[SPAIN] National Report to the Scientific Committee of the Indian Ocean Tuna Commission, 2019

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)	YES or NO [delete one] 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).	YES or NO [delete one] DD/MM/YYYY [Add submission date here]
If no, please indicate the reason(s) and intended actions:	

UE-Spain

Executive Summary

A total of 11 longliners operated in the IOTC area during the year 2019. Longline vessels have an average of 32 meters in length, 174 of TRB and 576 CV. The catch of the target species, swordfish was of 2,097 t and other important species were 3,073 t of sharks, 142 t of tunas, 87 t of billfish and 62 t of other fish species. A total of 300 swordfish have been individually sized during 2019 as well as 297 bycatch individuals. Biological sampling as sex at size data and others has been also obtained for swordfish as well as for some bycatch species.

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. Nevertheless the total volume of catch of the fleet during 2019 (172 700 t) was 200 t lower than the preceding year, but above the average catch of the previous ten years (approximately 137 thousand tons, about 26% of total catch). This increase in the catches is mainly comprised by SKJ. Thus, 2018 and 2019 have been the years with the highest volume of catch of SKJ of the Spanish fleet.

Contents:

1. BACKGROUND/GENERAL FISHERY INFORMATION

1.1. Purse Seine

Ending the third quarter of 2019 a new vessel has joined the Spanish freezer purse seiner fleet (i.e. the total number of Spanish purse seine vessels was 15 boats), increasing the carrying capacity by more than 2400 t. Despite this, the total catch of the fleet during 2019 (172 700 tons) was lower than in 2018 (> 200 thousand tons), but above the average catch of the previous ten years (approximately 137 thousand tons, about 26% of total catch). This increase is mainly comprised by SKJ. Thus, 2018 and 2019 have been the years with the highest volume of catch of SKJ of the Spanish fleet.

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 2019, 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 2008-2019. 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 2008-2019. The average characteristics of these vessels were 174 TRB, 32.0 m in length and 576 HP. 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 seine and surface longliners fishing in the Indian Ocean during the period 2008-2019 (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

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 31.9% of the sets directed at associated schools, to around of 76% of the sets in recent years (2008–2017 period). A maximum peak was recorded in 2018 (96%) (Báez et al., 2020[1]), and an 83% in 2019. This arises from the unusual behavior of the fishing fleet during 2018 year.

On the other hand, during 2019 the fishing effort measured both in fishing days and in searching days was the lowest for the all historical series (Table 2a), but the number of sets was higher than in previous years (4280 sets in average for the period 2009- 2018 vs. 5038 recorded during the 2019 year).

[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

Therefore, in a short space-time period the number of sets has increased. Searching time between sets has been shorter than in previous years).

Since 2017, the Indian Ocean yellowfin tuna stock has been subject to an interim Rebuilding Plan (IOTC Resolution 19/01 at present). In 2018 the General Secretariat for Fisheries (SGP) adopted Individual Vessel Quotas which cannot be monitored using T3 (to see Báez et al., 2020[1] for major detail), because this systems used a average estimation for all EU-fleet. For the YFT, it was then decided to provide as official data the sale slips used for the control of quota utilization by Spanish purse seine vessels, which is in accordance with the TAC control and management per vessel. However, for the correction of catches of the rest of the species the T3 was used.

By species, 119138 tonnes have been caught of SKJ, 42243 tonnes have been caught of YFT, and 11303 tonnes have been caught of BET (table 2a). Of the three species, SKJ is the component that most has increased in recent years. Thus the 5-year average SKJ catches between 2013 to 2017 was 10883 tons versus 133 thousand and 119 thousand tons for the years 2018 and 2019 respectively. Furthermore, if we take into account that during 2018 the maximum catch in SKJ was reached in the historical series, during 2019 the second highest catch of SKJ in the historical series was reached. During 2019 BET catches have been below the average of the last 5 years. The trend in YFT is a decrease in catches, which is due to the management rules imposed.

The figure 2.a show the distribution of the effort (fishing days) of the purse seine Spanish fleet in 2019 per quarter and fishing mode. The figure 2.b show the distribution of the catches by species of de PS Spanish fleet in 2019 per quarter, species and fishing mode.

3.2. Longline

Figures 1.b and 1.c show the historical annual swordfish catches and nominal effort, respectively, 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 2008-2019 period.

A total of 2,097 t of swordfish (round weight) were caught during 2019 and the overall nominal catch rate was 700.9 kg (round weight) per thousand hooks.

During the year 2019 a total of 2,992 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 2019 is shown in figure 2.c. The figures 2.d and 2.e show the spatial distribution for the nominal effort in number of thousand hooks and nominal yield in kg of round weight of swordfish per thousands hooks set in the Indian Ocean by the Spanish surface longline fleet during the year 2019.

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 -2019.

