

Mechanism to monitor catches of Bigeye and other Tropical Tunas by countries member of OSPESCA having purse seine fisheries for tropical tunas in the IATTC Area

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Background

The adoption by the Inter-American Tropical Tuna Commission (IATTC) of Resolution C-21-04¹¹, on the conservation of tropical tuna in the IATTC area, incorporates the need to carry out a more exhaustive monitoring of bigeye tuna catches by purse-seine vessels, establishing as an objective that the annual catch of bigeye during the 2022-2024 period does not exceed 66,906 tons, value that corresponds to the average catch recorded for the period 2017-2019¹², defined as *status quo* conditions.

Resolution C-21-04 also establishes in its paragraphs 6 and 9 that the obligation to estimate the catch will fall on the flag CPCs of the vessel, as well as the data that could be used to produce the estimates, as follows (indicated in bold by the author):

*6. Starting 1 January 2022, each CPC shall strengthen the monitoring and control system for tuna catches through, among others, the utilization of on-board **observer data, logbooks, port sampling and information from tuna processing facilities**, to facilitate to the operators and captains the monitoring of their catches and a better compliance with the objectives of this Resolution.*

CPCs shall be responsible for the compilation and submission of the final data on the annual catches of bigeye tuna made by individual vessels flying their flag during the current year and such data shall be reported to the Secretariat no later than 15 February of the following year.

[...]

For 2023 and 2024, as soon as possible, after the conclusion of each trip, the IATTC staff will transmit to the flag CPC their best estimate of a vessel's catch for that trip, together with an accounting of the data and the methodology used to arrive at the estimate. The flag CPC will then determine the amount of bigeye catch that will be attributed to a vessel for a given trip per paragraph 9.

9. The CPCs will be responsible for estimating the catch of bigeye tuna of each vessel flying its flag at the end of each trip, to the extent that one or more data sources are available to the CPC in the days immediately after the conclusion of the trip and discharge (e.g., observer estimates, ship's log data, well sampling, cannery data). The duty to estimate the catch of the vessel will be the responsibility of the flag CPC.

Therefore, the adoption of this measure establishes new obligations for those IATTC Member and Cooperating Parties (CPC) that flag purse-seine vessels.

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¹¹ [Tuna Conservation 2022-2024 \(iattc.org\)](https://www.iattc.org)

¹² Paragraph 10: *In the event that the status quo conditions, as represented by the average annual catches of bigeye tuna during the three-year period 2017-2019 (66,906 t – Best Scientific Estimate [BSE]), are not offset by this measure, or taking into consideration the results of any new stock assessments for bigeye, the IATTC scientific staff shall propose to the Commission an update of its recommendations for these conservation measures, including, among others, an increase of the numbers of closure days.*

On the other hand, the IATTC Secretariat has requested those CPCs with a tuna processing industry to voluntarily provide the names of the processing companies¹³.

Purpose of the Document

This document presents the mechanism for data collection and catch estimation of tropical tuna, especially bigeye tuna, that CPC Members of OSPESCA with purse-seine vessels fishing for tropical tunas in the IATTC area have adopted to ensure full compliance with IATTC Resolution C-21-04.

The main objective is to present such mechanism to the IATTC Scientific Advisory Committee (SAC) and request the assistance of the IATTC Secretariat in formalizing a data exchange mechanism to provide IATTC CPC with all data required for its implementation.

The document contains three sections: the first to describe the types of records available for the estimation of tropical tuna catches, identify the available data and their origin; the second where the catch estimation mechanism adopted by OSPESCA is presented, and; the third to propose a data exchange protocol between the IATTC Secretariat and CPC, including minimum data requirements, and the timelines that are proposed for the exchange.

Types of information available from purse seine fisheries

This section reviews the information normally available and necessary to monitor catches of tropical tuna for the tropical purse seine, to obtain an estimate of the total catch by landing, trip and species and, finally, proceed to the estimate of annual catches of bigeye and other tropical tunas, by CPC, fishing year and species, in the IATTC Area.

The following points list the types of records and the details of the data collected, the entity or entities that collect the information, the usefulness of said information to estimate catches, and the flow of information:

- **Observer Program:** The IATTC International Dolphin Conservation Program (IDCP¹⁴) is regional in nature and its implementation is generally mixed, with 50% or more of the trips of each CPC covered by IATTC observers, and the rest by the national programs of each CPC (IATTC Resolution C-94-04¹⁵). The obligation to have observers onboard purse seiners apply to purse-seine vessels of capacity greater than 363 metric tons. Regardless of the type of program, the information collected is the same, including data on the daily activity of each purse-seine vessel, which is filled in by the observers¹⁶. The relevant data for the catch estimate are:
 - Name and identification of the Vessel,
 - Start and end days of the fishing trip,
 - Activity week (calendar year, determined by IATTC staff)
 - Information on each capture fishing set: Date (day and time), geographical position (latitude and longitude), type of set (dolphin, free-school or floating object), catch of tropical tuna, by species, also including the amount of discarded tuna, when applicable.

