

**INFORMATION NOTE ON THE MONITORING OF THE YFT TUNA QUOTA CONSUMPTION BY  
THE FRENCH AND ITALIAN PURSE SEINE FLEET IN THE INDIAN OCEAN**

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**Abstract**

Following the evaluation of the stock of yellowfin tuna (YFT) in the Indian Ocean for 2014, an interim plan for rebuilding the stock was implemented in the Indian Ocean and it was decided to reduce catches of purse seiners from 15%. In 2017, the European Union Total Allowable Catch (TAC) was distributed among EU member States and yellowfin tuna (YFT) quotas were implemented for the first time in the Indian Ocean. After a first phase of adaptation to this new measure, a methodology based on a cross validation of operational data (landing certificates, sale slips, catch certificates was developed). This example demonstrates that monitoring quota consumption in real time is feasible. Alternative management measures, such as large closures of the fishery are discussed in the light of these results.

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## 1. YFT quotas for France, Italy and Spain

Following the evaluation of the stock of yellowfin tuna (YFT) in the Indian Ocean for 2014 (concluding that the stock was overfished and subject to overfishing; IOTC, 2015), an interim plan for rebuilding the stock was implemented in the Indian Ocean (IOTC Resolution 16/01). Among others, it was decided to reduce purse seine YFT catches of 15% for CPCs having landed more than 5000 t in 2014, as compared to the reference year of 2014 (IOTC Resolutions 16/01 and 17/01).

For European Union (EU), this decision resulted in implementing a Total Allowable Catch (TAC) of 77 698 tons of YFT to be shared among EU flagged purse seiners operating in the Indian Ocean (IO) in 2017. In January 2017, this quota was then distributed between French, Italian and Spanish purse seiners (EU Regulation 2017/127, Table 1).

**Table 1:** French, Italian and Spanish YFT quotas

EU PS fleet	Quota	% Reduction / 2014
France	29 501	- 12%
Italy	2 515	*
Spain	45 682	- 21%
Total	77 698	- 15 %

\* In 2014, the purse seiner that is currently under the Italian flag was under the French flag. This allowed this vessel to be protected against piracy by French protection team.

At that time, the decision was made to use the period 2007-2014 to define fishing anteriorities. This period, prior to the fast increase in the use of FOBs during the 2010s (Maufroy et al. 2016) and covering 2014, was used to ensure a fair allocation of the EU yellowfin tuna TAC among member states. The objective was to ensure that the fleets that voluntarily limited their use of FOBs (ORTHONGEL 2011), and that had therefore potentially contributed less to the degradation of the YFT stock of the Indian Ocean, would reduce less their catches than others.

In addition, payback of excess catches and quotas transfers between EU member states may occur. This was the case for France and Italy in 2018 (Table 2).

**Table 2:** French and Italian quotas in 2017, 2018 and 2019. Compared to Table 1, quotas are adjusted to take into account the overshooting of the French quota in 2017 (payback in 2018) and transfers of quota between France and Italy.

EU PS fleet	Year	Payback	Transfer	Quota
France**	2017	0	+ 150	29 651
Italy**	2017	0	- 150	2 365
France	2018	- 310	- 75	29 116
Italy	2018	0	+ 75	2 590

\*\* French and Italian PS being part of the same Producer Organization, quota transfers are facilitated and can be adjusted using real time estimates of the quota consumption.

## 2. T3 or not T3?

Since 2017, the Producer Organisation ORTHONGEL, representing all French and Italian tropical tuna purse seine fishing companies operating in the IO, is mandated by the French and Italian administrations to monitor the consumption of the quota in real time. In 2017, 2018 and 2019, quota management plan have been implemented for these fleets (ORTHONGEL 2017, 2018, 2019), setting out the repartition of the French YFT sub-quota among French purse seine fishing companies and describing the means used by ORTHONGEL to monitor YFT catches in real-time.

Since it was the first time that a catch quota applied to tropical tuna purse seiners in the IO, the methodology for monitoring the YFT quota consumption needed to be defined. The first option that was initially adopted was to use the scientific estimates of the T3 procedure (Pianet and Pallares 2000), that had been used since the 1990s to prepare spatialized catch data. Based on the correction of logbooks with landing certificates and port sampling, these estimates originally seemed a good solution to avoid multiple declarations of YFT catches (scientific estimates vs operational estimates).

