Received: 8 November, 2012
IOTC–2012–WPNT02–17

REPOBLIKAN'I MADAGASIKARA

Fitiavana – Tanindrazana - Fandrosoana

Overview on neritic tunas bycatch by the national bottom longliners in Madagascar

Second Working Party on Neritic tunas
Penang, Malaysia 19 – 21 November 2012

Draft

Rijasoa FANAZAVA
Chef de Service Suivi des Ressources
Centre de Surveillance des Pêches de Madagascar

Abstract :

National fleets targeting demersal fishes are encountered in Madagascar's EEZ. It is bottom longliners allowed which catch also neritic tunas as bycatches.

Trip reports are provided by observers of CSP during the period from 2007 to 2011, covering around 30% of fleets, have been used on this analysis of the national bottom longliners catches, including the spatial distribution and species composition of the catch.
Mapped from geographic coordinates, the longline fishery targeting the demersal fishes is present in the East coast of the Malagasy EEZ since 2007 up to now. However, from 2010, this costal fishery is present also at the middle West of Madagascar EEZ.

Analyzing the composition of catches, neritic tunas are caught by this fishery. For this observation period, the catch rates of tuna neritic vary from year to year with a rate not exceeding 11%. Two neritic tunas species are identified by observers. The first predominated one is *Acanthocybium solandri* (Wahoo), and the second one, *Scomberomorus commerson* (Narrow-barred Spanish Mackerel), is a poorly represented species.

Key words: *Bottom longline, trip reports, neritic tunas, fishing zones, catch composition.*

List of contents

List of illustrations

Table

Charts

1 Introduction

Different fisheries in the Madagascar waters catch Neritic Tunas. It seems that this is one of the most tuna is caught by traditional fishermen using sailing canoe with their line but this fishery is still unknown. In 2011, Rahombanjanahary D., in analyzes of byproducts purse seiners estimated that Frigate tuna (*Auxis thasard*) constitutes around 26% of the by-products and he marked the presence of Wahoo (*Acanthocybium solandri*) and Kawakawa (*Euthynnus affinis*).

The observer program implemented by the CSP for the industrial and artisanal fishing has generally permitted to know each catch fishery types of national fleets. This program covers 30% of the fleet trip of each company. Trip reports provided by observers found that neritic tunas are caught as bycatch by fishing bottom longline targeting demersal fishes. Artisanal fishing using vessels having an engine under or equal 50 hp or industrial fishing which are the vessel having a engine horses power more than 50hp are concerned by this program.

This paper reports the analysis made on two parameters of the bottom longline fishing for the national fleets during the period 2007 to 2011. The spatio-temporal distribution of the bottom longline fishery was mapped at first and then the changing on the species composition of the catch was monitored. This monitoring includes the development on species composition of the fleets catches having onboard observers. Such analyses provide a trend seen on the evolution of stocks and thus allow to provide technical elements for the political decision-making in the management of tuna resources.

2 Methods

Trip reports provided by observers are recorded to supply the database, designed for the entire fishery. Catches of the vessel observed during the trip as well as the geographical positions of the fishery are included in each report.

2.1 Location of bottom longline fishing :

The data used in the maps of the locations of the bottom longliners are extracted from the database of trip reports. These are the records with coordinates corresponding dates and vessels and companies involved. The following table summarizes the number of records used for these maps.

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

Year	2007	2008	2009	2010	2011	2012
Number of tuna longline vessels	2	5	3	13	10	
Number of trips observed	2	8	5	107	63	
Number of fishing days observed	64	130	185	922	424	
Number of positions recorded	291	143	291	3887	1690	ND

2.2 Catch composition:

From the database, the table below summarizes the data used to monitor the catch composition of bottom longliners after triage, formatting and structuring.

