

## UPDATES ON THE IMPLEMENTATION OF THE IOTC REGIONAL OBSERVER SCHEME AND ITS PILOT PROJECT

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### Purpose

To inform the Scientific Committee (SC) of the status of implementation and reporting to the IOTC Secretariat of the Regional Observer Scheme (ROS) set out by Resolution 11/04 *on a Regional Observer Scheme* at the 15<sup>th</sup> Session of the Commission in 2011, and superseded by Resolution [22/04](#) *On a regional observer scheme* in 2022.

### Background

Fisheries observer data is important for fisheries management, providing an independent source of detailed, high-quality information on fishing activities and catches at a sufficient level of resolution to be used for analyses such as the standardisation of catch rates and analysis of bycatch mitigation measures. At the 13<sup>th</sup> Session of the Commission (S13), the Commission adopted Resolution 09/04 *on a Regional Observer Scheme*, which was superseded in 2010 by Resolution 10/04, again in 2011 by Resolution 11/04 and again in 2022 by Resolution 22/04. The main objective of the IOTC Regional Observer Scheme is to *'collect verified catch data and other scientific data related to the fisheries for tuna and tuna-like species in the IOTC area of competence'* [Res 22/04, para. 2].

Resolution 22/04 *On a Regional Observer Scheme* makes provision for the development and implementation of national observer schemes among the IOTC CPCs starting in July 2010 and covering *"at least 5 % of the number of operations/sets for each gear type by the fleet of each CPC while fishing in the IOTC Area of competence of 24 meters overall length and over, and under 24 meters if they fish outside their EEZs shall be covered by this observer scheme."*

The Resolution also states that *"landings from artisanal vessels shall also be monitored at the landing place by field samplers"* and that *"the indicative level of the coverage of the artisanal fishing vessels shall be 5% of the total levels of vessel activity (i.e., total number of vessel trips or total number of vessels active)"*. There are currently no established guidelines for the collection of data from artisanal vessels fishing within their national EEZ, so this remains an area for further development.

Several national observer programmes have now been established for industrial fleets across the Indian Ocean and these are used to collect scientific fisheries data by onboard observers, according to specific research requirements specified by each of the coordinating organisations. Scientific observer data are therefore collected and reported at the regional level to the IOTC Secretariat as part of the mandate of the ROS, and are summarised in this paper.

### Update on the status of implementation and reporting

#### Implementation of the observer scheme

As of 22<sup>nd</sup> November 2023, sixteen CPCs (Australia, China (including Taiwan,China), Comoros, EU (France<sup>2</sup>, Spain, Portugal), Indonesia, Japan, Kenya, Rep. of Korea, Madagascar, Maldives, Mauritius, Mozambique, Seychelles, South Africa, Sri Lanka, and Thailand) have submitted a list of observers and have been allocated an IOTC observer registration number. A total of **442** observers are currently registered as active.

To date, information for a total of **2,813** trips has been reported to the IOTC Secretariat (in different formats) by Australia, China (including Taiwan,China), EU (France, Italy, Portugal, and Spain), the United Kingdom, France OT, Indonesia, Japan, Kenya, Rep. of Korea, Madagascar, the Maldives, Mauritius, Mozambique, Seychelles, South Africa, Sri Lanka, and Tanzania.

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<sup>2</sup> Including Mayotte due to its status as a French outermost region since January 2014

**Appendix A** provides a summary of the status of implementation of the ROS between 2012 and 2022 by all IOTC CPCs. **Appendix B** and **Appendix C** provide an estimation of the level of effort covered by observers between 2018 and 2022 for industrial longline and purse seine vessels (data updated as of 22<sup>nd</sup> November 2023).

## Reporting in electronic format

At the SC20 in 2017, there was a recommendation for all observer data to be submitted in electronic format:

(Para. 115) "*Resolution 11/04 On a Regional Observer Scheme requests the submission of a report after each trip but the SC **RECOMMENDED** that on the next revision of the Resolution, this should be amended to request the submission of data in an electronic format suitable for automated data extraction (including historic data) with a given deadline so that information from multiple trips can be provided*".