The forms completed by the observers are transmitted to the IATTC staff and, when appropriate, to the flag state at the end of each trip, in electronic format. On the other hand, the observers send **weekly reports** to the IATTC staff that include catch estimates of tropical tuna and other species for the purse seine fleet. Currently, the weekly reports are not transmitted in a disaggregated format, by vessel, to the flag state.

- **Logbooks:** Logbooks include data on the daily activity of each purse-seine vessel, which is completed by the captains of the vessels. The obligation to collect logbooks apply only to purse seiners of small size (up to 363 metric tons of fish carrying capacity), and to those trips that were not observed, for any reason (e.g., COVID19 or other causes). The relevant data for the catch estimate are:
 - Name and identification of the Vessel,

¹³ Message from the Acting Director of the IATTC dated February 14, 2022 (Ref. 0059-410)

¹⁴ [Agreement on the International Dolphin Conservation Program \(AIDCP\) | IATTC](#)

¹⁵ Resolution on the International Dolphin Conservation Program: *The Inter-American Tropical Tuna Commission (IATTC): [...] Agrees: To continue the current international observer program, including the requirement of placing an observer on each trip made in the EPO by purse-seine vessels of capacity greater than 363 metric tons and ensure that at least one-half of the observers assigned each year to each national fleet are IATTC observers;* ([BACKGROUND PAPER 3 \(iattc.org\)](#))

¹⁶ [Formularios | CIAT \(iattc.org\)](#)

- Start and End days of the fishing trip,
- Information on each fishing set and its catch: Date (day and time), geographical position (latitude and longitude), type of set (dolphin, free-school or floating object), catch of tropical tuna, by species.

Logbooks are transmitted to the IATTC and/or the flag state at the end of each trip, depending on the case, in electronic or paper format. However, logbooks may not be available for all vessels or fishing trips, for which the IATTC Scientific Staff provides estimates each year.

Although observer and logbook catch estimates are not accurate, referring mostly to eyeball estimates, this information is important to produce final estimates of retained catches and discards of tropical tunas, by RFMO region and calendar year. Thus, this information is essential to determine both the proportion of tropical tuna that was caught in the IATTC area and in the year in which the estimates are made, by fishing boat and species.

- **Unloading Manifests:** Unloading manifests (or landing declarations) detail the total quantities of tropical tuna unloaded in port at the end of each fishing trip and are completed by port surveyors. Unloading manifests apply only in cases where the fish is not fully landed to local canning factories, with part or the whole catch transported to other locations or countries. The relevant data for the catch estimate are:
 - Name and Identification of the Vessel,
 - Start and End days of the fishing trip
 - Type of unloading (total or partial)
 - Total catches landed by species and commercial category.

It is important to indicate that, as reflected in the type of unloading, there are landings in which the entire catch of the trip is not unloaded, remaining aboard, for various reasons. The information in unloading manifests is important to adjust the catches declared in the logbooks, since the tuna are weighed and classified at unloading, unlike the figures that are reflected in logbook and observer data, which refer to eyeball estimates. Unloading manifests are normally transmitted to the flag state at the end of each trip, in electronic or paper format, and are used by the flag state to issue **Catch Certificates**, where applicable.

- **Plant Vouchers and Sales Notes:** Plant vouchers and sale notes detail, respectively, the total quantities of tropical tuna processed and finally purchased by canneries or other tuna processing plants and are completed by designated personnel at each processing plant. While their format and denomination may vary depending on the plant, their content tend to be the same. The relevant data for the catch estimate are:
 - Name and identification of the Vessel,
 - Name of the processing plant,
 - Catch classification date,
 - Total catches classified by species and commercial category.

The main difference between plant vouchers and sale notes is that the former includes all tropical tunas handled in the plant, while the sale notes may only record the amounts finally acquired (purchased) by the plant, including its price. However, sale notes may in some cases also record the amounts of product that has been rejected. In any case, the objective is using the most complete information, to guarantee that all the retained catch unloaded is accounted for.