	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

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 2008-2019 (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

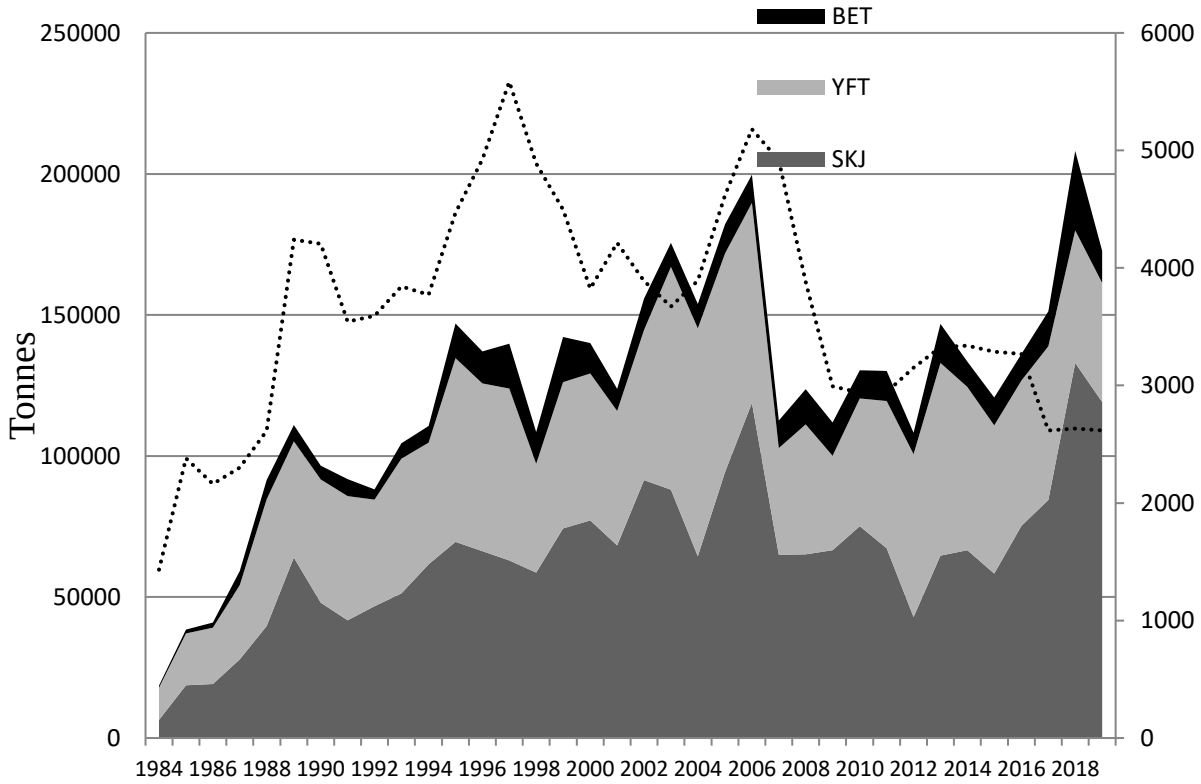


Figure 1.a. Catch by species and effort (searching days) of the purse seine Spanish fleet in the Indian Ocean in the period 1984-2019.

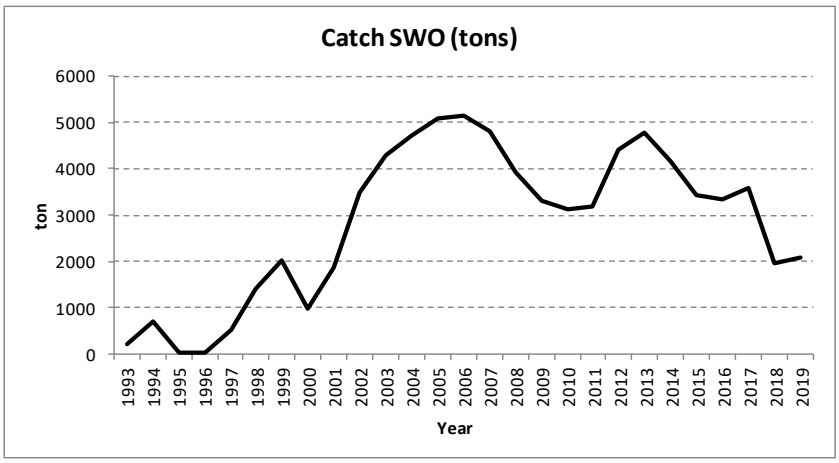


Figure 1.b. Historical annual swordfish catches (tons RW) of the Spanish longline fleet in the Indian Ocean for the 1993-2019 period.

