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Update on shark catch characteristics by national longline fleets in Madagascar (2010-2016)

13TH WORKING PARTY ON ECOSYSTEMS AND BYCATCH

Spain, 04th-08th September 2017

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ABSTRACT

The national fleet consists of longline vessels less than 24 meters operating in the eastern part of Madagascar. Their number varied from 6 to 8 from 2010 to 2013 but the following three years, it has remained at 7 vessels. They deploy 800 to 1300 hooks per set and do short cruises of 4 to 7 days to maintain their catch fresh. Tuna and swordfish are the main targeted species but they also catch some billfish species and sharks. This paper contains update on the previous document concerning the shark catch characteristics by national fleets in Madagascar. In addition to the evolution of shark catch by these vessels in recent years (from 2010 to 2016), some weight distribution data are presented in this paper. The data have been collected from the catch declarations by the fishing companies and from sampling at the port of landing. The total fish catch of the longline vessels is estimated at 2878 tons from 2010 to 2016 with an average of 411 tons per year. The largest proportion of catches is primarily constituted by the tunas (49%), then billfish (19%). Sharks represented 12% of the catches. Generally, the trend of total catch is decreasing since 2010, the same for sharks from 85 tons in 2010 to 36 tons in 2016. Principally, more than three shark species have been caught in the Malagasy waters by the longline vessels but since 2013, the shark catch data declared in the logbooks only concern blue shark.

Keywords: longline vessels, tuna, bycatch, sharks, shark catch, Madagascar

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BACKGROUND

Longline fishery has been developed after the decline of the shrimp stock in the western part of Madagascar in 2007. Currently, it has become the main fishing technique for tuna and tuna-like species in Madagascar. The following table shows the structure of the national longline fleets.

Table 1 : Number of longline vessels targeting tuna and tuna-like species (2007-2016)

YEAR	**LONGLINE VESSELS**		**TOTAL**
	<25m	>25m	
2007		01	**01**
2008	02	02	**04**
2009	02*	02	**04**
2010	05*	01	**06**
2011	06	01	**07**
2012	08		**08**
2013	08		**08**
2014	07		**07**
2015	07		**07**
2016	07		**07**

* 2 longline vessels used for prospection in 2009 and 4 in 2010

Most of the vessels have less than 25 meters length. They mainly used monofilament line. 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 circle hooks in order to reduce the catch rate of some bycatch species. 6 to 8 hooks per basket and 3 or 4 (yellow or red) chemical lightsticks every 3 or 4 branch lines were deployed (RAHOMBANJANAHARY, 2012).

In this paper, we are focusing on shark catch specificity because of, firstly, their classification within the IUCN. It is mentioned that the third of open ocean sharks face extinction (Merry D. and Al, 2007). Secondly, many species of sharks are considered as near threatened species (i.e. *Isurus oxyrinchus*, *Carcharhinus falciformis*…) or vulnerable (i.e. *Prionace glauca*…).

I. MATERIAL AND METHOD

The fishing companies declare their catches regularly by sending the copy of their logbooks to the Ministry of fisheries and the related entities (CSP, USTA…). According to the model of logbooks provided by the Ministry of fisheries, the following informations are reported:

- the total catch (in kilo);
- the vessel (name, flag, registration number, tonnage, length, ...);
- the fishing gear (length of branch lines, length of float line, length between branch lines...);
- the fishing operation (date and geographic positions);
- the fishing effort (number of hooks between floats, number of hooks or baits used, number of fishing days, ...);
- And details on the species composition of their main catch and bycatch (number and weight).

Note that some information mainly fishing effort and geographical fishing position are sometimes missing because the logbooks are not properly filled by the captains. Furthermore, the logbooks data do not contain the individual weight neither the length but only the total catch weight.

The analysis of 2010 to 2016 catch data has allowed us to obtain the evolution of the total catch and effort (number of hooks deployed) of longline vessels in recent years and their annual average catch. CPUE expressed in kg/100 hooks was obtained from catch and effort data. In addition, the declared catch data broken-down by species allowed us to carry out the species composition except for 2010 data during which there was no species identification of the catch.