It is important to indicate that the catches unloaded in a fishing trip can be processed in different plants, therefore, at the end of each fishing trip there should be as many documents as there are plants involved in the processing of said catches. The information in such documents is essential to determine the final quantities of tropical tuna landed in each trip, by species, and to make the final adjustment of catches in the logbooks and catch certificates, where applicable. Plant vouchers and/or sales notes are normally transmitted to the flag state by the shipping company at the end of each fishing trip, in electronic or paper format, once all the tuna unloaded has been classified in the plant.

Both unloading manifests and, less frequently, plant vouchers/sale notes, may include some catch recorded as MIX, not classified by species. Those catches need to be broken by species and the amounts estimated for each species summed up to obtain the final estimates.

There are cases in which part of the catch from a purse-seine fishing trip is unloaded to one or more local plants, which produce plant vouchers/sales notes, and the remaining, recorded in the unloading manifest, is transhipped to one or more cargo freezers, transported to be processed in other countries. In those cases, first estimates of the catches landed refer to the sum of the amounts from local sale notes and the landing manifest, which may require updating once that sale notes are available from the plants in other countries that process the fish.

- **Port Inspection:** Port inspections are carried out by inspectors accredited by the flag state and/or inspectors accredited by the port state, as defined in Resolution C-21-07, recently adopted by the CIAT¹⁷. The information that is collected depends on the objective of the inspection. If the objective is to control catches during unloading, the inspectors monitor the unloading and verify the amounts recorded in unloading manifests, in addition to comparing this information with the catches declared by observers or in logbooks. The relevant data are:

- Name and identification of the Vessel,
- Start and end days of the inspection (coinciding with the unloading),
- Type of unload (full or partial),
- Total catches landed by species and commercial category.

If the information is recorded by flag state inspectors, this information has official value, so it should replace any other estimate. In the event that the information is collected by inspectors of the port state, the authority in that state must share the result of the inspection with the flag state authority, for verification and final validation, when appropriate.

- **Port Sampling Program:** This program is coordinated by the scientific staff of the IATTC, through its regional offices. For this, the samplers apply a procedure for the selection of fish wells in purse seiners during the unloading of the tuna and try to take a random sample of the tuna that is unloaded from said tanks. IATTC scientific staff use all sampling conducted to produce best scientific estimates of tropical tuna catch for the whole purse seine fishery, which are used for tropical tuna stock assessments. The relevant information for the catch estimate is:

- Name and identification of the Vessel,
- Start and end days of the unload,
- Sampling Day,
- Sampled tank(s) (the tank map of each purse seiner details the tank number and its position, to facilitate its identification), and weight of the tuna contained in each tank, by set and type of set,
- Total specimens sampled, by species (fish is sampled for length),
- Average weight per species and procedures used for length-weight conversion (detail of the equations or conversion keys used)
- Estimated weight per species.

Sampling data should not be used to raise estimates of catch per vessel trip, because those estimates would be uncertain, depending on the number of samples, sampled weight, and potential sources of bias (e.g., length-weight equations, measuring tools, sampler, etc.). Therefore, sampling information is of limited value in terms of compliance monitoring, since it refers to catch estimates, subject to bias and variability, depending on various factors. However, this information is important to assess how estimates from sampling may differ from data coming from other sources, and to assist in estimates of catches reported in aggregated manner in unloading manifests or sale slips. Port sampling data is computerized at regional offices and accessible by IATTC scientific staff. Currently, this information is not transmitted to the flag state.

- **Best Scientific Catch Estimates:** The IATTC scientific staff uses information from observers, logbooks, canneries, and port sampling to produce best estimates of tropical tuna catch each year, by species and fishing mode. This estimate is made using an algorithm¹⁸. The relevant information for the catch estimate is:

- Name and identification of the Vessel,
- Calendar year,
- Number of trips sampled, number of samples in each trip, sampled number and weight,
- Total unloaded weight for the period under consideration,

¹⁷ Resolution for an IATTC Scheme for Minimum Standards for Inspection in Port ([Port State measures \(iattc.org\)](#))

¹⁸ [Special Report 18](#). An Evaluation of the Area Stratification used for Sampling Tunas in the Eastern Pacific Ocean and Implications for Estimating Total Annual Catches

[DOCUMENT WSBET-02-06](#). Summary of Purse-Seine Data Available for Bigeye Tuna in the Eastern Pacific Ocean

[Stock Assessment Report 2](#), Page 339. Progress on sampling the eastern Pacific Ocean tuna catch for species composition and length-frequency distributions ([Microsoft Word - SAR2, cover.doc \(iattc.org\)](#))

