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Sharks caught by malagasy longliners in 2012

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ABSTRACT

Madagascar started exploring longline fishery in 2007 by shifting from trawl gear to small longliners. The number of vessels, targeting tuna and tuna-like species in the IOTC area of competence, has been increasing. In 2012, Malagasy flag deployed 8 longliners less than 24 m off the east coast (Annexe1). Note that some of them are multigear, whereby fishing vessels may target demersal resources and at othertimes they may target tuna and tuna-like species. The following results were obtained from the Malagasy observer program database and from pelagic species companies' declarations. The trend of total declared catches decreased throughout recent years and ranged from 497 tons to 388 tons in 2010 and 2012, respectively. The decline of catches is due to the reduction of number of big vessels. Indeed, a significant declining trend in percentage of shark landings (from 17% to 13%) was observed over the period. This paper figured out that monthly effort ranged from 14,000 hooks deployed in April to 49,447 hooks deployed in October. Total catch was 388,361 tons which was composed of 44.66% tuna, 25.38% billfishes, 13.24% sharks and 16.72% of others species. Sharks landed were composed mainly of mako shark (92.42%) and blue shark (6.84%) and their CPUEs' were 143.5 Kg/1,000 hooks and 13.6 Kg/1,000 hooks, respectively. Two specimens of shortfin mako ranged from 212 to 258 cm FL were identified by observers on board. In the same way, 37 specimens of Blue shark ranged from 164 cm to 352 cm FL. This study showed some biological information of all observed species such as length, weight, sex, GSI maturity. Observers reported that Malagasy longliners still caught IOTC prohibited species such as bigeye thresher and thresher.

Keys: Madagascar, longline, sharks, CPUE, FL

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INTRODUCTION

Madagascar has a great potential in terms of fisheries. This island has 1.14 million km² of EEZ (Economic Exclusive Zone) and its total coastline extends for more than 5,600 km. From February to may, Mozambic channel attracts big purse seiners targetting tropical tuna.

Madagascar started exploring longline fishery in 2007 by shifting from trawl gear to small fresh tuna longline vessels. The number of vessels, targeting tuna and tuna-like species in the IOTC area of competence, has been increasing. In 2012, Malagasy flag deployed 8 longliners less than 24 m off the east coast (Annexe1). Note that some of them are multigear, wherebery fishing vessels may target demersal resources and at othertimes they may target tuna and tuna-like species. In general, trip duration is confined to 5 to 10 days. The length of main line is about 35 to 70 km and the float line is around 4 to 30 m. Night set is generally practiced (3 to 9 pm) with using circle hooks. They utilized this type of hook in order to reduce the catch rate of some bycatch species. 6 to 8 hooks per basket and 3 or 4 either yellow or red chemical lightsticks every 3 or 4 branch lines were deployed. Main of these companies utilized also bait squid (**Ommastrephidae**) (RAHOMBANJANAHARY, 2012). Apart from data declared by three companies, data collected by observers on bord (November to December 2012) are used. Note that until now, declared data are exempted of set information details as in logbook pattern.

MATERIAL AND METHOD

The eight Malagasy multiday longline vessels provide in the end of the year an aggregating catch data wich was used in this study. They comprise of vessel information, monthly deployed hooks and composition species broken-down by species and by month. In addition, Malagasy observers report from november to december 2012 were used too. They include the daily catch per species in number and weight, effort in number of hooks, the mid operation fishing longitude and latitude position. The sampling biological information such as body weight in Kg, length in cm FL, sex detail and GSI maturity stage was also utilized to carry out this study.

Aggregated data on declared catch broken-down by species allowed us to carry out the composition species. Thereafter, catch rate such as catch per unit of effort (Kg/1,000 hooks) would be carried out. Besides, aggregated data from observers including daily catch and geographical information let us to figure out the capture location on the map. In addition, body weight (minimum, mean and maximum weight in Kg) and length of fishes (minimum, mean and

maximum fork length or lower jaw fork length in cm) would be done after using aggregating morphological data. Comparison test of major species contribution was done by using catch declared landings for recent years.

