The first year of SEALOR : Database of SEA-going observer surveys monitoring the local pelagic LOngline fishery based in La Reunion

Bach Pascal [1], Njaratiana Rabearisoa [1], Theo Filippi [1] & Séverine Hubas [1]

Abstract : This study is a preliminary presentation of the observer program carried out under the French National Database Plan (PNDB). In 2007, from April to December, and from July in 2008, one or two observers of the Institut de Recherche pour le Développement (IRD) embarked on board pelagic longliners based in La Reunion. In order to implement this observer program, sampling forms were developed as well as the database SEALOR. To date, a number of 58 fishing operations totalizing 63525 hooks were observed on different fishing units with an overall length ranging from 9 m to 25 m (10 and 2 cruises were done in 2007 and 2008, respectively). All fishing units target swordfish and then develop a similar fishing strategy regarding the setting time, the hauling time, the type of bait, the deployment of the mainline, the use of lightsticks, .. . A descriptive analysis of a subsample of the data collected in 2007 highlights differences between landings (i.e. logbook data) and catches. If the number of species in landings is less than 10, at least 38 identified species were observed by observers with 1 species of sea turtle and of seabird (1 individual per species for each). The proportion of the weight of swordfish as the target species in major landings concerning tuna (Thunnus albacares, T. alalunga and T. obsesus) and swordfish is about 33%. For the same assemblage the proportion is about 37.9% from data collected on board (26.7% in number). Now regarding the number of swordfish caught compared to the total number of catches the proportion decreases to 17.1% and 44.6% are tunas. The proportion of bycatch (considering that swordfish and tuna species can be targeted at the same time) in observer samples reaches about 40%. A part of these bycatch such as the dolphinfish and billfishes are landed and commercialized (about 42% of bycatch in number) and the rest (26% of the total number of capture) is discarded alive, exhausted or dead. In our data, 31% of discards were blue sharks.

Keywords : European Union data collection regulation, observer, onboard sampling, database, pelagic longline, La Reunion, bycatch, sharks

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1. Introduction

The systematic collection of reliable basic data on fisheries is a cornerstone of fish stock assessment and scientific advice, and consequently is of critical importance for the implementation of the Common Fisheries Policy (CFP).

In this view, a legal Community Framework for the collection and management of the data needed to conduct the CFP was established. The first community framework was put in place in 2000 with the adoption of a Council Regulation (EC) N° 1543/2000 of 29 June 2000 and a Council Decision (EC) N° 439/2000 of 29 June 2000, followed in 2001 by a Commission Regulation (EC) N°1639/2001 of 25 July 2001, amended in 2004 by Commission Regulation (EC) N° 1581/2004 of 27 August 2004 laying down the detailed rules of application. In order to implement new approaches to fisheries management a new regulation has been recently adopted (Council Regulation (EC) No 199/2008 of 25 February 2008 concerning the establishment of a Community framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the Common Fisheries Policy). Such approaches include the transition from fish stock-based management to a fleet- and area-based management as well as the ecosystem-based approach (EAF).

In this context, since 2000 a national database plan has been implemented by the "Direction des Pêches Maritimes et de l'Aquaculture". This plan aims to collect information about fishery characteristics that cannot be recorded from fishing logbooks, sampling in port and off-loadings.

Two French institutes, IRD (Institut de Recherche pour le Développement) and IFREMER (Institut Français de Recherche pour l'exploitation de la mer) undertook to manage this collection of activities for the French fisheries, temperate fisheries for IFREMER and tropical fisheries for IRD. Thus, since 2005 IRD has in charge the observer program in order to estimate bycatch and discards (species, quantities in number and weight, length distributions) of French purse seiners in both the Atlantic and Indian Oceans with a cover rate of days at sea of 10% for each ocean (Viera & Pianet, 2006). In addition, detailed information on the purse seining activities, FAD deployments in particular, are collected.

Till 2001, the activity of longliners based in La Reunion was known through the analysis of logbooks delivered by captains to follow the capture of species targeted by the fishery, i.e. mainly the swordfish (Miossec & Taquet, 2004; Jean *et al.*, 2006; Bourgea & Evano, 2008). The observer program included in the NDBP framework and supported

by E.U. funds started in March 2007. The bulk of these WP are descriptive. It gives a preliminary presentation of both the database elaborated to gather information collected on board, a quick view of information archived and a brief analysis of contribution of bycatch in the total catch composed by the target species, the wanted species, marketable bycatch, bycatch kept on board for self-consumption and discards.

2. Material and Methods

At the beginning, we had to develop all the practical aspects of the project from the design of forms to fill by observers to the structure of the database. In this context, we took into account the great experience accumulated in the South and Central Pacific to monitor longline activities of foreign fleets in local EEZ or the Hawaiian longline fleet (http://www.spc.int/OceanFish/Html/Statistics/Forms/index.htm; Anonyme, 2006; Beverly et al., 2003). Moreover, experience gained at sea during instrumented longline surveys was useful to quantify both the type and the volume of information to collect (Bach et al., 2003).

Observer forms

When aboard a pelagic longline vessel, observers collect accurate information during longlining operations (setting and hauling) following instructions on the data collection forms.