An increasing number of CPCs are now submitting data electronically, including Australia, EU, France, EU, Spain, EU, UK, China (partial), Indonesia, Japan, Kenya, Maldives, Mozambique, Mauritius, and Sri Lanka (see also [Appendix A](#)) although not all the formats adopted for data submission are suitable for automated and accurate extraction of the information to be stored in the ROS regional database.

Furthermore, several important data fields marked as *for reporting purposes* are regularly missing from these submissions (e.g., estimated catch by species at set level for some of the PS fleets) although known to be available to the data providers and in addition, a potential misunderstanding on the meaning of "*optional / mandatory for reporting*" (see the ROS data fields specification) was encountered with some CPCs thus preventing the submission of important data fields (e.g. weight measurements of caught / retained individuals) that were instead available in earlier reports.

While the ROS data collection tool can support observers to record all required information, its use is mainly targeting CPCs that do not have already a proper platform to collect, manage, and report such information to the IOTC.

In order to guarantee appropriate submission of all ROS data fields, the IOTC Secretariat has presented at the WPDCS in 2022 a set of [draft ROS data reporting forms for longline and purse seine fisheries](#), which have been further refined and extended with analogous forms for gillnet and pole and line fisheries. The latest versions of these *data reporting* forms are available on the [dedicated ROS page](#) of the IOTC website.

It is worth recalling that the Scientific Committee in 2022 has agreed to consider only two possible formats for the submission of ROS data to the Secretariat, i.e., either the ROS XML files, or the new ROS Excel forms.

Therefore, starting with 2024, the IOTC Secretariat will consider data submitted through other formats, no matter how well structured and easy to process, as *non-compliant* with respect to the ROS standards.

As of today, EU, France and Taiwan, China are the only two fleets that have *reported* scientific observers' data through the new IOTC ROS forms for the statistical year 2022. While these submissions are still sub-optimal, due to the misinterpretation of certain reporting requirements and the lack of a few mandatory information, they demonstrate the feasibility of using the new ROS forms as standard containers for the provision of these data to the IOTC.

## A Pilot Project for the ROS

Since its origination in 2009, national implementation of the Regional Observer Scheme has remained very low among IOTC CPCs. Where observer programmes have been established, these are wide ranging and highly variable in the type and quality of information collected and the reporting of data to IOTC standards remains poor and so the data that are submitted and stored regionally are currently of little value.

In recognition of these issues and in a positive step towards addressing the problems and seeking solutions, the IOTC adopted Resolution 16/04 "*On the implementation of a pilot project in view of promoting the Regional Observer Scheme of IOTC*" and following this a pilot project was developed.

The project outlined a comprehensive plan as part of a long-term, holistic strategy for supporting the implementation of the Regional Observer Scheme in the IOTC area of competence. It aimed to tackle each of the key issues that currently prevent the collection and analysis of high-quality data to contribute to stock assessment and management advice through the development of new technologies, tools, standards, and processes. The overall strategic framework was centred on five key components:

1. Observer training programme and minimum standards
2. Electronic reporting

3. Observer database development and historic data collation
4. Electronic monitoring system
5. Observation in-port

A critical component in each of the work streams was the piloting phase and Resolution 16/04 provides a framework for trialling these innovations by drawing together the outputs from the various work streams and operationalising them in selected voluntary CPCs.

## Outcomes of SC24 relevant to the IOTC ROS and its pilot project

### *Report of the 18th Session of the Working Party on Data Collection and Statistics (WPDCS18)*

The SC **RECOMMENDED** the Commission to **STRENGTHEN** the requirements for the monitoring of artisanal and semi-industrial fisheries to improve the collection, reporting and the quality of Neritic tunas and Billfish fisheries statistics.

The SC **ENDORSED** the revised versions of the ROS data reporting forms for longline and purse seine fisheries presented at the WPDCS for use by those fleets / CPCs that do not adopt the ROS electronic tools for the collection and management of scientific observer data.

### *Update on WGEMS02*

The SC **NOTED** the report of the 2<sup>nd</sup> ad hoc working group meeting on Electronic Monitoring Standards ([IOTC-2022-WGEMS02-R](#)). The meeting was attended by 104 participants (cf. 79 in 2021).

