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Preliminary demographic structure parameters of Frigate tuna through landing in Antsiranana

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ACRONYM

FAD : Log associated schools

FL : Fork Length

k: is a rate constant with units of reciprocal time (eg year⁻¹)

L_t : Total length, but in our case, we used the fork length

L_∞ : (L infinity) Is the mean maximum length ($t = \infty$)

PFOI: Pêche et Froid de l'Océan Indien

t_0 : Age at fertilization

USTA (Unité Statistique Thonière d'Antseranana or Statistical tuna fisheries unit)

VBGF : Von Bertalanffy growth function

1. INTRODUCTION

Purse seine fishery is a veritable predation between purse seiners, predators, and tuna shoal, prey. In the Indian Ocean, this industrial vessel would to monitor the migration system of tuna schools in order to optimize their system of fishing. The simplified map analysis reveals that the harvest season tuna in the Mozambique Channel is carried out usually between February and June. Note that the gear, which is purse seine net, is non selective. It catches all resources encircled and retained by the net once closed including other species than tunas, billfish and bycatch. The bycatch may be divided in two parts which are by-products and discards. We call by-products by the overall fish that are kept for a particular use, i.e. to be sold after unloading on the local market. As for discards, it is a part of bycatch rejected, died or alive at sea. This paper is talking about by-products which are composed by all non-targeted species plus small or damaged target tuna species that are not marketed through canneries.

It has been constated for years of landing that ecologically and economically concerns, represent an extent dimension. That is why, USTA (Unité Statistique Thonière d'Antseranana or Statistical tuna fisheries unit) wanted to elucidate qualitative and quantitative characteristics of fish discarded by cannerie (PFOI: Pêche et Froid de l'Océan Indien). Our goal is to seek out the composition species and quantity of the by-products in the harbor.

2. METHODE

We have undertaken the initiative to engage two non permanent investigators to ensure the collect of all informations about this special landing. The surveys include, initially, to carry out sampling on the unlandings and transhipments, i.e., they take about 200 fish, pre-sorted by the dockers, per day per boat. Then, an investigator identify each fish before carrying out its measurement, while the other records information in a form. Note that during the fishing season, the number of vessels that make operations in the harbor is 0 to 8. Also, to achieve such investigation, two investigators are not enough especially when the number of operations at the port is greater than 4. This is already a limit and may well affect the quality of our results. The second step is to explore the information associated with the quantitative évaluation of by-products landed by each boat. For this, a suitable form was designed to follow the dockers' speed movement, the net carriage (Estimated to contain 800 Kg of fish), cages (either 1,200 or 1,400 Kg). Thus, a coded categorization for each type of landing, called "conditioning" was done in the form. The species and size are also coded for making easy and getting been fast the data collection.

All information collected will be entered in an Excel file, copy of the form. These filled files are, then, classified in the data warehouse before serving as a source for the database. Finally, the scientist makes sure to aggregate all the forms in a single database ready for any kind of process.

This study intends to provide preliminary elements on the demographics of Frigate tuna through the details of operation at the harbor of Antsiranana. The database includes catches per statistical square $1^{\circ} \times 1^{\circ}$, the quantity of by-products landed by species and length frequencies according to the fork length of each species. From this information, the frequency distribution of the fork length or weight can be erected. The length at age frequency can be done using the age-length relationship of The Von Bertalanffy growth function (VBGF, 1938)

$$L_t = L_{\infty} (1 - e^{-k(t-t_0)}), \text{ where :}$$

L_t : Total length, but in our case, we used the fork length

L_{∞} : (L infinity) Is the mean maximum length ($t = \text{infinity}$) = 51.5 cm (according to Dwiponggo et al. (1986)

