SWIOFP – ASCLME Project

Mesoscale eddies and large pelagic fish in the Mozambique Channel

Grands prédateurs en relation avec les tourbillons méso-échelles dans le Canal du Mozambique.

Report of monitored longline fishing experiments carried out on board the fishing vessel "Manohal" from 27th of November to 18th of December 2008

Rapport de la campagne de pêches expérimentales à la palangre réalisées à bord du palangrier « Manohal » du 27/11/2008 au 18/12/2008

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Context : SWIOFP/ASCLME project

Up to now, only tuna and some large pelagic fishes associated with tuna fisheries in the South Western Indian Ocean are under monitoring and management by the regional fisheries management organization (RFMO): Indian Ocean Tuna Commission (IOTC). However numbers of other marine living resources in the region are exploited by commercial fisheries and need a regional approach in order to improve their respective management in the frame of the "ecosystem approach to fisheries". These resources are mostly spread along Exclusive Economic Zones (EEZs) of coastal countries representing shared stocks of crustaceans, demersal fishes and small pelagic fishes. Because the weakness of financial supports in marine fisheries research in the region compared to the diversity of stocks to manage, both scientists and politic managers have to share information and knowledge to improve marine resource management at local, regional and basin-wide scales. Moreover, the south-western part of the Indian Ocean is known to be frequently visited by endangered species of the marine megafauna (sea turtles, marine mammals) and the improvement of biological knowledge regarding these species is essential in order to reduce their interactions with fishing activities.
The South West Indian Ocean Fishery Commission becomes operational relatively recently. The aim of this commission is to promote a regional management of local fisheries complementary to marine fisheries management activities of the Indian Ocean Tuna Commission. This management will be structured around the three classical operating functions which are essentials for fisheries management: the survey/monitoring, the control (decisions on the appropriate exploitation levels) and the strict monitoring of compliance. Activities regarding the survey/monitoring are classically carried out by the Scientific and Technical Committee (SCT)
Major objectives for the first five years of the SWIOF Project are to develop operational framework allowing the establishment of this SCT. This SCT initiative is independent to the emergence of the SWIOFC but it represents a driver of its survey/monitoring function.

Indeed, the principal components are:

☞ integration of local fishery database at a regional level,
☞ audit of knowledge in general (scientific, technical) of major exploited stocks (crustaceans, demersal stocks and small and large pelagic fishes) with the aim of respective estimations of exploitation levels.
☞ the collect of data for non-commercial species due to theirs interactions with commercial fisheries (for instance some marine mammals interacted with gillnet fisheries, sea turtles interacted with longline fishery and purse seine fishery on FAD).

Countries involved in the project are countries of the South West Indian Ocean having coast along the ocean : Kenya, Tanzania, Mozambique, Republic of South Africa, Seychelles, Comoros, Madagascar, Mauritius and France (Eparses Islands, Mayotte, Tromelin, Reunion). Somalia could be soon integrated in the project as observer country.

The global cost of these five years project is 28.3 $ US (18.9 millions €).

The French Fund for the Environment (FFEM = Fonds Français pour l'Environnement Mondial) participates in this project as co-financial support at a level of 800 K€ (1 millions of US $).
Essentially, these funds are mobilized to support 3 components of the project :
❶ Component 1 "Data and Information": Gap analysis and supply of an integrator database software named « StatBase »,
❷ Component 4 "Pelagic Fishes": Electronic tagging programme for swordfish and bigeye tuna, deployment of anchored Fish Aggregating Devices (FADs) allowing managing actions to increase the number of fishing activities for a given fishing pressure, improvement of fishing gear (develop methods to mitigate adverse impact of some fishing practices, application of the ecosystem based approach to fisheries),
❸ Component 5 "Non-commercial species": research studies of some marine mammals populations interacting with longline fisheries in the region, research programme of sea turtles movement behaviour to identify area and period for which the risk of accidental mortality due to fishing activities is high.

This project is carried out at a regional scale simultaneously with the ASCLME project (Agulhas Somalia Current Large Marine Ecosystem). One of the objectives of the ASCLME project is to develop indicators (simple or composite) to characterize ecosystems. As corollary of this objective, ASCLME investigates physical and biological characteristics of the ocean in this region and then the habitat of marine living resources targeted in the SWIOF project. These two regional projects ASCLME and SWIOF are parts of a set of project included in the Marge Marine Ecosystem international project. These two projects share some tools or operational framework such as oceanographic cruises.

1 Introduction : SWIOFP/ASCLME cruise in the Mozambique Channel

Mesoscale eddies in the Mozambique Channel are known to enhance the biological productivity of oceanic regional waters from several oceanographic events: upwelling of deep waters in the core of cyclonic eddies, advection phenomena of the coastal biological productivity towards oceanic waters, concentration of nutrients to the border of eddies (high physical gradients structure). Recent studies have shown the propagation of the biological enrichment through different components of the ecosystem, from the primary production (phytoplancton) to top pelagic predators such as seabirds, tuna, sharks, billfish, sea turltes, marine mammals). These top predators patrol in foraging areas related to mesoscale eddies in this region.

This ASCLME/SWIOFP oceanographic cruise is characterized by the interdisciplinary collaborative approach planned to analyze the role of eddies in the increase of the biological production of the pelagic ecosystem and on the catchability of large pelagic fishes intensively exploited by both purse seiner and longliner fleets. The high probability of incidental catches (bycatch) by longliners in this fishing zone that could be « hotspots

of pelagic biodiversity » will be analyzed. This impact of eddies on the ecosystem will be studied at different levels of the food chain from the first component of the chain (phytoplankton) to top predators.

In order to achieve an ecosystem based research taking into account all its components simultaneously, two working and sampling platfoms were combined (1) the oceanographic research vessel «Fridtjof Nansen » operating in the ASCLME project framework and (2) a fishing vessel equipped with a drifting longline operating in the SWIOF project, particularly the component 4 (Pelagic component) of this project.
The objectives of the cruise of the R/V « Fridtjof Nansen » were :

- To describe physical, chemical, biogeochemical environments including sampling of the phytoplankton and zooplankton and estimations of the primary production,
- To quantify the biomass of the micronekton obtained with acoustic transect (echosounder), to describe micronekton patches observed with an echosounder, and to study the fauna composition of these micronekton patches sampled with a pelagic trawl.

The commercial longliner, the F/V « Manohal » based in La Reunion has realized a sampling of large pelagic fishes in the mesoscale eddies by using a monitored longline. An effort was done to deploy the fishing gear in eddies previously sampled by the R/V « Fridtjof Nansen ».
Large pelagic fishes were sampled in their open ocean habitat by using a drifting longline equipped with temperature depth recorders and hook timers.
The species identification and the biological sampling (biometry, stomach contents, muscles and liver for genetic, isotopic and contaminants analysis, hard parts: otoliths and vertebra) were done for all individuals caught (except individuals of protected species immediately released alive if this type of events occurs). Finally, interactions between the longline and the marine megafauna were addressed by considering data on the longline behaviour during the fishing time and the trigger action of hook timers.

The objectives of this first report of operations carried out in the frame of the component 4 of the SWIOF project are :

- to describe the operational methodology (hydrological stations, fishing trials) used during the cruise ,
- to present the timetable of operations realized,
- to list biological and fishing samples collected on board as preliminary results,
- to briefly conclude regarding the sampling strategy adapted to consider simultaneously environment and living resources of the ecosystem.

2 Time schedule of operations

This first cruise of the SWIOFP Component 4 « Pelagic Fishes » started on Thursday 27th of November from Le Port (La Reunion). Initially scheduled for a departure on Friday 28th, the captain accepted to leave the port 12 hours before schedule.

The route of the cruise (date, time, latitude, longitude every 5 minutes) was recorded in a datalogger coupled to a GPS antenna installed in the navigation bridge. These data will be downloaded later and stored temporarily in the SEALOR[1] database.

A the beginning of the cruise, the major part of oceanographic operations and sampling would have been achieved in a spatial window located between latitudes 18°S et 24°S. In order to join this area as fast as possible we decided to travel towards the south of Madagascar crossing the Sainte Marie Cap.

Synthetic representations of operations at sea (hydrology, instrumented longline fishing, longline behaviour experiments) are displayed on the Table 1 and on Figures 1 and 2.

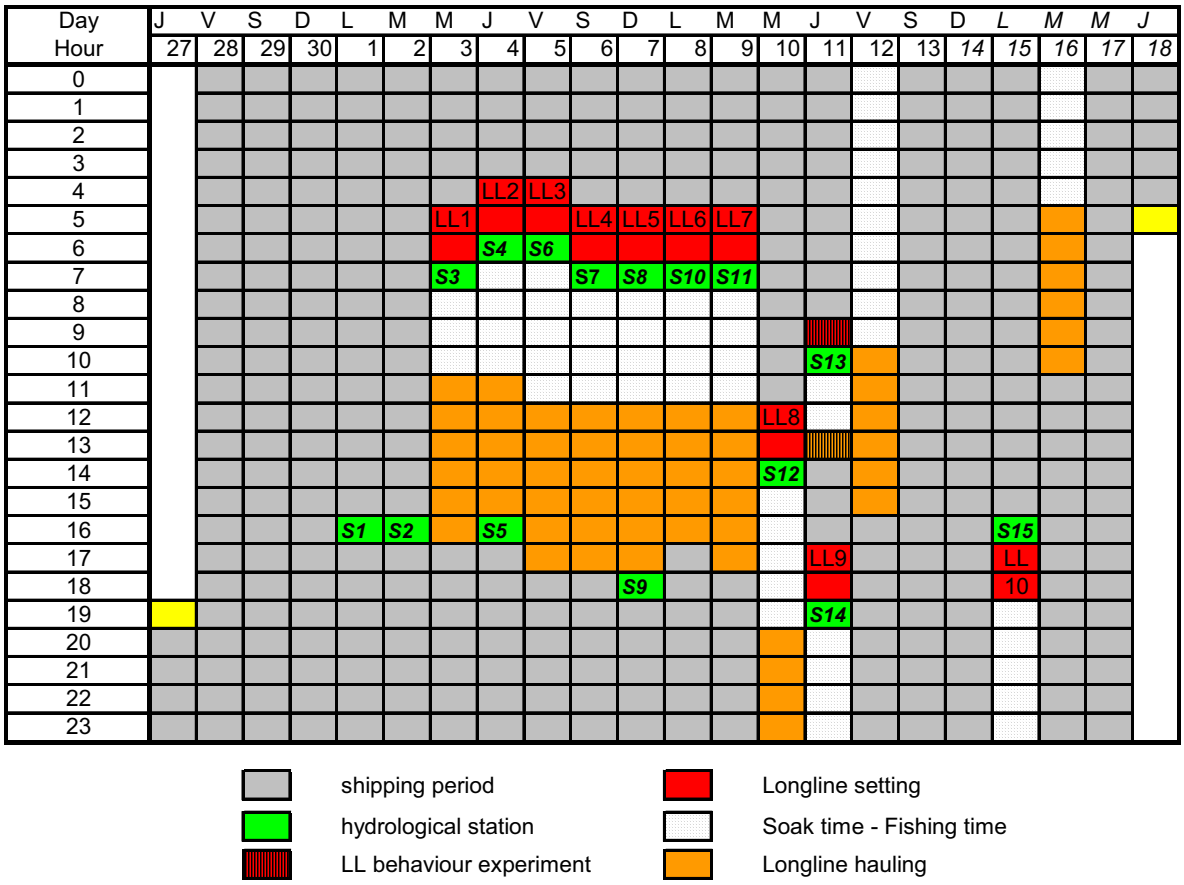


Figure 1 – Chronogram of operations carried out on board the F/V "Manohal" during the SWIOFP longline cruise.

1 - Bach P., N. Rabearisoa, T. Filippi & S. Hubas, 2008 - The first year of **SEALOR** : Database of **SEA**-going observer surveys monitoring the local pelagic **LO**ngline fishery based in La **R**eunion. IOTC/WPEB/WP13, 26 p

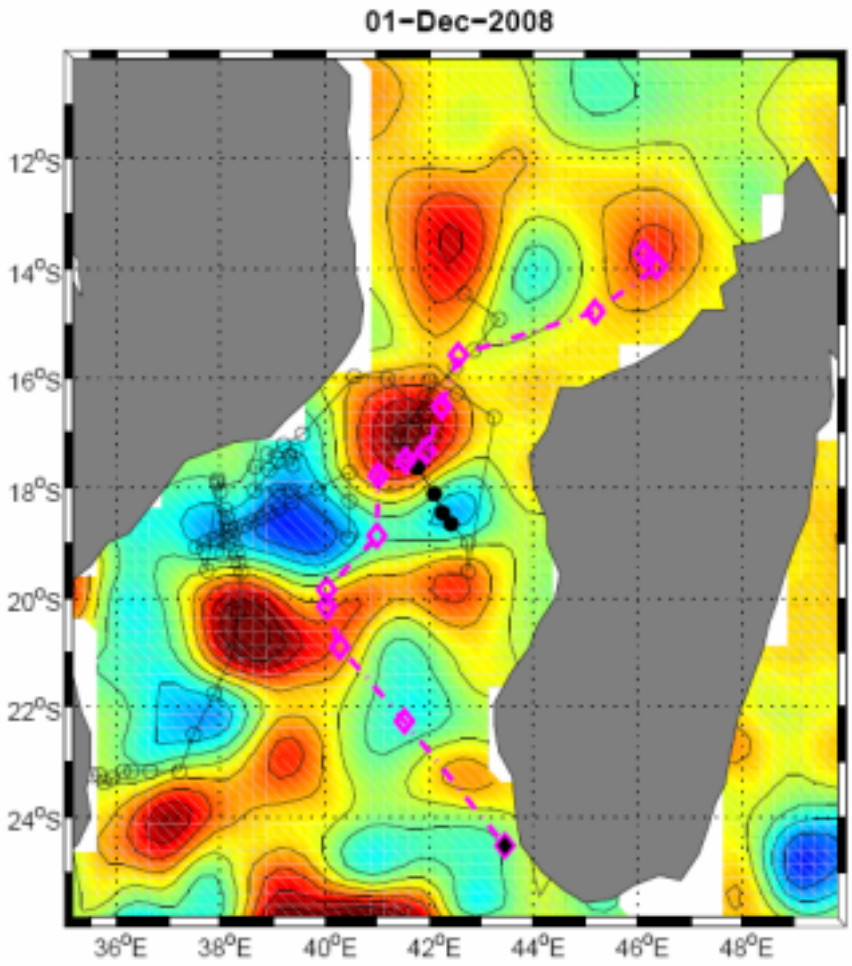


Figure 2 – Positions of hydrological stations realized by the R/V "Fridjof Nansen" (black circle) and the F/V "Manohal" (pink diamond).

Table 1 – Date, time and geographical positions of the setting and the hauling of instrumented longline sets.

Date	Set number	Setting time	Setting duration (hrs)	Lat (°S)	Long (°E)
03/12/2008	1	04:00	2.92	20.97	40.39
04/12/2008	2	03:00	2.33	20.06	40.09
05/12/2008	3	03:50	2.25	18.98	40.99
06/12/2008	4	04:10	2.25	17.88	40.93
07/12/2008	5	04:29	2.17	17.58	41.64
08/12/2008	6	03:58	2.1	16.59	42.31
09/12/2008	7	04:12	2.37	15.65	42.66
10/12/2008	8	12:00	1.97	14.88	45.1
11/12/2008	9	16:40	2.08	13.86	46.24
12/12/2008	10	17:20	2.12	17.03	52.75

3 Material and methods

3.1 Oceanographic observations

Hydrological observations were carried out using CTD probe SEABIRD Seacat SBE19plus (equipped with depth, temperature, salinity, oxygen and fluorescence sensors). Probe casts were carried out to the depth ~ 450 m with assistance of vessel' anchor winch. With this equipment we obtained vertical profiles of the temperature (°C), salinity (PSU), dissolved oxygen (ml/l) and chlorophyll (Figure 3 A to D).

Station duration was approximately 1 hour, therefore to minimize time losses, most of the stations were coupled with fishing operations: generally after the setting of longline. Some stations were done both before and after the setting. Some hydrological stations were not associated with fishing operation.

Results of CTD and XBT profiling performed by R/V 'Fridtjof Nansen' from 29 November to 4 December (a total of 51 station) were obtained from this vessel and were used in the analysis of hydrological situation and planning of longline fishing positions (see Results – Oceanographic observations).

A – CTD launching at the fore part on the starboard side

B – Stranded wire cable on the windlass

Figure 3 – Design of the installation of material (stranded wire cable, pulley, windlass) used to launch the SeaBird CTD probe.

C – Details of the windlass

D – Pulley at the end of the derrick

Figure 3 – Design of the installation of material (stranded wire cable, pulley, windlass) used to launch the SeaBird CTD probe.

3.2 Biological observations

All biological sampling were performed during hauling of the longline. Sampling matrix and planned sampling volumes are presented in the Table 2.

It should be stressed that general chartering agreement with vessel owner presumed that all fish caught during operations are belonged to the crew of the vessel and will be used for commercial purposes. Consequently, such arrangement put certain limitations on the period, which fish may stay unprocessed on the vessel' deck, on the approach to fish processing and on sampling of muscles and hard part tissues.

All fish were measured with a calliper (for straight length measurements) and measuring tape (curved length measurements) with precision to 1 cm. Several types of morphometric measurements were taken to develop relationships for further conversion of size to size or size to weight. The following measurements were taken:

Tuna: straight fork length (FL); curved fork length (CFL); straight predorsal length (PDL), and straight pectoral-anal length (PAL), (Figure 4 A).

Billfish: curved total length (TL); straight lower jaw-fork length (LJFL), curved lower jaw-fork length (CLJFL), curved eye-fork length (EFL), curved pectoral-anal length (PAL), (Figure 4 B).

Sharks: curved total length (TL); curved fork length (FL); curved standard length (SL); curved inter-dorsal length (IDL); straight length of the rear margin of the left and the right pectoral fin P1P (L) and P1P (R) respectively, (Figure 4 C).

Skates: straight total length (TL), straight disk width (DW) and straight disk length (DL).

Other species: straight fork length (FL).

Total weight was measured with spring balances or electronic balances:

100 kg max weight spring balances for fish > 20 kg, accuracy = 1 kg,

50 kg max weight electronic balances for fish 1-20 kg, accuracy = 50 g,

and 1 kg max weight spring balances for fish < 1 kg, and for gonads and liver, accuracy = 5 g.

Sex and maturity stage: of fish were recorded, gonad were weighed. Liver was weighed in tuna.

Stomach fullness: were recorded using (using semi-quantitative scale from 0 to 4): 0 – empty stomach, 1 – traces of food, 2 – less than ½ of stomach, 3 – more than ½ of stomach, 4 – full stomach, its walls stretched. Non-empty stomachs were sampled totally for every species till reaching cumulative number of 30 stomachs. After this limit, non-empty stomachs were randomly sampled.

Samples of white muscles: (~20 g) from the dorsal part of fish close to the head were taken for further analysis of **stable isotopes, lipids, genetics** – for sharks (by request of Nicolas Hubert, ECOMAR) and for swordfish (by request of IFREMER, project IOSSS). Same amount of liver were taken for stable isotopes and lipids analysis. Species sampled and sampling volumes are presented in the Table 2. White muscles and liver samples for stable isotope and lipids studies were placed in the NALGENE® Cryotubes, which stored in the DEWAR container with liquid nitrogen.

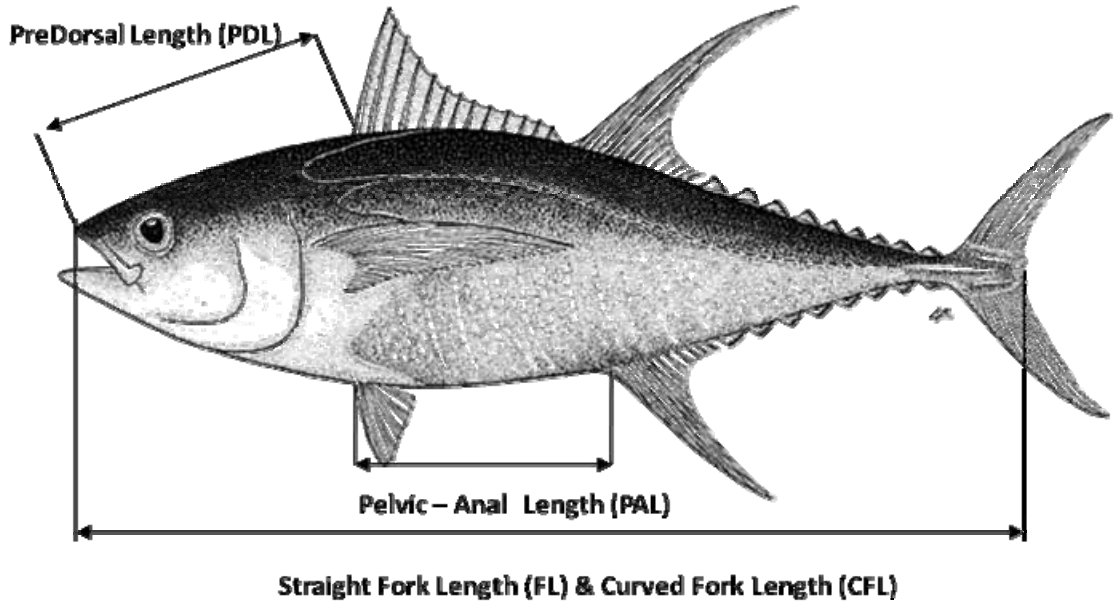
Contaminants: It was planned to sample white muscles (preferably 100 g of muscle tissues from dorsal part of fish) and liver (same volume of sample) of tuna, swordfish and two shark species (Table 2) for analysis of contaminant level (PCB) in the fish tissues. However contaminant sampling methodology is non-compatible with fish processing for further marketing. In particular, sampling of relatively big part of white muscles from the dorsal part makes the fish unmarketable. Fish processing by the crew makes impossible also removal of non-contaminated liver from the fish body. Therefore we focused on the contaminant sampling of non-marketable species: blue shark and silky shark. Sampling of tuna was opportunistic. We have also very limited supply of nitrile gloves (less than 10 pairs), which is necessary for clean sampling of tissues for contaminants. When our reserves of clean gloves are finished we developed a technique of tissue sampling using aluminium foil ('RB AluGlove'™, pat. pending) to avoid direct hand contacts with sampled tissue and to protect tissue from hand contamination.

Hard parts: vertebrae (mostly for blue shark and silky shark), first dorsal fin spine (tuna only), otoliths (tuna only) were taken for development of calibration technique on stable isotope composition between white muscles and hard parts and for fish ageing applications.

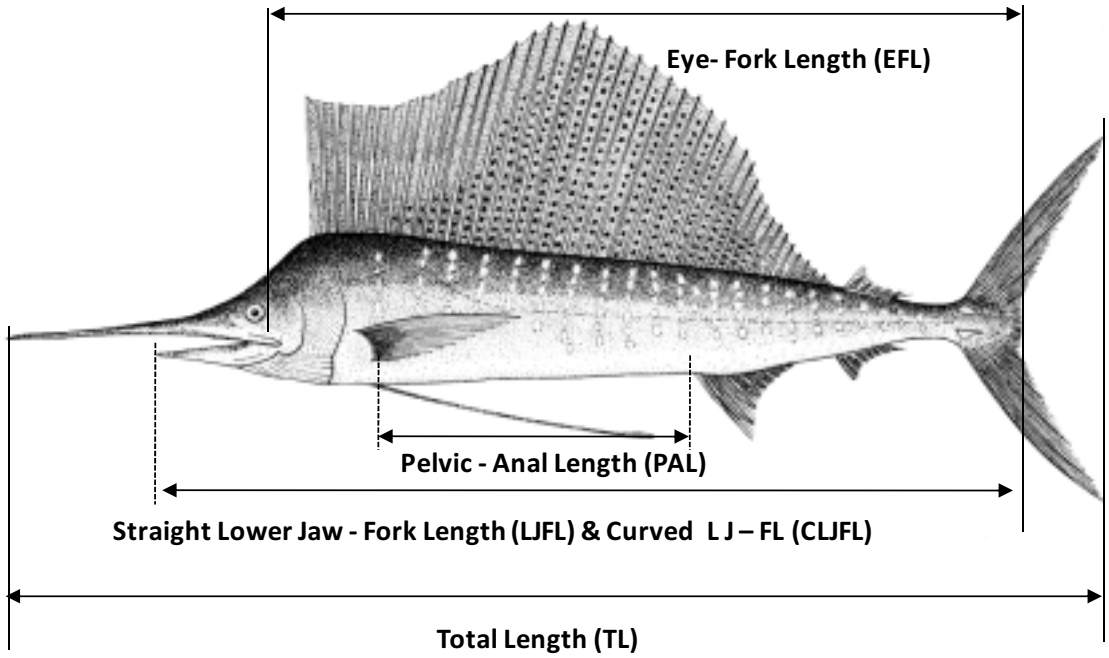
Table 2. Sampling matrix by species or species groups

Species		Hook, basket, time recording,	Identification	Measurement	Weighing	Analysis	Contaminants (5)		Lipids (20)		Isotopes (30)		Vertebrae	Otoliths	Spines	Stomachs (30)	Genetics
							Muscles	Liver	Muscles	Liver	Muscles	Liver					
Tuna	YFT	✓	✓	✓	✓	✓	✓ ♂	✓ ♂	✓	✓	✓	✓	✓	✓	✓	✓	
	BET	✓	✓	✓	✓	✓	✓ ♂	✓ ♂	✓	✓	✓	✓	✓	✓	✓	✓	
	ALB	✓	✓	✓	✓	✓	✓ ♂	✓ ♂	✓	✓	✓	✓	✓	✓**	✓	✓	
	Other TUN	✓	✓	✓	✓	✓					✓		✓			✓	
Billfish	SWO	✓	✓	✓	✓	✓	✓ ♂	✓ ♂	✓	✓	✓	✓	✓	✓		✓	✓
	Other BIL	✓	✓	✓	✓	✓					✓		✓			✓	
Sharks	BSH	✓	✓	✓	✓	✓	✓ ♂	✓ ♂	✓	✓	✓	✓	✓			✓	✓
	FAL	✓	✓	✓	✓	✓	✓ ♂	✓ ♂	✓	✓	✓	✓	✓			✓	✓
	PSK	✓	✓	✓	✓	✓					✓		✓			✓	✓
	Other sharks	✓	✓	✓	✓	✓					✓		✓*			✓	✓
Other species	ALI	✓	✓	✓	✓	✓					✓	✓		✓**		✓	
	OIL	✓	✓	✓	✓	✓					✓		✓			✓	
	LEC	✓	✓	✓	✓	✓					✓		✓			✓	
	Other	✓	✓	✓	✓	✓					✓					✓	

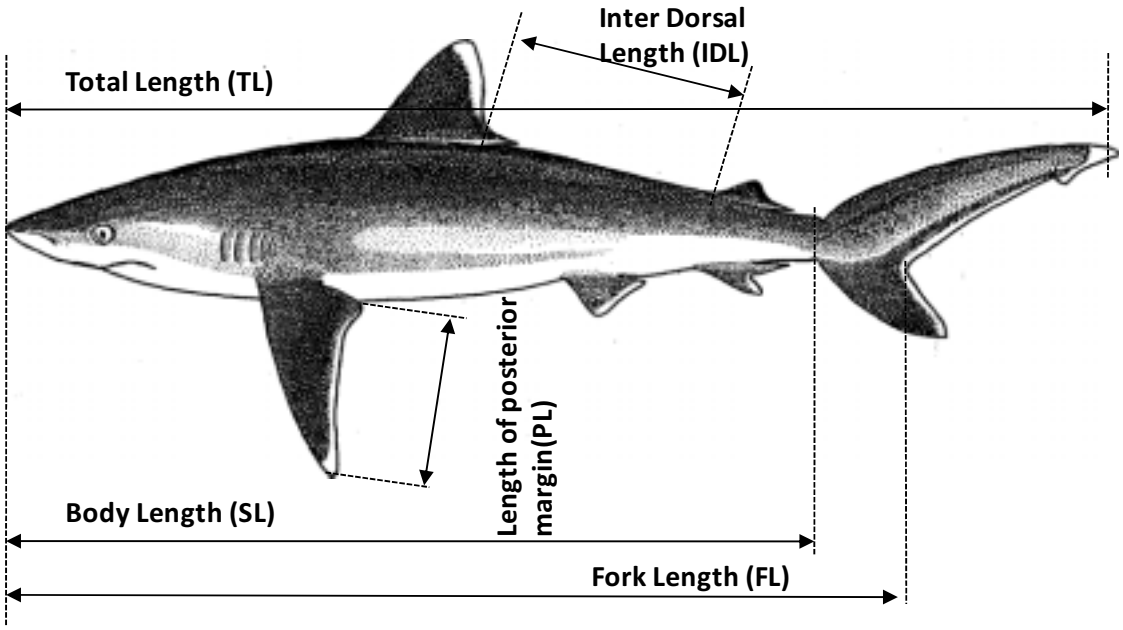
* *Isurus* spp. (MAK), *Alopias* spp. (THR),
** Optional (depend on time and resources)



A – Tuna and tuna like species



B – Billfish measurements



C - Sharks measurements

Figure 4 – Details of length measurements for tuna, billfish and shark.

