



GUIDELINES FOR THE PREPARATION OF NATIONAL REPORTS TO THE IOTC SCIENTIFIC COMMITTEE IN 2022

The National Report is due to be submitted no later than 15 days prior to the start of the annual regular session of the Scientific Committee.

DEADLINE: 20 NOVEMBER 2022

Purpose: To provide relevant information to the Scientific Committee on fishing activities of Contracting Parties and Cooperating Non-Contracting Parties operating in the IOTC area of competence. The report should include all fishing activities for species under the IOTC mandate as well as sharks and other byproduct/ bycatch species as required by the IOTC Agreement and decisions by the Commission.

NOTE: The submission of a National Report is **Mandatory**, irrespective if a CPC intends on attending the annual meeting of the Scientific Committee.

Explanatory note

This report is intended to provide a summary of the main features of the tuna and billfish fisheries for Contracting Parties and Cooperating Non-Contracting Parties. As such, it does not replace the need for submission of data according to Resolution 15/02 *Mandatory statistical reporting requirements for IOTC Contracting Parties and Cooperating Non-Contracting Parties (CPCs)*

Mandatory versus Desirable information

National Reports must include all headings as noted in the template below as [Mandatory]. Where data/information is not available for a given [Mandatory] heading, the reason why it is not available should be clearly stated. These mandatory fields for the *National Reports* were agreed to by the Scientific Committee in 2010.

Where available, CPCs are encouraged to provide additional information under the headings shown as [Desirable].

For clarification on minimum reporting requirements for the National Report, please contact the IOTC Secretariat (IOTC-Secretariat@fao.org).

NOTE

Please use the template below when preparing your National Report. Simply delete this explanatory page and add your own cover page/preliminaries if needed.

Please also delete any text shown in **red** below before submitting your National Report.

EU.SPAIN National Report to the Scientific Committee of the Indian Ocean Tuna Commission, 2022

IEO¹ & SGP²

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INFORMATION ON FISHERIES, RESEARCH AND STATISTICS

<p>In accordance with IOTC Resolution 15/02, final scientific data for the previous year was provided to the IOTC Secretariat by 30 June of the current year, for all fleets other than longline [e.g. for a National Report submitted to the IOTC Secretariat in 2022, final data for the 2021 calendar year must be provided to the Secretariat by 30 June 2022)</p>	<p>YES</p> <p>[07/10/2022] to the SGP (Spanish Fisheries Secretariat), for its transmission [15/10/2022] to the IOTC</p>
<p>In accordance with IOTC Resolution 15/02, provisional longline data for the previous year was provided to the IOTC Secretariat by 30 June of the current year [e.g. for a National Report submitted to the IOTC Secretariat in 2022, preliminary data for the 2021 calendar year was provided to the IOTC Secretariat by 30 June 2022).</p> <p>REMINDER: Final longline data for the previous year is due to the IOTC Secretariat by 30 Dec of the current year [e.g. for a National Report submitted to the IOTC Secretariat in 2022, final data for the 2021 calendar year must be provided to the Secretariat by 30 December 2022).</p>	<p>YES</p> <p>[07/10/2022] to the SGP (Spanish Fisheries Secretariat), for its transmission [15/10/2022] to the IOTC</p>
<p>If no, please indicate the reason(s) and intended actions:</p>	



Executive Summary [Mandatory]

UE-Spain

Executive Summary

In 2021, the Spanish fleets that have performed fishing activities in the IOTC area of competence were:

1. Surface longline fisheries comprised of 8 active vessels (with an average of 31 meters in length, 172 of TRB & 623 of CV) based in Durban port (South Africa). The total catch of swordfish rose to 1491,68 tons with total effort of 2086,803 thousand hooks. The swordfish (*SWO-Xiphias gladius*) catch represents a 36% of the catch, the sharks a 61% and the contribution of tunas (YFT-*Thunnus albacares*, BET-*Thunnus obesus* & ALB-*Thunnus alalunga*) rose to a 2%. Billfishes and other fish species are a minority (less than 1% of the catch each one). The scientific observer program of the General Fisheries Secretariat launched in 2017 and the program resumed by IEO.CSIC, covered together 151605 hooks.
2. Tropical purse seiner fisheries consisted of 15 active vessels (14 from May to October) based mainly in Victoria port (Seychelles). Taking into account two movements of the Spanish fleet in 2021, the carrying capacity has decreased by 1%, which supposes more than 1300 t. Twelve of these vessels range in capacities from 1200 m³ to 2000 m³, and 3 of them exceeded 2000 m³. In 2021, 5 supply vessels supported this fleet activity. The total catch landed for the three target species (29% YFT, 10% BET and 61% SKJ-*Katsuwonus pelamis*) amounted to approximately 154700 tons (a 7% more than in 2020) with a total effort of 3182 days, performing 4289 sets (77% on log schools and 23% on free-swimming schools). The whole fleet has deployed 3503 FADs (Fishing Aggregating Devices). The observers programs on board covered a 23,7% of the total sets vs. 14% in 2020.

The performance of the 2021 fishing trips has been driven by three underlying events:

- 1) Order APA/25/2021, which regulates the exercise of tropical tuna fishing under the Spanish flag, during the 2021 campaign in the Indian Ocean (Official Spanish State Bulletin "BOE" No. 18, of January 21st, 2021).
- 2) COVID19 global pandemic.
- 3) Fuel price increase. As the world learned how to accommodate safety measures put in place to combat the spread of Covid-19, energy demands rose in 2021, causing prices to increase across the globe.

Contents:

1. BACKGROUND/GENERAL FISHERY INFORMATION

1.1 PURSE SEINE

1.2 LONGLINE

2. FLEET STRUCTURE

2.1 PURSE SEINE

2.2 LONGLINE

3. CATCH AND EFFORT (BY SPECIES AND GEAR)

3.1 PURSE SEINE

3.2 LONGLINE

4. RECREATIONAL FISHERY

5. ECOSYSTEMS AND BYCATCH ISSUES

5.1 SHARKS

5.1.1. NPOA SHARKS

5.1.2. SHARK FINNING REGULATION

5.1.3. BLUE SHARK

5.2 SEABIRDS

5.3 MARINE TURTLES

5.4 OTHER ECOLOGICALLY RELATED SPECIES (E.G. MARINE MAMMALS, WHALE SHARKS)



6. NATIONAL DATA COLLECTION AND PROCESSING SYSTEMS

6.1 LOGSHEET DATA COLLECTION AND VERIFICATION

6.2 VESSEL MONITORING SYSTEM

6.3 OBSERVER SCHEME

6.4 PORT SAMPLING PROGRAMME

6.5 UNLOADING/TRANSHIPMENT OF FLAG VESSELS

6.6 ACTIONS TAKEN TO MONITOR CATCHES & MANAGE FISHERIES FOR STRIPED MARLIN, BLACK MARLIN, BLUE MARLIN AND INDO-PACIFIC SAILFISH

6.7 GILLNET OBSERVER COVERAGE AND MONITORING

6.8 SAMPLING PLANS FOR MOBULID RAYS

7. NATIONAL RESEARCH PROGRAMS

7.1 NATIONAL RESEARCH PROGRAMS ON BLUE SHARK

7.2 NATIONAL RESEARCH PROGRAMS ON STRIPED MARLIN, BLACK MARLIN, BLUE MARLIN AND INDO-PACIFIC SAILFISH

7.3 NATIONAL RESEARCH PROGRAMS ON SHARKS

7.4 NATIONAL RESEARCH PROGRAMS ON OCEANIC WHITETIP SHARKS

7.5 NATIONAL RESEARCH PROGRAMS ON MARINE TURTLES

7.6 NATIONAL RESEARCH PROGRAMS ON THRESHER SHARKS

8. IMPLEMENTATION OF THE SCIENTIFIC COMMITTEE RECOMMENDATIONS AND RESOLUTIONS OF THE IOTC RELEVANT TO THE SC.

9. LITERATURE CITED

1. BACKGROUND/GENERAL FISHERY INFORMATION

1.1 Purse Seine

Considering two new movements of the Spanish purse seine fleet in 2021, currently 15 Spanish tuna purse seiner vessels operated in the area (14 from May to October). The carrying capacity has decreased by 1% owing to these recent movements, which supposes more than 1300 t. The average catches of the previous five years 2016-2020 (approximately 162 thousand tons) was about 5% more than the catches during the 2021 campaign. This decrease in the catches is mainly comprised by skipjack tuna (*SKJ-Katsuwonus pelamis*). On the other hand, due to the regulations of tropical tuna fishing under the Spanish flag, the fuel price and the global pandemic, the purse seine fleet stopped during some days of the year.

With a fishing effort of 3281 days, this fleet has performed a 77% of the sets on log schools, surrounding with a net of approximately 1500 m long and 250 m depth the FAD and the associated tuna school, mainly composed by SKJ, YFT and BET. The rest of the sets were targeting free-swimming schools of tropical tunas. In 2021, most of the sets were concentrated from 50° to 70° East and northwards next to the equator line, particularly for the free school sets.

All the catches are frozen or deep-frozen on board and the landings are followed at port by sampling teams coordinated by research centres.

1.2 Longline

In the year 1993 commenced prospecting the Spanish longline fishery targeting swordfish in international waters of the Indian Ocean areas. A total of 8 longline units have been operating in the Indian Ocean during the year 2021. None of them moved to the Pacific or Atlantic oceans as in previous years.

2. FLEET STRUCTURE

2.1 Purse Seine

Table 1 shows the number of Spanish purse seiners fishing in the Indian Ocean in the period 2008-2021. During 2019, a new vessel has been incorporated into the Spanish freezer purse seine fleet, increasing the carrying capacity by more than 2400 t, and for 2021 two more movements has decreased a 1% the carrying capacity.

2.2 Longline

Table 1 shows the number of Spanish longliners fishing in the Indian Ocean during the period 2008-2021. Since the year 2000 the fleet replaced the traditional Spanish longline type by the American style, which uses an average of around 1200 hooks per set -a smaller number than in the traditional longline- although slightly higher than in the Florida style longline gear.

Table 1: Number of Spanish purse seiners and surface longliners operating in the IOTC area of competence during the period 2008-2021, by gear type (purse seine & longline) and categories (C.Cap.- carrying capacity in m³). Data of previous years have been already reported.

Year/Class	PURSE SEINE									LONGLINE
	50-400	401-600	601-800	801-1200	1201-2000	>2000	total	# Supply vessels	C.Cap.	# SHIPS
2008	0	0	0	3	10	4	17	11	24212	19
2009	0	0	0	2	9	4	15	11	20805	15
2010	0	0	0	1	8	4	13	6	20677	12
2011	0	0	0	1	8	4	13	7	20458	14
2012	0	0	0	1	9	4	14	6	21657	18
2013	0	0	0	1	9	4	14	4	22056	22
2014	0	0	0	2	9	4	15	7	20761	21
2015	0	0	0	1	11	5	17	10	23251	18
2016	0	0	0	0	10	4	14	11	23507	13
2017	0	0	0	0	10	4	14	10	22811	14
2018	0	0	0	0	10	4	14	6	22811	11
2019	0	0	0	0	10	5	15	6	24061	11
2020	0	0	0	0	10	5	15	5	24061	11
2021	0	0	0	0	12	3	15	5	22716	8

3. CATCH AND EFFORT (BY SPECIES AND GEAR) [Mandatory]

3.1 Purse Seine

The number of associated school sets (FADs and logs) has increased steadily from the early period (1984–1990), with a 31.9% of the sets focusing on associated schools, to around 76% of the sets in the recent years (2008–2017 period). A maximum peak was recorded in 2018 (96%) (Báez et al. 2020¹), and an 83% in 2019. During the 2021 the number was 3288 sets, going again to 76% of the total sets performed by the fleet vs. a 90% in 2020.

The fishing effort measured both in fishing days and in searching days was the lowest of the historical series in 2021 (Table 2.a), and the number of sets was also slightly lower than in previous years (4419 sets in average for the period 2010-2020 vs. 4289 sets recorded during the 2021 year). Therefore, in a short space-time period the number of sets has decreased.

Since 2017, the Indian Ocean yellowfin tuna (YFT-*Thunnus albacares*) stock has been subject to an interim Rebuilding Plan (IOTC Resolution 21/01 at present for the EU). During 2021 the General Secretariat for Fisheries (SGP) adopted Individual Vessel Quotas, for the total tropical tuna (Order APA/25/2021; <https://www.boe.es/buscar/act.php?id=BOE-A-2021-885>), according the quotas from Supplementary Table SS1.

Supplementary Table SS1: 2021 total tropical tuna quotas per authorized purse seiner vessel, according to Order APA/25/2021. Key: Spanish purse seiner name, Name of the vessel; GT, Gross Tons; Upper catch limit for YFT (in %); Tropical tuna upper catch limit (in kg).

Spanish purse seiner name	GT	YFT upper catch limit (%)
ALAKRANA	3.716	8,908351
ALBACAN	2.347	5,577146
ALBACORA CUATRO	2.082	5,995828
ALBACORA UNO	3.584	3,342036
ALBATÚN DOS	4.406	8,512197
ALBATÚN TRES	4.406	3,793354
ATERPE ALAI	2.789	5,144659
DONIENE	6.674	5,755224
ELAI ALAI	2.217	4,887882
ITSAS TXORI	2.994	4,637273
IZURDÍA	4.089	7,933852
PLAYA DE RIS	2.591	2,587639
PLAYA DE ARITZATXU	2.458	4,374856
PLAYA DE NOJA	1.259	2,848669
TXORI ARGÍ	4.134	9,505596
TXORI ZURI	3.671	7,680655
TXORI GORRI	2.937	7,514783

By species, 94165,29 tonnes have been caught of SKJ, 44346,81 tonnes have been caught of YFT, and 16190,28 tonnes have been caught of BET (bigeye -*Thunnus obesus*) (Table 2.a). Taking into account these three main tropical tuna species, the SKJ catch is the value that has decreased the most in the recent years. Thus the 5-year average SKJ catches between 2016 and 2020 was 103183 tons versus 94165,29 in 2021. Since 1984, the maximum catches of SKJ were recorded, by order, in 2018 and 2019. In 2021 have been recorded the sixth maximum data, and in 2020 the eight. Namely, in the last 10 years, there have been 5 new historical highs since 2017.

¹ BÁEZ, J.C., M^a.L. RAMOS, M- HERRERA, H. MURUA, J.L. CORT, S. DENIZ, V. ROJO, J. RUIZ, P.J. PASCUAL-ALAYÓN, A. MUNIATEGI, A. PEREZ SAN JUAN, J. ARIZ, F. FERNÁNDEZ & F. ABASCAL (2020). Monitoring of Spanish flagged purse seine fishery targeting tropical tuna in the Indian ocean: Timeline and history. *Marine Policy*, 119: 104094. <https://doi.org/10.1016/j.marpol.2020.104094>

The figure 1.a displays the historical quantity of the catch by main tropical species and the effort (in searching days), showing an increase trend in the last two years. The figure 2.ai gives the spatial distribution of the effort (in fishing days) in 2021, taking into account the quarter and the fishing mode. Figure 2.bi shows this distribution by 1°x1° squares, representing the average in 2017-2021. The figures 3.a (i to iii) display the distribution of catches by main tropical species in 2021, per quarter and fishing mode.

The figures 3.b. (i to iii) represent in maps the distribution of average catches by species in 5°x5° squares in 2017-2021.

3.2 Longline

Figure 1.b shows the historical annual swordfish (SWO - *Xiphias gladius*) trend of catches of the Spanish longline fleet in the IOTC area of competence since the fishery began its exploration in this ocean in September of 1993. Since 2014 to present a global continuous decrease trend is observed.

All the species caught are dressed, frozen and stowed on board. Table 2.b gives the total yearly catches of swordfish by year, in number of fish and in kg of round weight (RW) as well as the nominal fishing effort (thousands of hooks) for the 2008-2021 period (see Figure 1.c). Figure 2.a.ii shows the distribution of the nominal effort in 2021.

A total of 1492 t of swordfish (round weight) were caught during 2021 and the overall nominal catch rate was 714,8 kg (round weight) per thousand hooks. The distribution of the nominal fishing effort (in thousands of hooks in sets), in 5°x5° squares is shown in figure 2.bii.

During the year 2021 a total of 2087 thousand hooks were deployed by 8 longliners. The distribution of swordfish catches (kg of round weight) by 5°x5° squares of the Spanish surface longline fleet in 2021 is shown in figure 3.aiv. The figure 3.av displays the spatial distribution for the nominal effort in number of thousand hooks and nominal yield in kg of round weight of swordfish landed per thousand hooks set in the Indian Ocean by the Spanish surface longline fleet during 2021.

In figures 3.iv & 3.bv the distribution of SWO catch (round weigh in kg) and the nominal CPUE (round weight per thousand hooks) are mapped respectively, by 5°x5° squares.

Table 2.a: Spanish purse seiners total catch (in tons) by year and primary species, and nominal fishing effort in fishing days and searching days of the purse seine Spanish fleet in the IOTC area of competence during the period 2008-2021 (data of previous years have been already reported).

YEAR	TOTAL CATCH BY SPECIES			NOMINAL FISHING EFFORT	
	YFT	SKJ	BET	Fishing	Searching
2008	46051	65096	12490	4792	3882
2009	33511	66570	11781	3784	2992
2010	45209	75131	10022	3825	2938
2011	52256	67247	10702	3851	2944
2012	57745	42892	7589	3991	3150
2013	68352	64632	13880	4224	3326
2014	57892	66597	8988	4185	3340
2015	52631	58283	9832	4157	3287
2016	51489	75264	9371	4261	3268
2017	54513	84432	12345	3512	2618
2018	46991	132986	28167	3633	2632
2019	42273	119138	11303	3397	2567
2020	44246	85193	13338	3797	2838
2021	44347	94165	16190	3182	2277

Table 2.b: Catch in number of fish and in kg of round weight of swordfish (SWO) obtained by the Spanish surface longline fishery and total number of hooks (in thousands) set in the IOTC area of competence during the period 2008-2021 (data of previous years have been already reported).

YEAR	TOTAL CATCH of SWO		NOMINAL FISHING EFFORT
	Number of fish	Kg RW	Hooks*1000
2008	76882	3924743	4885
2009	66000	3306663	3634
2010	61100	3116458	3174
2011	63165	3191553	3758
2012	85472	4396670	4674
2013	92909	4766588	6263
2014	79373	4164218	6107
2015	64698	3421352	4509
2016	66952	3354291	4427
2017	58671	2897902	3579
2018	39803	1971026	2822
2019	41713	2097373	2992
2020	33378	1601720	2654
2021	30639	1491681	2087

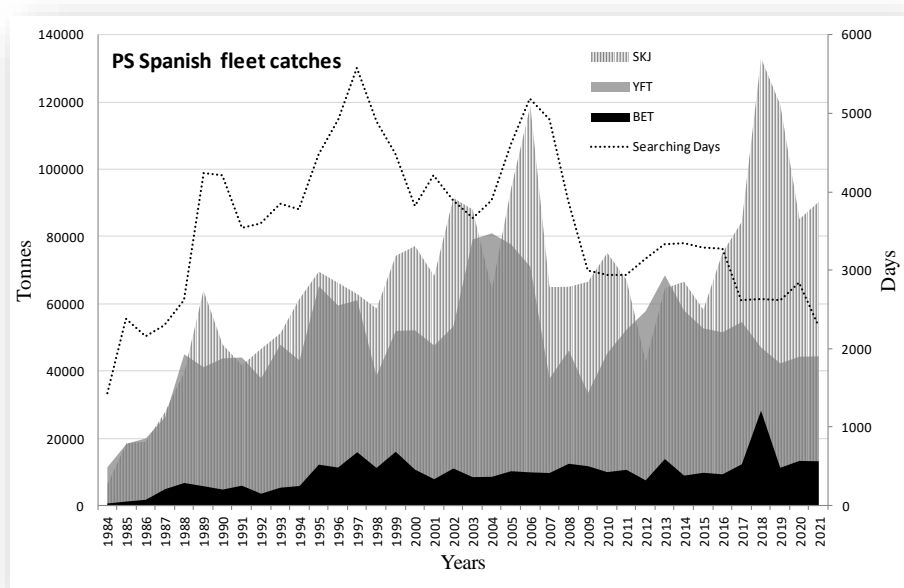


Figure 1.a. Historical annual catch and effort (searching days) of the Spanish purse seine fleet by main tropical tuna species, in the IOTC area of competence since 1984 to present.

