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**Catch and effort of neritic tuna in Comoros  
from 2011 to 2015**

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Prepared by: Ibrahim MOHAMED TOHIR  
Assistant Scientist

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# Catch and effort of neritic tuna in Comoros from 2011 to 2015

Ibrahim MOHAMED-TOIHIR,  
National Fisheries Department, Comoros

## Abstract:

Neritic tuna from Comorian fisheries represents a weak part of the annual total catch but really helps the local consumption in term of product variability and market. Its production represents 2.69% of annual total production of these five last years. Neritic tuna is the fourth important component of fishery behind tropical tuna, small pelagic and tuna like component. The main specie caught is Kawakawa (*Euthynnus affinis*), followed by Bullet tuna (*Auxis rochei*). The Frigate tuna (*Auxis thazard*) and the Longtail tuna (*Thunnus tonggol*) are not often caught. The Indo-Pacific king mackerel (*Scomberomorus guttatus*) and Narrow-barred Spanish mackerel (*Scomberomorus commerson*) are extremely rare. All this neritic tuna are mainly caught by trolling line or hook and line using fibber glass small boat or wooden pirogue. The main fishing gear is depending on the habit of the Comorian Island you are.

**Keys words:** neritic tuna, effort, strata, seasons

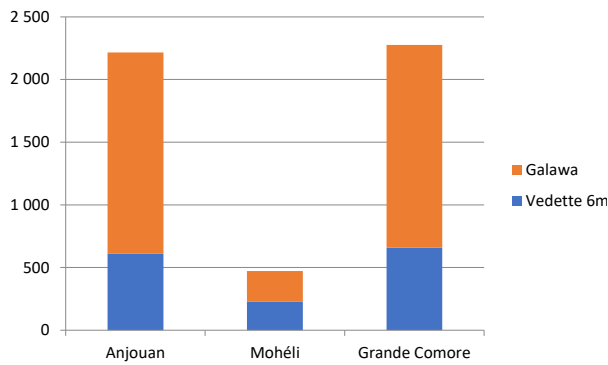
## BACKGROUND

Comorian economical exclusive zone (EEZ) is not yet completely defined. There is some negotiation running to complete the delimitation. It is supposed that Comorian EEZ is about 160,000 km<sup>2</sup> with 427 km of coast line (Youssouf et Naji, 2007).

According to the volcanic origin of Comoros, the continental shelf is limited with some small difference by island. Anjouan and Grande-Comore Islands have reduced continental shelf than Mohéli. But anyway the wide of this continental shelf is not exceeding 2 nautical miles (Breuil, 2018). As well as we leave from the coast for a few hundred meters, the deep is quickly exceeding 100 m (Bosc, 2016). The total area of this continental shelf is not exceeding 900 km<sup>2</sup>. This fine thickness of the continental shelf is one of the reasons of the orientation of

the main Comorian fishery to pelagic component instead of demersal. The Comorian EEZ has an important zone for tuna fishery based in the Mozambique Channel.

The capacity of artisanal fishery is limited. According to the census of (DGRH, 2014), the total fishery fleet is 5,006 units which composed by 1,500 units of fibber glass boat of 6 meters, 40 fibber glass boat of 9 meters, and 3,466 of pirogues. The 9 meters fibber glass boat is in another category called semi-industrial fleet. The main effort of fisheries is based in Anjouan and Grande-Comore (Figure 1) (Breuil, 2018).



**Figure 1: repartition of fishing small boats by Island (fibber glass boat (6 m long) and wooden pirogue (Galawa), fishery census of DGRH, 2014).**

In the territorial water, we have all the tuna species present in the Indian Ocean region. Comorian fishery is almost artisanal (Oirdi, 2002). For Comorian economy, Fishery is one of quick growth sector. The potential fishing capacity is estimated about 33,000 tons per year which composed by 3,000 tons for demersal, 10,000 tons for coastal pelagic resources and 20,000 tons for oceanic pelagic fishery (Youssouf et Naji, 2007). While the main component of fishery is pelagic, it is linked with a strong seasonality. The period of North monsoon (Kashkazi) when it is hot and humid is from November to April. The period of South monsoon (kusi) when it is cold and drayed, is from May to October. In the period of kashkazi, even fish are very far from the coast, but sea condition are favourable for fishery and catchability is high. Otherwise, in Kusi, fish are near the coast but, south monsoon is strong, more waves, the sea conditions are not favourable for fishery and there is less and less catches of pelagic fishes (Breuil 2018). The annual total catch is around 16,000 tons per year with some small variability between years.