3.3 Fishing experiments using instrumented longline

The F/V « Manohal » is a longliner of 25 m OAL recently entered in the local fleet. The crew is composed of 9 persons including the captain. The maximum number of scientists embarked is 4. The F/V "manohal" is equipped with a nylon monofilament mainline stocked on a spool manufactured by Lindgren Pitman™. The line capacity of the spool is ~ 60 miles for a line diameter of ~ 3.4 mm (Figure 5 A). This spool is also used for the hauling of the mainline. A shooter was used to set the line with a given sag ratio depending on the speed of the vessel (Figure 5 B) in order to reach certain depth targeted during fishing operation. The longline is a string of hooks attached with a snap to the mainline, which is maintained at the surface of the ocean by buoys also attached to the mainline at regular intervals. A transmitter buoy is fastened at each end of the mainline (Figure 6). During our fishing experiments, the mainline was attached to 10-m polypropylene float lines with 10-l floats at the surface. Monofilament branch lines were 12-m long and snapped on at a constant time interval for a given set. Each brancline is equipped with a weight of 60 g and a circle hook with an offset of 12°. Circle hooks were used because their lower impact on potential capture of non-target species (mainly sea turtles). Squid (*Ilex* spp.) and European mackerel (*Scomber scombrus*) were used as bait, alone or mixed. The respective individual weight of each type of bait was ~ 200 – 250 g and ~ 150 g (Figure 7).

For each set, all baskets (the part of the longline between two successive floats) were equipped with time depth recorders. TDRs were programmed to record fishing depth once per minute. The TDRs were placed at the mid-point on the basket mainline which corresponds to its maximum depth (Figure 6). For one experiment the longline behaviour

was studied with several TDRs close to each hook of a given basket and with GPS buoys to measure simultaneously the variation of the sag ratio.

Each branch line was equipped with a hook timer. Hook timers indicate elapsed time in minutes between the hooking contact (triggered hook timer with or without capture) of fish on the line and landing on deck, from which the time of the hooking contact is deduced. Hooking depths will be inferred from hook depths at hooking times estimated by a longline shape model.

A - The spool by Lindgren Pitman ™ installed on board the longliner

B – The shooter installed astern of the fishing vessel

Figure 5 – Longline fishing material installed on the F/V "Manohal"

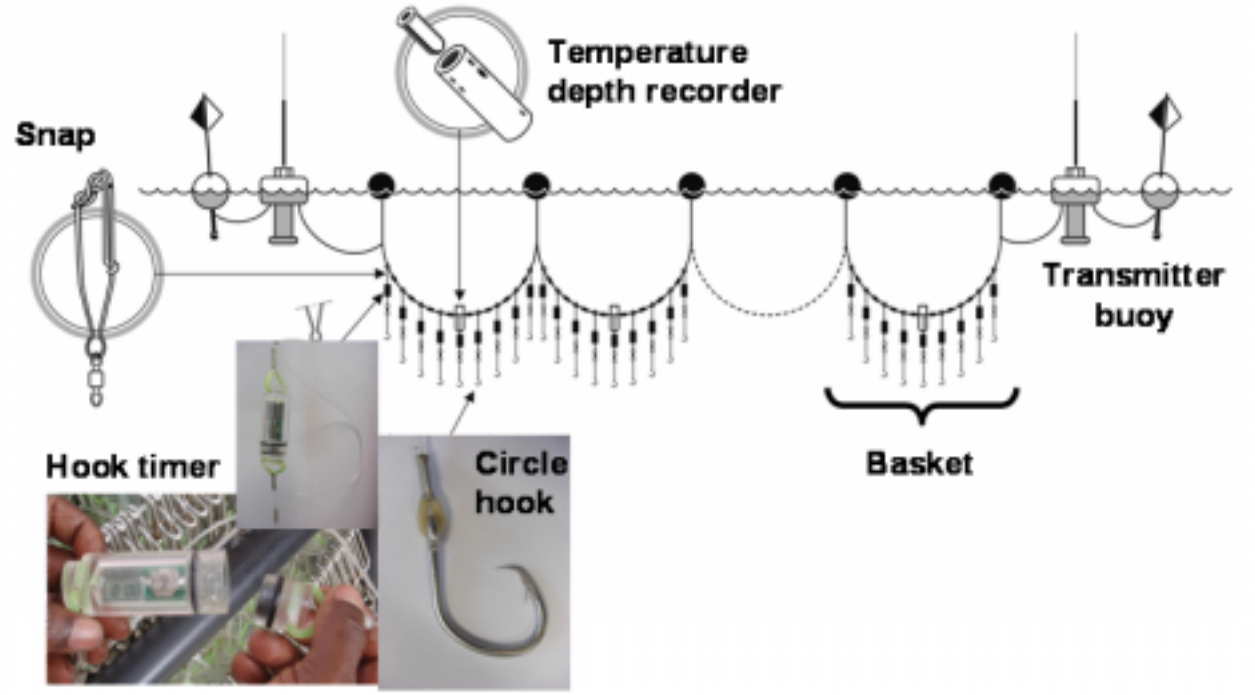


Figure 6 – The instrumented longline deployed during the SWIOFP cruise

Figure 7 – Squid (*Ilex spp.*) and european mackerel (*Scomber scombrus*) used as bait during the longline scientific cruise.

4 Results

4.1 Hydrological situation in the area

Mesoscale gyres in the Mozambique Channel are important oceanographic structures responsible for increased biological productivity of the region. It usually developed in its northern part of the channel demonstrating quasi-stationary behaviour slowly moving southward toward South African coast. Study of the mesoscale dipole (pair of cyclonic-anticyclonic gyre) and its effect on local biological productivity at the various levels of the trophic chain was principal goal of this expedition.

During approach of the F/V 'Manohal' to the operation area (Mozambique Channel) first information on environmental situation were obtained from satellite data distributed through 'OrbMap' channel. This information represents estimates of zone of cyclonic and anticyclonic gyres and frontal zones based on satellite sea level altimetry data. There were several well developed dipole (cyclone-anticyclone) structures along the channel 'southern', 'central' and 'northern' (Figure 8). As more perspectives for further studies was considered 'central' dipole structure situated in the middle of the Channel (central position of the cyclonic gyre: 18°00'S, 42°20'E and the anticyclonic gyre 17°20'S, 42°20'E) based on following considerations:

a. Well developed 'mature' but probably not very 'old' dipole structure in the channel (compare to southern anticyclone, middle position 20°30'S, 39°00'E); therefore anticyclonic gyre may contain enough biomass of the species from 'intermediate' trophic level to accumulate aggregation of top predators. Dipole-like structure at the north of the channel (northward from 16°00' S) looks too 'young' to accumulate enough prey for top predators.

b. Well located for joint work of both vessels: 'Manohal' and 'Fridtjof Nansen': the later vessel have a possibility to arrive first at dipole structure to make oceanographic survey and to precise position of the dipole, while 'Manohal' arriving one day later may perform longline setting in the well developed gradient zones and in the centers of the dipole. Longline stations could be easily complimented by the tows of midwater trawls by 'Fridtjof Nansen' to sample micronecton communities.

c. Southern dipole structure assumed to be too 'old' for good aggregations of top predators and situated too far from 'Fridtjof Nansen' route from Pemba.

During radio-contact with 'Fridtjof Nansen' they agree with our proposal of target dipole study. On our run to the operation area, we performed two oceanographic stations in the south-eastern part of the channel (CTD stations 01, 02), which showed that this area is represents cyclonic gyre with high thermocline (at approx. 50 m depth), low water temperature 17.7-20.7° C at the 100 m depth and highly pronounced fluorescence peak in the thermocline layer (Figure 9).

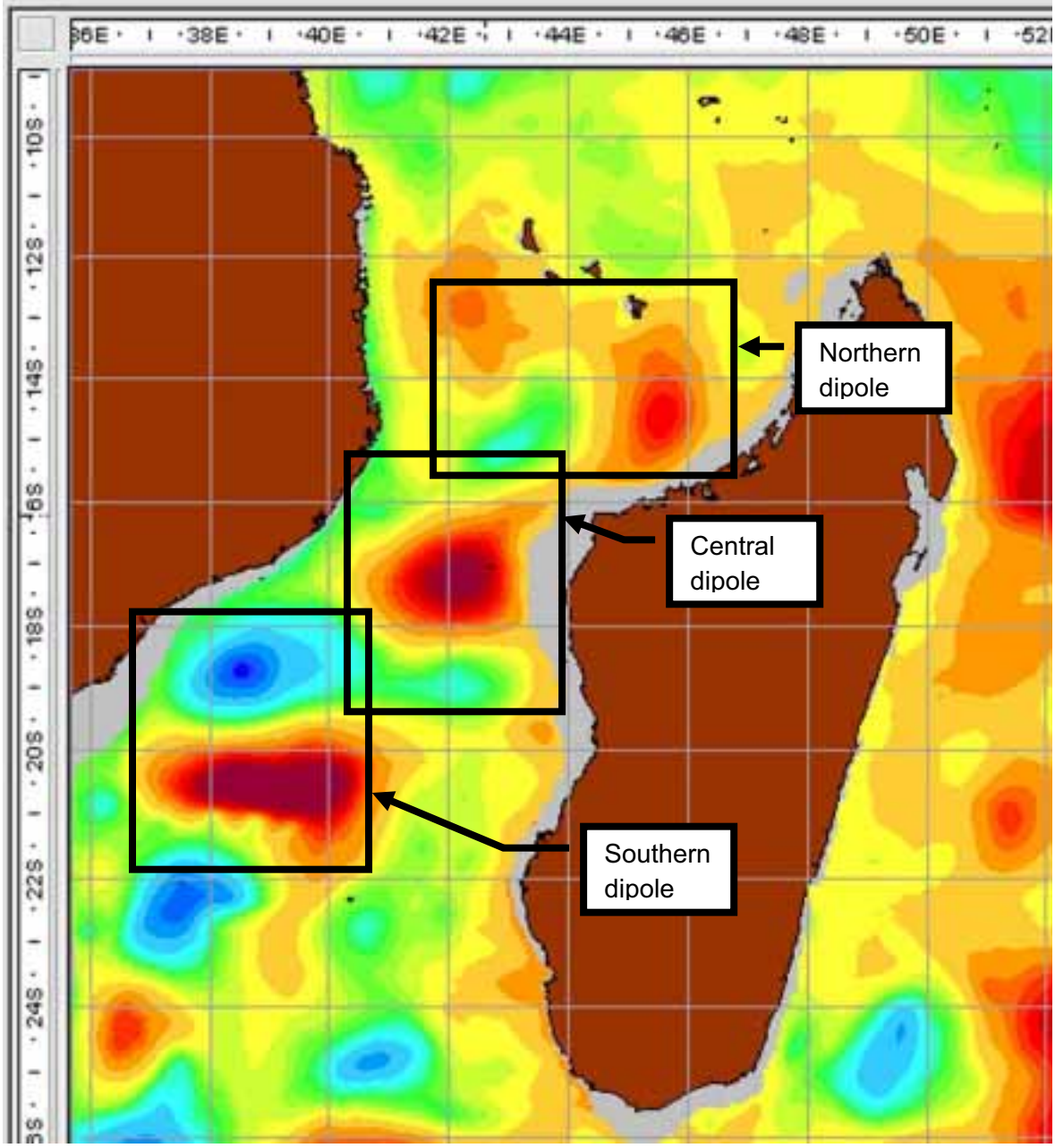


Figure 8 – Positions of the mesoscale eddies in the Mozambique Channel based on sea level height anomalies data obtained through 'OrbMap' channel. Picture represents situation on 03.12.2008

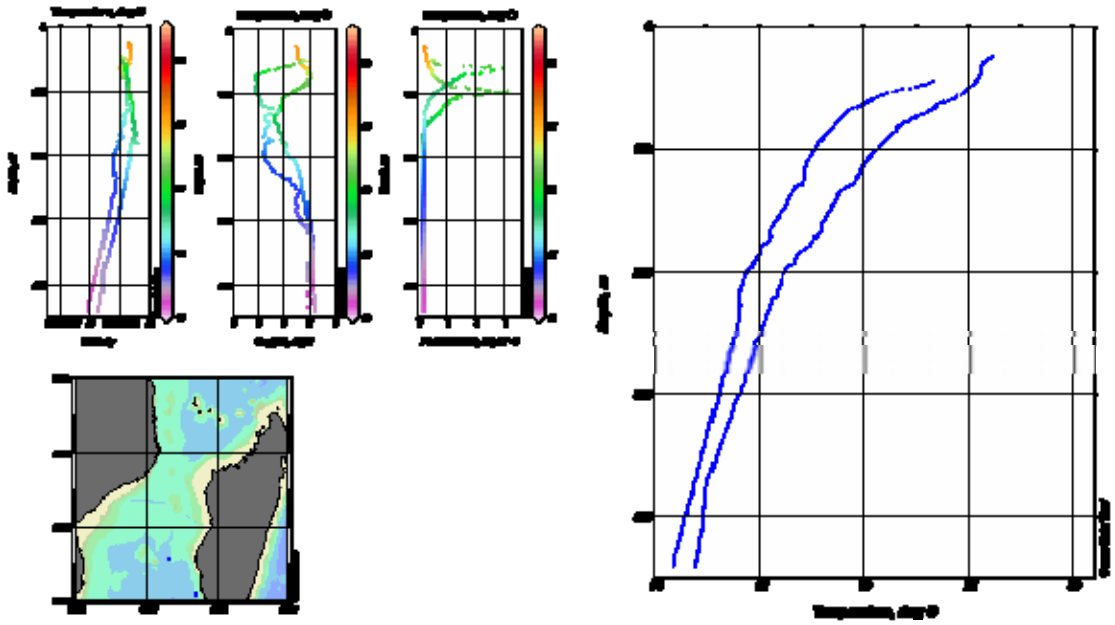


Figure 9 – Positions of oceanographic stations and environmental data (temperature – right panel; salinity, dissolved oxygen, and fluorescence – upper left panels) at the CTD stations 01 and 02 performed by 'Manohal' at the south-east Mozambique Channel. Colour bar at the upper left panels represents water temperature.

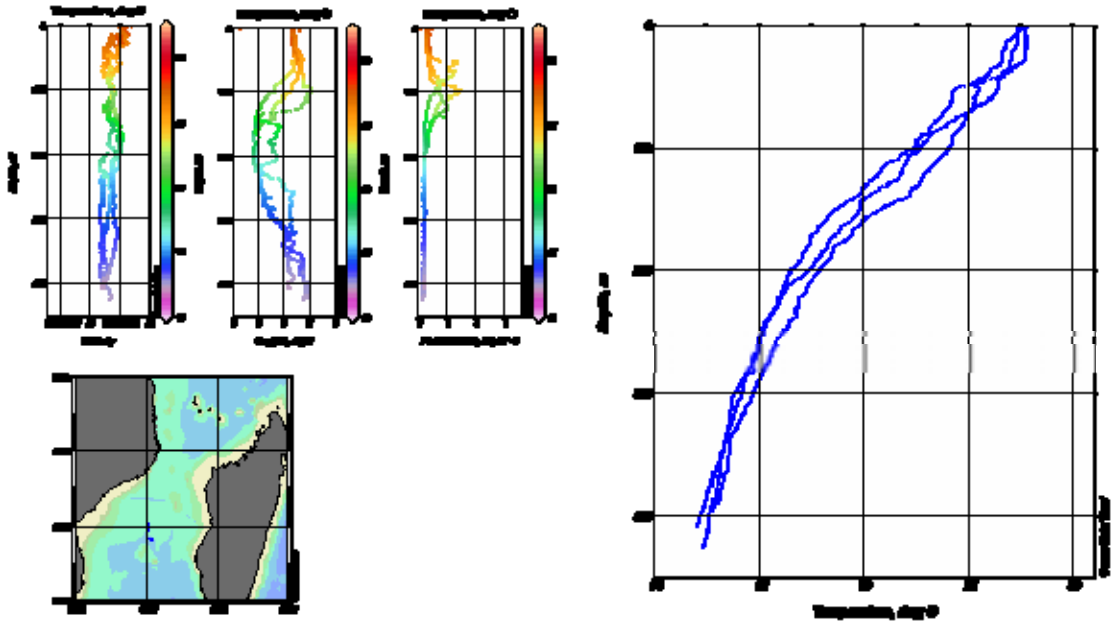


Figure 10 – Positions of oceanographic stations and environmental data (temperature – right panel; salinity, dissolved oxygen, and fluorescence – upper left panels) at the CTD stations 03-04 performed by F/V 'Manohal' at the south-western periphery of the 'central' dipole structure. Colour bar at the upper left panels represents water temperature.

First two longline operations and CTD stations 03-05 were made in the south-western periphery of the central area characterised by transitional water structure: poorly defined thermocline and water temperature between 23-24°C at the 100 m depth (Figure 10). At this period 'Fridtjof Nansen' finished oceanographic section along the 'central' dipole structure. Data collected by 'Fridtjof Nansen' in general well corresponded to the satellite information, however *in situ* data are more precise in term of geographic location of gradient zones and central parts of the gyres (Figure 11). Centre of anticyclone gyres was located at approximate position 17°00'S, 41°20'E, while central part of cyclonic gyre lies at 18°40'S, 42°20'E. Our environmental observations in the position of longline operation No1 ('transitional waters') are well correspond to environmental data collected by R/V 'Fridtjof Nansen'. Typical water characteristics in the anticyclone: deep thermocline (lower thermocline depth at 170-180 m, temperature ~25°C at 100 m) and cyclone: shallow thermocline (lower thermocline depth at 30-70 m, temperature ~18.3-22.0°C at 100 m) of the 'central' dipole is presented on Figures 12 and 13. As a logical consequence from oceanographic data obtained jointly by R/V 'Fridtjof Nansen' and F/V 'Manohal' further longline operations and joint sampling operations of both vessels should be directed in the gradient zone within dipole and in the anticyclonic part of dipole as more perspective for aggregations of top predators. Therefore further operations of F/V 'Manohal' were directed to the mentioned areas in the 'central' dipole.

LL station No 3 (CTD station No 06) was performed at the western periphery of the cyclonic gyre (Figure 14).

Longline operations NoNo 4-7 (CTD stations 07-11) were situated within different areas (periphery, intermediate and middle parts) of the anticyclonic gyre of the 'central' dipole (Figure 15). However temperature profiles suggest that we weren't reach the centre of the gyre (our deepest lower thermocline depth was located at 150 m compare to 170-180 m recorded by R/V 'Fridtjof Nansen'). Our data showed that thermocline was less pronounces at the positions of longline stations. This may be explained by the movement of the anticyclonic eddy or its transformation. However we have no enough environmental data to clarify the situation due to low number of stations performed by F/V 'Manohal'. In this context XBT equipment at the board of F/V 'Manohal' could certainly increase numbers of temperature profiles and reduce uncertainty in the understanding of spatial distribution of oceanographic fields.

Since LL catches in the 'central' dipole were generally low, we decided to perform two final fishing operations (LL 8 and 9, CTD stations 12-14) in the Mozambique Channel in the anticyclonic gyre of the 'northern' dipole exploring 'younger' oceanographic structure. Water structure was similar with anticyclonic gyre of the central dipole however thermocline was very weak suggesting intensive vertical mixing in the area (Figure 16).

Last CTD station and LL fishing operation was performed eastward from Madagascar, in the waters of South Equatorial Current (SEC). Environmental data are presented on the Figure 17.

In general meteorological and oceanographic situations in the studied area were rather favourable for longlining and sampling. Sea conditions were relatively calm with wind force below 4 in Beaufort scale.

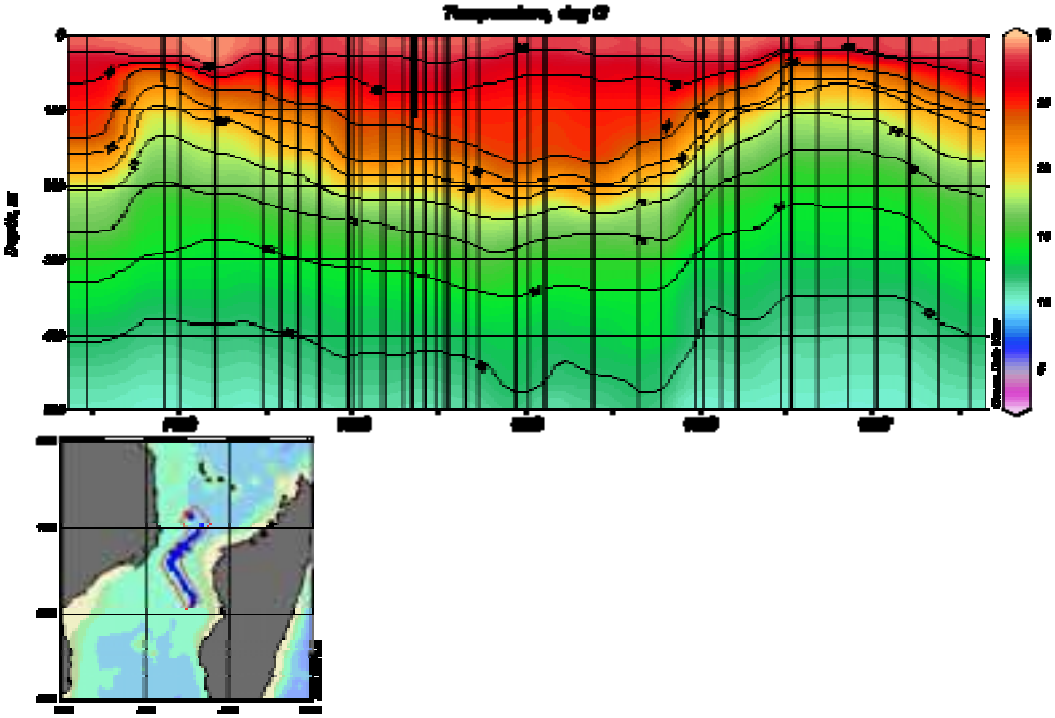


Figure 11 – Positions of oceanographic stations and vertical distribution of the temperature along cross-section of the 'central' dipole structure performed by R/V 'Fridtjof Nansen'.

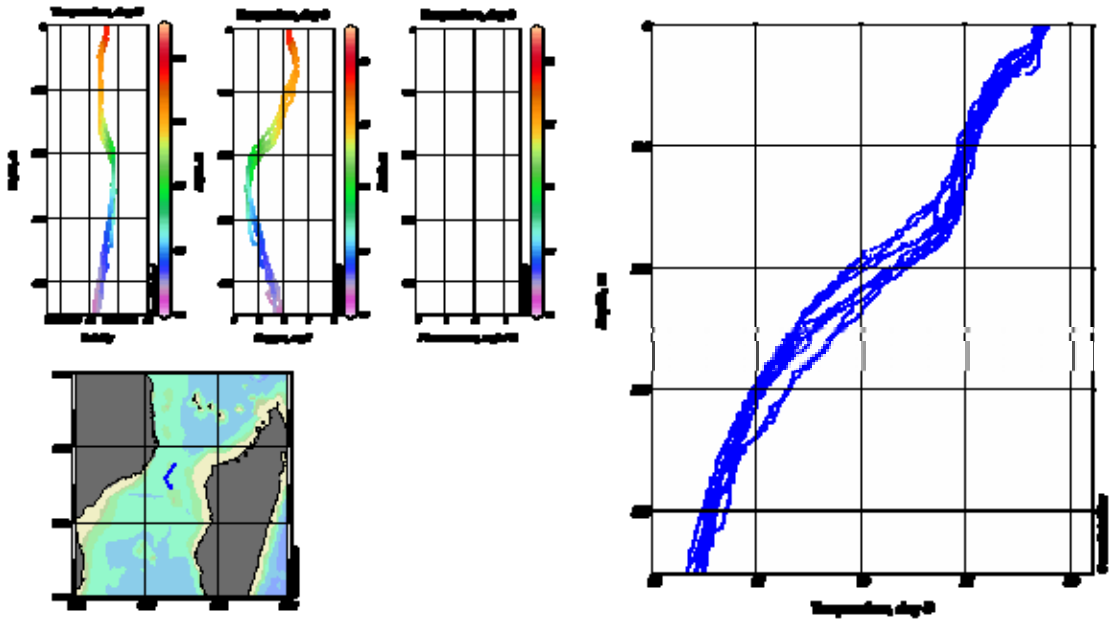


Figure 12 – Positions of oceanographic stations and environmental data (temperature – right panel; salinity and dissolved oxygen – upper left panels) at the stations performed by R/V 'Fridtjof Nansen' at the anticyclonic part of the 'central' dipole structure. Colour bar at the upper left panels represents water temperature.

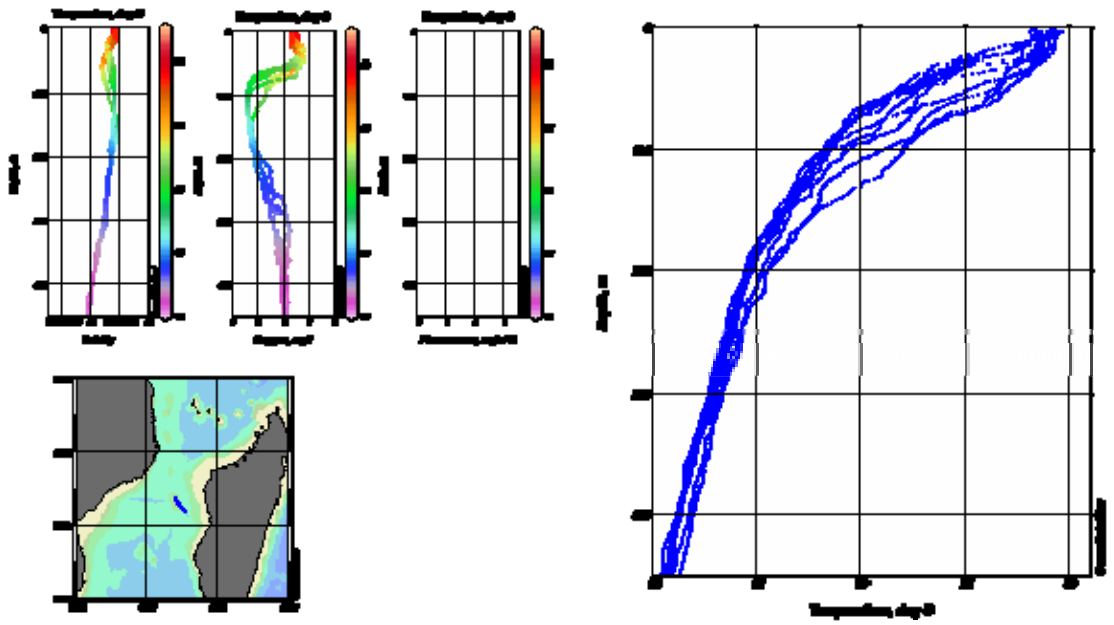


Figure 13 – Positions of oceanographic stations and environmental data (temperature – right panel; salinity and dissolved oxygen – upper left panels) at the stations performed by R/V 'Fridtjof Nansen' at the cyclonic part of the 'central' dipole structure. Colour bar at the upper left panels represents water temperature.

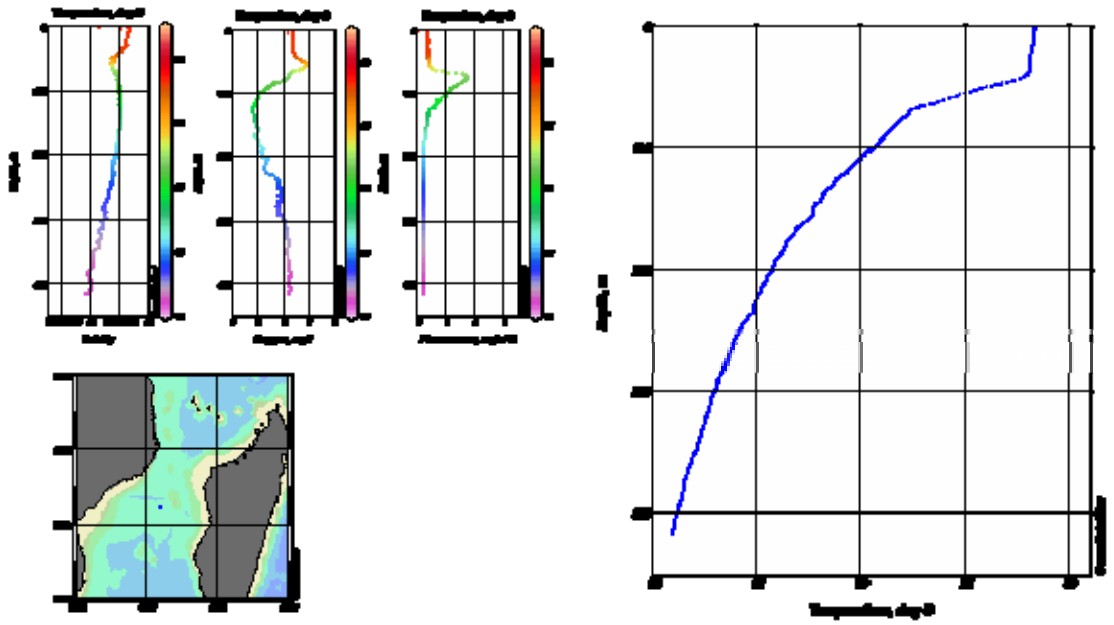


Figure 14 – Positions of oceanographic stations and environmental data (temperature – right panel; salinity, dissolved oxygen and fluorescence – upper left panels) at the station performed by F/V 'Manohal' at the western periphery of the cyclonic part of the 'central' dipole structure. Colour bar at the upper left panels represents water temperature.

