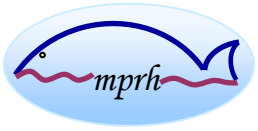
Received: 18 October 2013



REPOBLIKAN'I MADAGASIKARA

Fitiavana – Tanindrazana - Fandrosoana

TROPICAL TUNAS CAUGH BY THE MALAGASY LONGLINERS IN 2012

FIFTEENTH WORKING PARTY ON TROPICAL TUNAS

San Sebastian, Spain 23 – 28 October 2013

Draft

Rijasoa FANAZAVA

Chef de Service Suivi des Ressources

Centre de Surveillance des Pêches de Madagascar

List of Contents

List of illustrations

Tables

Figures

Abstract:

The longline fishing is one of a recent fishery practiced by Malagasy fishing fleets. Partial analyzes were made on their activities during the year 2012. VMS Positions, logbooks and observer data sampling were used for these analyzes.

Mapping of VMS positions shows that national longliners fishing zones focus in the North East of the EEZ.

For the year 2012, a slight decrease of the total catch was observed compared to the previous two years (From 490 tons in 2010 to 388 in 2013 tons).

The description of the species composition of catches show the predominance of tropical tuna catch rate (45%) compared to other pelagic species such as billfishes, sharks ... In the Tropical tunas, the catch rate in Bigeye predominates (44%) followed by albacore (29%) and Yellowfin tuna (26%). The catch rate in Skipjack is very low (less than 1%).

The samples made by observers on board were used to calculate the average size of individual catches. Bigeye, Yellowfin, Albacore and Skipjack have respectively an average size of 116.51, 127.55, 105.82 and 63.08cm.

1. Introduction

The potential for tuna resources and like species passing by the yearly in Malagasy waters is estimated at 52 000 tons (Andrianaivojaona C. et Al. 1992). National longline fleet is a recent activity and date of 2007. In fact, before, all industrial tuna vessels operating in Malagasy waters are foreign fleets (Océan Consultant, 2004). Since 2006, national fleets begin to be interested too on this fishery. While in 2007, only one national fleet has been licensed for longline fishery targeting tunas and tuna like species, but that number continues to rise. In 2012, three companies using eight vessels conduct this activity. These are small longliners size less than 24 m.

The fishery management preoccupies the Government. Efforts were made in implementing the national policy and strategy supported by regional cooperation. Thus, information is collected through the Vessel Monitoring System (VMS), the logbooks as well as the trip reports of the observers.

This document provides analysis on some results of statistic information for activities during the year 2012. Three parameters such as fishing locations, species compositions and the individual average size of the catch are selected for these analyze.

2. Method

2.1. Localisation of pelagic longline fishery

The positions of the national pelagic longline fleets were extracted from the VMS database. Then, the triage relative to vessel speeds recorded during the transmission of the position signals were made to separate the positions of the active and the not active vessels. In fact, for longliner, if the vessel is fishing, it should be moving. The speed should be not nil or precisely more than 1 knot.

The following table summarizes the number of records used for these maps.

Table 1 : summarizes the number of records used for the maps:

Year	**2012**
Number of tuna longline vessels	8
Number of positions recorded VMS	Num position (speed >1)

2.2. Evolution of nominal catch and effort

The evolution of nominal catch is determined from the catch reports provided by the companies. The annual weight of each species is available per vessel per Company. The table below summarizes the data used to determine the nominal catch of domestic pelagic longliners after triage, formatting and structuring. Species were grouped into oilfishes (Oil), Dolphin fishes (Dolp) Tunas (tuna), Sharks (sharks) Mixture (Mix) Fishes (fish) and Billfishes (Bill).

Table 2 : summarizes the data used to monitor the nominal catch of domestic pelagic longliners

Species group	2010	2011	2012
bill	$W_{Bill,2010}$	$W_{Bill,2011}$	$W_{Bill,2012}$
Fish	$W_{Fish,2010}$	$W_{Fish,2011}$	$W_{Fish,2012}$
Mix	$W_{Mix,2010}$	$W_{Mix,2011}$	$W_{Mix,2012}$
Shark	$W_{Shark,2010}$	$W_{Shark,2011}$	$W_{Shark,2012}$
Tuna	$W_{Tuna,2010}$	$W_{Tuna,2011}$	$W_{Tuna,2012}$
Dolp	$W_{Dolp,2010}$	$W_{Dolp,2011}$	$W_{Dolp,2012}$
Oil	$W_{Oil,2010}$	$W_{Oil,2011}$	$W_{Oil,2012}$

Wi, Y : Species group weight for the year Y

For the nominal effort, only the fluctuation of nominal effort of year 2012 will be detailed in this document and which is expressed in number of hooks deployed and number of operational vessels per month.

