°51.52  
 start stop duration Lon E 96°35.41  
 TIME : 15:41:58 16:12:03 30.1 (min) Purpose : 3  
 LOG : 7108.81 7110.18 1.4 Region : 10320  
 FDEPTH: 70 72 Gear cond.: 0  
 BDEPTH: 70 72 Validity : 0  
 Towing dir: 0° Wire out : 180 m Speed : 2.7 kn  
 Sorted : 0 Total catch: 38.00 Catch/hour: 75.82

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Triichurus lepturus	17.00	509	22.42	
Small shrimps	16.10	12882	21.24	
Pennahia ovata	13.65	790	18.00	
Johnius dussumieri	6.05	48	7.97	
Acropoma japonicum	4.91	648	6.47	
Metapenaeus tenuipes	4.49	269	5.92	
Polydactylus sextarius	3.71	106	4.89	
Thryssa dussumieri	2.51	451	3.32	
Bregmaceros mccllellandi	1.74	625	2.29	
Halleutaea sp.	1.44	6	1.89	
Nemipterus japonicus	1.26	18	1.66	
Cynoglossus lingua	0.64	48	0.84	
HARPIOSQUILLIDAE	0.48	44	0.63	
Dussumieri a acuta	0.44	6	0.58	
Pomadasy s maculatus	0.40	6	0.53	
Sepia sp.	0.24	6	0.32	
Lophomus setigerus	0.20	2	0.26	
Bathycongrus sp.	0.16	6	0.21	
OPHIIDIAE	0.12	6	0.16	
Lagocephalus inermis	0.08	2	0.11	
Lagocephalus lunaris	0.08	4	0.11	
Ostorhynchus fasciatus	0.06	14	0.08	
Siganus canaliculatus	0.04	2	0.05	
Neehelys sp.	0.04	2	0.05	
Total	75.82		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 104  
 DATE : 16/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 15°10.50  
 start stop duration Lon E 96°37.22  
 TIME : 19:06:52 19:37:04 30.2 (min) Purpose : 3  
 LOG : 7131.63 7133.21 1.6 Region : 10320  
 FDEPTH: 29 29 Gear cond.: 0  
 BDEPTH: 29 29 Validity : 0  
 Towing dir: 0° Wire out : 90 m Speed : 3.1 kn  
 Sorted : 12 Total catch: 40.55 Catch/hour: 80.56

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Small shrimps	25.03	20527	31.07	
Harpadon nehereus	20.74	142	25.75	
Otholithoides pama	7.75	131	9.62	
UNIDENTIFIED FISH	6.75	2	8.38	
Coilia dussumieri	6.68	2003	8.29	
Congrosx talabon	4.37	8	5.43	
Johnius carouna	3.34	370	4.14	
Bregmaceros mccllellandi	2.50	1126	3.11	
Triichurus lepturus	0.77	30	0.96	
Charybdis feriata	0.48	6	0.59	
Polydactylus sextarius	0.48	89	0.59	
C R A B S	0.42	209	0.52	
HARPIOSQUILLIDAE	0.42	60	0.52	
Portunus sanguinolentus	0.36	149	0.44	
Sea snakes	0.16	2	0.20	
Chrysochir aureus	0.12	30	0.15	0
Polynemus paradiseus	0.08	2	0.10	
Bathycongrus sp.	0.06	12	0.07	
Amblyotrypauchen arctoccephalus	0.06	12	0.07	
Total	80.56		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 105  
 DATE : 18/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 15°9.46  
 start stop duration Lon E 96°58.45  
 TIME : 15:19:43 15:49:47 30.1 (min) Purpose : 3  
 LOG : 7320.40 7321.18 0.8 Region : 10320  
 FDEPTH: 29 30 Gear cond.: 0  
 BDEPTH: 29 30 Validity : 0  
 Towing dir: 0° Wire out : 100 m Speed : 1.5 kn  
 Sorted : 11 Total catch: 71.99 Catch/hour: 143.64

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Harpadon nehereus	66.84	2873	46.53	
Plotosus canius	32.84	32	22.86	
S H R I M P S	13.17	758	9.17	
Triichurus lepturus	4.19	239	2.92	
Trypauchen pelaeos	3.99	40	2.78	
C R A B S	3.39	1387	2.36	
Coilia dussumieri	2.99	579	2.08	
Polynemus melanochir melanochir	2.39	70	1.67	
Osteogeniosus militaris	2.39	269	1.67	
Congrosx talabonides	1.68	8	1.17	
Arius venosus	1.66	2	1.15	
Oratosquillina interupta				
Opisthoteris tardoopta	1.40	160	0.97	0.97
Chrysochir aureus	1.40	40	0.97	
Otholithoides pama	1.20	409	0.83	
Polynemus paradiseus	0.80	20	0.56	
Scoliodon cf. laticaudus	0.72	4	0.50	
Pampus argenteus	0.60	30	0.42	
Bregmaceros mccllellandi	0.40	219	0.28	
Polydactylus sextarius	0.20	30	0.14	
Total	143.64		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 106  
 DATE : 18/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 14°46.11  
 start stop duration Lon E 96°55.98  
 TIME : 18:37:04 19:07:18 30.2 (min) Purpose : 3  
 LOG : 7344.06 7345.60 1.6 Region : 10320  
 FDEPTH: 51 53 Gear cond.: 0  
 BDEPTH: 51 53 Validity : 0  
 Towing dir: 0° Wire out : 150 m Speed : 3.1 kn  
 Sorted : 34 Total catch: 98.09 Catch/hour: 194.69

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Pennahia ovata	98.00	5817	50.65	181
Lepturacanthus savala	21.44	464	11.01	
Polydactylus sextarius	8.93	536	4.59	
Brachypleura novaezeelandiae	7.20	125	3.70	
Coilia dussumieri	6.91	899	3.55	
Cynoglossus lingua	6.67	30	3.43	
Nemipterus japonicus	6.31	113	3.24	180
Johnius cf. dussumieri	5.12	36	2.63	
Acropoma japonicum	4.64	1024	2.39	
Harpadon sp.	3.87	131	1.99	
Parastromateus niger	3.02	2	1.55	
MYCTOPHIDAE	2.98	992	1.53	
Osteogeniosus militaris	2.02	119	1.04	
Thryssa vittirostris	1.91	208	0.98	
Congrosx talabon	1.79	6	0.92	
Priacanthus macracanthus	1.37	12	0.70	
Chrysochir aureus	1.31	6	0.67	
Epinephelus sexfasciatus	1.19	6	0.61	
Jaydia queketti	1.19	262	0.61	
Small shrimps	0.95	143	0.49	
Muraenesox bagio	0.65	6	0.34	
Small crabs	0.65	101	0.34	
Trypauchen microcephalus	0.60	6	0.31	
Uroconger sp.	0.60	30	0.31	
Uranoscopus affinis	0.48	6	0.24	
Saurida tumbil	0.48	30	0.24	
Neomerinthe sp.	0.42	42	0.21	
Cociella sp.	0.42	0.21		
Loligo sp.	0.42	12	0.21	
Bregmaceros mccllellandi	0.42	71	0.21	
Squillidae	0.36	42	0.18	
Sepia sp.	0.36	286	0.18	
Lagocephalus lunaris	0.36	6	0.18	
Neehelys sp.	0.36	12	0.18	
Pomadasy s maculatus	0.36	12	0.18	
Metapenaeus sp.	0.24	77	0.12	
Dussumieri a acuta	0.12	6	0.06	
Total	194.69		100.00	



R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 107  
 DATE : 19/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 14°24.27  
 start stop duration Lon E 96°52.93  
 TIME : 21:25:47 21:56:49 31.0 (min) Purpose : 3  
 LOG : 7366.22 7368.03 1.8 Region : 10320  
 FDEPTH: 73 81 Gear cond.: 0  
 BDEPTH: 73 81 Validity : 0  
 Towing dir: 0° Wire out : 190 m Speed : 3.5 kn  
 Sorted : 28 Total catch: 58.30 Catch/hour: 112.73

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Sepia sp.	19.03	572	16.88	
Nemipterus japonicus	16.55	2185	14.68	182
Saurida undosquamis	16.47	336	14.61	184
Dactyloptena orientalis	9.20	81	8.16	
Small crabs	4.87	487	4.32	
Pentapriion longimanus	4.80	228	4.25	
Rhinobatos sp.	4.10	3.64	3.22	
Upeneus guttatus		151		183
Seriolina nigrofasciata	2.71	8	2.40	
Siganus canaliculatus	2.55	70	2.26	
Narcine cf. brevifasciata	2.36	8	2.09	
Cociella sp.	2.05	104	1.82	
Cyclichthys orbicularis	1.93	15	1.72	
Aluterus monoceros	1.86	8	1.65	
Paraperchis alboguttata	1.86	70	1.65	
Upeneus moluccensis	1.62	23	1.44	
Small shrimps	1.55	77	1.37	
Fistularia petimba	1.51	50	1.34	
Samaris cristatus	1.35	50	1.20	
Saurida tumbil	1.24	4	1.10	
Portunus sanguinolentus	1.01	4	0.89	
Leiognathus sp.	1.01	89	0.89	
Brachypterois serrulata	0.97	23	0.86	
Haliutaea sp.	0.85	4	0.75	
Cynoglossus sp.	0.73	66	0.65	
Parascolopsis aspinosa	0.73	27	0.65	
Polydactylus sextarius	0.70	15	0.62	
Octopus sp.	0.62	19	0.55	
Trachinocephalus myops	0.54	23	0.48	
Pristipomoides sp.	0.50	8	0.45	
Gymnothorax minor	0.50	8	0.45	
Brachypleura novaezeelandiae	0.46	66	0.41	
Lophomus setigerus	0.46	12	0.41	
Uranoscopus affinis	0.39	4	0.34	
Inimicus cuvieri	0.39	4	0.34	
Cociella cf. hutchinsi	0.35	12	0.31	
Thryssa vitrirostris	0.23	27	0.21	
Loligo sp.	0.23	8	0.21	
Aesopia cornuta	0.23	12	0.21	
Pseudotriacanthus strigilifer	0.19	4	0.17	
Pterois russelii	0.15	8	0.14	
Antennarius hispidus	0.12	4	0.10	
Hoplichthys citrinus	0.12	12	0.10	
Mnous coccineus	0.00	12	0.00	
Total	112.73		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 108  
 DATE : 19/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 14°0.72  
 start stop duration Lon E 96°49.40  
 TIME : 00:25:00 00:47:10 22.2 (min) Purpose : 3  
 LOG : 7390.78 7391.69 0.9 Region : 10320  
 FDEPTH: 90 94 Gear cond.: 0  
 BDEPTH: 90 94 Validity : 0  
 Towing dir: 0° Wire out : 230 m Speed : 2.5 kn  
 Sorted : 0 Total catch: 22.70 Catch/hour: 61.43

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Trichiurus lepturus	33.40	54	54.36	
Loligo sp.	7.69	260	12.51	
Saurida undosquamis	3.41	273	5.55	185
Dactyloptena orientalis	2.27	14	3.70	
Haliutaea sp.	2.27	11	3.70	
Nemipterus japonicus	1.57	38	2.56	186
Portunus sp.	1.57	171	2.56	
Acropoma japonicum	1.41	130	2.29	
Priacanthus macracanthus	1.19	8	1.94	
Seriolina nigrofasciata	1.19	3	1.94	
Aluterus monoceros	1.14	5	1.85	
Portunus sp.	0.87	14	1.41	0
Brachypleura novaezeelandiae	0.62	35	1.01	
Upeneus guttatus	0.60	22	0.97	
Parascolopsis aspinosa	0.38	16	0.62	
Starfish	0.30	30	0.48	
Photopectoralis aureus	0.27	38	0.44	
Jaydia queketti	0.22	14	0.35	
Sphyræna pinguis	0.16	3	0.26	
Brachypterois serrulata	0.11	3	0.18	
Sorsogona melanopectera	0.11	5	0.18	
Champsodon sp.	0.11	57	0.18	
Mnous coccineus	0.11	3	0.18	
Ostorhynchus fasciatus	0.08	24	0.13	
Samariscus sp.	0.08	5	0.13	0
Paraperchis alboguttata	0.05	3	0.09	
Siganus canaliculatus	0.05	3	0.09	
Egglestonichthys melanopectera	0.05	3	0.09	
Neomerinthe sp.	0.05	3	0.09	
Samaris cristatus	0.03	3	0.04	
Chelioperca sp.	0.03	3	0.04	
Cynoglossus lingua	0.03	3	0.04	
Psettina sp.	0.03	3	0.04	
Pseudotriacanthus strigilifer	0.03	5	0.04	
Total	61.46		100.04	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 109  
 DATE : 19/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 13°47.44  
 start stop duration Lon E 96°48.39  
 TIME : 02:40:26 03:10:28 30.0 (min) Purpose : 3  
 LOG : 7405.88 7407.16 1.3 Region : 10320  
 FDEPTH: 93 97 Gear cond.: 0  
 BDEPTH: 93 97 Validity : 0  
 Towing dir: 0° Wire out : 250 m Speed : 2.6 kn  
 Sorted : 0 Total catch: 10.13 Catch/hour: 20.24

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Nemipterus bipunctatus	7.11	86	35.14	187
Selar crumenophthalmus	1.92	38	9.48	
Saurida undosquamis	1.92	116	9.48	188
Trachinocephalus myops	1.72	24	8.49	
Cyclichthys spilostylus	1.64	2	8.09	
Sepia sp.	1.48	10	7.31	
Trichiurus lepturus	1.20	2	5.92	
Loligo sp.	1.20	40	5.92	
Parupeneus heptacanthus	0.58	2	2.86	
Nemipterus randalli	0.54	12	2.67	
Parascolopsis aspinosa	0.30	4	1.48	
Priacanthus macracanthus	0.20	4	0.99	
Pseudorhombus quinquecellatus	0.16	2	0.79	
Lepidotrigla sp. C	0.10	2	0.79	
Siganus canaliculatus	0.06	0.49	2	0.30
Samaris cristatus	0.06	2	0.30	
Upeneus guttatus	0.06	2	0.30	
Total	20.24		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 110  
 DATE : 19/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 13°54.94  
 start stop duration Lon E 97°12.08  
 TIME : 07:13:56 07:44:05 30.1 (min) Purpose : 3  
 LOG : 7440.95 7442.39 1.4 Region : 10320  
 FDEPTH: 72 72 Gear cond.: 0  
 BDEPTH: 72 72 Validity : 0  
 Towing dir: 0° Wire out : 190 m Speed : 2.8 kn  
 Sorted : 28 Total catch: 108.90 Catch/hour: 216.79

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Selar crumenophthalmus	109.89	768	50.69	189
Trichiurus lepturus	56.24	135	25.94	190
Decapterus russelli	17.92	215	8.26	
Muraenesox bagio	9.44	12	4.35	
Saurida undosquamis	4.36	273	2.01	193
Nemipterus nematophorus	3.70	36	1.71	191
Loligo sp.	2.81	117	1.29	
Rastrelliger kanagurta	1.95	12	0.90	192
Haliutaea sp.	1.75	8	0.81	
Nemipterus bipunctatus	1.31	6	0.61	
Narcine cf. brevifasciata	0.78	10	0.36	
Priacanthus sagittarius	0.76	10	0.35	
Nemipterus japonicus	0.74	2	0.34	
Parupeneus heptacanthus	0.72	4	0.33	
Chirocentrus nudus	0.66	6	0.30	
Siganus canaliculatus	0.64	6	0.29	
Epinephelus areolatus	0.58	6	0.27	
Upeneus guttatus	0.52	24	0.24	
Dactyloptena orientalis	0.40	4	0.18	
Brachypleura novaezeelandiae	0.40	60	0.18	
Urapsis helvola	0.24	2	0.11	
Leiognathus brevirrostris	0.24	28	0.11	
Paraperchis alboguttata	0.12	6	0.06	
Callionymus cf. margaretae	0.10	6	0.05	
Pentapriion longimanus	0.10	6	0.05	
Sorsogona melanopectera	0.10	4	0.05	
Samaris cristatus	0.10	6	0.05	
Zebrias sp.	0.06	6	0.03	
SYNGNATHIDAE	0.06	2	0.03	
Parascolopsis aspinosa	0.06	6	0.03	
Plotosus lineatus	0.04	2	0.02	
Upeneus moluccensis	0.04	4	0.02	
Total	216.79		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 111  
 DATE : 19/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 14°17.98  
 start stop duration Lon E 97°12.37  
 TIME : 10:24:19 10:54:51 30.5 (min) Purpose : 3  
 LOG : 7464.26 7465.63 1.4 Region : 10320  
 FDEPTH: 53 45 Gear cond.: 0  
 BDEPTH: 53 45 Validity : 0  
 Towing dir: 0° Wire out : 150 m Speed : 2.7 kn  
 Sorted : 0 Total catch: 35.56 Catch/hour: 69.86

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Selar crumenophthalmus	48.33	511	69.18	194
Loligo sp.	8.25	37	11.81	
Nemipterus bipunctatus	3.42	35	4.89	196
Atule mate	2.36	12	3.37	
Saurida undosquamis	1.30	37	1.86	195
Rastrelliger kanagurta	1.14	6	1.63	
Saurida tumbil	0.98	4	1.41	
Parupeneus heptacanthus	0.98	6	1.41	
Priacanthus hamrur	0.71	14	1.01	
Cyclichthys orbicularis	0.51	2	0.73	
Siganus canaliculatus	0.43	4	0.62	
Haliutaea sp.	0.39	2	0.56	
Decapterus russelli	0.35	6	0.51	
Egyprosonop sp.	0.31	8	0.45	
Trachinocephalus myops	0.16	8	0.22	
Fistularia petimba	0.08	2	0.11	
Carangoides malabariensis	0.08	2	0.11	
CALLIONYMI DAE	0.08	4	0.11	
Total	69.86		100.00	

R/V Dr. Fridtjof Nansen				SURVEY: 2015404				STATION: 112							
DATE	start	stop	duration	GEAR TYPE:	BT NO:	POSITION: Lat	Lon	DATE	start	stop	duration	GEAR TYPE:	BT NO:	POSITION: Lat	Lon
19/05/15	13:33:33	14:04:31	30.9 (min)			N 14°40.29	E 97°15.93	20/05/15	00:15:19	00:45:22	30.1 (min)			N 14°53.62	E 97°35.58
LOG	7487.48	7489.33	1.9	Purpose	:	3		LOG	7576.73	7578.98	2.3	Purpose	:	3	
FDEPTH	57	57		Region	:	10320		FDEPTH	29	29		Region	:	10320	
BDEPTH	57	57		Gear cond.	:	0		BDEPTH	29	29		Gear cond.	:	0	
Towing dir:	0°	0°	0°	Validity	:	0		Towing dir:	0°	0°	0°	Validity	:	0	
Sorted	0	0	0	Speed	:	3.6 kn		Sorted	13	13	13	Speed	:	4.5 kn	
				Wire out	:	150 m						Wire out	:	90 m	
				Total catch:	:	97.20						Total catch:	:	125.64	
				Catch/hour:	:	188.44						Catch/hour:	:	250.86	
SPECIES								SPECIES							
				CATCH/HOUR		% OF TOT. C	SAMP					CATCH/HOUR		% OF TOT. C	SAMP
				weight	numbers							weight	numbers		
Coilia sp.				43.11	4311	22.88		Harpadon nehereus				67.09	1414	26.74	
S H R I M P S				31.02	14268	16.46		Coilia dussumeri				64.29	6853	25.63	
Pennahia anea				25.43	2047	13.50		Scoliodon cf. laticaudus				40.33	200	16.08	
Saurida tumbil				17.06	620	9.05		Himantura walga				39.29	120	15.66	
Thryssa sp.				16.75	397	8.89		Arius venosus				11.50	120	4.58	
Trichurus lepturus				12.10	171	6.42		Acetes sp.				4.31	7547	1.72	
Loligo sp.				6.82	171	3.62		Pampus argenteus				3.83	144	1.53	
Ostorhynchus fasciatus				5.58	70	2.96		Trichurus lepturus				3.11	192	1.24	
Johnius macrorhynchus				5.12	39	2.72		Osteogeneiosus militaris				2.88	168	1.15	
Portunus sp.				4.03	729	2.14		S H R I M P S				2.88	695	1.15	
Stoleporus indicus				3.72	853	1.98		Portunus sp.				2.64	791	1.05	
Sepia sp.				3.41	186	1.81		Johnieops macrorhynchus				2.64	72	1.05	
Chilocyllium sp.				2.83	2	1.50		Pennahia ovata				1.44	431	0.57	
Saurida undosquamis				2.17	62	1.15		Lagocephalus lunaris				1.00	2	0.40	
Uranoscopus affinis				2.17	16	1.15		Plotosus lineatus				0.84	2	0.33	
Lagocephalus guentheri				2.17	78	1.15		Chrysochir aureus				0.72	48	0.29	
Polydactylus sextarius				1.55	78	0.82		Thryssa mystax				0.72	120	0.29	
Pampus argenteus				1.43	4	0.76		Taki fugu oblongus				0.68	2	0.27	
Ophichthus sp.				1.01	8	0.53		SQUILLIDAE				0.48	72	0.19	
Ophichthus sp.				0.31	2	0.16	0	Sillaginopsis panijus				0.20	2	0.08	
Octopus sp.				0.27	4	0.14									
Plotosus sp.				0.19	2	0.10		Total				250.86		100.00	
Zebrias sp.				0.10	4	0.05									
Upeneus cf. tragula				0.04	2	0.02									
MNonus monodactylus				0.02	2	0.01									
Engyprosopon grandisquama				0.00	2	0.00									
Total				188.44		100.00									
R/V Dr. Fridtjof Nansen				SURVEY: 2015404				STATION: 113							
DATE	start	stop	duration	GEAR TYPE:	BT NO:	POSITION: Lat	Lon	DATE	start	stop	duration	GEAR TYPE:	BT NO:	POSITION: Lat	Lon
19/05/15	15:49:35	16:19:37	30.0 (min)			N 14°53.27	E 97°16.28	20/05/15	05:51:47	06:22:02	30.3 (min)			N 14°17.04	E 97°33.95
LOG	7502.26	7504.61	2.4	Purpose	:	3		LOG	7621.56	7622.80	1.2	Purpose	:	3	
FDEPTH	28	29		Region	:	10320		FDEPTH	57	57		Region	:	10320	
BDEPTH	28	29		Gear cond.	:	0		BDEPTH	57	57		Gear cond.	:	0	
Towing dir:	0°	0°	0°	Validity	:	0		Towing dir:	0°	0°	0°	Validity	:	0	
Sorted	5	5	5	Speed	:	4.7 kn		Sorted	0	0	0	Speed	:	2.5 kn	
				Wire out	:	90 m						Wire out	:	155 m	
				Total catch:	:	47.10						Total catch:	:	35.95	
				Catch/hour:	:	94.11						Catch/hour:	:	71.31	
SPECIES								SPECIES							
				CATCH/HOUR		% OF TOT. C	SAMP					CATCH/HOUR		% OF TOT. C	SAMP
				weight	numbers							weight	numbers		
Harpadon nehereus				23.98	4795	25.48		Trichurus lepturus				16.94	204	23.76	
S H R I M P S				22.70	28595	24.12		Urotolithes cf. machelae				9.92	115	13.91	16.97
Coilia dussumeri				15.02	4795	15.97		Saurida tumbil				6.78	69	9.51	
Congresox talabonoides				11.47	14	12.19		Arius venosus				4.80	58	6.73	
Portunus sp.				9.59	959	10.19		Saurida undosquamis				4.76	26	6.68	
Pennahia cf. ovata				5.43	1407	5.77		Atrypus atrypus				2.82	73	3.95	
Otolithoides bauratus				2.24	208	2.38		Siganus canaliculatus				1.90	26	2.67	
Bregmaceros mcllellandi				1.60	687	1.70		Coilia ramcarati				1.63	113	2.28	
SQUILLIDAE				0.96	224	1.02		Rastrelliger kanagurta				1.19	8	1.67	
Chrysochir aureus				0.64	16	0.68		Muraenesox cinereus				1.11	2	1.56	
Polydactylus sextarius				0.48	160	0.51		Nemipterus japonicus				0.91	10	1.28	
Total				94.11		100.00		Lagocephalus guentheri				0.87	6	1.22	
								Polydactylus sextarius				0.81	6	1.14	
								Nemipterus nematophorus				0.73	14	1.03	
								Epinephelus sexfasciatus				0.60	2	0.83	
								Ostorhynchus gularis				0.56	244	0.78	
								Johnius borneensis				0.50	2	0.70	
								Himantura walga				0.44	2	0.61	
								Scolopsis taeniotera				0.36	6	0.50	
								Coilia dussumeri				0.32	54	0.45	
								Small crabs				0.30	18	0.42	
								Brachypleura novaezeelandiae				0.22	18	0.31	
								Sepia sp.				0.12	2	0.17	
								Priacanthus sagittarius				0.10	2	0.14	
								Plotosus lineatus				0.08	2	0.11	
								Pentapriion longimanus				0.08	6	0.11	
								Photopectoralis bindus				0.08	36	0.11	
								Osteogeneiosus militaris				0.08	4	0.11	
								Elates ransonettii				0.06	6	0.08	
								Sorsogona melanoptera				0.06	2	0.08	
								Jaydia truncata				0.04	2	0.06	
								Xiphophilus typus				0.04	2	0.06	
								Selarodes leptolepis				0.02	2	0.03	
								Total				71.31		100.00	
R/V Dr. Fridtjof Nansen				SURVEY: 2015404				STATION: 114							
DATE	start	stop	duration	GEAR TYPE:	BT NO:	POSITION: Lat	Lon	DATE	start	stop	duration	GEAR TYPE:	BT NO:	POSITION: Lat	Lon
19/05/15	18:11:50	18:42:14	30.4 (min)			N 15°11.10	E 97°17.15	19/05/15	75:20:52	75:21:44	0.9			N 15°11.10	E 97°17.15
LOG	7520.52	7521.44	0.9	Purpose	:	3		LOG	7520.52	7521.44	0.9	Purpose	:	3	
FDEPTH	31	30		Region	:	10320		FDEPTH	31	30		Region	:	10320	
BDEPTH	31	30		Gear cond.	:	0		BDEPTH	31	30		Gear cond.	:	0	
Towing dir:	0°	0°	0°	Validity	:	0		Towing dir:	0°	0°	0°	Validity	:	0	
Sorted	34	34	34	Speed	:	1.8 kn		Sorted	34	34	34	Speed	:	1.8 kn	
				Wire out	:	90 m						Wire out	:	90 m	
				Total catch:	:	54.23						Total catch:	:	54.23	
				Catch/hour:	:	107.03						Catch/hour:	:	107.03	
SPECIES								SPECIES							
				CATCH/HOUR		% OF TOT. C	SAMP					CATCH/HOUR		% OF TOT. C	SAMP
				weight	numbers							weight	numbers		
Harpadon nehereus				52.52	9454	49.07		Harpadon nehereus				52.52	9454	49.07	
Coilia dussumeri				11.84	4855	11.06		Coilia dussumeri				11.84	4855	11.06	
Portunus sp.				8.59	2753	8.02		Portunus sp.				8.59	2753	8.02	
Metapenaeus tenuipes				7.11	1776	6.64		Metapenaeus tenuipes				7			