RESULTS AND DISCUSSION

1 Catch fluctuation

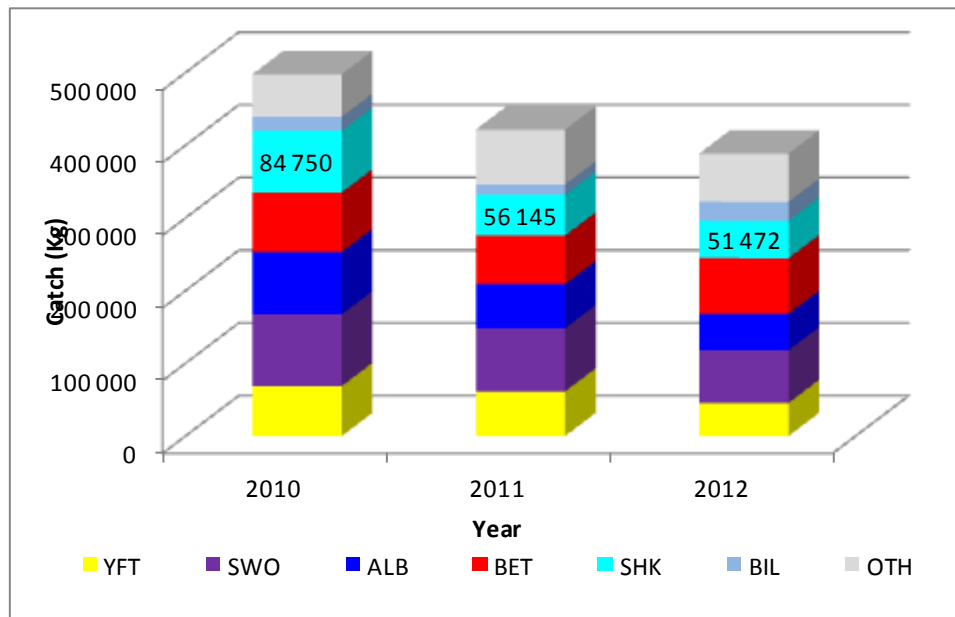


Figure 1 : Malagasy longliners annual catch (companies declared data)

Trend of total catches has decreased throughout three last years. In other words, total catch landed was 497.8 tons in 2010 when it was estimated 388.6 tons in 2012. The decreasing of total catches was due to decreasing of total effort regarding to number of big fishing vessels (higher than 24m). Malagasy longliner flag accounted one vessel more than 24 m in both 2010 and 2011 when in 2012, Madagascar used only small longliners, less than 24m. Subsequently, total sharks landed decreased too, from 85 tons to 51 tons in 2010 and 2012, respectively.

2 Spatial distribution of catch

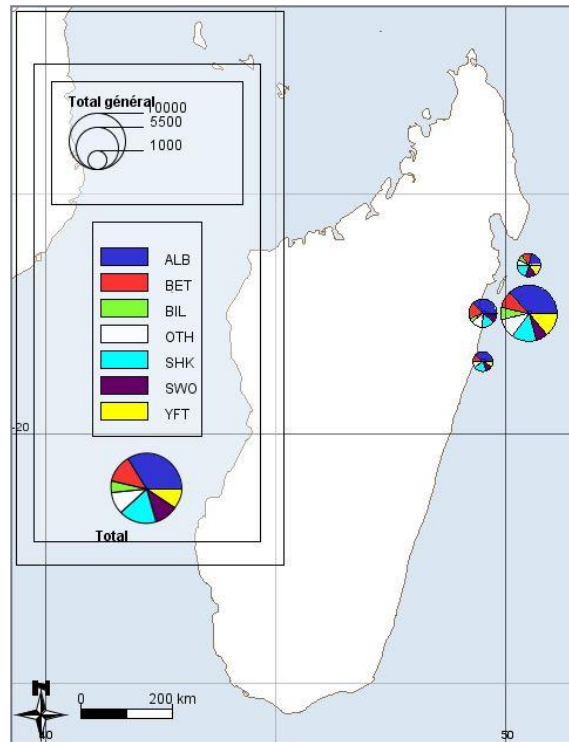


Figure 2 : Capture locations sampled by observers (November to December 2012)

Malagasy longliners target mainly fresh tuna and tuna like species. They have been operating only in the east of Madagascar waters. In addition, they limited the fishing day less than 10 days to keep fresh all the fish caught. Fishing areas were confined to two IOTC 5 degree squares which were: 6215045 and 6215050 because their landing sites are in Toamasina and Sainte-Marie. Sample size during this period was 951 fishes where albacore tuna was the majority species found in all observed sets. Note that november to january is the best season of this species in southern Indian ocean. The IOTC 1 degree square 5217050 was the highest sharks caught grid.

