

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

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### INFORMATION ON FISHERIES, RESEARCH AND STATISTICS

|   |   |
|---|---|
| <p>In accordance with IOTC Resolution 15/02, final scientific data for the previous year was provided to the IOTC Secretariat by 30 June of the current year, <b>for all fleets other than longline</b> [e.g. for a National Report submitted to the IOTC Secretariat in 2022, final data for the 2021 calendar year must be provided to the Secretariat by 30 June 2022)</p>   | <p>N/A. Portugal does not have any fleets other than pelagic longlines</p>  |
| <p>In accordance with IOTC Resolution 15/02, provisional <b>longline data</b> for the previous year was provided to the IOTC Secretariat by 30 June of the current year [e.g. for a National Report submitted to the IOTC Secretariat in 2022, preliminary data for the 2021 calendar year was provided to the IOTC Secretariat by 30 June 2022).</p> <p><b>REMINDER:</b> Final longline data for the previous year is due to the IOTC Secretariat by 30 Dec of the current year [e.g. for a National Report submitted to the IOTC Secretariat in 2022, final data for the 2021 calendar year must be provided to the Secretariat by 30 December 2022).</p> | <p>YES (nominal catches and catch an effort); NO (sizes)</p> <p>Dates submitted:</p> <ul style="list-style-type: none"> <li>- nominal catches; catch and effort: provided on 01/06/2022</li> <li>- size data: Not provided. We sent an e-mail on the 30/06/2022 explaining that sizes for 2021 were not available due to impossibility to carry out observer trips in 2021</li> </ul> |
| <p>If no, please indicate the reason(s) and intended actions:</p> <p>Size data was not possible to collect and submit for 2021 as the size data is collected exclusively by onboard fishery observers, and it was not possible to have onboard observers in 2021. This was mainly due to Covid-19 restrictions (restrictions for boarding the commercial vessels and restrictions for international travelling).</p>  |   |

## Executive Summary

During 2021 EU-Portugal the active fishing fleet operating in the IOTC convention area consisted of only 2 pelagic longliners targeting swordfish mostly in the temperate southwest Indian Ocean. Overall, a total of 1,383 MT was caught, of which 458 MT corresponded to swordfish, 742 MT to blue shark, 112 MT to shortfin mako, 42 MT to tuna, 21 MT to billfish (excluding swordfish) and 8 MT to other species. In 2021, EU-Portugal kept implementing the data collection program based on logbooks, but due to problems with placing observers onboard the fishing vessels and restrictions in international travelling, it was not possible to have the onboard observers placed and collecting data. In 2021, and within the EU data collection framework, EU-Portugal continued the collection and revision of fisheries and biological data, including historical catches, and catch and effort, which were provided to IOTC Secretariat in due time. Size data was not possible to collect and submit due to the reasons explained above. EU-Portugal scientists produced and participated in several relevant working documents to several IOTC Working Parties, which are described in this report.

### 1. BACKGROUND/GENERAL FISHERY INFORMATION

The Portuguese fishing fleet operating in the IOTC area of competence consist only of pelagic longline vessels, which started their activities in 1998. Since then, there have been some changes and variability on the fleet composition, as after a sharp increase on the number of active vessels, after 2007 the active fleet was substantially reduced. Currently, the fleet uses semi-automatic pelagic longlines (Florida style gear), using J hooks baited with squid and/or mackerel, depending on abundance of the target species as well as availability and price of the baits. Moreover, the increasingly use of wire traces has been registered, particularly in areas and/or seasons with higher abundance of pelagic sharks. More recently the number of active fishing vessels has been substantially reduced, with only 2 to 3 active vessels operating in recent years.

### 2. FLEET STRUCTURE

The Portuguese fishing vessels operating in the IOTC area of competence consist only of pelagic longline vessels targeting mainly swordfish. The number of vessels licensed increased from the beginning of the fishery in 1998 (5 vessels) until 2009 (24 vessels). The number of active vessels followed a similar trend, with a peak in 2006 (17 vessels). However, during the last years, the active vessels in the convention area decreased to as low as three (in 2009 and 2012), and now also more recently in 2018 to 2020 when again the number of active vessels was only three. One of the main reasons for some of the previous decreasing trends on the number of active vessels, specifically the drop seen between 2008 and 2012, was piracy in the Mozambique Channel, which traditionally was a major fishing area for the Portuguese fleet operating in the IOTC Convention area. Then, for several years, specifically in 2013 and 2014, the number of active vessels increased again to 7. But since then and to the present date it has continued to decrease and currently there are only 2 active vessels (**Table 1**). The fishing operations are surface pelagic drifting longlines, set in shallow waters with night setting and targeting mainly swordfish, with blue shark being an important secondary target species.

**Table 1:** EU-Portugal longline fishing vessels licensed and actively operating in the IOTC area of competence, for the period 1998 to 2021.

| Year | No. licensed vessels | No. active vessels |
|------|----------------------|--------------------|
| 1998 | 5                    | 1                  |
| 1999 | 8                    | 3                  |
| 2000 | 9                    | 3                  |
| 2001 | 9                    | 6                  |
| 2002 | 11                   | 7                  |
| 2003 | 12                   | 6                  |
| 2004 | 14                   | 5                  |
| 2005 | 16                   | 7                  |
| 2006 | 18                   | 17                 |
| 2007 | 17                   | 15                 |
| 2008 | 21                   | 4                  |
| 2009 | 24                   | 3                  |
| 2010 | 18                   | 4                  |
| 2011 | 16                   | 4                  |

|      |    |   |
|------|----|---|
| 2012 | 16 | 3 |
| 2013 | 16 | 7 |
| 2014 | 18 | 7 |
| 2015 | 18 | 6 |
| 2016 | 18 | 6 |
| 2017 | 18 | 6 |
| 2018 | 18 | 3 |
| 2019 | 18 | 3 |
| 2020 | 20 | 3 |
| 2021 | 20 | 2 |