Since this document is focused on the shark catch as bycatch by tuna longline fishing, analysis of shark catch was also deeply conducted to know its evolution and fishing effort in recent years, its percentage on the total catch landed, the species composition and the dominant species of sharks. As the Ministry of fishery has implemented a port sampling since 2015, some length and weight distribution data are also presented in this document.

II. RESULTS AND DISCUSSIONS

2.1. Annual variations of total fish catch, fishing effort and Catch Per Unit Effort (CPUE)

The Figure 1 presents the total fish catch in kilos and the fishing effort in number of hooks used by the vessels, when the figure 2 shows the variation of CPUE.

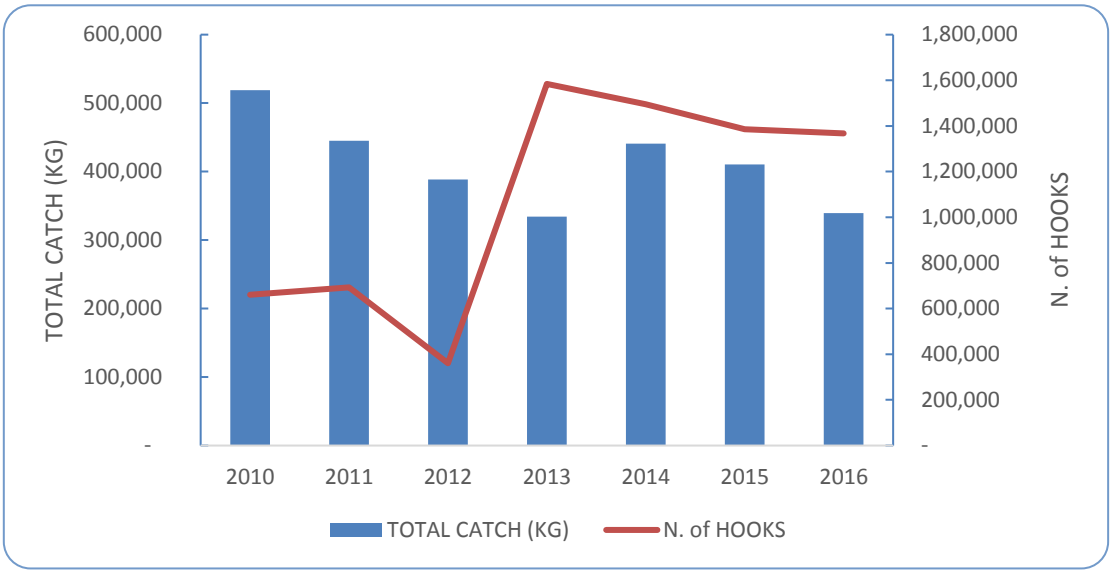


Figure 1 : Variations of catch and fishing effort by the national longline fleets (2010-2016)