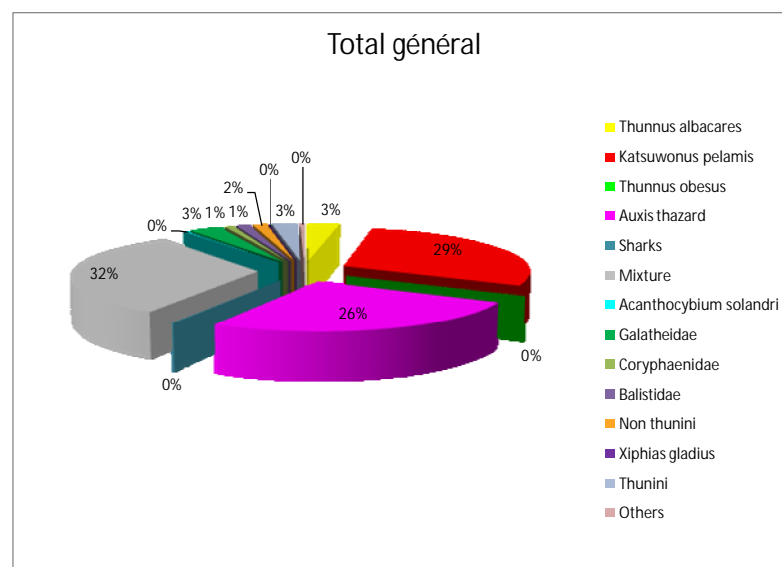
k : is a rate constant with units of reciprocal time (eg year⁻¹) = 1 (according to Dwiponggo et al. (1986)

t_0 : Age at fertilization = 0 (according Dwiponggo et al. (1986)

Consequently, age per recruitment, where the cohortes of Frigate tuna start being caught by purse seinners (by assuption) will be made through Bertalanffy equation,

3. RESULTS

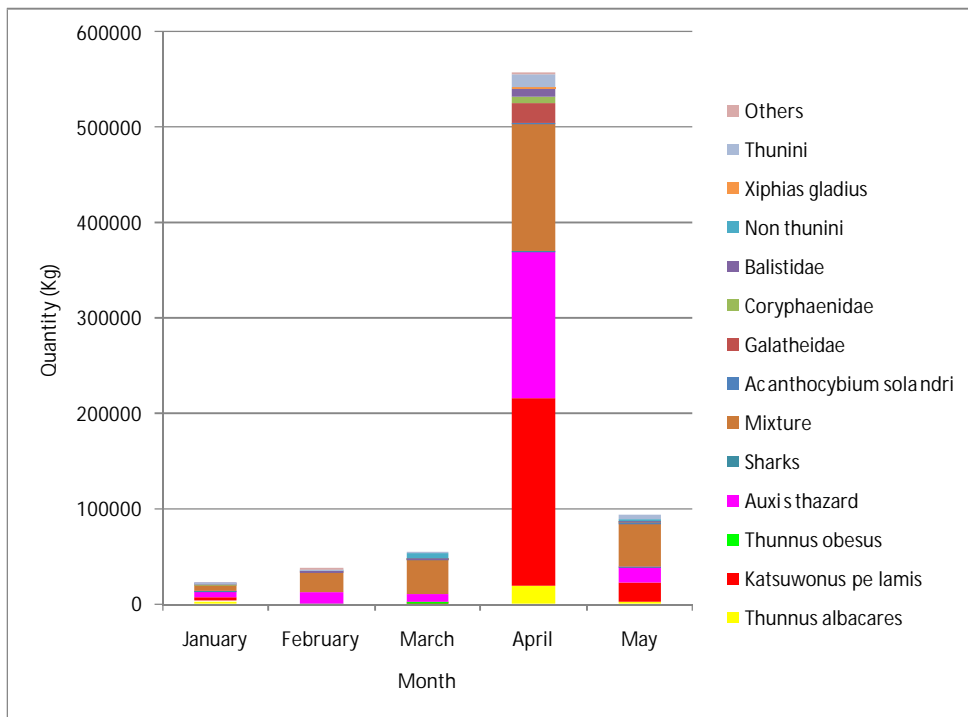
Available informations relative to by-products and the methods mentioned above have allowed us to provide some preliminary results wich are presented below.



Source: USTA, 2011.

