NORAD-FAO PROGRAMME
GCP/GLO/690/NOR

CRUISE REPORTS *DR FRIDTJOF NANSEN*
EAF-Nansen/CR/2018/1

SURVEY OF THE MARINE FISHERY RESOURCES AND ECOSYSTEMS OFF SOUTHEAST AFRICA

South Africa

19 January – 10 February 2018

ORI, South Africa
UKZN, South Africa
DEA, South Africa
SANBI, South Africa
UWC, South Africa
DAFF, South Africa
SAIAB, South Africa

Institute of Marine Research
Bergen, Norway

The EAF-Nansen Programme

The EAF-Nansen Programme "Supporting the application of the Ecosystem Approach to Fisheries Management considering climate and pollution impacts" (GCP/GLO/690/NOR) aims to further strengthen the knowledge base and the overall institutional capacity for the implementation of the Ecosystem Approach to Fisheries (EAF) in developing countries, with additional attention to the impact of climate variability and change, pollution and other anthropogenic stressors.

The programme, that started implementation in May 2017, builds on earlier phases, and is governed by an agreement between the Food and Agriculture Organization of the United Nations (FAO), the Institute of Marine Research (IMR), Norway and the Norwegian Agency for Development Cooperation (Norad). The three pillars of the new programme are: Science, Fisheries management, and Capacity development. A new state of the art research vessel, *Dr Fridtjof Nansen* is an integral part of the programme. A science plan, covering 11 research themes, guides the programme scientific work.

The programme works in partnership with countries, regional organizations, other UN agencies as well as other partner projects and institutions.

Le Programme EAF-Nansen

Le Programme EAF-Nansen "Appuyer la mise en œuvre de l'approche écosystémique de la gestion des pêches en tenant compte des impacts du climat et de la pollution" (GCP/GLO/690/NOR), vise à renforcer la base de connaissances et la capacité institutionnelle pour la mise en œuvre de l'approche écosystémique des pêches (AEP) dans les pays en développement, en accordant une attention particulière aux effets de la variabilité et du changement climatique, de la pollution et d'autres facteurs de stress anthropiques.

Le programme, qui a débuté en mai 2017, s'appuie sur les phases précédentes et est régi par un protocole d'accord entre l'Organisation des Nations Unies pour l'alimentation et l'agriculture (FAO), l'Institut de recherche marine (IMR) de Norvège et l'Agence norvégienne de Coopération au développement (Norad). Les trois piliers du nouveau programme sont : la science, l'aménagement de la pêche et le développement des capacités. Un navire de recherche à la pointe de la technologie, le nouveau *Dr Fridtjof Nansen*, fait partie intégrante du programme. Un plan scientifique, couvrant 11 thèmes de recherche, guide les travaux scientifiques du programme.

Le programme travaille en partenariat avec les pays, les organisations régionales, d'autres agences des Nations Unies ainsi que d'autres projets et institutions partenaires.

Michalsen, K., Olsen, M., Bruck, S.A., Cervantes, D., Alvestad, A.H., Fennessy, S., Green, A., MacKay, F., Huggett, J., Sink, K., Tsanwani, M., Cedras, R., Leslie, R., Kunnen, T., Holleman, W., Sonnenberg, W., Everett, B. 2018. Survey of the marine fishery resources and ecosystems of Southeast Africa, 19 January – 10 February 2018. NORAD-FAO PROGRAMME GCP/GLO/690/NOR, CRUISE REPORTS *DR FRIDTJOF NANSEN*, EAF-Nansen/CR/2018/1.

CRUISE REPORTS *DR FRIDTJOF NANSEN*

SURVEY OF THE MARINE FISHERY RESOURCES AND ECOSYSTEMS OFF SOUTHEAST AFRICA

South Africa

19 January – 10 February 2018

by

Kathrine Michalsen[1], Magne Olsen[1] , Sarah Ann Bruck[1], David Cervantes[1], Anja H. Alvestad[1] and Sean Fennessy[2], Andrew Green[3], Fiona MacKay[2], Jenny Huggett[4], Kerry Sink[5], Mutshutshu Tsanwani[4], Riaan Cedras[6], Rob Leslie[7], Travis Kunnen[3], Wouter Holleman[8], William Sonnenberg[4], Bernadine Everett[2]

[1] Institute of Marine Research (IMR), P.O. Box 1870 Nordnes, N-5817 Bergen, Norway
[2] Oceanographic Research Institute (ORI), Durban, South Africa
[3] University of KwaZulu-Natal (UKZN), Durban, South Africa
[4] Department of Environmental Affairs (DEA), Cape Town, South Africa
[5] South African National Biodiversity Institute (SANBI), Cape Town, South Africa
[6] University of the Western Cape (UWC), Cape Town, South Africa
[7] Department of Agriculture, Forestry and Fisheries (DAFF), Cape Town, South Africa
[8] South African Institute for Aquatic Biodiversity (SAIAB), Grahamstown, South Africa

Institute of Marine Research
Bergen, 2020

CONTENTS

EXECUTIVE SUMMARY

The overall framework and rationale for the surveys carried out by the research vessel (R/V) *Dr Fridtjof Nansen* are provided by the EAF-Nansen Science Plan. Within this framework, the survey scope and objectives for eastern Africa were discussed and agreed to in connection with a regional meeting held in Mauritius in August 2017.

This survey consisted of two legs, i.e Leg 1.1a, the ASCA transect (Agulhas System Climate Array) with 10 hydrographic and plankton stations, and Leg 1.1b, an ecosystem survey of the continental shelf and upper slope of the eastern coast of Souh Africa.

During both legs not all the planned work could be carried out due to the extremely strong current and sometimes strong wind.

Numerous samples and/or data were collected for the components on sea floor geology and sedimentology, macrobenthic infauna, plankton, microplastics and taxonomy, and will need considerable laboratory processing before results are available. These data are expected to provide inputs to national initiatives such as the national biodiversity assessment.

Trawling in deeper waters, which was one of the main objectives of this survey, was limited because the waters here are quite challenging with strong currents and strong winds often blowing in the opposite direction of the surface current.

Overall, catches were dominated by anchovies (Engraulis), sand soldiers (Pagellus), greeneyes (Chlorophthalmus) and minikob (Johnius). The dominance of anchovies is perhaps surprising as mainly bottom trawls were used, but these fish form very large shoals and most of them were caught in just two trawls. In total 382 different species were caught in the bottom trawl hauls. Due to the limited numer of trawl hauls, no biomass estimate was attempted.

CHAPTER 1. INTRODUCTION

In 2018 the R/V *Dr Fridtjof Nansen* operated in the Indian Ocean. The areas surveyed included the continental shelf and upper slope of East Africa (continental) (Leg 1), the Mascarene Bank (Leg 2) and parts of the Bay of Bengal region (Leg 3). Leg 1 covered the continental shelf and upper slope of eastern Africa, with oceanographic transects in the Agulhas Current region and off Tanzania to the Seychelles (Figure 1).

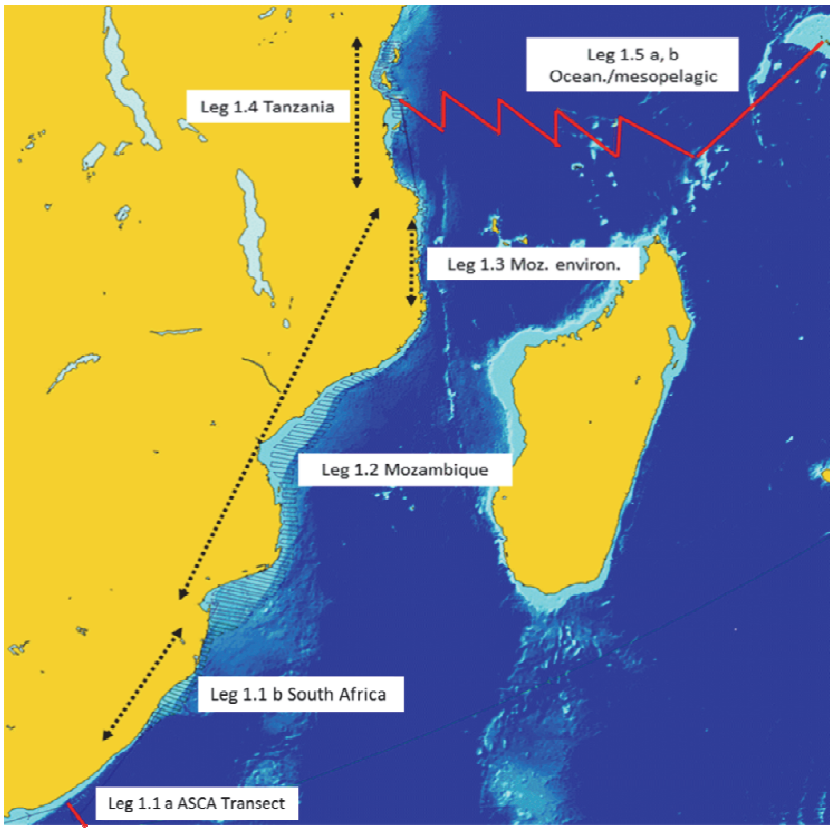


Figure 1. R/V *DR Fridtjof Nansen* survey programme 2018, Leg 1.

1.1 Survey objectives

The overall framework and rationale for the surveys carried by the R/V *Dr Fridtjof Nansen* are provided by the EAF-Nansen Science Plan that includes three main pillars (Sustainable fisheries, Oil/gas and pollution impacts and Climate change) and 11 science themes. Within this framework, the survey scope and objectives for eastern Africa were discussed and agreed to in connection with a regional meeting held in Mauritius in August 2017.

Leg 1 had a broad ecosystem approach and aimed at gaining understanding of ecosystem status in general and of specific ecosystem components and attributes. Most of the results based on the data and samples collected will be published separately.

Leg 1.1 consisted of two parts, a and b. The objectives of the two parts of leg 1.1 are listed below.

Leg 1.1a:

Hydrography:

- To observe the hydrographic/environmental conditions along the ASCA transect (Agulhas System Climate Array) with 10 hydrographic and plankton stations (temperature, salinity, oxygen, chlorophyll, nutrients, dissolved inorganic carbon, pH and total alkalinity.

- To observe the hydrographic/environmental conditions at the surface for the entire duration of the transit via Acoustic Doppler Current Profiler (ADCP), Thermosalinograph (TSG) and scientific pump outflow for additional nutrient, chlorophyll a, size-fractionated chlorophylls, flow cytometry and phytoplankton sampling every four hours from Cape Town to Durban.

Phytoplankton, zooplankton and ichthyoplankton and jellyfish:

- To establish as far as possible, the distribution, abundance and composition of phyto- and zooplankton, and species composition of fish eggs and larvae (data to be used, in part, to understand acoustic backscatter from zooplankton that can be used to refine the target strength for fish and jellyfish targets).

Leg 1.1b:

Hydrography:

- Identical to Leg 1.1a objectives without discrete sampling for dissolved inorganic carbon.

Phytoplankton, zooplankton and ichthyoplankton and jellyfish:

- Identical to Leg 1.1a objectives.

Pelagic stocks:

- To obtain information on abundance, distribution (also by size) of *Sardinops sagax, Scomber japonicus, Trachurus delagoa, Engraulis encrasicolus, Etrumeus whiteheadi*, *E. wongratanai*, *Decapterus russelli*, *D. macrosoma*, *Selar crumenophthalmus*, *Encrasicholina punctifer*, *Sardinella albella, Thryssa vitrirostris*. using acoustic methods in a systematic grid survey strategy and conducting pelagic trawling;

- To collect samples for genetic analysis and for morphometric studies, for stock identification of *Aprion virescens* and

- To obtain information on maturity stages, and to collect stomach samples for analysis of contents

Mesopelagic fish:

- To identify the main species and collect samples for identification by specialist and isotope analysis.

Demersal fish and crustacean

- To obtain information on abundance, distribution (also by size) of *Haliporoides triarthrus, Metanephrops* spp*, Chaceon* spp, *Penaeus indicus, Metapenaeus monoceros, Otolithes ruber, Merluccius paradoxus.*

Marine debris and pollution:

- To record occurrence of marine debris (surface);
- To collect samples for levels of nutrients and contaminants including microplastics;
- To map occurrence of microplastics in surface waters and describe associated neuston communities.

Contaminants:

- To collect samples of fish species consumed locally, and other indicator species such as soles, for analysis of contaminant levels and nutrient values.

1.2 Participation

Institute of Marine Research (IMR), Bergen, Norway:

Leg 1.1: Kathrine Michalsen, Magne Olsen, Sarah Ann Bruck, David Cervantes, Anja H. Alvestad, Oddgeir Alvheim, Aina Bruvik

South Africa:

Leg 1.1a: Tamaryn Morris, Gustav Rautenbach, Rudzani Silima, Zonke Gumede, William Sonnenberg, Jenny Huggett, Liam Ferguson, Marco Worship, Lucienne Human, Phumlile Cotiyane, David Walker, Eesaa Harris, Nasreen Burgher, Rebecca Lewer, Simone Louw, Seyanokeng Lentswana, Zizile Ngwenze, Mutshutshu Tsanwani, Danielle Julius

Leg 1.1b: Sean Fennessy, Brent Newman, Andrew Green, Fiona MacKay, Bernadine Everett, Jenny Huggett, Mutshutshu Tsanwani, Kerry Sink, Zoleka Filander, Rob Leslie, Wouter Holleman, Yonella Sithole, Stacy Badenhorst, William Sonnenberg, Steven Weerts, Johan Groeneveld, Riaan Cedras, Travis Kunnen,

Mozambique:

Leg 1.1b: Osvaldo Filipe, Lourenço Zacharias

1.3 Narrative

A transect with 10 hydrographic and plankton stations wase planned to be sampled off East London in collaboration with the ASCA[1],. The objective of this transect was to contribute to ASCA monitoring programme of the Agulhas Current during the transfer of *Dr Fridtjof Nansen* from Cape Town to Durban. This Leg will be referred to as Leg 1.1a. The vessel left Cape Town on 19 January at 20:00. Arrived at the first station on 22 January. Due to rough weather and strong current only 7 out of 10 stations were completed. The vessel reached Durban on 24 January. Embarking of the new team of local scientists occurred at 08:00 on 26 January. A reception was held on 26 January which included a visit and statement from the Minister from Department of Agriculture, Forestry and Fisheries Mr. Senzeni Zokwana. The second part of Leg 1.1 (Leg 1.1b) started when the vessel left Durban at 20:00 local time the same day, heading south to Port St. Johns. Due to a death in the close family of one of the crew members, the vessel had to return to Durban on 29 January to bring on board a new on-signing crew. A special transect, requested by South Africa was conducted just outside Durban (the Durban transect), corresponding to a national monitoring line. The standard survey was completed close to the border of the iSimangaliso Wetland Park Marine Protected Area (a world heritage site) on 4 February. Continued the survey by including several special benthic transects on our way south to Richards Bay where the South African scientists disembarked on 8 February at 11:00. The vessel continued to Maputo with arrival in port on 10 February. An overview of the number of days in the various regions is presented in Table 1.

The hydrographic and plankton sampling is described in the sailing orders for Leg 1. In addition, South African special sampling was undertaken to the list in the sailing orders.

Due to the extremely strong current and sometimes strong wind, not all the planned stations could be conducted.

Table 1. Number of survey days and respective dates for the main areas covered.

Survey area	Days	Date Start	Date Completion
South-Africa, south (Cape Town – East-London)	4	20/01/2018	24/01/2018
South-Africa, south east (Port St. Johns-Durban)	4	26/01/2018	29/01/2018
South-Africa, north east (Durban-St. Lucia)	11	29/01/2018	10/02/2018
Total	19		

[1] The Agulhas System Climate Array (ASCA) is a multi-institutional, international collaboration. It is designed to provide the first long-term observations of Agulhas Current volume, heat and salt transport and its variability from mesoscale (eddies), through seasonal to interannual timescales, and critically, its contribution in terms of heat and salt to the Thermohaline Circulation - and thus its impacts on climate variability and climate change. http://www.saeon.ac.za/enewsletter/archives/2015/february2015/doc02.

1.4 Survey effort

Leg 1 had a broad ecosystem approach and aimed at gaining an understanding of ecosystem status in general and of specific ecosystem components and attributes. Sampling was undertaken in relation to hydrographic conditions, plankton, egg and larvae, jellyfish, demersal, pelagic and mesopelagic resources, bottom sediment, and top predators. Opportunistic sampling for pollution (micro plastics and food safety) was undertaken throughout the survey. In addition to providing data for ecosystem monitoring, specific research questions were addressed in special transects.

The design of the standard survey and the sampling followed the agreed design described in the sailing order for Leg 1. This implied a systematic survey track consisting of pseudo-parallel acoustic transect lines perpendicular to the coastline and equally spaced (about 15 nautical miles apart from East-London to Durban and 10 nm apart from Durban to St Lucia). Table 1 summarizes the survey effort for Leg 1.1a and Leg 1.1b. Figure 4 to 4 show the cruise tracks with fishing, plankton, benthos and hydrographical stations for the two parts of the survey.

Table 2. Sampling effort during the survey including:. Distance surveyed (log, NM), number of CTDs, phytoplankton nets (Phyto) , WP-2 (zooplankton nets), Multi (nets for eggs and larvae), Manta for plastic particles on the surface, BT - bottom trawl and PT - Pelagic trawl, Bongo –(net for zooplankton), Box corer and grab for sediment and Ring net for fish larvae.

Region name	Region description	Distance surveyed (nm)	CTD no	Phyto no	WP-2 no	Multi no	Manta No	BT no	PT no	Bongo	Box corer	Grab	Ring net
Leg 1.1.a	Cape Town - East London	803,77	7	0	0	0	0	0	0	8			
Leg 1.1b	Port St. Johns – St Lucia	1323,7	64	10	16	19	21	21	1	28	2	52	17
	Total	2127,47	71	10	16	19	21	21	1	36	2	52	17

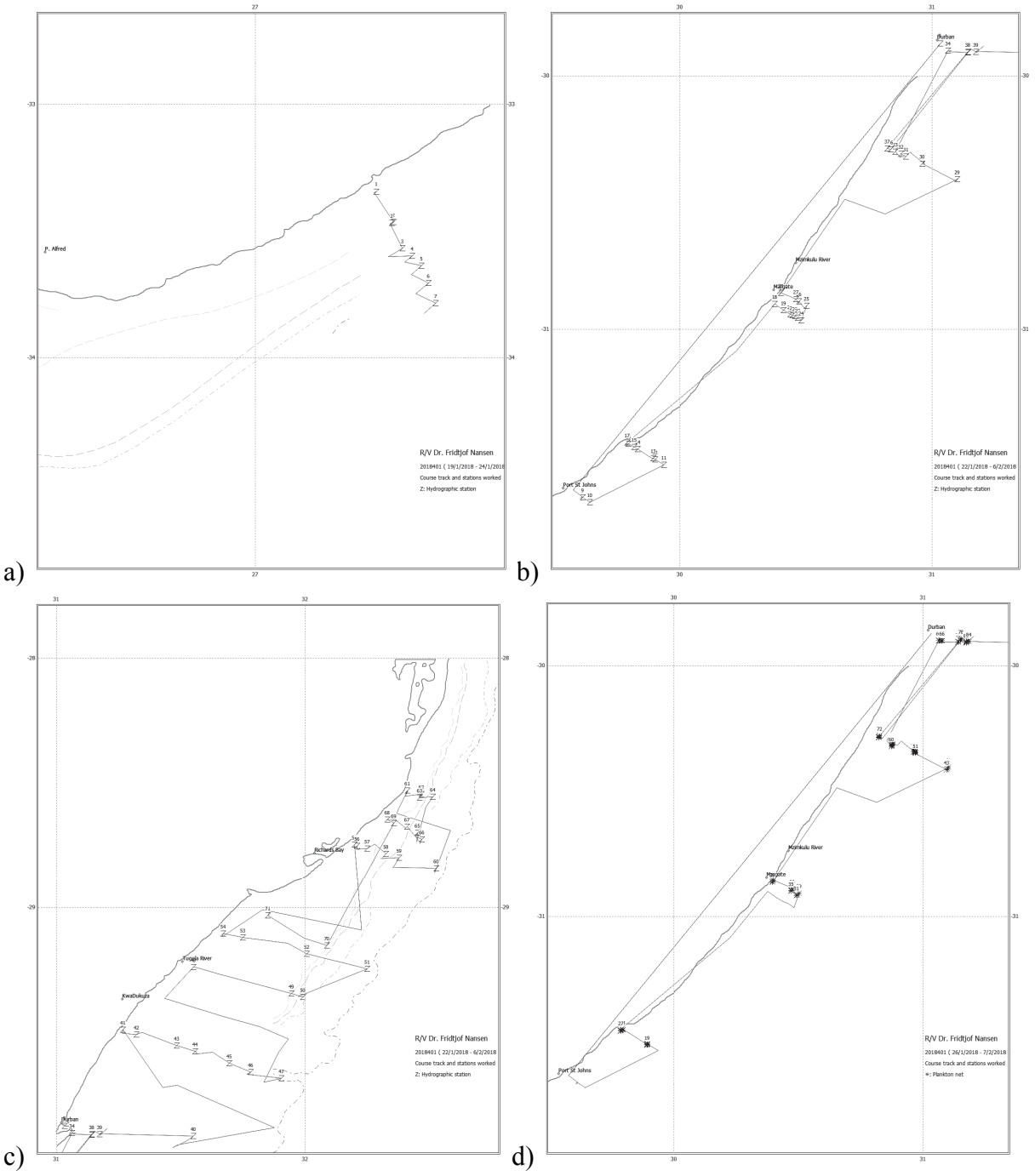


Figure 2. Showing course track and stations for a-c) hydrographic, d-e) trawl f-g) plankton and h-i) sediment samples (grab and box corer) sampling on leg 1.1a, Cape Town to East London (a), and 1.1b, Port St. Johns-St. Lucia (b-i). Depth contours at 50, 100, 200 and 500 m.

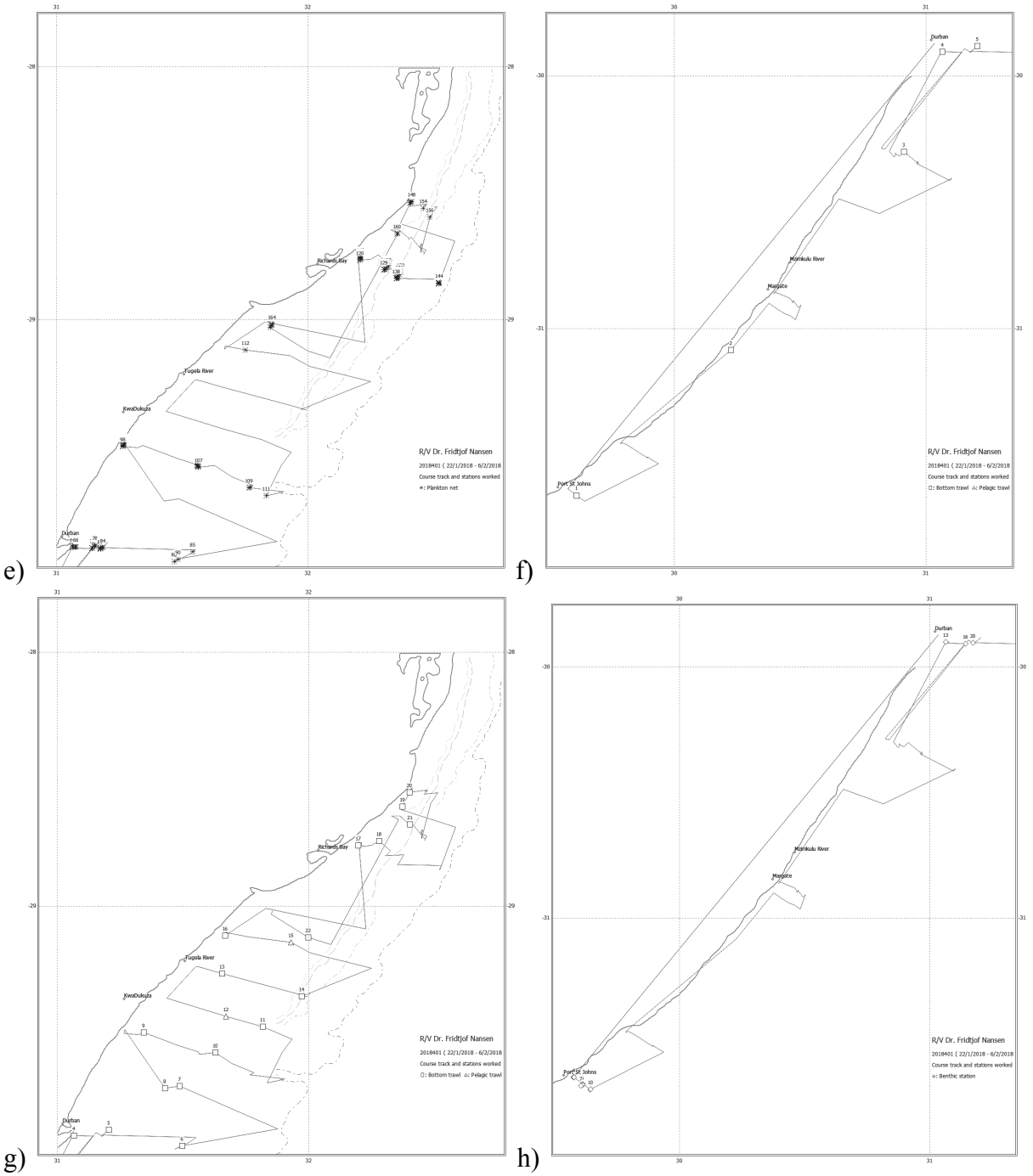


Figure 3 cont. Showing course track and stations for a-c) hydrographic, d-e) trawl f-g) plankton and h-i) sediment samples (grab and box corer) sampling on leg 1.1a, Cape Town to East London (a), and 1.1b, Port St. Johns-St. Lucia (b-i). Depth contours at 50, 100, 200 and 500 m.

i)

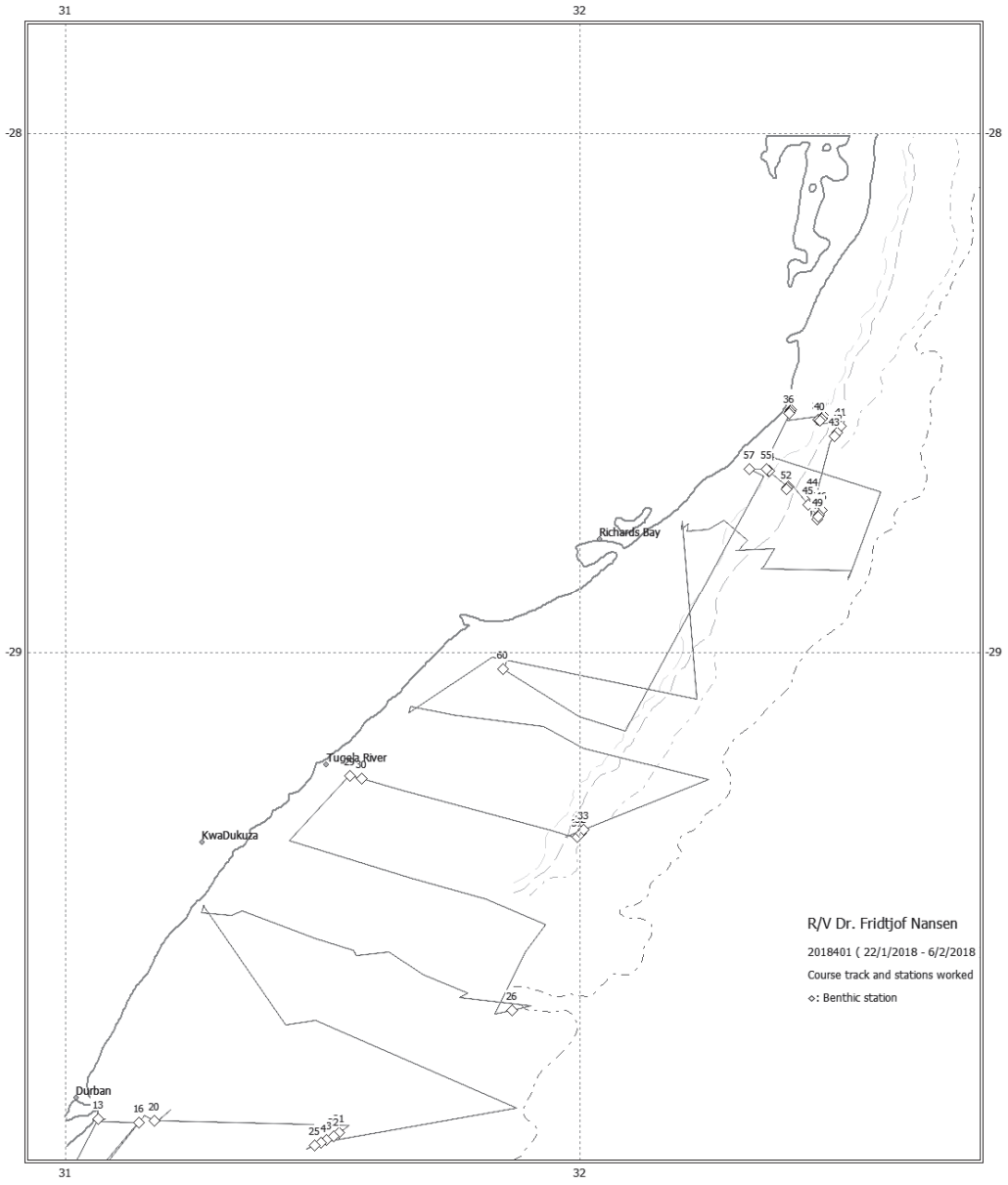


Figure 4 cont. Showing course track and stations for a-c) hydrographic, d-e) trawl f-g) plankton and h-i) sediment samples (grab and box corer) sampling on leg 1.1a, Cape Town to East London (a), and 1.1b, Port St. Johns-St. Lucia (b-i). Depth contours at 50, 100, 200 and 500 m.

CHAPTER 2. METHODS

2.1 Underway sampling

2.1.1 Meteorological data recording

Meteorological data were normally logged continuously from the AANDERAA Smartguard meteorological station and included wind direction and speed, air pressure, relative humidity, air temperature and solar radiation. All data were logged to the Nansis tracklog system averaged every 60 sec, but unfortunately the sensors were not calibrated and the data therefore unreliable.

2.1.2 Thermosalinograph

The SBE 21 Seacat thermosalinograph ran continuously during the survey, obtaining data of sea surface (at 4 m depth) salinity and relative temperature every 10 seconds. An attached in-line C3 Turner Design Submersible Fluorometer measured turbidity and chlorophyll-*a* levels.

2.1.3 Current speed and direction measurements (ADCP)

Two hull-mounted Acoustic Doppler Current Profilers (VMADCP) from RD Instruments ran during the survey. The frequencies of the VMADCP are 75 and 150 kHz. The system was run in narrow band mode and data were averaged in 16 and 4 m vertical bins at 75 and 150 kHz respectively and stored on files for post survey processing. The 150 kHz was run continuously while the 75 kHz was turned off during the last part of the survey due to interference with the ping rate of the EK80 echosounder.

2.2 Station sampling

For Leg 1.1b, a series of biological and oceanographic sampling was undertaken every 60 NM along every 6th acoustic transect .Samples were taken at the inshore end of the acoustic transects at depths of 25-30 m, at the 100 m isobath and at the outer end of the transects with a bottom depth of 500 m. These stations were referred to as “super-stations” (Figure 5). In addition, further lines of CTD stations were sampled along the intermediary transects 30 NM between the acoustic transects. On this line, additional CTD stations were added at 60-70 m and 200 m depths. North of Durban the distance between transects were 10 NM. Due to unforseable events, the distance between the transects south of Durban had to be increased from 10 to 15 NM to be able to cover the whole sampling area set out for this leg.

The sample protocol on these transects is shown in Figure 5 and in Annex I.

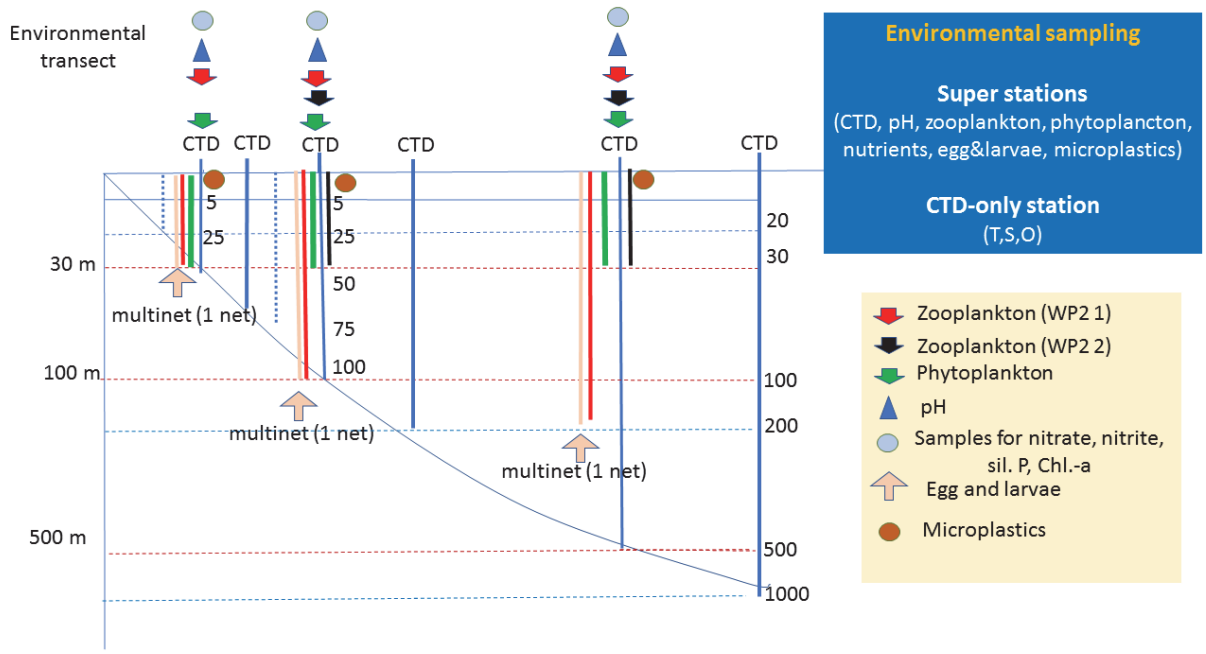


Figure 5. Sampling diagram showing the depth and the equipment used at the super stations transects, from the inshore (left side) towards the deep 500 m stations (right side).

2.2.1 CTD sensors – temperature, salinity, oxygen and fluorescence

Vertical temperature and salinity profiles were obtained by a Seabird 911 CTD containing a SBE 3plus temperature sensor, SBE 4C conductivity sensor and a Digiquartz® pressure sensor. In addition, *in situ* concentrations of dissolved oxygen were measured using a CTD-mounted SBE 43 oxygen sensor. Real time logging and plotting was performed using the Seabird Seasave software. Attached to the CTD was also an uncalibrated Chelsea Mk III Aquatracka fluorometer, which measures *in situ* fluorescence on a relative scale and a Photosyntetic Active radiation (PAR) sensor, measuring downwelling irradiance (in micromole photons m^{-2}).

The salinity calculated from the CTD conductivity sensor was validated using a Portasal Salinometer 8410A from OSIL on board the vessel (Figure 6) and the oxygen sensor was validated via Winkler titration (Grasshoff *et al.* 1983) (Figure 7) also performed on the vessel.

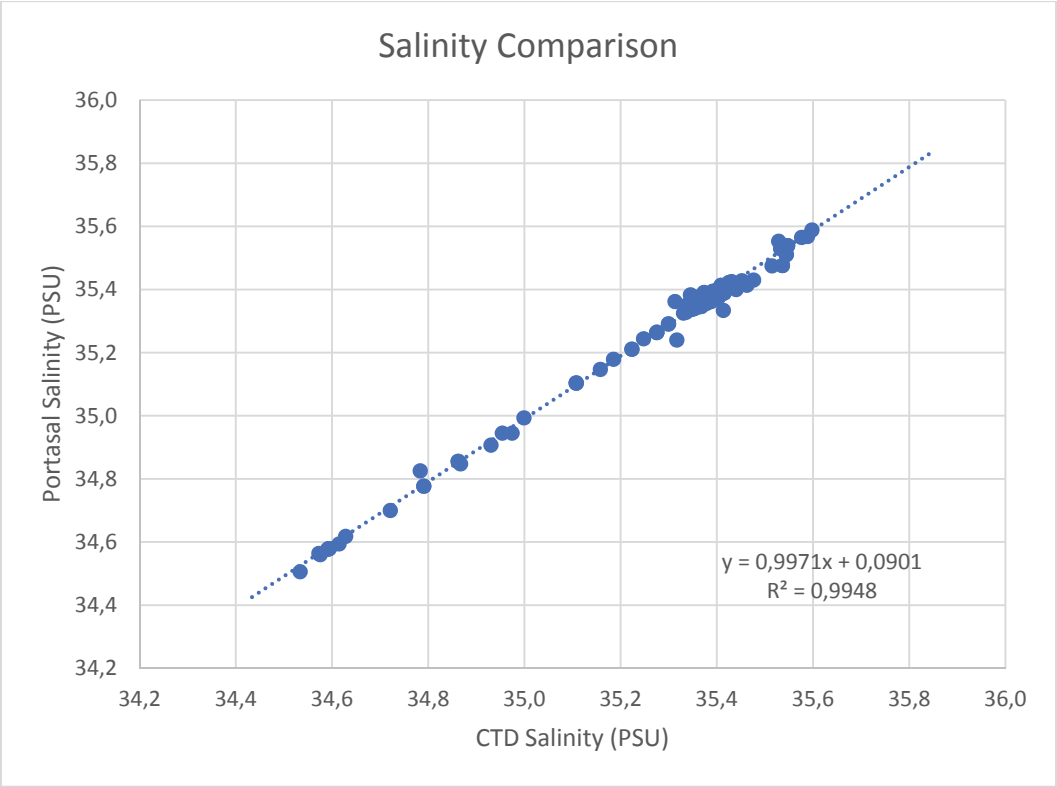


Figure 6. CTD calculated salinity values compared to Portasal calculated salinity values from water collected at the same depths from the surface to 987 m at stations between 1 and 46.

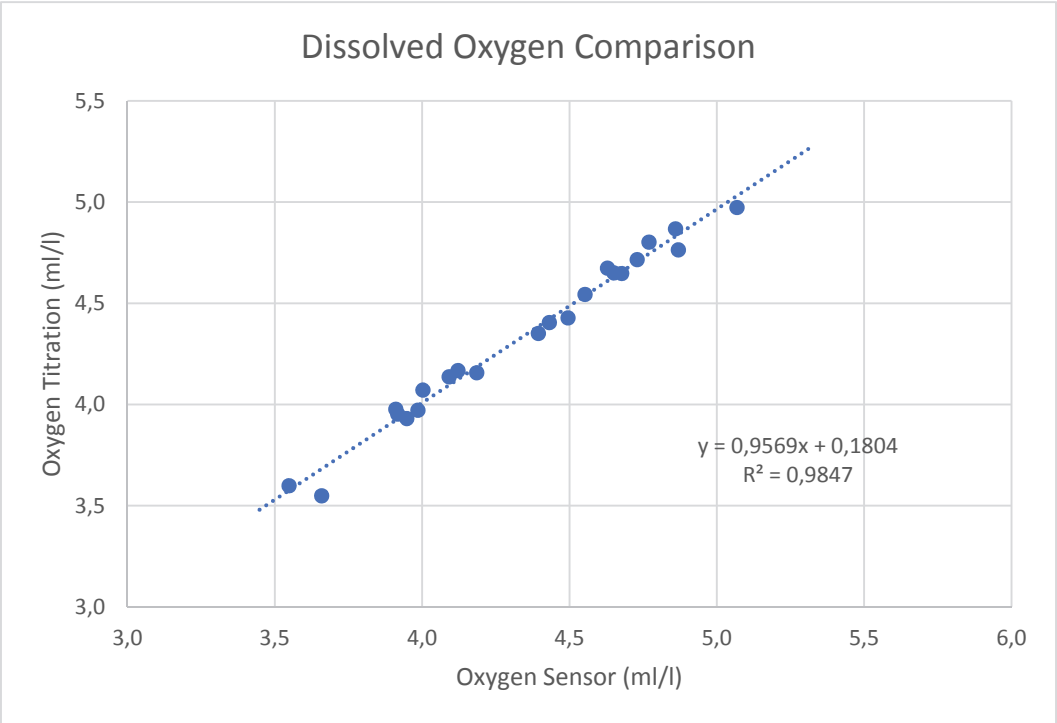


Figure 7. CTD mounted SBE 43 dissolved oxygen sensor measurements compared to Winkler titration measurements from water collected at the same depths from 100 m to 1000 m at stations between 3 and 41.