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 117  
 DATE : 20/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 13° 54.91  
 start stop duration Lon E 97° 31.85  
 TIME : 09:03:31 09:33:33 30.0 (min) Purpose : 3  
 LOG : 7644.40 7645.82 1.4 Region : 10320  
 FDEPTH: 61 62 Gear cond.: 0  
 BDEPTH: 61 62 Validity : 0  
 Towing dir: 0° Wire out : 165 m Speed : 2.8 kn  
 Sorted : 29 Total catch: 29.47 Catch/hour: 58.86

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Loligo sp.	9.15	459	15.54	
Saurida tumbil	8.99	629	15.27	
Lepturacanthus savala	8.63	86	14.66	
Saurida undosquamis	7.07	839	12.01	
Nemipterus nematophorus	3.91	38	6.65	
Brachypleura novaezeelandiae	2.84	653	4.82	
Photopectoralis bindus	2.28	2966	3.87	
Muraenesox cinereus	1.72	4	2.92	
Selar crumenophthalmus	1.68	8	2.85	
Narcline cf. brevilabiata	1.68	4	2.85	
Atropus atropus	1.48	10	2.51	
Priacanthus macracanthus	1.16	10	1.97	
Jaydia smilthei	1.16	108	1.97	
Nemipterus japonicus	1.00	18	1.70	
Osteogeneiosus militaris	0.76	10	1.29	
Siganus canaliculatus	0.72	12	1.22	
Sepia sp.	0.68	2	1.15	
Inimicus cf. calledonius	0.48	2	0.81	
Epi n ephelus henochus	0.40	30	0.68	
Small crabs	0.40	30	0.68	
Lagocephalus guentheri	0.32	2	0.54	
Himantura walga	0.30	2	0.51	
Decapterus sp.	0.28	2	0.48	
Fistularia petimba	0.24	4	0.41	
Pentapriion longimanus	0.20	8	0.34	
Aurigoquula longispina	0.16	2	0.27	
Xiphochelidius typus	0.16	2	0.27	
Cynoglossus arel	0.16	2	0.27	
S H R I M P S	0.16	120	0.27	
Trachinocephalus myops	0.16	2	0.27	
Champsodon sp.	0.12	52	0.20	
Upeneus moluccensis	0.12	6	0.20	
SCORPAENIDAE	0.06	4	0.10	
Stolephorus indicus	0.06	2	0.10	
Parapeneus sp.	0.04	2	0.07	
Metapeneus sp.	0.04	2	0.07	
SQUILLIDAE	0.04	4	0.07	
Uranoscopus affinis	0.04	2	0.07	
Upeneus guttatus	0.04	2	0.07	
Total		58.86	100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 118  
 DATE : 20/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 13° 24.00  
 start stop duration Lon E 98° 7.00  
 TIME : 15:34:59 16:05:03 30.1 (min) Purpose : 3  
 LOG : 7697.55 7698.88 1.3 Region : 10330  
 FDEPTH: 34 34 Gear cond.: 0  
 BDEPTH: 34 34 Validity : 0  
 Towing dir: 0° Wire out : 90 m Speed : 2.7 kn  
 Sorted : 11 Total catch: 73.91 Catch/hour: 147.48

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
S H R I M P S	20.67	10741	14.02	
Stolephorus indicus	19.83	6146	13.45	
Photopectoralis aureus	16.20	5992	10.99	
Saurida tumbil	15.08	1034	10.23	
Lepturacanthus savala	9.50	168	6.44	
Lagocephalus sp.	7.82	56	5.30	
Jaydia queketti	7.54	601	5.11	
Nemipterus mesopriion	6.70	126	4.55	
Sepia sp.	4.75	192	3.22	
Bregmaceros mcllellandi	3.63	615	2.46	
Loligo sp.	3.35	210	2.27	
Sardinella longiceps	2.79	140	1.89	
Upeneus guttatus	2.79	126	1.89	
Rastrelliger brachysoma	2.79	154	1.89	
Nemipterus marginatus	2.51	154	1.70	
Elates ransonettii	2.51	475	1.70	
Siganus canaliculatus	2.51	168	1.70	
SQUILLIDAE	2.23	349	1.52	
Thryssa mystax	1.96	279	1.33	
Sardinella gibbosa	1.96	42	1.33	
Alpes kleini	1.68	42	1.14	
Rhynchoconger sp.	1.40	56	0.95	
Terapon theraps	1.12	126	0.76	
Octopus sp.	1.12	28	0.76	
Nemipterus hexodon	0.98	14	0.66	
Dactyloptena orientalis	0.84	14	0.57	
Dussumeria acuta	0.84	28	0.57	
C R A B S	0.84	182	0.57	
Ilisha sp. *** PRSIL00	0.56	14	0.38	
Epi n ephelus bleekeri	0.24	2	0.16	
Muraenesox cinereus	0.24	2	0.16	
Acanthocephala abbreviata	0.20	4	0.14	
CALLIONYMIDAE	0.14	42	0.09	
Brachypleura novaezeelandiae	0.14	14	0.09	
Total		147.48	100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 119  
 DATE : 20/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 13° 24.43  
 start stop duration Lon E 97° 28.17  
 TIME : 20:48:10 21:18:17 30.1 (min) Purpose : 3  
 LOG : 7735.78 7737.38 1.6 Region : 10330  
 FDEPTH: 78 81 Gear cond.: 6  
 BDEPTH: 78 81 Validity : 5  
 Towing dir: 0° Wire out : 210 m Speed : 3.2 kn  
 Sorted : 20 Total catch: 48.59 Catch/hour: 96.79

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Saurida undosquamis	23.27	1629	24.04	
Nemipterus japonicus	11.16	1673	11.53	
Photopectoralis bindus	8.76	1052	9.06	
Upeneus guttatus	6.22	127	6.42	
Epi n ephelus areolatus	6.06	169	6.26	
Sepia sp.	4.94	88	5.10	
Brachypleura novaezeelandiae	4.70	657	4.86	
Epi n ephelus bleekeri	4.06	2	4.20	
Rhinobatos cf. schlegelii	3.35	4	3.46	
Siganus canaliculatus	2.71	72	2.80	
Cyclichthys orbicularis	2.43	6	2.51	
Parapercis alboguttatus	2.31	92	2.39	
Pentapriion longimanus	2.23	104	2.31	
Sorsogona melanoptera	1.99	131	2.06	
Narcline cf. brevilabiata	1.75	4	1.81	
Octopus sp.	1.55	14	1.61	
Psettina sp.	1.27	80	1.32	
Terapon jarbua	1.04	40	1.07	
Dactyloptena orientalis	0.88	16	0.91	
Osteogeneiosus militaris	0.80	4	0.82	
Cynoglossus cynoglossus	0.80	88	0.82	
Priacanthus macracanthus	0.68	4	0.70	
Parapeneus sp.	0.68	4	0.70	
Hoplithys citrinus	0.64	100	0.66	
Parascolopsis aspinnosa	0.56	32	0.32	
Apogon smilthei	0.48	20	0.49	
Fistularia petimba	0.48	16	0.48	
Zebrias sp.	0.28	12	0.29	
Metapeneus tenuipes	0.28	12	0.29	
OPHIOTHIRIDAE	0.24	8	0.25	
Rhynchoconger sp.	0.22	2	0.23	
Total		96.79	100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 120  
 DATE : 21/05/15 GEAR TYPE: BT No: 26 POSITION: Lat N 13° 24.63  
 start stop duration Lon E 97° 5.75  
 TIME : 00:10:38 00:40:43 30.1 (min) Purpose : 3  
 LOG : 7757.80 7759.05 1.3 Region : 10330  
 FDEPTH: 88 93 Gear cond.: 0  
 BDEPTH: 88 93 Validity : 0  
 Towing dir: 0° Wire out : 210 m Speed : 2.5 kn  
 Sorted : 0 Total catch: 10.60 Catch/hour: 21.14

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Saurida undosquamis	5.35	38	25.28	197
Nemipterus bipunctatus	4.91	32	23.21	198
Sepia sp.	3.87	14	18.30	
Loligo sp.	3.07	94	14.53	
Trachinocephalus myops	2.35	16	11.13	
Lagocephalus guentheri	0.60	2	2.83	
Seriolina nigrofasciata	0.52	4	2.45	
Dactyloptena orientalis	0.28	2	1.32	
BOTHIDAE	0.20	10	0.94	
Total		21.14	100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 121  
 DATE : 21/05/15 GEAR TYPE: BT No: 26 POSITION: Lat N 13° 24.31  
 start stop duration Lon E 96° 45.03  
 TIME : 03:56:33 04:26:33 30.0 (min) Purpose : 3  
 LOG : 7778.69 7780.04 1.4 Region : 10330  
 FDEPTH: 104 104 Gear cond.: 0  
 BDEPTH: 104 104 Validity : 0  
 Towing dir: 0° Wire out : 250 m Speed : 2.7 kn  
 Sorted : 0 Total catch: 19.19 Catch/hour: 38.37

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Loligo sp.	11.36	828	29.60	
Cyclichthys orbicularis	6.64	6	17.30	
Abalistes stellatus	5.08	4	13.24	
Saurida undosquamis	3.52	24	9.17	
Sepia sp.	2.68	2	6.98	
Dactyloptena orientalis	2.04	34	5.32	
Priacanthus macracanthus	1.80	2	4.69	
Nemipterus bipunctatus	1.40	8	3.65	
Torquigener sp.	0.70	10	1.82	
Parapeneus heptacanthus	0.60	2	1.56	
Seriolina nigrofasciata	0.52	4	1.35	
Nemipterus japonicus	0.40	6	1.04	
Rhynchostracion nasus	0.40	6	1.04	
Lagocephalus gloweri	0.34	2	0.89	
Fistularia petimba	0.26	8	0.68	
Parascolopsis aspinnosa	0.22	2	0.57	
Tosarhombus longimanus	0.18	8	0.47	
Trachinocephalus myops	0.14	4	0.36	
Upeneus guttatus	0.10	4	0.26	
Total		38.37	100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 122
DATE : 21/05/15 GEAR TYPE: BT No: 26 POSITION: Lat N 13° 4.81
start stop duration Lon E 96° 31.65
TIME : 15:28:09 15:58:13 30.1 (min) Purpose : 3
LOG : 7838.33 7839.88 1.6 Region : 10330
FDEPTH: 248 250 Gear cond.: 0
BDEPTH: 248 250 Validity : 0
Towing dir: 0° Wire out : 600 m Speed : 3.1 kn
Sorted : 13 Total catch: 53.04 Catch/hour: 105.83

Table with columns: SPECIES, CATCH/HOUR (weight, numbers), % OF TOT. C, SAMP. Lists various species like Satyricthys sp., Neoharriotta pinnata, Chlorophthalmus sp., etc.

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 125
DATE : 22/05/15 GEAR TYPE: BT No: 26 POSITION: Lat N 13° 3.56
start stop duration Lon E 97° 24.83
TIME : 01:40:39 02:10:43 30.1 (min) Purpose : 3
LOG : 7911.86 7913.49 1.6 Region : 10330
FDEPTH: 84 86 Gear cond.: 0
BDEPTH: 84 86 Validity : 0
Towing dir: 0° Wire out : 210 m Speed : 3.3 kn
Sorted : 23 Total catch: 47.46 Catch/hour: 94.70

Table with columns: SPECIES, CATCH/HOUR (weight, numbers), % OF TOT. C, SAMP. Lists various species like Nemipterus bipunctatus, Saurida undosquams, Siganus canaliculatus, etc.

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 123
DATE : 21/05/15 GEAR TYPE: BT No: 26 POSITION: Lat N 13° 3.21
start stop duration Lon E 96° 41.62
TIME : 17:46:02 18:16:17 30.3 (min) Purpose : 3
LOG : 7850.40 7851.99 1.6 Region : 10330
FDEPTH: 129 121 Gear cond.: 0
BDEPTH: 129 121 Validity : 0
Towing dir: 0° Wire out : 320 m Speed : 3.2 kn
Sorted : 32 Total catch: 47.51 Catch/hour: 94.23

Table with columns: SPECIES, CATCH/HOUR (weight, numbers), % OF TOT. C, SAMP. Lists various species like Parascloopsis eriomma, Squalus hemipinnis, Parascloopsis aspinnosa, etc.

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 126
DATE : 22/05/15 GEAR TYPE: BT No: 26 POSITION: Lat N 13° 3.42
start stop duration Lon E 97° 47.78
TIME : 04:32:25 05:03:48 31.4 (min) Purpose : 3
LOG : 7934.27 7935.90 1.6 Region : 10330
FDEPTH: 66 68 Gear cond.: 0
BDEPTH: 66 68 Validity : 0
Towing dir: 0° Wire out : 170 m Speed : 3.1 kn
Sorted : 0 Total catch: 22.05 Catch/hour: 42.13

Table with columns: SPECIES, CATCH/HOUR (weight, numbers), % OF TOT. C, SAMP. Lists various species like Saurida undosquams, Trichiurus lepturus, Lagocephalus guentheri, etc.

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 124
DATE : 21/05/15 GEAR TYPE: BT No: 26 POSITION: Lat N 13° 4.22
start stop duration Lon E 97° 5.04
TIME : 22:36:34 23:06:39 30.1 (min) Purpose : 3
LOG : 7889.86 7891.36 1.5 Region : 10330
FDEPTH: 95 100 Gear cond.: 0
BDEPTH: 95 100 Validity : 0
Towing dir: 0° Wire out : 250 m Speed : 3.0 kn
Sorted : 0 Total catch: 42.56 Catch/hour: 84.92

Table with columns: SPECIES, CATCH/HOUR (weight, numbers), % OF TOT. C, SAMP. Lists various species like Saurida undosquams, Nemipterus bipunctatus, Loligo sp., etc.

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 127
DATE : 22/05/15 GEAR TYPE: BT No: 26 POSITION: Lat N 13° 5.30
start stop duration Lon E 98° 7.81
TIME : 07:35:29 08:05:50 30.4 (min) Purpose : 3
LOG : 7956.84 7958.33 1.5 Region : 10330
FDEPTH: 45 44 Gear cond.: 0
BDEPTH: 45 44 Validity : 0
Towing dir: 0° Wire out : 110 m Speed : 3.0 kn
Sorted : 32 Total catch: 64.18 Catch/hour: 126.84

Table with columns: SPECIES, CATCH/HOUR (weight, numbers), % OF TOT. C, SAMP. Lists various species like Secutor insidiator, Trichiurus lepturus, Saurida tumbi, etc.

R/V Dr. Fridtjof Nansen				SURVEY: 2015404				STATION: 128			
DATE : 22/05/15				GEAR TYPE: BT No: 27				POSITION: Lat N 12° 44. 26			
TIME : 10:53:20				start stop duration				Purpose : 3			
LOG : 7981.50				7982.48				Region : 10330			
FDEPTH: 37				32				Gear cond.: 0			
BDEPTH: 37				32				Validity : 0			
Towing dir: 0°				Wire out : 110 m				Speed : 3.0 kn			
Sorted : 17				Total catch: 81.82				Catch/hour: 251.11			
SPECIES											
			CATCH/HOUR		% OF TOT. C		SAMP				
			weight numbers								
Scutolaria insidiator			46.40	6580	18.48	31.97					
Loligo sp.			28.05	3	11.17						
Scomberomus comerson			26.52	1743	10.56						
JELLYFISH			12.28	12	4.89						
Pomadasy maculatus			8.59	86	3.42						
Pomadasy kaakan			8.53	21	3.40						
Leiognathus equulus			7.37	184	2.93						
Rastrelliger brachysoma			6.63	61	2.64						
Terapon theraps			5.40	98	2.15						
Saurida tumbil			3.93	49	1.56						
Psettodes erumei			3.93	12	1.56						
Stoleporus indicus			2.70	344	1.08						
Ilisha melastoma			2.46	61	0.98						
Gerres filamentosus			2.46	6	0.98						
Lagocephalus guentheri			2.46	37	0.98						
Carangoides hedlandensis			0.74	12	0.29						
Podophthalma vigil			0.74	12	0.29	0.29					
Ephippus orbis			0.68	3	0.27						
Calappa sp.			0.25	37	0.10						
Siganus canaliculatus			0.00	9	0.00						
Fishing gears											
Total			251.11		100.00						
R/V Dr. Fridtjof Nansen				SURVEY: 2015404				STATION: 129			
DATE : 22/05/15				GEAR TYPE: BT No: 27				POSITION: Lat N 12° 43. 21			
TIME : 14:07:30				start stop duration				Purpose : 3			
LOG : 8005.99				8007.28				Region : 10330			
FDEPTH: 69				67				Gear cond.: 0			
BDEPTH: 69				67				Validity : 0			
Towing dir: 0°				Wire out : 180 m				Speed : 3.1 kn			
Sorted : 0				Total catch: 52.62				Catch/hour: 125.92			
SPECIES											
			CATCH/HOUR		% OF TOT. C		SAMP				
			weight numbers								
Saurida undosquamis			25.13	826	19.96						
Solenocera sp.			17.35	5033	13.78						
Nemipterus japonicus			16.75	203	13.30						
Apogon truncatus			13.64	138	10.83						
Johnius dussumieri			8.62	36	6.84						
Loligo sp.			7.78	263	6.18						
Rhinchoconger squaliceps			5.27	5.98	156	4.75					
Cynoglossus arel				3.83	120	3.04					
Sepia brevimana			3.83	239	3.04						
Sorsogona melanoptera			2.87	36	2.28						
Trichurus lepturus			2.69	12	2.14						
Lagocephalus guentheri			2.15	2	1.71						
Muraenesox bagio			2.11	2	1.67						
Octopus sp.					1.79	227					
Oratosquilla perpena			1.56	6	1.24	1.43					
Selar crumenophthalmus			1.26	6	1.00						
Caesio cf. xanthonota			0.96	48	0.76						
C R A B S			0.84	96	0.67						
Photoportalis bindus			0.60	36	0.48						
Dactyloptena orientalis			0.48	0.48	24	0.38					
Neomerinthe kaufmani			0.24	6	0.19	0.10					
Brachyplura novaezeelandiae			0.12	6	0.05	0.10					
Inimicus siemensis			0.06	6	0.05						
Antennarius hispidus			0.02	2	0.02						
Zenopsis nebulosa			0.00	2	0.00						
Fishing gears											
Total			125.92		100.00						
R/V Dr. Fridtjof Nansen				SURVEY: 2015404				STATION: 130			
DATE : 22/05/15				GEAR TYPE: BT No: 27				POSITION: Lat N 12° 43. 59			
TIME : 17:00:10				start stop duration				Purpose : 3			
LOG : 8025.05				8026.77				Region : 10330			
FDEPTH: 74				73				Gear cond.: 0			
BDEPTH: 74				73				Validity : 0			
Towing dir: 0°				Wire out : 180 m				Speed : 3.3 kn			
Sorted : 0				Total catch: 66.85				Catch/hour: 126.37			
SPECIES											
			CATCH/HOUR		% OF TOT. C		SAMP				
			weight numbers								
Siganus canaliculatus			55.01	1707	43.53						
Saurida tumbil			15.84	62	12.54						
Dactyloptena orientalis			13.42	180	10.62						
Saurida undosquamis			9.83	888	7.78						
Engyprosopon grandisquama			6.05	510	4.79						
Nemipterus zysron			5.29	113	4.19						
Trachinocephalus myops			5.10	166	4.04						
Lagocephalus guentheri			3.50	38	2.77						
Uranoscopus affinis			2.46	19	1.94						
Sorsogona melanoptera			2.27	289	1.80						
Trichurus lepturus			1.23	2	0.97						
C R A B S			1.13	195	0.90						
Cyclichthys orbicularis			0.81	6	0.64						
Sepia sp.			0.76	9	0.60						
Bregmaceros mclellandi			0.72	397	0.57						
Fistularia petimba			0.66	28	0.52						
Parapeneus sp.			0.57	6	0.45						
OPHIURIDAE			0.38	38	0.30						
Small shrimps			0.38	369	0.30						
Stoleporus indicus			0.28	9	0.22						
Lutjanus vitta			0.25	6	0.19						
Neeschelus sp.			0.25	15	0.19						
Pseudotriacanthus strigilifer			0.09	9	0.07	6					
Ergosquilla woodmasoni					0.09	6					
Total			126.37		100.00						
R/V Dr. Fridtjof Nansen				SURVEY: 2015404				STATION: 131			
DATE : 22/05/15				GEAR TYPE: BT No: 27				POSITION: Lat N 12° 43. 21			
TIME : 20:11:50				start stop duration				Purpose : 3			
LOG : 8047.45				8048.99				Region : 10330			
FDEPTH: 89				88				Gear cond.: 0			
BDEPTH: 89				88				Validity : 0			
Towing dir: 0°				Wire out : 230 m				Speed : 3.0 kn			
Sorted : 37				Total catch: 147.72				Catch/hour: 293.19			
SPECIES											
			CATCH/HOUR		% OF TOT. C		SAMP				
			weight numbers								
Saurida undosquamis			84.95	103	28.97						
Nemipterus bipunctatus			73.04	198	24.91						
Trachinocephalus myops			43.03	341	14.68						
Upeneus guttatus			14.93	580	5.09						
Siganus canaliculatus			12.23	357	4.17						
Lutjanus vitta			10.32	119	3.52						
Sargocentron rubrum			9.53	48	3.25						
Parupeneus heptacanthus			2.22	56	3.03						
Okamejei cf. powelli			5.48	8	1.87						
Parascalopsis aspinosa			4.60	48	1.57						
UNIDENTIFIED FISH			3.18	8	1.08	0					
Sepia sp.			2.94	16	1.00						
Dactyloptena orientalis			2.86	32	0.97						
Small shrimps			2.22	365	0.76						
Small crabs			2.06	302	0.70						
Aluterus monoceros			1.91	8	0.65						
Lophomus setigerus			1.19	8	0.41						
Gazza minuta			0.95	16	0.32						
Tosarhombus longimanus			0.95	32	0.32						
Neeschelus sp.			0.95	24	0.32						
Sorsogona melanoptera			0.95	24	0.32						
Uranoscopus affinis			0.87	8	0.30						
Parapercis alboguttata			0.79	16	0.27						
Pseudorhombus quinquelatus			0.71	8	0.24						
Lagocephalus guentheri			0.71	8	0.24						
Fistularia petimba			0.56	24	0.19						
Cyclichthys orbicularis			0.56	16	0.19						
Decapterus sp.			0.40	8	0.14						
Canthigaster sp.			0.40	4	0.14						
UNIDENTIFIED FISH			0.32	8	0.11						
Neeschelus sp.			0.32	8	0.11						
Haliutaea sp.			0.24	8	0.08						
Antennarius hispidus			0.16	8	0.05						
Total			293.19		100.00						
R/V Dr. Fridtjof Nansen				SURVEY: 2015404				STATION: 132			
DATE : 22/05/15				GEAR TYPE: BT No: 27				POSITION: Lat N 12° 43. 12			
TIME : 22:57:49				start stop duration				Purpose : 3			
LOG : 8066.46				8067.97				Region : 10330			
FDEPTH: 106				108				Gear cond.: 0			
BDEPTH: 106				108				Validity : 0			
Towing dir: 0°				Wire out : 280 m				Speed : 3.0 kn			
Sorted : 25				Total catch: 61.22				Catch/hour: 121.35			
SPECIES											
			CATCH/HOUR		% OF TOT. C		SAMP				
			weight numbers								
Ostracion sp.			55.18	123	45.48						
Cyclichthys spilostylus			22.44	14	18.49						
Saurida undosquamis			10.31	167	8.49						
Trachinocephalus myops			9.83	254	8.10						
Tosarhombus longimanus			9.51	309	7.84						
Loligo sp.			7.93	111	6.53						
Lagocephalus guentheri			1.74	8	1.44						
Pseudorhombus quinquelatus			1.59	24	1.31						
Rhinobatos lionotus			0.91	2	0.75						
Siganus canaliculatus			0.79	24	0.65						
Haliutaea sp.			0.63	4	0.52						
C R A B S			0.48	40	0.39						
Total			121.35		100.00						
R/V Dr. Fridtjof Nansen				SURVEY: 2015404				STATION: 133			
DATE : 23/05/15				GEAR TYPE: BT No: 27				POSITION: Lat N 12° 43. 47			
TIME : 01:48:13				start stop duration				Purpose : 3			
LOG : 8079.78				8081.27				Region : 10330			
FDEPTH: 286				280				Gear cond.: 0			
BDEPTH: 286				280				Validity : 0			
Towing dir: 0°				Wire out : 700 m				Speed : 3.0 kn			
Sorted : 24				Total catch: 494.26				Catch/hour: 987.53			
SPECIES											
			CATCH/HOUR		% OF TOT. C		SAMP				
			weight numbers								
Synagrops adeni			418.78	67013	42.41						
Chirophthalmus corniger			242.96	5355	24.60						
S H R I M P S			62.34	26174	6.31</						