- *Trip characteristics form*

Observers report here the specifics of the fishing trip: their name, the vessel and the operator name, the departure and the arrival date, and the port of departure and arrival.

- *Longline fishing gear characteristics form*

This form is a record of longline fishing gear configuration. The data on this form are used to describe specific parts of the gear deployment strategy. Captains or fishing masters may occasionally change the deployment strategy according to both local conditions and targeted species. This data can be used with other observer collected data elements to determine the effects on the catch of protected species as well as target species. Amongst information requested are descriptors and/or indicators of the fishing effort (total number of hooks set, the number of baskets, the number of hooks per basket), the fishing efficiency (hook type and bait species used, …), the setting strategy (straight or zigzag, longline cut or not…), both floatline and branchline length.

- *Longline set and haul information form*

This form is used to record data about set and haul parameters of longline sets such as the date and the time when the setting and hauling operations start and end,

and the latitude and longitude at the beginning and at the end of the setting and hauling operations.

- *Catch event form*

Observer records on this form data related to all fish caught during the fishing time. In the ideal situation, each fish is recorded in the order of its position on the mainline (the number of the section, the number of both the basket and the hook). Information reported for each individual are: species, capture status (dead, exhausted or alive), its disposition (kept to be commercialized, kept for self-consumption, discarded). In the case of depredation events, the predator is noted if possible (marine mammal identified or not, unknown shark in general, *Isistius brasiliensis*, squid…). Data related to fish measurements and biology are also required: size (several sizes can be collected), weight, sex, gonad maturity. Biometric data to collect are selected regarding the volume of catches to sample.

- *Depredation events form*

This form is used to report information about depredation affecting catch: observers record the number of damaged fish per species and per depredation type.

- *Basket information form*

This form enables observers to report data about basket configuration, such as the set duration, the number of hooks deployed and the position of TDR along the longline and on the basket. In general the TDR is attached at the mid length of the mainline which corresponds to the deepest point, i.e. the maximum fishing depth.

- *Protected species observation or capture form*

This form is a record of data related to the observation or the catch of any protected species such as birds, marine mammals or turtles. In addition of the species encountered or captured, information required here are the group size and the vessel activity during the observation (setting, hauling or soaking operation).

Instrumentation deployed

- *Fishing depth and temperature records*

At the beginning of the program, 25 TDRs were bought in order to deploy at least 10 TDRs per set when two observers were on board at the same time. Currently, 35 TDRs are available (Model Data Storage Tag - centi from Star Oddi , http://www.star-oddi.com/Temperature_Recorders/Data_Storage_Tags/, and Model P2T600 from NKE Electronics, http://www.nke.fr/prod.php?rs=ins&fam=19) and deployed regularly during monitoring cruises.

- *Geolocation records of the longliner and the mainline*

The second type of instrumentation deployed by observer is a GPS antenna connected to a datalogger. This system allows recording the geographical position of the boat every 5 minutes. Further analyses of these data will be carried out to classify time periods regarding boat speeds and to compare this classification with fishing activities noted in the observer report. Are there speed group differences corresponding to differences in exploitation patterns and fishing strategies.

Moreover, in a second stage, this system will be deployed as drifting buoys on the longline to quantify variations of the longline shape during the fishing time.

Database

An Access ® database was built to store information collected by observers during fishing operations. Data recorded here are based on the information reported on the forms described above. The database is organized around three groups of tables that hold different records of data. Relations between the main tables are shown on the Figure 1.

Fishing operations

- The table "Trip" contains information related to the specifics of the fishing trip (data recorded here are those recorded on the Trip characteristics form). Each trip is identified by the TripID.
- The table "Longline" stores information collected on the Longline fishing gear characteristics form. Each set is identified by its SetID.
- The table "Setting" records data about the longline geographic positions at the beginning and at the end of the setting operation (and the corresponding times)
- The table "Hauling" records data about the longline geographic positions at the beginning and at the end of the hauling operation (and the corresponding times). That information are collected on the
- Longline set and haul information form.

Capture

- The table "Individual catch" contains information about each catch and is related to the Catch event form. Each capture is identified by a Capture_No.
- The table "Biometry" stores information about fish measurements and biology.
- The table "Hook timer" stores data recorded by hook timers. Each record is identified by an automatic number. If a hook timer is associated to a capture, the capture number (Capture_No) is entered.

- The tables "Protected species capture" and "Protected species observation" store data related to the Protected species observation or capture forms.

Environmental data

- The table "Basket" stores information collected on the Basket information form. Each basket is identified by a BasketID. If a TDR was set on a particular basket, its number is stored in the field "No_TDR".

- The table "TDR" stores data recorded by TDR devices (Temperature Depth Recorder). Each record is identified by the combination of the BasketID, TDR number, date and time.

- The table "Data_logger_trip" stores the geographic location of the boat recorded by the data logger during the whole trip. Each record is identified by the combination of the TripID, date and time.

- The table "Data_logger_set" stores the geographic location of the longline recorded by the data logger between the setting and the hauling operation. Each record is identified by the combination of the SetID, date and time.

