

***Partial analysis of tropical tuna catches by
industrial fishing in the Malagasy EEZ***

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Abstract

Partial analysis have been made to databases of Fisheries Surveillance Centre during the period 2005 to 2010. The changes in some parameters of the capture fishery industry of tropical tunas have been followed. The daily yield of each type of vessel (longliner and purse seiner) was calculated from information received by the declarations of input/output of each vessel. The composition of the catch logbooks as well as the average weight of the three tropical tuna species are followed.

Stability, despite a small decrease was observed on the average weight of fish caught and the daily yield of longliners over the years. However, a change in the composition of the catch is palpable especially for the three tropical tuna species (bigeye, yellowfin and skipjack)

1 Introduction

Having 5603 km of coastline, 300 000 ha of mangroves constitute a real ecological niche, 50 000 ha of salt flats suitable for shrimp farming, 117 000 square kilometers of continental shelf and 1.14 million square miles of EEZ, Madagascar has assets geographical and important fishery and significant (MPRH File, 2009).

Like the tuna and associated species, relatively large quantities, estimated at 52,000 tons per year pass during their migration in Malagasy waters (Andrianaivojaona C. et Al 1992). In the fisheries agreements contracted into by the fisheries Company with Madagascar for tuna fishing, the Fisheries Monitoring Centre (CSP) receives logbooks and declarations of input / output. In fact, each fishing vessel enters or leaves the Malagasy EEZ should send his statement to the CSP by email or fax. That statement indicates the amount of catch on board, position, and the date and time of entry or exit. In addition, while fishing in the EEZ, each vessel is hired to send copies of their logbooks to the CSP. This logbook contains logs, including their position, the surface temperature, the detail of the catch (quantity and quality) per day. This information is stored in a database within the CSP.

Besides its usefulness in monitoring and controls matters, monitoring resources can be done from these data. Thus, in this paper, some analysis were made to the information received on the fisheries catch of three tropical species such as tuna *Thunnus albacares* (Yellowfin tuna) *Katsuwonus pelamis* (Skipjack tuna) and *Thunnus obesus* (Bigeye tuna). Changes in the average weight, daily yield, and the composition of catches for each vessel type were analyzed. The spatiotemporal distribution of catches was also studied. Such analysis give a comprehensive overview of the trend changes in stocks and thus allow to provide the technical components useful for the political decision-making in the tuna resources management.

2 Methodology:

The database includes information on logbooks and declarations of input / output received by CSP have been exploited. Checks followed by corrections and / or eliminations of suspected recordings were made before the formatting and structuring of data. Next, data processing and analysis of trends were launched during the 2005 to 2010, according to data availability.

The estimates concern only the number of declarations of input / output and the number retained after the checking. The following table shows the number of declarations of input / output analyzed.

Table 1: Number of declarations of input / output analyzed

years	2005	2006	2007	2008	2009	2010
Number of input / output Longliner	27	54	82	73	96	109
Number of input / output seiners	63	19	44	83	127	92

For the logbooks, all estimations in the analysis concerns only the number of the logbooks returned as shown in table below

Table 2 Number of logbooks analyzed

years	2007	2008	2009	2010
Number of logbooks retuned by longliners	2644	964	2055	1940
Number of logbooks retuned by purse seiners	423	70	441	