For tuna and tuna like fishery, operations are based on trolling line in open free school or deep hand line applied around FADs. In this fishery context FADs are well experimanted and well known to

improve the catchability of tuna and tuna like in artisanal fishery. Actually only anchored FADs are used out of continental shelf. There are two kinds of FADs: coastal FADs which its deep is around 600 m and deep FADs which its deep is between 1,000 and 1,800 m.

Effort data have collected since 2011 and the dataset available at National Fisheries Directorate (DGRH) are expressed in number of fishing days. Those data should be taken with prudence because the 6 m small boat can have two fishing tide per day especially in period of North monsoon (Kashkazi) when catchability is maximal. For 6 m fibber glass boats, effort has increased up to 24% in 2015 compared to the average observed from 2011 to 2015. According to evolution by Island, effort is more raising in Anjouan Island (+38%) and Mohéli (+63%) than Grande-Comore where the effort raising is about +2% (Breuil, 2018). Concerning the Galawa, effort has generally increased at 21% with a special increase in Grande-Comore.

The main objective of this paper is to describe the situation of neritic tuna in national and insular level of Comoros archipelago from 2011 to 2015.

## MATERIAL AND METHODS

### Zone of study

Data are collected over the whole country except Mayotte where administration has not intervention. Data are collected in Grande-Comore, Anjouan and Mohéli islands. There is a national statistic data collection based at national fisheries department.

## Strata of collection data

The collected data are stratified by 7 strata distributed as follow:

In Grande-Comore, collection data is organized by two strata (Figure. 2) one in the coastal Nord-West and East.

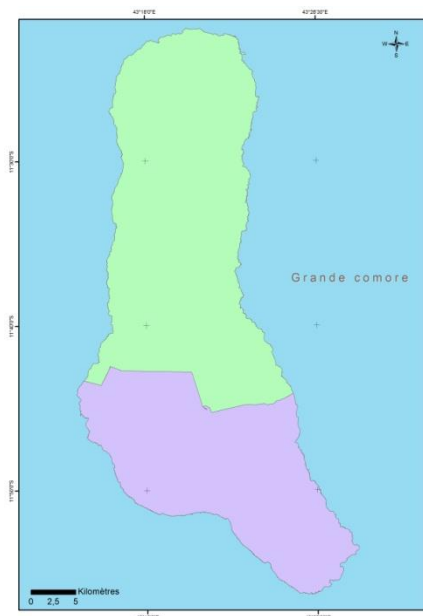


Figure 2: strata of data collection in Grande-Comore. Source: DGRH

For Anjouan Island, there are 3 strata which one is in the South-Western side, another one in the North and the last one in the Eastern part of the Island (Figure. 3). This planning is made because of the relief of the Island.

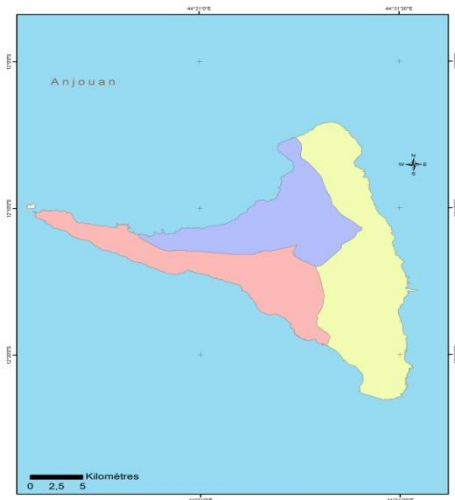


Figure 3: presentation of strata of data collections of Anjouan Island. Source: DGRH

Mohéli Island has only two strata for data collection, one in the Northern Part and the other one in the Southern part of the Island (Figure. 4). These two strata are again reduced in one with the last update of the National data Collection System.