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 134  
 DATE : 23/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 12° 42.99  
 start stop duration Lon E 96° 36.50  
 TIME : 04:22:35 04:52:36 30.0 (min) Purpose : 3  
 LOG : 8092.19 8093.57 1.4 Region : 10330  
 FDEPTH: 522 520 Gear cond.: 0  
 BDEPTH: 522 520 Validity : 0  
 Towing dir: 0° Wire out : 1020 m Speed : 2.8 kn  
 Sorted : 14 Total catch: 180.13 Catch/hour: 359.90

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Hexatrygon bickelli	183.82	12	51.07	
Centroporus sp.	85.51	24	23.76	
Small shrimps	26.37	9231	7.33	
Scallicus investigatoris	23.98	36	6.66	
NOMEIAE	7.67	827	2.13	
Neoharriotta pinnata	7.07	2	1.97	
Chimera sp.	5.39	6	1.50	
Cubiceps whiteleggi	2.52	300	0.70	
Neopeinnula orientalis	2.22	66	0.62	
Halietaea cocinea	2.22	6	0.62	
Synagrops japonicus	1.92	42	0.53	
Tetronarce sp.	1.80	210	0.50	
NEOSCOPELIDAE	1.20	36	0.33	
Coelorinchus quadricristatus	1.14	12	0.32	
MYCTOPHIDAE	0.96	36	0.27	
Coloconger sp.	0.90	12	0.25	
Bathycongrus sp.	0.90	60	0.25	
Alpocephalus sp.	0.78	6	0.22	
Satyriichthys sp.	0.72	36	0.20	
Macrorhamphosodes sp.	0.72	60	0.20	
BOTHIDAE	0.48	36	0.13	
Zenopsis nebulosa	0.48	6	0.13	
Bathypterois sp.	0.36	30	0.10	
Coelophrys macropus	0.18	0.24	12	0.07
PARALEPIDIDAE	0.18	18	0.05	
Chauliodus sp.	0.18	18	0.05	
Synaphobranchus sp.	0.12	6	0.03	
Synagrops adeni	0.06	12	0.02	
Plastic	0.00	2	0.00	
Fishing gears	0.00	2	0.00	
Howella sp.	0.00	6	0.00	
Total	359.90		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 135  
 DATE : 23/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 12° 21.98  
 start stop duration Lon E 96° 37.31  
 TIME : 11:43:37 12:14:11 30.6 (min) Purpose : 3  
 LOG : 8128.90 8130.31 1.4 Region : 10330  
 FDEPTH: 523 506 Gear cond.: 0  
 BDEPTH: 523 506 Validity : 0  
 Towing dir: 0° Wire out : 1100 m Speed : 2.8 kn  
 Sorted : 0 Total catch: 20.84 Catch/hour: 40.90

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Aristeus virilis	12.64	1794	30.90	
Glyptophidium sp.	4.47	314	10.94	
Alpocephalus sp.	2.90	27	7.10	
Neoscopelus sp.	2.90	57	7.10	
Hypopleuron caninum	2.63	10	6.43	
SYNAPOBRANCHIDAE	2.55	24	6.24	
Coelorinchus cf. quadricristatus	2.00	49	4.89	
C E P H A L O P O D A	1.84	18	4.51	
Synagrops japonicus	1.26	31	3.07	
Cruriraja andamanica	1.02	6	2.50	
Neopeinnula orientalis	0.94	29	2.30	
Nephropsis stewarti	0.75	26	1.82	
NETTASTOMATIDAE	0.71	8	1.73	
MORIDAE	0.67	10	1.63	
Heterocarpus sibogae	0.47	31	1.15	
Bathypterois sp.	0.43	24	1.06	
Tydemania navigatoris	0.39	49	0.96	
Diretmoides parini	0.37	8	0.91	
Physiculus sp.	0.31	2	0.77	
Apristurus cf. macrostomus	0.22	0.24	8	0.58
Coryphaenoides sp.	0.20	20	0.48	
SICYONIDAE	0.18	22	0.43	
MYCTOPHIDAE	0.16	2	0.38	0
Iago cf. garricki	0.14	2	0.34	
Benthobatis moresbyi	0.14	20	0.34	
Cubiceps pauciradiatus	0.14	14	0.34	
Chauliodus sp.	0.12	12	0.29	
Bathycongrus sp.	0.06	2	0.14	
Photoneustes sp.	0.04	6	0.10	
Haliomochi rurgus sp.	0.02	10	0.05	
Macrorhamphosodes sp.				
Total	40.90		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 136  
 DATE : 23/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 12° 21.60  
 start stop duration Lon E 96° 51.47  
 TIME : 14:32:09 15:02:54 30.8 (min) Purpose : 3  
 LOG : 8145.16 8146.52 1.4 Region : 10330  
 FDEPTH: 257 252 Gear cond.: 0  
 BDEPTH: 257 252 Validity : 0  
 Towing dir: 0° Wire out : 670 m Speed : 2.7 kn  
 Sorted : 18 Total catch: 195.24 Catch/hour: 380.96

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Chlorophthalmus cf. acutifrons	124.88	4433	32.78	
S H R I M P S	59.32	20168	15.57	
Puerulus sewelli	43.79	613	11.49	
Satyriichthys sp.	28.84	53	7.57	
Dipturus sp.	19.71	2	5.17	
Setarches longimanus	19.20	3262	5.04	
Cubiceps whiteleggi	15.61	780	4.10	
Coelorinchus cf. argentatus	12.49	500	3.28	
Pycnocraspedum sp.	11.24	156	2.95	
Priacanthus macracanthus	6.24	94	1.64	
Bythaelurus sp.	5.62	94	1.48	
Chascanopsetta lugubris	4.37	125	1.15	
MYCTOPHIDAE	4.06	749	1.07	
Bythaelurus hispidus	3.75	47	0.98	
Glyptophidium sp.	3.75	687	0.98	
Bembrops caudimacula	3.75	31	0.98	
Psenopsis obscura	3.12	94	0.82	
Lophomus setigerus	3.12	16	0.82	
Lihuparus cf. sommosus	1.09	8	4	0.43
Cruriraja andamanica	0.94	16	0.25	
Lepidotrigla sp.	0.94	16	0.25	
Synagrops adeni	0.94	16	0.25	
Cynoglossus gracilis	0.70	47	0.18	
Poecilopsetta sp.	0.62	47	0.16	
Glossanodon sp.	0.62	16	0.16	
Hoplitchthys sp.	0.62	16	0.16	
Xyrias revulus	0.31	2	0.08	
Peristedion liorhynchus	0.31	16	0.08	
Pterygotrigla arabica	0.16	16	0.04	
Haliomochi rurgus sp.	0.16	31	0.04	
Total	380.96		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 137  
 DATE : 23/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 12° 22.53  
 start stop duration Lon E 97° 1.65  
 TIME : 16:23:33 16:53:55 30.4 (min) Purpose : 3  
 LOG : 8156.68 8158.06 1.4 Region : 10330  
 FDEPTH: 162 154 Gear cond.: 0  
 BDEPTH: 162 154 Validity : 0  
 Towing dir: 0° Wire out : 380 m Speed : 2.7 kn  
 Sorted : 22 Total catch: 100.08 Catch/hour: 197.72

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Saurida undosquamis	80.01	1264	40.47	
Satyriichthys sp.	30.19	36	15.27	
Torquigener sp.	16.83	948	8.51	
Squalus cf. hemipinnis	15.81	12	7.99	
Pseudorhombus quinqueocellatus	14.82	302	7.49	
Okamejei cf. powelli	7.35	89	3.72	
Nemipterus japonicus	6.16	89	3.12	
Ostiichthys acanthorhinus	5.57	332	2.82	
Coccella sp.	89	1.80		
Lophomus setigerus	3.32	12	1.68	
Platyrrhina sp.	2.37	30	1.20	
Callionymus sp.	2.13	160	1.08	
Bleekeria kallilepis	1.54	83	0.78	
Scyllarides sp.	1.30	18	0.66	
Setarches longimanus	1.19	107	0.60	
Portunus sp.	1.13	71	0.57	
Halietaea sp.	0.93	6	0.47	
Xyrias revulus	0.67	2	0.34	
Arnglossus sp.	0.65	41	0.33	
Octopus sp.	0.59	12	0.30	
Sepia sp.	0.59	18	0.30	
Peristedion sp.	0.59	41	0.30	
Monocentris japonica	0.36	2	0.18	
Symphysanodon xanthopterygi	0.36	0.06	6	0.03
Total	197.72		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 138  
 DATE : 23/05/15 GEAR TYPE: BT NO: 27 POSITION: Lat N 12°22.33  
 start stop duration duration Lon E 97°13.17  
 TIME : 19:30:18 20:00:23 30.1 (min) Purpose : 3  
 LOG : 8169.75 8171.22 1.5 Region : 10330  
 FDEPTH: 101 97 Gear cond.: 0  
 BDEPTH: 101 97 Validity : 0  
 Towing dir: 0° Wire out : 255 m Speed : 2.9 kn  
 Sorted : 27 Total catch: 62.50 Catch/hour: 124.67

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Saurida undosquamis	17.39	303	13.95	
Trachinocephalus myops	13.32	267	10.69	
Sargocentron rubrum	9.97	68	8.00	
Nemipterus bipectatus	7.98	128	6.40	
Dactyloptena orientalis	7.98	36	6.40	
Bleekeria sp.	7.34	359	5.89	
Epi nophelus areolatus	6.26	24	5.02	
Upeneus guttatus	4.63	160	3.71	
Tosarhombus longimanus	4.15	199	3.33	
Abalistes stellatus	3.63	4	2.91	
Satyricthys sp.	3.39	4	2.72	
Muraesox bagio	3.15	2	2.53	
Dipterygionotus balteatus	3.11	758	2.50	
Uranoscopus affinis	3.03	12	2.43	
Okamejei cf. powelli	2.39	16	1.92	
Cantherhines multineatus	2.07	16	1.66	
Epi nophelus bleekeri	1.91	2	1.54	
Parascolopsis boesemani	1.91	40	1.54	
Priacanthus hamur	1.76	12	1.41	
Tetrosomus cf. reipublicae	1.76	12	1.41	
Sepia sp.	1.60	156	1.28	
Lutjanus quinquelineatus	1.52	8	1.22	
Loligo sp.	1.44	16	1.15	
Nemipterus japonicus	1.36	40	1.09	
Diodes holocanthus	1.32	4	1.06	
Rhinobatos sp.	1.20	4	0.96	
Small crabs	1.12	295	0.90	0
Lutjanus lutjanus	1.12	24	0.90	
Octopus macropus	0.92	16	0.74	
Lepidotrigla sp.	0.80	4	0.64	
Synodus macrops	0.64	72	0.51	
Parapanesus sp.	0.64	32	0.51	
Small crabs	0.60	100	0.48	
Parapercis alboguttata	0.48	8	0.38	
Synodus sp.	0.48	12	0.38	
Parascolopsis aspinosa	0.48	12	0.38	
Monocentris japonica	0.40	4	0.32	
CALLIONYMIDAE	0.40	36	0.32	
Synodus cf. randalli	0.32	8	0.26	
Lagocephalus guentheri	0.20	4	0.16	
Ostorhynchus fasciatus	0.16	72	0.13	
Synodus cf. indicus	0.12	8	0.10	
Equulites elongatus	0.08	8	0.06	
Ophidiion sp.	0.08	4	0.06	
Halmochirus sp.	0.04	4	0.03	
Photoptoralis aureus	0.04	4	0.03	
Total	124.67		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 139  
 DATE : 23/05/15 GEAR TYPE: PT NO: 1 POSITION: Lat N 12°22.43  
 start stop duration duration Lon E 97°18.66  
 TIME : 20:40:31 21:10:41 30.2 (min) Purpose : 1  
 LOG : 8175.13 8176.99 1.9 Region : 10330  
 FDEPTH: 12 12 Gear cond.: 0  
 BDEPTH: 93 89 Validity : 0  
 Towing dir: 0° Wire out : 75 m Speed : 3.7 kn  
 Sorted : 0 Total catch: 1.28 Catch/hour: 2.55

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
C R A B S	0.91	119	35.94	
Loligo sp.	0.89	20	35.16	
Rastrelliger kanagurta	0.48	8	18.75	
Selar crumenophthalmus	0.14	4	5.47	
Chelodopon cf. katoptron	0.12	4	4.69	
Dactyloptena orientalis	0.00	0	0.00	
Total	2.55		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 140  
 DATE : 23/05/15 GEAR TYPE: BT NO: 27 POSITION: Lat N 12°22.30  
 start stop duration duration Lon E 97°34.47  
 TIME : 22:41:51 23:12:08 30.3 (min) Purpose : 3  
 LOG : 8190.55 8192.06 1.5 Region : 10330  
 FDEPTH: 86 86 Gear cond.: 0  
 BDEPTH: 86 86 Validity : 0  
 Towing dir: 0° Wire out : 225 m Speed : 3.0 kn  
 Sorted : 39 Total catch: 158.10 Catch/hour: 313.28

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Loligo sp.	206.08	2473	65.78	
Priacanthus macracanthus	44.70	1205	14.27	204
Siganus canaliculatus	12.36	246	3.95	
Rastrelliger kanagurta	8.88	119	2.83	
Upeneus moluccensis	7.77	428	2.48	
Synodus cf. indicus	5.71	285	1.82	
Selar crumenophthalmus	5.12	95	1.82	
Sorsogona melanoptera	4.76	317	1.52	
Sphyraena obtusata	4.44	63	1.42	
Nemipterus japonicus	3.33	87	1.06	
Trichurus lepturus	2.26	4	0.72	
Saurida undosquamis	1.74	40	0.56	
Parapercis alboguttata	1.27	24	0.40	
Samaris cristatus	1.11	48	0.35	
Upeneus guttatus	1.03	48	0.33	
Champsodon sp.	0.55	285	0.18	
Photoptoralis aureus	0.48	48	0.15	
Parupeneus heptacanthus	0.40	4	0.13	
Cynoglossus puncticeps	0.32	24	0.10	
Aesopia cornuta	0.32	8	0.10	
BOTHIDAE	0.08	48	0.03	
Total	313.28		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 141  
 DATE : 24/05/15 GEAR TYPE: BT NO: 27 POSITION: Lat N 12°20.36  
 start stop duration duration Lon E 97°54.60  
 TIME : 02:36:51 03:07:05 30.2 (min) Purpose : 3  
 LOG : 8214.36 8215.93 1.6 Region : 10330  
 FDEPTH: 30 31 Gear cond.: 0  
 BDEPTH: 30 31 Validity : 0  
 Towing dir: 0° Wire out : 90 m Speed : 3.1 kn  
 Sorted : 28 Total catch: 126.79 Catch/hour: 251.65

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Rachycentron canadum	131.57	30	52.28	206
Loligo sp.	48.35	2076	19.21	
Stolephorus indicus	21.75	7066	8.64	
Eubleekeria jonesi	14.29	3287	5.68	
Saurida tumbil	11.11	103	4.42	
Scomberomorus koreanus	7.78	18	3.09	205
Upeneus sulphureus	3.02	143	1.20	
Jaydia poeciloptera	1.95	492	0.77	
Brachypleura novaezeelandiae	1.91	167	0.76	
Chirocentrus nudus	1.79	4	0.71	
Siganus canaliculatus	1.59	175	0.63	
Rastrelliger kanagurta	1.51	44	0.60	
Plotosus lineatus	1.11	111	0.44	
Alpes djedaba	1.03	24	0.41	
Sphyraena pinguis	0.99	16	0.39	
Pomadasya kaakan	0.71	14	0.28	207
Dussumeria acuta	0.40	16	0.16	
Scomberomorus guttatus	0.36	2	0.14	
S B R I M P S	0.24	24	0.09	
Bembrops platyrhynchus	0.12	12	0.05	
SQUILLIDAE	0.08	32	0.03	
Rhinocodon typus	0.00	2	0.00	
Total	251.65		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 142  
 DATE : 24/05/15 GEAR TYPE: BT NO: 27 POSITION: Lat N 12°1.23  
 start stop duration duration Lon E 97°50.07  
 TIME : 07:10:19 07:40:22 30.1 (min) Purpose : 3  
 LOG : 8249.56 8251.08 1.5 Region : 10330  
 FDEPTH: 52 45 Gear cond.: 0  
 BDEPTH: 52 45 Validity : 0  
 Towing dir: 0° Wire out : 145 m Speed : 3.0 kn  
 Sorted : 0 Total catch: 94.10 Catch/hour: 187.89

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Pomadasya kaakan	38.86	48	19.62	210
Loligo sp.	32.59	1825	17.34	
Trichurus lepturus	27.23	1006	14.50	
Saurida undosquamis	16.45	427	8.76	213
Acropoma japonicum	11.58	7296	6.16	
Saurida tumbil	9.26	168	4.93	212
Stolephorus indicus	8.23	595	4.38	208
Upeneus sulphureus	6.15	202	3.27	211
Sphyraena putnamae	5.99	4	3.19	
Scomberomorus koreanus	5.35	8	2.85	
Atule mate	5.11	32	2.72	209
Megalaspis cordyla	4.07	4	2.17	
Gazza minuta	3.03	36	1.62	
Leiognathus equulus	2.88	28	1.53	
Jaydia striata	2.16	439	1.15	
Sepia sp.	1.92	4	1.02	
Ulua mentalis	1.68	4	0.89	
Aurigequala fasciata	1.44	28	0.77	
Dussumeria elopsoides	1.44	36	0.77	
Panulirus polyphagus	1.20	2	0.64	
Lagocephalus lunaris	0.84	8	0.45	
Mene maculata	0.64	12	0.34	
Pennahia anea	0.56	16	0.30	
Sargocentron rubrum	0.48	4	0.26	
Gerres sp.	0.32	4	0.17	
Brachypleura novaezeelandiae	0.24	24	0.13	
Carangoides sp.	0.12	4	0.06	
Jaydia truncata	0.08	4	0.04	
Total	187.89		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 143  
 DATE : 24/05/15 GEAR TYPE: BT NO: 27 POSITION: Lat N 12°1.08  
 start stop duration duration Lon E 97°28.79  
 TIME : 10:37:58 11:08:05 30.1 (min) Purpose : 3  
 LOG : 8275.90 8277.31 1.4 Region : 10330  
 FDEPTH: 82 82 Gear cond.: 0  
 BDEPTH: 82 82 Validity : 0  
 Towing dir: 0° Wire out : 200 m Speed : 2.8 kn  
 Sorted : 0 Total catch: 45.63 Catch/hour: 90.90

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Saurida undosquamis	26.53	332	29.19	214
Aluterus monoceros	14.40	60	15.84	
Lagocephalus guentheri	12.13	175	13.35	
Nemipterus bipectatus	9.98	111	10.98	215
Selar crumenophthalmus	6.57	123	7.23	
Sepia sp.	3.47	24	3.81	
Pomadasya kaakan	2.69	3	2.96	
Siganus canaliculatus	2.39	45	2.63	
Loligo sp.	2.39	45	2.63	
Trachinocephalus myops	2.09	24	2.30	
Priacanthus macracanthus	1.37	33	1.51	
Carangoides malabaricus	1.37	33	1.51	
Octopus sp.	1.20	3	1.31	
Tosarhombus longimanus	1.14	36	1.25	
Sorsogona melanoptera	0.96	45	1.05	
Atule mate	0.54	3	0.59	
Scomberoides tala	0.54	3	0.59	
Fistularia petimba	0.48	6	0.53	
Dactyloptena orientalis	0.30	6	0.33	
Parupeneus heptacanthus	0.18	3	0.20	
Upeneus guttatus	0.18	45	0.20	
Total	90.90		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 144  
 DATE : 24/05/15 GEAR TYPE: BT NO: 27 POSITION: Lat N 12°2.98  
 start stop duration Lon E 97°17.89  
 TIME : 12:48:22 13:18:22 30.0 (min) Purpose : 3  
 LOG : 8288.43 8289.85 1.4 Region : 10330  
 FDEPTH: 91 90 Gear cond.: 0  
 BDEPTH: 91 90 Validity : 0  
 Towing dir: 0° Wire out : 240 m Speed : 2.8 kn  
 Sorted : 21 Total catch: 77.46 Catch/hour: 154.87

