REPORT ON THE REVIEW OF RE-ESTIMATION METHODOLOGY OF INDONESIA'S ANNUAL CATCH DATA IN IOTC FOR THE PERIOD 1950-2022

Indonesia

Prepared for the Indian Ocean Tuna Commission (IOTC) 20th Session of Working Party on Data Collection and Statistics (WPDCS20)

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Executive Summary

Catch data is essential in building a robust fisheries management strategy. However, in some Regional Fisheries Management Organization (RFMO) e.g., Indian Ocean Tuna Commission (IOTC), requires data to be verified by RFMO to ensure the catch composition by gear reflects scientific observation from logbooks. However, such method sometimes create a substantial difference between reported national catch in the country's national report and those presented in the IOTC datasets. Like what happened in Indonesia, in particular affecting the yellowfin tuna catch. The re-estimation undertaken by the IOTC Secretariat resulted in a 40% decrease from Indonesia's original catch report. This substantial discrepancy necessitated a collaborative re-estimation process with the IOTC Secretariat to rectify the situation.

Since the Indian Ocean yellowfin tuna stock has been estimated to be overfished and subject to overfishing since 2015, catch reduction was an inevitable solution for guiding it back into recovery. Nevertheless, if the re-estimated data by IOTC were to be used as the basis for catch reductions, it would not accurately represent the actual situation, given that Indonesia possesses the largest ocean area and fishing capacity among IOTC members. Indonesia appreciates the effort taken by IOTC Secretariat to work with Indonesia on developing a new methodology based on the best data available from the robust logbook to produce data catch for the period of 2010-2021. Both parties agreed that the historic re-estimation methodology was somewhat confusing and unreliable as it was based on an outdated study, thus an updated version with more recent and robust datasets is submitted in this report.

Ten-join/assistance meetings (virtual and in person) with the IOTC staff were held during 2021-2024 to follow up the WPDCS recommendation and the SC. This report provided an in-depth study on how to conduct recalculation on the Indonesian tuna datasets, emphasizing the use of reliable data source, increased coherence, and reduced uncertainties. Once this approach has been accepted by WPDCS and endorsed by the SC, this methodology will be used as the foundation for estimating Indonesian catches for the 1950–2022 periods.

1. Purpose of this paper

To provide the re-estimation methodology of Indonesia's annual catch data for the period 1950-2022 and to present the re-estimation results.

2. Background and the impact of data discrepancies on Indonesian tuna and tuna-like fisheries

2.1. Background

Catch data is essential in building a robust fisheries management strategy. However, in some Regional Fisheries Management Organization (RFMO) e.g., Indian Ocean Tuna Commission (IOTC), requires data to be verified by RFMO to ensure the catch composition by gear reflects scientific observation from logbooks. However, such method sometimes create a substantial difference between reported national catch in the country's national report and those presented in the IOTC datasets. Like what happened in Indonesia, in particular affecting the yellowfin tuna catch. The re-estimation undertaken by the IOTC Secretariat resulted in a 40% decrease from Indonesia's original catch report. This substantial discrepancy necessitated a collaborative re-estimation process with the IOTC Secretariat to rectify the situation.

Ten-join/assistance meetings (virtual and in person) with the IOTC staff were held during 2021-2024 to follow up the WPDCS recommendation and the SC. This report provided an in-depth study on how to conduct recalculation on the Indonesian tuna datasets, emphasizing the use of reliable data source, increased coherence, and reduced uncertainties.

2.2. The impact of data discrepancies on Indonesian tuna and tuna-like fisheries

The Indian Ocean yellowfin tuna stock has been estimated to be overfished and subject to overfishing since 2015, and catch reduction was an inevitable solution for guiding it back into recovery. Nevertheless, if the re-estimated data by the IOTC was to be used as the basis for catch reductions this would not reflect the real situation bearing in mind that the Indonesia waters is the largest ocean area, number of fishers, and fishing capacity among IOTC members, as reflected by Table 1.

Table 1. The number of fishers for each fleet category from 2019-2022 in the IOTC area of competence.

FLEET	NUMBER OF FISHERS			
	2019	2020	2021	2022
TOTAL	**682,326**	**652,705**	**615,434**	**746,213**
ARTISANAL (< 30 GT)	**644,542**	**622,136**	**568,755**	**709,384**
Danish seine (DS)	74,504	54,296	50,864	40,539
Gill net (GI)	295,405	341,385	271,088	371,904
Handline (HL)	95,037	103,212	129,435	127,832
Longline (LL)	41,532	39,169	35,226	46,381
Lift net (LN)	55,338	26,453	25,025	30,612
Pole and line (PL)	24,548	19,388	12,552	29,086
Purse seine (PS)	37,385	22,169	27,531	38,965
Troll line (TL)	20,793	16,064	17,034	24,065
INDUSTRIAL (> 30 GT)	**37,784**	**30,569**	**46,679**	**36,829**
Danish seine (DS)	6	11		9
Gill net (GI)	82	2, 030	23	
Handline (HL)	27	5,025	312	494
Longline (LL)	414	2,568	7,735	5,994
Lift net (LN)	1,849	4,652	1,787	39
Pole and line (PL)	2	431	38	
Purse seine (PS)	35,403	15,851	36,784	30,285
Troll line (TL)	1	1		8

3. New re-estimation methodology

3.1. Source of catch composition

Having had investigated all available data sources (fishing logbook, port landing, and observer data), it was clear that usable data for the re-estimation is only log book and port landing data. They provide pertinent information of catch composition which is critical in our re-estimates of species composition by gear. The catch composition of logbook data is used to re-estimate the catch composition for LL (Drifting longline; over 1800 hooks), LLFR (Drifting longline; up to 1800 hooks), LLCO (Small longline), PS (Tuna purse seine), PSSS (Small purse seines), GI (Gillnet), HL (Handline) and HLOF (Offshore handline), while the catch composition of port landing is used to re-estimate the catch composition for DS (Danish seine), LN (Lift net), PL (Pole and line) and TL (Trolling).

3.1.1. Fishing logbook

Fishing logbook provides information of fishing coordinate to identify the portion of catch for each fishing area. The logbook information used for this study available from 2012-2022. Logbook reporting was mandatory since the issuance of Marine Affairs and Fisheries Ministerial Regulation No.18/2010. In order to elevate the efficiency and optimization of data reporting, a logbook information system (SILOPI) was initiated in 2011. The number of vessels reporting logbook in national scale was increasing, from only 1,140 in 2012 to relatively stable number since 2019 between 5,852 vessels to 7,970 vessels in 2022. The same trend also occurred in the Indonesia's jurisdiction in the IOTC area of competence, where the reporting rose from less than 500 vessels to 3,559 vessels in 2022 (Figure 1). Thus, we consider logbook data was one of the best tools available as the base for recalculating the catch composition, because it contained a large documentation of high-resolution fisheries data across gears and species. The data itself was well-maintained by the Directorate General of Capture Fisheries (DGCF), in particular since 2018, when e-logbook program was initiated.

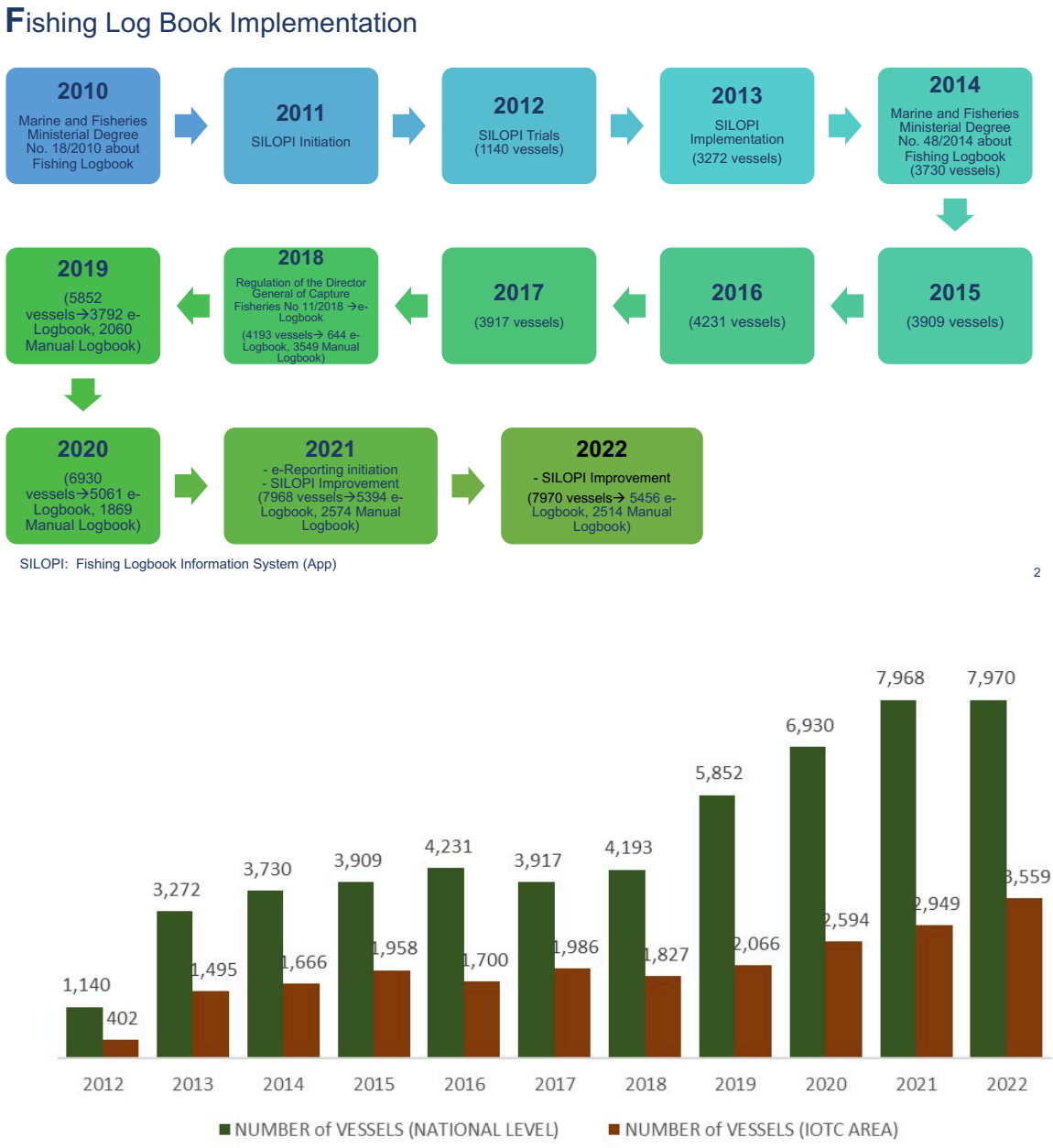


Figure 1. The development of mandatory logbook reporting

3.1.2. Port Landing (PIPP)

For convenience and completeness of presenting data in a certain format and easily accessible to the public as well as the need for policy analysis, it is necessary to digitize the data. For this reason, the Ministry of Marine Affairs and Fisheries encouraged digital-based data collection, one of which is the Fishing Port Information Center (PIPP).

The PIPP is an information system that includes the collection, management, analysis, storage, presentation, and dissemination of fishing port data and information. It was developed in 2019. Data and information on fishing ports are used to support the operations of fishing

ports, improve information services to the public, and support the formulation of policies in the fishing port sector.

PIPP covers data and information of fishing port facilities, daily, monthly, and annual operational data of fishing ports, which contain the frequency of vessel's arrival, fish production and prices, fishing gear, logistics, marketing, and labor in the form of daily data that can be accumulated in the form of monthly, quarterly and even yearly.

Based on the Decree of the Minister of Marine Affairs and Fisheries Number 6 of 2018 concerning the National Fishing Port Master Plan, there are 538 fishing ports in Indonesia whose operational data and facilities are expected to be entered in the Fishing Port Information Center (PIPP) digitally that can be easily accessed and processed into the update and valid information for the development of capture fisheries, especially in fishing ports. The PIPP website can be accessed on the www.pipp.djpt.kkp.go.id page.

The number of fishing ports which actively reporting data in the PIPP at national scale was increasing, from 109 fishing ports in 2019 to 127 fishing ports in 2022 (Figure 2).

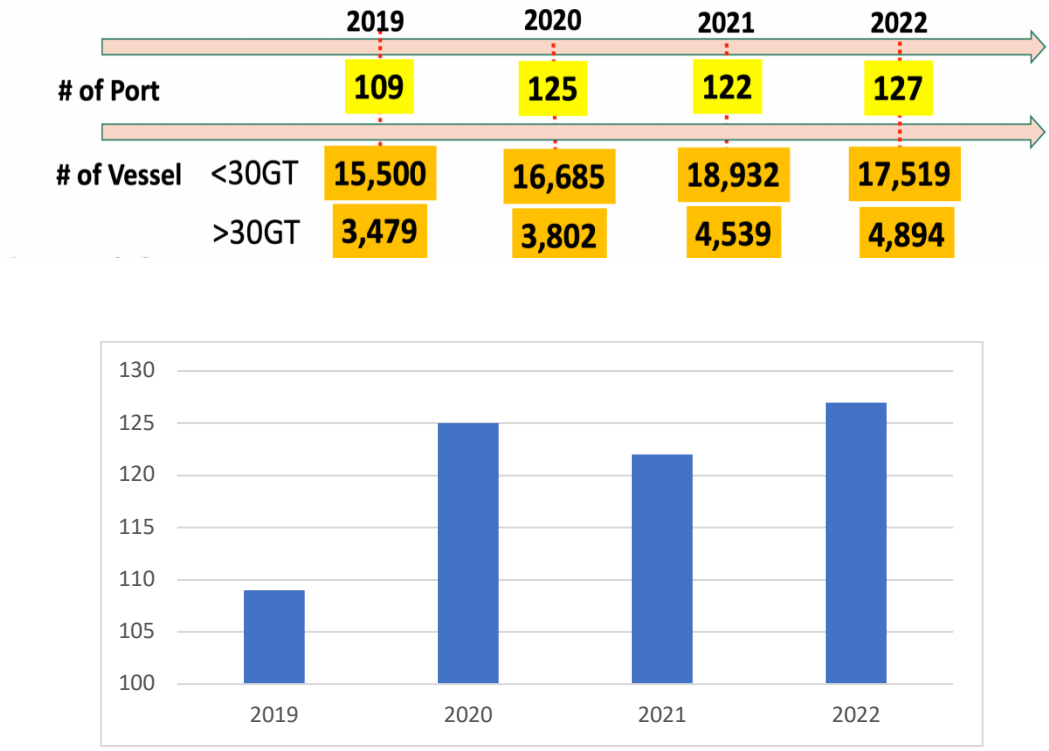


Figure 2. The development of PIPP reporting

3.2. Data Processing and Analysis

3.2.1. Fishing Logbook

Prior to use the logbook data, following was scrutinized by the port officers:

1. Suitability of the fishing gear used and the catch
2. Suitability of fishing days with the number of settings
3. Compliance the fishing area with permits

Having been checked, the fishing logbook is entered into SILOPI for verification. The verification process as in the following :

1. Conformity of capture coordinate points (setting points) with Vessel Monitoring System (VMS) coordinate points
2. Correspondence of the number of settings to the number of days at sea. The number of settings during the trip period is at least 50% or more of the number of days at sea for fishing (settings) considering the operating characteristics of the fishing gear
3. Correspondence of the number and type of fish landed with those reported
4. Suitability of the number of catches with the size of the vessel (hold capacity)
5. Compatibility of fishing areas with permits
6. Compliance of base port with permits
7. Suitability of fishing gear and catch composition

Processing and analysis of fishing logbook data:

Data preparation is as follows:

1) Synchronize setting coordinates
2) Data filtering

For form 3CE, there are additional steps as follows: (Raup S A *et al,* 2021)

- Setting must be commenced between the departure and the arrival date
- The number of day-at-sea should be the differential between the arrival and the departure date
- Total sets per landing should be at least 50% of the total day-at-sea
- Georeferenced points should not intersect with the land nor excess the boundaries from the area of interest