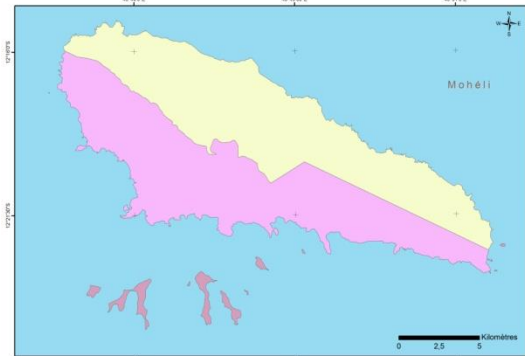


Figure 4: strata of data collection of Mohéli Island. Source: DGRH

## Data collectors

Eleven data collectors are assigned to collect all data in the whole country. Their repartition is as follow: 5 for Grande-Comore, 4 for Anjouan and 2 data collectors for Moheli.

## Fishing boat

According to the fishery census from 2014, the total fishing fleet is 5006 small boat which 30% are motorised. There are 6 types of small boats named locally as follow: GAP (Wooden pirogue without engine), GAF (pirogue with net as fishing gear), Fedawa I (FD1) (wooden pirogue with engine), Fedawa II (FD2), G18 (6 m fibber glass boat with engin), JAK (komacat and Japawa, respectively local 9 m fibber glass boat with two outboard engine and Japanese model 9 m fibber glass boat formatted on local pirogue with inboard engine).

## Fishing gears

Next to these categories of boat there are seven (7) types of fishing gears using with it: PAL (Hook and line: vertical line), TRA

(Hook and line: trolling line), PAN (Hook and line: vertical line operated at night with light), PNL (Hook and line: vertical line operated at night without light), FIL (small senne or net), CAS (trap), LIG (Hook and line for small pelagic). There are some fishing gears which are not implicated for neritic tuna fishery.

### Fishing Units

The combination of fishing gear and categories of fishing boat constitute a fishing unit (Table 1). According to this table the statistic service has considered 1,250 samples of fishing Unit for following data. Up to 50% of these fishing units, fishes all pelagic species especially neritic tuna.

**Table 1: repartition of fishing Unit per strata all over the study zone**

Strata	G18-LIG	G18-PAL	G18-PNL-PAN	G18-TRA	GAF-FIL	GAP-LIG	GAP-PAL	GAP-PNL-PAN	GAP-TRA	Total
Anjouan East				50		50	30	50		180
Anjouan North & South-West				50	30	50	50	50		230
Grand-Comore East & North-West	50	30		50	30	50	50	50	50	360
Grand-Comore South-West	30	50		50		50	50	50		280
Mohéli all	25		25	50		50		50		200
<b>Total</b>	<b>105</b>	<b>80</b>	<b>25</b>	<b>250</b>	<b>60</b>	<b>250</b>	<b>180</b>	<b>250</b>	<b>50</b>	<b>1,250</b>

### Data collected

The collection system is organized by strata and in each strata there is primary site which is sampled regularly and secondary site which is sampled once a week. In this way the whole coastal villages are implicated in the data collection system. For each landing site all categories of fishing boat are sampled for different fishing gears.

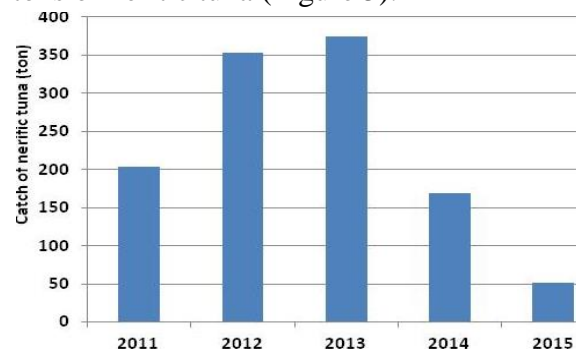
All species of neritic tuna found in the Indian Ocean are also found in Comorian water: there are Bullet tuna (*Auxis rochei*), Frigate tuna (*Auxis thazard*), Kawakawa (*Euthynnus affinis*), Longtail tuna (*Thunnus tonggol*), Indo-Pacific king mackerel (*Scomberomorus guttatus*) and Narrow-barred Spanish mackerel (*Scomberomorus commerson*).

These are the species which it situation will be descript in this paper.

## RESULTS

### Total Catch for neritic tuna

The data collection system is updated on 2011 when the system is launched until now. From this 5 years data collection, neritic tuna catches represents almost 3% of national total catch. Only on 2012 and 2013 there are respectively 350 and 375 tons of neritic tuna (Figure 5).



