[SPAIN] National Report to the Scientific Committee of the Indian Ocean Tuna Commission, 2020

INFORMATION ON FISHERIES, RESEARCH AND STATISTICS

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 2017, final data for the 2016 calendar year must be provided to the Secretariat by 30 June 2017)	NO DD/MM/YYYY [Add submission date here]
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 2017, preliminary data for the 2016 calendar year was provided to the IOTC Secretariat by 30 June 2017). **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 2017, final data for the 2016 calendar year must be provided to the Secretariat by 30 December 2017).	NO DD/MM/YYYY [Add submission date here]
If no, please indicate the reason(s) and intended actions: **Due to the pandemic we have delays in receiving data**	

UE-Spain

Executive Summary

Longline vessels have an average of 30 meters in length, 161 of TRB and 576 CV. A total of 11 longliners operated in the IOTC area during the year 2020. The catch of the target species, swordfish was of 1,602 t and other important species were 2,766 t of sharks, 76 t of tunas, 40 t of billfish and 41t of other fish species. The Observers Program of the General Fisheries Secretariat launched in 2017 covered less fishing effort than in previous years due to the covid-19. The at-sea sampling program of longline fishery coordinated by the IEO was suspended in 2020, due notably to administrative problems and to a lesser extend to covid-19. At-sea sampling program is hired by IEO through call for tenders addressed to specialized companies. The public tender launched in 2019 (to start in 2020) was declared void, having to be re-launched again. This second launch was delayed as a result of the paralysis of public activity during the state of alarm due to the covid-19 pandemic, and could only be reopened in june-july. Given that the process of awarding the contract by public tender takes three-four months under normal conditions, it was finally resolved in December 2020 and signed in January 2021. Since then all activities have been resumed.

Concerning to purse seiners, apart from the pandemic, there are two main factors affecting the data reported: i) from 2010 to 2013 the observation was stopped owing to the uncertainty caused by Somali piracy, though a few trips could be covered in 2009 and 2014; and ii) ending the third quarter of 2019 a new vessel has joined the Spanish freezer fleet. This recent addition has increased the carrying capacity by more than 2400 t.

The performance of the 2020 fishing trips has been driven by two underlying events:

1) Order APA/93/2020, which regulates the exercise of fishing for yellowfin tuna (*Thunnus albacares*) under the Spanish flag, during the 2020 campaign (Bulletin Official of the Spanish State "BOE" No. 31, of February 5, 2020).

2) COVID19 global pandemic.

Contents:

1. BACKGROUND/GENERAL FISHERY INFORMATION

1.1. Purse Seine

Concerning to purse seiners, ending the third quarter of 2019 a new vessel has joined the Spanish freezer fleet. This recent addition has increased the carrying capacity by more than 2400 t. The average catch of the previous five years, 2015-2019 (approximately 157 thousand tons was about 10% more than the catches during the 2020 year. This decrease in the catches is mainly comprised by skipjack tuna (*Katsuwonus pelamis*). Thus, the average catch of the previous five years, 2015-2019 (approximately 94 thousand tons), was about 10% catch more than the campaign 2020 year. On the other hand, due to the outbreak COVID19 global pandemic, sampling in port has been performed for only some months of 2020. Moreover, the scientific observation on board was reduced to minimums. The COVID19 global pandemic has also led to changes in the routes of the fishing boats. For example, due to the international closure of the Seychelles, some crew relays have been held in Mombasa (Kenya).

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 11 longline units have been operating in the Indian Ocean during the year 2020, some on them alternating the Indian with Atlantic and Pacific oceans.

2. FLEET STRUCTURE

2.1. Purse Seine

Table 1 shows the number of Spanish purse seiners fishing in the Indian Ocean in the period 2008-2020. During 2019, a new vessel has been incorporated into the Spanish freezer purse seine fleet, increasing the carried capacity by more than 2400 t.

2.2. Longline

Table 1 shows the number of Spanish longliners fishing in the Indian Ocean during the period 2008-2020. Since the year 2000 the fleet replaced the traditional Spanish longline type by the American style, which uses an average of around 1,200 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 fishing in the Indian Ocean during the period 2008-2020 (data of previous years have been already reported).

PURSE SEINE									LONGLINE
Year/Class	**50-400**	**401-600**	**601-800**	**801-1200**	**1201-2000**	**>2000**	**total**	**C.Cap.**	**# SHIPS**
2008	0	0	0	3	10	4	17	24212	19
2009	0	0	0	2	9	4	15	20805	15
2010	0	0	0	1	8	4	13	20677	12
2011	0	0	0	1	8	4	13	20458	14
2012	0	0	0	1	9	4	14	21657	18
2013	0	0	0	1	9	4	14	22056	22
2014	0	0	0	2	9	4	15	20761	21
2015	0	0	0	1	11	5	17	23251	18
2016	0	0	0	0	10	4	14	23507	13
2017	0	0	0	0	10	4	14	22811	14
2018	0	0	0	0	10	4	14	22811	11
2019	0	0	0	0	10	5	15	25258	11
2020	0	0	0	0	10	5	15	25258	11

3. CATCH AND EFFORT (BY SPECIES AND GEAR)

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. 2020[1]), and an 83% in 2019. During the 2020 the number was 4144 sets, a 90% of the total sets performed by the fleet.

The fishing effort measured both in fishing days and in searching days was the lowest of the historical series in 2019 (Table 2a), and the number of sets was higher than in previous years (4577 sets in average for the period 2009-2019 vs. 4590 sets recorded during the 2020 year). Therefore, in a short space-time period the number of sets has increased.

Since 2017, the Indian Ocean yellowfin tuna stock has been subject to an interim Rebuilding Plan (IOTC Resolution 19/01 at present). During 2020 the General Secretariat for Fisheries (SGP) adopted Individual Vessel Quotas, for the total tropical tuna (Order APA/93/2020; https://www.boe.es/eli/es/o/2020/02/04/apa93), according the quotas from Supplementary Table SS1.

[1] BÁEZ, J.C., Mª.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

Supplementary Table SS1. 2020 total tropical tuna quotas per purse seiner boat, according to Order APA/93/2020. Key. Nombre, Name of vessel; GT, Gross Tons; Upper catch limit for YFT (in kg); Tropical tuna upper catch limit (in kg).

Spanish purse seiner name	GT	YFT upper catch limit	BET, YFT & SKJ
ALAKRANA	3.716	3.377.000	11.256.667
ALBACORA UNO	3.584	3.377.000	11.256.667
ALBATÚN DOS	4.406	3.377.000	11.256.667
ALBATÚN TRES	4.406	3.377.000	11.256.667
DONIENE	6.674	3.377.000	11.256.667
IZURDÍA	4.089	3.377.000	11.256.667
TXORI ARGI	4.134	3.377.000	11.256.667
TXORI ZURI	3.671	3.377.000	11.256.667
ALBACAN	2.347	2.658.000	8.860.000
ALBACORA CUATRO	2.082	2.658.000	8.860.000
ELAI ALAI	2.217	2.658.000	8.860.000
ITSAS TXORI	2.994	2.658.000	8.860.000
PLAYA DE ARITZATXU	2.458	2.658.000	8.860.000
TXORI GORRI	2.937	2.658.000	8.860.000
ATERPE ALAI	2.789	2.658.000	8.860.000
Total		**45.622.000**	**152.073.336**

By species, 85192.614 tonnes have been caught of SKJ, 44245.995 tonnes have been caught of YFT, and 13338.096 tonnes have been caught of BET (Table 2a). Taking into account these three main tropival 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 2015 to 2019 was 94020.6 tons versus 85192.6 in 2020. Furthermore, if we take into account that during 2018 the maximum catch of SKJ reached the maximum in the historical series, during 2019 the second highest catch of SKJ in the historical series was recorded.

The figure 2.a displays the distribution of the effort (in fishing days) of the purse seine Spanish fleet in 2020, per quarter and fishing mode. The figure 2.b gives the distribution of the catches by species of de PS Spanish fleet in 2020 per quarter, species and fishing mode.

3.2. Longline

Figures 1.b shows the historical annual swordfish catches of the Spanish longline fleet in the Indian Ocean since the fishery began its exploration in this ocean in September of 1993.

All the species caught are dressed, frozen and stowed on board. Table 2.b. shows the total yearly catches of swordfish in number of fish and in kg round weight as well as the nominal fishing effort (thousands of hooks) for the 2008-2020 period (Figure 1c).

A total of 1,602 t of swordfish (round weight) were caught during 2020 and the overall nominal catch rate was 603.6 kg (round weight) per thousand hooks.

During the year 2020 a total of 2,654 thousand hooks were deployed by 11 longliners. The distribution of swordfish catches (kg round weight) by 5ºx5º squares of the Spanish surface longline fleet in 2020 is shown in figure 3.iv. The figures 3aiv and 3av show the spatial distribution for the nominal effort in number of thousand hooks and nominal yield in kg of round weight of swordfish per thousand hooks set in the Indian Ocean by the Spanish surface longline fleet during 2020.

Table 2.a. Spanish purse seiners total catch by species and nominal fishing effort in fishing days and searching days of the purse seine Spanish fleet in the Indian Ocean during the period 2008 -2020.