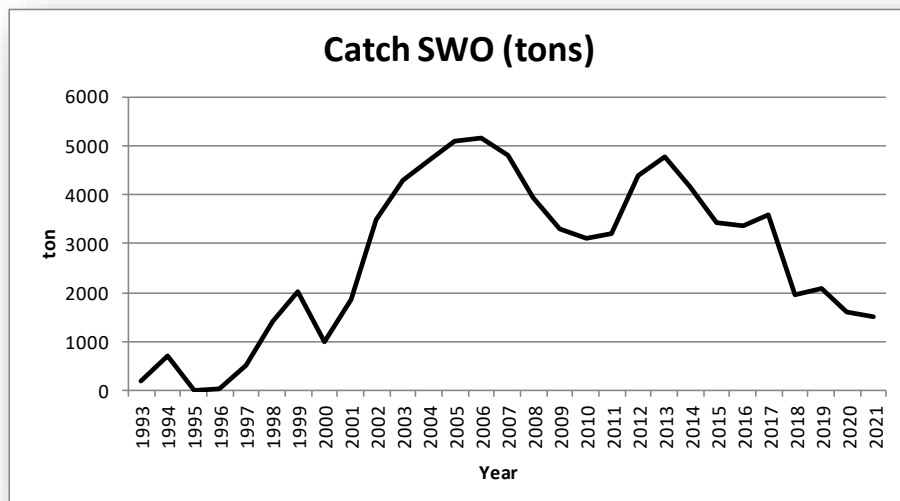


Figure 1.b. Historical annual swordfish catches (tons of RW) of the Spanish longline fleet, for the IOTC area of competence since 1993 to present.

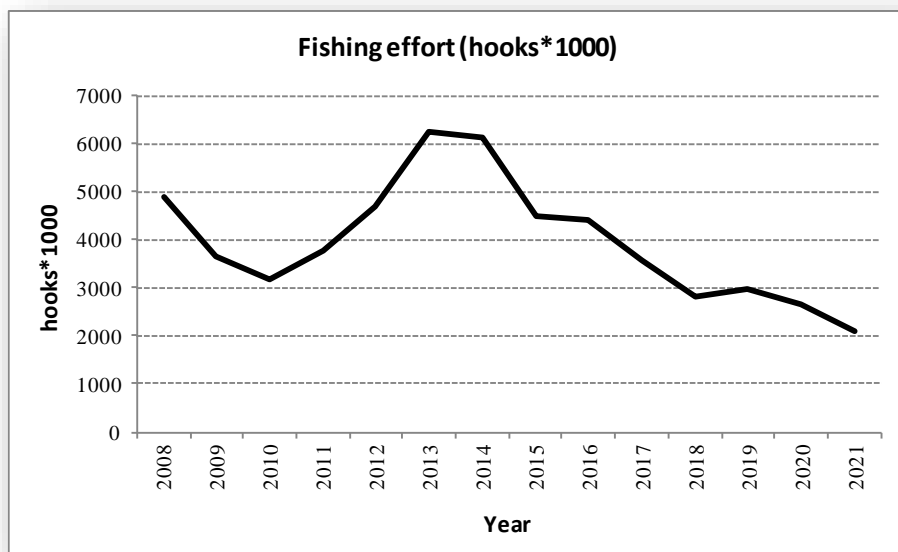


Figure 1.c. Historical annual nominal effort (in thousands of hooks) of the Spanish surface longline fleet, in the IOTC area of competence since 2008 to present.

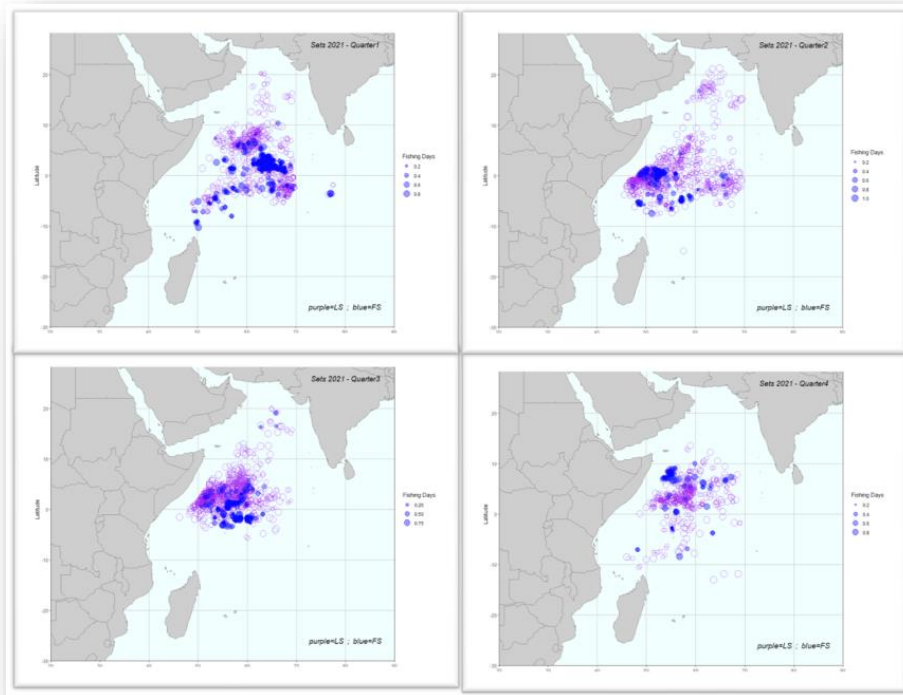


Figure 2.ai. Map of the distribution of the fishing effort (fishing days) of the Spanish purse seine fleet in 2021, per quarter and fishing mode, in the IOTC area of competence. Key: Purple, Log School associated sets; Blue: Free-Swimming School sets.

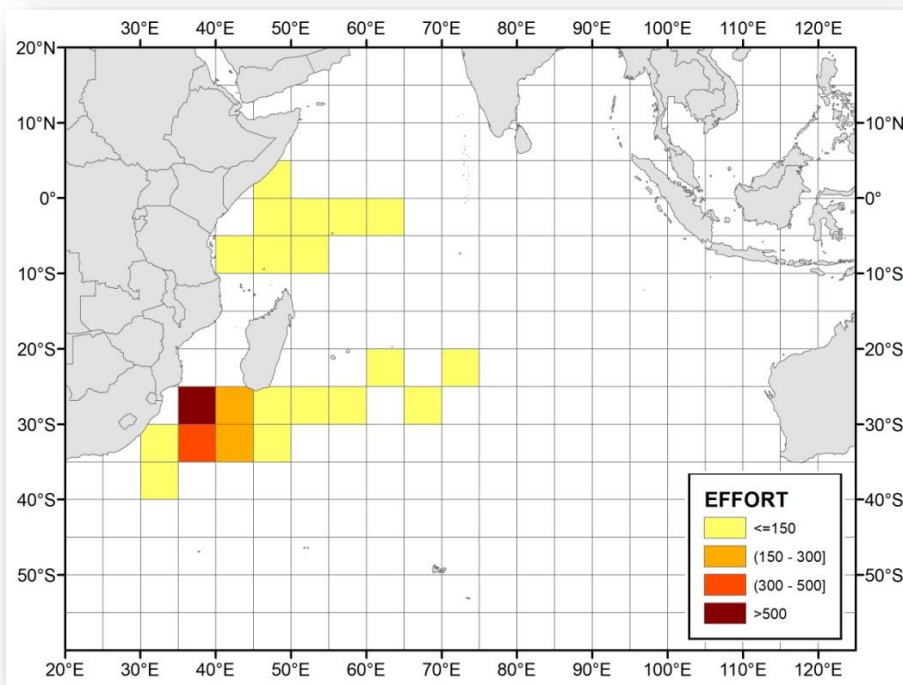


Figure 2.a.ii. Map of the distribution of the nominal fishing effort (thousand hooks), by 5°x5° squares of the Spanish longline fleet during the year 2021, in the IOTC area of competence.

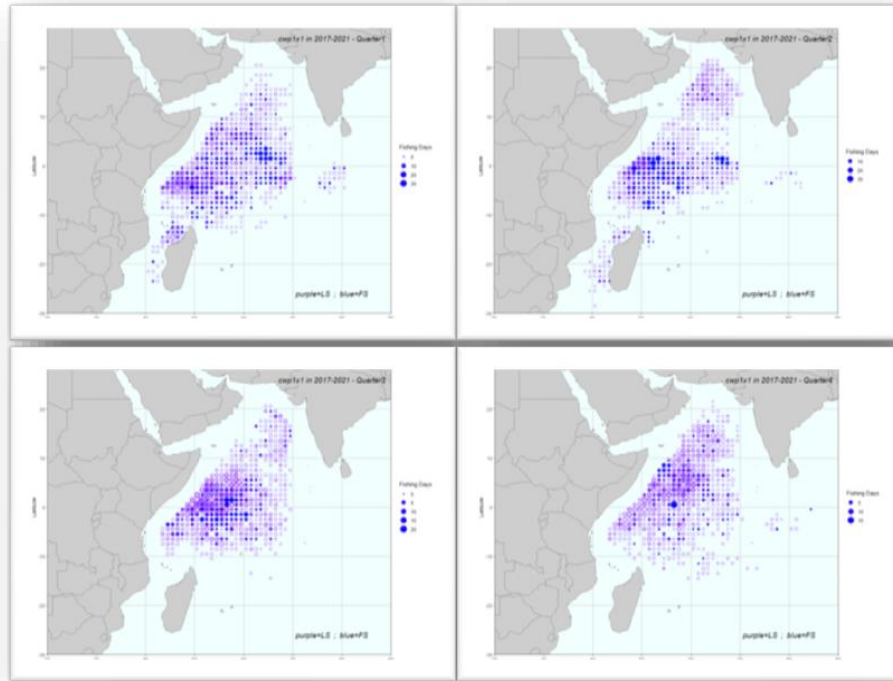


Figure 2.bi. Map of the distribution of fishing effort (fishing days), by cwp1x1, of the purse seine Spanish fleet in 2017-2021 (average of the 5 most recent years), per quarter and fishing mode, in the IOTC area of competence. Key: Purple, Log School associated sets; Blue, Free-swimming School sets-

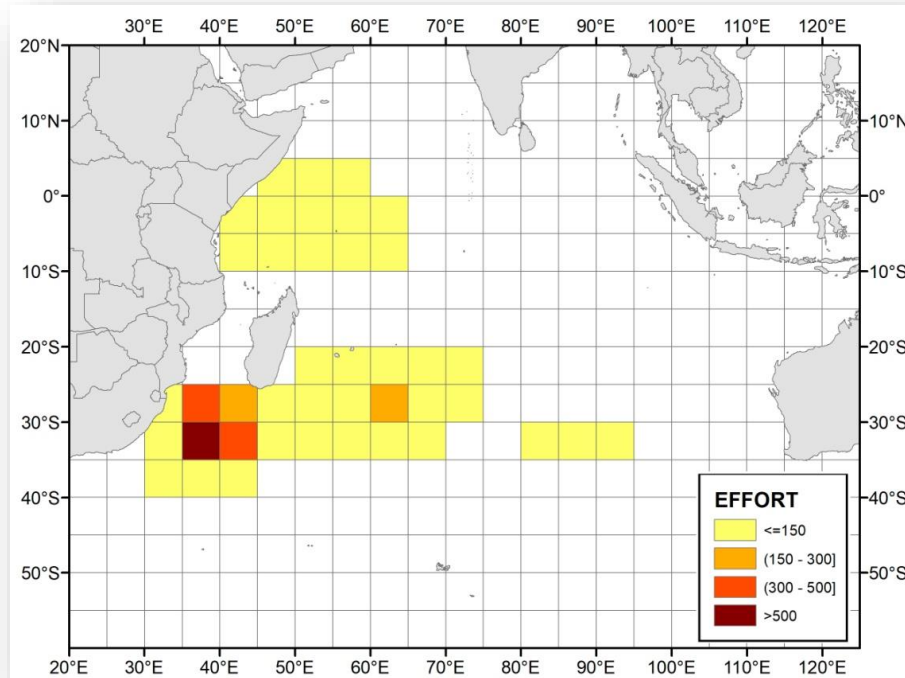


Figure 2.bii. Distribution of the nominal fishing effort (thousand hooks) by 5°x5° squares carried out by the Spanish surface longline fleet in the Indian Ocean (average of the 5 previous years 2017-2021).

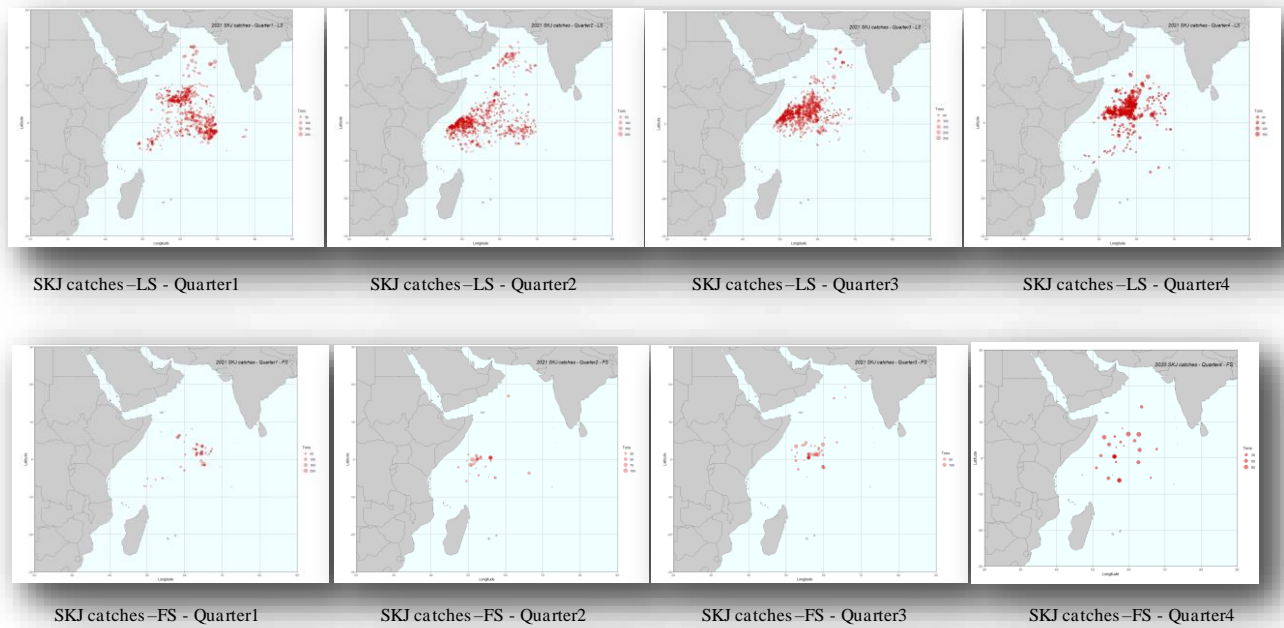


Figure 3.ai. Map of distribution of SKJ catches of the Spanish purse seine fleet in 2021, in the IOTC area of competence, per quarter and fishing mode. Key: LS = Log Schools associated sets; FS = Free-swimming Schools sets.

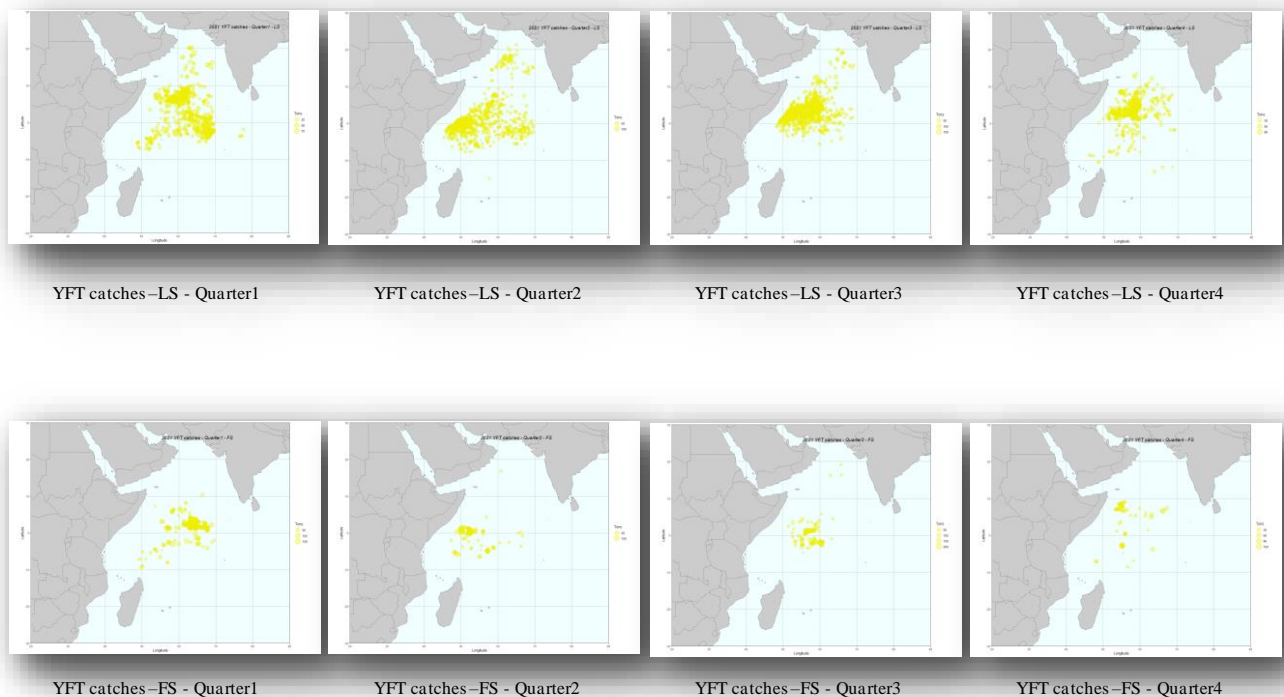


Figure 3.ii. Map of distribution of YFT catches of the Spanish purse seine fleet in 2021, in the IOTC area of competence, per quarter and fishing mode. Key: LS = Log Schools associated sets; FS = Free-swimming Schools sets.