**Figure 5: Evolution of total catch of neritic tuna in Comoros from 2011 to 2015**

The others years have some catches between 50 and 200 tons. This category of species is not regularly caught. Neritic tuna is the fourth important component of Comorian fisheries.

### Catch by species

Globally, neritic tuna are caught at national level. The kawakawa (*Euthynnus affinis*), is the very dominant specie in catch followed by Bullet tuna (*Auxis rochei*) (Figure 6).

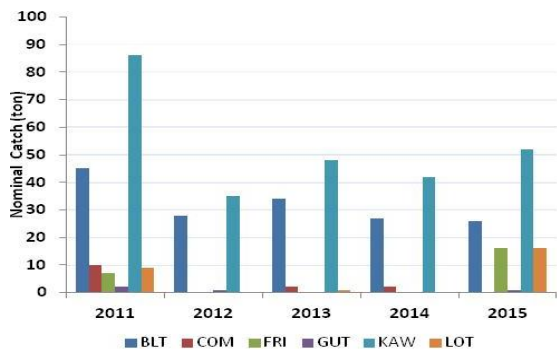


Figure 6: nominal catch of neritic tuna in Comoros from 2011 to 2013

Here below is the distribution of nominal catch of neritic tuna by fishing gear. This distribution shows that most of neritic tuna have caught by trolling line then hook and vertical line (Figure 7).

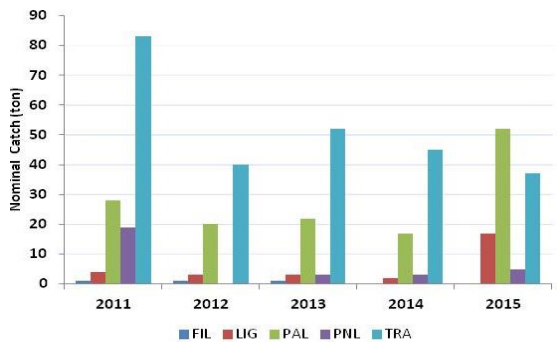


Figure 7: neritic tuna catches distribution by fishing gear in Comoros (Ref. fishing gear)

There is a fin part of neritic tuna caught by hook and line for small pelagic. It seems to be juvenile of some species like kawakawa which sometimes there are a lot at local market.

Regarding distribution of neritic tuna catch by type of fishing boat, it appears that most of catches are made by G18 type of boat followed by GAP (Figure 8).

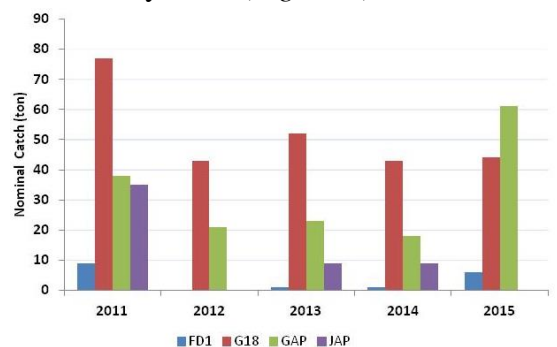


Figure 8: neritic tuna catch distribution by type of fishing boat (Ref. fishing boat).

The model JAP, is used to catch neritic tuna, but in weak frequency. The FD1 category has used less and less for neritic tuna fishery.

For neritic tuna there is no really seasonality. All over the year there are available but there is some variability from the species it selves (Figure 9).

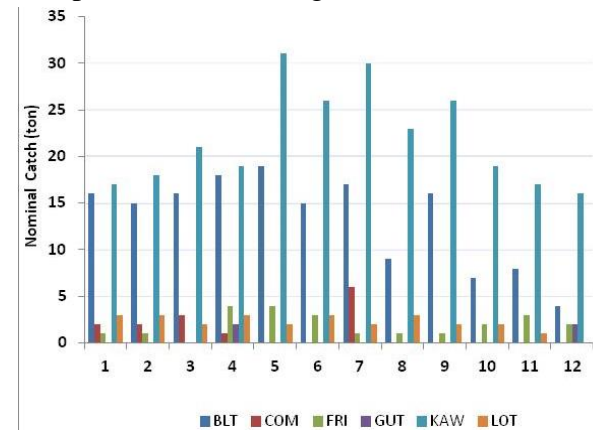


Figure 9: distribution of neritic tuna in 2015 in Comoros

### Fishing effort

Fishing effort is determined in this case as the number of fishing trip of the whole type of boat for defined period. Fishing effort is presented in Figure 10, as the average of number of trip from different categories of boat.