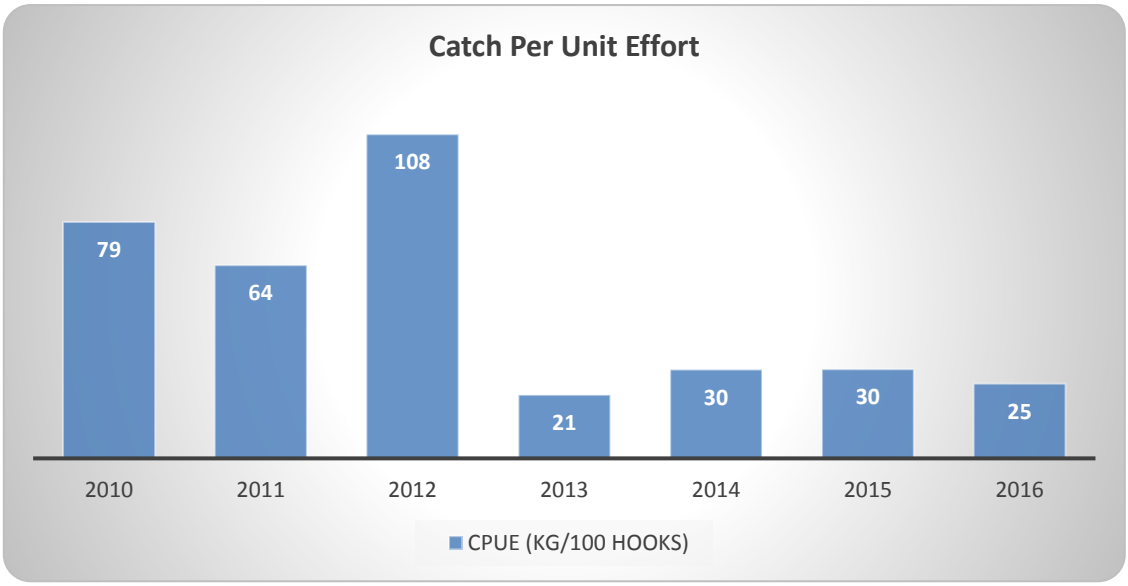


Figure 2 : Variation of Catch Per Unit Effort of Malagasy longline fleets (2010-2016)

The figure 1 shows that the total fish cached by the longline fleets doesn't present significant difference. The average total fish catch is 411 tons with the minimum of 334tons/year and the maximum of 519tons/year. This is slightly in relation with the stable number of vessels.

Considering the variation of the fishing effort (number of hooks) recorded, it is observed that the Catch Per Unit Effort (CPUE) represents two different trends. The first trend from 2010 to 2012 is characterized by the higher CPUE that more than 64kg/100hooks. The second trend is marked by the lower value of the CPUE that is less than 30kg/100hooks and it is observed during 2013 to 2016. This variation between these two periods is may be due to the different sources of the data used by the USTA. In other word, before the year of 2013, the logbook model developed by the Ministry of the fishery of Madagascar didn't require the detail of the hooks number used by the vessels during the fishing operation. So that, the estimation of the deployed hooks presents significant difference comparing to the four recent years value.

Since 2013, according to the development of the new logbook, the shipowners have the obligation to indicate the number of the hooks used during each operation. Consequently, during the four recent year, there is no significant change in terms of CPUE. This is also in relation with the number of the longline fleets. The average value of the CPUE is 26kg/100hooks with the minimum and maximum values of 21-30kg/100hooks during the four recent years.

2.2. Catch rates repartition per targeted fish group

The main targeted fishes such as tunas and billfishes are very important in terms of catch weight. They represent an average of 280 tons per year or the equivalent of 69% of total fish catch. The other bycatch is characterized by some species such as the great barracuda, jacks and crevalles nei, Pargo breams, Ground fishes, Wahoo… They globally occupied the next place with an average of 80 tons per year that represent the 29% of total catch weight.

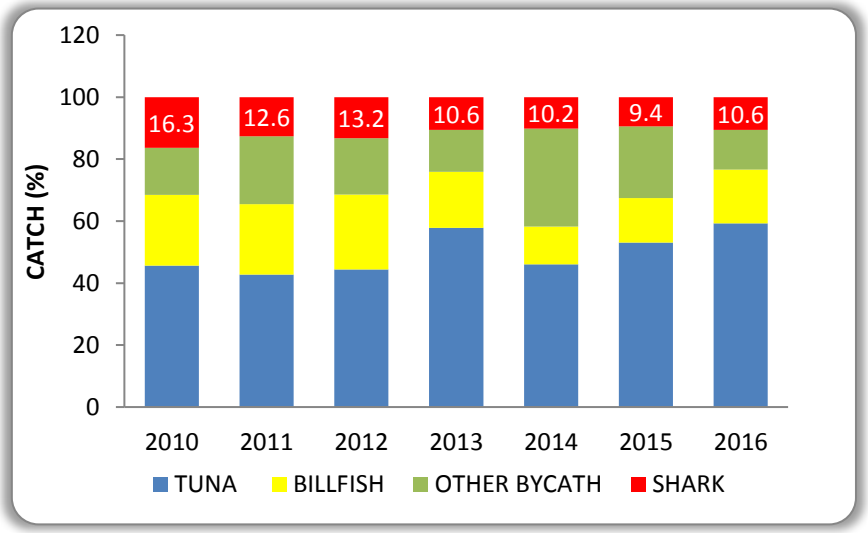


Figure 3 : Repartition rate of catch per fish group (2010-2016)

As shown in figure 3, the shark catch is evaluated at an average of 50 tons/year that represents the 12% of the total catch by the Malagasy longliner. Thus, the weight of shark catch represents the lowest value comparing to the catch of other fish group. However, bio-ecologically, this proportion is important if we consider the status of the sharks according to the IUCN categorization.