The SC reviewed and **ENDORSED** a) the EM terms and definitions b) the EM Program standards, and c) the EM Data standards described in Appendices [6A](#), [6B](#) and [6C](#) (except Annex 1 and 2 to be adopted in March 15-16), respectively, and **RECOMMENDED** their adoption by the Commission.

Moreover, the SC **NOTED** that Annex 1 and 2 of the EM Data Standards (Appendix 6C) are general guides that should be tailored to each fishery and could vary from fleet to fleet, those annexes (VMS and EM capabilities to collect ROS minimum requirements) will be finalised during next IOTC WGEMS (15-16 March, 2023) before IOTC Commission Consideration.

### *Implementation of the Regional Observer Scheme*

The SC **NOTED** paper [IOTC-2022-SC25-07](#) which provided an update on the status of implementation and reporting to the IOTC Secretariat set out by Resolution 11/04 On a Regional Observer Scheme (ROS) including the coverage estimated for both the longline and purse seine large scale fisheries from concerned CPCs, and how these compare to the expected minimum coverage level.

The SC **CONGRATULATED** the Secretariat for the compilation of the data which provide a comprehensive view of the status of the ROS.

The SC **ENCOURAGED** CPCs to validate the information provided in appendices A, B and C of paper IOTC-2021-SC24-07, and confirm that it correctly reflects the status of implementation of the ROS at the national level, and to liaise with the IOTC Secretariat should any discrepancy be identified.

The SC **NOTED** that the annual observer coverage estimated by the Secretariat for longline fisheries (Appendices B1-B2 of paper IOTC-2022-SC25-07 is calculated as the proportion of hooks observed with respect to the total number of hooks deployed by the fleet while the third paragraph of the IOTC Resolution 22/04 mentions a coverage of “at least 5% of the number of operations/sets”, further **NOTING** that the number of fishing sets is also used in ICCAT, IATTC and WCPFC for deriving observer coverage and that harmonisation in methods should be sought across tuna RFMOs.

While **NOTING** that there are still many CPCs that have been unable to meet the minimum of 5% coverage, due to the importance of observer data for the SC, the SC **NOTED** that raising this minimum level of coverage would be beneficial.

The SC **RECOMMENDED** that the Commission **ENDORSE** the mandatory reporting of geo-referenced effort data as number of sets/operations for longline and surface fisheries (according to the definitions in Res 15/02) to complement the current requirements of Res. 15/02, in order for the Secretariat to accurately and independently calculate the ROS coverage in agreement with the provisions of Res. 22/04.

The SC **NOTED** reports from some CPCs which are looking to further develop their observer schemes as well as roll out EMS across parts of their fleets which will help to increase the coverage for these fleets. **NOTING** that it is mandatory for CPCs

to report ROS information for all vessels listed in IOTC record of authorisation, that clarity will be sought for the research vessels, which are collecting scientific data on their compliance obligation.

### **Consideration of Resolution 16/04 On the implementation of a Pilot Project in view of promoting the Regional Observer Scheme of IOTC**

The SC **NOTED** that the ROS pilot project had been paused throughout 2020 and most of 2021 due to the inability of the Contractors to travel to the participating countries and provide the necessary training. However, the project resumed towards the end of 2021.

The SC **NOTED** that in 2022, full comprehensive training was completed in all four participating CPCs and pilot deployments had been carried out in two CPCs. The SC **NOTED** that this project was now coming to a close.

The SC **NOTED** that the Secretariat plans to continue working with CPCs to further develop their observer schemes and to finalise the eCollection systems so that data can easily be imported into the ROS database. This will help to ensure that the ROS continues to provide information required of the Commission.

### **Outcomes of S27 relevant to the IOTC ROS and its pilot project**

The Commission **ADOPTED** the following Conservation and Management Measures:

- (...)
- Resolution 23/08 *On Electronic Monitoring Standards for IOTC fisheries*

### **ROS Pilot Project: update**

A vast array of observer initiatives, with different training curricula, data collection methods and procedures have been developed across the Indian Ocean by a range of organisations, both prior to and since the implementation of Resolution 11/04 (and the subsequent Resolution 22/04). As a result, an assortment of data of varying quality is being collected and reported, with many inconsistencies and gaps, and overall, a lack of standardisation in the procedures employed by national observer schemes and of conformity with IOTC mandatory data requirements.