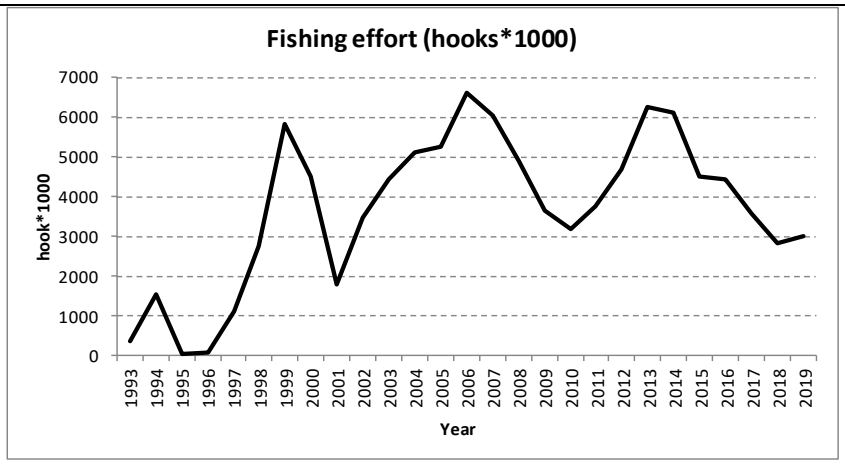


Figure 1.c. Historical annual swordfish nominal fishing effort (thousands of hooks) of the Spanish longline fleet in the Indian Ocean for the 1993-2019 period.

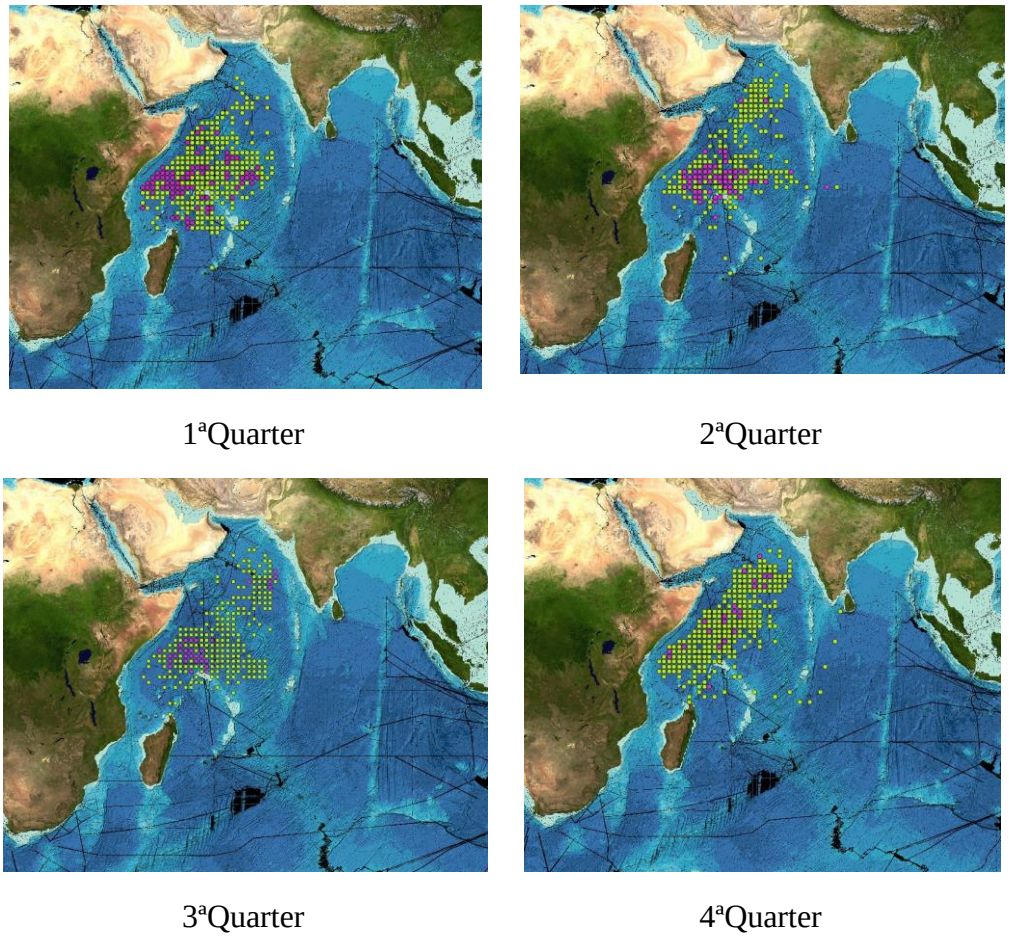
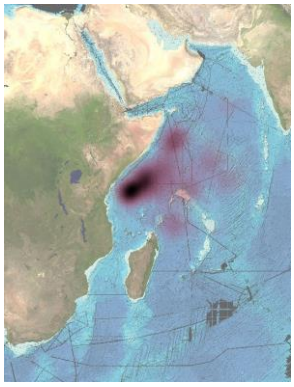
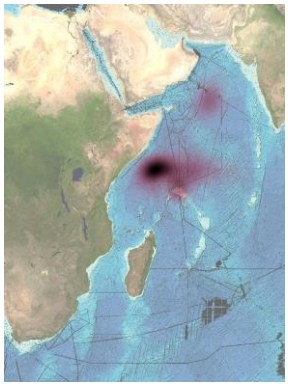


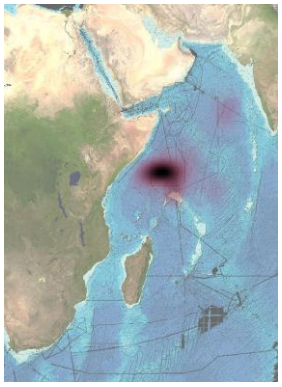
Figure 2.a. Distribution of the effort (fishing days) of the purse seine Spanish fleet in 2019 per quarter and fishing mode. Key: Green, Log school associated sets; Pink, Free school sets.