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Saurida undosquamis	33.31	938	21.51	
Parapetrolis heterura	31.63	616	20.42	
Tosarhombus longimanus	15.95	958	10.30	
Nemipterus bipunctatus	12.60	210	8.13	
Small crabs	7.80	4003	5.03	
Aluterus monoceros	6.30	28	4.07	
Trachinocephalus myops	6.16	98	3.98	
Sorsogona melanoptera	5.04	350	3.25	
S H R I M P S	5.04	1162	3.25	
Arothron stellatus	4.12	4	2.66	
Synodus cf. indicus	3.98	98	2.57	
Octopus sp.	3.36	98	2.17	
Upeneus guttatus	3.08	154	1.99	
Photopectoralis aureus	2.52	210	1.63	
Dactyloptena orientalis	2.52	70	1.63	
Lepidotrigla sp. C	2.52	56	1.63	
Priacanthus macracanthus	1.68	42	1.08	
Echeneis naucrates	1.52	2	0.98	
Parascolopsis aspinnosa	1.40	14	0.90	
CALLIONYMIDAE	1.26	56	0.81	
Diodon holocanthus	1.00	2	0.65	
Sea snakes	0.60	2	0.39	
Ariosoma sp.	0.56	8	0.36	
Uranoscopus oligolepis	0.56	8	0.36	
Gymnothorax sp.	0.28	14	0.18	
Pterois russellii	0.10	8	0.06	
Total	154.87		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 145  
 DATE : 24/05/15 GEAR TYPE: BT NO: 27 POSITION: Lat N 12°2.18  
 start stop duration Lon E 97°8.95  
 TIME : 14:48:21 15:18:24 30.1 (min) Purpose : 3  
 LOG : 8300.07 8301.49 1.4 Region : 10330  
 FDEPTH: 131 131 Gear cond.: 0  
 BDEPTH: 131 131 Validity : 0  
 Towing dir: 0° Wire out : 340 m Speed : 2.8 kn  
 Sorted : 28 Total catch: 82.71 Catch/hour: 165.14

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Saurida undosquamis	27.55	587	16.68	
Pseudohombus qui nquocellatus	13.18	156	7.98	
Bleekeria kallelepis	7.79	743	4.72	
Torquigener sp.	6.35	401	3.84	
Synagrops adeni	5.39	701	3.26	
Aluterus monoceros	5.39	6	3.26	
Uranoscopus sp.	3.59	6	2.18	
Tosarhombus longimanus	3.59	78	2.18	
Lophomus setigerus	3.00	12	1.81	
Cylichthys orbicularis	2.70	6	1.63	
Small crabs	2.40	521	1.45	
Rhinobatoides sp.	1.80	12	1.09	
Nemipterus japonicus	1.80	18	1.09	
Parascolopsis aspinnosa	1.80	18	1.09	
Scyllarides sp.	1.20	12	0.73	
Monocentris japonica	0.60	6	0.36	
Callionymus sp.	0.60	6	0.36	
Photopsetta sp.	0.48	42	0.29	
Small shrimps	0.48	114	0.29	
Centroberyx druzhyni	0.36	24	0.22	
Roa jakakari	0.12	6	0.07	
Sepia sp.	0.12	18	0.07	
Total	165.14		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 146  
 DATE : 24/05/15 GEAR TYPE: BT NO: 27 POSITION: Lat N 12°2.73  
 start stop duration Lon E 96°57.75  
 TIME : 17:01:16 17:31:40 30.4 (min) Purpose : 3  
 LOG : 8313.05 8314.47 1.4 Region : 10330  
 FDEPTH: 260 257 Gear cond.: 0  
 BDEPTH: 260 257 Validity : 0  
 Towing dir: 0° Wire out : 640 m Speed : 2.8 kn  
 Sorted : 0 Total catch: 98.76 Catch/hour: 194.86

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Metanephrops andamanicus	74.23	935	38.09	216
Chlorophthalmus cf. acutifrons	48.66	178	24.97	
Small shrimps	37.41	49247	19.20	
Pseuopsis obscura	6.33	225	3.25	
Saurida undosquamis	5.92	47	3.04	
Coelirinchus cf. argentatus	3.79	130	1.94	
Lophomus setigerus	3.20	18	1.64	
Bythaelurus hispidus	3.14	36	1.61	
Priacanthus macracanthus	2.60	18	1.34	
Ostichthys japonicus	2.37	4	1.22	
Arnoglossus sp.	1.18	59	0.61	
Neopinnula orientalis	0.95	12	0.49	
Loligo sp.	0.83	6	0.43	
UNIDENTIFIED FISH	0.65	12	0.33	
Tydemania navigatoris	0.59	59	0.30	
Setarches longimanus	0.53	59	0.27	
OPHIIDIDAE	0.47	12	0.24	
MYCTOPHIDAE	0.47	53	0.24	
Cynoglossus gracilis	0.36	6	0.18	
Synagrops adeni	0.24	30	0.12	
Physiculus sp.	0.12	6	0.06	
Chascanopsetta lugubris	0.12	6	0.06	
Eridacnis radcliffei	0.12	12	0.06	
Coelirinchus sp.	0.12	24	0.06	
Rexea bengalensis	0.12	6	0.06	
Callionymus sp.	0.12	12	0.06	
Lestrolaps intermedia	0.06	6	0.03	
Pterygotrigla macrorhynchus	0.06	6	0.03	
Haliinchiurgus sp.	0.06	6	0.03	
Macrorhamphosodes sp.	0.06	6	0.03	0
Squalus cf. megalops	0.00	2	0.00	
Acanthaphtitis barbata	0.00	2	0.00	
Total	194.86		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 147  
 DATE : 24/05/15 GEAR TYPE: BT NO: 27 POSITION: Lat N 12°0.69  
 start stop duration Lon E 96°43.14  
 TIME : 20:00:32 20:31:48 31.3 (min) Purpose : 3  
 LOG : 8331.17 8332.69 1.5 Region : 10330  
 FDEPTH: 359 360 Gear cond.: 0  
 BDEPTH: 359 360 Validity : 0  
 Towing dir: 0° Wire out : 780 m Speed : 2.9 kn  
 Sorted : 54 Total catch: 162.21 Catch/hour: 311.34

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
ALEPOCEPHALIDAE	103.65	115	33.29	
Neoscopelus microchir	74.86	207	24.04	
Polyipnus cf. asper	32.25	0	10.36	
S H R I M P S	23.03	58	7.40	
Synagrops sp.	17.27	230	5.55	
OPHIIDIDAE	16.12	58	5.18	
Loligo sp.	11.52	173	3.70	
Pseuopsis obscura	11.52	115	3.70	
MYCTOPHIDAE	5.76	0	1.85	0
Ophiidion sp.	5.76	58	1.85	
Chascanopsetta lugubris	3.45	104	1.11	
UNIDENTIFIED FISH	2.30	58	0.74	
Chlorophthalmus cf. corniger	1.15	58	0.37	
Satyricthys sp.	1.09	0.98	2.35	0.31
Linuparus cf. somnolus	0.40	6	0.13	
Priacanthus hamur	0.10	2	0.03	
Macrorhamphosodes sp.	0.08	2	0.02	
Tydemania navigatoris	0.04	4	0.01	
Setarches longimanus	0.04	2	0.01	
Peristedion sp.	0.02	2	0.01	
Total	311.34		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 148  
 DATE : 25/05/15 GEAR TYPE: BT NO: 27 POSITION: Lat N 11°42.03  
 start stop duration Lon E 96°46.90  
 TIME : 00:23:46 00:45:57 22.2 (min) Purpose : 3  
 LOG : 8365.26 8366.32 1.1 Region : 10330  
 FDEPTH: 319 316 Gear cond.: 0  
 BDEPTH: 319 316 Validity : 0  
 Towing dir: 0° Wire out : 760 m Speed : 2.9 kn  
 Sorted : 18 Total catch: 109.40 Catch/hour: 295.94

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
ARI STEIIDAE	71.42	19996	24.13	
ACROPOMATIDAE	40.25	4658	13.60	
Chlorophthalmus cf. acutifrons	31.16	487	10.53	
Satyricthys sp.	30.19	16	10.20	
Neopinnula orientalis	22.72	390	7.68	
MYCTOPHIDAE	14.28	3717	4.83	
Pseuopsis obscura	9.09	97	3.07	
Ateleopus sp.	8.44	130	2.85	
Hypopleuron caninum	7.79	97	2.63	
Coelirinchus cf. quadricristatus	7.79	227	2.63	
Puerulus sewelli	7.36	84	2.49	
Setarches sp.	7.14	1006	2.41	
C E P H A L O P O D A	7.14	65	2.41	
Gephyroberyx cf. japonicus	6.49	65	2.19	
Eridacnis radcliffei	5.19	130	1.76	
Chascanopsetta lugubris	4.54	130	1.54	
Priacanthus macracanthus	4.54	32	1.54	
Rexea bengalensis	2.80	162	0.88	
Haliinchiurgus sp.	1.95	32	0.66	
Synagrops japonicus	1.95	65	0.66	
Scalirus investigatoris	1.30	32	0.44	
Macrorhamphosodes sp.	1.30	16	0.44	
BOTHIDAE	0.65	97	0.22	
Tydemania navigatoris	0.65	97	0.22	
Total	295.94		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 149  
 DATE : 25/05/15 GEAR TYPE: BT NO: 27 POSITION: Lat N 11°39.96  
 start stop duration Lon E 97°16.16  
 TIME : 04:28:05 04:58:25 30.3 (min) Purpose : 3  
 LOG : 8397.70 8399.28 1.6 Region : 10330  
 FDEPTH: 105 105 Gear cond.: 0  
 BDEPTH: 105 105 Validity : 0  
 Towing dir: 0° Wire out : 250 m Speed : 3.1 kn  
 Sorted : 73 Total catch: 72.61 Catch/hour: 143.59

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Parascolopsis eriomma	101.41	425	70.62	218
Parupeneus heptacanthus	8.23	49	5.73	217
Lethrinus lentjan	7.40	2	5.15	220
Sepia sp.	5.18	8	3.61	
Cantherhines multilineatus	4.67	34	3.25	
Epinephelus areolatus	3.24	18	2.26	219
Wattsi a mossambica	2.29	10	1.60	
Pristigynis refulgens	2.18	4	1.51	
Fistularia petimba	2.14	18	1.49	
Pristipomoides typus	1.38	4	0.96	
Sargocentron rubrum	1.23	8	0.85	
Monocentris japonica	0.83	8	0.58	
Pseudanthias 'red fin-tips'	0.79	6	0.55	
Choerodon cf. robustus	0.63	2	0.44	
Bodianus leucostictus	0.59	10	0.41	
Haploogynys merguensis	0.36	2	0.25	
Heniocichthys acuminatus	0.32	2	0.22	
Roa jakakari	0.20	6	0.14	
Antigonia sp.	0.20	16	0.14	
Chromis sp.	0.16	10	0.11	
Odontanthias sp.	0.10	2	0.07	
Pseudanthias cf. fasciatus	0.08	4	0.06	
Coral - mixed	0.00	0	0.00	
Total	143.59		100.00	



R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 150  
 DATE : 25/05/15 GEAR TYPE: BT NO: 27 POSITION: Lat N 11°41.76  
 start stop duration Lon E 97°35.74  
 TIME : 07:25:24 07:55:40 30.3 (min) Purpose : 3  
 LOG : 8419.67 8421.13 1.4 Region : 10330  
 FDEPTH: 75 75 Gear cond.: 0  
 BDEPTH: 75 75 Validity : 0  
 Towing dir: 0° Wire out : 205 m Speed : 2.9 kn  
 Sorted : 18 Total catch: 18.05 Catch/hour: 35.78

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight numbers			
Trichiurus lepturus	13.56	50	37.89
JELLYFISH	4.52	4	12.63
Carangoides coeruleopinnatus	3.73	6	10.42
Saurida tumbil	3.37	83	9.42
Lagocephalus guentheri	1.78	8	4.99
Carangoides chrysophrys	1.39	2	3.88
Sea snakes	1.31	2	3.66
Lophomus setigerus	0.99	2	2.77
Saurida undosquamis	0.99	14	2.77
Rastrelliger kanagurta	0.63	4	1.77
Sepia sp.	0.63	2	1.77
Cantherhines multilineatus	0.59	4	1.66
Pentaprion longimanus	0.52	18	1.44
Nemipterus nematophorus	0.42	4	1.16
Hemiochus diaphreus	0.40	2	1.11
Halietaea sp.	0.24	2	0.66
Fistularia petimba	0.24	4	0.66
Selar crumenophthalmus	0.20	4	0.55
Siganus canaliculatus	0.20	4	0.55
Sorsogona melanoptera	0.08	4	0.22
Total	35.78	100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 151  
 DATE : 25/05/15 GEAR TYPE: BT NO: 27 POSITION: Lat N 11°41.58  
 start stop duration Lon E 97°54.10  
 TIME : 09:58:53 10:21:22 22.5 (min) Purpose : 3  
 LOG : 8438.13 8439.15 1.0 Region : 10330  
 FDEPTH: 60 57 Gear cond.: 0  
 BDEPTH: 60 57 Validity : 0  
 Towing dir: 0° Wire out : 180 m Speed : 2.7 kn  
 Sorted : 29 Total catch: 85.56 Catch/hour: 228.46

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight numbers			
Stolephorus indicus	136.18	18385	59.61
Loligo sp.	27.88	1786	12.20
Saurida tumbil	21.74	668	9.51
Trichiurus lepturus	16.02	288	7.01
Brachypleura novaezeelandiae	3.85	352	1.68
Penaeus monodon	3.15	3	1.38
C R A B S	2.88	320	1.26
Ostorhynchus fasciatus	2.56	288	1.12
Scomberomorus koreanus	2.32	3	1.02
Cynoglossus arel	1.92	32	0.84
Jaydia smithi	1.92	336	0.84
Lethrinus nebulosus	1.12	16	0.49
SCULLIDAE	1.12	128	0.49
Siganus canaliculatus	0.96	32	0.42
Epinephelus sexfasciatus	0.93	3	0.41
Carangoides malabariensis	0.80	16	0.35
Rastrelliger kanagurta	0.67	3	0.29
Atule mate	0.67	3	0.29
Sepia sp.	0.64	16	0.28
Decapterus russelli	0.32	16	0.14
Rhynchoconger sp.	0.32	16	0.14
Ulua mentalis	0.32	16	0.14
Jaydia striata	0.16	32	0.07
Total	228.46	100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 152  
 DATE : 25/05/15 GEAR TYPE: BT NO: 27 POSITION: Lat N 11°40.98  
 start stop duration Lon E 97°59.72  
 TIME : 11:14:14 11:44:17 30.1 (min) Purpose : 3  
 LOG : 8444.38 8445.81 1.4 Region : 10330  
 FDEPTH: 42 43 Gear cond.: 0  
 BDEPTH: 42 43 Validity : 0  
 Towing dir: 0° Wire out : 120 m Speed : 2.9 kn  
 Sorted : 24 Total catch: 85.60 Catch/hour: 170.92

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight numbers			
Loligo sp.	57.50	1839	33.64
Saurida tumbil	22.76	671	13.32
Leiognathus equulus	22.76	240	13.32
Sphyræna putnamae	11.54	4	6.75
Trichiurus lepturus	7.67	90	4.49
Lutjanus johni	6.87	2	4.02
Lagocephalus guentheri	6.71	36	3.93
Plotosus sp.	6.71	563	3.93
Secutor sp.	5.15	1629	3.01
Rastrelliger brachysoma	5.03	30	2.94
Pomadasy kaakan	2.64	24	1.54
Octopus sp.	2.20	4	1.29
Ostorhynchus fasciatus	2.16	168	1.26
Upeneus sulphureus	2.16	72	1.26
Pemphid a anea	2.16	36	1.26
Penaeus monodon	2.04	36	1.19
Scomberomorus koreanus	1.04	2	0.61
Ilisha sp.	0.96	24	0.56
Charybdis ferata	0.92	2	0.54
Brachypleura novaezeelandiae	0.72	36	0.42
MUGILIDAE	0.64	4	0.37
Siganus canaliculatus	0.36	6	0.21
Total	170.92	100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 153  
 DATE : 25/05/15 GEAR TYPE: BT NO: 27 POSITION: Lat N 11°22.49  
 start stop duration Lon E 97°54.32  
 TIME : 15:16:34 15:46:35 30.0 (min) Purpose : 3  
 LOG : 8470.17 8471.73 1.6 Region : 10330  
 FDEPTH: 55 56 Gear cond.: 0  
 BDEPTH: 55 56 Validity : 0  
 Towing dir: 0° Wire out : 160 m Speed : 3.1 kn  
 Sorted : 25 Total catch: 131.19 Catch/hour: 262.21

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight numbers			
Leiognathus equulus	42.77	320	16.31
Jaydia smithi	33.98	1699	12.96
S H R I M P S	33.98	1079	12.96
Loligo sp.	27.98	360	10.67
Saurida tumbil	22.78	200	8.69
Bregmaceros mcclellandi	19.99	3198	7.62
JELLYFISH	19.99	20	7.62
Pomadasy kaakan	16.39	30	6.25
Upeneus sulphureus	9.99	240	3.81
Brachypleura novaezeelandiae	6.00	520	2.29
Muraenox cinereus	5.12	8	1.95
Trichiurus lepturus	4.40	40	1.68
Nemipterus japonicus	4.00	120	1.56
Lutjanus lutjanus	3.90	80	1.49
Octopus sp.	2.00	100	0.72
Sepia sp.	1.60	10	0.61
Jaydia queketti	1.00	20	0.38
Rachycentron canadum	0.88	2	0.34
Apogon truncatus	0.80	40	0.30
Brachypterois serrulata	0.80	40	0.30
C R A B S	0.80	80	0.30
Cynoglossus arel	0.60	20	0.23
Stolephorus indicus	0.60	10	0.23
Penaeus monodon	0.48	4	0.18
Cyclichthys orbicularis	0.44	2	0.17
Lagocephalus guentheri	0.44	2	0.17
Ariosoma sp.	0.24	2	0.09
Zebrias sp.	0.20	10	0.08
Pterocasio chrysozona	0.08	2	0.03
Total	262.21	100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 154  
 DATE : 25/05/15 GEAR TYPE: BT NO: 27 POSITION: Lat N 11°22.53  
 start stop duration Lon E 97°34.22  
 TIME : 18:21:00 18:54:37 30.6 (min) Purpose : 3  
 LOG : 8492.72 8494.32 1.6 Region : 10330  
 FDEPTH: 80 78 Gear cond.: 0  
 BDEPTH: 80 78 Validity : 0  
 Towing dir: 0° Wire out : 200 m Speed : 3.1 kn  
 Sorted : 27 Total catch: 111.82 Catch/hour: 219.11

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight numbers			
Siganus canaliculatus	54.87	1536	25.04
Nemipterus bipunctatus	32.29	157	14.74
Lutjanus quinquelineatus	22.73	400	10.37
Dactyloptena orientalis	16.30	219	7.44
Trachinocephalus myops	14.89	180	6.80
Galeocerdo cuvier	11.25	2	5.13
Saurida undosquamis	10.35	306	4.72
Diodon holocanthus	9.56	86	4.36
Panulirus polyphagus	9.41	16	4.29
Pomadasy kaakan	6.58	16	3.00
Upeneus guttatus	3.92	188	1.79
Parupeneus heptacanthus	3.92	39	1.79
Uranoscopus affinis	3.61	39	1.65
Sepia sp.	3.45	16	1.57
Saurida tumbil	3.21	16	1.47
Priacanthus hamrur	2.82	47	1.29
Rhinobatos sp.	2.66	8	1.22
Seriolina nigrofasciata	2.04	8	0.93
Lagocephalus guentheri	1.96	16	0.89
Fistularia petimba	0.94	55	0.43
Ammodioides sp.	0.71	63	0.32
Scorpaenopsis neglecta	0.47	8	0.21
Synodus sp.	0.47	31	0.21
Pterois cf. miles	0.31	0.39	8
Uraspis helvola	0.31	8	0.14
Total	219.11	100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 155  
 DATE : 25/05/15 GEAR TYPE: BT NO: 27 POSITION: Lat N 11°22.67  
 start stop duration Lon E 97°16.72  
 TIME : 22:35:29 23:05:47 30.3 (min) Purpose : 3  
 LOG : 8514.35 8515.92 1.6 Region : 10330  
 FDEPTH: 178 181 Gear cond.: 0  
 BDEPTH: 178 181 Validity : 0  
 Towing dir: 0° Wire out : 470 m Speed : 3.1 kn  
 Sorted : 25 Total catch: 186.49 Catch/hour: 369.29

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
weight numbers			
Satyriichthys sp.	144.71	347	39.19
Saurida undosquamis	57.39	915	15.54
Synagrops sp.	44.63	13390	12.09
Priacanthus macracanthus	24.95	236	6.76
S H R I M P S	20.51	16606	5.56
Ostiichthys acanthorhynchus	14.97	471	4.05
Galeocerdo cuvier	11.37	2	3.08
Lophomus setigerus	10.81	42	2.93
Pseudorhombus quinquocellatus	6.38	83	1.73
Neopomacentrus orientalis	5.41	55	1.46
Cocciella sp.	5.41	1.20	
Neomerinthe sp.	3.05	305	0.83
Chlorophthalmus corniger	3.05	776	0.83
Glossanodon sp.	3.05	250	0.83
Ibacus novemdentatus	2.91	28	0.79
Dactyloptena orientalis	2.81	14	0.76
Siganus canaliculatus	1.94	55	0.53
Loligo sp.	1.94	28	0.53
CALLIONYMI DAE	1.62	28	0.44
MYCTOPHI DAE	0.83	166	0.23
Antigonia sp.	0.83	55	0.23
C R A B S	0.69	55	0.19
Uroconger sp.	0.55	42	0.15
Bembrops sp.	0.28	14	0.08
Xyrias revulusus	0.16	2	0.04
Total	369.29	100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 156  
 DATE : 26/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 11°22.41  
 start stop duration  
 TIME : 02:41:19 03:14:44 33.4 (min) Purpose : 3  
 LOG : 8541.95 8543.55 1.6 Region : 10330  
 FDEPTH: 300 298 Gear cond.: 0  
 BDEPTH: 300 298 Validity : 0  
 Towing dir: 0° Wire out : 720 m Speed : 2.9 kn  
 Sorted : 23 Total catch: 229.14 Catch/hour: 411.38

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Plesiobatis daviesi	141.65	11	34.43
Chlorophthalmus cf. acutifrons	76.70	1605	18.64
Psenopsis obscura	50.84	1077	12.36
Synagrops adenii	30.16	3199	7.33
S H R I M P S	23.27	7680	5.66
Rexea bengalensis	19.39	539	4.71
Heptranchias perlo	14.90	5	3.62
Satyriichthys sp.	13.57	22	3.30
Loligo sp.	7.54	97	1.83
Puerulus sewelli	6.57	158	1.60
Synagrops japonicus	6.46	194	1.57
Bythaelurus hispidus	6.46	65	1.57
Rexea prometheoides	5.82	65	1.41
Cubiceps whitelleggi	3.23	65	0.79
Coelorinchus quadricristatus	1.72	65	0.42
Priacanthus macracanthus	1.51	11	0.37
Chascanopsetta lugubris	0.86	22	0.21
Xyrias revulus	0.54	2	0.13
Iago cf. garricki	0.18	0	0.04
Total	411.38	100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 157  
 DATE : 26/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 11°5.70  
 start stop duration  
 TIME : 13:02:19 13:32:23 30.1 (min) Purpose : 3  
 LOG : 8595.02 8596.47 1.4 Region : 10330  
 FDEPTH: 459 457 Gear cond.: 0  
 BDEPTH: 459 457 Validity : 0  
 Towing dir: 0° Wire out : 960 m Speed : 2.9 kn  
 Sorted : 13 Total catch: 89.23 Catch/hour: 178.04