#### **Minimum standards for the ROS**

The issues associated with this variety of standards, programmes and lack of coordination have already been identified in some areas such as the southwest Indian Ocean region and resulted in increasing number of requests being addressed to the Secretariat for clarification of standards and for formal accreditation or recognition that national or sub-regional programmes are adhering to IOTC standards.

A workshop was held in 2018 with specific objectives focused on the revision of proposed ROS standards, data collection fields and reporting requirements, with participants that were invited to review the relevance and practical applicability of existing and proposed standards, data collection fields and reporting requirements. Following this workshop, the final set of standards recommended by this expert group was then presented to the WPDCS14 for review and to the SC21 for approval and triggered several significant updates to the ROS e-tools that were eventually finalized.

#### **ROS training package**

In 2019, a project to develop a complete training package for the IOTC ROS was awarded to CapMarine based on the finalised standards and included the development training materials for observer coordinators as well as observers, both on-line (e-learning tools) and on paper.

The newly developed tools and materials were implemented, and training of observers and observer coordinators was carried out in four countries (Sri Lanka, Tanzania, Kenya, and Indonesia<sup>3</sup>). The project wrapped up at the end of 2022. The Secretariat is now offering support to the participating countries to ensure that their observer schemes continue to run smoothly and that data from the schemes can be provided to the IOTC Secretariat.

A package of training manuals and supporting documents and forms prepared by the service provider were presented at the WPDCS 17 and included the following items:

- Observer Logistics Coordinator (OLC) training curriculum

<sup>3</sup> Due to issues with many CPCs being unable to meet the requirements set out for participating in the Regional Observer Scheme, the number of participating countries has been reduced from the six that were originally planned down to four.

- OLC Manual
- Scientific Field Observer (SFO) training curriculum
- Draft SFO training manual
- Observer workbooks (for purse seine / longline / gillnet)
- Observer data collection forms (for purse seine / longline / gillnet)

### ***Electronic data collection and reporting***

The IOTC has developed a set of electronic tools to support data collection and reporting of ROS data, specifically aimed at observers and observer coordinators.

Two different tools were developed with this purpose:

- the **ROS e-collection tool**, to support observers in their task of compiling observed data in electronic format, and verify that the ROS minimum data collection requirements are met
- the **ROS national database**, to help observer coordinators collate all data produced with the ROS e-collection tool (for observers deployed on vessels from a given flag state), analyze their content, and submit the data to the ROS regional database

Both tools are designed to be platform-independent (they can run on Windows, Mac OS, and Linux), have minimum HW / SW requirements, are localized in the two official languages of IOTC and can seamlessly integrate with the IOTC databases to ensure continuous update of all reference codes and core datasets (e.g., the IOTC Record of Authorised Vessels).

End-users need to authenticate against a list of currently accredited IOTC observers (ROS e-collection) and ROS focal points (ROS national database): for this reason, a formal workflow should be established in IOTC so that CPCs can provide updates to list of their active observers and focal points (see also [Appendix A](#)), and see these reflected in real time within the set of valid ROS credentials.

The ROS e-collection tool does not require internet connectivity to work, and it has been updated to include changes in data collection and reporting requirements emerging from the *ROS expert consultation workshop*, and eventually from the discussions held with the ROS training programme service provider.

The tool is currently undergoing a major revision exercise to accommodate the feedback collected during the practical training sessions delivered by the staff of the IOTC Secretariat and / or by the service provider to various CPCs that include:

- Sri Lanka and Indonesia (2017, 2018)
- Mauritius (2019)
- Kenya (2020)

The adoption of the ROS electronic tools will support the full management lifecycle of data collected under the ROS program for those CPCs that lack established data management systems and can also be a viable option to manage observations collected through other instruments such as EMS.

The IOTC Secretariat is currently liaising with EMS providers to verify the feasibility of exporting data in the IOTC ROS format for future integration within ROS national databases of selected CPCs.

The ROS electronic tools are complemented by a revised version of the ROS electronic data reporting forms (see [here](#)), which are designed to be used by all those CPCs that already have well-established observer data collection systems in place and need to submit this information to the ROS Regional Database of IOTC.

The ROS electronic data reporting forms provide a tabular representation of the highly structured ROS data reporting requirements, and as such can be programmatically (and automatically) filled by CPCs with limited effort.