Table 2 : *summarizes the data used to monitor the catch composition of bottom longliners*

family	Year (Y)				
	2007	2008	2009	2010	2011
FAM_1	$W_{1,2007}$	$W_{1,2008}$	$W_{1,2009}$	$W_{1,2010}$	$W_{1,2011}$
FAM_2	$W_{2,2007}$	$W_{2,2008}$	$W_{2,2009}$	$W_{2,2010}$	$W_{2,2011}$
FAM_3	$W_{3,2007}$	$W_{3,2008}$	$W_{3,2009}$	$W_{3,2010}$	$W_{3,2011}$
FAM_4	$W_{4,2007}$	$W_{4,2008}$	$W_{4,2009}$	$W_{4,2010}$	$W_{4,2011}$
FAM_5	$W_{5,2007}$	$W_{5,2008}$	$W_{5,2009}$	$W_{5,2010}$	$W_{5,2011}$
…					
FAM_n	$W_{n,2007}$	$W_{n,2008}$	$W_{n,2009}$	$W_{n,2010}$	$W_{n,2011}$

FAMi : Family num i

$W_{i, Y}$: Family num i weight for the year Y

The specific composition is expressed in percentage for each year from the following operation :

Catch rate of the family i, for the year Y = (total weight of the family i for the year Y/sum of the total weight of all families for the year Y)x 100

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

$R_{i,Y}$: Catch rate of the family i, for the year Y

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

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

The same method was used to follow the evolution of neritic tuna species of the family of Scombridae as shown in the table below :

Table 3 : *summarizes the data used to monitor the neritic tunas composition of family of Scombridae*

Scombridae	Year (Y)				
	2007	2008	2009	2010	2011
Acanthocybium solandri	$W_{As,2007}$	$W_{As,2008}$	$W_{As,2009}$	$W_{As,2010}$	$W_{As,2011}$
Scomberomorus commerson	$W_{Sc,2007}$	$W_{Sc,2008}$	$W_{Sc,2009}$	$W_{Sc,2010}$	$W_{Sc,2011}$

As : *Acanthocybium solandri*; Sc : *Scomberomorus commerson*

$W_{As, Y}$: *Acanthocybium solandri* weight for the year Y

The species composition 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

$$r_{i,Y} = (\mathbf{wi, Y} / \sum_{i=As}^{Sc} \boldsymbol{wi, Y}) \text{x}100$$

$r_{i,Y}$: Catch rate of the species i, for the year Y

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

$\sum_{i=As}^{Sc} \boldsymbol{wi, Y}$) : Sum of the total weight of Scombridae for the year Y

3 Results :

3.1 Mapping locations of bottom longliner fishing zone

The following five maps show the locations of the bottom longline fishery, each year, in Madagascar's EEZ during the period 2007 to 2011 according to trip reports provided by observers