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Hexatrygon bickelli	68.20	6	38.31
Plesiobatis daviesi	32.32	4	18.16
Aristeus virilis	26.22	7075	14.73
Mycetophidae	7.90	1568	4.44
ALPOCEPHALIDAE	7.06	162	3.97
Polyipnus cf. asper	5.51	826	3.09
S H R I M P S	5.39	539	3.03
Neoscopelus microchir	4.67	120	2.62
Bythaelurus hispidus	4.19	42	2.35
BYTHIIDAE	3.83	245	2.15
Gavialiceps taeniola	3.59	42	2.02
Heterocarpus sp.	2.39	132	1.34
Coelorinchus cf. argentatus	1.68	132	0.94
Squalus sp.	1.08	2	0.61
Cubiceps whitelleggi	0.96	24	0.54
Chascanopsetta lugubris	0.84	6	0.47
Malacocephalus sp.	0.72	6	0.40
Chlorophthalmus acutifrons	0.72	6	0.40
Tydemania navigatoris	0.36	36	0.20
Synagrops japonicus	0.24	6	0.13
Chauliodus sp.	0.12	12	0.07
Benthodesmus sp.	0.06	2	0.03
Total	178.04	100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 158  
 DATE : 26/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 11°1.75  
 start stop duration  
 TIME : 16:38:57 17:09:32 30.6 (min) Purpose : 3  
 LOG : 8616.67 8618.11 1.4 Region : 10330  
 FDEPTH: 325 320 Gear cond.: 0  
 BDEPTH: 325 320 Validity : 0  
 Towing dir: 0° Wire out : 780 m Speed : 2.8 kn  
 Sorted : 36 Total catch: 35.52 Catch/hour: 69.69

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Plesiobatis daviesi	17.27	2	24.77
Small shrimps	12.87	4632	18.47
Chlorophthalmus cf. acutifrons	9.97	200	14.30
OMMASTREPHIDAE	8.12	67	11.66
Eridacnis radcliffei	4.55	96	6.53
Coelorinchus sp.	3.61	163	5.18
Psenopsis obscura	3.53	49	5.07
MYCTOPHIDAE	2.98	1130	4.28
Puerulus sewelli	2.79	29	4.00
Chlorophthalmus corniger	0.90	86	1.30
Tydemania navigatoris	0.59	78	0.84
Metanephrops andamanicus	0.45	0	0.65
Neobythites sp.	0.35	6	0.51
Bythaelurus hispidus	0.35	24	0.51
Bembradium roseum	0.20	8	0.28
Antigonia cf. rubescens	0.20	4	0.28
Gavialiceps taeniola	0.18	10	0.25
Bathymyrus echionorhynchus	0.18	2	0.25
Chascanopsetta lugubris	0.16	8	0.23
Satyriichthys sp.	0.12	2	0.17
Lophomus setigerus	0.08	2	0.11
Macrorhamphosodes sp.	0.08	10	0.11
Setarches longimanus	0.06	4	0.08
Ariosoma sp.	0.04	2	0.06
Polymixia cf. berndti	0.04	2	0.06
Poecilopsetta sp.	0.04	4	0.06
DICERATIIDAE	0.00	2	0.00
Total	69.69	100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 159  
 DATE : 26/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 11°3.28  
 start stop duration  
 TIME : 20:21:02 20:51:26 30.4 (min) Purpose : 3  
 LOG : 8646.09 8647.51 1.4 Region : 10330  
 FDEPTH: 113 112 Gear cond.: 0  
 BDEPTH: 113 112 Validity : 0  
 Towing dir: 0° Wire out : 270 m Speed : 2.8 kn  
 Sorted : 0 Total catch: 64.71 Catch/hour: 127.72

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
R A Y S	78.95	2	61.81
Saurida undosquamis	9.04	118	7.08
Engyproson sp.	7.62	229	5.97
Torquigener sp.	6.91	414	5.41
Neopepimula orientalis	3.47	105	2.72
Mnocrentris japonica	3.39	30	2.66
Uranoscopus affinis	2.37	18	1.85
Centroberyx druzhinini	1.97	16	1.55
OMMASTREPHIDAE	1.42	16	1.11
Uranoscopus oligolepis	1.42	6	1.11
Trachinocephalus myops	1.38	12	1.08
Tetrosomus cf. reipublicae	1.14	8	0.90
Sepia sp.	0.99	6	0.77
Octopus sp.	0.91	16	0.71
Synodus sp.	0.79	32	0.62
Hapalogenys merguensis	0.75	2	0.59
Chelidoperca pleurospilus	0.75	89	0.59
Priacanthus hamrur	0.75	6	0.59
Blakeria kalilolepis	0.55	103	0.43
Priacanthus sagittarius	0.51	2	0.40
Parasclopsis aspinoza	0.45	2	0.36
Nemipterus japonicus	0.43	28	0.34
Parupeneus heptacanthus	0.41	2	0.32
Sargocentron rubrum	0.24	12	0.19
Sorsogona melanoptera	0.24	6	0.19
Snyderia yamanokami	0.20	2	0.15
Hoplithys citrinus	0.16	14	0.12
Ariosoma sp.	0.12	4	0.09
Ophiidion sp.	0.08	4	0.06
Paraperca cf. sexfasciata	0.06	2	0.05
Synodus cf. randalli	0.04	2	0.03
Acanthaphritis barbata	0.04	6	0.03
Synodus cf. macrops	0.04	4	0.03
Priacanthus proluxus	0.04	2	0.03
Aulotrachichthys sp.	0.04	2	0.03
Cynoglossus puncticeps	0.04	2	0.03
Uranoscopus affinis	0.00	2	0.00
Total	127.72	100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 160  
 DATE : 26/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 11°1.85  
 start stop duration  
 TIME : 22:17:06 22:47:18 30.2 (min) Purpose : 3  
 LOG : 8658.73 8660.36 1.6 Region : 10330  
 FDEPTH: 83 81 Gear cond.: 0  
 BDEPTH: 83 81 Validity : 0  
 Towing dir: 0° Wire out : 245 m Speed : 3.2 kn  
 Sorted : 27 Total catch: 54.98 Catch/hour: 109.23

SPECIES	CATCH/HOUR	% OF TOT. C	SAMP
	weight numbers		
Siganus canaliculatus	22.89	588	20.95
Saurida undosquamis	19.87	246	18.19
Trachinocephalus myops	11.05	127	10.11
Nemipterus bipunctatus	9.70	60	8.88
Sepia sp.	7.87	20	7.20
Parapterois heterura	6.68	87	6.11
Dactyloptena orientalis	5.72	68	5.24
Priacanthus hamrur	5.25	40	4.80
Upeneus guttatus	5.25	211	4.80
Centroberyx druzhinini	2.70	20	2.47
Fistularia petimba	1.99	4	1.82
Charybdis feriata	1.71	4	1.56
Loligo sp.	1.11	16	1.02
Decapterus smithvanizi	0.79	16	0.73
Cyclichthys orbicularis	0.75	16	0.69
Sorsogona melanoptera	0.72	48	0.65
Sargocentron rubrum	0.72	4	0.65
Parupeneus heptacanthus	0.72	4	0.65
Calappa sp.	0.64	4	0.58
Torquigener sp.	0.60	28	0.55
Callionymus margaretae	0.56	12	0.51
Uranoscopus affinis	0.52	8	0.47
C R A B S	0.52	77	0.47
Tetrosomus cf. reipublicae	0.40	4	0.36
Ariosoma sp.	0.32	4	0.29
Synodus sp.	0.24	4	0.22
Arothron stellatus	0.00	2	0.00
Total	109.23	100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 161  
 DATE : 27/05/15 GEAR TYPE: BT NO: 27 POSITION: Lat N 11°1.31  
 start stop duration Lon E 97°56.68  
 TIME : 00:59:38 01:29:40 30.0 (min) Purpose : 3  
 LOG : 8681.05 8682.36 1.3 Region : 10330  
 FDEPTH: 55 57 Gear cond.: 0  
 BDEPTH: 55 57 Validity : 0  
 Towing dir: 0° Wire out : 150 m Speed : 2.6 kn  
 Sorted : 0 Total catch: 61.41 Catch/hour: 122.66

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Rachycentron canadum	61.52	2	50.15	
JELLYFISH	14.90	28	12.15	
Saurida undosquamis	12.18	146	9.93	227
Loligo sp.	11.23	190	9.15	
Saurida tumbil	6.15	30	5.02	228
Aluterus monoceros	3.99	4	3.26	
Lagocephalus guentheri	3.72	42	3.03	
Upeneus guttatus	2.16	52	1.76	
Mene maculata	1.84	16	1.50	
Nemipterus bipunctatus	1.52	20	1.24	
Tentoriceps cristatus	1.16	16	0.94	
Siganus canaliculatus	0.76	22	0.62	
Decapterus russelli	0.40	6	0.33	
Rhinobatos sp.	2	2	0.33	
Dactyloptena orientalis	0.20	4	0.16	
Carangoides coerulescens	0.14	2	0.11	
Pseudotriacanthus strigilifer	0.10	4	0.08	
Sorsogona melanopectera	0.10	4	0.08	
Haliutaea sp.	0.08	2	0.07	
Callionymus cf. margaretae	0.06	2	0.05	
C R A B S	0.06	16	0.05	
Total		122.66		100.00

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 162  
 DATE : 27/05/15 GEAR TYPE: BT NO: 27 POSITION: Lat N 11°0.03  
 start stop duration Lon E 98°3.09  
 TIME : 03:32:06 04:02:09 30.1 (min) Purpose : 3  
 LOG : 8697.88 8699.52 1.6 Region : 10330  
 FDEPTH: 46 43 Gear cond.: 0  
 BDEPTH: 46 43 Validity : 0  
 Towing dir: 0° Wire out : 150 m Speed : 3.3 kn  
 Sorted : 16 Total catch: 45.87 Catch/hour: 91.59

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Loligo sp.	30.11	599	32.88	
Aluterus monoceros	19.57	20	21.36	
Selaroidea leptolepis	16.21	371	17.70	
Saurida undosquamis	6.95	132	7.59	229
Nemipterus bipunctatus	5.11	40	5.58	
Saurida tumbil	3.99	16	4.36	
Abalistes sp.	3.67	6	4.01	
Sepia sp.	2.32	10	2.53	
Carangoides malabariensis	1.24	12	1.35	
Rastrelliger brachysoma	0.88	8	0.96	
Sillago argenti fasciata	0.48	16	0.52	
Arothron stellatus	0.30	2	0.33	
Trachinocephalus myops	0.24	12	0.26	
Iniistius sp.	0.24	2	0.26	
Tosarhombus longimanus	0.12	28	0.13	
Fistularia petimba	0.12	2	0.13	
Synodus cf. tectus		0.04	8	0.04
Total		91.59		100.00

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 163  
 DATE : 27/05/15 GEAR TYPE: BT NO: 27 POSITION: Lat N 10°47.31  
 start stop duration Lon E 98°7.58  
 TIME : 06:51:22 07:21:33 30.2 (min) Purpose : 3  
 LOG : 8724.16 8725.72 1.6 Region : 10330  
 FDEPTH: 31 32 Gear cond.: 0  
 BDEPTH: 31 32 Validity : 0  
 Towing dir: 0° Wire out : 90 m Speed : 3.1 kn  
 Sorted : 21 Total catch: 103.35 Catch/hour: 205.47

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Photopectoralis bindus	30.42	4801	14.80	231
Lelionathus sp.	25.45	1879	12.39	237
Selaroidea leptolepis	24.65	716	12.00	235
Carangoides malabariensis	18.89	716	9.19	233
Saurida undosquamis	17.59	915	8.56	238
Equulites leuciscus	16.00	1153	7.79	236
Loligo sp.	15.41	388	7.50	234
Gazza minuta	11.43	427	5.56	234
Secutor sp.	10.14	915	4.93	232
Lagocephalus lunaris	6.26	40	3.05	
Carangoides armatus	4.67	10	2.27	
Upeneus sulphureus	4.37	149	2.13	
Rastrelliger kanagurta	3.78	189	1.84	
Aurigequalia fasciata	3.78	89	1.84	230
Trichiurus lepturus	2.49	30	1.21	
Atule mate	1.99	40	0.97	
Pomadasya kaakan	1.59	10	0.77	
Sphyraena forsteri	1.19	40	0.58	
Lutjanus vitta	0.99	60	0.48	
Scolopsis taenioptera	0.80	50	0.39	
Iniistius sp.	0.10	0	0.39	
Gerres macracanthus	0.50	20	0.24	
Priacanthus tayenus	0.40	10	0.19	
Ostorhynchus fasciatus	0.40	149	0.19	
Rastrelliger brachysoma	0.40	20	0.19	
Apogon truncatus	0.30	10	0.15	
Stoleporus sp.	0.30	139	0.15	
Pomadasya argenteus	0.30	10	0.15	
Upeneus sundaiensis	0.20	10	0.10	
Ostorhynchus pleuron	0.00	2	0.00	
Total		205.47		100.00

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 164  
 DATE : 27/05/15 GEAR TYPE: BT NO: 27 POSITION: Lat N 10°41.55  
 start stop duration Lon E 97°49.73  
 TIME : 10:07:46 10:37:48 30.0 (min) Purpose : 3  
 LOG : 8748.08 8749.66 1.6 Region : 10330  
 FDEPTH: 68 68 Gear cond.: 0  
 BDEPTH: 68 68 Validity : 0  
 Towing dir: 0° Wire out : 180 m Speed : 3.1 kn  
 Sorted : 35 Total catch: 100.41 Catch/hour: 200.82

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Jellyfish	62.44	120	31.12	
Loligo sp.	47.23	991	23.54	
Saurida undosquamis	37.68	500	18.78	
Saurida tumbil	25.13	88	12.53	
Trichiurus lepturus	8.79	152	4.38	
Mene maculata	3.12	24	1.55	
Selaroidea leptolepis	2.96	20	1.47	
Rastrelliger kanagurta	2.40	40	1.20	
Nemipterus bipunctatus	1.84	28	0.92	
Lagocephalus guentheri	1.52	4	0.76	
Nemipterus nematophorus	1.36	20	0.68	
Selaroidea leptolepis	1.16	36	0.58	
Sorsogona melanopectera	1.04	56	0.52	
Scomberoides tala	1.04	8	0.52	
Champsodon sp.	0.92	372	0.46	
Sphyraena putnamae	0.64	4	0.32	
Secutor sp.	0.56	40	0.28	
Upeneus guttatus	0.24	8	0.12	
Decapterus sp.	0.24	8	0.12	
Sepia sp.	0.16	8	0.08	
Upeneus sp.	0.16	4	0.08	
Total		200.82		100.00

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 165  
 DATE : 27/05/15 GEAR TYPE: BT NO: 27 POSITION: Lat N 10°42.34  
 start stop duration Lon E 97°29.74  
 TIME : 13:15:04 13:45:59 30.9 (min) Purpose : 3  
 LOG : 8771.84 8773.28 1.4 Region : 10330  
 FDEPTH: 92 91 Gear cond.: 0  
 BDEPTH: 92 91 Validity : 0  
 Towing dir: 0° Wire out : 220 m Speed : 2.8 kn  
 Sorted : 24 Total catch: 48.40 Catch/hour: 93.92

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Dactyloptena orientalis	30.04	539	31.98	
Saurida undosquamis	17.31	167	18.43	240
Trachinocephalus myops	9.66	58	10.29	
Tosarhombus longimanus	5.67	198	6.03	
Tetrosomus cf. reipublicae	5.36	70	5.70	
Nemipterus bipunctatus	4.50	19	4.79	
Parapterois heterura	4.42	74	4.71	
Uranoscopus cf. oligolepis	3.42	27	3.64	
Upeneus guttatus	2.41	66	2.56	
Saurida tumbil	2.06	4	2.19	
Loligo sp.	1.79	16	1.90	
Torquigener sp.	1.67	27	1.78	
Sorsogona melanopectera	1.63	74	1.74	
Cyclichthys orbicularis	0.97	12	1.03	
Parupeneus heptacanthus	0.74	8	0.79	
Callionymus cf. margaretae	0.70	12	0.74	
PORTUNIDAE	0.31	8	0.33	
Priacanthus macracanthus	0.27	4	0.29	
Trixiophichthys weberi	0.19	4	0.21	
Selaroidea leptolepis	0.19	8	0.21	
Ophiurus sp.	0.19	2	0.21	
Histioteuthis tytus	0.16	4	0.17	
Haliutaea sp.	0.12	8	0.12	
Arothron stellatus	0.08	4	0.08	
Ablabys cf. macracanthus	0.04	4	0.04	
Fistularia petimba	0.04	4	0.04	
Waste General	0.00	4	0.00	
Total		93.92		100.00

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 166  
 DATE : 27/05/15 GEAR TYPE: BT NO: 27 POSITION: Lat N 10°41.92  
 start stop duration Lon E 97°20.00  
 TIME : 15:36:22 16:07:10 30.8 (min) Purpose : 3  
 LOG : 8784.30 8785.73 1.4 Region : 10330  
 FDEPTH: 279 276 Gear cond.: 0  
 BDEPTH: 279 276 Validity : 0  
 Towing dir: 0° Wire out : 650 m Speed : 2.8 kn  
 Sorted : 25 Total catch: 58.46 Catch/hour: 113.88

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Puerulus sewelli	33.08	717	29.05	
Plesionika sp.	23.08	5772	20.27	
Bythaelurus hispidus	21.82	318	19.16	
Chlorophthalmus acutifrons	9.27	199	8.14	
MYCTOPHIDAE	7.81	2345	6.86	
Chascanopsetta lugubris	2.90	55	2.55	
Setarches guentheri	2.73	327	2.39	
Bembrops platyrhynchus	2.08	18	1.83	
Lophomus setigerus	1.99	8	1.74	
Dactyloptena orientalis	1.99	27	1.74	
Priacanthus macracanthus	1.09	8	0.96	
BYTTIDAE	1.09	55	0.96	
Chlorophthalmus corniger	0.90	117	0.79	
Torquigener sp.	0.90	8	0.79	
Ophioidon sp.	0.72	18	0.63	
Ceolorhynchus sp.	0.72	45	0.63	
Ophioidon sp.	0.72	35	0.63	
Lepidotrigla sp.	0.55	8	0.48	
Gephyroberyx cf. japonicus	0.45	8	0.39	
Total		113.88		100.00

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 167  
 DATE : 27/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 10° 40. 47  
 start stop duration Lon E 97° 0. 05  
 TIME : 18:32:30 19:02:50 30.3 (min) Purpose : 3  
 LOG : 8806.31 8808.03 1.7 Region : 10330  
 FDEPTH: 329 329 Gear cond.: 0  
 BDEPTH: 329 329 Validity : 0  
 Towing dir: 0° Wire out : 790 m Speed : 3.4 kn  
 Sorted : 19 Total catch: 18.73 Catch/hour: 37.05

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Chlorophthalmus cf. acutifrons	8.15	123	22.00	
S H R I M P S	7.83	2271	21.14	
OMMASTREPHIDAE	6.49	61	17.51	
Psenopsis obscura	3.60	47	9.72	
Puerulus sewelli	3.09	26	8.33	
Priacanthus hamur	1.13	16	3.04	
Chascanopsetta lugubris	0.91	14	2.46	
Squalus cf. hemipinnis	0.87	2	2.35	
Satyriichthys sp.	0.73	2	1.98	
Bythaelurus hispidus	0.71	12	1.92	
Lophodes mutilus	0.55	4	1.49	
Coelorinchus cf. argentatus	0.51	22	1.39	
Glyptophidum sp.	0.38	18	1.01	
Octopus sp.	0.28	4	0.75	
Ophiion sp.	0.24	6	0.64	
Tydemania navigatoris	0.22	36	0.59	
MYCTOPHIDAE	0.22	57	0.59	
Neopinnula orientalis	0.18	2	0.48	
Zenopsis nebulosa	0.16	2	0.43	
Atelopus sp.	0.16	2	0.43	
Synagrops adeni	0.10	10	0.27	
Hopllichthys filamentosus	0.08	2	0.21	
Halimochirus rurgus sp.	0.08	6	0.21	
Dactyloptena orientalis	0.08	2	0.21	
Cyttopsis rosea	0.08	2	0.21	
Rexea bengalensis	0.06	4	0.16	
Bembradium roseum	0.06	2	0.16	
Bembrrops caudimaculata	0.06	2	0.16	
Trixiichthys weberi	0.06	2	0.16	
Total	37.05		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 168  
 DATE : 27/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 10° 44. 70  
 start stop duration Lon E 96° 40. 90  
 TIME : 22:40:14 23:10:19 30.1 (min) Purpose : 3  
 LOG : 8830.81 8832.36 1.6 Region : 10330  
 FDEPTH: 399 400 Gear cond.: 0  
 BDEPTH: 399 400 Validity : 0  
 Towing dir: 0° Wire out : 900 m Speed : 3.1 kn  
 Sorted : 17 Total catch: 43.69 Catch/hour: 87.18

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
S H R I M P S	25.70	11306	29.48	
RAYS	18.56	2	21.29	
Polyipnus cf. asper			12.77	5236
Setarches longimanus			7.98	263
Iago sp.			4.47	48
MYCTOPHIDAE			2.47	144
Chlorophthalmus cf. acutifrons			2.39	24
Neoscopelus microchir			2.00	80
Benthodesmus sp.			1.84	24
Lophodes mutilus			1.56	4
Tydemania navigatoris			1.12	104
Chaunax sp.			1.12	16
MYCTOPHIDAE	1.04	375	1.19	
Scallicus investigatoris	1.04	12	1.19	
Neopinnula orientalis			0.88	8
Malacocephalus laevis			0.80	80
Rexea bengalensis			0.40	16
Pterygotrigla cf. macrorhynchus			0.24	8
Coelorinchus cf. argentatus			0.24	16
Cyttopsis rosea			0.20	4
Metanephrops sp.			0.20	4
Metanephrops andamanicus			0.12	4
Ostracoberyx dorygenys			0.06	2
Total	87.18		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 169  
 DATE : 28/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 10° 20. 04  
 start stop duration Lon E 96° 24. 24  
 TIME : 03:54:28 04:24:56 30.5 (min) Purpose : 3  
 LOG : 8867.36 8868.84 1.5 Region : 10330  
 FDEPTH: 802 823 Gear cond.: 0  
 BDEPTH: 802 823 Validity : 0  
 Towing dir: 0° Wire out : 1600 m Speed : 2.9 kn  
 Sorted : 46 Total catch: 45.85 Catch/hour: 90.29

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Hexatrygon bickelli	59.07	4	65.43	
S H R I M P S	7.52	1955	8.33	
Gavialiceps taeniola	2.44	12	2.70	
Cruriraja andamanica	2.36	2	2.62	
Xenomystax sp.	2.28	8	2.53	0
Tydemania navigatoris	1.89	189	2.09	
Coelorinchus quadricristatus	1.77	4	1.96	
Xenomystax trucidans		1.71	8	1.90
Neopinnula orientalis	1.38	2	1.53	
Talismania sp.	1.26	12	1.40	
OMMASTREPHIDAE	1.10	6	1.22	
Gonstoma sp.	1.08	16	1.20	
Polyipnus cf. asper		0.91	272	1.00
Allocephalus sp.	0.71	8	0.79	
Coryphaenoides sp.	0.59	16	0.65	
Benthobatis moresbyi	0.59	4	0.65	
Bathypterois atricolor	0.51	26	0.57	
Coelorinchus sp.	0.43	26	0.48	
Satyriichthys investigatoris	0.39	2	0.44	
Aldrovandisa sp.	0.24	10	0.26	
Avocettina infans	0.20	6	0.22	
Scombrobrax heterolepis	0.20	6	0.22	
Bathyrcongrus sp.	0.18	4	0.20	
Hypopleuron caninum	0.18	2	0.20	
Diceratias spl	0.16	2	0.17	
MYCTOPHIDAE	0.16	12	0.17	
Anoplögaster cornuta	0.12	2	0.13	
Cubiiceps baxteri	0.10	4	0.11	
Neoscopelus microchir	0.10	2	0.11	
Chauliodus sp.	0.10	8	0.11	
Oneroides sp.	0.08	2	0.09	
Halimochirus rurgus alcocki	0.08	4	0.09	
Gephyroberyx darwini	0.06	2	0.07	
Astronesthes sp.	0.06	6	0.07	
PARALEPIDIDAE	0.06	2	0.07	
Glyptophidum sp.	0.06	2	0.07	
Bufocephalus cf. thele	0.06	2	0.07	
Ostracoberyx dorygenys	0.04	2	0.04	0.07
Satyriichthys sp.	0.04	2	0.04	
MYCTOPHIDAE	0.02	2	0.02	
Hopllostethus cf. melanopus	0.00	2	0.00	
Total	90.29		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 170  
 DATE : 28/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 10° 21. 85  
 start stop duration Lon E 96° 44. 83  
 TIME : 11:20:20 11:50:37 30.3 (min) Purpose : 3  
 LOG : 8904.14 8905.70 1.6 Region : 10330  
 FDEPTH: 379 376 Gear cond.: 0  
 BDEPTH: 379 376 Validity : 0  
 Towing dir: 0° Wire out : 900 m Speed : 3.1 kn  
 Sorted : 24 Total catch: 120.82 Catch/hour: 239.33