The overarching goal of this workstream is to ensure that scientific observer data could be seamlessly transmitted to the IOTC for inclusion within the ROS Regional Database while avoiding a proliferation of different data exchange formats.

These will indeed be limited to two accepted formats only:

- the ROS structured format, i.e., **.ros** files (produced by the ROS e-collection tool and managed by the ROS national databases)
- the ROS data reporting format, i.e., **.xlsx** files (MS Excel workbooks, in tabular form)

and will contribute to increase the coverage of data in the ROS Regional Database and ensure its close-to-real time updates as soon as information is received by the IOTC Secretariat.

### **Observer database development and historic data collation**

The ROS *e-collection tool* mainly serves as a tool to support data collection on the field: all captured information has to be submitted to a national focal point that will in turn incorporate all observer data within a ROS *national database* (also supplied as a standalone and multi-platform application). The main goal of the ROS national database – besides establishing a central repository for national observer data – is also to submit information to the ROS *regional database*, hosted by IOTC and specifically designed to accommodate all data marked as “*mandatory / optional for reporting*” (according to the revised definitions following the ROS expert consultation workshop).

The ROS national database and the ROS regional database have both been finalised: the regional database is now integrated with the IOTC statistical systems and contains a collation of all ROS data submitted so far in a convenient (from a data extraction and analysis perspective) electronic format – including (but not limited to) the information entered through the various version of the ROS e-collection tool.

As of today, the ROS regional database stores observer data reported by several fleets during different time periods, covering a total of **29,711** sets from **1,699** trips recorded between 2005 and 2021 (see **tables 1.a-c** and **figs. 2.a-b**).

The processed information consists of trip reports provided in the ICCAT ST09 format (for both European longliners / purse seiners and Seychellois purse seiners), trip reports in a custom electronic format (Japan), ROS trip reports entered through the ROS e-collection tool (Sri Lanka) and various purse seiners trip reports (for Rep. of Korea, Mauritius, and Seychelles) originally provided as Word / PDF documents and digitized with the support of a consultant funded by SIOTI<sup>4</sup>.

The data currently available in the IOTC ROS regional database cover **60.4%** of all ROS trip data provided to the Secretariat (2813 trips occurring in years between 2012 and 2022) and work is underway to finalize a batch processor that could integrate observer data provided through the new IOTC ROS forms.

A breakdown of all currently available observer data in the ROS regional database (with data as of 22 November 2023) is as follows (**Table 1.a-c**):

<b>Fleet</b>	<b>Gear</b>	<b>Num. trips</b>
EU.ESP	PS	152
EU.FRA	LL	691
EU.FRA	PS	419
JPN	LL	51
KOR*	PS	6
LKA	LL	9
MUS*	PS	17
SYC*	PS	354
<b>Total</b>		<b>1,699</b>

**Table 1.a:** Number of available observer trips by fleet and gear (\* includes data entered with support from SIOTI)

<sup>4</sup> The Sustainable Indian Ocean Tuna Initiative (SIOTI) has been jointly established by key governments in the region, major tuna processors, producer organisations and their fishing vessels, with the support of WWF. This FIP is a multi-stakeholder effort, and its goal is to support improvement in the management of tuna fisheries in the Indian Ocean so that in the future, consumers can be assured that the purse-seine tuna they purchase has been harvested sustainably.