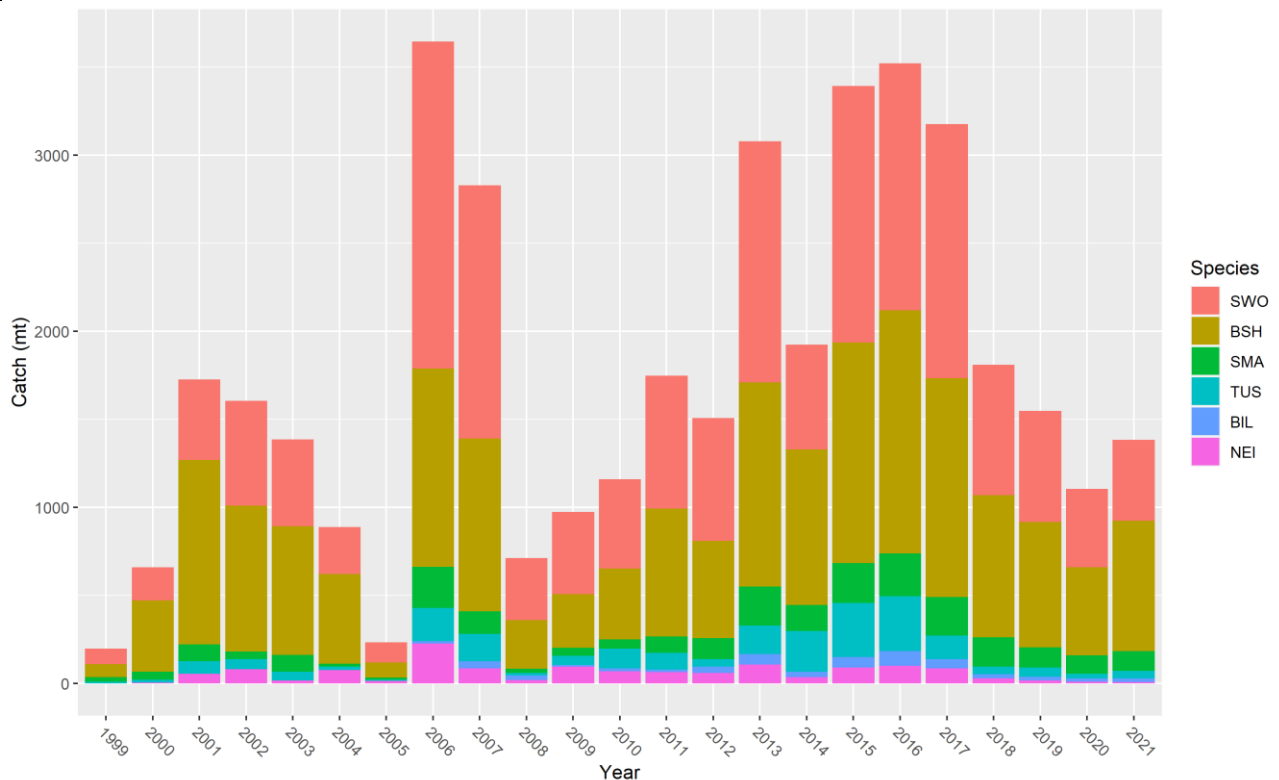
### 3. CATCH AND EFFORT (BY SPECIES AND GEAR)

The overall catch had a peak in 2006 (3,646 MT), followed by a sharp decrease in 2008. In recent years an increasing trend has been observed until 2017, followed by reductions in the most recent years of 2018 and 2019. The 2021 overall production was 1,383 MT, which represents a 25% increase from the 2020 catches (1,102 MT).

The Portuguese fleet has swordfish as the main target species. After a peak on the catches of swordfish in 2006 of 1,857 MT, the mean catches during the last 5 years were of 742 MT. In 2021, a total of 458 MT of swordfish were caught (**Table 2** and **Figure 1**). After a sharp decrease on the catches in 2008, most species groups followed an increasing trend up to 2017, which are followed by decreases in the most recent years. Among the pelagic sharks, the blue shark is the main species, followed by the shortfin mako. Their respective catches in 2021 were 742 and 112 MT, while their mean catch during the last five years were of 800 MT and 143 MT (**Table 2** and **Figure 1**).

**Table 2.** Total EU-Portugal longline annual catch (MT - metric tons) and effort (x 10<sup>3</sup> hooks) and catch for the primary species (or group of species) in the IOTC area of competence, for the period 2017 to 2021. SWO – swordfish; BSH – blue shark; SMA – shortfin-mako; TUS – tuna; BIL – other billfishes; NEI – not elsewhere included, category for all other species combined.

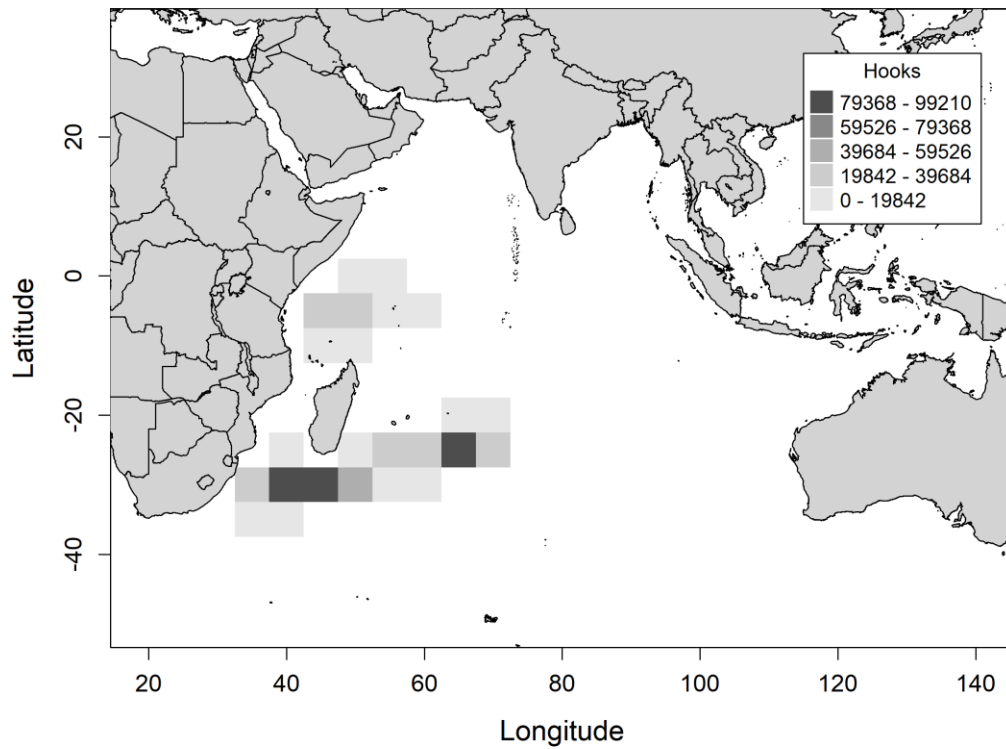
| Year | Total effort | Total catch | SWO  | BSH  | SMA | TUS | BIL | NEI |
|------|--------------|-------------|------|------|-----|-----|-----|-----|
| 2017 | 1618         | 3168        | 1439 | 1240 | 218 | 133 | 51  | 86  |
| 2018 | 893          | 1808        | 741  | 806  | 166 | 42  | 25  | 28  |
| 2019 | 809          | 1544        | 629  | 711  | 114 | 52  | 21  | 17  |
| 2020 | 592          | 1102        | 443  | 499  | 104 | 26  | 20  | 9   |
| 2021 | 646          | 1383        | 458  | 742  | 112 | 42  | 21  | 8   |



**Figure 1.** Historical annual catch for the Portuguese longline fleet, by primary species (or groups of species), for the IOTC area of competence for the entire history of the fishery (1999-2021). SWO – swordfish; BSH – blue shark; SMA – shortfin mako; TUS – tuna; BIL – billfishes; NEI - category for all other species combined.