2.3. Species composition of the catch

The species composition is determined from calculation of catch rate of each species group. The catch rate for each tuna species is calculated from the tuna group itself. The specific composition is expressed in percentage for each year from the following operation:

Catch rate of the Species group i, for the year Y = (total weight of the Species group i for the year Y/sum of the total weight of all groups for the year Y)x 100

$$\mathbf{Ri,Y} = (\mathbf{Wi,Y}/\sum_{\mathbf{i=1}}^{\mathbf{n}} \mathbf{Wi,Y})\mathbf{x\ 100}$$

Ri,Y : Catch rate of the Species group i, for the year Y

$\mathbf{Wi,Y}$: total weight of the Species group i for the year Y

$\sum_{\mathbf{i=1}}^{\mathbf{n}} \mathbf{Wi,Y}$: sum of the total weight of all groups for the year Y

The same method was used to determine the catch rate of each tropical tuna species in the Species group of Scombridae as shown in the table below :

Table 3 : summarizes the data used to determine the tropical tunas composition of Species group Tuna (family of Scombridae)

	Catch rate in %		
Species	2010	2011	2012
ALB	R_{alb},2010	R_{alb},2011	R_{alb},2012
BET	R_{bet},2010	R_{bet},2011	R_{bet},2012
YFT	R_{yft},2010	R_{yft},2011	R_{yft},2012
SKJ	R_{skj},2010	R_{skj},2011	R_{skj},2012
OTH	R_{oth},2010	R_{oth},2011	R_{oth},2012

ALB : Albacore ; BET : Big eye tuna ; YFT : Yellow fin tuna ; SKJ : Skipjack tuna; OTH : Others

The catch rate per species is expressed in percentage for each year from the following operation:

Catch rate of the species i, for the year Y = (total weight of the species i for the year Y/sum of the total weight of Scombridae for the year Y)x 100

$$\text{Ri,Y} = (\mathbf{wi,Y}/\sum_{\mathbf{i=alb}}^{\mathbf{oth}} \mathbf{wi,Y})\text{x}100$$

Ri,Y : Catch rate of the species i, for the year Y

$\mathbf{wi,Y}$: Total weight of the species i for the year Y

$\sum_{\mathbf{i=alb}}^{\mathbf{oth}} \mathbf{wi,Y})$: Sum of the total weight of Scombridae for the year Y

2.4. Individual average size of the catch

Biometric measurements were also performed for samples aboard. The average size and average weight are obtained from the following formula:

$$\text{TLav} = \frac{\sum_{\text{i}}^{\text{n}} \text{TLi}}{\text{n}}$$

TLav : Average Total length; TLi : Individual Total Length

$$\text{Wav} = \frac{\sum_{\text{i}}^{\text{n}} \text{Wi}}{\text{n}}$$

Wav : Average Weight ; Wi : Individual Weight

3. Results

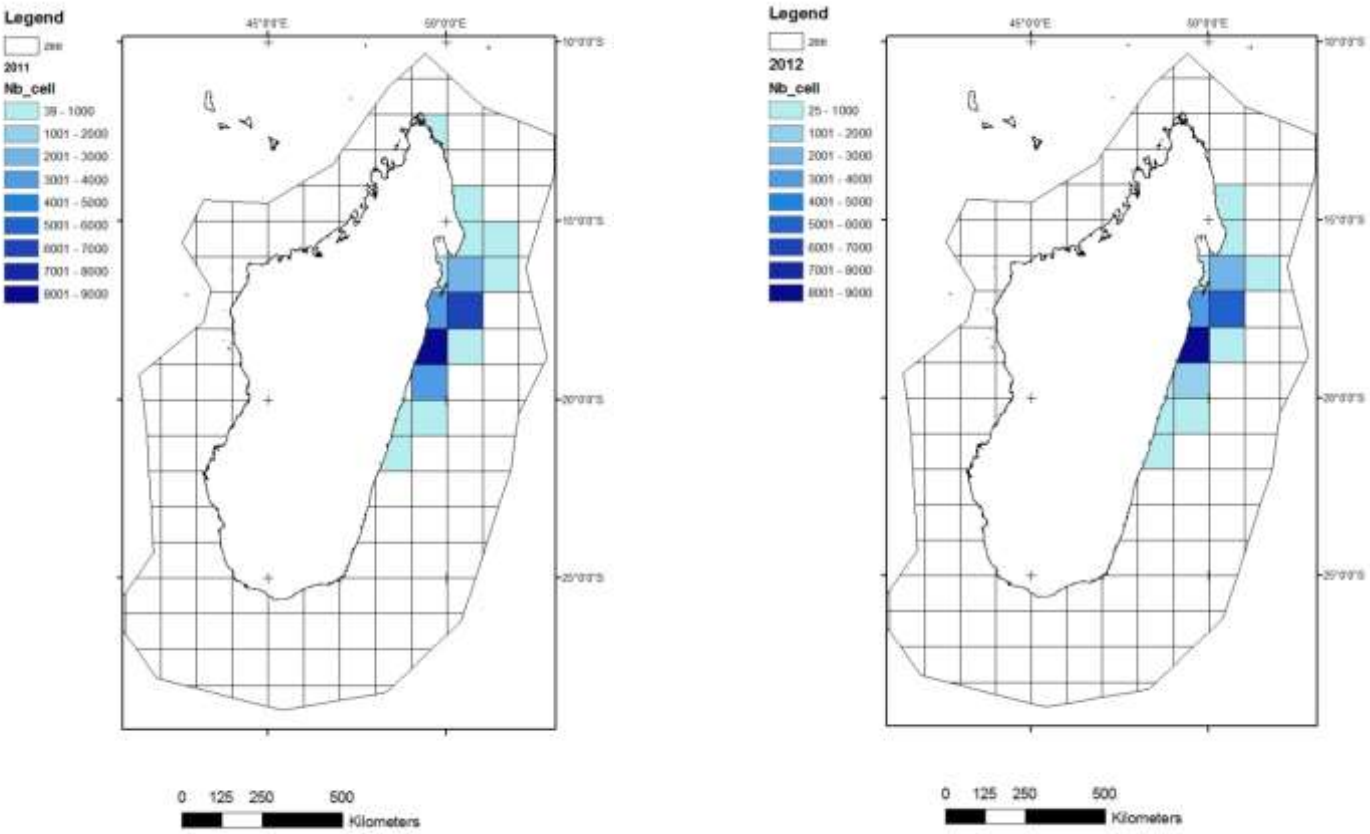
3.1. Location of the pelagic longline fishing zone

Table 4 : Number of positions recorded by VMS in 2011 and 2012

Year	2011	2012
Number of tuna longline vessels	07	08
Number of positions recorded by VMS (speed >1)	25 257	23 269

After triage of speed recorded in the VMS database, the numbers of position records considered as active fishing vessel are shown in the above table. They correspond to the number of position with speeds greater than 1 knot. These points were mapped and show the domestic longliner fishing zones during 2011 and 2012.