- The table "Data_logger_basket" stores data (geographic location of the basket) recorded by the data logger between the setting and the hauling operation of the basket. Each record is identified by the combination of the BasketID, date and time.

- The table "ProbeProfile" stores data recorded by a CTD (conductivity temperature and depth) probe. The probe profile allows us to calculate different physical parameters: temperature, depth, salinity, fluorimetry, quantity of dissolved oxygen, irradiance and turbidity. A CTD probe is associated to a set.

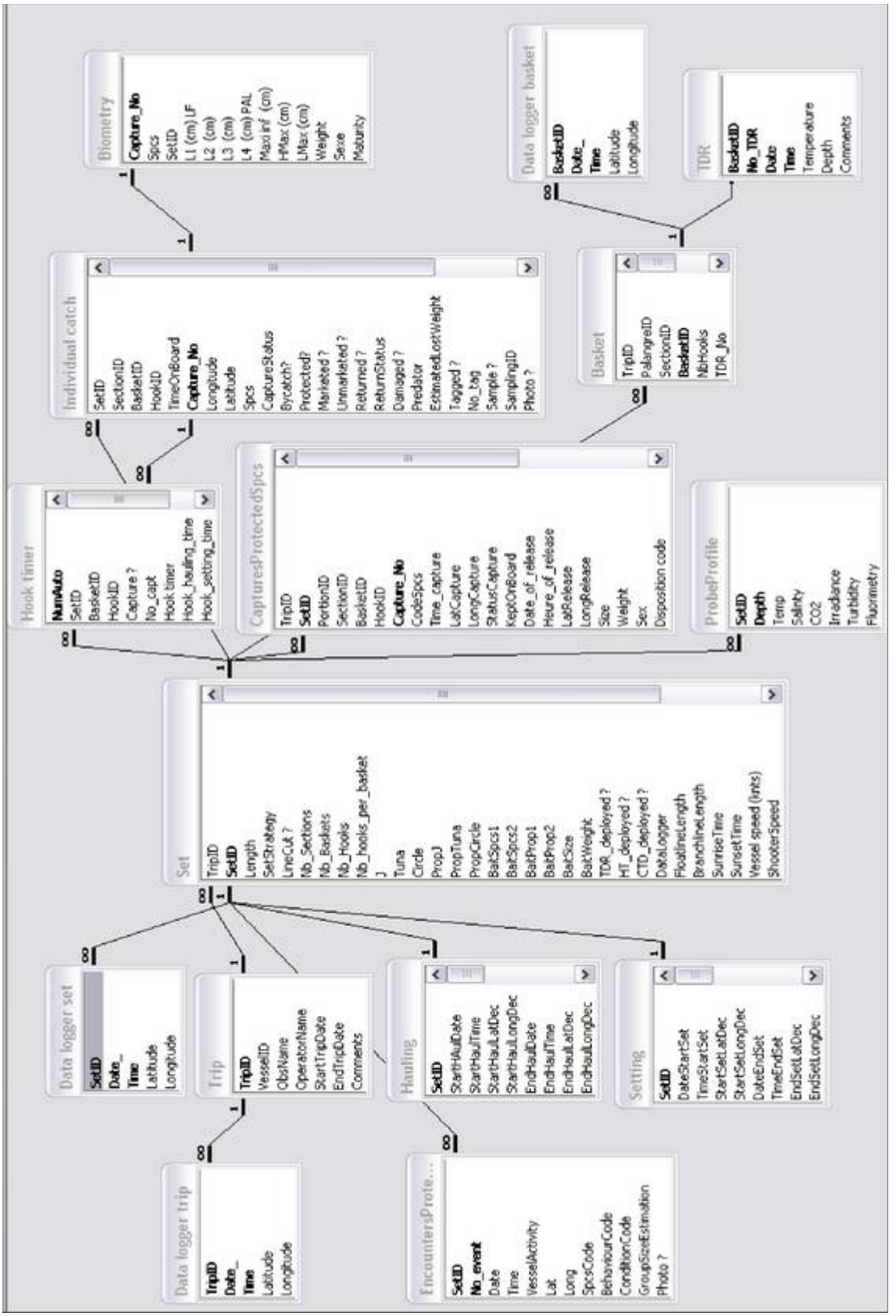

Figure 1. Relation between the main tables of SEALOR Database

3. Results

Principal features of the local longline fishery in 2007

The longline fishery based in La Reunion is represented by a fleet of 45 fishing units in 2007. If the major part of the fleet is composed of medium size boats (overall length ranged from 10 m to 17 m), the year 2007 was characterized by the arrival of six large fishing units of 24.90 m LOA (Fig. 2). In 2007, this fleet landed 3400 t by deploying a fishing effort of 4 million hooks (Fig. 3). From the beginning of the fishery to now the swordfish is still targeted even if its catch rate has decreased. Indeed the catch composition of landings which was 2/3 of swordfish and 1/3 of tunas has shifted to 1/3 for swordfish and 2/3 for tunas even if the general traits of the fishing strategy (hook, bait, fishing time period, maximum targeted depth) stayed quite stable.