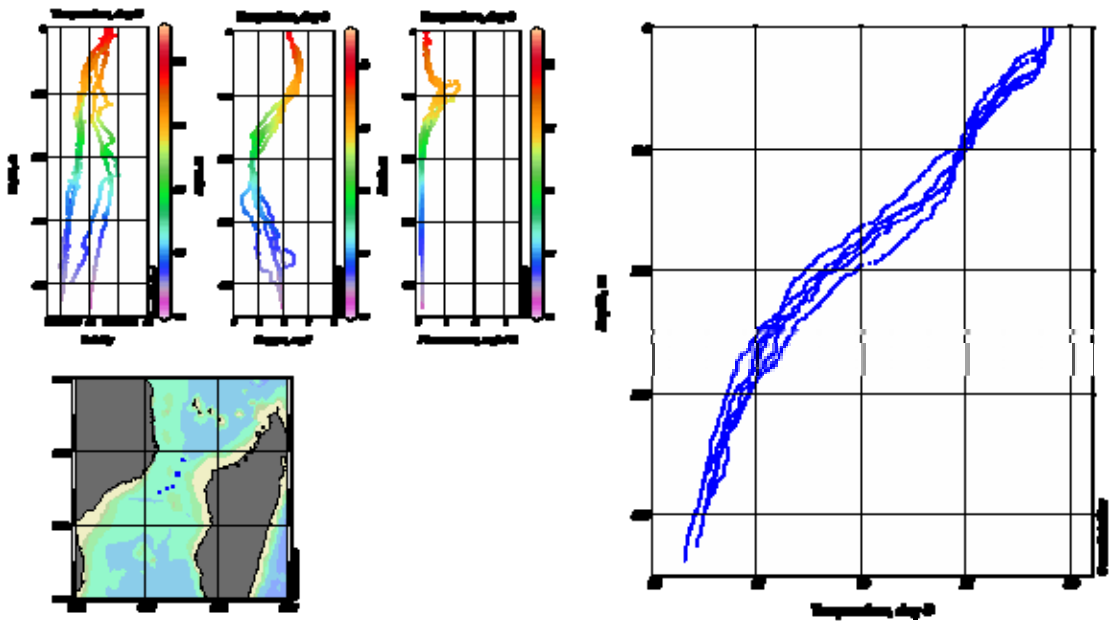


Figure 15 – Positions of oceanographic stations and environmental data (temperature – right panel; salinity, dissolved oxygen, and fluorescence – upper left panels) at the CTD stations 07-11 performed by F/V 'Manohal' at the anticyclonig gyre of the 'central' dipole structure. Colour bar at the upper left panels represents water temperature.

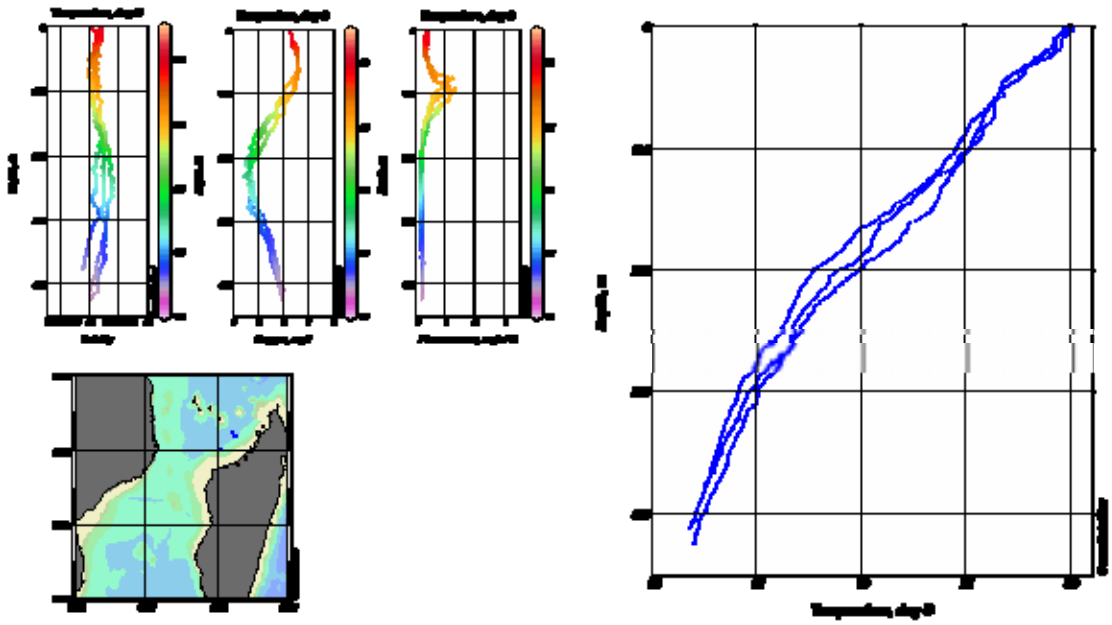


Figure 16 – Positions of oceanographic stations and environmental data (temperature – right panel; salinity, dissolved oxygen, and fluorescence – upper left panels) at the CTD stations 12-14 performed by F/V 'Manohal' at the anticyclonig gyre of the 'northern' dipole structure. Colour bar at the upper left panels represents water temperature.

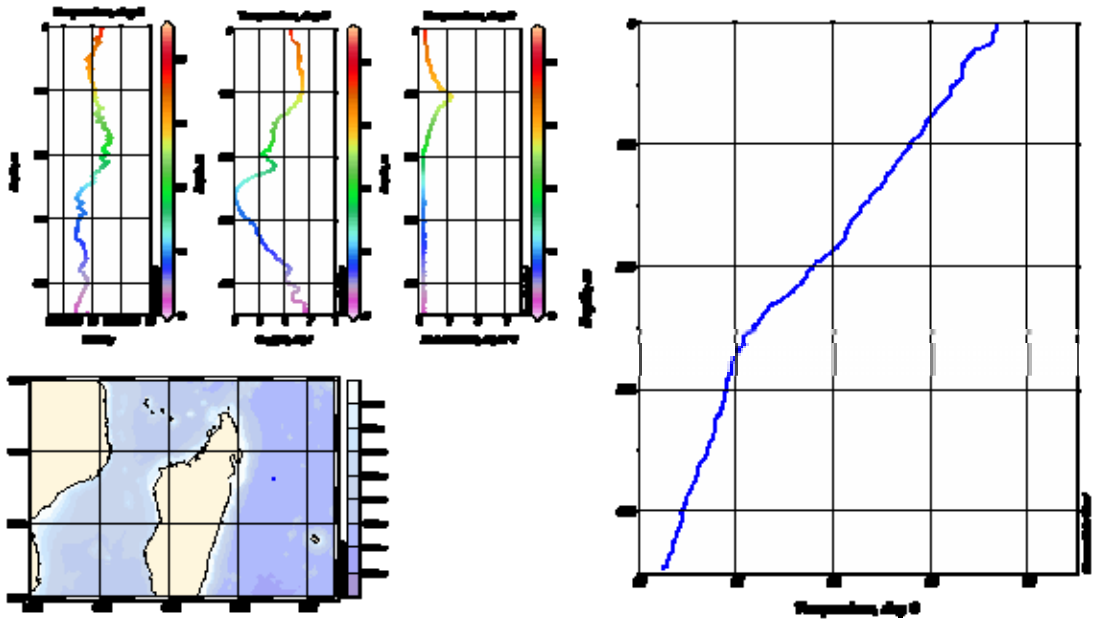


Figure 17 – Positions of oceanographic stations and environmental data (temperature – right panel; salinity, dissolved oxygen, and fluorescence – upper left panels) at the CTD station 15 performed by F/V 'Manohal' in the waters of the South Equatorial Current estward from Madagascar. Colour bar at the upper left panels represents water temperature.

4.2 Longline fishing experiments

4.2.1 General presentation of longline fishing operations

F/V Manohal departed from Reunion on Nov. 27 and was back at the same location on Dec 18 after cruising throughout the Mozambique Channel, from South to North. It took 7 days for the Manohal to reach the first eddy studied by the R/V Nansen and to set the first longline. Nine longline sets were operated in the Mozambique Channel (and one East of Madagascar on the way back to Reunion). Basic information on the date, time and positions of the setting and the heuling of the fishing are displayed in the Table 2. Geographical situations of both setting and hauling operations are shown on the figure 18.

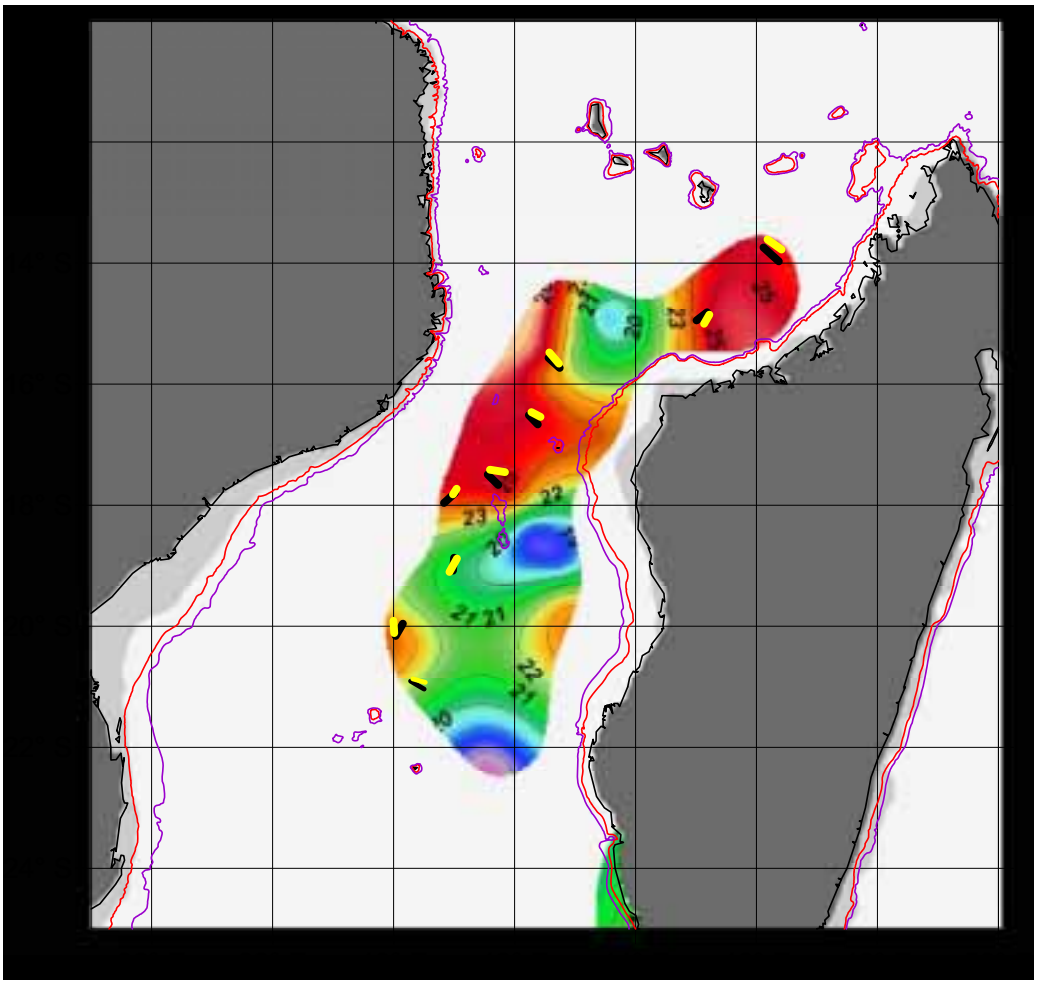


Figure 18 – Overlap of locations of both longline settings (black stroke) and haulings (yellow stroke) on a kriging map of the water temperature at 100 m depth obtained from CTD data collected by the R/V "Fridtjof Nanasen" and the F/V "Manohal".

Table 2 – Date, time and geographical positions of the setting and the hauling of instrumented longline sets

			START			END				
Date	Set number	Opération	Local time	Lat (°S)	Long (°E)	Local time	Lat (°S)	Long (°E)	Bearing (°)	Distance (km)
03/12/2008	1	Setting	4:00	-21.037	40.507	6:55	-20.905	40.281	302	27.69
03/12/2008	1	Hauling	11:00	-20.928	40.526	15:40	-20.869	40.317	287	22.69
04/12/2008	2	Setting	3:00	-19.957	40.153	5:20	-20.161	40.035	208	25.93
04/12/2008	2	Hauling	11:00	-19.909	39.997	15:20	-20.113	40.012	176	22.69
05/12/2008	3	Setting	3:50	-19.083	40.983	6:05	-18.867	41	4	24.18
05/12/2008	3	Hauling	12:00	-19.103	40.925	16:23	-18.881	41.048	28	27.92
06/12/2008	4	Setting	4:10	-17.963	40.833	6:25	-17.797	41.017	46	26.86
06/12/2008	4	Hauling	11:55	-17.822	40.982	17:35	-17.729	41.042	31	12.12
07/12/2008	5	Setting	4:29	-17.665	41.73	6:39	-17.493	41.557	316	26.52
07/12/2008	5	Hauling	12:00	-17.454	41.843	17:00	-17.413	41.593	280	26.88
08/12/2008	6	Setting	3:58	-16.666	42.385	6:04	-16.513	42.235	317	23.37
08/12/2008	6	Hauling	12:05	-16.542	42.429	16:20	-16.462	42.278	299	18.45
09/12/2008	7	Setting	4:12	-15.732	42.748	6:34	-15.566	42.562	313	27.2
09/12/2008	7	Hauling	12:00	-15.663	42.734	17:20	-15.477	42.576	321	26.73
10/12/2008	8	Setting	12:00	-14.948	45.01	13:58	-14.812	45.183	51	24.03
10/12/2008	8	Hauling	19:43	-15.003	45.132	23:41	-14.852	45.222	30	19.36
11/12/2008	9	Setting	16:40	-13.971	46.37	18:45	-13.742	46.117	313	37.43
11/12/2008	9	Hauling	9:54	-13.775	46.415	14:43	-13.609	46.183	306	31.25
12/12/2008	10	Setting	17:20	-16.945	52.64	19:27	-17.121	52.857	130	30.34
12/12/2008	10	Hauling	6:00	-17.019	52.635	10:45	-17.064	52.871	101	25.64

Each fishing operation was conducted by instrumented longline equipped with temperature-depth recorders and hook timers. Fishing success of operation and every capture was analysed with respect to the environment (habitat-based approach) and setting configuration using temperature-depth sensors attached to the longline. Environmental data were collected during the cruise (15 CTD stations); complementary data were received on regular basis from the R/V "F. Nansen".

4.2.2 Longline fishing strategy

↳ Hook per basket and basket per set

In order to deploy the mainline in intermediate or deep waters the mainline was set in the water using a line shooter. To target a given maximum fishing depth of baskets the speed of the shooter was controlled with a tachometer. Moreover to know the maximum fishing depth reached by the line during the fishing time a time depth recorder (TDR) was attached on each basket on the longline. These TDR data will also be used to further estimate the depth and parameters related to depth for each capture (see Bach *et al.*, 2003 [2]).

We present below a synthetic table to summarize the fishing strategy deployed for each fishing set (in terms of number of basket per set and number of hooks per basket, table 3) when detailed information for it are presented in the Annex 1. See also the Table 2 above for further information on the fishing strategy.

Finally, we deployed 357 baskets for the 10 fishing sets totalizing a number of hooks of 5734 (5225 hook timers).

↳ Temperature depth recorder and vertical habitat sampled

By using the line shooter, the mainline was deployed to maximum fishing depths reaching a maximum average value of ~ 470 m (Figure 19). Some records were down to 500 m depth. These results clearly indicate a possibility to manipulate with fishing gear and to adapt the fishing strategy to environmental conditions we wanted to sample. However for at least two fishing sets we observed strong shoaling of the gear due to environmental forcing, i.e. fishing set 3 and 5 with theoretical maximum fishing depth targeted 300-350 m (Figure 19).

For fishing sets 1, 2, 4, 9 and 10 the high range of the maximum fishing depth is due to testing of different fishing strategy during the same set: shapes of baskets varied from shallow (fishing sets 9 and 10) to very deep (fishing sets 1 and 4).

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2 - Bach P., L. Dagorn, A. Bertrand, E. Josse, C. Misselis, 2003. Acoustic telemetry versus monitored longline fishing for studying the vertical distribution of pelagic fish : bigeye tuna (*Thunnus obesus*) in French Polynesia. Fish. Res., 60 (2-3), 281-292.

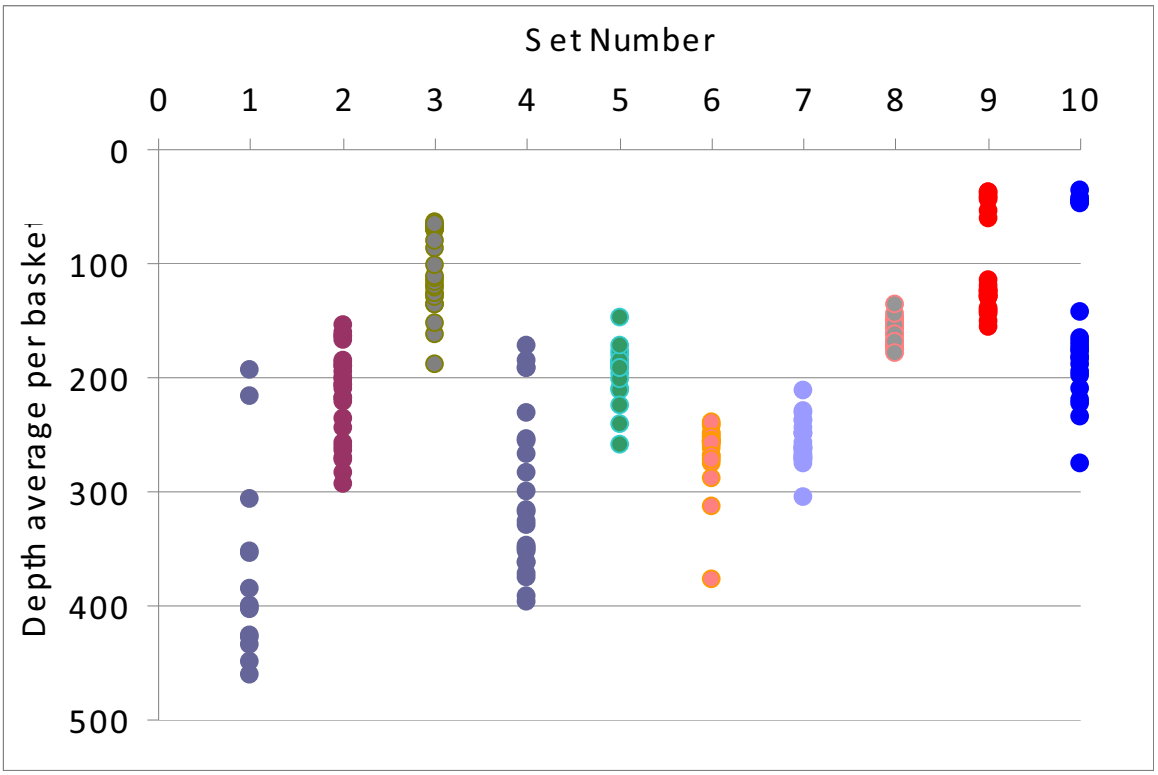

Figure 19 – Maximum fishing depth average estimated for the TDR profiles recorded on baskets of the 10 longline fishing operations.

Table 3 – Fishing strategy deployed for each set in terms of number of baskets per set and number of hooks per basket

Basket	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	N. basket	N. Hook
LL1	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	24	24	24	24	24	27	21	24	24	24	24	24	28	576
LL2	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	24	24	24	24	24	24	24	24	24	24	24		27	552
LL3	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20			26	520
LL4	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22					24	528
LL5	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22						23	506
LL6	20	20	20	20	20	20	20	20	20	20	20	20	20	20	16	20	20	20	20	20	20	20	20	20					24	476
LL7	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24						23	552
LL8	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20		27	540
LL9 - S1	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6									20	120
LL9 - S2	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6									20	120
LL9 - S3	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6									20	120
LL9 - T1	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20										19	380
LL10 - T1	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24													16	384
LL10 - S1	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6									20	120
LL10 - S2	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6									20	120
LL10 - S3	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6									20	120
																													357	5734

4.2.3 Comments on capture

➪ List of species caught and specific relative abundance distribution

A total of 25 large pelagic predators were caught including 1 species of a searturtle (*Caretta caretta*) which is a protected species (Table 4). The abundance distribution of species caught clearly displays the high dominance of the longnose lancetfish (*Alepisaurus ferox)* in catches. This species represents 49% of capture in number. The common targeted species, i.e. *Thunnus albacares*, *Thunnus obesus* have a specific average contribution of about 7% and the swordfish (*Xiphias gladius*) represents 4.8% but the majority of set were done during daytime when swordfish is mostly targeted by nighttime fishing operations (Figure 20).

Moreover, except the surprising dominance of the longnose lancetfish in catches, we can note a good relationship between abundance and occurrence (% of fishing operations where a species was encountered) of species in catches (Figure 21).

Finally, the blue shark which is one of the most common bycatch of longline fisheries reaches a contribution of 6% in global catches.

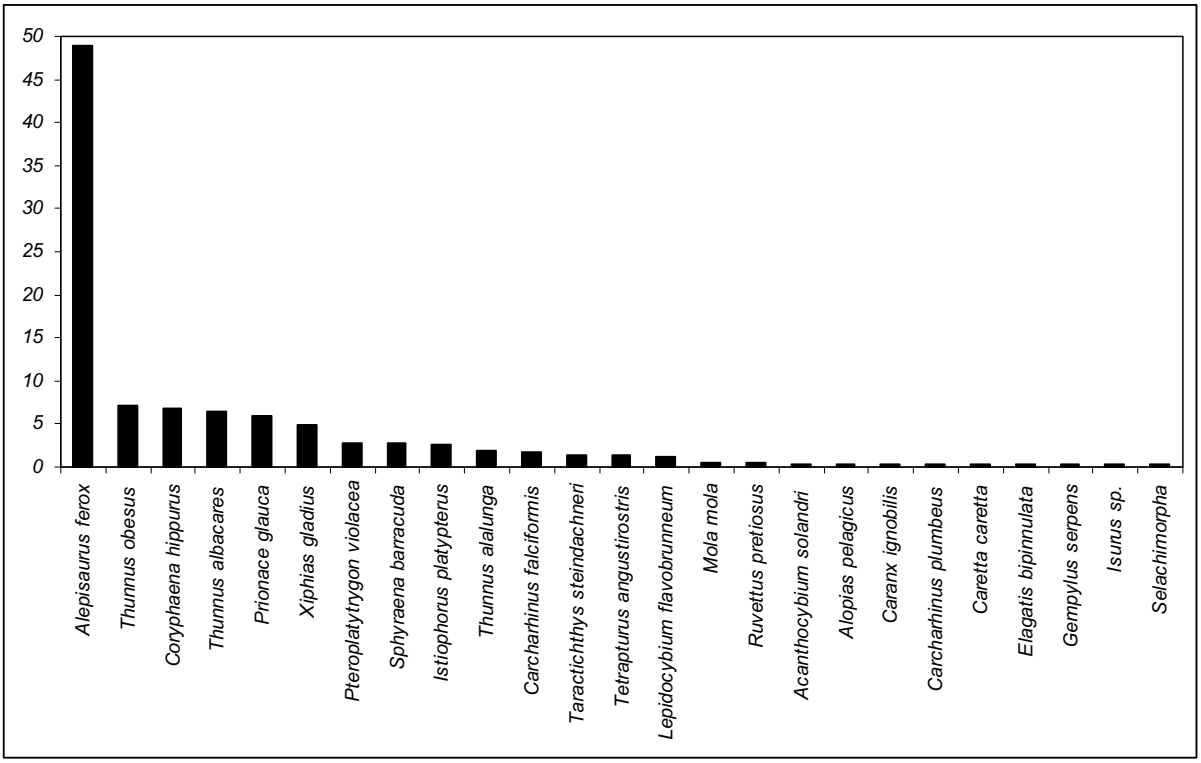

Figure 20 – Abundance (number in %) distribution of species caught during the SWIOFP cruise.

Table 4 - Number of marine species caught or escaped from longline during cruise of F/V 'Manohal' in December 2008

Latin name	Common name	Gear and date													
		Troll 01.12	LL1 03.12	LL2 04.12	LL3 05.12	LL4 06.12	LL5 07.12	LL6 08.12	LL7 09.12	LL8 10.12	Troll 11.12	LL9 12.12	LL10 14.12	Total	%
Acanthocybium solandri	Wahoo												1	1	**0.3**
Alepisaurus ferox	Longnose lancetfish		5	16	9	28	27	31	30	12		11	3	172	**48.6**
Alopias pelagicus	Pelagic thresher							1						1	**0.3**
Caranx ignobilis	Giant trevally						1							1	**0.3**
Carcharhinus falciformis	Silky shark			2								4		6	**1.7**
Carcharhinus plumbeus	Sandbar shark		1											1	**0.3**
Caretta caretta	Loggerhead turtle											1		1	**0.3**
Coryphaena hippurus	Common dolphinfish		2		11	5			1			4	1	24	**6.8**
Elagatis bipinnulata	Rainbow runner							1						1	**0.3**
Gempylus serpens	Snake mackerel												1	1	**0.3**
Istiophorus platypterus	Indo-Pacific sailfish				1	1	1	1	1	1		3		9	**2.5**
Isurus sp.	Mako shark			1										1	**0.3**
Lepidocybium flavobrunneum	Escolar											1	3	4	**1.1**
Mola mola	Ocean sunfish								2					2	**0.6**
Prionace glauca	Blue shark		3	2		2	5	2	2	2			3	21	**5.9**
Pteroplatytrygon violacea	Pelagic stingray			1			1	5		2		1		10	**2.8**
Ruvettus pretiosus	Oilfish												2	2	**0.6**
Selachimorpha	Various sharks nei						1							1	**0.3**
Sphyraena barracuda	Great barracuda			1	1		1	1	1		1	4	1	11	**3.1**
Taractichthys steindachneri	Sickle pomfret					4							1	5	**1.4**
Tetrapturus angustirostris	Shortbill spearfish			1								2	2	5	**1.4**
Thunnus alalunga	Albacore tuna											2	5	7	**2.0**
Thunnus albacares	Yellowfin tuna	2	5	1	3	2	2	1	2	1		5	1	25	**7.1**
Thunnus obesus	Bigeye tuna		2	1	1	5	2	2	4	1		3	4	25	**7.1**
Xiphias gladius	Swordfish		3	1	1	1				1		6	4	17	**4.8**
Total	25	2	21	27	27	48	41	45	43	20	1	47	32	354	

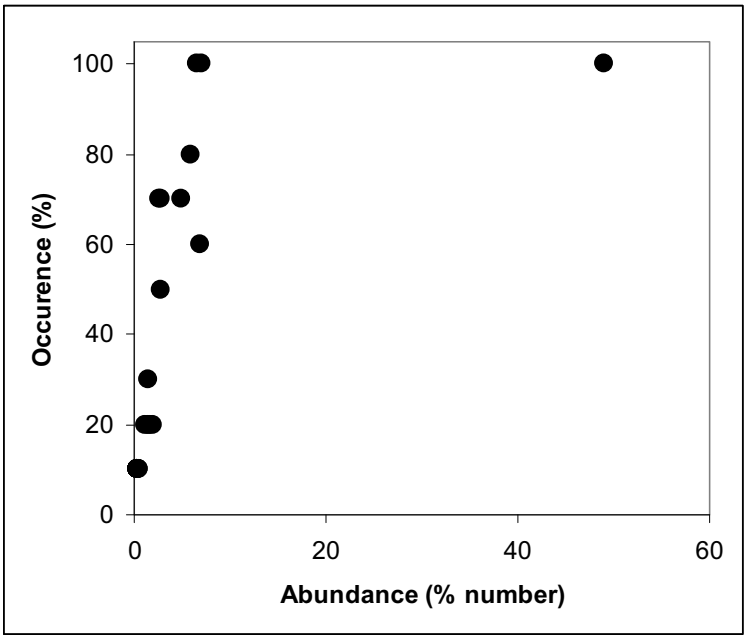

Figure 21 – Relationship between the occurrence of species during the longline fishing operations of the cruise and their respective abundance.