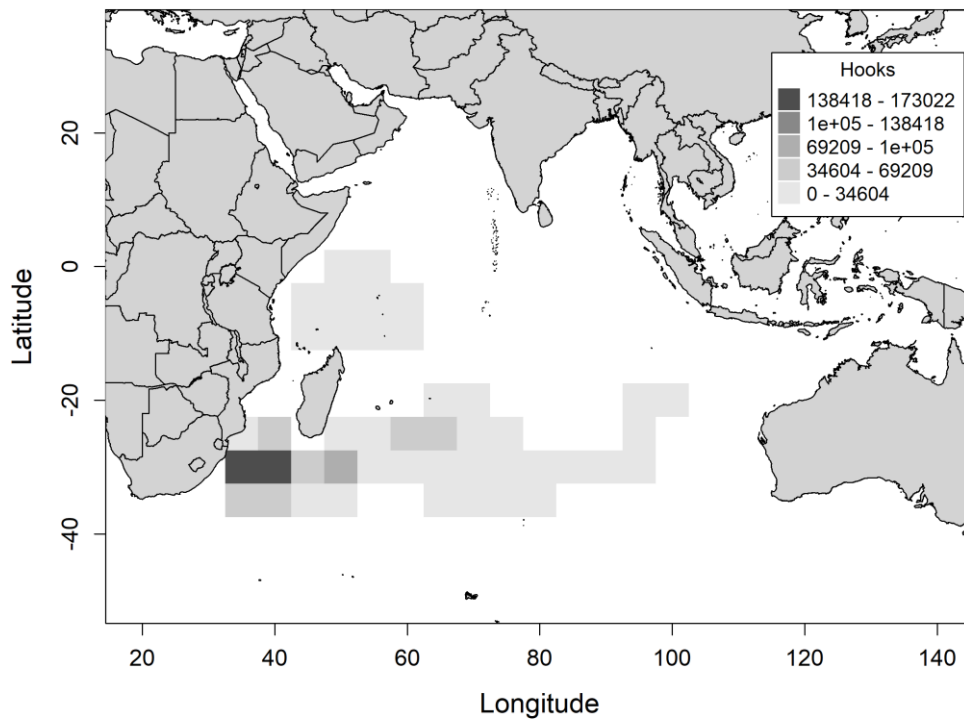
During 2021 the overall fishing effort was 6462 thousand hooks, with the SW Indian Ocean area being the most heavily fished (**Figure 2a**). During the first years of the fishery the fishing effort was concentrated in the SW Indian Ocean, but then developed towards the Central and Eastern regions of the convention area (**Figure 2b**). However, in recent years due to several reasons (including piracy, oil price and the decreased number of active boats), most of the fishing activity occurred in the SW area of the Indian Ocean. **Figure 3a** shows the spatial distribution of the catch for the three most important species in 2021. **Figure 3b** shows the geographical distribution of the catch (MT) for the three most important species during the period 2017-2021.

### Total Hooks - 2021

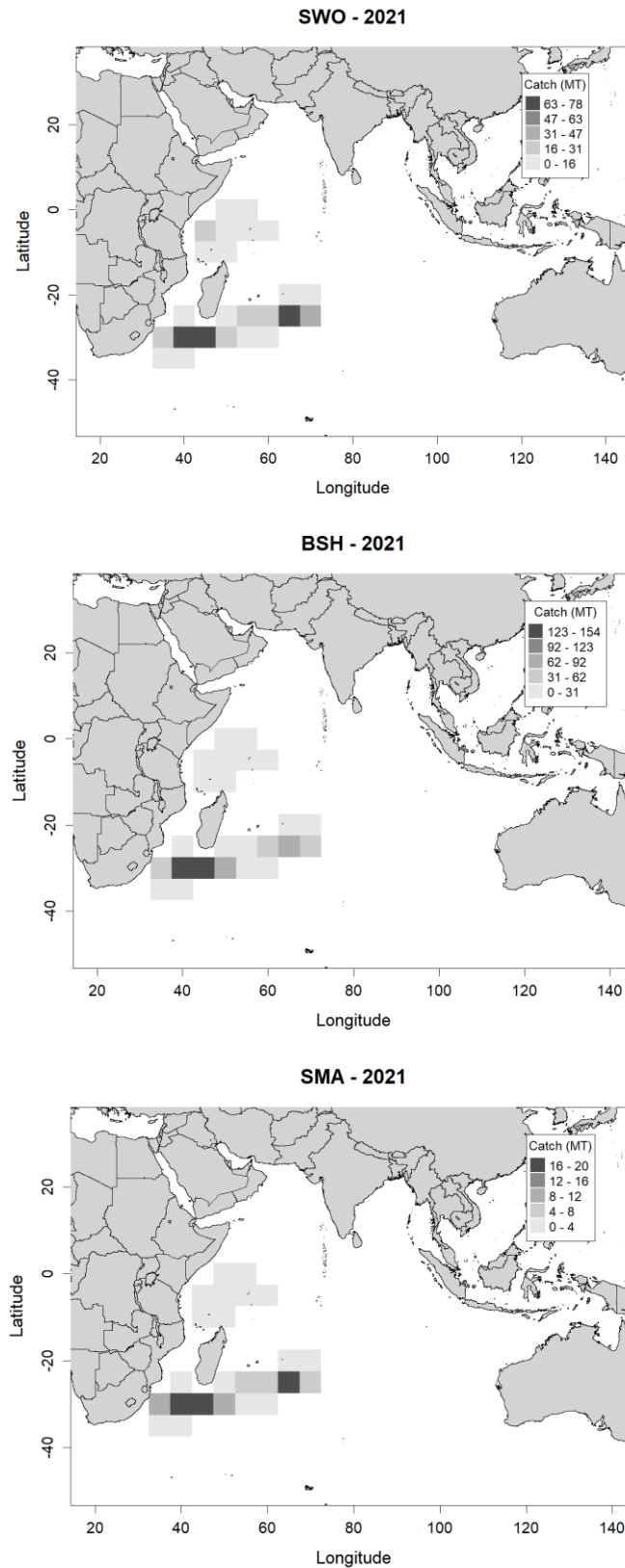


**Figure 2a.** Map of the distribution of fishing effort (number of hooks deployed), by the Portuguese longline fleet operating in the IOTC area of competence during 2021.