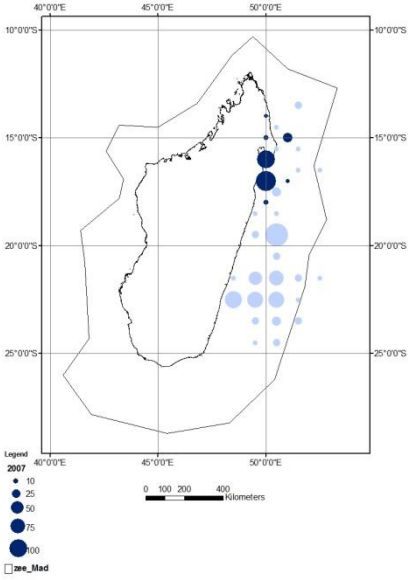


fig. a

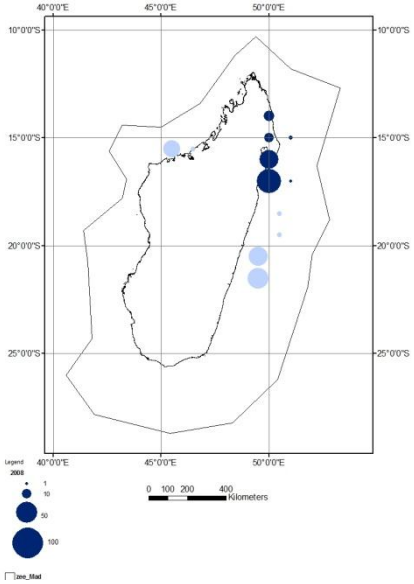


fig. b

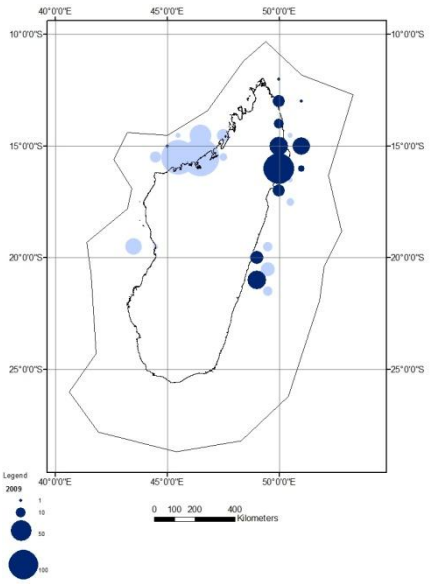


fig. c

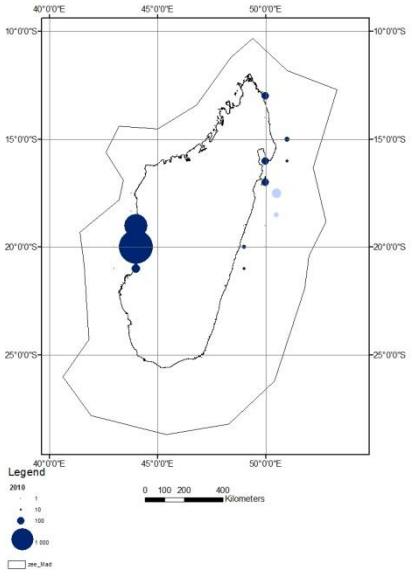


fig. d

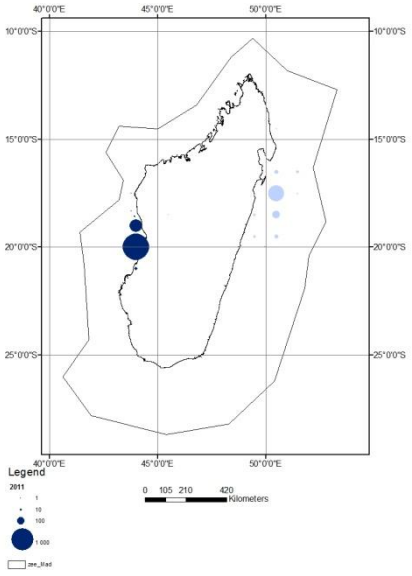


fig. e

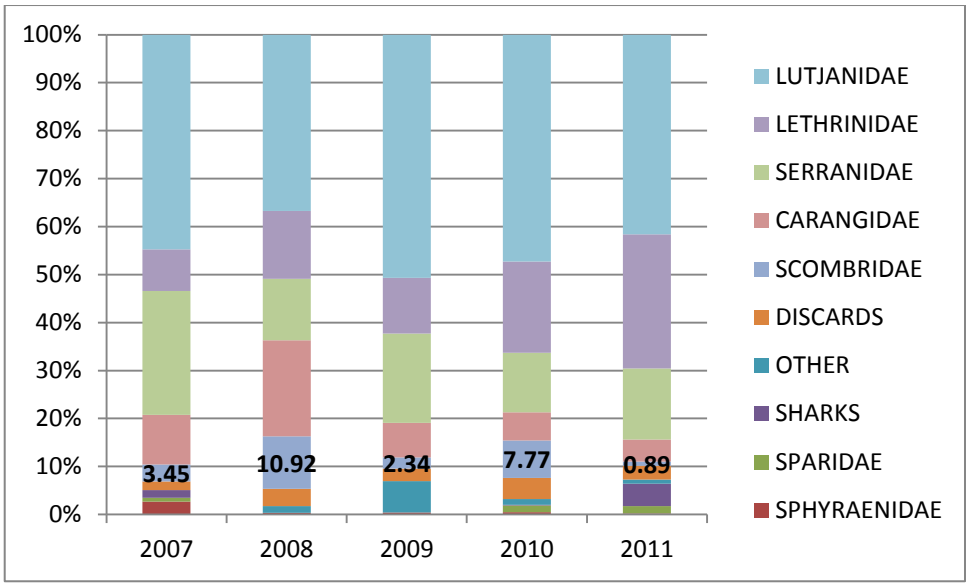
These maps show that the locations of bottom longline evolve and grouped into two periods for the five years of observation. The first period is shown by the figures a, b and c which correspond to the years respectively 2007, 2008 and 2009. The fishery operates throughout the Eastern part of the EEZ by the industrial vessels. For the second period, shown by the figures e and f, which

correspond to the years respectively 2010 and 2011, is different of the first period by the presence of fishing zone in the Western part. At the West part, some artisanal vessels which was the shrimp trawlers have changed into bottom longliners targeting the demersal fishes. In 2011, trip reports analyzed concern only the artisanal fishing at the Western part. However, all of the bottom longline fleets at the East part of the EEZ are still operating on this year.