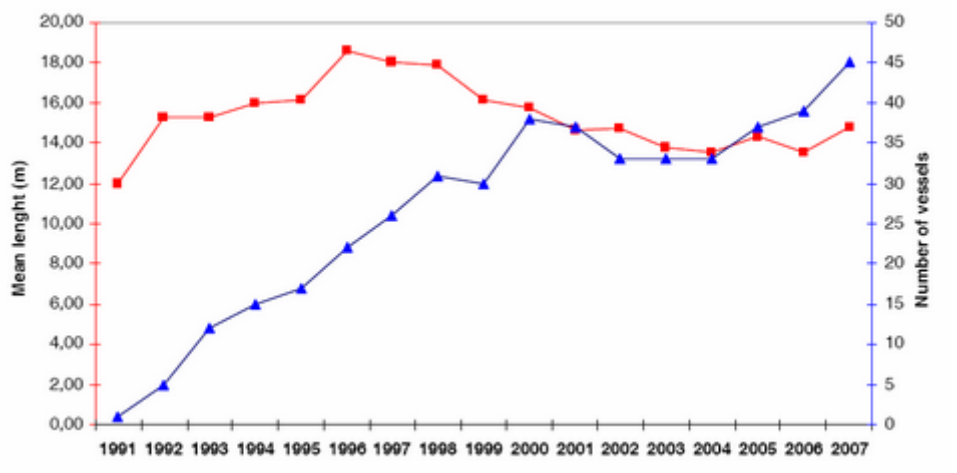

Figure 2. Time series of the number of fishing units (blue triangle) and the average size of a fishing vessel (red line) for the longliner fleet based in La Reunion (from Bourjea & Evano, 2008).

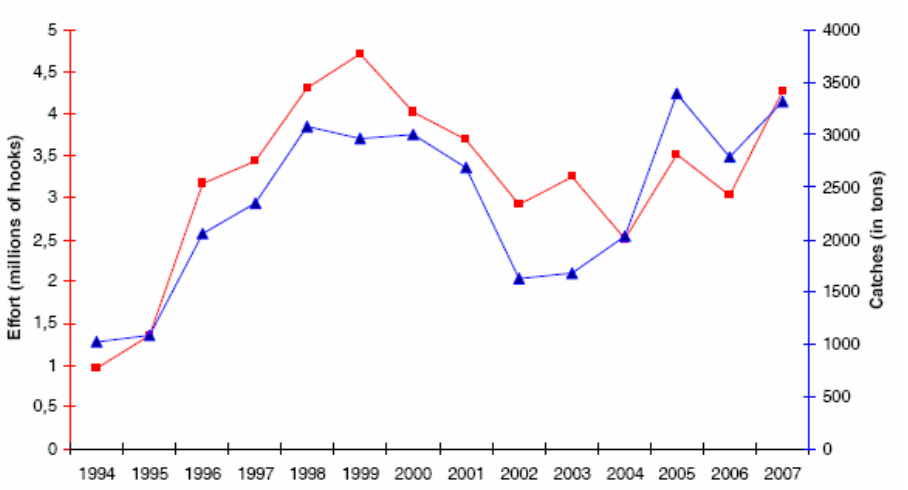

Figure 3. Time series of total catches (blue line) and fishing effort (number of hooks, red line) for the local longline fishery based in La Reunion (from Bourjea & Evano, 2008).

Fishing operations observed in 2007 and 2008

The program based on onboard sampling on local longliner started in April 2007. It stopped in November 2007 and started its activities again in July 2008 after the recruitment of a trained observer. In 2007, 44 fishing operations were recorded in SEALOR. The objective of onboard sampling of longlining cover rate was 5% in terms of fishing sets which represents the cover level for the French purse seiners in the Atlantic and Indian Oceans (Viera A. & R. Pianet, 2006). This objective could not be reached in 2007 and the situation will be the same for 2008. The cover rate for the different longlining activity criteria was about 2% in 2007 and the same level can be expected for 2008 (Table 1). However, the experience gained during this year and a half allows us to determine a reasonable level for the cover rate at about 3% of the number of hooks deployed (i.e. 120000 hooks regarding the fishing effort in 2007).

Fishing sets described in this study ranged from 1 day (coastal longliners with a length less than 9 m) to 20 days at sea (biggest longliners of the fleet with LOA ranging from 22 m to 25 m). The geographical location of the fishing sets observed by observers on board are presented in figure 4. Fishing sets are distributed in the south west part of the Indian ocean which corresponds to the traditional longlining area of the fleet (Poisson & Taquet, 2001).