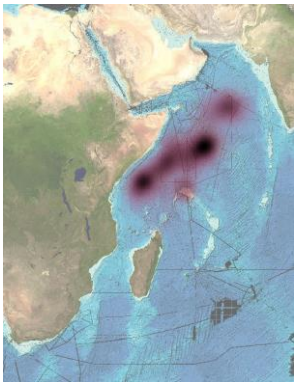
Skipjack tuna catches 1ªQuarter Log school associated Sets



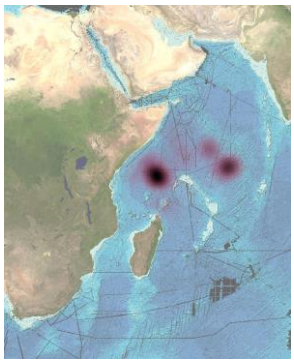
Skipjack tuna catches 2ªQuarter Log school associated Sets



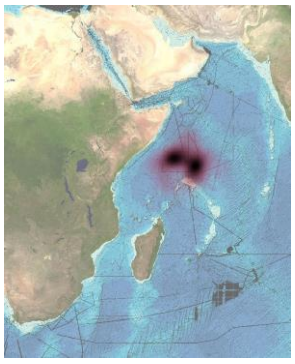
Skipjack tuna catches 3ªQuarter Log school associated Sets



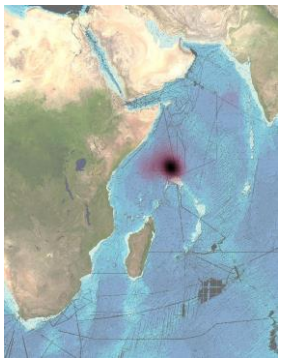
Skipjack tuna catches 4ªQuarter Log school associated Sets



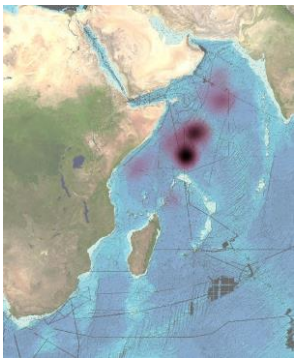
Skipjack tuna catches 1ªQuarter Free school Sets



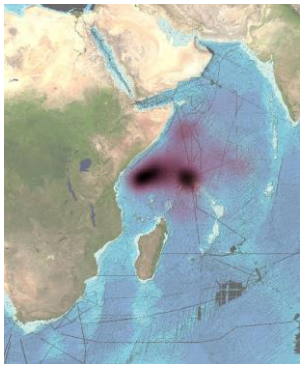
Skipjack tuna catches 2ªQuarter Free school Sets



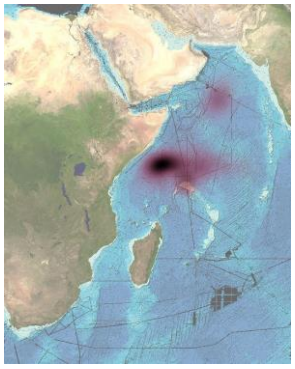
Skipjack tuna catches 3ªQuarter Free school Sets



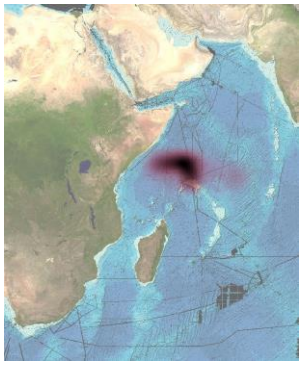
Skipjack tuna catches 4ªQuarter Free school Sets



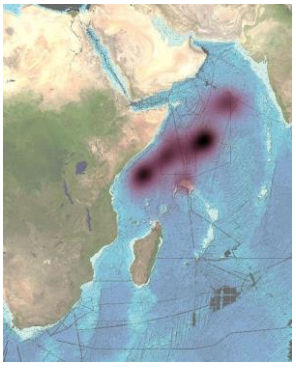
Yellowfin tuna catches 1ªQuarter Log school associated Sets



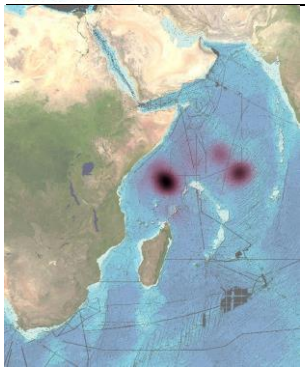
Yellowfin tuna catches 2ªQuarter Log school associated Sets