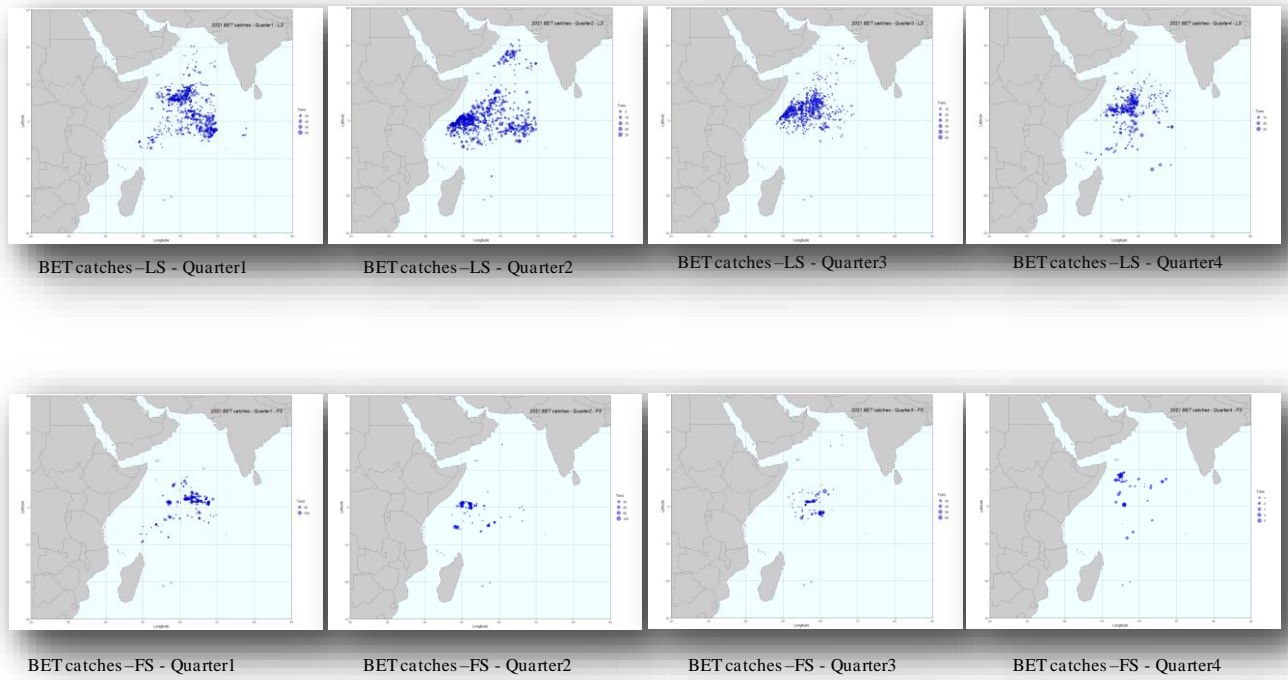


Figure 3.iii. Map of distribution of BET catches of the Spanish purse seine fleet in 2021, in the IOTC area of competence, per quarter and fishing mode. Key: LS = Log Schools associated sets; FS = Free-swimming Schools sets.

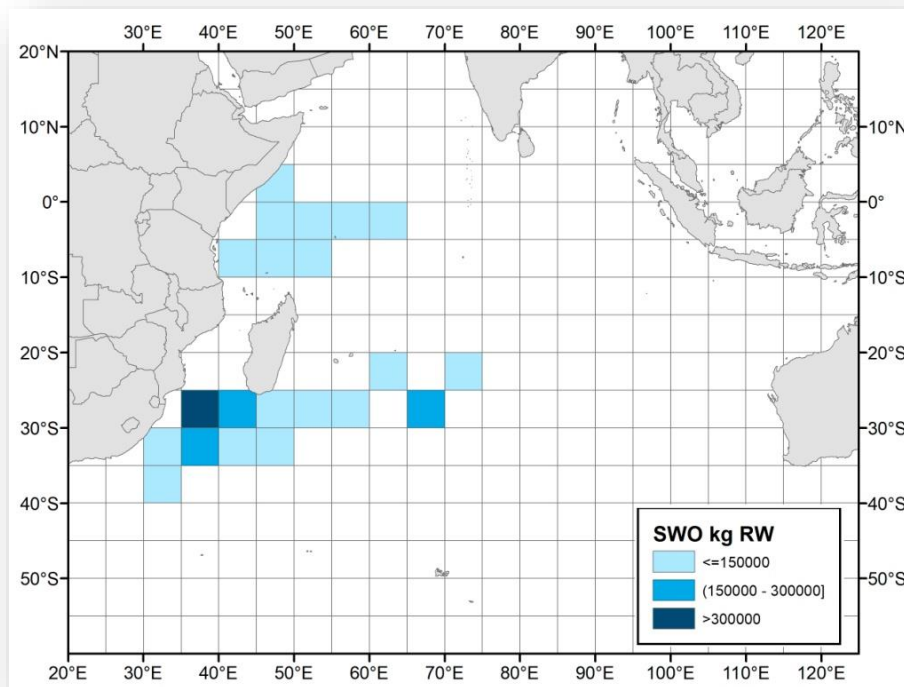


Figure 3.iv. Map of distribution of SWO catches (kg of round weight) of the Spanish surface longline fleet in 2021, by 5°x5° squares, in the IOTC area of competence.

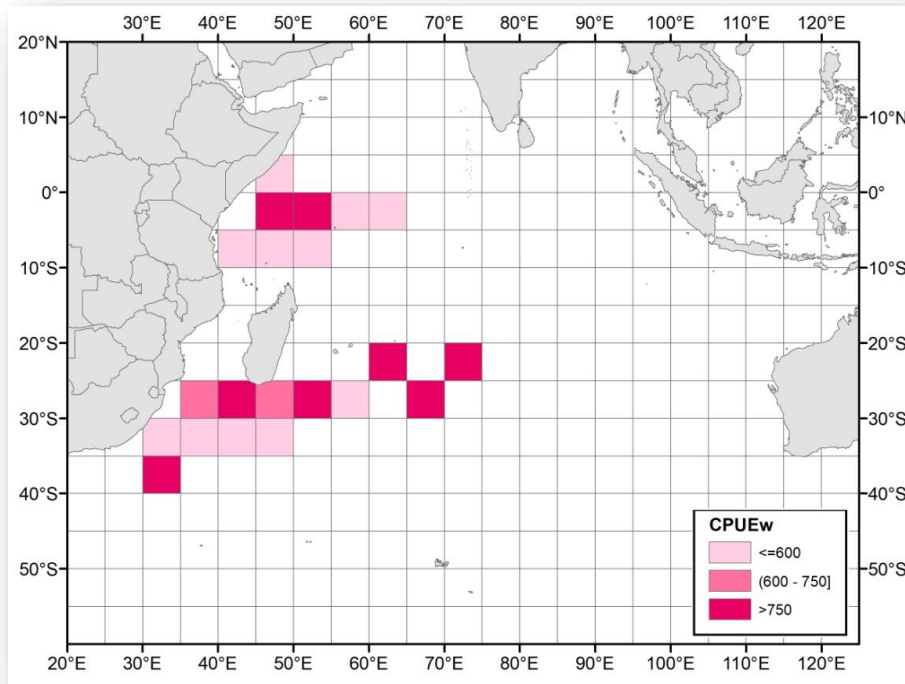


Figure 3.av. Map of distribution of the nominal CPUEw in kg (round weight) of SWO landed per thousand hooks set by 5°x5° squares, carried out by the Spanish surface longline fleet in 2021, in the IOTC area of competence.

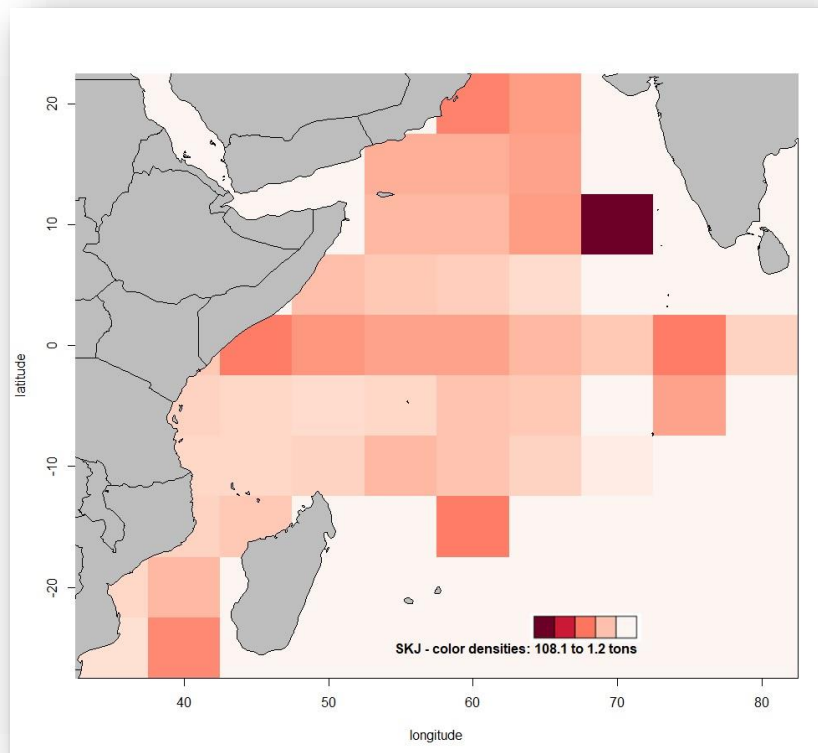


Figure 3.bi. Map of distribution of SKJ catches, in cwp5x5 squares, by the Spanish purse seine fleet, in the IOTC area of competence (average of the 5 previous years: 2017–2021).

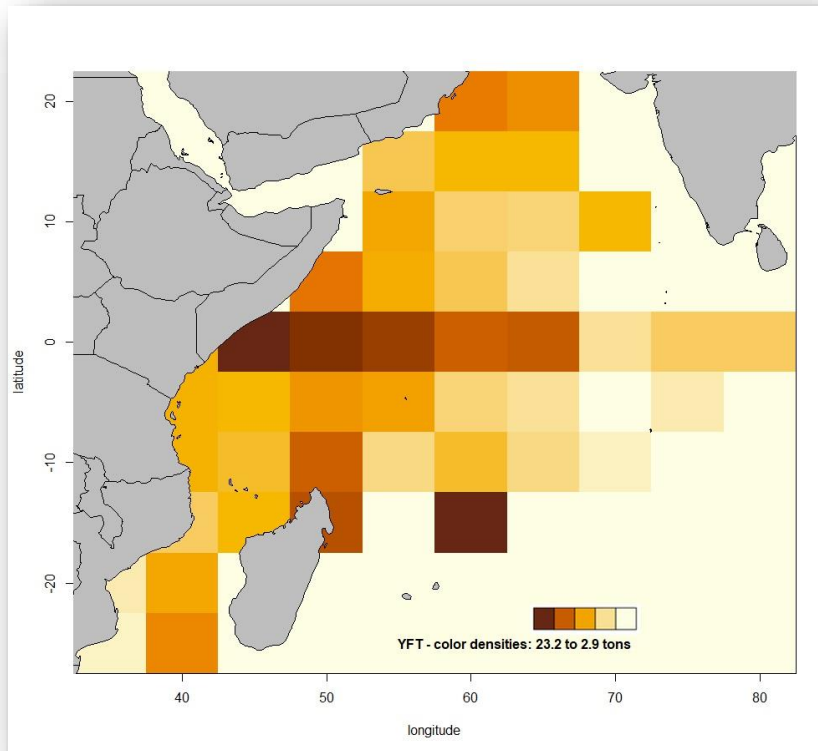


Figure 3.bii. Map of distribution of YFT catches, in cwp5x5 squares, by the Spanish purse seine fleet, in the IOTC area of competence (average of the 5 previous years: 2017–2021).

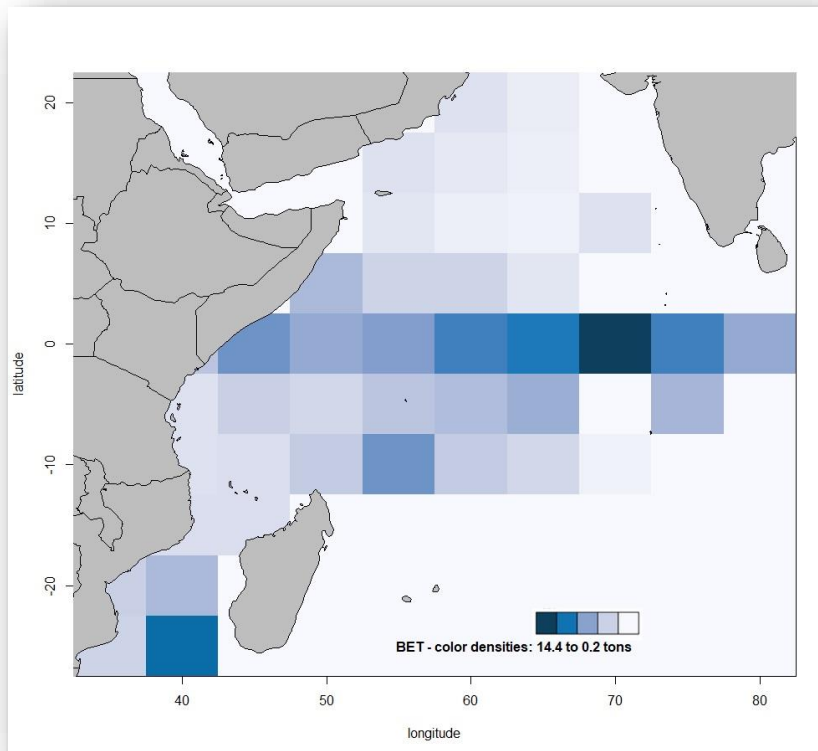


Figure 3.biii. Map of distribution of BET catches, in cwp5x5 squares, by the Spanish purse seine fleet, in the IOTC area of competence (average of the 5 previous years: 2017–2021).

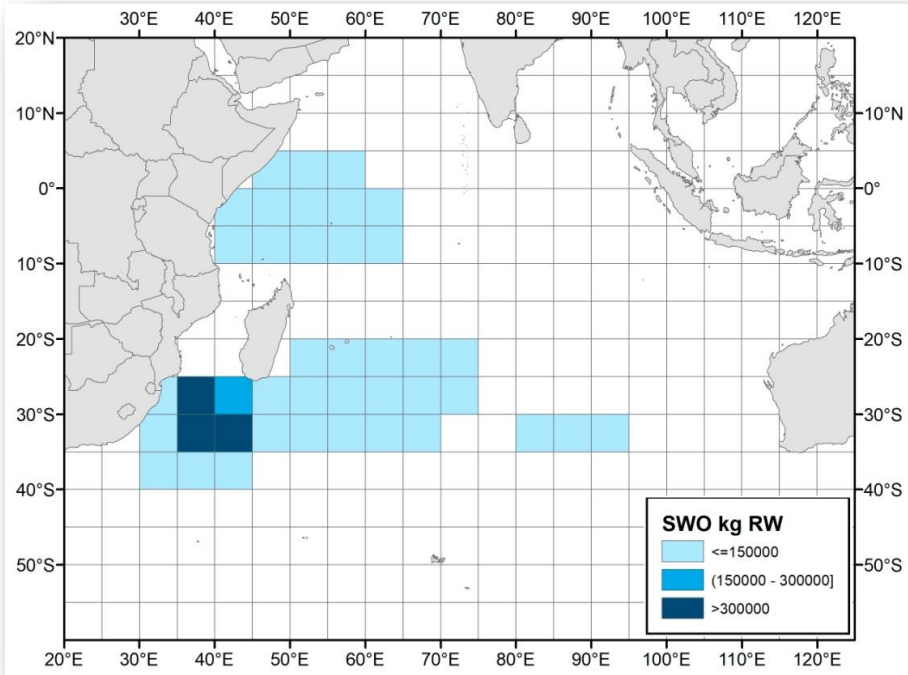


Figure 3.biv. Map of distribution of SWO catches (kg of round weight), in cwp5x5 squares, by the Spanish surface longline fleet, in the IOTC area of competence (average of the 5 previous years: 2017–2021).

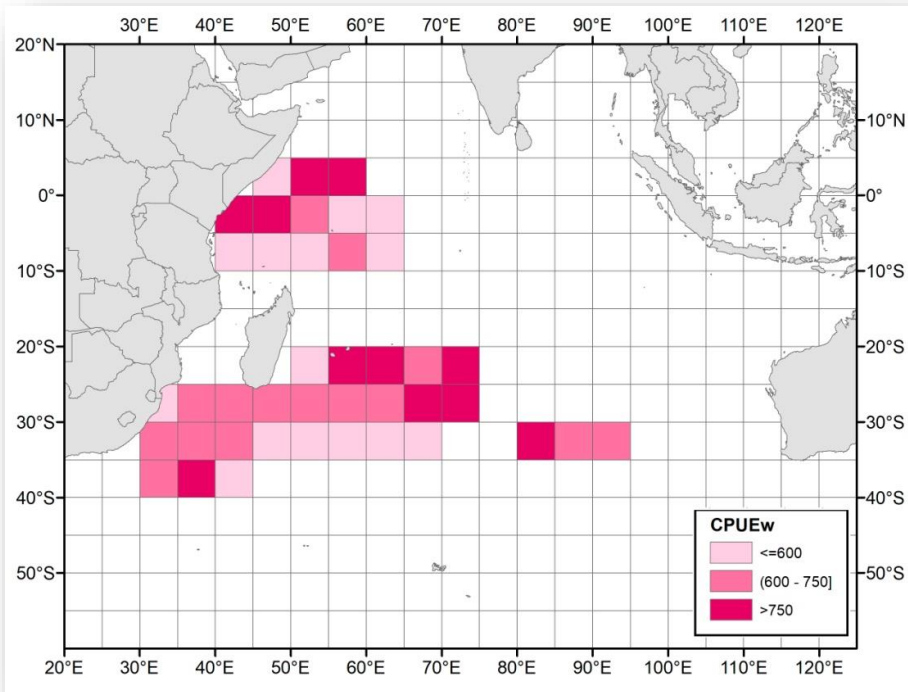


Figure 3.bv. Map of distribution of the nominal CPUE in kg (round weight) of SWO landed per thousand hooks set, in cwp5x5 squares, by the Spanish surface longline fleet, in the IOTC area of competence (average of the 5 previous years: 2017–2021).

4. RECREATIONAL FISHERY

There are no recreational fishing activities of Spanish vessels in the IOTC area.

5. ECOSYSTEM AND BYCATCH ISSUES

Purse Seine

A total of 35 trips (approximately a 23,8 % of the total trips performed by this fleet) and 1015 sets (a 23,7% of the total sets) on board 10 of the 15 Spanish tropical tuna purse seiners in the Indian Ocean have been carried out. They are shown in the following table, stating the number of days at sea and the number of sets (on free schools or object schools) by vessel performed in 2021, with a media of 2,7 null sets by trip. All the sets performed (917 on object schools and 98 on free schools) were sampled by the observers on board.

Apart from tuna species, a total of 48 species and taxa belonging to species groups associated to tropical tuna fisheries have been identified and measured during the sampled trips, having an approximate global retained catch of 45666 kg, an equivalent to 12091 individuals. The discarded fraction of these taxa reached an estimation of 54773 individuals. A total of 9500 individuals were sampled (from the retained and the discarded fraction), most of them belonging to the species FAL (*Carcharhinus falciformis*), RRU (*Elagatis bipinnulata*), DOL (*Coryphaena hippurus*), CNT (*Canthidermis maculata*) and WAH (*Acanthocybium solandri*).

The highest volume of discarded associated catches, considering the number of individuals, corresponds to the species, in order: CNT (*Canthidermis maculata*), RRU (*Elagatis bipinnulata*), FAL (*Carcharhinus falciformis*) and DOL (*Coryphaena hippurus*). For the retained fraction, the most numerous species were: RRU (*Elagatis bipinnulata*), DOL (*Coryphaena hippurus*), MSD (*Decapterus macarellus*) and CNT (*Canthidermis maculata*).