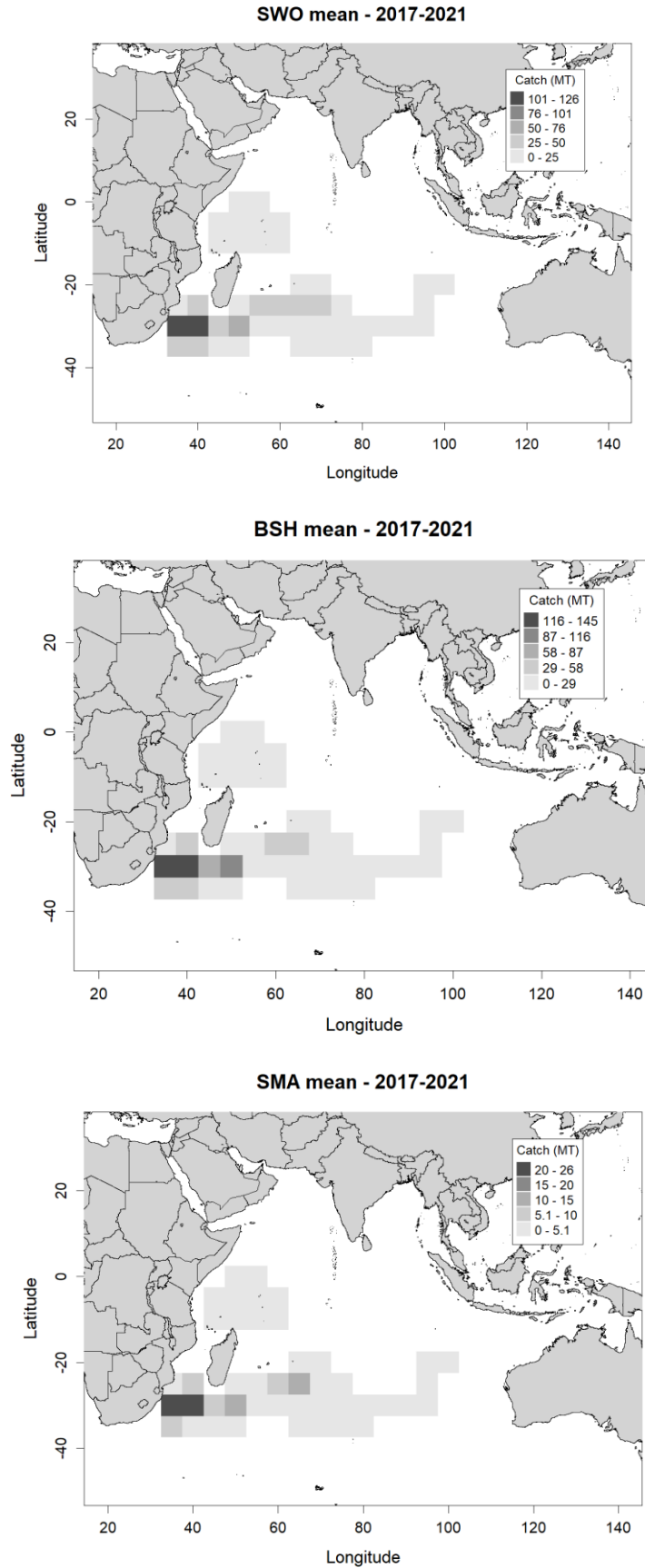
### Mean Hooks - 2017-2021



**Figure 2b.** Map of the distribution of mean fishing effort (number of hooks deployed), by the Portuguese longline fleet operating in the IOTC area of competence during the period 2017-2021.



**Figure 3a.** Map of distribution of the catches (MT) by major species in the IOTC area of competence in 2021: SWO (swordfish) – *Xiphias gladius*; BSH (blue shark) – *Prionace glauca*; and SMA (shortfin mako) - *Isurus oxyrinchus*). Note: different catch scales.



**Figure 3b.** Map of distribution of mean catches (MT) by major species in the IOTC area of competence during the period 2017-2021: SWO (swordfish) – *Xiphias gladius*; BSH (blue shark) – *Prionace glauca*; and SMA (shortfin mako) - *Isurus oxyrinchus*. Note: different scales in the colour codes.



#### 4. RECREATIONAL FISHERY

No activity concerning recreational fishery by Portuguese vessels in the IOTC Convention area have been carried out for the last years.

#### 5. ECOSYSTEM AND BYCATCH ISSUES

All IOTC Resolutions and Recommendations concerning Sharks, Seabirds and Marine Turtles are broadly publicized among fishermen operating in the IOTC convention area. The recently IOTC ID guides are being distributed as Portuguese and/or Spanish printed translations are made available. IPMA has participated in the Shark Ecological Risk Assessments that were presented and discussed by the WPEB in 2015.

##### 5.1 Sharks

Major shark species catches are reported annually. Fishermen are encouraged to release by-catch species that are alive at-haulback, as well as juvenile specimens. The fleet must comply with the EU regulations on shark finning and fins-attached policy. Blue shark belly has been observed as being occasionally used as bait, particularly in areas/seasons when high shark bycatch occurs. Accordingly, an increased use of wire traces has also been observed. Shark catches have increased between 2014 and 2017 but dropped substantially especially after 2017 (**Table 3**). Only blue shark and shortfin mako are retained by the national fleet and commercialized, while the other species are discarded due to International and/or EU regulations. Those other species are therefore not retained nor landed, but are recorded and reported by the onboard observer programs when interactions occur.

##### 5.1.1. NPOA sharks

The EU has presented and implemented a NPOA for sharks. This was approved in 2009 and it is currently being implemented.

##### 5.1.2. Sharks finning regulation

EU.Portugal follows the EU regulations on this issue. Specifically, shark finning has been illegal under the EU's shark finning Regulation since 2003. That regulation was amended in 2013 to introduce a stricter fins-naturally-attached policy that prohibits all EU vessels, including EU.Portugal, from removing shark fins on board prior to landing the fish.

##### 5.1.3. Blue shark

All vessels have electronic logbooks and major shark species catches, of which blue shark is the main species followed by shortfin mako, are recorded and reported annually. **Table 3** below summarizes the catches of the main shark species, namely blue shark and shortfin mako over the last 5 years.

**Table 3:** Total weight (MT) of sharks, by species, retained by the national fleet in the IOTC area of competence during the period 2017-20201.

| FAO code | Species name             | 2017 | 2018 | 2019 | 2020 | 2021 |
|----------|--------------------------|------|------|------|------|------|
| BSH      | <i>Prionace glauca</i>   | 1240 | 806  | 711  | 499  | 742  |
| SMA      | <i>Isurus oxyrinchus</i> | 218  | 166  | 114  | 104  | 112  |
|          | <b>Total</b>             | 1458 | 973  | 825  | 603  | 854  |

**Table 4** requests to provide the total number of sharks, by species, released/discarded by the national fleet in the IOTC area of competence, including, when available, life status upon released/discard. This Table has been provided by EU.Portugal every year in the past, using data and reporting from onboard observer data. Because in 2021 it was not possible to carry out fishery observer trips, this table cannot be provided in the 2022 report.

##### 5.2 Seabirds

IOTC recommendations on seabirds have been made available to the fishermen operating longline gear. Skippers are encouraged to adopt mitigation measures, namely the use of tori lines, line weights and to conduct night gear setting with minimum deck lights, when fishing south of 25° South or



whenever interaction with seabirds is foreseen. Moreover, within the scope of the EU data collection framework (EU-Portugal mainland component), skippers are encouraged to report the incidental catches of sea birds. The recently IOTC ID sea-bird guides are distributed to the fleet.

The EU adopted in 2012 an Action Plan to address the problem of incidental catches of seabirds in fishing gears of its fishing fleets, that also applies to Portuguese vessels operating in the IOTC.

EU-Portugal fully complied with the Data Call for seabirds according to IOTC circular 2016/043 and submitted the requested data within the established deadlines (full datasets from 2011-2015). This full data is more complete than the data requested to be submitted in the tables for the IOTC National Reports.

Additionally, EU. Portugal has provided every year the interactions observer by fishery observers. Because in 2021 it was not possible to carry out fishery observer trips, this table cannot be provided in the 2022 report.

### 5.3 Marine Turtles

Fishermen are encouraged to carefully handle marine turtles accidentally caught, and immediately release them after gear removal. IPMA has provided guidance on how to safely handle and release the turtles, as well as ID guides. Within the scope of the EU data collection framework (EU-Portugal mainland component), skippers are encouraged to report the incidental catches of marine turtles.