↳ Hook rate (hooking contact & hooking success)

Hook timer attached on the branchline allowed to estimate the level of encounter (contact) of the large pelagic predators with the fishing gear. For the 5720 hooks deployed, the number of hooking contact is 626 representing a hooking contact rate of 109 for 1000 hooks. Among these hooking contacts the relationship between the hooking contact rate and the hooking success rate shows that the average level of success is approximately 66% (Figure 22). For target species, yellowfin tuna, bigeye tuna and swordfish the capture per unit effort is 4, 4.4 and 3 individuals per 1000 hooks respectively. Finally, the catch rate of blue shark is approximately 4 individuals per 1000 hooks. This level of capture equivalent to those observed for target species justifies the improvement of the quality of fishery statistics for this species in particular but for all bycatch species in general to propose a better evaluation of the impact of longline fisheries on the large pelagic fish community.

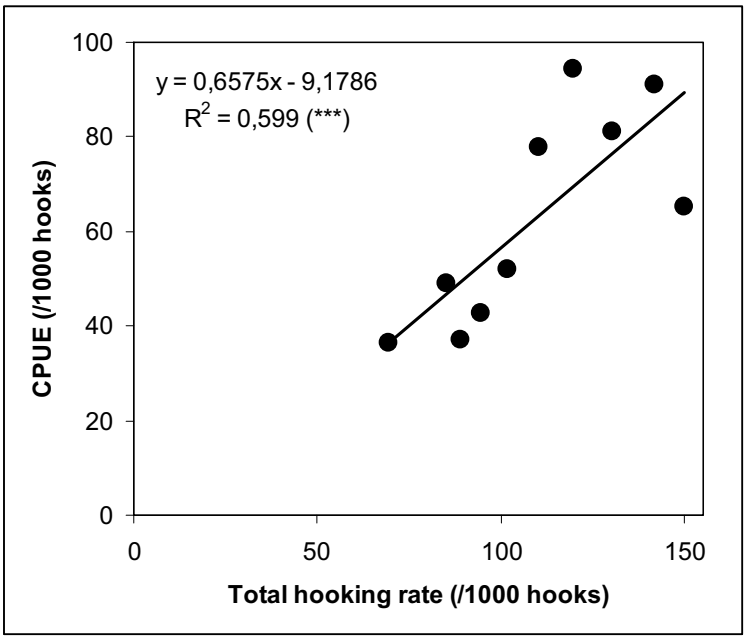

Figure 22 – Relationship between the hooking success and the global hooking observed for each fishing operation giving the level of fishing success compared to the encounter level between the resource and the fishing gear.

Depredation events

Depredation is a common term for removal or damage of the catch (bait) from fishing gear or cultured animals in stocking facilities due to interaction with predators, mainly marine mammals and elasmobranch. Depredation usually causes economic losses and non-reporting capture statistics (Romanov et al., 2008 [3]). Most affected by depredation fisheries worldwide are pelagic and bottom longlining.

During cruise of F/V "Manohal" depredation events were closely monitored: all cases of such interactions and predators responsible for damage (provisional identification based on damage pattern, see Romanov et al. (2008)) were carefully recorded.

Although 80% of operations (8 sets) were affected by depredation, overall impact of depredation on our operations was very low:

1. **No cetacean attacks** were recorded during the cruise (heaviest impact on catch usually attributes to cetacean depredation);
2. Depredation by **large pelagic sharks** (which also associated with relatively heavy damage of fish caught) were recorded in 50% of operations but target species (tuna and swordfish) were damaged in 2 operations only;

[3] - Romanov E, Gaertner D, Bach P, Romanova N, 2008. Depredation on pelagic longlines in the Indian Ocean: an analysis of the Soviet historical database (1961-1989) on tuna research. Proceedings of the international workshop on the depredation in the tuna longline fisheries in the Indian Ocean, Seychelles, 9-10 July 2007.

3. Damage intensity (number of fish damaged per operation) was low: 2.7 overall and 1.1 for shark damage;
4. Target depredation rate (% of target individuals damaged to target individuals caught) was 6.8% overall and 4.1% for sharks depredation;
5. Depredation on non-target species like lancetfish, which usually discarded by fishermen, increased overall depredation rate to 7.6% but not considered as matter of economic concern;
6. Highest shark depredation rate (8.5) were recorded in the set No 9, which is associated with longest soaking time (related with reparation of vessel main engine);
7. Five cases of cookiecutter shark depredation (two of them are on target species – swordfish) are not considered as important fisheries interaction since overall damage to catch is minor;
8. Depredation of lancetfish on conspecifics was recorded 10 times (6 operations) is considered as peculiar case of intraspecific interactions, which have no any economic impact to fisheries.
9. Overall depredation index (fish damaged per 10000 hooks) 4.7 overall and 0.5 for target species (shark depredated) was very low compare to respective hook rate (fish caught per 1000 hooks) 61.9 and 12.9 respectively.

4.3 Biological results

4.3.1 Biological sampling and observations.

Among 351 animals interacted with longline a total of 313 were taken onboard and analyzed (measured, weighed, sexed, etc.); majority of fish were sampled for hard parts, body tissues and stomach content. 3 troll-caught fish were analyzed also. Number of analyzed fish by gear, date and species are presented in the table 5.

A total of 209 stomachs (Table 6), 115 vertebrae, and 22 otoliths were sampled. For stable isotope analysis 196 samples of white muscles and 128 samples of liver were collected (Table 7). Moreover 89 white muscles and 87 liver samples were taken for analysis of lipids composition (Table 8). Sampling for contaminants analysis covered 16 white muscles samples and 11 liver samples. Genetic samples were taken from 32 fish individuals.

Table 5 - Number of fish analyzed during cruise of F/V 'Manohal' in December 2008

Latin name	Common name	Gear and date												Total	%
		Troll	LL1	LL2	LL3	LL4	LL5	LL6	LL7	LL8	Troll	LL9	LL10		
		01.12	03.12	04.12	05.12	06.12	07.12	08.12	09.12	10.12	11.12	12.12	14.12		
Acanthocybium solandri	Wahoo												1	1	**0.3**
Alepisaurus ferox	Longnose lancetfish		5	15	9	27	24	28	30	10		7	2	157	**49.7**
Alopias pelagicus	Pelagic thresher							1						1	**0.3**
Caranx ignobilis	Giant trevally						1							1	**0.3**
Carcharhinus falciformis	Silky shark			2								3		5	**1.6**
Carcharhinus plumbeus	Sandbar shark		1											1	**0.3**
Coryphaena hippurus	Common dolphinfish		2		11	4			1			4	1	23	**7.3**
Elagatis bipinnulata	Rainbow runner							1						1	**0.3**
Gempylus serpens	Snake mackerel												1	1	**0.3**
Istiophorus platypterus	Indo-Pacific sailfish				1	1	1	1	1	1		3		9	**2.8**
Lepidocybium flavobrunneum	Escolar											1	3	4	**1.3**
Prionace glauca	Blue shark		2			1	2	1	2	2			2	12	**3.8**
Pteroplatytrygon violacea	Pelagic stingray			1			1	5		2		1		10	**3.2**
Ruvettus pretiosus	Oilfish												1	1	**0.3**
Sphyraena barracuda	Great barracuda			1	1		1	1	1		1	4	1	11	**3.5**
Taractichthys steindachneri	Sickle pomfret					4							1	5	**1.6**
Tetrapturus angustirostris	Shortbill spearfish			1								2	2	5	**1.6**
Thunnus alalunga	Albacore tuna											2	5	7	**2.2**
Thunnus albacares	Yellowfin tuna	2	5	1	3	2	2	1	1	1		3	1	22	**7.0**
Thunnus obesus	Bigeye tuna		2	1	1	5	2	2	3	1		2	4	23	**7.3**
Xiphias gladius	Swordfish		3	1	1	1				1		6	3	16	**5.1**
Total		21	2	20	23	27	45	34	41	39	18	1	38	28	316	

Table 6 - Number of stomachs sampled during cruise of F/V 'Manohal' in December 2008

Group	Latin name	Common name	Gear and date												Total
			Troll	LL1	LL2	LL3	LL4	LL5	LL6	LL7	LL8	Troll	LL9	LL10	
			01.12	03.12	04.12	05.12	06.12	07.12	08.12	09.12	10.12	11.12	12.12	14.12	
Tuna	*Thunnus alalunga*	Albacore tuna											2	5	7
	Thunnus albacares	Yellowfin tuna	1	5	1	3	2	2	1	1	1		3	1	21
	Thunnus obesus	Bigeye tuna		2		1	2	1	1	3	1		2	4	17
Billfish	*Istiophorus platypterus*	Indo-Pacific sailfish				1	1	1	1	1	1		3		9
	Tetrapturus angustirostris	Shortbill spearfish			1								1	1	3
	Xiphias gladius	Swordfish		3	1		1				1		4	3	13
Sharks and rays	*Carcharhinus falciformis*	Silky shark			2										2
	Carcharhinus plumbeus	Sandbar shark		1											1
	Pteroplatytrygon violacea	Pelagic stingray							2						2
Teleosts bycatch	*Alepisaurus ferox*	Longnose lancetfish		4	15	8	25	14	11	18	4		3	1	103
	Acanthocybium solandri	Wahoo												1	1
	Coryphaena hippurus	Common dolphinfish		2		9	4			1			2	1	19
	Gempylus serpens	Snake mackerel												1	1
	Elagatis bipinnulata	Rainbow runner							1						1
	Sphyraena barracuda	Great barracuda				1			1	1			3	1	7
	Taractichthys steindachneri	Sickle pomfret			2									1	2
	Total		1	17	20	23	35	18	19	25	8	0	23	20	209

Table 7 - Number of samples for stable isotope analysis (white muscles/liver) collected during cruise of F/V 'Manohal' in December 2008

Group	Latin name	Common name	Gear and date												Total
			Troll	LL1	LL2	LL3	LL4	LL5	LL6	LL7	LL8	Troll	LL9	LL10	
			01.12	03.12	04.12	05.12	06.12	07.12	08.12	09.12	10.12	11.12	12.12	14.12	
Tuna	*Thunnus alalunga*	Albacore tuna											2/2	5/5	7/7
	Thunnus albacares	Yellowfin tuna	2/2	5/5	1/1	3/3	2/2	2/2	1/1	1/1	1/1		3/3	1/1	22/22
	Thunnus obesus	Bigeye tuna		2/2	1/1	1/1	5/5	2/2	2/2	3/3	1/1		2/2	4/4	23/23
Billfish	*Istiophorus platypterus*	Indo-Pacific sailfish				1/-	1/-	1/-	1/-	1/-	1/-		3/-		9/-
	Tetrapturus angustirostris	Shortbill spearfish			1/-								1/-	2/-	4/-
	Xiphias gladius	Swordfish		3/2	1/1	1/1	1/1				1/1		5/5	3/3	15/14
Sharks and rays	*Carcharhinus falciformis*	Silky shark			2/2								3/3		5/5
	Carcharhinus plumbeus	Sandbar shark		1/1											1/1
	Prionace glauca	Blue shark		2/2			1/1	2/2	1/1	2/2	2/2			2/2	12/12
	Pteroplatytrygon violacea	Pelagic stingray	1/-		1/-			1/-	5/-		2/-		1/-		10/-
Teleosts bycatch	*Alepisaurus ferox*	Longnose lancetfish		5/5	15/13	9/9	17/17								46/43
	Coryphaena hippurus	Common dolphinfish		2/1		11	4			1			4	1	23/1
	Gempylus serpens	Snake mackerel												1/-	1/-
	Lepidocybium flavobrunneum	Escolar											1/-	3/-	4/-
	Ruvettus pretiosus	Oilfish												1/-	1/-
	Sphyraena barracuda	Great barracuda			1/-	1/-		1/-	1/-	1/-		1/-	1/-	1/-	8/-
	Taractichthys steindachneri	Sickle pomfret					4/-							1/-	5/-
	Total		2/2	20/18	23/18	27/13	35/26	9/6	11/4	9/6	8/5	1/-	26/15	25/15	196/128

Table 8 - Number of samples for lipids analysis (white muscles/liver) collected during cruise of F/V 'Manohal' in December 2008

Group	Latin name	Common name	Gear and date												Total
			Troll	LL1	LL2	LL3	LL4	LL5	LL6	LL7	LL8	Troll	LL9	LL10	
			01.12	03.12	04.12	05.12	06.12	07.12	08.12	09.12	10.12	11.12	12.12	14.12	
Tuna	*Thunnus albacares*	Yellowfin tuna	2/2	5/5	1/1	3/3	2/2	2/2	1/1	1/1	1/1		3/3	1/1	22/22
	Thunnus obesus	Bigeye tuna		2/2	1/1	1/1	5/5	2/2	2/2	3/3	1/1		2/2	4/4	23/23
	Thunnus alalunga	Albacore tuna											2/2	5/5	7/7
Billfish	*Xiphias gladius*	Swordfish		3/2	1/1	1/1	1/1				1/1		5/5	3/3	15/14
Sharks and rays	*Carcharhinus falciformis*	Silky shark											3/3		3/3
	Carcharhinus plumbeus	Sandbar shark		1/1											1/1
	Prionace glauca	Blue shark		2/2			1/1	2/2	1/1	2/2	2/2			1/1	11/11
Teleosts bycatch	*Alepisaurus ferox*	Longnose lancetfish		5/5											5/5
	Coryphaena hippurus	Common dolphinfish		2/1											2/1
	Total		2/2	20/18	3/3	5/5	9/9	6/6	4/4	6/6	5/5	0	15/15	14	89/87

4.3.2 Short biological characteristics for principal species

Longnose lancetfish, *Alepisaurus ferox* was the most abundant species in the catch. Size composition is presented at the Fig 23. Medum-sized fish (FL 70-120 cm) and large fish (FL> 130 cm) dominated in the catch. Most of fish (83%) has prey in the stomachs. Average stomach fullness was 1.7. Natural cannibalism was rarely observed during the cruise (few cases) however depredation by lancetfish on conspecifics caught on longline was common. Stomach content was typical for lancetfish with dominance of Sternoptychidae family, *Omosudis lowei*, two species of hiperiid crustaceans and cephalopods (including Argonauts, pelagic octopuses *Amphitretus pelagicus* and small squids)

Yellowfin tuna, *T. albacares* was represented in the catch by two groups: small (FL 50-90 cm) and medium-large fish (FL 120-170 cm) Fig. 23. Sex ratio was 2:1 with dominance of males. Only one fish has empty stomach, average stomach fullness was 2.1.

Bigeye tuna, *T. obesus*. Most of bigeye tuna caught was medium-sized fish (FL 90-130 cm) (Fig. 23). Sex ratio was balanced 1:1.2, females prevails. Average stomach fullness was 1.9 while stomach content of four fish (18% of fish analyzed) was not sampled due to regurgitation.

Dolphinfish, *C. hippurus*, was one of the important fish in the longline catch. Most of dolphinfish individuals were caught at the surface during longline hauling. Only medium-sized fish were recorded (FL 88-114 cm), female predominates 1:1.9, all females were mature at pre- or post-spawning conditions. Average stomach fullness was 1.5.

Swordfish, *X. gladius*. Size composition of swordfish is presented below. Sex ratio was 1:1.3, female prevails. Most of fish were in the reproductively resting conditions (except three males caught during first LL sets: 3 males at advanced maturity stage). Stomach of swordfish was high level of replenishment with mean fullness 2.1.

It was number of interesting biological observations during the cruise, which may have further development during laboratory analysis of the data:

- Stomach content of fish bring several individuals of relatively rare species: two juvenile individuals of slender sunfish *Ranzania laevis* were recovered from the stomachs of dolphinfish and lancetfish. Tapertale ribbonfish (dealfish) *Trachipterus* sp., was found in the stomach of the lancetfish.
- Two females of sailfish and one female of shortbill spearfish have very high level of gonad maturity – ripe spawners, with gonadosomatic index (GW/TW*100%) 6.8 and 10.3 for sailfish and 8.7 for shortbill spearfish. Fishes at such physiological state are rarely recorded in the field. These records are indicators that Mozambique Channel is spawning area for these species. It should be noted however that all analyzed males of both species was at the low level of gonad maturation.
- 6 of 7 caught individuals of albacore were post spawners just finished spawning activity or close to this stage.

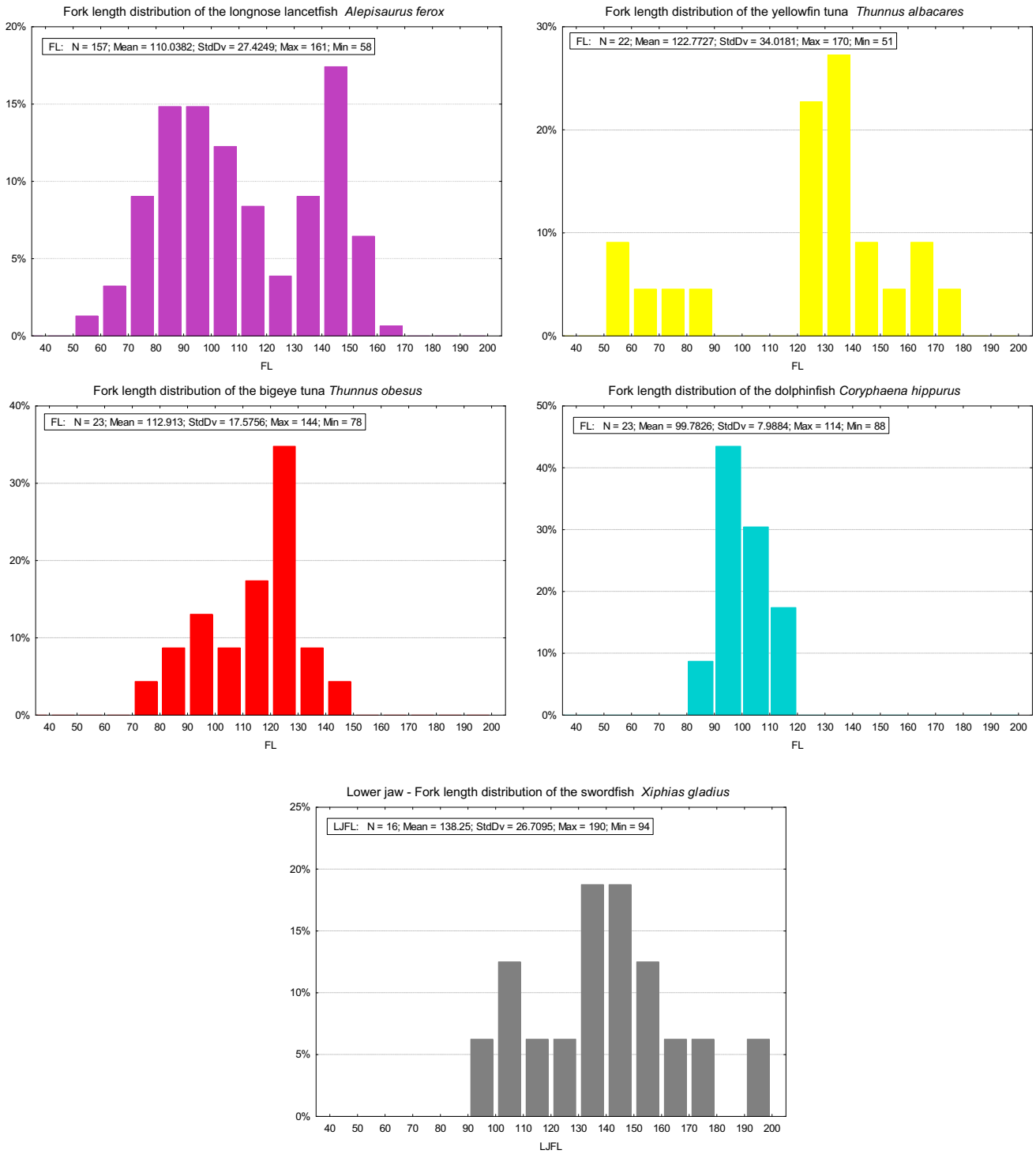

Figure 23 – Length distribution of individuals of dominant species in number sampled during the instrumented longline fishing operations (up: longlnose lancetfish on the left and yellowfin tuna on the right; medium: bigeye tuna on the left and doflphin fish on the right; bottom: swordfish).

5 Conclusions

General recommendations

The joint cruise ASCLME/SWIOFP was successful in terms of quality of data collected and integration between physical and biological components. However, conducting such a cruise with two vessels cruising at different speeds is challenging. The R/V Manohal spent 69% of its time at sea steaming to reach the appropriate areas (eddies sampled by the F. Nansen). Because the cruise departed from Reunion, it took 3.5 days to reach the Mozambique Channel and 5 days to return. It became impossible to have the two vessels operating at the same location the same day. However, the F/V Manohal could deployed sets in same areas before or after survey operations by the R/V.

Time spent fishing represented 28% of the cruise. This put limitations on overall performance of fish survey operation in terms of sampling effort and selection of the fishing ground. Because of this situation we propose two types of research strategy in order to increase the number of fishing operations up to ~ 15 – 17 and simultaneously to obtain more time to optimize fishing strategy and LL setting positions :

1- fishing vessel should be in the port close to the research operation area. It means that the fishing vessel should ship from the home port to the operation port before the start of research operations. In that case, the scientific crew will join the operation port by plane.

2- The scientific crew embarks in the fishing vessel home port. In this case, if the operation area is far from this port it is necessary to increase duration of research operations up to ~ 30 days

Instead of three people as in this cruise the scientific crew should be composed of 4 persons (2 senior scientists and 2 junior scientists or trainees).

To improve sampling performance of fish caught, fishes should be the property of the scientific team. At the end of the cruise depending on the condition of fish, capture could be sale back to the vessel crew and then reduce the price of the charter. This gives more freedom to scientist to use any gear configuration for testing and to select any fishing grounds.

Even if an Internet connexion is not an obligation to communicate between boats, experience have shown that this equipment was recommended for being able to communicate about the encounter of several “surprises” on field.

Recommendations on oceanographic survey

It should be noted however that performing of 1 to 2 oceanographic stations in relation with single longline operation is not enough for target longlining and for precise studies of the pelagic fish habitats. It was shown earlier that higher aggregations of top predators are related with high horizontal gradients of oceanographic characteristics (temperature and salinity) in the environment. Combining with relatively short length of research longlines (~ 20 nautical miles) the precision in the setting of longline gear in horizontal dimension is very important to obtain higher catches and to collect better data on fish environmental preferences. Satellite altimetry data give only approximate information on position of oceanic frontal zones, which may significantly differ from the real front position in fine-scale resolution. For location of the horizontal environmental gradients in the scale 20-30 miles it is necessary to perform several, approx. 4-10 vertical profiles before setting of longline. It is important also to make temperature profiling at the all 4 points of single longline operation: start and finish of setting and start and finish of hauling. Such approach allows to obtain information on variability of environmental conditions during longline soaking time and allows to take into account longline gear drift. It seems impossible to achieve such number of the station using CTD equipment only. It would be highly important to equip each IRD longline research expedition with XBT equipment to achieve higher precision in the longline operations and environmental studies of pelagic fish habitat.

Recommendations on fishing operations

Fishing equipment and vessel machinery (drum, line shooter, buoys, etc.) should have an enough spare parts for the entire cruise.

Recommendation on biological sample

There is a particular importance to consider method to keep samples in optimal conditions (nitrogen solution, frozen, dried). In particular, we have to stress the importance of the safety of handling with the liquid nitrogen container. Because of that, a special vehicle to transport this kind of dangerous material must be used.

Biological sampling strategy should be clearly defined long time before the cruise and balanced: some sampling operations (e.g. contaminant sampling are highly time consuming and difficult to implement on big fish on small fishing vessels)

Problem to transfer biological sample from one partner country to another one should be addressed also.

ANNEX 1

Parameters of the fishing strategy selected for each set

Basket N°	Rank of the basket during the setting
HPB	Number of hooks per basket
TDR	Temperature depth recorder
ID TDR	TDR Identifier
TbH (s)	Time between hooks
Duration (s)	Cumaltive time of the basket setting
Boat speed (kts)	Speed of the boat during the setting (knts)
Shooter Speed (m/min)	Speed of the line shooter to set the mainline (m/min)
DBF	Linear distance between floats
LLBF	Length of the mainline between floats
SR(%)	Sag ratio = DBF/LLBF
Bait	Type of bait S = squid - M = mackerel

Longline Set n° 1 – 03/12/2008

Basket N°	HPB	TDR	ID TDR	TbH (s)	Duration (s)	Boat speed (kts)	Shooter Speed (m/min)	DBF	LLBF	SR(%)	Bait
1	18	1	NKE 1	14	266	6	265	821	1175	69.9	S
2	18	2	NKE 2	14	532	6	275	821	1219	67.4	S
3	18	3	NKE 3	14	798	6	260	821	1153	71.2	S
4	18	4	NKE 4	14	1064	6	248	821	1099	74.7	S
5	18	5	NKE 5	14	1330	6	273	821	1210	67.9	S
6	18	6	NKE 6	14	1596	6	263	821	1166	70.4	S
7	18	7	NKE 7	14	1862	6	254	821	1126	72.9	S
8	18	8	NKE 8	14	2128	6	235	821	1042	78.8	S
9	18	9	NKE 9	14	2394	6	235	821	1042	78.8	S
10	18	10	NKE 10	14	2660	6	235	821	1042	78.8	S
11	18			14	2926	6	235	821	1042	78.8	S
12	18			14	3192	6	235	821	1042	78.8	S
13	18			14	3458	6	235	821	1042	78.8	S
14	18			14	3724	6	259	821	1148	71.5	S
15	18	11	NKE 11	14	3990	6	270	821	1197	68.6	S
16	18	12	NKE 12	14	4256	6	270	821	1197	68.6	S
17	24	13	NKE 13	14	4606	6	270	1080	1575	68.6	S
18	24	14	NKE 14	14	4956	6	269	1080	1569	68.8	S
19	24	15	NKE 15	14	5306	6	268	1080	1563	69.1	S
20	24	16	NKE 16	14	5656	6	268	1080	1563	69.1	S
21	24	17	NKE 17	14	6006	6	270	1080	1575	68.6	S
22	27	18	NKE 18	14	6398	6	270	1210	1764	68.6	S
23	21	19	NKE 19	14	6706	6	267	951	1371	69.4	S
24	24	20	NKE 20	14	7056	6	266	1080	1552	69.6	S
25	24	21	NKE 21	14	7406	6	271	1080	1581	68.3	S
26	24	22	NKE 22	14	7756	6	270	1080	1575	68.6	S
27	24	23	NKE 23	14	8106	6	268	1080	1563	69.1	S
28	24	1	Star Oddi 1	14	8456	6	269	1080	1569	68.8	S
HOOK	**576**			**Hour**	**2**		**Total (km)**	**26.1**	**36.8**		
BASKET	**28**			**Minute**	**21**						

Longline Set n° 2 – 04/12/2008

Basket N°	HPB	TDR	ID TDR	TbH (s)	Duration (s)	Boat speed (kts)	Shooter Speed (m/min)	DBF	LLBF	SR(%)	Bait
1	18	1	NKE 1	14	266	6.15	267	842	1184	71.1	S
2	18	2	NKE 2	14	532	6.15	271	842	1201	70.1	S
3	18	3	NKE 3	14	798	6.15	271	842	1201	70.1	S
4	18	4	NKE 4	14	1064	6.15	271	842	1201	70.1	S
5	18	5	NKE 5	14	1330	6.15	276	842	1224	68.8	S
6	18	6	NKE 6	14	1596	6.15	284	842	1259	66.9	S
7	18	7	NKE 7	14	1862	6.15	279	842	1237	68.1	S
8	18	8	NKE 8	14	2128	6.15	265	842	1175	71.7	S
9	18	9	NKE 9	14	2394	6.15	264	842	1170	72	S
10	18	10	NKE 10	14	2660	6.15	263	842	1166	72.2	S
11	18	11	NKE 11	14	2926	6.15	263	842	1166	72.2	S
12	18	12	NKE 12	14	3192	6.15	263	842	1166	72.2	S
13	18	13	NKE 13	14	3458	6.15	264	842	1170	72	S
14	18	14	NKE 14	14	3724	6.15	265	842	1175	71.7	S
15	18	15	NKE 15	14	3990	6.15	266	842	1179	71.4	S
16	18	16	NKE 16	14	4256	6.15	267	842	1184	71.1	S
17	24	17	NKE 17	14	4606	6.15	266	1107	1552	71.3	S
18	24	18	NKE 18	14	4956	6.15	266	1107	1552	71.3	S
19	24	19	NKE 19	14	5306	6.15	267	1107	1558	71.1	S
20	24	20	NKE 20	14	5656	6.15	266	1107	1552	71.3	S
21	24	21	NKE 21	14	6006	6.15	266	1107	1552	71.3	S
22	24	22	NKE 22	14	6356	6.15	267	1107	1558	71.1	S
23	24	23	NKE 23	14	6706	6.15	267	1107	1558	71.1	S
24	24	1	Star Oddi1	14	7056	6.15	266	1107	1552	71.3	S
25	24	2	Star Oddi2	14	7406	6.15	265	1107	1546	71.6	S
26	24	3	Star Oddi3	14	7756	6.15	267	1107	1558	71.1	S
27	24	4	Star Oddi4	14	8106	6.15	267	1107	1558	71.1	S
HOOK	**552**			**Hour**	**2**		**Total (km)**	**25.6**	**36.2**		
BASKET	**27**			**Minute**	**15**						