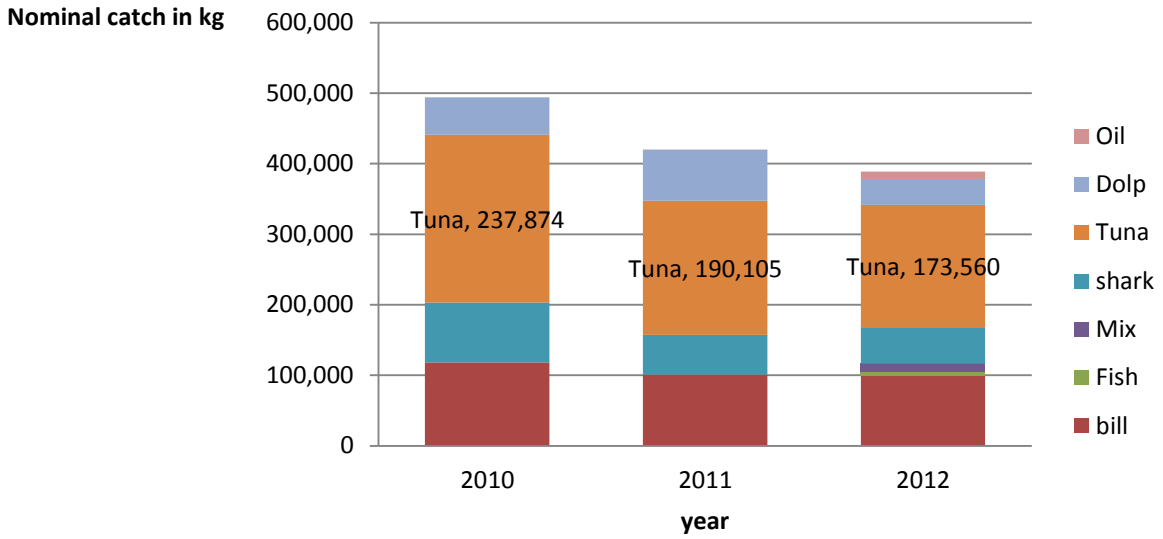
Figure 1 : Location of the fishing zone of domestic pelagic longliner in 2011 and 2012



These two maps show fishing zones of the domestic pelagic longliners during the last two years (2011 and 2012). The surface of the EEZ is divided into 1x1 square degree and blue colors from light to dark represent the proportion of the number of position recorded in each square as shown in the legend. The fishing zones focus in the eastern part of the EEZ.

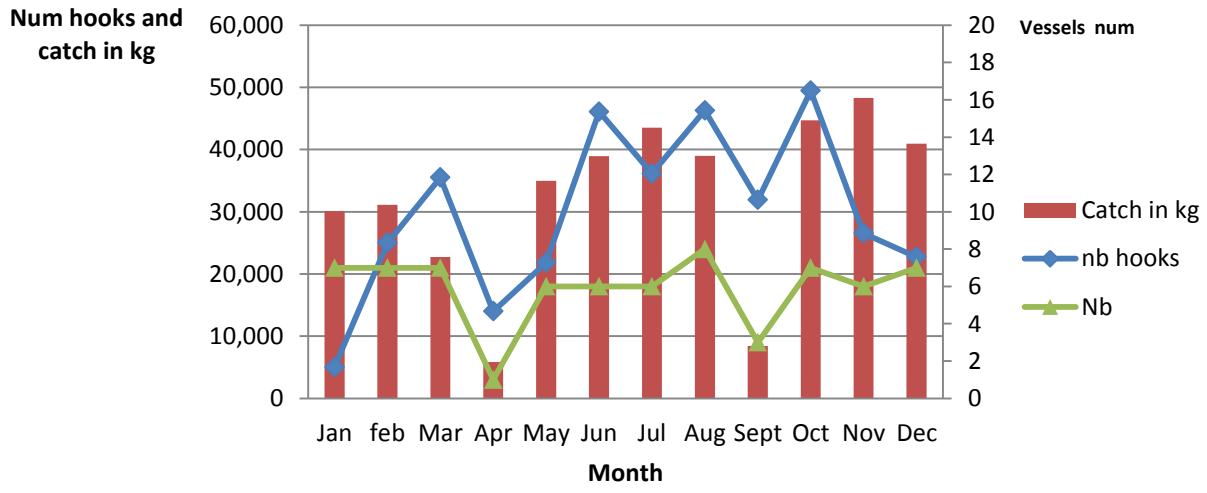
3.2. Evolution of nominal catch and effort

Figure 2 : Evolution of nominal catches from 2010 to 2012 :



This chart shows the evolution of the nominal catch in kilograms of the domestic pelagic longliner during the last three years. Species were grouped into oilfishes (Oil), Dolphin fishes (Dolp) Tunas (tuna), Sharks (sharks) Mixture (Mix) Fishes (fish) and Billfishes (Bill). A decrease in the nominal catch has been observed every year (approximately 490, 421 and 390 tons respectively for the year 2010, 2011 and 2012). For tuna group especially, the decrease in nominal catch was also observed (approximately 238, 190 and 173 tons respectively for the year 2010, 2011 and 2012).