2.2.2 Ocean acidification parameters (pH and alkalinity)

The Nansen is currently equipped with a CTD rosette holding up to 12 ten-litre Niskin bottles that are used to collect water samples from pre-defined depths. The standard sampling depths were set to: 5, 25, 50, 75, 100, 200, 300, 400 and 500 m and the standard stations were sampled at 30, 100 and 500 m depth. These samples were used to determine chlorophyll, pH, alkalinity and for nutrient analyses (nitrate, nitrite, silicate and phosphate) as described below.

Seawater samples (250 ml) from the CTD-mounted Niskin-bottles were collected in borosilicate glass bottles using silicone tubing to reduce air exchange. Both pH and alkalinity were analysed on board the vessel. pH was determined spectrophotometrically using a diode array spectrophotometer and a pH sensitive indicator, m-cresol purple in 2 mM solution (Clayton and Byrne, 1993; Chierici *et al*., 1999). Alkalinity was measured by titration with acid (0.05M HCl) and changes in pH were measured with an electrode (potential in mV) using tiamo software. On Leg 1.1, duplicate samples were also collected for processing on land for validation of onboard measurements. Further processing of the data (e.g. calculating of DIC) will be done on land and will provide more information on the marine carbonate system and parameters for ocean acidification.

2.2.3 Nutrient samples

Seawater samples (20 ml) for nutrient analyses (nitrate, silicate and phosphate) were collected from the Niskin water bottles. The samples were stored in 20 ml polyethylene vials, conserved with 0.2 ml chloroform, and kept cool and dark in a refrigerator The analyses will be made on shore by IMR, using a modified Alpkem AutoAnalyzer C (O I Analytical, USA) and following standard procedures (Grasshoff, 1965). Storage may introduce loss of accuracy of the results, especially when the concentrations of nitrate, silicate and phosphate are low, such as in surface samples from the productive season. Samples from deep water are more stable, because most of the nutrients in the deep occur in their inorganic form.

2.3 Phytoplankton sampling

Due to an initial oversight, chlorophyll-*a* (an indicator of phytoplankton biomass) was not sampled routinely during Leg 1.1b East Coast component (Port St Johns to St Lucia), but was initiated along the 4th super-station transect just north of Richards Bay (stations 56, 58 and 59). Water samples from selected depths from the CTD were filtered using a 0.7µm filtration system (Munktell glass-fibre filters Grade: MGF, vacuum 200 mm Hg). Filters were stored at -20°C for subsequent chlorophyll-*a* analysis at IMR.

Qualitative phytoplankton samples were collected at super-stations as described above. At each super-station, qualitative phytoplankton samples were collected with a net (35 cm in diameter and mesh-size of 10 µm (Figure 8), hauled vertically at a speed of 0.1 ms^{-1} from the depth of 30 m to the surface (from ca. 5 m above bottom at the 30 m stations). These samples are not fro quantitative analysis, but will be used to establish the taxonomic composition of the phytoplankton community.

2.4 Zooplankton sampling

Mesozooplankton was collected with a WP2-net along the super-station hydrographic transects at stations positioned at bottom-depths of approximately 30 m, 100 m and 500 m. The WP2-net (56 cm diameter, mesh size 180 µm, (Figure 8), (Fraser 1966, Anonymous 1968) was hauled vertically at a speed of ~0.5 ms^{-1} at each station. At the shallowest and intermediately deep stations (bottom-depths of 30 m and 100 m, respectively) the sampling strata were from near-bottom to the surface (deepest sampling depths of ~25 and 90 m, respectively). At the stations with bottom-depth of ~500 m or greater, the sampling stratum was from the depth of 200 m to the surface.

Furthermore, a second sample with the WP2 net was collected from the upper 30 m at the stations with bottom depths of 100 m and 500 m. The purpose of these additional samples was to enable a direct comparison of the zooplankton composition and concentrations in the uppermost layer of the water-column along the bottom-depth gradient. Each zooplankton sample was divided into two equal parts using a Motoda plankton splitter (Motoda 1959). The first part of the sample was size-fractioned by using a series of sieves with the decreasing mesh-sizes of 2 000 µm, 1 000 µm and 180 µm, and the zooplankton retained on each sieve were dried on aluminium trays at ~60 ºC for 24 h. These samples will be dried once more and weighed on shore after the cruise at IMR for estimation of biomasses for the different size-groups. The second part of the sample was preserved in seawater with a final solution of 4% formaldehyde buffered with borax for subsequent species identification and quantification, also at IMR.

Additional plankton nets (see Figure 8) were used to collect mesozooplankton, macrozooplankton and ichthyoplankton along several special transects between the super-station transects (Protea Canyon, Durban, St Lucia), as well as at depths of 1 000 m along the super-station transects. Oblique tows in the upper 200 m were conducted with the Hydrobios Multinet (0.25 m^2 mouth area), fitted with five 180 µm mesh nets, to collect mesozooplankton from up to 5 depth strata, including above the depth of maximum fluorescence (f-max), through the f-max and just below the f-max. Oblique tows with a Bongo net (60 cm diameter, 2 x 500 µm mesh) were used to collect macrozooplankton and ichthyoplankton (fish eggs and larvae) in the upper 200 m. The manta trawl (335 µm) was towed at the surface for 15 mins to collect neuston and samples for microplastics analysis, and a ring net (1 m diameter, 500 µm mesh) was towed just below the surface to collect phyllosoma larvae. Along the Durban transect mesozooplankton were collected with a vertical Bongo net haul (60 cm diameter, 2 x 200µm) instead of a Multinet, as a trial run for a future monitoring programme to be operated by ORI. All net samples were preserved in seawater with a final solution of 5% buffered formalin for zooplankton (2% formaldehyde), and 10% for ichthyoplankton (4% formaldehyde), except for the ring net samples which were preserved in 96% ethanol for later genetic analyses. [Note: neat (~40%) formaldehyde = 100% formalin].

2.5 Fish-eggs and larvae

Sampling for fish eggs and larvae was done at the super-stations using a Bongo net (60 cm diameter) fitted with a manual Hydrobios flowmeter and 500 µm mesh. The net was towed obliquely from ~10 m above the bottom, or from a maximum depth of 200 m, to the surface with a speed of ~1 ms^{-1}. Actual depth sampled will be calculated using length and angle of the cable deployed (wire out and angle). Before and after flowmeter readings were taken to enable calculation of water volume filtered.

Fish larvae visible with "the naked eye" were removed from the total sample (from the net fitted with a flowmeter), photographed in fresh water and transferred to a separate jar for each station. The fish larvae were then preserved in 4% formaldehyde (10% formalin) buffered with borax. When all visible fish larvae had been removed from the Bongo sample, the rest of the sample was preserved for reference purposes and to check for any overlooked larvae. The fish-eggs will be sorted, and the larvae identified on shore after the cruise.

Figure 8. Plankton sampling equipment. Top: CTD with Niskin bottles used to collect water for microzooplankton analysis, Phytoplankton net, WP2 net. Middle: Bongo net rigged for vertical haul, Bongo net rigged for oblique tow, Multinet rigged for oblique tow. Bottom: Manta trawl, Ring net. Image credits: Jenny Huggett.

2.6 Microplastics and debris

Microplastics are small pieces of plastic marine debris normally less than 5 mm long. Microplastics were collected along the hydrographic transects at all super-stations. At each station, the surface layer was sampled with a Manta-trawl, with a rectangular opening of 19 cm × 61 cm (HxW), mesh-size 335 µm and two wings to keep it balanced and at the surface during the tow. Trawls were hauled horizontally at a speed of ~1.5 ms^{-1} for 15 minutes. The counts of a manual flowmeter attached in the lower part of the trawl opening were recorded at the start and end of each trawl. Trawling was performed some meters away from the starboard side, about mid-ship, attempting to avoid the wake of the vessel.

Once the Manta-trawl was back on the ship, the samples were washed in filtered sea-water over a sieve with a mesh-size 180 µm. Microplastic particles were sorted from the sample under a stereo-microscope, and the sorted sample was then checked once more to reduce the risk of overlooking the smallest plastic particles. All assumed plastic items were then placed on a gridded petri dish for examination under the stereo-microscope, photographed and, to the extent possible, also measured and described (e.g. length, shape, type and colour). The sorted microplastics were washed with distilled water and dried in pre-weighed aluminium-trays in a drying cabinet at 30 ºC. The trays were packed in aluminium foil and stored at room-temperature until transport to IMR, where they will be studied in more detail. After removing the plastics, the remaining part of the samples - mainly biological material - was preserved in formalin for studies of neuston at UWCafter the cruise.

2.7 Sediment and infauna (macrobenthos) sampling

The sea floor of the east coast of South Africa is poorly surveyed, sampled and mapped. The area is characterised by several large river systems with likely coastal/marine connectivity influences even to the outer shelf. Three special transects were selected to integrate bottom sampling (including demersal trawling) with this in mind. The Mzimvubu and Thukela Rivers are seasonal, pulsed systems with visible plumes and sediment fans that are respectively, turbid and muddy; creating conditions for likely uncommon habitats and unique ecosystems on an Agulhas swept outer to mid shelf.

Where surveys have taken place in this area, they are limited to depth strata <100m, close to the coast. The intention was to obtain deeper station information on habitats, sediments and infauna community types from <100m to 1 000m, because of the typically narrow shelf and to investigate hypothesised influences of large riverine inputs to the shelf and beyond.

For macrobenthos, sediment from grabs at stations in planned bottom depths of 100, 200, 500, and 1 000 m were collected with a short-arm or long-arm van Veen grab appropriately weighted for depth. Three replicates were planned per station. It was intended that the drift of the vessel between replicates should not be >100m, failing which the vessel should steam back to the original station location. Notes on the sediment characterisitics were made for each sample, and subsamples were collected for organic and grain analysis. Once retrieved, the grabs were checked for fauna on the sediment surface (particularly fragile annelids,

crustaceans, molluscs) and handpicked. Each replicate was washed through a fractionated sieve system with decreasing mesh apertures of 5 000 um, 1 000 um and 500 um. Each station (x3 replicates) had three separate subsamples. Usually, hand-picked and 5 000 um sub-fractions were fixed in 96% ethanol so that once identified and photographed, fauna will be genetically bar-coded and a species page for each depth and transect community will be developed and entered into the South African national biodiversity assessment.

Habitat information was obtained from multibeam scans and sub-bottom profiling. A single CTD cast was deployed to the maximum depth of the station to collect water temperature, salinity, etc. These samples and data will be processed by ORI. Sediments were collected from each replicate grab sample and where successful, from each demersal trawl for habitat characterisation. Sediments were collected for multiple analyses including physical characteristics, chemistry, contaminants, micro-organisms and bacteria (see schematic Figure **9**). In addition, sediment from bottom trawls using stainless steel cylinders were mounted on the footrope of the trawl to collect samples at every trawl station. The samples were collected from the cylinder when the trawl was on deck and stored in plastic jars, roughly classified according to grain size and preserved for further analyses of sedimentological and chemical composition. A box corer was deployed on two occasions when seabed conditions were deemed suitable.

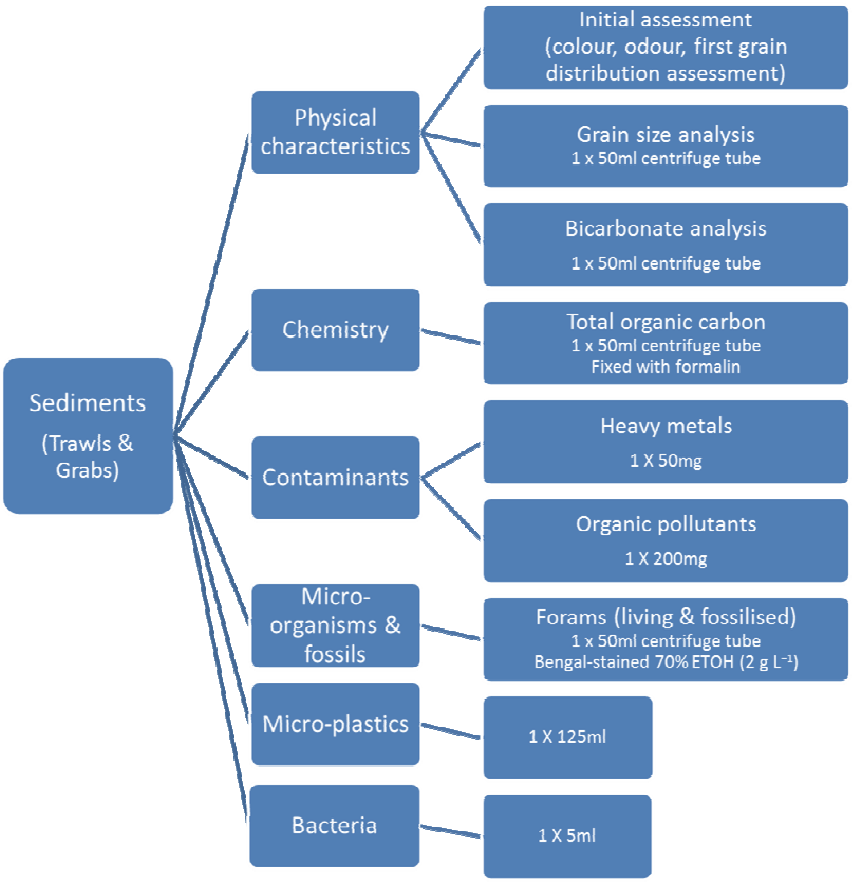


Figure 9. Protocol for sediment subsamples from trawl and grab sampling for habitat physical, chemistry, contaminant, and micro-organism characterisation.

2.8 Bottom mapping echo sounder

The EM 710 and EM 302 multibeam echo sounders both belong to a high to very high-resolution seabed mapping system. Data acquisition depth starts approximately 3 m below the transducers and the maximum acquisition depth is limited in practice to 1 000-1 500 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 according to depth. The receiving beam width is 2 degrees. Sound profiles were set manually in the system according to the area of operation. The data were logged to the on-board Olex plotting system.

2.9 Food safety

Fisheries are almost invisible in strategies to achieve SDG2, and nutrition and food security are not the primary focus in SDG14. Fisheries, however, support 200 million Africans either directly or indirectly through food and income and the unique nutrient content of fish plays a significant role in combating the triple burden of hunger, micronutrient deficiencies and non-communicable diseases. Nevertheless, the qualities of fish are not recognized in the global food security discourse, and fish is strikingly missing from strategies for nutrient deficiency reduction. Having relevant, reliable and up-to-date food composition data are the basis for assessing nutrient intake, nutrient requirements and food based dietary guidelines.

Whole fish, fillet and different organs from various fish that are regularly consumed in South Africa were sampled during this survey and preserved pending analysis. The samples are to be analysed for a wide variety of nutrients, contaminants and/or parasites at IMR as listed in the results. Thus, samples of whole fish and fillet were sampled and stored pending analysis, with priority on selected nutrients and metals. Samples for other nutrients and contaminants were stored pending budget for analysis.

Samples of whole fish, fillet and liver of various fish species were taken and prepared for analysis by filleting, homogenising and freeze-drying.

Additionally, a variety of fish species from bottom trawls was collected for examination of microplastics by UKZN, and flatfishes (soles) were collected, particularly in areas associated with river mouths (Mzimvubu, Durban, Thukela), for analysis by CSIR of contaminants in flesh and organs.

2.10 Top predator observations

There was no dedicated top predator observer on board for leg 1.1b of the cruise. When time allowed between trawl stations a watch was kept for top predators.

2.11 Biological trawl sampling

With the expanding scope of the research to be carried out in the context of the EAF-Nansen Programme, the survey objectives and related sampling strategy have been expanded to support research on life cycles, stock identities, and trophic relationships of pelagic fish.

For this scope, special effort was carried out to collect biological parameters of eight target species: *Sardinops sagax, Scomber japonicus, Trachurus delagoa, Engraulis encrasicolus, Etrumeus whiteheadi, E. wongratanai, Decapterus russelli, D. macrosoma, Selar crumenophthalmus, Encrasicholina punctifer, Sardinella albella, Thryssa vitrirostris*. The biological parameters which were planned to be collected were: lengths, weights, otoliths, fin clips, stomachs, livers and gonad maturity stages. These biological parameters will be used for post-survey age and growth, stock structure, population biology and trophic interaction studies.

Biological sampling of the fish was carried out using pelagic and bottom trawls. In shallow water (<30 m) or at night when pelagic fish were close to the surface, the pelagic trawl with floats or bottom trawl with floats was used for sampling. A more detailed description of instruments and fishing gear is given Annex II.

All catches were sampled for composition by weight and numbers of each species caught. Species identification was based on the FAO Species Guides as well as local South African guides. For selected species, length (total length to the nearest cm), weight (to the nearest 0.5 g), sex and gonad maturity stage (according to tables in Annex III) were recorded. Length and weight measurements were used to estimate the length-weight relationship and together with length frequency distributions applied in biomass calculations if appropriate. In addition, samples for genetic analysis and specimens for specific requests were collected. For an overview of the sampling procedures in the fish lab see Annex VIII.

Two members of the South African Institute for Aquatic Biodiversity participated in Leg 1.1b, Wouter Holleman (Research Associate) and Ms Yonela Sithole (PhD candidate). Their reason for participating was to collect representatives of all fish species caught and as many cephalopods as feasible. With few exceptions tissue samples were taken of required species and fixed in 99% ethanol, those voucher specimens were photographed and all specimens fixed in 35% formalin. Both tissue material and specimens will add to the SAIAB collections as these comprise the South African National Collection of Fishes, and its associated tissue collection.

2.11.1 Jellyfish collection and preservation

Jellyfish were identified to the lowest possible taxon.

Jellyfish specimens in good condition were photographed (top and bottom sections). Thereafter, a small piece of the oral arm tissue removed and preserved in 96% ethanol (EtOH) and stored at -20°C. After 24 hours, the 96% EtOH drained from each sample and then replaced with new 96% EtOH, the sample then stored at -20°C until analyses. Tissue samples

stored in EtOH were collected for genetic studies, aimed at determine the population structure, determining the species and establish regional and global connectivity.

The rest of the specimens were preserved in 10% formalin and placed in a cooler on board for long-term storage. These samples tform part of a greater morphological identification and taxonomic study. In addition to this, jellyfish specimens of a variety of sizes that were in good condition were rinsed with freshwater, and individually oven dried at 40°C and then frozen at -20°C for stable isotope and fatty acid analyses. These to determine the trophic position and ecological role of jellyfish within their ecosystem. All specimen to be accompanied by a wet label with identifiable details (station, specimen id, date, species, ect).

Due to limited space and storage material, 5-10 of the best representatives of species of interest caught in each trawl were stored as explained above. Species of interest no special interest were treated as explained above, but only if the species was caught for the first time. This specimen then to serve as a type specimen. Thereafter, only presence was noted.

2.12 Acoustic sampling

There are no commercial fisheries for small pelagic fishes in the region, other than a small-scale beach-seine fishery in winter (June – August) for *Sardinops*. This survey represents the first formal assessment of small pelagic fishes in months other than in winter (the last small pelagic survey took place in winter > 10 years ago).

2.12.1 Sonar data

A Simrad SH90 Sonar recorded data continuously during the survey for post processing after the survey. The sonar was set to a frequency of 26 kHz, in FM Normal mode. The sonar was operated using bow up/180 deg operation mode with the bearing of the vertical beams 90 deg, perpendicular to the vessel direction with a range of 450 m and with the horizontal beams set to 450 m with a tilt angle of 3 deg. The filters built into the sonar software to improve the school representation (i.e. AGC, RCG and ping to ping) were set to default values except for the Noise filter, which was turned off.

The settings including range and tilt was kept the same during all the surveying except during trawling operations where the sonar was at times used actively to focus in on targets.

No other sonars were used during the survey.

2.12.2 Echo sounder

Acoustic data were recorded using a Simrad EK80 Scientific Split Beam Echo Sounder equipped with keel-mounted transducers at nominal operating frequencies of 18, 38, 70, 120, 200 and 333 kHz. The last calibration was conducted outside Walvis Bay during the last part of the previous survey, although the sounders were calibrated in Bergen on the 23 January 2017. Annex II gives the details of the acoustic settings used during the survey.

2.12.3 Allocation of acoustic energy to species group

Acoustic data were logged and post-processed on board using the latest acoustic data post-processing software, the Large-Scale Survey System (LSSS) Version 2.0. Scatters were displayed at 38 kHz. The mean 5 nautical miles (NM) area backscattering coefficient s_A (m^2/NM^2) was allocated to a predefined set of species groups on the basis established echogram features and stored as mean values per 1 NM. Allocation of acoustic densities to species groups and respective species are listed in Table 3. Ground truthing and estimation of mean length and weight were accomplished by means of targeted pelagic and demersal trawling. In cases where the integrated echo contained more than one category of fish (see Table 3), the mean s_A-value allocated to each category was in the same ratio as their contribution to the abundance in trawls in that area. Table 3 lists the target groups used, adapted from previous groupings owing to the intenion to provide biomass estimates for *Decapterus* sp., *Scomber* sp*, Trachurus* sp and *Engraulis encrasicolus.*

The acoustic backscatter was scrutinized daily and allocated to the various target groups. The s_V threshold used when sardinellas occurred to filter out other species and plankton was -45 dB, or in regions where the plankton layer was extremely dense an even lower threshold had to be used. For Pelagic I, Pelagic II and "other pelagic species" -50 dB was used. To identify mesopelagic layers a threshold of -60 dB was used. To identify jellyfish layers a threshold of - 60 dB was used for high concentrations, while -70 dB was used for more dispersed layers. Biomas estimates can only be estimated for those acoustic groups in which lengths and weights were recorded (see Table 3).

2.12.4 Estimation of biomass

The target strength (TS) function used to convert mean area backscattering coefficient s_A (m^2/NM^2) at 38 kHz to number of fish corresponds to:

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

or

$$CF = \frac{10^{7.2}}{4\pi} \cdot \overline{L}^{-2} \quad (2)$$

and in the simplest form

$$CF = \frac{1.2612 \cdot 10^{6}}{\overline{L}^{2}} \quad (3)$$

where CF is the conversion factor from acoustic density to fish biomass and $\overline{L}^2$ is the mean of squared fish lengths. This target strength function was originally established for North Sea herring, but has later been attributed to clupeids in general (Foote *et al*., 1986; Foote, 1987).

Table 3. Allocation of acoustic densities to species groups (potentially encountered).

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

No specific target strength relations presently are available for the species at hand, and equation (3) has therefore been applied consequently for all targeted. The biomass was calculated by multiplying the number of fish by the expected length at weight, estimated by regression of the log-length (total) against total weight. Separate length-weight relationships were worked for each region (north, central, south), pooling all data within each region.

The boundaries of encountered fish aggregations (post strata) were determined by means of contouring within the inner and outer zero-value limits of the transect lines. The strata contours were digitised using Nansis Maptool Version 2.1.4. Sub-stratification was used to isolate areas of similar densities, using the following pre-defined, standard categories:

1: $0 < s_A < 300$; 2: $300 \le s_A < 1000$; 3: $1000 \le s_A < 3000$;
4: $3000 \le s_A \le 10000$;5 : $10000 \le s_A \le \infty$ (m^2/NM^2)

The basis for contouring is averages of five 1 NM values along transects. At the end of transects and in connection with trawl stations the averaging may include fewer (from 1 to 4 single NM observations). This is a source of bias, but this bias is limited due to observations within strata having similar values. Other sources of bias of concern are the shallow distribution pattern (above integration limit), vessel avoidance behaviour of sardinella (Misund and Aglen, 1992) and inshore distribution (at depths less than 20 meters). All estimates should consequently be considered as relative indices of abundance.

The overall length frequency distributions within strata were estimated by weighting the sample-distributions with the nearest valid 1 NM integrator value, or the average of two adjacent values. Target species of the same genus are not acoustically distinguishable, and the s_A values were therefore split according to the relative distributions of the two species in each length group based on trawl catches. The total number of fish in each length group was estimated as:

$$\rho_i = \frac{< s_A > t_{i,j} \cdot u_i}{\sum_i \frac{u_i}{C_{Fi}}} \cdot A_s = \frac{10^{7.2} \cdot t_{i,j} \cdot u_i \cdot < s_A > \cdot A_s}{4\pi \sum_i u_i \cdot (L_i + 0.5)^2} \qquad (4)$$

where: ρ_i = estimated number of fish in length group i
$<s_A>$ = mean recorded area backscattering coefficient (m^2/NM^2)
$t_{i,j}$ = proportion of species j in length group i
u_i = proportion of sampled fish in length group i
A_s = horizontal area of stratum s
C_{Fi} = conversion factor for length group i
L_i = length group i (nearest full cm below total length)
$L_i+0.5$ = mean length in L_i.

The above equations show that the conversion from s_A-values to number of fish is dependent on the length composition of the fish. It was therefore important to get representative length distributions from the key species groups in the whole distribution area.

When the size classes (of e.g. young fish and older fish) were well mixed, the various length distributions were pooled together with equal importance. Otherwise, when the size classes were segregated, the total distribution area was post-stratified, according to length distributions, and separate estimates were made for the strata containing fish with equal size.

For a stratum representing a distribution of a target group, the following basic data are needed for the estimation of abundance;

1) The average s_A-value for the region,

2) The surface area (usually square nautical miles, NM^2), and

3) A representative length distribution of the fish in the region.

If the targeted fish was a mixture of more than one species, for example sardinellas, representative distributions of all the species within the stratum, as shown in the trawl catches, was used. Length distributions representing the various species for each catch was calculated and normalized to a unit number (usually 100). These were then averaged without weighting. Very small catches (normally less than about 20 fish) were not included. The total catch of each species from all the trawls in a stratum was used as a proxy for estimating the proportion of the total biomass of each species present. While it is recognised that catch is a poor indicator of relative abundance, especially for pelagic fish, no other method is accessible from the data available.

The process followed was therefore to

a) divide the s_A-value between groups of fish and/or species,

b) produce pooled length distributions of a target species/category for use in the above equation and

c) calculate the biomass estimates for a region, using the following procedure:

- The length-frequency samples of the species in the category were respectively pooled together with equal importance (normalized).
- The mean back scattering strength (ρ/s_A) of each length frequency distribution of the target group/species was calculated and summed. This was automatically done in the Excel spreadsheet made available for acoustic abundance estimation on board R/V *Dr Fridtjof Nansen*.
- The pooled length distribution was used, together with the mean s_A-value, to calculate the density (numbers per square NM) by length groups and species, using the above formula.

The total number by length group in the area was obtained by multiplying each number by the area.

- The numbers were then converted to biomass using the estimated weight at length.

However the combination of low s_A value recorded few PEL1 and PEL2 in the bottom trawl catch and few pelagic trawls made the splitting by length groups unreliable. Therefore a theoretic mean length of 10 cm was used to convert the s_A values by stratum to number of fish.

2.12.5 Swept area density calculations

Originally there was an intention to determine swept area biomass for the demersal resources, the trawls were so few and so far apart with uneven representation across depth strata and contrasting habitats of the KZN coast that it was decided to avoid misrepresentations that would have been introduced by attempting biomass estimates. As an alternate measure, nominal densities (kg/nm^2) were calculated based on trawl swept area. The use of densities rather than biomass also eliminates biases introduced by not using species-specific catchability parameters which may vary widely between species.

Swept area (a) was estimated by:

$$a = (V * t) * E$$

where V = velocity of the trawl over the ground when trawling (nm/h), t = time spent trawling (h), and E = effective net width (converted to nm). Thus the area swept by the trawl net during 30 minutes trawl time with an average horizontal trawl opening of 18.5 m effective net width (see above), at a speed of 3 nm/h (knots), would be 0.015 square nautical miles. Trawl velocities and time spent trawling were used as recorded on the trawl sheets. Total trawled areas for each depth stratum are presented in Table 4. Nominal densities were determined by dividing the catch weight by total swept area.

Table 4. Areas in nm^2 used to estimate density for different depth strata.

Depth stratum (m)	**Area trawled (nm^2)**
101-200	0.048735
201-500	0.071268
20-50	0.097612
51-100	0.033642
Total	**0.251257**

CHAPTER 3. RESULTS – OCEANOGRAPHY

3.1 Underway sampling

Underway monitoring and sampling from the onboard thermosalinograph occurred throughout leg 1.1 from 19 January 2018 to 07 February 2018. The weather station was not working properly so we do not present data for atmospheric conditions of incoming solar radiation and wind vectors.

3.1.1 Thermosalinograph- near surface conditions

Data was recorded from the thermosalinograph on board to monitor the temperature, salinity, and chlorophyll readings throughout leg 1.1 at 5 m depth. Due to coastal upwelling, temperature and salinity are depicted having relatively low levels near Cape Town with slightly higher levels of chlorophyll. Temperature and salinity levels begin to increase as the ship moved up along the East African Coast. Salinity readings dropped significantly at the outlet of the Mzimvubu River, which is most likely a result of fresh water flowing into the ocean (Figure 10).

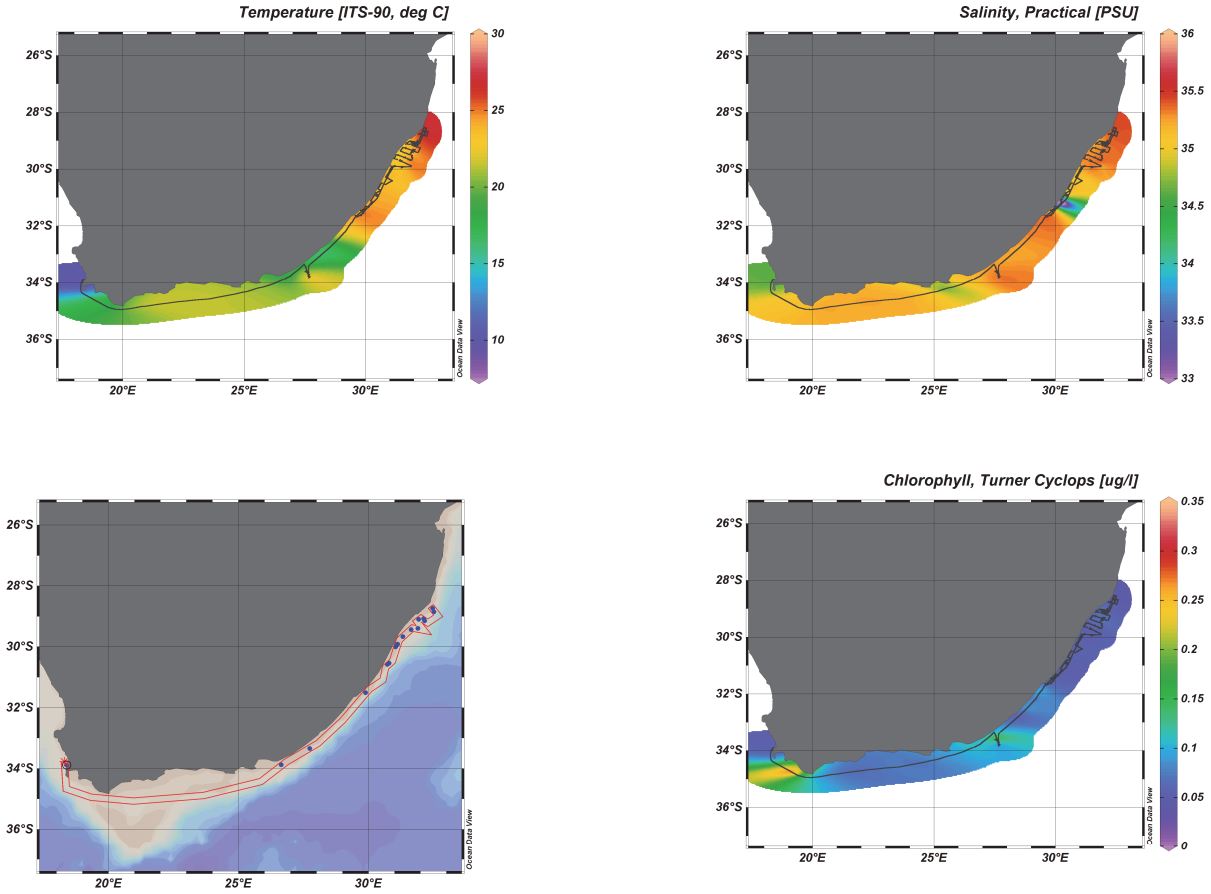


Figure 10. Temperature, salinity, and chlorphyll readings along the South African coast from the thermosalinograph. The cruise track and stations where readings were taken are also shown.

3.1.2 ADCP current velocity

The vessel-mounted Acoustic Doppler Current Profiler or s-ADCP measures the speed, ocean circulation and direction of ocean currents using the principle "Doppler shift" or "Doppler effect". The *Dr Fridtjof Nansen* is equipped with two vessel-mounted ADCPs, 75kHz and 150kHz. The data collected by the ADCP was processed using the Common Ocean Data Access System (CODAS).

The continuous vertical profiles of currents measured by the Acoustic Doppler Current Profiler (ADCP) 75 kHz narrowband shows that off Durban, there is a steady northeast current of about 0.6m/s reaching a depth of 800 meters off the shelf. In contrast towards the southern limit of the KZN Bight shelf (31.5°E) a rapid flow of around 1.6 m/s is apparent with a gradual decrease as depth increases beyond 300 metres. These two currents flow simultaneously in opposite directions with the latter moving in a south-westerly direction.

North of Durban the north-easterly "coastal current" loses momentum moving at a speed of about 0.3m/s while further off the shelf the initially stronger current is staying constant at 1.5 m/s at a depth of 200 metres.

Between Durban (30^{o}S) and Richard Bay (29°S) the south-westerly current becomes more prominent reaching speeds of 2 m/s at depths greater than 850 metres. The coastal current, although much slower (less than 0.5 m/s) reaches a distinct depth of greater than 600 metres. As observed this strong dominant south-westerly current referred to as the Agulhas current is well documented and is the Western Boundary Current of the South Indian Ocean. Values of speeds and depths observed are relatively common with extreme cases of current speeds reaching 3 m/s and to depths of 2 km.

Note that data collected by the ADCP have not been corrected with regard to the direction of the vessel. This must be done before further analyses.

3.2 Hydrography

Hydrographic parameters were monitored at 71 stations throughout leg 1.1a and b (Table 5). The CTD and additional sensors mounted on the 12-bottle rosette collected vertical profiles for conductivity (salinity), temperature, pressure (depth), oxygen, fluorescence, and photosynthetically active radiation. In addition to the sensor created profiles, water was collected at various depths during the entire ASCA transect and at the previously defined super-stations every 60 nm. At these super stations, water was collected for the analysis of dissolved oxygen, pH, total alkalinity, salinity, and nutrients. The ASCA transect also collected water for dissolved inorganic carbon measurements to be performed in Cape Town. Chlorophyll-*a* samples were measured on board during the ASCA transect and only collected at the northern most super-station transect on Leg 1.1b as a result of an oversight by the CTD lab. Additional hydrographic monitoring was requested to coinside with the grab work being perfomed on the benthic transects. Therefore, water was also collected at bottom depths for dissolved oxygen, pH, total alkalinity, salinity, and nutrients. All collected parameters between Durban and Maputo were analyzed on board except for nutrients and chlorophyll-*a*.

Nutrients and chlorophyll-*a* samples were sent back to IMR for analysis. The plots in Figure 11 and Annex IV depict hydrographic conditions on a transect near 29.5˚S (Figure 2c) were chosen to show here because of the large amount of data collected from its seven stations.

Before and after the seven ASCA transect stations (Leg 1.1a), additional samples were collected from the underway system on board the vessel. Fifteen underway samples in total were collected for the analysis of pH, dissolved inorganic carbon, total alkalinity. See also Annex V.

Table 5. Quantity of samples collected for hydrographic parameters.

Survey area	No. of sampling stations	No. of nutrient samples	No. of pH/ Alk samples	No. of DIC samples	No. of Chl.A samples	No. of Oxygen samples	No. of salinity samples
Leg 1.1a	7	51	58	58	46	19	21
Leg 1.1b	64	157	136	0	17	86	127
Total	71	200	194			105	148

3.2.1 Temperature

Along the selected transect near 29.5˚ S, much warmer surface waters were observed troughout the transect while the temperature gradient was large as waters cooled to almost 5˚C at 800 m depth.

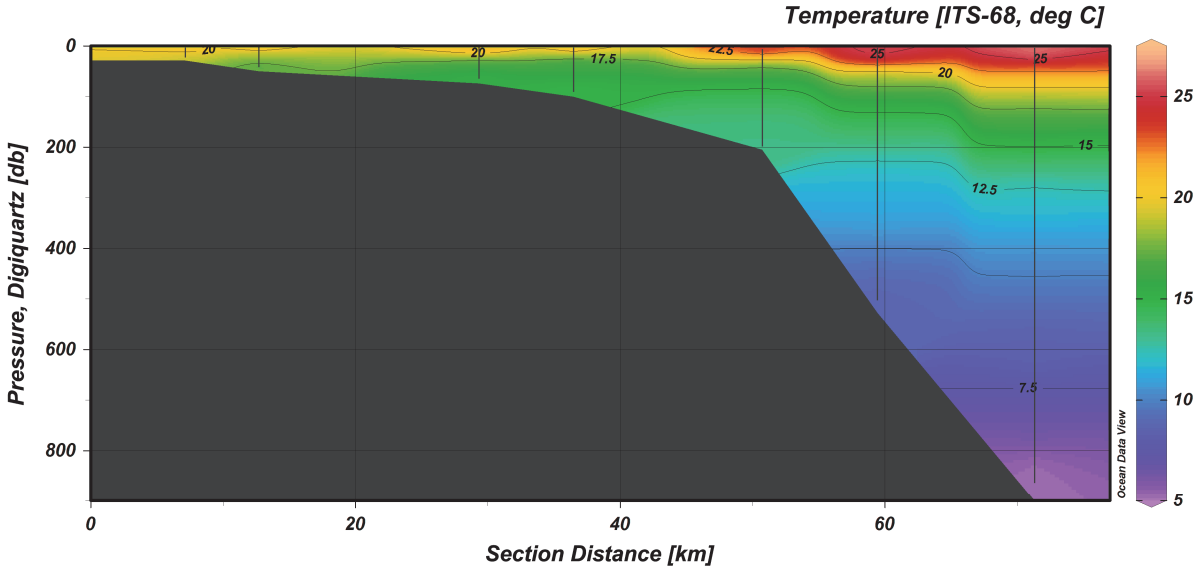


Figure 11. Cross section of the temperature distribution during the transect near 29.5˚ S.

3.2.2 Salinity

Annex IV depicts the salinity distribution along the selected transect near 29.5˚ S. The salinity ranges from 34.5 to 35.6 and remains consistent with its vertical distribution.

3.2.3 Oxygen

Annex IV depicts the oxygen distribution along the transect near 29.5˚ S. The transect provided much lower oxygen levels higher up in the water column and even depicted a double oxygen minium. High oxygen levels were observed at the surface 45 km to 80 km from the coast.