Considering only the weight, the highest volume corresponds to, in order: FAL (*Carcharhinus falciformis*), DOL (*Coryphaena hippurus*) and RRU (*Elagatis bipinnulata*).

During the year 2021 a total of 1015 sets were directly human observed on board 5 Spanish purse seiners targeting on tropical tunas in the Indian Ocean. The total number of sets performed for the Spanish fleet was 4289 sets. According to this fishing effort, the sampling coverage achieved was 23,7 % of the sets. The [table 4](#) shows specifically the number of sharks observed in the discarded fraction, by species and condition when released.

A total of 8 sea turtles were observed interacting with purse seiners, all of them were released alive. The turtles were related with sets on floating objects (FOBs).

The global resulting interaction and mortality rates were 0,0019 turtles per set and 0, respectively (see [table 5.bii](#)). Total interaction rate was lower than to last year's (2020) bycatch ratio (0,0107).

The observers on board the Spanish purse seine fleet in the Indian Ocean have also recorded 2 turtles not involved in the sets but in FOBs: one of them (*Eretmochelys imbricata*) swimming free next to the FOB and a non identified turtle entangled and died in a FOB. The ratio of turtles observed was 0,0005, having observed 2372 visits to FOBs.

- There were no records of interactions with cetaceans.
- There was one record of an interaction with a whale shark, which was found after the set and released alive.
- There were no records of interactions with seabirds.

Longline

The scientific monitoring of the swordfish fishery and some research was conducted to find out what species are captured as by-catch or incidental interactions occurred.

This report includes data of bycatch data obtained during the year 2021. The catches of the bycatch by species since the beginning of this fishery in 1993 have been described in several scientific papers previously presented and also provided by reports of the National Fishing Authority. Total catch of sharks was estimated as 2515t (see [table 3](#)), 85t of tuna, 31t of billfish and 27t for other species in the year 2021.

Studies about the interaction between seabirds and the Spanish surface longline targeting swordfish were carried out following the scientific recommendations of the SC and reported in several papers in previous years.

A total 101990 hooks were observed by the General Fisheries Secretariat and analyzed in the Spanish surface longline fishery targeting swordfish in the Indian Ocean during the year 2021, which corresponded to a total of 96 sets and 117 days at sea.

In this period two interactions with marine turtles were reported, being both of the species *Dermochelys coriacea*. The initial locations of the sets where they were captured are 29°9.6'S, 41°3.5'E and 28°39'S, 38°49.1'E (set numbers 21 and 35). Both of them were hooked with their left flipper on the hook, but were released and returned alive to the sea.

Taking this into consideration, the resulting interaction was $1,979E^{-05}$ per hook and mortality rate has been null (see [table 5.bi](#))

Regarding the scientific at-sea sampling program coordinated by the IEO-CSIC during 2021, a total of 49615 hooks were observed, that means a total of 45 fishing days and 51 days at sea. There was an interaction with one *Caretta caretta* in the location 23°S-062°E that was released alive, so the mortality rate was null during this trip, with an interaction rate per hook of $2,0155E^{-05}$.

The global interaction rate of surface longline gear with turtles was of $1.98E^{-05}$.

- There has been no interaction on mammals and neither on the basking shark.
- There were no records of interactions with seabirds.
- There were no records of interactions with whale sharks.

5.1 Sharks

For the **purse seine** fishery, shark bycatch, while not significant globally compared to other fishing gears, is tried to be avoided by the implementation of good practices, such as the application of appropriate handling and release protocols. The fleet is strict regarding the practice of shark finning, which is completely prohibited.

For the surface **longline** fishery the sharks, are processed on board as trunks or carcass with their respective fins naturally attached, frozen and stowed on board, and landed for human consumption. The profitable use of the different parts of the sharks is regularly better than that most bony fish species. Bycatch data of sharks is summarized in [table 3](#) for 2012-2021 periods. It was not feasible to obtain a scientifically robust data by extensive area-time stratification due to the low occurrence of most bycatch species. However, total catches of all bycatch species are scientifically estimated and reported for assessment.

5.1.1. NPOA sharks [Desirable]

Currently, there are no National Plans of Action developed.

5.1.2. Sharks finning regulation

Sharks finning legislation is settled in the COUNCIL REGULATION (EC) No 1185/2003 of 26 June 2003 on the removal of fins of sharks on board vessels, amended by COUNCIL REGULATION (EC) No 605/2013. It came into force in September of 2003.

The mentioned regulation forbids practising finning in sharks and retaining on board, tranship and land fins without bodies directly from the vessel. It is also forbidden to purchase, offer for sale or sell shark fins which have been removed on board, retained on board, transhipped or landed.

The regulation allows partially sliding of fins for a better on-board storage and under a special fishing permit is also allowed to retain, tranship and land shark fins. An annual report of the practices is mandatory for all the Member States fishing sharks.

This EU regulation is mandatory for all Spanish vessels which are subject to aleatory inspections on board and in port.

5.1.3. Blue shark

Electronic Reporting System is mandatory for all Spanish vessels operating in the IOTC area, according to the Regulation 1224/2009, establishing a Community control system for ensuring compliance with the rules of the common fisheries policy. Blue shark has no special regulation related to the report of its catches. Catches of blue sharks have to be reported by ERS as for the rest of the species.

Table 3: Total number and weight of sharks (in tons), by species, retained by the national fleet (PS & LL) in the IOTC area of competence (for the most recent five years at a minimum, e.g. 2017–2021).

SPECIES/YEAR	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
<i>Carcharhinus falciformis</i>	25	0.5	0	0	0	0	4	0,9	0	0
<i>Isurus oxyrinchus</i>	561	620	823	441	450	532	399	424	348	390
<i>Isurus paucus</i>	0.2	0.7	0.1	0	0.1	0	0,8	0,6	0	0
<i>Prionace glauca</i>	3686	414	4657	3701	3592	3059	2162	2646	2417	2125

Table 4: Total number of sharks observed on board, by species, released/discarded by the purse seiner national fleet in the IOTC area of competence (for the most recent five years at a minimum, e.g. 2017–2021). Life status upon released/discard is indicated. Observer coverage, in number of sets is indicated.

Species	2017_17%sets		2018_22%sets		2019_23%sets		2020_14%sets		2021_24%sets	
	No. Released Alive	No. Released Dead	No. Released Alive	No. Released Dead	No. Released Alive	No. Released Dead	No. Released Alive	No. Released Dead	No. Released Alive	No. Released Dead
<i>Prionace glauca</i>			2						1	
<i>Carcharhiniformes</i>	1	5				11				
<i>Carcharhinus falciformis</i>	1709	869	3466	2985	3910	1621	2223	894	1576	2060
<i>Carcharhinus longimanus</i>	17	2	99	26	20	7	14	5	21	17
<i>Rhincodon typus</i>	2		1		5				1	
<i>Carcharhinidae</i>	1								10	25
<i>Isurus oxyrinchus</i>			1			1				

5.2 Seabirds

In 2021 a total of 151605 hooks were observed in total by the IEO.CSIC and SGP sampling program on board and there were no reported interactions with seabirds (see [table 5.a](#)).

Table 5.a: IEO observed annual interactions rates of surface longline gear on seabirds for the 2010-2021 period and number of individuals observed.

	Year	Interaction rate	Mortality rate	Number
SEABIRDS	2010	0	0	0
	2011	0	0	0
	2012	0	0	0
	2013	7,19E-05	7,19E-05	13
	2014	2,83E-05	2,83E-05	2
	2015	8,75E-05	8,75E-05	4
	2016	0	0	0
	2017	0	0	0
	2018	0	0	0
	2019	2,10E-05	2,10E-05	1
	2020	0	0	0
	2021	0	0	0

Observer seabird interaction data sheet for the IOTC longline fleet [Desirable]

Reporting period* or calendar year _____

Species _____

Fishery		Observed					Estimate
Area ¹	Total effort ²	Total observed effort ²	Observer coverage ³	Captures (number)	Mortalities (number)	Live releases (number)	Mortality estimate (number)
Total							

*This field can be used to specify a temporal stratification to the data e.g. season

¹Spatial stratification (5x5, 10x10 or other – to be determined)

²Number of hooks observed hauled

³Percentage of all hooks set that were observed hauled

1. How many vessels operated south of 25°S in the period covered by this report?
2. How many of those vessels used bird scaring lines (as a proportion of total effort)?
3. How many of those vessels used line weighting (as a proportion of total effort)?
4. How many of those vessels used night setting (as a proportion of total effort)?

5.3 Marine Turtles

The national strategy on marine turtles is based on international, European and Spanish regulation. The main acts are the following:

- Resolution IOTC 12/04 on the conservation of marine turtles.
- Regulation (EC) No. 520/2007, of the Council, of May 7, 2007, which establishes technical measures for the conservation of certain populations of highly migratory fish species and which repeals Regulation (EC) No. 973/2001. Specifically the provisions of articles 15, 20 and 27 (relating to sea turtles).
- Order APM / 1057/2017, of October 30, which modifies Order AAA/658/2014, of April 22, which regulates fishing with surface longline gear for the capture of highly migratory species, and which repeals Order ARM / 1647/2009, of June 15, which regulates the fishing of highly migratory species (BOE of November 3, 2017).
- Order AAA / 658/2014, of April 22, regulating surface longline fishing for the capture of highly migratory species and creating the unified surface longline census.
- FAO Guidelines to reduce the mortality of sea turtles in fishing operations (2009).

Spanish mitigation measures on sea turtles are carried out through Temporary Fishing Licences (PTP) issued by the General Fisheries Secretariat (SGP) which is mandatory for all Spanish vessels operating in the IOTC area, both for the purse-seine fishery and for the surface longline fishery. The mentioned licences have an annex that includes the obligation to comply with the regulations issued by IOTC, mandatory measures on sea turtles and the obligation to record the interactions that occur with them.

These licences are reviewed and updated annually to include the new provisions that emanate from regulations approved by the IOTC Commission, as well as other European and national regulations.

There are other mitigation measures on marine turtles:

- Management Plan on Fisheries Aggregation Devices (FAD): established by the Spanish administration as mandatory since 2010. It includes mitigation measures on non-target species as marine turtles, through the use of non-entangling FADs.
- This plan is updated annually to incorporate new regulation.
- “Code of Good Practices on board purse seiners”: it includes the design and use of non-entangling FADs that reduce entanglement mortality of vulnerable species such as sea turtles, among others; best practices for their release and, the application of a FAD management system through the implementation of a FAD logbook and responsible use of active FADs.
- Training sessions on Mitigation measures on marine turtles by the industry and the administration and projects involved in this action field.

Year	Fishery			Observed **				
	Lat*	Lon	Total effort	Total effort observed	Species	Captures (number)	Mortalities (number)	Live releases (number)

NB: Effort units should be appropriate for the gear type, i.e., hooks or sets for LL and sets of fishing days for purse seine or gillnet fleets and fishing days for pole and line fleets.

*The resolution should be consistent with the standard data requirements (i.e. 5°x5° for longline and 1°x1° for surface fisheries)

**Indicate data source (e.g. logbooks or observer data)

See Annex I. Tables of marine turtle data for time/area strata, in purse seiners and longliners in period 2010 to 2021.

Table 5.bi: Observed annual interactions rates of surface longline gear by the LL Spanish fleet on marine turtles for the 2010-2021 period and number of individuals observed.

	Year	Interaction rate	Mortality rate	Number
TURTLES	2010	0	0	0
	2011	0	0	0
	2012	0	0	0
	2013	1,49E ⁻⁰⁴	2,76E ⁻⁰⁵	27
	2014	7,07E ⁻⁰⁵	0	5
	2015	4,37E ⁻⁰⁵	0	2
	2016	3,78E ⁻⁰⁵	9,44E ⁻⁰⁶	4
	2017	3,34E ⁻⁰⁵	0	2
	2018	0	0	0
	2019	2,10E ⁻⁰⁵	0	1
	2020	6,038E ⁻⁰⁵	0	3
	2021	1,979E ⁻⁰⁵	0	3

Table 5bii: Rates of interaction and mortality of marine turtles by species and total, obtained during the year 2021 in the Indian Ocean by the observers sampling programs on board the Spanish purse seine fleet.

Species	Year	Interaction rate (turtles/sets observed)	Mortality rate	Number of turtles
<i>Dermochelys coriacea</i>	2021	0,0012	0	1
<i>Eretmochelys imbricata</i>	2021	0,0002	0	1
<i>Lepidochelys olivacea</i>	2021	0,0015	0	5
<i>Chelonias mydas</i>	2021	0,0002	0	1
Total turtles	2021	0,0019	0	8

5.4 Other ecologically related species (e.g. marine mammals, whale sharks) [Desirable]

Purse seine

- There were no records of interactions with cetaceans.
- There was one record of an interaction with a whale shark, which was found after the set and released alive.
- There were no records of interactions with seabirds.

Longline

- There has been no interaction on mammals and neither on the basking shark.
- There were no records of interactions with seabirds.
- There were no records of interactions with whale sharks.

6. NATIONAL DATA COLLECTION AND PROCESSING SYSTEMS [Mandatory]

Purse seine: During 2020, the sampling activities of the landings in Port Victoria (Seychelles) (that are subsequently used in the catch correction process), currently under Spanish coordination, has been stopped due to the outbreak of COVID19 pandemic. This activity was resumed in 2021.

The year 2021 data collection on board by scientific observers was also affected by the pandemic. A total of 35 trips (approximately a 23,8 % of the total trips performed by this fleet) and 1015 sets (a 23,7% of the total sets vs. 14% in 2020) on board 10 of the 15 Spanish tropical tuna purse seiners in the Indian Ocean have been carried out. All the sets performed (917 on object schools and 98 on free schools) were sampled by the observers on board.

Longline: The implementation of an Information and Sampling Network for scientific since the beginning of this fishery in the Indian Ocean in 1993, has provided the basic data for the study research and for estimating the annual statistics for swordfish by 5°x5° degrees up to the year 2021. Same size-sex variables of swordfish and some blue shark were obtained. The voluntary tagging program is still being carried out tentatively on both, swordfish and bycatch species. Information about interaction with marine turtles, seabirds or others incidental unwanted captures continues being collecting. Nevertheless, the at-sea sampling program of longline fishery coordinated by the IEO.CSIC was suspended in most of 2020, due notably to administrative problems and to a lesser extends to covid-19. This activity was resumed under the IEO.CSIC coordination in 2021.

Besides, since 2017 the Fisheries General Secretariat carries out an additional National Program of Observers onboard longliners in the IOTC area which continued developed these observations in 2021.

6.1 Logsheet data collection and verification (including date commenced and status of implementation)

The Electronic Fisheries Reporting Logbook was implemented in Spanish fleet according to Council Regulation (EC) No 1224/2009 of 20 November 2009 establishing a Community control system for ensuring compliance with the rules of the common fisheries policy, according to the following calendar:

- since 2010 in fishing vessels of 24 metres' length overall or more
- since 2011 in fishing vessels of 15 metres' length overall or more and less than 24 metres' length overall
- since 2012 in fishing vessels of 12 metres' length overall or more and less than 15 metres' length overall

Currently, at the national level, 1.733 active fishing vessels use the Electronic Fisheries Reporting Logbook (17%).

Purse Seine: The General Secretariat of Fisheries (SGP) has implemented a new module of the Electronic Fisheries Reporting Logbook, where the captains and fishing patterns indicate the type of fishing mode (school free or associated), and total catch by species among other information.

6.2 Vessel Monitoring System (including date commenced and status of implementation)

Council Regulation (EEC) No 2847/93 of 12 October 1993 establishing a control system applicable to the common fisheries policy in accordance with the amendment of Council Regulation (EC) n° 686/97 of April 14, 1997, established as mandatory the VMS since June 30, 1998 for vessels operating in the high seas greater than 24 m.

Later, Council Regulation (EC) No 1224/2009 of 20 November 2009 establishing a Community control system for ensuring compliance with the rules of the common fisheries policy extended the obligation to carry VMS equipment installed to all vessels with an overall length greater than 12 meters and less than 15 meters from 01-01-2012. Those under 15 meters may be exempted if they only fish in territorial waters of the flag state or do not make tides greater than 24 hours.

Currently, at the national level, 1.865 fishing vessels are subject to carrying a monitoring team, of which 163 vessels (9%) correspond to surface longliners in international waters, freezer tuna seiners and auxiliary vessels that habitually fish in third party waters. All Spanish vessels operating in IOTC have installed a VMS equipment.

6.3 Observer scheme (including date commenced and status; number of observer, include percentage coverage by gear type)

Purse Seine: The EU establishes a Union framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the common fisheries policy (CFP) through the Regulation (UE) 2017/1004 of the European Parliament and of the Council of 17 May 2017.

Under the coordination of the Spanish Fisheries Secretariat (SGP), a multi-annual data collection program (PNDB – *Programa Nacional de Datos Básicos*) is implemented with the collaboration of various research centres since 2003.

The Spanish Institute of Oceanography (IEO), together with the AZTI Foundation, are in charge of the implementation concerning the '*National Program of Tropical Tuna Fishing*'. Commercial vessels are sampled with Scientific Observers to estimate the bycatch and discards of Spanish-flagged tuna purse seiners operating in tropical waters of the Atlantic and Indian Oceans.

In addition to PNDB, a Memorandum of Understanding (MoU) for the deployment of fisheries observers on tuna purse-seine fleet between TAAF, Mauritius Ministry of Fisheries, Seychelles Fisheries Authority (SFA) and AZTI Foundation was signed in 2014. This agreement has allowed placing local observers on board instructed with the directives of the PNDB.

During each trip, the observers on board must collect the required data by filling in the following FORMS:

- ✓ Form TRIP: general characteristics of the trip (start date, end date, port...)
- ✓ FORM A: route and environmental parameters (types of activity, coordinates, temperature...)
- ✓ FORM B: fishing characteristics (type of banc, tuna discards, bycatch, catch, destiny...)
- ✓ FORM C1: tuna discards length sampling
- ✓ FORM C2: bycatch length and sex sampling
- ✓ FORM D: description and components of floating objects

The main tasks to be performed by these scientific observers during the set follow a PRIORITY order, which is:

- ✓ 1st Tuna discards and estimation of bycatch:

Tuna discards by species

Tuna Length sampling (FL to the lowest nearest cm)

Bycatch estimation (weight or number) by species

- ✓ 2nd Sampling of other species:

The whole bycatch will be sampled or a representative sample will be selected whenever its quantity is high. Sampling will be done following a list of priorities by species group, measuring always the size to the lowest nearest cm:

- Sharks and rays
- Turtles
- Billfishes
- Other fishes

- ✓ 3rd Tuna catch:

The data collected will be obtained from the information provided by the skipper and/or the main engineer, registering the catch weight (in tonnes) by species and the destiny well/s. If any discrepancy were observed, it will be described in the comments of the suitable form.

1. COVERAGE:

The number of sets sampled supposes approximately a 24% of the total number of sets performed by the Spanish tropical tuna purse seiner fleet in the Indian Ocean in 2021.

2. VESSELS AND SETS SAMPLED:

A total of 35 trips (approximately a 23,8 % of the total trips performed by this fleet) and 1015 sets (a 23,7% of the total sets) on board 10 of the 15 Spanish tropical tuna purse seiners in the Indian Ocean have been carried out (table 6.a). They are shown in the following table, stating the number of days at sea and the number of sets (on free schools or object schools) by vessel performed in 2021, with a media of 2.7 null sets by trip. All the sets performed (917 on object schools and 98 on free schools) were sampled by the observers on board.

Table 6.a: Effort of scientific observation on board Spanish purse seiner fleet, by vessel, indicating the days at sea, the number of sets by fishing mode and the number of trips.