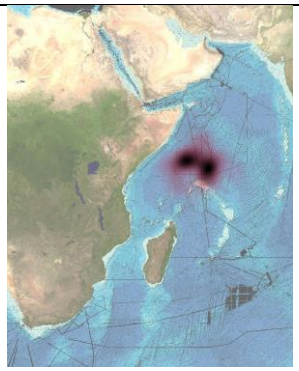
Yellowfin tuna catches 3ªQuarter Log school associated Sets



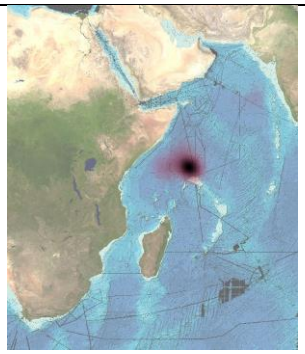
Yellowfin tuna catches 4ªQuarter Log school associated Sets



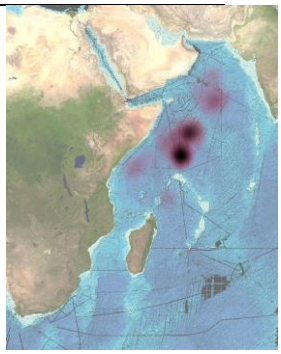
Yellowfin tuna catches 1ªQuarter Free school Sets



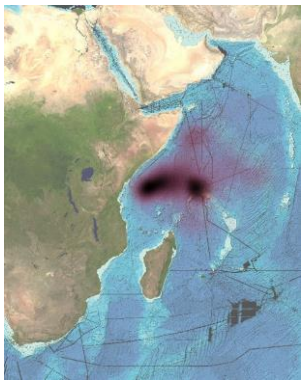
Yellowfin tuna catches 2ªQuarter Free school Sets



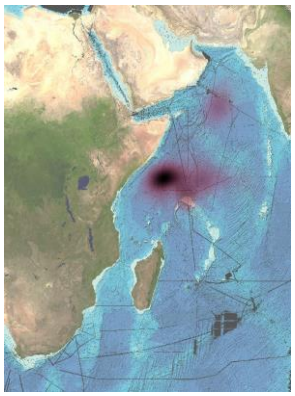
Yellowfin tuna catches 3ªQuarter Free school Sets



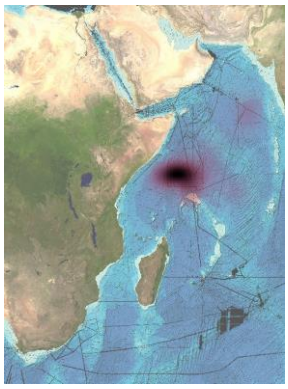
Yellowfin tuna catches 4ªQuarter Free school Sets



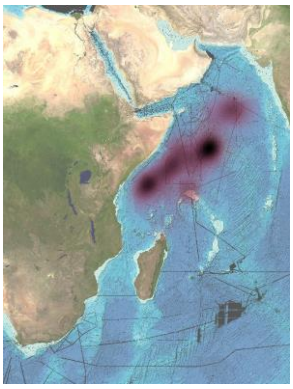
BFT catches 1ªQuarter Log school associated Sets



BFT catches 2ªQuarter Log school associated Sets



BFTcatches 3ªQuarter Log school associated Sets



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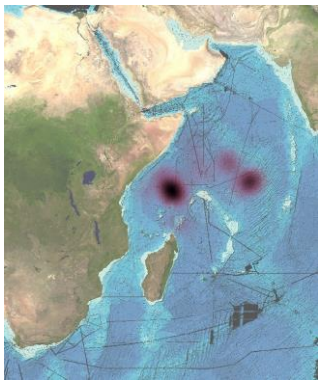

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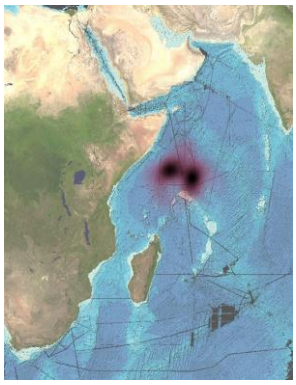

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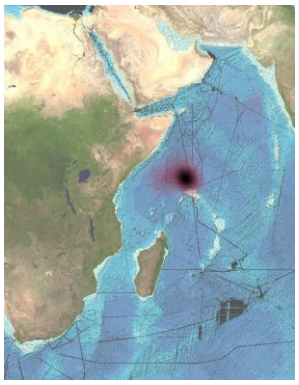
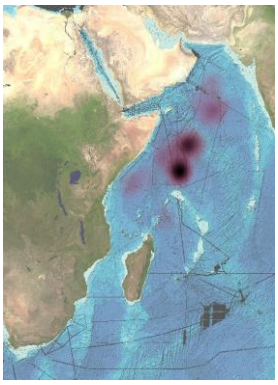


BFT catches 3ªQuarter Free school Sets



BFT catches 4ªQuarter Free school Sets

Figure 2.b. Distribution of the catches by species of de PS Spanish fleet in 2019 per quarter, species and fishing mode.