[Stock Assessment Report 4](#), Page 325. Sampling the tuna catches of the eastern Pacific Ocean for species composition and Length-Frequency Distributions (https://www.iattc.org/GetAttachment/5bc36019-ee7-4685-a1fc-c8c35d930ff6/No-4-2004_Status-of-the-tuna-and-billfish-stocks-in-2002.pdf)

- Estimated weight by species and confidence intervals/precision of the estimate (overall and by vessel or landing)

As indicated, the best scientific estimates of catch are valid as estimates of catch by species for tuna stock assessments, but not as catches by boat or trip, because they are subject to variability, depending on several factors (intensity of sampling, bias and precision in particular). However, this information can be useful to assess the type of deviations that occur between the best scientific estimate of catch and the final catches estimated. The best scientific catch estimates produced by the IATTC scientific staff are presented in aggregated mode, by year and species. Currently, this information is not transmitted to the flag state in a disaggregated format, by vessel, species, calendar year, and landing.

Although the data records referred to in the previous points reflect the maximum number of catch records that can be generated at the end of a fishing trip, the number of records produced is subject to the type of operation, particularly

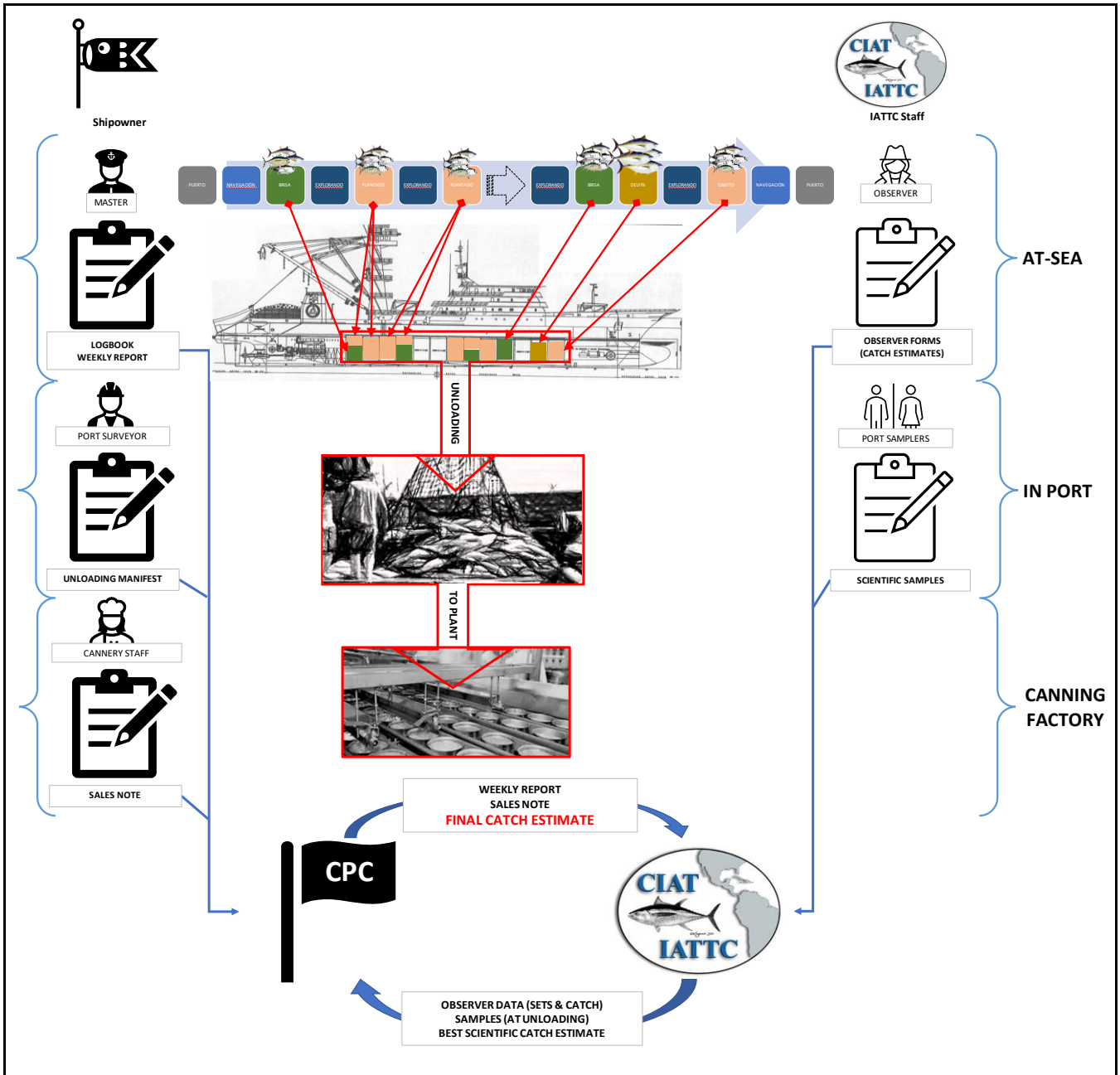


Figure 1. Flowchart detailing the information that is collected regarding the catches of each trip of a purse seiner in the IATTC area, the type of record and its source, which authority receives the information in the first instance and the flow of information required to allow for the final estimation of catches by the member countries (CPC) of OSPESCA (for additional information see the previous section).