	TOTAL CATCH BY SPECIES			NOMINAL FISHING EFFORT	
YEAR	YFT	SKJ	BET	**Fishing Days**	**Searching Days**
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	3505	2619

Table 2.b. Catch in number of fish and in kg round weight of swordfish obtained by the Spanish surface longline fishery and total number of hooks (in thousands) set in the Indian Ocean during the period 2008-2020 (data of previous years have been already reported).

	TOTAL CATCH SWO		**NOMINAL FISHING EFFORT**
YEAR	**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

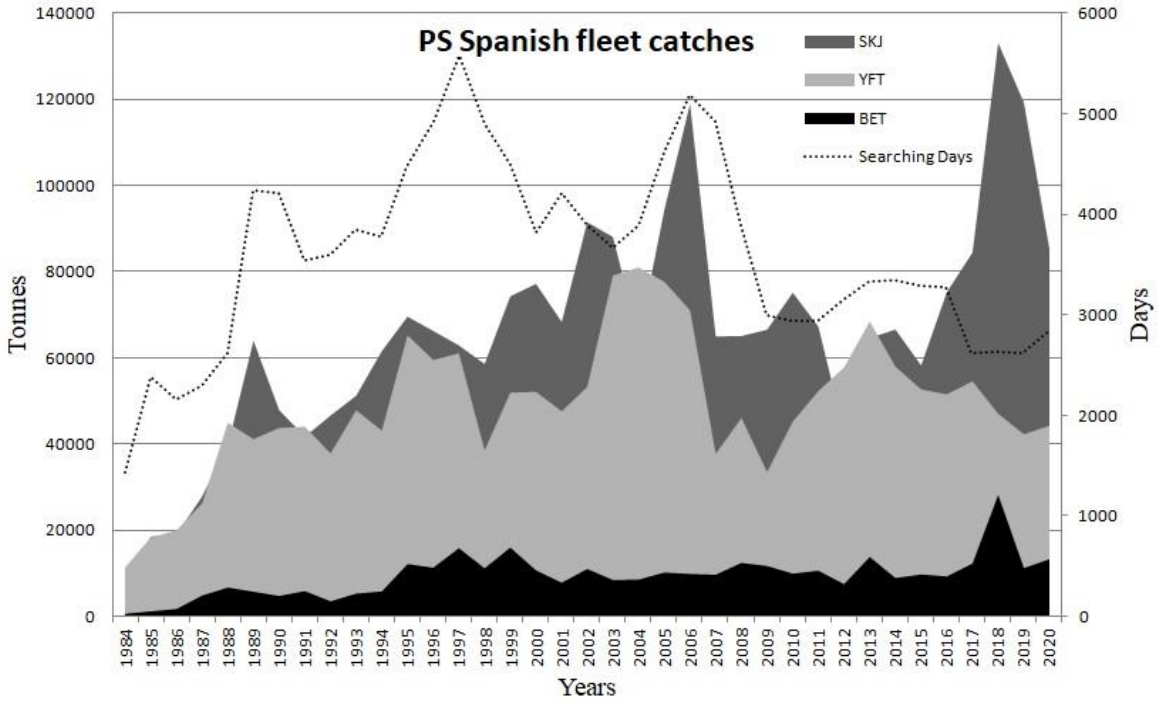


Figure 1.a. Catch by species and effort (searching days) of the purse seine Spanish fleet in the Indian Ocean in the period 1984-2020.

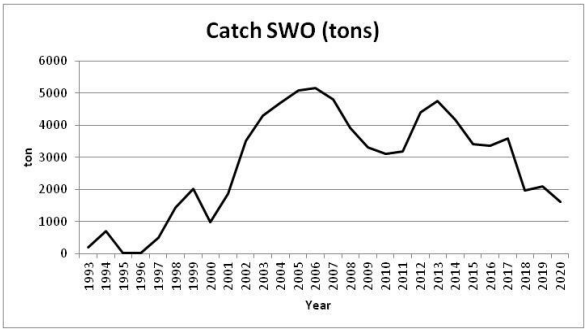


Figure 1.b. Historical annual swordfish catches (tons RW) of the Spanish longline fleet in the Indian Ocean for the 1993-2020 period.

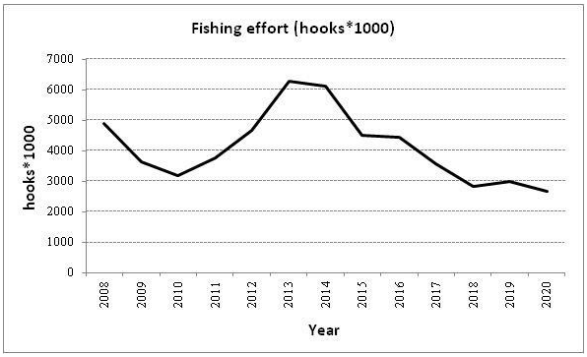


Figure 1.c. Nominal fishing effort (thousands of hooks) of the Spanish longline fleet in the Indian Ocean for the 2008-2020 period.

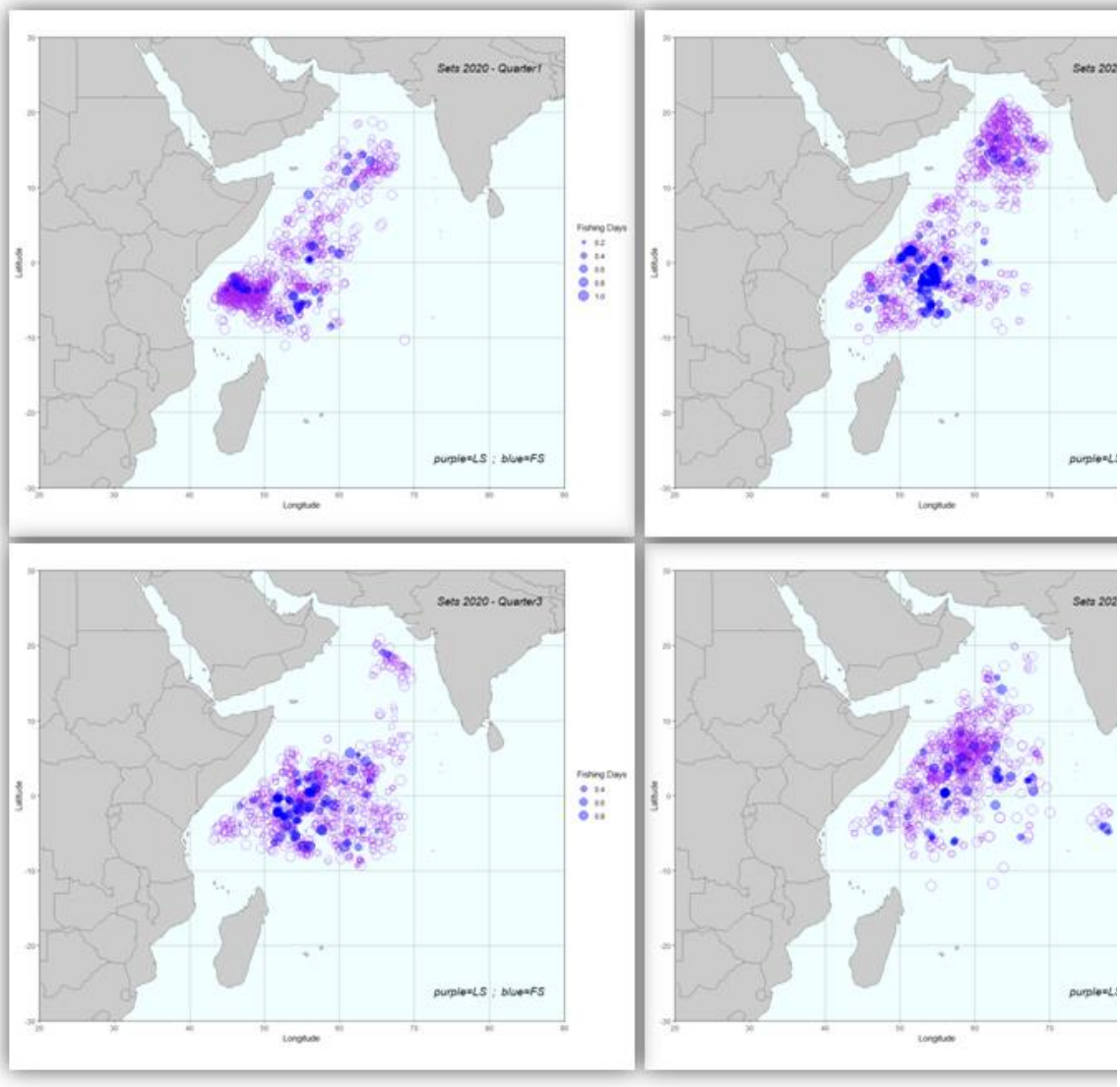


Figure 2.a. Distribution of the effort (fishing days) of the purse seine Spanish fleet in 2019 per quarter and fishing mode. Key: Purple, Log school associated sets; Blue, Free school sets.