Longline Set n° 3 – 05/12/2008

Basket N°	HPB	TDR	ID TDR	TbH (s)	Duration (s)	Boat speed (kts)	Shooter Speed (m/min)	DBF	LLBF	SR(%)	Bait
1	20	1	NKE 1	14	294	6.15	225	930	1103	84.3	S
2	20	2	NKE 2	14	588	6.15	232	930	1137	81.8	S
3	20	3	NKE 3	14	882	6.15	232	930	1137	81.8	S
4	20	4	NKE 4	14	1176	6.15	240	930	1176	79.1	S
5	20	5	NKE 5	14	1470	6.15	243	930	1191	78.1	S
6	20	6	NKE 6	14	1764	6.15	242	930	1186	78.4	S
7	20	7	NKE 7	14	2058	6.15	242	930	1186	78.4	S
8	20	8	NKE 8	14	2352	6.15	234	930	1147	81.1	S
9	20	9	NKE 9	14	2646	6.15	237	930	1161	80.1	S
10	20	10	NKE 10	14	2940	6.15	239	930	1171	79.4	S
11	20	11	NKE 11	14	3234	6.15	235	930	1152	80.7	S
12	20	12	NKE 12	14	3528	6.15	235	930	1152	80.7	S
13	20	13	NKE 13	14	3822	6.15	235	930	1152	80.7	S
14	20	14	NKE 14	14	4116	6.15	198	930	970	95.9	S
15	20	15	NKE 15	14	4410	6.15	208	930	1019	91.3	S
16	20	16	NKE 16	14	4704	6.15	205	930	1005	92.5	S
17	20	17	NKE 17	14	4998	6.15	205	930	1005	92.5	S
18	20	18	NKE 18	14	5292	6.15	203	930	995	93.5	S
19	20	19	NKE 19	14	5586	6.15	203	930	995	93.5	S
20	20	20	NKE 20	14	5880	6.15	204	930	1000	93	S
21	20	21	NKE 21	14	6174	6.15	204	930	1000	93	S
22	20	22	NKE 22	14	6468	6.15	204	930	1000	93	S
23	20	23	NKE 23	14	6762	6.15	204	930	1000	93	S
24	20	1	Star Oddi1	14	7056	6.15	204	930	1000	93	S
25	20	2	Star Oddi2	14	7350	6.15	204	930	1000	93	S
26	20	3	Star Oddi3	14	7644	6.15	204	930	1000	93	S
HOOK	**520**			**Hour**	**2**		**Total (km)**	**24.2**	**28**		
BASKET	**26**			**Minute**	**7**						

Longline Set n° 4 – 06/12/2008

Basket N°	HPB	TDR	ID TDR	TbH (s)	Duration (s)	Boat speed (kts)	Shooter Speed (m/min)	DBF	LLBF	SR(%)	Bait
1	22	1	NKE 1	14	322	6.5	264	1077	1417	76	S
2	22	2	NKE 2	14	644	6.5	264	1077	1417	76	S
3	22	3	NKE 3	14	966	6.5	265	1077	1422	75.7	S
4	22	4	NKE 4	14	1288	6.5	265	1077	1422	75.7	S
5	22	5	NKE 5	14	1610	6.5	265	1077	1422	75.7	S
6	22	6	NKE 6	14	1932	6.5	266	1077	1428	75.4	S
7	22	7	NKE 7	14	2254	6.5	267	1077	1433	75.2	S
8	22	8	NKE 8	14	2576	6.5	266	1077	1428	75.4	S
9	22	9	NKE 9	14	2898	6.5	265	1077	1422	75.7	S
10	22	10	NKE 10	14	3220	6.5	265	1077	1422	75.7	S
11	22	11	NKE 11	14	3542	6.5	265	1077	1422	75.7	S
12	22	12	NKE 12	14	3864	6.5	265	1077	1422	75.7	S
13	22	13	NKE 13	14	4186	6.5	266	1077	1428	75.4	S
14	22	14	NKE 14	14	4508	6.5	267	1077	1433	75.2	S
15	22	15	NKE 15	14	4830	6.5	266	1077	1428	75.4	S
16	22	16	NKE 16	14	5152	6.5	265	1077	1422	75.7	S
17	22	17	NKE 17	14	5474	6.5	267	1077	1433	75.2	S
18	22	18	NKE 18	14	5796	6.5	267	1077	1433	75.2	S
19	22	19	NKE 19	14	6118	6.5	265	1077	1422	75.7	S
20	22	20	NKE 20	14	6440	6.5	267	1077	1433	75.2	S
21	22	21	NKE 21	14	6762	6.5	268	1077	1438	74.9	S
22	22	22	NKE 22	14	7084	6.5	265	1077	1422	75.7	S
23	22	23	NKE 23	14	7406	6.5	267	1077	1433	75.2	S
24	22	1	Star Oddi1	14	7728	6.5	267	1077	1433	75.2	S
HOOK	**528**			**Hour**	**2**		**Total (km)**	**25.8**	**34.2**		
BASKET	**24**			**Minute**	**9**						

Longline Set n° 5 – 07/12/2008

Basket N°	HPB	TDR	ID TDR	TbH (s)	Duration (s)	Boat speed (kts)	Shooter Speed (m/min)	DBF	LLBF	SR(%)	Bait
1	22	1	NKE 1	14	322	6.6	273	1093	1465	74.6	S
2	22	2	NKE 2	14	644	6.6	273	1093	1465	74.6	S
3	22	3	NKE 3	14	966	6.6	268	1093	1438	76	S
4	22	4	NKE 4	14	1288	6.6	270	1093	1449	75.4	S
5	22	5	NKE 5	14	1610	6.6	271	1093	1454	75.2	S
6	22	6	NKE 6	14	1932	6.6	272	1093	1460	74.9	S
7	22	7	NKE 7	14	2254	6.6	273	1093	1465	74.6	S
8	22	8	NKE 8	14	2576	6.6	273	1093	1465	74.6	S
9	22	9	NKE 9	14	2898	6.6	273	1093	1465	74.6	S
10	22	10	NKE 10	14	3220	6.6	268	1093	1438	76	S
11	22	11	NKE 11	14	3542	6.6	265	1093	1422	76.9	S
12	22	12	NKE 12	14	3864	6.6	265	1093	1422	76.9	S
13	22	13	NKE 13	14	4186	6.6	262	1093	1406	77.7	S
14	22	14	NKE 14	14	4508	6.6	260	1093	1395	78.4	S
15	22	15	NKE 15	14	4830	6.6	259	1093	1390	78.6	S
16	22	16	NKE 16	14	5152	6.6	256	1093	1374	79.5	S
17	22	17	NKE 17	14	5474	6.6	253	1093	1358	80.5	S
18	22	18	NKE 18	14	5796	6.6	263	1093	1411	77.5	S
19	22	19	NKE 19	14	6118	6.6	273	1093	1465	74.6	S
20	22	20	NKE 20	14	6440	6.6	271	1093	1454	75.2	S
21	22	21	NKE 21	14	6762	6.6	270	1093	1449	75.4	S
22	22	22	NKE 22	14	7084	6.6	270	1093	1449	75.4	S
23	22	23	NKE 23	14	7406	6.6	270	1093	1449	75.4	S
HOOK	**506**			**Hour**	**2**		**Total (km)**	**25.1**	**33**		
BASKET	**23**			**Minute**	**3**						

Longline Set n° 6 – 08/12/2008

Basket N°	HPB	TDR	ID TDR	TbH (s)	Duration (s)	Boat speed (kts)	Shooter Speed (m/min)	DBF	LLBF	SR(%)	Bait
1	20	1	NKE 1	14	294	6.3	254	953	1245	76.5	S
2	20	2	NKE 2	14	588	6.3	260	953	1274	74.8	S
3	20	3	NKE 3	14	882	6.3	264	953	1294	73.6	S
4	20	4	NKE 4	14	1176	6.3	262	953	1284	74.2	M
5	20	5	NKE 5	14	1470	6.3	260	953	1274	74.8	M
6	20	6	NKE 6	14	1764	6.3	263	953	1289	73.9	M
7	20	7	NKE 7	14	2058	6.3	266	953	1303	73.1	S
8	20	8	NKE 8	14	2352	6.3	265	953	1299	73.4	S
9	20	9	NKE 9	14	2646	6.3	263	953	1289	73.9	S
10	20	10	NKE 10	14	2940	6.3	267	953	1308	72.9	M
11	20	11	NKE 11	14	3234	6.3	267	953	1308	72.9	M
12	20	12	NKE 12	14	3528	6.3	267	953	1308	72.9	M
13	20	13	NKE 13	14	3822	6.3	262	953	1284	74.2	S
14	20	14	NKE 14	14	4116	6.3	256	953	1254	76	S
15	16	15A		14	4354	6.3	256	771	1015	76	S
16	20	15B	NKE 15	14	4648	6.3	255	953	1250	76.2	S
17	20	16	NKE 16	14	4648	6.3	255	953	1250	76.2	M
17	20	17	NKE 17	14	4942	6.3	255	953	1250	76.2	M
18	20	18	NKE 18	14	5236	6.3	255	953	1250	76.2	M
19	20	19	NKE 19	14	5530	6.3	258	953	1264	75.4	S
20	20	20	NKE 20	14	5824	6.3	260	953	1274	74.8	S
21	20	21	NKE 21	14	6118	6.3	263	953	1289	73.9	S
22	20	22	NKE 22	14	6412	6.3	268	953	1313	72.6	M
23	20	23	NKE 23	14	6706	6.3	266	953	1303	73.1	M
HOOK	**476**			**Hour**	**1**		**Total (km)**	**22.7**	**30.5**		
BASKET	**24**			**Minute**	**52**						

Longline Set n° 7 – 09/12/2008

Basket N°	HPB	TDR	ID TDR	TbH (s)	Duration (s)	Boat speed (kts)	Shooter Speed (m/min)	DBF	LLBF	SR(%)	Bait
1	20	1	NKE 1	12	252	6.3	250	817	1050	77.8	S
2	20	2	NKE 2	12	504	6.3	250	817	1050	77.8	S
3	20	3	NKE 3	12	756	6.3	250	817	1050	77.8	S
4	20	4	NKE 4	12	1008	6.3	250	817	1050	77.8	S
5	20	5	NKE 5	12	1260	6.3	250	817	1050	77.8	S
6	20	6	NKE 6	12	1512	6.3	250	817	1050	77.8	S
7	20	7	NKE 7	12	1764	6.3	250	817	1050	77.8	S
8	20	8	NKE 8	12	2016	6.3	250	817	1050	77.8	S
9	20	9	NKE 9	12	2268	6.3	250	817	1050	77.8	S
10	20	10	NKE 10	12	2520	6.3	250	817	1050	77.8	S
11	20	11	NKE 11	12	2772	6.3	250	817	1050	77.8	S
12	20	12	NKE 12	12	3024	6.3	250	817	1050	77.8	S
13	20	13	NKE 13	12	3276	6.3	250	817	1050	77.8	S
14	20	14	NKE 14	12	3528	6.3	250	817	1050	77.8	S
15	20	15	NKE 15	12	3780	6.3	250	817	1050	77.8	S
16	20	16	NKE 16	12	4032	6.3	250	817	1050	77.8	S
17	20	17	NKE 17	12	4284	6.3	250	817	1050	77.8	S
18	20	18	NKE 18	12	4536	6.3	250	817	1050	77.8	S
19	20	19	NKE 19	12	4788	6.3	250	817	1050	77.8	S
20	20	20	NKE 20	12	5040	6.3	250	817	1050	77.8	S
21	20	21	NKE 21	12	5292	6.3	250	817	1050	77.8	S
22	20	22	NKE 22	12	5544	6.3	250	817	1050	77.8	S
23	20	23	NKE 23	12	5796	6.3	250	817	1050	77.8	S
24	20	23	STO1	12	6048	6.3	250	817	1050	77.8	S
25	20	23	STO2	12	6300	6.3	250	817	1050	77.8	S
26	20	23	STO3	12	6552	6.3	250	817	1050	77.8	S
27	20	23	STO4	12	6804	6.3	250	817	1050	77.8	S
HOOK	**540**			**Hour**	**1**		**Total (km)**	**19.6**	**25.2**		
BASKET	**27**			**Minute**	**53**						

Longline Set n° 8 – 10/12/2008

Basket N°	HPB	TDR	ID TDR	TbH (s)	Duration (s)	Boat speed (kts)	Shooter Speed (m/min)	DBF	LLBF	SR(%)	Bait
1	20	1	NKE 1	12	252	6.3	250	817	1050	77.8	S
2	20	2	NKE 2	12	504	6.3	250	817	1050	77.8	S
3	20	3	NKE 3	12	756	6.3	250	817	1050	77.8	S
4	20	4	NKE 4	12	1008	6.3	250	817	1050	77.8	S
5	20	5	NKE 5	12	1260	6.3	250	817	1050	77.8	S
6	20	6	NKE 6	12	1512	6.3	250	817	1050	77.8	S
7	20	7	NKE 7	12	1764	6.3	250	817	1050	77.8	S
8	20	8	NKE 8	12	2016	6.3	250	817	1050	77.8	S
9	20	9	NKE 9	12	2268	6.3	250	817	1050	77.8	S
10	20	10	NKE 10	12	2520	6.3	250	817	1050	77.8	S
11	20	11	NKE 11	12	2772	6.3	250	817	1050	77.8	S
12	20	12	NKE 12	12	3024	6.3	250	817	1050	77.8	S
13	20	13	NKE 13	12	3276	6.3	250	817	1050	77.8	S
14	20	14	NKE 14	12	3528	6.3	250	817	1050	77.8	S
15	20	15	NKE 15	12	3780	6.3	250	817	1050	77.8	S
16	20	16	NKE 16	12	4032	6.3	250	817	1050	77.8	S
17	20	17	NKE 17	12	4284	6.3	250	817	1050	77.8	S
18	20	18	NKE 18	12	4536	6.3	250	817	1050	77.8	S
19	20	19	NKE 19	12	4788	6.3	250	817	1050	77.8	S
20	20	20	NKE 20	12	5040	6.3	250	817	1050	77.8	S
21	20	21	NKE 21	12	5292	6.3	250	817	1050	77.8	S
22	20	22	NKE 22	12	5544	6.3	250	817	1050	77.8	S
23	20	23	NKE 23	12	5796	6.3	250	817	1050	77.8	S
24	20	23	STO1	12	6048	6.3	250	817	1050	77.8	S
25	20	23	STO2	12	6300	6.3	250	817	1050	77.8	S
26	20	23	STO3	12	6552	6.3	250	817	1050	77.8	S
27	20	23	STO4	12	6804	6.3	250	817	1050	77.8	S
HOOK	**540**			**Hour**	**1**		**Total (km)**	**19.6**	**25.2**		
BASKET	**27**			**Minute**	**53**						

Longline Set n° 9 – 11/12/2008

Basket N°	HPB	TDR	ID TDR	TbH (s)	Duration (s)	Boat speed (kts)	Shooter Speed (m/min)	DBF	LLBF	SR(%)	Bait
1	6			9	63	8.5	264	275	277	99.3	S/M
2	6			9	126	8.5	264	275	277	99.3	S/M
3	6			9	189	8.5	264	275	277	99.3	S/M
4	6			9	252	8.5	264	275	277	99.3	S/M
5	6			9	315	8.5	264	275	277	99.3	S/M
6	6			9	378	8.5	264	275	277	99.3	S/M
7	6	1	NKE1	9	441	8.5	264	275	277	99.3	S/M
8	6			9	504	8.5	264	275	277	99.3	S/M
9	6			9	567	8.5	264	275	277	99.3	S/M
10	6			9	630	8.5	264	275	277	99.3	S/M
11	6			9	693	8.5	264	275	277	99.3	S/M
12	6			9	756	8.5	264	275	277	99.3	S/M
13	6			9	819	8.5	264	275	277	99.3	S/M
14	6			9	882	8.5	264	275	277	99.3	S/M
15	6			9	945	8.5	264	275	277	99.3	S/M
16	6			9	1008	8.5	264	275	277	99.3	S/M
17	6	2	NKE2	9	1071	8.5	264	275	277	99.3	S/M
18	6			9	1134	8.5	264	275	277	99.3	S/M
19	6			9	1197	8.5	264	275	277	99.3	S/M
20	6			9	1260	8.5	264	275	277	99.3	S/M
21	6			9	1323	8.5	264	275	277	99.3	S/M
22	6			9	1386	8.5	264	275	277	99.3	S/M
23	6			9	1449	8.5	264	275	277	99.3	S/M
24	6			9	1512	8.5	264	275	277	99.3	S/M
25	6			9	1575	8.5	264	275	277	99.3	S/M
26	6			9	1638	8.5	264	275	277	99.3	S/M
27	6	3	NKE3	9	1701	8.5	264	275	277	99.3	S/M
28	6			9	1764	8.5	264	275	277	99.3	S/M
29	6			9	1827	8.5	264	275	277	99.3	S/M
30	6			9	1890	8.5	264	275	277	99.3	S/M
31	6			9	1953	8.5	264	275	277	99.3	S/M
32	6			9	2016	8.5	264	275	277	99.3	S/M
33	6			9	2079	8.5	264	275	277	99.3	S/M
34	6			9	2142	8.5	264	275	277	99.3	S/M
35	6			9	2205	8.5	264	275	277	99.3	S/M
36	6			9	2268	8.5	264	275	277	99.3	S/M
37	6	4	NKE4	9	2331	8.5	264	275	277	99.3	S/M
38	6			9	2394	8.5	264	275	277	99.3	S/M
39	6			9	2457	8.5	264	275	277	99.3	S/M
40	6			9	2520	8.5	264	275	277	99.3	S/M
41	6			9	2583	8.5	264	275	277	99.3	S/M
42	6			9	2646	8.5	264	275	277	99.3	S/M
43	6			9	2709	8.5	264	275	277	99.3	S/M
44	6			9	2772	8.5	264	275	277	99.3	S/M
45	6			9	2835	8.5	264	275	277	99.3	S/M
46	6			9	2898	8.5	264	275	277	99.3	S/M
47	6	5	NKE5	9	2961	8.5	264	275	277	99.3	S/M
48	6			9	3024	8.5	264	275	277	99.3	S/M
49	6			9	3087	8.5	264	275	277	99.3	S/M
50	6			9	3150	8.5	264	275	277	99.3	S/M
51	6			9	3213	8.5	264	275	277	99.3	S/M
52	6			9	3276	8.5	264	275	277	99.3	S/M
53	6			9	3339	8.5	264	275	277	99.3	S/M
54	6			9	3402	8.5	264	275	277	99.3	S/M
55	6			9	3465	8.5	264	275	277	99.3	S/M
56	6			9	3528	8.5	264	275	277	99.3	S/M
57	6	6	NKE6	9	3591	8.5	264	275	277	99.3	S/M
58	6			9	3654	8.5	264	275	277	99.3	S/M
59	6			9	3717	8.5	264	275	277	99.3	S/M
60	6			9	3780	8.5	264	275	277	99.3	S/M
61	20	7	NKE7	9	3969	8.5	264	826	832	99.3	S
62	20	8	NKE8	9	4158	8.5	264	826	832	99.3	S
63	20	9	NKE9	9	4347	8.5	264	826	832	99.3	S
64	20	10	NKE10	9	4536	8.5	264	826	832	99.3	S
65	20	11	NKE11	9	4725	8.5	264	826	832	99.3	S
66	20	12	NKE12	9	4914	8.5	264	826	832	99.3	S
67	20	13	NKE13	9	5103	8.5	264	826	832	99.3	S
68	20	14	NKE14	9	5292	8.5	264	826	832	99.3	S
69	20	15	NKE15	9	5481	8.5	264	826	832	99.3	S
70	20	16	NKE16	9	5670	8.5	264	826	832	99.3	S
71	20	17	NKE17	9	5859	8.5	264	826	832	99.3	S
72	20	18	NKE18	9	6048	8.5	264	826	832	99.3	S
73	20	19	NKE19	9	6237	8.5	264	826	832	99.3	S
74	20	20	NKE20	9	6426	8.5	264	826	832	99.3	S
75	20	21	NKE21	9	6615	8.5	264	826	832	99.3	S
76	20	22	NKE22	9	6804	8.5	264	826	832	99.3	S
77	20	23	NKE23	9	6993	8.5	264	826	832	99.3	S
78	20	1	STO1	9	7182	8.5	264	826	832	99.3	S
HOOK	**720**			**Hour**	**1**		**Total (km)**	**31.4**	**31.6**		
BASKET	**78**			**Minute**	**60**						

Longline Set n° 10 – 16/12/2008

Basket N°	HPB	TDR	ID TDR	TbH (s)	Duration (s)	Boat speed (kts)	Shooter Speed (m/min)	DBF	LLBF	SR(%)	Bait
1	24	1	NKE	9	225	8.2	256	949	960	98.9	S
2	24	2	NKE	9	450	8.2	256	949	960	98.9	S
3	24	3	NKE	9	675	8.2	256	949	960	98.9	S
4	24	4	NKE	9	900	8.2	256	949	960	98.9	S
5	24	5	NKE	9	1125	8.2	256	949	960	98.9	S
6	24	6	NKE	9	1350	8.2	256	949	960	98.9	S
7	24	7	NKE	9	1575	8.2	256	949	960	98.9	M
8	24	8	NKE	9	1800	8.2	256	949	960	98.9	M
9	24	9	NKE	9	2025	8.2	256	949	960	98.9	M
10	24	10	NKE	9	2250	8.2	256	949	960	98.9	S
11	24	11	NKE	9	2475	8.2	256	949	960	98.9	S
12	24	12	NKE	9	2700	8.2	256	949	960	98.9	S
13	24	13	NKE	9	2925	8.2	256	949	960	98.9	S
14	24	14	NKE	9	3150	8.2	256	949	960	98.9	S
15	24	15	NKE	9	3375	8.2	256	949	960	98.9	M
16	24	16	NKE	9	3600	8.2	256	949	960	98.9	M
17	6			9	3663	7.8	243	253	255	99.2	S/M
18	6			9	3726	7.8	243	253	255	99.2	S/M
19	6			9	3789	7.8	243	253	255	99.2	S/M
20	6			9	3852	7.8	243	253	255	99.2	S/M
21	6	17	NKE	9	3915	7.8	243	253	255	99.2	S/M
22	6			9	3978	7.8	243	253	255	99.2	S/M
23	6			9	4041	7.8	243	253	255	99.2	S/M
24	6			9	4104	7.8	243	253	255	99.2	S/M
25	6			9	4167	7.8	243	253	255	99.2	S/M
26	6			9	4230	7.8	243	253	255	99.2	S/M
27	6			9	4293	7.8	243	253	255	99.2	S/M
28	6			9	4356	7.8	243	253	255	99.2	S/M
29	6			9	4419	7.8	243	253	255	99.2	S/M
30	6	18	NKE	9	4482	7.8	243	253	255	99.2	S/M
31	6			9	4545	7.8	243	253	255	99.2	S/M
32	6			9	4608	7.8	243	253	255	99.2	S/M
33	6			9	4671	7.8	243	253	255	99.2	S/M
34	6			9	4734	7.8	243	253	255	99.2	S/M
35	6			9	4797	7.8	243	253	255	99.2	S/M
36	6			9	4860	7.8	243	253	255	99.2	S/M
37	6			9	4923	7.8	243	253	255	99.2	S/M
38	6			9	4986	7.8	243	253	255	99.2	S/M
39	6			9	5049	7.8	243	253	255	99.2	S/M
40	6	19	NKE	9	5112	7.8	243	253	255	99.2	S/M
41	6			9	5175	7.8	243	253	255	99.2	S/M
42	6			9	5238	7.8	243	253	255	99.2	S/M
43	6			9	5301	7.8	243	253	255	99.2	S/M
44	6	20	NKE	9	5364	7.8	243	253	255	99.2	S/M
45	6			9	5427	7.8	243	253	255	99.2	S/M
46	6			9	5490	7.8	243	253	255	99.2	S/M
47	6			9	5553	7.8	243	253	255	99.2	S/M
48	6			9	5616	7.8	243	253	255	99.2	S/M
49	6			9	5679	7.8	243	253	255	99.2	S/M
50	6	21	NKE	9	5742	7.8	243	253	255	99.2	S/M
51	6			9	5805	7.8	243	253	255	99.2	S/M
52	6			9	5868	7.8	243	253	255	99.2	S/M
53	6			9	5931	7.8	243	253	255	99.2	S/M
54	6	22	NKE	9	5994	7.8	243	253	255	99.2	S/M
55	6			9	6057	7.8	243	253	255	99.2	S/M
56	6			9	6120	7.8	243	253	255	99.2	S/M
57	6			9	6183	7.8	243	253	255	99.2	S/M
58	6			9	6246	7.8	243	253	255	99.2	S/M
59	6			9	6309	7.8	243	253	255	99.2	S/M
60	6	23	NKE	9	6372	7.8	243	253	255	99.2	S/M
61	6			9	6435	7.8	243	253	255	99.2	S/M
62	6			9	6498	7.8	243	253	255	99.2	S/M
63	6			9	6561	7.8	243	253	255	99.2	S/M
64	6			9	6624	7.8	243	253	255	99.2	S/M
65	6			9	6687	7.8	243	253	255	99.2	S/M
66	6			9	6750	7.8	243	253	255	99.2	S/M
67	6			9	6813	7.8	243	253	255	99.2	S/M
68	6			9	6876	7.8	243	253	255	99.2	S/M
69	6			9	6939	7.8	243	253	255	99.2	S/M
70	6			9	7002	7.8	243	253	255	99.2	S/M
71	6			9	7065	7.8	243	253	255	99.2	S/M
72	6			9	7128	7.8	243	253	255	99.2	S/M
73	6			9	7191	7.8	243	253	255	99.2	S/M
74	6			9	7254	7.8	243	253	255	99.2	S/M
75	6			9	7317	7.8	243	253	255	99.2	S/M
76	6			9	7380	7.8	243	253	255	99.2	S/M
77	6			9	7443	7.8	243	253	255	99.2	S/M
HOOK	**750**			**Hour**	**2**		**Total**	**30.6**	**30.9**		
BASKET	**77**			**Minute**	**4**						