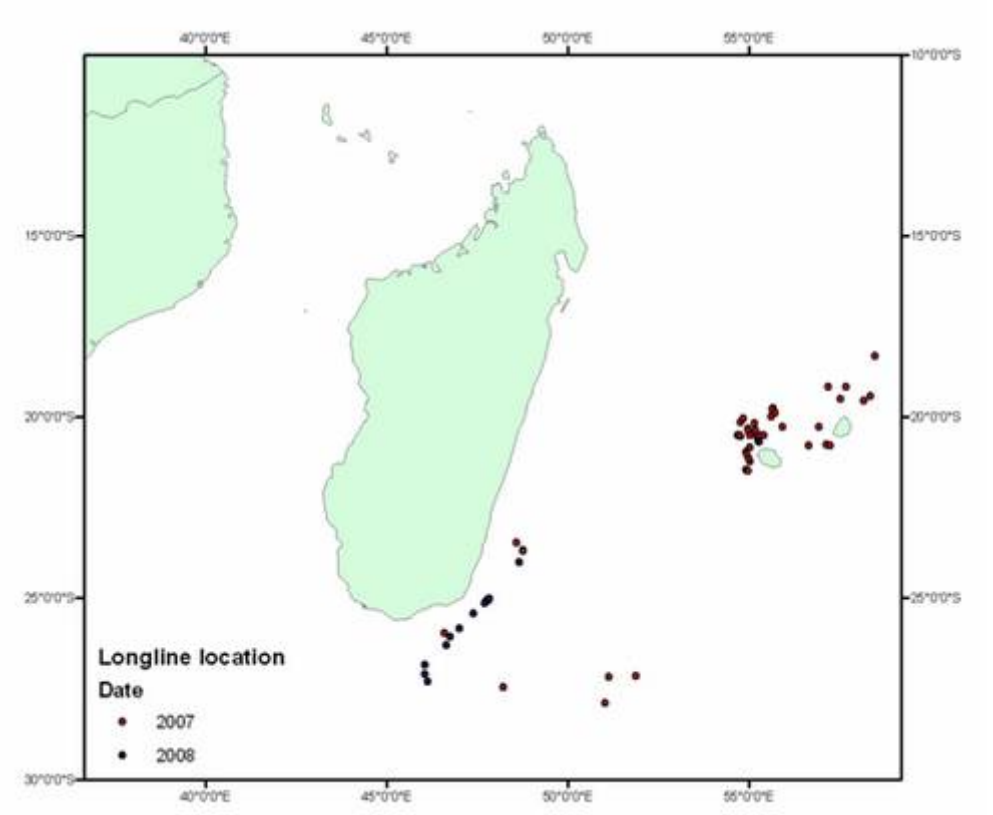

Figure 4. Spatial distribution of fishing operations sampled by observers in 2007 and 2008

Table 1. Cover rate of observer surveys regarding different longlining activities in 2007 and 2008.

	2007		2008	
	Objective (5%)	Sampled	Objective (5%)	Sampled (*)
Trip	24	10 (2%)	NA	2
Fishing sets	139	44 (1,6%)	NA	14
N. hooks	200000	46984 (1,6%)	NA	16541
Landing (t)	139	NA	NA	

(*) surveys realized in July and August 2008

List of species observed during fishing operations

To date, 38 species were identified within a list of 42 species and group of species. Among these species we note the presence of 1 seabird species (*Catharacta lonnbergi*) and 1 sea turtle species (*Dermochelys coriacea*) accidentally caught. Unfortunately the seabird was dead while hauling but the sea turtle entangled in both the mainline and a branchline was released alive (Table 2).

The group of elasmobranchs is well represented with 10 species of sharks and 3 species of rays and it is not surprising that the dominant species in catches are the blue shark (*Prionace glauca*) and the pelagic stingray (*Dasyatis violacea*).

Target species and main landings (2007 surveys only)

The weight proportion of the target species in the main landings is estimated at 38% from observer data. This value is comparable to the 33% of swordfish in landings declared in logbooks. Then it must be noted that the distribution of catches woth a ratio of 2/3 – 1/3 for swordfish and tuna group respectively observed at the beginning of the fishery shifted to 1/3 – 2/3, the target species being now less attractive and/or less abundant. The tuna group became dominant (62% of landings in weight with these data and 73% in number); however the specific contribution of tuna species depends on the location of fishing grounds (Bourjea & Evano, 2008).

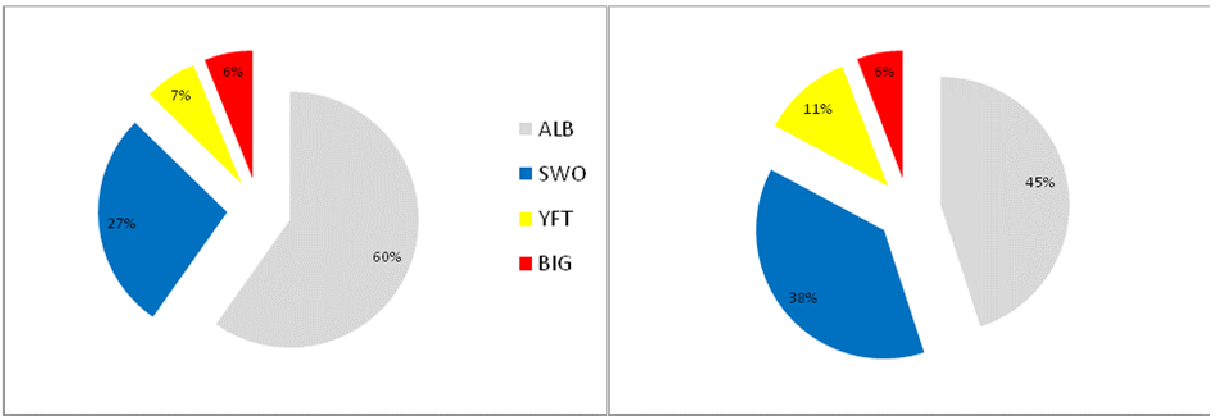

Figure 5. Proportion of the target species (swordfish) and wanted species (tuna species) in the main landings (in number on the left, in weight on the right) in 2007.