3.2.4 Fluorescence

Annex IV depicts the fluorescence along the selected transect near 29.5˚ S. Fluorescence levels are relatively low, although some detection was observed about 50 km from the start of the transect.

3.3 Phyto and zooplankton samples

Samples containing phytoplankton and zooplankton were collected using a suite of different plankton nets, sea state and weather permitting, as described in sections 2.5–2.7, and shown in Figure 2. At CTD station 44 (PL99) the phytoplankton net tore almost completely off above the collar connecting to the cod-end, so no sample was collected. The net end was tied with a cord at CTD stations 56 and 58 so that the sample could be rinsed into a bucket and subsequently preserved, but the conditions were too rough for sampling this way at station 46, as the crew were concerned the cod-end section would tear off completely. At station 59 the cord would no longer stay fastened, so no sample was obtained.

- Phytoplankton net (10 µm) – vertical haul (only at super-stations)
- WP2 net (180 µm) – vertical hauls (only at super-stations)
- Multinet (5 x 180 µm) – oblique tow (at all stations except along Durban transect)
- Bongo net (2 x 200 µm) – vertical haul (along Durban transect only).
- Bongo net (2 x 500 µm) - oblique tow (at all stations)
- Manta trawl (335 µm) – surface tow for 15 mins (at all stations)
- Ring net (500 µm) – near-surface tow for 5 mins (from Durban transect onwards)

In addition to the net sampling, samples for microzooplankton analysis were collected from the CTD along the Durban and St Lucia transects. Five litres of water from both the surface and f- max were passed through a 200 µm mesh and collected on a 20 µm mesh to obtain the 20 - 200 µm size fraction, which was preserved with formalin (3.5% final solution) and frozen at -20°C for later analysis at DEA using the FlowCAM.

A total of 16 microzooplankton, 10 phytoplankton and 170 zooplankton samples were collected during the survey (see Table 6). These samples will be analysed later by South African institutions and the results reported separately. Interesting observations from the manta trawl during the survey, in addition to the typical neustonic members *Physalia*,

Porpita, *Velella* and Pontellid copepods, were dense concentrations of the copepod *Temora* sp. inshore off Port St Johns, high abundances of pteropods in general and *Creseis* sp. in particular, and high abundances of late-stage phyllosoma larvae at stn 56 south of Richards Bay. Sapphirinid copepods were also commonly observed. Some examples of the zooplankton community collected are shown in Figure 12.

Table 6. Summary of stations where samples of phyto- and zooplankton were collected.

Date	Transect	CTD STN No.	Lat	Long	Sounding [m]	Microzoo (20-200 µm) Jar #	Phyto (10 µm) upper 30 m PL #	WP2 1: (180 µm) upper 200 m PL #	WP2 2: (180 µm) upper 30 m PL #	V Bongo (200 µm) upper 200 m PL #	Multi (180 µm) upper 200 m PL #	Multi (180 µm) # nets opened	O Bongo (500 µm) upper 200 m PL #	Manta (335 µm) surface PL #	Ring net (500 µm) near-surface PL #
27-Jan-18	SS1	13	-31.51	29.89	98		10	11	14		19	3	17,18	12,13	15,16
28-Jan-18	SS1	16	-31.45	29.80	32		20	21			23	3	26	22,24	25,27
28-Jan-18	Protea	25	-30.91	30.50	643						29	5	31	28,30	
28-Jan-18	Protea	26	-30.89	30.47	82						33	3	35	32,34	
28-Jan-18	Protea	28	-30.86	30.40	30						37	1	38	36,39	
29-Jan-18	SS2 deep	29	-30.41	31.10	1054						40	5	43	41,42	
29-Jan-18	SS2	30	-30.35	30.96	493		44	45			52	5	49	46,47	49,50
29-Jan-18	SS2	32	-30.31	30.88	94		53	54			56	3	58	55,57	59,60
29-Jan-18	Durban	34	-29.90	31.06	26	22,23				61			63,64	62,65	66
29-Jan-18	Durban	35	-29.91	31.14	106	24,25									
29-Jan-18	SS2	37	-30.29	30.82	34		67	68			70	1	72		69,71
30-Jan-18	Durban	38	-29.90	31.14	104	26,27				73			75	74,76	77,78
30-Jan-18	Durban	39	-29.90	31.17	201	28,29				79			80	81,82	83,84
30-Jan-18	Durban	40	-29.91	31.55	509	30,31				85			87	86	
31-Jan-18	SS3	41	-29.49	31.27	29		91	92			94	1	97	93,95	96,98
31-Jan-18	SS3	44	-29.58	31.56	100		99	100	101		103	4	104	102,105	106,107
31-Jan-18	SS3	46	-29.66	31.78	524			108	109						
31-Jan-18	SS3 deep	47	-29.68	31.91	1005						110	5	111		
03-Feb-18	N of Tugela	53	-29.12	31.75	34					112					
03-Feb-18	SS4	56	-28.75	32.21	32		114	113			116	3	118	115,117	119,120
03-Feb-18	SS4	58	-28.78	32.32	99		121	122	123		125	3	126	124,127	128,129
03-Feb-18	SS4	59	-28.80	32.38	512		130	131	132		134	5	138	133,135	136,137
04-Feb-18	SS4 deep	60	-28.84	32.53	1021						140	5	139	141,142	143
04-Feb-18	St Lucia	61	-28.53	32.41	30	32,33					145	1	147	146,148	
04-Feb-18	St Lucia	62, 63	-28.54	32.47	199,192	34,35					150	5	154	151	152
04-Feb-18	St Lucia	64	-28.55	32.51	511	36,37					155	5	156		
05-Feb-18	ad hoc	69	-28.66	32.36	59									157,158	159,160
06-Feb-18	ad hoc	71	-29.03	31.85	34									161.162	163, 164
TOTAL						**16**	**10**	**11**	**5**	**5 x 2**	**19 stns**	**66**	**23 x 2**	**21**	**17**

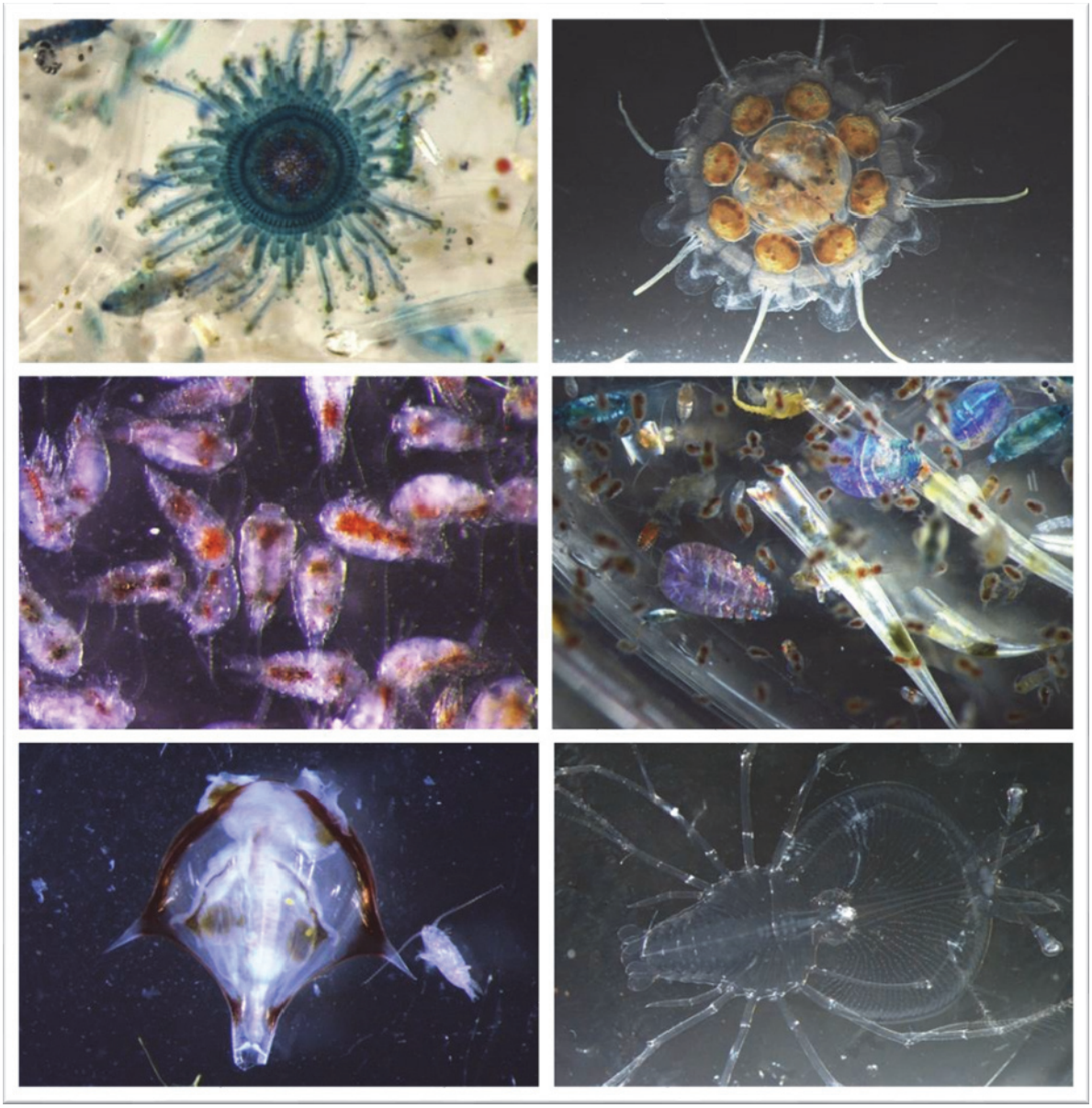


Figure 12. Examples of some of the zooplankton collected during the survey. Top left: the colonial hydrozoan *Porpita porpita* ("blue button"*);* Top right: unknown hydromedusa; Middle left: the copepod *Temora* sp.; Middle right: mixed zooplankton including copepods *Sapphirina* sp., *Temora* sp. and Pontellidae, and pteropods *Creseis* spp.; Bottom left: pteropod *Diacria* sp. and a calanoid copepod; Bottom right: phyllosoma larva. Image credits: Jenny Huggett, Anja Alvestad, Steven Weerts, Johan Groeneveld.

3.4 Fish eggs and fish larvae

Oblique bongo net (500 µm-mesh) tows to collect fish eggs and larvae were conducted at 23 stations, 10 of which were super stations. Samples from one of the nets (the one fitted with the flowmeter) were rinsed into a sorting tray to check for the presence of fish larvae. All fish larvae visible to the naked eye were removed from the total sample, placed in fresh water, and photographed using a camera attached to a stereomicroscope. Images were taken of each fish larva, including with a graduated background (laminated graph paper) to facilitate length measurements. Larvae were then preserved in a separate jar per station, in 5% formaldehyde

(10% formalin). Fish larvae were extracted and photographed at 6 of the super-stations (32, 41, 44, 56, 58, 59) and at 2 other stations (28, 60). Some examples of fish larvae found during the survey are shown in Figure 13.

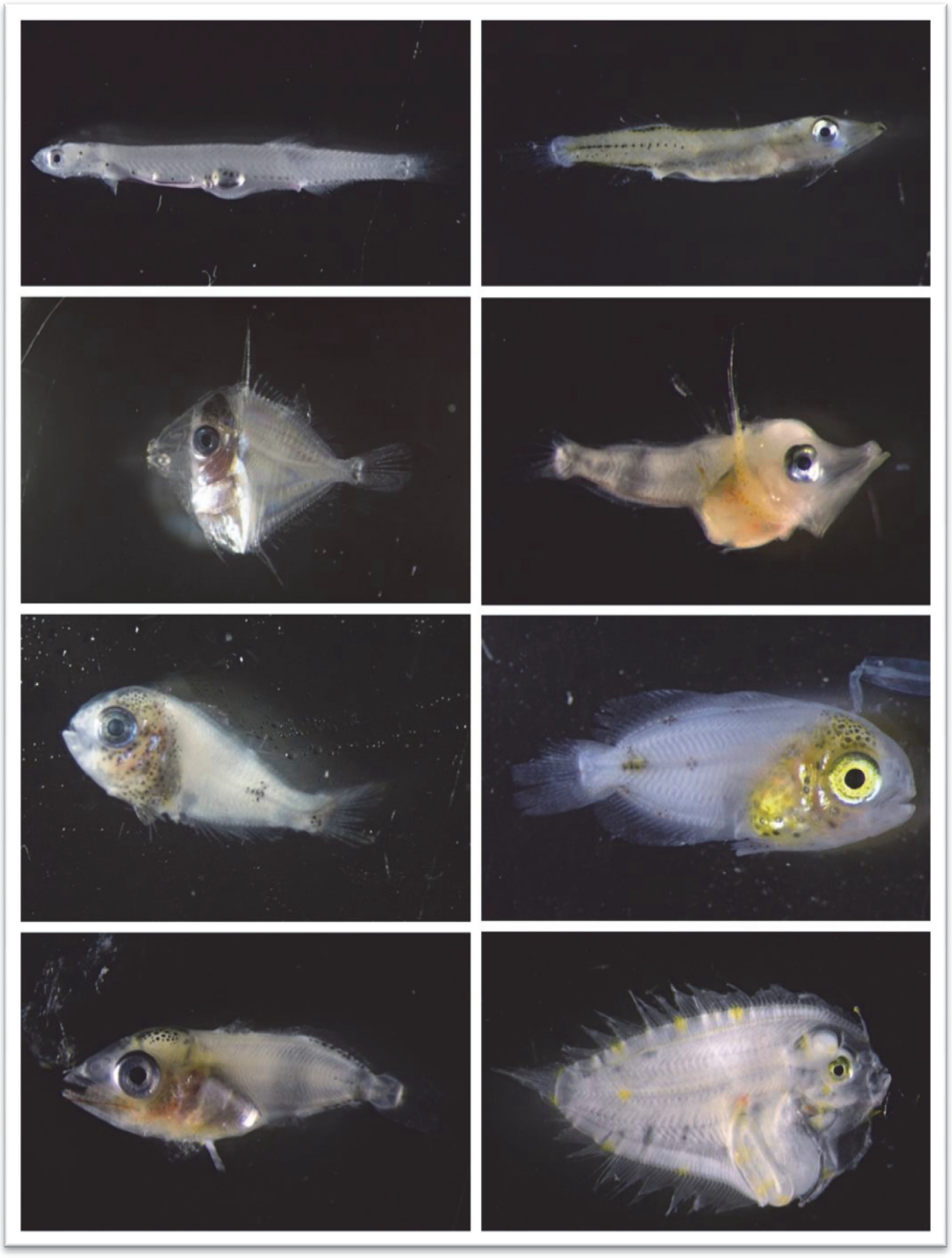


Figure 13. Some examples of fish larvae collected with the Bongo net (500 µm oblique tow) during the survey. Image credits: Anja Alvestad, Steven Weerts, Jenny Huggett, Riaan Cedras.

3.5 Microplastics and debris

3.5.1 Surface Microplastics

Surface sea water was collected to determine the concentration and extent of microplastic (microfiber) pollution. At 38 stations, 6 litres of surface sea water was filtered through 1.2 µm reinforced glass fibre filters. Upon non–aided visual inspection, the presence of small blue and yellow micro–pellets and black strands were seen on some of the filters (see Figure 14 as an example). Filters will be analysed by microscopy at UKZN for more detailed inspection of plastic contamination.

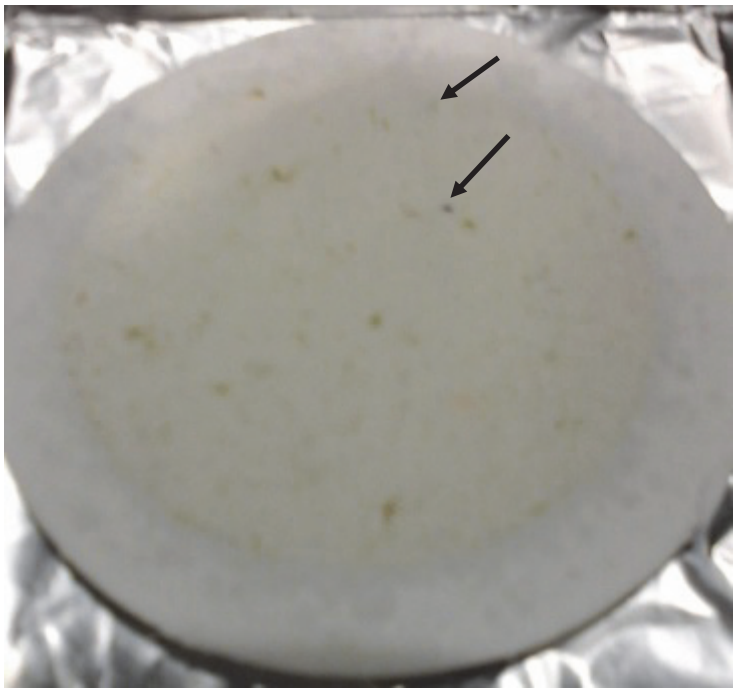


Figure 14. Surface particulates from 6 litres of sea water captured onto a glass fibre filter (1.2 µm). The yellow spots are either plastic pollution or concentrated phytoplankton cells and will be tested in the laboratory. The blue spots (pointed out) are most likely microplastics.

3.5.2 Benthic Microplastics

From each benthic grab, a run off sample was collected for possible microplastic presence. It is believed that within the benthic environment microplastic size is beyond non–aided visual inspection and will require microscopy analysis. Fifteen samples were collected for benthic microplastic determination at UKZN.

3.5.3 Fish Micro- and macroplastics

From each benthic trawl, at least 5 individuals of the most common species of fish were collected. The gastro intestinal tract and gills (if present) will be examined at UKZN for the presence of microplastics. It is unknown how many samples have been collected (2 collectors), but it is believed that the sample quantity is representative of the most common

species caught. When some of the trawls were being brought aboard, the presence of macroplastic pollution was present within the net, including an old crayfish trap and a whole intact plastic shopping bag (see Figure 15 for examples). The shopping bag's thickness and discolouration suggests it has been in the sediment for some time. Sediment samples (15) were also collected from the benthic trawl by means of attached metal cylinders which collected surface sediment over distance.

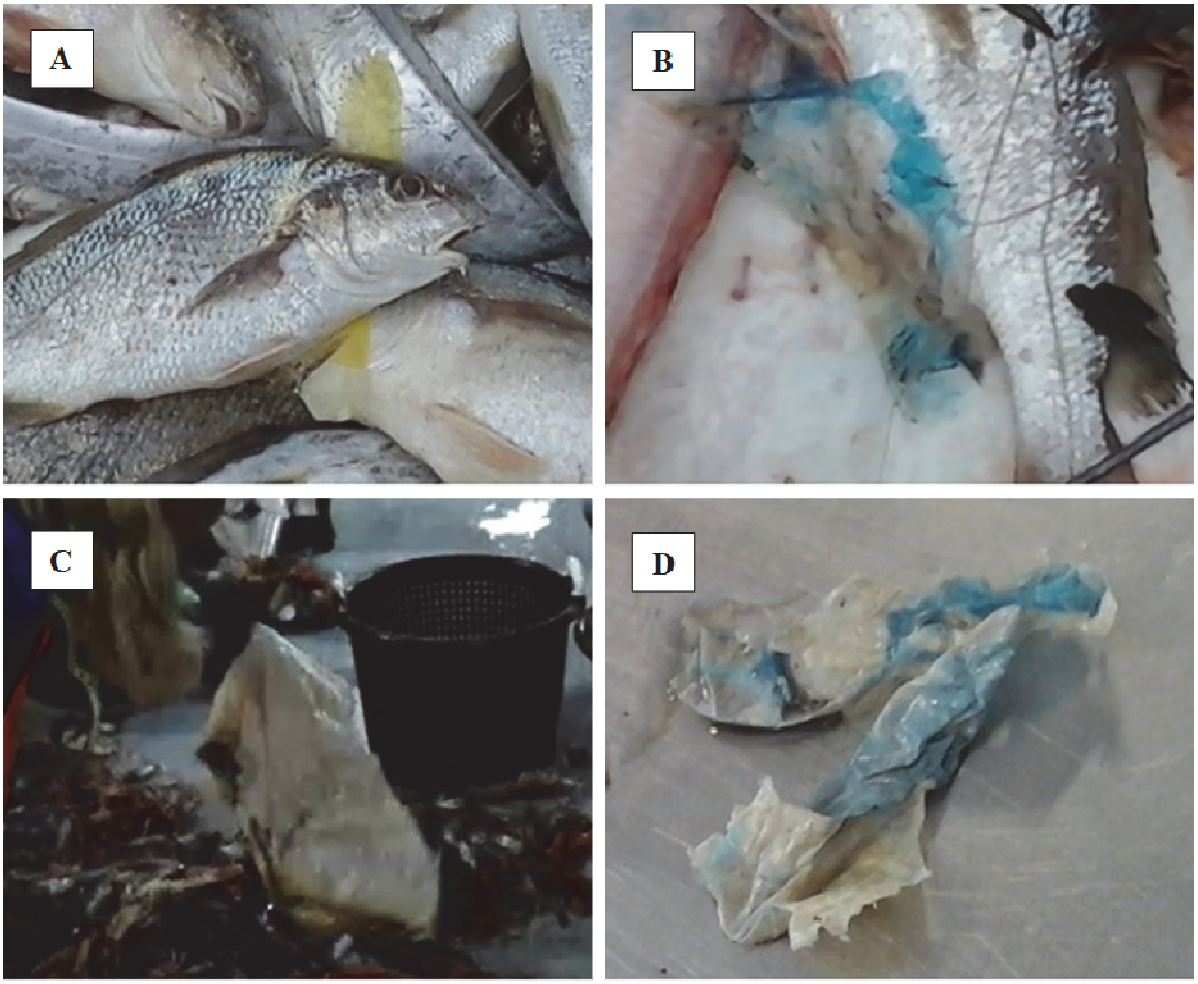


Figure 15. Macroplastics collected from benthic trawls. A, B, C and D were from the same trawl with C showing the whole plastic shopping bag.

3.5.4 Manta Trawl Microplastics

Microplastics were sampled at the surface using the Manta Trawl Net - a total of 21 trawls were deployed on Leg 1.1b, of which were super sampling stations that were sampled for microplastics. All 10 stations had visible microplastic particles (Table 7, Figure 16).

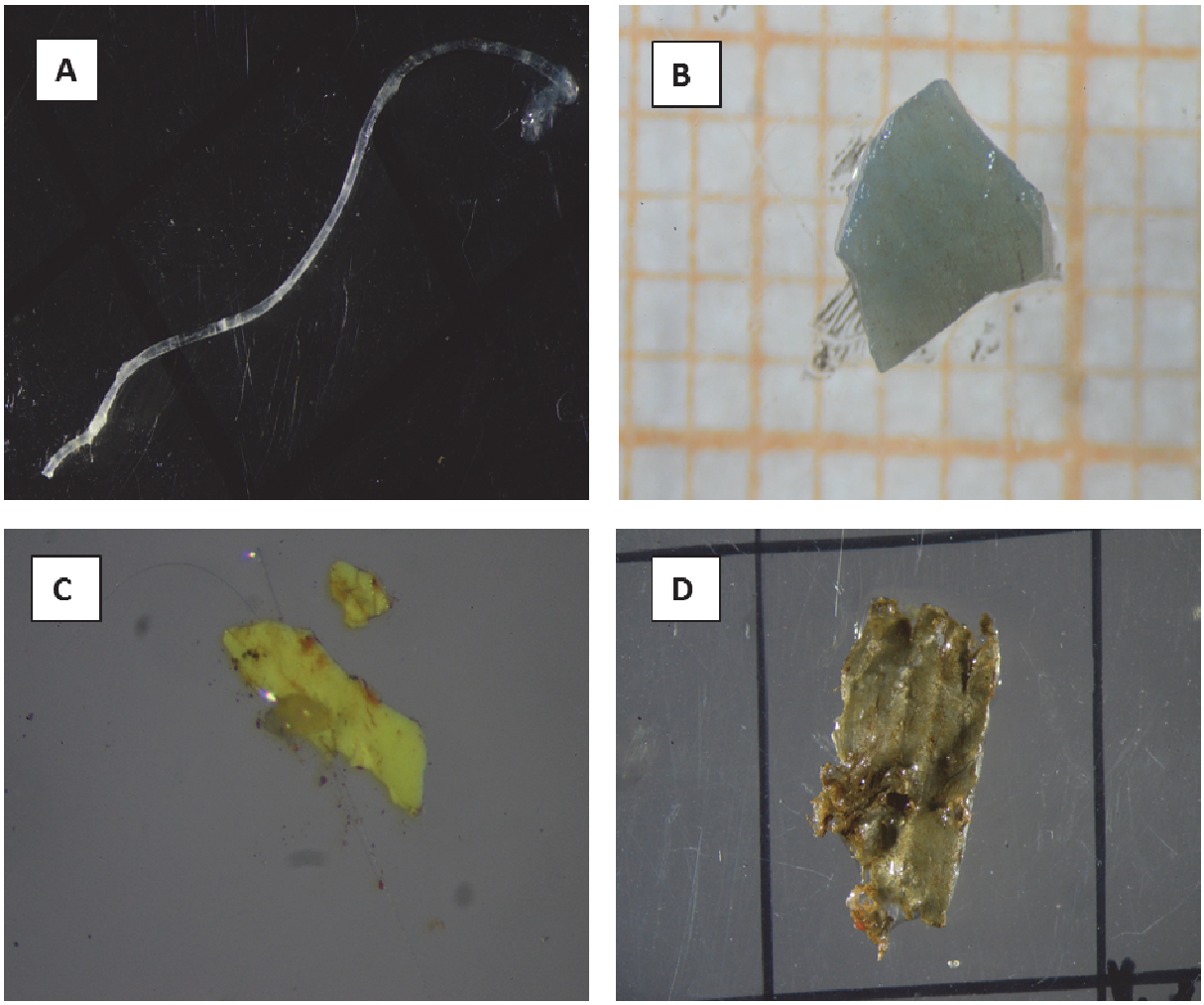


Figure 16. Microplastics collected from manta trawl stations 59 (A), 58 (B), 56 (C) and 32 (D) during January - February 2018.

Table 7. Summary of manta trawl stations for microplastics.

Country	No. of sampling stations	No. of samples with visible microplastics	Total no. of plastic objects	No. of samples preserved in formaldehyde	No. of samples preserved by freezing
East coast South Africa	10	10	40	0	9

3.6 Sediment sampling and macrobenthos

Sixty grabs were deployed from 27/01/2018 to 6/02/2017 at 17 stations, at a depth range of 20 - 860 m from Mzimvubu Transect to St Lucia lighthouse. Not all stations were fully replicated. Samples will be processed at ORI. Although three replicate samples are required per station for habitat characterisation, this was not always possible. In particular, deepest stations (<500 m) were sampled once due to time constraints in grab deployment and retrieval. All sampling was conducted during daylight hours, except at stations 500 m and

deeper where diurnal effects of fauna exiting burrows to forage are not an issue. Pictures of the sediment sampling is shown in Figure 17.

Figure 17. Pictures of the sediment sample processing and examples of organisms picked from the KwaZulu-Natal shelf and deep macrobenthos survey.

The Durban transect was most fully sampled at ca. 20 m, 100 m, 200 m and 500 m. Unfortunately, replicates collected at station 500 m were not fully representative of the station selected, being up to 6 km apart in the case of the most separated successful grabs. The Mzimvubu transect had three stations at ca. 20 m, 100 m, 500 m and the Thukela transect was

least well sampled; at 20 m and 500 m only. In all cases the 20 m station was not in the original sampling plan, but adds value to near-coast stations that exist. Overall, some new information was gathered at each of the three transects and extra opportunities were exploited to cover some never-before sampled areas off Nhlabane Estuary and just south of St Lucia, in two additional transects. More inshore sampling was conducted than envisioned; and no stations were sampled at 1000m due to strong current and wind conditions for the duration of the cruise. In a first for grab sampling for infauna community analysis, a single station (Grab 26) was sampled at a record depth of 860 m north of the Durban transect, off the uMhlali coast, extending out from the coast-perpendicular to the transect of demersal trawls No. 9 (inshore ca.55 m) and outer shelf No. 10 (130-144 m). Sediment samples were not successful at Station No. 9 but the trawl community was typical of a fine-medium sand bottom type (*Pagellus natalansis, Pomadasys olivaceus*, several flat fish species, and *Astropecten* starfish). Station No. 10 had very fine sand, fine, dark brown grey sand, mud, no bioclastics and no detritus at 130-144 m. Off the shelf at 860 m, the sediment was sticky dark brown/grey mud, rich in Foraminfera and finely crushed bioclastic material. Once analysed, the information will contribute to the description of sea floor habitats in the area.

3.6.1 Habitat assessment

In addition to the community assessments of each station, the information will be integrated with the surrounding environmental conditions. At each grab station a CTD was deployed with bottom water collected for nutrient, pH and carbonate chemistry. Multibeam surveys were passed over each station with backscatter collected and sub-bottom profile information stored. No detailed mapping was conducted over grab stations.

Records of all stations, sieve sub fractions and method of fixation/short-term storage are collated in Annex IX.

3.7 Bottom Mapping

Continuous recording of the seafloor depth was made whilst underway. In addition, several areas of interest were mapped in detail in a grid fashion. In deeper water, the EM302 swath was sufficient to cover areas on the upper to mid slope up to 5 km in width. This allowed for almost complete visualisation of a number of unknown landslide scarps, canyon head and slope gully systems. A number of impressive canyons were mapped en route from Port St John's, on the more seaward transit lines. These include the shelf-breaching canyon of the Mzimbuvu River at Port St John's, together with the associated slope-hosted canyons to the north, in the Pondoland area (Figure 18a). A special transect was made over the Margate Canyon, associated with the Protea Banks reef system of the Port Shepstone shelf region (Figure 18b). The canyon breaches the shelf, with multiple landslides in the head that form interlinked arcuate lobes. The canyon is a linear feature on the upper slope, but becomes markedly sinuous in the mid-slope where it widens.

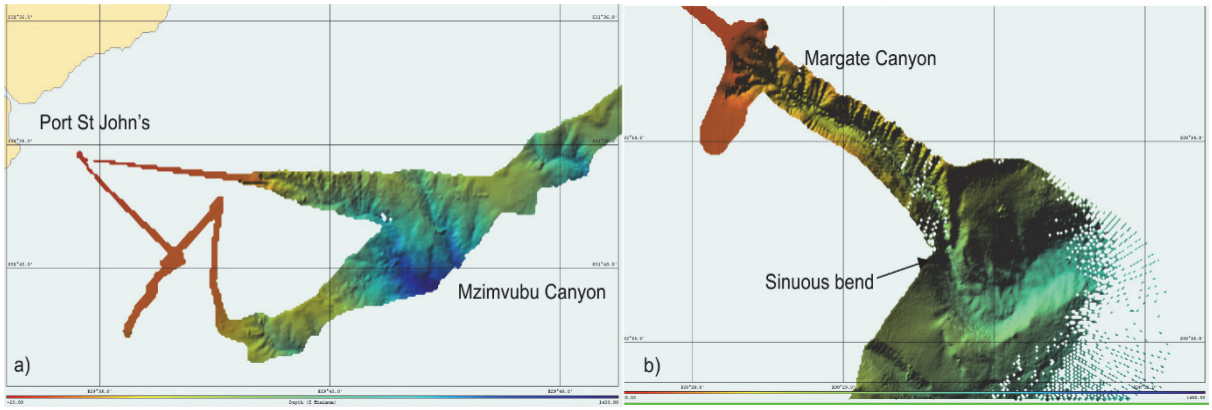


Figure 18. Multibeam blocks surveyed whilst in transit offshore a) Port St Johns/Mzimvubu River and b) the Margate Canyon.

Several new submerged shorelines were mapped offshore of the south coast of KwaZulu-Natal for the first time and highlight areas of interest for further mapping studies. These are particularly high-relief features, with thick impoundments of sediment to either side. Some of these have trapped migrating dune fields to seaward, causing an unusually thick accumulation of Holocene sediment on the seaward facing margin (Figure 19).

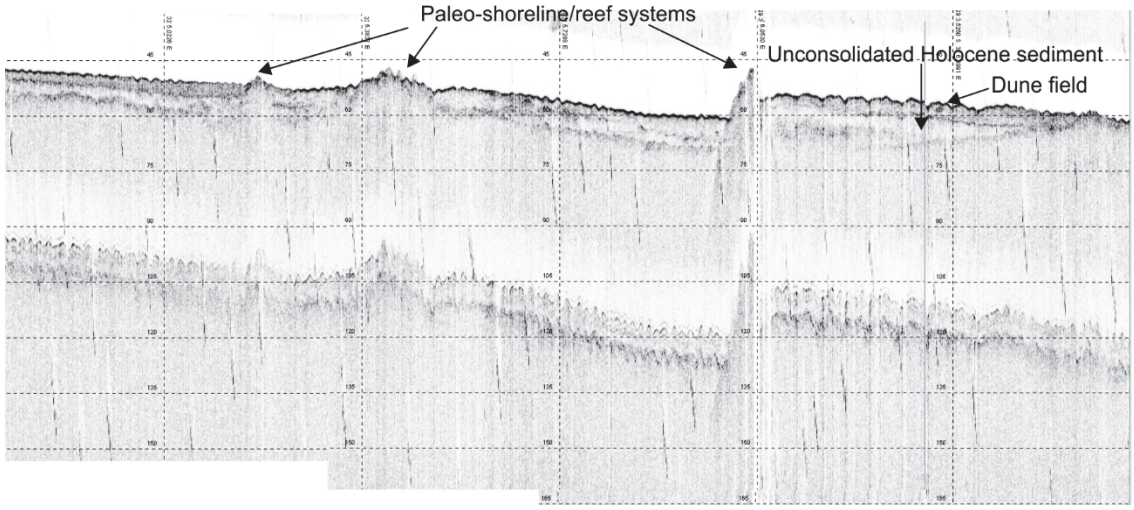


Figure 19. Topas sub-bottom profile from the SBP300 system, showing a 10 m high palaeo-shoreline/reef, backed by smaller features, and fronted to seaward by a thick sediment comprising a migrating subaqueous dune field.

The special transect off Durban revealed a relatively featureless seafloor. At depths of 350 – 450 m, some irregular topography is formed by bedrock outcrop. Poor sea conditions made interpretation of the record further seaward more difficult, and until these data are processed at UKZN, an account is not possible to be made.

Several small slope rills were mapped between Durban and Sheffield Beach, with the head of the Thukela Canyon being, for the first time, definitively mapped at a water depth of 738 m. A larger, unknown canyon-rill system was mapped to the north, offshore the Thukela area at

29.4000108° S; 32.1638944° E. These canyons are associated with several landslide scarps at the shelf edge (Figure 20a). A dedicated block was mapped on the upper slope and outer shelf of the area (Figure 20a). This revealed spectacular reef systems arranged in a coast parallel manner. These are remnants of old palaeo-shorelines, with a series of suspected prograding beach ridges, backed by large relict parabolic dunes drowned in situ from a phase of rising sea level (Figure 20b). The reef system extends from the shelf edge to ~ 60 m, and is marked by little to no sediment cover and implies a once extensive dune system that occupied this area, in stark contrast to the modern coastline of today.

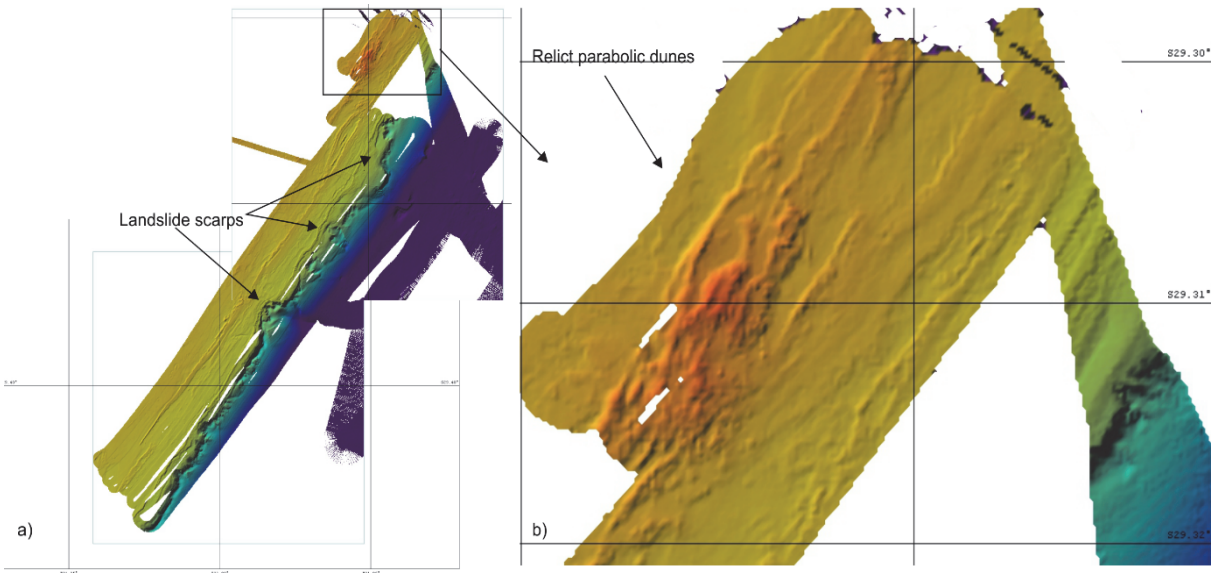


Figure 20. Detailed multibeam block offshore the Thukela River with a) Overall coverage showing landslide scarping of the upper shelf and b) the arcuate ridges and relict parabolic dunes of the palaeo-shoreline reef complex at ~ 70-60 m depth.

Another focused survey between depths of 300 m and 55 m was undertaken offshore the Mlalazi/Mtinzini area (Figure 21). This revealed a flat shelf with sparse sediment cover, interspersed by coast parallel ridges ~ 10 m high in relief. Where ridges are particularly prominent, localised gravel patches occur in association. The flat outer shelf backs a very steep, landslide-modified shelf edge that consists of a near vertical scarp ~ 100 m high. Mass wasting features are evident seaward of this ledge at ~ 600 m depth (Figure 21).

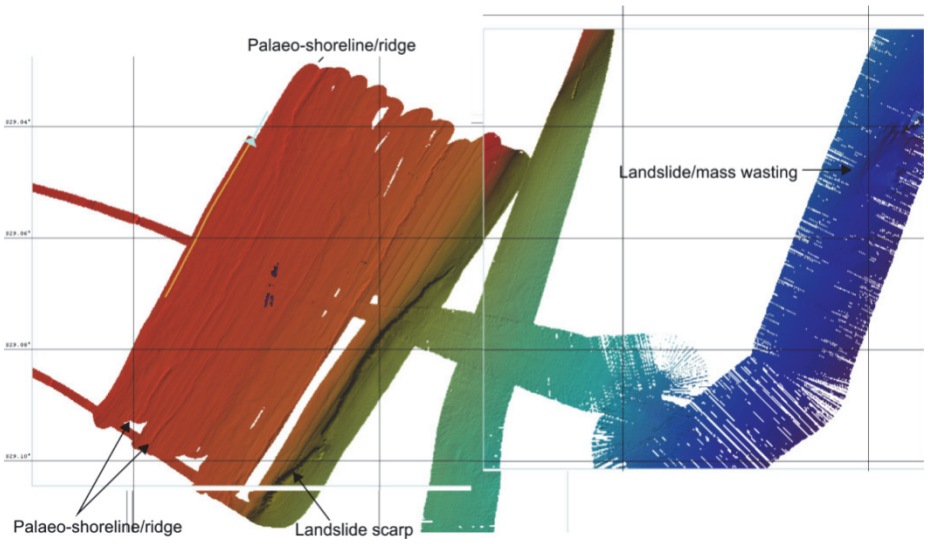


Figure 21. Detailed multibeam block offshore the Mtzinzini/Mlalazi area. Note the long coast-parallel seafloor ridges correpsondng to palaeo-shorelines and the steep shelf edge marked by a cliff/landslide scarp.

