

Study on the sampling of catch species composition and size distribution in the purse seine fisheries

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Introduction

Obtaining accurate estimates of species and size composition of tuna catches is essential in order to provide accurate scientific advices for management of tuna resources. Experience has shown that this requires dedicated sampling programs, particularly when species are difficult to identify except by a trained observers (Fonteneau 1975, Báez et al. 2019). For the Atlantic and Indian ocean, species composition and size distribution of tuna targeted species (skipjack, yellowfin and bigeye) are estimated from the T3 methodology, developed by IRD and IEO (Pallarés and Hallier 1997, Pallarés and Petit 1998). The efficiency of this data processing depends on the quality of the sampling data (Duparc et al. 2018, Herrera and Baez 2019). Recent results (Duparc et al. 2018, 2019a, 2019b) pointed out the importance of the sampling at landing for the assessment of the species composition that lead to the final estimation of PS catches for several CPCs (EU-SP, EU-FR, EU-IT, SYC).

The reliability of the samples should so be investigated to improve the data quality reported to RFMOs. It is proposed to conduct such study by collecting data onboard the purse seiners, at landing and in the cannery to clarify several assumptions and adapt the data collection accordingly, as it was recommended by Working Group on tuna purse seine and bait boat catch species composition (WGTPSBB 2009, 2010).

Scope of the study

The purpose of the study is to answer to several questioning on the data collection for bigeye (BET, *Thunnus obesus*), skipjack tuna (SKJ, *Katsuwonus pelamis*) and yellowfin tuna (YFT, *Thunnus albacares*).

General topic:

- How representative of the fishing sets is the well sampling in terms of species composition and size distribution?
- Are the species composition estimated in the logbook and the spill sampling of each fishing set similar at the scale of the well?
- Are the species composition estimated during the well sampling and by cannery similar at the scale of the well?
- Is the species composition influenced by the timing and size of fishing sets?
- How does the school type influence these potential biases?
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Identify sources of bias in the well sampling:

- Do the samplers really select at random for species?
- Do the samplers really select at random for fishes in term of size?
- What is the optimal sampling size for the estimation of the species composition and the size distribution?

Method

Sampling methods

Spill sampling onboard

This sampling method involves the collection of a sample of fish as the catch is loaded aboard the vessel (Lawson 2008). For each of the sets during the fishing trip, a fraction of every tenth brail is spilt into a bin. Every fishes of the bin are then identified and measured. The first brail to be sampled must vary among fishing sets in order to reduce potential effects of layering in the set (e.g. small fish are near the surface in the net and bigger fish deeper).

Well sampling at port

The sampling is based on strata defined by large spatial areas, quarters and fishing mode (free school and FOB school). The sampling is made in 2 rounds separated from a few hours and is a simple random sampling within each selected well. The number of fishes counted and measured depends on both the fish size category within the well and the fish species (Details in Duparc et al. 2018). To estimate the catch species composition, the sample in number of fish is transformed into weight using the length-weight relationship.

Cannery estimates

During the cannery process, all fishes are sorted by species and weighted by commercial category. Thus, the total species composition of a well could be accurately calculated. Therefore, cannery estimates can be considered as reference to test for the representativeness of the other data source.

General sampling plan

Protocol

For a given fishing trip, species composition and t size distribution of the 3 major tuna (BET, SKJ and YFT) species will be estimated with 3 methods:

- 1- Spill sampling of each fishing set by onboard observers
- 2- Port sampling by different teams (current teams that collect data of the French, Spanish and Seychelles fleet) who will follow the current port sampling protocol on selected wells. All team will sample the same well several time (see sampling effort for details). Order of the sampling between teams will be choose at random to avoid for the stratification issues (flip a coin).
- 3- At the cannery, the weight by species and category will be collected.

Sampling effort

The purpose is to sample 30 wells of each school type to ensure a minimum amount of data for the analyses considering a sampling of 4 wells sampled by trip on average (calculated on data from 2000-2019 in Indian ocean), a minimum of 16 trips should be sampled in purse seiners of different fleets (EU-SP, EU-FR, EU-IT, SYC) to reach the number of 60 wells (30 of each school type). However, regarding the wells composed of sets on free school, this threshold number will be difficult to reach because of

their avoidance by purse seiner (due to quotas on YFT). Wells on free school sets will so be the priority to sample. Free school of SKJ will be excluded from this study because of their scarcity in catches.

Budget schedule

The budget schedule contains estimates for the study

Designation	Unit cost (€)	Nb sample per well	Duration (month)	Nb trip	Nb well	cost (€)
Spill sampling						
<i>Observer onboard</i>	4 087.3		1.2	16		78 476.16
Well sampling						
<i>Sampling at landing</i>	204.62	4			60	49 108.8
Cannery reporting						
<i>Data collection*</i>						0
Data analyses						
<i>Statistical analyses</i>	4 585.25		4			18341
Total cost (€)						145 926

*no supplementary cost is planned

Report schedule

- Intermediate report: autumn 2020
- Final report: autumn 2021

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Table: Working plan

Topic	Sub-topic and project	Priority ranking	Lead	Est. budget (potential source)	TIMING				
					2020	2021	2022	2023	2024
Data collection of purse seine fisheries	Scoping study on the data quality of species composition and nominal catches of the purse seine fisheries <ul style="list-style-type: none"> • Collect data on board the purse seiners, at landing and in the cannery • Analyze the collected data to clarify several assumptions • Recommendations on the data collection to improve the data quality 		IRD/IEO/SFA AZTI/ ORTHONGEL	150 K€ (European union additional co-financing)					