# REGIONAL OBSERVER SCHEME DATA ON SHORTFIN MAKO SHARK CPUE

## PURPOSE

To update the 20th Working Group on Ecosystem and Bycatch (WPEB20) about catch effort data related to shortfin mako shark (SMA) from the Regional Observer Scheme (ROS). We aim to check if this data can help develop a suitable catch per unit effort (CPUE) index for the SMA stock assessment. The data examined in the paper are based on data already submitted and included in the IOTC ROS database.

## BACKGROUND

During the 20th Working Party on Ecosystems and Bycatch Data Preparatory Meeting (22-26 April 2024), the WPEB requested the Secretariat to explore feasibility to use SMA catch and effort from the Regional Observer Scheme (ROS) database for a combined CPUE and if feasible to develop a CPUE index for the shortfin mako shark (IOTC 2024a). The catch effort data were extracted from the IOTC ROS database on 30th May 2024 and were examined for their suitability for CPUE standardisations.

The extracted data includes 7325 records from EU. France, Japan, and Sri Lanka longline fleets (Gear code: Drifting longline). Each record represents an observed longline fishing set, together with information on catches of shortfin mako sharks. Key variables include trip and set numbers, country, vessel number, dates (start and end) and location (longitude and latitude), number of hooks, hooks between floats, and SMA catch in numbers. The ROS data also has information on fishing operations concerning gear configurations and mitigation measures, but it's often incomplete due to various reporting requirements (IOTC 2024b).

The dataset includes 657 SMA catches (179 by France, 478 by Japan, 0 by Sri Lanka). Table 1 summarizes catch effort stats for the French and Japanese fleets. For France, data from 2009 to 2021 indicates about 200 to 600 longline sets (~200, 000 to ~600, 000 hooks) and 3 to 30 catches of shortfin mako sharks from these observed sets annually. Japan's data covers only five years (2012 to 2016) with 400 to 900 sets (~1300,000 to ~2700,000 hooks) and 40 to 180 SMA catches annually.

The encounter rate of SMA by the Japanese longline (the proportion of sets with positive catches of SMA) is over 10% for four out of five years, higher than that by the French longline, which is usually below 5% (Figure 1-left). However, the CPUE for the French fleet (0.5 to 1.20 SMA per 1000 hooks) is higher than Japanese fleet (0.3 to 0.4 SMA per 1000 hooks) (Figure 1-right).

French longliners mainly operate near Reunion Island in the southwestern Indian Ocean (Figure 2 - left) and have one of the highest observer coverages (IOTC 2023). The Japanese efforts are more spread out, but the data in the ROS database doesn't fully represent all areas fished by their fleet (Figure 2 - right).

## DISCUSSIONS

The ROS database currently holds detailed information on longline fishing, which is generally enough to analyse catch and effort trends. However, for the Shortfin mako sharks, the data isn't sufficient to develop a standardised CPUE index. The Japanese longline data in the database is incomplete, and the French fleet's (observed) SMA catch is too small and variable. Additionally, the existing data doesn't cover the longline fishery in the Indian Ocean region well.

The Secretariat receives ROS data in various formats. At present, only three CPCs have their data uploaded to the ROS database. This is due to difficulties in importing data from incompatible formats like PDF or Word, or issues with CPCs accessing the ROS online tool. Many CPCs have been using PDF/Word formats for years, following the initial standard reporting requirements of the ROS (Resolution 11/04). Despite

being outdated, several CPCs continue to use these forms, often providing information in a summarized manner (Table 2).

**REFERENCES**

IOTC 2023. Updates on the implementation of the IOTC regional observer scheme and its pilot project. IOTC-2023-WPDCS19-10_Rev2.

IOTC 2024a. Report of the 20th Session of the IOTC Working Party on Ecosystems and Bycatch Data Preparatory Meeting. Online, 22 - 26 April 2024. IOTC–2024–WPEB20(DP)–R.

IOTC 2024b. Regional Observer Scheme data field reporting rates. IOTC–2024–WGEMS04-05.