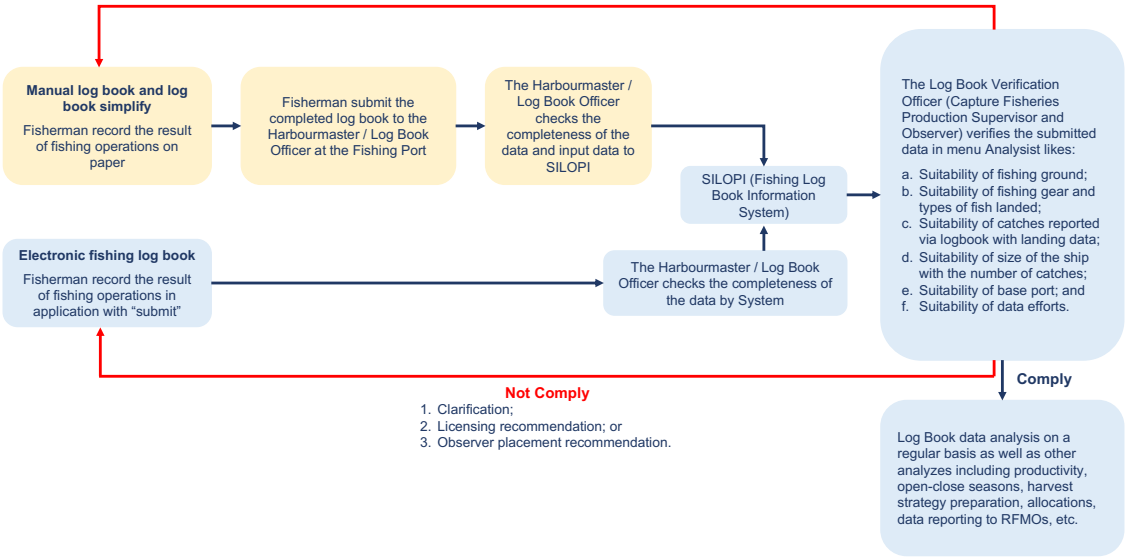
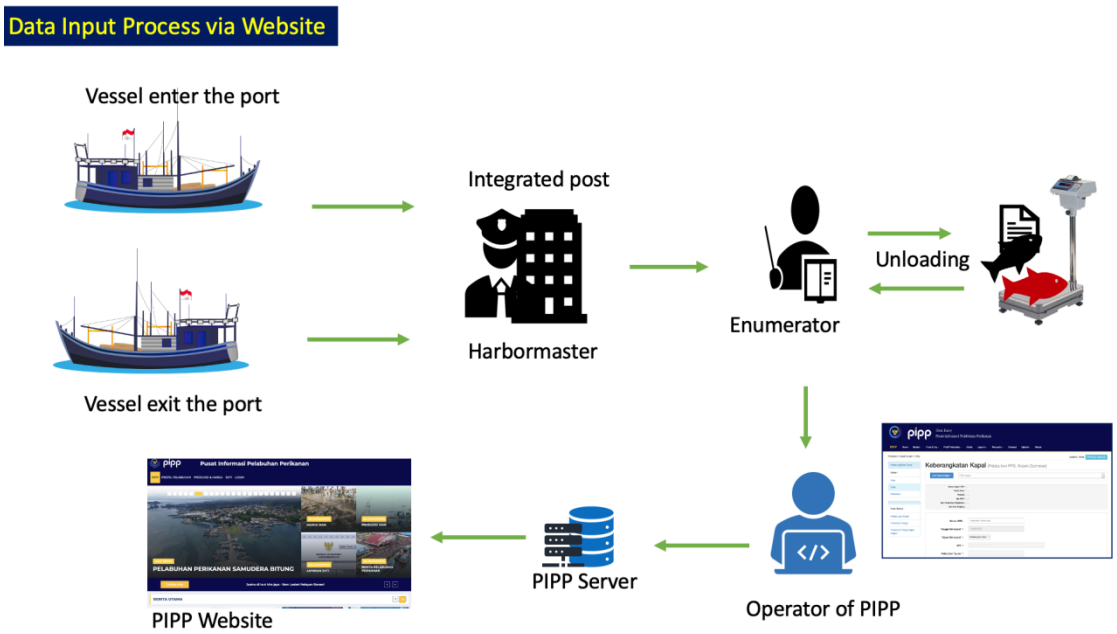


Figure 3. The flow chart of logbook data processing and analysis

3.2.2. Port Landing/PIPP



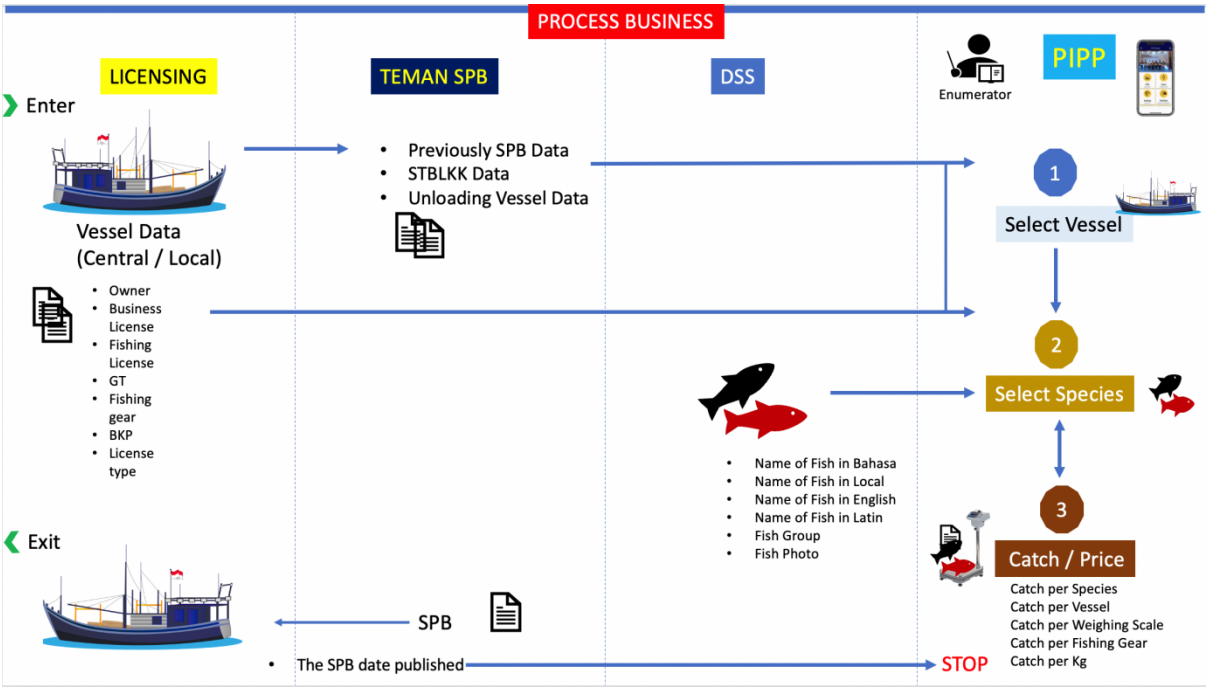


Figure 4. The flow chart of port landing (PIPP) data processing and analysis

3.3. Re-estimation methodology

3.3.1. Previous definition of artisanal and industrial fisheries

Indonesia defined the term artisanal and industrial fisheries depending on fishing license categorization. Artisanal fleets are justified as vessels under or equal with 30 GT which the license is issued by local government, whereas industrial fleet refers to those above 30 GT and under management of central government. Both terms became the basis for determining the separation between artisanal (LLCO) and industrial (LLTU) longline as well as artisanal (PSSS) and industrial (PS) purse seine fleets according to types of fisheries for IOTC species (IOTC Secretariat, 2014) as mentioned in Appendix 2.

3.3.2. New definition of the fisheries

Based on the recommendation of The IOTC Technical Support Mission in March 2023 that the updated threshold of 115 GT be used from now on to identify purse seine vessels with length overall (LoA) of 24 m and above within all IDN data sets (logbook, port landing, vessel registries, etc.). That the 85 GT threshold for longline vessels is also used, in lack of any other current evidence, for all other vessel types besides purse seiners. The updated threshold became the basis for determining the fisheries according to types of fisheries for IOTC species (IOTC Secretariat, 2014) as mentioned in Appendix 1 and classification and dimensions of fisheries (IOTC Secretariat, 2014) as mentioned in Appendix 3.

3.3.3. New re-estimation methodology

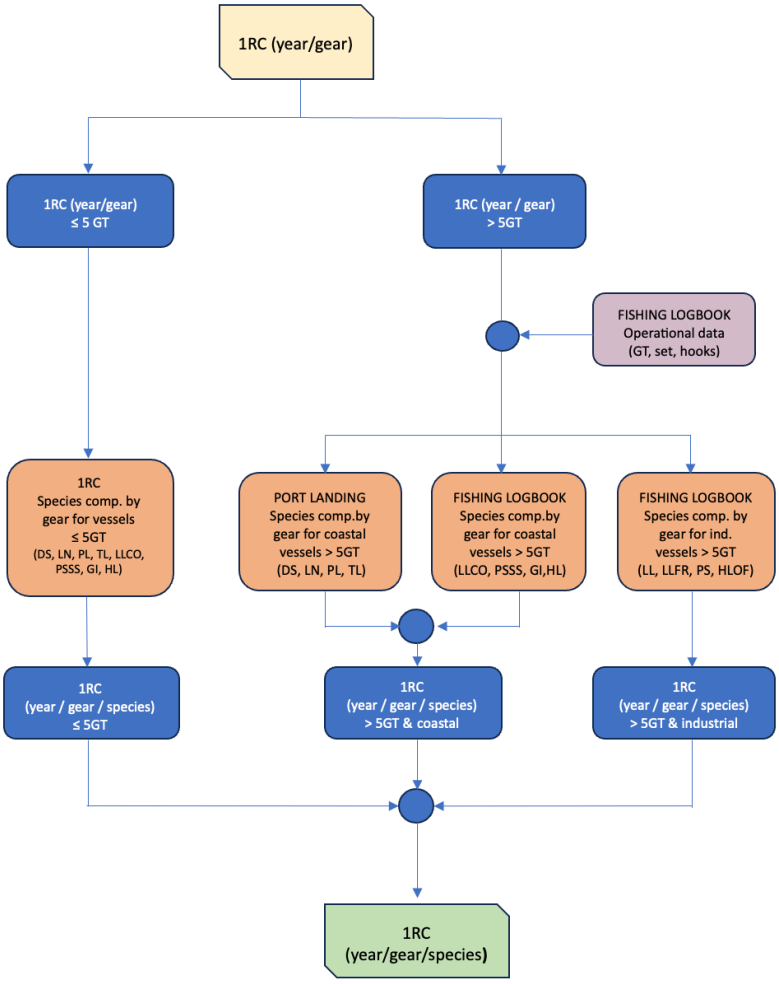


Figure 5. The flow chart of the re-estimation methodology

The fishing logbook provides information for vessels above 5 GT, therefore, the catch in the 1RC is divided into two categories, which are the catch for vessels above 5 GT and vessels up to 5 GT for each fishery.

The re-estimation will keep the aggregated annual catches (2010-2022) remain the same as what originally reported by IDN through forms 1-RC. The re-estimation of catch composition for vessels above 5 GT was conducted by multiplying the catch in the 1RC with the catch composition from logbook for LL, LLFR, LLCO, PS, PSSS, HL, HLOF, GI and multiplying the catch in the 1RC with the catch composition from port landing (PIPP) for DS, LN, PL, TL. The catch composition for vessels up to 5 GT is using catch composition in the 1RC..

The procedure to estimate the logbook catch composition are in the following :

Calculation of catch composition based on fishing logbook data using the data range for 2012-2022, taking into account:

a. Spatial and temporal fishing logbook data available as well as catches since 2012 even though e-logbooks are not yet used
b. The reason why we did not use averaged data for 2019-2022, because the time gap is too large, there are concerns that it will not represent the conditions of the year.
c. The use of manual fishing logbook for period 2012-2022, while electronic fishing logbook for period 2018-2022.

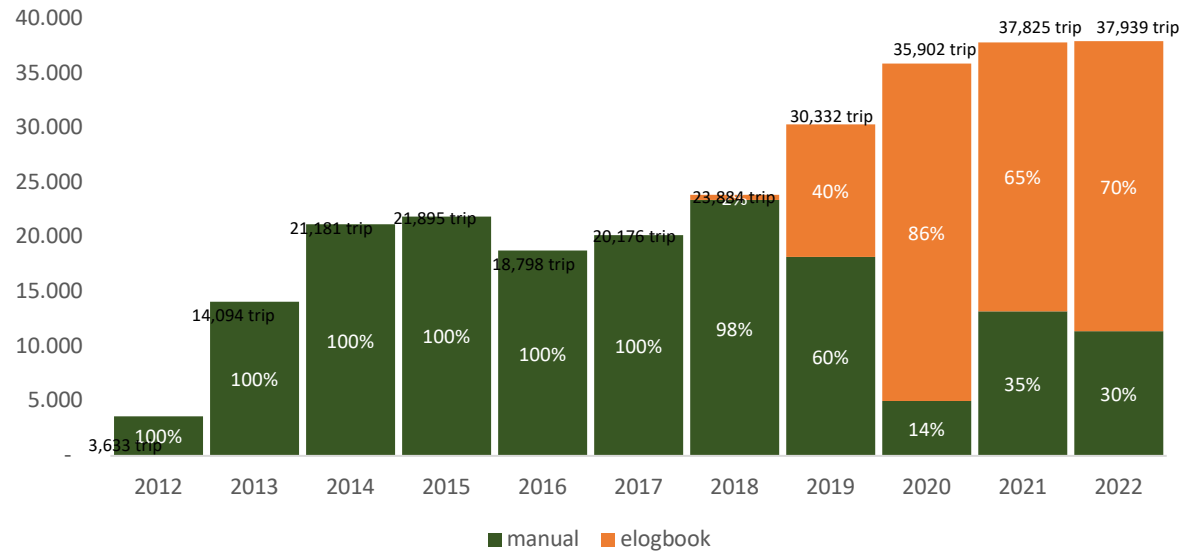


Figure 6. The comparison between manual and electronic fishing logbook

The preparation of the catch composition of fishing logbook data is carried out in the following stages:

1. Categorization of fishing vessel as follows:

IOTC Gear Code	Category	Description
DS	<24 m inside IEEZ	24 m = 85 GT
GI	<24 m inside IEEZ	24 m = 85 GT
GIOF	>=24 m and <24 m outside IEEZ	24 m = 85 GT
HL	<24 m inside IEEZ	24 m = 85 GT
HLOF	>=24 m and <24 m outside IEEZ	24 m = 85 GT
LLCO	<24 m inside IEEZ	24 m = 85 GT
LLFR (<1800 hooks)	>=24 m and <24 m outside IEEZ	24 m = 85 GT
LL (>=1800 hooks)	>=24 m and <24 m outside IEEZ	24 m = 85 GT
LN	<24 m inside IEEZ	24 m = 85 GT
PL	<24 m inside IEEZ	24 m = 85 GT
PS	>=24 m and <24 m outside IEEZ	24 m = 115 GT
PSSS	<24 m inside IEEZ	24 m = 115 GT
TL	<24 m inside IEEZ	24 m = 85 GT

2. Data filtering, based on:
   a. vessel size above 5 GT
   b. year of capture according to what will be reconstructed
   c. fishing gear according to the IOTC code
   d. types of species according to those managed by IOTC

The procedure to estimate the port landing catch composition are in the following :

The PIPP catch composition is used only for vessels > 5 GT, LoA < 24m but operates inside EEZ, since the coverage in the fishing logbook data is low for lift net, pole and line, danish seine and trolling. The PIPP data is available for period 2015- 2022.

Using PIPP data in re-estimation requires the coverage of PIPP catch data on 1RC data, with the following calculation stages:
1. Calculate the weight of fish caught for each species and for each fishing gear based on PIPP data
2. Calculate the weight of fish caught for each species and for each fishing gear based on 1RC data
3. Calculate the proportion of coverage by comparing PIPP catch weight data with 1RC catch weight data for each species and for each fishing gear per year.

The PIPP catch composition data preparation is carried out in the following stages:
a. Create an IOTC fishing gear code by vlookup the list of fishing gear codes resulting from the agreement.
b. Determine the weight of catch by adjusting the reconstruction form by PIPP data pivot table as in the following:
   1) Filter Column:
      • the year of capture corresponds to the year of the reconstructed data
      • fishing gear based on classification in number 1 (new code 2)
   2) Row column:

• FAO code

3) Value column:

• weight of catch in tons

c. The results of the pivot table are carried out for each fishing gear and input into the reconstruction form per fishing gear per year.

d. The reconstruction form produces catch composition per fishing gear per year

e. Input the catch composition from the PIPP reconstruction form into the processing form by multiplying the total number of catches from 1RC by the percentage of PIPP catch composition, the formula is as follows:

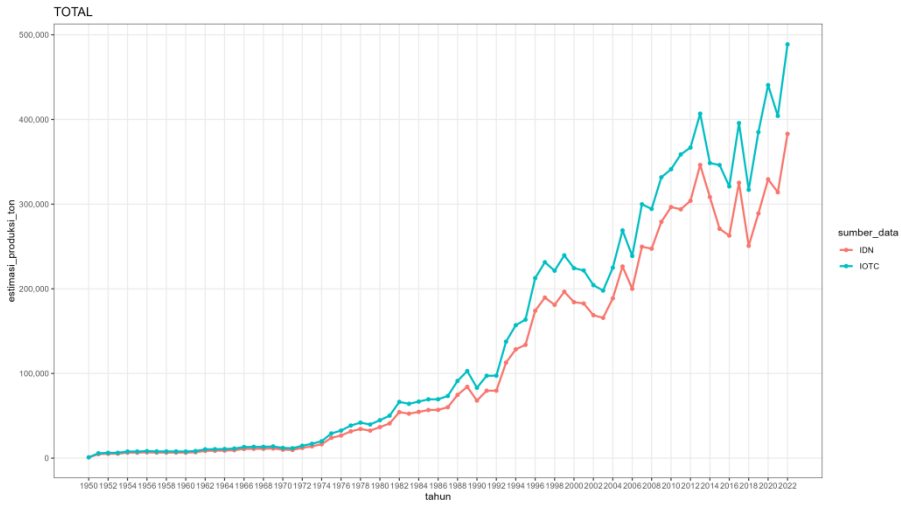
=Total number of catches from 1RC*VLOOKUP(fish code,recon form,column order,FALSE))

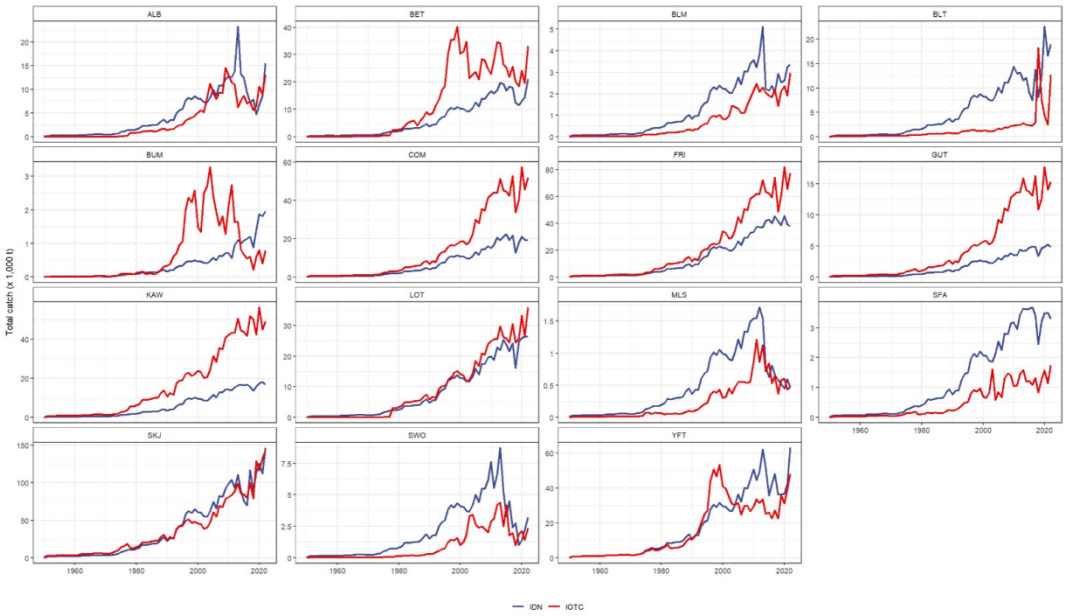
Information:
If the catch composition data is 0% for a particular fishing gear but the data from 1RC contains the total catch, then the catch composition is calculated based on the percentage composition of the species to the total catch on that fishing gear.