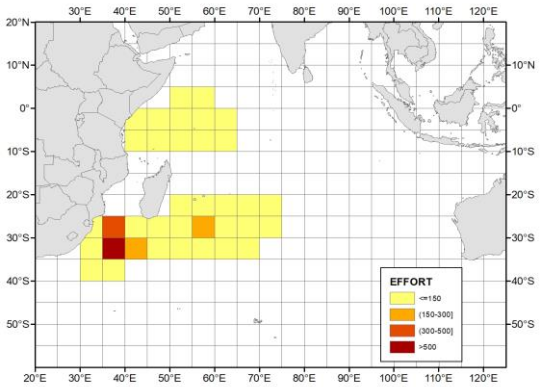


Figure 2.aii. LL. Distribution of the nominal fishing effort (thousand hooks) by 5ºx5º squares carried out by the Spanish surface longline fleet in the Indian Ocean during the year 2020.

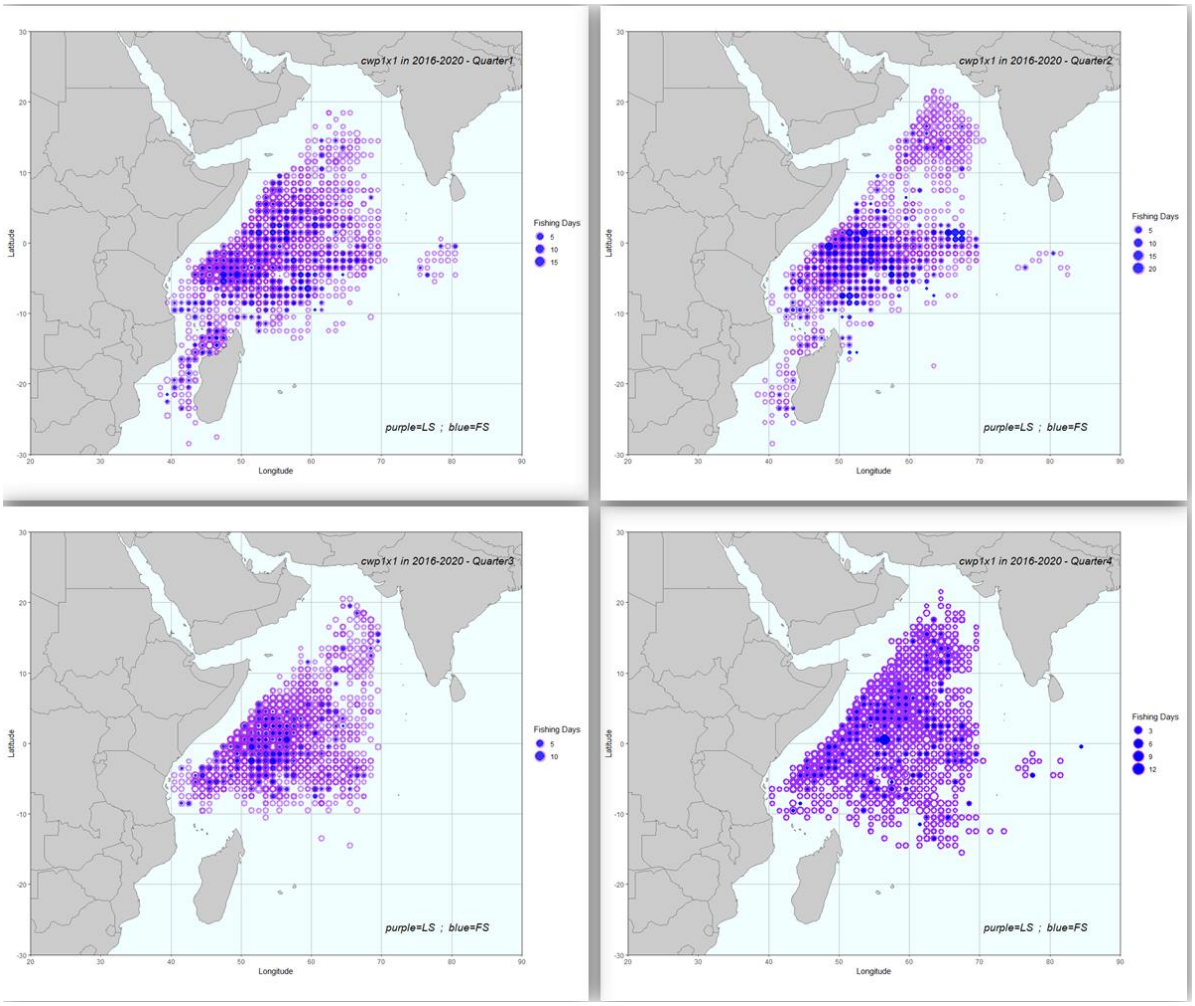


Figure 2b. **PS**. Distribution of the effort (fishing days), by cwp1x1, of the purse seine Spanish fleet in 2016-2020 per quarter and fishing mode. Key: Purple, Log School associated sets; Blue, Free-swimming School sets.

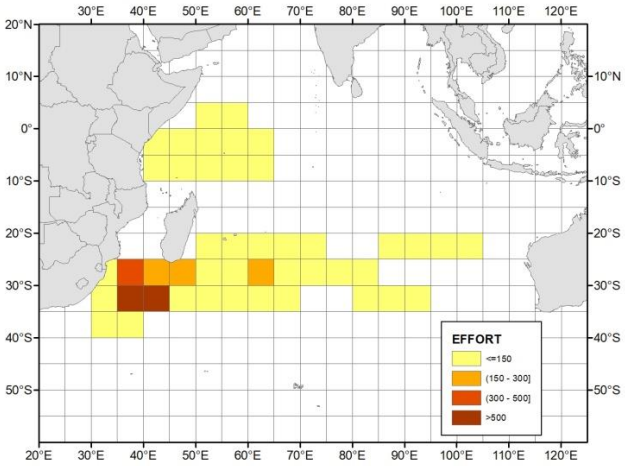


Figure 2.bii. LL. Distribution of the nominal fishing effort (thousand hooks) by 5ºx5º squares carried out by the Spanish surface longline fleet in the Indian Ocean (average of the 5 previous years e.g. 2016-2020).

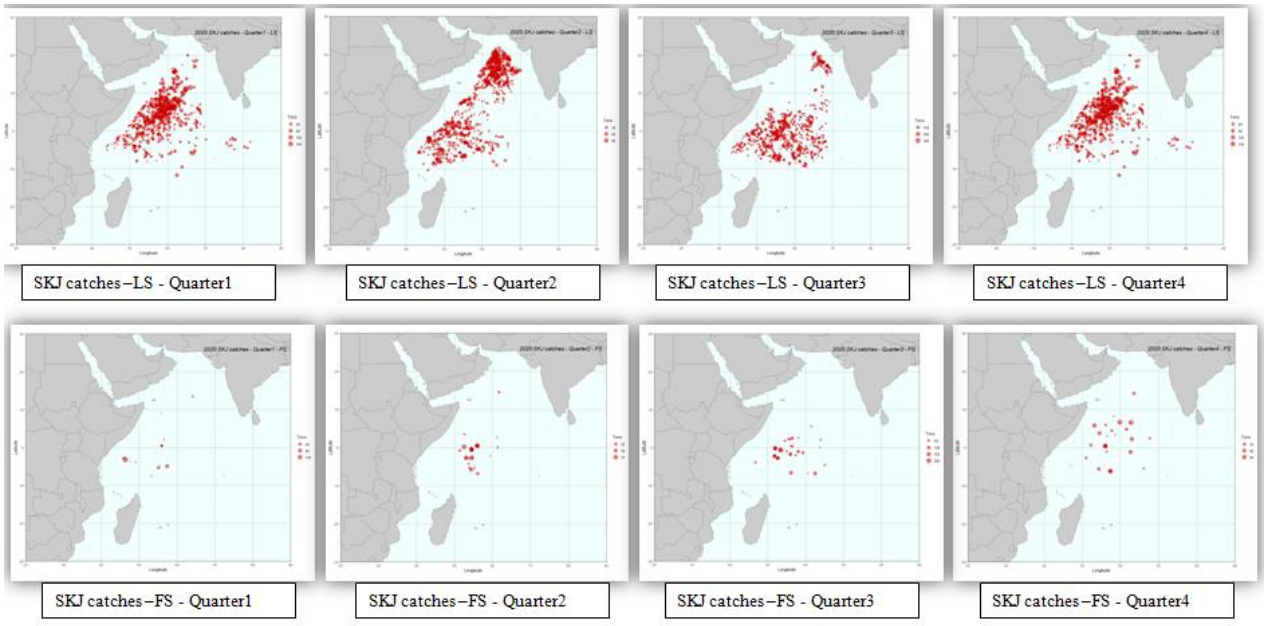


Figure 3.ai. Distribution of the SKJ catches of PS Spanish fleet in 2020 per quarter and fishing mode. Key: LS, FOB associated school; FS, Free-school.