Landings in the total catch (in terms of number of individuals, 2007 surveys only)

In 2007, observer surveys (44 fishing operations) contributed to the sampling of 1428 fishes. Among them 62% are considered as target (swordfish) or wanted (tuna) and 38% concerned bycatch (here we considered as bycatch all species different from the target and wanted species even if they represent a marketable catch). Among these bycatch, two species represent about 55% of individuals, the dolphinfish (36,8%) and the blue shark (17,9%). However, among these bycatch some individuals are marketable or kept for self-consumption, they represent 42% of the total bycatch. Finally, 58% of the bycatch is discarded and the blue shark represents 30% of these discards. Further analysis of these discards will be carried out, however we can briefly mention the principal reasons for discarding : fish damaged due to depredation by marine mammals and sharks (Rabearisoa, 2007; Romanov et al., 2007), fish cannot be stored with others catches (the case for some sharks individuals and species, Anonyme fishing master, Pers. Com.); species with a very low commercial value (case for pomfrets, escolar, oilfish), high grading (discards of a marketable species in order to retain other species of higher value or to stay longer in a productive fishing ground) and capture prohibited by law.

Table 2. List of species, number of individuals caught and measured by species, recorded in the SEALOR Database for 2007 and 2008 observer surveys.

		2007		2008	
ScientificName	Status	Capture	N. measured	Capture	N. measured
Acanthocybium solandri	BY/KCA	11	6	1	1
Alepisaurus ferox	BY/D	50	4	14	12
Alopias vulpinus	BY/D			1	1
Brama brama	BY/KA or BY/D			1	1
Catharacta lonnbergi (seabird)	BY/D	1	0		
Carcharhinus amblyrhynchos	BY/D	16	2	3	3
Carcharhinus falciformis	BY/D	12	1	1	1
Carcharhinus longimanus	BY/D	8	3	1	1
Carcharhinus melanopterus	BY/D	1	0		
Coryphaena hippurus	BY/KCA	195	47	68	65
Cubiceps gracilis	BY/D	1	1	1	0
Dasyatis pastinaca	BY/D	15	5		
Dasyatis ushiei	BY/D	6	0		
Dasyatis violacea	BY/D	23	0	26	1
Dermochelys coriacea (sea turtle)	BY/D	1	0		
Desmodema polystictum	BY/D	1	0		
Euthynnus affinis	BY/KA	1	0		
Gempilus serpens	BY/D			11	10
Istiophorus platypterus	BY/KCA	10	1	4	4
Isurus oxyrinchus	BY/KC or BY/D			2	1
Isurus paucus	BY/KC or BY/D	7	6		
Katsuwonus pelamis	BY/KA	1	1		
Lepidocybium flavobrunneum	BY/D			5	5
Makaira nigricans	BY/KC	6	0	1	1
Masturus lanceolatus	BY/D	1	0	3	0
Mola mola	BY/D	5	2	1	0
Prionace glauca	BY/D	95	22	32	3
Pseudocarcharias kamoharai	BY/D	2	0	5	5
Ruvettus pretiosus	BY/D	25	14		
Sphyraena barracuda	BY/D	4	1		
Sphyrna mokarran	BY/KCA	1	0		
Tetrapterus angustirostris	BY/KA	3	2		
Tetrapterus audax	BY/KC	7	4		
Thunnus alalunga	T2	549	275	72	72
Thunnus albacares	T2	57	39	50	50
Thunnus obesus	T2	45	37	291	278
Thunnus spp	T2	7	0		
Thyrsites atun	BY/D	7	2		
Unknown fish	BY/D	11	1		
Unknown ray	BY/D	1	0		
Unknown shark	BY/D	2	0	2	2
Xiphias gladius	T1	240	144	135	133
	TOTAL	1428	620	731	650

T1 = target species, T2 = wanted rather than target, BY = bycatch, KA = kept for self-consumption, KC = kept for commercialization, KCA = kept for commercialization or self-consumption, D = discarded.

Observer survey versus logbook data (subsample of 2007 surveys)

A comparison between logbook declarations and data collected by observer was carried out for a subsample of trips sampled in 2007. It is not surprising that a large difference is to be observed for the undeclared catch and for this subsample we can note that the relative abundance (number) of the undeclared group is similar to those of the capture landed (Figure 6). However, differences between logbook data and observer data exist for marketable species such as swordfish and tuna. Even if these differences are quite low, this observation deserves a particular attention and an analysis must be done to determine if some practices developed by fishermen could introduce or not a significant error in the capture of targeted and wanted species.