Example:
In the LL-TU fishing gear, the PIPP composition for the SKJ was 0%, while the 1RC data contained SKJ catches, so the percentage of skipjack for LL-TU was calculated based on the percentage of skipjack in LL-TU to the total LL-TU catch.

3.3.4. The results of re-estimation

Comparison of Re-estimation Results of Indonesia's Annual Catch Data for period 1950-2022 with the IOTC datasets (15 mandatory species)





4. Conclusion

We have introduced a new methodology to re-estimate Indonesian data, incorporating relatively recent information from both manual and electronic logbook and port landing data (PIPP).

Compared to the existing estimate based on outdated (2012) fishing patterns, our new estimate aligns with more recent reference patterns and stock conditions in Indian Ocean. The total of re-estimation is lower than the IOTC database, however the catch trend for 1950-2022 is quite similar.

Despite challenges in the catch data collection system, the new re-estimate demonstrates greater year-to-year consistency.

5. Recommendation

The new proposed re-estimation method has proven effective in addressing the new information available bringing greater consistency across gears and species. We are confident that this methodology accurately adjusts the Indonesian datasets for the period 1950-2022.

Therefore, Indonesia recommends that IOTC endorse and adopt this methodology for re-estimating Indonesia’s historical catch data for all scientific purposes.

References

IOTC Secretariat. (2014). *Guidelines for the reporting of fisheries statistics to the IOTC* (p. 70pp). Indian Ocean Tuna Commission (IOTC).

IOTC Secretariat (2010-2022). Official Indonesia's Annual Catch for 2010-2022. Indian Ocean Tuna Commission (IOTC).

Appendix 1. Relevant information related to the background

Relevant information related to the background of the development of re-estimation methodology of Indonesia's annual catch data for the period 1950-2022 quoted from the reports below:

The report of 20th Working Party on Tropical Tunas (WPTT20)

1. The WPTT **NOTED** the large increase in the Indonesian yellowfin tuna catch and queried whether this may be a result of error in data entry or reporting. Indonesia clarified that data verification was needed and an update on this would be included in their national report to SC21.
2. The WPTT **NOTED** that it may be beneficial to include a sensitivity run in the yellowfin tuna stock assessment that investigates the potential bias due to the uncertainties in the catch estimates, which would enable comparison of results with the standard approach that uses the reconstructed catch histories estimated by the IOTC Secretariat. The WPTT further **NOTED** that this approach was not undertaken during the 2018 yellowfin tuna assessment. The WPTT **NOTED** that such an approach may require additional calculations.

The report of 14th Working Party on Data Collection and Statistics (WPDCS14)

1. The WPDCS **NOTED** the changes to the IOTC Secretariat's methodology in terms of revisions to the estimation of average catches and the species composition of Indonesia's fresh longline catches, and the range of data sources used to validate the new estimates, including:
   a. The 2013 Fishing Capacity report, published by the IOTC Secretariat.
   b. Comparisons with the species composition of catches from port sampling conducted by the Research Institute of Tuna Fisheries in Benoa, one of the main landing sites for Indonesia's fresh longline fleets.
   c. Validation of longline observer trips reports submitted by Indonesia.
   d. Comparisons of average catches of vessels unloading in Benoa.
2. The WPDCS **ACKNOWLEDGED** the work of the IOTC Secretariat to develop and improve current estimates of catches of Indonesia's fresh longline fleet. **RECOGNIZING** the need for the Secretariat to report a single nominal catch series for each CPC prior to the IOTC Working Parties, the WPDCS **AGREED** that the catch series provided by the Secretariat is likely the best available information on Indonesian fresh longline catches at present and **REQUESTED** that the possibility of revisions for years prior to 2014 be explored in order to ensure consistency in the catch trends over the longer time period.
3. The WPDCS **ENDORSED** the current methodology developed by the Secretariat to produce the new catch series for scientific use and **REQUESTED** that this methodology be subject to frequent review to provide the best available information, given the ongoing uncertainties with the quality of Indonesia's official statistics.

The report of the 21st Session of the IOTC Scientific Committee (SC21)

1. The SC noted that a recent update to official figures for Indonesia nominal catches for 2017 has been received in November 2018 and is in the process of being assessed by the

Secretariat. Also, the SC noted that time-area information is included by Indonesia in its national report, but that these same data is not yet submitted to the Secretariat in accordance with Resolution 15/02. Indonesia noted that it is making efforts to comply with Resolution 15/02 and that these data will be provided as soon as possible. The SC **NOTED** that the significant decline in catches reported at the Port of Benoa in 2017 could be explained by a reduction in effort due to an issue with allocating fishing permits to fishers. In response to a query around the large increase in swordfish catches since 2012, the SC noted that the Secretariat has revised its catch reconstruction for the Indonesian fresh longline fishery, and that the detected increase has been corrected resulting in higher confidence around the data in recent years (while ongoing uncertainties remain with historical catches).

2. The SC noted that there are apparent discrepancies in the IOTC database (as this is disseminated through the IOTC website) and the catch levels in 2017 and previous years for tropical tuna species as reported during the WPTT20. The SC **ACKNOWLEDGED** that this difference was due to the need to provide two distinct nominal catch series to account for the ongoing re-estimation of Indonesian fresh-tuna longline catches, that the method to produce these revised best scientific estimates for the time series has been endorsed during the last WPDCS and that therefore these apparent discrepancies will soon disappear.
3. The SC noted the IOTC Secretariat has re-estimated the catches for Indonesia's fresh longline fleet and provided the WPB16 meeting with an alternative catch series (IOTC–2018–WPB16–DATA03b). The total catches mostly affect catches of swordfish, blue marlin, and striped marlin to a lesser extent, which have been revised downwards by as much as 30%. The SC further noted that these estimates have been reviewed by WPDCS14.

The report of 25th Session of the Indian Ocean Tuna Commission

Indonesia's concerns in the 25th Session of the Indian Ocean Tuna Commission and Associated Meetings are as follow:

- There were two proposals on the Interim Plan for Rebuilding Yellowfin Tuna in the IOTC Area of Competence submitted by the EU and Maldives, respectively. The Commission agreed that the Maldives proposal was used as a basis for discussion.
- The proposal used the IOTC data set which is a catch re-estimation carried out by the IOTC Secretariat.
- Regardless of the data source, the proposal proposed reducing YFT catches for developing coastal states that catch YFT >5,000 tons (in 2014) including Indonesia by 12%.
- The data re-estimation process carried out by the IOTC Secretariat on YFT catch data reported by Indonesia reduced the catch in 2014 by 45,122 tons to 25,275 tons. So that the catch limit obtained by Indonesia when using the IOTC data set will decrease by 44% from 39,707 tons to 22,242 tons.
- Indonesia in principle supports the yellowfin tuna re-building measure, as stated at S25. However, the use of catch re-estimation caused Indonesia to raise an objection.

The report of 1st Indonesian tuna fisheries data workshop

1. An ad-hoc technical workshop on the status of Indonesian tuna fisheries data at IOTC was held online on the 25th, 27th and 28th of May 2021, to provide update and ongoing work on data collection an d improvement and how they may use in revising the re-estimation of Indonesia's official catches (performed in agreement with the IOTC Scientific Committee) and the current rationale for continuing to estimate the species composition of Indonesia's total catches, in particular related to the use of re-estimated data by the IOTC will consequently reduce Indonesia's YFT catch limit significantly by more than 40% compared to Resolution 19/01. This workshop was attended by the IOTC Secretariat, the Ministry of Marine Affairs of Indonesia along with support of the International Pole and line Foundation (IPNLF)
2. Indonesia (IDN) **INDICATED** that they currently lack of understanding of the methodology used to re-estimate Indonesia's official catches by the IOTC Secretariat and that they would like to understand the current discrepancies observed between the reported information (through Forms 1-RC) and the published information (IOTC best scientific estimates) since this among other things may affect the catch limit of YFT for Indonesian fisheries (IOTC Res. 19/01), with potentially major negative consequences on Indonesian fishers and livelihoods.
3. IPNLF **STATED** that it is essential to understand the current methodology used for species and gear assignment to reconcile the catch data sources and address the gap between the position of IDN and the Secretariat with regards to catches of YFT, discuss the extent to which the current estimation methodology was reviewed over time, specifically focusing on the period 2018-2019.
4. The IOTC Secretariat **NOTED** that a key question of the workshop is in first place to understand why the IOTC Scientific Committee requested the Secretariat to re-estimate IDN catch data, **RECALLING** that the estimation procedure has been developed from the early 2000s and revised through time in collaboration with IDN, and that it also concerns fisheries from other CPCs.
5. The IOTC Secretariat **INDICATED** their interest in better understanding the data collection and validation systems in place for IDN tuna fisheries data, and provide IDN with more clarity on the origins and methods applied for the catch data re-estimation, with the objective of helping IDN clarify whether a revision of the estimation process should be discussed and presented at the next WPDCS and SC.
6. The IOTC Secretariat **RECALLED** that the methodology used for validating and re-estimating the IDN's official data has been periodically reviewed, and was last refined in 2018 (specifically, for the component relating to IDN fresh longline fisheries) as a consequence of the issues emerging from the re-estimated catch trends due to the uncertainty in the number of IDN's active fishing vessels, sampling coverage, and species composition in the catch.
7. FAO **INDICATED** that they also expected this meeting to clarify some of the inconsistencies and sharp fluctuations in IDN's official capture fisheries statistics submitted via FAO's NS-1 questionnaire, particularly since 2017 and the implementation of the One Data and agree with IDN on the way forward to ensure transparency and a common understanding of the main data issues.
8. Conclusions and future activities
    - The Workshop **NOTED** the recent progress accomplished by IDN through the One Data program, with accurate information now acquired through Electronic Reporting Systems (ERS) and fishing positions validated with VMS, **ACKNOWLEDGING** that

delays in data submission for the reference year 2020 are expected to occur due to the COVID-19 pandemic.

- The Workshop **AGREED** on the need for the IOTC Secretariat to improve information and feedback provided to the CPCs, especially when some re-estimation of the data is performed.
- The Workshop **AGREED** that new technical workshops specifically dealing with IDN tuna fisheries catch data should be conveyed to review and assess the available information and update the methodology used for generating the best scientific estimates to be used for stock assessment and management purposes.

The report of 2nd Indonesian tuna fisheries data workshop

1. The 2nd Indonesian tuna fisheries data workshop was held online on the 20th and 21st September 2021 as a follow up one of the recommendations of the first workshop. It discussed the re-estimation methodology of Indonesia's annual tuna catch for 2017-2019 proposed by Indonesia.
2. The IOTC Secretariat **INDICATED** their acknowledgement on the proposed re-estimation methodology of Indonesia's annual tuna catch for 2017-2019 with some corrections and **SUGGESTED** Indonesia to present the paper of re-estimation methodology in the 17th working party on data collection and statistics (WPDCS).
3. The chair of Scientific Committee **SUGGESTED** to Indonesia to add some additional information regarding the data sources that is used in the proposed re-estimation methodology, such as coverage level of logbook.

The report of the 17th Session of Working Party on Data Collection and Statistics (WPDCS17)

1. The 17th Session of Working Party on Data Collection and Statistics (WPDCS17) was held virtually from 29th November to 3rd December 2021.
2. Therefore **NOTING** the unusual variabilities in some of Indonesia's official catch statistics prior to the implementation of One Data in 2017, particularly in the case of neritic and tropical tuna species, the WPDCS **REQUESTED** that Indonesia undertake work – in collaboration with the IOTC Secretariat – to reassess their official catches (for the period 2010-2016) to ensure consistency and coherence in the longer-term catch series available for management and stock assessment purposes and **RECOMMENDED** that the Scientific Committee endorse this process.
3. The WPDCS therefore **RECOMMENDED** that work is undertaken to test an alternative, more flexible, matrix-based approach developed by FAO, to help refine the characterization of fisheries in IOTC at the national and regional level and **NOTED** that a number of CPCs (including Indonesia, Kenya, Maldives, Pakistan and Sri Lanka) expressed their interest in participating in these studies.

The report of 3rd Indonesian tuna fisheries data workshop

1. The 3rd Workshop of Indonesian Tuna Fisheries Catch Data was held from Monday to Wednesday, 11th – 13th July, 2022 at Directorate General of Capture Fisheries - Jakarta and on Thursdays to Saturday, July 14-16, 2022, in the Meeting Room of the Tuna Fisheries Research Center - Bali. The meeting was a follow-up to the recommendations

of the 17th Working Party Data Collection and Statistics (WPDCS17) meeting, namely Indonesia undertook work – in collaboration with the IOTC Secretariat – to reassess their official catches (for the period 2010-2016) to ensure consistency and coherence in the longer-term catch series available for management and stock assessment purposes.

2. Recommendations from the workshop as follow:

<u>FAO and IOTC Secretariat</u>

1) That the reasons for high fluctuations in Indonesia's official catches for selected species/gears highlighted by FAO and IOTC in years *post* One Data, including for tuna and tuna-like species as well as non-tuna species, are further analysed and discussed intersessional.
2) Similarly, that major changes in Indonesia's official data (1-RC- and NS-1) pre- and post-One Data are further analysed to better understand the reason for the abrupt changes in the species and gear composition reported to FAO and IOTC.
3) That FAO and IOTC continue to estimate or adjust the official catches (2010-2021+) of Indonesia for selected gears and species (IOTC) and /or species/ISSCAP groups (FAO), to moderate the impact of unexplained fluctuations in the catches - particularly since 2017 - subject to the findings of the additional verification and clarification requested of Indonesian scientists by FAO and IOTC.
4) Given the uncertainty of catches in 2017, due to the transition of One Data, FAO, the IOTC Secretariat and Indonesia agree that official catches for 2017 should not be used and instead estimated until further notice.

<u>IOTC Secretariat</u>

5) That Indonesia categorises all relevant fishery information according to the criteria that define the limits of applicability of most IOTC resolutions, i.e., vessels LoA and area of operation.
6) That Indonesia re-assigns all information currently collected / reported for the LLTU fishery code to either LLFR (fresh tuna longliners) or LL (deep-freezing longliners), considering that LLCO is a fishery code that shall be used only for vessels of LoA <24m exclusively fishing in the EEZ.
7) That in the ad-interim period, 85 GT and 78 GT be considered as the equivalent (from a tonnage point of view) of 24m LoA for longline and purse seine vessels, respectively.
8) That Indonesia re-assigns all information currently collected and reported for the PS and PSSS fishery in agreement to points 5) and 7).

<u>Re-estimation of tuna and tuna-like species</u>

9) Considering the importance of logbook data have in the proposed re-estimation procedure of IDN catches for 2010-2021+:
   a. That further clarification is made on the levels of logbook coverage data for vessels of less than 5 GT by gear type (e.g., number of trips/vessels covered by logbook; total number of fishing trips or vessels);
   b. That the coverage (or the absolute number of data points available) is expressed not only in relative, but also in absolute form (e.g., number of vessels, or trips covered by logbook);
   c. That coverage is also calculated as the fraction of trips for which logbook data are available;
   d. That the logbook data for 2019-2020-2021 used by the new re-estimation procedure better reflect the nature of the fisheries considered (in particular, the high proportion of vessels of <5 GT that is currently missing);

e. That in the intersessional period the IOTC Secretariat continues to provide advice and technical assistance to Indonesian scientists as necessary regarding the development and appraisal of options/scenarios of the new re-estimation procedure and how these are presented to the WPDCS;
f. That any re-estimation produced by Indonesia for catches by species and gears in the period 2010-2021+ is documented and also assessed in the context of all Indian Ocean fisheries, to better understand the changes introduced to the global time series of sensitive species;

10) That a follow-up IOTC Data Compliance and Support mission is organised in advance of the 2022 WPDCS meeting (29 Nov - 3 Dec) to continue discussions on the re-estimation methodology and address any other related issues that remain outstanding.