Note that this average of 50 tons of sharks accidentally killed every year by these Malagasy vessels is equal to the shark catch by a single European Union longline vessel in a year. If we focus on the whole number of the longline vessels that act within the north of the Mozambique Channel where the Tunas are, the annual loss of these endangered cartilaginous species is disastrous.

2.3. Global shark species repartition rates

The figure 4 illustrates the average repartition rates of the shark species from 2011 to 2016. As it has told in the beginning, some data are incomplete and not used here; that is the case of 2010 when the captains did not distinguish the shark species.

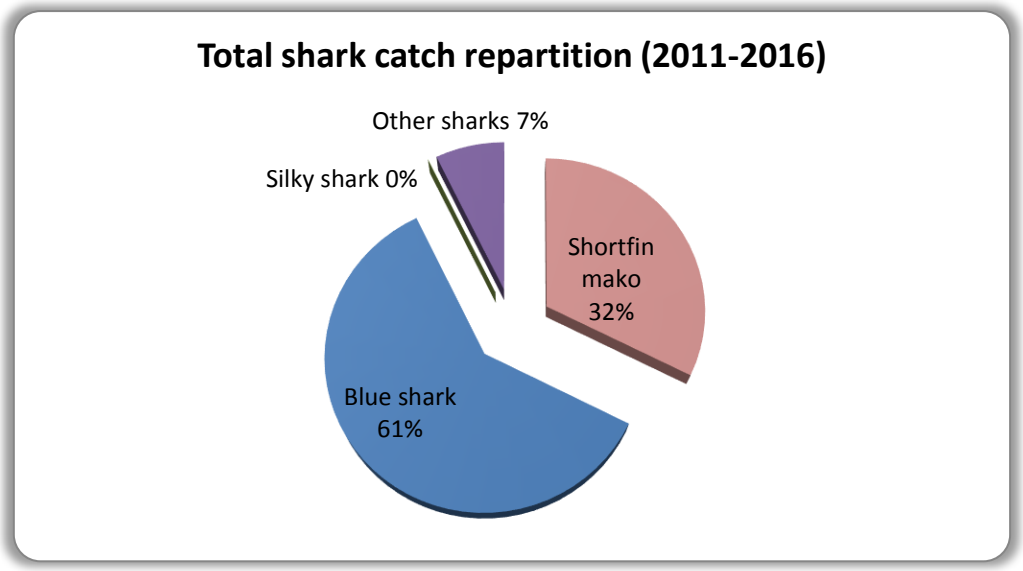


Figure 4: Shark species repartition (2011-2016)

Note also that from 2013, the shark catches only consists the Blue shark. Thus, they represent 61% of the shark weight caught by the Malagasy longline vessels. Shortfin mako (*Isurus oxyrinchus)* is about 32% of the total shark weight. The other sharks that the species name were not mentioned by the vessels data loggers constituted the 07% of the sharks caught. The Silky shark (*Carcharhinus falciformis)* is known as accessories catch with the rate under

0.1%. We point out the details of each species quantity in the next subtitle which describes the repartition of shark species each year.

2.4. The variations of shark catch, effort and CPUE (2010-2016)

Generally, the shark catch by the national fleets trends to decrease during the seven recent years. in spite of the number of vessels.