From 2011 to 2015, the average of fishing effort shows that the main fishing power is made by only two categories of boat which are wooden pirogue and 6 meters fiber glass boat (G18) (Figure 10).

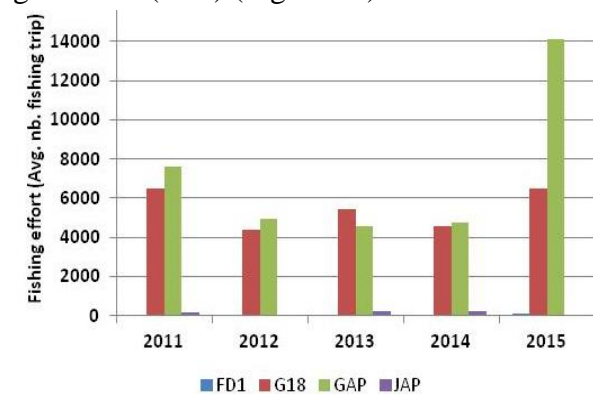


Figure 10: average of fishing effort distribution from 2011 to 2015 in Comoros

This effort is not made for only targeting neritic tuna. But with this effort, fishers target all tuna species and tuna like while it is an artisanal fishery context.

Anyway, in 2011 the fishing effort was high while the three years followed have moderate decrease of effort until 2015 which this effort is doubled again.

## DISCUSSIONS

The distribution by Island shows that in Moheli and Anjouan the main neritic specie caught is kawakawa then bullet tuna (Figure 122, Figure 133). In Grande-Comore, the bullet tuna is the main specie caught followed by kawakawa (Figure 111).

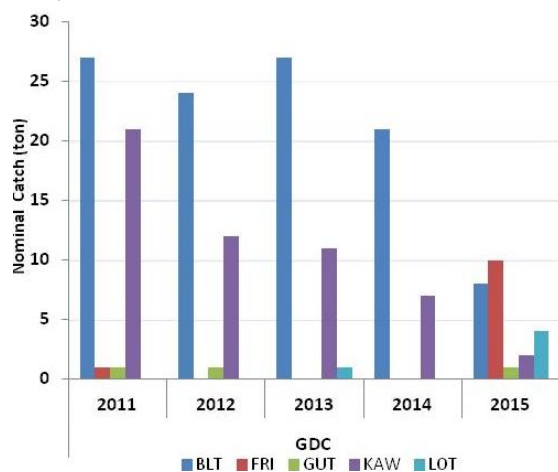


Figure 11: neritic tuna distribution in Grande-Comore from 2011 to 2015.

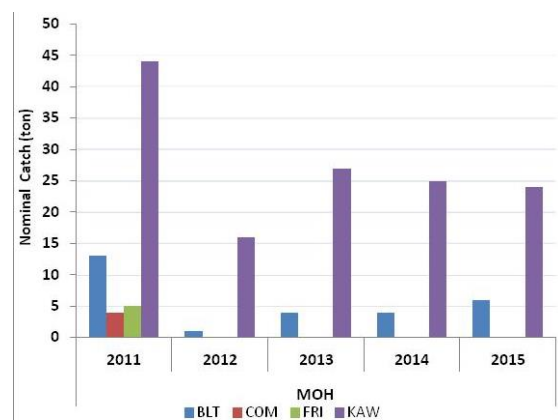


Figure 12: neritic tuna distribution in Moheli from 2011 to 2015.

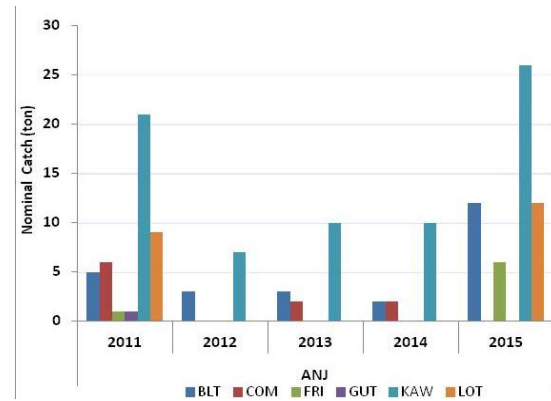


Figure 13: neritic tuna distribution in Anjouan from 2011 to 2015.