ANNEX 2

Hooking responses observed for each set

Longline Set n° 1

Date	N° Longline	N. total basket	N° Basket	Hauling time REUNION	Diff heure local - RUN	Hauling time local	Capture n° (day)	Capture n° (cumulated)	Code Espèce	Hook triggered (HC) or species	N° Hook settled	Hook timer	Capture time local
03/12/2008	1	28	3	12:17	1:00	11:17				HC	5	1:41	9:38
03/12/2008	1	28	3	12:17	1:00	11:17				HC	6	5:06	6:13
03/12/2008	1	28	5	12:27	1:00	11:27	1	1	DOL	Dorade coryphène	1	0:02	11:25
03/12/2008	1	28	10	12:55	1:00	11:55				HC	3	2:03	9:53
03/12/2008	1	28	11	13:00	1:00	12:00				HC	9	0:01	12:01
03/12/2008	1	28	12	13:04	1:00	12:04				HC	11	6:41	5:38
03/12/2008	1	28	12	13:04	1:00	12:04				HC	14	6:47	5:33
03/12/2008	1	28	14	13:12	1:00	12:12	2	2	SPLU	Carcharhinus plumbeus	7	4:47	7:38
03/12/2008	1	28	14	13:12	1:00	12:12	3	3	YFT	Yellowfin tuna	9	4:40	7:47
03/12/2008	1	28	14	13:12	1:00	12:12	4	4	YFT	Yellowfin tuna	10	4:30	7:57
03/12/2008	1	28	14	13:12	1:00	12:12				HC	12	3:05	9:24
03/12/2008	1	28	15	13:34	1:00	12:34	5	5	ALX	Alepisaurus ferox	3	0:01	12:32
03/12/2008	1	28	15	13:34	1:00	12:34				HC	6	4:39	7:56
03/12/2008	1	28	15	13:34	1:00	12:34	6	6	YFT	Yellowfin tuna	11	0:08	12:34
03/12/2008	1	28	20	14:28	1:00	13:28				HC	23	1:18	12:18
03/12/2008	1	28	21	14:37	1:00	13:37	7	7	ALX	Alepisaurus ferox	5	0:01	13:39
03/12/2008	1	28	21	14:37	1:00	13:37	8	8	DOL	Dorade coryphène	14	7:29	6:15
03/12/2008	1	28	21	14:37	1:00	13:37				HC	22	6:49	7:00
03/12/2008	1	28	21	14:37	1:00	13:37	9	9	BSH	Blue shark	23	0:10	13:40
03/12/2008	1	28	22	14:55	1:00	13:55				HC	2	5:58	7:58
03/12/2008	1	28	22	14:55	1:00	13:55	10	10	BSH	Blue shark	13	4:45	9:17
03/12/2008	1	28	22	14:55	1:00	13:55				HC	22	2:55	11:12
03/12/2008	1	28	23	15:08	1:00	14:08	11	11	YFT	Yellowfin tuna	1	3:09	1:01
03/12/2008	1	28	23	15:08	1:00	14:08				HC	9	1:47	12:27
03/12/2008	1	28	23	15:08	1:00	14:08				HC	14	7:51	6:25
03/12/2008	1	28	23	15:08	1:00	14:08	12	12	ALX	Alepisaurus ferox	18	0:01	14:18
03/12/2008	1	28	24	15:21	1:00	14:21	13	13	SWO	Xiphias gladius	14	5:32	8:57
03/12/2008	1	28	24	15:21	1:00	14:21	14	14	BSH	Blue shark	19	3:16	11:16
03/12/2008	1	28	25	15:35	1:00	14:35	15	15	ALX	Alepisaurus ferox	2	0:01	14:36
03/12/2008	1	28	25	15:35	1:00	14:35	16	16	SWO	Xiphias gladius	14	7:27	7:16
03/12/2008	1	28	25	15:35	1:00	14:35	17	17	SWO	Xiphias gladius	15	5:35	9:09
03/12/2008	1	28	25	15:35	1:00	14:35	18	18	BET	Bigeye tuna	16	0:02	14:46
03/12/2008	1	28	25	15:35	1:00	14:35				HC	22	5:11	9:41
03/12/2008	1	28	25	15:35	1:00	14:35	19	19	YFT	Yellowfin tuna	23	5:13	9:40
03/12/2008	1	28	25	15:35	1:00	14:35				HC	24	5:14	9:41
03/12/2008	1	28	26	15:55	1:00	14:55				HC	14	1:50	13:12
03/12/2008	1	28	26	15:55	1:00	14:55				HC	22	7:45	7:23
03/12/2008	1	28	27	16:07	1:00	15:07	20	20		Bigeye tuna	9	5:24	9:53
03/12/2008	1	28	27	16:07	1:00	15:07	21	21	ALX	Alepisaurus ferox	22	0:01	15:22

Longline Set n° 2

Date	N° Longline	N. total basket	N° Basket	Hauling time REUNION	Diff heure local - RUN	Hauling time local	Capture n° (day)	Capture n° (cumulated)	Code Espèce	Hook triggered (HC) or species	N° Hook settled	Hook timer	Capture time local
04/12/2008	2	27	1	12:10	1:00	11:10	1	22	SSP	Tetrapturus angustirostris	1	NA	######
04/12/2008	2	27	2	12:21	1:00	11:21	2	23	ALX	Alepisaurus ferox	4	0:01	11:22
04/12/2008	2	27	4	12:39	1:00	11:39	3	24	GBA	Sphyraena barracuda	14	6:27	5:09
04/12/2008	2	27	4	12:39	1:00	11:39	4	25	ALX	Alepisaurus ferox	6	NA	######
04/12/2008	2	27	4	12:39	1:00	11:39				HC	21	5:02	6:44
04/12/2008	2	27	4	12:39	1:00	11:39				HC	22	5:20	6:26
04/12/2008	2	27	7	13:05	1:00	12:05				HC	1	4:05	8:00
04/12/2008	2	27	7	13:05	1:00	12:05	5	26	ALX	Alepisaurus ferox	20	0:01	12:13
04/12/2008	2	27	8	13:15	1:00	12:15	6	27	ALX	Alepisaurus ferox	17	0:02	12:21
04/12/2008	2	27	9	13:26	1:00	12:26	7	28	ALX	Alepisaurus ferox	3	0:01	12:26
04/12/2008	2	27	10	13:35	1:00	12:35	8	29	ALX	Alepisaurus ferox	3	0:01	12:35
04/12/2008	2	27	10	13:35	1:00	12:35	9	30	BSH	Blue shark	11	0:01	12:42
04/12/2008	2	27	13	14:04	1:00	13:04	10	31	MAKO	Mako shark spp.	7	NA	######
04/12/2008	2	27	14	14:14	1:00	13:14				HC	2	6:57	6:18
04/12/2008	2	27	14	14:14	1:00	13:14				HC	5	8:12	5:05
04/12/2008	2	27	14	14:14	1:00	13:14				HC	11	8:53	4:25
04/12/2008	2	27	14	14:14	1:00	13:14				HC	15	6:16	7:03
04/12/2008	2	27	14	14:14	1:00	13:14	11	32	FAL	Carcharhinus falciformis	18	4:56	8:24
04/12/2008	2	27	15	14:23	1:00	13:23	12	33	FAL	Carcharhinus falciformis	2	0:08	13:16
04/12/2008	2	27	15	14:23	1:00	13:23				HC	11	0:01	13:29
04/12/2008	2	27	15	14:23	1:00	13:23	13	34	ALX	Alepisaurus ferox	12	2:03	11:27
04/12/2008	2	27	16	14:33	1:00	13:33	14	35	PLS	Dasyatis violacea	7	0:20	13:17
04/12/2008	2	27	17	14:41	1:00	13:41				HC	2	7:14	6:28
04/12/2008	2	27	17	14:41	1:00	13:41				HC	11	0:01	13:45
04/12/2008	2	27	17	14:41	1:00	13:41	15	36	BSH	Blue shark	16	3:59	9:49
04/12/2008	2	27	17	14:41	1:00	13:41				HC	18	1:26	12:23
04/12/2008	2	27	18	14:50	1:00	13:50				HC	2	0:08	13:42
04/12/2008	2	27	18	14:50	1:00	13:50	16	37	ALX	Alepisaurus ferox	8	0:06	13:50
04/12/2008	2	27	18	14:50	1:00	13:50				HC	14	9:48	4:10
04/12/2008	2	27	18	14:50	1:00	14:00				HC	17	NA	######
04/12/2008	2	27	19	15:00	1:00	14:00				HC	6	NA	######
04/12/2008	2	27	19	15:00	1:00	14:07	17	38	ALX	Alepisaurus ferox	10	0:04	14:00
04/12/2008	2	27	20	15:07	1:00	14:14				HC	18	4:42	9:31
04/12/2008	2	27	21	15:14	1:00	14:21				HC	17	8:18	6:03
04/12/2008	2	27	22	15:21	1:00	14:21	18	39	BET	Bigeye tuna	8	9:20	5:09
04/12/2008	2	27	22	15:21	1:00	14:21	19	40	ALX	Alepisaurus ferox	11	0:04	14:26
04/12/2008	2	27	23	15:32	1:00	14:32				HC	6	6:39	7:57
04/12/2008	2	27	23	15:32	1:00	14:32	20	41	SWO	Xiphias gladius	7	11:10	3:29
04/12/2008	2	27	23	15:32	1:00	14:32	21	42	ALX	Alepisaurus ferox	8	0:23	14:17
04/12/2008	2	27	24	15:44	1:00	14:44	22	43	ALX	Alepisaurus ferox	5	0:01	14:45
04/12/2008	2	27	24	15:44	1:00	14:44	23	44	ALX	Alepisaurus ferox	8	0:04	14:45
04/12/2008	2	27	24	15:44	1:00	14:44				HC	17	2:26	12:27
04/12/2008	2	27	25	15:53	1:00	14:53	24	45		Alepisaurus ferox	12	0:04	14:56
04/12/2008	2	27	25	15:53	1:00	14:53				HC	15	2:59	12:02
04/12/2008	2	27	25	15:53	1:00	14:53	25	46	YFT	Yellowfin tuna	16	8:32	6:31
04/12/2008	2	27	26	16:05	1:00	15:05	26	47	ALX	Alepisaurus ferox	6	0:01	15:07
04/12/2008	2	27	26	16:05	1:00	15:05	27	48	ALX	Alepisaurus ferox	NA	NA	######

Longline set n° 3

Date	N° Longline	N. total basket	N° Basket	Hauling time REUNION	Diff heure local - RUN	Hauling time local	Capture n° (day)	Capture n° (cumulated)	Code Espèce	Hook triggered (HC) or species	N° Hook settled	Hook timer	Capture time local
05/12/2008	3	26	1	13:00	1:00	12:00				HC	20	5:39	6:29
05/12/2008	3	26	2	13:08	1:00	12:08	1	49	DOL	Dorade coryphène	19	0:01	12:12
05/12/2008	3	26	3	13:14	1:00	12:14				HC	1	5:03	7:11
05/12/2008	3	26	3	13:14	1:00	12:14	2	50	YFT	Yellowfin tuna	17	5:37	6:45
05/12/2008	3	26	3	13:14	1:00	12:14	3	51	DOL	Dorade coryphène	19	0:01	12:24
05/12/2008	3	26	4	13:28	1:00	12:28	4	52	GBA	Sphyraena barracuda	1	4:42	7:46
05/12/2008	3	26	4	13:28	1:00	12:28				HC	5	0:01	12:31
05/12/2008	3	26	5	13:35	1:00	12:35				HC	5	6:51	5:46
05/12/2008	3	26	5	13:35	1:00	12:35	5	53	YFT	Yellowfin tuna	6	6:53	5:46
05/12/2008	3	26	6	13:44	1:00	12:44	6	54	DOL	Dorade coryphène	20	2:15	10:35
05/12/2008	3	26	7	13:52	1:00	12:52				HC	5	0:04	12:50
05/12/2008	3	26	7	13:52	1:00	12:52				HC	18	0:14	12:50
05/12/2008	3	26	7	13:52	1:00	12:52				HC	19	2:24	10:40
05/12/2008	3	26	8	14:09	1:00	13:09				HC	9	5:35	7:38
05/12/2008	3	26	8	14:09	1:00	13:09				HC	20	3:56	9:19
05/12/2008	3	26	9	14:16	1:00	13:16				HC	1	3:52	9:24
05/12/2008	3	26	9	14:16	1:00	13:16	7	55	DOL	Dorade coryphène	3	2:21	10:57
05/12/2008	3	26	9	14:16	1:00	13:16	8	56	DOL	Dorade coryphène	4	0:51	12:30
05/12/2008	3	26	9	14:16	1:00	13:16	9	57	ALX	Alepisaurus ferox	18	0:01	13:26
05/12/2008	3	26	10	14:27	1:00	13:27				HC	1	6:04	7:24
05/12/2008	3	26	10	14:27	1:00	13:27	10	58	DOL	Dorade coryphène	18	5:37	7:57
05/12/2008	3	26	11	14:37	1:00	13:37				HC	3	5:55	7:44
05/12/2008	3	26	11	14:37	1:00	13:37				HC	20	5:33	8:10
05/12/2008	3	26	12	14:44	1:00	13:44				HC	1	NA	######
05/12/2008	3	26	12	14:44	1:00	13:44				HC	2	NA	######
05/12/2008	3	26	12	14:44	1:00	13:44				HC	4	0:45	13:00
05/12/2008	3	26	12	14:44	1:00	13:44	11	59	ALX	Alepisaurus ferox	12	4:49	8:58
05/12/2008	3	26	13	14:51	1:00	13:51	12	60	DOL	Dorade coryphène	1	2:09	11:44
05/12/2008	3	26	14	15:18	1:00	14:18	13	61	DOL	Dorade coryphène	2	3:12	11:07
05/12/2008	3	26	15	15:25	1:00	14:25				HC	7	0:56	13:34
05/12/2008	3	26	15	15:25	1:00	14:25	14	62	DOL	Dorade coryphène	8	1:40	12:50
05/12/2008	3	26	15	15:25	1:00	14:25				HC	18	5:20	9:15
05/12/2008	3	26	16	15:34	1:00	14:34				HC	1	NA	######
05/12/2008	3	26	17	15:42	1:00	14:42				HC	5	NA	######
05/12/2008	3	26	18	15:48	1:00	14:48				HC	3	4:26	10:25
05/12/2008	3	26	18	15:48	1:00	14:48	15	63	BET	Bigeye tuna	4	0:01	14:51
05/12/2008	3	26	18	15:48	1:00	14:48	16	64	ALX	Alepisaurus ferox	8	0:01	14:55
05/12/2008	3	26	20	16:10	1:00	15:10				HC	3	2:59	12:12
05/12/2008	3	26	20	16:10	1:00	15:10	17	65	DOL	Dorade coryphène	20	2:53	12:23
05/12/2008	3	26	21	16:19	1:00	15:19	18	66	DOL	Dorade coryphène	2	1:24	13:57
05/12/2008	3	26	21	16:19	1:00	15:19	19	67	ALX	Alepisaurus ferox	3	0:01	15:21
05/12/2008	3	26	22	16:28	1:00	15:28	20	68	SWO	Xiphias gladius	3	10:48	4:44
05/12/2008	3	26	22	16:28	1:00	15:28	21	69	ALX	Alepisaurus ferox	4	5:33	10:02
05/12/2008	3	26	22	16:28	1:00	15:28	22	70	ALX	Alepisaurus ferox	11	0:02	15:36
05/12/2008	3	26	22	16:28	1:00	15:28				HC	13	2:34	13:06
05/12/2008	3	26	22	16:28	1:00	15:28	23	71	YFT	Yellowfin tuna	17	0:01	15:42
05/12/2008	3	26	23	16:49	1:00	15:49				HC	4	3:59	11:52
05/12/2008	3	26	23	16:49	1:00	15:49				HC	6	3:55	11:57
05/12/2008	3	26	23	16:49	1:00	15:49	24	72	SFA	Istiophorus platypterus	18	0:00	15:58
05/12/2008	3	26	24	16:58	1:00	15:58				HC	1	7:37	8:21
05/12/2008	3	26	24	16:58	1:00	15:58				HC	5	0:00	16:00
05/12/2008	3	26	24	16:58	1:00	15:58	25	73	ALX	Alepisaurus ferox	12	0:00	16:02
05/12/2008	3	26	24	16:58	1:00	15:58	26	74	ALX	Alepisaurus ferox	14	0:05	15:58
05/12/2008	3	26	26	17:14	1:00	16:14	27	75	ALX	Alepisaurus ferox	4	10:02	6:13

Longline set n° 4

Date	N° Longline	N. total basket	N° Basket	Hauling time REUNION	Diff heure local - RUN	Hauling time local	Capture n° (day)	Capture n° (cumulated)	Code Espèce	Hook triggered (HC) or species	N° Hook settled	Hook timer	Capture time local
06/12/2008	4	24	1	13:14	1:00	12:14	1	76	ALX	Alepisaurus ferox	1	NA	######
06/12/2008	4	24	1	13:14	1:00	12:14	2	77	DOL	Dorade coryphène	22	0:01	12:25
06/12/2008	4	24	3	13:36	1:00	12:36				HC	1	1:24	11:12
06/12/2008	4	24	3	13:36	1:00	12:36	3	78	ALX	Alepisaurus ferox	14	NA	######
06/12/2008	4	24	3	13:36	1:00	12:36	4	79	DOL	Dorade coryphène	22	6:09	6:36
06/12/2008	4	24	4	13:46	1:00	12:46	5	80	DOL	Dorade coryphène	1	3:29	9:17
06/12/2008	4	24	4	13:57	1:00	12:57				HC	19	NA	######
06/12/2008	4	24	5	13:57	1:00	12:57	6	81	ALX	Alepisaurus ferox	5	Ntrig	######
06/12/2008	4	24	5	13:57	1:00	12:57	7	82	ALX	Alepisaurus ferox	13	1:03	12:00
06/12/2008	4	24	5	13:57	1:00	12:57				HC	16	1:04	12:00
06/12/2008	4	24	5	13:57	1:00	12:57	8	83	YFT	Yellowfin tuna	17	1:30	11:37
06/12/2008	4	24	6	14:08	1:00	13:08	9	84	ALX	Alepisaurus ferox	16	0:00	13:13
06/12/2008	4	24	6	14:08	1:00	13:08	10	85	YFT	Yellowfin tuna	17	1:59	11:17
06/12/2008	4	24	6	14:08	1:00	13:08	11	86	SFA	Istiophorus platypterus	21	2:43	10:36
06/12/2008	4	24	6	14:08	1:00	13:08	12	87	DOL	Dorade coryphène	22	3:07	10:16
06/12/2008	4	24	7	14:25	1:00	13:25				HC	1	3:01	10:24
06/12/2008	4	24	7	14:25	1:00	13:25	13	88	DOL	Dorade coryphène	3	2:51	10:35
06/12/2008	4	24	7	14:25	1:00	13:25	14	89	BET	Bigeye tuna	4	7:10	6:18
06/12/2008	4	24	7	14:25	1:00	13:25	15	90	ALX	Alepisaurus ferox	16	0:00	13:38
06/12/2008	4	24	7	14:25	1:00	13:25				HC	22	NA	######
06/12/2008	4	24	8	14:41	1:00	13:41	16	91	ALX	Alepisaurus ferox	7	4:57	8:47
06/12/2008	4	24	9	14:50	1:00	13:50	17	92	ALX	Alepisaurus ferox	11	0:00	13:57
06/12/2008	4	24	10	15:03	1:00	14:03	18	93	ALX	Alepisaurus ferox	10	NA	######
06/12/2008	4	24	10	15:03	1:00	14:03	19	94	ALX	Alepisaurus ferox	16	0:01	14:10
06/12/2008	4	24	10	15:03	1:00	14:03	20	95	BSH	Blue shark	18	3:25	10:48
06/12/2008	4	24	10	15:03	1:00	14:03				HC	20	3:20	10:55
06/12/2008	4	24	11	15:16	1:00	14:16	21	96	ALX	Alepisaurus ferox	16	0:01	14:22
06/12/2008	4	24	11	15:16	1:00	14:16	22	97	ALX	Alepisaurus ferox	19	0:01	14:26
06/12/2008	4	24	12	15:29	1:00	14:29				HC	1	0:01	14:28
06/12/2008	4	24	12	15:29	1:00	14:29	23	98	ALX	Alepisaurus ferox	18	0:00	14:36
06/12/2008	4	24	13	15:42	1:00	14:42	24	99	ALX	Alepisaurus ferox	4	7:06	7:39
06/12/2008	4	24	13	15:42	1:00	14:42	25	100	ALX	Alepisaurus ferox	5	NA	######
06/12/2008	4	24	14	15:54	1:00	14:54				HC	15	3:40	11:22
06/12/2008	4	24	14	15:54	1:00	14:54	26	101	BET	Bigeye tuna	16	3:54	11:08
06/12/2008	4	24	15	16:07	1:00	15:07	27	102	BSH	Blue shark	10	3:34	11:40
06/12/2008	4	24	15	16:07	1:00	15:07	28	103	TST	Taractichthys steindachneri	17	9:08	6:11
06/12/2008	4	24	15	16:07	1:00	15:07	29	104	ALX	Alepisaurus ferox	18	0:02	15:19
06/12/2008	4	24	16	16:23	1:00	15:23	30	105	ALX	Alepisaurus ferox	7	0:03	15:25
06/12/2008	4	24	16	16:23	1:00	15:23	31	106	ALX	Alepisaurus ferox	16	0:09	15:25
06/12/2008	4	24	17	16:37	1:00	15:37	32	107	ALX	Alepisaurus ferox	6	0:00	15:42
06/12/2008	4	24	17	16:37	1:00	15:37	33	108	SWO	Xiphias gladius	9	9:07	6:38
06/12/2008	4	24	17	16:37	1:00	15:37	34	109	ALX	Alepisaurus ferox	10	0:00	15:47
06/12/2008	4	24	17	16:37	1:00	15:37	35	110	TST	Taractichthys steindachneri	12	1:09	14:41
06/12/2008	4	24	17	16:37	1:00	15:37				HC	21	NA	######
06/12/2008	4	24	18	16:55	1:00	15:55	36	111	ALX	Alepisaurus ferox	13	0:12	15:50
06/12/2008	4	24	18	16:55	1:00	15:55				HC	16	NA	######
06/12/2008	4	24	19	17:07	1:00	16:07				HC	3	NA	######
06/12/2008	4	24	19	17:07	1:00	16:07				HC	4	4:47	11:21
06/12/2008	4	24	19	17:07	1:00	16:07	37	112	ALX	Alepisaurus ferox	6	0:01	16:10
06/12/2008	4	24	19	17:07	1:00	16:07	38	113	ALX	Alepisaurus ferox	10	0:05	16:07
06/12/2008	4	24	19	17:07	1:00	16:07	39	114	ALX	Alepisaurus ferox	21	0:00	16:19
06/12/2008	4	24	20	17:21	1:00	16:21				HC	2	2:24	13:59
06/12/2008	4	24	20	17:21	1:00	16:21	40	115	BET	Bigeye tuna	4	9:27	6:59
06/12/2008	4	24	20	17:21	1:00	16:21				HC	5	4:41	11:45
06/12/2008	4	24	20	17:21	1:00	16:21	41	116	TST	Taractichthys steindachneri	13	0:00	16:34
06/12/2008	4	24	20	17:21	1:00	16:21	42	117	BET	Bigeye tuna	15	9:20	7:15
06/12/2008	4	24	20	17:21	1:00	16:21	43	118	ALX	Alepisaurus ferox	18	0:00	16:40
06/12/2008	4	24	21	17:43	1:00	16:43	44	119	ALX	Alepisaurus ferox	1	0:00	16:43
06/12/2008	4	24	21	17:43	1:00	16:43	45	120	TST	Taractichthys steindachneri	9	10:43	6:05
06/12/2008	4	24	21	17:43	1:00	16:43	46	121	BET	Bigeye tuna	15	3:22	13:32
06/12/2008	4	24	22	17:48	1:00	16:48	47	122	ALX	Alepisaurus ferox	5	7:05	9:55
06/12/2008	4	24	22	17:48	1:00	16:48				HC	7	1:25	15:37
06/12/2008	4	24	22	17:48	1:00	16:48				HC	10	1:03	16:00
06/12/2008	4	24	22	17:48	1:00	16:48				HC	12	2:03	15:01
06/12/2008	4	24	22	17:48	1:00	16:48				HC	18	7:09	9:58
06/12/2008	4	24	23	18:09	1:00	17:09				HC	1	8:06	8:58
06/12/2008	4	24	23	18:09	1:00	17:09	48	123	ALX	Alepisaurus ferox	7	0:08	17:05
06/12/2008	4	24	23	18:09	1:00	17:09				HC	8	0:00	17:14
06/12/2008	4	24	23	18:09	1:00	17:09				HC	9	0:53	16:21
06/12/2008	4	24	23	18:09	1:00	17:09				HC	10	1:26	15:49
06/12/2008	4	24	23	18:09	1:00	17:09				HC	13	11:25	5:52
06/12/2008	4	24	23	18:09	1:00	17:09				HC	14	0:13	17:04
06/12/2008	4	24	23	18:09	1:00	17:09				HC	22	9:35	7:46
06/12/2008	4	24	24	18:21	1:00	17:21				HC	2	Ntrig	######
06/12/2008	4	24	24	18:21	1:00	17:21				HC	19	11:21	6:09
06/12/2008	4	24	24	18:21	1:00	17:21				HC	20	11:16	6:14

Longline set n° 5

Date	N° Longline	N. total basket	N° Basket	Hauling time REUNION	Diff heure local - RUN	Hauling time local	Capture n° (day)	Capture n° (cumulated)	Code Espèce	Hook triggered (HC) or species	N° Hook settled	Hook timer	Capture time local
07/12/2008	5	23	2	13:09	1:00	12:09	1	124	YFT	Yellowfin tuna	2	5:13	6:56
07/12/2008	5	23	2	13:09	1:00	12:09	2	125	SFA	Istiophorus platypterus	21	3:43	8:36
07/12/2008	5	23	3	13:29	1:00	12:29	3	126	ALX	Alepisaurus ferox	3	0:02	12:22
07/12/2008	5	23	3	13:29	1:00	12:29	4	127	ALX	Alepisaurus ferox	9	0:06	12:23
07/12/2008	5	23	3	13:29	1:00	12:29	5	128	ALX	Alepisaurus ferox	17	0:00	12:33
07/12/2008	5	23	3	13:29	1:00	12:29				HC	22	Ntrig	######
07/12/2008	5	23	4	13:35	1:00	12:35				HC	1	0:04	12:31
07/12/2008	5	23	4	13:35	1:00	12:35	6	129	BSH	Blue shark	2	1:47	10:53
07/12/2008	5	23	4	13:35	1:00	12:35	7	130	BET	Bigeye tuna	12	5:53	6:53
07/12/2008	5	23	4	13:35	1:00	12:35	8	131	ALX	Alepisaurus ferox	14	:07	######
07/12/2008	5	23	4	13:35	1:00	12:35				HC	22	Ntrig	######
07/12/2008	5	23	5	13:52	1:00	12:52				HC	2	5:32	7:20
07/12/2008	5	23	5	13:52	1:00	12:52				HC	3	5:33	7:19
07/12/2008	5	23	5	13:52	1:00	12:52				HC	4	5:30	7:24
07/12/2008	5	23	5	13:52	1:00	12:52				HC	5	5:30	7:24
07/12/2008	5	23	5	13:52	1:00	12:52	9	132	ALX	Alepisaurus ferox	12	0:00	12:59
07/12/2008	5	23	5	13:52	1:00	12:52	10	133	ALX	Alepisaurus ferox	20	Ntrig	######
07/12/2008	5	23	6	14:05	1:00	13:05				HC	1	Ntrig	######
07/12/2008	5	23	6	14:05	1:00	13:05	11	134	UNSHAI	Shark unidentified	8	6:36	6:34
07/12/2008	5	23	6	14:05	1:00	13:05				HC	9	3:56	9:14
07/12/2008	5	23	6	14:05	1:00	13:05	12	135	BSH	Blue shark	22	NA	######
07/12/2008	5	23	7	14:20	1:00	13:20	13	136	ALX	Alepisaurus ferox	4	6:34	6:46
07/12/2008	5	23	7	14:20	1:00	13:20	14	137	BSH	Blue shark	10	0:00	13:27
07/12/2008	5	23	7	14:20	1:00	13:20	15	138	ALX	Alepisaurus ferox	12	0:34	12:55
07/12/2008	5	23	8	14:33	1:00	13:33	16	139	ALX	Alepisaurus ferox	9	0:00	13:38
07/12/2008	5	23	8	14:33	1:00	13:33	17	140	ALX	Alepisaurus ferox	18	5:02	8:41
07/12/2008	5	23	8	14:33	1:00	13:33	18	141	CIS	Caranx ignobilis	21	4:58	8:46
07/12/2008	5	23	9	14:48	1:00	13:48				HC	2	Ntrig	######
07/12/2008	5	23	9	14:48	1:00	13:48	19	142	ALX	Alepisaurus ferox	9	0:00	13:52
07/12/2008	5	23	10	14:57	1:00	13:57				HC	2	Ntrig	######
07/12/2008	5	23	10	14:57	1:00	13:57	20	143	ALX	Alepisaurus ferox	6	0:00	14:00
07/12/2008	5	23	10	14:57	1:00	13:57				HC	10	4:54	9:07
07/12/2008	5	23	10	14:57	1:00	13:57	21	144	ALX	Alepisaurus ferox	12	0:00	11:02
07/12/2008	5	23	10	14:57	1:00	13:57				HC	20	8:24	5:42
07/12/2008	5	23	10	14:57	1:00	13:57				HC	21	3:32	10:34
07/12/2008	5	23	10	14:57	1:00	13:57				HC	22	8:01	6:05
07/12/2008	5	23	11	15:07	1:00	14:07				HC	1	3:32	10:35
07/12/2008	5	23	12	15:22	1:00	14:22				HC	1	Ntrig	######
07/12/2008	5	23	12	15:22	1:00	14:22				HC	2	Ntrig	######
07/12/2008	5	23	12	15:22	1:00	14:22	22	145	ALX	Alepisaurus ferox	14	7:04	7:29
07/12/2008	5	23	13	15:36	1:00	14:36	23	146	ALX	Alepisaurus ferox	3	0:00	14:38
07/12/2008	5	23	13	15:36	1:00	14:36	24	147	ALX	Alepisaurus ferox	4	0:00	14:41
07/12/2008	5	23	13	15:36	1:00	14:36	25	148	ALX	Alepisaurus ferox	10	0:00	14:44
07/12/2008	5	23	13	15:36	1:00	14:36				HC	18	0:12	14:36
07/12/2008	5	23	14	15:49	1:00	14:49	26	149	ALX	Alepisaurus ferox	8	0:01	14:52
07/12/2008	5	23	14	15:49	1:00	14:49				HC	15	2:50	12:05
07/12/2008	5	23	14	15:49	1:00	14:49				HC	21	Ntrig	######
07/12/2008	5	23	16	16:22	1:00	15:22	27	150	ALX	Alepisaurus ferox	5	0:01	15:10
07/12/2008	5	23	16	16:22	1:00	15:22	28	151	YFT	Yellowfin tuna	19	0:01	15:22
07/12/2008	5	23	18	16:41	1:00	15:41	29	152	GBA	Sphyraena barracuda	1	4:46	10:55
07/12/2008	5	23	18	16:41	1:00	15:41	30	153	ALX	Alepisaurus ferox	7	NA	######
07/12/2008	5	23	19	16:50	1:00	15:50				HC	2	NA	######
07/12/2008	5	23	19	16:50	1:00	15:50	31	154	ALX	Alepisaurus ferox	4	0:00	15:52
07/12/2008	5	23	19	16:50	1:00	15:50	32	155	BET	Bigeye tuna	10	0:00	16:00
07/12/2008	5	23	20	17:05	1:00	16:05	33	156	ALX	Alepisaurus ferox	3	5:45	10:21
07/12/2008	5	23	20	17:05	1:00	16:05				HC	8	4:42	11:27
07/12/2008	5	23	20	17:05	1:00	16:05	34	157	ALX	Alepisaurus ferox	12	0:00	16:11
07/12/2008	5	23	20	17:05	1:00	16:05				HC	13	2:27	13:45
07/12/2008	5	23	21	17:15	1:00	16:15				HC	4	1:10	15:06
07/12/2008	5	23	21	17:15	1:00	16:15	35	158	BSH	Blue shark	15	7:23	######
07/12/2008	5	23	22	17:27	1:00	16:27				HC	1	NA	######
07/12/2008	5	23	22	17:27	1:00	16:27	36	159	ALX	Alepisaurus ferox	4	0:01	16:29
07/12/2008	5	23	22	17:27	1:00	16:27	37	160	PLS	Dasyatis violacea	5	0:05	16:26
07/12/2008	5	23	22	17:27	1:00	16:27	38	161	ALX	Alepisaurus ferox	15	9:43	6:56
07/12/2008	5	23	23	17:42	1:00	16:42	39	162	ALX	Alepisaurus ferox	5	0:00	16:43
07/12/2008	5	23	23	17:42	1:00	16:42	40	163	ALX	Alepisaurus ferox	12	0:00	16:47
07/12/2008	5	23	23	17:42	1:00	16:42				HC	16	8:30	8:20
07/12/2008	5	23	23	17:42	1:00	16:42	41	164	BSH	Blue shark	17	3:55	12:56