Indonesia

11) That before submitting data to FAO and IOTC according to the respective deadlines, workshops are organized with both institutions to improve the level of reporting and resolve any outstanding issues that might be encountered; [Timeline: before next reporting cycle (2023)].
12) That capacity delivery activities continue being implemented in Indonesia, on topics of relevance to this forum and with support from FAO, IOTC, and any other concerned stakeholder (OFCF and similar agencies) [Timeline: N/A].

The report of IOTC Data Compliance and Support Mission

1. The IOTC Data Compliance and Support Mission was held on the 1st -3rd November 2022 as a follow up one of the recommendations of the 3rd Indonesian tuna fisheries data workshop. It discussed the re-estimation methodology and address any other related issues that remain outstanding.
2. The recommendations:
   a. Recommendations 1: The manuscript would benefit for more detailed information on the logbook and landing coverage, i.e., the sampling design including year, month, area, gear, vessel size, and landing sites, as well as proportion of vessel-days covered through the logbook.
   b. Recommendations 2: The current classification of Indonesian fisheries is solely based on vessel size and restricted to longline and purse seine vessels and should be revised to comply with IOTC standard gear classification and better represent the species composition of the catches which is expected to differ between coastal and offshore components. Information is available from logbook for the period 2019- 2021 and assumptions must be made for the period 2010-2018.
   c. Recommendations 3: Review scenario 3 with species-specific values of contribution of each gear from IOTC approach for comparison with the revised methodology proposed by Indonesia.
   d. Recommendations 4: (i) Correct the number of active industrial longliners used for estimating the total catch of the industrial longline component, by removing the small vessels, accounting for the proportion of small longliners that may operate in ABNJ, and splitting the large vessels between fresh and deep-freezing longliners as derived from logbook for the period 2019-2021. (ii) Explore an alternative method to derive the mean annual productivity of industrial longliners and purse seiners based on daily catch rates derived from landing and/or logbook and assumptions about the numbers of days of activity in the year if available. (iii) Apply the method used for artisanal fisheries to the industrial fisheries (i.e., allocation of total catches by industrial gear and

use of species composition for each gear based on logbook and/or landing data) as an alternative scenario.

e. Recommendations 5: (i) Estimate logbook and landing coverage by fishing gear to assess the level of representativeness of the samples, (ii) Describe species composition of the catch in the logbook, including variability between years (similar to Figure 11 used for landing data) and months to assess seasonal effects, and (iii) Compare species composition between logbook and landing data based on a set of common fishing trips and (iv) Assess the interest of landing data for deriving the species composition of the catch.

The report of the 18th Session of Working Party on Data Collection and Statistics (WPDCS18)

1. The 18th Session of the Indian Ocean Tuna Commission's (IOTC) Working Party on Data Collection and Statistics (WPDCS18) was held virtually (through the Zoom collaborative platform) from the 28th of November to the 2nd of December 2022.
2. ***Overview of data processing procedures and proposed revisions of historical data.*** Rec. WPDCS18.05 (para 103): The WPDCS **REQUESTED** that Indonesia continue – in collaboration with the IOTC Secretariat – to reassess their official catches and **RECOMMENDED** that the Scientific Committee ENDORSE this activity.

The IOTC Technical Support Mission

1. The IOTC Technical Support Mission was held physically in Jakarta on 27th February – 3rd March 2023 as a follow up the recommendation of the 18th Session of Working Party on Data Collection and Statistics (WPDCS18).
2. Classification of fishing vessels: That the updated threshold of 115 GT be used from now on to identify purse seine vessels with length overall (LoA) of 24 m and above within all IDN data sets (logbooks, port landing, vessel registries, etc.). That the 85 GT threshold for longline vessels is also used, in lack of any other current evidence, for all other vessel types besides purse seiners.
3. That details of the re-estimation process for industrial fisheries (longline, purse seine, handline, and any other relevant fishery identified from the logbook data) are formalized in a separate document (**for internal use**, and **NOT yet to be shared outside the context of this IDN - IOTC collaboration**) which shall clearly detail:
   a. The overall rationale for the process;
   b. The assumptions made;
   c. All input data sources involved in the process;
   d. The produced output data;
   e. The R scripts and accompanying data frames (or the Excel spreadsheets) that implement the process, to allow for better reproducibility of its results.
4. Training sessions: Support training sessions in species identification in Indonesia in 2023-2024, with a focus on juveniles of tropical tunas, neritic tunas, seerfish, billfish, and pelagic sharks. The training could be developed in collaboration with SEAFDEC.
5. Considering that the information required to proceed with the re-estimation is partially held by **Pusdatin** (licensing, total annual catch estimates, etc.) and partially by **DGCF** (logbook data, landing data, etc.) the group recommends that:
   - Communication between the two groups (Pusdatin / DGCF) is further strengthened so that access to each source of information is streamlined and simplified.

- Representatives from both groups actively participate to the re-estimation exercise.

6. That **additional work** is still required to identify a proper strategy for the re-estimation of IDN catches from **industrial longliners** (including their categorization as FLL / LL).
7. That **additional work** is still required to identify a proper strategy for the re-estimation of IDN catches from **all artisanal fisheries**, and particularly those operating with vessels < 5 GT for which no information is available through logbook, although partial information can be extracted from landing data (PIPP).

The 4th Indonesian tuna fisheries data workshop

1. The 4th Indonesian tuna fisheries data workshop was held online on the 19th – 21st July 2023. It discussed the updated of re-estimation methodology of Indonesia's annual tuna catch for 2010--2021 proposed by Indonesia.
2. Recommendations from IOTC Secretariat :
   a. To separate the catch in the 1RC between vessel above 5 GT and vessel up to 5 GT for each fishery;
   b. The re-estimation only applies for those species that in 2010-2021 1RC appeared with a significant number of catches overall (above 100t in total), besides the sixteenth IOTC mandatory species and shark species.

The 5th Indonesian tuna fisheries data workshop

1. The 5th Indonesian tuna fisheries data workshop was held online on the 11th – 13th October 2023. It discussed the updated of re-estimation methodology of Indonesia's annual tuna catch for 2010--2021 from the previous workshop.
2. Recommendations from IOTC Secretariat:
   a. Check the estimates of proportions of catches estimated for vessels below and above 5 GT against the proportions of numbers of vessels by class category reported through forms 1RC
   b. Estimate logbook coverage for each fishing gear, year, and species before and after the filtering process to assess their representativeness for deriving the species composition of the catch
   c. To compare the species reported in the logbook with information available from landing and observer data when available
   d. To provide more information on port samples made by enumerators in fishing ports (e.g., numbers of samples, frequency, protocol)
   e. To describe which data will be used to estimate the species composition of the catch for coastal vessels <5GT for which logbook are not available.

The 6th Indonesian tuna fisheries data workshop

1. The 6th Indonesian tuna fisheries data workshop was held physically on the 22nd – 26th April 2024. It discussed the updated of re-estimation methodology of Indonesia's annual catch data for the period 1950-2022.
2. Re-estimation of Indonesian catch data in IOTC for 2010-2022 uses 2 types of formulas, namely interpolation and smoothing.
3. The key points of the proposed re-estimation method are:

a. The estimation of the species composition depends on gear and vessel size categories (i.e., <5 GT and >5GT)
b. During the period of 2010-2016, instances of zero values were substituted with the average catch estimated for the species in the years preceding and following the observed zeros
c. Depending on data availability in 2016, the average species composition was calculated for either the period of 2010-2015 or 2010-2016. This average composition was then applied to the total 1RC catches categorized by gear type and vessel size for the periods 2016-2022 or 2017-2022
d. Catches from southern bluefin tuna (*Thunnus maccoyii*) were considered reliable and kept as reported.

4. Based on a comparison of logbook and PIPP data with the same vessel and trip, a fairly high level of similarity was obtained.
5. In order to study tuna stocks in the Indian Ocean and reconcile historical estimates of catches (pre-2010) with the new estimates to ensure continuity in the time series, the IOTC Secretariat proposed a calculation formula based on the average species composition of the catch by gear as estimated for 2010-2022.

The Virtual Consultation Meeting with the IOTC Secretariat

1. The consultation meeting was held virtually on the 4th of July and 27th of August 2024. It discussed the progress of reviewing the updated of re-estimation methodology of Indonesia's annual catch data for period 1950-2022.
2. The report details the 2 distinct methodological approaches extensively discussed in Bandung (see above) to estimate:
   a. The catches for the period 2010-2022 based on the imputation method (for addressing the NA catch for some key species) and average species composition estimated for 2010-2015 or 2010-2016 for estimating the catch for 2017-2022.
   b. The catches for the period 1950-2009 based on the average species composition estimated for 2010-2012.

Appendix 2. Types of fisheries for IOTC species

IOTC Code	Type of Operation	English name
BS	Artisanal	Beach seine
CN	Artisanal	Cast net
DS	Artisanal	Danish seine
DSD	Artisanal	Demersal Danish seine
GI	Artisanal	Gillnet
GIDR	Industrial	Driftnet
GIOF	Semi-industrial	Offshore gillnet
HL	Artisanal	Handline
HLPA	Artisanal	Handline on anchored-FAD
DL	Artisanal	Dropline (vertical handline)
DLLS	Artisanal	Dropline on anchored-FAD
HR	Artisanal	Harpoon
LL	Industrial	Drifting longline (over 1800 hooks)
LLCO	Artisanal	Smalll longline
LLEX	Industrial	Drifting longline (exploratory)
LLFR	Industrial	Drifting longline (up to 1800 hooks)
LLGI	Semi-industrial	Gillnet/longline
LLSI	Semi-industrial	Swordfish longline (semi-industrial)
LLSK	Industrial	Shark longline
LLSW	Industrial	Swordfish longline (Florida longline)
LLTU	Industrial	Tuna longline
LN	Artisanal	Liftnet
LNPA	Artisanal	Liftnet on anchored-FAD
PL	Artisanal	Pole and line
PLIN	Industrial	Industrial pole and line
PLPA	Artisanal	Pole-and-line on anchored-FAD
PLFS	Artisanal	Free-school pole-and-line
PLDF	Artisanal	Dolphin associated school pole-and-line
PLME	Artisanal	Pole and line (mechanized boats)
PLNM	Artisanal	Pole and line (non-mechanized boats)
PLOF	Semi-industrial	Offshore pole and line
PS	Industrial	Tuna purse seine
PSFS	Industrial	Free-school tuna purse seine
PSLS	Industrial	Log-school tuna purse seine
PSSA	Semi-industrial	Coastal purse seine on anchored-FAD
PSSF	Semi-industrial	Free-school coastal purse seine
PSRN	Artisanal	Ringnet
PSRP	Artisanal	Ringnet with anchored-FAD
PSSP	Industrial	Support vessel industrial purse seiner
PSSS	Semi-industrial	Small purse seines
SN	Artisanal	Setnet
SP	Artisanal	Sport fishing
TL	Artisanal	Trolling
TLME	Artisanal	Trolling (mechanized boats)
TLNM	Artisanal	Trolling (non-mechanized boats)
TP	Artisanal	Trap
TR	Semi-industrial	Trawl

Appendix 3. Classification and dimensions of fisheries (Modified from Moreno & Herrera (2013))

Type of boat	Boat size	Area of Operation	Fleet
Non-motorised	All	Flag state EEZ only	Artisanal
Motorised outboard	All	Flag state EEZ only	Artisanal
Motorised inboard	<15 m	Flag state EEZ only	Artisanal
Motorised inboard	15-24 m	Flag state EEZ only	Semi-industrial
Motorised inboard	<15 m	Includes other EEZ areas and/or high seas	Semi-industrial
Motorised inboard	15-24 m	Includes other EEZ areas and/or high seas	Industrial
Motorised inboard	≥ 24 m	Anywhere	Industrial

Appendix 4. Catch estimation methodology prior 2017

Since 2010, Indonesia has been submitting the official annual tuna catch to the IOTC Secretariat through form 1RC. The 2010-2016 data was accepted as official data, and it was published by FAO. It has been used for various purposes by public as well as other institutions. Based on the IOTC Secretariat's presentation in the 1st Indonesian tuna fisheries data workshop, there were some collaborating activities between the IOTC Secretariat, relevant institutions and Indonesia Government on the review of Indonesia data collection and reporting procedures have been conducted, as the following:

1. 2011: (1) Review of fisheries data collection systems for BOBLME countries, (2) CSIRO-led project on "Capacity development to monitor, analyse and report on Indonesian tuna fisheries" (ACIAR).
2. 2012: Pilot project to improve data collection from IO artisanal fisheries (IOTC), involving (1) Several data sources from 1950-1991 e.g., IPTP, IOTC, etc., (2) Catch data reports and sheets from ports and provinces from 2003-2011 e.g., DGCF, DINAS, etc., (3) Exclusion of unlikely gear-species combinations. The project output was time series of artisanal catches by gear and species 1950-2011, using fixed gear / species ratios for Artisanal (ART) fisheries.
3. 2013: Workshop on evaluating the procedure developed by the IOTC secretariat to estimate IDN albacore catches for 2002-2012 (methodology potentially applicable to other species). For this purpose, several datasets were considered, such as:
   - Different data sources: WCPFC, DGCF, ISSF, IOTC
   - Time series of artisanal catches derived from Revision II
   - Fishing craft data on the number of deep-freezing longliners (LL)
   - TWN LL fishery: proxy for the annual catch rate and composition of IDN LL

   The final outputs were as follows:
   - Time series of IDN deep-freezing longliners, 2002-2011
   - Time series of catches of LL fisheries by species/gear, 2002-2011
   - Time series of catches of FLL fisheries by species/gear, 2002-2011

Based on the paper prepared by IOTC Secretariat in the WPDCS10, there were some capacity building activities implemented by the IOTC and its partners during 2014, in particular Indonesia, as the following:

1. Review of data collection and management systems artisanal fisheries of West Sumatra, Indonesia
2. Data collection Workshop West Sumatra Indonesia
3. Review of data collection and management systems artisanal fisheries of Bali and East Java, Indonesia
4. Pilot sampling activities in the North and West Sumatra, Indonesia

Based on the paper prepared by IOTC Secretariat in the WPDCS11, there were some capacity building activities implemented by the IOTC and its partners during 2015 in Indonesia, as the following:

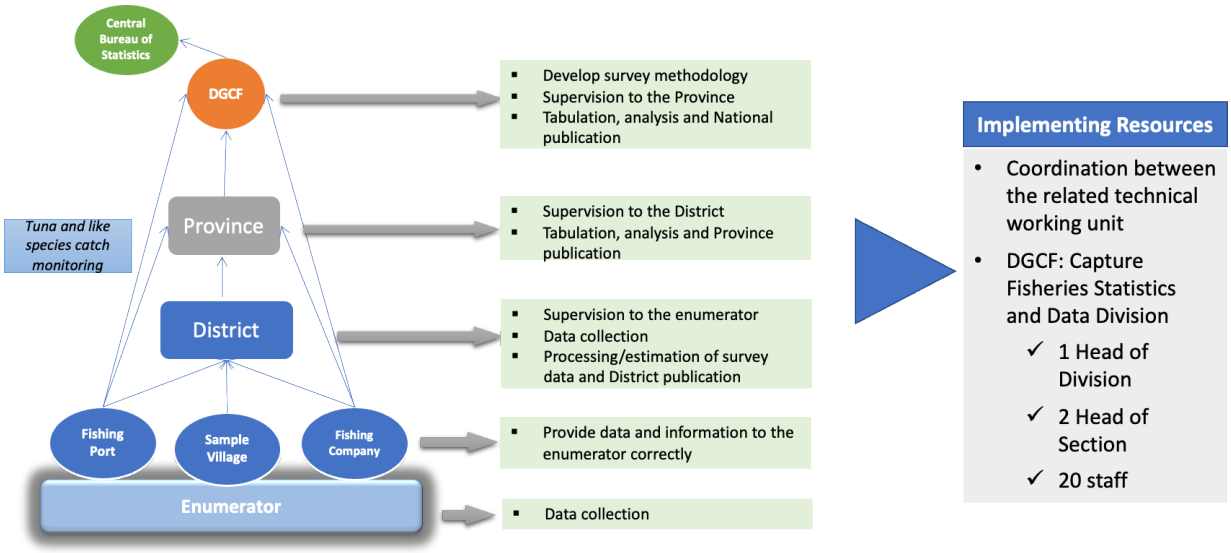
1. Indonesia pilot sampling monitoring activities (North and West Sumatra)
2. Technical assistance mission: reporting of catch-and-effort, size data and Regional Observer data (Jakarta)
3. Indonesia pilot sampling: project evaluation and catch estimation workshop (Jakarta)

Based on the paper prepared by IOTC Secretariat in the WPDCS12, there were some capacity building activities implemented by the IOTC and its partners during 2016 in Indonesia, as the following:

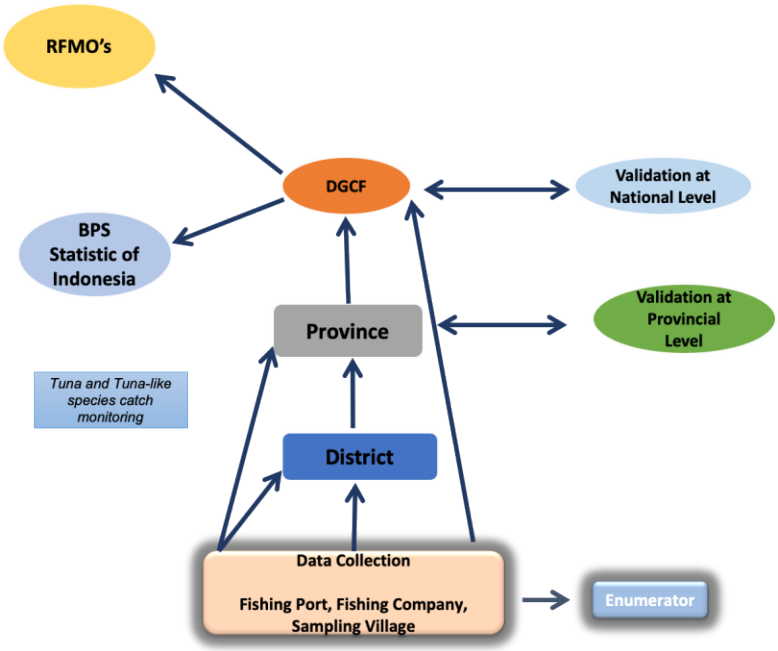
1. Continuation of support for the IOTC/OFCF/BOBLME pilot sampling of artisanal fisheries.
2. Data compliance mission to facilitate the reporting of catch-and-effort and size data from industrial longline fleet.