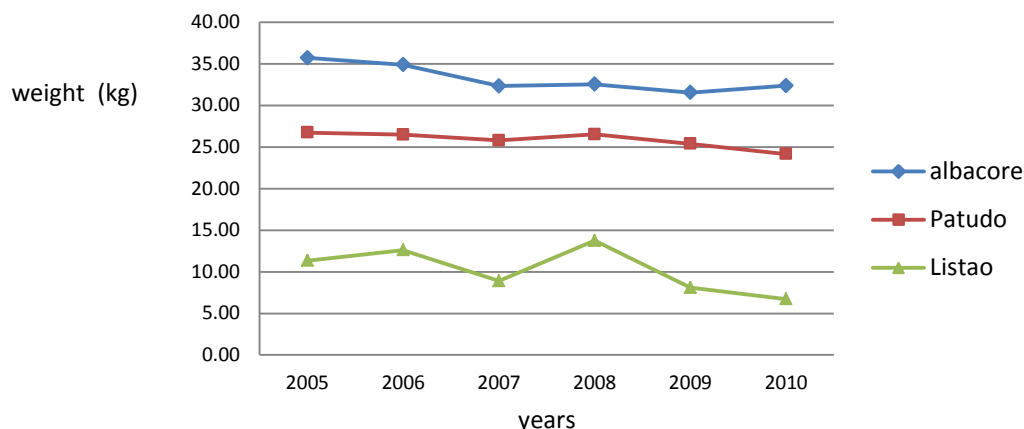
- *average weight* : The average weight of each of three tropical species was calculated from the logbooks for the longline catches (2005-2010).
- *daily yield* : The daily yield of each type of vessel (longliner and purse seiner) was calculated from information received by the declarations of I/O of each vessel.
- *specific composition of the catch* : The composition of the catch was determined from information from logbooks (2007-2010).
- *Spatiotemporal distribution of the catch* :The temporal distribution has been studied for the period 2007 to 2010 and the catches were mapped based on information received from logbooks for 2007

3 Results

3.1 Average weights of the three tropical tuna species

The following chart shows the evolution of the average weight of each of the three tropical tuna species.

Figure 1 : Graphic of average weight of Three tropical tuna species of caught by longliners.



Stability in the average weights of yellowfin tuna (~ 32.5 kg) and bigeye (~ 25 kg). Fluctuation was observed in the Skipjack with a marked decrease since 2009. The average weight of purse seiner catches are not available due to lack of data on the number of individuals captured.

3.2 Daily yield

The following figures show the evolution of daily yield of longliner (Fig. 1a) and seiner (Fig. 1b) in the Malagasy EEZ.

Figure 2: Yield of longliners and purse Seiners in the Malagasy EEZ (2005-2010)