Figure 3 : Fluctuation of nominal catch and effort in 2012 :



This figure shows the monthly fluctuations of nominal catch in kilograms and effort in number of hooks in the year 2012 as reported by companies. The brown histogram represents the monthly

catch in kg, the blue curve represents the number of hooks deployed and the green curve is the number of operational vessels. Catch varies from 5.8 tons (in April) to about 48.3 tons (in November) per month. The number of hooks deployed also vary from 5,000 (January) to over 49,000 (in October) and the number of operational vessels vary from 1 (April) to 8 (August).

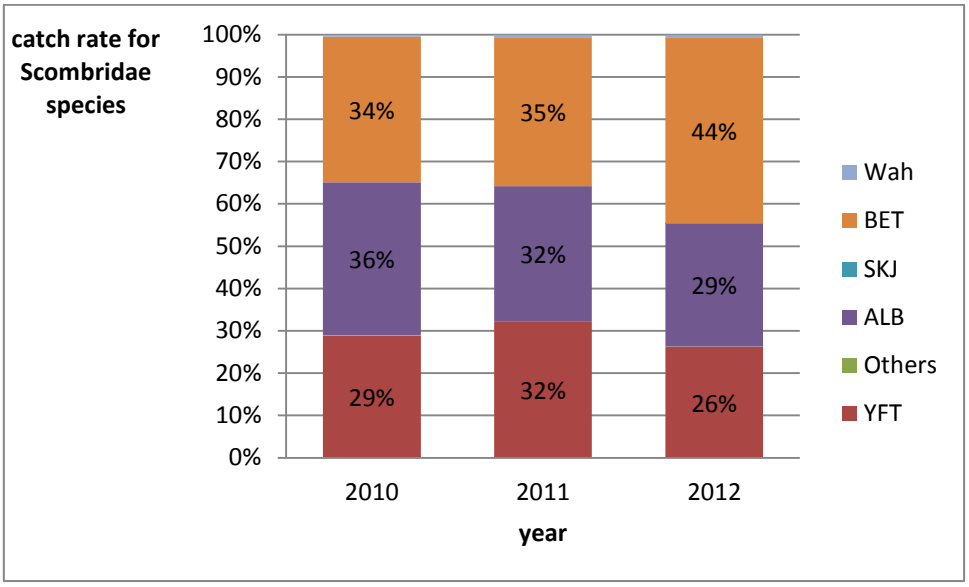
3.3. Species composition of the catch

Table 5 : Evolution of the species composition from 2010 to 2012

	Catch rate in %		
Species group	2010	2011	2012
bill	23,94	24,07	25,63
Fish	0,00	0,00	1,18
Mix	0,00	0,00	3,21
shark	17,15	13,36	13,24
Tuna	48,15	45,25	44,66
Dolp	10,76	17,14	9,42
Oil	0,00	0,17	2,67

This table shows the changes in catch rates of each species group caught by the domestic pelagic longliners. Compared to the other species group of the catch, the catch rates of tuna group predominate. However, the catch rate of the tuna group decreased during the last three years (approximately 48, 45 and 44% respectively for the year 2010, 2011 and 2012).

Figure 4 : Evolution of the catch rate of the tropical tuna species from 2010 to 2012



This graph shows theevolution of the catch rate of each tuna species from tuna group (family Scombridae). The three tropical tuna species such as albacore, yellowfin tuna and big eye tuna largely predominate in tuna catching. For the last three years (2010, 2011 and 2012), they represent approximately 99% of Scombridae caught each year. A small decrease on the catch rate is observed

for yellowfin tuna (29% in 2012 against 32% in 2011 and 36% in 2010), while a small increase was observed for the catch rate of big eye tuna (44 % in 2012 against 35% in 2011 and 34% in 2010). The yellowfin tuna has a small decrease in 2012 (26%) compared to 2011 (32%).

3.4. Individual average size of the catch

The biometric measurements were taken on board for 370 individuals sampled from the domestic pelagic longliners by the observers on 2012. Total length and weight were measured. The following table shows the average total length and average weight for each of the four species of Tropical Tuna.