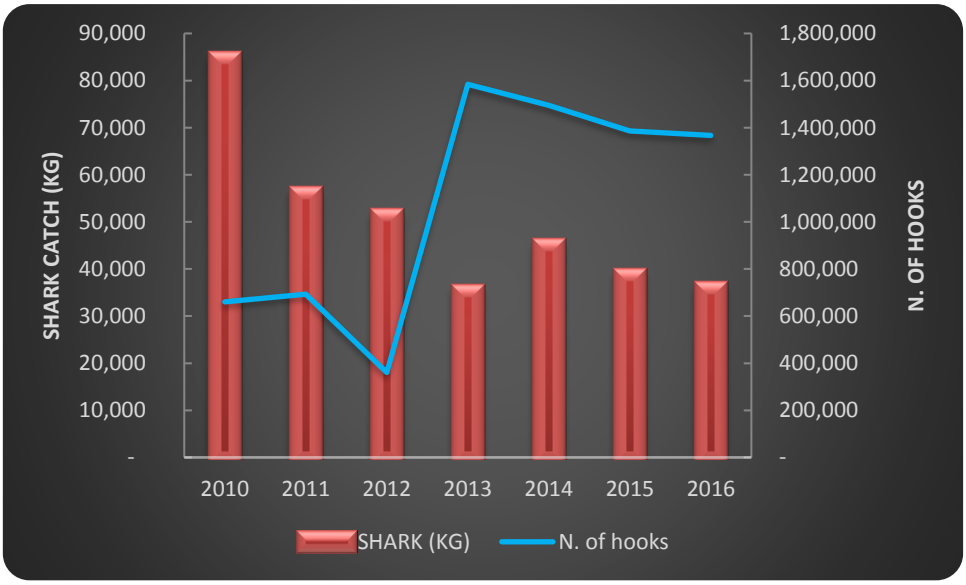


Figure 5: Variations of shark catch and effort (2010-2016)

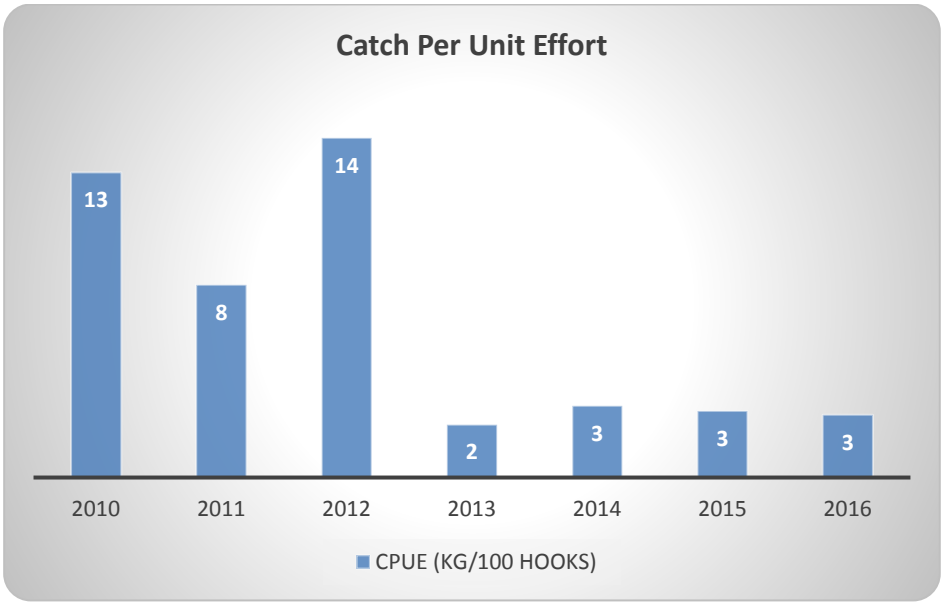


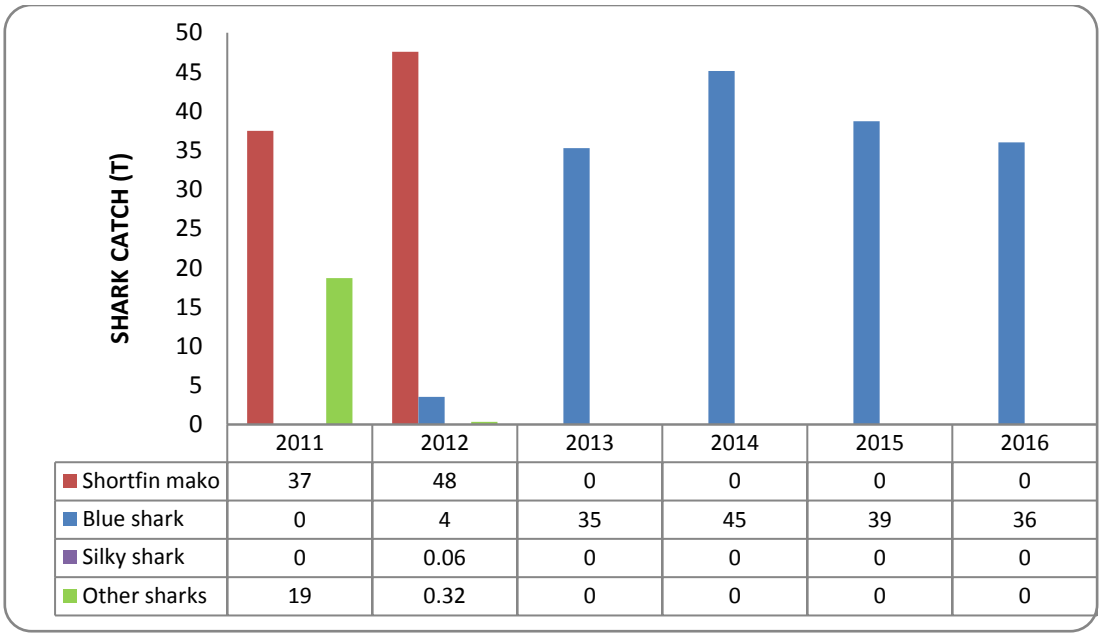
Figure 6: Shark CPUE variation (2010-2016)