3 Biological data from observer program

Species	FL (cm)			Body Weight (Kg)			Sex		GSI maturity						Inds
	Min	Average	Max	Min	Average	Max	F	M	1	2	3	4	5	U	
ALB Albacore	64	106	155	14	20	45	8	359	11	58	81	64	3	150	367
ALS* Silvertip shark	149	149	149	100	100	100		2		2					2
ALV* Thresher	182	182	182	70	70	70		1						1	1
BAR Barracudas nei	56	90	131	3	6	13		8		2		2		4	8
BET Bigeye tuna	40	118	162	1	32	84	2	90	5	26	24	11	1	25	92
BSH* Blue shark	160	244	352	25	55	120	1	49	5		4			41	50
BTH* Bigeye thresher	210	213	216	82	83	83		2						2	2
BUM Blue marlin	142	190	215	12	43	86		9		2	3	2	2		9
DOL Common dolphinfish	89	106	154	5	8	15	1	237	6	48	100	39	2	43	238
GBA Great barracuda	99	102	104	5	6	6		2				2			2
MLS Striped marlin	186	190	194	7	8	8		2		1				1	2
MOX Ocean sunfish	56	57	58	3	4	4		4	2					2	4
OCS Oceanic whitetip shark	92	92	92	4	4	4		1	1						1
OIL Oilfish	42	86	154	2	8	24		25		5	7	3		10	25
SKJ Skipjack tuna	54	64	69	3	5	7	1	17		1	14			3	18
SMA* Shortfin mako	212	235	258	34	58	82		2						2	2
SMJ <i>Scleronema minutum</i>	54	54	54	3	3	3		1			1				1
SSP Shortbill spearfish	171	181	196	6	7	9		8		2	2			4	8
SWA White seabream	104	104	104	25	25	25		2						2	2
SWO Swordfish	97	143	221	7	29	87	1	59	9	16	4		2	29	60
WAH Wahoo	190	194	196	9	10	10		6	3	2				1	6
YFT Yellowfin tuna	112	127	163	25	38	79	3	48	1	15	12	7		16	51

*Shark species

Table 1 : List of observed species in the national longliners observer trip during Nov-Dec 2012.

Two specimens of Silvertip shark were discovered by observers. Both of them were male with average body weight 100 kg. They were in third stage of GSI maturity.

One specimen of Thresher was discovered by observers. This male shark was weighed 70 Kg.

50 specimens of Blue shark were recorded by observers. Most of them were male and their average body weight was 55 Kg. In terms of GSI maturity, 80% were undetermined, 10% first stage and 10% third stage of maturity.

Two specimens of Bigeye thresher were found by observers. The two sharks were male and their average body weigh reached 83 Kg. Their GSI maturity was undetermined.

Two specimens of shortfin mako were recorded by observers. Their body weight ranged from 34 to 82 Kg and their average weigh was reached 58 Kg. All of them were male and their GSI maturity was undetermined.

4 Composition species

				Comparison test of proportions (2010vs2012)
Years	2010	2011	2012	<i>p value</i>
%TUN	47,47%	44,79%	44,08%	0.9999
%SHK	17,02%	13,31%	13,18%	0.9999
%BIL	23,75%	23,97%	25,24%	0.99999

Table 2 : Inter-annual proportions of major species group in landing catch (companies declared data)

Tuna and shark proportions decreased significantly from 2010 to 2012 with $p \geq 0.9999^1$. Contrary to these species announced before, billfishes proportion has significantly increased from 2010 to 2012 with $p \geq 0.99999$.