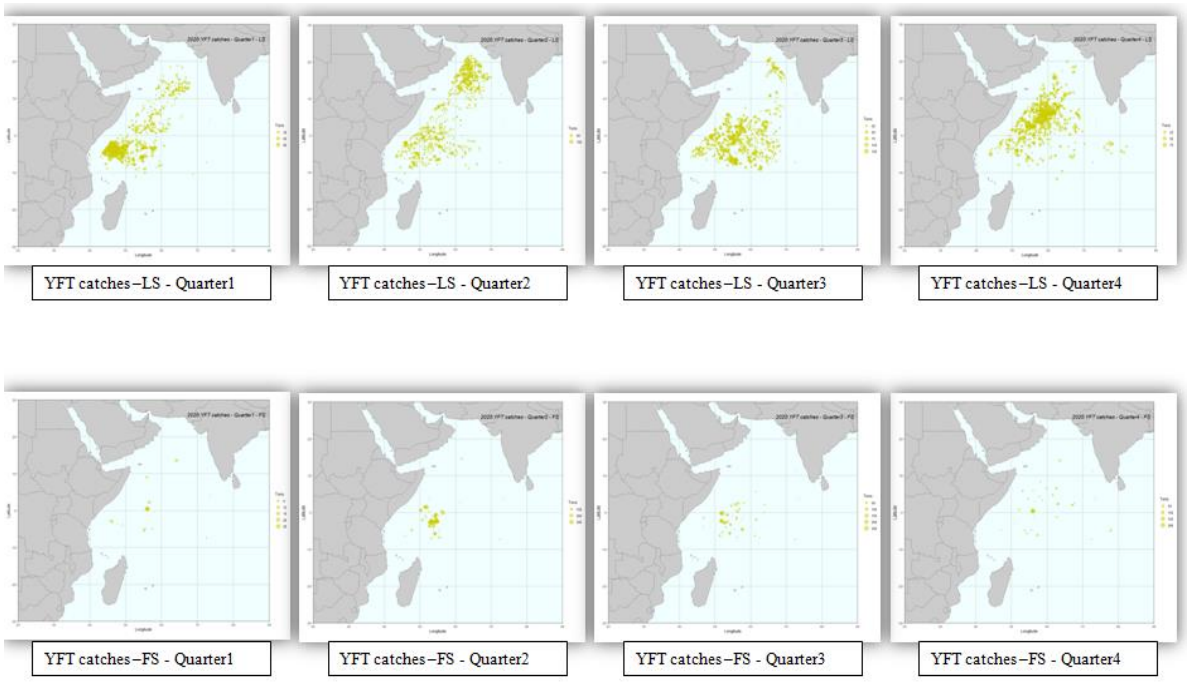


Figure 3aii. Distribution of the YFT catches of PS Spanish fleet in 2020 per quarter and fishing mode. Key: LS, FOB associated school; FS, Free-school.

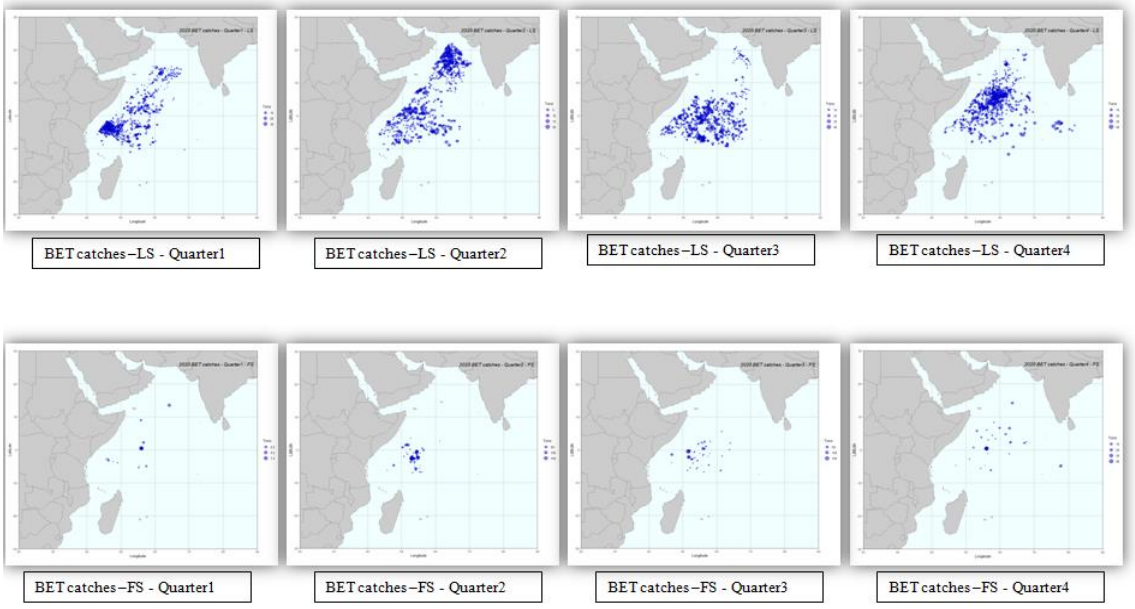


Figure 3 aiii. Distribution of the BET catches of PS Spanish fleet in 2020 per quarter and fishing mode. Key: LS, FOB associated school; FS, Free-school.

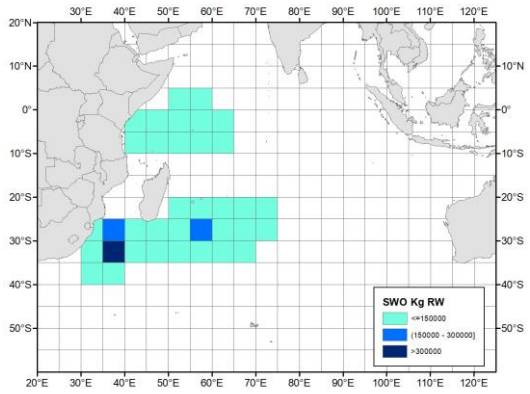


Figure 3.aiv. LL. Map of the distribution of swordfish catch (kg round weight) by 5ºx5º squares of the Spanish surface longline fleet in 2020.

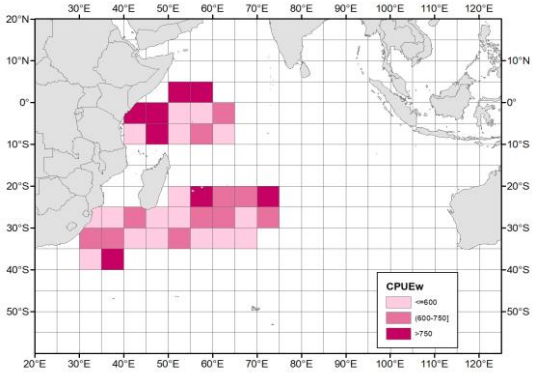


Figure 3.av. LL. Distribution of the nominal CPUEw in kg (round weight) of swordfish landed per thousand hooks set by 5ºx5º degrees, carried out by the Spanish surface longline fleet in the Indian Ocean during the year 2020.

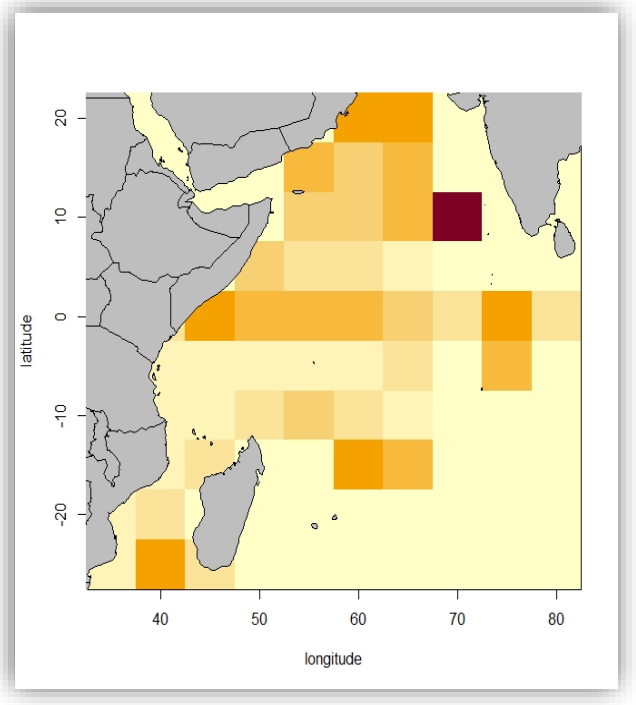


Figure 3bi. Map of distribution of SKJ catches, in cwp5x5, by the Spanish PS fleet, in the IOTC area of competence (average of the 5 previous years e.g. 2016-2020).