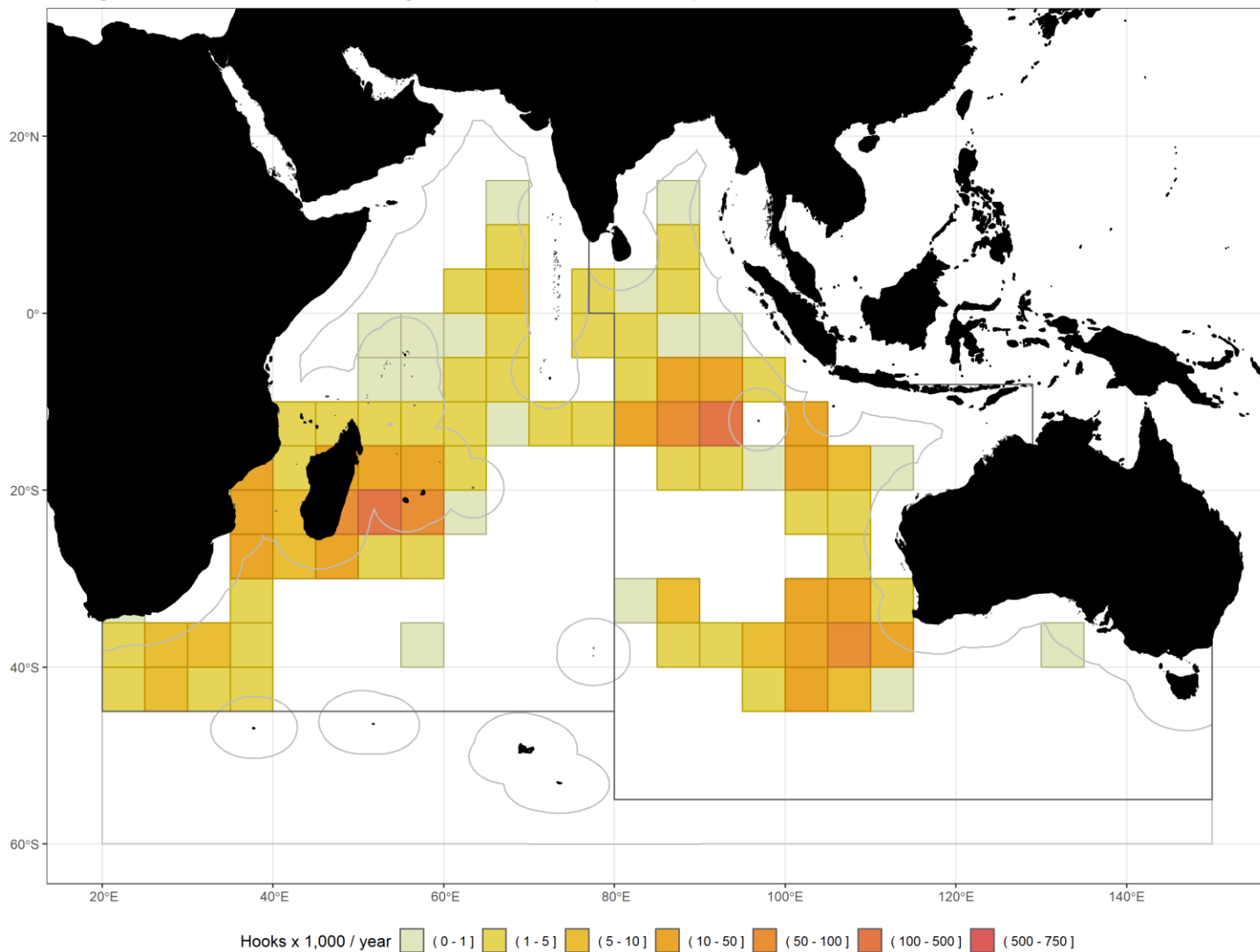
Year	Number of trips	
	PS	LL
2021	61	56
2020	44	47
2019	138	55
2018	179	50
2017	153	61
2016	144	59
2015	122	98
2014	50	87
2013	11	90
2012	7	95
2011	3	42
2010	0	6
2009	3	4
2008	13	0
2007	11	0
2006	8	0
2005	1	0
<b>Total</b>	<b>948</b>	<b>750</b>
	<b>1,698</b>	

Table 1.b: Number of available observer trips by year and gear

Year	Number of sets	
	PS	LL
2021	1516	431
2020	1210	441
2019	3535	479
2018	4211	355
2017	3336	377
2016	3616	896
2015	2496	917
2014	981	1283
2013	206	896
2012	156	958
2011	95	219
2010	0	54
2009	137	41
2008	307	0
2007	370	0
2006	168	0
2005	24	0
<b>Total</b>	<b>22,364</b>	<b>7,347</b>
	<b>29,711</b>	