The northern-most focused survey offshore Richards Bay revealed a much narrower shelf, with a very rocky upper slope (Figure 22). The shelf is dominated by a spectacular submerged palaeo-shoreline/reef complex at 60 m depth. This appears to form part of an old lagoonal system that was submerged and left stranded on the shelf by rising sea level. This is now backed by very large and unusually high subaqueous dunes which reach almost 10 m in amplitude from crest to trough. These are orientated north-south with the prevailing Agulhas current of the area. Further analyses will be undertaken by the geology department of UKZN.

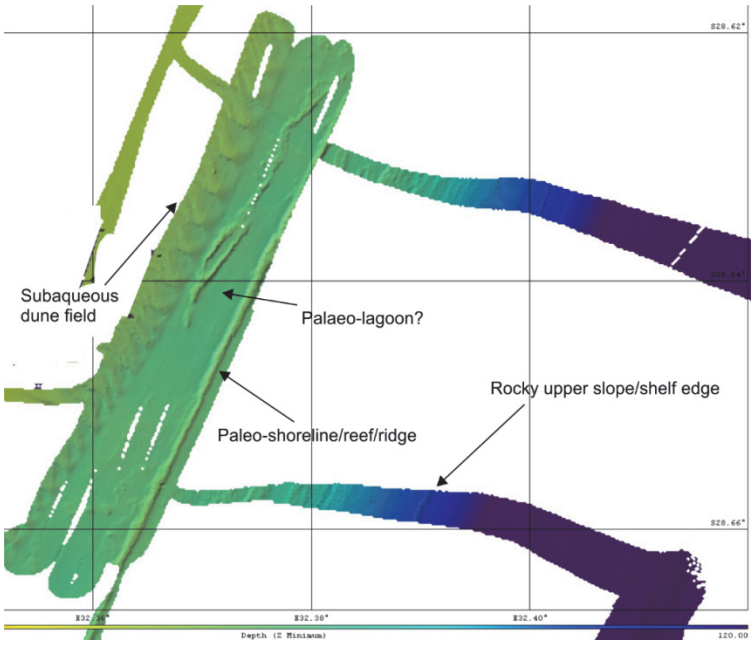


Figure 22. Detailed multibeam block offshore of Richards Bay showing a rocky outer shelf/upper slope, a well-developed palaeo-shoreline and large subaqueous dunes. A palaeo-lagoon is suspected to have formed behind the seaward most ridge.

3.8 Nutrition and food safety

Table 8 shows the number of samples taken for the different kinds of analyses of fish for food safety and nutrition. The analyses will be carried out at Institute of Marine Research in Bergen, Norway. Typical analyses will include:

Nutrients: Energy, water content, total fat, proteins, ash, fatty acids, cholesterol, vitamins (D, A, B12,), iodine, selenium and other minerals. Samples will be stored pending budget for analysis of amino acids and other vitamins.

Contaminants: Analyses of heavy metals will be carried out by IMR. Samples will be stored pending budget for analysis of inorganic arsenic, methyl mercury, PCB, dioxins, furans, PBDE, pesticides, and PAH.

Table 8. Number of samples taken for the different kinds of analyses of fish for food safety and nutrition for a) big fish and b) small fish.

a)

DATE	SPECIES	NUMBER OF FISH	JOURNAL NO.	TISSUE	FREEZE-DRIED SAMPLES	STATION NO.
29.01.2018	POLYSTEGANUS CAERULEOPUNCTATUS	6	2018-68	FILLET AND LIVER	7	3
30.01.2018	ZEUS SP.	2	2018-69	FILLET AND LIVER	3	5
30.01.2018	HELICOLENUS DACTYLOPTERUS	25	2018-71	FILLET AND LIVER	30	6
30.01.2018	MERLUCCIUS PARADOXUS	20	2018-70	FILLET AND LIVER	24	6
02.02.2018	POMATOMUS SALTATRIX	25	2018-73	FILLET AND LIVER	30	15

b)

DATE	SPECIES	NUMBER OF FISH	JOURNAL NR.	TISSUE	FREEZE DRIED SAMPLES	STATION NR.
27.01.2018	ENGRAULIS ENCRASICOLUS	150	2018-81	WHOLE FISH AND FILLET WITH SKIN AND BONES	6	1
02.02.2018	ENGRAULIS ENCRASICOLUS	150	2018-82	WHOLE FISH AND FILLET WITH SKIN AND BONES	6	17

3.9 Top predator observations

A watch was kept informally for top predators and a total of 1035 minutes of observation were logged. Top predators recorded during the observation periods are listed in Table 9, however the most interesting sightings were not made during observation periods. These *ad hoc* sightings are listed in Table 10.

Diversity and density of top predators was very low, often no animals were sighted during a full hour of observation. The commonest bird recorded in oceanic waters was the great-winged petrel (*Pterodroma macroptera*) and in coastal waters is was the greater crested tern (*Thalasseus bergii*). The most interesting bird sighting of the trip was of a white-tailed tropicbird (*Phaethon lepturus*) that was seen on the first morning off Port Edward. This

species is occasionally recorded off northern KZN and is an extremely rare vagrant elsewhere off the South African coast.

Table 9. Seabird and cetacean species observed off KZN during observation periods.

Species	**Animal count**
Indian yellow-nosed albatross (*Thalassarche carteri*)	3
White-chinned petrel (*Procellaria aequinoctialis*)	6
Great-winged petrel (*Pterodroma macroptera*)	34
Cory's shearwater (*Calonectris diomedea*)	3
Sooty shearwater (*Ardema grisea*)	1
Cape gannet (*Morus capensis*)	3
Kelp gull (*Larus dominicanus*)	1
Great crested tern (*Thalasseus bergii*)	15
Sandwich tern (*Thalasseus sandvicensis*)	2
Sooty tern (*Onychoprion fuscatus*)	1
Spotted dolphin (*Stenella attenuata*) @ 28° 50.9'S; 032° 17.0'E	20-30

Table 10. Notable top predator sightings made outside of observation periods.

When	**What**
27/01/18	White-tailed tropicbird bird was seen off Port Edward
27/01/18	A feeding flock of Cape gannets was seen near the first station off Port St Johns
27/01/18	A shoal of about 20 hammerhead sharks (*Sphyrna* sp) was seen near the first station off Port St Johns
04/02/18	Possible Risso's dolphin (*Grampus griseus*) was seen off the St Lucia lighthouse

CHAPTER 4. RESULTS – ACOUSTIC ABUNDANCE AND GEOGRAPHIC DISTRIBUTION OF PELAGIC FISH

4.1 Distribution, size composition and biomass estimates

4.1.1 Pelagic species Group 1

During the survey, two species, anchovy (*Engraulis encrasicolus)* and round herring *(Etrumeus whiteheadi*) belonging to the Pelagic Species Group 1 (P1), were found in patches along the northern region. Anchovy was the most abundant species caught, whilst round herring was only found at a few stations in very small quantities. The two species were found in low numbers ($1<sA<300$ m^2/NM^2) in mainly one area (two trawl stations) outside Durban (Figure 23). The low number of stations with catches of individuals from the group P1 makes it impossible to calculate any acoustic biomass estimation for this group of fish.

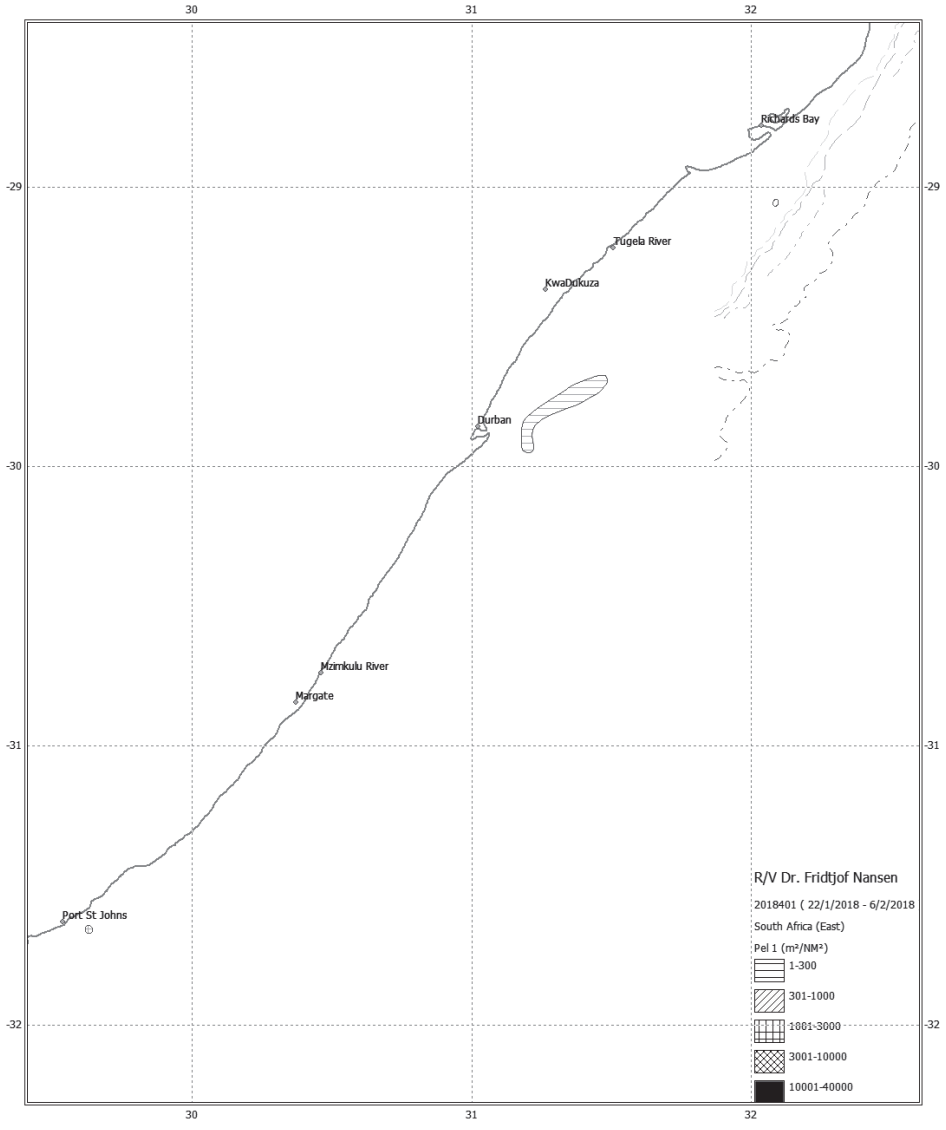


Figure 23. Distribution of Pelagic 1, Port St Johns - Richards Bay. Depth contours at 50, 100, 200 and 500 m.

4.1.2 Pelagic species Group 2

During the survey, only one species, mackerel (*Scomber japonicus)* belonging to the Pelagic Species Group 2 (P2), were caught. The species group P2 was found in low numbers ($1<sA<300$ m^2/NM^2) at two main areas, one close to Mzimvubu River and one north of Durban (Figure 24). The low number of stations with catches of individuals from the group P2 makes it impossible to calculate any acoustic biomass estimation for this group of fish.

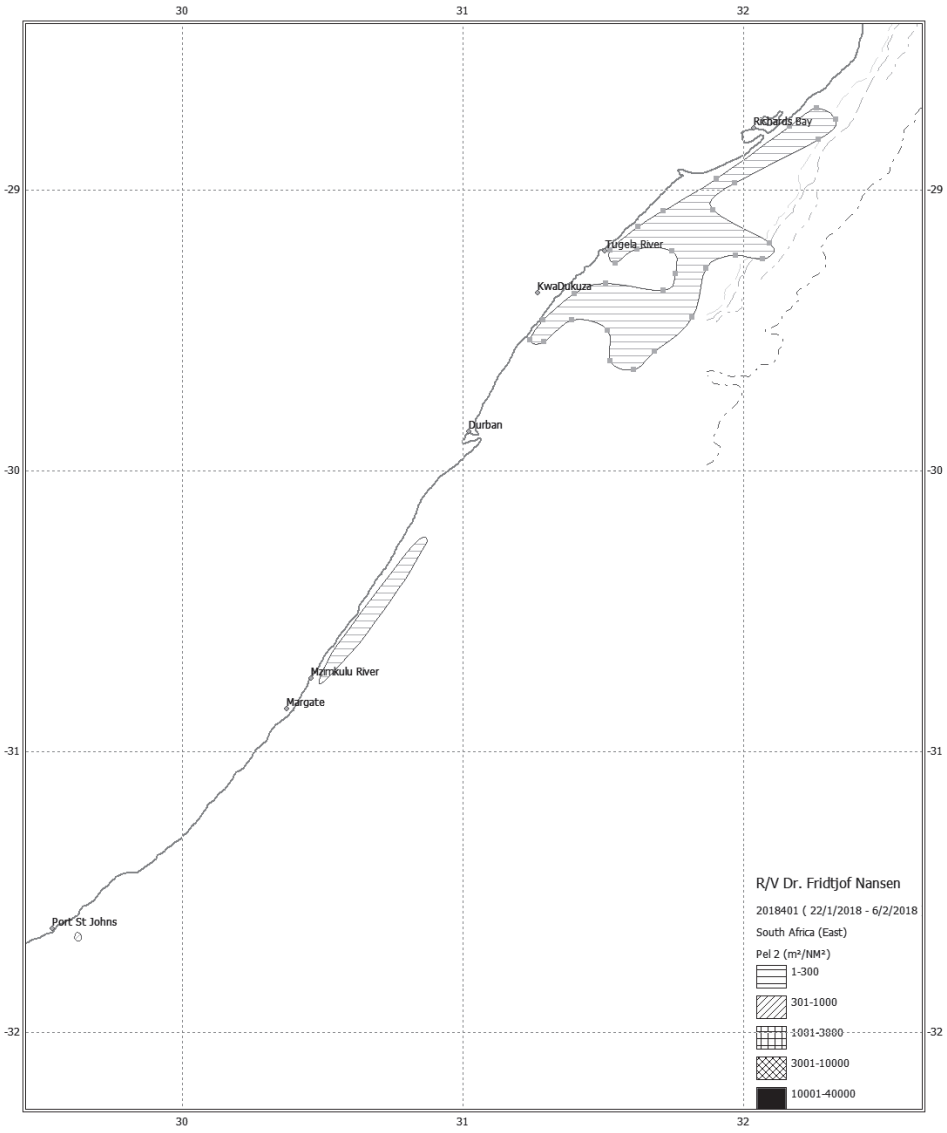


Figure 24. Distribution of Pelagic 2, Port St Johns – St Lucia. Depth contours at 50, 100, 200 and 500 m.

CHAPTER 5. RESULTS – BIOLOGY AND SWEPT AREA ABUNDANCE OF DEMERSAL FISH AND CRUSTACEANS

5.1 Biology of target species

Catches of the species prioritized before the survey were generally very low, with the exception of *Engraulis encrasicolus*, and occasional moderate catches of *Trachurus delagoa* and *Etrumeus* spp. A total of 379 species was collected. The most numerous by number were *Engraulis encrasicolus*, *Pagellus natalensis*, *Johnius fuscolineatus*, *Chlorophthalmus punctatus*, and mixed coral pieces which together accounted for 67.5% of all organisms caught. By weight the most abundant species were *Pagellus natalensis*, *Engraulis encrasicolus*, mixed sponges, *Johnius fuscolineatus* and *Neoscombrops cynodon* which represented just over half of the total catch (54.3%). A total of 1 301 individual organisms from 19 species were measured and weighed. The sex from 407 individuals from seven species were also recorded while maturity was recorded for 124 individuals from five species. The species and number of individuals sampled for each biological parameter are provided in Table 11.

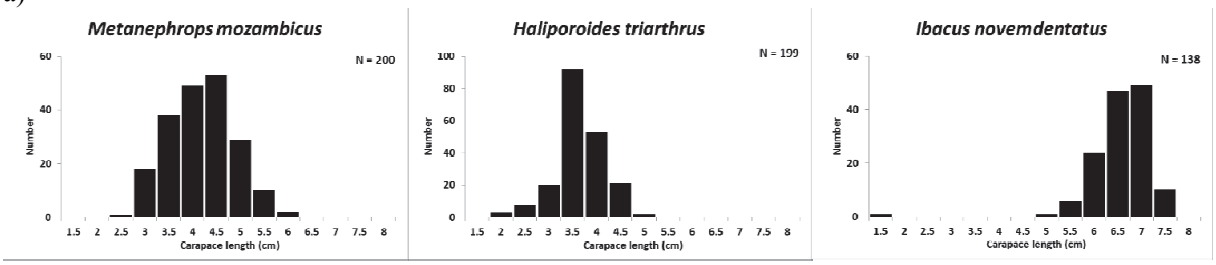
Table 11. Species for which biological parameters were recorded. Numbers of samples for each species that were measured, weighed, sexed and estimation of maturity are provided.

Species	Lengths	Weights	Sex	Maturity
Metanephrops mozambicus	200	200	65	13
Haliporoides triarthrus	199	199	129	70
Trachurus delagoa	166	165		
Ibacus novemdentatus	138	138	138	5
Etrumeus wongratanai	118	118		
Decapterus russelli	100	100		
Metapenaeus monoceros	94	94	30	23
Engraulis encrasicolus	50	50		
Pagellus natalensis	50	50		
Squalus mahia	45	45		
Squalus megalops	45	45		
Scomber japonicus	41	41		
Penaeus indicus	19	19	19	13
Palinurus delagoae	16	16	16	
Scyllarides elisabethae	10	10	10	
Plesionika sp.	5	5		
Carcinoplax sp	3	3		
Neobythites analis	1	1		
Helicolenus dactylopterus	1	1		
TOTAL	**1 301**	**1 300**	**407**	**124**

Length frequencies

Length frequencies for *Metanephrops mozambicus*, *Haliporoides triarthrus* and *Ibacus novemdentatus* are presented in Figure 25a while *Decapterus russelli* and *Etrumeus wongratanai* are in Figure 25b. Carapace lengths (CL) of *M. mozambicus* ranged from 2.5 cm to 5.9 cm with a mean CL of 4.0 cm (SD = 0.7). The minimum CL for *H. triarthrus* was 1.7 cm with a maximum of 4.8 cm. The mean CL was 3.5 cm (SD = 0.5). The more robust *I. novemdentatus* ranged in CL between 1.3 cm and 7.5 cm with an overall mean CL of 6.4 cm (SD = 0.6). *Decapterus russelli* ranged in TL from 14 cm to 23.5 cm (mean = 19.3cm TL, SD = 2.3) and *E. wongratanai* was between 14.5 cm and 19 cm TL with a mean TL of 17 cm (SD = 0.8).

a)



b)

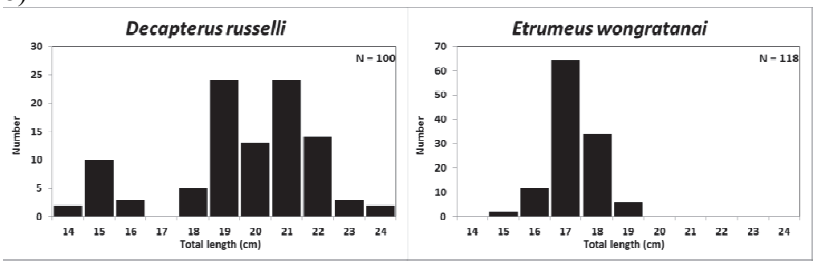


Figure 25. Length frequencies of a) *Metanephrops mozambicus*, *Haliporoides triarthrus* and *Ibacus novemdentatus* and b) *Decapterus russelli* and *Etrumeus wongratanai.*

Sex ratios

Sex ratios of *M mozambiques*, *H. triarthrus* and *I. novemdentatus* are presented in Figure 26. Females outnumbered males in both *M mozambicus* and *H. triarthrus* although only by 10.8% and 8.5% respectively. Males, however, dominated in *I. novemdentatus* with 44.9% more individuals being male.

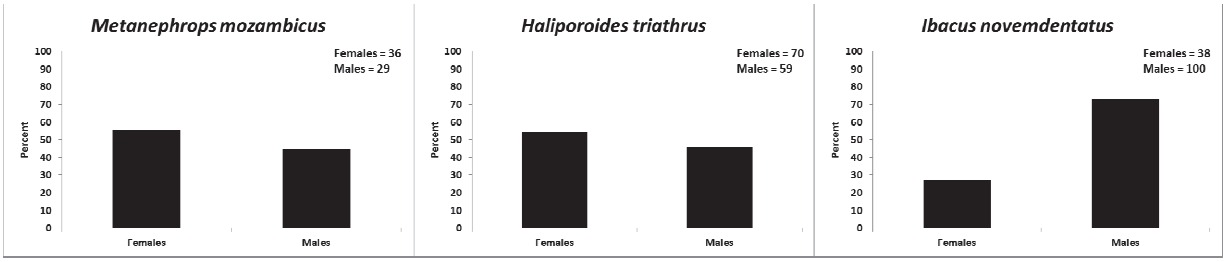


Figure 26. Sex ratios of *M mozambicus*, *H. triarthrus* and *I. novemdentatus.*

Maturity

Females of only five species were sampled for maturity and these were all crustaceans. For consistency the same three species as presented above are included in Figure 27.

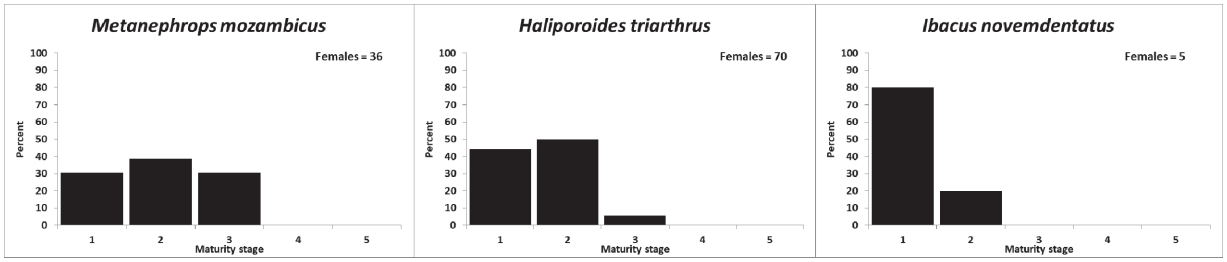


Figure 27. Maturity stages of *M mozambiques*, *H. triarthrus* and *I. novemdentatus.*

5.2 Catch rates of target demersal groups

The trawl survey covered the shelf and slope from 20 m to 500 m bottom depth, with one trawl haul in deeper waters (511 m). It was generally difficult to find areas suitable for trawling (rough bottom and rugged terrain combined with very strong currents and occational bad weather with strong winds. Catch rates in kg/hour are presented per depth strata for main taxonomic groups found during the survey.

Four depth strata were defined prior to the survey; 20-50 m depth, 51-100 m depth, 101 - 200 m and 201-500 m depth. While deeper trawls were planned, weather and current conditions precluded this. The region between the coast and 20 m bottom depth was not covered due to safety restrictions set by the vessel. The trawl positions are mapped in Figure 2 (d,e). Station information and catch by species are presented in Annex VI.

The survey area was dominated by a steep slope and few possibilities to trawl. A total of 6 trawl hauls was conducted south of Durban and 16 trawl hauls were conducted between Durban and Cape St Lucia. *Pagellus natalensis* contributed the most (21.7%) to overall weight of catches while *Engraulis encrasicolus* (49.0%) contributed the most by number. The largest catch occurred at Station 7 which was on the slope at a depth between 201 and 500 m to the north of Durban. It consisted predominantly of sombre splitfin (*Neoscombrops cynodon*) (182 kg) and spotted greeneye (*Chlorophthalmus punctatus*) (111 kg). The next largest catch was at Station 16 in 25 m just north of the Thukela River mouth. This catch was dominated by bellfish (*Johnius fuscolineatus*) (196 kg).

Catch per unit effort ($kg.hr^{-1}$) for the various broad groups of species was highly variable (Table 12). The three highest fish CPUEs were at stations 4, 17 and 16 but the highest CPUE was in the 51 to 100 m depth strata. Crustaceans (prawns, langoustines, lobsters and crabs) had the highest CPUE at Station 14 which was also in the depth stratum (201-500 m) with the highest CPUE. Similarly the highest sharks and rays CPUE was in the 201-500 m depth stratum but at Station 3. It should be noted that the capture of one large shark or ray can skew the analysis. Squid and octopus CPUEs generally increased with increasing depth but the highest Station CPUE was recorded at Station 10 in the 101-200 m depth stratum.

Table 12. Catch per unit effort (kg.hr^{-1}) of the main groups of species caught off KwaZulu-Natal in the depth strata of 20-50 m, 51-100 m, 101-200 m and 201 to 500 m.

Depth level (m)	Station	Gear depth (m)	Fish	Crustaceans	Sharks and rays	Squids and octopus	Overall CPUE
20-50	2	28	12.8	0.2	10.0	4.8	27.8
	4	42.5	1 028.6		25.8	16.6	1 071.0
	13	49	81.7	1.0	23.4	2.0	108.1
	16	25	641.4	12.1	42.3	0.1	695.8
	17	30.5	817.2			4.9	822.1
	19	37.5	245.2			1.7	246.9
	20	37.5	4.8	0.1		3.2	8.0
	22	45.5	1.9		3.6	2.3	7.8
20-50 CPUE			**274.7**	**2.0**	**13.7**	**3.5**	**293.9**
51-100	1	97	631.1	0.7	9.8		641.6
	9	53.5	220.0	1.7	25.2	12.6	259.6
	18	52.5	419.2	6.7	7.6	9.3	442.8
51-100 CPUE			**421.5**	**3.2**	**14.0**	**7.4**	**446.1**
101-200	8	185	399.4	62.9	4.5	3.2	469.9
	10	137	122.0	13.8	11.3	23.5	170.6
	11	104	25.3	15.9	3.8	3.1	48.0
	21	187.5	5.0	3.0	6.2	5.6	19.9
101-200 CPUE			**160.8**	**26.7**	**6.7**	**9.7**	**203.9**
201-500	3	226	295.5	4.7	68.2	5.3	373.7
	5	221	173.2	17.6	25.0	6.8	222.5
	6	501.5	134.1	38.0	3.2	14.3	189.6
	7	265	772.5	20.0	54.7	12.0	859.2
	14	400	101.2	80.8	0.2	9.3	191.5
201-500 CPUE			**288.2**	**33.7**	**27.1**	**10.0**	**359.0**
Group CPUE			**274.3**	**16.8**	**16.4**	**7.2**	**314.8**

While crustaceans are the target species of the commercial trawl fishery off KwaZulu-Natal, some fish families are retained or dominate catches. The catch rates (kg.hr^{-1}) of these families are presented in Table 13. The family with the highest overall CPUE (25.7 kg.hr^{-1}) was the lanternbellies (*Acropoma*) with most of the catches occurring deeper than 200m. The grunts occurred in depths shallower than 200 m with rthe highest CPUE occurring in the 51-100 m depth stratum. Grenadiers and hakes were present in depths greater than 200 m and groupers occurred less than 200 m with very low CPUEs. Croakers were found in all depths except in the 51-100 m depth stratum and a single large catch at Station 16 accounted for the highest of their CPUEs. The seabreams were encountered at all depths trawled but were more abundant in the shallower areas. Station 4 had the highest CPUE for seabreams and this was the highest CPUE for any of these selected fish families.

Table 13. Catch per unit effort (kg.hr^{-1}) of the more important demersal fish families caught off KwaZulu-Natal in the depth strata of 20-50 m, 51-100 m, 101-200 m and 201 to 500 m.

Depth level (m)	Station	Gear depth (m)	Lantern-bellies	Grunts	Grenadiers	Hakes	Croakers	Groupers	Seabreams
20-50	2	28							11.4
	4	42.5		9.9					1 010.6
	13	49		14.2			0.3	0.4	59.3
	16	25		17.6			580.7	1.5	
	17	30.5							6.5
	19	37.5							175.3
	20	37.5							1.8
	22	45.5							1.0
20-50 CPUE				**5.5**			**85.5**	**0.3**	**96.3**
51-100	1	97	0.4						
	9	53.5		36.8					175.9
	18	52.5		30.4					275.8
51-100 CPUE			**0.1**	**22.9**					**156.7**
101-200	8	185		5.8			2.0		359.1
	10	137	4.8	0.8			0.9		47.5
	11	104	0.5				0.4	0.2	7.8
	21	187.5							1.8
101-200 CPUE			**1.5**	**2.0**			**0.9**	**0.0**	**122.3**
201-500	3	226					1.8		25.4
	5	221	12.2						0.2
	6	501.5	18.8		15.5	8.6			
	7	265	365.8		23.6				
	14	400	13.2		4.3	1.5			
201-500 CPUE			**83.3**		**9.6**	**2.5**	**0.3**		**3.9**
Group CPUE			**25.7**	**5.3**	**2.9**	**0.8**	**31.6**	**0.1**	**81.1**

5.3 Biomass estimates (swept area indices) of target demersal commercial groups

The densities provided in Tables Table 14 and Table 15 provide an indication of potential biomass of demersal lmarine species encountered off the KwaZulu-Natal coast. These estimates have not been scaled up to the total depth stratum areas since sampling was not formally stratified in terms of numbers of trawls per depth stratum, and the succesful stations were too few and too scattered to provide a meaningful overall biomass estimate. Nevertheless some interesting observations can be drawn from the results.

Considering the densities of the broad groups of species presented in Table 14, fish contributed the highest densities overall and in each depth stratum, being highest in the shallow stratum of 20-50 m. Crustaceans, which are the most commercially valuable group,

had highest densities in the deepest stratum (201-500 m). Squids and octopus had the lowest densities overall and they were most dense also in the deepest stratum (201-500 m). The sharks and rays had high densities in the very shallow areas (20-50 m) and the very deep areas (201-500 m) but it should be borne in mind that a single large animal can skew the results.

Table 14. Densities ($kg.nm^{-1}$) of the main groups of species caught off KwaZulu-Natal in the depth strata of 20-50 m, 51-100 m, 101-200 m and 201 to 500 m.

Depth level (m)	Station	Gear depth (m)	Fish	Crustaceans	Sharks and rays	Squids and octopus	Overall CPUE
20-50	2	28	710.3	9.9	557.8	269.0	1 547.0
	4	42.5	29 419.5	0.0	737.0	475.3	30 631.8
	13	49	2 405.4	30.7	687.8	60.2	3 184.2
	16	25	18 344.3	345.5	1 209.7	2.5	19 902.0
	17	30.5	20 976.0	0.0	0.0	126.5	21 102.5
	19	37.5	6 459.3	0.0	0.0	46.0	6 505.3
	20	37.5	154.3	2.4	0.0	103.2	259.9
	22	45.5	69.6	0.0	134.1	84.3	288.0
20-50 density			**8 779.5**	**63.5**	**437.7**	**111.6**	**9 392.3**
51-100	1	97	23 397.5	25.4	364.6	0.0	23 787.5
	9	53.5	6 675.3	53.0	765.8	381.4	7 875.5
	18	52.5	12 717.8	204.6	229.3	280.8	13 432.5
51-100 density			**13 561.3**	**103.6**	**450.3**	**238.6**	**14 353.9**
101-200	8	185	13 327.3	2 099.0	148.8	105.7	15 680.8
	10	137	3 816.5	431.2	352.6	736.1	5 336.4
	11	104	1 011.4	634.9	151.2	125.6	1 923.0
	21	187.5	219.8	131.9	268.9	245.0	865.6
101-200 density			**5 711.7**	**948.7**	**236.8**	**344.5**	**7 241.8**
201-500	3	226	11 834.4	186.4	2 731.4	211.8	14 964.1
	5	221	5 977.6	606.3	861.9	234.1	7 679.9
	6	501.5	5 592.0	1 585.6	133.7	597.2	7 908.4
	7	265	28 642.1	743.0	2 026.3	443.6	31 855.0
	14	400	3 070.0	2 452.1	4.8	283.3	5 810.2
201-500 density			**10 497.6**	**1 227.3**	**987.4**	**365.5**	**1 3077.7**
Group Density			**9 312.0**	**570.7**	**556.3**	**245.8**	**10 684.8**

When the fish group was teased out for the more important families (Table 15), it was the seabreams that had the overall highest density with the 20-50 m depth stratum being the most productive. Croakers provided the second highest density which was driven by a single haul at Station 16. The next overall highest density was from the lanternbellies which were more abundant in the 201-500 m depth stratum. Groupers were by far the least dense group.

Table 15. Densities (kg.nm^{-1}) of the more important demersal fish families caught off KwaZulu-Natal in the depth strata of 20-50 m, 51-100 m, 101-200 m and 201 to 500 m.

Depth level (m)	Station	Gear depth (m)	Lantern-bellies	Grunts	Grenadiers	Hakes	Croakers	Groupers	Sea-breams
20-50	2	28							632.5
	4	42.5		282.8					28 905.1
	13	49		418.4			8.0	11.5	1 746.0
	16	25		504.6			16 610.7	42.4	
	17	30.5							166.8
	19	37.5							4 618.6
	20	37.5							59.6
	22	45.5							36.6
20-50 density				**177.0**			**2 733.3**	**9.0**	**3 079.1**
51-100	1	97	13.1						
	9	53.5		1 117.6					5 334.8
	18	52.5		923.2					8 368.0
51-100 density			**3.6**	**737.8**					**5 041.9**
101-200	8	185		194.5			65.3		11 983.6
	10	137	149.0	25.4			27.9		1 485.6
	11	104	19.2				14.9	8.5	313.0
	21	187.5							79.9
101-200 density			**54.2**	**69.8**			**32.8**	**1.6**	**4 343.7**
201-500	3	226					72.6		1 016.7
	5	221	422.5						5.5
	6	501.5	783.2		646.9	359.8			
	7	265	13 562.5		875.2				
	14	400	401.3		131.2	44.9			
201-500 density			**3 033.1**		**348.8**	**91.3**	**10.1**		**142.6**
Group density			**871.3**	**181.1**	**98.9**	**25.9**	**1 071.1**	**3.8**	**2 754.3**

5.4 Ecosystem classification

Drawing from the seabed mapping, trawl samples, grab sampling and a towed camera, species diversity was examined and used to map and describe different ecosystem types (Table 16). The towed camera was very experimental, took considerable time to rig and proved difficult to manage in the strong current; it was only attempted on two occasions and provided some imagery of the seabed. The survey covered river-influenced shelf areas, sandy and muddy slopes and some hard seabed with surprising samples from a deep kelp habitat. The deepest trawl station was at 511 m (Figure 28). Two areas that may be potential Vulnerable Marine Ecosystems (VMEs) were recognised at stations 8 and 11. These are sensitive habitats characterised by high densities of habitat-forming species such as sponges, black corals and

seafans. These sites will be used in conjuction with the national map of marine ecosystem types to report on the status of marine biodiversity in the National Biodiversity Assessment underway this year (2018).

Figure 28. Fish, sharks and invertebrates trawled from the upper bathyal (slope) of KwaZulu-Natal. This catch included hake, jacopever, monk, a sawshark, rattails and a spikefish. Deep water rock lobsters, langoustines, spider crabs and cloaked hermits were among the crustaceans. Image credit: Kerry Sink.

Table 16. Trawl station characterization.

Trawl station:	**Sediment description** *(taken from visual observation of trawl cylinder sediments)*	**Ecosystem classification and description** *(classification from South Africa's National Biodiversity Assessment)*
No: 1 **Date:** 27/01 **Site:** Mzimvubu River at Port St Johns **Depth:** 96-98m **Demersal Trawl**	No sample but evidence of mud on organisms.	**Natal Muddy Shelf Edge.** Muddy ground with seapens (Pennatulacea), Flabellidae cup corals and crustaceans (*Carcinoplax* sp., *Portunus spp.* (including *P.hastatoides*) and *Plesionika* sp. Fish catch was dominated by Engraulidae, juvenile *Scomber* and other small pelagic fish. Demersal species included *Acropoma japonicum*, *Symphurus* cf. *strictus*, *Physiculus* sp. and *Neobythites analis*.
No: 2 **Date:** 28/01 **Site:** uMtamvuna River at Port Edward **Depth:** 28m **Demersal Trawl**	Fine medium coarse brown sand with some bioclastic material.	**Natal Sandy Inner Shelf.** Catch dominated by *Pagellus natalensis*, flatfishes (*Crossorhombus valderostratus*, *Cynoglossus* and Bothidae) and *Rhinobatos leucospilus.* Other catches included the crustacean *Ovalipes punctatus, Codium megalophysum* seaweed cf. *Cavernularia* seapens.
No: 3 **Date:** 29/01 **Site:** Scottburgh **Depth:** 226m **Demersal Trawl**	Medium-coarse to very coarse sand, with reef gravel and bioclastic material. Many Amphipoda.	Two habitat types, a **potential Vulnerable Marine Ecosystem (VME)**. **Natal Gravel Reef Mosaic and Rocky Upper Slope.** Porifera- dominated community (>100Kg) with fishes dominated by *Spicara australis*. Other important species were *Macroramphosus scolopax*, *Antigonia* sp., *Parapercis maritzi*, and Scorpaenidae. *Balanophyllia* solitary cup corals, gorgonian *Narella* sp., *Thouarella* sp. and other Octocorralia.
No: 4 **Date:** 29/01 **Site:** Durban **Depth:** 41-44m **Demersal Trawl**	Muddy sand comprising very fine to fine sand and mud with little bioclastic material. Some POM (detritus) present.	**Natal Sandy Mid Shelf.** Catch dominated by *Pagellus natalensis*, *Pomadasys olivaceus*, flatfish *Crossorhombus valderostratus* and gurnard *Lepidotrigla faurei*. Notable invertebrate catch of *Actinoptilum molle* seapens.

Trawl station:	**Sediment description** *(taken from visual observation of trawl cylinder sediments)*	**Ecosystem classification and description** *(classification from South Africa's National Biodiversity Assessment)*
No: 5 **Date:** 30/01 **Site:** Durban **Depth:** 224-218m **Demersal Trawl**	Very fine to fine dark brown sand, some mud and no bioclastic or detrital material.	**Natal Sandy Upper Slope.** Catch dominated by fishes *Cubiceps whiteleggii*, *Champsodon capensis, Acropoma japonicum, Malthopsis tiarella*, *Chaunax* sp., *Zenops conchifer* and *Gonorhynchus gonorhynchus*. Invertebrates included Flabellidae (*Flabellum* sp. and *Truncatoflabellum* sp.) and Micrabaciidae corals, sea slugs *Philine aperta,* and dominant Echinoidea urchins *Eurypatagus parvituberculatus* and *Coelopleurus*.
No: 6 **Date:** 30/01 **Site:** Durban Deep **Depth:** 492-511m **Demersal Trawl**	Very fine, fine and medium-brown sand with some mud (silt & clay) with very fine, crushed bioclastic material. No visible detritus.	**Natal Sandy Mid-Slope.** Catch dominated by Myctophidae, Macrouridae rattails (*Ventrifossa mystax*, *Coelorinchus trunovi*, *C.braueri, Nezumia propinqua, Lucigadus ori*), Chlorophthalmidae (greeneye), langoustines and Haliporoides pink prawns. Also characterised by various fish groups such as Japanese splitfins and Jacopever, and species such as *Pliotrema warreni*, *Selachophidium guentheri*, *Lophiodes insidiator*, *Chaunax* spp., *Nettastoma parviceps*, *Xenolepidichthys dalgleishi,* multiple anemones (cf. *Actinauge*) and a single *Palinurus delagoae*.
No: 7 **Date:** 30/01 **Site:** uMhlali **Depth:** 263-267m **Demersal Trawl**	Very fine to fine brown sand with mud, (silt & clay). No bioclastic or detrital material.	**Natal Sandy Upper Slope.** Catch dominated by greeneye *Chlorophthalmus punctatus*, splitfins *Neoscombrops cynodon* and *Synagrops japonicus*, gurnards *Peristedion* cf. *weberi, Lepidotrigla multispinosa* and *Satyrichthys adeni, Macroramphosus scolopax*, myctophids (*Diaphus knappi*), *Ventrifossa mystax*, *Champsodon, Selachophidium guentheri*, *Ateleopus natalensis, Physiculus natalensis*, batfish *Malthopsis* cf *tiarella, Chaunax pictus*. *Spicara australis* and *Squatina africana*. Indications of mixed habitat type supported by specimens of Cephalopoda and Crustacea; *Carcinoplax,* giant isopods *Parabathynomus natalensis* and mantis shrimps *Bathysquilla crassispinosa*.