As the follow up of the coordination activities above, Indonesia has submitted revised annual catch data for the concern years to the IOTC Secretariat and been acknowledged receipt as a final of Indonesia official catch data.

The data collection prior 2017 was conducted based on Yamamoto method as specified below:

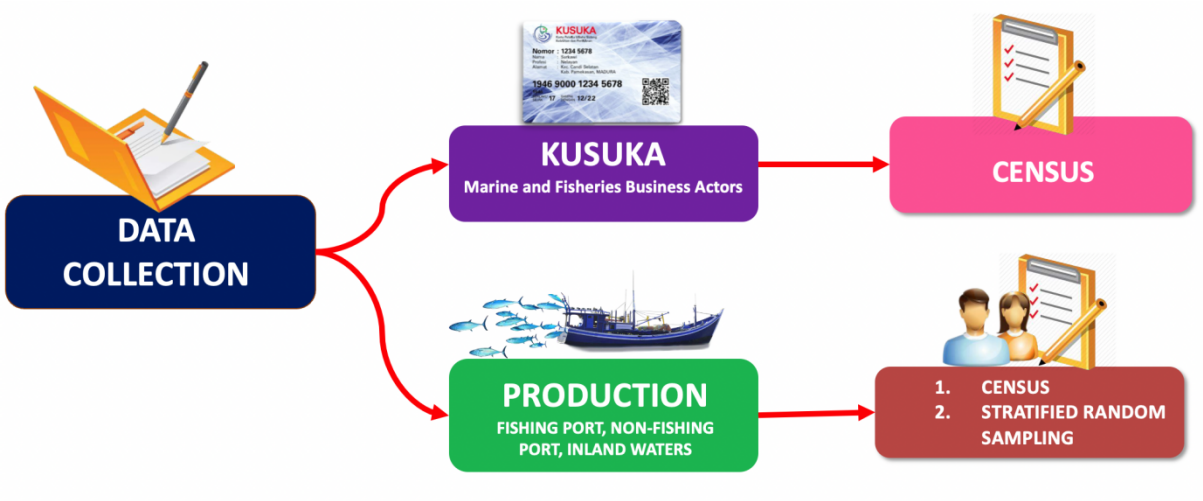


Prior to submission, the official catch data of 2010-2016 has been verified and scrutinized through validation scheme as described below:


RFMO's
DGCF
Validation at National Level
BPS Statistic of Indonesia
Province
Validation at Provincial Level
Tuna and Tuna-like species catch monitoring
District
Data Collection
Fishing Port, Fishing Company, Sampling Village
Enumerator

Appendix 5. Catch estimation methodology for 2017-2021

One Data is a National Program, aimed to provide an integrated data for a more cohesive national planning process. In the beginning of 2017, the MMAF implemented One Data of Marine and Fisheries for the very first time. By late of 2019, the Presidential Decree No. 39 about the National One Data was finally signed, and One Data became a nation-wide Program. The type and method of data collection under the One Data program described as below:



The objective of KUSUKA data collection is collecting/updating data on marine and fishery business actors (fishermen, fish farmers, fish traders/marketers and fish processors and salt farmers), including data on Fisheries households, facilities and types of activities of all marine and fisheries business actors according to their domicile by census.

Meanwhile, the objectives of production data collection are 1) Collecting production data at the fishing port; 2) Collecting sampling data on marine and inland capture fisheries production, aquaculture production, fish processing production and salt production; 3) As a basis for estimating district / city level to aggregate production figures.

The methodology of production data collection is described below:

1. Census for fishing port (daily)
2. Sampling, randomly selected from each population stratification in each district / city (monthly)
3. Recall where the respondent was interviewed regarding fishing activities carried out in the last month (t-1)

Respondents:

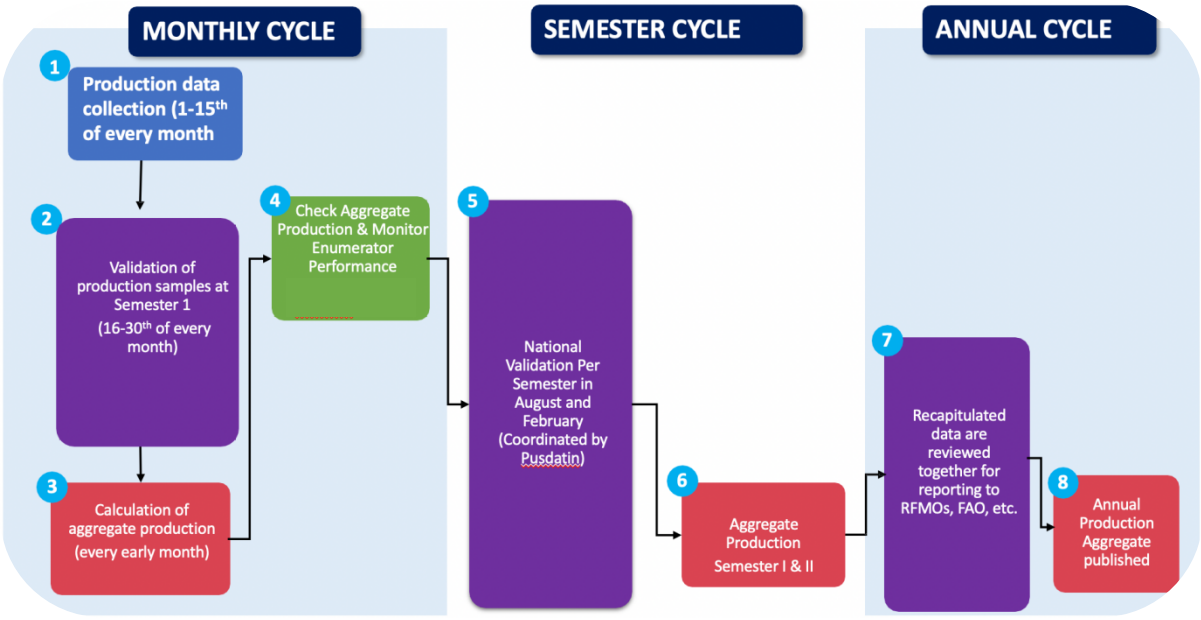
1. All vessels / units that land their catch at the fishing port
2. Fisheries household sample selected in the district / city (non-fishing port)

Data Collection Instruments:
Capture fisheries production questionnaire

Data Collection Periods:
1. Daily for fishing port
2. Monthly for non-fishing port capture fisheries production in marine and inland waters.

Aggregated Number Formulation

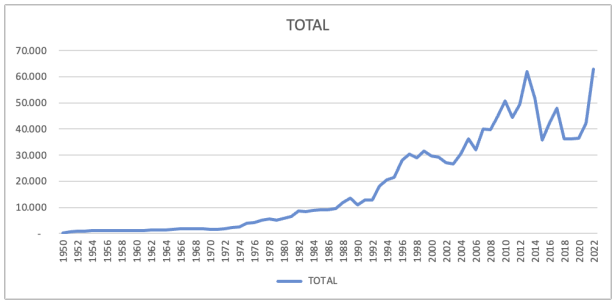
Sampling taken (According to the rules)	Aggregated number (A) (Representing districts)
$A = Nx\frac{p}{n}$ Where: A : Production calculation result (aggregated) N : Sum of gear population unit n : Sum of gear sampling unit p : Sum of sampling production	• The sample must be derived from stratified population of gears • Sample taken from each gear

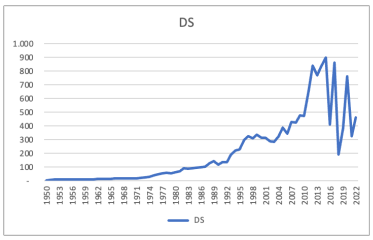


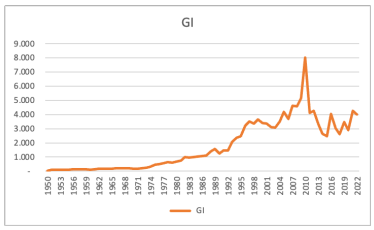
The process of annual statistical fisheries data publication by One Data

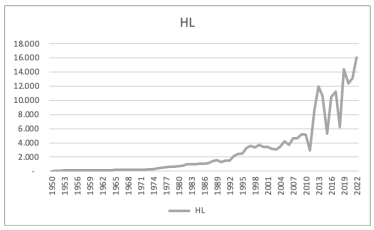
Appendix 6. The results of re-estimation by species by fishing gear

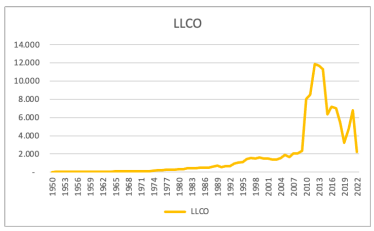
Yellowfin tuna/YFT (in metric tonnes)

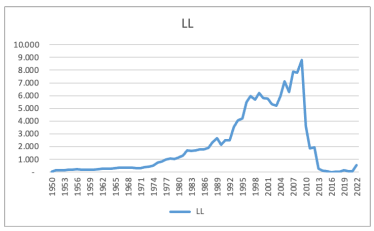


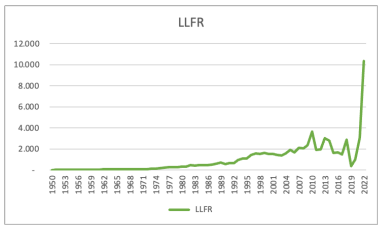


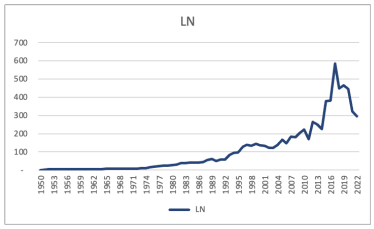


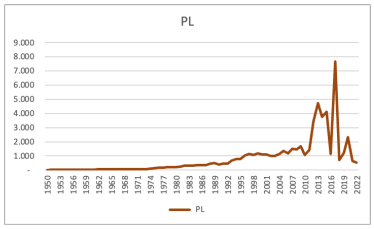


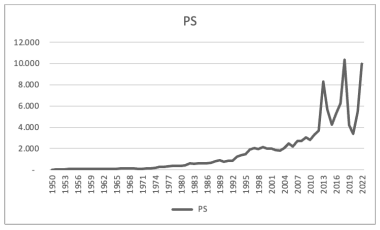


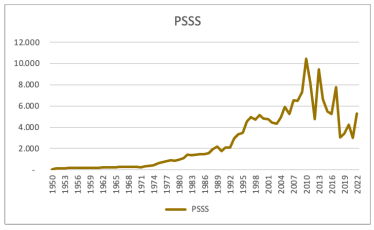


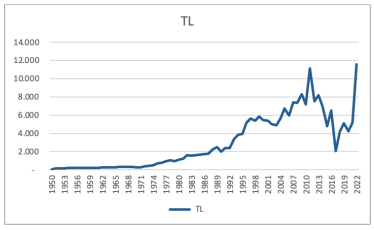




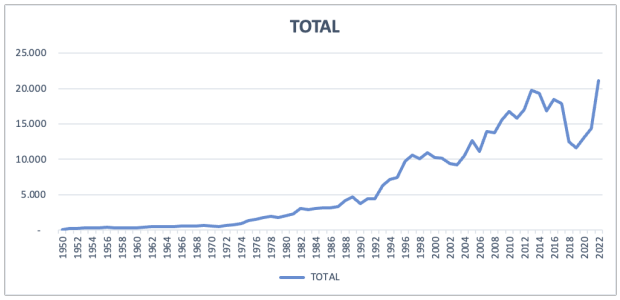


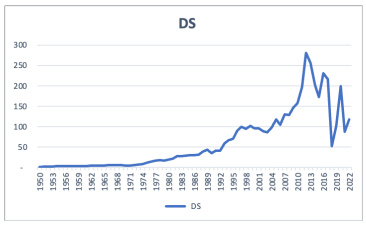


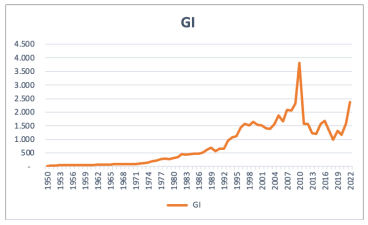


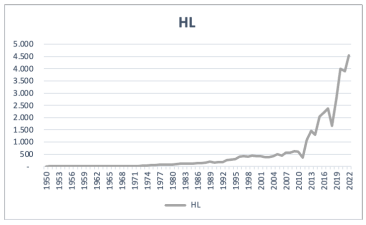


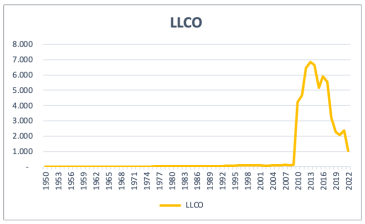
Bigeye tuna/BET (in metric tonnes)

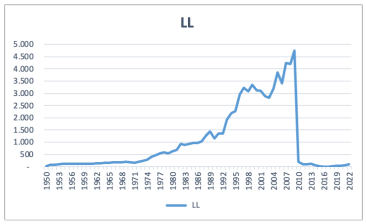


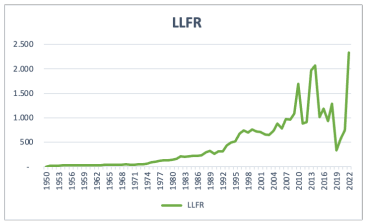


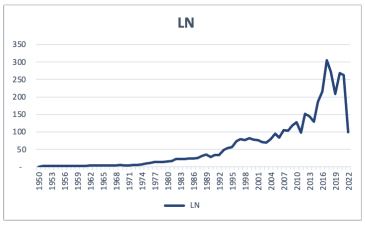


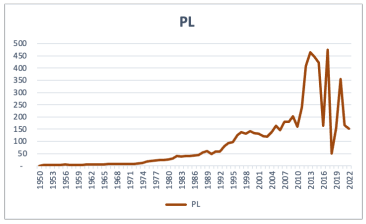


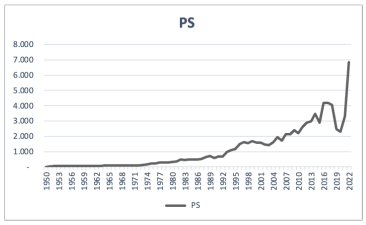


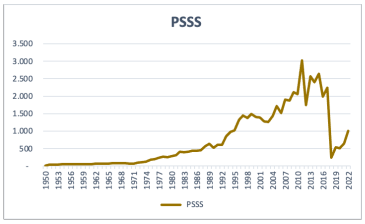


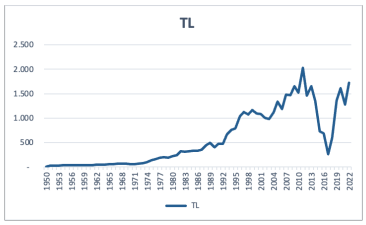


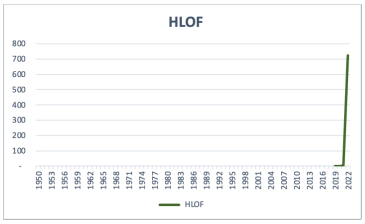




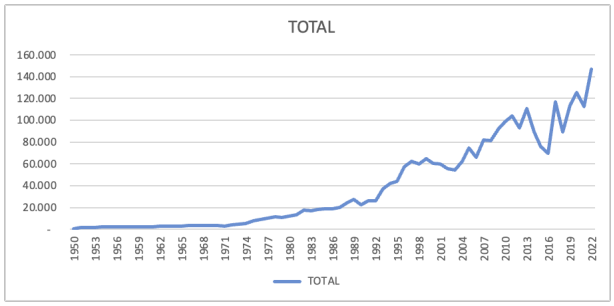


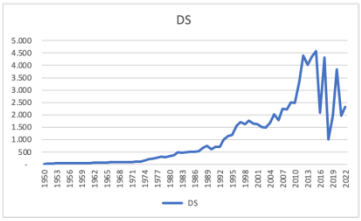


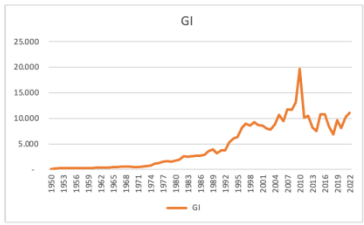


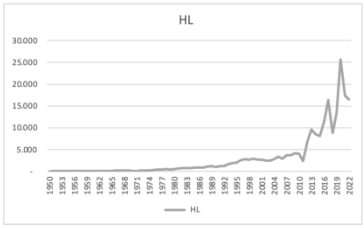


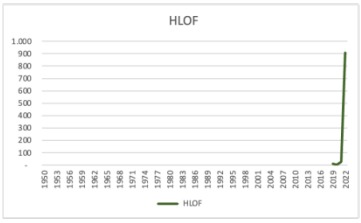
Skipjack tuna/SKJ (in metric tonnes)