The EU Council Regulation (EC) No 520/2007 of 7 May 2007 lay down technical measures for the conservation of migratory species including marine turtles incorporating articles and provisions to reduce marine turtle bycatch on EU member states fisheries. This also applies to EU.Portugal vessels operating in the IOTC area.

In the 2020 SC report, and as requested by the WPEB and SC, we provided a table with detailed data on sea turtle captures and releases, using data from the Portuguese pelagic fishery observer program, that included data between 2016 and 2019.

Additionally, EU.Portugal has provided every year the interactions observer by fishery observers. Because in 2021 it was not possible to carry out fishery observer trips, this table cannot be provided in the 2022 report.

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

The accidental catch of other species such as marine mammals and whale sharks are considered extremely rare. Whenever such animals are caught, fishermen are encouraged to immediately and safely release them.

EU.Portugal has provided every year the interactions of other ecologically related species observed by fishery observers. Because in 2021 it was not possible to carry out fishery observer trips, this table cannot be provided in the 2022 report. As such, it is not possible to provide data for 2021 with regards to **Table 5**.

## 6. NATIONAL DATA COLLECTION AND PROCESSING SYSTEMS

### 6.1. Logsheet data collection and verification

All longline vessels operating in the area have records of their catches registered on official logbooks, since the year they have beginning the fisheries operations in the area. In 2012 electronic logbooks

became mandatory. All logbooks are transmitted to the Portuguese Fisheries Administration (DGRM), which processes the data and transmit it to IOTC Secretariat through the European Commission.

### 6.2. Vessel Monitoring System

Since 1998 all Portuguese vessels over 15 meters long are obliged to have VMS equipment on board. Thereby all Portuguese vessels operating in the convention area are monitored by a tracking satellite VMS. The specific national legislation that regulates the use of VMS in EU.Portugal vessels is the called Decreto-Lei n.º 310/98, from 14 October 1998.

### 6.3. Observer scheme

Since 2011 an observer program was fully implemented by IPMA. Until 2018 the onboard fishery observers were part of the technical staff of IPMA, but since 2019 the onboard observers are hired through a private company. IPMA provides the training to the observers from the company and those are required to use IPMA protocols and forms for data collections. The program aims to cover 10% of the fishing effort on the convention, while a minimum of 5% is established. **Table 6** provides the coverage of the program by year calculated both in number of hooks and sets since the start of the program in 2011.

Seven observers have received the necessary training to collect a wide range of fisheries data, to fulfil all fields covered by the IOTC Observer Trip Report. Starting in 2011, the observers started collecting information on all specimens caught, which includes: ID to the most detailed taxonomic possible level; size; sex; the condition at-haulback (alive / dead); fate (retained/discarded); and, condition if discarded (alive/dead). Finally, biological samples were collected for some of the major shark and bony fish species, aiming a number of studies focusing on: life history issues (ages, growth and reproduction); genetics (population structure and paternity; and, morphometrics (weight:length, length:length, weight:weight relationships).

It is noted that the EU.Portugal observer program could not be executed during 2020 and 2021 mostly due to restrictions related with Covid-19, specifically restrictions to place fishery observers onboard and restrictions related with international travelling. As such, it is not possible to provide the map requested in **Figure 4**, nor the **Tables 7 and 8**.

**Table 6.** Annual observer coverage of the Portuguese pelagic longline fleet since it was established in 2011, measured as a percentage of the total effort in number of hooks and sets, for the period 2011–2020.

| Year  | Gear             | Observer coverage |          | Size data coverage   |
|-------|------------------|-------------------|----------|--|
|       |                  | Hooks (%)         | Sets (%) |  |
| 2011  | Pelagic longline | 17.9              | 16.3     | Sizes are taken for all retained specimens and dead discards |
| 2012  | Pelagic longline | 10.7              | 10.9     |  |
| 2013  | Pelagic longline | 11.0              | 9.9      |  |
| 2014  | Pelagic longline | 7.3               | 5.7      |  |
| 2015  | Pelagic longline | 11.1              | 8.2      |  |
| 2016  | Pelagic longline | 9.1               | 7.2      |  |
| 2017  | Pelagic longline | 7.9               | 7.0      |  |
| 2018  | Pelagic longline | 15.5              | 13.9     |  |
| 2019  | Pelagic longline | 17.4              | 16.1     |  |
| 2020* | Pelagic longline | 0                 | 0        |  |
| 2021* | Pelagic longline | 0                 | 0        |  |

\* Impossibility to place fishery observers onboard in that year.

**Figure 4:** Not possible to provide as the fishery observer program could not be executed in 2021.

**Table 7:** Not possible to provide as the fishery observer program could not be executed in 2021.

**Table 8:** Not possible to provide as the fishery observer program could not be executed in 2021.

#### 6.5. Unloading/Transshipment of flag vessels

All Portuguese vessels operating in the IOTC convention area catches are moved to containers in ports of those countries and shipped to non-Portuguese ports in Europe (mostly Vigo, Spain). Thus, the current port sampling program for the Portuguese longline fleet does not cover those vessels operating in the IOTC conventional area. Thus, **Tables 9** and **10** do not apply to this report

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

In terms of species identification, the onboard observers and skippers are distributed with the IOTC Billfish identification cards, as well as material like dichotomic keys prepared by IPMA- Portugal.

In terms of data recording, all catch of all species including marlins, are recorded and reported in the electronic logbooks. Additionally, all catches, including retained species, alive and dead discards, are recorded in the observer program and dully reported in electronic format to the IOTC Secretariat by the established deadlines. This includes all billfish species when those are captured. However, as stated previously above, given the impossibility of conducting observer trips in 2021, observer data is not available from 2021 to report in this 2022 report.

#### 6.7. Gillnet observer coverage and monitoring

This point does not apply to EU.Portugal, as EU.Portugal does not have any gillnets fisheries in the IOTC convention area.

#### 6.8. Sampling plans for mobulid rays

This point is mostly related with subsistence and artisanal fisheries and therefore does not apply to EU.Portugal fleet.

However, we can add that all mobulids rays from the UE.Portugal longline fleet are released. In terms of data recording and reporting, and as mentioned previously, all catch for all species (including retained species, alive and dead discards) are recorded in the observer program and dully reported in electronic format to the IOTC Secretariat by the established deadlines. This includes all mobulid rays when those are captured and discarded. As stated previously, given the impossibility of conducting observer trips in 2021, observer data is not available from 2021 to report in this 2022 report.

### 7. NATIONAL RESEARCH PROGRAMS [Desirable]

The Portuguese research program carried out by IPMA, I.P., for highly migratory species begun in 2010. The programme covers 3 main research lines: fisheries, fleet dynamics and biological studies. The fisheries research lines involves: i) revisiting historical official logbook data and the collection of skippers logbooks and VMS data; ii) spatial-temporal analysis of fishing effort and catch at size for major species caught; and iii) haulback mortality. The fleet dynamics involves: i) the spatial-temporal analysis of the fishing activity and catches; and ii) investigating the link between gear configuration/characteristics and target vs. by-catch of sharks. Finally, the biological studies focus all major species, but primarily on pelagic sharks, namely in terms of: i) life history parameters (age, growth and reproduction); ii) genetics (population structure and paternity); iii) morphometrics (weight:length, length:length and weight:weight relationships); and iv) movements and habitat use. Among shark species, particular attention is being provided to the two most important species caught (blue shark and shortfin mako), and to a less extent to other species, including threshers, hammerheads, oceanic whitetip and silky sharks (**Table 11**). It is also worth noting that IPMA scientists have participated in the technical work for the development of MSE for the Indian Ocean swordfish, and involved in several other EU funded projects that have focused migratory species in the Indian Ocean, such as tagging sea-turtles and swordfish.