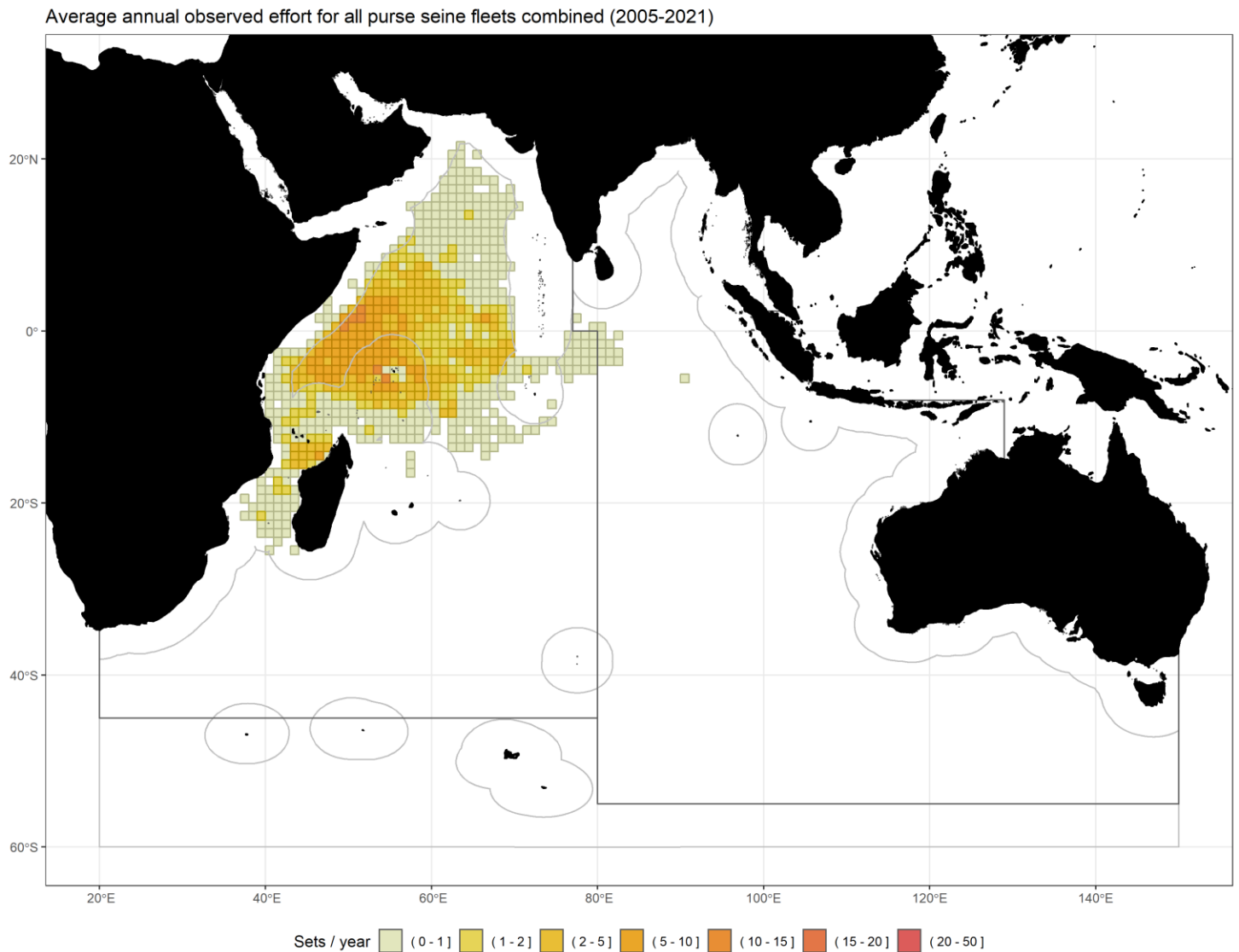
Table 1.c: Number of available observed sets by year and gear

Average annual observed effort for all longline fleets combined (2009-2021)



**Figure 2.a:** Average annual effort (in number of hooks by 5x5 degrees grids) reported to the ROS by longline fleet between 2009 and 2021. Includes data from coastal longlines for selected flags.





**Figure 2.b:** Average annual effort (in number of sets by 1x1 degrees grids) reported to the ROS by purse seine fleets between 2005 and 2021.

The ROS regional database will be regularly and automatically populated with *live* observer data submitted through the new ROS forms or collected through the ROS e-collection tool and managed through dedicated ROS national database instances, increasing the level of compliance and the technical capacity of all participating developing flag states.