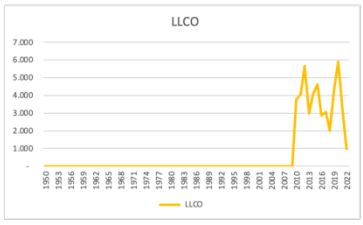


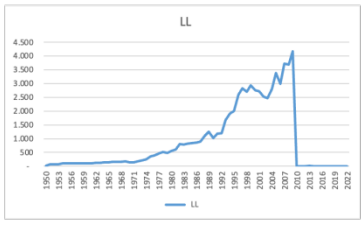


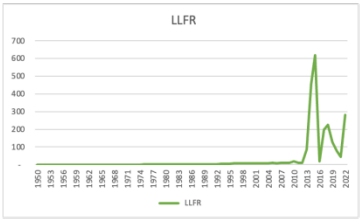


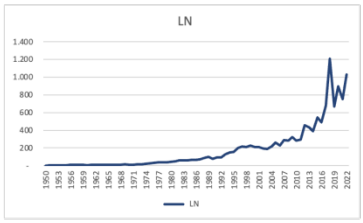


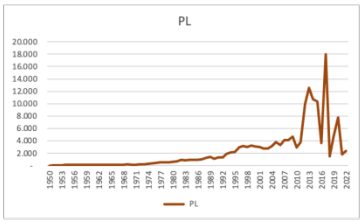


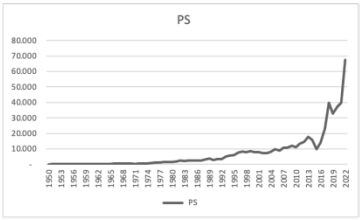


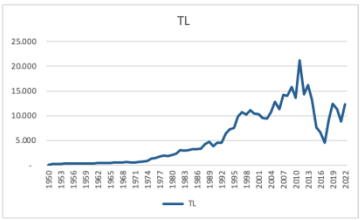




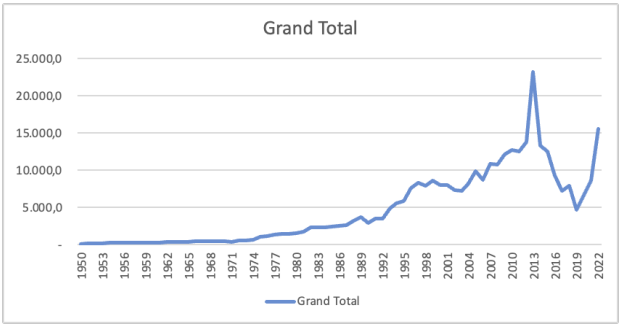


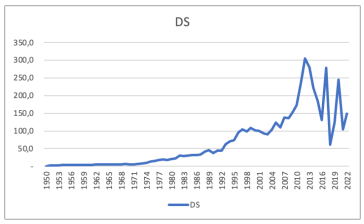


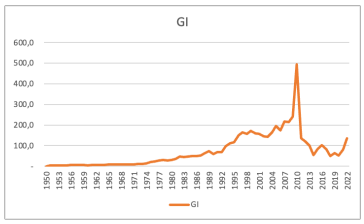


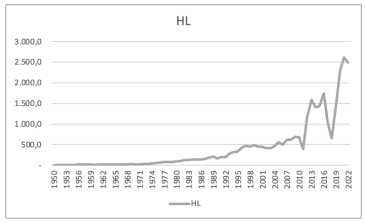


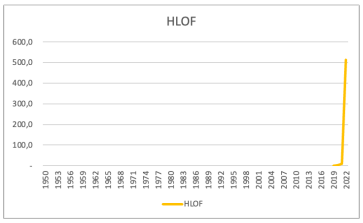
Albacore tuna/ALB (in metric tonnes)

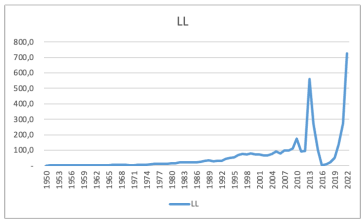


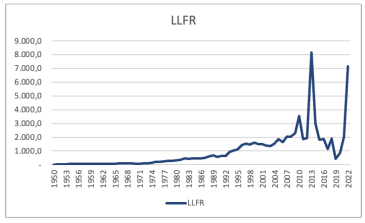


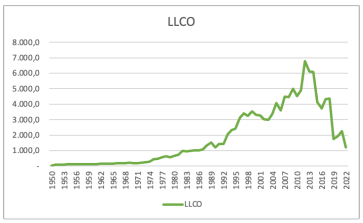


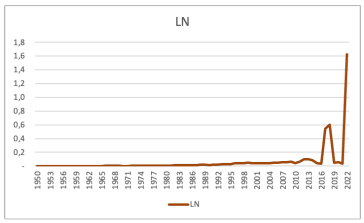


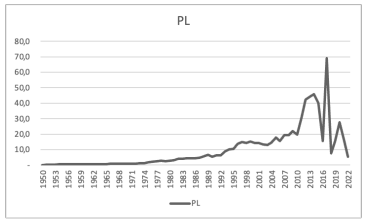


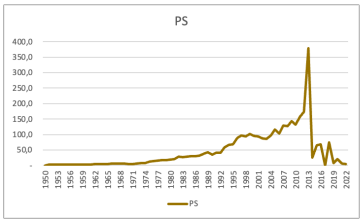


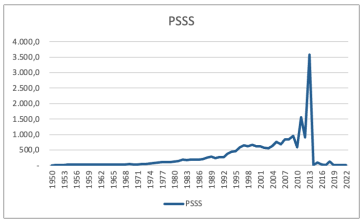


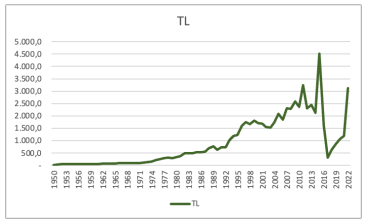




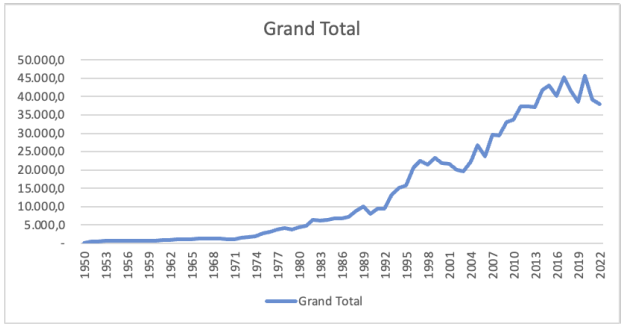


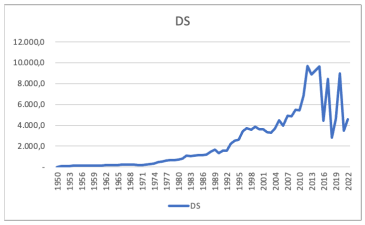


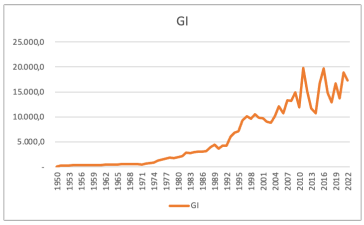


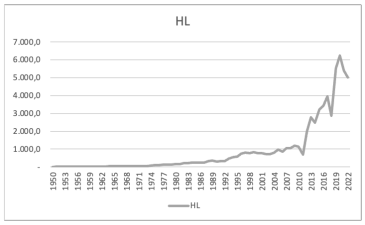


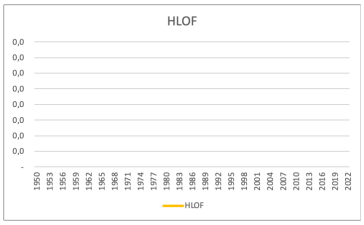
Frigate tuna/FRI (in metric tonnes)

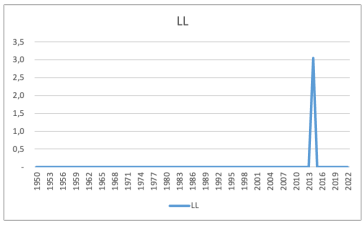


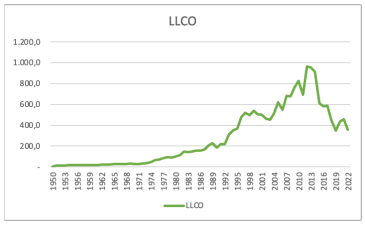


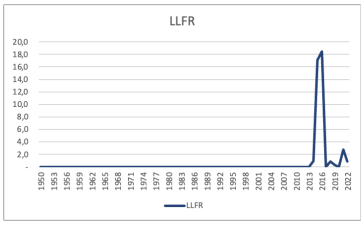


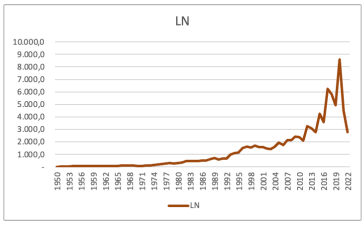


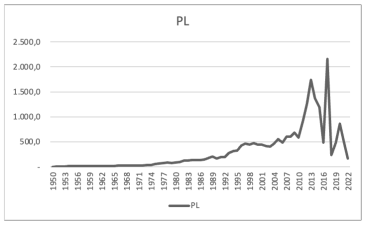


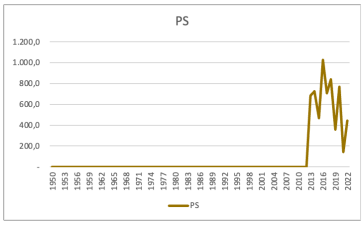


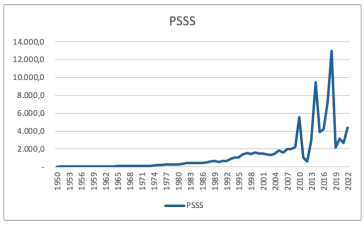


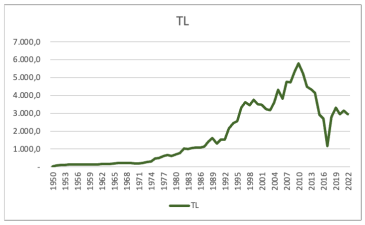




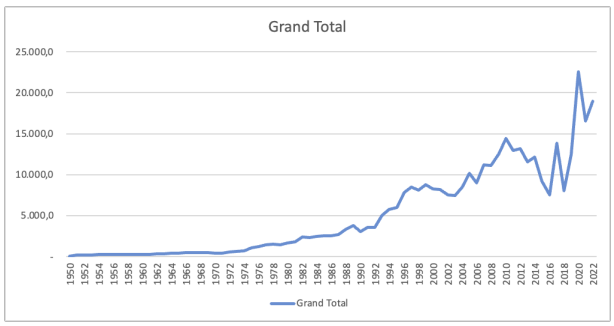


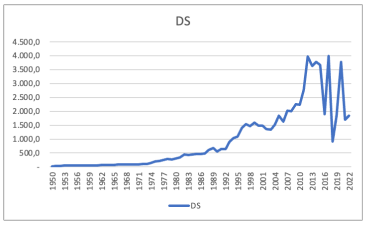


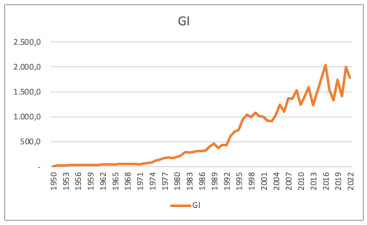


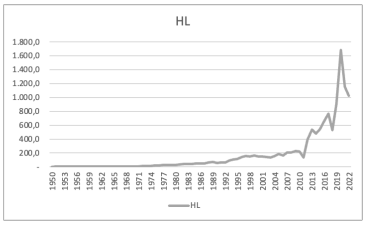


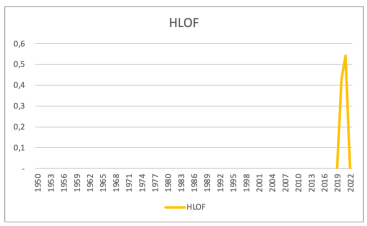
Bullet tuna/BLT (in metric tonnes)

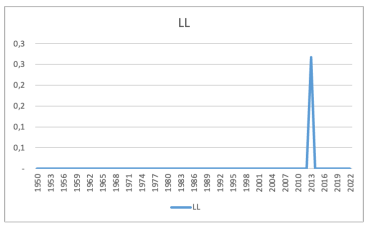


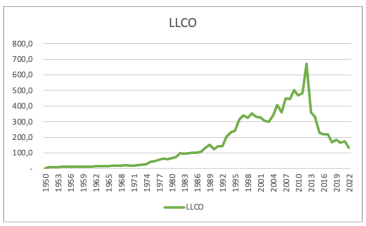


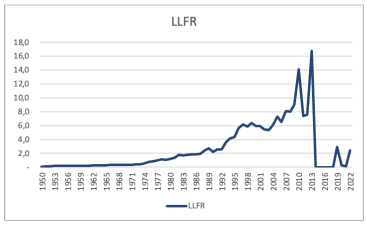


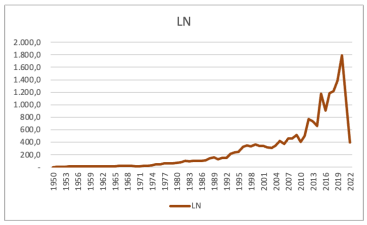


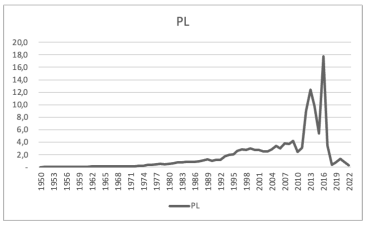


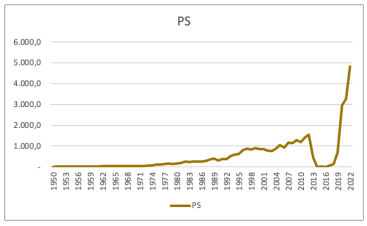


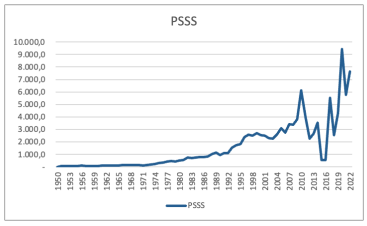


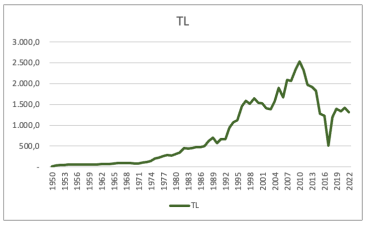




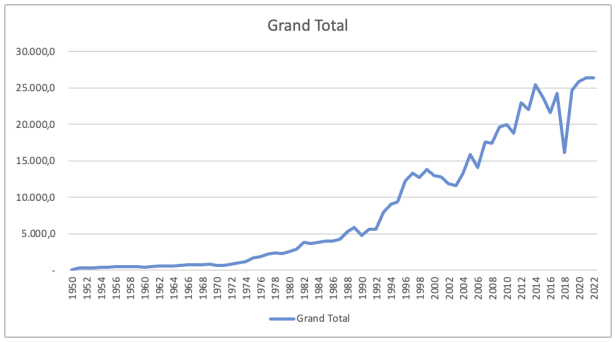


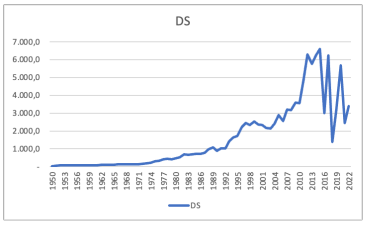


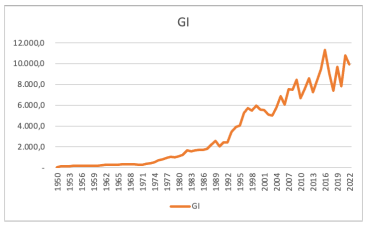


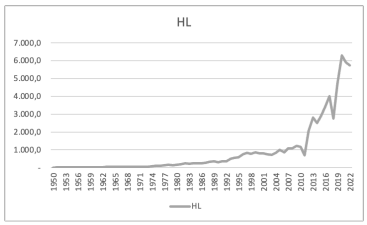


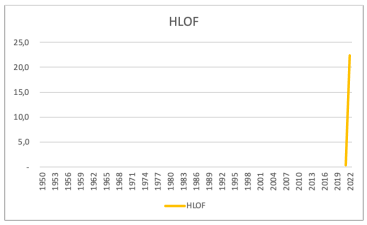
Longtail tuna/LOT (in metric tonnes)