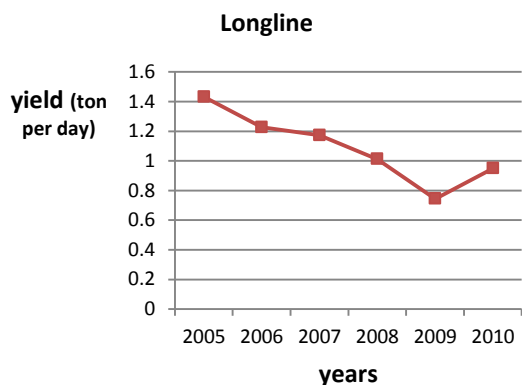


Fig. 1a : Yield of longline

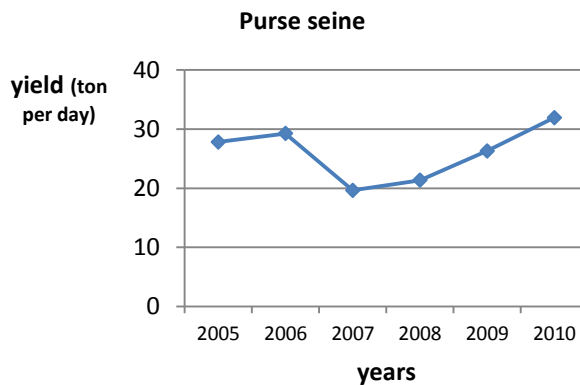


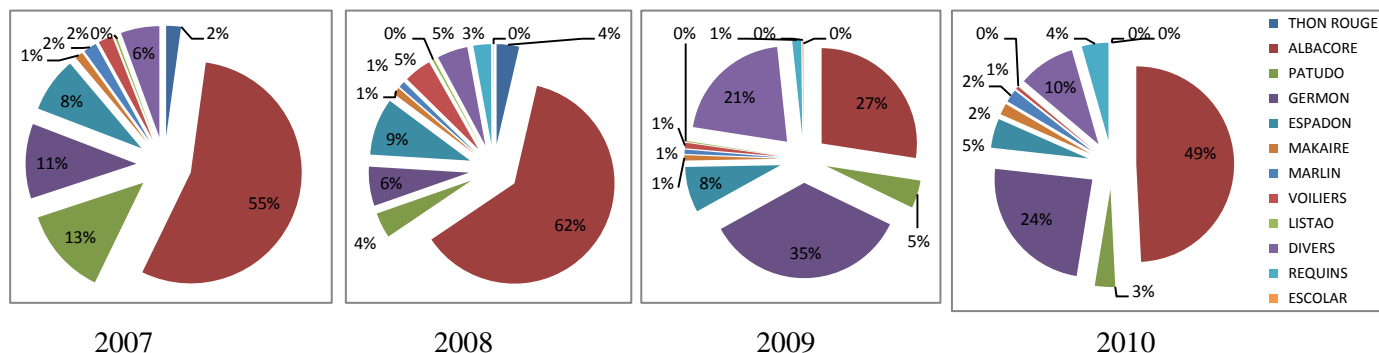
Fig. 1b : Yield of purse seiners

On a global view, the daily yield of longliners is low (0.5 to 1.5 tons) (Fig. 1a) compared to that of purse seiners (19 to 35 tons, fig. 1b). For longliners, an annual decrease has been observed since 2005 until 2009. An increase was observed for the daily yield of the purse seiners since 2007.

3.3 Composition of catches

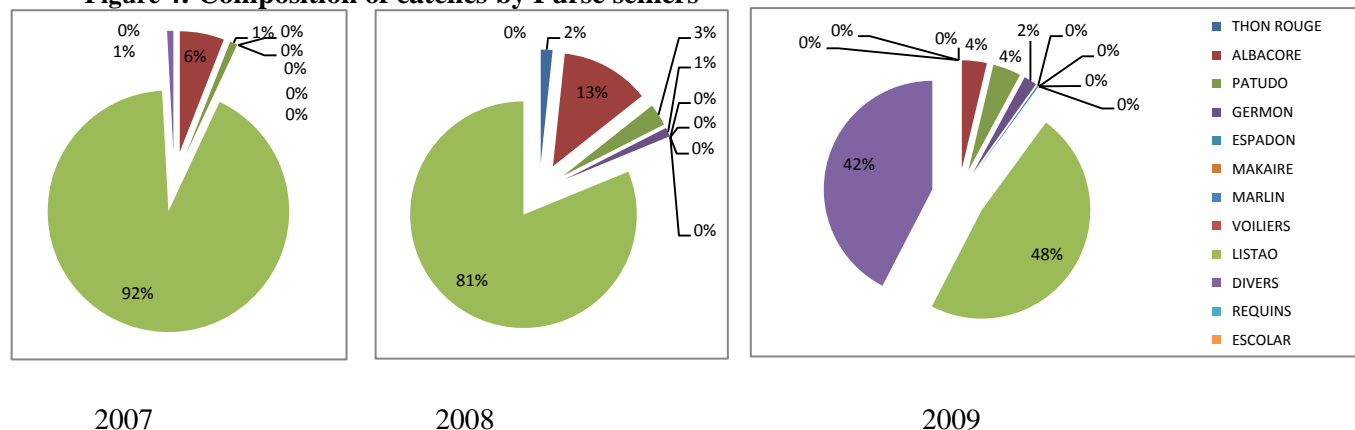
The following figure shows the evolution of the species composition of longline vessels between 2007 – 2010

Figure 3 : Composition of Catches by longliners



The Albacore represents the major proportion by weight of the longliner catches in tropical tuna. Its proportion varies between 27% (in 2009) to 62% (in 2008). Bigeye that of between 3 to 5% between 2008 and 2010 while it represents 13% of the catch in 2007. The proportion of Skipjack is the least represented in the catch of longliners. It represents only less than 1% of the catch.