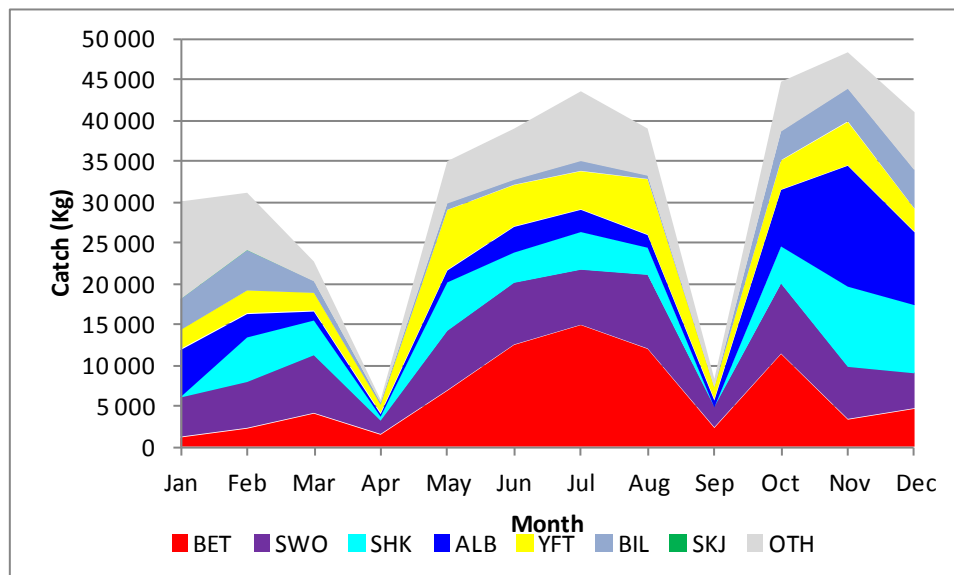


Figure 3: Catch fluctuation in 2012 (companies declared data)

This figure revealed that monthly catch rates varied from 5.8 tons to 48.2 tons , in april and in November, respectively. It's not recommended to fish far away from the coast during the hurricane period, from january up to the end of april. Thus, vessels were occupied by coastal and demersal fisheries. The low catch rate in september was due to maintenance of vessels. Total catch was 388.3 tons which was composed of 44.66% tuna, 25.38% billfishes, 13.24% sharks and 16.72% of other species. Sharks catch percentage ranged from 0.45% to 20.57% in january and December, respectively. The average percentage of sharks contribution to total catch landed was 12.13%.

¹ Non parametric test, comparison of two proportion

5 Sharks landing proportions

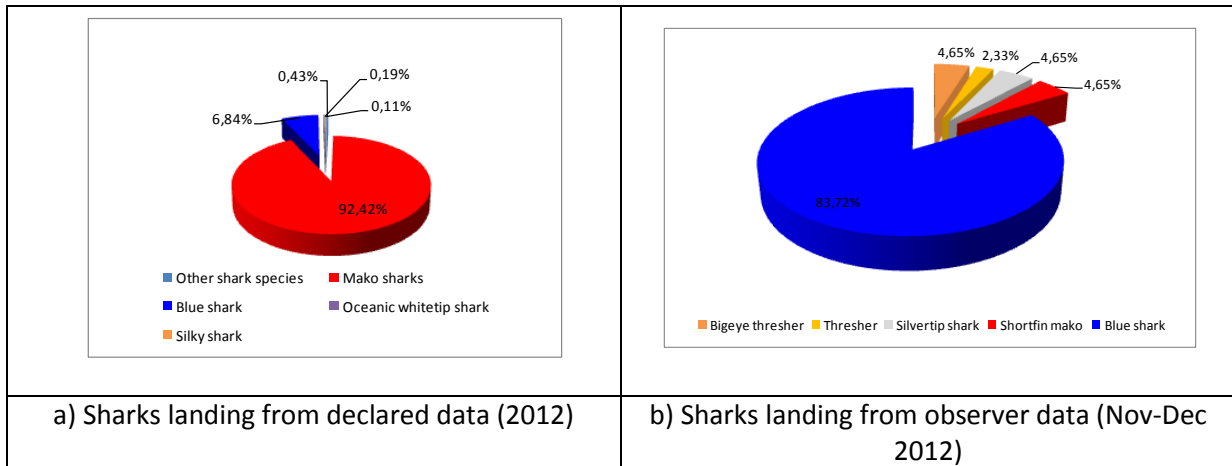


Figure 4 : Sharks composition in total sharks landed

The two charts above from two different databases, such as companies' declaration and from observer program database, revealed two different results. Figure a) showed significant catch of mako sharks (92.4%) when figure b) revealed a predominance of blue shark (83.72%). We pointed out that these species were the main sharks caught by malagasy longliners. However, we guessed that the difference was due to the misidentification of shark species either in data collection in companies or/and observer scale. Capacity building related to species identification is recommended. This study pointed out that some IOTC prohibited species, such as bigeye thresher and thresher, were still caught by Malagasy fleet.