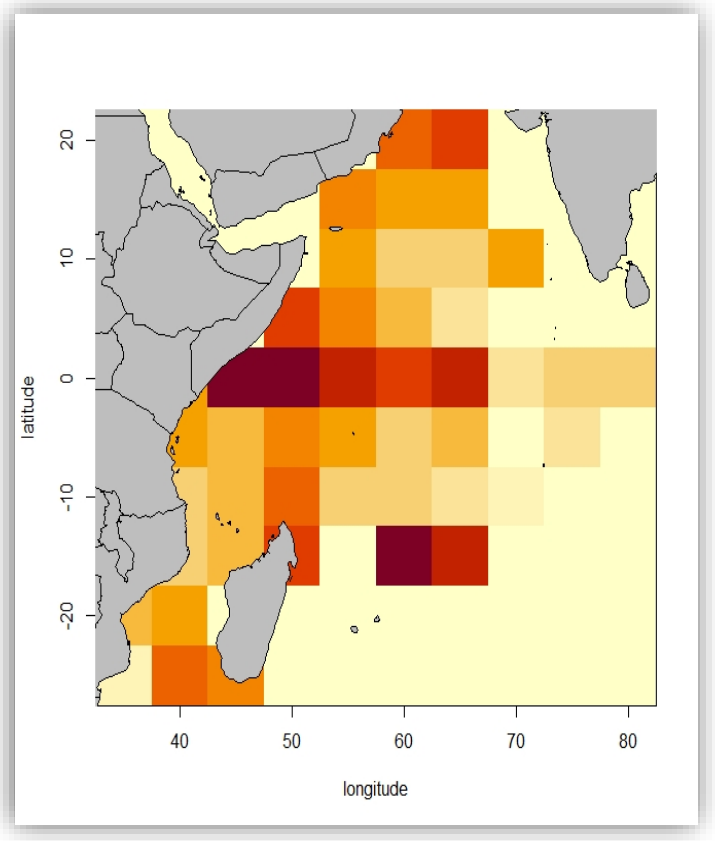


Figure 3bii. Map of distribution of YFT catches, in cwp5x5, by the Spanish PS fleet, in the IOTC area of competence (average of the 5 previous years e.g. 2016-2020).

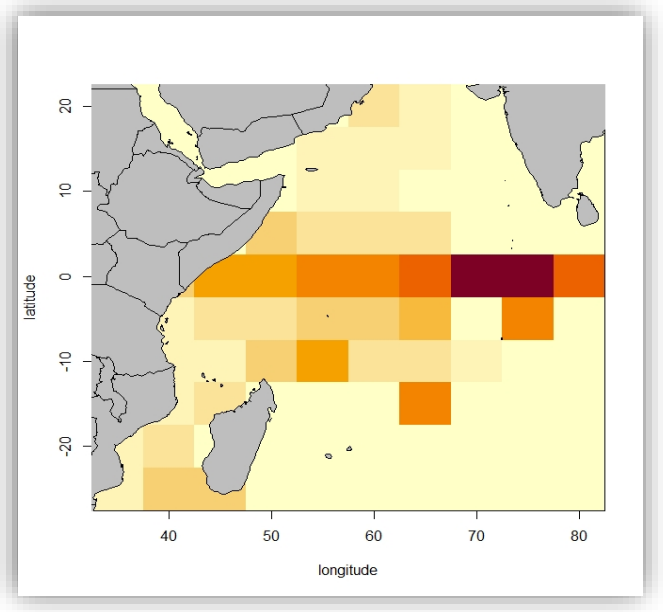


Figure 3biii. Map of distribution of BET catches, in cwp5x5, by the Spanish PS fleet, in the IOTC area of competence (average of the 5 previous years e.g. 2016-2020).

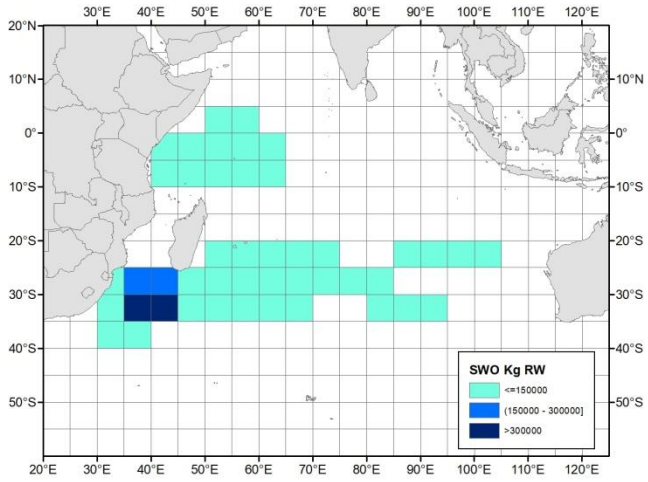


Figure 3.biv. LL. Distribution of swordfish catch (kg round weight) by 5ºx5º squares of the Spanish surface longline fleet fleet in the Indian Ocean (average of the 5 previous years e.g. 2016-2020).

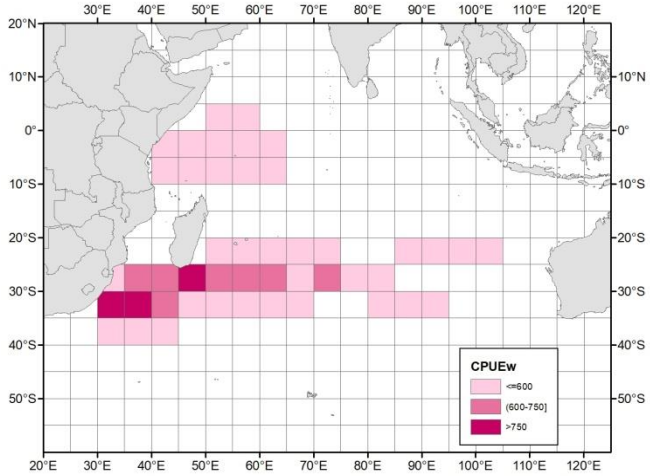


Figure 3bv. LL Distribution of the nominal CPUE in kg (round weight) of swordfish landed per thousand hooks set by 5ºx5º degrees, carried out by the Spanish surface longline fleet in the Indian Ocean (average of the 5 previous years e.g. 2016-2020).

4. RECREATIONAL FISHERY

There is not UE-Spanish recreational fishing activities in the IOTC Convention Area.

5. ECOSYSTEM AND BYCATCH ISSUES

Purse Seine

A total of 29 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 catch of 171,914 kg, an equivalent to 40,933 individuals. 9,061 individuals were sampled, most of them belonging to the species RRU (*Elagatis bipinnulata)*, DOL (*Coryphaena hippurus)*, FAL (*Carcharhinus falciformis)*, CNT (*Canthidermis maculata)* and WAH (*Acanthocybium solandri)*.

The highest volume of associated catches, considering the number of individuals, corresponds to the species, in order: CNT (*Canthidermis maculata*), RRU (*Elagatis bipinnulata*) and FAL (*Carcharhinus falciformis*).

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

In relation to the sea turtle bycatch, during the year 2020 a total of 651 sets were directly observed on board 5 Spanish purse seiners targeting on tropical tunas in the Indian Ocean (data provided by AZTI). The total number of sets performed for the Spanish fleet was 4590 sets. According to this fishing effort, the sampling coverage achieved was 14.2 % of the sets. A total of 43 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 0.0107 turtles per set and 0, respectively (see Table 4bii). Total interaction rate was lower than to last year's (2019) bycatch ratio (0.0198).

The observers on board the Spanish purse seine fleet in the Indian Ocean have also recorded 1 turtle (*Eretmochelys imbricata)* not involved in the sets but swimming free next to the FOB. The ratio of turtles observed was 0.00048, having visited 2094 FOBs.

There were no records of interactions with cetaceans.

There were no records of interactions with whale sharks.

There were no records of interactions with whale sharks.

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 by-catch data obtained during the year 2020. The catches of the by-catch 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 2,766 t, 76 t of tuna, 40 t of billfish and 41 t for other species in the year 2020.

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.

The at-sea sampling program of longline fishery coordinated by the IEO were suspended in most of 2020, due notably to administrative problems and to a lesser extend to covid-19.

After analyzing 721,170 hooks observed by the IEO during the period 2010-2019, the overall interaction rate reached for this period was of $5.82E^{-05}$ marine turtles by hook. The overall mortality rate for the period 2010-2019 reached was of $4.30E^{-05}$.Table 4b shows the different rates obtained by year between 2010 and 2019.

Besides, the Program of the General Fisheries Secretariat in 2020 observed a total of 49,686 hooks of the Spanish surface longline fishery targeting swordfish in the Indian Ocean that means a total of 48 fishing days which corresponds to 48 sets. The observed area ranged 29ºS and 33º-38ºE. There were two interactions with marine turtles of *Caretta caretta*, both of them in January, with a location unknown as well as the state of the release.

There has been no interaction on marine mammals and neither on the basking shark for the surface longline fishery operating in the Indian Ocean.

5.1. Sharks

The sharks, trunks or carcass with their respective fins naturally attached are retained, 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. By-catch data of sharks is summarized in table 3 for 2012-2020 period. It was not feasible to obtain a scientifically robust data by extensive area-time stratification due to the low occurrence of most by-catch species. However, total catches of all by-catch species are scientifically estimated and reported for assessment.

Table 3. Scientific estimation of sharks by species, of the annual by-catch landings (tons round weight) obtained by the Spanish longline fleet in the Indian Ocean for the 2012-2020 period (the most recent period is included in this table).

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

5.1.1. 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 it 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.

5.1.2. 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 have 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.

5.2. Seabirds

The at-sea sampling program of longline fishery coordinated by the IEO were suspended in most of 2020, due notably to administrative problems and to a lesser extend to covid-19.