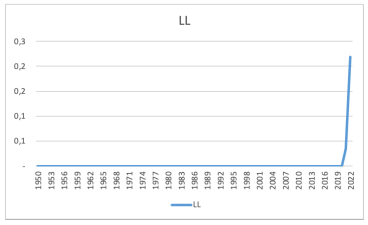


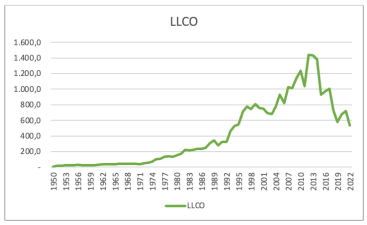


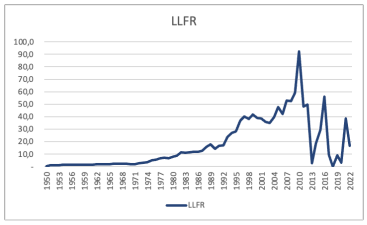


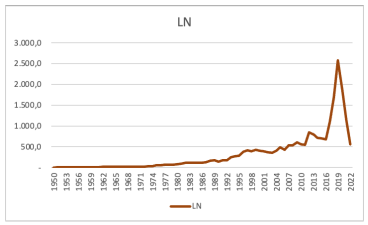


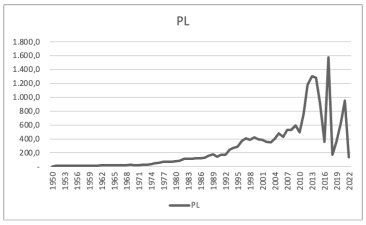


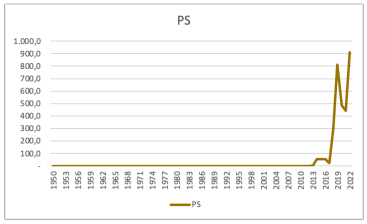


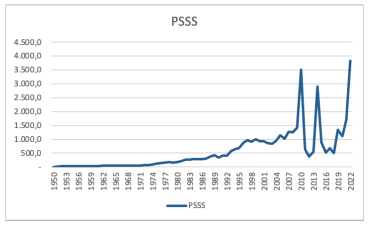


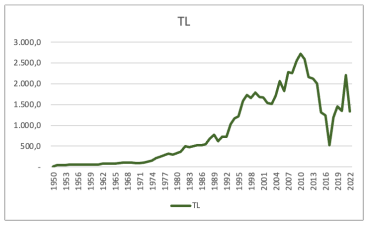




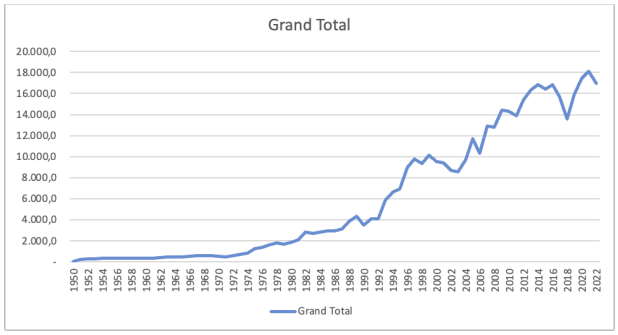


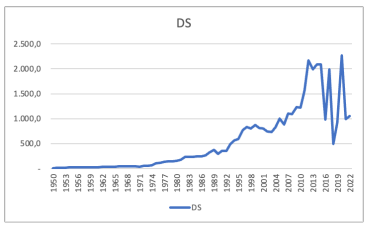


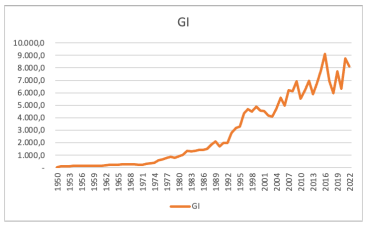


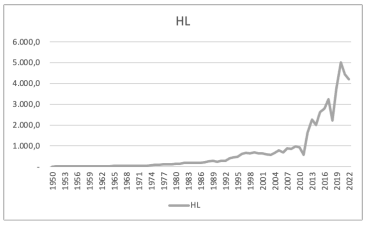


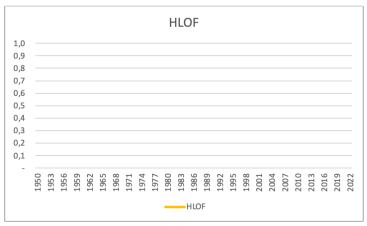
Kawakawa/KAW (in metric tonnes)

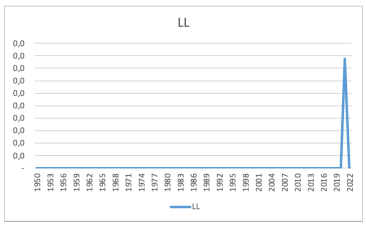


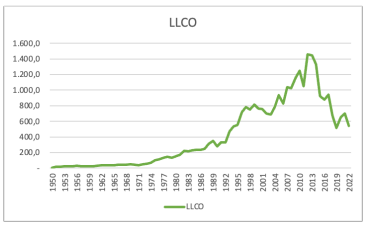


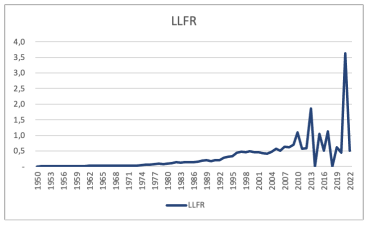


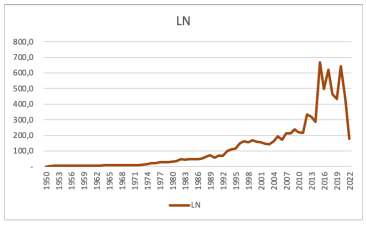


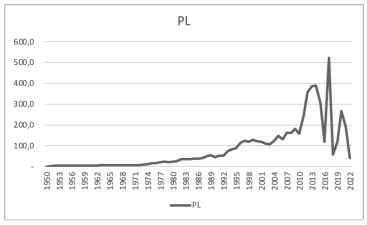


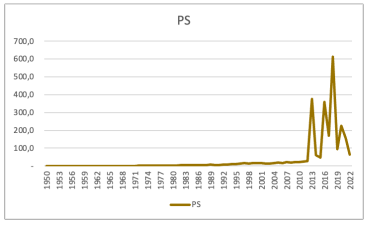


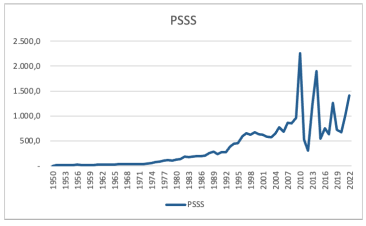


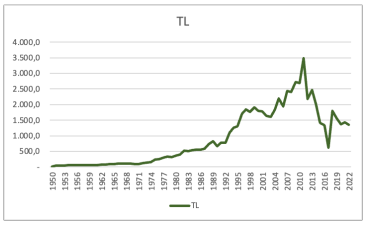




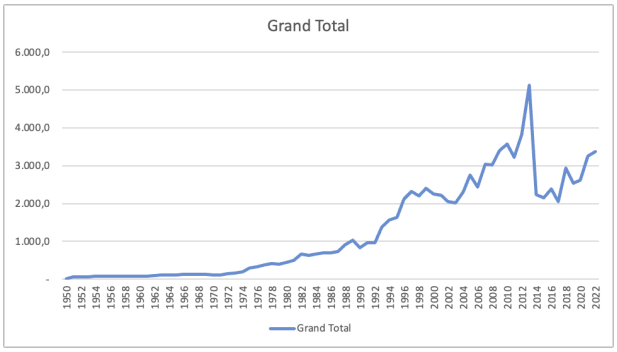


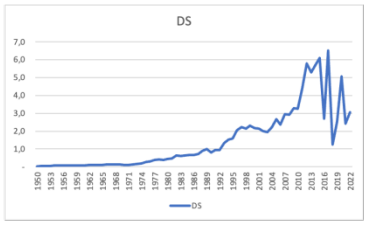


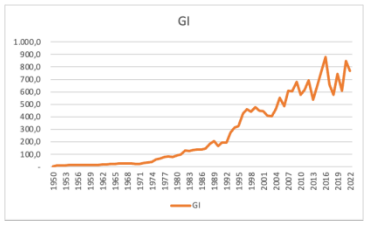


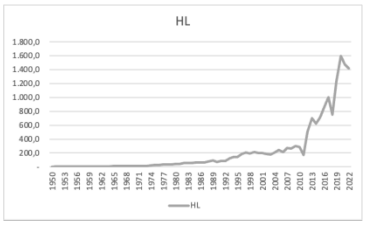


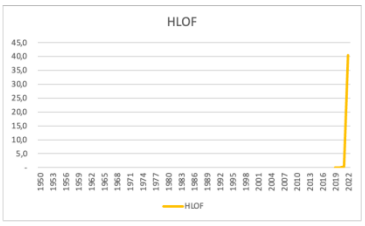
Black marlin/BLM (in metric tonnes)

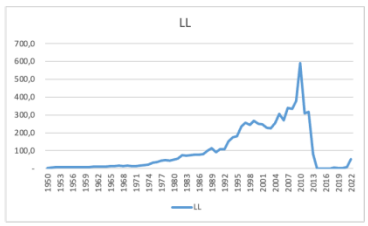


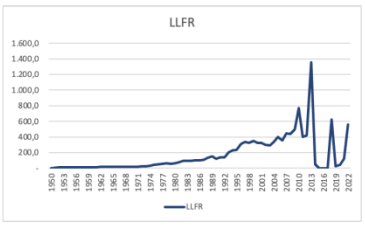


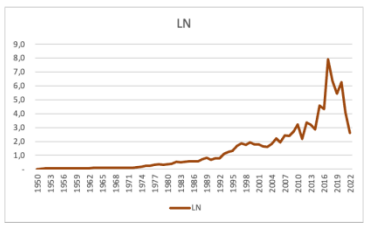


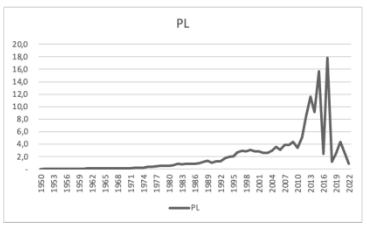


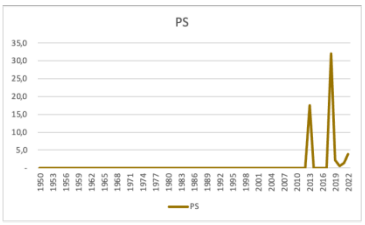


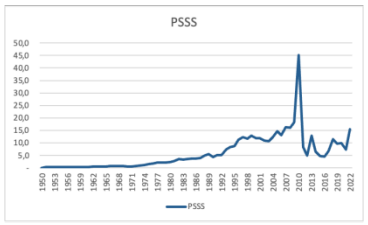


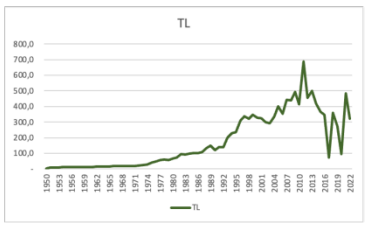




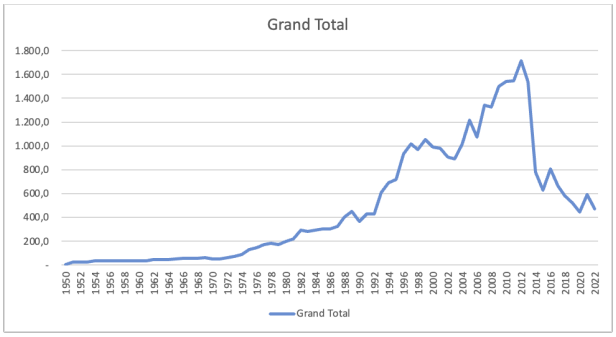


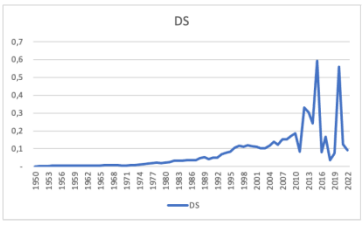


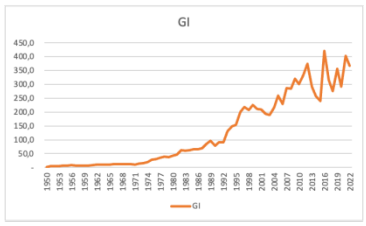


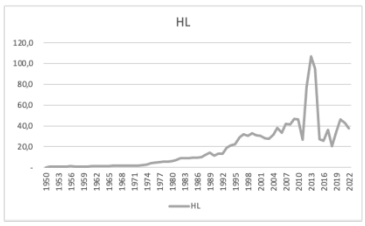


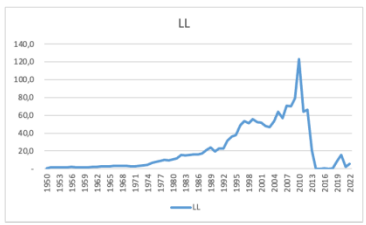
Striped marlin/MLS (in metric tonnes)

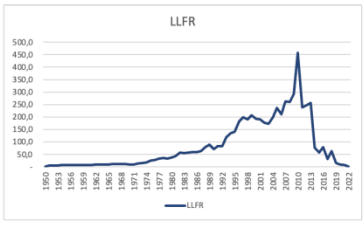


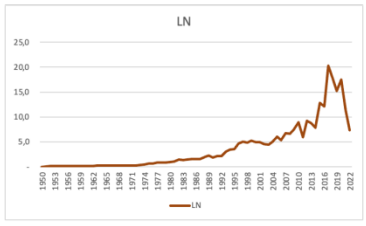


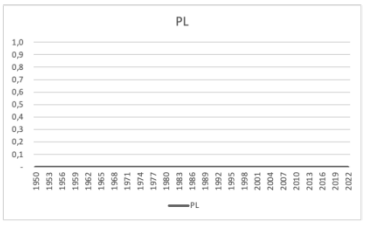


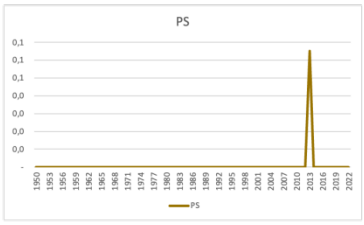


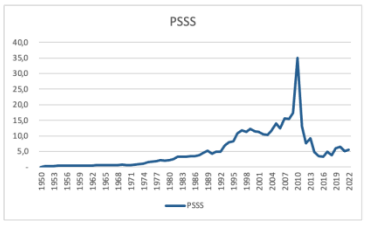


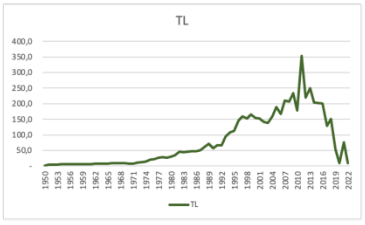




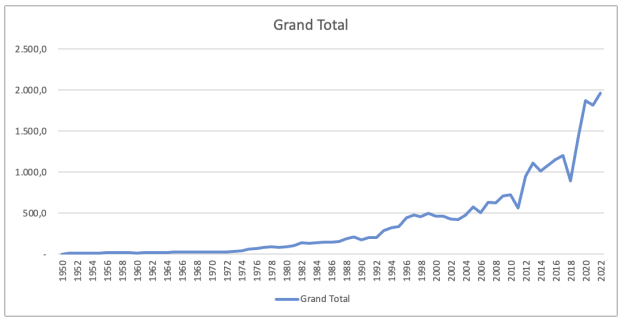


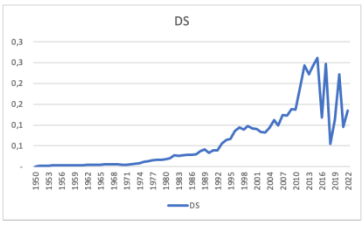


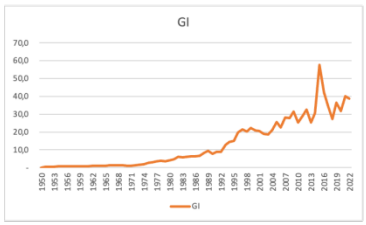


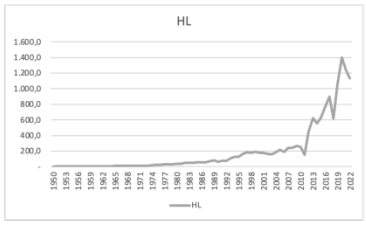


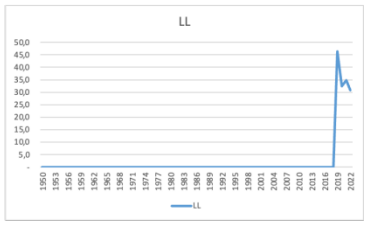
Blue marlin/BUM (in metric tonnes)