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
MYCTOPHIDAE	53.88	7543	22.51	
S H R I M P S	44.69	10728	18.67	
Plesiobatis daviesi	25.20	4	10.53	
Dipturus cf. johannesdavesi	18.62	2	7.78	
Neopinnula orientalis	11.09	143	4.63	
Setarches longimanus	9.83	792	4.11	
Squalus megalops	7.76	48	3.24	
Hypopleuron caninum	7.61	16	3.18	
Astronesthes sp.	6.34	697	2.65	
MYCTOPHIDAE	6.34	1521	2.65	
Polyipnus cf. asper		6.02	1925	2.52
Loligo sp.	5.23	63	2.19	
Ophiion sp.	4.91	16	2.05	
Chlorophthalmus cf. acutifrons	4.28	0	1.79	
Psenopsis obscura	3.80	32	1.59	
Cubiiceps whitelaggi	3.64	63	1.52	
Tydemania navigatoris	3.49	396	1.46	
Metanephrops andamanicus	3.05	36	1.27	241
Lestrolepis intermedia	3.01	206	1.26	
Priacanthus macracanthus	1.35	8	0.56	
Rexea bengalensis	1.11	63	0.46	
Chaunax sp.	1.11	63	0.46	
Cyttopsis rosea	1.11	32	0.46	
Scallicus investigatoris	1.11	32	0.46	
Brama sp.	0.95	32	0.40	
Lophodes mutilus	0.87	8	0.36	
Ariosoma sp.	0.87	16	0.36	
BYTIDAE	0.79	143	0.33	
Chlorophthalmus corniger	0.48	40	0.20	
Coelorinchus cf. argentatus	0.32	16	0.13	
Neoscopelus microchir	0.24	8	0.10	
Bembrrops platyrhynchus	0.24	8	0.10	
Mephisto Fraserbrunneri	0.00	2	0.00	
Iago sp.	0.00	2	0.00	
Total	239.33		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 171  
 DATE : 28/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 10°22.10  
 start stop duration Lon E 97°10.86  
 TIME : 18:19:35 18:49:42 30.1 (min) Purpose : 3  
 LOG : 8954.70 8956.15 1.4 Region : 10330  
 FDEPTH: 255 266 Gear cond.: 0  
 BDEPTH: 255 266 Validity : 0  
 Towing dir: 0° Wire out : 600 m Speed : 2.9 kn  
 Sorted : 30 Total catch: 29.97 Catch/hour: 59.70

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
S H R I M P S	31.08	6837	52.05	
Chlorophthalmus cf. acutifrons	11.95	398	20.02	
Squalus cf. hemipinnis	2.15	12	3.60	
Chascanopsetta lugubris	1.83	16	3.07	
MYCTOPHIDAE	1.75	359	2.94	
Tydemania navigatoris	1.67	255	2.80	
Priacanthus hamur	1.55	22	2.60	
UNIDENTIFIED FISH	1.16	48	1.94	
Chironema chryseres	0.96	16	1.60	
Bythaelurus hispidus	0.96	24	1.60	
Polypnus cf. asper	0.72	295	1.20	
Ophidiid sp.	0.64	32	1.07	
Peristedion sp.	0.58	10	0.97	
Coelorrhinus cf. argentatus	0.40	80	0.67	
Rexea bengalensis	0.40	8	0.67	
Satyricthys sp.	0.32	8	0.53	
OMMASTREPHIDAE	0.32	8	0.53	
Chlorophthalmus corniger	0.32	32	0.53	
Halmochiurgus sp.	0.32	32	0.53	
Synagrops adeni	0.24	32	0.40	
Psenopsis obscura	0.24	16	0.40	
Arnoglossus cf. japonicus	0.16	16	0.27	
Total	59.70		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 172  
 DATE : 28/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 10°23.33  
 start stop duration Lon E 97°24.81  
 TIME : 21:08:15 21:39:52 31.6 (min) Purpose : 3  
 LOG : 8972.08 8973.67 1.6 Region : 10330  
 FDEPTH: 184 181 Gear cond.: 0  
 BDEPTH: 184 181 Validity : 0  
 Towing dir: 0° Wire out : 440 m Speed : 3.0 kn  
 Sorted : 0 Total catch: 30.24 Catch/hour: 57.38

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Glossanodon sp.	11.76	824	20.50	
Proscyllium magnificum	9.91	51	17.26	
Antigonia cf. socotrae	5.28	114	9.19	
Snyderia yamanokami	4.93	99	8.60	
Saurida undosquamis	4.67	36	8.13	
Ostichthys acanthorhinus	3.87	28	6.75	
Chelioperca pleurospilus	2.85	99	4.96	
Cubiceps baxteri	2.13	27	3.70	
Zenopsis nebulosa	2.09	2	3.64	
Paraperis sp.	1.94	21	3.37	
Scorpaenopsis sp. 2	1.14	4	1.98	
Squalus sp.	1.06	2	1.85	
Histiogaster typus	1.06	9	1.85	
Synagrops adeni	1.06	154	1.85	
Scorpaena sp.	0.95	27	1.65	
Rexea bengalensis	0.80	8	1.39	
Peristedion liorhynchus	0.32	0.47	11	0.83
Pseudorhombus quinocellatus	0.27	70	0.46	
Plectranchias sp.	0.25	15	0.53	
Synagrops japonicus	0.23	6	0.40	
Mephisto fraserbrunneri	0.13	4	0.23	
Decodon sp.	0.08	8	0.13	
Aulotrachichthys sp.	0.06	6	0.10	
Physiculus cf. yoshiidae	0.04	2	0.07	0
Callionymus sp. 92	0.04	2	0.07	0
Zenopsis nebulosa	0.00	0	0.00	0
Peristedion liorhynchus	0.00	0.00	2	0.00
Bembras macrolepis	0.00	2	0.00	0
Chelioperca pleurospilus	0.00	2	0.00	0
Total	57.32		99.90	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 173  
 DATE : 29/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 10°20.97  
 start stop duration Lon E 97°46.14  
 TIME : 01:41:19 02:12:41 31.4 (min) Purpose : 3  
 LOG : 8996.89 8998.43 1.5 Region : 10330  
 FDEPTH: 70 68 Gear cond.: 0  
 BDEPTH: 70 68 Validity : 1  
 Towing dir: 0° Wire out : 180 m Speed : 2.9 kn  
 Sorted : 144 Total catch: 1779.85 Catch/hour: 3405.33

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
JELLYFISH	3225.00	80625	94.70	
Nemipterus bipunctatus	44.52	585	1.31	242
Saurida tumbil	30.00	327	0.88	243
Priacanthus macracanthus	28.58	188	0.84	
Parupeneus heptacanthus	18.27	210	0.54	
Decapterus russelli	10.77	1500	0.32	
Loligo sp.	9.38	163	0.28	
Aluterus monoceros	9.18	8	0.27	
Rastrelliger brachysoma	8.19	69	0.24	
Mustelus mosis	6.93	2	0.20	
Snyderia yamanokami	4.92	94	0.14	
Fistularia petimba	4.46	46	0.13	
Rhinobatoc cf. schlegelii	1.49	2	0.04	
Zebrias sp.	0.94	23	0.03	
Sorsogona melanopectera	0.94	46	0.03	
Platyrrhina sp.	0.77	2	0.02	
Proscyllium magnificum	0.54	2	0.02	
UNIDENTIFIED FISH	0.46	23	0.01	
Total	3405.33		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 174  
 DATE : 29/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 10°19.43  
 start stop duration Lon E 98°14.69  
 TIME : 06:51:01 07:21:09 30.1 (min) Purpose : 3  
 LOG : 9033.60 9035.07 1.5 Region : 10330  
 FDEPTH: 39 31 Gear cond.: 0  
 BDEPTH: 39 31 Validity : 0  
 Towing dir: 0° Wire out : 95 m Speed : 2.9 kn  
 Sorted : 51 Total catch: 50.86 Catch/hour: 101.25

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Selaroides leptocephalus	34.08	478	33.66	244
Loligo sp.	22.10	1105	21.82	
Atule mate	10.99	275	10.85	246
Scolopsis taeniopetra	6.97	151	6.88	245
Saurida tumbil	5.65	66	5.58	248
Saurida undosquamis	4.94	141	4.88	247
Photopectoralis bindus	3.94	187	3.89	
Ostorhinchus pleuron	1.51	362	1.49	
Sphyræna putnamae	1.23	2	1.22	
Rachycentron canadum	1.21	2	1.20	
Alepes melanopectera	1.15	12	1.14	
Epiplatys sexfasciatus	0.96	6	0.94	
Scomberomorus commerson	0.90	2	0.88	
Upeneus tragula	0.78	54	0.77	
Sepia sp.	0.60	6	0.59	
Alepes vari	0.60	2	0.59	
Lagocephalus guentheri	0.46	20	0.45	
Lepturacanthus savala	0.40	2	0.39	
Mene maculata	0.36	6	0.35	
Elates ransonettii	0.36	52	0.35	
Plotosus lineatus	0.32	159	0.31	
Stolephorus indicus	0.24	18	0.24	
Trichiurus lepturus	0.20	2	0.20	
Sorsogona melanopectera	0.18	14	0.18	
Nemipterus marginatus	0.16	2	0.16	
Rhynchostracion nasus	0.16	2	0.16	
Apogon truncatus	0.14	4	0.14	
Carangoides armatus	0.12	4	0.12	
Snyderia yamanokami	0.12	2	0.12	
LABRIDAE	0.12	4	0.12	
Sardinella gibbosa	0.08	2	0.08	
Leiognathus equulus	0.06	2	0.06	
Jaydia queketti	0.06	2	0.06	
Pterocaesio chrysozona	0.04	2	0.04	
Pterois russelli	0.04	2	0.04	
Equilites leuciscus	0.04	2	0.04	
Total	101.25		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 175  
 DATE : 29/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 10°1.08  
 start stop duration Lon E 98°6.35  
 TIME : 11:01:50 11:32:14 30.4 (min) Purpose : 3  
 LOG : 9062.67 9064.25 1.6 Region : 10330  
 FDEPTH: 30 28 Gear cond.: 0  
 BDEPTH: 30 28 Validity : 0  
 Towing dir: 0° Wire out : 90 m Speed : 3.1 kn  
 Sorted : 22 Total catch: 43.33 Catch/hour: 85.52

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
Nemipterus bipunctatus	21.39	470	25.02	249
Upeneus cf. tragula	13.89	655	16.25	
Selaroides leptocephalus	13.34	442	15.60	
Loligo sp.	8.37	138	9.79	
Jellyfish	5.13	20	6.00	
Cantherhines sp.	4.58	3845	5.35	
Saurida undosquamis	4.50	91	5.26	250
Rastrelliger brachysoma	3.39	28	3.97	
UNIDENTIFIED FISH	2.84	209	3.32	
Plotosus lineatus	2.05	205	2.40	
Siganus canaliculatus	2.05	103	2.40	
Pristotis obtusirostris	1.26	87	1.48	
Scolopsis taeniopetra	1.03	32	1.20	
Ostorhinchus pleuron	0.36	39	0.42	
C R A E S	0.24	4	0.28	
Rachycentron canadum	0.24	4	0.28	
Photopectoralis bindus	0.16	8	0.18	
Torquigener sp.	0.12	8	0.14	
Sorsogona melanopectera	0.12	12	0.14	
Sardinella gibbosa	0.08	4	0.09	
Lagocephalus guentheri	0.08	4	0.09	
Sphyræna cf. forsteri	0.08	8	0.09	
Trachinocephalus myops	0.08	4	0.09	
Digramma pictum	0.06	22	0.07	
Centriscus sp.	0.04	8	0.05	
Rhynchostracion nasus	0.04	4	0.05	
Equilites stercorarius	0.00	2	0.00	
Equilites oblongus	0.00	2	0.00	
Total	85.52		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 176  
 DATE : 29/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 10° 3.64  
 start stop duration Lon E 97° 45.91  
 TIME : 14:23:06 14:53:08 30.0 (min) Purpose : 3  
 LOG : 9087.72 9089.09 1.4 Region : 10330  
 FDEPTH: 74 73 Gear cond.: 0  
 BDEPTH: 74 73 Validity : 0  
 Towing dir: 0° Wire out : 181 m Speed : 2.7 kn  
 Sorted : 31 Total catch: 69.20 Catch/hour: 138.26

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
<i>Nemipterus bipunctatus</i>	23.82	236	17.23	
<i>Aluterus monoceros</i>	14.95	48	10.81	
<i>Priacanthus macracanthus</i>	13.51	68	9.77	
<i>Upeneus guttatus</i>	9.75	428	7.05	
<i>Saurida undosquamis</i>	9.03	128	6.53	251
<i>Synodus cf. tectus</i>	6.55	352	4.74	
<i>Abalistes stellatus</i>	5.63	6	4.08	4.74
<i>Parupeneus heptacanthus</i>	5.19	76	3.78	
<i>Nemipterus zysron</i>	5.03	80	3.64	
<i>Trachinocephalus myops</i>	4.28	32	3.09	
<i>Sorsogona melanoptera</i>	4.08	184	2.95	
<i>Cyclichthys orbicularis</i>	3.60	36	2.60	
<i>Ostorhynchus fleureri</i>	3.36	400	2.43	
SEPIIDAE	3.20	4	2.31	
<i>Lophomus setigerus</i>	2.72	8	1.97	
<i>Parapercis alboguttata</i>	2.60	56	1.88	
<i>Sphyræna pinguis</i>	2.16	28	1.56	
<i>Pristotis obtusirostris</i>	2.08	108	1.50	
<i>Neotrygon kuhlii</i>	2.00	4	1.45	
<i>Lagocephalus glovei</i>	1.92	20	1.39	
<i>Samaris cristatus</i>	1.40	36	1.01	
S H R I M P S	1.36	36	0.98	
<i>Epinephelus areolatus</i>	1.16	6	0.84	
<i>Selaroides leptolepis</i>	1.08	28	0.78	
<i>Maltopsis striped</i>	1.04	4	0.75	
<i>Dactyloptena orientalis</i>	0.84	16	0.61	
<i>Champsodon sp.</i>	0.80	400	0.58	
<i>Loligo sp.</i>	0.68	8	0.49	
<i>Parasclopsis aspinosa</i>	0.64	12	0.46	
<i>Arothron stellatus</i>	0.56	2	0.40	
<i>Thiurus orientalis</i>	0.56	4	0.40	
<i>Pterois russelli</i>	0.56	4	0.40	
<i>Tentoriceps cristatus</i>	0.48	4	0.35	
<i>Pseudorhombus duplucellatus</i>	0.44	12	0.32	
<i>Decapterus russelli</i>	0.40	8	0.29	
<i>Octopus sp.</i>	0.24	4	0.17	
<i>Tosarhombus longimanus</i>	0.20	8	0.14	
<i>Fistularia petimba</i>	0.20	4	0.14	
<i>Lutjanus lutjanus</i>	0.20	4	0.14	
Total	138.26		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 177  
 DATE : 29/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 10° 2.91  
 start stop duration Lon E 97° 22.78  
 TIME : 18:01:51 18:31:58 30.1 (min) Purpose : 3  
 LOG : 9113.41 9114.92 1.5 Region : 10330  
 FDEPTH: 181 182 Gear cond.: 0  
 BDEPTH: 181 182 Validity : 0  
 Towing dir: 0° Wire out : 450 m Speed : 3.0 kn  
 Sorted : 30 Total catch: 93.57 Catch/hour: 186.39

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
MYCTOPHIDAE	86.53	17695	46.43	
<i>Glisssonodon sp.</i>	26.77	2104	14.36	
<i>Liposchelus carnolabrum</i>	12.55	2	6.73	
<i>Priacanthus macracanthus</i>	10.76	42	5.77	
<i>Ostiichthys acanthorhynchus</i>	8.01	60	4.30	
<i>Saurida undosquamis</i>	6.39	66	3.43	
<i>Proscyllium magnificum</i>	4.82	20	2.59	
<i>Snyderina yamanokami</i>	3.59	66	1.92	
<i>Aluterus monoceros</i>	2.99	6	1.60	
<i>Chironema chryseres</i>	2.21	24	1.19	
<i>Aulotrachichthys sp.</i>	2.15	215	1.15	
<i>Squalus megalops</i>	2.09	6	1.12	
<i>Chelidoperca pleurospilus</i>	1.91	54	1.03	
<i>Loligo</i>	1.79	12	0.96	
<i>Neomerinthe sp.</i>	1.55	30	0.83	
S H R I M P S	1.43	263	0.77	
<i>Pseudorhombus quinocellatus</i>	1.43	12	0.77	
<i>Ostiichthys japonicus</i>	1.37	6	0.74	
<i>Dactyloptena orientalis</i>	1.08	6	0.58	
<i>Histiogaster typus</i>	1.08	6	0.58	
<i>Symphysanodon xanthopterygion</i>	0.88	24	0.47	0.47
<i>Samaris cristatus</i>	0.72	24	0.38	
<i>Haplogenyx sp.</i>	0.72	6	0.38	
<i>Cubiiceps baxteri</i>	0.54	6	0.29	
<i>Rexea bengalensis</i>	0.48	12	0.26	
<i>Decapterus russelli</i>	0.42	12	0.22	
<i>Peristedion liorhynchus</i>	0.36	6	0.19	0.19
<i>Sepia sp.</i>	0.30	6	0.16	
<i>Synagrops japonicus</i>	0.30	6	0.16	
<i>Ophiidion sp.</i>	0.24	24	0.13	
<i>Cantherhines multilineatus</i>	0.24	6	0.13	
<i>Decodon sp.</i>	0.18	6	0.10	
<i>Sinchiropus altivelis</i>	0.18	12	0.10	
<i>Samaris macrolepis</i>	0.12	6	0.06	
<i>Physiculus cf. yoshi dae</i>	0.12	6	0.06	
<i>Plectranchias sp.</i>	0.06	12	0.03	
<i>Grammatonotus sp.</i>	0.04	0	0.02	
<i>Plectranchias sp. 92</i>	0.00	2	0.00	
Total	186.39		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 178  
 DATE : 29/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 10° 1.13  
 start stop duration Lon E 97° 7.92  
 TIME : 20:54:03 21:24:19 30.3 (min) Purpose : 3  
 LOG : 9131.94 9133.42 1.5 Region : 10330  
 FDEPTH: 306 308 Gear cond.: 0  
 BDEPTH: 306 308 Validity : 0  
 Towing dir: 0° Wire out : 720 m Speed : 2.9 kn  
 Sorted : 23 Total catch: 40.11 Catch/hour: 79.50

SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
<i>Chlorophthalmus cf. acutifrons</i>	34.89	279	43.88	
S H R I M P S	10.58	2753	13.31	
<i>Metanephrops andamanicus</i>	6.18	165	7.78	252
<i>Chascanopsetta lugubris</i>	4.56	57	5.73	
<i>Priacanthus hamrur</i>	3.92	20	4.94	
MYCTOPHIDAE	2.78	803	3.49	
<i>Squalus megalops</i>	2.32	6	2.92	
<i>Platyrrhina sp.</i>	1.67	6	2.09	
<i>Satyriichthys sp.</i>	1.41	4	1.77	
<i>Hypopleuron caninum</i>	1.41	16	1.77	
<i>Bythaelurus hispidus</i>	1.31	26	1.65	
OMMASTREPHIDAE	1.29	12	1.62	
<i>Pseuopsis obscura</i>	1.17	22	1.47	
<i>Snyderina yamanokami</i>	0.99	18	1.25	
<i>Ophiidion sp.</i>	0.75	18	0.95	
<i>Coelorrinchus cf. argentatus</i>	0.71	30	0.90	
<i>Tydenania navigatoris</i>	0.69	99	0.87	
<i>Ophiidion sp.</i>	0.44	6	0.55	0
<i>Ariosoma sp.</i>	0.42	10	0.52	
<i>Macrorhamphosodes uradoi</i>	0.38	59	0.45	
<i>Lophiodon mutilus</i>	0.38	4	0.45	
<i>Eridacnis radcliffei</i>	0.28	14	0.35	
<i>Peristedion sp.</i>	0.18	4	0.22	
<i>Symphysanodon xanthopterygion</i>	0.12	4	0.15	0.22
<i>Hoplischthys citrinus</i>	0.12	4	0.15	
<i>Lepidotrigla sp.</i>	0.12	10	0.12	
<i>Synagrops adeni</i>	0.10	4	0.12	
<i>Neomerinthe sp.</i>	0.10	4	0.12	
<i>Scaliscus investigatoris</i>	0.06	4	0.07	
<i>Satyriichthys sp.</i>	0.06	4	0.07	
<i>Bembrops caudimacula</i>	0.06	4	0.07	
OPHIIDIIDAE	0.06	4	0.07	
Total	79.50		100.00	

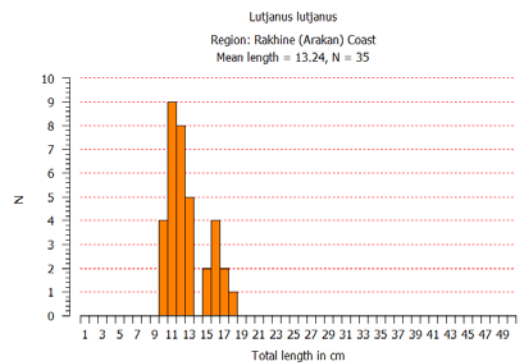
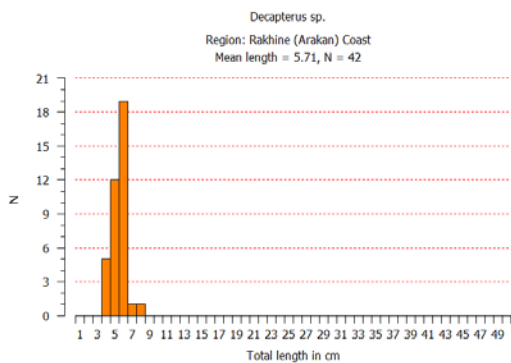
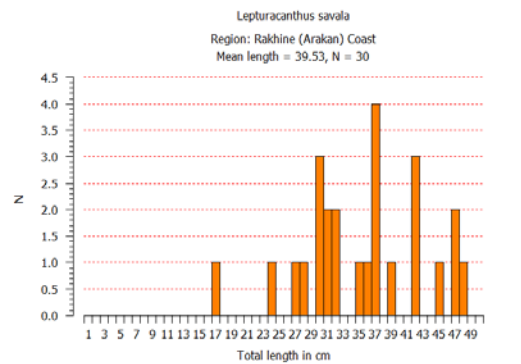
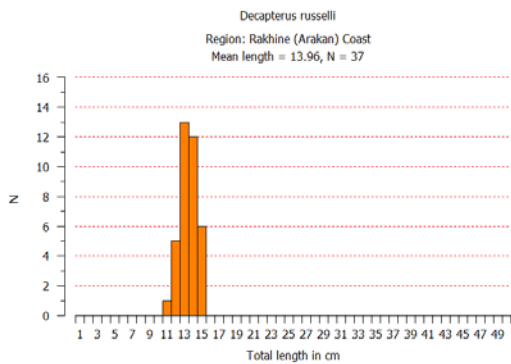
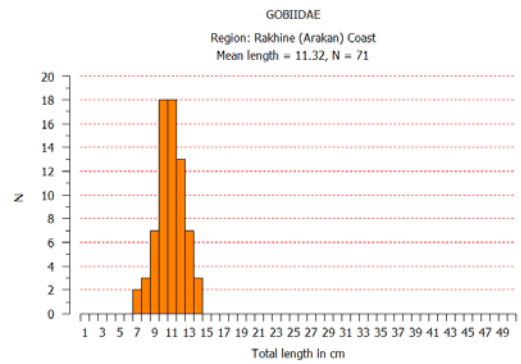
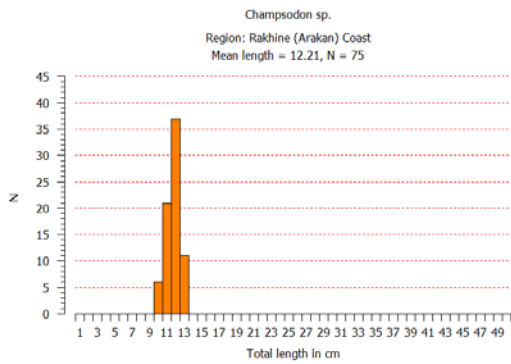
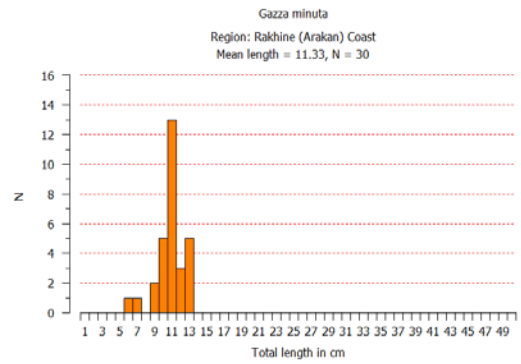
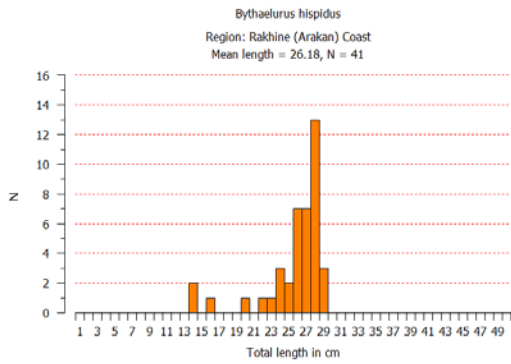
R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 179  
 DATE : 30/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 10° 1.68  
 start stop duration Lon E 96° 46.41  
 TIME : 00:17:37 00:48:53 31.3 (min) Purpose : 3  
 LOG : 9153.71 9155.18 1.5 Region : 10330  
 FDEPTH: 374 373 Gear cond.: 0  
 BDEPTH: 374 373 Validity : 0  
 Towing dir: 0° Wire out : 800 m Speed : 2.8 kn  
 Sorted : 17 Total catch: 70.86 Catch/hour: 135.96