Data of previous year were analyzed, a total of 721,170 hooks were observed by the IEO during the period 2010-2019. The overall interaction and mortality rates reached were of $2.77E^{-05}$ seabirds by hook. Table 4a shows the different rates obtained by year during the 2010 - 2019 period.

Besides, the Program of the General Fisheries Secretariat in 2020 observed a total of 49,686 hooks of the Spanish surface longline fishery targeting swordfish in the Indian Ocean that means a total of 48 fishing days which corresponds to 48 sets. The observed area ranged 29ºS and 33º-38ºE. There were no interactions occurred with seabirds.

Table 4a. IEO observed annual interactions rates of surface longline gear on seabirds for the 2010-2019 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

5.3 Marine Turtles

The national strategy on marine turtle sis 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.*

See Annex I. Tables of marine turtle data for time/area strata, in purse seiners and longliners in period 2009 to 2020.

Table 4b. Observed annual interactions rates of surface longline gear by the LL Spanish fleet on marine turtles for the 2010-2020 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

Table 4bii. 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
Caretta caretta	2020	0.0046	0	3
Dermochelys coriacea	2020	0	0	0
Eretmochelys imbricata	2020	0.0031	0	2
Lepidochelys olivacea	2020	0.0015	0	1
Lepidochelys kempii	2020	0	0	0
Chelonias mydas	2020	0.0015	0	1
Unidentified	2020	0	0	0
Total turtles	2020	**0.0107**	**0**	**7**

6. NATIONAL DATA COLLECTION AND PROCESSING SYSTEMS

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.

The scientific observation on board purse seiners has also been affected by the pandemic, leading to a low coverage in comparison with the recent years (651 sets observed from 4590 sets performed by the fleet: 14%).

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 5ºx5º degrees up to the year 2019. 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 were suspended in most of 2020, due notably to administrative problems and to a lesser extend to covid-19.

Besides, since 2017 the Fisheries General Secretariat carry out an additional National Program of Observers onboard long liners in the IOTC area which continued developed this observations in 2020. So, all scientific data in the Indian Ocean in 2020 are provided exclusively by this program.

6.1. Logsheet data collection and verification

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 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), total catch by species into others information.

6.2. Vessel Monitoring System

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) nº 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 a 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. On board sampling program

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 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.

1. 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.

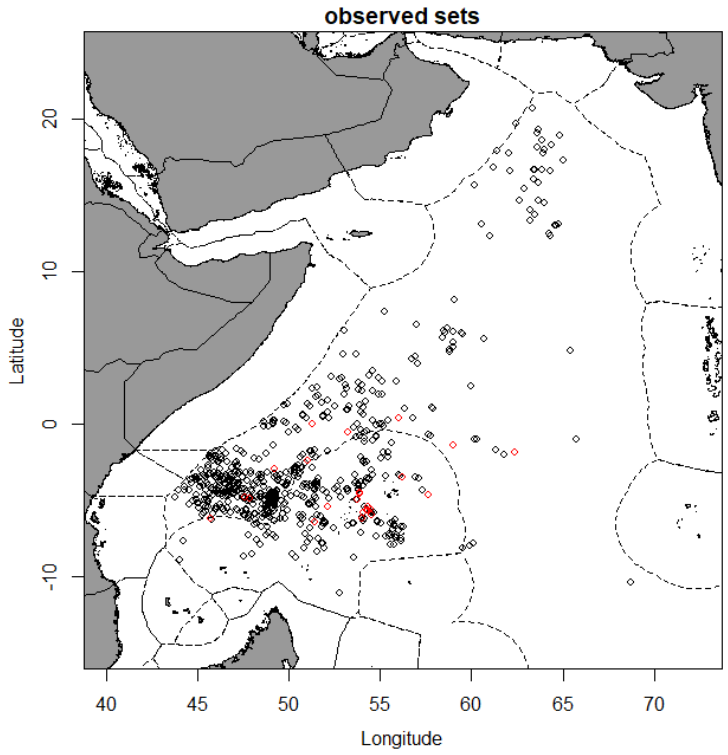
2. VESSELS AND SETS SAMPLED:

A total of 24 trips (approximately a 17 % of the total trips performed by this fleet) and 651 sets (a 14% of the total sets) on board 5 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 2020, with a media of 2.04 null sets by trip. All the sets performed were sampled by the observers on board:

IOTC vessel code	Days at sea	Set number				Number of trips
		Free schools		Object schools		
		Positive	Negative	Positive	Negative	
IOTC00907	170	6	3	217	14	6
IOTC00161	100	0	3	94	3	4
IOTC17253	224	2	4	168	13	8
IOTC00175	83	1	1	67	2	3
IOTC00187	86	4	2	43	4	3
TOTAL	**663**	**13**	**13**	**589**	**36**	**24**

3. FISHING GROUND:

The following figure shows the position of the sets performed in the 24 trips sampled, including a graphical distinction between free schools (in red) and object schools (in black):



4. 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	Retained catches (Kg)	Discards (Kg)	No of individuals measured*	Weight (Kg) of the measured individuals*
SKJ (*Katsuwonus pelamis*)	9,940,000	9,830	275	37.08
YFT (*Thunnus albacares*)	5,602,000	1,590	241	22.22
BET (*Thunnus obesus*)	1,290,000	50	17	5.37
FRI (*Auxis thazard*)	45,000	19,900	2,304	508.82
FRZ (*Auxis spp.*)		7,500		
BLT (*Auxis rochei*)				
KAW (*Euthynnus affinis*)				

* All measurements of tuna species belong to discarded fraction

Longline:

The at-sea sampling program of longline fishery coordinated by the IEO were suspended in most of 2020, due notably to administrative problems and to a lesser extend to covid-19.

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.

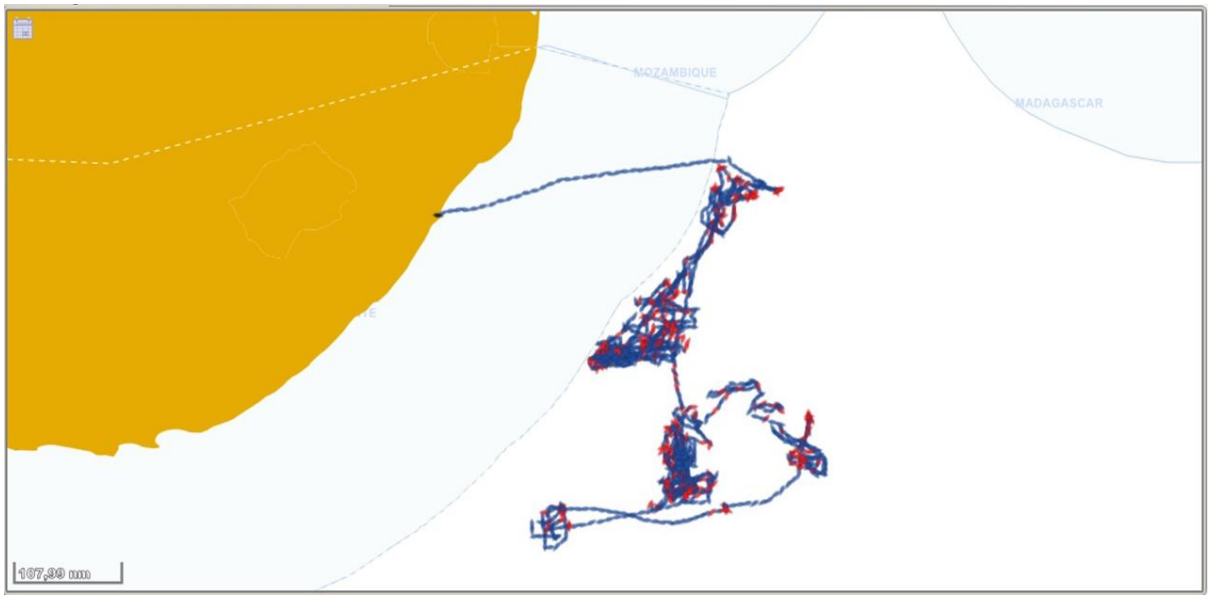
On the other hand, the Program of the General Fisheries Secretariat in 2020 observed a total of 49,686 hooks of the Spanish surface longline fishery targeting swordfish in the Indian Ocean that means a total of 48 fishing days which corresponds to 48 sets.

The main task of the observers onboard is recording catch and effort data as well as size data and observing the interaction with bycatch and incidental-bycatch species. Additional information about fishing operations and fishing gear configuration is also taken. They also record other aspects such as reproductive factors. In 2020, as well as in 2019, a training was conducted in the framework of this program so observers gave data with a good standard quality. After the observation work onboard, there is an additional work of data processed.

Table 5. Yearly number of hooks observed at sea by the Spanish administration in the Spanish surface longline fishery

Year	Hooks obs.
2015	45732
2016	105918
2017	278437
2018	181282
2019	126056
2020	49686

Figure 4. Map showing the spatial distribution of observer coverage in 2020.



6.4. Port sampling programme

Currently, these data unable to provide at this time due to the availability of 2020 data due to the pandemic and lack of agreement between Spanish private companies, which provided services to Spanish administration, and the Spanish administration. This problem could be resolved before the end year.