### 7.1. National research programs on blue shark

As mentioned before, the biological studies carried out at IPMA focus all major species, but primarily on pelagic sharks, namely in terms of: i) life history parameters (age, growth and reproduction); ii) genetics (population structure and paternity); iii) morphometrics (weight:length, length:length and weight:weight relationships); and iv) movements and habitat use. Among shark species, particular attention is being provided to the two most important species caught (blue shark and shortfin mako), and to a less extent to other species, including threshers, hammerheads, oceanic whitetip and silky sharks.

One recent work specific to blue shark was estimating ages and modelling growth in the SW Indian Ocean. The results from that work have been shown to the WPEB (Andrade et al., 2017) and published in the peer-reviewed literature (Andrade et al., 2019).

Another major contribution was a revision for catch-at-size data for both the Indian Ocean and Atlantic, that has been provided to the WPEB and used in the 2017 stock assessment, to inform the size distribution in the integrated assessment models. This work has in the meanwhile been published in the peer-reviewed literature (Coelho et al., 2018).

In the previous blue shark stock assessment (2017), EU.Portugal scientists have worked and provide to the WPEB an alternative catch series based on ratios (Coelho and Rosa, 2017), as well as developing priors for population dynamic parameters (Rosa and Coelho, 2016), that were used in the stock assessment. In 2021, the WPEB carried out a new blue shark stock assessment and EU.Portugal provided updated CPUE series and size data information for informing the new assessment models (Coelho et al., 2021).

Finally, EU.Portugal has lead a EU project (Coelho et al., 2019) that worked with several shark case studies, including a preliminary works for MSE and length-based indicators for blue shark in the Indian Ocean, that were also presented to the WPEB (Ortiz de Urbina et al., 2018; Walker et al., 2018).

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

All billfish interactions are recorded in the observer program and reported to IOTC. Those interactions are relatively rare, so at this stage EU.Portugal only does some opportunistic, but not systematic, biological sampling on those species. A program has started a few years ago to collect spines and otoliths of swordfish and that could be expanded to other billfishes in the future.

EU.Portugal has in the past provided to the WPB observations on the Indo-Pacific sailfish from the Portuguese fleet in the Indian Ocean, and updates can be further provided if and when requested by the WPB (Rosa et al., 2015). Additionally, EU.Portugal has provided samples to a large scale effort for population genetics on sailfish, that has been accepted in the peer-reviewed literature (Ferrette et al., 2021).

Finally, EU.Portugal/IPMA is participating in a EU project lead by Ifremer (EU.France) to tag swordfish and marlins in the Indian Ocean (update provided in Nieblas et al., 2020).

### 7.3. National research programs on sharks

As mentioned before, the biological studies carried out at IPMA focus all major species, but primarily on pelagic sharks, namely in terms of: i) life history parameters (age, growth and reproduction); ii) genetics (population structure and paternity); iii) morphometrics (weight:length, length:length and weight:weight relationships); and iv) movements and habitat use. Among shark species, particular attention is being provided to the two most important species caught (blue shark and shortfin mako), and to a less extent to other species, including threshers, hammerheads, oceanic whitetip and silky sharks.

Some experimental work has been done with the use of monofilament *versus* wire leaders in the pelagic longline configuration, which has been presented to the WPEB (Santos et al., 2014) and published in the peer review literature (Santos et al., 2017).

Additionally, EU.Portugal recently lead a EU Project on a meta-analysis for the effects of hook, bait and leader type effects on surface pelagic longline retention and mortality rates, comparing target, bycatch and vulnerable fauna interactions. The last update made to the WPEB is provided in Santos et al. (2019). That project final report is available from Coelho et al. (2020).

#### **7.4. National research programs on oceanic whitetip sharks**

See point 7.3 above for a general description on the research carried out in sharks, with some aspects also applying to oceanic whitetip sharks.

EU.Portugal (IPMA) has participated in some previous studies focusing on oceanic whitetip sharks, including with samples from the Indian ocean (Mendes et al., 2015, Camargo et al., 2016). However, and with regards to biological samples, it is worth noting that since the inclusion of oceanic whitetip shark in CITES in 2014, all biological sampling has stopped (e.g., tissue for genetics and vertebrae). So only samples collected before the CITES listing are now being used.

IPMA has also carried out a work focused on the hooking mortality of oceanic whitetip shark, in an attempt to provide information in the effectiveness of the no-retention of that species and at the request of the WPEB. That work has been presented to the WPEB (Coelho, 2016) and updates can be further provided in and when requested by the WPEB.

Finally, EU.Portugal/IPMA participates in a collaborative project on oceanic whitetip shark habitat use and post-release mortality using satellite telemetry (Bach et al., 2019).

#### **7.5. National research programs on marine turtles**

All sea turtle interactions are recorded in the observer program and reported to IOTC. EU.Portugal is currently participating in a collaborative research that includes the Atlantic (ICCAT) and Indian Ocean (IOTC) scientists and data.

Furthermore, since 2016 IPMA has been collaborating with projects from Ifremer (EU.France) and NGOs to deploy satellite tags on sea turtles to study their movements and migrations in the Indian Ocean.

#### **7.6. National research programs on thresher sharks**

See point 7.3 above for a general description on the research carried out in sharks, with some aspects also applying to thresher sharks.

EU.Portugal/IPMA has participated in a bigeye thresher sharks study on population genetics for the Atlantic and Indian oceans (Morales et al., 2018). With regards to biological samples, it is worth noting that since the inclusion of thresher sharks in CITES in 2017, all biological sampling has stopped (e.g., tissue for genetics and vertebrae), due to complications in sample transportation. As such, only samples collected previous to CITES inclusion are currently being used.

Since 2018, IPMA has been collaborating with IOTC projects to deploy satellite tags on bigeye thresher sharks to study movement patterns and migrations, and determine post-release mortality (Romanov et al., 2020).

**Table 8.** Summary table of national (EU-Portugal) research projects focusing migratory species in the Indian Ocean, that were ongoing in 2020.



| Project title                                   | Period    | Countries involved | Budget total     | Funding source   | Objectives   | Short description  |
|---|-----------|--------------------|------------------|--|--|--|
| National Program for Biological Sampling (PNAB) | 2011-2022 | Portugal           | 50,000€ (yearly) | EU (DCF – Data Colletion Framework) and National funds | Data collection and reporting of data for the Portuguese pelagic longline fleet. | This yearly program involves the collection of data, reporting and scientific work to provide advice in the IOTC area of competence. |

Based on the data collected in 2021 and in previous years, several working documents and info papers were prepared or co-authored by the Portuguese research team during several 2021 IOTC meetings. Those also include technical documents produced within international cooperative initiatives, either involving other EU colleagues or having a broader international scope.