Figure 4: Composition of catches by Purse seiners



The Skipjack represents the major proportion by weight of catch in purse seine tropical tuna, with a percentage of 92, 81 and 48 for the respective years 2007, 2008 and 2009 (fig. 4). Trend of decrease was also observed with a marked drop on the proportion in 2009, to give place to others catches (42%). The proportion of Albacore fluctuates between 4-13%. Bigeye tuna remain less than 4%.

3.4 Spatiotemporal distribution of catches

The figure below shows the distribution of catches in each year of longliners and purse seiners in the Malagasy EEZ.

Figure 5 : Temporal distribution of catches by purse seiners and longliners.

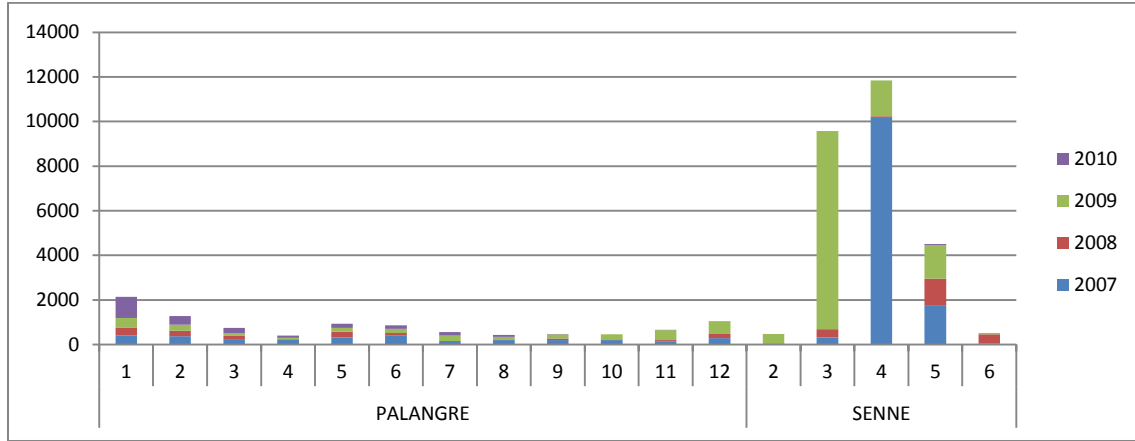


Figure 6 : Spatial distribution of catches of purse seiners and longliners in 2007