6.5. Unloading/Transshipment of flag vessels

Table 6. Quantities by species and gear landed in ports located in the IOTC area competence

Gear	AL3_sspp	landed (tonnes)
longliner	ALB	109,82
longliner	BET	13.415,47
longliner	BLM	2.072,14
longliner	BSH	1.027.197,51
longliner	DOL	236,05
longliner	LEC	11.095,70
longliner	LMA	696,60
longliner	MLS	347,53
longliner	OIL	148,80
longliner	SFA	2.087,60
longliner	SMA	73.477,18
longliner	SSP	638,75
longliner	SWO	316.891,80
longliner	YFT	1.139,20
purse seiner	ALB	500,00
purse seiner	ALM	0,00
purse seiner	BET	40.927,87
purse seiner	BIL	250,00
purse seiner	BLM	12.900,50
purse seiner	BLT	75.699,99
purse seiner	BUM	1.699,00
purse seiner	CGX	4.133,00
purse seiner	CNT	12.096,96
purse seiner	COM	3.092,00
purse seiner	DOL	60.363,78
purse seiner	DOX	501,00
purse seiner	ELP	1.025,00
purse seiner	FAL	574,30
purse seiner	FRI	657.011,70
purse seiner	GBA	5.752,20
purse seiner	LOT	120,00
purse seiner	LTA	11.909,00
purse seiner	MLS	1.400,00
purse seiner	RRU	60.922,78
purse seiner	SFA	22,00
purse seiner	SKJ	6.819.450,07
purse seiner	TRI	374,00
purse seiner	WAH	22.306,90
purse seiner	YFT	6.370.516,69

Table 7. Quantities by species and gear transhipped in ports located in the IOTC area of competence

Gear	AL3_sspp	transhipped (tonnes)
longliner	ALB	478,00
longliner	BAZ	241,00
longliner	BET	41.456,00
longliner	BLM	5.649,00
longliner	BSH	1.026.414,00
longliner	DOL	2.011,00
longliner	LEC	21.986,00
longliner	MLS	7.838,00
longliner	OIL	197,00
longliner	SAI	936,00
longliner	SFA	2.965,00
longliner	SMA	205.017,00
longliner	SSP	7.119,00
longliner	SWO	1.012.919,00
longliner	WAH	226,00
longliner	YFT	10.462,00
longliner	YRS	230,00
purse seiner	ALB	7.975,00
purse seiner	BET	12.542.396,03
purse seiner	BIL	1.792,00
purse seiner	BLM	5.008,00
purse seiner	BLT	0,01
purse seiner	BUM	100,00
purse seiner	BXQ	550,00
purse seiner	CNT	600,05
purse seiner	DOL	12.222,02
purse seiner	FRI	1.048.327,00
purse seiner	RRU	100,02
purse seiner	SKJ	75.652.025,04
purse seiner	WAH	3.196,00
purse seiner	YFT	34.065.640,11

6.6. Actions taken to monitor catches & manage fisheries for 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. Sampling plans for mobulid rays

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.

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

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 8. Scientific requirements contained in Resolutions of the Commission, adopted between 2012 and 2020.

Res. No.	Resolution	Scientific requirement	CPC progress
11/04	On a regional observer scheme	Paragraph 9	Since 2017 an observer program is implemented in the longliners fleet, to reach the 5% of mandatory observation in that fleet. In the purse seine fleet the observation reach a 100%, according to their "*Código de Buenas Prácticas*". The achievement of the observation in each fleet has been positive, with the exemption of problems in 2020 due to the COVID pandemic.
12/04	On the conservation of marine turtles	Paragraphs 3, 4, 6-10	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 2020 with marine turtles was provided 27/07/2021 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, "Código de Buenas Prácticas" for purse seine fleet) The Instituto Español de Oceanografía (IEO) elaborates studies related to marine turtles

Res. No.	Resolution	Scientific requirement	CPC progress
			interactions and measures to reduce the impact of fishing in them. Reference of the studies about bycatch: 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. Báez J.C., Mª. 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).
12/06	On reducing the incidental bycatch of seabirds in longline fisheries.	Paragraphs 3-7	Each year the report of the interaction with sea birds is provided by Spanish Fisheries Secretariat , A report about interaction in 2020 between longliners and seabirds was provided to the EU Commission on 29th June 2021. The mitigation measures applied are reported in the Implementation repor each year. In 2020, the report was providedto the European Commission on 23rd of April 2021. 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" Complete scientific studies about sea birds interaction with this surface longline gear have been presented for the period 2011-2015 for areas South of 25ºS (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).
12/09	On the conservation of thresher sharks (family alopiidae) caught in association with fisheries in the IOTC area of competence	Paragraphs 4–8	Thresher shark isa forbidden specie 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). If accidentally catched, it is mandatory to report the catches in the ERS As the Spanish fleet is not directed to catch these species, nor there are no interactions

Res. No.	Resolution	Scientific requirement	CPC progress
			reported, these species aren't, by the moment, subject of study for the IEO.
13/04	On the conservation of cetaceans	Paragraphs 7– 9	Cetaceans are forbidden species to be fished in Spain. 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.
13/05	On the conservation of whale sharks (*Rhincodon typus*)	Paragraphs 7– 9	Whale sharks are forbidden to be fished as stated in the TAC/Quota regulation. For the year 2020, Regulation 123/2020, article 52. 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.
13/06	On a scientific and management framework on the conservation of shark species caught in association with IOTC managed fisheries	Paragraph 5–6	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. Reference of the studies about whitetip sharks: Ramos-Cartelle, A., B. García-Cortés, J. Fernández-Costa, J. Mejuto (2012). Standardized catch rates of the oceanic whitetip shark (Carcharhinus longimanus) from observations of the Spanish longline fishery targeting swordfish in the Indian Ocean during the 1998-2011 period. IOTC-2012- WPEB08-27 (2012). García-Cortés, B., A. Ramos-Cartelle, I. González-González, J. Mejuto (2012). Biological observations of oceanic whitetip shark (Carcharhinus longimanus) on Spanish surface longline fishery targeting swordfish in the Indian Ocean over the period 1993-2011. IOTC-2012-WPEB08-25 (2012). 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. 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
15/01	On the recording of catch and effort by fishing vessels in the IOTC area of competence	Paragraphs 1–10	Electronic Reporting System is mandatory in accordance with Regulation 1224/2009.

Res. No.	Resolution	Scientific requirement	CPC progress
			Actualised template of the logbook sent to EU Commission on 6/09/2021
15/02	Mandatory statistical reporting requirements for IOTC Contracting Parties and Cooperating Non-Contracting Parties (CPCs)	Paragraphs 1–7	Estimated catches are sent as part of the obligations each year. 2020 Estimated catches provided 31/08/2021 Reports of the interaction and measures implemented related to sea birds and marine turtles are sent regularly. For 2020, sea birds, reported on 29th June 2021, marine turtles reported on 27th July 2021 ERS is mandatory for Spanish vessels. 5Size data has been provided regularly. However, during 2020 because of problems related to the pandemic situation there have been troubles to provide size data PS LL. 6. FADs obligations are fulfilled every year, in 2020, active vessels 19/01/2021, information about the daily FADs use provided monthly. 7. Timeliness fulfilled or causes reported.
17/05	On the conservation of sharks caught in association with fisheries managed by IOTC	Paragraphs 6, 9, 11	The statistical requirements about sharks are sent annually to the EU Commission, Estimated catches provided for sharks was sent on 31/08/2021 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., 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). 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 García-Cortés, B., Ramos-Cartelle, A., Mejuto, J., Carroceda A. and Fernández-Costa, J. (2021). Biological observations of shortfin mako shark (Isurus oxyrinchus) on Spanish surface longline fishery targeting swordfish. IOTC-2021-WPEB17(AS)-INF07. 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. 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.

Res. No.	Resolution	Scientific requirement	CPC progress
			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. 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. 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). 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. Tolotti, M., Sabarros, P.S., Bach, P., Grande, M., Ruiz, J., Murua, H., Coelho, R., Abascal, F., Báez, J.C., 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	It is mandatory to notify all the catches and bycatches in the ERS, according to Regulation 1224/2009. Fernández-Costa J., A. Ramos-Cartelle, B. García-Cortés, J. Mejuto. (2015). Standardized catch rates for the blue shark (Prionace glauca) caught by the Spanish longline in the Indian Ocean during the 2001-2013 period. IOTC-2015-WPEB11-25. Reference of the studies about blue sharks: 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 (Prionace glauca) in the Atlantic and Indian Oceans. Fish

Res. No.	Resolution	Scientific requirement	CPC progress
			and Fisheries. 19(1): 90-106 (https://doi.org/10.1111/faf.12238). Fernández-Costa, J., Ramos-Cartelle, A. and Mejuto, J. (2021). Updated standardized catch rates in biomass for the blue shark (Prionace glauca) caught by the Spanish surface longline fleet in the Indian Ocean during the 2001-2019 period. IOTC-2021-WPEB17(DP)-09.
18/05	On management measures for the conservation of the Billfishes: Striped marlin, black marlin, blue marlin and Indo-Pacific sailfish	Paragraphs 7 – 11	It is mandatory to notify all the catches and bycatches in the ERS, according to Regulation 1224/2009 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.
18/07	On measures applicable in case of non-fulfilment of reporting obligations in the IOTC	Paragraphs 1, 4	Report of Implementation is annually sent to the EU Commission. For 2020, report of implementation sent on 23rd March 2021. Nominal catches provided in 2021 as stated by the IOTC for purse seiners and longliners (July and August 2021).
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 2020 in the Indian Ocean