TABLE 1 RETAINED CATCHES OF TROPICAL TUNAS		RETAINED CATCHES: OBSERVER / LOGBOOK DATA									
		IATTC			WCPFC			TOTAL			
		YFT	BET	SKJ	YFT	BET	SKJ	YFT	BET	SKJ	TOTAL
EXAMPLES FOR ILLUSTRATION	ΣC_{2021}	16	53	140				136	140	1319	1595
	Trip 1 ΣC_{2022}	120	87	1179							
	Trip 2 ΣC_{2022}	7	10	102	32	57	790	39	67	892	998
	Trip 3 ΣC_{2022}				78	119	1029	78	119	1029	1226
	Trip 4 ΣC_{2022}	3	7	49	82	16	740	85	23	789	897
	Trip 5 ΣC_{2022}	87	132	1237				87	132	1237	1456
	Trip 6 ΣC_{2022}	52	90	982				52	90	982	1124
	Trip 7 ΣC_{2022}	156	230	1154				156	230	1154	1540
	Trip 8 ΣC_{2022}	43	78	527	14	62	470	60	147	1042	1249
ΣC_{2023}				3	7	45					
TOTAL ΣC_{2022}	468	634	5230	206	254	3029	557	808	7125	8490	

TABLE 3 TOTAL CATCHES UNLOADED		RETAINED CATCHES: UNLOADING MANIFEST / SALES NOTE				
		YFT	BET	SKJ	TOTAL	MIX
		ΣC_{2021}	138	162	1322	1622
Trip 1 ΣC_{2022}						
Trip 2 ΣC_{2022}	31	75	942	1048	3	
Trip 3 ΣC_{2022}	66	105	1068	1239	20	
Trip 4 ΣC_{2022}	76	29	802	907	16	
Trip 5 ΣC_{2022}	98	119	1343	1560	2	
Trip 6 ΣC_{2022}	44	91	1016	1151	0	
Trip 7 ΣC_{2022}	149	219	1261	1629	5	
Trip 8 ΣC_{2022}	61	164	1101	1326	46	
ΣC_{2023}						

TABLE 4 SPECIES COMPOSITION		PORT SAMPLING: COMPOSITION OF MIX (Prop.)							
		IATTC				WCPFC			
		YFT	BET	SKJ	OTH	YFT	BET	SKJ	OTH
ΣC_{2021}	0.20	0.05	0.50	0.25					
Trip 1 ΣC_{2022}	0.10	0.10	0.40	0.40					
Trip 2 ΣC_{2022}	0.00	0.10	0.70	0.10	0.00	0.30	0.20	0.50	
Trip 3 ΣC_{2022}					0.20	0.10	0.30	0.40	
Trip 4 ΣC_{2022}	0.00	0.00	0.80	0.20	0.10	0.30	0.40	0.20	
Trip 5 ΣC_{2022}	0.10	0.60	0.30	0.00					
Trip 6 ΣC_{2022}									
Trip 7 ΣC_{2022}	0.00	0.00	0.00	1.00					
Trip 8 ΣC_{2022}	0.20	0.08	0.40	0.32	0.05	0.15	0.40	0.40	
ΣC_{2023}					0.00	0.00	0.90	0.10	