IOTC vessel code	Days at sea	N sets on Free schools	N sets on Object	Number of trips
IOTC0015353	46	7	62	2
IOTC0015569	57	2	52	2
IOTC00159	19	-	30	1
IOTC00161	87	15	101	3
IOTC0016254	23	3	32	1
IOTC0017253	214	41	224	8
IOTC00175	159	6	173	7
IOTC00187	107	21	83	5
IOTC008281	14	-	25	1
IOTC00907	76	3	135	5
TOTAL	802	98	917	35

3. FISHING GROUND:

The following figure (figure 4.a) shows the position of the sets performed in the 35 trips sampled, including a graphical distinction between by fishing mode.

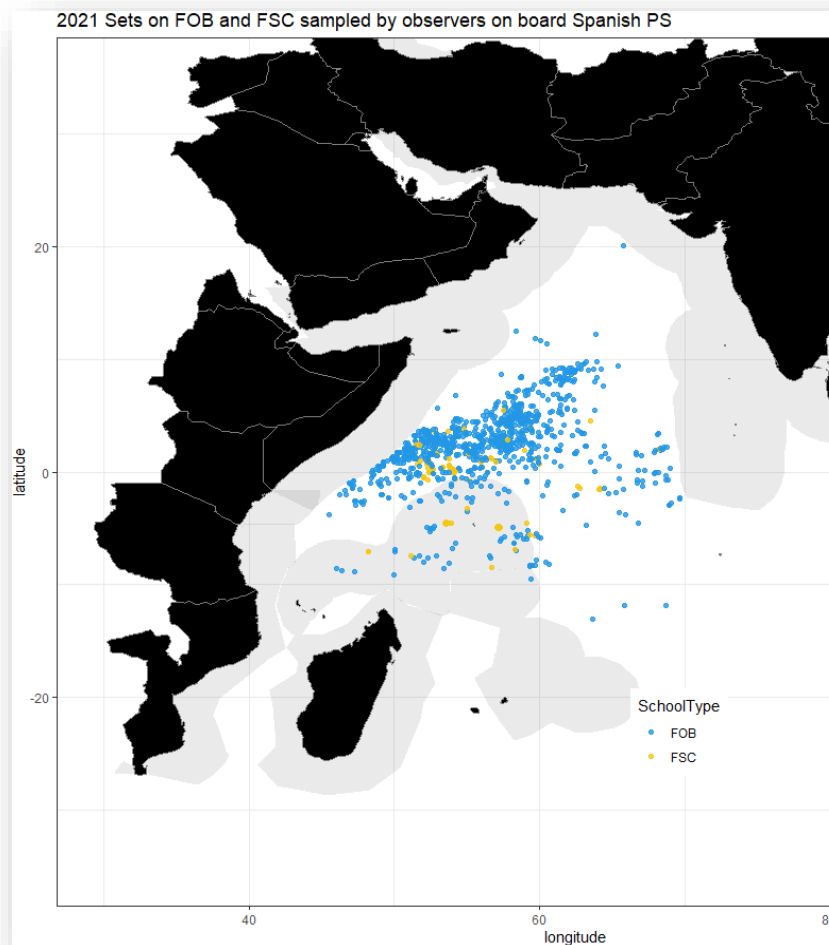


Figure 4.a: Distribution of the observed sets on board Spanish purse seiners in 2021. Key: Blue, Log School associated sets (FOB); Yellow, Free-Swimming Schools sets (FSC).

4. TARGET CATCHES AND DISCARDS

The following table (table 6.b) specifies the observed tuna catches by species (in kilograms), depending on whether they have been retained or discarded, and the number and weight of the individuals sampled by scientific observers.

Table 6.b: Nominal catches and discards of tuna species sampled by scientific observers on board Spanish purse seiner vessels, by species and fraction, in kg and number of fish by species.

Tuna species	Observed retained catches (Kg)	Observed Discards (Kg)	No of individuals measured*	Weight (Kg) of the measured individuals*
SKJ (<i>Katsuwonus pelamis</i>)	18786631,90	39232,20	953	1683,44
YFT (<i>Thunnus albacares</i>)	8569552,13	71162,00	381	1233,17
BET (<i>Thunnus obesus</i>)	2612417,81	58,76	30	99,00
FRI (<i>Auxis thazard</i>)	32001,00	52233,26	1212	1414,74
FRZ (<i>Auxis spp.</i>)	11,64	2648,359	571	646,11
BLT (<i>Auxis rochei</i>)	-	1,02	18	16,83
KAW (<i>Euthynnus affinis</i>)	-	-	-	-

* all measurements of tuna species belong to discarded fraction

Longline:

The main task of the samplers onboard is recording catch and effort data as well as sampling the size of the target species, the species composition of catches to the more detailed taxonomic level possible and observing the interaction with bycatch and incidental-bycatch species. At the same time, information about fishing operations and fishing gear configuration is also taken. The working protocol for scientific purposes of sampler is based on recording of catches of the target species, obtaining biological and biometric information and sampling to various studies. They also record the number of individuals affected by the false killer whale attacks. In the case of sharks, sometimes reproductive factors and presence-absence of embryos is also studied. In another hand it continues tagging different species.

On the other hand, the Program of the General Fisheries Secretariat in 2021 observed a total of 101990 hooks (see table 6.c) of the Spanish surface longline fishery targeting swordfish in the Indian Ocean that means a total of 117 fishing days which corresponds to 96 sets. In 2021 a total of 49615 hooks, 45 sets and 51 fishing days were observed by the IEO.CSIC sampling program on board. The distribution of the effort is shown in figure 4.b.

Table 6.c: Annual observer coverage by year, indicating the number of longline hooks observed (for the most recent five years at a minimum, e.g. 2017–2021 or to the extent available).

Year	Hooks
2015	45732
2016	105918
2017	278437
2018	181282
2019	126056
2020	49686
2021	151605

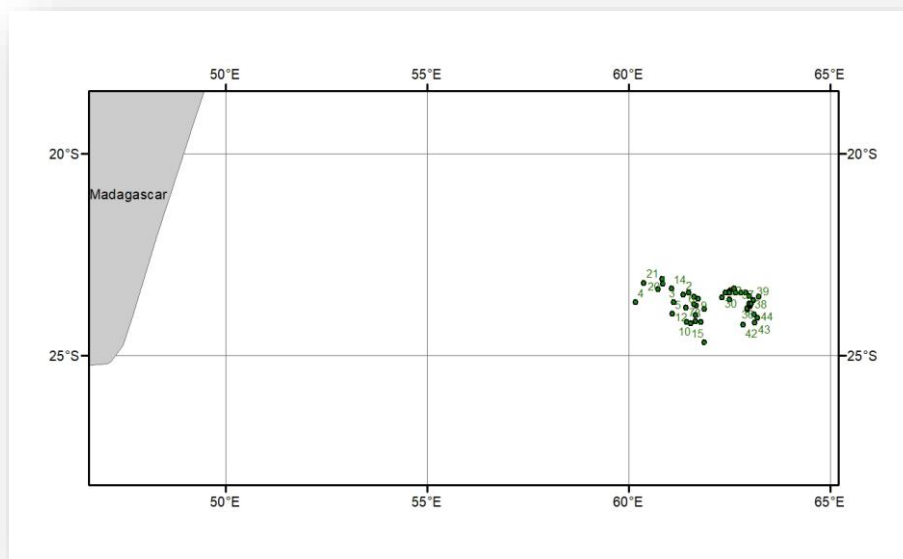


Figure 4.b: Map showing the spatial distribution of observer coverage IEO.CSIC on board Spanish longline vessels in 2021.

6.4 Port sampling programme

During 2019, Spain reinforced the sampling team in the port of Victoria (Seychelles), which is the main port of discharge for the Spanish freezer **purse seine** fleet. 2020 data are unable to provide at this time due to the pandemic and a lack of agreement between Spanish private companies, which provided services to Spanish administration and the Spanish administration itself.

Currently, the sampling port team is made up of a Spanish coordinator, 4 technicians and 1 computer technician responsible for the databases. In 2021, 118800 tuna fishes were sampled during the landings of the Spanish purse seine fleet in Victoria. The number of sampling units in wells was 538 (1091 wells in total). Taking into account that the number of landings performed by the EU-Spain purse seiner fleet was 129 in Victoria-Seychelles, the sampling effort covered by around 80% of the yearly unloading (103 landings).

Regarding the **longline** fleet, Spain do not have established a port sampling programme.

Tables 7, 8.a and 8.b display the number of fish sampled and counted at port, including the number of fishing trips, vessels and sets by species an month.

Table 7: Number of vessel trips and fish sampled at port by species during 2021 in the Spanish purse seine fleet landings performed in Victoria – Seychelles. The number of sets were the species sampled were present is also indicated.

FAO code	Species	n length measures at port	n fishes counted at port	n fishing trips sampled	n unique vessels sampled	n sets presence (source: logbooks)
ALB	<i>Thunnus alalunga</i>	72	72	6	5	18
BET	<i>Thunnus obesus</i>	11994	11994	99	15	2098
FRI	<i>Auxis thazard</i>	2895	2895	88	15	293
KAW	<i>Euthynnus affinis</i>	1	1	1	1	-
SKJ	<i>Katsuwonus pelamis</i>	44121	176308	93	15	3188
YFT	<i>Thunnus albacares</i>	59717	59717	103	15	3190
Total		118800	250987			

Table 8a: Number of tuna fishes sampled at Victoria port during 2021 by month and species.

Month	Tuna species	Number of fishes counted	Number of fishes measured
January	<i>Thunnus albacares</i>	3498	3498
January	<i>Katsuwonus pelamis</i>	1100	3824
January	<i>Thunnus obesus</i>	987	987
January	<i>Thunnus alalunga</i>	21	21
January	<i>Auxis thazard</i>	119	119
February	<i>Thunnus albacares</i>	1487	1487
February	<i>Katsuwonus pelamis</i>	500	2048
February	<i>Thunnus obesus</i>	408	408
February	<i>Thunnus alalunga</i>	1	1
March	<i>Thunnus albacares</i>	3410	3410
March	<i>Katsuwonus pelamis</i>	3500	12617
March	<i>Thunnus obesus</i>	2034	2034
March	<i>Auxis thazard</i>	412	412
April	<i>Thunnus albacares</i>	2238	2238
April	<i>Katsuwonus pelamis</i>	2800	11466
April	<i>Thunnus obesus</i>	1113	1113
April	<i>Auxis thazard</i>	222	222
May	<i>Thunnus albacares</i>	1939	1939
May	<i>Katsuwonus pelamis</i>	1800	7615
May	<i>Thunnus obesus</i>	381	381
May	<i>Auxis thazard</i>	236	236
June	<i>Thunnus albacares</i>	7929	7929
June	<i>Katsuwonus pelamis</i>	3500	13712
June	<i>Thunnus obesus</i>	1294	1294
June	<i>Auxis thazard</i>	257	257
July	<i>Thunnus albacares</i>	6562	6562
July	<i>Katsuwonus pelamis</i>	3500	14190
July	<i>Thunnus obesus</i>	999	999
July	<i>Thunnus alalunga</i>	7	7
July	<i>Auxis thazard</i>	94	94
July	<i>Euthynnus affinis</i>	1	1
August	<i>Thunnus albacares</i>	8677	8677
August	<i>Katsuwonus pelamis</i>	7400	29931
August	<i>Thunnus obesus</i>	961	961
August	<i>Thunnus alalunga</i>	43	43
August	<i>Auxis thazard</i>	341	341
September	<i>Thunnus albacares</i>	10720	10720
September	<i>Katsuwonus pelamis</i>	6621	26387
September	<i>Thunnus obesus</i>	1249	1249
September	<i>Auxis thazard</i>	268	268
October	<i>Thunnus albacares</i>	7462	7462
October	<i>Katsuwonus pelamis</i>	7200	29223
October	<i>Thunnus obesus</i>	1402	1402
October	<i>Auxis thazard</i>	494	494
November	<i>Thunnus albacares</i>	5485	5485
November	<i>Katsuwonus pelamis</i>	5850	23909
November	<i>Thunnus obesus</i>	1009	1009
November	<i>Auxis thazard</i>	399	399
December	<i>Thunnus albacares</i>	310	310
December	<i>Katsuwonus pelamis</i>	350	1386
December	<i>Thunnus obesus</i>	157	157
December	<i>Auxis thazard</i>	53	53

Table 8b: Number of Spanish purse seine trips sampled at Victoria port by month during 2021.

Months	Number of landings sampled	Species sampled
January	23	Tropical tunas
February	11	Tropical tunas
March	35	Tropical tunas
April	29	Tropical tunas
May	21	Tropical tunas
June	58	Tropical tunas
July	52	Tropical tunas
August	78	Tropical tunas
September	89	Tropical tunas
October	76	Tropical tunas
November	61	Tropical tunas
December	4	Tropical tunas

6.5 Unloading/Transhipment of flag vessels

Table 9: Quantities (tons) by species and gear landed in ports located in the IOTC area competence.

AL3	Purse seiner	Longliner
ALB	107,87	1,36
BET	16190,28	65,13
BLM	10,17	10,75
BSH	0,00	2125,03
BUM	27,14	0,20
DOL	0,00	2,34
FRI	1596,86	0,00
KAW	0,00	0,00
LEC	0,00	24,18
MLS	0,00	6,61
OIL	0,00	0,44
SFA	0,81	5,59
SKJ	94165,29	0,02
SMA	0,00	390,05
SSP	0,00	8,02
SWO	0,00	1491,68
WAH	0,00	0,07
YFT	44346,81	18,51

Table 10: Quantities (tons) by species and gear transhipped at ports located in the IOTC area of competence.

Gear	AL3_sspp	transhipped (tonnes)
longliner	ALB	0,66
longliner	BET	43,98
longliner	BLM	4,26
longliner	BSH	892,54
longliner	DOL	1,40
longliner	LEC	17,22
longliner	MLS	4,67
longliner	OIL	0,26
longliner	SFA	3,78
longliner	SMA	247,20
longliner	SSP	9,17
longliner	SWO	971,53
longliner	WAH	0,07
longliner	YFT	12,84
Purse seiner	ALB	89,00
Purse seiner	BET	15820,94
Purse seiner	FRI	782,74
Purse seiner	SKJ	84786,12
Purse seiner	YFT	39591,33

6.6 Actions taken to monitor catches & manage fisheries for Striped Marlin, Black Marlin, Blue Marlin and Indo-pacific Sailfish [Mandatory]

[Res 18.05 paragraph 9: CPCs shall include in their Annual Reports to the Scientific Committee information on the actions they have taken domestically to monitor catches and to manage fisheries for sustainable exploitation and conservation of Striped Marlin, Black Marlin, Blue Marlin and Indo-pacific Sailfish.]

Electronic Reporting System is mandatory for all the vessels operating in the IOTC area, according to the Regulation 1224/2009. Marlins and sailfish have no special regulation related to the report of its catches. Catches of these species have to be reported by ERS as for the rest of the species.

6.7 Gillnet observer coverage and monitoring [Desirable]

[Res 19.01 paragraph 22]: CPCs are encouraged to increase their observer coverage or field sampling in gillnet fishing vessels by 10% using alternative data collection methodologies (electronic or human) verified by the IOTC Scientific Committee by 2023.

6.8 Sampling plans for mobulid rays [Mandatory]

[Res 19.03 paragraph 11]: CPCs, unless clearly demonstrate that intentional and/or incidental catches of mobulids do not occur in their fisheries, shall develop, with the assistance from the IOTC Secretariat where required, sampling plans for the monitoring of the mobulid rays catches by the subsistence and artisanal fisheries. The sampling plans, including their scientific and operational rationale, shall be reported in the national scientific reports to the Scientific Committee, starting in 2020, which will provide its advice on their soundness by 2021 at the latest. The sampling plans, where required, will be implemented by the CPCs from 2022 onward taking into account the Scientific Committee advice.

As there are no mobulid catches, there is no plan regarding this species.

7. NATIONAL RESEARCH PROGRAMS

Several internal IEO projects are responsible for the scientific tracking of Spanish tuna fisheries from Indian Ocean.

7.1 National research programs on blue shark

[Res 18.02 paragraph 5: CPCs are encouraged to undertake scientific research on blue shark that would provide information on key biological/ecological/behavioural characteristics, life-history, migrations, post-release survival and guidelines for safe release and identification of nursery grounds, as well as improving fishing practices. Such information shall be made available to the Working Party on Ecosystem and Bycatch and Scientific Committee through working documents and the national Annual Reports.]

7.2 National research programs on Striped Marlin, Black Marlin, Blue Marlin and Indo-pacific Sailfish

[Res 18.05 paragraph 11: CPCs are encouraged to undertake scientific research on key biological/ecological/behavioural characteristics, life-history, migrations, post-release survival and guidelines for safe release, identification of nursery grounds, improving selectivity of fishing practices and fishing gears, for Striped Marlin, Black Marlin, Blue Marlin and Indo-pacific Sailfish. The results of such researches shall be made available to the Working Party on Billfishes and the Scientific Committee through working documents and their national Annual Reports.]

7.3 National research programs on sharks

[Res 17.05 paragraph 11: CPCs shall undertake research to: a) identify ways to make fishing gears more selective, where appropriate, including research into the effectiveness of prohibiting wire leaders; b) improve knowledge on key biological/ecological parameters, life-history and behavioural traits, migration patterns of key shark species; c) identify key shark mating, pupping and nursery areas; and d) improve handling practices for live sharks to maximise post-release survival.]

7.4 National research programs on oceanic whitetip sharks

[Res 13.06 paragraph: 6. CPCs shall, where possible, implement research on oceanic whitetip sharks taken in the IOTC area of competence, in order to identify potential nursery areas.]

7.5 National research programs on marine turtles

[Res 12.04 paragraph 10: 10. All CPCs are requested to, where appropriate undertake research trials of circle hooks, use of whole finfish for bait, alternative FAD designs, alternative handling techniques, gillnet design and fishing practices and other mitigation methods which may improve the mitigation of adverse effects on marine turtles.]

7.6 National research programs on thresher sharks

*[Res 12.09 paragraph: 6. CPCs shall, where possible, implement research on sharks of the species *Alopias spp* in the IOTC area of competence, in order to identify potential nursery areas.]*

Table 11. Summary table of national research programs, including dates. [currently underway]

Project title	Period	Countries involved	Budget total	Funding source	Objectives	Short description
Programme régional de marquage de thons	2017–2021	EU – France and Spain		ED- DG FISH	Observer program: collection of bycatch data	

8. IMPLEMENTATION OF SCIENTIFIC COMMITTEE RECOMMENDATIONS AND RESOLUTIONS OF THE IOTC RELEVANT TO THE SC. [Mandatory]

Longline: Vessels are tracked by the Spanish National Fishery Authority and also required to fill in EU fishery logbooks system to be presented to the pertinent authorities and well as VMS and other requirements for fishing.

This surface longline fleet is part of a group of vessels that operate far from their port bases and may not call at their home ports for as long as several years. These vessels have similar structural and fishery characteristics and carry out extremely lengthy trips in terms of time. They may even change oceans between trips providing that this is allowed under their administrative situation.

Table 12. Scientific requirements contained in Resolutions of the Commission, adopted between 2012 and 2021.