Trawl station:	**Sediment description** *(taken from visual observation of trawl cylinder sediments)*	**Ecosystem classification and description** *(classification from South Africa's National Biodiversity Assessment)*
No: 8 **Date:** 31/01 **Site:** uTongaati shelf edge **Depth:** 185m **Demersal Trawl**	Very fine to fine medium-brown sand with mud. No silt/clay. Bioclastic material but no detritus present.	**Natal Sandy Upper Slope, a potential VME.** Catch dominated by *Pagellus natalensis*, grunter *Pomadasys olivaceus,* gurnards *Lepidotrigla faueri* and *Chelidonichthys kumu*, flounder *Pseudorhombus natalensis* and banded catshark *Halaelurus lineatus.* Some specimens of *Physiculus natalensis*. Dominant Crustacea were *Ibacus novemdentatus*, *Scyllarides elisabethae*, unidentified *Penaeus* sp. and two mantis shrimp morphotypes. Six corals present with ratios of ~16kg sampled as follows: *80% Flabellum, 10% Heteropsammia,* , *5% Truncatoflabellum*, *4.5 % Micrabaciidae* (cf *Letepsammia*) and *0.5% Herterocyanthus*. High invertebrate diversity including sponges, anemones, starfish, *Sepia* spp. (*S.aculeata*, *S.confusa* and *S.simoniana*) and seapen *Penella* sp. Indications of mixed habitat type with specimen of Santer, *Cheimerius nufar*.
No: 9 **Date:** 31/01 **Site:** uMhlali **Depth:** 53-54m **Demersal Trawl**	No sample (trawl cylinder not attached) but evidence of sand.	**Natal Sandy Mid Shelf.** Catch dominated by *Pagellus natalensis*, *Pomadasys olivaceus*, flatfish (*Pseudorhombus valderostratus*, *Aesopia* sp, *Crossorhombus* sp. *Cynoglossus* sp.) lizardfish (*Saurida undosquamis*), flathead *Cociella heemstrai* and rays *Rhinobatos leucospilus* and *Torpedo sinuspersci*. Crustaceans included *Ovalipes punctatus*, *Metapenaeopsis stridulans* and smaller numbers of Fasciolaridae gastropods*,* Flabellidae cup corals and algae (*Codium megalophysum*).
No: 10 **Date:** 31/01 **Site:** Prince's Grant **Depth:** 130-144m **Demersal Trawl**	Very fine to fine sand and mud. No bioclastic or detrital material.	**Natal Sandy Outer shelf** (inshore of shelf break). Catch dominated by *Pagellus natalensis,* flounder *Citharoides macrolepis, Acropoma japonicum, Champsodon capensis,* batfish *Halieutaea sp.*, gurnards *Peristidion weberi* and *Lepidotrigla faurei,* angelshark *Squatina africana*, multiple *Hoplichthys acanthopleurus* and *Chaunax* sp. Invertebrates were *Ibacus, Carcinoplax* sp. *Parapenaeus fissurus*, *Astropecten* starfish and *Sepia spp.*

Trawl station:	**Sediment description** *(taken from visual observation of trawl cylinder sediments)*	**Ecosystem classification and description** *(classification from South Africa's National Biodiversity Assessment)*
No: 11 **Date:** 1/02/ **Site:** uNonoti Shelf Edge **Depth:** 101-107m **Demersal Trawl**	Reef gravel, reef rubble with mud. Bioclastic material but no detritus present.	**Natal River Influenced Rocky and Muddy Outer Shelf, a potential VME.** Porifera habitat with 115kg of sponges collected. Sponge habitat with Octocorallia and large black corals (specimen cf. *Antipathella* sp.), but no Scleractinia. Fish catches characterised by Sparidae *Polysteganus coeruleopunctatus* and *Pagellus natalensis*. Pineapple fish *Monocentris japonicus*, drift fish *Ariomma indicum* and *Citharoides macrolepis*. Indications of mixed substrates. Sea slug retained which is often visible on KZN green bowl sponges.
No: 12 **Date:** 31/01 **Site:** Sinkwazi **Depth:** 70m (bottom) **Pelagic Trawl**	No bottom-type information.	Main catches of elf *Pomatomus saltatrix*, cutlassfish *Trichiurus lepturus*, round herring *Etrumeus whiteheadi* and squid cephalopods.
No: 13 **Date:** 01/02 **Site:** Off uThukela River (shallow trawl grounds) **Depth:** 47-51m **Demersal Trawl**	Very fine to fine sand and mud (no slit or clay). Minimal bioclastic material and detritus.	**Natal Sandy Mid Shelf.** Catch dominated by *Pagellus natalensis, Pomadasys olivaceum*, gurnard *Chelidonichthys kumu* and *Champsodon capensis*. Invertebrates sampled across the Echinodermata were urchins with multiple *Salmacis bicolor*, an unidentified heart urchin (Brissidae) and common *Astropecten* starfish. A high diversity of Gastropoda, Bivalvia, crabs, *Ibacus* and *Loligo duvauceli* were also caught.

Trawl station:	**Sediment description** *(taken from visual observation of trawl cylinder sediments)*	**Ecosystem classification and description** *(classification from South Africa's National Biodiversity Assessment)*
No: 14 **Date:** 01/02 **Site:** Off uThukela Shelf **Depth:** 397-403m **Demersal Trawl**	Very fine medium-brown sand and mud (silt & clay). Little bioclastic material.	**Natal Sandy Upper Slope**. Dominated by langoustine *Metanephrops mozambicus and p*ink prawn *Haliporoides triarthrus.* Fishes caught included *Chlorophthalmus punctatus*, *Diaphus knappi*, grenadier *Coelorinchus trunovi*, *Neoscombrops cynodon* and *Polymixia berndti, Selachophidium guentheri*, *Chaunax pictus*, *Helicolenus dactylopterus* and *Merluccius paradoxus*. A recovered rock lobster trap contained several rattails, *Physiculus natalensis* and *Oreosoma* specimens. Invertebrates were octopus *Veladona togata,* beret urchins (*Phormosoma* sp.), lobster *Palinurus delagoae* and *Nephropsis stewarti*, and *Munida*, cf. *rochinia* and *Chaceon macphersoni* crabs.
No: 15 **Date:** 02/02 **Site:** Mtunzini mid shelf **Depth:** 43-46m bottom depth **Pelagic Trawl**	No bottom-type information.	*Trachurus delagoa*, *Decapterus russelli*, *Etrumeus* sp., *Ariomma indicum* and *Selar crumenophthalmus* fishes.
No: 16 **Date:** 03/02 **Site:** aMatikulu inner shelf **Depth:** 25m **Demersal Trawl**	No sample. Trawl cylinders lost.	**Natal River Influenced Inner Shelf.** Shallow water trawl grounds. Catch dominated by Sciaenidae in order of decreasing abundance: *Johnius fuscolineatus*, *Johnius dorsalis*, *Otolithes ruber, Argyrosomus thorpei* and *Atrobucca nibe*. Other characteristic fishes were *Pomadasys commersonii*, *P. olivaceum*, *Cynoglossus attenuatus*, *Cociella heemstrai*, *Leiognathus equulus* and *Thryssa* spp. Prawns represented by *Metapenaeus monoceros*, *Penaeus indicus*, *Parapeneaopsis* sp. and *Penaeus monodon*.

Trawl station:	**Sediment description** *(taken from visual observation of trawl cylinder sediments)*	**Ecosystem classification and description** *(classification from South Africa's National Biodiversity Assessment)*
No: 17 **Date:** 03/02 **Site:** Richards Bay North inner shelf **Depth:** 30-31m **Demersal Trawl**	Very fine to fine sand. No bioclastic or detrital material. *(Low confidence as trawl had limited seafloor contact)*.	***No bioregion category as trawl had limited seafloor contact.*** Trawl was not properly fishing off the bottom and therefore catch dominated by *Engraulis encrasicolus*, *Decapterus russelli*, *Trachurus delagoa*, *Pagellus natalensi*s, *Carangoides malabaricus* and *Herklotsichthys quadrimaculatus*.
No: 18 **Date:** 03/02 **Site:** Richards Bay North mid shelf **Depth:** 51-53m **Demersal Trawl**	No sample. Trawl cylinders lost. *(Muddy sand?)*	**Natal Sandy Mid Shelf.** Catch dominated by *Pagellus natalensis, Trachurus delagoa, Decapterus macarellus*, *Scomber japonicus, Uranoscopus archionema, Pomatomus saltatrix, Lepidotrigla faurei, Saurida undosquamis, Sorsogona portuguesa* and *Halaelurus lineatus*. Cephalopod invertebrates *Loligo duvauceli* and *Sepia vermiculata*, prawns *Trachysalambria curvirostris* and *Penaeus japonicas*. *Cavernularia* sea pens and sea stars *Astropecten irregularis* present.
No: 19 **Date:** 04/02 **Site:** iNhlabane North inner shelf **Depth:** 37-38m **Demersal Trawl**	Medium sand, coarse to very coarse brown sand, no mud. Bioclastic material with little detritus.	**Natal Sandy Inner Shelf.** *Pagellus natalensis* and *Trachurus delagoa* dominant with some *Decapterus*, *Scomber japonicus* and *Etrumeus wongratanai*. Invertebrates *Loligo duvauceli*, *Sepia vermiculata* and *Actinoptilum* and cf. *Cladiella* sea pens.
No: 20 **Date:** 04/02 **Site:** St Lucia Lighthouse **Depth:** 36-39m **Demersal Trawl**	Fine sand, medium sand, little coarse sand. Much bioclastic material and some detritus.	**Natal Sandy Inner Shelf.** *Decapterus macrosoma* and *Pagellus natalensis*, small pelagic fishes (*Etrumeus wongratanai* and *Engraulis encrasicolus*) and sailfin velifer *Velifer hypselopterus*. *Sepia confusa, Loligo duvauceli* and *Actinoptilum molle* invertebrates found amongst kelp *Ecklonia radiata* specimens.

Trawl station:	**Sediment description** *(taken from visual observation of trawl cylinder sediments)*	**Ecosystem classification and description** *(classification from South Africa's National Biodiversity Assessment)*
No: 21 **Date:** 05/02 **Site:** iNhlabane outer shelf **Depth:** 184-191m **Demersal Trawl**	Very fine dark-brown sand, fine sand, medium sand, coarse sand, little mud, no gravel. Some bioclastic material. No detritus or gravel. *(Low confidence as trawl may have had limited seabed contact)*.	**Natal Sandy Shelf Edge.** Mixed fish and invertebrate dominated catch including *Loligo duvauceli*, *Pagellus natalensis*, *Champsodon capensis*, *Ibacus* and *Scyllarides elisabethae*. Few specimens of *Squalus mahia*, *Chaunax* sp., *Lepidotrigla faurei*, *Chelidonichthys kumu* an unidentified orange-coloured starfish and *Emmelichthys* sp. Multiple *Flabellum* solitary corals.
No: 22 **Date:** 06/02 **Site:** Mtunzini mid shelf **Depth:** 45-46m **Demersal Trawl**	Fine sand, medium sand, no gravel or mud. Bioclastic material with detritus (particulate).	**Natal Sandy Middle Shelf.** Catch very small, but interesting habitat with many soft sediment ascidians, unknown *Astropecten* and cf. *Cavernularia* star fish. *Actinoptilum* cf. *molle* seapens and Heterobranchia. Selection of fishes; *Raja miraletus*, *Pagellus natalensis*, *Saurida undosquamis*, *Champsodon capensis*, *Crossorhombus* sp. and a single *Caranx sexfasciatus.*

CHAPTER 6. RESULTS – SAMPLING OF SPECIAL TRANSECTS - MZIMVUBU, PROTEA CANYON, DURBAN, THUKELA

Sampling commenced on the Mzimvubu special benthic transect on 27 January with a grab station (CTD cast and three grabs) in ca. 30 m of water, followed by another grab station in ca. 100 m depth. A bottom trawl was conducted at this depth, and, although the net was damaged with most of the catch being lost, a considerable catch of anchovies (*Engraulis encrasicolus*) was brought on board,. No further trawling was attempted, although another grab station was successfully taken at ca. 500 m. Sediment characteristics were indicative of the significant influence of the Mzimvubu River plume and sediment fan. The influence extends to the outer shelf. Bottom type was dominated by terrigenous mud (including silt/clay types) and very fine to fine sand. The deep station (off shelf) was well sorted very fine to fine sand (no mud) with visible detrital particles on the sediment surface.

Further north, CTD castss, Multinet tows, oblique Bongo net tows and Manta net tows were undertaken on three stations (500, 100, 30 m) on 28 January in the vicinity of the southernmost of the three Protea Bank canyons for the ACEP Canyon-Connect project. Initial indications suggest moderately high plankton biomass in the vicinity of the canyon head as well as farther offshore, with the surface community dominated by small copepods (*Temora*) and pteropods on this occasion. Multibeam scanning of the seabed over the Margate Canyon was also undertaken to build on the existing seafloor maps for the other canyons associated with the Protea Banks reef system of the Port Shepstone shelf region. The canyon breaches the shelf, with multiple landslides in the head that form interlinked arcuate lobes. The canyon is a linear feature on the upper slope, but becomes markedly sinuous in the mid-slope where it widens.

Sampling of the Durban "super-special" transect commenced on 29 January in ca. 30 m water depth off Durban Bluff around 5 pm. A CTD cast, three grabs, vertical (200 µm) and oblique bongo (500 µm) hauls, a manta (335 µm) and a ring net tow (500 µm) as well as a trawl were all successfully undertaken (the latter in ~40 m depth and which comprised around 94% *Pagellus natalensis*. Water samples for microzooplankton analysis (20-200 µm) were also collected from the CTD niskin bottles, at the surface and depth of maximum fluorescence. A second successful grab station was undertaken in ~100 m, as well as plankton/neuston net hauls, before the line was temporarily abandoned due to night fall (no grabbing < 500m was attempted as the macrobenthic communities exhibit diurnal changes). The line was resumed early the next morning (30 January) but no trawlable seabed in 100 m depth was found. At the 200 m station, a CTD, three grabs, and the bongos and ring nets were used. The trawl catch at this station was very diverse, and dominated by *Cubiceps*, *Etrumeus, Champsodon* and *Eurypatagus*. At the 500 m station, 3 out of 5 grabs were successful. The bongos and manta nets were successfully deployed, but the relatively light-weight ring net was cancelled due to the strong winds (16 ms^{-1}). The bottom trawl was dominated by myctophids, but present in considerable numbers were *Coelorinchus* and *Metanephrops*. Further trawl/grab sampling at 1 000 m depth was abandoned as the sea was too rough. Inshore, sediments on this transect were characterised by uniform fine sand, with no mud and a high input of bioclastic material

(crushed molluscs). At ca. 100 m, the sea floor was characterised by very fine-fine sand with some mud, and grab samples evidenced the change in sediments by the increased number of surface burrows, large benthic Foraminifera and many solitary corals. At 500 m, unconsolidated sediments showed a large mud fraction, finely-crushed bioclastic material and a large abundance of agglutinated branching Foraminifera.

The Thukela special benthic transect commenced on 1 February, with a CTD and three grabs in 20 m water depth, followed by a box core in ~30 m. The bottom was considered too muddy to trawl at this site, and trawling was undertaken in 100 m; the catch was dominated by gastropods, portunid crabs and the ubiquitous *Pagellus*. No other grabs or trawls were possible until 500 m as the sea bed was steep and very hard; the grab samples at that depth were uniformly very muddy, with no visible sand, and multiple Scaphopoda on the surface. Tubes of tube-building polychaetes typified grab samples. Suitable trawl area was found at 400 m where the main catch was myctophids, *Chlorophthalmus*, *Metanephrops* and *Haliporoides*.

Surface sea water samples were taken at most of the CTD stations to determine the concentration and extent of microplastic pollution (notably microfibres). Within and around the Durban and Thukela River transects, especially closer to the coast, the seawater sample filters had to be changed more frequently as they were quickly clogged; whether this increased particulate load comprises organic matter or microplastics will require detailed microscopy analysis. Along these transects, several samples of flatfish (soles) were collected, which will be analysed for the presence of anthropogenic contaminants, to further assist in characterizing the relative effect of terrestrial inputs on these marine habitats.

6.1 First description of special transects & additional ad hoc macrobenthos sampling

Coast-perpendicular benthic transects were sampled off Mzimvubu, Durban, Thukela, Nhlabane and St. Lucia between 27 January and 6 February 2018. These transects were conducted perpendicular to the coast. An additional deep (860 m) station south of uThukela was sampled on 31 January 2018 and a shallow (20 m) station off Mlalazi was sampled on 6 February 2018. Transects and additional stations are presented in the order of survey south (Mzimvubu) to north (St Lucia lighthouse) and a return south to Nhlabane and Mlalazi.

6.2 Mzimvubu special transect

The Mzimvubu transect consisted of 20 m (Nansis grabs 1-4), 100 m (Nansis grabs 5-7), and 500 m (Nansis grabs 8-10) stations sampled on 27 January 2018. Conditions were favourable for successful grabs with a small (1.5 m swell) and a light south-westerly breeze that increased along the transect from approximately 1m/s inshore, to 9 m/s at the deep, off shelf station. A strong, turbid plume was observed exiting the Mzimvubu River mouth and running coast parallel, northwards. There was a strong current present at all stations along this transect.

One unsuccessful and three successful sediment stations were collected from the 20 m station. Sediments were fine sand and mud, with evidence of terrigenous organic debris. Polychaetes, molluscs, and pagurid crabs were visible and polychaete tubes constructed from vegetation were present on the sediment surface.

Three successful sediment grabs were obtained from the 100 m station, which was dominated by mud with a fresh orange-brown silt layer. Small burrows were observed on the sediment surface. Polychaetes and sea pens were visible in the samples and picked for identification and genetic bar-coding. The station was adjacent to demersal Trawl 1 (see Figure 2h) which was muddy ground with sea pens, Flabellidae solitary corals and multiple Crustacea trawled from 96-98 m.

A full grab station was completed at 500 m. Sediments were described as sticky brown, oxidising mud over more compact, grey mud with much silt. Polychaete burrows were on the sediment surface and many sponge spicules, few polychaetes and few bivalves were visible.

6.3 Durban special transect

The Durban transect was sampled at 20 m (Nansis grabs 11-13), 100 m (Nansis grabs 14-16), 200 m (Nansis grabs 18-20), and 500 m (Nansis grabs 21-25) as full stations from 29 to 30 January 2018. The wind was from a north-easterly direction, increasing from approximately 10 m/s at the shallow station to 16 m/s at the deep station. The swell also increased further offshore from approximately 0.5 m at the 20 m station to approximately 2 m at the 500 m station. Deep station grabs were collected drifting southwards in a strong current, and were up to 3 nm apart.

Three successful sediment grabs were sampled at 20 m, which was a seabed of brown-grey fine sand with fine bioclastic material. Polychaete burrows, polychaetes, and brittle stars were visible in samples.

The 100 m Durban station was successfully sampled and was typified by a heterogeneous habitat of brown fine to very fine sand with some mud, bioclastics and reef gravel and rubble. Burrows were evident on the sample surface and sea pens, soft corals, bryozoans, Foraminifera, crabs and amphipods were visible in the sediment samples, picked and fixed for genetic and morphological identification.

One unsuccessful and three successful sediment grabs occurred at the 200 m Durban station. The sediment sampled was fine to medium brown sand with mud, characterised by many burrows and sponge spicules. Amphipods, prawns, crabs, bivalves, pagurid crabs, and Foraminifera were visible in all sediments.

Two unsuccessful and three successful sediment grabs occurred at the 500 m Durban station. Sediment was brown muddy sand with fine, crushed bioclastic material present. Burrows, large foraminifera, amphipods, and polychaetes were observed, picked and fixed for identification and bar coding.

6.4 Deep grab Station 47

Station 47 was sampled on 31 January 2018. Bottom mapping showed unconsolidated sediments suitable for deep grabbing and although not on a chosen transect, the opportunity was taken south of the uThukela transect at a depth of 860 m. The wind was 8 m/s south-west at the time of sampling with a 2-2.5 m swell running. Only a single grab was attempted at this station. The sediment was a sticky brown-grey mud with fine bioclastic material. Many burrows and Foraminifera, and few live Scaphopoda were observed.

6.5 Thukela special transect

The uThukela transect consisted of only two successfully sampled stations at 20 m and 500 m, completed on 1 February 2018. The wind persisted at 10-11 m/s from a south-westerly direction with a constant swell of 1.5 to 2 m.

Inshore, three successful sediment grabs were collected at 20 m (Nansis grabs 27-29). The sediment obtained consisted of two distinct layers: an orange-brown soft unconsolidated mud overlying a dark grey consolidated mud. There was no obvious visible fauna at this station.

Three successful sediment grabs occurred at the 500 m station (Nansis grabs 31-33). The sediment consisted of two layers: a brown sticky mud overlying thicker clay, but also containing bioclastic material. Many sponge spicules, some burrows, Scaphopoda shells, bivalves and Ophiuroidea were observed in the samples. Demersal Trawl 14, close by was characterised by very fine sand, medium brown mud, silt/clay, little bioclastics, no detritus. A characteristic community of langoustine and pink prawns, beret urchins and *Nephropsis stewarti* were trawled from 397-403 m.

6.6 St. Lucia additional transect

The St. Lucia transect consisted of 20 m (Nansis grabs 34-36), 200 m (Nansis grabs 37-40) and 500 m (Nansis grabs 41-43) stations completed on 04 February 2018. The wind changed direction from the south-west to the north-east and increased in intensity from 1 m/s at 20 m to > 10 m/s at the 500 m station. The swell was small (~1 m) and did not interfere with sampling operations.

One unsuccessful and three successful sediment grabs occurred at the 20 m station. Much bioclastic material was present with medium sand, fine sand and some compact mud balls. The presence of wood particles and visible heavy minerals show contemporary and historical coastal inputs. Sample grain sizes were mostly in the sand fractions and were large volume samples that required elutriation before fixation and storage. Small bivalves and polychaetes were present in the sample. Demersal station Trawl 20 was in the vicinity and sediments trawled at 36-39 m were fine sand, medium sand, little coarse medium-brown sand, no gravel, no mud, much bioclastic material, little detritus and a trawled community characterised by *Pagellus natalensis*, small pelagic fish and cephalopods. An important community of *Ecklonia radiata* were encountered in sediments there.

After three unsuccessful attempts at grabbing, the 200 m site was repositioned nearby. There, only a single successful grab was obtained for quantified biological analysis. Brown muddy sand, with small, crushed bioclastic material was present. Amphipods, polychaetes, ophiuroids and heart urchins were visible.

Three unsuccessful sediment grabs and only one successful grab occurred at the 500 m station. The sediment was dark brown very fine to fine sand with coarse sand and mud. Many sponge spicules were present with Scaphopoda shells.

6.7 Nhlabane additional transect

The Nhlabane transect consisted of 20 m (Nansis grabs 56-57), 200 m (Nansis grabs 50-52), and 500 m (Nansis grabs 44-45) stations completed on 05 February 2018. The wind remained north-easterly but increased during the day (6 m/s to 10 m/s) as operations progressed inshore from 500 m to 20 m. The swell remained at 1 m throughout this transect.

Two unsuccessful and three successful sediment grabs occurred at the 20 m station. The sediment was brown medium to coarse sand, with fine bioclastic material present. Live bivalves were visible in all samples.

Three unsuccessful and two successful grabs occurred at the 200 m station. The sediment was a mixture of coarse sand through to mud, rich in bioclastic material. Amphipods, polychaetes, ophiuroidea, gastropods, bivalves, solitary bryozoans, and Foraminifera were visible.

Two grabs were attempted at the 500 m station and were both unsuccessful. After repositioning further offshore, grabs were collected at 700 m (Nansis grabs 46-49). Two unsuccessful and two successful sediment grabs were collected . However, given the difficulty in sampling and extreme current conditions, both incomplete grabs were kept for non-quantified infauna picking. The sediment was brown muddy sand containing fine bioclastic material and black ferrous-like nodules. Burrows and spicules were observed, with live polychaetes and foraminifera.

6.8 Mlalazi additional station

A single station at 20 m (Nansis grabs 58-60) was completed off the Mlalazi River on 6 February 2018. The sampling conditions were a 13 m/s north-east wind with a 1 m swell at the time of sampling. One unsuccessful and three successful sediment grabs occurred at this station. The sediment was brown very fine sand with some bioclastic material, clay, and mud balls. The underlying sediment layer was more compact than the surficial layer. Burrows, bivalves, Scaphopoda, crabs, and polychaetes were visible in the samples.

CHAPTER 7. SUMMARY OF SURVEY RESULTS

During Leg 1.1b not all the planned work could be carried out due to the extremely strong current and sometimes strong wind. The prevailing north-south current was particularly strong offshore. Surface temperatures and sailinities were relatively high, while oxygen levels were relatively low. Productivity levels were generally very low. These conditions are typical for this region. Many of the hydrographic data require processing and analysis to contextualize them, and will contribute to ongoing ocean acidification and carbonate chemistry monitoring for the region.

Numerous samples and/or data were collected for the components on sea floor geology and sedimentology, macrobenthic infauna, plankton, microplastics and taxonomy, and will need considerable laboratory processing before results are available. In particular, acoustic sampling of the seabed in certain regions will provide very useful information for current and planned research projects; macrobenthic samples were collected in areas and depths hitherto not sampled in the area; and organisms and sediments were collected to study microplastic and other contamination. Valuable habitat and community data were gathered to enable local ecosystem characterization which will provide input to national initiatives to modify proposed bioregions as part of the national biodiversity assessment.

Since not much research trawling has been done deeper than 200 m off the eastern coast of South Africa, one of the objectives for this survey was to trawl in the deeper areas, particularly > 500m, as commercial trawling here is mainly from 300-500m. However, the waters here are quite challenging with strong currents, varying vertically in direction and speed (over 4 knots), and strong winds often blowing in the opposite direction of the surface current. We were therefore only able to conduct 3 trawl stations deeper than 200 m. In total, 22 trawls were done, from 20-511 m. The catches were mostly quite small, particularly north of Richards Bay. Overall, catches were dominated by anchovies (*Engraulis*), sand soldiers (*Pagellus*), greeneyes (*Chlorophthalmus*) and minikob (*Johnius*). The dominance of anchovies is perhaps surprising as mainly bottom trawls were used, but these fish form very large shoals and most of them were caught in just two trawls. Few species of commercial interest were caught, apart from prawns and langoustines on the deep water crustacean trawl grounds, confirming the limited existing knowledge of productivity of this coast. In total 382 different species were caught in the bottom trawl hauls, of which 200 were various fish species.

Since the trawls were so few and so scattered the survey could not be considered stratified. Swept area biomass was replaced with densities to eliminate possible errors introduced by using the same catchability factor for fish and crustaceans. Scaling up from nominal densities by stratum to overall density estimates was not done, to prevent unreliable estimates of biomass for KwaZulu-Natal. As expected, fish had the highest densities and these were particularly high on the shelf from 20 to 50 m. The commercially important crustaceans were found to have the highest densities in the deepest trawled areas of the slope. Elasmobranchs, which are concerning bycatch in the commercial trawl fisheries, were found both on the shelf and on the deep slope. An overall nominal density for the KZN coast was calculated as 94 599

kg.nm^{-1}. Seabreams were the most abundant of the prominent fish families with a nominal density of 24 385 kg.nm^{-1}. A single catch of croakers at station 16 gave this family the second highest overall density, which highlighted that caution must be exercised when using such a low number of trawls to estimate a total biomass estimate for KZN.

REFERENCES

Foote, K. G. 1987. Fish target strengths for use in echo integrator surveys. *J. Acoust. Soc. Am.* 82(3): 981-987.

Foote, K. G., Aglen, A. and Nakken, O. 1986. Measurements of fish target strength with a split-beam echo sounder. *J. Acoust. Soc. Am.* 80(2): 612-621.

Grasshoff, K., Erhardt, M., Kremling, K. (eds.) 1983. Methods for sea water analysis, Verlag Chemie, Weinheim, 63-97, 127-187.

Korneliussen, R.J., Ona, E., Eliassen, I.K., Heggelund, Y., Patel, R., Godø, O.R., Giertsen, C., Patel, D., Nornes, E.H., Bekkvik, T., Knudsen, H.P. and Lien, G. 2006. The Large-Scale Survey System-LSSS, a new post-processing system for multi-frequency echo sounder data. ICES WGFAST Report 2006.

Misund, O. A. and Aglen, A. 1992. Swimming behaviour of fish schools in the North Sea during acoustic surveying and pelagic trawl sampling. *ICES J. Mar. Sci.* 49: 3.

Ndjaula, H., Krakstad, J.O., Kjesbu, O.S. 2013. Reproductive biology of horse mackerel *Trachurus capensis* and *Trachurus trecae* in Namibia and Angola. African Journal of Marine Science 2013, 35(2): 141–150.

Wysokinski, A. 1985. Horse mackerel age determination using otoliths. Collection of scientific papers from InternationalCommunity of South East Atlantic Fisheries, 12: 199–203.

ANNEX I. DESCRIPTION OF SAMPLING AT HYDROGRAPHIC TRANSECTS

Superstation transect: 3 stations at 30 m, 100 m, 500 m.

1. CTD to bottom, release bottles at standard depths
2. Phytoplankton net to 30 m (or 25 m at inner station) - maks haul speed 0,1 m ^{s}, not in bad weather!
3. WP2 to 25 m (inner station), 100 m or 200 m – maks haul speed 0,5 m^{s}
4. WP2 to 30m, at the 100 m and 500 m station – maks haul speed 0,5 m^{s}
5. Multinet to bottom (inner and middle stations) or 200 m (outer station), 5 nets released at (200-120, 120-80, 80 to below Fmax, through Fmax, above Fmax to surface) – maximum speed 1,5 m ^{s}
6. Manta trawl at surface for 15 minutes - maks speed 1-1,5 m ^{s}, not in bad weather! (usually simultaneous with multinet)
7. Oblique Bongo net to 25 m (inner station), 100 m or 200 m – maks haul speed 0,5 m^{s}
8. Ring net at surface for 15 minutes - maks speed 1-1,5 m ^{s}, not in bad weather! (usually simultaneous with oblique bongo)

CTD transect: at bottom depths (20 m, 50 m, 75 m, 100 m, 200 m, 500 m). In some special cases, we go deeper.

ANNEX II. DESCRIPTION OF ACOUSTIC INSTRUMENTS AND FISHING GEAR

Acoustic instruments

The Simrad EK80/18, 38, 70,120, 200 and 333 kHz scientific sounder was run during the survey. Scrutinizing was done in LSSS using the data from the 38-kHz transducer. Last standard sphere calibrations were checked on the 23.01.2017 in Sandviksflaket, Bergen, Norway using Cu64 for the 18 kHz, Cu60 for the 38 kHz, WC38.1 for the 70, 120 and 200 kHz, and the WC22 for the 333 kHz. The details of the settings for the 38-kHz echo sounder were as follows:

Transceiver2 menu (38 kHz)	
Transducer depth	5 8 m
Absorption coeff.	8.3 dB/km
Pulse duration	medium (1,024ms)
Bandwidth	2.43 kHz
Max power	2000 Watt
2way beam angle	20,6dB
gain	26,95 dB
SA correction	0.03 dB
Angle sensitivity	21.9
3 dB beamwidth	6.22º along ship
	6.28 athwart ship
Alongship offset	0.10º
Athwardship offset	0.06º
Bottom detection menu	Minimum level 50 Db

Fishing gear

The vessel has one small four-panel Åkrahamn pelagic trawl, one MultPelt 624 trawl and one 'Gisund super bottom trawl' (Figures II1-II3). The Multpelt trawl was not used during the survey due to a problem on the winch system. The smallest pelagic trawl has 8 to 12 m vertical opening under normal operation, whereas the MultPelt 624 trawl has 25 to 35 m opening.

The bottom trawl has a 31-m headline and a 47-m footrope fitted with a 12" rubber bobbins gear. The codend has 20 mm meshes, and has an inner net with 10 mm mesh size. The vertical opening is about 5.5 m. The distance between the wing tips is about 18 m during towing. The sweeps are 40 m long. The trawl doors are 'Thyborøen' combi, 8 m^2 and weigh 2 000 kg. The door spreading is about 45 m when using restraining rope. Trawling was conducted for species identification only and no restraining rope was therefore used during the survey.

The SCANMAR system was used during 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 interdistance and angle, while a height sensor is fitted on the bottom trawl to measure the trawl opening and provide information on clearance and bottom contact.

The all trawls are equipped with a trawl eye that provides information about the trawl opening and the distance of the footrope to the bottom. A pressure sensor is used to show the depth on the headline.

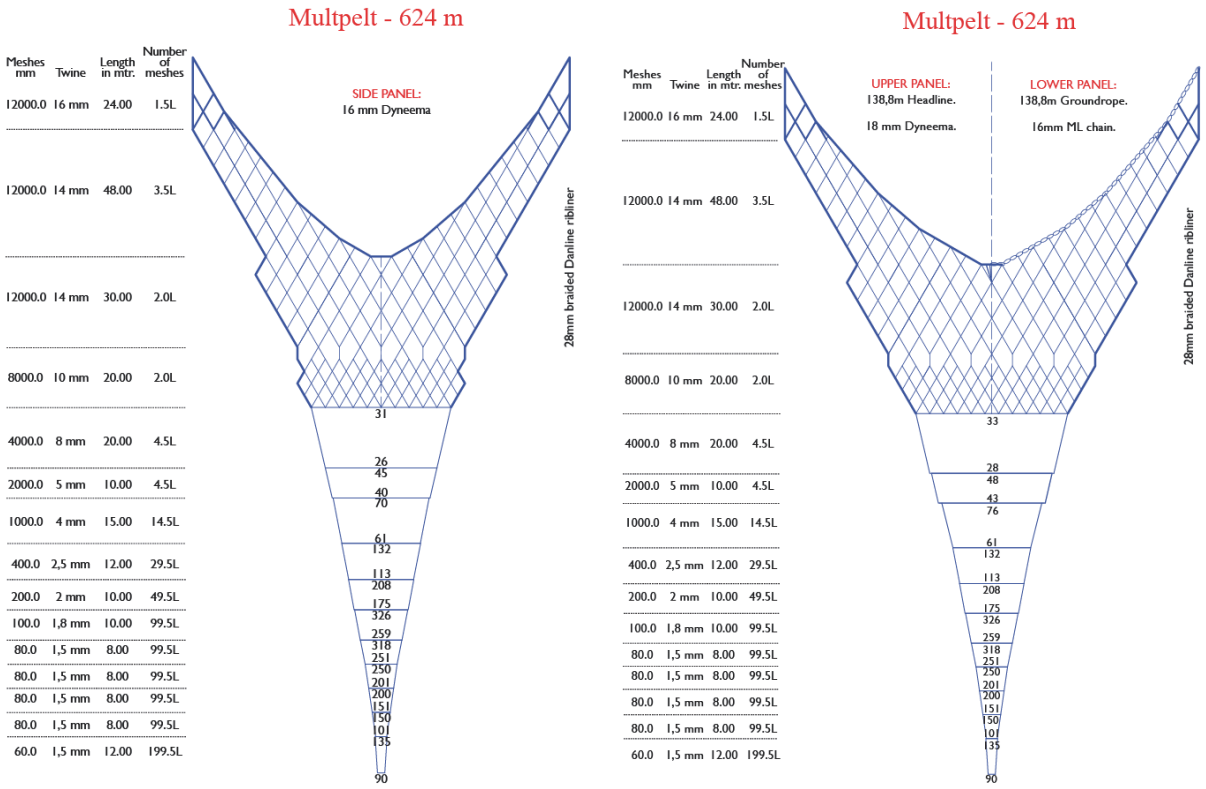
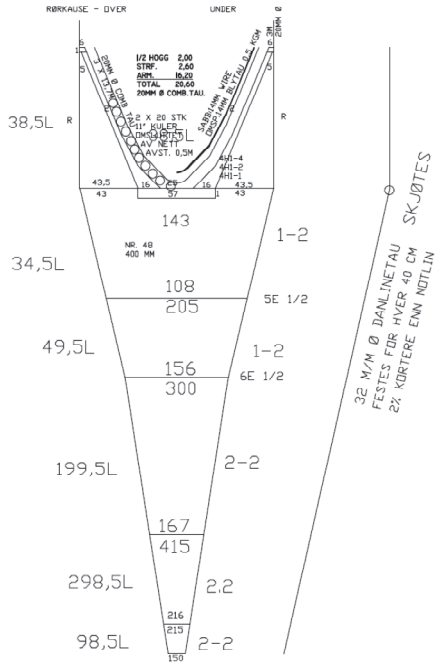


Figure II1. Schematic drawing of the MultPelt 624.

LITEN PELAGISK ÅKRATRÅL

HEL MASKER M/M	TRÅD NR.	LENGDE I METER	MASKER I EVING
400	64	38,5	4
400	48	14	4
200	32	10,0	4
100	24	20,0	4
38	12	11,4	4
38	18	3,76	4



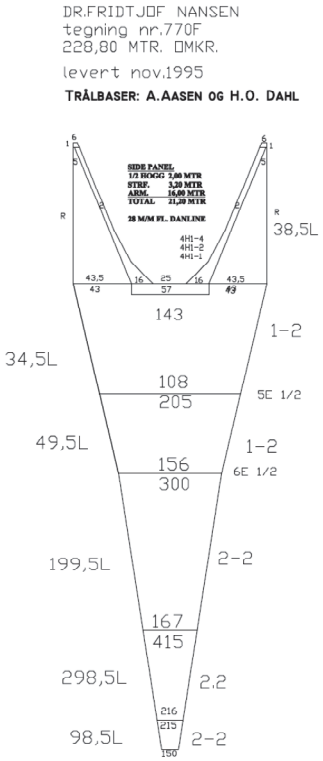


Figure II2. Schematic drawing of the small pelagic Åkratrawl.