However, the use of T3 estimates soon raised various issues as:

- (i) *These estimates are not available in real time.* The final estimates are generally available in May of the following year. Though such a schedule may be adapted to produce spatialized catch statistics for stock assessment, it is obviously not suitable for a real-time monitoring of catches of yellowfin tuna by tropical tuna purse seiners.
- (ii) *Too strong assumptions are made on the homogeneity of catches in large zones, for a given fishing mode and a given quarter* (Duparc et al. 2018). Estimates are therefore not accurate at the scale of the fishing vessel and do not allow verifying quota consumption for each fishing company.
- (iii) *T3 estimates are not provided with an interval of confidence.* It is therefore not possible to assess their precision, which is yet crucial to ensure they can be used to monitor the YFT tuna quota consumption.

## 3. Cross validation of landing certificates, landing declarations and sale slips

### 3.1 Sources of information

In 2017, T3 estimates have been used by the French administration (DPMA) to report on the YFT quota consumption. In 2018, acknowledging the potential issues in T3 estimates, it was decided to use an alternative methodology to monitor the YFT quota consumption. This methodology, based on operational data provided to ORTHONGEL by member fishing companies has been used in 2018 and 2019 for the French and Italian purse seine fleets. ORTHONGEL member fishing companies provide:

**Logbooks:** PS crews report for each fishing set visual estimates of the catches. At this stage, the catch has not been weighed and a potential confusion between juveniles of yellowfin and bigeye tuna may occur. Logbooks are available to ORTHONGEL at the end of the fishing trip.

**Estimates of onboard catches:** PS crews report several times a week visual estimates of catches stored on board since the beginning of the fishing trip. These estimates are produced with the same data that is collected in logbooks. Therefore, they have the same sources of bias.

**Landing certificates:** at the time of landing, the catch is weighed for the first time and the species/size composition is assessed more precisely. Landing certificates are produced with two sources of information.

- (i) For the fraction of the catch that is sold to the cannery of the landing port, the catch is sorted by species and commercial category. Though the precision of the sorting is generally depending on the cannery, the estimate of catches is generally more precise than in other sources of information.
- (ii) For the fraction of the catch that is sold to a distant cannery (i.e. transhipped at port on a cargo), the total catch is weighed and a fraction of the catch is sampled to assess its species/size composition. These estimates called “sizing” are generally less precise as only a fraction of the catch is sampled.

**Sale slips:** sale slips are either produced directly after the end of the fishing trip (catch sold to the cannery of the landing port) or up to several months after the end of the fishing trip (catch sold to a distant cannery). The precision of estimates may vary from one cannery to another and the duration of storage of the catch in brine (fish slightly dries when stored in brine).

**Landing declarations (LAN):** crews report in the Electronic Reporting System (ERS) information on the catch that was landed at the end of the fishing trip. Depending on the fishing company and the destination of the fish, LANs either contain information of the sale slip (fish sold to the cannery of the landing port), the sizing procedure (catch sold to a distant cannery) or the logbook (when the landing certificate is not immediately available).