TABLE 5 FINAL ESTIMATE RETAINED CATCH		RETAINED CATCHES: FINAL ESTIMATE										TOTAL + OTHER
		IATTC				WCPFC				TOTAL	TOTAL	
		YFT	BET	SKJ	TOTAL	YFT	BET	SKJ	TOTAL			
ΣRC_{2021}	16.4	61.4	140.6	218.4	0.0	0.0	0.0	0.0	218.4	218.5		
Trip 1 ΣRC_{2022}	122.2	101.1	1183.4	1406.7	0.0	0.0	0.0	0.0	1406.7	1408.5		
Trip 2 ΣRC_{2022}	5.6	11.2	108.0	124.8	25.4	64.6	834.8	924.8	1049.6	1051.0		
Trip 3 ΣRC_{2022}	0.0	0.0	0.0	0.0	70.0	107.0	1074.0	1251.0	1251.0	1259.0		
Trip 4 ΣRC_{2022}	2.7	8.8	50.6	62.2	74.8	24.7	758.2	857.6	919.8	923.0		
Trip 5 ΣRC_{2022}	98.2	120.2	1343.6	1562.0	0.0	0.0	0.0	0.0	1562.0	1562.0		
Trip 6 ΣRC_{2022}	44.0	91.0	1016.0	1151.0	0.0	0.0	0.0	0.0	1151.0	1151.0		
Trip 7 ΣRC_{2022}	149.0	219.0	1261.0	1629.0	0.0	0.0	0.0	0.0	1629.0	1634.0		
Trip 8 ΣRC_{2022}	48.5	88.9	566.4	703.8	15.2	72.2	504.7	592.1	1295.9	1311.6		
ΣRC_{2023}	0.0	0.0	0.0	0.0	3.1	7.8	49.4	60.2	60.2	60.4		
TOTAL ΣC_{2022}	470.1	640.3	5529.0	6639.4	185.5	268.4	3171.6	3625.6	10265.02			

TABLE 2 DISCARDS OF TROPICAL TUNAS		DISCARDS: OBSERVER / LOGBOOK DATA									
		IATTC			WCPFC			TOTAL			
		YFT	BET	SKJ	YFT	BET	SKJ	YFT	BET	SKJ	TOTAL
EXAMPLES FOR ILLUSTRATION	ΣD_{2021}	0	0	3				0	0	3	3.0
	Trip 1 ΣD_{2022}	1	2	10				1	2	10	13
	Trip 2 ΣD_{2022}	0	0	0	0	0	0	0	0	0	0
	Trip 3 ΣD_{2022}				0	0	0	0	0	0	0
	Trip 4 ΣD_{2022}	0	0	0	2	1	6	2	1	6	9
	Trip 5 ΣD_{2022}	1	3	7				1	3	7	11
	Trip 6 ΣD_{2022}	0	0	0				0	0	0	0
	Trip 7 ΣD_{2022}	2	4	16				2	4	16	22
	Trip 8 ΣD_{2022}	0	0	0	0	0	0	0	0	0	0
ΣD_{2023}				1	0	0	1	0	0	1.0	
TOTAL ΣD_{2022}	4	9	33	2	1	6	6	10	39	59	

TABLE 6 FINAL CATCH (RETAINED + DISCARDS)		FINAL CATCH ESTIMATE*									
		IATTC				WCPFC				TOTAL	
		YFT	BET	SKJ	TOTAL	YFT	BET	SKJ	TOTAL		
ΣTC_{2021}	16.4	61.4	143.6	221.4	0.0	0.0	0.0	0.0	221.4		
Trip 1 ΣTC_{2022}	123.2	103.1	1193.4	1419.7	0.0	0.0	0.0	0.0	1419.7		
Trip 2 ΣTC_{2022}	5.6	11.2	108.0	124.8	25.4	64.6	834.8	924.8	1049.6		
Trip 3 ΣTC_{2022}	0.0	0.0	0.0	0.0	70.0	107.0	1074.0	1251.0	1251.0		
Trip 4 ΣTC_{2022}	2.7	8.8	50.6	62.2	76.8	25.7	764.2	866.6	928.8		
Trip 5 ΣTC_{2022}	99.2	123.2	1350.6	1573.0	0.0	0.0	0.0	0.0	1573.0		
Trip 6 ΣTC_{2022}	44.0	91.0	1016.0	1151.0	0.0	0.0	0.0	0.0	1151.0		
Trip 7 ΣTC_{2022}	151.0	223.0	1277.0	1651.0	0.0	0.0	0.0	0.0	1651.0		
Trip 8 ΣTC_{2022}	48.5	88.9	566.4	703.8	15.2	72.2	504.7	592.1	1295.9		
ΣTC_{2023}	0.0	0.0	0.0	0.0	4.1	7.8	49.4	61.2	61.2		
TOTAL ΣTC_{2022}	474.1	649.3	5562.0	6685.4	187.5	269.4	3177.6	3634.6	10320.0		

Figure 2. Mechanism adopted by the members of OSPESCA to estimate catch per trip for purse-seine vessels in the IATTC area (simplified).

Top panel: Illustrative example summarizing the **catch information** available for each trip of a hypothetical purse-seine vessel active in the IATTC area during the year 2022.