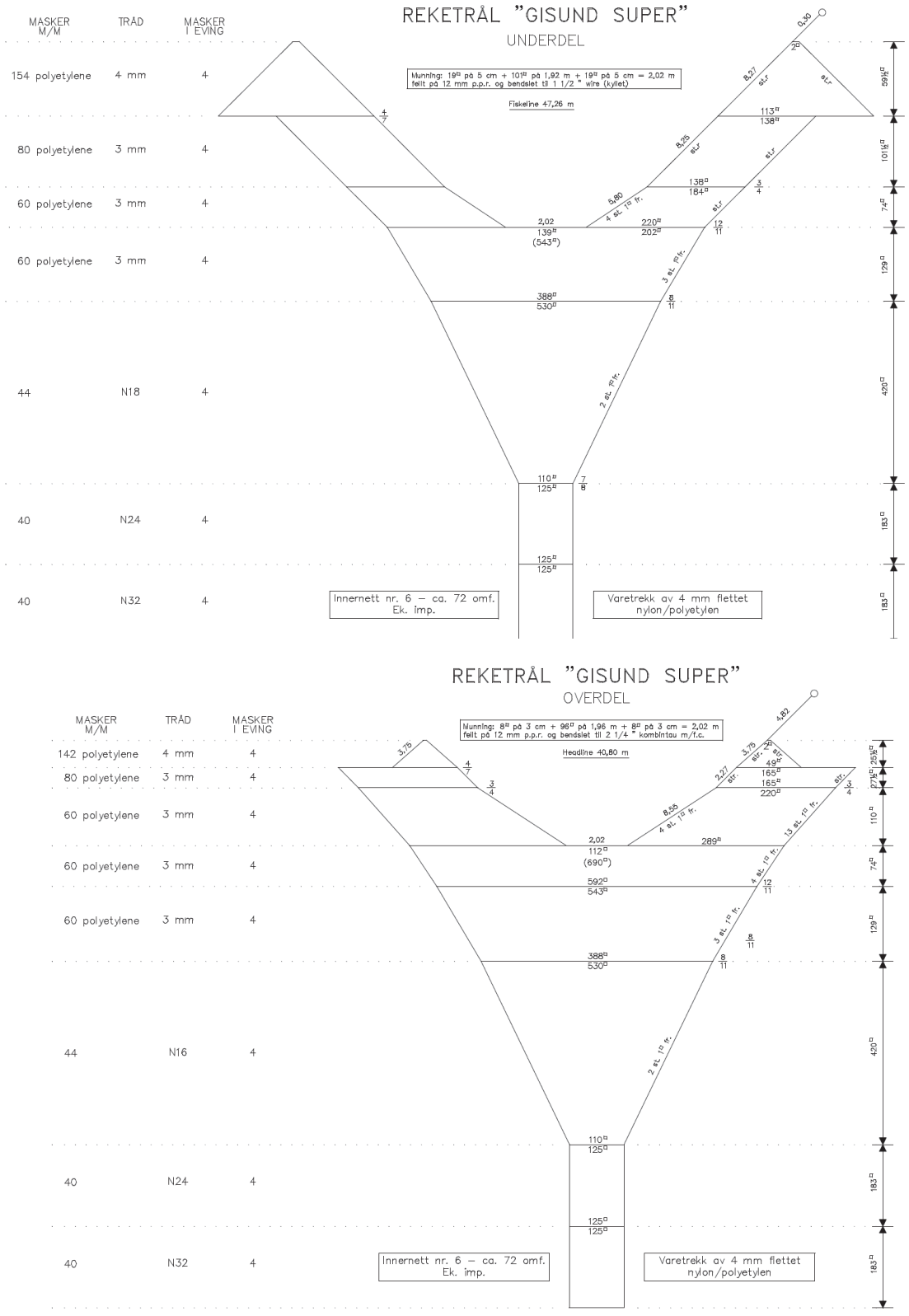


Figure II3. Schematic drawing of the Super Gisund bottom trawl.

ANNEX III. BIOLOGY STAGES

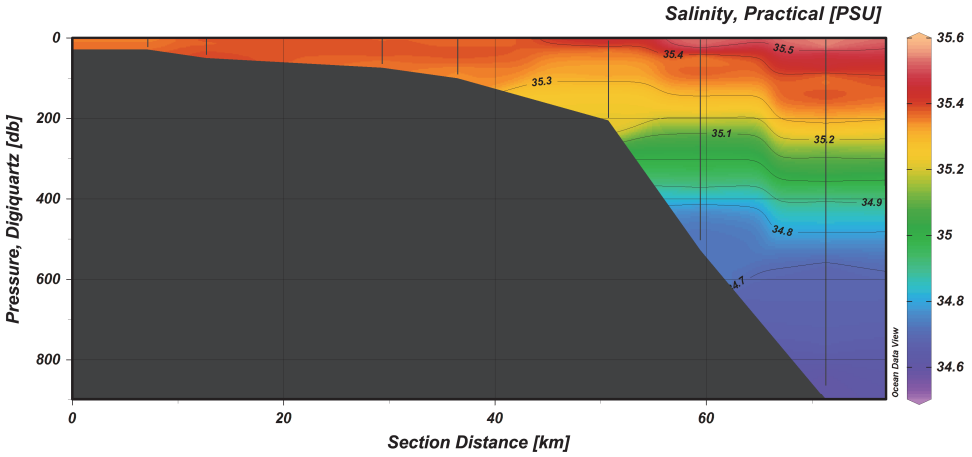
Sexual maturity

Stage	State	Description
I	Immature	Ovary and testis about 1/3rd length of body cavity. Ovaries pinkish, translucent, testis whitish. Ova not visible to naked eye.
II	Maturing virgin and recovering spent	Ovary and testis about ½ length of body cavity. Ovary pinkish, translucent, testis whitish, symmetrical. Ova not visible to naked eye.
III	Ripening	Ovary and testis is about 2/3rds length of body cavity. Ovary pinkish yellow colour with granular appearance, testis whitish to creamy. No transparent or translucent ova visible.
IV	Ripe	Ovary and testis from 2/3rds to full length of body cavity. Ovary orange-pink in colour with conspicuous superficial blood vessels. Large transparent, ripe ova visible. Testis whitish-creamy, soft.
V	Spent	Ovary and testis shrunken to about ½ length of body cavity. Walls loose. Ovary may contain remnants of disintegrating opaque and ripe Ova, darkened or translucent. Testis bloodshot and flabby

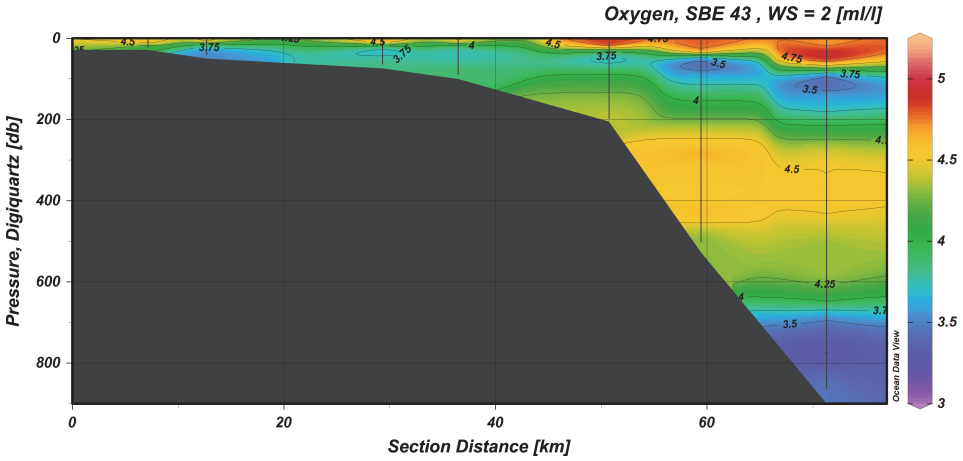
Stomach content

Scale	Designation	Description
0	Empty	Stomach empty except for water.
1	Very little content	Stomach is almost empty. Only traces of small organisms can be found.
2	Some content	Stomach not completely full and not dilated.
3	Stomach full	Stomach full, but not bloated/dilated.
4	Bloated/dilated	The stomach is visibly expanded and tight. Content can be observed from the outside.

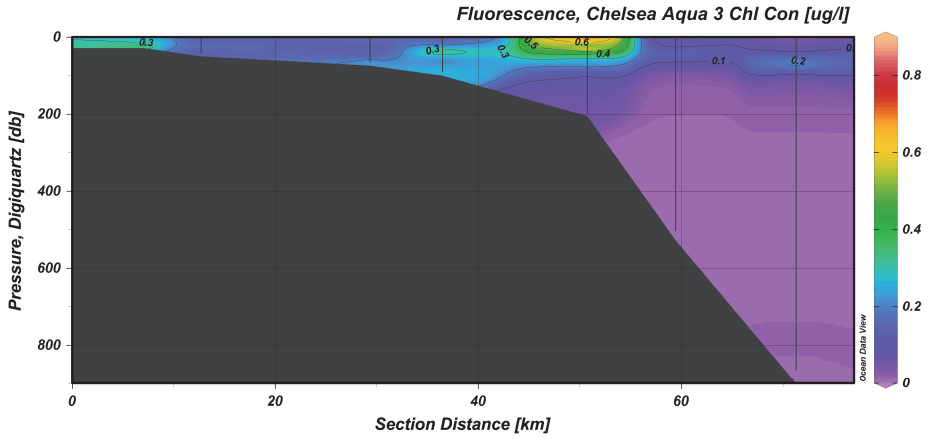
ANNEX IV. HYDROGRAPHIC CONDITIONS ON A TRANSECT NEAR 29.5˚S



Cross section of the salinity distribution during the transect near 29.5˚ S



Cross section of the oxygen distribution during the transect near 29.5˚ S



Cross section of the fluorescence distribution during the transect near 29.5˚ S

ANNEX V. PH, ALKALINITY AND ARAGONITE SATURATION STATE

Water samples were collected from the whole water column at the stations on most of the transects. These were analyzed on board for pH and alkalinity, and the nutrients will later be analyzed in on shore laboratories. Preliminary calculations are shown here, final results can only be calculated when nutrient concentrations are known. These variables will be used to characterize the inorganic carbon components of the waters, which also show the status of ocean acidification.

Deep water has low pH because of high content of CO_2, which is produced by degradation of sinking organic material. The upwelling water along the shelf, consequently had low pH values, and pH decreased gradually with depth.

Alkalinity is more related to the salinity of the waters, and a layer was found around 50m depth, consisting of warm high saline water with lower alkalinity than the surrounding waters.

Saturation state of calcium carbonates is an indicator used for monitoring development of ocean acidification in seawater. A saturation state value below one for a calcium carbonate mineral, means the water is under-saturated for the mineral. Under-saturation predicts that over time the mineral will dissolve. Aragonite saturation state was well above one in the waters studied, but in the below 250 m depth the values were rather low, as is expected in upwelling waters. For some marine organisms that construct shells of aragonite, saturation state below 2 has been shown to slow down the process of shell formation.

ANNEX VI. RECORDS OF FISHING STATIONS

R/V Dr. Fridtjof Nansen SURVEY:2018401 STATION: 1
DATE :27/01/18 GEAR TYPE: BT NO: 1 POSITION:Lat S 31°39.75
start stop duration Lon E 29°36.64
TIME :14:18:28 14:38:54 20.4 (min) Purpose : 1
LOG : 2554.93 2555.86 0.9 Region : 6000
FDEPTH: 96 98 Gear cond.: 6
BDEPTH: 96 98 Validity : 5
Towing dir: 0° Wire out : 250 m Speed : 2.7 kn
Sorted : 53 Total catch: 218.56 Catch/hour: 641.57

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Engraulis encrasicolus	626.07	74530	97.58	
Dasyatis chrysonota	8.81	3	1.37	
Scomber japonicus	3.73	68	0.58	23
Pliotrema warreni	1.03	3	0.16	
Helicolenus dactylopterus	0.59	3	0.09	6
Carcinoplax sp	0.53	18	0.08	2
Acropoma japonicum	0.35	12	0.05	25
Etrumeus whiteheadi	0.23	12	0.04	24
Plesionika sp.	0.09	12	0.01	1
Neobythites analis	0.06	3	0.01	5
Portunus hastatus	0.06	12	0.01	
Physiculus sp.	0.01	3	0.00	4
Symphurus strictus	0.01	3	0.00	7
C R A B S	0.01	3	0.00	3
Total	641.57		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2018401 STATION: 2
DATE :28/01/18 GEAR TYPE: BT NO: 1 POSITION:Lat S 31°5.10
start stop duration Lon E 30°13.51
TIME :09:37:21 10:07:44 30.4 (min) Purpose : 3
LOG : 2640.78 2641.69 0.9 Region : 6000
FDEPTH: 28 28 Gear cond.: 0
BDEPTH: 28 28 Validity : 0
Towing dir: 0° Wire out : 120 m Speed : 1.8 kn
Sorted : 15 Total catch: 14.53 Catch/hour: 28.69

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Pagellus bellottii natalensis**	11.37	618	39.64	8
Squatina africana	9.67	4	33.73	
Loligo duvauceli	2.90	357	10.12	14
Sepia vermiculata	1.93	14	6.75	12
Trachinocephalus myops	0.55	26	1.93	9
Pseudorhombus arsius	0.47	2	1.65	15
Algaes	0.47	2	1.65	
Halaelurus lineatus	0.24	2	0.83	10
Cavernularia sp.	0.22	18	0.76	18
Ovalipes punctatus	0.18	16	0.62	
Decapterus russelli	0.16	6	0.55	13
SALPS	0.16	0	0.55	
Rhinobatos leucospilus	0.12	2	0.41	19
Crossorhombus valderostratus	0.10	8	0.34	16
Decapterus macarellus	0.08	2	0.28	21
Ascidans	0.02	2	0.07	
Cynoglossus durbanensis	0.02	2	0.07	17
Heteropriacanthus cruentatus	0.01	2	0.04	20
Fistularia sp.	0.00	2	0.01	11
BOTHIDAE	0.00	2	0.01	22
Total	28.69		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2018401 STATION: 3
DATE :29/01/18 GEAR TYPE: BT NO: 21 POSITION:Lat S 30°18.02
start stop duration Lon E 30°54.79
TIME :08:16:25 08:40:14 23.8 (min) Purpose : 3
LOG : 2763.59 2764.59 1.0 Region : 6000
FDEPTH: 226 226 Gear cond.: 0
BDEPTH: 226 226 Validity : 0
Towing dir: 0° Wire out : 630 m Speed : 2.5 kn
Sorted : 0 Total catch: 249.45 Catch/hour: 628.35

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
PORIFERA (Sponges)	254.41	0	40.49	
Spicara australis	188.26	2310	29.96	27
Squalus mahia	63.68	118	10.13	26
Polysteganus coeruleopunctatus	25.39	18	4.04	
Scorpaena scrofa	23.12	28	3.68	
Scombrops boops	18.14	116	2.89	29
Antigonia sp.	10.43	300	1.66	28
Zeus capensis	9.32	10	1.48	33
Chirodactylus grandis	6.70	3	1.07	
Loligo duvauceli	4.58	111	0.73	
Scyllarides elisabethae	4.53	13	0.72	
Chaunax atimovatae	4.53	13	0.72	35
Macrorhamphosus scolopax	2.57	338	0.41	34
Umbrina canariensis	1.81	8	0.29	37
Pliotrema warreni	1.71	3	0.27	
Mustelus palumbes	1.41	3	0.22	43
Citharoides macrolepis	1.41	13	0.22	31
Helicolenus dactylopterus	1.06	8	0.17	36
Rhinobatos ocellatus	0.86	3	0.14	30
SCORPAENIDAE	0.55	25	0.09	
Rostroraja alba	0.55	3	0.09	41
Parapercis maritzi	0.45	28	0.07	32
Sepia confusa	0.35	3	0.06	
Chelidonichthys lastoviza ***	0.35	3	0.06	40
Kentrocapros rosapinto	0.30	5	0.05	42
Halieutaea fitzsimonsi	0.30	3	0.05	44
Polymixia berndti	0.25	5	0.04	38
Priacanthus hamrur	0.20	5	0.03	
Champsodon capensis	0.15	30	0.02	39
Bryozoa spp.	0.12	8	0.02	
Zenopsis conchifer	0.10	3	0.02	
Cynoglossus capensis	0.10	3	0.02	
Sepia sp.	0.10	3	0.02	
Sepia sp.	0.10	10	0.02	0
Sepia acuminata	0.10	3	0.02	
Octopus sp.	0.05	3	0.01	45
Whelks	0.05	5	0.01	
Homolidae	0.05	3	0.01	
Thouarella	0.03	5	0.00	
Diogenidae	0.03	5	0.00	
CARIDEA	0.03	8	0.00	
Argentina euchus	0.03	3	0.00	
Munidopsis	0.03	18	0.00	
Balonophyllia	0.02	15	0.00	
Primnoidae	0.02	3	0.00	
Narella	0.02	3	0.00	
Astropectinidae	0.01	3	0.00	
Astrocladus euryale	0.00	3	0.00	
Total	628.36		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2018401 STATION: 4
DATE :29/01/18 GEAR TYPE: BT NO: 21 POSITION:Lat S 29°54.32
start stop duration Lon E 31°3.91
TIME :15:48:45 16:00:10 11.4 (min) Purpose : 3
LOG : 2801.48 2802.15 0.7 Region : 6000
FDEPTH: 41 44 Gear cond.: 0
BDEPTH: 41 44 Validity : 0
Towing dir: 0° Wire out : 140 m Speed : 3.5 kn
Sorted : 204 Total catch: 204.10 Catch/hour: 1073.27

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Pagellus bellottii natalensis**	1008.90	20340	94.00	46
Squatina africana	14.20	5	1.32	47
Pomadasys olivaceus	9.89	142	0.92	
Sepia vermiculata	9.26	47	0.86	53
Pliotrema warreni	6.84	5	0.64	
Loligo duvauceli	5.36	126	0.50	
Halaelurus lineatus	4.73	16	0.44	
Decapterus russelli	3.79	47	0.35	
Actinoptilum molle	2.37	32	0.22	
Lithognathus mormyrus	1.68	21	0.16	48
Loligo duvauceli	1.58	5	0.15	0
Sphyraena acutipinnis	1.47	16	0.14	51
Saurida undosquamis	0.74	11	0.07	49
Cociella heemstrai	0.63	5	0.06	
Crossorhombus valderostratus	0.53	42	0.05	
Aesopia cornuta	0.42	5	0.04	
OCTOPODIDAE	0.42	5	0.04	52
Lepidotrigla faueri	0.21	16	0.02	
ANGUILLIFORMES	0.11	5	0.01	50
Trachinocephalus myops	0.11	5	0.01	
ANGUILLIFORMES	0.11	5	0.01	0
Total	1073.32		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2018401 STATION: 5
DATE :30/01/18 GEAR TYPE: BT NO: 21 POSITION:Lat S 29°52.94
start stop duration Lon E 31°12.26
TIME :05:44:56 06:15:08 30.2 (min) Purpose : 3
LOG : 2872.87 2874.35 1.5 Region : 6000
FDEPTH: 224 218 Gear cond.: 0
BDEPTH: 224 218 Validity : 0
Towing dir: 0° Wire out : 570 m Speed : 2.9 kn
Sorted : 0 Total catch: 139.70 Catch/hour: 277.55

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Cubiceps whiteleggii	81.38	3717	29.32	
Etrumeus wongratanai	45.46	1126	16.38	56
Eurypatagus parvituberculatus	41.44	564	14.93	
Squatina africana	14.15	2	5.10	
Scyllarides elisabethae	9.81	26	3.54	
Pliotrema warreni	9.02	22	3.25	57
Sphoeroides cf. pachygaster	7.75	20	2.79	
Acropoma japonicum	7.51	570	2.71	
Champsodon capensis	6.64	757	2.39	60
Coelopleurus	6.20	10	2.23	0
Zeus capensis	5.88	4	2.12	
Puerulus angulatus	5.52	42	1.99	
Synagrops japonicus	4.57	46	1.65	
Waste General	3.81	0	1.37	
Sepia acuelata	3.14	44	1.13	
Coelopleurus	2.82	181	1.02	
Nototodarus hawaiiensis	2.78	68	1.00	
Chelidonichthys kumu	2.66	16	0.96	
Hoplichthys acanthopleurus	2.11	79	0.76	55
Uranoscopus archionema	1.75	8	0.63	
Squalus mahia	1.67	6	0.60	
Chaunax atimovatae	1.43	12	0.52	
Citharoides macrolepis	1.39	14	0.50	
Ibacus novemdentatus	1.03	6	0.37	
Chlorophthalmus punctatus	0.87	159	0.31	
Laeops natalensis	0.83	12	0.30	
Gonorhynchus gonorhynchus	0.75	8	0.27	54
OCTOPODIDAE	0.60	4	0.21	
ANGUILLIFORMES	0.48	36	0.17	
Mursia aspera	0.48	8	0.17	
Trichiurus lepturus	0.48	12	0.17	
Parapenaeus fissurus	0.40	111	0.14	
Arminidae	0.32	2	0.11	
Brisingidae	0.24	0	0.09	
Sepia confusa	0.20	4	0.07	
Platymaia turbynei	0.20	2	0.07	
Pagellus bellottii natalensis**	0.16	2	0.06	
Neoscombrops cynodon	0.16	36	0.06	
Peristedion cf weberi	0.16	24	0.06	
Zenopsis conchifer	0.12	2	0.04	
Torpedo sinuspersici	0.12	2	0.04	
Astromuricea fusca	0.12	0	0.04	
Halieutaea sp.	0.12	2	0.04	

Lophiodes sp.	0.12	2	0.04	
Scyllarus batei	0.12	4	0.04	
Triacanthodes ethiops	0.12	2	0.04	
Scomber japonicus	0.12	2	0.04	
Rexea prometheoides	0.08	18	0.03	59
Truncatoflabellum	0.06	14	0.02	
Philine aperta	0.05	101	0.02	
Cynoglossus sp.	0.04	20	0.01	
Malthopsis tiarella	0.02	2	0.01	
Flabellum	0.02	46	0.01	
Sepia sp.	0.02	6	0.01	
Micrabaciidae	0.02	6	0.01	
Foraminifera	0.02	28	0.01	
Chaunax sp.	0.02	2	0.01	
Haploblepharus sp.	0.01	2	0.01	58
Small squid	0.00	2	0.00	
Total	277.55		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2018401 STATION: 6
DATE :30/01/18 GEAR TYPE: BT NO: 21 POSITION:Lat S 29°56.66
start stop duration Lon E 31°29.84
TIME :14:00:52 14:40:56 40.1 (min) Purpose : 1
LOG : 2902.05 2903.68 1.6 Region : 6000
FDEPTH: 492 511 Gear cond.: 0
BDEPTH: 492 511 Validity : 0
Towing dir: 0° Wire out : 1150 m Speed : 2.4 kn
Sorted : 0 Total catch: 127.30 Catch/hour: 190.62

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Helicolenus dactylopterus	42.53	322	22.31	
Metanephrops mozambicus	23.99	677	12.58	61
MYCTOPHIDAE	16.92	2231	8.88	
Chlorophthalmus punctatus	14.08	193	7.38	
Coelorinchus braueri	11.62	382	6.10	65
Synagrops japonicus	10.21	100	5.36	
Haliporoides triarthrus	9.28	349	4.87	62
Merluccius paradoxus	8.62	30	4.52	
Neoscombrops cynodon	8.57	349	4.49	
Velodona togata	8.15	58	4.27	
Neoscopelus microchir	6.05	765	3.17	
Ommastrephes bartrami	5.63	1	2.95	
Polymetme corythaeola	5.27	205	2.77	64
Pliotrema warreni	3.02	6	1.59	
Chaeceon macphersoni	2.49	6	1.30	
Ventrifossa mystax	2.02	139	1.06	63
Coelorinchus trunovi	1.62	19	0.85	
Lophiodes insidiator	1.59	3	0.83	
Gonorhynchus gonorhynchus	1.56	13	0.82	
Munida sp.	1.17	163	0.61	
Selachophidium guentheri	0.72	15	0.38	66
ANGUILLIFORMES	0.72	10	0.38	
Chascanopsetta lugubris	0.60	4	0.31	70
Actinauge sp.	0.60	6	0.31	
Plesionika longirostris	0.28	97	0.15	
Palinurus delagoae	0.27	1	0.14	
PARAPAGURIDAE	0.27	6	0.14	
Pleistacantha ori	0.25	7	0.13	
Cynoglossus capensis	0.24	15	0.13	
Histioteuthis sp.	0.24	6	0.13	
Plutonaster	0.21	6	0.11	
Nettastoma parviceps	0.21	7	0.11	
Malacocephalus laevis	0.15	3	0.08	
Holohalaelurus sp.	0.15	6	0.08	
Xenolepidichthys dagleishi	0.15	3	0.08	
SALPS	0.12	1	0.06	
Histioteuthis sp.	0.12	3	0.06	0
Lestrolepis intermedia	0.12	9	0.06	
Velodona togata	0.10	10	0.05	0
Triacanthodes ethiops	0.10	1	0.05	68
Nezumia sp.	0.09	3	0.05	
Astronesthes sp.	0.06	12	0.03	
Calliaster acanthodes	0.06	1	0.03	
Austrorossia sp.	0.06	3	0.03	
Chaunax sp.	0.06	12	0.03	
Neobythites analis	0.04	1	0.02	
Polyipnus sp.	0.03	12	0.02	72
Chaunax pictus	0.03	1	0.02	
Pseudarchaster sp.	0.03	1	0.02	
R A Y S	0.03	1	0.02	
Malthopsis sp.	0.03	3	0.02	69
Nansenia macrolepis	0.01	1	0.01	
Sea pens	0.01	1	0.01	
Zenion leptolepis	0.01	4	0.01	67
Owstonia sp.	0.01	1	0.01	71
Stoloteuthis sp	0.01	6	0.01	
Lucigadus ori	0.01	1	0.01	
Janicella spinicauda	0.01	13	0.01	
Maurolicus walvisensis	0.00	1	0.00	
Chauliodus sloani	0.00	1	0.00	
Philine sp.	0.00	16	0.00	
Total	190.63		100.01	

R/V Dr. Fridtjof Nansen SURVEY:2018401 STATION: 7
DATE :30/01/18 GEAR TYPE: BT NO: 21 POSITION:Lat S 29°42.59
start stop duration Lon E 31°29.18
TIME :21:53:57 22:25:15 31.3 (min) Purpose : 1
LOG : 2952.74 2954.17 1.4 Region : 6210
FDEPTH: 263 267 Gear cond.: 0
BDEPTH: 263 267 Validity : 0
Towing dir: 0° Wire out : 690 m Speed : 2.7 kn
Sorted : 138 Total catch: 449.32 Catch/hour: 861.59

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Neoscombrops cynodon	349.84	2219	40.60	
Chlorophthalmus punctatus	213.73	3764	24.81	
Squatina africana	48.71	4	5.65	
Peristedion cf weberi	32.91	4345	3.82	
Macrorhamphosus scolopax	24.93	2593	2.89	
Ventrifossa mystax	23.60	1022	2.74	
Citharoides macrolepis	21.27	174	2.47	
Synagrops japonicus	15.95	1952	1.85	
Trichiurus sp.	14.96	199	1.74	
Satyrichthys adeni	10.97	13	1.27	
Sepia acuelata	10.14	274	1.18	
Chaunax atimovatae	9.93	33	1.15	
Diaphus knappi	8.97	698	1.04	
Champsodon sp.	8.65	984	1.00	
Pleistacantha ori	7.09	15	0.82	
Physiculus natalensis	6.16	82	0.71	
Ateleopus natalensis	5.18	12	0.60	
Carcinoplax sp	4.81	242	0.56	
Ateleopus natalensis	4.16	33	0.48	0
Parabathynomus natalensis	3.99	242	0.46	
Pliotrema warreni	3.37	15	0.39	
Halieutaea sp.	3.32	8	0.39	
Saurida undosquamis	3.03	8	0.35	
Poecilopsetta natalensis	2.99	67	0.35	
Squalus bassi	2.57	2	0.30	
Selachophidium guentheri	2.49	75	0.29	
Bathycongrus wallacei	1.99	17	0.23	73
Platymaia turbynei	1.92	12	0.22	
Nototodarus hawaiiensis	1.82	58	0.21	
Arminidae	1.32	8	0.15	
Argentina euchus	1.32	67	0.15	
Zeus capensis	1.30	4	0.15	
Parapenaeus fissurus	1.00	299	0.12	
Spicara australis	1.00	8	0.12	
Sphoeroides sp.	0.82	8	0.10	
SALPS	0.67	8	0.08	
Cynoglossus sp.	0.58	25	0.07	
Lepidotrigla multispinosa	0.58	17	0.07	
Scomber japonicus	0.46	2	0.05	
Neolaeops microphthalmus	0.42	8	0.05	
Malthopsis cf. tiarella	0.33	25	0.04	
Plesionika sp.	0.33	75	0.04	
CARIDEA	0.33	307	0.04	
Bathysquilla crassispinosa	0.33	8	0.04	
Plutonaster	0.27	2	0.03	
Hydrozoa spp.	0.25	0	0.03	
Rexea prometheoides	0.17	17	0.02	
Chaunax pictus	0.17	17	0.02	
Argentina euchus	0.17	8	0.02	0
Munida sp.	0.17	17	0.02	
Snapper shrimp (Alpheus sp.?)	0.08	17	0.01	
Polymixia sp.	0.08	8	0.01	
Selachophidium sp.	0.08	8	0.01	
Total	861.67		100.01	

R/V Dr. Fridtjof Nansen SURVEY:2018401 STATION: 8
DATE :31/01/18 GEAR TYPE: BT NO: 21 POSITION:Lat S 29°43.04
start stop duration Lon E 31°25.63
TIME :00:19:26 00:50:07 30.7 (min) Purpose : 1
LOG : 2956.41 2956.41 0.0 Region : 6210
FDEPTH: 185 185 Gear cond.: 0
BDEPTH: 185 185 Validity : 0
Towing dir: 0° Wire out : 330 m Speed : 0.0 kn
Sorted : 0 Total catch: 259.35 Catch/hour: 507.21

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Pagellus bellottii natalensis**	359.06	4488	70.79	
Ibacus novemdentatus	49.48	374	9.76	75
Coral - mixed	36.10	4602	7.12	
Lepidotrigla faueri	10.44	264	2.06	
Scyllarides elisabethae	7.98	16	1.57	76
Pseudorhombus natalensis ***	6.69	305	1.32	
Chelidonichthys kumu	6.41	66	1.26	
Pomadasys olivaceus	5.83	57	1.15	
Halieutaea sp.	4.30	53	0.85	
Palinurus delagoae	3.32	2	0.66	74
Pliotrema warreni	2.74	8	0.54	
Umbrina canariensis	1.96	18	0.39	
Octopus vulgaris	1.86	2	0.37	
Scorpaena scrofa	1.29	2	0.25	
Saurida undosquamis	1.17	12	0.23	
Penaeus marginatus	1.02	16	0.20	
Halaelurus lineatus	0.98	8	0.19	
Cynoglossus sp.	0.82	25	0.16	
Squatina africana	0.74	2	0.15	
PORIFERA (Sponges)	0.70	0	0.14	
Loligo duvauceli	0.51	16	0.10	
Sepia acuelata	0.49	6	0.10	
Arothron immaculatus	0.37	14	0.07	
Uranoscopus sp.	0.35	4	0.07	
PAGUROIDEA	0.31	8	0.06	
Sea anemone sp	0.31	4	0.06	
Portunus sp.	0.20	2	0.04	
Pennellidae	0.20	2	0.04	
Sepia confusa	0.16	4	0.03	
Clypeaster	0.16	16	0.03	
Sepia simoniana	0.16	2	0.03	
Branchiostegus doliatus	0.16	2	0.03	79
SQUILLIDAE	0.12	4	0.02	
Carcinoplax sp	0.10	6	0.02	
Lactoria fornasini	0.10	2	0.02	80
Sphoeroides cf. pachygaster	0.10	4	0.02	81
Gnathophis habenatus	0.08	2	0.02	
Etrumeus wongratanai	0.08	2	0.02	
DORIPPIDAE	0.08	12	0.02	
Laeops nigromaculatus	0.08	6	0.02	77
Cheimerius nufar	0.06	2	0.01	
Arnoglossus sp.	0.04	2	0.01	78
SQUILLIDAE	0.04	2	0.01	0
Starfish	0.04	8	0.01	
Arcania sp.	0.02	4	0.00	
C R A B S	0.02	6	0.00	
Philyra sp.	0.01	2	0.00	
Total	507.21		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2018401 STATION: 9
DATE :31/01/18 GEAR TYPE: BT NO: 21 POSITION:Lat S 29°29.91
start stop duration Lon E 31°20.58
TIME :06:09:06 06:30:07 21.0 (min) Purpose : 1
LOG : 2996.26 2997.42 1.1 Region : 6210
FDEPTH: 53 54 Gear cond.: 0
BDEPTH: 53 54 Validity : 0
Towing dir: 0° Wire out : 160 m Speed : 3.3 kn
Sorted : 0 Total catch: 91.67 Catch/hour: 261.80

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Pagellus bellottii natalensis**	175.86	2119	67.17	
Pomadasys olivaceus	36.84	408	14.07	
Loligo duvauceli	12.05	314	4.60	
Torpedo sinuspersici	9.82	3	3.75	
Squatina sp 2	5.43	14	2.07	83
Gymnura natalensis	3.60	3	1.37	
Gymnura natalensis	2.51	3	0.96	0
Squatina sp.	1.88	6	0.72	82
Saurida undosquamis	1.49	37	0.57	
Halaelurus lineatus	1.37	9	0.52	
Ibacus novemdentatus	1.26	11	0.48	
Flabellum	1.21	160	0.46	
Crossorhombus sp.	1.20	80	0.46	
Pseudorhombus sp.	1.20	57	0.46	
Aesopia cornuta	1.09	29	0.41	
Trachinocephalus myops	0.74	17	0.28	
Pliotrema warreni	0.63	3	0.24	
Sepia acuminata	0.46	11	0.17	
Lepidotrigla faueri	0.46	11	0.17	
Sea anemone sp	0.37	9	0.14	
Paralichthodes algoensis	0.34	3	0.13	
Soft corals	0.29	3	0.11	
Astropecten sp.	0.29	77	0.11	
Halieutaea sp.	0.23	3	0.09	
Trachurus delagoa	0.17	3	0.07	
Cociella heemstrai	0.17	3	0.07	
Metapenaeopsis stridulans	0.17	3	0.07	
Hermits, mixed	0.17	77	0.07	
Choridactylus natalensis	0.14	6	0.05	86
ANGUILLIFORMES	0.09	3	0.03	84
Philine aperta	0.06	9	0.02	
PAGUROIDEA	0.06	54	0.02	
Carybdis sp.	0.06	3	0.02	
FASCIOLARIIDAE	0.03	3	0.01	
ANGUILLIFORMES	0.03	3	0.01	85
MAJIDAE	0.02	3	0.01	0
PARTHENOPIDAE	0.01	9	0.00	
Fistularia petimba	0.01	3	0.00	
Dendrophylia sp.	0.00	3	0.00	
Foraminifera	0.00	20	0.00	
MAJIDAE	0.00	3	0.00	
Total	261.80		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2018401 STATION: 10
DATE :31/01/18 GEAR TYPE: BT NO: 21 POSITION:Lat S 29°34.66
start stop duration Lon E 31°37.67
TIME :10:16:13 10:47:11 31.0 (min) Purpose : 1
LOG : 3017.82 3019.47 1.6 Region : 6210
FDEPTH: 130 144 Gear cond.: 0
BDEPTH: 130 144 Validity : 0
Towing dir: 0° Wire out : 400 m Speed : 3.2 kn
Sorted : 0 Total catch: 88.96 Catch/hour: 172.29

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Pagellus bellottii natalensis**	47.49	397	27.56	
Citharoides macrolepis	31.61	662	18.35	
Loligo duvauceli	17.16	571	9.96	
Myliobatis aquila	10.65	2	6.18	
Ibacus novemdentatus	9.49	74	5.51	87
Uranoscopus archionema	8.52	62	4.95	
Halieutaea sp.	6.47	76	3.75	
Sepia simoniana	5.69	27	3.30	
Acropoma japonicum	3.49	430	2.02	
Hoplichthys acanthopleurus	3.21	145	1.87	
Cynoglossus zanzibarensis	3.14	87	1.82	93
Lepidotrigla faueri	2.32	43	1.35	
Cynoglossus marleyi	2.30	19	1.34	94
Champsodon sp.	1.47	188	0.85	
Trichiurus lepturus	1.47	19	0.85	91
Scyllarides elisabethae	1.39	4	0.81	88
Flabellum	1.28	19	0.74	
Synagrops japonicus	1.28	176	0.74	
Carcinoplax sp	1.24	25	0.72	
Neobythites analis	1.12	41	0.65	
ANGUILLIDAE	1.07	21	0.62	95
Chelidonichthys kumu	1.01	8	0.58	
Atrobucca cf nibe	0.89	2	0.52	
Lophiomus setigerus	0.85	2	0.49	92
Pomadasys olivaceus	0.81	10	0.47	
Sphoeroides cf. pachygaster	0.81	8	0.47	
Monomia sp.	0.72	130	0.42	
Parapenaeus fissurus	0.68	72	0.39	
Sepia acuminata	0.66	12	0.38	
Squatina africana	0.62	15	0.36	
Ariomma indicum	0.62	4	0.36	89
Astropecten sp.	0.58	35	0.34	
Saurida undosquamis	0.52	4	0.30	90
Bathycongrus wallacei	0.50	2	0.29	
Pomatomus saltatrix	0.50	2	0.29	
Squilla sp.	0.23	4	0.13	
Chaunax atimovatae	0.23	4	0.13	
Arnoglossus dalgleishi	0.12	6	0.07	
Tylerius spinosissimus	0.08	2	0.04	
Zebrias regani	0.06	2	0.03	
Sepia vermiculata	0.02	2	0.01	
Peristedion cf weberi	0.02	4	0.01	
Hermits, mixed	0.02	6	0.01	
Platylambris sp.	0.01	2	0.01	
Arcania sp.	0.00	2	0.00	0
Total	172.44		100.09	

R/V Dr. Fridtjof Nansen SURVEY:2018401 STATION: 11
DATE :31/01/18 GEAR TYPE: BT NO: 21 POSITION:Lat S 29°28.50
start stop duration Lon E 31°49.03
TIME :21:27:29 21:50:03 22.6 (min) Purpose : 1
LOG : 3071.82 3072.74 0.9 Region : 6210
FDEPTH: 101 107 Gear cond.: 0
BDEPTH: 101 107 Validity : 0
Towing dir: 0° Wire out : 261 m Speed : 2.5 kn
Sorted : 0 Total catch: 131.27 Catch/hour: 348.96

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
PORIFERA (Sponges)	304.81	0	87.35	
Cheimerius nufar	5.53	19	1.58	
Scorpaena scrofa	4.31	16	1.23	
Squalus mahia	3.77	5	1.08	
Octopus vulgaris	2.71	5	0.78	
Soft corals	2.66	319	0.76	0
Brisingidae	2.66	0	0.76	
Starfish	2.66	0	0.76	
Monocentris japonica	2.39	21	0.69	98
Polysteganus coeruleopunctatus	1.81	11	0.52	
Chelidonichthys lastoviza ***	1.44	11	0.41	
Scyllarides elisabethae	1.38	3	0.40	
Champsodon capensis	1.33	197	0.38	
Citharoides macrolepis	1.17	45	0.34	
Antipatharia	1.06	11	0.30	
Trachurus delagoa	0.90	5	0.26	
Tetrosomus gibbosus	0.69	5	0.20	97
Halieutaea sp.	0.69	8	0.20	
PORTUNIDAE	0.66	13	0.19	
Hoplichthys sp.	0.58	27	0.17	
Ariomma indicum	0.48	3	0.14	
Pagellus bellottii natalensis**	0.48	3	0.14	
Gymnothorax sp.	0.43	3	0.12	102
Cynoglossus zanzibarensis	0.37	8	0.11	
Umbrina canariensis	0.37	3	0.11	
Acropoma japonicum	0.32	48	0.09	
Stychopathes sp	0.27	3	0.08	
OPHICHTHIDAE	0.24	3	0.07	0
Tylerius spinosissimus	0.21	3	0.06	
Serranus cabrilla	0.21	5	0.06	99
Uroteuthis (Photololigo) duvau	0.19	5	0.05	
DROMIIDAE	0.16	8	0.05	
Neoscombrops cynodon	0.16	3	0.05	
Synodus CF dermatogenys	0.16	11	0.05	96
Lactoria fornasini	0.16	3	0.05	101
Soft corals	0.13	16	0.04	
Plesionika longirostris	0.13	80	0.04	
Ophisurus serpens ***	0.13	3	0.04	
OPHICHTHIDAE	0.13	3	0.04	104
Muraenesox bagio	0.13	3	0.04	
Physiculus natalensis	0.11	19	0.03	100
Diaphus sp.	0.11	5	0.03	
Sepia simoniana	0.11	5	0.03	
Gnathophis habenatus	0.08	5	0.02	103
'Spider crab'	0.08	3	0.02	
Trichiurus lepturus	0.05	3	0.02	
Scorpaena sp.	0.05	8	0.02	105
Sepia confusa	0.05	13	0.02	
Squid unidentified	0.05	5	0.02	
G A S T R O P O D S	0.03	3	0.01	
Nudibranch sp	0.03	3	0.01	
Arcania sp.	0.03	5	0.01	
Parabembras robinsoni	0.03	3	0.01	
PORTUNIDAE	0.03	11	0.01	0
DROMIIDAE	0.03	5	0.01	0
Sepia sp.	0.03	8	0.01	
Clypeaster	0.01	3	0.00	
CARISTIIDAE	0.00	3	0.00	
S H R I M P S	0.00	3	0.00	0
S H R I M P S	0.00	5	0.00	
Crangon sp	0.00	13	0.00	
CARIDEA	0.00	3	0.00	
Total	348.99		100.01	