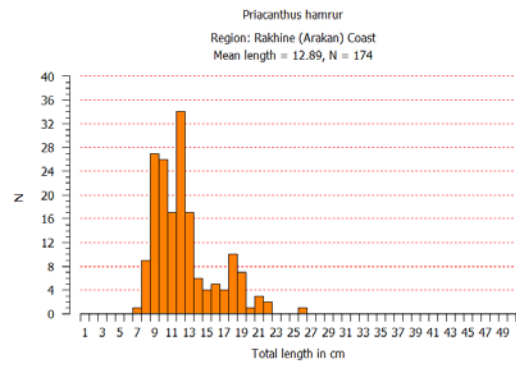
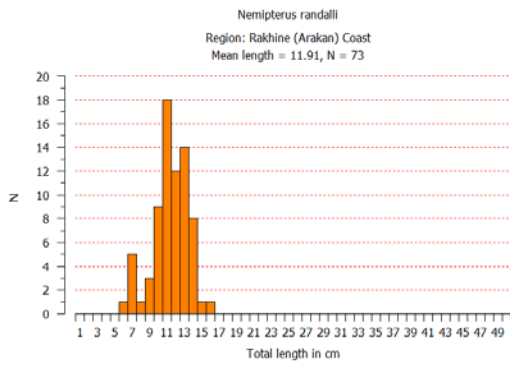
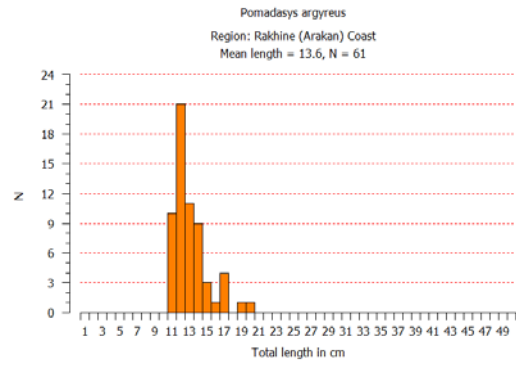
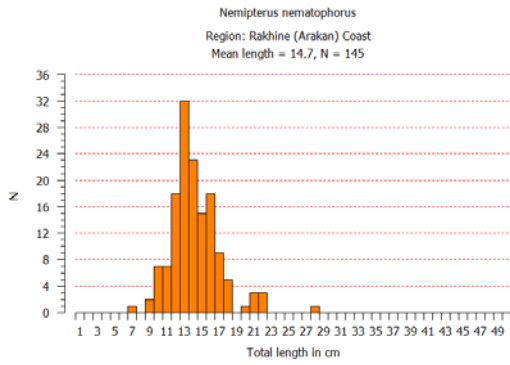
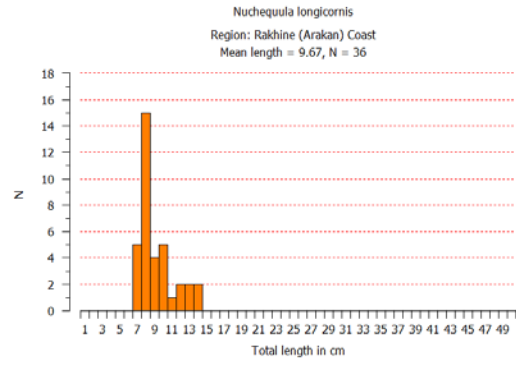
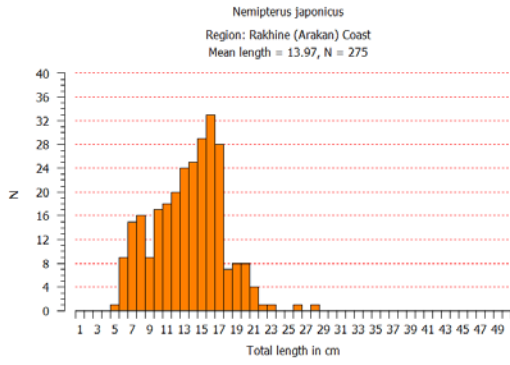
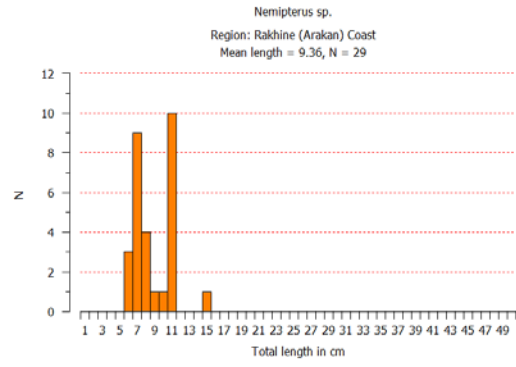
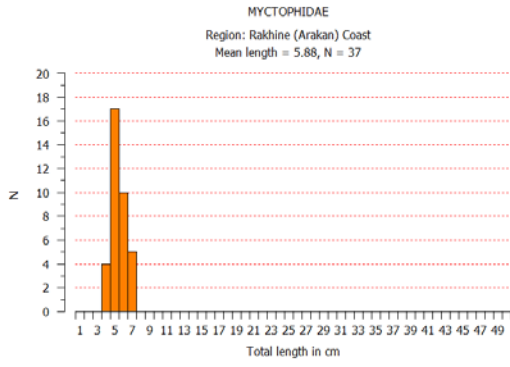
SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
<i>Heterocarpus sp.</i>	27.63	7184	20.32	
MYCTOPHIDAE	25.79	4382	18.97	
<i>Neopinnula orientalis</i>	17.19	246	12.64	
<i>Astronesthes sp.</i>	9.21	921	6.77	
<i>Mycetophum cf. fissunovi</i>	6.52	81	17.65	5.42
<i>Metanephrops anadamanicus</i>	6.18	6	4.80	253
<i>Neosopelus miocrochir</i>	5.83	15	4.29	
OMMASTREPHIDAE	5.83	92	4.29	
<i>Cubiiceps whitelleggi</i>	4.91	307	3.61	
<i>Benthesmus sp.</i>	3.68	230	2.71	
<i>Setarches longimanus</i>	2.92	46	2.15	
<i>Hypopleuron caninum</i>	2.15	675	1.58	
C E P H A L O P O D A	2.00	31	1.47	
<i>Bythaelurus hispidus</i>	1.73	2	1.27	
<i>Echeneis naucrates</i>	1.69	61	1.24	
<i>Synagrops japonicus</i>	1.54	583	1.13	
<i>Polyipnus cf. asper</i>	1.38	200	1.02	
<i>Tydenania navigatoris</i>	1.38	15	1.02	
<i>Bathymyrus cf. echinorhynchus</i>	0.46	61	0.34	
<i>Macrorhamphosodes sp.</i>	0.46	4	0.34	
C R A B S	0.15	31	0.11	
PARALEPIDIDAE	0.15	31	0.11	
Total	135.96		100.00	

R/V Dr. Fridtjof Nansen SURVEY: 2015404 STATION: 180  
 DATE : 30/05/15 GEAR TYPE: BT No: 27 POSITION: Lat N 10° 2.02  
 start stop duration Lon E 96° 25.95  
 TIME : 06:34:16 07:04:32 30.3 (min) Purpose : 3  
 LOG : 9189.92 9191.38 1.5 Region : 10330  
 FDEPTH: 503 485 Gear cond.: 0  
 BDEPTH: 503 485 Validity : 0  
 Towing dir: 0° Wire out : 1050 m Speed : 2.9 kn  
 Sorted : 36 Total catch: 73.08 Catch/hour: 144.86

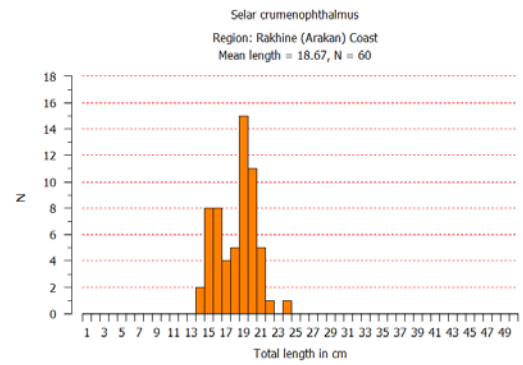
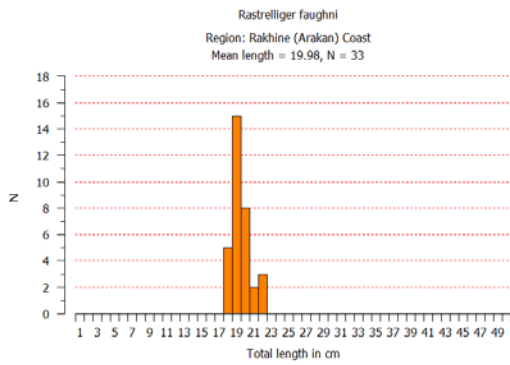
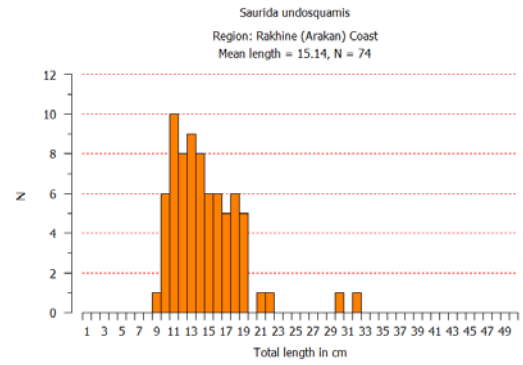
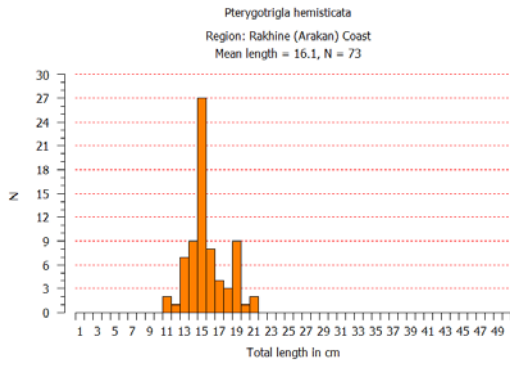
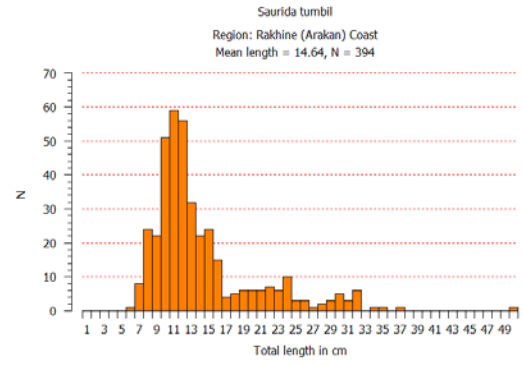
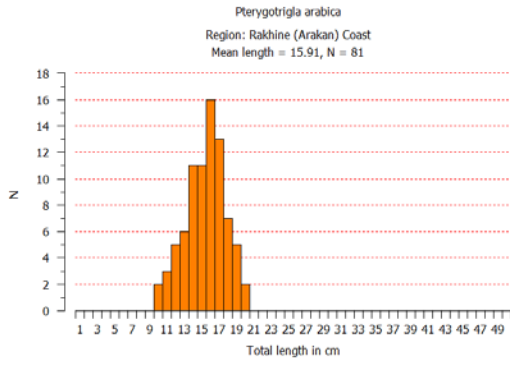
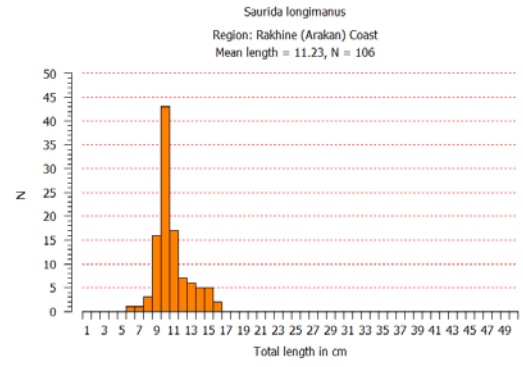
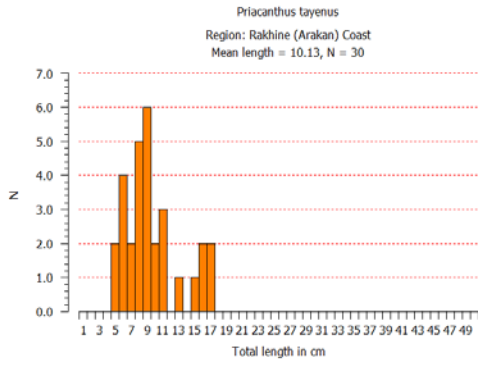
SPECIES	CATCH/HOUR		% OF TOT. C	SAMP
	weight	numbers		
<i>Coelorrinchus cf. quadricristatus</i>	45.03	238	31.09	
S H R I M P S	37.42	2470	25.83	
MYCTOPHIDAE	26.64	3619	18.39	
<i>Neosopelus miocrochir</i>	6.98	143	4.82	
<i>Setarches longimanus</i>	4.60	48	3.17	
<i>Ophiidion sp.</i>	4.12	24	2.85	
<i>Coelorrinchus sp.</i>	3.57	79	2.46	
<i>Synagrops japonicus</i>	3.17	63	2.19	
BYTIIDAE	2.54	143	1.75	
<i>Satyriichthys adeni</i>	2.46	8	1.70	
<i>Haliutaea sp.</i>	2.06	16	1.42	
<i>Xenomystax sp.</i>	1.43	32	0.99	
ALEPOCEPHALIDAE	1.11	238	0.77	
<i>Diceratias cf. bispinosus</i>	0.95	16	0.66	
<i>Squalus cf. mistukurii</i>	0.56	2	0.38	
<i>Ostracoberyx dorygenus</i>	0.48	16	0.33	
<i>Physiculus cf. yoshi dae</i>	0.48	16	0.33	
<i>Apristurus cf. platyrhynchus</i>	0.44	4	0.30	
<i>Leptocephalus</i>	0.16	16	0.11	
<i>Lestrolepis sp.</i>	0.16	16	0.11	
<i>Centrophorus cf. atomarginatus</i>	0.16	16	0.11	
OMMASTREPHIDAE	0.16	48	0.11	
<i>Astronesthes sp.</i>	0.16	16	0.11	
<i>Photonetes sp.</i>	0.04	16	0.03	
Plastic	0.00	2	0.00	
Total	144.86		100.00	

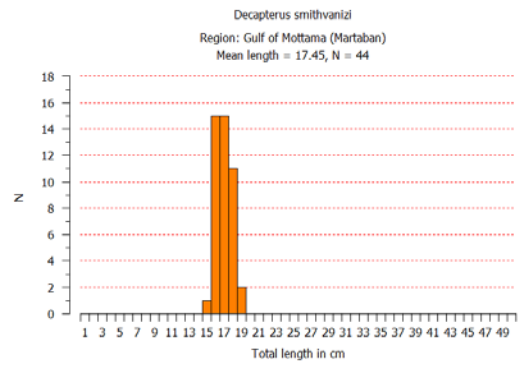
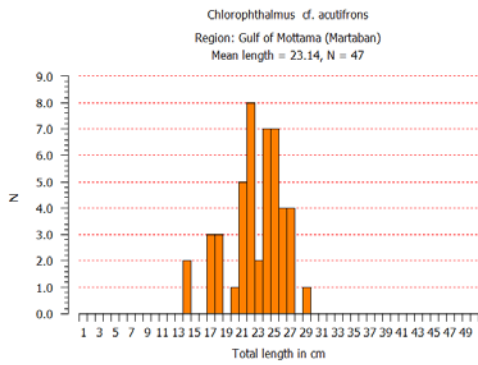
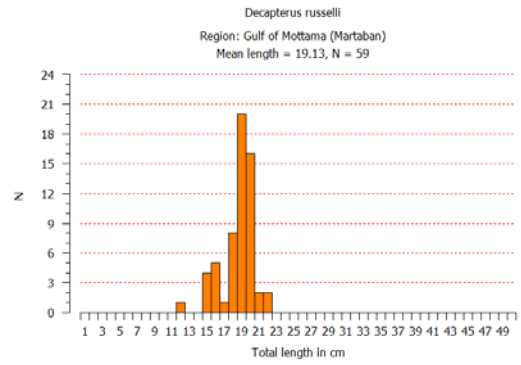
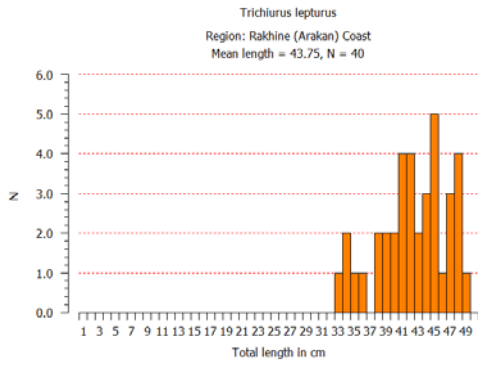
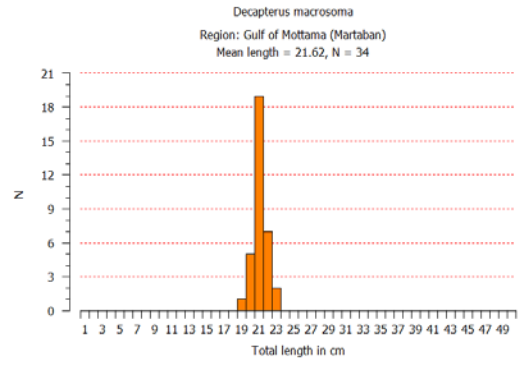
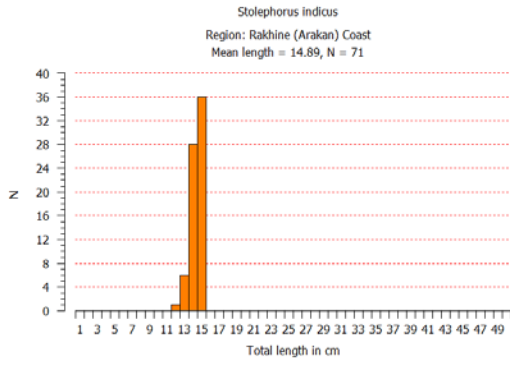
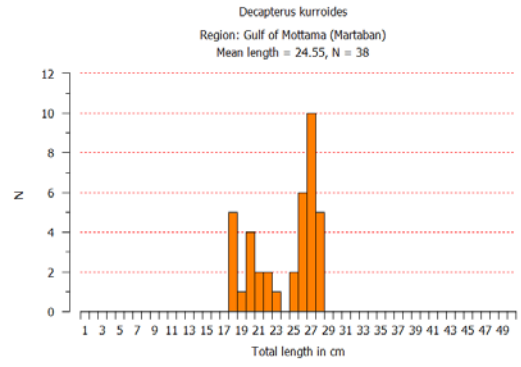
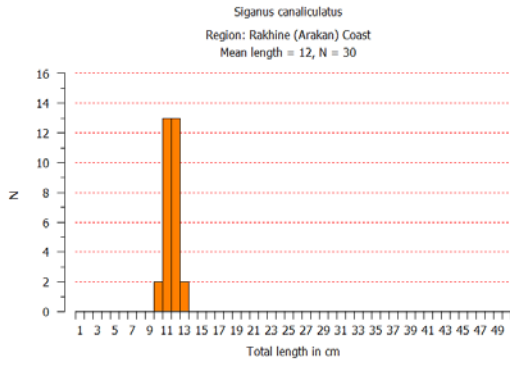
ANNEX II. LENGTH DISTRIBUTION OF MAIN SPECIES