Retained catches observed (TABLE 1): The information in this table shows the catch summary of the trips of the vessel with fishing during the year 2022, as recorded by observers and/or vessel skippers (**Figure 1**). This includes two overlapping trips, one between 2021 and 2022, and another between 2022 and 2023, and also trips with fishing in the IATTC and/or WCPFC area. The summary of catches is presented according to the year and the fishing area, since this information is important for the purposes of the final estimate of catches.

Discards (TABLE 2): This table shows a summary of discards of tropical tunas at-sea, as recorded by observers or, less frequently, fishing logbooks (**Figure 1**). Discards are rarely reported in logbooks and therefore may need to be estimated.

Catches Unloaded (TABLE 3): This table shows a summary of the catches landed in port at the end of each trip, according to sales notes and/or unloading manifests, recorded by cannery staff and/or port surveyors, respectively (**Figure 1**). The case presented is generic. There are cases in which the catches unloaded are available by RFMO area; in those cases the final catch should be estimated independently for each RFMO area.

Species Composition of MIX category (TABLE 4): This table summarizes the contribution of each species of tropical tunas, and other species, to the total in the MIX category (proportions), which are estimated using the samples available for the area, period, and size class concerned.

Final Estimates of Retained Catches (TABLE 5) and Final Catch Estimates (TABLE 6): Table 5 shows the final estimates of retained catches, for which information in the Tables 1, 3, and 4 are used, and final estimates of catch, for which information in Tables 2 and Table 5 are used (see text for further details).

EXAMPLES FOR ILLUSTRATION

the type of vessel and the type of unloading. For example, in cases where the entire tuna catch is unloaded to a canning factory at the port of landing, the classification of the tuna unloaded is done by cannery personnel, and the final catches are obtained from such data (there is no Unloading Manifest *per se*). On the contrary, in cases in which the catch at the end of the trip is transhipped in port to one or more refrigerated merchant ships destined for other countries, both the unloading manifest and the sales notes are produced. Similarly, in the case of Class VI purse-seine vessels, which are subject to 100% observer coverage, the observer estimates the catches by species for each set, so some captains do not complete logbooks.

Mechanism for Monitoring and Estimating Catches of Tropical Tuna

This section presents the route that OSPESCA members have adopted for monitoring and estimating tropical tuna catches in the IATTC Convention Area. **Figure 1** includes a Flow Chart where the catch monitoring and estimation scheme is presented and **Figure 2** shows, through an example, how the information collected is used to obtain the final estimates of catch. More details about the methodology adopted by the OSPESCA Members is presented in **Box 1**.

BOX 1: Example of estimate of catches of Yellowfin Tuna (YFT) Trip 1 using the methodology adopted by the Members of OSPESCA (catches reported in 2022 in the IATTC Area)

Estimates use the figures in cells highlighted in yellow and orange in **Figure 2**

Step 1 (Table 1): Obtaining total retained catches of yellowfin tuna corresponding to the first fishing trip of 2022, which include catches of YFT in 2021 and 2022 (figures obtained from observer data or, in lack of it, the fishing logbook)

The total catches of YFT reported amount to 136 tons, with **120 tons caught in 2022 in the IATTC Area**.

Step 2 (Table 2): Obtaining the total discards of yellowfin tuna reported by observers (or in fishing logbooks, where available)

The total discards of YFT reported amount to 1 ton, **caught in the IATTC Area in 2022**.

Step 3 (Table 3): Obtaining the total catches of yellowfin tuna unloaded at the end of the first trip from Sales Note[s] ([landing manifest[s]])

The total catches of YFT unloaded amount to **138 tons** (this amount refers to both catches in 2021 and 2022, which cannot be broken by year or RFMO area), plus the catches of YFT that may be contained in the MIX category, which refers to various species (**5 tons** in all).

Step 4 (Table 4): Obtaining the species composition from the samples available for fish in the MIX category

The available samples are broken according to the size class of the MIX category, and then the species composition of the fish within that category estimated. The resulting proportions are shown in Table 4 (**YFT represented 10% of the MIX in 2022 in the IATTC Area**).