R/V Dr. Fridtjof Nansen SURVEY:2018401 STATION: 12
DATE :31/01/18 GEAR TYPE: PT NO: 4 POSITION:Lat S 29°26.05
start stop duration Lon E 31°40.23
TIME :23:19:49 23:50:10 30.3 (min) Purpose : 1
LOG : 3080.68 3082.05 1.4 Region : 6210
FDEPTH: 0 0 Gear cond.: 0
BDEPTH: 71 73 Validity : 0
Towing dir: 0° Wire out : 150 m Speed : 2.7 kn
Sorted : 4 Total catch: 3.60 Catch/hour: 7.13

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Pomatomus saltatrix	2.02	8	28.29	108
Uroteuthis (Photololigo) duvau	1.90	330	26.63	
Etrumeus whiteheadi	1.38	26	19.42	106
Trichiurus lepturus	1.03	4	14.42	107
Squid unidentified	0.59	589	8.32	0
Miscellanious larvae	0.20	0	2.77	
Squid unidentified	0.01	4	0.11	
CARANGIDAE, juvenile	0.00	2	0.03	
Total	7.13		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2018401 STATION: 13
DATE :01/02/18 GEAR TYPE: BT NO: 21 POSITION:Lat S 29°16.00
start stop duration Lon E 31°39.29
TIME :05:58:10 06:28:59 30.8 (min) Purpose : 1
LOG : 3113.41 3115.18 1.8 Region : 6210
FDEPTH: 51 47 Gear cond.: 0
BDEPTH: 51 47 Validity : 0
Towing dir: 0° Wire out : 160 m Speed : 3.4 kn
Sorted : 0 Total catch: 63.44 Catch/hour: 123.51

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Pagellus bellottii natalensis**	59.30	736	48.01	
Dasyatis chrysonota	22.35	4	18.10	
Pomadasys olivaceus	14.21	164	11.51	
G A S T R O P O D S	10.79	2628	8.74	
Pseudorhombus elevatus	4.52	206	3.66	
Salmacis bicolor	2.84	68	2.30	
Loligo duvauceli	1.71	33	1.39	
Raja miraletus	1.01	2	0.82	
Saurida undosquamis	0.75	21	0.61	
Portunus hastatus	0.70	713	0.57	
Astropectinidae	0.66	43	0.54	
Ariomma indicum	0.47	4	0.38	
Epinephelus andersoni	0.39	2	0.32	
Pomatomus saltatrix	0.35	2	0.28	
Astropecten irregularis	0.35	16	0.28	

Pegusa nasuta	0.31	12	0.25	
Cynoglossus attenuatus	0.28	6	0.23	
Argyrosomus thorpei	0.27	2	0.22	
Sea anemone sp	0.25	4	0.20	
Trichiurus lepturus	0.23	8	0.19	
B I V A L V E S	0.22	181	0.18	0
Champsodon capensis	0.21	51	0.17	
B I V A L V E S	0.21	197	0.17	
Cociella heemstrai	0.19	2	0.16	
LEUCOSIIDAE	0.19	286	0.15	
Sepia vermiculata	0.16	12	0.13	
PARTHENOPIDAE	0.11	27	0.09	
Loligo duvauceli	0.08	49	0.07	0
Ostorhinchus fasciatus	0.08	4	0.06	109
Cynoglossus acaudatus	0.04	4	0.04	
Cynoglossus marleyi	0.04	2	0.04	
OCTOPODIDAE	0.04	2	0.03	
Octopus vulgaris	0.04	2	0.03	
Brissidae	0.03	2	0.02	
PENAEIDAE	0.02	14	0.02	
Philine sp.	0.02	14	0.02	
DORIPPIDAE	0.02	21	0.02	
Decapterus macrosoma	0.02	2	0.02	
Priacanthus sp.	0.01	2	0.01	111
Upeneus sp.	0.01	2	0.01	110
Total	123.51		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2018401 STATION: 14
DATE :01/02/18 GEAR TYPE: BT NO: 21 POSITION:Lat S 29°21.30
start stop duration Lon E 31°58.32
TIME :16:33:43 17:04:06 30.4 (min) Purpose : 1
LOG : 3158.53 3160.18 1.6 Region : 6210
FDEPTH: 403 397 Gear cond.: 0
BDEPTH: 403 397 Validity : 0
Towing dir: 0° Wire out : 1050 m Speed : 3.3 kn
Sorted : 42 Total catch: 108.56 Catch/hour: 214.33

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Chlorophthalmus punctatus	62.78	1106	29.29	
Metanephrops mozambicus	28.73	1076	13.40	112
Haliporoides triarthrus	18.07	652	8.43	113
Phormosoma sp.	15.60	39	7.28	0
Neoscombrops cynodon	13.23	578	6.17	
Diaphus knappi	12.93	727	6.03	
Palinurus delagoae	12.64	75	5.90	114
Aristaeomorpha foliacea	9.38	539	4.38	
Histioteuthis miranda	5.29	4	2.47	
PORIFERA (Sponges)	3.95	16	1.84	
Benthosema fibulatum	3.75	938	1.75	
Aristeus antennatus	3.55	99	1.66	
Parabathynomus natalensis	3.46	302	1.61	
Coelorinchus trunovi	3.36	45	1.57	
Plesionika sp.	2.57	677	1.20	
Phormosoma sp.	1.74	6	0.81	
Merluccius paradoxus	1.48	6	0.69	
Velodona togata	1.38	6	0.64	
Rossia sp.	1.09	30	0.51	
Starfish	0.99	20	0.46	
Histioteuthis celetaria	0.89	10	0.41	0
Gonorhynchus gonorhynchus	0.89	10	0.41	
Chaeceon macphersoni	0.74	6	0.35	
Chaunax pictus	0.61	39	0.29	
Nototodarus hawaiiensis	0.59	6	0.28	
Ventrifossa mystax	0.44	16	0.21	
Polycheles sp.	0.44	16	0.21	
Hymenocephalus italicus	0.44	30	0.21	0
Nephropsis stewarti	0.39	45	0.18	
Chascanopsetta lugubris	0.32	2	0.15	
Pleistacantha ori	0.30	6	0.14	
Arminidae	0.30	6	0.14	
Heterocarpus ensifer	0.20	20	0.09	
Centroberyx spinosus	0.20	20	0.09	115
JELLYFISH	0.20	6	0.09	
Symphurus ocellatus	0.17	20	0.08	
Dipturus springeri	0.16	2	0.07	
Helicolenus dactylopterus	0.15	6	0.07	
Selachophidium guentheri	0.15	10	0.07	
Cynoglossus zanzibarensis	0.10	6	0.05	
Hermits, mixed	0.10	30	0.05	
Munida sp.	0.10	10	0.05	
Sepia vermiculata	0.10	6	0.05	
Peristedion cf weberi	0.09	6	0.04	
Lyreidus brevifrons	0.09	10	0.04	
Coelorinchus trunovi	0.05	6	0.02	0
Rochinia sp.	0.05	6	0.02	
Propeamussium sibogai	0.04	6	0.02	
Malacocephalus laevis	0.03	6	0.01	
Pasiphaea japonica	0.03	16	0.01	
Polymixia berndti	0.02	2	0.01	
Munida sp.	0.01	6	0.00	0
CARIDEA	0.01	6	0.00	
Total	214.33		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2018401 STATION: 15
DATE :02/02/18 GEAR TYPE: PT NO: 4 POSITION:Lat S 29°8.60
start stop duration Lon E 31°55.80
TIME :22:43:51 23:45:40 61.8 (min) Purpose : 1
LOG : 3340.80 3344.01 3.2 Region : 6210
FDEPTH: 0 0 Gear cond.: 0
BDEPTH: 43 46 Validity : 0
Towing dir: 0° Wire out : 140 m Speed : 3.1 kn
Sorted : 0 Total catch: 156.98 Catch/hour: 152.36

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Trachurus delagoa	77.94	874	51.15	116
Etrumeus whiteheadi	22.79	422	14.96	
Decapterus russelli	18.83	261	12.36	117
Scomber japonicus	16.40	102	10.77	
Pomatomus saltatrix	6.15	27	4.04	
Uroteuthis (Photololigo) duvau	3.63	178	2.38	
Selar crumenophthalmus	3.24	21	2.13	118
Etrumeus wongratanai	2.35	27	1.54	
Ariomma indicum	0.56	5	0.37	
Herklotsichthys quadrimaculat.	0.16	3	0.10	120
Decapterus macrosoma	0.16	3	0.10	
Sphyraena helleri	0.10	1	0.06	119
Engraulis encrasicolus	0.06	5	0.04	
Total	152.36		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2018401 STATION: 16
DATE :03/02/18 GEAR TYPE: BT NO: 21 POSITION:Lat S 29°6.96
start stop duration Lon E 31°40.02
TIME :03:48:04 04:15:37 27.6 (min) Purpose : 1
LOG : 3364.20 3365.82 1.6 Region : 6210
FDEPTH: 25 25 Gear cond.: 0
BDEPTH: 25 25 Validity : 0
Towing dir: 0° Wire out : 120 m Speed : 3.5 kn
Sorted : 147 Total catch: 320.19 Catch/hour: 697.34

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Johnius fuscolineatus	428.43	8703	61.44	
Johnius dorsalis	85.20	1594	12.22	
Otolithes ruber	61.85	1002	8.87	
Carcharhinus obscurus	19.60	2	2.81	
Trachurus delagoa	17.16	131	2.46	
Mobula sp.	15.25	2	2.19	
Pomadasys kaakan	9.36	2	1.34	
Trichiurus lepturus	7.49	166	1.07	
Pomadasys olivaceus	6.97	52	1.00	
Metapenaeus monoceros	6.19	405	0.89	133
Cynoglossus attenuatus	5.31	57	0.76	
Argyrosomus thorpei	4.62	26	0.66	124
Leiognathus equulus	4.01	52	0.57	121
Penaeus indicus	3.92	87	0.56	132
Galeichthys trowi	3.27	4	0.47	
Pteromylaeus bovinus	2.96	2	0.42	
Gymnura natalensis	2.00	2	0.29	
Epinephelus andersoni	1.48	9	0.21	
Pomadasys commersonnii	1.31	4	0.19	
Dasyatis chrysonota	1.26	4	0.18	
Sphyrna lewini	1.22	2	0.17	
Cynoglossus lida	1.22	44	0.17	
Lagocephalus guentheri	0.96	78	0.14	127
Bryozoa spp.	0.78	9	0.11	
Cociella heemstrai	0.74	17	0.11	
Atrobucca nibe	0.65	13	0.09	126
Panulirus homarus	0.61	2	0.09	
Penaeus monodon	0.48	2	0.07	
Pellona ditchela	0.39	9	0.06	131
Atergatis roseus	0.39	4	0.06	0
Penaeus monodon	0.26	4	0.04	0
Thryssa setirostris	0.26	9	0.04	129
ANGUILLIFORMES	0.17	4	0.02	125
Caesio caerulaurea	0.17	4	0.02	
Parapenaeopsis sp.	0.16	83	0.02	
Polydactylus malagasyensis	0.13	4	0.02	123
PORIFERA (Sponges)	0.13	4	0.02	
Uroteuthis (Photololigo) duvau	0.09	9	0.01	
Gazza minuta	0.09	4	0.01	128
Thryssa vitrirostris	0.07	22	0.01	130
MATUTIDAE	0.04	13	0.01	
Pegusa nasuta	0.02	4	0.00	
Philyra sp.	0.01	9	0.00	
Ophiocnemis	0.01	4	0.00	
Parapriacanthus ransonneti	0.01	4	0.00	
Bregmaceros sp.	0.01	4	0.00	122
C R A B S	0.01	4	0.00	
Ficus ficus	0.00	4	0.00	
SQUILLIDAE	0.00	4	0.00	
Total	696.75		99.92	

R/V Dr. Fridtjof Nansen SURVEY:2018401 STATION: 17
DATE :03/02/18 GEAR TYPE: BT NO: 21 POSITION:Lat S 28°45.65
start stop duration Lon E 32°11.76
TIME :14:05:49 14:21:53 16.1 (min) Purpose : 1
LOG : 3431.05 3432.11 1.1 Region : 6210
FDEPTH: 30 31 Gear cond.: 0
BDEPTH: 30 31 Validity : 0
Towing dir: 0° Wire out : 120 m Speed : 3.9 kn
Sorted : 73 Total catch: 220.19 Catch/hour: 822.11

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Engraulis encrasicolus	749.35	103587	91.15	135
Trachurus delagoa	36.07	515	4.39	134
Sardinella gibbosa	9.86	112	1.20	137
Pagellus bellottii natalensis**	6.50	134	0.79	
Decapterus russelli	5.60	202	0.68	
Uroteuthis (Photololigo) duvau	4.93	246	0.60	
Secutor insidiator	4.48	202	0.54	139
Pomatomus saltatrix	2.69	22	0.33	
Herklotsichthys quadrimaculat.	2.53	269	0.31	138
Carangoides malabaricus	0.11	11	0.01	136
Total	822.11		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2018401 STATION: 18
DATE :03/02/18 GEAR TYPE: BT NO: 21 POSITION:Lat S 28°44.62
start stop duration Lon E 32°16.77
TIME :17:01:38 17:25:08 23.5 (min) Purpose : 1
LOG : 3441.16 3442.46 1.3 Region : 6210
FDEPTH: 52 53 Gear cond.: 0
BDEPTH: 52 53 Validity : 0
Towing dir: 0° Wire out : 220 m Speed : 3.3 kn
Sorted : 87 Total catch: 173.51 Catch/hour: 443.01

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Pagellus bellottii natalensis**	275.85	5224	62.27	
Trachurus delagoa	50.96	664	11.50	
Pomadasys olivaceus	30.43	766	6.87	
Lepidotrigla faueri	12.66	342	2.86	
Sphyraena obtusata	10.11	97	2.28	140
Halaelurus lineatus	7.56	31	1.71	
Saurida undosquamis	7.15	82	1.61	
Loligo duvauceli	7.15	291	1.61	

Pomatomus saltatrix	7.05	56	1.59	
Trachypenaeus curvirostris	5.21	1481	1.18	
Sorsogona portuguesa	4.39	194	0.99	141
Uranoscopus archionema	3.78	5	0.85	
Trachinocephalus myops	3.47	56	0.78	
Scomber japonicus	3.17	26	0.71	
Crossorhombus valderostratus	2.14	158	0.48	
Amblyrhynchotes honkenii	2.04	36	0.46	
Decapterus macarellus	2.04	26	0.46	
Gonorhynchus gonorhynchus	1.84	61	0.41	
Cynoglossus gilchristi	1.23	143	0.28	
Sepia confusa	1.12	133	0.25	
Penaeus japonicus	1.02	26	0.23	
Sepia vermiculata	0.92	5	0.21	
Selar crumenophthalmus	0.61	10	0.14	
PENAEIDAE	0.36	51	0.08	
ANGUILLIFORMES	0.31	15	0.07	
Astropecten sp.	0.11	5	0.03	
PENAEIDAE	0.10	5	0.02	0
Cavernularia sp.	0.10	10	0.02	
Sepiella cyanea	0.07	15	0.01	
Charybdis sp.	0.04	5	0.01	
Caridae sp.	0.02	20	0.00	
Total	443.01		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2018401 STATION: 19
DATE :04/02/18 GEAR TYPE: BT NO: 21 POSITION:Lat S 28°36.49
start stop duration Lon E 32°22.37
TIME :04:39:28 05:03:11 23.7 (min) Purpose : 1
LOG : 3493.53 3495.04 1.5 Region : 6210
FDEPTH: 37 38 Gear cond.: 0
BDEPTH: 37 38 Validity : 0
Towing dir: 0° Wire out : 140 m Speed : 3.8 kn
Sorted : 0 Total catch: 97.58 Catch/hour: 246.93

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Pagellus bellottii natalensis**	175.32	2715	71.00	
Trachurus delagoa	60.84	2452	24.64	142
Scomber japonicus	6.63	104	2.68	143
Decapterus macrosoma	1.67	48	0.68	
Loligo duvauceli	1.37	51	0.55	
Pomatomus saltatrix	0.40	3	0.16	
Sepia vermiculata	0.38	5	0.15	
Etrumeus wongratanai	0.20	5	0.08	
Priacanthus sp.	0.13	3	0.05	144
Total	246.93		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2018401 STATION: 20
DATE :04/02/18 GEAR TYPE: BT NO: 21 POSITION:Lat S 28°33.11
start stop duration Lon E 32°24.07
TIME :08:08:20 08:33:41 25.3 (min) Purpose : 1
LOG : 3507.43 3508.74 1.3 Region : 6210
FDEPTH: 36 39 Gear cond.: 0
BDEPTH: 36 39 Validity : 0
Towing dir: 0° Wire out : 150 m Speed : 3.1 kn
Sorted : 5 Total catch: 5.49 Catch/hour: 13.00

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Ecklonia sp.	4.93	0	37.88	
Decapterus macrosoma	2.06	116	15.84	
Pagellus bellottii natalensis**	1.85	54	14.21	
Loligo duvauceli	1.56	62	12.02	
Sepia vermiculata	1.47	9	11.29	
Trachinocephalus myops	0.38	7	2.91	
Etrumeus wongratanai	0.31	14	2.37	
Sepia confusa	0.14	14	1.09	
Pennella sp	0.07	2	0.56	
Engraulis encrasicolus	0.07	7	0.55	
Velifer hypselopterus	0.07	2	0.55	145
Actinoptilum molle	0.03	2	0.22	
Crossorhombus sp.	0.02	2	0.18	
SEPIOLIDAE	0.02	2	0.18	
Amblyrhynchotes honkenii	0.02	2	0.15	
Total	13.00		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2018401 STATION: 21
DATE :05/02/18 GEAR TYPE: BT NO: 21 POSITION:Lat S 28°40.73
start stop duration Lon E 32°24.19
TIME :07:24:28 07:44:06 19.6 (min) Purpose : 1
LOG : 3575.74 3576.48 0.7 Region : 6210
FDEPTH: 184 191 Gear cond.: 0
BDEPTH: 184 191 Validity : 0
Towing dir: 0° Wire out : 520 m Speed : 2.3 kn
Sorted : 0 Total catch: 6.83 Catch/hour: 20.89

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Squalus mahia	6.18	6	29.57	
Loligo duvauceli	5.63	171	26.93	
Scyllarides elisabethae	2.63	6	12.59	
Pagellus bellottii natalensis**	1.83	21	8.78	
Sphoeroides pachygaster	1.83	3	8.78	
Chaunax atimovatae	0.98	3	4.68	
Flabellum	0.43	55	2.05	
SALPS	0.40	15	1.90	
Ibacus novemdentatus	0.40	3	1.90	
Chelidonichthys kumu	0.15	3	0.73	
Lepidotrigla faueri	0.09	3	0.44	
PYROSOMIDAE	0.07	3	0.34	
Champsodon capensis	0.06	21	0.29	
JELLYFISH	0.06	9	0.29	
Pisodonophis cancrivorus	0.06	3	0.29	
Starfish	0.03	6	0.16	
Emmelichthys sp.	0.03	3	0.15	146
Bryozoa spp.	0.01	3	0.03	
Antigonia rubescens	0.00	3	0.01	147
FISH LARVAE	0.00	6	0.01	
Sea urchin	0.00	6	0.01	
S H R I M P S	0.00	3	0.01	
Unidentified crustacean larvae	0.00	3	0.01	
Uroteuthis sp.	0.00	3	0.01	
Total	20.89		100.00	

R/V Dr. Fridtjof Nansen SURVEY:2018401 STATION: 22
DATE :06/02/18 GEAR TYPE: BT NO: 21 POSITION:Lat S 29°7.46
start stop duration Lon E 31°59.93
TIME :04:57:50 05:19:44 21.9 (min) Purpose : 1
LOG : 3656.75 3657.74 1.0 Region : 6210
FDEPTH: 46 45 Gear cond.: 0
BDEPTH: 46 45 Validity : 0
Towing dir: 0° Wire out : 150 m Speed : 2.7 kn
Sorted : 3 Total catch: 3.02 Catch/hour: 8.29

SPECIES	CATCH/HOUR weight	numbers	% OF TOT. C	SAMP
Raja miraletus	2.90	8	35.04	
Pagellus bellottii natalensis**	0.99	14	11.90	
Sepia confusa	0.82	11	9.92	0
Sepia vermiculata	0.79	3	9.59	
Halaelurus lineatus	0.71	3	8.60	
Loligo duvauceli	0.66	36	7.93	
Saurida undosquamis	0.66	5	7.93	
Cavernularia sp.	0.35	41	4.17	
Trachinocephalus myops	0.11	8	1.32	
Ascidans	0.08	197	1.02	
Actinoptilum molle	0.07	8	0.79	
Caranx sexfasciatus	0.05	3	0.66	
Champsodon capensis	0.03	3	0.33	
Decapterus macrosoma	0.03	5	0.33	
Starfish	0.02	5	0.20	
Crossorhombus valderostratus	0.01	3	0.17	
Opistobranch	0.01	5	0.10	
Total	8.29		100.00	

ANNEX VII. LIST OF BIOLOGICAL SAMPLES COLLECTED FOR FUTURE ANALYSIS

Survey	Station	Species	Total no sampled	Preservation	Stored where?	Receiving institution	Comments
2018401	1	Engraulus encrasicolus	25	Formalin	DAFF Barrel 1	DAFF	
2018401	1	Scomber japonicus	5	Formalin	DAFF Barrel 1	DAFF	
2018401	2	Sepia acuminata	2	Formalin	DAFF Barrel 1	DAFF	
2018401	2	Uroteuthis duvaceli	4	Formalin	DAFF Barrel 1	DAFF	
2018401	3	Squalus mahai	5	Formalin	DAFF Barrel 1	DAFF	
2018401	3	Sepia confusa	1	Formalin	DAFF Barrel 1	DAFF	
2018401	3	Sepia acuminata	1	Formalin	DAFF Barrel 1	DAFF	
2018401	3	Sepia cf heironus	1	Formalin	DAFF Barrel 1	DAFF	
2018401	3	Sepia sp	5	Formalin	DAFF Barrel 1	DAFF	
2018401	4	Sepia vermiculata	5	Formalin	DAFF Barrel 1	DAFF	
2018401	8	Sepia confusa	1	Formalin	DAFF Barrel 1	DAFF	Tissue sample taken
2018401	8	Sepia simoniana	1	Formalin	DAFF Barrel 1	DAFF	Tissue sample taken
2018401	7	Diaphus knappi	3	Formalin	DAFF Barrel 1	DAFF	
2018401	11	Sepia confusa	5	Formalin	DAFF Barrel 1	DAFF	
2018401	11	Sepia sp	3	Formalin	DAFF Barrel 1	DAFF	
2018401	11	Uroteuthis duvaceli	2	Formalin	DAFF Barrel 1	DAFF	
2018401	11	Notodarius	2	Formalin	DAFF Barrel 1	DAFF	
2018401	11	Diaphus sp	2	Formalin	DAFF Barrel 1	DAFF	
2018401	12	Unid squid sp 1	2	Formalin	Sample jar	DAFF	
2018401	12	Unid squid sp 2	20	Formalin	Sample jar	DAFF	
2018401	15	Etrumeus wongratanai	20	Frozen	Freezer	DAFF	
2018401	15	Etrumeus whiteheadi	25	Frozen	Freezer	DAFF	
2018401	5	Chelidonichthys, Etrumeus whiteheadi, E. wongratanai	10, 10, 2	Frozen	Freezer	DAFF	
2018401	6	Helicolenus	10	Frozen	Freezer	DAFF	
2018401	12	Etrumeus	8	Frozen	Freezer	DAFF	

Survey	Station	Species	Total no sampled	Preservation	Stored where?	Receiving institution	Comments
2018401	15	Etrumeus	20	Frozen	Freezer	DAFF	
2018401	14	Helicolenus	3	Frozen	Freezer	DAFF	
2018401	21	Chelidonichthys	3	Frozen	Freezer	DAFF	
2018401	15	Engraulus encrasicolus	25	Frozen	Freezer	DAFF	
2018401	17	Engraulus encrasicolus	25	Frozen	Freezer	DAFF	
2018401	17	Stolophorus punctifer	25	Frozen	Freezer	DAFF	
2018401	1	Physiculus sp.	1	Formalin	Main deck drum	SAIAB	Fin clips taken
2018401	1	Neobythites analis	1	Formalin	Main deck drum	SAIAB	Fin clips taken
2018401	1	Helicolenus dactylopterus	1	Formalin	Main deck drum	SAIAB	Fin clips taken
2018401	1	Symphurus strictus	1	Formalin	Main deck drum	SAIAB	
2018401	1	Scomber japonicus	4	Formalin	Main deck drum	SAIAB	Fin clips taken
2018401	1	Etrumeus whitehead	4	Formalin	Main deck drum	SAIAB	Fin clips taken
2018401	1	Acropoma japonicum	4	Formalin	Main deck drum	SAIAB	Fin clips taken
2018401	2	Sepia vermiculata	5	Formalin	Main deck drum	SAIAB	Tissue samples taken
2018401	2	Fistularia sp.	1	Formalin	Main deck drum	SAIAB	
2018401	2	Pagellus natalensis	10	Formalin	Main deck drum	SAIAB	Fin clips taken
2018401	2	Cavernularia sp.	7	99% ethanol	Main deck drum	SAIAB	
2018401	2	Trachinocephalus myops	5	Formalin	Main deck drum	SAIAB	Fin clips taken
2018401	2	Pseudorhombus arsius	1	Formalin	Main deck drum	SAIAB	
2018401	2	Decapterus russelli	3	Formalin	Main deck drum	SAIAB	Tissue samples taken
2018401	2	Cynoglossus cf durbanesis	1	Formalin	Main deck drum	SAIAB	
2018401	2	Heteropriacanthus cruentatus	1	Formalin	Main deck drum	SAIAB	
2018401	2	Decapterus macarellus	1	Formalin	Main deck drum	SAIAB	
2018401	2	Halaelurus lineatus	1	Formalin	Main deck drum	SAIAB	
2018401	2	Bothidae (larvae)	1	99% ethanol	Main deck drum	SAIAB	
2018401	2	Crossorhombus valderostratus	4	Formalin	Main deck drum	SAIAB	Fin clips taken
2018401	3	Parapercis marItzi	4	Formalin	Main deck drum	SAIAB	Fin clips taken

Survey	Station	Species	Total no sampled	Preservation	Stored where?	Receiving institution	Comments
2018401	3	Helicolenus dactylopterus	3	Formalin	Main deck drum	SAIAB	Fin clips taken
2018401	3	Macroramphosus scolax	5	Formalin	Main deck drum	SAIAB	Fin clips taken
2018401	3	Chaunax atimovatae	3	Formalin	Main deck drum	SAIAB	Fin clips taken
2018401	3	Rhinobatos ocellatus	1	Formalin	Main deck drum	SAIAB	Fin clips taken
2018401	3	Umbrina canariensis	1	Formalin	Main deck drum	SAIAB	Fin clips taken
2018401	3	Squalus mahia	4	Formalin	Main deck drum	SAIAB	Fin clips taken
2018401	3	Polymixia berndti	1	Formalin	Main deck drum	SAIAB	Fin clips taken
2018401	3	Kentrocapros rosapinto	2	Formalin	Main deck drum	SAIAB	Fin clips taken
2018401	3	Citharoides macrolepis	3	Formalin	Main deck drum	SAIAB	Fin clips taken
2018401	3	Spicara australis	5	Formalin	Main deck drum	SAIAB	Fin clips taken
2018401	3	Zeus capensis	2	Formalin	Main deck drum	SAIAB	Fin clips taken
2018401	3	Mustelus palumbe	1	Formalin	Main deck drum	SAIAB	Fin clips taken
2018401	3	Champsodon capensis	2	Formalin	Main deck drum	SAIAB	Fin clips taken
2018401	3	Rostroraja alba	1	Formalin	Main deck drum	SAIAB	Fin clips taken
2018401	3	Halilutea cf fitsimonsi	1	Formalin	Main deck drum	SAIAB	Fin clips taken
2018401	3	Boxfish	1	Formalin	Main deck drum	SAIAB	Fin clips taken
2018401	3	Scombrops boops	2	Formalin	Main deck drum	SAIAB	Fin clips taken
2018401	3	Octopus	1	Formalin	Main deck drum	SAIAB	Tissue sample taken
2018401	3	Chelodonichthyes lastoviza	1	Formalin	Main deck drum	SAIAB	Fin clips taken
2018401	4	Pagellus natalensis	10	Formalin	Main deck drum	SAIAB	
2018401	4	Decapterus russelli	2	Formalin	Main deck drum	SAIAB	Fin clip
2018401	4	Lithognathes mormyrus	4	Formalin	Main deck drum	SAIAB	Fin clip
2018401	4	Saurida undosquamis	1	Formalin	Main deck drum	SAIAB	Fin clip
2018401	4	Unidentified eel	2	Formalin	Main deck drum	SAIAB	Tissue sample taken
2018401	4	Sphyraena acutipinnis	2	Formalin	Main deck drum	SAIAB	Fin clip
2018401	4	Octupus	1	Formalin	Main deck drum	SAIAB	Tissue sample taken
2018401	4	Sepia vermiculata	2	Formalin	Main deck drum	SAIAB	Tissue sample taken

Survey	Station	Species	Total no sampled	Preservation	Stored where?	Receiving institution	Comments
2018401	5	Gonorhynous gonorhynous	3	Formalin	Main deck drum	SAIAB	Fin clip
2018401	5	Etrumeus wongratanai	5	Formalin	Main deck drum	SAIAB	Fin clip
2018401	5	Hoplichthys acanthopleurus	5	Formalin	Main deck drum	SAIAB	Fin clip
2018401	5	Pliotrema warreni	5	Formalin	Main deck drum	SAIAB	Fin clip
2018401	5	Haploplephelus sp.	1	Formalin	Main deck drum	SAIAB	Fin clip
2018401	5	Rexia sp.	1	Formalin	Main deck drum	SAIAB	Fin clip
2018401	5	Champsodon capensis	3	Formalin	Main deck drum	SAIAB	Fin clip
2018401	6	Ventrifossa mystax	2	Formalin	Main deck drum	SAIAB	Fin clip
2018401	6	Coelorinchus braueri	2	Formalin	Main deck drum	SAIAB	Fin clip
2018401	6	Polymetme sp.	2	Formalin	Main deck drum	SAIAB	Fin clip
2018401	6	Selachophidium guentheri	2	Formalin	Main deck drum	SAIAB	Fin clip
2018401	6	Zenion leptolepis	3	Formalin	Main deck drum	SAIAB	Fin clip
2018401	6	Triacanthodes ethiops	1	Formalin	Main deck drum	SAIAB	Fin clip
2018401	6	Malthopis sp.	2	Formalin	Main deck drum	SAIAB	Fin clip
2018401	6	Chascapopsetta lugubris	3	Formalin	Main deck drum	SAIAB	Fin clip
2018401	6	Oreosoma atlanticum	1	Formalin	Main deck drum	SAIAB	Fin clip
2018401	6	Polylphus indicus	5	Formalin	Main deck drum	SAIAB	Fin clip
2018401	6	Owstonia smoterus	no specimen	Formalin	Main deck drum	SAIAB	Tissue sample taken
2018401	6	Owmastrephes bartiammi	1	Formalin	Main deck drum	SAIAB	Tissue samples taken by Rob
2018401	7	Rechias wallace	2	Formalin	Main deck drum	SAIAB	Fin clip
2018401	7	Parabembras robinsoni	1	Formalin	Main deck drum	SAIAB	Fin clip
2018401	8	Laeops nigromaculatus	3	Formalin	Main deck drum	SAIAB	Fin clip
2018401	8	Neolaepos microphthalmus	1	Formalin	Main deck drum	SAIAB	Fin clip
2018401	8	Tylerius spinosissimus	3	Formalin	Main deck drum	SAIAB	Fin clip
2018401	8	Branchiostegus dolicitus	1	Formalin	Main deck drum	SAIAB	Fin clip
2018401	8	Lactoria fornasini	1	Formalin	Main deck drum	SAIAB	Fin clip
2018401	8	Sphoeroides pachygaster	2	Formalin	Main deck drum	SAIAB	Fin clip

Survey	Station	Species	Total no sampled	Preservation	Stored where?	Receiving institution	Comments
2018401	9	Choridactylus natalensis	2	Formalin	Main deck drum	SAIAB	Fin clip
2018401	9	Eel 1	1	Formalin	Main deck drum	SAIAB	Tissue sample taken
2018401	9	Eel 2	1	Formalin	Main deck drum	SAIAB	Tissue sample taken
2018401	9	Squatina sp.1	5	Formalin	Main deck drum	SAIAB	Fin clip
2018401	9	Squatina sp.2	2	Formalin	Main deck drum	SAIAB	Fin clip
2018401	10	Ariomma indicam	2	Formalin	Main deck drum	SAIAB	Fin clip
2018401	10	Saurida undosquamis	2	Formalin	Main deck drum	SAIAB	Fin clip
2018401	10	Triurus leptrurus	2	Formalin	Main deck drum	SAIAB	Tissue sample taken
2018401	10	Lophiomus setigerus	1	Formalin	Main deck drum	SAIAB	Fin clip
2018401	10	Cynoglossus cf zanzibarensis	6	Formalin	Main deck drum	SAIAB	Fin clip
2018401	10	Cynoglossus marley	3	Formalin	Main deck drum	SAIAB	Fin clip
2018401	10	Chlopsiadae (eel 1)	2	Formalin	Main deck drum	SAIAB	Tissue sample taken
2018401	10	Ophichthidae 1 (eel 2)	3	Formalin	Main deck drum	SAIAB	Tissue sample taken
2018401	10	Ophichthidae 1 (eel 3)	3	Formalin	Main deck drum	SAIAB	Tissue sample taken
2018401	14	Piptus cf springeri	1	Formalin	Main deck drum	SAIAB	Fin clip
2018401	14	Nettastoma parviceps	5	Formalin	Main deck drum	SAIAB	Tissue sample taken
2018401	14	Hymenocephala italicus	1	Formalin	Main deck drum	SAIAB	
2018401	15	Ariomma indicam	2	Formalin	Main deck drum	SAIAB	Fin clip
2018401	15	Selar crumenophthalmus	2	Formalin	Main deck drum	SAIAB	Fin clip
2018401	15	Sphyraena hellieri	1	Formalin	Main deck drum	SAIAB	Fin clip
2018401	15	Herkiotsichthys quadrimaculatus	3	Formalin	Main deck drum	SAIAB	Tissue sample taken
2018401	16	Leignathus equula	3	Formalin	Main deck drum	SAIAB	Fin clip
2018401	16	Bregmaceros sp.	1	Formalin	Main deck drum	SAIAB	Tissue sample taken
2018401	16	Polydacttylus malagasyensis	1	Formalin	Main deck drum	SAIAB	Fin clip
2018401	16	Atrobucca nibe	2	Formalin	Main deck drum	SAIAB	Fin clip
2018401	16	Argyosomus thorpei	3	Formalin	Main deck drum	SAIAB	Fin clip
2018401	16	Unidentified eel	1	Formalin	Main deck drum	SAIAB	Tissue sample taken

Survey	Station	Species	Total no sampled	Preservation	Stored where?	Receiving institution	Comments
2018401	16	Lagocephalus guentheri	3	Formalin	Main deck drum	SAIAB	Fin clip
2018401	16	Gazza minuta	1	Formalin	Main deck drum	SAIAB	Fin clip
2018401	16	Thryssa setirostris	2	Formalin	Main deck drum	SAIAB	Fin clip
2018401	16	Thryssa vitriostris	5	Formalin	Main deck drum	SAIAB	Fin clip
2018401	16	Pellona ditchella	1	Formalin	Main deck drum	SAIAB	Tissue sample taken
2018401	17	Carangoides malabaricus	1	Formalin	Main deck drum	SAIAB	Fin clip
2018401	17	Sardinella gibbosa	4	Formalin	Main deck drum	SAIAB	Tissue samples
2018401	17	Herklotsichthys quadrimaculatus	6	Formalin	Main deck drum	SAIAB	Tissue samples
2018401	17	Secutar insidiator	8	Formalin	Main deck drum	SAIAB	Fin clip
2018401	18	Sphyraena obstusata	6	Formalin	Main deck drum	SAIAB	Fin clip
2018401	18	Sorsogona portugesa	5	Formalin	Main deck drum	SAIAB	Fin clip
2018401	18	Halieutaea spicata	1	Formalin	Main deck drum	SAIAB	Fin clip
2018401	19	Priacanthus sp.	1	Formalin	Main deck drum	SAIAB	Fin clip
2018401	20	Velifer hypselopterus	1	Formalin	Main deck drum	SAIAB	Fin clip
2018401	21	Emmelichthys ruber	1	Formalin	Main deck drum	SAIAB	Tissue sample
2018401	21	Antigonia rubiscens	1	Formalin	Main deck drum	SAIAB	Fin clip
2018401	1	Plesionika sp	5	Frozen	Main deck freezer	ORI	ID
2018401	1	Carcinoplax sp	2	Frozen	Main deck freezer	ORI	ID
2018401	1	Ovalipes punctatus	1	Frozen	Main deck freezer	ORI	ID
2018401	3	Caridae	3	FROZEN	Freezer	ORI	ID
2018401	4	Pagellus natalensis	10	Frozen	Freezer	ORI	Parasites
2018401	17	Stolophorus punctifer	20	Frozen	Freezer	ORI	Parasites
2018401	19	Pagellus + Decapterus	5 + 5	Frozen	Freezer	ORI	Parasites
2018401	22	Pagellus natalensis	6	Frozen	Freezer	ORI	Parasites
2018401	14	Chlorophthalmus	5	Frozen	Freezer	ORI	Parasites
2018401	18	Pagellus natalensis	7	Frozen	Freezer	ORI	Parasites
2018401	13	Pagellus natalensis	3	Frozen	Freezer	ORI	Parasites

Survey	Station	Species	Total no sampled	Preservation	Stored where?	Receiving institution	Comments
2018401	10	Pagellus natalensis	6	Frozen	Freezer	ORI	Parasites
2018401	9	Pagellus natalensis	7	Frozen	Freezer	ORI	Parasites
2018401	3	Helicolenus dactylopterus	9	Frozen	Freezer	ORI	Parasites
2018401	10	Ibacus	4	Frozen	Freezer	ORI	Genetics
2018401	8	Mixed crabs	15	Frozen	Freezer	ORI	ID
2018401	10	Mantis	3	Frozen	Freezer	ORI	ID
2018401	11	Carids, mixed crabs	2 + 10	Frozen	Freezer	ORI	ID
2018401	9	Mixed crabs	3	Frozen	Freezer	ORI	ID
2018401	8	Penaeid	1	Frozen	Freezer	ORI	ID
2018401	6	Hermits, Carcinoplax, other crust	4, 1, 4	Frozen	Freezer	ORI	ID
2018401	5	Hermit + crab	5 + 2	Frozen	Freezer	ORI	ID
2018401	14	Hermit	2	Frozen	Freezer	ORI	ID
2018401	5	Ibacus + crab	1,1	Frozen	Freezer	ORI	ID
2018401	16	Echinoderm, mixed crustaceans	1, 4	Frozen	Freezer	ORI	ID
2018401	18	Mixed crustaceans	8	Frozen	Freezer	ORI	ID
2018401	14	Mixed crustaceans	12	Frozen	Freezer	ORI	ID
2018401	10	Atrobucca nibe	1	Frozen	Freezer	ORI	Genetics
2018401	10	Pomadasys olivaceus	5	Frozen	Freezer	ORI	Parasites
2018401	10	Hermit	3	Frozen	Freezer	ORI	ID
2018401	11	Hermit	5	Frozen	Freezer	ORI	ID
2018401	14	Nephropsis, Metanephrops, Haliporoides	8, 30, 30	Frozen	Freezer	ORI	Genetics
2018401	10	Pagellus natalensis	10	Formalin	Freezer	UKZN	Plastic ingestion
2018401	13	Pagellus natalensis	3	Frozen	Freezer	UKZN	Plastic ingestion
2018401	10	Pagellus natalensis	6	Frozen	Freezer	UKZN	Plastic ingestion
2018401	9	Pagellus natalensis	7	Frozen	Freezer	UKZN	Plastic ingestion
2018401	4	Pagellus natalensis	10	Frozen	Freezer	UKZN	Plastic ingestion
2018401	6	Helicolenus dactylopterus	4	Frozen	Freezer	UKZN	Plastic ingestion