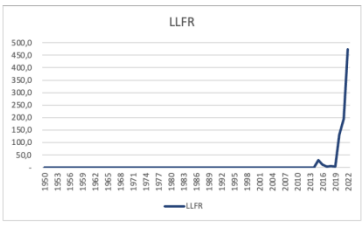


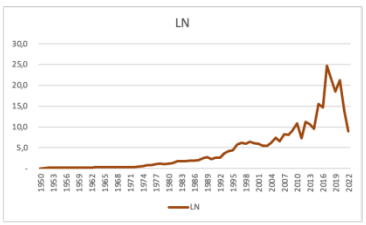


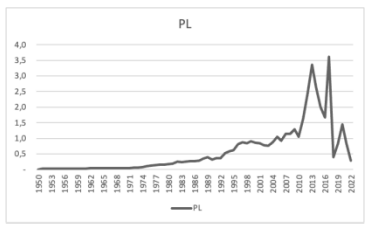


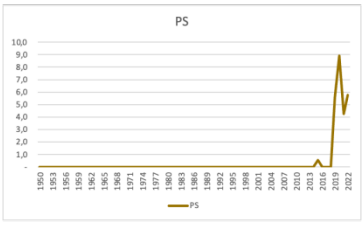


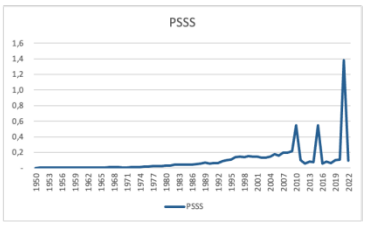


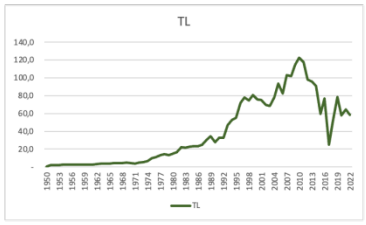




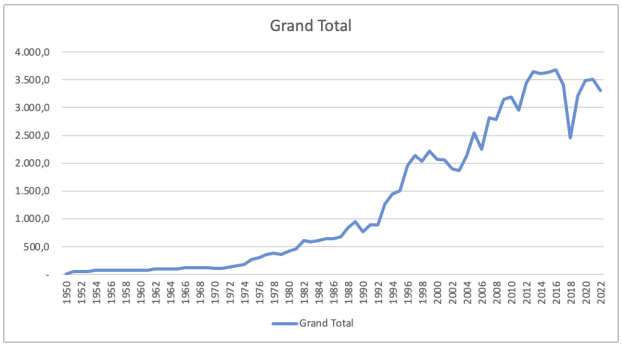


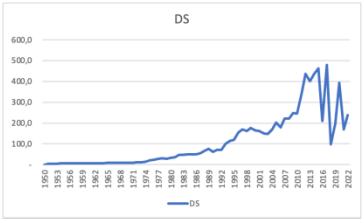


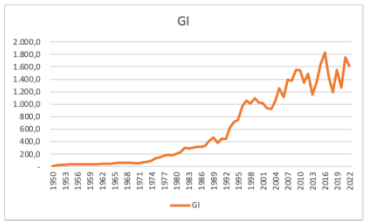


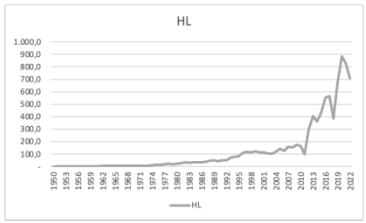


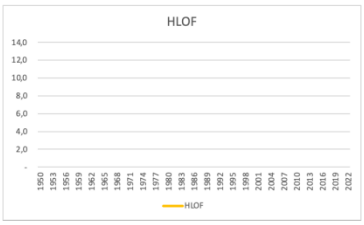
Indo-Pacific sailfish/SFA (in metric tonnes)

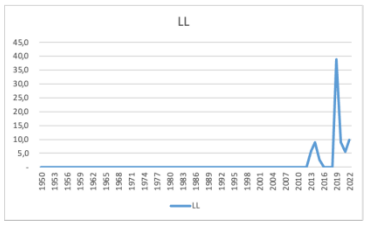


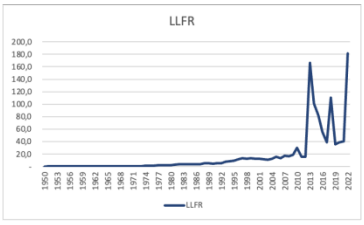


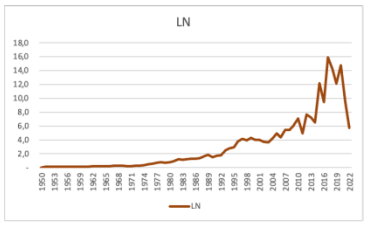


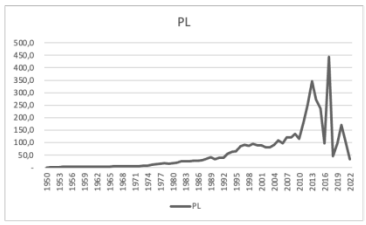


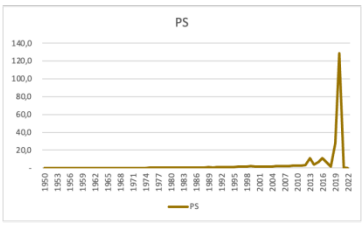


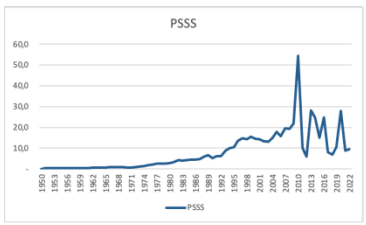


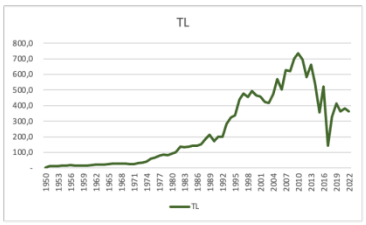




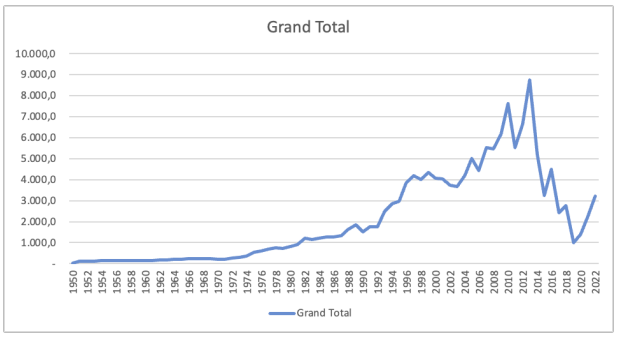


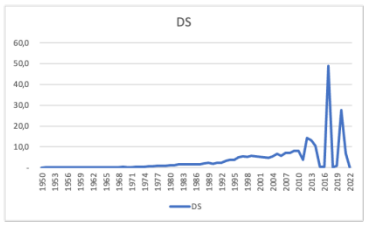


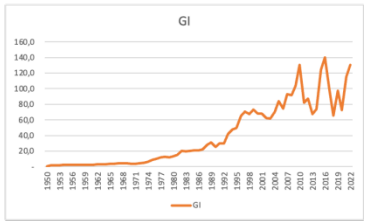


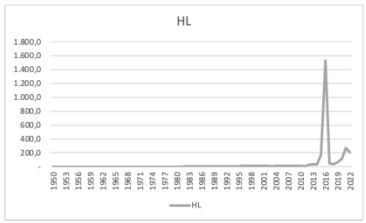


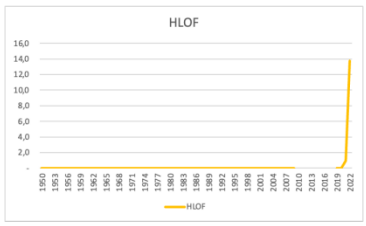
Swordfish/SWO (in metric tonnes)

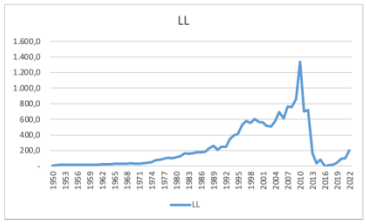


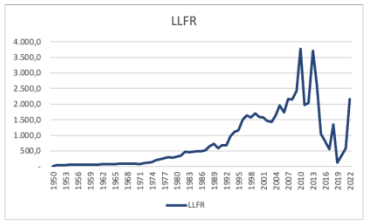


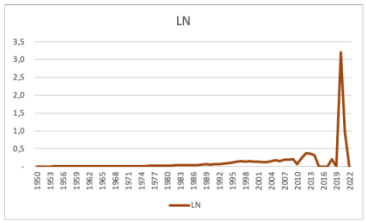


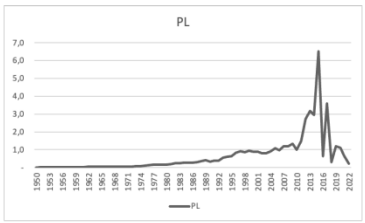


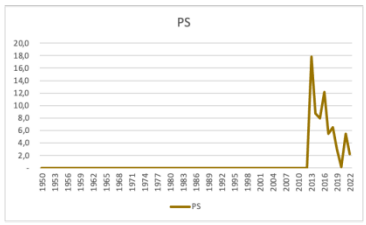


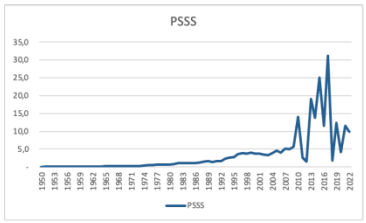


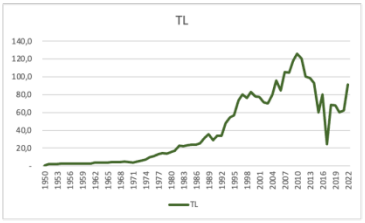




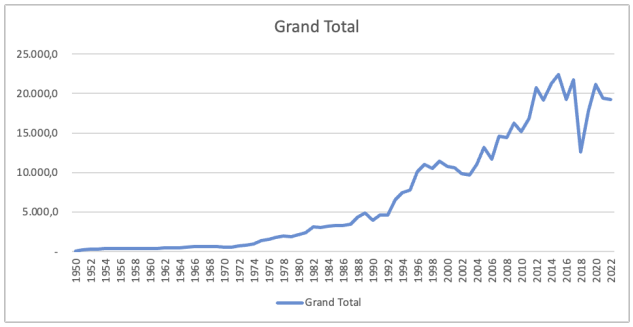


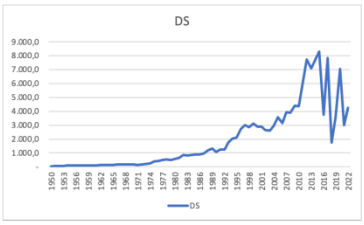


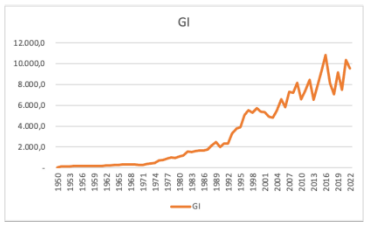


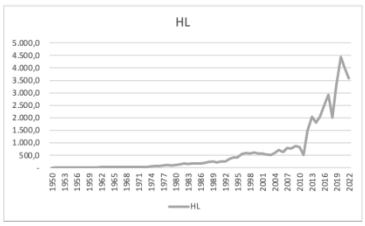


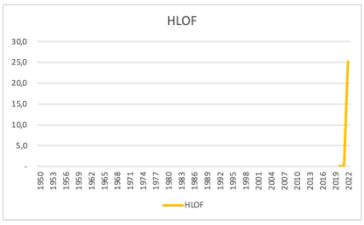
Narrow-barred Spanish mackerel/COM (in metric tonnes)

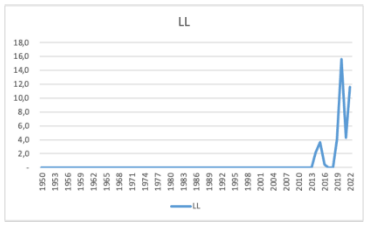


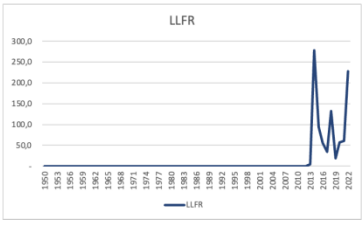


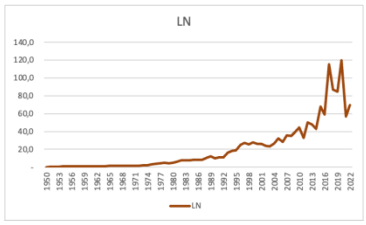


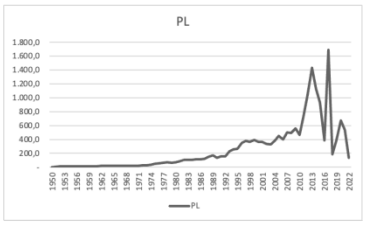


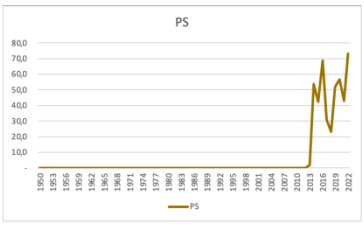


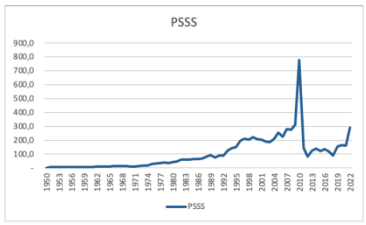


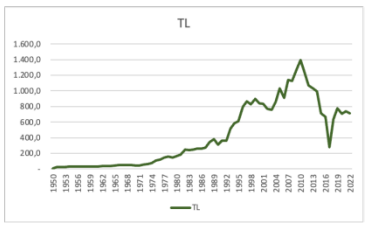




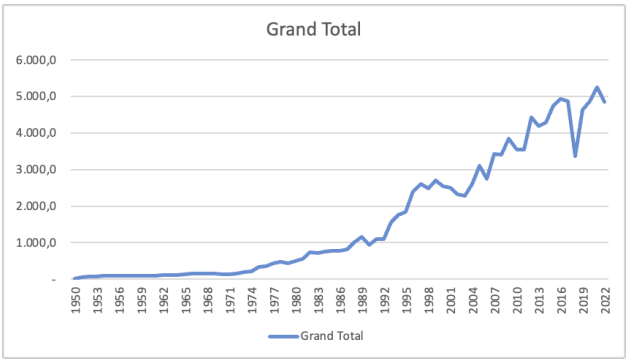


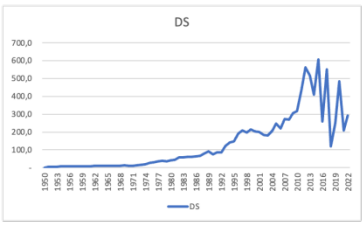






Indo-Pacific king mackerel/GUT (in metric tonnes)

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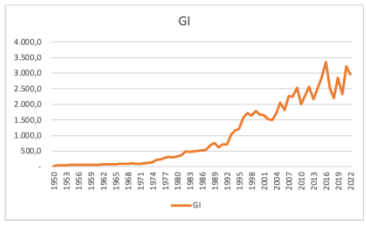
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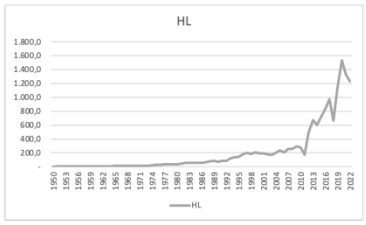
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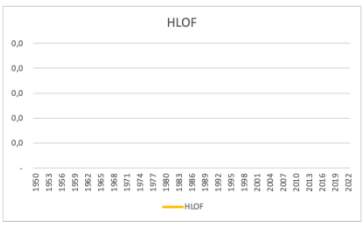
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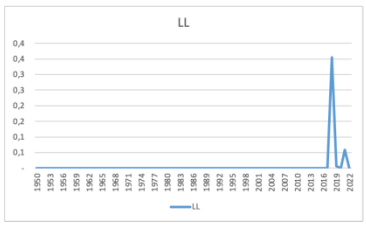
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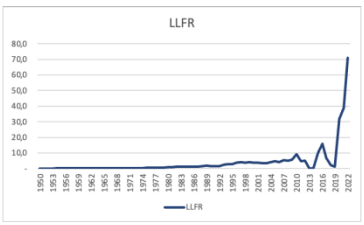
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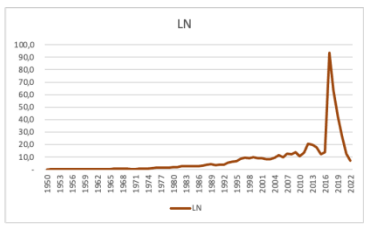
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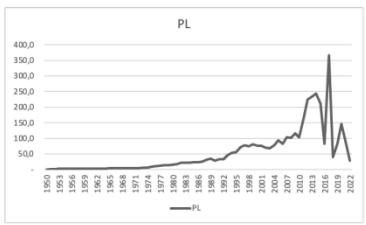
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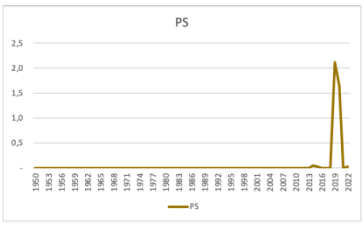
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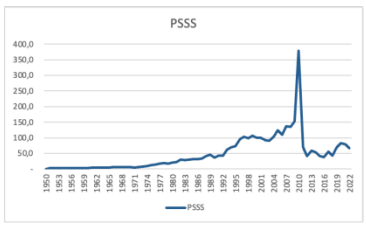
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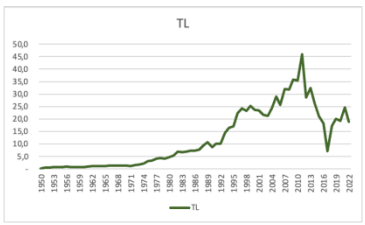
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