The shark catch weight of 85 tons in 2010 corresponds with about 660,618 hooks used. In 2014, only, 45 tons of sharks have been caught with about 327,884 hooks deployed (fig. 5).

The variation of the CPUE does not really match with the effort variation (fig. 6). The highest CPUEs are observed in 2010 and 2012 (about 14kg of shark/100 hooks) while the effort recorded is the lowest during these periods.

2.5. The annual variation of the shark species catches (2011-2016)

The figure 7 shows the species composition of shark catch during 2011 to 2016. More than three species of shark are caught by the Malagasy longline vessels but only three have been identified such as shortfin mako (*Isurus oxyrinchus*), Blue shark (*Prionace glauca*) and silky shark (*Carcharhinus falciformis*). Moreover, the shark species within the 2010 data are not identified by the vessels data loggers and in consequence not used here.



	2011	2012	2013	2014	2015	2016
Shortfin mako	37	48	0	0	0	0
Blue shark	0	4	35	45	39	36
Silky shark	0	0.06	0	0	0	0
Other sharks	19	0.32	0	0	0	0

Figure 7: Species composition of the shark catches (2011-2016)

In terms of weight, the first couple year (2011 and 2012) is dominated by the shortfin mako species that represents 37 tons and 48 tons (67% and 92% of shark catch weight). However, this species of shark doesn't appear since the year of 2013. Since this year, the whole shark catch was represented by the Blue shark with the average of 38 tons of fresh weight per year.

The absence of the Shortfin mako during the last four years may be supported by the following hypothesis: the important catch of this species in 2011 and 2012 leads to the rarity of its population in the Malagasy EEZ where the National vessels operate. Then, other species such as the Blue shark appears from the 2012 and became abundant since 2013.

2.6. Species size distribution of the longline vessels catches (2015-2016)

Figure 8: Size distribution of the targeted species (2015-2016)

Figure 9: Size distribution of the Blue shark (2016)

CONCLUSION AND RECOMMENDATIONS

To conclude, the total fish catch by Malagasy longliner vessels within the Madagascar EEZ doesn't significantly change except the slight decreasing trends. Nevertheless, the CPUE estimated in number of hooks shows different trends due to the different form of the logbook. The CPUE trend remains constant since 2013 to 2016.

Regarding the bycatch, globally, the results showed that the shark catch is positively correlated with the fishing effort. The Malagasy fleets similar to the other vessels could not prevent the accidental catch of sharks. However, Malagasy longliner fleets have adopted fishing techniques to minimize shark and other species accidental catch such as the use of monofilament lines and the deployment of "circle hooks".

At the end, the Tuna Statistic Unit of Antsiranana (USTA) is trying to extend the data collection effort around the Madagscar fishing zone. The USTA is based in the North of Madagascar and is working mainly in the Antsiranana harbor but the longline fleets are in the Eastern region of the big Island. However, to fulfill the data collection and sampling over the longline fleets, Hopefully next year, the unit in collaboration with the Madagascar Ministry of Fishery will set two new antennas have been set up in the east cost and middle west to ensure the collection of the data related to the IOTC species.

REFERENCES

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

Merry D. Camhi, Sarah V. Valenti, Sonja V. Fordham, Sarah L. Fowler and Claudine Gibson. 2007. The Conservation Status of Pelagic Sharks and Rays, IUCN Report.