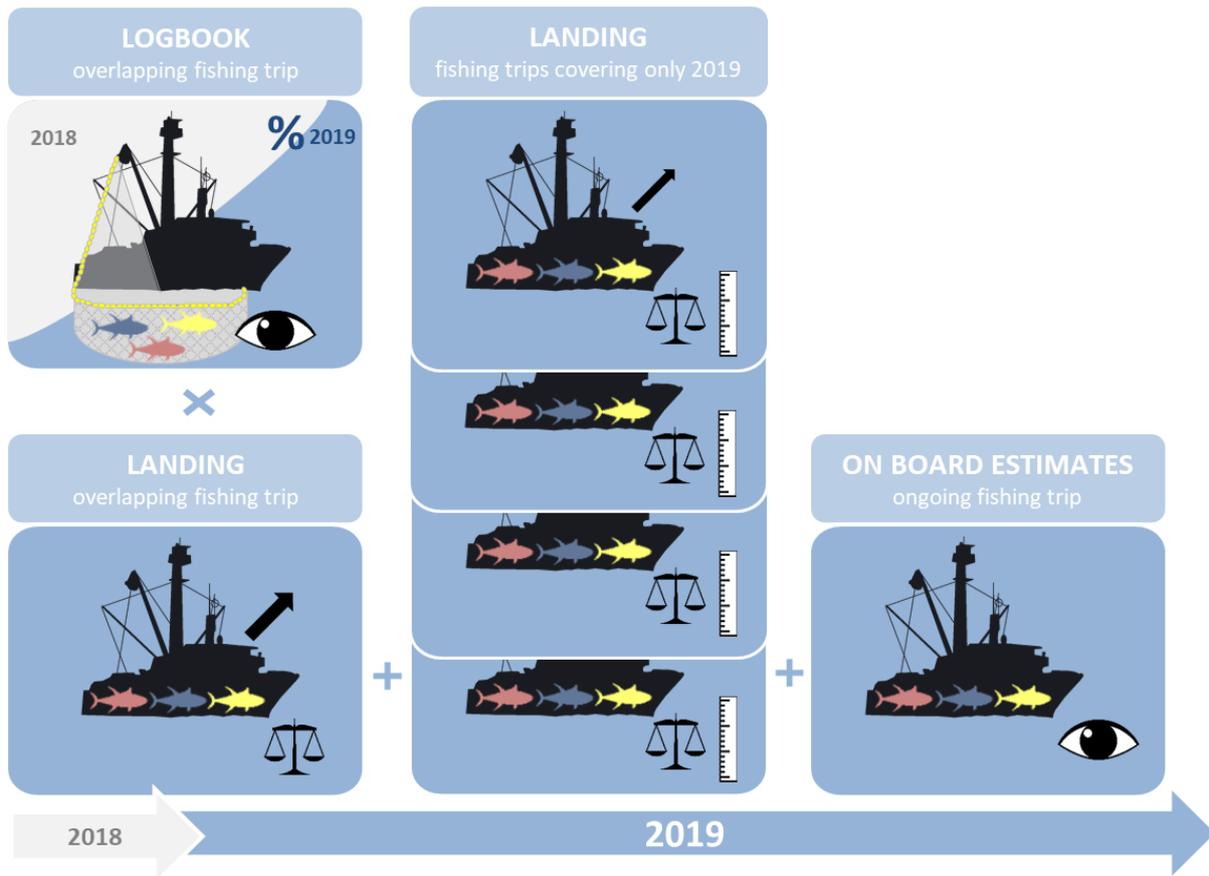
**At port transhipment declarations (TRA):** since June 2019, with the implementation of the ERS v3, crews report information on the fish that was transported by cargo to a distant cannery. Depending on the fishing company and the destination of the fish, TRAs either contain information of the sizing procedure (catch sold to a distant cannery) or the logbook (when the landing certificate is not immediately available).

### 3.2 Near real-time estimates of the YFT quota consumption

For the year Y and a given vessel, catches of YFT are estimated as following

$$YFT = \sum_i YFT_{non-overlapping,i} + YFT_{overlapping} + YFT_{onboard}$$

Catches of YFT are calculated with a different methodology for fishing trips covering only year Y, for the first fishing trip of year Y (generally overlapping years Y and Y-1) and for the ongoing fishing trip (not landed at the time of YFT quota consumption, Figure 1).



**Figure 1:** methodology for the monitoring of the YFT tuna quota consumption – example for 2019.

**Fishing trips covering only year Y:** each of the available sources of information has its own sources of bias. To be as conservative as possible, the highest value among landing certificates, ERS declarations (LAN + TRA) and sale slips is used. For fishing trip  $i$

$$YFT_{non-overlapping,i} = \text{MAX}(\text{landing certificate}; \text{sale slip}; \text{LAN} + \text{TRA})$$

**Fishing trips covering years Y and Y-1:** the ratio between YFT catches of years Y et Y-1 is calculated using the logbook.

$$R_y = \frac{YFT_Y}{YFT_{Y-1} + YFT_Y} \quad \text{and}$$

$$YFT_{overlapping} = R_y \times \text{MAX}(\text{landing certificate}; \text{sale slip}; \text{LAN} + \text{TRA})$$