3.2 Catch composition of bottom longliners

The following chart shows the rate of catch by family for bottom longliner from 2007 to 2011 according to trip reports provided by observers onboard.

Chart **1** *: Catch rate per family for whole fishery*



This chart shows that the family of Lutjianidae, Letrinidae, Serranidae and Carangidae predominate in terms of quantity expressed in weight for bottom longliners as these fisheries targeting demersal fishes. However, these fisheries caught also Scombridae constituted by the neritic tunas as bycatches. They take a small quantities of the catch with a rate varying from 2,34% (2009) to 10,92% (2008) for the whole observed fleets, except on 2011 when data concern only the artisanal fishing at the West part of the EEZ.

Considering the two groups of fisheries separately (bottom longline industrial at the East part and bottom longline artisanal at the West), the following charts show the results of analyzes

Chart 2 : Catch rate per family for Industrial Bottom longline at the East part

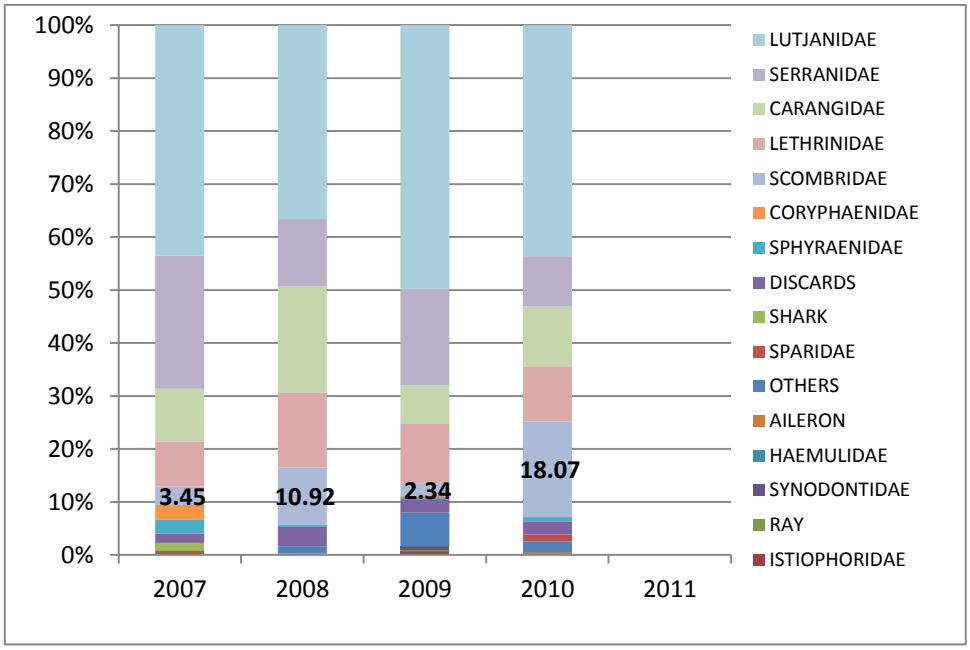
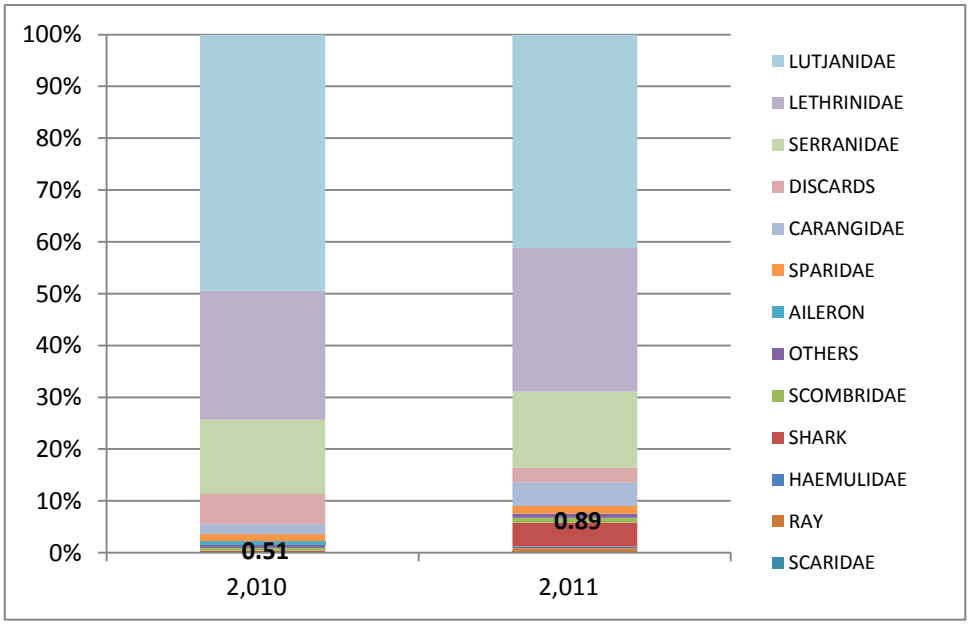