Longline set n° 6

Date	N° Longline	N. total basket	N° Basket	Hauling time REUNION	Diff heure local - RUN	Hauling time local	Capture n° (day)	Capture n° (cumulated)	Code Espèce	Hook triggered (HC) or species	N° Hook settled	Hook timer	Capture time local
08/12/2008	6	24	1	13:11	1:00	12:11	1	165	BSH	Blue shark	5	0:54	11:18
08/12/2008	6	24	2	13:20	1:00	12:20	2	166	BET	Bigeye tuna	10	1:16	11:08
08/12/2008	6	24	3	13:29	1:00	12:29				HC	1	Ntrig	######
08/12/2008	6	24	3	13:29	1:00	12:29				HC	2	Ntrig	######
08/12/2008	6	24	8	13:49	1:00	12:49	3	167	ALX	Alepisaurus ferox	7	0:02	13:03
08/12/2008	6	24	9	13:55	1:00	12:55	4	168	PLS	Dasyatis violacea	6	0:05	13:07
08/12/2008	6	24	9	13:55	1:00	12:55	5	169	ALX	Alepisaurus ferox	8	2:46	10:27
08/12/2008	6	24	9	13:55	1:00	12:55				HC	12	0:02	13:13
08/12/2008	6	24	10	14:01	1:00	13:01	6	170	GBA	Sphyraena barracuda	17	0:09	13:17
08/12/2008	6	24	11	14:27	1:00	13:27				HC	1	5:47	7:40
08/12/2008	6	24	11	14:27	1:00	13:27	7	171	ALX	Alepisaurus ferox	5	5:47	7:41
08/12/2008	6	24	11	14:27	1:00	13:27				HC	11	7:19	6:12
08/12/2008	6	24	11	14:27	1:00	13:27				HC	12	7:22	6:09
08/12/2008	6	24	11	14:27	1:00	13:27				HC	13	7:22	6:09
08/12/2008	6	24	11	14:27	1:00	13:27	8	172	PLS	Dasyatis violacea	14	7:22	6:10
08/12/2008	6	24	12	14:35	1:00	13:35	9	173	PLS	Dasyatis violacea	7	0:06	13:32
08/12/2008	6	24	12	14:35	1:00	13:35				HC	11	7:11	6:31
08/12/2008	6	24	12	14:35	1:00	13:35	10	174	BET	Bigeye tuna	13	7:20	6:24
08/12/2008	6	24	12	14:35	1:00	13:35	11	175	ALX	Alepisaurus ferox	17	0:07	13:39
08/12/2008	6	24	13	14:58	1:00	13:58	12	176	RAIN	Elagatis bipinnulata	1	NA	######
08/12/2008	6	24	13	14:58	1:00	13:58	13	177	ALX	Alepisaurus ferox	6	0:01	14:00
08/12/2008	6	24	14	15:08	1:00	14:08				HC	8	8:26	5:43
08/12/2008	6	24	15	15:13	1:00	14:13	14	178	ALX	Alepisaurus ferox	11	0:01	14:17
08/12/2008	6	24	16	15:22	1:00	14:22	15	179	ALX	Alepisaurus ferox	4	0:01	14:23
08/12/2008	6	24	16	15:22	1:00	14:22	16	180	ALX	Alepisaurus ferox	8	7:30	6:56
08/12/2008	6	24	16	15:22	1:00	14:22	17	181	PLS	Dasyatis violacea	19	0:17	14:16
08/12/2008	6	24	17	15:33	1:00	14:33	18	182	PLS	Dasyatis violacea	3	0:14	14:21
08/12/2008	6	24	17	15:33	1:00	14:33	19	183	ALX	Alepisaurus ferox	5	0:00	14:37
08/12/2008	6	24	17	15:33	1:00	14:33	20	184	ALX	Alepisaurus ferox	6	0:00	14:37
08/12/2008	6	24	17	15:33	1:00	14:33	21	185	ALX	Alepisaurus ferox	20	9:31	5:13
08/12/2008	6	24	18	15:44	1:00	14:44	22	186	ALX	Alepisaurus ferox	5	0:02	14:44
08/12/2008	6	24	18	15:44	1:00	14:44	23	187	BSH	Blue shark	7	0:02	14:45
08/12/2008	6	24	18	15:44	1:00	14:44	24	188	ALX	Alepisaurus ferox	9	5:05	9:46
08/12/2008	6	24	18	15:44	1:00	14:44	25	189	ALX	Alepisaurus ferox	17	0:02	14:52
08/12/2008	6	24	18	15:44	1:00	14:44				HC	19	9:58	4:58
08/12/2008	6	24	18	15:44	1:00	14:44	26	190	SFA	Istiophorus platypterus	20	5:51	9:05
08/12/2008	6	24	19	16:00	1:00	15:00	27	191	ALX	Alepisaurus ferox	19	5:32	9:36
08/12/2008	6	24	20	16:10	1:00	15:10	28	192	ALX	Alepisaurus ferox	5	0:01	15:11
08/12/2008	6	24	20	16:10	1:00	15:10	29	193	ALX	Alepisaurus ferox	7	0:17	14:56
08/12/2008	6	24	20	16:10	1:00	15:10				HC	10	Ntrig	######
08/12/2008	6	24	20	16:10	1:00	15:10				HC	12	10:36	4:38
08/12/2008	6	24	20	16:10	1:00	15:10	30	194	ALX	Alepisaurus ferox	14	0:00	15:18
08/12/2008	6	24	21	16:22	1:00	15:22	31	195	YFT	Yellowfin tuna	3	1:04	14:21
08/12/2008	6	24	21	16:22	1:00	15:22	32	196	ALX	Alepisaurus ferox	5	5:07	10:18
08/12/2008	6	24	21	16:22	1:00	15:22	33	197	ALX	Alepisaurus ferox	16	0:03	15:28
08/12/2008	6	24	21	16:22	1:00	15:22	34	198	ALX	Alepisaurus ferox	20	Ntrig	######
08/12/2008	6	24	22	16:35	1:00	15:35	35	199	ALX	Alepisaurus ferox	4	0:02	15:36
08/12/2008	6	24	22	16:35	1:00	15:35	36	200	ALX	Alepisaurus ferox	8	5:27	10:11
08/12/2008	6	24	22	16:35	1:00	15:35	37	201	ALX	Alepisaurus ferox	10	0:02	15:40
08/12/2008	6	24	22	16:35	1:00	15:35	38	202	ALX	Alepisaurus ferox	14	0:02	15:43
08/12/2008	6	24	23	16:48	1:00	15:48	39	203	TSPE	Alopias pelagicus	2	0:01	15:51
08/12/2008	6	24	23	16:48	1:00	15:48	40	204	ALX	Alepisaurus ferox	3	8:53	6:59
08/12/2008	6	24	23	16:48	1:00	15:48				HC	NA	NA	NA
08/12/2008	6	24	23	16:48	1:00	15:48	41	205	ALX	Alepisaurus ferox	NA	NA	NA
08/12/2008	6	24	23	16:48	1:00	15:48	42	206	ALX	Alepisaurus ferox	NA	NA	NA
08/12/2008	6	24	23	16:48	1:00	15:48	43	207	ALX	Alepisaurus ferox	NA	NA	NA
08/12/2008	6	24	23	16:48	1:00	15:48	44	208	ALX	Alepisaurus ferox	NA	NA	NA
08/12/2008	6	24	24	17:08	1:00	16:08	45	209	ALX	Alepisaurus ferox	NA	NA	NA
08/12/2008	6	24	24	17:08	1:00	16:08		209		HC	NA	NA	NA

Longline set n° 7

Date	N° Longline	N. total basket	N° Basket	Hauling time REUNION	Diff heure local - RUN	Hauling time local	Capture n° (day)	Capture n° (cumulated)	Code Espèce	Hook triggered (HC) or species	N° Hook settled	Hook timer	Capture time local
09/12/2008	7	23	2	13:03	1:00	12:03		209		HC	23	5:42	6:39
09/12/2008	7	23	3	13:21	1:00	12:21	1	210	BET	Bigeye tuna	11	1:15	11:10
09/12/2008	7	23	4	13:29	1:00	12:29	2	211	SFA	Istiophorus platypterus	1	2:52	9:37
09/12/2008	7	23	4	13:29	1:00	12:29	3	212	ALX	Alepisaurus ferox	19	0:03	12:35
09/12/2008	7	23	5	13:40	1:00	12:40	4	213	BET	Bigeye tuna	11	2:02	10:43
09/12/2008	7	23	6	13:50	1:00	12:50	5	214	ALX	Alepisaurus ferox	2	NA	######
09/12/2008	7	23	6	13:50	1:00	12:50	6	215	ALX	Alepisaurus ferox	11	0:02	12:54
09/12/2008	7	23	6	13:50	1:00	12:50	7	216	ALX	Alepisaurus ferox	14	0:01	12:56
09/12/2008	7	23	7	14:07	1:00	13:07		216		HC	1	Ntrig	######
09/12/2008	7	23	8	14:16	1:00	13:16	8	217	ALX	Alepisaurus ferox	11	0:01	13:23
09/12/2008	7	23	8	14:16	1:00	13:16		217		HC	12	3:10	10:14
09/12/2008	7	23	9	14:29	1:00	13:29		217		HC	1	2:37	10:52
09/12/2008	7	23	9	14:29	1:00	13:29	9	218	ALX	Alepisaurus ferox	2	1:31	11:58
09/12/2008	7	23	9	14:29	1:00	13:29	10	219	ALX	Alepisaurus ferox	8	0:19	13:15
09/12/2008	7	23	9	14:29	1:00	13:29	11	220	ALX	Alepisaurus ferox	17	0:03	13:35
09/12/2008	7	23	9	14:29	1:00	13:29	12	221	ALX	Alepisaurus ferox	21	0:05	13:36
09/12/2008	7	23	10	14:42	1:00	13:42	13	222	ALX	Alepisaurus ferox	2	0:04	13:38
09/12/2008	7	23	10	14:42	1:00	13:42	14	223	ALX	Alepisaurus ferox	10	4:12	9:36
09/12/2008	7	23	10	14:42	1:00	13:42	15	224	ALX	Alepisaurus ferox	18	1:10	12:42
09/12/2008	7	23	11	14:54	1:00	13:54	16	225	ALX	Alepisaurus ferox	8	0:01	13:57
09/12/2008	7	23	11	14:54	1:00	13:54	17	226	ALX	Alepisaurus ferox	20	0:00	14:04
09/12/2008	7	23	12	15:06	1:00	14:06	18	227	ALX	Alepisaurus ferox	3	2:49	11:18
09/12/2008	7	23	12	15:06	1:00	14:06	19	228	YFT	Yellowfin tuna	5	2:51	11:17
09/12/2008	7	23	12	15:06	1:00	14:06		228		HC	6	2:48	11:20
09/12/2008	7	23	12	15:06	1:00	14:06		228		HC	8	2:51	11:19
09/12/2008	7	23	12	15:06	1:00	14:06		228		HC	18	3:18	10:58
09/12/2008	7	23	12	15:06	1:00	14:06	20	229	ALX	Alepisaurus ferox	19	0:01	14:15
09/12/2008	7	23	13	15:26	1:00	14:26	21	230	GBA	Sphyraena barracuda	1	2:50	11:36
09/12/2008	7	23	13	15:26	1:00	14:26	22	231	ALX	Alepisaurus ferox	20	0:00	14:37
09/12/2008	7	23	13	15:26	1:00	14:26		231		HC	22	Ntrig	######
09/12/2008	7	23	14	15:39	1:00	14:39	23	232	ALX	Alepisaurus ferox	2	0:00	14:40
09/12/2008	7	23	14	15:39	1:00	14:39	24	233	ALX	Alepisaurus ferox	7	0:00	14:44
09/12/2008	7	23	15	15:51	1:00	14:51	25	234	BET	Bigeye tuna	7	9:46	5:09
09/12/2008	7	23	15	15:51	1:00	14:51	26	235	BET	Bigeye tuna	8	9:47	5:09
09/12/2008	7	23	15	15:51	1:00	14:51	27	236	MOX	Mola mola	9	9:46	5:12
09/12/2008	7	23	15	15:51	1:00	14:51		236		HC	10	9:50	5:09
09/12/2008	7	23	15	15:51	1:00	14:51		236		HC	11	9:31	5:28
09/12/2008	7	23	16	16:10	1:00	15:10	28	237	ALX	Alepisaurus ferox	8	0:00	15:14
09/12/2008	7	23	16	16:10	1:00	15:10	29	238	ALX	Alepisaurus ferox	10	0:00	15:14
09/12/2008	7	23	17	16:21	1:00	15:21		238		HC	14	9:18	6:09
09/12/2008	7	23	17	16:21	1:00	15:21		238		HC	15	9:14	6:13
09/12/2008	7	23	17	16:21	1:00	15:21		238		HC	21	0:20	15:09
09/12/2008	7	23	17	16:21	1:00	15:21		238		HC	22	8:37	6:52
09/12/2008	7	23	17	16:21	1:00	15:21	30	239	MOX	Mola mola	23	0:07	15:25
09/12/2008	7	23	17	16:21	1:00	15:21	31	240	DOL	Dorade coryphène	24	4:26	11:09
09/12/2008	7	23	18	16:35	1:00	15:35	32	241	ALX	Alepisaurus ferox	7	0:03	15:37
09/12/2008	7	23	18	16:35	1:00	15:35	33	242	ALX	Alepisaurus ferox	11	0:06	15:37
09/12/2008	7	23	18	16:35	1:00	15:35	34	243	BSH	Blue shark	20	0:35	15:16
09/12/2008	7	23	18	16:35	1:00	15:35	35	244	ALX	Alepisaurus ferox	21	0:00	15:52
09/12/2008	7	23	19	16:55	1:00	15:55		244		HC	1	6:04	9:51
09/12/2008	7	23	19	16:55	1:00	15:55	36	245	YFT	Yellowfin tuna	21	4:52	11:28
09/12/2008	7	23	19	16:55	1:00	15:55		245		HC	20	0:16	16:04
09/12/2008	7	23	20	17:29	1:00	16:29	37	246	ALX	Alepisaurus ferox	13	8:18	8:17
09/12/2008	7	23	20	17:29	1:00	16:29	38	247	ALX	Alepisaurus ferox	20	0:03	16:36
09/12/2008	7	23	20	17:29	1:00	16:29	39	248	ALX	Alepisaurus ferox	21	3:09	13:30
09/12/2008	7	23	21	17:45	1:00	16:45		248		HC	1	Ntrig	######
09/12/2008	7	23	21	17:45	1:00	16:45	40	249	ALX	Alepisaurus ferox	23	0:00	16:53
09/12/2008	7	23	22	17:53	1:00	16:53	41	250	ALX	Alepisaurus ferox	18	0:00	17:00
09/12/2008	7	23	22	17:53	1:00	16:53	42	251	ALX	Alepisaurus ferox	23	3:00	14:01
09/12/2008	7	23	22	17:53	1:00	16:53	43	252	BSH	Blue shark	24	0:01	17:05
09/12/2008	7	23	23	18:08	1:00	17:08		252		HC	13	11:34	5:39

Longline set n° 8

Date	N° Longline	N. total basket	N° Basket	Hauling time REUNION	Diff heure local - RUN	Hauling time local	Capture n° (day)	Capture n° (cumulated)	Code Espèce	Hook triggered (HC) or species	N° Hook settled	Hook timer	Capture time local
10/12/2008	8	27	1	20:45	1:00	19:45		252		HC	4	NA	######
10/12/2008	8	27	2	20:52	1:00	19:52	1	253	SWO	Xiphias gladius	4	NA	######
10/12/2008	8	27	3	21:04	1:00	20:04		253		HC	2	Ntrig	######
10/12/2008	8	27	3	21:04	1:00	20:04		253		HC	16	4:07	16:02
10/12/2008	8	27	4	21:11	1:00	20:11		253		HC	7	6:34	13:41
10/12/2008	8	27	4	21:11	1:00	20:11		253		HC	12	Ntrig	######
10/12/2008	8	27	4	21:11	1:00	20:11	2	254	YFT	Yellowfin tuna	17	4:47	15:33
10/12/2008	8	27	4	21:11	1:00	20:11		254		HC	18	4:46	15:34
10/12/2008	8	27	5	21:21	1:00	20:21	3	255	ALX	Alepisaurus ferox	4	0:10	20:13
10/12/2008	8	27	5	21:21	1:00	20:21		255		HC	16	6:34	13:56
10/12/2008	8	27	5	21:21	1:00	20:21		255		HC	18	Ntrig	######
10/12/2008	8	27	6	21:32	1:00	20:32		255		HC	4	Ntrig	######
10/12/2008	8	27	6	21:32	1:00	20:32		255		HC	16	4:31	16:08
10/12/2008	8	27	7	21:41	1:00	20:41		255		HC	1	0:00	20:41
10/12/2008	8	27	7	21:41	1:00	20:41		255		HC	20	5:07	15:41
10/12/2008	8	27	8	21:48	1:00	20:48		255		HC	3	Ntrig	######
10/12/2008	8	27	8	21:48	1:00	20:48	4	256	ALX	Alepisaurus ferox	6	0:01	20:50
10/12/2008	8	27	9	21:55	1:00	20:55		256		HC	20	3:18	17:45
10/12/2008	8	27	10	22:03	1:00	21:03	5	257	BET	Bigeye tuna	9	2:37	18:31
10/12/2008	8	27	10	22:03	1:00	21:03		257		HC	10	Ntrig	######
10/12/2008	8	27	10	22:03	1:00	21:03		257		HC	11	5:52	######
10/12/2008	8	27	11	22:13	1:00	21:13		257		HC	14	3:04	18:14
10/12/2008	8	27	12	22:20	1:00	21:20	6	258	BSH	Blue shark	15	0:36	20:55
10/12/2008	8	27	12	22:20	1:00	21:20		258		HC	18	Ntrig	######
10/12/2008	8	27	13	22:34	1:00	21:34	7	259	PLS	Dasyatis violacea	5	0:02	21:33
10/12/2008	8	27	14	22:40	1:00	21:40	8	260	ALX	Alepisaurus ferox	8	0:01	21:41
10/12/2008	8	27	14	22:40	1:00	21:40		260		HC	16	4:16	17:28
10/12/2008	8	27	14	22:40	1:00	21:40	9	261	SFA	Istiophorus platypterus	17	0:02	21:46
10/12/2008	8	27	14	22:40	1:00	21:40		261		HC	18	6:42	15:06
10/12/2008	8	27	15	22:50	1:00	21:50		261		HC	7	5:57	16:03
10/12/2008	8	27	15	22:50	1:00	21:50	10	262	ALX	Alepisaurus ferox	14	3:02	19:00
10/12/2008	8	27	16	23:05	1:00	22:05	11	263	PLS	Dasyatis violacea	6	0:02	22:06
10/12/2008	8	27	16	23:05	1:00	22:05		263		HC	10	Ntrig	######
10/12/2008	8	27	16	23:05	1:00	22:05		263		HC	16	Ntrig	######
10/12/2008	8	27	17	23:14	1:00	22:14		263		HC	1	Ntrig	######
10/12/2008	8	27	17	23:14	1:00	22:14	12	264	ALX	Alepisaurus ferox	10	0:00	22:17
10/12/2008	8	27	18	23:21	1:00	22:21	13	265	ALX	Alepisaurus ferox	8	0:00	22:25
10/12/2008	8	27	20	23:35	1:00	22:35		265		HC	2	Ntrig	######
10/12/2008	8	27	20	23:35	1:00	22:35	14	266	ALX	Alepisaurus ferox	13	7:00	15:42
10/12/2008	8	27	20	23:35	1:00	22:35	15	267	BSH	Blue shark	16	10:10	12:34
10/12/2008	8	27	21	23:48	1:00	22:48	16	268	ALX	Alepisaurus ferox	6	0:00	22:50
10/12/2008	8	27	21	23:48	1:00	22:48	17	269	ALX	Alepisaurus ferox	12	0:00	22:52
10/12/2008	8	27	22	23:57	1:00	22:57		269		HC	11	Ntrig	######
10/12/2008	8	27	23	0:04	1:00	#########	18	270	ALX	Alepisaurus ferox	8	0:01	23:06
10/12/2008	8	27	23	0:04	1:00	23:04	19	271	ALX	Alepisaurus ferox	13	Ntrig	######
10/12/2008	8	27	24	0:12	1:00	23:12		271		HC	2	2:53	20:19
10/12/2008	8	27	26	0:25	1:00	23:25		271		HC	19	10:36	12:57
10/12/2008	8	27	27	0:34	1:00	23:34	20	272	ALX	Alepisaurus ferox	17	7:05	16:32

Longline set n° 9

Date	N° Longline	N. total basket	N° Basket	Hauling time REUNION	Diff heure local - RUN	Hauling time local	Capture n° (day)	Capture n° (cumulated)	Code Espèc	Hook triggered (HC) or species	N° Hook set	Hook timer	Capture time
12/12/2008	9	78	1	10:56	1:00	9:56	1	273	ALB	Thunnus alalunga	13	NA	######
12/12/2008	9	78	2	11:02	1:00	10:02	2	274	ALX	Alepisaurus ferox	17	NA	######
12/12/2008	9	78	4	11:12	1:00	10:12	3	275	ALX	Alepisaurus ferox	9	NA	######
12/12/2008	9	78	6	11:22	1:00	10:22	4	276	ALX	Alepisaurus ferox	11	2:04	8:20
12/12/2008	9	78	6	11:22	1:00	10:22				HC	14	15:02	20:25
12/12/2008	9	78	6	11:22	1:00	10:22				HC	15	15:00	20:27
12/12/2008	9	78	7	11:28	1:00	10:28	5	277	SWO	Xiphias gladius	2	10:03	0:28
12/12/2008	9	78	7	11:28	1:00	10:28				HC	15	1:32	9:02
12/12/2008	9	78	8	11:36	1:00	10:36	6	278	ALX	Alepisaurus ferox	11	0:00	10:38
12/12/2008	9	78	10	11:52	1:00	10:52				HC	9	3:28	7:26
12/12/2008	9	78	11	11:55	1:00	10:55				HC	4	1:14	9:42
12/12/2008	9	78	12	11:59	1:00	10:59				HC	7	13:21	22:41
12/12/2008	9	78	12	11:59	1:00	10:59				HC	8	13:16	22:46
12/12/2008	9	78	13	12:03	1:00	11:03	7	279	BET	Bigeye tuna	1	0:00	12:03
12/12/2008	9	78	13	12:03	1:00	11:03				HC	11	7:29	3:36
12/12/2008	9	78	14	12:09	1:00	11:09	8	280	GBA	Sphyraena barracuda	2	2:55	8:14
12/12/2008	9	78	15	12:15	1:00	11:15				HC	11	2:26	8:53
12/12/2008	9	78	15	12:15	1:00	11:15	9	281	YFT	Yellowfin tuna	12	2:28	8:52
12/12/2008	9	78	15	12:15	1:00	11:15				HC	13	15:48	20:32
12/12/2008	9	78	15	12:15	1:00	11:15				HC	14	15:51	20:29
12/12/2008	9	78	16	12:24	1:00	11:24	10	282	SWO	Xiphias gladius	2	15:52	20:32
12/12/2008	9	78	17	12:33	1:00	11:33	11	283	LEC	Lepidocybium flavobrunneum	3	8:32	3:02
12/12/2008	9	78	17	12:33	1:00	11:33	12	284	ALX	Alepisaurus ferox	4	Ntrig	######
12/12/2008	9	78	18	12:38	1:00	11:38	13	285	ALX	Alepisaurus ferox	10	0:00	11:41
12/12/2008	9	78	19	12:43	1:00	11:43	14	286	YFT	Yellowfin tuna	12	3:46	8:02
12/12/2008	9	78	19	12:43	1:00	11:43	15	287	PLS	Dasyatis violacea	19	0:01	11:50
12/12/2008	9	78	20	12:54	1:00	11:54				HC	2	17:32	19:22
12/12/2008	9	78	20	12:54	1:00	11:54				HC	6	18:13	18:43
12/12/2008	9	78	22	12:57	1:00	11:57	16	288	FAL	Carcharhinus falciformis	2	2:02	9:56
12/12/2008	9	78	23	13:00	1:00	12:00	17	289	SWO	Xiphias gladius	5	14:24	22:39
12/12/2008	9	78	26	13:06	1:00	12:06	18	290	GBA	Sphyraena barracuda	2	6:03	6:06
12/12/2008	9	78	28	13:12	1:00	12:12				HC	2	11:35	0:39
12/12/2008	9	78	28	13:12	1:00	12:12	19	291	SFA	Istiophorus platypterus	3	18:18	18:56
12/12/2008	9	78	29	13:15	1:00	12:15				HC	1	14:22	22:53
12/12/2008	9	78	29	13:15	1:00	12:15				HC	2	15:52	21:24
12/12/2008	9	78	29	13:15	1:00	12:15	20	292	YFT	Yellowfin tuna	3	17:09	20:10
12/12/2008	9	78	29	13:15	1:00	12:15	21	293	DOL	Dorade coryphène	6	13:06	0:17
12/12/2008	9	78	30	13:23	1:00	12:23	22	294	DOL	Dorade coryphène	6	0:00	12:24
12/12/2008	9	78	31	13:27	1:00	12:27				HC	6	Ntrig	######
12/12/2008	9	78	32	13:28	1:00	12:28				HC	1	5:42	6:46
12/12/2008	9	78	32	13:28	1:00	12:28				HC	2	9:58	2:31
12/12/2008	9	78	32	13:28	1:00	12:28				HC	3	9:50	2:39
12/12/2008	9	78	33	13:32	1:00	12:32				HC	4	19:00	18:32
12/12/2008	9	78	33	13:32	1:00	12:32				HC	5	13:50	23:42
12/12/2008	9	78	34	13:34	1:00	12:34				HC	4	Ntrig	######
12/12/2008	9	78	34	13:34	1:00	12:34				HC	5	Ntrig	######
12/12/2008	9	78	36	13:35	1:00	12:35				HC	3	6:28	6:10
12/12/2008	9	78	36	13:35	1:00	12:35				HC	4	11:20	1:18
12/12/2008	9	78	36	13:35	1:00	12:35				HC	5	11:50	0:50
12/12/2008	9	78	36	13:35	1:00	12:35				HC	6	13:34	0:06
12/12/2008	9	78	39	13:42	1:00	12:42	23	295	YFT	Yellowfin tuna	1	18:33	19:11
12/12/2008	9	78	39	13:42	1:00	12:42				HC	6	0:01	12:40
12/12/2008	9	78	40	13:48	1:00	12:48	24	296	SWO	Xiphias gladius	4	NA	######
12/12/2008	9	78	44	13:55	1:00	12:55	25	297	ALB	Albacore tuna	6	NA	######
12/12/2008	9	78	45	13:57	1:00	12:57				HC	1	NA	######
12/12/2008	9	78	45	13:57	1:00	12:57	26	298	GBA	Sphyraena barracuda	2	NA	######
12/12/2008	9	78	46	14:00	1:00	13:00				HC	1	NA	######
12/12/2008	9	78	47	14:02	1:00	13:02	27	299	ALX	Alepisaurus ferox	2	NA	######
12/12/2008	9	78	47	14:02	1:00	13:02	28	300	BET	Bigeye tuna	3	NA	######
12/12/2008	9	78	48	14:06	1:00	13:06				HC	2	NA	######
12/12/2008	9	78	48	14:06	1:00	13:06	29	301	BET	Bigeye tuna	6	NA	######
12/12/2008	9	78	50	14:12	1:00	13:12	30	302	SFA	Istiophorus platypterus	1	NA	######
12/12/2008	9	78	51	14:21	1:00	13:21				HC	4	NA	######
12/12/2008	9	78	54	14:25	1:00	13:25	31	303	ALX	Alepisaurus ferox	3	NA	######
12/12/2008	9	78	54	14:25	1:00	13:25	32	304	SWO	Xiphias gladius	4	NA	######
12/12/2008	9	78	56	14:29	1:00	13:29				HC	3	NA	######
12/12/2008	9	78	56	14:29	1:00	13:29	33	305	YFT	Yellowfin tuna	4	NA	######
12/12/2008	9	78	57	14:33	1:00	13:33				HC	6	NA	######
12/12/2008	9	78	58	14:35	1:00	13:35	34	306	SSP	Tetrapturus angustirostris	2	NA	######
12/12/2008	9	78	59	14:38	1:00	13:38				HC	5	20:36	18:04
12/12/2008	9	78	60	14:40	1:00	13:40	35	307	GBA	Sphyraena barracuda	1	4:14	9:26
12/12/2008	9	78	61	14:42	1:00	13:42				HC	6	20:42	18:01
12/12/2008	9	78	62	14:44	1:00	13:44	36	308	SWO	Xiphias gladius	1	14:09	0:34
12/12/2008	9	78	62	14:44	1:00	13:44	37	309	TTL	Caretta caretta	4	1:40	12:13
12/12/2008	9	78	62	14:44	1:00	13:44				HC	6	20:48	18:05
12/12/2008	9	78	64	14:55	1:00	13:55				HC	5	15:17	23:39
12/12/2008	9	78	67	14:59	1:00	13:59	38	310	ALX	Alepisaurus ferox	5	Ntrig	######
12/12/2008	9	78	67	14:59	1:00	13:59	39	311	SSP	Tetrapturus angustirostris	6	19:34	19:27
12/12/2008	9	78	68	15:05	1:00	14:05				HC	3	10:53	3:09
12/12/2008	9	78	68	15:05	1:00	14:05				HC	3	1:18	12:44
12/12/2008	9	78	68	15:06	1:00	14:06				HC	3	12:00	2:06
12/12/2008	9	78	70	15:11	1:00	14:11	40	312	FAL	Carcharhinus falciformis	1	NA	######
12/12/2008	9	78	70	15:11	1:00	14:11	41	313	FAL	Carcharhinus falciformis	4	0:02	14:14
12/12/2008	9	78	70	15:11	1:00	14:11	42	314	ALX	Alepisaurus ferox	6	3:30	10:46
12/12/2008	9	78	73	15:20	1:00	14:20				HC	1	8:19	6:02
12/12/2008	9	78	73	15:20	1:00	14:20	43	315	FAL	Carcharhinus falciformis	2	9:39	4:43
12/12/2008	9	78	73	15:20	1:00	14:20				HC	5	4:34	9:51
12/12/2008	9	78	73	15:20	1:00	14:20	44	316	DOL	Dorade coryphène	6	19:09	20:17
12/12/2008	9	78	74	15:25	1:00	14:25	45	317	DOL	Dorade coryphène	5	21:31	17:58
12/12/2008	9	78	75	15:32	1:00	14:32				HC	1	13:13	1:19
12/12/2008	9	78	75	15:32	1:00	14:32	46	318	ALX	Alepisaurus ferox	2	0:01	14:33
12/12/2008	9	78	75	15:32	1:00	14:32	47	319	SFA	Istiophorus platypterus	3	21:18	18:19
12/12/2008	9	78	76	15:38	1:00	14:38				HC	5	7:08	7:30