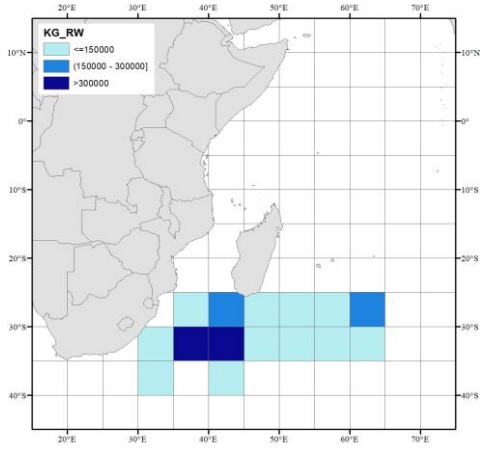


Figure 2.c. LL. Map of the distribution of swordfish catch (kg round weight) by 5ºx5º squares of the Spanish surface longline fleet in 2019.

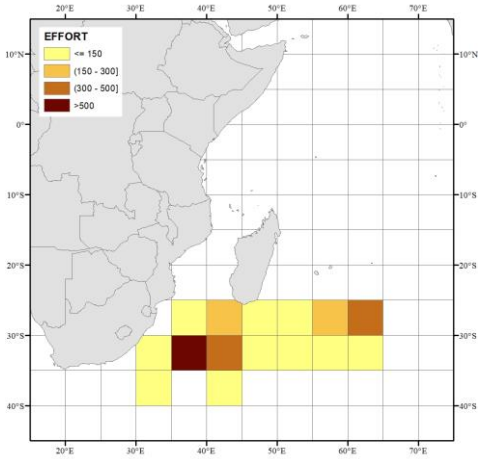


Figure 2.d. LL. Distribution of the nominal fishing effort (thousands hooks) by 5ºx5º squares carried out by the Spanish surface longline fleet in the Indian Ocean during the year 2019.

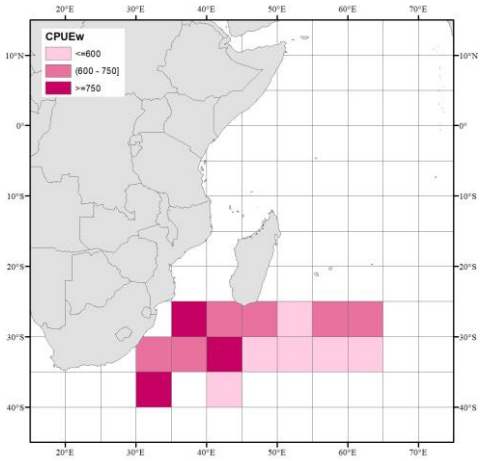


Figure 2.e. LL. Distribution of the nominal CPUEw in kg (round weight) of swordfish landed per thousand hooks set by 5ºx5º degrees, carried out by the Spanish surface longline fleet in the Indian Ocean during the year 2019.

4. RECREATIONAL FISHERY

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

5. ECOSYSTEM AND BYCATCH ISSUES

5.1. Purse Seine

A total of 51 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 356111 kg, an equivalent to 90671 individuals. 19782 individuals were sampled, most of them belonging to the species RRU (*Elagatis bipinnulata*), DOL (*Coryphaena hippurus*), FAL (*Carcharhinus falciformis*), CNT (*Canthidermis maculata*), MSD (*Decapterus macarelus*) 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 DOL (*Coryphaena hippurus*).

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

In relation to the sea turtle bycatch, during the year **2019** a total of 1161 sets were directly observed on board 8 Spanish purse seiners targeting on tropical tunas in the Indian Ocean (1008 sets provided by AZTI and 153 provided by IEO). The total number of sets performed for the Spanish fleet was 5038 sets. According to this fishing effort, the sampling coverage achieved was 23% 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 0.0198 turtles per set and 0, respectively (see table 3). Total interaction rate was higher than to last year (2018) bycatch ratio 0.0293 (a total of 30 turtles in 1023 sets for 2018).

Table 3. Rates of interaction and mortality of marine turtles by species and total, obtained during the year 2019 in the Indian Ocean.

Species	**Year**	**Interaction rate (turtles/sets observed)**	**Mortality rate**	**Number**
Caretta caretta	2019	0.0041	0	9
Dermochelys coriacea	2019	0	0	0
Eretmochelys imbricata	2019	0	0	0
Lepidochelys olivacea	2019	0.0069	0	15
Lepidochelys kempii	2019	0	0	0
Chelonias mydas	2019	0.0009	0	2
Unidentified	2019	0	0	17
Total turtles	**2019**	**0.0198**	**0**	**43**

The observers on board the Spanish purse seine fleet in the Indian Ocean have recorded also 16 turtles not involved in the hauls but interacting with the Floating Objects visited (FOBs): 10 *Caretta caretta*, 1 *Lepidochelys olivacea* and 5 unidentified. The ratio of turtles observed was 0.0052, having visited 3074 FOBs.
The status of these turtles varied: 13 of them were found entangled alive and the rest, 3 turtles, were found swimming free next to the FOB. Some of the FOBs were not-own corks surrounded by net and the turtles were entangled by the neck or one of the fins in the net or the ropes.
There were no records of interactions with cetaceans.
There were 4 interactions with whale sharks during 4 sets. All of them were released alive.