Step 5 (Table 5): Estimating total retained catches of yellowfin tuna in the IATTC Area from the first trip of 2022 (excluding catches in 2021)

This includes raising the catches of YFT in T1 to the totals landed recorded in T2, and adding the amount of YFT estimated as part of the MIX category, using the available samples:

$$\Sigma RCT_{2022} = (120 * 138 / 136) + ((5 * 0.10 * (120 + 87 + 1179) / 1595)) = 122.2 \text{ tons IATTC Area}$$

The first component of the formula is used to scale the amount of YFT reported by observers (**120**) to the amount in sales notes, assigning it proportionally to the year and area for which the catches need to be estimated (catches of YFT made in 2022 during the trip 1 of 2022, in the IATTC Area; **the scaling factor is 138/136 = 1.015**). Then, **120 * 1.015 = 121.8**

The second component of the equation is used to estimate the amount of YFT within the MIX category, using the total catches recorded in such category (**5 tons**), the proportion of YFT in the MIX estimated from samples (**0.10**), and the amount of the estimated YFT that refers to the trip, year, and area concerned; i.e., the amount resulting (**5 * 0.10 = 0.5**) is multiplied by the proportion that tropical tunas made in the trip, year and area concerned (**0.5*(120 + 87 + 1179) / 1595 = 0.43**)

The final retained catch of YFT in 2022 for the first trip in the IATTC Area is: **121.8 + 0.43 = 122.2**

Step 6 (T6): Estimating the final catches of yellowfin tuna in the IATTC Area from the first trip of 2022 (excluding catches in 2021)

The final catches of YFT are estimated adding up the estimated retained catches (**122.2**) to the discards reported (**1 ton**): **122.2 + 1 = 123.2 metric tons**.

The methodology presented in **Box 1** is comprehensive in which it accounts for all the catches of tropical tunas. However, it is not clear if the final estimates of catch of bigeye tuna should account for the amounts discarded, as it is not known if discards were accounted for to set the original catch thresholds for IATTC purse seiners (from 1200 metric tons up).

Data exchange mechanism proposed by the IATTC Members of OSPESCA

The following is necessary to implement the mechanism that has been adopted by OSPESCA:

1. Establish protocols for the exchange of information between the IATTC Secretariat and the OSPESCA IATTC members, in particular:
 - i. Data to be provided by the IATTC Secretariat: Estimates of retained catch and discards from IATTC observers and data from port sampling at the end of each fishing trip. And best scientific estimates of catch obtained by the IATTC scientific staff for the fishing trip concerned¹⁹, as soon as possible, including the precision of such estimates.
 - ii. Data to be provided by the OSPESCA members: Logbooks for trips not covered by observers and Sale Notes issued from processing plants corresponding to the catches unloaded, at the end of each fishing trip²⁰. Final estimates of catch of bigeye tuna, per purse seiner and year, at the end of each year. All as per the timelines specified in IATTC Resolution C-21-04²¹, where possible.
2. Consolidate the processes and mechanisms that have been adopted by the OSPESCA members to allow for the timely monitoring of tuna catches and respond to the new obligations that fall on IATTC member countries, including:
 - i. Short-term: Timely exchange of information with the IATTC Secretariat to implement, in an ad-hoc manner, the protocols adopted by OSPESCA to produce estimates of catch of bigeye tuna for each purse-seine trip, per RFMO Area and year.
 - ii. Medium-term: Strengthening data collection, management and reporting protocols, through the implementation of a regional fishery information system at the OSPESCA Secretariat, to integrate all available information. OSPESCA has initiated work for the implementation of a web-based tool for the monitoring of catches by its members, to be finalized by 2026.

It is Recommended that the IATTC formalizes data exchange formats and protocols to allow for the timely monitoring of the catches of bigeye tuna by IATTC Members and Cooperating Countries, in line with provisions in IATTC Resolution C-21-04.

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¹⁹ Paragraph 6, 4th subparagraph. *For 2023 and 2024, as soon as possible, after the conclusion of each trip, the IATTC staff will transmit to the flag CPC their best estimate of a vessel's catch for that trip, together with an accounting of the data and the methodology used to arrive at the estimate. [...]*

²⁰ Paragraph 8. *CPCs shall ensure that the processing plants data for vessels flying their flags for any fish caught in the IATTC Convention Area be provided to its fisheries authorities in real time (i.e., within 10 days from the first day of unloading until the last day of grading by size), with copy to the IATTC staff.*

²¹ Paragraph 6, 2nd subparagraph. *CPCs shall be responsible for the compilation and submission of the final data on the annual catches of bigeye tuna made by individual vessels flying their flag during the current year and such data shall be reported to the Secretary no later than 15 February of the following year.*

Paragraph 6, 4th subparagraph. *[...] The flag CPC will then determine the amount of bigeye catch that will be attributed to a vessel for a given trip per paragraph 9.*

The IATTC Secretariat will then release the list of vessels that must observe additional closure days, as estimated by the CPC (Paragraph 5, 4th subparagraph. *The IATTC Secretariat shall send to the CPCs by 1 March 2023 and 2024 the names of the vessels that must observe additional closure days in accordance with this paragraph.*)