6 Sharks catch rates

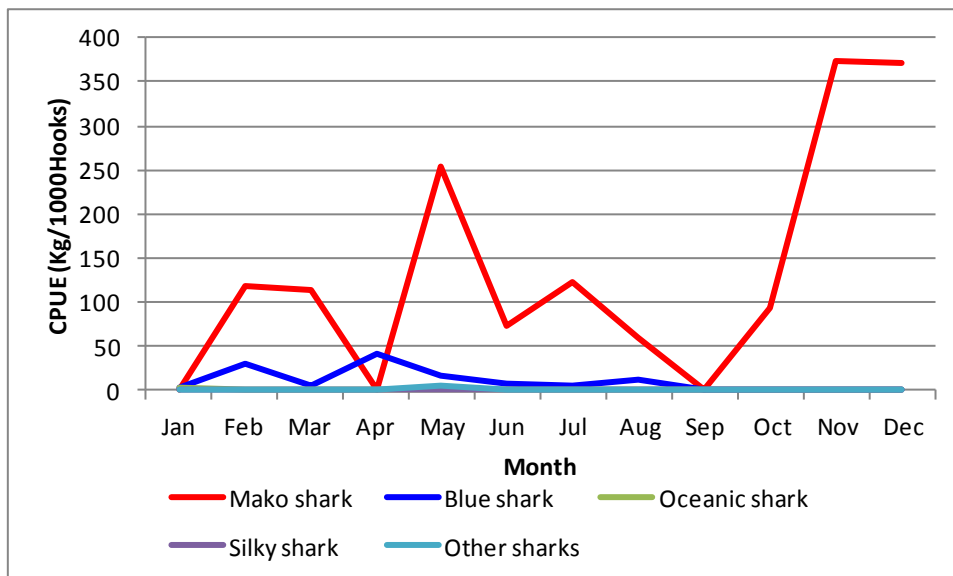


Figure 5: Monthly catch rate (companies declared data)

Mako sharks monthly CPUE varied from 60.1 to 372.9 Kg/1,000 Hooks when its average CPUE reached 143.5 Kg/1,000 Hooks.

Blue shark monthly CPUE ranged from 2.8 to 40.7 Kg/1,000 Hooks when its average CPUE was 13.6 Kg/1,000 Hooks.

The monthly CPUEs of Oceanic shark ranged from 0.4 to 3.7 Kg/1,000 Hooks. Its average CPUE reached 2.1 Kg/1,000 Hooks.

The monthly CPUEs of Silky shark varied from 1.07 to 1.2 Kg/1,000 hooks. Its average CPUE was 1.1 Kg/1,000 Hooks.

7 Incidental catches of seabirds, turtles and marine mammals

One specimen of green turtle (*Chelonia mydas*) weighed 4 Kg was incidentally caught during observed trip from November to December 2012. No capture of seabird and marine mammal were recorded in the same period.

CONCLUSION

Malagasy longliners has been operating within the east part of Madagascar EEZ and carrying out a short trip less than ten days. The bulk of large pelagic species production was comprised of tuna and tuna-like fish. Sharks were considered as a bycatch species. The trend of total declared catches decreased throughout recent years ranging from 497 tons to 388 tons in 2010 and 2012, respectively. The decline of catches was due to the reduction of number of big vessels. Indeed, shark proportion decreased also significantly over the period. In 2012, sharks make up to 12.24% of the total large pelagic landings in Malagasy longliner flag. No evident trend of catch rates was found. The data from Malagasy observer program figured out some biological information of all observed sets (Nov-dec 2012) such as length, weight, sex, GSI maturity stage. In spite of their limited sample size, they revealed that albacore tuna was the majority species during this period. In addition, mako and blue sharks were the most captured sharks with 143.5 Kg/1,000 hooks and 13.6 Kg/1,000 hooks, respectively. Observers reported that IOTC prohibited species such as **Alopiidae** were still caught by Malagasy longliners. In consequence, Madagascar is still exhorted to create and implement a National plan of action regarding for sharks species in order to continue reducing their trend catch landed.

REFERENCE

RAHOMBANJANAHARY M., 2012. Catch rates of sharks as bycatch caught by malagasy longliners, IOTC-WPEB-10, Cape Town, South Africa, 8p.

ANNEXE

Years	Prospection vessels		Active longliners		Total
	<25	>25m	<25	>25m	
2007				1	1
2008			2	2	4
2009	2			2	4
2010	4		1	1	6
2011			6	1	7
2012			8		8

Table 3: Number of malagasy active fishing vessels.