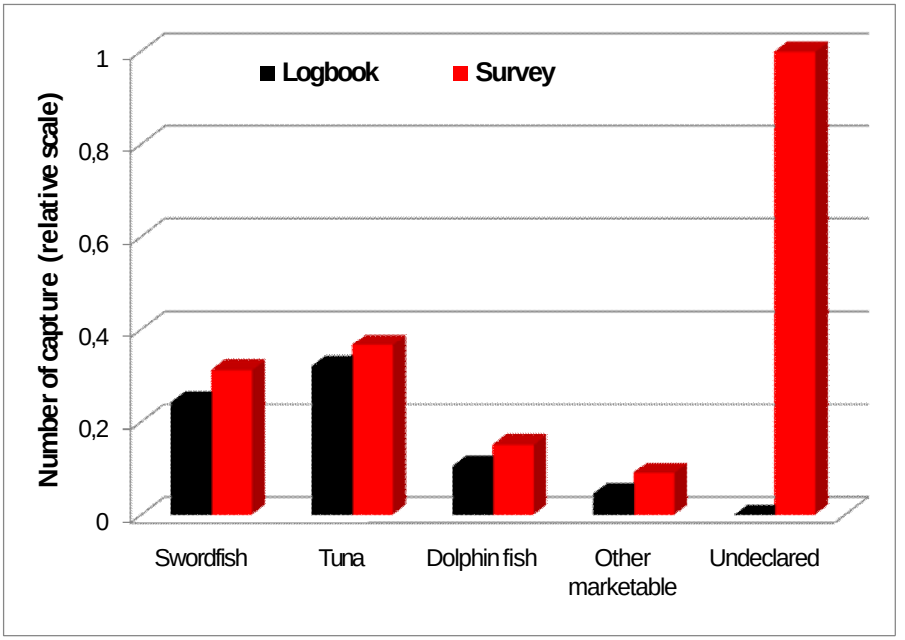

Figure 6. Comparison of the relative abundance (number) of capture declared on logbooks and sampled by observers for different group of species.

4. Discussion

The observer program of the longline fishery based in La Reunion can now be considered as operational. Stakeholders have worked in cooperation to accept observers aboard. Sometimes fishermen were reluctant to have observers on board because of sensitive bycatch issues. However, the deployment of instruments such as temperature depth recorders on the mainline while fishing was of interest for the professionals. Even if observers embarked for the program are fisheries biologists, they need an in-depth training to collect the baseline data before going on board. These baseline data regroup information regarding fishing strategy, catch monitoring as well as interactions of the longline and/or capture with marine mammals, seabirds and sea turtles. The longline fleet in La Reunion is mostly made up by small boats with about 65% of fishing boats having a LOA ranging from 10 m to 17 m. In these conditions the monitoring work on-board must be considered as both arduous and

dangerous. Moreover, the characteristics of both fleet and fishery do not allow a well defined design-based survey. On the contrary our sampling strategy was opportunist and we will stay with the same design in the future. This type of fleet represents typically "a field" where alternative monitoring methods could be tested. Among these methods, the video monitoring system has been proposed (Gilroy *et al.*, 2000) but it seems not yet capable of multi-species monitoring. Then in an ecosystem-based approach to manage fisheries on-board, observers collect valuable scientific information on population (length data, weight, sex, stomach contents, parasites, genetic samples, …), community (determination of species and abundance of each of them, status of individuals removed from the sea, observations of others animals interacting or not with the longline such as seabirds, sea turtles, marine mammals), ecosystem (physical & biological environment, pollution events) , fishing practices (gear characteristics, fishing methods, measures of the maximum fishing depth by deploying TDR [1]) and commercial practices (species and individuals kept on board, self-self-consumption, high grading).

In 2007, the cover rate of the fishing activity in terms of number of hooks sampled was 1.6% (about 47 000 baited hooks). This rate is quite low and a reasonable value of 3% could be reached in 2009 depending on the availability of well-trained observers. However, the structure of the fleet essentially composed of small and medium size boats does not allow to expect an increase of the number of surveys at sea up to 3% of coverage.

The brief descriptive analysis of collected data highlighted the fact that the target species was not the dominant species in landings in which the tuna group as wanted species represents about 66%. A similar trend is observed for the local Seychelles longline fishery during some periods (V. Lucas, Seychelles Fishing Authority, pers. Comm.). Explanations of these landing shifts are needed in particular the hypothesis of the reduction of the stock level of the swordfish in the south west part of the Indian Ocean must be considered seriously.

Except both target species and wanted species, the other part of catches is bycatch. In general, locally based longline fisheries do not practice high grading and then a large part of the bycatch is commercialized or conserved for self-consumption. The comparative analysis of logbook data (declared capture) with a subsample of observer data corresponding to these declarations shows a high level of undeclared catches suggesting the importance of the self-consumption. However, a large part of these undeclared catches are discarded. Some species such as pomfrets, lancetfish, oilfish, escolar, … are discarded dead in most cases. In the catch sampled in 2007, the shark group represents 46% of discards and the blue

[1] - This information is crucial in the longline standardization CPUE framework. The number of hooks per basket (HPB) is a robust proxy of the maximum fishing depth (MFD) for traditional longline. Nowadays the multifilament longline is abandoned and for nylon monofilament or other new material the well-known number of hooks between floats (HBF) cannot be used as a proxy of the MFD. The deployment of TDRs by observer and/or fishermen should be proposed as a recommendation by RFMOs (Bach et al., 2005; 2006).

shark as dominant species in this group contributes for 6,7% of total catches. In general, sharks are rejected alive because of their high survival capacity after hooking (Boggs, 1992). However the knowledge of the mortality of these individuals is an important issue in fisheries management because it is not estimated and represents a large source of uncertainty in stock level estimations (Davis, 2002).