5.2. Longline

Basic statistical tasks, 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 2019. 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 in 2019 was estimated as 3,073 t, 142 t for tunas, 87 t for billfish and 62 t for other species.

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

5.2.1 Sharks

Longline: 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 4 for 2012-2019 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 4. Scientific estimation of sharks by species, of the annual by-catch landings (kg round weight) obtained by the Spanish longline fleet in the Indian Ocean for the 2012-2019 period (the most recent period is included in this table).

SPECIES/YEAR	2012	2013	2014	2015	2016	2017	2018	2019
C. falciformis	25625	565	0	0	0	0	4075	923
Galeocerdo cuvieri	0	0	0	0	0	0	0	0
Isurus oxyrinchus	561690	620973	823549	441013	450893	532306	399838	424523
Isurus paucus	250	791	171	0	122	0	858	600
Lamna nasus	0	0	0	0	0	0	0	0
Prionace glauca	3686452	414948	4657270	3701847	3592515	3059154	2162043	2646743
Other sharks	0	0	0	0	0	0	0	0

5.2.2 Seabirds

Longline: During 2019 a total of 47,590 hooks were observed in the Spanish surface longline fishery targeting swordfish in the Indian Ocean that means a total of 44 fishing days and 56 days at sea. The observed area ranged 30ºS and 30º-55ºE. Only one interaction occurred with a seabird (*Thalassarche chlororinchos*), with a resulting mortality rate of $2.10E^{-05}$ seabird by hook.

After analyzing 721,170 hooks observed during the period 2010-2019, the overall interaction and mortality rates reached were of $2.77E^{-05}$ seabirds by hook. Table 5 shows the different rates obtained by year during the 2010 - 2019 period.

Fishing areas, night setting and low levels of lighting during setting operations as well as other fishing protocols applied by the vessels, including domestic regulations, were identified as the most important factors to explain the regularly low or null interaction with seabirds in this fishery.

Table 5. 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

In 2019, an additional number of 78,466 hooks were also observed by the Spanish General Secretariat of Fisheries in the Spanish surface longline fishery targeting swordfish in the Indian Ocean that means a total of 119 fishing days and 119 sets. There were no interactions occurred with seabirds. The data of this National Observer Program are not included in the analysis of the table 5.

5.2.3 Marine Turtles

Longline: During the year 2019 a total of 44 sets, 56 days at sea and 47,590 hooks observed in the Spanish surface longline fishery targeting swordfish in the Indian Ocean were analyzed. The observed area ranged between 30ºS and 30º-55ºE.

There was only one encounter with a marine turtle that could not be identified so that the resulting interaction rate was $2.10E^{-05}$. This turtle was released alive so the mortality rate was null during 2019.

After analyzing 721,170 hooks observed 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 6 shows the different rates obtained by year for between 2010 and 2019.

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

In 2019, an additional number of 78,466 hooks were also observed by the Spanish General Secretariat of Fisheries in the Spanish surface longline fishery targeting swordfish in the Indian Ocean that means a total of 119 fishing days and 119 sets. Two interactions occurred with marine turtles of the specie *Caretta caretta*, one of them in the location 30ºS-35ºE in January 13th which was release alive and, the other in the location 31ºS-36ºE in December 21th. For the last interaction the state of the release is unknow. Finally, the global resulting interaction in the framework of this National Observer Program in 2019 was 2.55E-05 per hook.

Regarding cetaceans there was an interaction with a *Common dolphin* in the location 30ºS-53ºE in January 13th and it was released alive and other interaction with a *Megaptera novaeangliae* in the location 29ºS-48ºE in October 3rd, it was also released alive.

This data of the of this National Observer Program by the General Fisheries Secretariat are analyzed separately from the data presented in table 6.

Table 6. Observed annual interactions rates of surface longline gear on marine turtles for the 2010-2019 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

6. NATIONAL DATA COLLECTION AND PROCESSING SYSTEMS

Purse seine: During 2019 year, for the samplings throughout the landings in the port of Victoria (Seychelles) (that are subsequently used in the catch correction process), currently under Spanish coordination, the number of local samplers has been reinforced. Thus, the sampling team currently consists of four local samplers and two Spanish coordinators.

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, several sharks and billfish were obtained. The voluntary tagging program done by the commercial fleet and by the scientific observers on board 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.

Since 2017, the Fisheries General Secretariat carry out an additional National Program of Observers onboard long liners in the IOTC area.

6.3. On board sampling program (IEO)

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, and 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.

The number of sets sampled supposes approximately a 23% of the total number of sets performed by the Spanish tropical tuna purse seiner fleet in the Indian Ocean in 2019.