**Ongoing fishing trip:** estimates of catches stored on board are used.

$$YFT_{on\ board} = \text{on board}$$

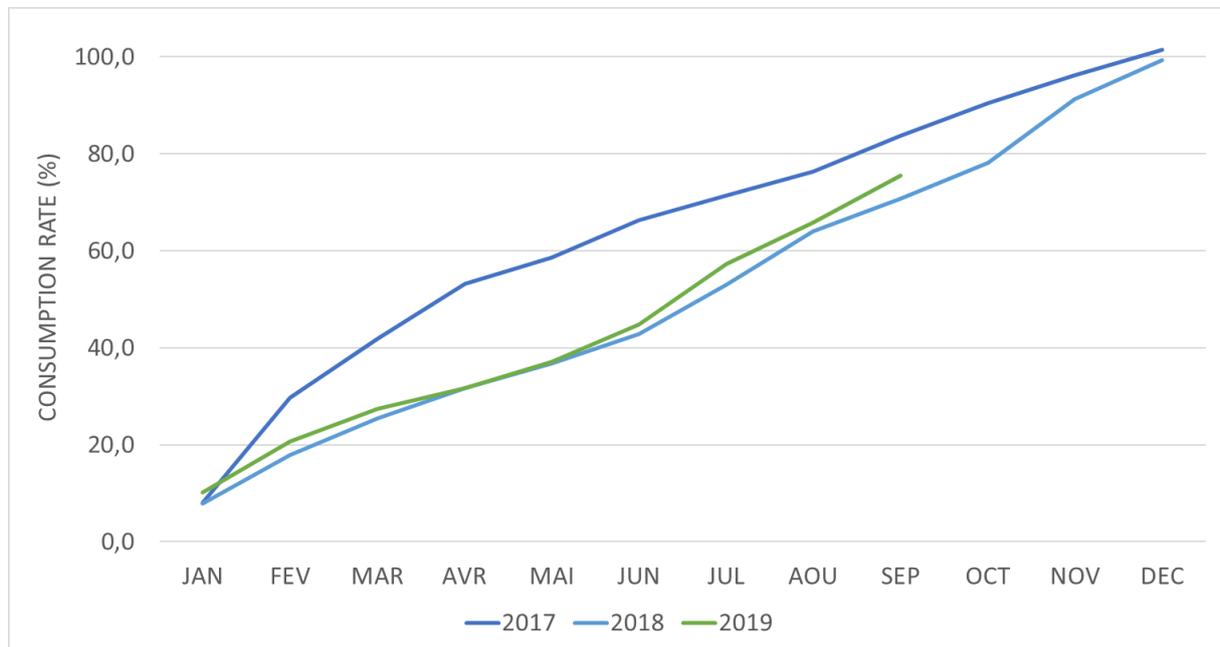
Since 2018, this procedure is used to estimate catches of each purse seiner at a given moment of the year. These estimates are transmitted to DPMA:

- (i) once a fortnight or once a week when the consumption < 80%
- (ii) once to three times a week when the consumption  $\geq$  80%

#### 4. Managing fisheries with quotas or alternative tools?

Despite the implementation of the YFT quota in 2017, catches of YFT have not been significantly reduced (IOTC 2019). In the case of the PS fleet, issues have been raised regarding the use of the T3 procedure (Herrera and Baez 2019) and the monitoring of quotas. As a result, alternative management measures, such as large fishery closures have been discussed (Herrera 2019).

The example of the French and Italian PS fleet demonstrates that monitoring quota consumption in real time is feasible. Of course, as this was the first time that such quotas were implemented for YFT of the Indian Ocean, time was necessary to adapt to this new measure and identify the most appropriate monitoring methodology. Though differences between scientific T3 estimates and operational estimates still exist, work is currently carried out by the French Institute for Research and Development (Duparc et al. 2019). In a near future, operational estimates (e.g. landing certificates or sale slips) should be made available to IRD to further improve T3, by comparing species composition in T3 port samplings and in operational data.



**Figure 2:** Consumption of the YFT quota by French and Italian purse seiners of the Indian Ocean over 2017-2019. In 2017: T3 estimates. In 2018 and 2019: cross validation of operational information.

In addition, though monitoring compliance with fisheries closures is easier than verifying multiple sources of declarations of catches, the efficacy of such closures may be lowered by changes in fishing efficiency. For the highly adaptive and efficient tuna purse seine fleets (Torres-Irineo et al. 2014, Maufray et al. 2015, Tidd et al. 2016) and given the lack of success of such tools in the past (Fonteneau

et al. 2015), it is therefore unlikely that fisheries closures alone will allow meeting the current target reduction of catches.

A combination of tools should probably be preferred and a careful monitoring of YFT catches should be maintained, so as to ensure that catches do not prevent the YFT stock of the Indian Ocean from recovering.

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