Table 6 : Average size of the tropical tuna sampled onboard in 2012

Species	Number	Average Length	STDEV Length	Average Weight	STDEV Weight
SKJ *(Katsuwonus pelamis)*	12	63,08	5,98	4,96	1,20
ALB *(Thunnus alalunga)*	257	105,82	8,42	20,63	2,93
YFT *(Thunnus albacares)*	42	127,55	10,91	39,19	11,83
BET *(Thunnus obesus)*	59	116,51	18,23	31,25	14,07

Average of individual total length for skipjack tuna, albacore, Yellowfin tuna and Bigeye tuna are 63.08 cm, 105.82 cm, 127.55cm and 116.51cm respectively. The average of individual weights are 4.96 kg, , 20.63 kg, 39.19 kg and 31.25 kg respectively.

4. Discussion

Domestic pelagic longliners fishing zone focus in the East part of the EEZ. However, the presence of the foreign fleets in others fishing zones is a proof that tropical tuna resources occur in other zones but this fishing zone of the domestic pelagic longliners correspond to the fishing zones nearest to the home port of the company fleet owners. In fact, these companies use the small longliners having autonomy not enough to go far.

The analysis of species composition of catches shows that four species of Tropical tunas are caught by the domestic pelagic longliners in Madagascar EEZ. The catch rate of the tunas group predominate compared to others species groups caught by these longliners but it decreases from 48 to 44 % during the last three years. In this proportion, the three species such as Albacores, Yellowfin tuna and Bigeye tuna occupy mainly the total weight of the tuna group (99%). This high catch rate could be explained by the fact that this is target for this fishery.

In general, nominal catch during the three last years was decrease from 490 tons to 388 tons.

The explanation for this decrease in nominal catch remains blurred since the number of vessels that are interested in this fishery continues to increase (06 in 2010, 07 in 2011 and 08 in 2012).

Samplings made aboard by the observers were used to calculate the average size of fish caught by this fishery. Sizes observed are 116.51 cm, 127.55 cm, 105.82 cm and 63.08 cm respectively for Bigeye Tuna, Yellowfin tuna, Albacores and Skipjack. These size are largely upper compared to the

maturity sizes in the published literatures which are 103.3 cm for the Yellowfin tuna (IGFA,2001), 100-125cm for bigeye tuna (Reiner, F., 1996), 85.0 cm for the Albacore (Torre, F.S.B .Jr., 1991) and 40.0 cm for the Skipjak tuna (McMillan, P.J., L.H. Griggs, M.P. Francis, P.J Marriott, L.J. Paul, E. Mackay, B.A. Wood, H. Sui and F. Wei, 2011). While the average size of fish caught are 94.51 and 42.02 cm respectively.

5. Conclusion

Tropical tunas are caught by the domestic pelagic longliners in the malagasy waters. The VMS database shows that the fishing zone is limited at the fishing zone nearest the homeport of the fishing vessels. The logbooks provided by the Companies show the important catch rate for the tropical tunas mainly the Bigeye tuna, yellow fin tuna and Albacores compared to the others group of pelagic fishes. The nominal catch was decreasing from 2010 up to now (2012) in term of weight even the operating vessels were increasing (from 06 to 08) for the reason not yet unknown. However, the average size of the individual species caught are upper than the maturity size published in the literatures.

Bibliographies

ANDRIANAIVOJAONA Ch. et al. 1992. Pêches et Aquaculture à Madagascar – Bilan Diagnostic ;

IGFA, 2001. Database of IGFA angling records until 2001. IGFA, Fort Lauderdale, USA ;

McMillan, P.J., L.H. Griggs, M.P. Francis, P.J Marriott, L.J. Paul, E. Mackay, B.A. Wood, H. Sui and F. Wei, 2011. New Zealand fishes. Volume 3: A field guide to common species caught by surface fishing. New Zealand Aquatic Environment and Biodiversity Report No. 69. 145 p.;

Océan Consultant, 2004, Fiche N°309, Filière Thon

Reiner, F., 1996. Catálogo dos peixes do Arquipélago de Cabo Verde. Publicações avulsas do IPIMAR No. 2. 339 p.;

Torres, F.S.B. Jr., 1991. Tabular data on marine fishes from Southern Africa, Part II: Growth parameters. Fishbyte 9(2):37-38.