Res. No.	Resolution	Scientific requirement	CPC progress
11/04	On a regional observer scheme	Paragraph 9	<p>Since 2017 an observer program is implemented in the longliners fleet, to reach the 5% of mandatory observation in that fleet.</p> <p>In the purse seine fleet the observation reach a 100%, according to their “<i>Código de Buenas Prácticas</i>”.</p> <p>The achievement of the observation in each fleet has been positive, with the exemption of problems in 2020 due to the COVID pandemic.</p>
12/04	On the conservation of marine turtles	Paragraphs 3, 4, 6-10	<p>Each year the report of the implemented measures and the interaction with sea turtles is provided by Spanish Fisheries Secretariat. The report of the interaction in 2021 with marine turtles was provided 01/08/2022</p> <p>Interactions and mortality in marine turtles are annually reported by Spain. The associations are involved in projects in order to inform the fishermen with the best techniques to release and to manage turtles in accordance with FAO requirements (achieved thanks to different initiatives such as FIP in longline fleet, “<i>Código de Buenas Prácticas</i>” for purse seine fleet)</p> <p>The Instituto Español de Oceanografía (IEO) elaborates studies related to marine turtles interactions and measures to reduce the impact of fishing in them.</p> <p>Reference of the studies about bycatch:</p> <p>Ruiz J., F.J. Abascal, P. Bach, J.C. Báez, P. Cauquil, M. Grande, I. Krug, J. Lucas, H. Murua, M. L. Ramos Alonso & P.S. Sabarros (2018). Bycatch of the European, and associated flag, purse-seine tuna fishery in the Indian Ocean for the period 2008-2017. IOTC-2018-WPEB14-15. Working Party on Ecosystems and Bycatch (WPEB), Mon, 10/09/2018 (All day) to Fri, 14/09/2018. Cape Town, South Africa.</p> <p>Báez J.C., M^a. L. Ramos & I.A. Czerwinski (2019). Analysing the bycatch taxonomic structure changes from observers data on board Spanish purse seiners in the Indian Ocean. IOTC-2019-WPEB15-40. Working Party on Ecosystems and Bycatch (WPEB), IOTC meeting, 03/09/2019 to 07/09/2019, La Reunión (France).</p>
12/06	On reducing the incidental bycatch of seabirds in longline fisheries.	Paragraphs 3-7	<p>Each year the report of the interaction with sea birds is provided by Spanish Fisheries Secretariat , In 2021 there were no reported interactions with seabirds.</p>

Res. No.	Resolution	Scientific requirement	CPC progress
			<p>The mitigation measures applied are reported in the Implementation report each year. For the 2022 data, the report was provided to the European Commission on 14thth of March 2022.</p> <p>Mitigation measures summed up in the Resolution have to be implemented in the longline vessels according to the Fishing Temporary Permission and provided as information with the “Fichas de Aves y Tortugas”</p> <p>Complete scientific studies about sea birds interaction with this surface longline gear have been presented for the period 2011-2015 for areas South of 25°S (Fernández-Costa et al. 2016). A broader study was presented in 2018 including a retrospective and geographical overview of the interaction observed between seabirds and this fishery during the long 1993-2017 period inferred from data provided by scientific observers (Fernández-Costa et al. 2018 ref. IOTC-2018-WPEB14-23).</p>
12/09	On the conservation of thresher sharks (family <i>Alopiidae</i>) caught in association with fisheries in the IOTC area of competence	Paragraphs 4–8	<p>Thresher shark is a forbidden species to be caught according to the temporary fishing permission for longliners fishing in the Indian Ocean (a permission mandatory to fish in the IOTC area) and the Spanish law (Orden ARM/2689/2009 & Orden AAA/658/2014).</p> <p>If accidentally caught, it is mandatory to report the catches in the ERS</p> <p>As the Spanish fleet is not directed to catch these species, nor there are no interactions reported, these species aren't, by the moment, subject of study for the IEO.</p>
13/04	On the conservation of cetaceans	Paragraphs 7– 9	<p>Cetaceans are forbidden species to be fished in Spain.</p> <p>As the Spanish fleet is not catching these species, nor there are no interactions reported, these species aren't by the moment subject of study for the IEO.</p>
13/05	On the conservation of whale sharks (<i>Rhincodon typus</i>)	Paragraphs 7– 9	<p>Whale sharks are forbidden to be fished as stated in the TAC/Quota regulation. For the year 2020, Regulation 123/2020, article 52.</p> <p>As the Spanish fleet is not catching these species, nor there are no interactions reported, these species aren't by the moment subject of study for the IEO.</p>
13/06	On a scientific and management framework on the conservation of shark species caught in association with IOTC managed fisheries	Paragraph 5–6	<p>It is forbidden to catch whitetip sharks while it is mandatory to daily report in the Electronic Reporting System the bycatches of every species and to release whitetip sharks avoiding damage to them.</p> <p>Reference of the studies about whitetip sharks: Ramos-Cartelle, A., B. García-Cortés, J. Fernández-</p>

Res. No.	Resolution	Scientific requirement	CPC progress
			<p>Costa, J. Mejuto (2012). Standardized catch rates of the oceanic whitetip shark (<i>Carcharhinus longimanus</i>) from observations of the Spanish longline fishery targeting swordfish in the Indian Ocean during the 1998-2011 period. IOTC-2012-WPEB08-27 (2012).</p> <p>García-Cortés, B., A. Ramos-Cartelle, I. González-González, J. Mejuto (2012). Biological observations of oceanic whitetip shark (<i>Carcharhinus longimanus</i>) on Spanish surface longline fishery targeting swordfish in the Indian Ocean over the period 1993-2011. IOTC-2012-WPEB08-25 (2012).</p> <p>Lopetegui L., Poos J.J, Arrizabalaga H., Guirhem G., Murua H., Lezama-Ochoa N., Griffiths S., Ruiz Gondra J., Sabarros P.S., Báez J.C. & Juan-Jordá, M.J. (2021). A preliminary habitat suitability model for oceanic whitetip shark in the western Indian Ocean. 17th Working Party on Ecosystems and Bycatch: Assessment Meeting, 13-17 de septiembre online. IOTC-2021-WPEB17(AS)-25.</p> <p>Báez J.C., A.M. Barbosa, M.L. Ramos, P. Pascual, J. Ruiz, P.S. Sabarros, M.Tolotti, P. Bach, H. Murua & F. Abascal (2019). Forecasting Oceanic Whitetip shark potential global distribution in a context of climatic change. Joint t-RFMO By-catch WG Doc. No. BYC-13/2019 December 11, 2019. Oporto (Portugal) 16-18 de diciembre 2019. Resumen</p>
15/01	On the recording of catch and effort by fishing vessels in the IOTC area of competence	Paragraphs 1–10	<p>Electronic Reporting System is mandatory in accordance with Regulation 1224/2009.</p> <p>Actualised template of the logbook sent to EU Commission on 6/09/2021</p>
15/02	Mandatory statistical reporting requirements for IOTC Contracting Parties and Cooperating Non-Contracting Parties (CPCs)	Paragraphs 1–7	<p>1 Estimated catches are sent as part of the obligations each year. 2021 Estimated catches provided 19/08/2022</p> <p>2 Reports of the interaction and measures implemented related to sea birds and marine turtles are sent regularly. 3 For 2021, there was no reported interaction with sea birds, marine turtles interactions reported on 1st August 2022</p> <p>4 ERS is mandatory for Spanish vessels.</p> <p>5 Size data has been provided regularly, for 2021, data provided on 22nd of July 2022.</p> <p>6. FADs obligations are fulfilled every year, in 2021, active vessels 22/02/2021, information about the daily FADs use provided monthly.</p> <p>7. Timeliness fulfilled or causes reported.</p>
17/05	On the conservation of sharks caught in association with fisheries managed by IOTC	Paragraphs 6, 9, 11	<p>The statistical requirements about sharks are sent annually to the EU Commission, Estimated catches provided for sharks was fully (ps+II) sent on 19/08/2022</p> <p>Reference of the studies about sharks in IOTC area: Murua, H., Abascal, F.J., Amande, J., Ariz, J., Bach, P., Chavance, P., Coelho, R., Korta, M., Poisson, F.,</p>

Res. No.	Resolution	Scientific requirement	CPC progress
			<p>Neves, M., Seret, B. (2013). Provision of scientific advice for the purpose of the implementation of the EUPOA sharks. Final Report. European Commission, Studies for Carrying out the Common Fisheries Policy (MARE/2010/11 - LOT 2).</p> <p>Poisson, F., Abascal, F., Ellis, J.R., Chavance, P., Bach, P., Santos, M.N., Séret, B., Korta, M., Coelho, R., Ariz, J., Murua, H. (2016). Technical mitigation measures for sharks and rays in tuna and tuna-like fisheries: turning possibility into reality. Aquatic Living Resources 29, 402</p> <p>García-Cortés, B., Ramos-Cartelle, A., Mejuto, J., Carroceda A. and Fernández-Costa, J. (2021). Biological observations of shortfin mako shark (<i>Isurus oxyrinchus</i>) on Spanish surface longline fishery targeting swordfish. IOTC-2021-WPEB17(AS)-INF07.</p> <p>Queiroz, N., Humphries, N.E., Couto, A., Vedor, M., da Costa, I, Sequeira, A.M.M., Mucientes, G., Santos, A.M., Abascal, F.J. et al. (2019) Global spatial risk assessment of sharks under the footprint of fisheries. Nature 572, 461-466.</p> <p>Brunel T., R. Coelho, G. Merino, J. Ortiz De Urbina, D. Rosa, C. Santos & H. Murua, P. Bach, S. Saber & D. Macias (2018). A preliminary stock assessment for the shortfin mako shark in the Indian ocean using a data-limited approach. IOTC-WPEB14-2018-033. Working Party on Ecosystems and Bycatch (WPEB), Mon, 10/09/2018 (All day) to Fri, 14/09/2018. Cape Town, South Africa.</p> <p>Murua, H., J. Santiago, R. Coelho, I. Zudaire, C. Neves, D. Rosa., I. Zudaire, Y. Semba, Z. Geng., P. Bach, H. Arrizabalaga, P. Bach, J.C. Baez, M.L. Ramos, J.F. Zhu & J. Ruiz (2018). Updated Ecological Risk Assessment (ERA) for shark species caught in fisheries managed by the Indian Ocean Tuna Commission (IOTC). Submitted to 21th IOTC Scientific Committee. IOTC-2018-SC21-14_Rev.1.</p> <p>Diallo A, Travassos T.M., Sabarros P., Dagorn L., Deneubourg J.L., Murua H., Ruiz J., Ramos M.L., Báez J.C., Abascal F., Pascual P. & Capello M. (2019). Silky Shark Population Trend In The Indian Ocean Derived From Its Associative Behavior With Floating Objects. IOTC-2019-WPEB15-23. Working Party on Ecosystems and Bycatch (WPEB), IOTC meeting, 03/09/2019 to 07/09/2019, La Reunión (France).</p> <p>Diallo A., M.T. Tolotti, P. Sabarros, L. Dagorn, J.L. Deneubourg, H. Murua, J. Ruiz, M.L. Ramos, J.C. Báez, F.J. Abascal, P.J. Pascual & M. Capello (2019). Deriving abundance indices for pelagic sharks based on their associative behavior with floating objects. Joint t-RFMO By-catch WG Doc. No. BYC-23/2019. Oporto (Portugal) 16-18 de diciembre 2019.</p> <p>Tolotti, M., Sabarros, P.S., Bach, P., Grande, M., Ruiz, J., Murua, H., Coelho, R., Abascal, F., Báez, J.C.,</p>

Res. No.	Resolution	Scientific requirement	CPC progress
			Pascual, P., Ramos, M.L., Shahid, U. and Juan-Jordá, M.J. (2019). In support of the IOTC ecosystem report card: Indicators for non-retained sharks and rays. 15th Working Party on Ecosystems and Bycatch. Indian Ocean Tuna Commission. IOTC-2019-WPEB15-25_Rev1
18/02	On management measures for the conservation of blue shark caught in association with IOTC fisheries	Paragraphs 2-5	<p>It is mandatory to notify all the catches and bycatches in the ERS, according to Regulation 1224/2009.</p> <p>Fernández-Costa J., A. Ramos-Cartelle, B. García-Cortés, J. Mejuto. (2015). Standardized catch rates for the blue shark (<i>Prionace glauca</i>) caught by the Spanish longline in the Indian Ocean during the 2001-2013 period. IOTC-2015-WPEB11-25.</p> <p>Reference of the studies about blue sharks:</p> <p>Coelho, R., J. Mejuto, A. Domingo, K. Liu, E. Cortés, K. Yokawa, F. Hazin, F. Arocha, Ch. da Silva, B. García-Cortés, A.M. Ramos-Cartelle, P. Lino, R. Forselledo, S. Ohshimo, F. Carvalho, M. Neves. (2018). Distribution patterns and population structure of the blue shark (<i>Prionace glauca</i>) in the Atlantic and Indian Oceans. <i>Fish and Fisheries</i>. 19(1): 90-106 (https://doi.org/10.1111/faf.12238).</p> <p>Fernández-Costa, J., Ramos-Cartelle, A. and Mejuto, J. (2021). Updated standardized catch rates in biomass for the blue shark (<i>Prionace glauca</i>) caught by the Spanish surface longline fleet in the Indian Ocean during the 2001-2019 period. IOTC-2021-WPEB17(DP)-09.</p>
18/05	On management measures for the conservation of the Billfishes: Striped marlin, black marlin, blue marlin and Indo-Pacific sailfish	Paragraphs 7 – 11	<p>It is mandatory to notify all the catches and bycatches in the ERS, according to Regulation 1224/2009</p> <p>Data on discards and retained catches provided (19/09/2022 and 19/08/2022).</p>
18/07	On measures applicable in case of non-fulfilment of reporting obligations in the IOTC	Paragraphs 1, 4	<p>Report of Implementation is annually sent to the EU Commission. For 2021, report of implementation sent on 14th March 2021.</p> <p>Nominal catches provided in 2022 as stated by the IOTC for purse seiners and longliners (19th August 2022).</p>
19/01	On an Interim Plan for Rebuilding the Indian Ocean Yellowfin Tuna Stock in the IOTC Area of Competence	Paragraph 22	Gillnets are not a gear used by Spain in IOTC.
19/03	On the Conservation of Mobulid Rays Caught in Association with Fisheries in the IOTC Area of Competence	Paragraph 11	There wasn't any catch of Mobulid Rays by Spanish fleet between 2012 and 2021 in the Indian Ocean

9. LITERATURE CITED

- BÁEZ, J.C., M^a.L. RAMOS, M- HERRERA, H. MURUA, J.L. CORT, S. DENIZ, V. ROJO, J. RUIZ, P.J. PASCUAL-ALAYÓN, A. MUNIATEGI, A. PEREZ SAN JUAN, J. ARIZ, F. FERNÁNDEZ & F. ABASCAL (2020). Monitoring of Spanish flagged purse seine fishery targeting tropical tuna in the Indian ocean: Timeline and history. *Marine Policy*, 119: 104094. <https://doi.org/10.1016/j.marpol.2020.104094>
- Order APA/25/2021; <https://www.boe.es/buscar/act.php?id=BOE-A-2021-885>
- COUNCIL REGULATION (EC) No 1185/2003 of 26 June 2003 on the removal of fins of sharks on board vessels, amended by COUNCIL REGULATION (EC) No 605/2013

Annex I

Table A1 displays, in a 5°x5° grid, the marine turtles catch performed by the purse seiner fleet between 2010 and 2021. The data collection was strongly influenced by the intensity of Somali piracy (between 2009 and 2014) and the recent pandemic. The observation on board has covered most of the 5°x5° squares where the fleet has been working.

Recently, for the period 2010-2018, some data have been recovered from the Good Practices Program, under the MoU agreement (see section 6.3).

Table A1. Marine turtle bycatches of the purse seiner fleet from 2010-2021 from observers' data in 5°x5° grids. *Note: From 2010 to 2013 the observation on board was suspended (see text)*

Year	Cwp5x5	Lat	Lon	Total effort (number of sets)	Total effort observed (number of sets)	Species	nCaptures	nMortalities	nLiveReleases
2010	-	-	-	-	-	-	-	-	-
2011	-	-	-	-	-	-	-	-	-
2012	-	-	-	-	-	-	-	-	-
2013	-	-	-	-	-	-	-	-	-
2014	-	-	-	-	-	-	-	-	-
2014	100055	00	055	334	21				
2014	100060	00	060	79	4				
2014	105055	05	055	139	1				
2014	105060	05	060	55	3				
2014	200040	-00	040	290	1				
2014	200045	-00	045	696	31				
2014	200050	-00	050	595	63				
2014	200055	-00	055	235	23				
2014	200060	-00	060	102	18				
2014	200065	-00	065	162	5				
2014	205040	-05	040	120	3				
2014	205045	-05	045	240	21				
2014	205050	-05	050	100	1				
2014	205055	-05	055	99	11				
2014	205060	-05	060	72	2				

Year	Cwp5x5	Lat	Lon	Total effort (number of sets)	Total effort observed (number of sets)	Species	nCaptures	nMortalities	nLiveReleases
2015	100045	00	045	90	60	<i>Lepidochelys olivacea</i>	1	0	1
2015	100050	00	050	591	336	<i>Chelonia mydas</i>	1	0	1
2015						Unidentified turtle	1	0	1
2015	100055	00	055	300	163				
2015	100060	00	060	88	29				
2015	100065	00	065	89	4				
2015	105050	05	050	22	14	<i>Chelonia mydas</i>	1	0	1
2015						<i>Lepidochelys olivacea</i>	1	0	1
2015	105055	05	055	112	49				
2015	105060	05	060	26	18				
2015	105065	05	065	4	4				
2015	110060	10	060	1	1				
2015	200040	-00	040	76	56				
2015	200045	-00	045	733	480	<i>Chelonia mydas</i>	1	0	1
2015	200050	-00	050	544	341	<i>Lepidochelys olivacea</i>	1	0	1
2015	200055	-00	055	348	197	<i>Chelonia mydas</i>	2	0	2
2015	200060	-00	060	164	88				
2015	200065	-00	065	213	86				
2015	205040	-05	040	39	15				
2015	205045	-05	045	60	39				
2015	205050	-05	050	109	53				
2015	205055	-05	055	123	67	<i>Chelonia mydas</i>	1	0	1
2015	205060	-05	060	135	76	<i>Eretmochelys imbricata</i>	1	0	1
2015	205065	-05	065	55	36				
2015	210040	-10	040	93	34				
2015	210045	-10	045	59	34				
2015	210050	-10	050	22	9				
2015	210055	-10	055	1	1				
2015	210070	-10	070	2	2				
2015	215040	-15	040	123	75				
2015	215045	-15	045	1	1				
2015	220040	-20	040	9	3				
2016	100045	00	045	19	7				
2016	100050	00	050	464	122	<i>Chelonia mydas</i>	1	0	1
2016						<i>Lepidochelys olivacea</i>	3	0	3
2016	100055	00	055	426	133	<i>Chelonia mydas</i>	1	0	1
2016	100060	00	060	195	95	<i>Caretta caretta</i>	1	0	1
2016						Unidentified turtle	1	0	1
2016	100065	00	065	94	35				
2016	105050	05	050	79	32	<i>Lepidochelys olivacea</i>	1	0	1