Survey	Station	Species	Total no sampled	Preservation	Stored where?	Receiving institution	Comments
2018401	18	Pagellus natalensis, Lepidotrigla, Pomadasys	5,5,5	Frozen	Freezer	UKZN	Plastic ingestion
2018401	19	Trachurus	5	Frozen	Freezer	UKZN	Plastic ingestion
2018401	20	Loligo, Trachurus, Pagellus	5,5,5	Frozen	Freezer	UKZN	Plastic ingestion
2018401	16	Penaeus, Cithroides, Trachurus, Trichiurus, Johnius, Lagocephalus	10, 10, 10, 10, 5, 5	Frozen	Freezer	UKZN	Plastic ingestion
2018401	15	Decapteru russselli, Trachurus	5,5	Frozen	Freezer	UKZN	Plastic ingestion
2018401	14	Aristeus, Diaphus, Plesionika, Haliporoides, Neoscombrops, Myctophid sp	10, 10, 10, 10, 10, 10	Frozen	Freezer	UKZN	Plastic ingestion
2018401	6	Synagrops, Helicolenus	10,10	Frozen	Freezer	UKZN	Plastic ingestion
2018401	2	Pagellus	10	Frozen	Freezer	UKZN	Plastic ingestion
2018401	4	Pagellus	10	Frozen	Freezer	UKZN	Plastic ingestion
2018401	21	Pagellus		Frozen	Freezer	UKZN	Plastic ingestion
2018401	17	Pagellus, Sardinella, Loligo, Secutor, Engraulis, Trachurus	5,5,5,5,10,7	Frozen	Freezer	UKZN	Plastic ingestion
2018401	1	Octocorallia	21	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	1	Scleractinian	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	3	Porifera	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	3	Porifera	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	3	Porifera	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	3	Porifera	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	3	Porifera	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	3	Porifera	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	3	Porifera	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	3	Porifera	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	3	Porifera	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	3	Porifera	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	3	Porifera	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	3	Porifera	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	3	Bryozoan	2	96 % ethanol	Red Bin_fish lab	DEA	ID

Survey	Station	Species	Total no sampled	Preservation	Stored where?	Receiving institution	Comments
2018401	3	Porifera	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	3	Porifera	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	3	Scleractinian	6	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	3	Scleractinian	5	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	5	Scleractinian	2	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	5	Scleractinian	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	5	Scleractinian	2	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	5	Octocorallia	2	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	5	Octocorallia	6	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	5	Echinodermata	2	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	5	Echinodermata	2	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	5	Echinodermata	4	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	5	Octocorallia	8	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	5	Echinodermata	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	6	Scleractinian	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	6	Scleractinian	6	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	8	Scleractinian	14	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	8	Scleractinian	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	8	Scleractinian	8	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	8	Scleractinian	3	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	8	Scleractinian	20	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	8	Echinodermata	4	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	8	Echinodermata	8	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	8	Porifera	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	8	Porifera	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	8	Porifera	1	96 % ethanol	Red Bin_fish lab	DEA	ID

Survey	Station	Species	Total no sampled	Preservation	Stored where?	Receiving institution	Comments
2018401	8	Porifera	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	8	Porifera	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	8	Porifera	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	7	Arthropoda	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	7	Mollusca	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	7	Arthropoda	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	7	Arthropoda	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	9	Scleractinian	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	9	Scleractinian	3	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	9	Scleractinian	2	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	9	Arthropoda	2	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	10	Scleractinian	10	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	10	Echinodermata	2	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	10	Arthropoda	6	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	11	Porifera	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	11	Porifera	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	11	Porifera	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	11	Porifera	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	11	Porifera	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	11	Porifera	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	11	Porifera	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	11	Porifera	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	11	Porifera	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	11	Porifera	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	11	Porifera	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	11	Porifera	1	96 % ethanol	Red Bin_fish lab	DEA	ID

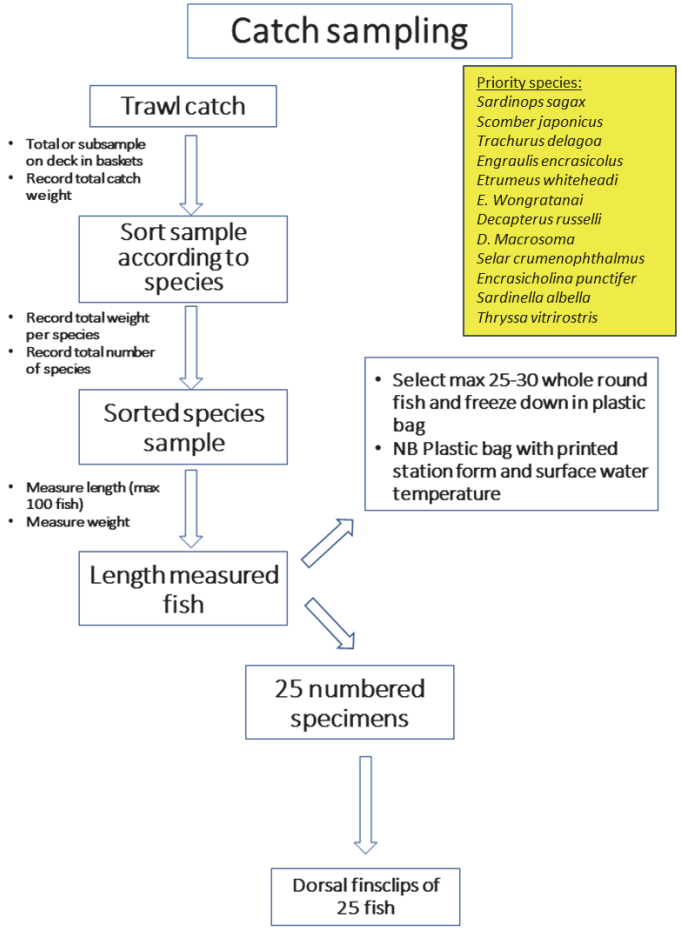
Survey	Station	Species	Total no sampled	Preservation	Stored where?	Receiving institution	Comments
2018401	11	Porifera	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	11	Porifera	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	11	Porifera	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	11	Porifera	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	11	Porifera	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	11	Porifera	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	11	Porifera	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	11	Porifera	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	11	Hydrozoa	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	11	Octocorallia	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	11	Octocorallia	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	11	Octocorallia	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	11	Octocorallia	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	11	Octocorallia	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	11	Octocorallia	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	11	Octocorallia	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	11	Octocorallia	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	11	Octocorallia	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	11	Octocorallia	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	11	Echinodermata	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	11	Octocorallia	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	11	Echinodermata	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	11	Octocorallia	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	13	Echinodermata	2	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	13	Scleractinian	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	13	Echinodermata	1	96 % ethanol	Red Bin_fish lab	DEA	ID

Survey	Station	Species	Total no sampled	Preservation	Stored where?	Receiving institution	Comments
2018401	13	Octocorallia	2	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	13	Echinodermata	2	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	16	Bryozoan	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	16	Porifera	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	21	Scleractinian	2	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	21	Echinodermata	2	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	21	Algae	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	21	Scleractinian	1	96 % ethanol	Red Bin_fish lab	DEA	ID
2018401	2	*Cavernularia* sp.	1	ETOH	SAIAB bin	SANBI (Sink)	ID
2018401	3	Octocorallia	6	dried	Kerry box	SANBI (Sink)	ID
2018401	3	Octocorallia	6	ETOH	Kerry box	SANBI (Sink)	ID
2018401	3	Asteroidea	1	ETOH	Kerry box	SANBI (Sink)	ID
2018401	3	Philophorid bryozoan	1	dried	Kerry box	SANBI (Sink)	ID
2018401	6	*Actinaugue* cf.	1	ETOH	DEA Red bin	SANBI (Sink)	ID
2018401	7	Goniasteridae	1	dried	Kerry box	SANBI (Sink)	ID
2018401	8	Penella sp.	1	ETOH	DEA Red bin	SANBI (Sink)	ID
2018401	9	Unidentified	1	ETOH	DEA Red bin	SANBI (Sink)	ID
2018401	9	cf Fasciolaridae		dried	Kerry box	SANBI (Sink)	ID
2018401	11	Antipathella sp.	2	dried	DEA Red bin	SANBI (Sink)	ID
2018401	11	Stichopathes sp.	1	dried	DEA Red bin	SANBI (Sink)	ID
2018401	11	Ophistobranch	1	ETOH	ORI macrobenthos box 4	SANBI (Sink)	ID
2018401	13	Paguridae	25	Frozen	ORI yellow bucket	SANBI (Sink)	ID
2018401	13	unidentified	1	ETOH	DEA Red bin	SANBI (Sink)	ID

Survey	Station	Species	Total no sampled	Preservation	Stored where?	Receiving institution	Comments
2018401	20	*Ecklonia cf radiata*	1	formalin	SAIAB bin	SANBI (Sink)	ID
2018401	20	*Ecklonia cf radiata*	5	dried (genetics)	Kerry box	SANBI (Sink)	ID
2018401	20	*Ecklonia cf radiata*	2	dried	Kerry bag	SANBI (Sink)	ID
2018401	21	unidentified	2	ETOH	DEA Red bin	SANBI (Sink)	ID
2018401	22	*Actinoptilum molle*	2	ETOH	DEA Red bin	SANBI (Sink)	ID
2018401	22	*Cavernularia* sp.	3	ETOH	DEA Red bin	SANBI (Sink)	ID
2018401	22	opistobranch	1	formalin	ORI macrobenthos box 4	SANBI (Sink)	ID
2018401	22	Ascidiacea	5	ETOH	DEA Red bin	SANBI (Sink)	ID
2018401	22	Ascidiacea	5	dried	Kerry box	SANBI (Sink)	ID
2018401	Various	Molluscs		dried	Kerry box	SANBI (Sink)	ID
2018401	4	Pagellus natalensis	15	Frozen	Freezer	CSIR	Contaminants
2018401	4	Peocilopsetta natalensis	6	Frozen	Freezer	CSIR	Contaminants
2018401	5	Bothidae	5	Frozen	Freezer	CSIR	Contaminants
2018401	5	Citharoides macrolepis	5	Frozen	Freezer	CSIR	Contaminants
2018401	5	Cynoglossus sp.	1	Frozen	Freezer	CSIR	Contaminants
2018401	6	Cynoglossus sp.	5	Frozen	Freezer	CSIR	Contaminants
2018401	6	Helicolenus dactylopterus	15	Frozen	Freezer	CSIR	Contaminants
2018401	7	Bothidae	1	Frozen	Freezer	CSIR	Contaminants
2018401	7	Citharoides macrolepis	10	Frozen	Freezer	CSIR	Contaminants
2018401	8	Cynoglossus sp.	25	Frozen	Freezer	CSIR	Contaminants
2018401	8	Pagellus natalensis	8	Frozen	Freezer	CSIR	Contaminants
2018401	8	Pseudorhombus natalensis	20	Frozen	Freezer	CSIR	Contaminants
2018401	9	Crossorhombus valderostratus	10	Frozen	Freezer	CSIR	Contaminants
2018401	9	Paralichthoides	1	Frozen	Freezer	CSIR	Contaminants

Survey	Station	Species	Total no sampled	Preservation	Stored where?	Receiving institution	Comments
2018401	9	Pseudorhombus elevatus	1	Frozen	Freezer	CSIR	Contaminants
2018401	10	Citharoides macrolepis	20	Frozen	Freezer	CSIR	Contaminants
2018401	10	Cynoglossus marleyi	15	Frozen	Freezer	CSIR	Contaminants
2018401	10	Cynoglossus sp.	10	Frozen	Freezer	CSIR	Contaminants
2018401	10	Pagellus natalensis	10	Frozen	Freezer	CSIR	Contaminants
2018401	11	Cynoglossus sp.	3	Frozen	Freezer	CSIR	Contaminants
2018401	13	Cynoglossus attenuatus	5	Frozen	Freezer	CSIR	Contaminants
2018401	13	Pseudorhombus elevatus	20	Frozen	Freezer	CSIR	Contaminants
2018401	14	Cynoglossus sp.	1	Frozen	Freezer	CSIR	Contaminants
2018401	16	Cynoglossus sp.	10	Frozen	Freezer	CSIR	Contaminants
2018401	18	Crossorhombus valderostratus	20	Frozen	Freezer	CSIR	Contaminants

CHAPTER 8. ANNEX VIII. OVERVIEW OF SAMPLING PROCEDURES IN THE FISH LAB



Sampling conducted on priority species;

1. Recording of sex, maturity and stomach fullness
2. Collection of 25-30 whole fish
3. Collection of 25-30 individuals for biological samples:
   - otoliths for aging
   - fin clipping for genetic analyses
   - stomachs for diet studies
   - liver for condition studies

ANNEX IX. OVERVIEW OF THE SEDIMENT SAMPLES

Cruise Station	Latitude (°S)	Longitude (°E)	Date	Rep.	Sample	Volume	Preservative
0008	31 38.18	29 34.50	27/01/2018	A	Grains	50ml	None
					TOC	50ml	Formalin
					Bicarb.	50ml	None
					Micro-orgs.	50ml	70% ETOH & rose bengal
					Bacteria	5ml	None
					Heavy metals	50ml	Freeze
					Organic contaminants	100ml	Freeze
					Benthos 5000		96% ETOH
					Benthos 1000		Formalin
					Benthos 500		Formalin
					Microplastics	Runoff	Formalin
				B	Grains	50ml	None
					TOC	50ml	Formalin
					Bicarb.	50ml	None
					Micro-orgs.	50ml	70% ETOH & rose bengal
					Benthos 5000		96% ETOH
					Benthos 1000		Formalin
					Benthos 500		Formalin
				C	Grains	50ml	None
					TOC	50ml	Formalin
					Bicarb.	50ml	None
					Micro-orgs.	50ml	70% ETOH & rose bengal
					Heavy metals	50ml	Freeze
					Organic contaminants	100ml	Freeze
					Benthos 5000		96% ETOH
					Benthos 1000		Formalin
					Benthos 500		Formalin

Cruise Station	Latitude (^{o}S)	Longitude (^{o}E)	Date	Rep.	Sample	Volume	Preservative
0009	31 39.86	29 36.81	27/01/2018	A	Grains	50ml	None
					TOC	50ml	Formalin
					Bicarb.	50ml	None
					Micro-orgs.	50ml	70% ETOH & rose bengal
					Bacteria	5ml	None
					Heavy metals	50ml	Freeze
					Organic contaminants	100ml	Freeze
					Benthos 5000		96% ETOH
					Benthos 1000		Formalin
					Benthos 500		Formalin
					Microplastics	Runoff	Formalin
				B	Grains	50ml	None
					TOC	50ml	Formalin
					Bicarb.	50ml	None
					Micro-orgs.	50ml	70% ETOH & rose bengal
					Heavy metals	50ml	Freeze
					Organic contaminants	100ml	Freeze
					Benthos 5000		96% ETOH
					Benthos 1000		Formalin
					Benthos 500		Formalin
				C	Grains	50ml	None
					TOC	50ml	Formalin
					Bicarb.	50ml	None
					Micro-orgs.	50ml	70% ETOH & rose bengal
					Benthos 5000		96% ETOH
					Benthos 1000		Formalin
					Benthos 500		Formalin
0010	31 41.03	29 38.55	27/01/2018	A	Grains	50ml	None
					TOC	50ml	Formalin

Cruise Station	Latitude (°S)	Longitude (°E)	Date	Rep.	Sample	Volume	Preservative
					Bicarb.	50ml	None
					Micro-orgs.	50ml	70% ETOH & rose bengal
					Bacteria	5ml	None
					Heavy metals	50ml	Freeze
					Organic contaminants	100ml	Freeze
					Benthos 1000		Formalin
					Benthos 500		Formalin
					Microplastics	Runoff	Formalin
				B	Grains	50ml	None
					TOC	50ml	Formalin
					Bicarb.	50ml	None
					Micro-orgs.	50ml	70% ETOH & rose bengal
					Heavy metals	50ml	Freeze
					Organic contaminants	100ml	Freeze
					Benthos 1000		Formalin
					Benthos 500		Formalin
				C	Grains	50ml	None
					TOC	50ml	Formalin
					Bicarb.	50ml	None
					Micro-orgs.	50ml	70% ETOH & rose bengal
					Benthos 1000		Formalin (& 96% ETOH)
					Benthos 500		Formalin
0034	29º 53,97	31º 03.80	29/01/2018	A	Grains	50ml	None
					TOC	50ml	Formalin
					Bicarb.	50ml	None
					Micro-orgs.	50ml	70% ETOH & rose bengal
					Bacteria	5ml	None
					Benthos 1000		Formalin
					Benthos 500		Formalin

Cruise Station	Latitude (°S)	Longitude (°E)	Date	Rep.	Sample	Volume	Preservative
					Microplastics	Runoff	Formalin
				B	Grains	50ml	None
					TOC	50ml	Formalin
					Bicarb.	50ml	None
					Micro-orgs.	50ml	70% ETOH & rose bengal
					Benthos 5000		96% ETOH
					Benthos 1000		Formalin
					Benthos 500		Formalin
				C	Grains	50ml	None
					TOC	50ml	Formalin
					Bicarb.	50ml	None
					Micro-orgs.	50ml	70% ETOH & rose bengal
					Benthos 5000		96% ETOH
					Benthos 1000		Formalin (& 96% ETOH)
					Benthos 500		Formalin
0035	29º 54,36	31º 08,57	29/01/2018	A	Grains	50ml	None
					TOC	50ml	Formalin
					Bicarb.	50ml	None
					Micro-orgs.	50ml	70% ETOH & rose bengal
					Bacteria	5ml	None
					Heavy metals	50ml	Freeze
					Organic contaminants	100ml	Freeze
					Benthos 5000		Formalin
					Benthos 1000		Formalin
					Benthos 500		Formalin
					Microplastics	Runoff	Formalin
				B	Grains	50ml	None
					TOC	50ml	Formalin
					Bicarb.	50ml	None

Cruise Station	Latitude (°S)	Longitude (°E)	Date	Rep.	Sample	Volume	Preservative
					Micro-orgs.	50ml	70% ETOH & rose bengal
					Heavy metals	50ml	Freeze
					Organic contaminants	100ml	Freeze
					Benthos 5000		Formalin (& 96% ETOH)
					Benthos 1000		Formalin
					Benthos 500		Formalin
				C	Grains	50ml	None
					TOC	50ml	Formalin
					Bicarb.	50ml	None
					Micro-orgs.	50ml	70% ETOH & rose bengal
					Heavy metals	50ml	Freeze
					Organic contaminants	100ml	Freeze
					Benthos 5000		Formalin
					Benthos 1000		Formalin
					Benthos 500		Formalin
0039	29º 54,25	31º 10,47	30/01/2018	A	Grains	50ml	None
					TOC	50ml	Formalin
					Bicarb.	50ml	None
					Micro-orgs.	50ml	70% ETOH & rose bengal
					Bacteria	5ml	None
					Benthos 5000		Formalin (& 96% ETOH)
					Benthos 1000		Formalin
					Benthos 500		Formalin (& 96% ETOH)
					Microplastics	Runoff	Formalin
				B	Grains	50ml	None
					TOC	50ml	Formalin
					Bicarb.	50ml	None
					Micro-orgs.	50ml	70% ETOH & rose bengal
					Heavy metals	50ml	Freeze

Cruise Station	Latitude (°S)	Longitude (°E)	Date	Rep.	Sample	Volume	Preservative
					Benthos 5000		Formalin (& 96% ETOH)
					Benthos 1000		Formalin
					Benthos 500		Formalin
				C	Grains	50ml	None
					TOC	50ml	Formalin
					Bicarb.	50ml	None
					Micro-orgs.	50ml	70% ETOH & rose bengal
					Heavy metals	50ml	Freeze
					Organic contaminants	100ml	Freeze
					Benthos 5000		Formalin (& 96% ETOH)
					Benthos 1000		Formalin
					Benthos 500		Formalin
0040	29º 54,68	31º 33,08	30/01/2018	A	Grains	50ml	None
					TOC	50ml	Formalin
					Bicarb.	50ml	None
					Micro-orgs.	50ml	70% ETOH & rose bengal
					Bacteria	5ml	None
					Heavy metals	50ml	Freeze
					Organic contaminants	100ml	Freeze
					Benthos 5000		96% ETOH
					Benthos 1000		Formalin
					Benthos 500		Formalin
					Microplastics	Runoff	Formalin
				B	Grains	50ml	None
					TOC	50ml	Formalin
					Bicarb.	50ml	None
					Micro-orgs.	50ml	70% ETOH & rose bengal
					Heavy metals	50ml	Freeze
					Organic contaminants	100ml	Freeze

Cruise Station	Latitude (°S)	Longitude (°E)	Date	Rep.	Sample	Volume	Preservative
					Benthos 5000		96% ETOH
					Benthos 1000		Formalin
					Benthos 500		Formalin
				C	Grains	50ml	None
					TOC	50ml	Formalin
					Bicarb.	50ml	None
					Micro-orgs.	50ml	70% ETOH & rose bengal
					Benthos 5000		Formalin (96% ETOH)
					Benthos 1000		Formalin (96% ETOH)
					Benthos 500		Formalin
0047	29º 40.94	31º 53.83	31/01/2018	A	Grains	50ml	None
					TOC	50ml	Formalin
					Bicarb.	50ml	None
					Micro-orgs.	50ml	70% ETOH & rose bengal
					Bacteria	5ml	None
					Heavy metals	50ml	Freeze
					Organic contaminants	100ml	Freeze
					Benthos 5000		96% ETOH
					Benthos 1000		Formalin
					Benthos 500		Formalin
					Microplastics	Runoff	Formalin
0048	29º 14.30	31º 33.13	01/02/2018	A	Grains	50ml	None
					TOC	50ml	Formalin
					Bicarb.	50ml	None
					Micro-orgs.	50ml	70% ETOH & rose bengal
					Bacteria	5ml	None
					Heavy metals	50ml	Freeze
					Organic contaminants	100ml	Freeze
					Benthos 5000		Formalin (& 96% ETOH)

Cruise Station	Latitude (°S)	Longitude (°E)	Date	Rep.	Sample	Volume	Preservative
					Benthos 1000		Formalin
					Benthos 500		Formalin
					Microplastics	Runoff	Formalin
				B	Grains	50ml	None
					TOC	50ml	Formalin
					Bicarb.	50ml	None
					Micro-orgs.	50ml	70% ETOH & rose bengal
					Heavy metals	50ml	Freeze
					Organic contaminants	100ml	Freeze
					Benthos 5000		96% ETOH
					Benthos 1000		Formalin
					Benthos 500		Formalin
				C	Grains	50ml	None
					TOC	50ml	Formalin
					Bicarb.	50ml	None
					Micro-orgs.	50ml	70% ETOH & rose bengal
					Benthos 5000		96% ETOH
					Benthos 1000		Formalin
					Benthos 500		Formalin
0050	29º 21.39	31º 59.52	01/02/2018	A	Grains	50ml	None
					TOC	50ml	Formalin
					Bicarb.	50ml	None
					Micro-orgs.	50ml	70% ETOH & rose bengal
					Bacteria	5ml	None
					Heavy metals	50ml	Freeze
					Organic contaminants	100ml	Freeze
					Benthos 5000		Formalin (& 96% ETOH)
					Benthos 1000		Formalin
					Benthos 500		Formalin

Cruise Station	Latitude (°S)	Longitude (°E)	Date	Rep.	Sample	Volume	Preservative
					Microplastics	Runoff	Formalin
				B	Grains	50ml	None
					TOC	50ml	Formalin
					Bicarb.	50ml	None
					Micro-orgs.	50ml	70% ETOH & rose bengal
					Heavy metals	50ml	Freeze
					Organic contaminants	100ml	Freeze
					Benthos 5000		Formalin (& 96% ETOH)
					Benthos 1000		Formalin
					Benthos 500		Formalin
				C	Grains	50ml	None
					TOC	50ml	Formalin
					Bicarb.	50ml	None
					Micro-orgs.	50ml	70% ETOH & rose bengal
					Benthos 5000		Formalin (& 96% ETOH)
					Benthos 1000		Formalin
					Benthos 500		Formalin
0061	28º 31.71	32º 24.66	04/02/2018	A	Grains	50ml	None
					TOC	50ml	Formalin
					Bicarb.	50ml	None
					Micro-orgs.	50ml	70% ETOH & rose bengal
					Bacteria	5ml	None
					Heavy metals	50ml	Freeze
					Organic contaminants	100ml	Freeze
					Benthos 5000		Formalin (& 96% ETOH)
					Benthos 1000		Formalin (& 96% ETOH)
					Benthos 500		Formalin
					Microplastics	Runoff	Formalin
				B	Grains	50ml	None

Cruise Station	Latitude (°S)	Longitude (°E)	Date	Rep.	Sample	Volume	Preservative
					TOC	50ml	Formalin
					Bicarb.	50ml	None
					Micro-orgs.	50ml	70% ETOH & rose bengal
					Heavy metals	50ml	Freeze
					Organic contaminants	100ml	Freeze
					Benthos 5000		Formalin
					Benthos 1000		Formalin
					Benthos 500		Formalin
				C	Grains	50ml	None
					TOC	50ml	Formalin
					Bicarb.	50ml	None
					Micro-orgs.	50ml	70% ETOH & rose bengal
					Benthos 5000		Formalin (& 96% ETOH)
					Benthos 1000		Formalin
					Benthos 500		Formalin
0063	28° 33.37	32°27.77	04/02/2018	A	Grains	50ml	None
					TOC	50ml	Formalin
					Bicarb.	50ml	None
					Micro-orgs.	50ml	70% ETOH & rose bengal
					Bacteria	5ml	None
					Heavy metals	50ml	Freeze
					Organic contaminants	100ml	Freeze
					Benthos 5000		Formalin (& 96% ETOH)
					Benthos 1000		Formalin (& 96% ETOH)
					Benthos 500		Formalin
					Microplastics	Runoff	Formalin
				B	Benthos		Formalin (& 96% ETOH)
				C	Benthos		Formalin (& 96% ETOH)
0064	28° 33.23	32° 30.76	04/02/2018	A	Grains	50ml	None

Cruise Station	Latitude (^{o}S)	Longitude (^{o}E)	Date	Rep.	Sample	Volume	Preservative
					TOC	50ml	Formalin
					Bicarb.	50ml	None
					Micro-orgs.	50ml	70% ETOH & rose bengal
					Bacteria	5ml	None
					Heavy metals	50ml	Freeze
					Organic contaminants	100ml	Freeze
					Benthos 5000		96% ETOH
					Benthos 1000		Formalin
					Benthos 500		Formalin
					Microplastics	Runoff	Formalin
0068	28° 38.69	32° 19.84	05/02/2018	A	Grains	50ml	None
					TOC	50ml	Formalin
					Bicarb.	50ml	None
					Micro-orgs.	50ml	70% ETOH & rose bengal
					Bacteria	5ml	None
					Heavy metals	50ml	Freeze
					Organic contaminants	100ml	Freeze
					Benthos 5000		96% ETOH
					Benthos 1000		Formalin
					Benthos 500		Formalin
					Microplastics	Runoff	Formalin
				B	Grains	50ml	None
					TOC	50ml	Formalin
					Bicarb.	50ml	None
					Micro-orgs.	50ml	70% ETOH & rose bengal
					Heavy metals	50ml	Freeze
					Organic contaminants	100ml	Freeze
					Benthos 5000		96% ETOH
					Benthos 1000		Formalin

Cruise Station	Latitude (^{o}S)	Longitude (^{o}E)	Date	Rep.	Sample	Volume	Preservative
					Benthos 500		Formalin
				C	Grains	50ml	None
					TOC	50ml	Formalin
					Bicarb.	50ml	None
					Micro-orgs.	50ml	70% ETOH & rose bengal
					Benthos 5000		96% ETOH
					Benthos 1000		Formalin
					Benthos 500		Formalin
0067	28° 40.45	32° 24.51	05/02/2018	A	Grains	50ml	None
					TOC	50ml	Formalin
					Bicarb.	50ml	None
					Micro-orgs.	50ml	70% ETOH & rose bengal
					Bacteria	5ml	None
					Heavy metals	50ml	Freeze
					Organic contaminants	100ml	Freeze
					Benthos 5000		96% ETOH
					Benthos 1000		Formalin
					Benthos 500		Formalin
					Microplastics	Runoff	Formalin
				B	Grains	50ml	None
					TOC	50ml	Formalin
					Bicarb.	50ml	None
					Micro-orgs.	50ml	70% ETOH & rose bengal
					Benthos 5000		Formalin (96% ETOH)
					Benthos 1000		Formalin
					Benthos 500		Formalin
				C	Benthos 5000		Formalin (96% ETOH)
					Benthos 1000		Formalin
					Benthos 500		Formalin

Cruise Station	Latitude (°S)	Longitude (°E)	Date	Rep.	Sample	Volume	Preservative
0066	28° 43.60	32° 28.09	05/02/2018	A	Grains	50ml	None
					TOC	50ml	Formalin
					Bicarb.	50ml	None
					Micro-orgs.	50ml	70% ETOH & rose bengal
					Bacteria	5ml	None
					Heavy metals	50ml	Freeze
					Organic contaminants	100ml	Freeze
					Benthos 5000		96% ETOH
					Benthos 1000		Formalin
					Benthos 500		Formalin
					Microplastics	Runoff	Formalin
				B	Grains	50ml	None
					TOC	50ml	Formalin
					Bicarb.	50ml	None
					Micro-orgs.	50ml	70% ETOH & rose bengal
					Heavy metals	50ml	Freeze
					Organic contaminants	100ml	Freeze
					Benthos 5000		
					Benthos 1000		Formalin
					Benthos 500		Formalin
				C	Grains	50ml	None
					TOC	50ml	Formalin
					Bicarb.	50ml	None
					Micro-orgs.	50ml	70% ETOH & rose bengal
					Benthos 5000		96% ETOH
					Benthos 1000		Formalin
					Benthos 500		Formalin
				Extra	Benthos 5000		
					Benthos 1000		Formalin

Cruise Station	Latitude (^{o}S)	Longitude (^{o}E)	Date	Rep.	Sample	Volume	Preservative
					Benthos 500		Formalin
0071	29° 01.88	31° 50.97	06/02/2018	A	Grains	50ml	None
					TOC	50ml	Formalin
					Bicarb.	50ml	None
					Micro-orgs.	50ml	70% ETOH & rose bengal
					Bacteria	5ml	None
					Heavy metals	50ml	Freeze
					Organic contaminants	100ml	Freeze
					Benthos 5000		Formalin & 96% ETOH
					Benthos 1000		Formalin & 96% ETOH
					Benthos 500		Formalin & 96% ETOH
					Microplastics	Runoff	Formalin
				B	Grains	50ml	None
					TOC	50ml	Formalin
					Bicarb.	50ml	None
					Micro-orgs.	50ml	70% ETOH & rose bengal
					Heavy metals	50ml	Freeze
					Organic contaminants	100ml	Freeze
					Benthos 5000		Formalin & 96% ETOH
					Benthos 1000		Formalin & 96% ETOH
					Benthos 500		Formalin & 96% ETOH
				C	Grains	50ml	None
					TOC	50ml	Formalin
					Bicarb.	50ml	None
					Micro-orgs.	50ml	70% ETOH & rose bengal
					Benthos 5000		Formalin & 96% ETOH
					Benthos 1000		Formalin & 96% ETOH

ANNEX X. OVERVIEW OF SAMPLES COLLECTED ON *DR FRIDTJOF NANSEN* ON LEG 1.1b (DURBAN-RICHARDS BAY)

Gear/equipment	Samples	Preservation	Port of off loading	Transport	Institution address	Contact person	Number	Status	Notes
Niskin bottles	Nutrients	Chloroform	Dar-es-Salam	Cold (3 to 5 ^{o}C)	IMR Bergen (?)	David Cervantes	157	Processed	Data at ORI
Niskin bottles	Chlorophyll a	Frozen (-18 to -20 ^{o}C, best -80 ^{o}C)	Analysis onboard (if instrument is calibrated)		IMR Bergen (if calibration not possible)	David Cervantes	17 (3 stns)	Processed	Data at ORI
Niskin bottles	Microzooplankton	Formaldehyde + frozen -40^{o}C	Richards Bay	Road/Air	DEA	Jenny Huggett	16	Unprocessed	Flow cytometry pending in February 2019
Niskin bottles	Bacteria	Formaldehyde+ refrigerated	Richards Bay	Road	UKZN	Debora Robertson-Andersson	185	Unprocessed	Pending students/funds
Niskin bottles	pH/TAlkalinity/DIC	Cool and dark area	Richards Bay	Road/Air	DEA	Mutshutshu Tsanwani	136	Unprocessed	Only onboard pH + TA measurements available; samples damaged
Algae net	Phytoplankton	Formaldehyde	Richards Bay	Road/Air	DEA	Jenny Huggett	10	Unprocessed	Flow cytometry pending in March 2019
WP2 (180 µm): (1) vertical haul from max 200 m) – ½ sample, (2) vertical haul from 30 m – ½ sample	Zooplankton (biomass)	Dried	Dar es Salaam	Air freight	IMR	Stamatina Isari	~50	Pending	

Gear/equipment	Samples	Preservation	Port of off loading	Transport	Institution address	Contact person	Number	Status	Notes
WP2 (180 µm): (1) vertical haul from max 200 m)- ½ sample (2) vertical haul from 30 m – ½ sample	Zooplankton identification	Formaldehyde	Richards Bay	Road/Air	DEA	Jenny Huggett	11 5	Processed Processed	
MultiNet (Midi, 5 x 180 µm): oblique tow from max 200m	Depth-related zooplankton community composition	Formaldehyde	Richards Bay	Road/Air	UWC	Riaan Cedras	66	Pending	EAF Nansen students (Gibbons) will process in 2019
Bongo net (2x500 µm):***oblique tow*** from max 200 m) – Net 1 – <u>Super stations only</u>	Fish eggs and larvae	Formaldehyde	Dar es Salaam	Air freight	IMR	Stamatina Isari	10	Pending	
Bongo net (2x500 µm):***oblique tow*** from max 200 m)	Fish eggs and larvae, microplastic densities and larval ingestion	Formaldehyde	Richards Bay	Road/Air	DEA/CSIR/UKZN	Jenny Huggett/ Steven Weerts, Debora Robertson-Andersson)	6 31	Unprocessed Pending	No interns/students/funding
Bongo net (2x200 µm, 60cm Φ) ***vertical tow***	Zooplankton community	Formaldehyde	Richards Bay	Road/Air	DEA/UWC	Jenny Huggett/ Riaan Cedras	5X2	Partially processed	Identification of larger taxa only. Calculations of bio-volumes required
Ring net (500 µm): tow in upper 5 m for 5 mins	Metabarcoding of Decapod larvae	96% ethanol	Richards Bay	Road	ORI	Johan Groeneveld	17	Only Phyllosomae barcoded. Rest to be metabarcoded	
Manta trawl (375 µm): surface tow	Neuston community identification	Formaldehyde	Richards Bay	Road	UWC	Riaan Cedras	21	Unprocessed	EAF Nansen students (Gibbons) will process in 2019

Gear/equipment	Samples	Preservation	Port of off loading	Transport	Institution address	Contact person	Number	Status	Notes
Manta trawl (375 µm): surface tow for 15 mins	Microplastics	Photographed and frozen	Dar es Salam	Road	IMR	Bjørn Einar Grøsvik	21 – incl. some still to be picked out of Riaan's samples	Unprocessed	
Manta trawl (375 µm): surface tow for 15 mins	Phyllosoma	Ethanol	Richards Bay	By road to Durban	ORI	Johan Groeneveld	Phyllosomae taken from 3 manta hauls	Only Phyllosomae barcoded	
Bucket overboard water	microplastic samples		Richards Bay	By road to Durban	UKZN	Debora Robertson-Andersson	38	Partly processed. EM photographs pending	To be done by 03.2019
Trawl	South Africa east coast special requests for clupeids, engraulids, *Helicolenus*, *Chelidonichthys*, Cephalopods, Myctophids	Either frozen or formaldehyde	Richards Bay	Road	ORI	Sean Fennessy (for Carl van der Lingen, Colin Attwood, Rob Leslie)	various	Sent to requestees	
Trawl	Whole fishes – plastic consumption	Frozen	Richards Bay	Road	UKZN	Debora Robertson-Andersson	262	Partly processed. EM photographs pending	To be done by 03.2019
Trawl	Crustacean flesh samples	Ethanol	Richards Bay	Road	ORI	Johan Groeneveld	68	Not processed	

Gear/equipment	Samples	Preservation	Port of off loading	Transport	Institution address	Contact person	Number	Status	Notes
Trawl	Standard Nansen food safety sampling	Frozen (-80^{o}C)	Dar-es-Salam	Shipment	IMR Bergen	Aina Bruvik	106	Pending	
Trawl	Contaminants in fishes – Leg 1.1	Frozen (-80^{o}C)	Richards Bay	Road	CSIR	Brent Newman	~240	Not processed	No interns/students/funding
Trawl	Sessile macrobenthos	Ethanol and dried	Richards Bay	Road	DEA/SANBI	Zoleka Philander/Kerry Sink	~300	On-board identification. Final identifications pending	
Trawl	Community composition (catch composition)	Frozen	Richards Bay	Road	ORI	Sean Fennessy	Various	Worked but some ID confirmation required	
Trawl	Miscellaneous fishes and cephalopods (whole & fin clips)	Ethanol Formaldehyde	Richards Bay	Road	SAIAB	Wouter Hollermann	294	Curation pending	
Grab (Van Veen 1000cm^{3})	Macrobenthos	4% formaldehyde	Richards Bay	Road	ORI	Fiona MacKay	43 samples across (mix of un/replicated stations)	Sorted, pending microscopy, identification, enumeration	No interns/students/funding
Grab (Van Veen 1000cm^{3})	Sediments (grain size, TOC, bicarbonates, forams)	4% formaldehyde, ethanol, no fixation	Richards Bay	Road	ORI	Fiona MacKay	43 samples of each	Grain Size, TOC bicarbonates complete. Forams pending	Forams require student & funding

Gear/equipment	Samples	Preservation	Port of off loading	Transport	Institution address	Contact person	Number	Status	Notes
Grab (Van Veen 1000cm^3)	Bacteria on sediments	4% formaldehyde	Richards Bay	Road	UKZN	Debora Robertson-Andersson	17	Unprocessed	Pending students/funds
Trawl - cylinder	Sediments (grain size, TOC, bicarbonates, forams)	4% formaldehyde, ethanol, no fixation	Richards Bay	Road	ORI	Fiona MacKay	15	Grain Size, TOC bicarbonates complete. Forams pending	Forams require student & funding
Trawl - cylinder	Sediment bacteria	4% formaldehyde	Richards Bay	Road	UKZN	Debora Robertson-Andersson	15	Unprocessed	Pending students/funds
Box corer	Sediment	Not preserved	Richards Bay	Road	UKZN	Andy Green	2	Unprocessed	