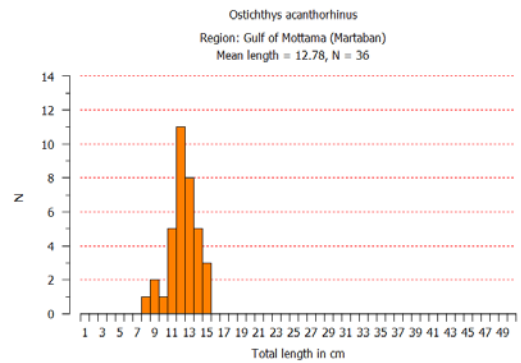
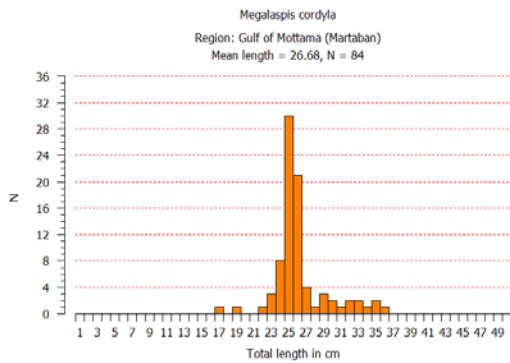
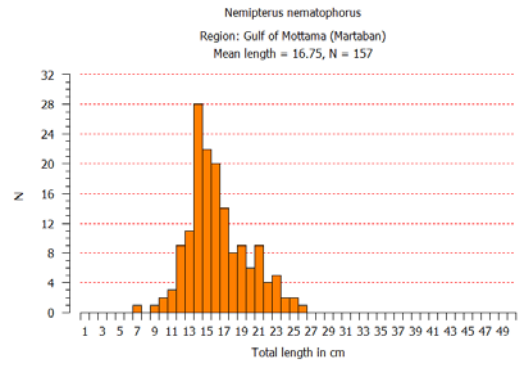
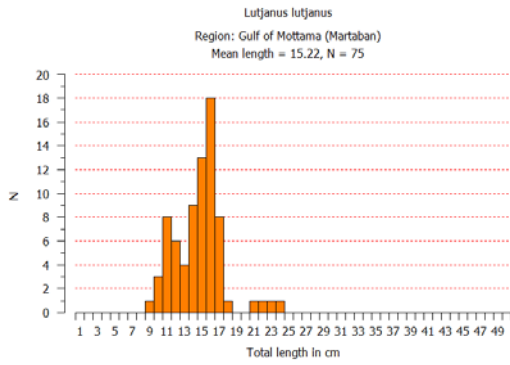
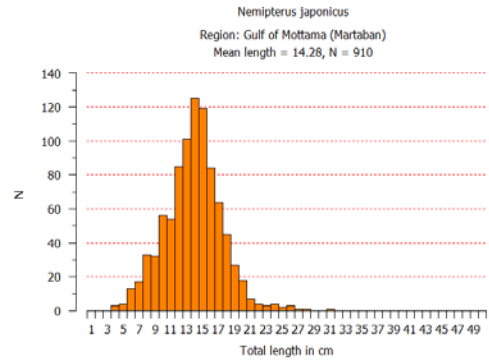
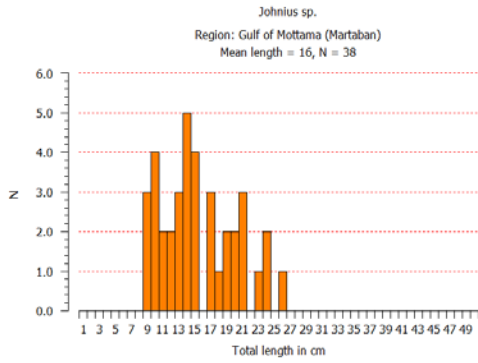
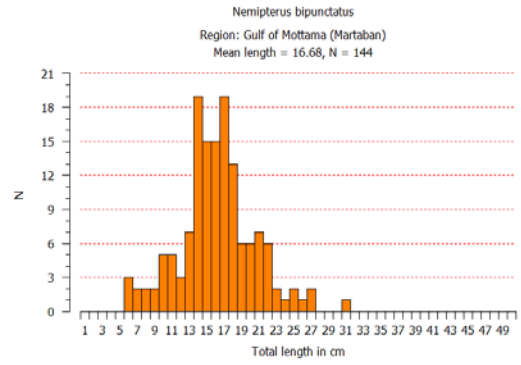
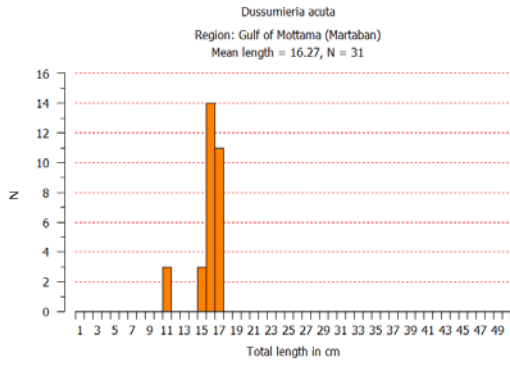


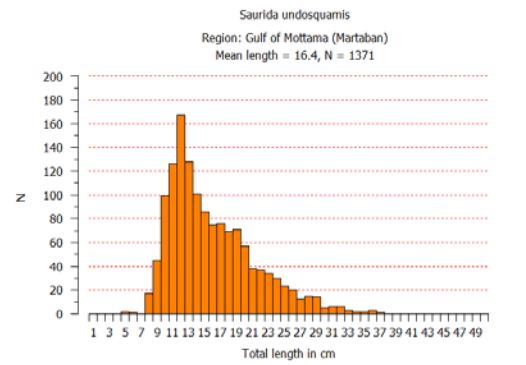
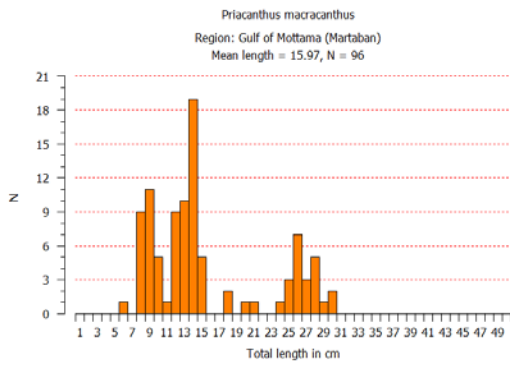
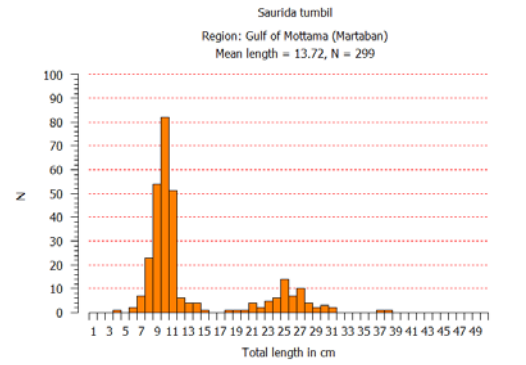
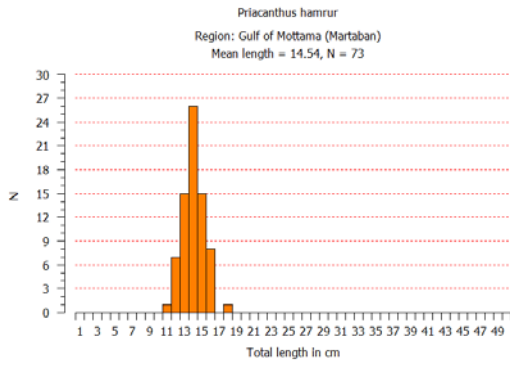
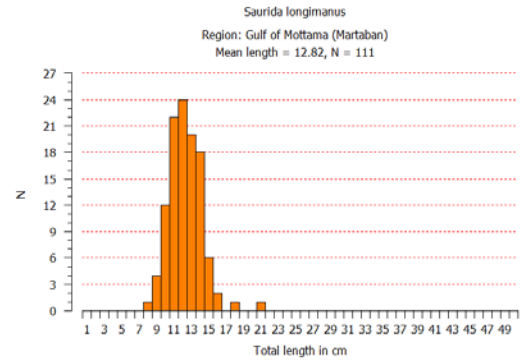
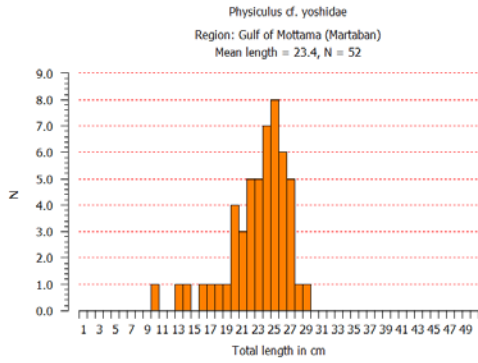
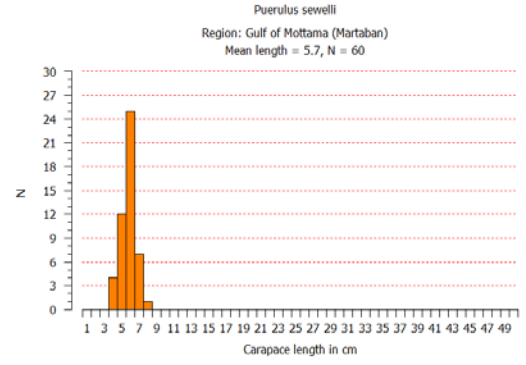
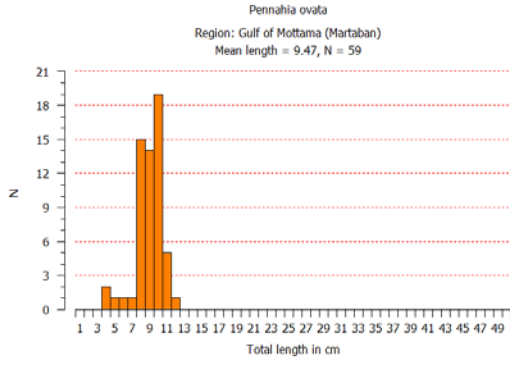


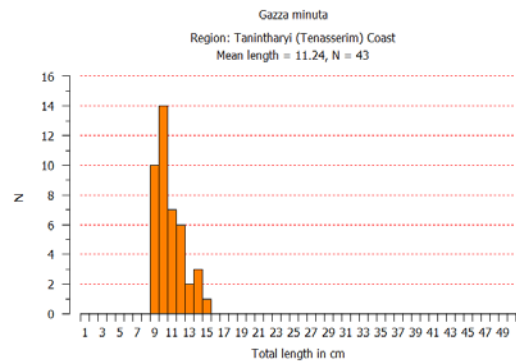
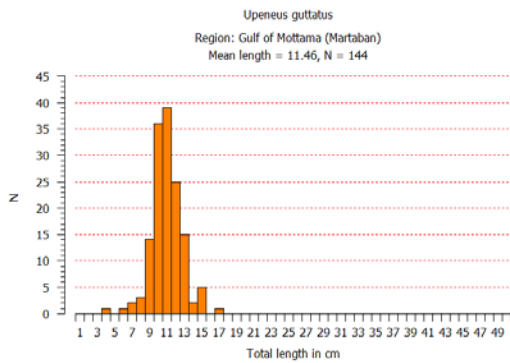
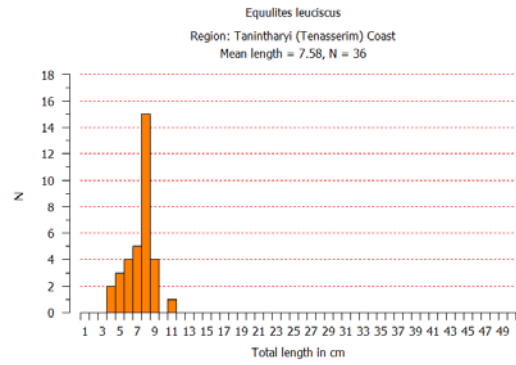
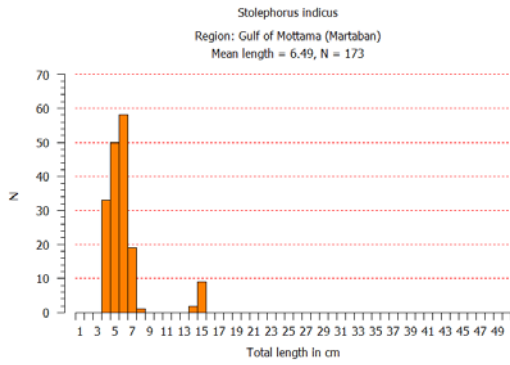
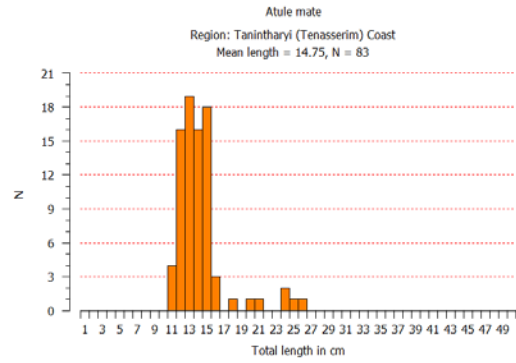
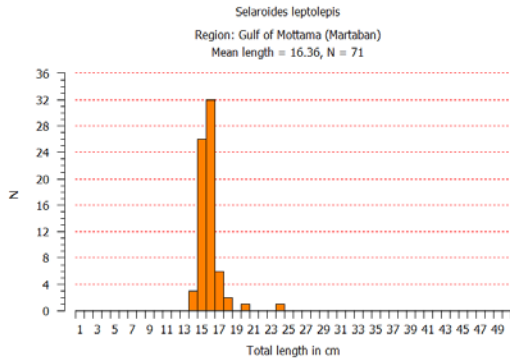
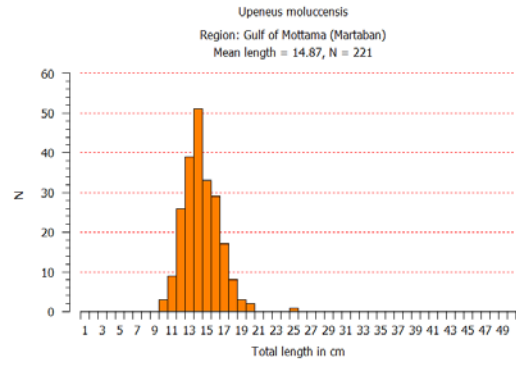
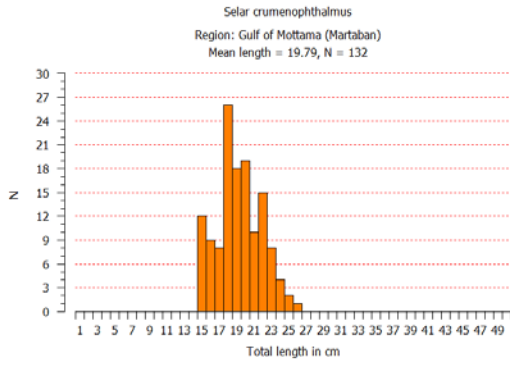


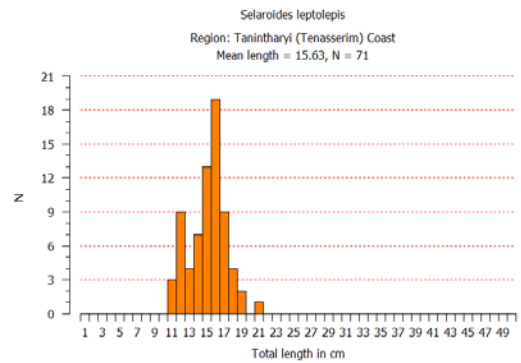
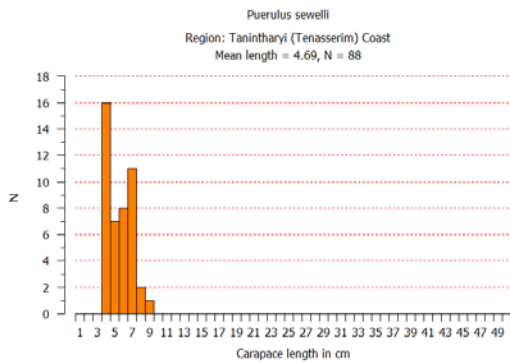
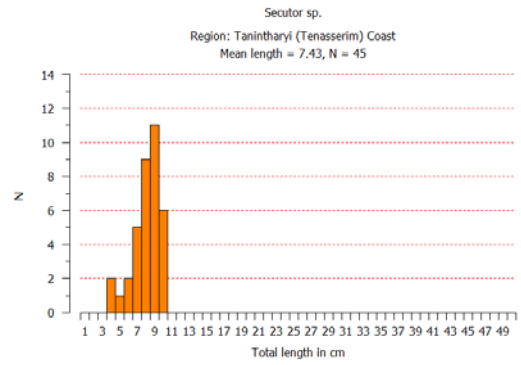
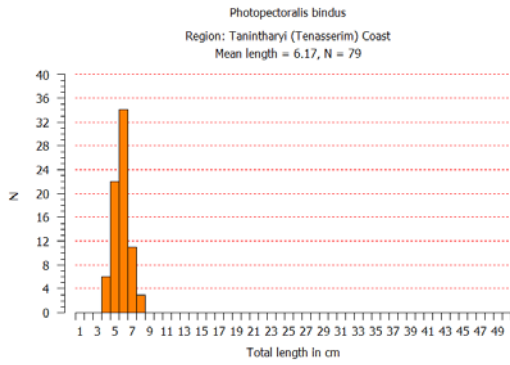
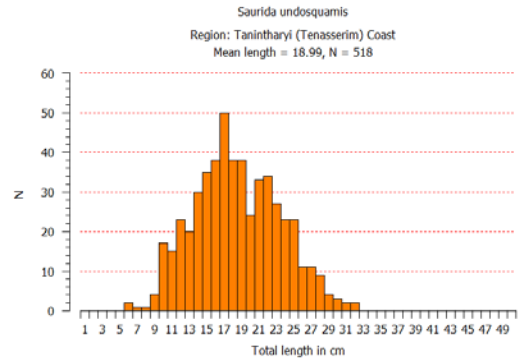
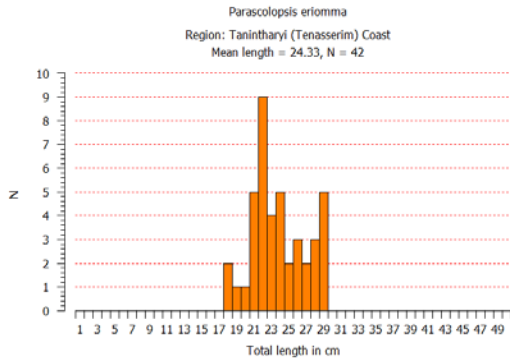
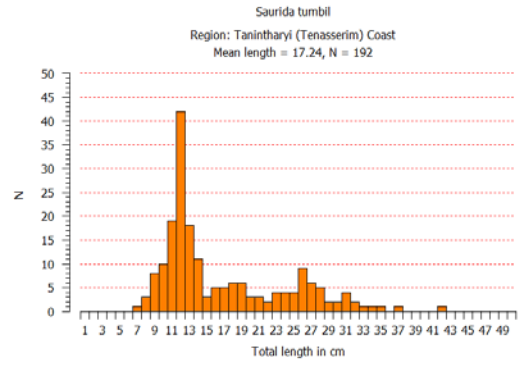
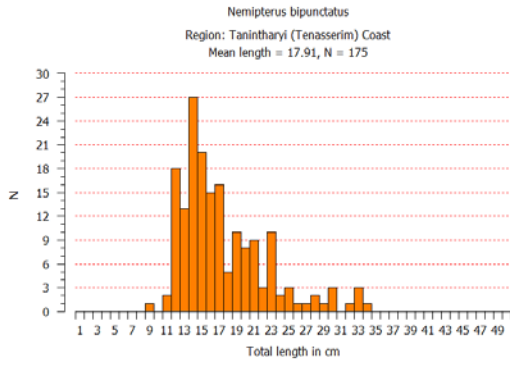


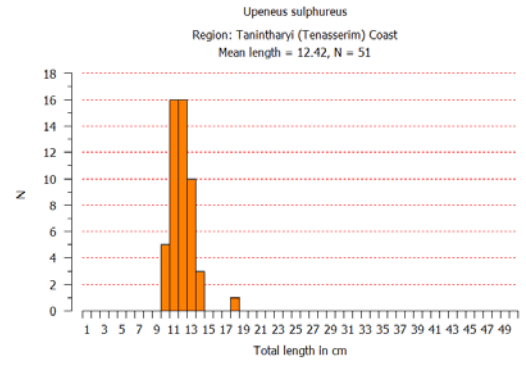
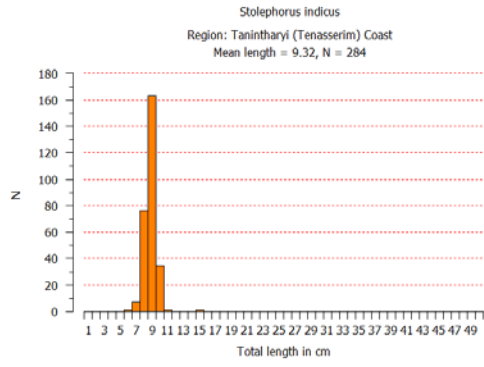












## ANNEX III. INSTRUMENTS AND FISHING GEAR USED

## Echo sounder

The SIMRAD ER60/38 kHz scientific sounder was used during the survey for fish abundance estimation. The LSSS Integrator system was used to scrutinise the acoustic records. The echosounder was calibrated in Angola 21/2-15 with the following results.

<b>DRIFTSJOURNAL 1</b>		<b>Calibration with reference sphere</b>		Rev:2006
Vessel :	F/F Dr. Fridtjof Nansen	Date :	21.02.2015	
Echosounder	DFNer60-2	Area:	Baia dos Elefantes	
Sphere :	CU-60	TS <sub>sphere</sub> :	-33.60 dB	
		(adjusted for sound velocity or t	Bottom depth	34 m
Calibration Version 2.1.0.12				
<b>Comments:</b>				
<b>Reference Target:</b>				
TS	-33.60 dB	Min. Distance		20.00 m
TS Deviation	5.0 dB	Max. Distance		25.00 m
<b>Transducer: ES38B Serial No. 38000</b>				
Frequency	38000 Hz	Beamtype		Split
Gain	25.83 dB	Two Way Beam Angle		-20.6 dB
Athw . Angle Sens.	21.90	Along. Angle Sens.		21.90
Athw . Beam Angle	6.66 deg	Along. Beam Angle		6.60 deg
Athw . Offset Angle	0.04 deg	Along. Offset Angl		0.11 deg
SaCorrection	-0.56 dB	Depth		5.50 m
<b>Transceiver: GPT 38 kHz 009072057b8a 2-1 ES38B</b>				
Pulse Duration	1.024 ms	Sample Interval		0.197 m
Power	2000 W	Receiver Bandwidth		2.43 kHz
<b>Sounder Type:</b>				
EK60 Version 2.4.3				
<b>TS Detection:</b>				
Min. Value	-50.0 dB	Min. Spacing		100 %
Max. Beam Comp.	6.0 dB	Min. Echolength		80 %
Max. Phase Dev.	8.0	Max. Echolength		180 %
<b>Environment:</b>				
Absorption Coeff.	9.5 dB/km	Sound Velocity		1536.0 m/s
<b>Beam Model results:</b>				
Transducer Gain =	25.11 dB	SaCorrection =		-0.60 dB
Athw . Beam Angle =	7.38 deg	Along. Beam Angle =		7.43 deg
Athw . Offset Angle =	0.04 deg	Along. Offset Angle=		0.06 deg
<b>Data deviation from beam model:</b>				
RMS = 0.12 dB				
Max = 0.36 dB No. = 19 Athw . = -0.2 deg Along = -0.2 deg				
Min = -0.41 dB No. = 30 Athw . = 4.7 deg Along = -0.2 deg				
<b>Data deviation from polynomial model:</b>				
RMS = 0.09 dB				
Max = 0.50 dB No. = 19 Athw . = -0.2 deg Along = -0.2 deg				
Min = -0.22 dB No. = 239 Athw . = 4.3 deg Along = -1.0 deg				



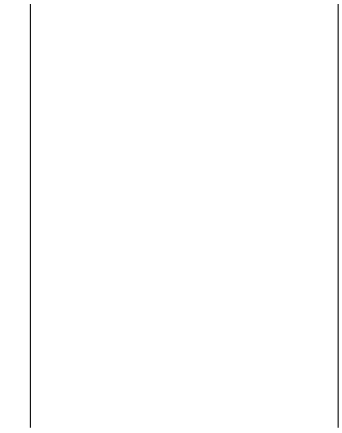
## Fishing gear

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

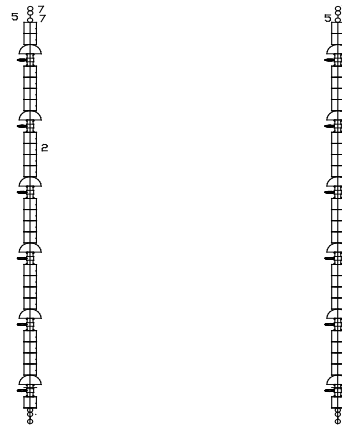
The bottom trawl has a headline of 31 m, footrope 47 m and 20 mm mesh size in the cod end with an inner net of 10 mm mesh size (see drawings below). The estimated opening is 6 m (observed 5.7) and distance between wings during towing about 18 m. The sweeps are 40 m long. The trawl is equipped with a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

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

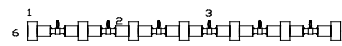
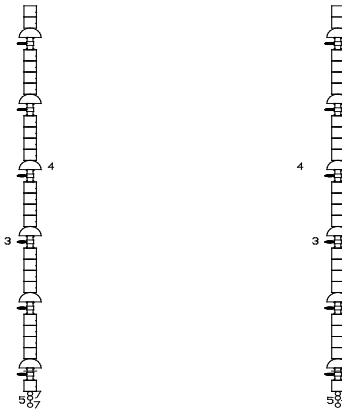
6,85 M  
16 MM CHAIN  
SHORT LINKED



SIDE GEAR  
6,55 M



SIDE GEAR  
6,55 M



## ANNEX IV EQUATIONS

## Biomass index

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

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

where

$L$  is the number of strata,

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

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

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

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

The total biomass in the area is calculated by

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

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

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

where

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

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

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