Longline set n° 10

Date	N° Longline	N. total basket	N° Basket	Hauling time REUNION	Diff heure local - RUN	Hauling time local	Capture n° (day)	Capture n° (cumulated)	Code Espèce	Hook triggered (HC) or species	N° Hook settled	Hook timer	Capture time local
12/12/2008	10	77	2	6:05	0:00	6:05	1	320	SSP	Tetrapturus angustirostris	1	NA	######
12/12/2008	10	77	3	6:08	0:00	6:08	2	321	LEC	Lepidocybium flavobrunneum	1	NA	######
12/12/2008	10	77	6	6:15	0:00	6:15	3	322	BET	Bigeye tuna	1	NA	######
12/12/2008	10	77	7	6:18	0:00	6:18	4	323	ALB	Albacore tuna	1	NA	######
12/12/2008	10	77	22	6:43	0:00	6:43				HC	3	NA	######
12/12/2008	10	77	28	6:51	0:00	6:51	5	324	GBA	Sphyraena barracuda	3	NA	######
12/12/2008	10	77	30	6:57	0:00	6:57	6	325	ALB	Albacore tuna	4	NA	######
12/12/2008	10	77	31	7:02	0:00	7:02	7	326	SWO	Istiophorus platypterus	5	NA	######
12/12/2008	10	77	34	7:11	0:00	7:11	8	327	ALB	Albacore tuna	2	NA	######
12/12/2008	10	77	36	7:17	0:00	7:17	9	328	SWO	Istiophorus platypterus	4	NA	######
12/12/2008	10	77	40	7:27	0:00	7:27	10	329	SWO	Istiophorus platypterus	3	9:18	22:13
12/12/2008	10	77	41	7:33	0:00	7:33	11	330	WAH	Acanthocybium solandri	3	11:56	19:39
12/12/2008	10	77	42	7:35	0:00	7:35				HC	1	6:17	1:20
12/12/2008	10	77	42	7:35	0:00	7:35	12	331	BSH	Blue shark	3	2:42	4:58
12/12/2008	10	77	42	7:35	0:00	7:35				HC	6	10:18	21:23
12/12/2008	10	77	43	7:44	0:00	7:44				HC	4	2:27	5:19
12/12/2008	10	77	44	7:45	0:00	7:45				HC	5	3:02	4:45
12/12/2008	10	77	45	7:47	0:00	7:47				HC	1	4:18	3:29
12/12/2008	10	77	45	7:47	0:00	7:47				HC	6	11:17	20:32
12/12/2008	10	77	46	7:49	0:00	7:49				HC	4	9:19	22:31
12/12/2008	10	77	46	7:49	0:00	7:49				HC	6	Ntrig	######
12/12/2008	10	77	47	7:50	0:00	7:50	13	332	BSH	Blue shark	1	5:51	1:59
12/12/2008	10	77	51	8:04	0:00	8:04				HC	4	12:05	19:59
12/12/2008	10	77	57	8:11	0:00	8:11	14	333	BSH	Blue shark	2	3:29	4:45
12/12/2008	10	77	57	8:11	0:00	8:11	15	334	ALB	Albacore tuna	3	2:53	5:23
12/12/2008	10	77	57	8:11	0:00	8:11				HC	5	7:46	0:30
12/12/2008	10	77	58	8:17	0:00	8:17				HC	5	4:09	4:09
12/12/2008	10	77	58	8:19	0:00	8:19	16	335	YFT	Yellowfin tuna	6	4:49	3:35
12/12/2008	10	77	61	8:30	0:00	8:30	17	336	BET	Bigeye tuna	4	10:30	22:03
12/12/2008	10	77	63	8:46	0:00	8:46	18	337	LEC	Lepidocybium flavobrunneum	9	4:06	4:43
12/12/2008	10	77	64	8:54	0:00	8:54	19	338	GES	Gempylus serpens	11	0:00	8:57
12/12/2008	10	77	66	9:07	0:00	9:07	20	339	ALX	Alepisaurus ferox	20	Ntrig	######
12/12/2008	10	77	67	9:13	0:00	9:13	21	340	ALB	Albacore tuna	8	2:34	6:43
12/12/2008	10	77	67	9:13	0:00	9:13	22	341	SWO	Istiophorus platypterus	19	7:11	2:11
12/12/2008	10	77	68	9:23	0:00	9:23	23	342	ALX	Alepisaurus ferox	21	0:00	9:29
12/12/2008	10	77	69	9:30	0:00	9:30	24	343	OIL	Ruvettus pretiosus	10	NA	######
12/12/2008	10	77	69	9:30	0:00	9:30				HC	21	15:33	18:02
12/12/2008	10	77	70	9:36	0:00	9:36				HC	15	15:04	18:35
12/12/2008	10	77	70	9:36	0:00	9:36	25	344	SSP	Tetrapturus angustirostris	23	15:17	18:26
12/12/2008	10	77	70	9:36	0:00	9:36				HC	24	15:02	18:41
12/12/2008	10	77	71	9:43	0:00	9:43				HC	11	3:57	5:50
12/12/2008	10	77	71	9:43	0:00	9:43	26	345	LEC	Lepidocybium flavobrunneum	19	11:45	22:04
12/12/2008	10	77	72	9:51	0:00	9:51				HC	7	7:47	2:05
12/12/2008	10	77	72	9:51	0:00	9:51	27	346	DOL	Dorade coryphène	24	0:20	9:36
12/12/2008	10	77	73	10:00	0:00	10:00				HC	3	14:48	19:13
12/12/2008	10	77	73	10:00	0:00	10:00				HC	15	4:03	5:59
12/12/2008	10	77	73	10:00	0:00	10:00				HC	16	4:04	5:58
12/12/2008	10	77	73	10:00	0:00	10:00				HC	17	4:04	5:58
12/12/2008	10	77	73	10:00	0:00	10:00				HC	18	4:05	5:57
12/12/2008	10	77	73	10:00	0:00	10:00				HC	19	4:16	5:52
12/12/2008	10	77	74	10:09	0:00	10:09	28	347	ALX	Alepisaurus ferox	7	Ntrig	######
12/12/2008	10	77	74	10:09	0:00	10:09	29	348	TST	Taractichthys steindachneri	18	Ntrig	######
12/12/2008	10	77	75	10:18	0:00	10:18	30	349	BET	Bigeye tuna	23	11:16	23:08
12/12/2008	10	77	76	10:25	0:00	10:25	31	350	BET	Bigeye tuna	11	3:43	6:47
12/12/2008	10	77	77	10:34	0:00	10:34				HC	4	7:44	2:53
12/12/2008	10	77	77	10:34	0:00	10:34				HC	5	7:44	2:53
12/12/2008	10	77	77	10:34	0:00	10:34				HC	6	3:59	6:38
12/12/2008	10	77	77	10:34	0:00	10:34				HC	11	7:46	2:52
12/12/2008	10	77	77	10:34	0:00	10:34	32	351	OIL	Ruvettus pretiosus	18	Ntrig	######
12/12/2008	10	77	77	10:34	0:00	10:34				HC	21	14:27	20:13

ANNEX 3

Agreement between SWIOFP and IEMANJA (F/V "Manohal")

EXECUTION OF AN OCEAN RESEARCH AND SURVEY CRUISE

CONTRACT NO. SWIOFP/PC/01/2008

BETWEEN:

South West Indian Ocean Fisheries Project herein after named SWIOFP,

and represented by: Dr. Kazungu, Johnson M.
Director,
Kenya Marine & Fisheries Research Institute,
P.O. Box 81651-80100,
Mombasa, Kenya.
Tel: +254-20-8021560
+254-20-8021561
Fax: +254-41-475157
E-mail: director@kmfri.co.ke

First party,

AND:

IEMANJA, Limited Liability Company (a partner in the **MANOHAL Maritime Corporation**) herein after named IEMANJA LLC and represented by its Director:

Mr. Jean Marc TATIBOUET
10, Impasse Laccassin
Pointe au sel les hauts 97436
Saint Leu, RCS Saint Pierre
485138762 Operation License Number 2005B664

Second party,

HAVE AGREED AS STIPULATED HEREIN:

ARTICLE 1- OBJECTIVE

1.1 This contract has been drawn with objective of defining the conditions in which the **IEMANJA Limited Liability Company** herein after referred to as **IEMANJA LLC** is to place at the disposal of SWIOFP the Long Liner property of MANOHAL together with its fishing system for the execution of an ocean research and survey cruise dabbed the name SWIOFP-MESOP 2008.

1.2 The program for the research and cruise survey SWIOFP-MESOP is described and outlined in Annexure 1, here-in.

ARTICLE 2 – CONDITIONS FOR LEASING OF THE MANOHAL LONG LINER

2.1 IEMANJA LLC shall put in place the following services hereafter referred to as services offered to SWIOFP:

- The MANOHAL Long Liner whose specifications are found in Annexure 3 here-in
- The fishing system inter alia, a one single wrap tow containing 1 trawl winch with at least 40,000m (Forty Thousand meters) long wrap, 1 start-up engine, 1 accelerating gear, 1 echo-sounder for detection fish shoals and barriers.
- Anchoring and safety equipment inter alia; 2 GPS systems, INMARSAT distress call system followed with CROS-ETEL (VMS) and 1 navigational radar.
- One light motorized lifeboat for possible disembarkation and for transfer of material between boats with a carrying capacity of 3 to 4 persons or a weight of 800kg (Eight Hundred Kilogram)
- Mechanisms of utilizing hydraulic and winching systems of hydraulic equipment as recommended by IRD.
- A 4 member crew to oversee the smooth running of the vessel to assure optimum functioning.
- Accommodation facilities for the persons on board, to inter alia; 1 cabin per person and meals in the dining room.
  The dining room can be used for other activities such as debriefing meetings, preparation of documents and recreation when not in use.

IEMANJA LLC affirms: (i) that the Long Liner and its specifications which have been stipulated in Article 2.1 herein above have been repeatedly observed and seen to be

working as said; (ii) that the crew members are well qualified to handle any technical work within the vessel; (iii) that the vessel and its crew are covered by all the valid and required insurances.

Annexure 2 herein shows the sharing of the costs related to hydraulic and detection operations between IEMANJA LLC and SWIOFP.

2.2 THE CRUISE PROGRAMME

The SWIOFP-MESOP 2008 survey and research cruise is scheduled to take place as indicated below:

Activity	Date
- Loading of persons and goods	27 November 2008
- Sailing from Le Port in Reunion Island to the destination through the Mozambican Channel via south of Madagascar	Morning of 28th Nov 2008
-Return to the Reunion Island, end of cruise	18th December 2008

ARTICLE 3 – MODE OF OPERATION

3.1 Research procedure

3.1.1 IRD is charged with the responsibility of appointing a leader of the research operation here-in-after referred to as IRD Chief Scientist on behalf of SWIOFP who shall be charged with responsibilities of executing all research operations and acquiring data from the cruise.

3.1.2 The research activities will be decided upon by the IRD Chief Scientist on behalf of SWIOFP in conjunction with the vessel's captain.

3.1.3 The cruise being scientific in nature limits the responsibility of IEMANJA LLC to fully avail the services discussed in article 2.1 herein above. SWIOFP consequently agrees that the responsibility of IEMANJA LLC is limited in fulfilling all the said services. It further declares that under no circumstances will SWIOFP hold IEMANJA LLC liable if any expected results of the cruise are not achieved.

3.1.4 IEMANJA LLC further commits itself to strictly observe confidentiality of all data collected on behalf of SWIOFP for the benefit of SWIOFP during the SWIOFP-MESOP research cruise 2008.

3.2 Weather conditions

The decision to continue or not of research activities by the vessel at sea due to adverse weather conditions is the responsibility of the vessel's captain.

In the case of adverse weather conditions such as those established by the vessel's captain to be so, the captain can decide to opt for a stand-by command due to adverse weather conditions as stipulated in Article 4.2 herein below.

3.3 Technical faults

The term technical fault is used herein to mean any mechanical problem that is not rectifiable and which affects the proper functioning of the MANOHAL long liner for a period of 24 consecutive hours. In the event of a technical fault, the vessel can be put on stand-by due to technical faults.

In the case of a stand-by order for a period lasting 24 consecutive hours the vessel's captain can decide to return vessel to home port.
The parties concerned can then study modalities of restructuring the calendar for the cruise owing to the long liner's availability under the direction of **IEMANJA LLC.**

In such a special case, the dispositions defined in Article 4.3 herein below shall be applicable.

3.4 Search and rescue

In the case where the MANOHAL long liner en route during the cruise is required for a search and rescue mission, the following rules shall be applicable:

- The total sum of money payable as defined in Article 4 herein below shall remain unchanged. SWIOFP shall by no means ask for a reduction of this amount from **IEMANJA LLC** whatever the duration of response to the distress call by the vessel.

- The final sum payable elaborated under the title assistance services rendered shall then be quoted by SWIOFP.

3.5 Unforeseen circumstances

The performance of this contract can be frustrated in the case of unforeseen circumstances like; strikes, piracy, war outbreaks or any other unforeseen event within its area of performance whose effects are beyond the control and responsibility of the parties to discharge their respective contractual responsibilities except for circumstances described in Articles 3.2 to 3.4 herein above.

In such a case, the parties shall act in concert to adopt the procedures of completion of the setting of the objective of the present contract and safeguarding of the committed expenditure.

ARTICLE 4 – TOTAL AMOUNT/TAX

4.1 – The total cost for the hire is estimated at **48 000** (Forty Eight Thousand) Euros without tax. This sum is however subject to modification in applying issues discussed in Articles 4.2 to 4.5 herein below:

4.2 Stand-by due to weather conditions

The vessel having left its berth and in case of a stand-by command due to adverse weather conditions as decided by the Ship's Captain, in such conditions as stipulated in Article 3.2 herein above, the total cost noted in Article 4.1 above shall be reduced by **0** Euros – Zero Euros (without tax) per day of stand-by command due to adverse weather conditions.

4.3 Stand-by due to technical faults

In the case of a stand-by command due to technical faults as is described in Article 3.3 above, the total cost noted in Article 4.1 above shall be reduced by **2 000** – Two Thousand Euros (without tax) per day of the stand-by command due to technical faults.

4.4 Extra days

In the case where extra days have to be decided upon by the SWIOFP scientific research team in order to successfully complete the envisaged work, a minimum of one and a maximum of two days are allowed. A sum of **2 500** Euros – Two Thousand Five Hundred Euros (without tax) is payable to **IEMANJA LLC** per every extra day in addition to the total amount payable and described in Article 4.1 herein above.

4.5 Tax Charges

The quotations provided in this contact are inclusive of normal V.A.T payable from the date of cruise but at the date of execution of this contract however, the rate is at **0%** - Zero Percent.

ARTICLE 5. - TERMS OF PAYMENT AND INVOICING

5.1 The total sum as described in Article 4.1 herein above and the payments discussed in Articles 4.2 and 4.3 herein above and the extra cost provided for in Article 4.4 herein above shall be paid by SWIOFP in the following conditions:

- 30% of the total amount described in Article 4.1 herein above is payable upon execution of this contract.
- 50% of the total sum defined in Article 4.1 herein above is payable upon the setting-off of the vessel
- The remaining percentage is payable upon the return of the vessel.

The payment of the 30% upon the execution of this contract shall be effected vide a bank.

In the absence of using a bank guarantee, the following conditions shall be applied:

- 10% of the total sum described in Article 4.1herein is payable at the execution of this contract.
- 60% - sixty percent at the setting off of the vessel with the crew and the SWIOFP research team
- The remaining sum at the return of vessel to Port.

5.2 **IEMANJA LLC's** invoices shall be signed by:

Mr. Jean Marc TATIBOUET
Director, S.A.R.L. IEMANJA
10, Impasse Laccassin
Pointe au Sel Les Hauts
97436 Saint Leu
GSM Tel: 06 92 87 56 41

To the SWIOFP Representative at the following address:

Regional Executive Secretary, SWIOFP
c/o Kenya Marine & Fisheries Research Institute
P.O. Box 81651-80100
MOMBASA, KENYA

Tel: +254-20-8023924
+254-20-8021560
+254-20-8021561
Fax: +254-41-475157
Email: director@kmfri.co.ke

5.3 All the payments shall be carried out by credit transfer in the following Bank Account:

Account name: S.A.R.L. IEMANJA
Bank code: 12169 (Banque de la reunion) – Bank of Reunion
Cashiers code: 00022
Account number: 51276409010 CLE RIB 32
Location:BR Saint Denis
IBAN: FR 7612169000 2251 2764 0901 032
BIC:REUBRERXXXX

Payments shall be made within 30 days of reception of invoice.

ARTICLE 6 ACCOUNTANT FOR IEMANJA LLC

For the success of this contract, IEMANJA LLC has engaged the services of the following accountant:

Mr. Patrice DALLEAU
Cap Conseils O.J
96, Ru e Raymond Mondon
97419, La Possession.

ARTICLE 7 –SHIP CAPTAIN AND CREW

7.1 The captain of the ship is responsible for its navigation and the safety of both the goods and the persons on board.

7.2 The captain shall work within the specified demands of IRD in carrying out of the operations within the scientific program such as security rules, navigational rules and functions of the long liner. He will not at anytime delegate his responsibilities of the vessel and of the operations falling under his jurisdiction to IRD.

7.2 The captain has full discretion to make any decision deemed to be necessary such as cancelling or prematurely ending a research/survey operation in the event that the weather conditions prove harmful to the safety of goods or/and of persons on board.

ARTICLE 8 – LIABILITIES – INSURANCE

8.1 Legal liability of workers vis-à-vis third party

All parties are liable according the law of damages of whatever nature of damages caused by their personnel or their property to personnel and property of third party during the subsistence of this contract.

8.2 Disclaimer of transfer of blame between parties

Under the provisions stipulated in Article 3.1 herein above, each party will be solely liable and will foot all damages accruing of whatever nature these may be to his personnel or his property and is exonerated of any blame by the other party under a formal provision which discusses personnel, the rights of the parties, their contractual rights, social security or any other related event.

ARTICLE 9 – OPERATION DOCUMENTS

From the commencement of the cruise, IEMANJA will avail to SWIOFP the following documents:
-The navigation cruise document which is to be handed over to IRD after the return of the vessel to the port of Reunion- Le Port.

ARTICLE 10 – PARTY REPRESENTATIVES

For the execution of the following contract, the representatives of the parties are:

- On behalf of SWIOFP:

  Dr. Kazungu, Johnson M.
  Director,
  Kenya Marine & Fisheries Research Institute
  P.O. Box 81651-80100
  MOMBASA, KENYA
  Tel: +254-20-8021560
  +254-20-8021561
  Fax: +254-41-475157
  E-mail: director@kmfri.co.ke

- On behalf of **IEMANJA LLC**:

Mr. Jean Marc TATIBOUET
Director, S.A.R.L. IEMANJA
10, Impasse Laccassin
Pointe au Sel Les Hauts
97436 Saint Leu
GSM Tel: 06 92 87 56 41

ARTICLE 11 – CONTRACT DURATION – EXPIARY

11.1 This contract shall commence on the date of its execution and will cease at the end of the cruise.

11.2 This contract can be rescinded by either party in the case of a breach committed by one party. Failure of one party to discharge its contractual obligations in reference to the subject of this contract should be communicated to the other party in writing but this letter shall be effective after a period of 48 hours.

ARTICLE 12 – LEGAL REPRESENTATION

In the event that there are differences arising in the performance and/or interpretation of this contract, both parties can meet to seek an amicable solution.

If a solution is not arrived at, legal advice can then be sought form the Business Tribunal of Saint-Denis, Reunion.

ARTICLE 13 – APPENDIX

Annexture 1- Cruise calendar

Annexture 2 – Description for the financial costs arrived at by IEMANJA and SWIOFP for the implementation of work relating to hydraulic equipment for the SWIOFP-MESOP 2008 research and survey cruise.

Annexture 3 – Mechanical characteristics of the vessel.

SIGNED AT: KMFRI/MOMBASA SIGNED AT: Le Port/RÉUNION

DATE: 23/10/08 DATE: 30/10/08

FOR SWIOFP: _____ FOR IEMANJA LLC: _____

SARL IEMANJA
RCS : 485 138 762
10, Impasse Lacassin - 97436 STLEU
GSM : 0692 87 56 41
MAIL : fimanohal@skyfile.com
COPRO : MANOHAL

-ANNEX 1-
CRUISE CALENDAR

The SWIOFP-MESOP research and survey cruise 2008 will take place in the Mozambican Canal in the Indian Ocean. The zone is found between the latitudes 18^0 S and 24^0 S and longitudes 37^0 E and 43^0 E will be studied during the cruise. The navigation of the vessel between Reunion Island and the zone to be studied will be under the leadership of the scientific research team on board.

Two operations will be carried out in the course of this cruise:

Hydraulic Operations
Parallel to any fishing operation, a hydraulic station will be established with the help of the bathymetric vessel SEABIRD Seacat SBE19Plus.

Fishing
Fishing activities will be carried out using a trawler loaded on board. Each fishing expedition will be executed after careful study of the data collected form the zone of study using the oceanographic vessel <Fridtjof Nansen> which will be operating simultaneously in the zone of study. With each fishing operation, 500 nets will be launched in water. Each basket will be fitted with a timer and 50% to 70% of the fishing baskets are fitted with frequency observing radars. GPS buoys will be fitted at the ends of the fishing lines so as to precisely record the movement of the water masses during harvest.

Each catch will be studied by the scientific team on board and the parts which are necessary and important in biological study removed (intestines, liver, bone marrow, verterbral colomn) before the catch is handed over the ship's crew.

-ANNEX 2-

Breakdown of cost sharing of the execution of the hydraulic and fishing operations between IRD and IEMANJA LLC during the SWIOFP-MESOP 2008 cruise campaign

Hydraulic operation

IEMANJA LLC is responsible for fitting in the vessel a hydraulic system capable of lifting weights of up to 500kg. This system should be fitted with a pulley having an inox cable 500m long. This cable will also be used to lower the bathymetric vessel SEABIRD Seacat SBE19Plus.

IRD will provide the cable, the motorized pulley and the bathymetre SEABIRD Seacat SBE19Plus.

Fishing

MANOHAL is responsible for providing the necessary foods to be used as baits during the fishing operations, the fishing lines preferable those with circle hooks as well as lights for night fishing operations.

-ANNEX 3-

SHIP'S SPECIFICATIONS

Type of vessel: Long Liner
Name of vessel:.....
Name and address of construcstor: EUJIAN Ship Building Industry Group – CHINE
Country of manufacture and year of manufacture: CHINE - 2006
Placed in water on:.....
Interior pavillion:.....**Import of:**Chine
Importing office: LE PORT _____ **Date:** 22/05/2007
Location of first francisation: LE PORT **Date:** 14/12/2007
Port of base: LE PORT **Registration number:** C0629
Maritime region: REUNION **Plate number:** RU 909673
Category: _____
Use of vessel: Deep sea fishing
Mode of propulsion: Mechanical

SPECIFIC SPECIFICATIONS

Valuation certificate given at: Gillet Date: 04/06/2007
Vessel made of: STEEL Number of : Masts: _____
Number of bridges;.....
Overall length:.....23.90 meters
Overall length(international certificate):.....*metres.*
Widest width:.....7.40 ***meters***
Middle height:.....3.80 ***meters***
Carrying capacity:.....***tonnes.***
Gross weight(international certificate).....165 UMS
Net weight(international certificate: .....49 UMS
Gross weight (national certificate): ..... Tons
Net weight (national certificate):..... Tons

ENGINE SPECIFICATIONS

Engine make: .....
Make:.....
Output:.....
Voltage:.....
Emergency engine (voltage): .....

OTHER INFORMATION

Number of crew members:..... Passengers: .....
.....
.....

Vessel's owners		
Name and surname or company nationality	Contact address	Shares (%)
MANOHAL is made up of:	47,Evaristus Parumy Street, P.O. BOX 295 97827- Port of Cedex	
1.SCOPAR	47, Evariste Parumy Street, P.O. Box- 295 97827-Port of Cedex	2%
2. SOFiRUN	47, Evariste Parumy Street, P.O. Box- 295 97827-Port of Cedex	49%
3.IEMANJA	10,Impasse Lacassin-Pointe au Sel les Hauts 97436-Saint Leu	49%