Figure 1: **Composition species of by-products landed**

This composition species shows that the weight of the by-products in 2011 was estimated at 763, 785 tons, the major of which is composed by "other", 32% of the total. Third with a percentage, of 26% of total tonnage landed, the Frigate tuna (*Auxis thazard*) is captured in a significant dimension by purse seiners. This leads us to undertake a research of the most important periode where the Frigate tuna are caught in the Mozambique channel by purse seiners.



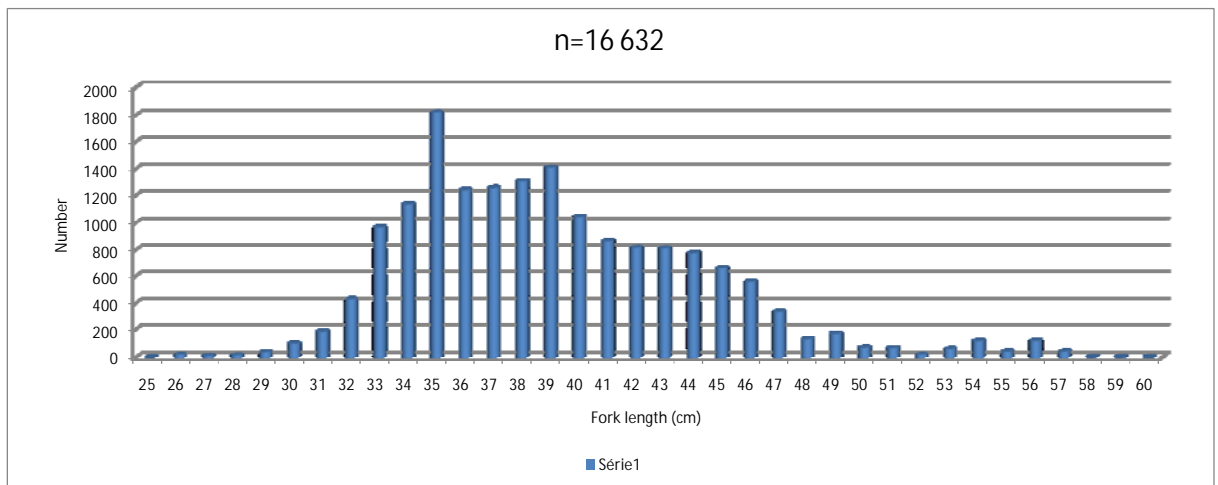
Source: USTA, 2011

Figure 2: Intra-annual distribution of the landing composition species.

Reminder that the purse seine operation¹ happen after harvesting some tonnage on board. In other words, the period between a net set and operation might take 1 day to 2 months. This reveals that the Frigate tuna are captured from March to April.

Here is a length frequencydistribution which is going to provide further information about demographic issue of Frigate tuna landed in the harbor.

¹ Operation : Unloading and/or transhipment in the harbor



USTA, 2011.

Figure 3: Length frequency distribution of Frigate tuna

The Frigate tuna caught are generally caught precociously, i.e., 48.6% of the catch undertaken in 2011 are below the mean fork length which is 39.73 cm. Frigate tuna's cohorts around 8 months may already be encircled and retained by the net. This reveals that Frigate tuna's recruitment is very early especially when they colonize log associated schools (FAD). Such cohorts are particularly vulnerable to the nets when they reach the size of FL = 35 cm corresponding to the age of 13, 65 months.

4. CONCLUSION

It must be noted that this paper intends to produce the first results from by-product landed by purse seiners studies in Madagascar. This paper reveals that the cohort of Frigate tuna starts being entangled at 1 year and 2 months by purse seiners in the Mozambique channel. USTA is going to undertake other small scale studies like socio-economic impacts of tuna fisheries in Madagascar. But before doing any survey in the future, USTA is exhorted to improve data collection especially artisanal fisheries issues.

5. REFERENCES

DWIPONGGO, A., T. Hariati, S. Banon, M. L. Palomares and D. Pauly, 1986. Growth, mortality and recruitment of commercially important fishes and penaeid shrimps in Indonesian waters. ICLARM Tech. Rep. 17, 91 p.