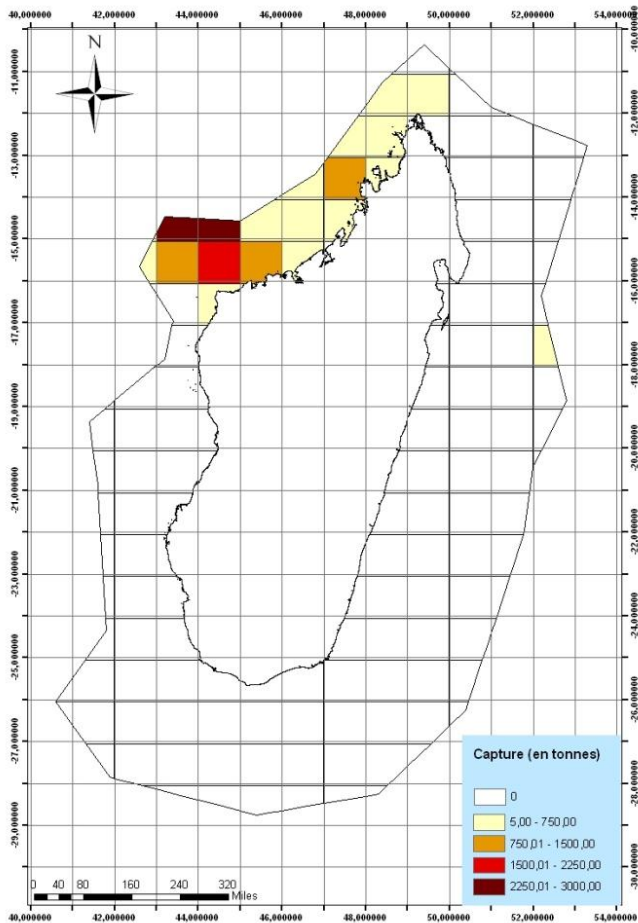


Fig. 6a : Spatial distribution of Purse seiners catches in 2007

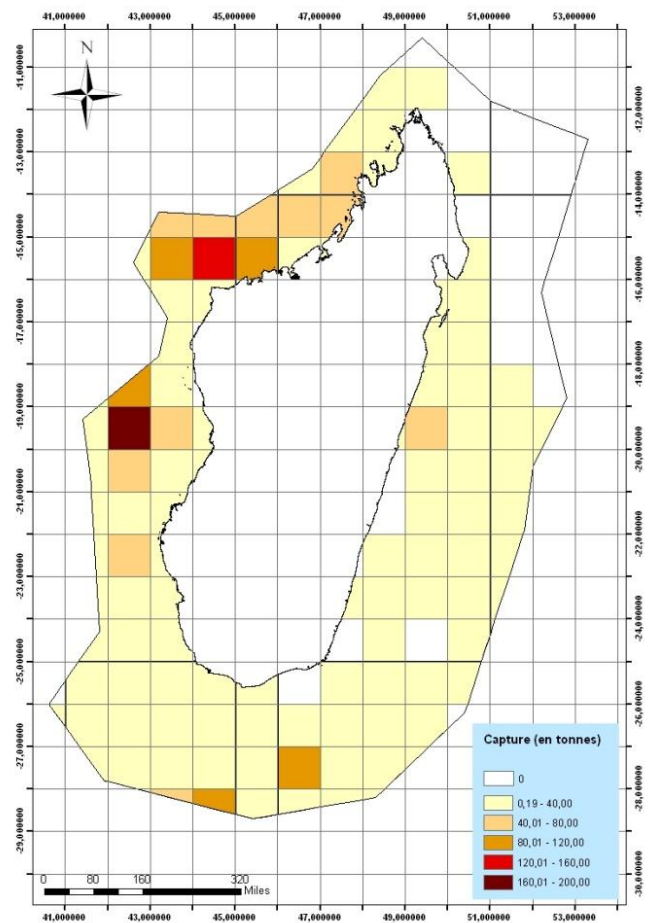


Fig. 6b : Spatial distribution of Longliners catches in 2007

The purse seine catches focus to the north west of the Malagasy EEZ, during the period from February to June but the peak is between March to May each year. As against the longliner catches are present throughout the Malagasy EEZ, and throughout the year with two peaks observed in January and May.

4 Discussion and conclusions

Since the stock of tropical tuna is regional scale, the trend of evolution is still unclear from this analysis. The fluctuation or stability of the studied parameters in this analysis does not conclude anything about the trend of the evolution of stocks. Different factors not yet analyzed on this study might be the cause of the situation. The decrease or increase in daily yield and the average weight of fish caught may be related to the migration of these species, which in turn, could be related to the parameters of the ocean environment. This could also be related to the fishing effort in the Malagasy waters. In fact, the number of purse seiners fishing authorization in the Malagasy EEZ continues to decline (45 in 2008, 38 in 2009 and 31 in 2009). Thus, further analysis with a consideration of all factors is needed to better understand the trend of the evolution of tuna stocks.

However, this partial analysis reveals suspicions of a possible trend of declining of tuna stocks in Malagasy waters. A slight decline were noted on the average weight of skipjack and bigeye tuna for longliners catches in the last three years. It is the same for the daily yield of the longliners despite a small increase in 2010. The decline trend is also observed in the proportion of the three tropical tunas species in the composition of longliners and purse seiners catches.