**Table 1: Summary of ROS catch and effort of shortfin mako sharks 2009 – 2021 for French and Japanese longline fleets. "Prob of encounter" is the proportion of sets that has positive catches of SMA.**

| | EU.France | | | | | Japan | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Year | No hooks (1000) | No sets | SMA number | Prob of encounter | Catch per 1000 hooks | No hook (1000) | No sets | SMA number | Prob of encounter | Catch per 1000 hooks |
| 2009 | 57 | 41 | 6 | 0.15 | 0.72 | | | | | |
| 2010 | 68 | 54 | 10 | 0.19 | 0.83 | | | | | |
| 2011 | 258 | 219 | 20 | 0.09 | 0.79 | | | | | |
| 2012 | 630 | 489 | 27 | 0.03 | 1.20 | 1487 | 469 | 85 | 0.14 | 0.42 |
| 2013 | 620 | 475 | 3 | 0.01 | 0.77 | 1388 | 421 | 77 | 0.14 | 0.40 |
| 2014 | 517 | 393 | 11 | 0.03 | 0.72 | 2773 | 890 | 183 | 0.16 | 0.40 |
| 2015 | 527 | 404 | 7 | 0.01 | 0.80 | 1528 | 511 | 38 | 0.07 | 0.35 |
| 2016 | 566 | 385 | 9 | 0.02 | 0.73 | 1548 | 511 | 95 | 0.15 | 0.40 |
| 2017 | 525 | 361 | 7 | 0.02 | 0.68 | | | | | |
| 2018 | 369 | 274 | 28 | 0.07 | 1.12 | | | | | |
| 2019 | 498 | 359 | 12 | 0.03 | 0.76 | | | | | |
| 2020 | 497 | 373 | 6 | 0.02 | 0.75 | | | | | |
| 2021 | 556 | 431 | 33 | 0.06 | 0.97 | | | | | |