It seems that in quantity there is more in Grande-Comore than other Island. That means that some fishers from Anjouan and Moheli land their catch in Grande Comore to target the good price of market.

In fact, specie variability is high in Anjouan where all six species of neritic tuna are caught during these five last years. Grande-Comore have followed by five neritic species caught and finally Mohéli with only four species caught during these five last years.

From these Island it shown that 2011 and 2015 the specie richness are high according to the catch especially in Anjouan and Grande-Comore (Figure 131, Figure 113).

In term of effort, the wooden pirogue makes more effort for fishing, but the 6 meters fibber glass catch more than it (Figure 1010).

About Island, the maximal fishing power is mainly made by wooden pirogue in Anjouan, while the main boat for fishing power effort in Moheli, is 6 meters fibber glass boat 'G18' (Figure 14, Figure 15).



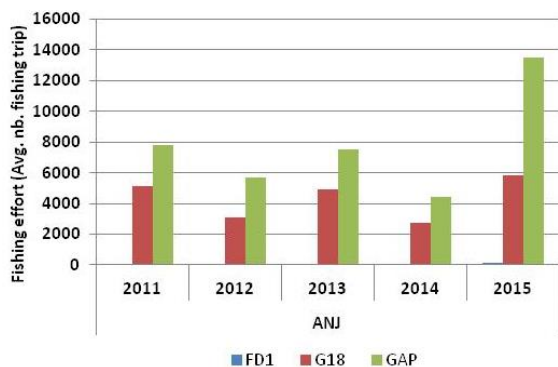


Figure 14: fishing effort distribution of by categories of boat in Anjouan from 2011 to 2015

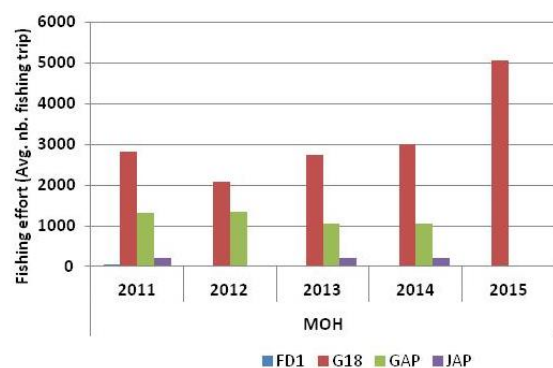


Figure 15: fishing effort distribution by categories of boat, in Mohéli from 2011 to 2015.

Grande-Comore the most fishing effort is come from both categories of boat, wooden pirogue and 6 meters fibber glass boat (Figure 16).

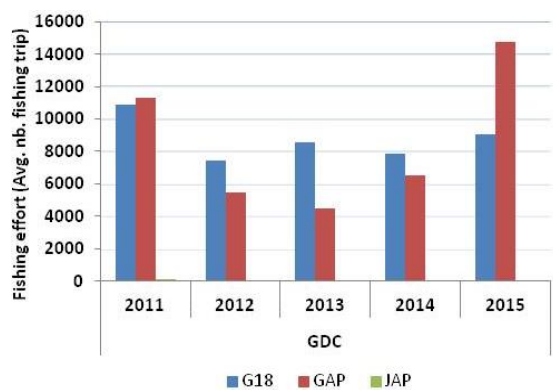


Figure 16: fishing effort distribution by type of boat in Grande-Comore from 2011 to 2015

For Grande-Comore and Anjouan the JAP is not implicated in the main power effort for pelagic fish but it is implicated in it for Mohéli.

## CONCLUSION

Neritic tuna constitute an important component of commercial species in Comorian local market. The catchability of its species is made both by wooden pirogue and by 6 meters fibber glass boat.

All the 6 species are available in Comorian water but it distribution by Island depends on the characteristic of the fishery, in term of habitat, gear, season and the fishing capacity of the Island.

The effort showed here is made to catch also other pelagic species while the artisanal fisheries has not yet licence to operate in national water. They catch all they can.

## ACKNOWLEDGMENT

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