Annex I

Table 1 displays, in a 5ºx5º grid, the marine turtles catch performed by the purse seiner fleet between 2009 and 2020. 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 5ºx5º 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 1. Marine turtle bycatches of the purse seiner fleet from 2009-2020 form observers' data in 5ºx5º 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
2009	100050	00	050	255	1				
2009	100055	00	055	356	3				
2009	105055	05	055	211	10				
2009	200045	-00	045	87	1				
2009	200050	-00	050	166	8				
2009	200055	-00	055	121	1				
2009	200065	-00	065	161	2				
2009	205045	-05	045	38	1				
2009	205050	-05	050	121	5				
2009	205055	-05	055	167	3				
2009	205060	-05	060	223	2				
2009	205065	-05	065	88	3				
2009	210040	-10	040	320	33				
2009	210045	-10	045	284	26				
2009	215040	-15	040	326	8				
2009	215045	-15	045	32	4				
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				
2015	100045	00	045	90	60	*Lepidochelys olivacea*	1	0	1
2015	100050	00	050	591	336	*Chelonia mydas*	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	*Chelonia mydas*	1	0	1
2015						*Lepidochelys olivacea*	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	*Chelonia mydas*	1	0	1
2015	200050	-00	050	544	341	*Lepidochelys olivacea*	1	0	1
2015	200055	-00	055	348	197	*Chelonia mydas*	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	*Chelonia mydas*	1	0	1
2015	205060	-05	060	135	76	*Eretmochelys imbricata*	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	*Chelonia mydas*	1	0	1
2016						*Lepidochelys olivacea*	3	0	3
2016	100055	00	055	426	133	*Chelonia mydas*	1	0	1
2016	100060	00	060	195	95	*Caretta caretta*	1	0	1
2016						*Unidentified turtle*	1	0	1
2016	100065	00	065	94	35				
2016	105050	05	050	79	32	*Lepidochelys olivacea*	1	0	1
2016	105055	05	055	155	49	*Eretmochelys imbricata*	3	0	3
2016						*Chelonia mydas*	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	*Lepidochelys olivacea*	5	0	5

2016	110065	10	065	6	2	*Lepidochelys olivacea*	2	0	2
2016	200040	-00	040	88	17				
2016	200045	-00	045	337	95	*Eretmochelys imbricata*	1	0	1
2016	200050	-00	050	516	101				
2016	200055	-00	055	416	67	*Lepidochelys olivacea*	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	*Eretmochelys imbricata*	1	0	1
2016	205045	-05	045	304	70	*Lepidochelys olivacea*	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	*Chelonia mydas*	1	0	1
2016						*Dermochelys coriacea*	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	*Caretta caretta*	1	0	1
2017						*Lepidochelys olivacea*	1	0	1
2017	100055	00	055	433	120	*Caretta caretta*	1	0	1
2017						*Lepidochelys olivacea*	2	0	2
2017	100060	00	060	109	36				
2017	100065	00	065	214	56				
2017	100075	00	075	3	3	*Caretta caretta*	1	0	1
2017	105050	05	050	38	9	*Lepidochelys olivacea*	1	0	1
2017	105055	05	055	108	25				
2017	105060	05	060	68	33	*Caretta caretta*	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	*Caretta caretta*	1	0	1
2017						*Lepidochelys olivacea*	2	0	2
2017	205045	-05	045	92	30	*Caretta caretta*	1	0	1
2017						*Eretmochelys imbricata*	2	0	2
2017	205050	-05	050	243	47	*Chelonia mydas*	1	0	1
2017						*Dermochelys coriacea*	1	0	1
2017	205055	-05	055	107	46	*Chelonia mydas*	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	*Caretta caretta*	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	*Lepidochelys olivacea*	5	0	5
2018						*Unidentified turtle*	1	0	1
2018	100055	00	055	315	58	*Chelonia mydas*	1	0	1
2018						*Lepidochelys olivacea*	1	0	1
2018	100060	00	060	117	30	*Lepidochelys olivacea*	1	0	1
2018						*Unidentified turtle*	1	0	1
2018	100065	00	065	77	35	*Lepidochelys olivacea*	1	0	1
2018	105050	05	050	152	37	*Caretta caretta*	1	0	1
2018						*Lepidochelys olivacea*	2	0	2
2018	105055	05	055	283	55	*Lepidochelys olivacea*	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	*Caretta caretta*	1	0	1
2018						*Unidentified turtle*	1	0	1
2018	110060	10	060	113	38	*Lepidochelys olivacea*	2	0	2
2018						*Unidentified turtle*	1	0	1
2018	110065	10	065	111	56	*Chelonia mydas*	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	*Lepidochelys olivacea*	1	0	1
2018	120060	20	060	6	1				
2018	200040	-00	040	30	1				
2018	200045	-00	045	498	164	*Eretmochelys imbricata*	1	0	1
2018						*Lepidochelys olivacea*	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	*Chelonia mydas*	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	*Lepidochelys olivacea*	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	*Caretta caretta*	1	0	1
2019	100050	00	050	670	168	*Chelonia mydas*	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	*Lepidochelys olivacea*	2	0	2
2019	105060	05	060	105	14				
2019	105065	05	065	18	3	*Chelonia mydas*	1	0	1
2019	110055	10	055	36	8	*Unidentified turtle*	1	0	1
2019	110060	10	060	237	35	*Caretta caretta*	1	0	1
2019						*Lepidochelys olivacea*	5	0	5
2019						*Unidentified turtle*	6	0	6
2019						*Unidentified turtle*	4	0	4
2019	110065	10	065	225	24	*Lepidochelys olivacea*	4	0	4
2019	115060	15	060	73	7				
2019	115065	15	065	44	3	*Lepidochelys olivacea*	4	0	4
2019	120060	20	060	2	2				
2019	200040	-00	040	96	8				
2019	200045	-00	045	796	191	*Caretta caretta*	1	0	1
2019	200050	-00	050	619	197	*Caretta caretta*	3	0	3
2019						*Unidentified turtle*	1	0	1
2019	200055	-00	055	488	111				
2019	200060	-00	060	162	67	*Caretta caretta*	1	0	1
2019	200065	-00	065	150	32	*Caretta caretta*	1	0	1
2019	205040	-05	040	41	9				
2019	205045	-05	045	64	14				
2019	205050	-05	050	135	36	*Caretta caretta*	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	*Caretta caretta*	2	0	2
2020	200045	-00	045	32	13	*Eretmochelys imbricata*	1	0	1
2020	200045	-00	045	495	165				
2020	200050	-00	050	14	6	*Chelonia mydas*	1	0	1
2020	200050	-00	050	19	6	*Eretmochelys imbricata*	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	*Lepidochelys olivacea*	1	0	1
2020	205050	-05	050	187	58				
2020	205055	-05	055	22	7	*Caretta caretta*	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				

Table 2. Marine turtle bycatches of the longline fleet from 2009-2020 form observers' data in 5ºx5º 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 hooks/1000)	Total effort observed (number of hooks/1000)	species	captures	mortalities	releases
2009	220035	-20	35	43,200	7,320				
2009	225035	-25	35	803,393	52,680				
2009	225040	-25	40	164,936	13,140				
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	*Dermochelys coriacea*	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				
2013	230030	-30	30	71,049	6,029	*Caretta caretta*	2	0	2
2013	230035	-30	35	787,328	57,750	*Caretta caretta*	13	2	11
2013	230040	-30	40	690,827	55,265	*Caretta caretta*	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	*Caretta caretta*	6	2	4
2013						*Dermochelys coriacea*	1	0	1
2014	220035	-20	35	15,964	1,916				
2014	225035	-25	35	774,128	50,957	*Chelonia mydas*	1	0	1
2014						*Caretta caretta*	1	0	1
2014	230035	-30	35	772,689	14,104	*Caretta caretta*	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	*Caretta caretta*	2	0	2
2016	220070	-20	70	15,168	15,173				
2016	225070	-25	70	174,702	42,699	*Dermochelys coriacea*	3	0	3
2016						*Caretta caretta*	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	*Caretta caretta*	1	0	1
2017						*Dermochelys coriacea*	3	0	3
2017	225045	-25	45	283,300	52,181				
2017	225065	-25	65	196,756	25,156	*Dermochelys coriacea*	1	0	1
2017	225070	-25	70	233,192	16,092				
2017	230065	-30	65	7,932	7,932	*Caretta caretta*	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	*Caretta caretta*	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	*Caretta caretta*	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				
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						*Caretta caretta*	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	225035	-25	35	479,112	3,060				
2020	230030	-30	30	139,770	9,964				
2020	230035	-30	35	767,638	34,442	*Caretta caretta*	1	0	1
2020	235030	-35	30	4,820	2,220	*Caretta caretta*	2	0	2

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)