Nowadays, bycatch is a conservation and management problem of global and regional significance. This question of conservation becomes more sensitive for the marine megafauna exploited by open fisheries or in interactions with them (Lewison *et al*., 2004). Uncontrolled by-catch can decrease the sustainability of resources and the net benefits provided by the fisheries in several ways. Then, the management of fisheries in an ecosystem-based approach cannot dispense with the estimation of bycatch levels. Observer programs are particularly well adapted in this way. Moreover, faced with the task of reducing bycatch, research must be implemented to evaluate the effects of both gear technology change and measures to minimize the capture of non-target species (Hall et al., 2000). These last ways of thinking proposed to reduce bycatch are the core of the E.U. research project MADE, which is focused on mitigation of adverse impacts of open ocean fisheries targeting large pelagic fishes (Dagorn et al., 2008).

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ANNEXES

SAMPLING FORMS OF THE LONGLINE OBSERVER PROGRAM BASED IN LA REUNION

DCR – LA REUNION LONGLINE OBSERVER PROGRAM

FORM LL1

PROJET CAPPER - Fiche d'information sur l'opération de pêche				
NOM BATEAU	OBSERVATEUR	NOM MAREE	DATE	N° PECHE

CARACTERISTIQUES APPAT		
Espèce	Taille individuelle moyenne (cm)	Poids individuel moyen (kg)

STRATEGIES DE PECHE
Stratégie filage
Profondeur max ciblée (m)

CARACTERISTIQUES ENGIN				
Longueur ligne-mère (m)		Longueur avançons (br)		Longueur orins (br)
Nb sections	Nb baskets	Nb basket/section	Nb hameçons	Nb hameçons/basket

INSTRUMENTATION			
HT	TDR	CTD	Nb cyalumes

HAMECONS DEPLOYES		
Circle	Tuna	J

COMMENTAIRES

DCR – LA REUNION LONGLINE OBSERVER PROGRAM

FORM LL2

PROJET CAPPER - Fiche d'information sur les positions		
NOM MAREE	N° PECHE	1ère gonio filée = 1ère gonio virée ?

Heure début filage
Heure fin filage

Filage Date (JJ/MM/AA) :				
Heure locale	Latitude dd° mm.mmm'	N/S	Longitude dd°mm.mm	E/W

Heure début virage
Heure fin virage

Virage Date (JJ/MM/AA) :				
Heure locale	Latitude dd° mm.mmm'	N/S	Longitude dd°mm.mmm'	E/W

COMMENTAIRES

ANNEXES

SAMPLING FORMS OF THE LONGLINE OBSERVER PROGRAM BASED IN LA REUNION

DCR – LA REUNION LONGLINE OBSERVER PROGRAM

FORM LL3

PROJET CAPPER - Fiche d'information sur FILAGE des baskets

NOM MAREE	N° PECHE	DATE FILAGE

Vitesse bateau (nds)

Vitesse lanceur de ligne		
knt	m/mn	slack (s)

Filage					Virage	
N° section	N° Basket	Durée filage	Nb hameçons	N° TDR	N° section	N° Basket

Filage					Virage	
N° section	N° Basket	Durée filage	Nb hameçons	N° TDR	N° section	N° Basket

COMMENTAIRES

DCR – LA REUNION LONGLINE OBSERVER PROGRAM

FORM LL4

PROJET CAPPER - Fiche d'information sur VIRAGE des palangres

NOM MAREE	N° PECHE	DATE VIRAGE

CAPTURE	COMMERCIALISES		NON COMMERCIALISES		REJETS		DEPREDATES		PERTE EN POIDS
					VIVANTS	MORTS	REQUINS	CETACES	
Espèce	Nombre	Poids	Nombre	Poids	Nombre	Nombre	Nombre	Nombre	

ANNEXES

SAMPLING FORMS OF THE LONGLINE OBSERVER PROGRAM BASED IN LA REUNION

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FORM LL5

PROJET CAPPER - Fiche d'information sur VIRAGE des palangres

Espèce	N° section	N° basket (section)	N° basket (palangre)	N° hameçon	L1 (cm)	L2 (cm)	L3 (cm)	L4 (cm)	Sexe	Poids	Statut (M/V)	Etat (C/V/C/REJ)	Dep (O/N)	Si dep. prédateur	Echantillon prélevé (O/N)	N° TDR

IRD Institut de recherche pour le développement

DCR – LA REUNION LONGLINE OBSERVER PROGRAM

FORM LL6

PROJET CAPPER - Fiche d'information sur 'observation ou la capture d'espèce protégée

NOM MAREE	N° PECHE	DATE

Espèce (ou groupe)	Heure	N° événement	Taille groupe	Activité bateau	Commentaires