The technical papers presented to IOTC in 2021 with EU.Portugal participation were:

- Bach, P., Sabarros, P.S., Romanov, E.V., Coelho, R., Guillon, N., Massey, Y., Murua, H. 2021. Third progress report on tag deployments to investigate the post-release mortality of oceanic white sharks discarded by EU purse seine and pelagic longline fisheries in the South-West Indian Ocean (POREMO project). 17th Working Party on Ecosystems and Bycatch: Assessment Meeting (WPEB17-AS). 6-10 September 2021, Online Meeting. IOTC Document, IOTC-2021-WPEB17-AS-26\_rev1. 9pp.
- Coelho, R., Santos, C.C., Rosa, D., Lino, P.G. 2021. Updated blue shark catches and standardized CPUE for the Portuguese pelagic longline fleet in the Indian Ocean. 17th Working Party on Ecosystems and Bycatch Data Preparatory Meeting (WPEB17-DP). 12-14 April 2021, Online Meeting. IOTC Document, IOTC-2021-WPEB17-DP-10. 17pp
- Druon, J.-N., Sabarros, P.S., Bach, P., Romanov, E.V., Coelho, R., 2021. Habitat modelling for the blue shark (*Prionace glauca*) by sex and size classes in the Indian Ocean. 17th Working Party on Ecosystems and Bycatch: Assessment Meeting (WPEB17-AS). 6-10 September 2021, Online Meeting. IOTC Document, IOTC-2021-WPEB17-AS-13\_rev1. 22pp
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## 8. IMPLEMENTATION OF SCIENTIFIC COMMITTEE RECOMMENDATIONS AND RESOLUTIONS OF THE IOTC RELEVANT TO THE SC.

**Table 9.** Scientific requirements contained in Resolutions of the Commission, adopted between 2012 and 2021.

| Res. No. | Resolution                    | Scientific requirement | CPC progress  |
|----------|-------------------------------|------------------------|---|
| 11/04    | On a regional observer scheme | Paragraph 9            | In late 2010 a national observer program was approved under the EU data collection framework. The observer program has been fully implemented since 2011 and is currently ongoing. The trip reports have always been submitted in due time to the IOTC Secretariat. Since 2017, all data has been fully transmitted in electronic format. |

| Res. No. | Resolution  | Scientific requirement | CPC progress  |
|----------|---|------------------------|---|
|          |   |                        | Since 2019 the onboard observers are no longer part of the IPMA staff but hired through a private company. Still, all training and data protocols and forms used are from IPMA, and IPMA is still responsible for the implementation, data compilation and quality check, and data transmission to IOTC. It is noted that in 2020 and 2021 due to restrictions to have onboard observers and restrictions in international traveling, it was not possible to conduct observer trips.  |
| 12/04    | On the conservation of marine turtles   | Paragraphs 3, 4, 6–10  | Incidental interaction with marine turtles are recorded by onboard observers. The information is fully submitted and provided to the IOTC Secretariat in the fishery observer reports and datasets. Fishermen are encouraged to carefully handle marine turtles accidentally caught, and immediately release them after gear removal. They are aware of and use proper mitigation, handling and de-hooking techniques and should keep onboard all necessary equipment for the release of marine turtles (including line cutters and de-hookers), in accordance with IOTC and FAO handling guidelines. Furthermore, since 2016 IPMA has been collaborating with projects from Ifremer (EU.France) and NGOs to deploy satellite tags on sea turtles to study their movements and migrations in the Indian Ocean.  |
| 12/06    | On reducing the incidental bycatch of seabirds in longline fisheries.   | Paragraphs 3–7         | All longline fishing vessels are aware of the need to use tori lines and/or line weights when operating south of 25°S. The incidental capture of sea birds in Portuguese longliners is rare. EU-Portugal fully complied with the Data Call for seabirds according to IOTC circular 2016/043 and submitted to the IOTC Secretariat the requested data within the established deadlines (full and detailed datasets from 2011-2015). IPMA fishery observers record all interactions with seabirds, which are fully reported in the observer trips data submitted to IOTC in due time. Additionally, IPMA was recently involved in a large scale effort and work to assess the effectiveness of mitigation measures in sea-birds (Jimenez et al., 2020), that was also requested by the IOTC Commission.   |
| 12/09    | On the conservation of thresher sharks (family alopiidae) caught in association with fisheries in the IOTC area of competence | Paragraphs 4–8         | Fishers are encouraged to release thresher sharks if recognised on the line before bringing them onboard the vessel. Skippers are requested to record and report incidental catches as well as live releases of thresher sharks. Scientific observers from IPMA used to collect biological samples (vertebrae and tissues) from thresher sharks taken in the IOTC area of competence that were dead at haulback, as part of a research project approved by the IOTC Scientific Committee. The information compiled by IPMA has been presented to the WPEB. Given than thresher sharks were listed in CITES in 2016, IPMA had to completely stop all sampling on this species, due to complications in sample transportation. Since 2018, IPMA has been collaborating with IOTC projects to deploy satellite tags on bigeye thresher sharks to study movement patterns and migrations, and determine post-release mortality. |
| 13/04    | On the conservation of cetaceans  | Paragraphs 7–9         | EU.Portugal does not have purse seiners operating in the IOTC area of competence. For other gears, namely pelagic longlines, interactions with cetaceans are rare. If such animals are caught, fishermen are encouraged to immediately and safely release them. IPMA fishery observers record all interactions with cetaceans, which  |



| Res. No. | Resolution  | Scientific requirement | CPC progress  |
|----------|---|------------------------|---|
|          |   |                        | are reported in the observer trips and electronic data submitted to IOTC in due time.   |
| 13/05    | On the conservation of whale sharks ( <i>Rhincodon typus</i> )  | Paragraphs 7–9         | EU.Portugal does not have purse seiners operating in the IOTC area of competence. For other gears, namely pelagic longlines, such interactions are extremely rare (almost non-existent). In the extremely unlikely event of such animals being caught, fishermen are encouraged to immediately and safely release them. IPMA fishery observers would record any possible interaction with whale sharks, which if happened would be reported in the observer trips submitted to IOTC in due time.  |
| 13/06    | On a scientific and management framework on the conservation of shark species caught in association with IOTC managed fisheries | Paragraph 5–6          | Fishers are encouraged to release oceanic whitetip sharks if recognised on the line before bringing them onboard the vessel. Skippers are requested to record and report incidental catches as well as live releases of oceanic whitetip sharks. Scientific observers from IPMA used to collected biological samples (vertebrae and tissues) from oceanic whitetip sharks taken in the IOTC area of competence that were dead at haulback, as part of a research project approved by the IOTC Scientific Committee and before inclusion of this species in CITES in 2014. However, after 2014 all biological sampling on this species stopped after the CITES listings due to complications in sample transportation internationally. Since 2018, IPMA has been collaborating with IOTC projects to deploy satellite tags on oceanic whitetip sharks to study movement patterns and migrations, and determine post-release mortality.   |
| 15/01    | On the recording of catch and effort by fishing vessels in the IOTC area of competence  | Paragraphs 1–10        | All operating longline vessels have records of their catches registered on official logbooks, since the year they have begun the fisheries operations in the IOTC convention area. In 2012 electronic logbooks became mandatory. All logbooks are transmitted to the Portuguese Fisheries Administration (DGRM), which processes the data and transmit it to European Commission (EU). EU is responsible for providing the data to the IOTC Secretariat   |
| 15/02    | Mandatory statistical reporting requirements for IOTC Contracting Parties and Cooperating Non-Contracting Parties (CPCs)        | Paragraphs 1–7         | Since 2009 catch by species in weight and effort in number of hooks deployed has been provided by 5° x 5° grid area   |
| 17/05    | On the conservation of sharks caught in association with fisheries managed by IOTC  | Paragraphs 6, 9, 11    | EU. Portugal reports all data for catches of sharks, in accordance with IOTC data reporting requirements and procedures. Additionally, all data from sharks recorded by the onboard observers is also fully reported and submitted to the IOTC Secretariat in electronic format. Furthermore, IPMA continues several lines of research on sharks, including: <ul style="list-style-type: none"> <li>• Fishing gear selectivity</li> <li>• Improvement of knowledge on biological parameters</li> <li>• Shark tagging studies aiming to identify habitat use.</li> <li>• Shark tagging studies for post-release mortality.</li> </ul> Finally, fishermen, operating in the area, are made aware of practices that should be put in place, namely: <ul style="list-style-type: none"> <li>• Shark species catches need to be reported annually;</li> <li>• Shark fining is banned on all licensed vessels; commercial sharks that are retained must be landed with the fins attached</li> </ul> |