Year	Cwp5x5	Lat	Lon	Total effort (number of sets)	Total effort observed (number of sets)	Species	nCaptures	nMortalities	nLiveReleases
2016	105055	05	055	155	49	<i>Eretmochelys imbricata</i>	3	0	3
2016						<i>Chelonia mydas</i>	1	0	1
2016	105060	05	060	64	18	Unidentified turtle	1	0	1
2016	105065	05	065	7	7				
2016	110055	10	055	2	1				
2016	110060	10	060	24	11	<i>Lepidochelys olivacea</i>	5	0	5
2016	110065	10	065	6	2	<i>Lepidochelys olivacea</i>	2	0	2
2016	200040	-00	040	88	17				
2016	200045	-00	045	337	95	<i>Eretmochelys imbricata</i>	1	0	1
2016	200050	-00	050	516	101				
2016	200055	-00	055	416	67	<i>Lepidochelys olivacea</i>	2	0	2
2016	200060	-00	060	214	45				
2016	200065	-00	065	103	25				
2016	205035	-05	035	1	1				
2016	205040	-05	040	339	89	<i>Eretmochelys imbricata</i>	1	0	1
2016	205045	-05	045	304	70	<i>Lepidochelys olivacea</i>	1	0	1
2016	205050	-05	050	119	41				
2016	205055	-05	055	174	60	Unidentified turtle	1	0	1
2016	205060	-05	060	139	29				
2016	205065	-05	065	24	1				
2016	210040	-10	040	76	12				
2016	210045	-10	045	186	86	<i>Chelonia mydas</i>	1	0	1
2016						<i>Dermodochelys coriacea</i>	1	0	1
2016	210050	-10	050	15	1				
2016	210055	-10	055	6	3				
2016	210060	-10	060	30	4				
2016	210065	-10	065	24	7				
2016	215040	-15	040	113	41				
2016	215045	-15	045	2	2				
2016	220035	-20	035	12	9				
2016	220040	-20	040	29	16				
2016	225040	-25	040	3	3				
2016	225045	25	045	1	1				
2017	100045	00	045	77	15				
2017	100050	00	050	692	149	<i>Caretta caretta</i>	1	0	1
2017						<i>Lepidochelys olivacea</i>	1	0	1
2017	100055	00	055	433	120	<i>Caretta caretta</i>	1	0	1
2017						<i>Lepidochelys olivacea</i>	2	0	2
2017	100060	00	060	109	36				
2017	100065	00	065	214	56				



Year	Cwp5x5	Lat	Lon	Total effort (number of sets)	Total effort observed (number of sets)	Species	nCaptures	nMortalities	nLiveReleases
2017	100075	00	075	3	3	<i>Caretta caretta</i>	1	0	1
2017	105050	05	050	38	9	<i>Lepidochelys olivacea</i>	1	0	1
2017	105055	05	055	108	25				
2017	105060	05	060	68	33	<i>Caretta caretta</i>	1	0	1
2017	105065	05	065	22	13				
2017	110055	10	055	21	3				
2017	110060	10	060	59	5				
2017	200040	-00	040	27	1				
2017	200045	-00	045	484	83				
2017	200050	-00	050	460	123				
2017	200055	-00	055	212	51				
2017	200060	-00	060	81	26				
2017	200065	-00	065	85	45				
2017	200075	-00	075	63	37	<i>Caretta caretta</i>	1	0	1
2017						<i>Lepidochelys olivacea</i>	2	0	2
2017	205045	-05	045	92	30	<i>Caretta caretta</i>	1	0	1
2017						<i>Eretmochelys imbricata</i>	2	0	2
2017	205050	-05	050	243	47	<i>Chelonia mydas</i>	1	0	1
2017						<i>Dermochelys coriacea</i>	1	0	1
2017	205055	-05	055	107	46	<i>Chelonia mydas</i>	1	0	1
2017	205060	-05	060	14	1				
2017	210040	-10	040	52	15				
2017	210045	-10	045	280	57				
2017	210060	-10	060	18	4	<i>Caretta caretta</i>	1	0	1
2017	215040	-15	040	54	9				
2017	215045	-15	045	26	11				
2018	100045	00	045	187	26				
2018	100050	00	050	670	162	<i>Lepidochelys olivacea</i>	5	0	5
2018						Unidentified turtle	1	0	1
2018	100055	00	055	315	58	<i>Chelonia mydas</i>	1	0	1
2018						<i>Lepidochelys olivacea</i>	1	0	1
2018	100060	00	060	117	30	<i>Lepidochelys olivacea</i>	1	0	1
2018						Unidentified turtle	1	0	1
2018	100065	00	065	77	35	<i>Lepidochelys olivacea</i>	1	0	1
2018	105050	05	050	152	37	<i>Caretta caretta</i>	1	0	1
2018						<i>Lepidochelys olivacea</i>	2	0	2
2018	105055	05	055	283	55	<i>Lepidochelys olivacea</i>	2	0	2
2018	105060	05	060	73	7	Unidentified turtle	1	0	1
2018	105065	05	065	22	3				
2018	110055	10	055	113	28	<i>Caretta caretta</i>	1	0	1



Year	Cwp5x5	Lat	Lon	Total effort (number of sets)	Total effort observed (number of sets)	Species	nCaptures	nMortalities	nLiveReleases
2018						Unidentified turtle	1	0	1
2018	110060	10	060	113	38	<i>Lepidochelys olivacea</i>	2	0	2
2018						Unidentified turtle	1	0	1
2018	110065	10	065	111	56	<i>Chelonia mydas</i>	1	0	1
2018						Unidentified turtle	1	0	1
2018	110070	10	070	2	1				
2018	115060	15	060	114	17				
2018	115065	15	065	53	19	<i>Lepidochelys olivacea</i>	1	0	1
2018	120060	20	060	6	1				
2018	200040	-00	040	30	1				
2018	200045	-00	045	498	164	<i>Eretmochelys imbricata</i>	1	0	1
2018						<i>Lepidochelys olivacea</i>	1	0	1
2018						Unidentified turtle	2	0	2
2018	200050	-00	050	526	150	Unidentified turtle	1	0	1
2018	200055	-00	055	246	44	<i>Chelonia mydas</i>	1	0	1
2018	200060	-00	060	109	26				
2018	200065	-00	065	162	41				
2018	205040	-05	040	56	23				
2018	205045	-05	045	136	32				
2018	205050	-05	050	167	49				
2018	205055	-05	055	59	30	<i>Lepidochelys olivacea</i>	1	0	1
2018	205060	-05	060	16	8				
2018	205065	-05	065	13	4				
2018	210045	-10	045	55	22				
2018	210055	-10	055	6	3				
2018	215045	-15	045	1	1				
2019	100045	00	045	58	12	<i>Caretta caretta</i>	1	0	1
2019	100050	00	050	670	168	<i>Chelonia mydas</i>	1	0	1
2019						Unidentified turtle	4	0	4
2019	100055	00	055	412	108				
2019	105050	05	050	90	16	Unidentified turtle	1	0	1
2019	105055	05	055	176	59	<i>Lepidochelys olivacea</i>	2	0	2
2019	105060	05	060	105	14				
2019	105065	05	065	18	3	<i>Chelonia mydas</i>	1	0	1
2019	110055	10	055	36	8	Unidentified turtle	1	0	1
2019	110060	10	060	237	35	<i>Caretta caretta</i>	1	0	1
2019						<i>Lepidochelys olivacea</i>	5	0	5
2019						Unidentified turtle	6	0	6
2019						Unidentified turtle	4	0	4
2019	110065	10	065	225	24	<i>Lepidochelys olivacea</i>	4	0	4



Year	Cwp5x5	Lat	Lon	Total effort (number of sets)	Total effort observed (number of sets)	Species	nCaptures	nMortalities	nLiveReleases
2019	115060	15	060	73	7				
2019	115065	15	065	44	3	<i>Lepidochelys olivacea</i>	4	0	4
2019	120060	20	060	2	2				
2019	200040	-00	040	96	8				
2019	200045	-00	045	796	191	<i>Caretta caretta</i>	1	0	1
2019	200050	-00	050	619	197	<i>Caretta caretta</i>	3	0	3
2019						Unidentified turtle	1	0	1
2019	200055	-00	055	488	111				
2019	200060	-00	060	162	67	<i>Caretta caretta</i>	1	0	1
2019	200065	-00	065	150	32	<i>Caretta caretta</i>	1	0	1
2019	205040	-05	040	41	9				
2019	205045	-05	045	64	14				
2019	205050	-05	050	135	36	<i>Caretta caretta</i>	1	0	1
2019	205055	-05	055	50	18				
2019	205060	-05	060	15	7				
2019	210045	-10	045	5	2				
2019	210050	-10	050	50	1				
2019	210055	-10	055	21	3				
2019	210060	-10	060	10	1				
2019	210065	-10	065	2	2				
2019	210070	-10	070	3	3				
2020	100045	00	045	21	9				
2020	100050	00	050	309	44				
2020	100055	00	055	490	17				
2020	100060	00	060	190	0				
2020	100065	00	065	36	1				
2020	105050	05	050	51	1				
2020	105055	05	055	298	12				
2020	105060	05	060	154	1				
2020	105065	05	065	49	0				
2020	110055	10	055	54	0				
2020	110060	10	060	265	13				
2020	110065	10	065	103	0				
2020	115055	15	055	1	0				
2020	115060	15	060	219	21				
2020	115065	15	065	140	1				
2020	120060	20	060	25	1				
2020	120065	-20	065	6	0				
2020	200040	-00	040	61	14				
2020	200045	-00	045	80	31	<i>Caretta caretta</i>	2	0	2



Year	Cwp5x5	Lat	Lon	Total effort (number of sets)	Total effort observed (number of sets)	Species	nCaptures	nMortalities	nLiveReleases
2020	200045	-00	045	32	13	<i>Eretmochelys imbricata</i>	1	0	1
2020	200045	-00	045	495	165				
2020	200050	-00	050	14	6	<i>Chelonia mydas</i>	1	0	1
2020	200050	-00	050	19	6	<i>Eretmochelys imbricata</i>	1	0	1
2020	200050	-00	050	467	92				
2020	200055	-00	055	266	19				
2020	200060	-00	060	94	5				
2020	200065	-00	065	43	1				
2020	200070	-00	070	1	0				
2020	200075	-00	075	14	0				
2020	200080	-00	080	4	0				
2020	205040	-05	040	29	4				
2020	205045	-05	045	168	87				
2020	205050	-05	050	6	2	<i>Lepidochelys olivacea</i>	1	0	1
2020	205050	-05	050	187	58				
2020	205055	-05	055	22	7	<i>Caretta caretta</i>	1	0	1
2020	205055	-05	055	81	17				
2020	205060	-05	060	73	1				
2020	205065	-05	065	17	0				
2020	210045	-10	045	1	0				
2020	210050	-10	050	2	1				
2020	210055	-10	055	1	0				
2020	210060	-10	060	1	0				
2020	210065	-10	065	1	1				
2021	100050	0	50	104	22				
2021	100055	0	55	152	44				
2021	100060	0	60	80	21				
2021	100065	0	65	45	5				
2021	100070	0	70	44	3				
2021	101050	1	50	55	29				
2021	101055	1	55	129	63	<i>Chelonia mydas</i>	1	0	1
2021	101060	1	60	168	32				
2021	101065	1	65	155	9				
2021	101070	1	70	58	3				
2021	102050	2	50	15	6				
2021	102055	2	55	173	97				
2021	102060	2	60	133	66	<i>Eretmochelys imbricata</i>	1	0	1
2021	102065	2	65	164	5				
2021	102070	2	70	25					
2021	103055	3	55	138	65				



Year	Cwp5x5	Lat	Lon	Total effort (number of sets)	Total effort observed (number of sets)	Species	nCaptures	nMortalities	nLiveReleases
2021	103060	3	60	134	56				
2021	103065	3	65	68	7				
2021	103070	3	70	7					
2021	104055	4	55	58	14				
2021	104060	4	60	156	74	<i>Lepidochelys olivacea</i>	3	0	3
2021	104065	4	65	24	3				
2021	104070	4	70	6					
2021	105055	5	55	18	1				
2021	105060	5	60	186	55	<i>Lepidochelys olivacea</i>	1	0	1
2021	105065	5	65	35	9				
2021	105070	5	70	10					
2021	106055	6	55	16	1				
2021	106060	6	60	113	22				
2021	106065	6	65	45	7				
2021	106070	6	70	9					
2021	107055	7	55	26					
2021	107060	7	60	67	12				
2021	107065	7	65	36	2				
2021	107070	7	70	13					
2021	108055	8	55	30					
2021	108060	8	60	39	14				
2021	108065	8	65	43	24				
2021	109055	9	55	3					
2021	109060	9	60	14	3				
2021	109065	9	65	28	19				
2021	109070	9	70	2					
2021	110060	10	60	5					
2021	110065	10	65	10					
2021	110070	10	70	1					
2021	111060	11	60	8	4				
2021	111065	11	65	2					
2021	112060	12	60	6					
2021	112065	12	65	7	1				
2021	113060	13	60	1					
2021	113065	13	65	5					
2021	113070	13	70	4					
2021	114060	14	60	3					
2021	114065	14	65	5					
2021	114070	14	70	5					
2021	115060	15	60	4					



Year	Cwp5x5	Lat	Lon	Total effort (number of sets)	Total effort observed (number of sets)	Species	nCaptures	nMortalities	nLiveReleases
2021	115065	15	65	10					
2021	115070	15	70	13					
2021	116060	16	60	4					
2021	116065	16	65	16					
2021	116066	16	66	4					
2021	116067	16	67	1					
2021	116069	16	69	1					
2021	117065	17	65	20					
2021	118065	18	65	15					
2021	119065	19	65	6					
2021	119070	19	70	2					
2021	120065	20	65	7	1				
2021	121065	21	65	2					
2021	200050	0	50	103	17				
2021	200055	0	55	106	35				
2021	200060	0	60	32	8				
2021	200065	0	65	23	1				
2021	200070	0	70	31	9				
2021	201045	1	45	1					
2021	201050	1	50	81	11				
2021	201055	1	55	50	8				
2021	201060	1	60	82	5				
2021	201065	1	65	49	10				
2021	201070	1	70	44	10	<i>Lepidochelys olivacea</i>	1	0	1
2021	201080	1	80	2					
2021	202045	2	45	2					
2021	202050	2	50	37	15				
2021	202055	2	55	56	9				
2021	202060	2	60	60	2				
2021	202065	2	65	48	1				
2021	202070	2	70	91	5				
2021	203045	3	45	1	1				
2021	203050	3	50	14					
2021	203055	3	55	43	3				
2021	203060	3	60	25					
2021	203065	3	65	18	3				
2021	203070	3	70	27	2	<i>Dermochelys coriacea</i>	1	0	1
2021	203080	3	80	8					
2021	204050	4	50	5					
2021	204055	4	55	38	11				

Year	Cwp5x5	Lat	Lon	Total effort (number of sets)	Total effort observed (number of sets)	Species	nCaptures	nMortalities	nLiveReleases
2021	204060	4	60	48	14				
2021	204065	4	65	3	1				
2021	204070	4	70	16	1				
2021	205050	5	50	25					
2021	205055	5	55	33	4				
2021	205060	5	60	7	3				
2021	205065	5	65	6					
2021	205070	5	70	3					
2021	206050	6	50	4	1				
2021	206055	6	55	20	2				
2021	206060	6	60	6	2				
2021	207050	7	50	6	3				
2021	207055	7	55	17	6				
2021	207060	7	60	3	3				
2021	208050	8	50	3	3				
2021	208055	8	55	3	2				
2021	208060	8	60	3	1				
2021	209050	9	50	8	1				
2021	210050	10	50	3					
2021	211065	11	65	1	1				
2021	211070	11	70	1	1				
2021	213065	13	65	1	1				
2021	214060	14	60	1					

Table 2. Marine turtle bycatches of the Spanish surface longline fleet from 2010-2021 from observers' data in 5°x5° grids. Note: All of the individuals are part of the capture, except for one, which is observed next to the gear but without interaction.

Year	Cwp5x5	Lat	Lon	Total effort (number of sets)	Total effort observed (number of sets)	Species	nCaptures	nMortalities	nLiveReleases
2010	225035	-25	35	1097,931	9,896				
2010	225040	-25	40	329,775	83,938				
2010	225045	-25	45	59,160	9,334				
2010	230040	-30	40	394,900	3,451				
2011	225035	-25	35	844,114	63,139				
2012	225070	-25	70	7,448	7,451				
2013	225035	-25	35	1253,195	25,547	<i>Dermochelys coriacea</i>	1	0	1
2013	225055	-25	55	179,199	1,221				
2013	225060	-25	60	378,680	1,201				
2013	225065	-25	65	140,404	3,594				
2013	225070	-25	70	54,600	3,089				



Year	Cwp5x5	Lat	Lon	Total effort (number of sets)	Total effort observed (number of sets)	Species	nCaptures	nMortalities	nLiveReleases
2013	230030	-30	30	71,049	6,029	<i>Caretta caretta</i>	2	0	2
2013	230035	-30	35	787,328	57,750	<i>Caretta caretta</i>	13	2	11
2013	230040	-30	40	690,827	55,265	<i>Caretta caretta</i>	4	1	3
2013	230045	-30	45	248,778	16,178				
2013	230055	-30	55	222,310	6,008				
2013	235040	-35	40	67,440	5,039	<i>Caretta caretta</i>	6	2	4
2013						<i>Dermochelys coriacea</i>	1	0	1
2014	220035	-20	35	15,964	1,916				
2014	225035	-25	35	774,128	50,957	<i>Chelonia mydas</i>	1	0	1
2014						<i>Caretta caretta</i>	1	0	1
2014	230035	-30	35	772,689	14,104	<i>Caretta caretta</i>	3	0	3
2014	230040	-30	40	138,240	1,180				
2014	235035	-35	35	13,349	2,592				
2015	225040	-25	40	80,660	6,957				
2015	230040	-30	40	439,697	38,776	<i>Caretta caretta</i>	2	0	2
2016	220070	-20	70	15,168	15,173				
2016	225070	-25	70	174,702	42,699	<i>Dermochelys coriacea</i>	3	0	3
2016						<i>Caretta caretta</i>	1	1	0
2016	225075	-25	75	186,638	48,046				
2017	220070	-20	70	10,712	10,712				
2017	225035	-25	35	528,761	72,232				
2017	225040	-25	40	432,900	85,407	<i>Caretta caretta</i>	1	0	1
2017						<i>Dermochelys coriacea</i>	3	0	3
2017	225045	-25	45	283,300	52,181				
2017	225065	-25	65	196,756	25,156	<i>Dermochelys coriacea</i>	1	0	1
2017	225070	-25	70	233,192	16,092				
2017	230065	-30	65	7,932	7,932	<i>Caretta caretta</i>	1	0	1
2018	225035	-25	35	457,327	45,192				
2018	225040	-25	40	269,700	56,823				
2018	225045	-25	45	91,522	4,496				
2018	225055	-25	55	179,590	19,550				
2018	230035	-30	35	523,500	21,714	<i>Caretta caretta</i>	3	0	3
2018	230040	-30	40	755,670	6,576				
2018	230045	-30	45	33,000	4,500				
2019	220060	-20	60	58,950	9,005				
2019	225035	-25	35	105,900	24,444	<i>Caretta caretta</i>	1	0	1
2019	225040	-25	40	254,600	3,858				
2019	225045	-25	45	79,600	4,941				
2019	225050	-25	50	30,900	9,706				
2019	225055	-25	55	202,400	13,457				



Year	Cwp5x5	Lat	Lon	Total effort (number of sets)	Total effort observed (number of sets)	Species	nCaptures	nMortalities	nLiveReleases
2019	225060	-25	60	303,800	39,666				
2019	230030	-30	30	27,685	24,170				
2019	230035	-30	35	1175,598	47,673	Unidentified turtle	1	0	1
2019						<i>Caretta caretta</i>	1	0	1
2019	230040	-30	40	460,400	4,705				
2019	230045	-30	45	94,900	4,871				
2019	230050	-30	50	87,160	3,369				
2019	230055	-30	55	31,000	2,290				
2019	235030	-35	30	100,500	1,294				
2020									
2020	225035	-25	35	479,112	3,060				
2020	230030	-30	30	139,770	9,964				
2020	230035	-30	35	767,638	34,442	<i>Caretta caretta</i>	1	0	1
2020	235030	-35	30	4,820	2,220	<i>Caretta caretta</i>	2	0	2
2021									
2021	225035	-25	35	589,879	41300	<i>Dermochelys coriacea</i>	2	0	2
2021	230035	-30	35	475,430	980				
2021	225040	-25	40	197,424	11,620				
2021	225070	-20	70	48,090	48,090				
2021	220060	-20	60	74,620	49,615	<i>Caretta caretta</i>	1	0	1

**REPORT OF THE 2021 TRIPS ON BOARD EU-SPAIN TROPICAL TUNA PURSE
SEINERS BY SCIENTIFIC OBSERVERS IN THE SPANISH DATA COLLECTION PLAN
(PNDB) SUPPLIED BY MoU (AZTI & SFA-Seychelles Fishing Authority) AND IEO
(Spanish Institute of Oceanography) RESEARCH CENTERS**

Authors:

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**1. NATIONAL OBSERVER PROGRAM FRAMEWORK AND ACTIVITIES
PERFORMED BY THE OBSERVERS:**

The EU establishes a Union framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the common fisheries policy (CFP) through the Regulation (UE) 2017/1004 of the European Parliament and of the Council of 17 May 2017.