A total of 42 trips (approximately a 39.6 % of the total trips performed by this fleet) and 1161 sets (a 23% of the total sets) on board 8 Spanish tropical tuna purse seiners have been carried out. They are shown in the following table (Table 7), stating the number of days at sea and the number of sets (on free schools or object schools) by vessel performed in 2019, with a media of 2.9 null sets by trip. All the sets performed were sampled by the observers on board:

Table 7. Purse seine sets sampling during 2019

IOTC vessel code	Days at sea	Set number				Number of trips
		Free schools		Object schools		
		Positive	Negative	Positive	Negative	
IOTC00812	22	17	8	29	2	1
IOTC00878	40			49		2
IOTC00879	19	2		17		1
IOTC00907	268	14	7	259	7	9
IOTC00161	259	43	42	186	16	9
IOTC17253	78	1		85	2	3
IOTC00175	301	8	5	236	12	12
IOTC00187	134	11	7	89	7	5
TOTAL	**1121**	**96**	**69**	**950**	**46**	**42**

The following figure (figure 3) shows the position of the sets performed in the 42 trips sampled.

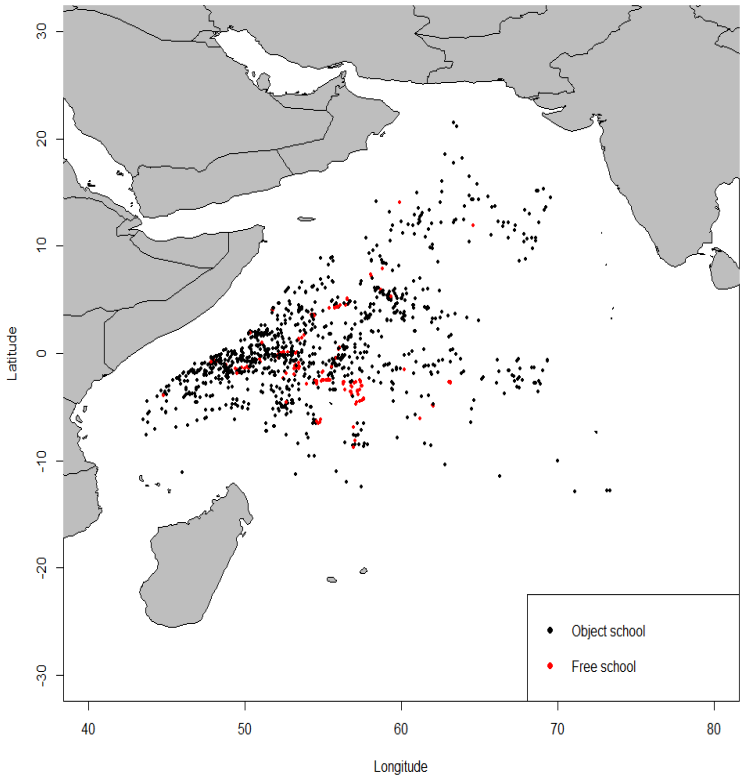


Figure 3. Position of the sets performed in the 42 trips sampled, including a graphical distinction between free schools (in red) and object schools (in black).

Longline: The sampling at sea programme was started at the beginning of the fishery in 1993. A total of 47,590 hooks (table 8) were observed during the year 2019 in areas of the Indian Ocean between 30ºS and 30º-55ºE.

In 2019, 78.466 additional hooks were observed by the General Fisheries Secretariat onboard 3 vessels during 119 fishing days and 119 sets in the IOTC area. Finally, the 119 observed days by this Program and the observations carried out by the IEO during 44 fishing days (47,590 hooks) summarize a total of 163 fishing days observed by both national Programs, so the observation reaches by 5,44% of fishing effort (2.998 total fishing days).

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.

Table 8. Yearly number of hooks observed at sea in the Spanish surface longline fishery

Year	Hooks obs.
2010	106619
2011	63139
2012	7451
2013	180921
2014	70750
2015	45732
2016	105918
2017	59890
2018	33160
2019	47590

During 2019 a total of 300 swordfish and a total of 297 bycatch fish individuals were measured. For the shark group the total sampled was of 257 individuals, from tunas were sampled 6 individuals and 4 for billfish. More than 30 individuals of lower economic value species and species that were eventually released or discarded were also measured. The faunal list is shown in table 9.

Table 9. Faunal list observed during 2019.

Species
Carcharhinus falciformis
Carcharhinus longimanus
Coriphaena hipurus
Dasiatys violacea
Galeocerdo cuvier
Istiphorus platypterus
Isurus oxyrinchus
Lampris guttatus
Lepidocibium flavobrunneum
Makaira indica
Makaira nigricans
Mobula mobula
Prionace glauca
Tetrapturus angustirostris
Sphyraena sp
Tetrapturus audax
Thunnus obesus
Thalassarche chlororhynchos
Xiphias gladius

6.4. National Program of Observers by the General Fisheries Secretariat (SGP)

The General Fisheries Secretariat started its National Program of Observers in 2017. A total of 78,466 hooks were observed during the year 2019 in the IOTC area, on board 3 vessels. There were observed 119 sets and 119 fishing days.

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 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.

All data are provided to the IOTC Secretariat through the observer templates once processed.

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.