| Res. No. | Resolution   | Scientific requirement | CPC progress   |
|----------|--|------------------------|--|
|          |  |                        | Bycatch species are released, and should use the best handling practices.  |
| 18/02    | On management measures for the conservation of blue shark caught in association with IOTC fisheries                                | Paragraphs 2-5         | <p>The EU.Portugal longline fleet is aware that all major sharks, including blue shark catches, have to be fully reported. Portugal has an electronic logbook system and uses VMS data for preparing nominal catches and catch and effort data, respectively, that is fully submitted to the IOTC Secretariat.</p> <p>Additionally, EU.Portugal has an ongoing onboard observer program that records all shark species catches, including blue shark. All detailed data from the observer program is fully submitted to IOTC Secretariat in electronic format.</p> <p>IPMA continues scientific research in all shark species, including blue shark, especially for life history characteristics, and the information is made available to the WPEB.</p>   |
| 18/05    | On management measures for the conservation of the Billfishes: Striped marlin, black marlin, blue marlin and Indo-Pacific sailfish | Paragraphs 7 – 11      | Fishers are encouraged to release any stripped, black or blue marlins that are captured or brought alive alongside the vessel. Skippers are requested to record and report incidental catches as well as live releases of those marlin species. Scientific observers from IPMA record all catches of marlins as well as their status when captured and when released in trips with onboard observers. The information is fully provided to the IOTC Secretariat in the observer trip reports and data.   |
| 18/07    | On measures applicable in case of non-fulfilment of reporting obligations in the IOTC  | Paragraphs 1, 4        | <p>EU-Portugal reports annually the catches, catch and effort and size samples of the main IOTC species, including sharks and other bycatch. Besides the official statistics, skippers are encouraged to report data using the self-sampling program, and all data is reported to the IOTC Secretariat. Additionally, EU-Portugal has been fully reporting in due time the observer trip reports, providing full details on the operations and catches (including all bycatch) since the start of the fishery observer program in 2011.</p> <p>These reporting obligations are included in the Portuguese National Data Collection Framework under the EU legislation (article 25, of EU Regulation 1380/2013, of 11 December). Still according to EU rules, the failure by a Member State to collect and /or provide data in a timely manner may result in a proportionate suspension or interruption of relevant Union financial assistance to that Member State. Thus, according to EU Regulation 665/2008, of 14 July the proportion of reduction is 1% of the total Community financial assistance per failure to satisfy a demand.</p> |
| 19/01    | On an Interim Plan for Rebuilding the Indian Ocean Yellowfin Tuna Stock in the IOTC Area of Competence                             | Paragraph 22           | Tropical tunas are only an occasional bycatch of the EU.Portugal pelagic longline fleet that is mostly targeting swordfish and blue shark.   |
| 19/03    | On the Conservation of Mobulid Rays Caught in Association with Fisheries in the IOTC Area of Competence                            | Paragraph 11           | All mobulid rays incidentally captured by the EU.Portugal longline fleet are released. In terms of data recording and reporting, all interactions with those species are recorded in the observer program and dully reported in electronic format to the IOTC Secretariat by the established deadlines, including data on the status at discarding (dead or alive).  |

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## IOTC Report - 2021

### Resolutions 13/04 and 13/05

During 2021, two Portuguese longliners were active in IOTC area:

|             |                |              |
|-------------|----------------|--------------|
| IOTC0014811 | Ribeira do Mar | PRT000021092 |
| IOTC00343   | Valmitão       | PRT000022649 |

The bycatch of cetaceans and whale sharks is considered extremely rare in longliners fisheries. During 2021 there was no bycatches from PT fishing vessels of that kind of marine animals, nor interactions reported.

Concerning whale sharks, this kind of interaction it's even more unlikely because Portuguese activity in this area occurs in temperate/cold waters and *Rhincodon typus* is a tropical specie. Even if its habitat overlaps the activity area, as it happens in the Atlantic Ocean, it is a planktivorous fish that is not attracted by bait or catch in the hooks.

Lisbon, 9<sup>th</sup> March 2022



(Vanessa Monteiro de Barros - External Resources Division)



(Isabel Maria Teixeira - Head of Unit of External Resources Division)

## IOTC Report – 2021

### Resolutions 12/04 and 12/06

During 2021, two Portuguese longliners were active in IOTC area:

|             |                |              |
|-------------|----------------|--------------|
| IOTC0014811 | Ribeira do Mar | PRT000021092 |
| IOTC00343   | Valmitão       | PRT000022649 |

During 2021 one interaction were registered by the vessel *Ribeira do Mar* regarding marine turtles.

| DATE       | POSITION          | SCIENTIFIC NAME       | FATE  | ACTIONS TAKEN |
|------------|-------------------|-----------------------|-------|---------------|
| 13/06/2021 | 29°30´S - 37°00´E | <i>Chelonia mydas</i> | Alive | Release alive |

During 2021 two interactions were registered by the vessel *Valmitão* regarding marine turtles.

| DATE     | POSITION          | SCIENTIFIC NAME       | FATE  | ACTIONS TAKEN |
|----------|-------------------|-----------------------|-------|---------------|
| 23/03/21 | 31°00´S - 41°00´E | <i>Chelonia mydas</i> | Alive | Release alive |
| 19/11/21 | 25°00´S - 68°00´E | <i>Chelonia mydas</i> | Alive | Release alive |

During 2021 none interaction was registered by the vessel *Ribeira do Mar* or *Valmitão* regarding sea birds.

In order to minimize the impact of the interactions with marine turtles and seabirds, the mitigation measures utilized were:



## 1. MARINE TURTLES

- Large circle hooks were utilized and adequate equipment for the disentanglement of turtles was available onboard;
- Manuals are regularly made available to the industry, containing instructions and information for a proper use of this equipment and for identification of the various species of marine turtles.

## 2. SEABIRDS

- Deep setting line shooter;
- Use of Tori lines;
- Line weighting.

Lisbon, 9<sup>th</sup> March 2021



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