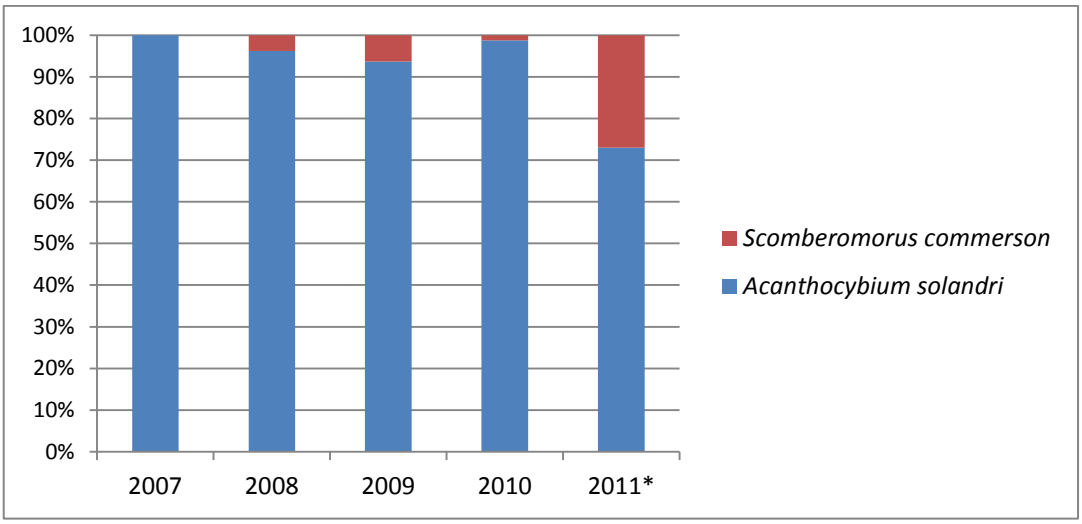
Chart 3 : Catch rate per family for Artisanal Bottom longline at the West part



Industrial bottom longliners at the East part of the EEZ have a higher catch rate on neritic tunas (minimum 2.34% in 2009 and maximum 18.07% in 2010) compared to artisanal longliners at the West part (0.51% in 2010 and 0.89% in 2011).

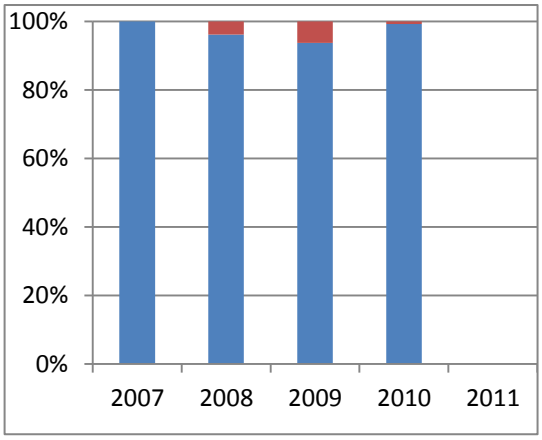
The chart below shows the rate of catch of each species of neritic tunas for the Scombridae family according to trip reports provided by the observers during the period from 2007 to 2011:

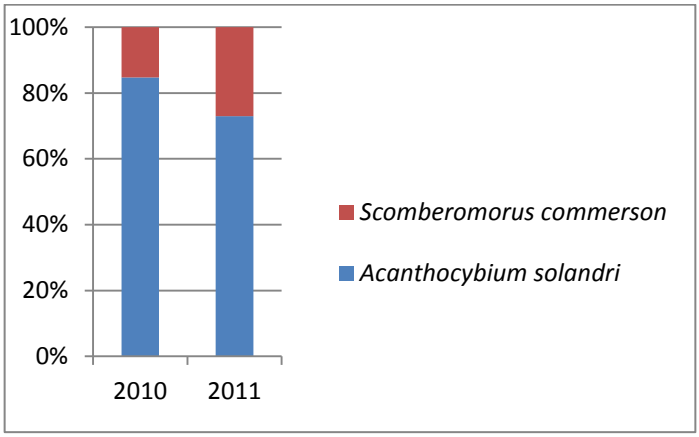
Chart 4 : Rate of each scombridae species for whole fishery



In global view, observers identify two species of neritic tunas caught by these fisheries, which are *Acanthocybium solandri* (Wahoo) and *Scomberomorus commerson* (Narrow-barred Spanish Mackerel). Wahoo predominates largely with a rate more than 90% except on 2011 when the catches of industrial bottom longline was lacking.

Chart 5 : Rate of each Scombridae species for artisanal and artisanal fishery separately





(Chart 5a) Industrial *(Chart 5b) Artisanal*

These charts above show that catch rate of narrow-barred Spanish mackerel is poorly caught by industrial bottom longline at the East part (catch rate less than 7%) than the Wahoo *(Chart 5a).* Even if that is also the case with the artisanal bottom longline at the West part *(Chart 5b),* the catch rate of narrow-barred Spanish mackerel is more or less higher (15,24% and 27% respectively for the year 2010 and 2011).

4 Discussions

Changes were observed on bottom longliner fishing. If the fishery was observed only in the eastern part of Madagascar's EEZ, the conversion of some artisanal shrimp trawlers into artisanal bottom longliners marked this change. This conversion is decided by the company itself and it is probably for economic reasons. Thus, a fishing area in the eastern part of Madagascar's EEZ appeared in 2010 up to now.

Both neritic tuna species are identified by both bottom industrial longline of the East and bottom artisanal longline of the West. However, the catch proportions of neritic tunas between these two types of fisheries had changed. For industrial bottom longliners of the East, the minimum catch rate of neritic tunas was observed on 2009 (2.34%) and the maximum was on 2010 (18.07%) but the proportion of Wahoo is over 90 %. While, for the artisanal bottom longliners of the West catch rates were 0.51 and 0.89% (less than 1%), respectively for 2010 and 2011, but the proportion of narrow-barred Spanish mackerel is 15 , 24 and 27% respectively for 2010 and 2011.

The choice of vessels and the timing for boarding of observers could affect the fluctuation of catch rates throughout the five years of observation. While, between the fishing zone East and West, the differences of the oceanic parameters in term of physico-chemical of the water and the structures of the seabed could explain the variations in the proportion of neritic tunas in the catches as a Scombridae family and the proportion of the both species. To this adds probably the difference in the vessel characteristics.

5 Conclusions

The bottom longline fisheries catch Neritic tunas as bycathes in Madagascar water. Apart of Frigate tuna (*Auxis thasard*) caught by the industrial purse seiners, the observers identified *Acanthocybium solandri* and *Scomberomorus commerson* on the bottom longliners targeting demersal fishes. Industrial vessels operating at the East part of EEZ present a higher level of catch rate of neritic tunas in term of catch composition than the artisanal vessels at the West part of EEZ. Change in term of fishing zones, difference on vessel characteristics may affect the catch composition.

Finally, it must recognize that efforts are needed to know more on catch of neritic tunas especially the catch of the traditional fishing.

Bibliography

- RAHOMBANJANAHARY D. M., 2011, Preliminary demographic structure parameters of Frigate tuna through landing in Antsiranana;
- CSP Database,