**Table 2: A summary of the  type of ROS submissions  by CPC/year that are not in ROS-DB.**

| CPC | YEAR | TYPE OF SUBMISSION | COMMENTS |
|---|---|---|---|
| AUS | 2010-2014 | PDF | |
| AUS | 2015-2023 | EXCEL | Several extracted table |
| CHN | 2014-22 | WORD | |
| PRT | 2011-16 | PDF | |
| PRT | 2017-23 | EXCEL | IOTC OLD FORMAT |
| ESP | 2017-18 | PDF | |
| ESP | 2020,22 | EXCEL | ST09 |
| UK | 2017-19 | EXCEL | IOTC OLD FORMAT |
| IDN | 2005-10 | EXCEL | SPREADSHEETS OF VARIOUS OUTPUTS |
| IDN | 2014-22 | EXCEL | IOTC OLD FORMAT |
| JPN | 2017-19 | EXCEL | 3 FILES( TRIP, SET, CATCH) |
| KEN | 2016 | EXCEL | |
| KEN | 2018-20 | WORD | |
| KOR | 2010-22 | WORD | |
| MUS | 2018 | WORD | |
| MOZ | 2012-17 | EXCEL | |
| ZAF | 2011-22 | WORD | |
| TWN | 2012-21 | PDF | |
| TWN | 2022 | EXCEL | NEW IOTC  FORMAT |
| TZA | 2016, 2019 | PDF | |
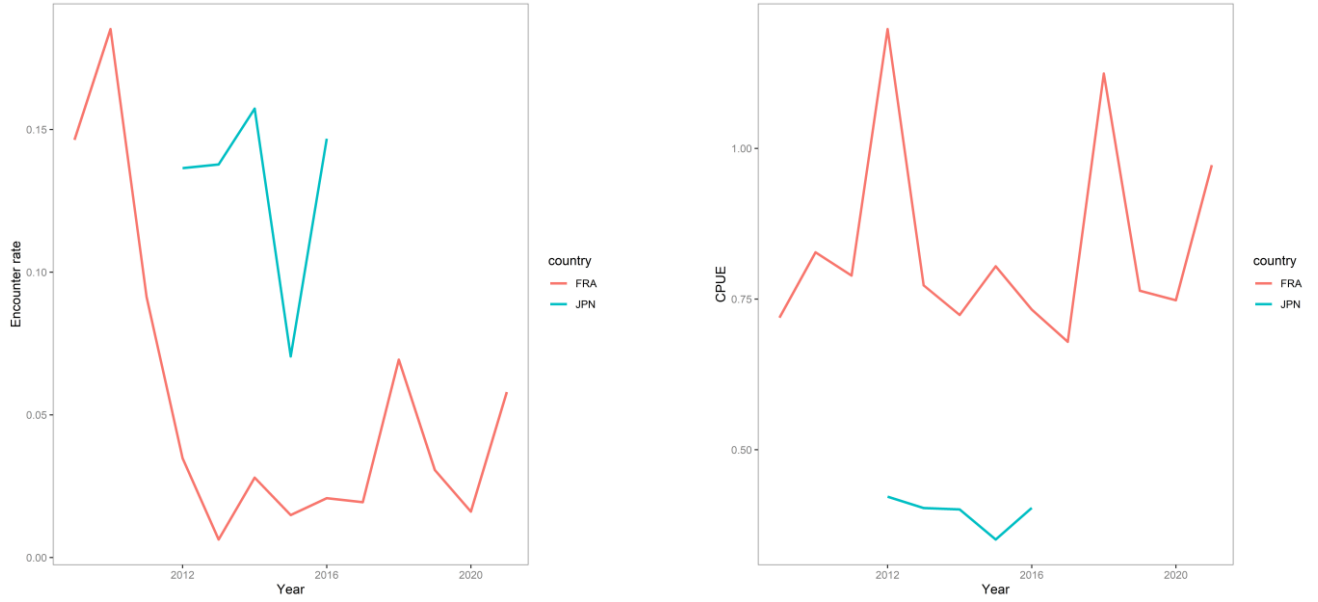
**Figure 1: Encounter probability (percent of sets with positive SMA catches) and nominal catch rates (catch per 1000 hooks, for positive sets) for French (2009 to 2021) and Japanese (2012-2016) longline fleet in the ROS database.**
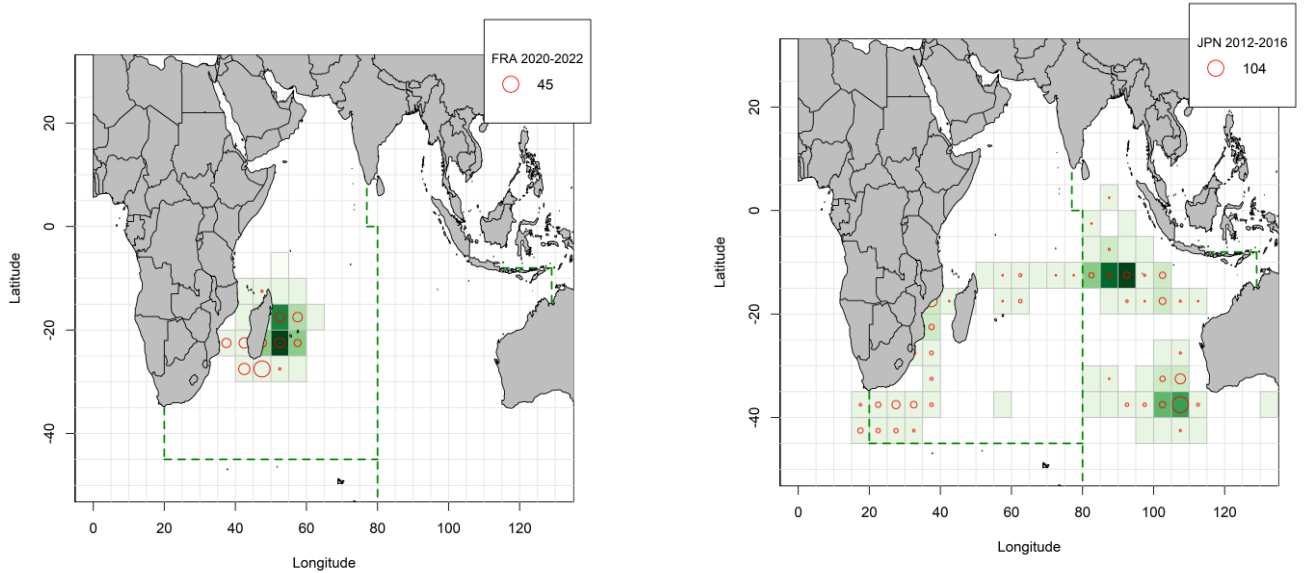


**Figure 2: Distribution of fishing effort (number of hooks) and catches of SMA for the French longline observer data (aggregated 2009 to 2021, left) and for the Japanese longline observer data ( aggregated 2012 to 2016, right) in the ROS database.**