Under the coordination of the Spanish Fisheries Secretariat (SGP), a multi-annual data collection program (PNDB – *Programa Nacional de Datos Básicos*) is implemented with the collaboration of various research centers.

The Spanish Institute of Oceanography (IEO), together with the AZTI Foundation, are in charge of the implementation concerning the ‘*National Program of Tropical Tuna Fishing*’. Commercial vessels are sampled with Scientific Observers to estimate the bycatch and discards of Spanish-flagged tuna purse seiners operating in tropical waters of the Atlantic and Indian Oceans.

In addition to PNDB, a Memorandum of Understanding (MoU) for the deployment of fisheries observers on tuna purse-seine fleet between TAAF, Mauritius Ministry of Fisheries, Seychelles Fisheries Authority (SFA) and AZTI Foundation was signed in 2014. This agreement has allowed placing local observers on board instructed with the directives of the PNDB.

During each trip, the observers on board must collect the required data by filling in the following FORMS:

- ✓ Form TRIP: general characteristics of the trip (start date, end date, port...)
- ✓ FORM A: route and environmental parameters (types of activity, coordinates, temperature...)



- ✓ FORM B: fishing characteristics (type of banc, tuna discards, bycatch, catch, destiny...)
- ✓ FORM C1: tuna discards length sampling
- ✓ FORM C2: bycatch length and sex sampling
- ✓ FORM D: description and components of floating objects

The main tasks to be performed by these scientific observers during the set follow a PRIORITY order, which is:

- ✓ 1st Tuna discards and estimation of bycatch:

Tuna discards by species

Tuna Length sampling (FL to the lowest nearest cm)

Bycatch estimation (weight or number) by species

- ✓ 2nd Sampling of other species:

The whole bycatch will be sampled or a representative sample will be selected whenever its quantity is high. Sampling will be done following a list of priorities by species group, measuring always the size to the lowest nearest cm:

Sharks and rays

Turtles

Billfishes

Other fishes

- ✓ 3rd Tuna catch:

The data collected will be obtained from the information provided by the skipper and/or the main engineer, registering the catch weight (in tonnes) by species and the destiny well/s. If any discrepancy were observed, it will be described in the comments of the suitable form.

2. COVERAGE:

The number of sets sampled supposes approximately a 14% of the total number of sets performed by the Spanish tropical tuna purse seiner fleet in the Indian Ocean in 2020.

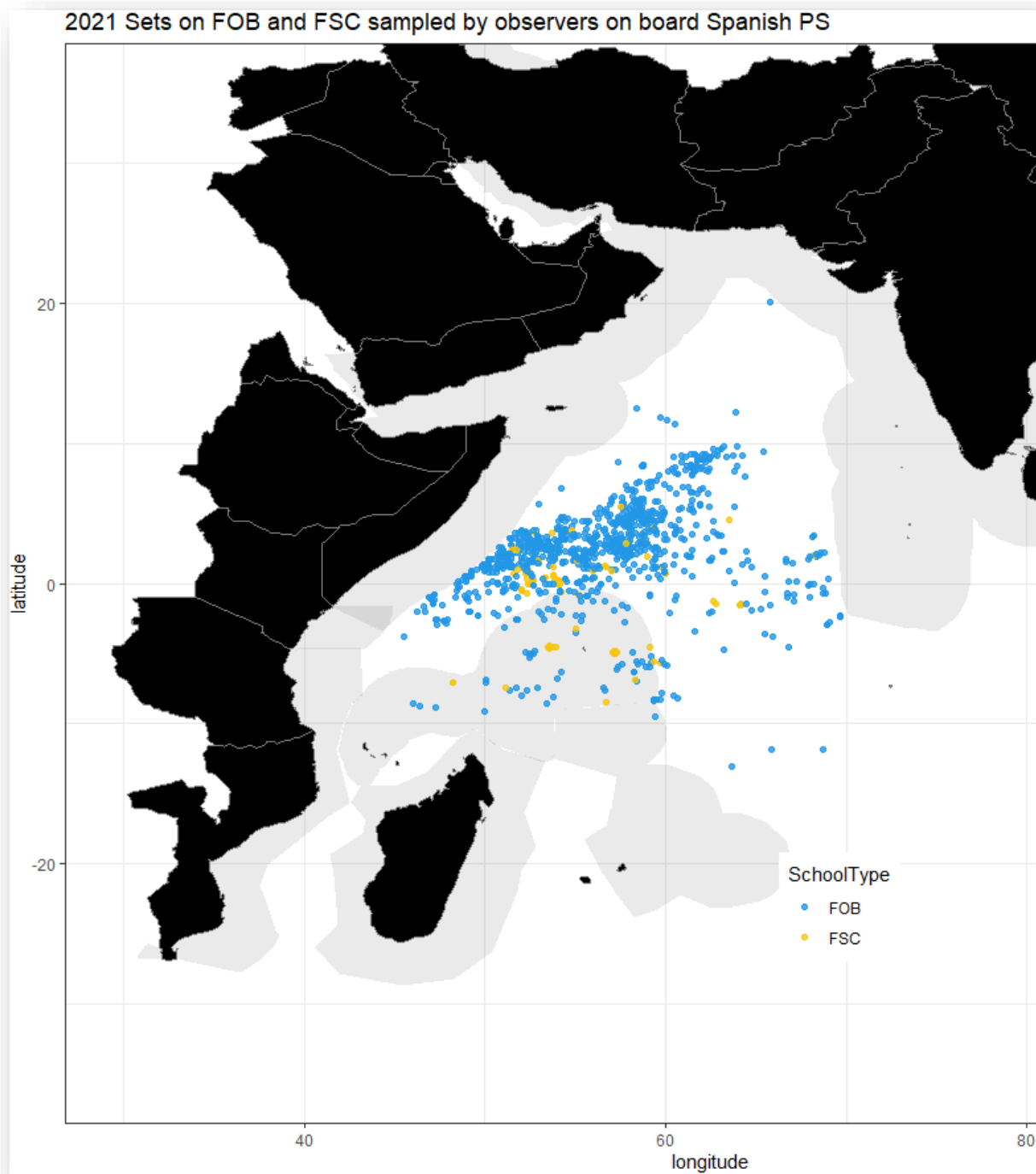
3. VESSELS AND SETS SAMPLED:

A total of 35 trips (approximately a 23,8 % of the total trips performed by this fleet) and 1015 sets (a 23,7% of the total sets) on board 10 of the 15 Spanish tropical tuna purse seiners in the Indian Ocean have been carried out. They are shown in the following table, stating the number of days at sea and the number of sets (on free schools or object schools) by vessel performed in 2021, with a media of 2.7 null sets by trip. All the sets performed (917 on object schools and 98 on free schools) were sampled by the observers on board:

IOTC vessel code	Days at sea	N sets on Free schools	N sets on Object schools	Number of trips
IOTC0015353	46	7	62	2
IOTC0015569	57	2	52	2
IOTC00159	19	-	30	1
IOTC00161	87	15	101	3
IOTC0016254	23	3	32	1
IOTC0017253	214	41	224	8
IOTC00175	159	6	173	7
IOTC00187	107	21	83	5
IOTC008281	14	-	25	1
IOTC00907	76	3	135	5
TOTAL	802	98	917	35

4. FISHING GROUND:

The following figure shows the position of the sets performed in the 35 trips sampled, including a graphical distinction between free schools (FSC-in yellow) and object schools (FOB-in blue):



5. TARGET CATCHES AND DISCARDS

The following table specifies the observed tuna catches by species (in kilograms), depending on whether they have been retained or discarded, and the number and weight of the individuals sampled by scientific observers.

Tuna species	Observed retained catches (Kg)	Observed Discards (Kg)	No of individuals measured*	Weight (Kg) of the measured individuals*
SKJ (<i>Katsuwonus pelamis</i>)	18786631,9	39232,2	953	1683,436
YFT (<i>Thunnus albacares</i>)	8569552,13	71162	381	1233,17
BET (<i>Thunnus obesus</i>)	2612417,81	58.764	30	99
FRI (<i>Auxis thazard</i>)	32001	52233,26	1212	1414,74
FRZ (<i>Auxis spp.</i>)	11,641	2648,359	571	646,11
BLT (<i>Auxis rochei</i>)	-	1,025	18	16,83
KAW (<i>Euthynnus affinis</i>)	-	-	-	-

* all measurements of tuna species belong to discarded fraction

6. BYCATCH:

Apart from tuna species, a total of 48 species and taxa belonging to species groups associated to tropical tuna fisheries have been identified and measured during the sampled trips, having an approximate global retained catch of 45666 kg, an equivalent to 12091 individuals. The discarded fraction of these taxa reached an estimation of 54773 individuals. A total of 9500 individuals were sampled (from the retained and the discarded fraction), most of them belonging to the species FAL (*Carcharhinus falciformis*), RRU (*Elagatis bipinnulata*), DOL (*Coryphaena hippurus*), CNT (*Canthidermis maculata*) and WAH (*Acanthocybium solandri*).

The highest volume of discarded associated catches, considering the number of individuals, corresponds to the species, in order: CNT (*Canthidermis maculata*), RRU (*Elagatis bipinnulata*), FAL (*Carcharhinus falciformis*) and DOL (*Coryphaena hippurus*). For the retained fraction, the most numerous species were: RRU (*Elagatis bipinnulata*), DOL (*Coryphaena hippurus*), MSD (*Decapterus macarellus*) and CNT (*Canthidermis maculata*).

Considering only the weight, the highest volume corresponds to, in order: FAL (*Carcharhinus falciformis*), DOL (*Coryphaena hippurus*) and RRU (*Elagatis bipinnulata*).

Report Turtles, Cetaceans and Whale sharks UE-Spain2022

IOTC-RESOLUTION 12/04 ON THE CONSERVATION OF MARINE TURTLES

IOTC-RESOLUTION 13/04 ON THE CONSERVATION OF CETACEANS

IOTC-RESOLUTION 13/05 ON THE CONSERVATION OF WHALE SHARKS

IOTC-RESOLUTION 13/03 ON THE CONSERVATION OF SEABIRDS

Indian Ocean

Purse Seine

- During the year **2021** a total of 1015 sets were directly human observed on board 5 Spanish purse seiners targeting on tropical tunas in the Indian Ocean. The total number of sets performed for the Spanish fleet was 4289 sets. According to this fishing effort, the sampling coverage achieved was 23.7 % of the sets.

A total of 8 sea turtles were observed interacting with purse seiners, all of them were released alive. The turtles were related with sets on floating objects (FOBs).

The global resulting interaction and mortality rates were 0.0019 turtles per set and 0, respectively (see table 1). Total interaction rate was lower than to last year's (2020) bycatch ratio (0.0107).

Table 1. Rates of interaction and mortality of marine turtles by species and total, obtained during the year 2020 in the Indian Ocean.

Species	Year	Interaction rate (turtles/sets observed)	Mortality rate	Number
<i>Dermochelys coriacea</i>	2021	0.0012	0	1
<i>Eretmochelys imbricata</i>	2021	0.0002	0	1
<i>Lepidochelys olivacea</i>	2021	0.0015	0	5
<i>Chelonias mydas</i>	2021	0.0002	0	1
Total turtles	2021	0.0019	0	8

The observers on board the Spanish purse seine fleet in the Indian Ocean have also recorded 2 turtles not involved in the sets but in FOBs: one of them (*Eretmochelys imbricata*) swimming free next to the FOB and a non identified turtle entangled and died in a FOB. The ratio of turtles observed was 0.0005, having observed 2372 visits to FOBs.

- There were no records of interactions with cetaceans.
- There was one record of an interaction with a whale shark, which was found after the set and released alive.
- There were no records of interactions with Seabirds

Surface Longline

A total of 101,900 hooks were observed and analyzed in the Spanish surface longline fishery targeting swordfish in the Indian Ocean during the year 2021, which corresponded to a total of 96 sets and 117 days at sea (figure 1).

In this period two interactions with marine turtles were reported, being both of the species *Dermochelys coriacea*. The initial locations of the sets where they were captured are 29°9.6' S, 41°3.5' E and 28°39' S, 38°49.1' E (set numbers 21 and 35). Both of them were hooked with their left flipper on the hook, but were released and returned alive to the sea. Taking this into consideration, the resulting interaction was $1.9610E^{-05}$ per hook and mortality rate has been nil..

There has been no interaction on mammals and neither on the basking shark.

There were no records of interactions with Seabirds

There were no records of interactions with Whale Sharks.

Regarding the scientific at-sea sampling program coordinated by the IEO-CSIC during 2021, a total of 49,615 hooks were observed, that means a total of 45 fishing days and 51 days at sea (figure 2). There was an interaction with one *Caretta caretta* in the location 23°S-062°E that was released alive, so the mortality rate was null during this trip, with an interaction rate per hook of $2.01552E^{-05}$.

There has been no interaction on seabirds neither on marine mammals, basking or whale sharks.

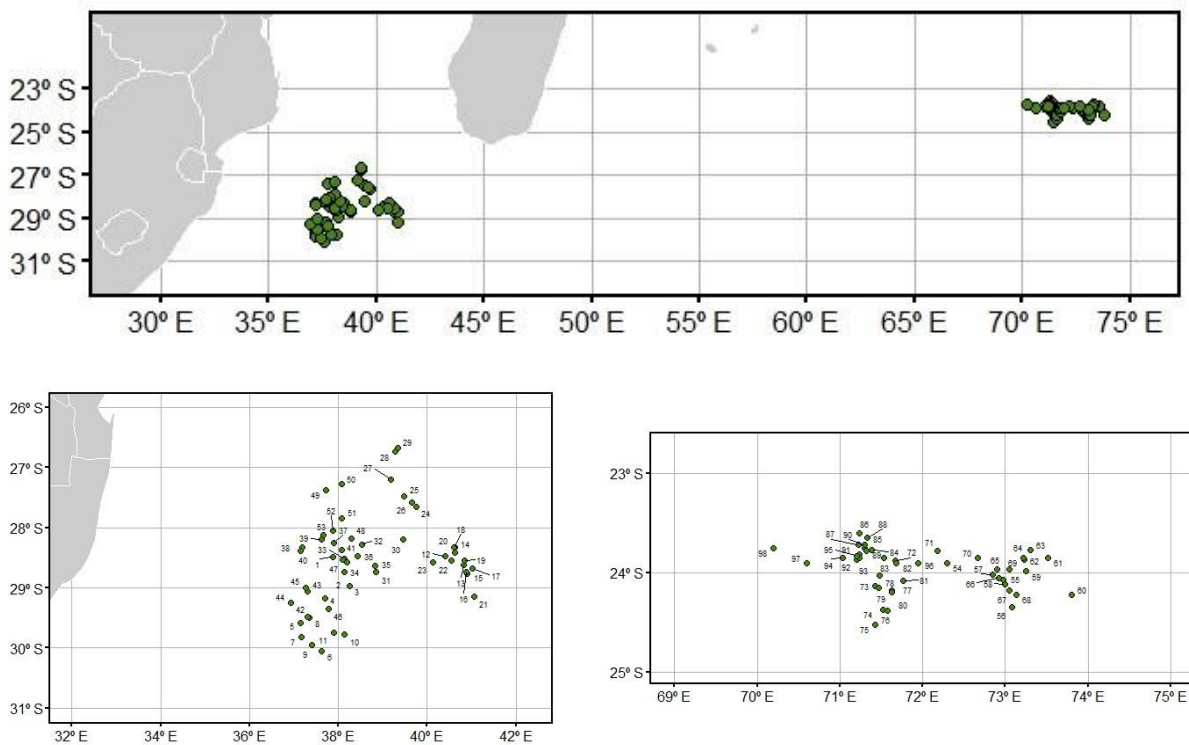


Figure 1: Location of 96 observed sets coordinated by the SGP in the Indian Ocean during the year 2021.

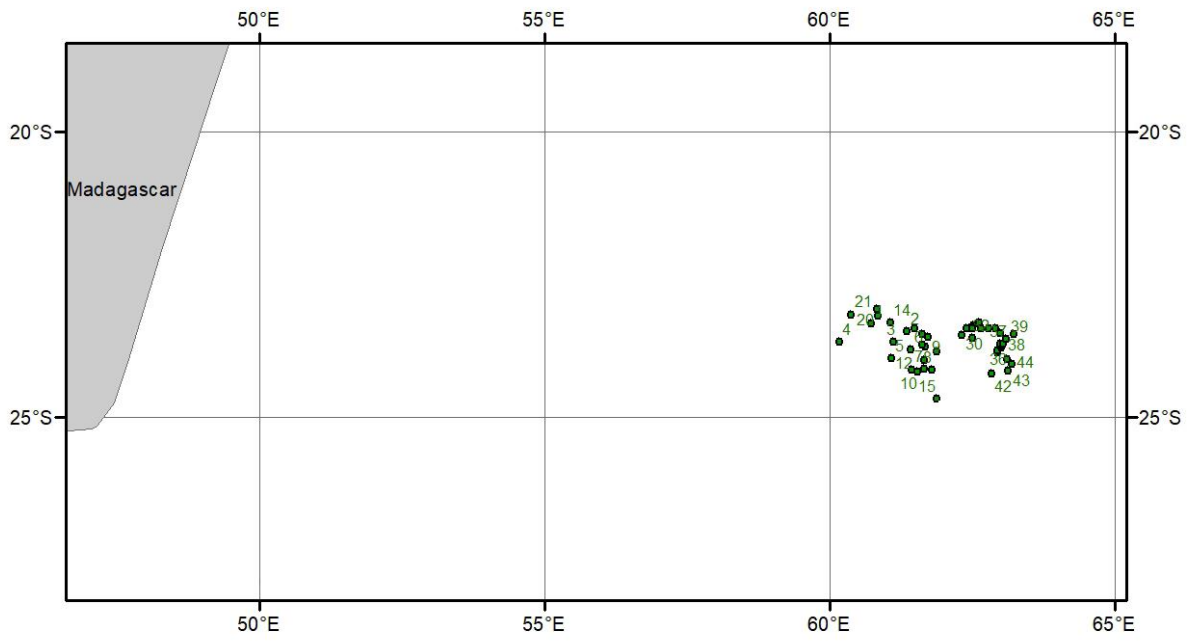


Figure 2. Location of 45 observed sets coordinated by the IEO-CSIC in the Indian Ocean during the year 2021.