The IOTC is continuing the development of custom importers that can generate data in ROS format (for inclusion in the IOTC ROS Regional Database) from data files produced through other platforms such as *ObServe* (EU and Seychelles PS and LL fleets) and the SWIOFP database (IOC countries), as well as through the *old* ROS data reporting templates.

This task is currently ongoing, with increased support from the IOTC Secretariat expected during 2024.

Data extracted from the ROS regional database is still considered to be preliminary and subject to changes in structure and content without prior notice: the scientific community should ask explicit consent from the IOTC Secretariat before publicly disseminating any study or analysis based on this information.

### **Electronic monitoring systems**

This activity aimed at improving the quality of data collection and coverage of fisheries where there are practical difficulties in placing scientific observers onboard (e.g., due to safety issues, lack of space, logistics, etc.), particularly in the case of the smaller-scale fisheries under 24m in length overall.

The IOTC Secretariat conducted field visits to I.R. Iran, Pakistan, and Sri Lanka, to assess the logistical practicalities of implementing EMS onboard their coastal gillnet and gillnet / longline vessels.

A proposal was subsequently developed in collaboration with the Sri Lanka Ministry of Fisheries and Aquatic Resources Development (MFARD) to trial EMS on-board six coastal longline/gillnet vessels (between 15 – 24m LOA): funding for this activity has been confirmed, procurement of the EMS equipment has been completed and the equipment has been installed on 4 of the vessels originally identified by the Sri Lankan authorities.

A first round of test trips was performed with the equipment fully deployed onboard: this helped stakeholders to identify some important technical issues (e.g., interference with radio communication equipment, high current drain from the main vessel batteries etc.). Equipment to support the work of “dry observers” (desktop computers, their training material etc.) was also purchased and deployed on site.

The resurgence of the CoViD pandemic has introduced unexpected delays in the finalization of the procurement and deployment processes for this task, which was put on temporary halt for reasons of *force majeure*: furthermore, a field mission to Sri Lanka – originally expected to be undertaken in Q2 2020 by the IOTC Secretariat in collaboration with the providers responsible for the actual installation of the EMS hardware and the training of designated observers – had to be postponed until further notice.

Eventually, in Q3 2021 the service provider confirmed the delivery of the last batch of EMS equipment to Sri Lanka, and requested the local representative and technology provider in the country to ensure onboard NAS (Network Attached Storage) are replaced with IP68-certified waterproof / shockproof external hard drives, to resolve the major issue of electronic interference between the EMS and the radio equipment reported by some of the vessels participating to the pilot study, which is a solution that will also have the beneficial effect of reducing the overall energy consumption of the systems, that was also another major concern.

Considering that travel restrictions were still in place during Q3 2021, the service provider also agreed about delivering remote training sessions to selected Sri Lanka observers and their coordinators, to cover for the basics of the entire EMS data collection and curation workflow, and discussion is still ongoing about the way forward to ensure that data collected through the deployed EMS systems can be properly “enriched” with the mandatory information that will make it fully compliant with the IOTC ROS data requirements, for its future inclusion within the ROS Regional Database.

In parallel, the IOTC initiated work on the review of EMS standards for purse seiners and longliners to help standardizing EMS implementation (e.g., number and position of cameras, installation, software requirements etc.) as well as data collection, usage, revision, and ownership.

A final report of this activity describing the minimum standards was presented to the IOTC Working Party on Data Collection and Statistics (WPDCS) and Scientific Committee (SC) in 2020 for consideration of adoption and recommendation to the Commission.

In line with the outcomes of the IOTC Pilot Project and the work carried on by the IOTC Working Group on Electronic Monitoring Standards (WGEMS), Res. 22/04 includes in its provisions the possibility of further developing – with supervision from the Scientific Committee – modalities to complement and progressively substitute human observer coverage through EMS, providing these systems can meet the minimum mandatory ROS data collection and reporting standards. To achieve this, EMS may also be complemented by port sampling and / or other Commission-approved data collection methods.

Furthermore, at its 27<sup>th</sup> session in 2023 the IOTC adopted Resolution 23/08 *On Electronic Monitoring Standards for IOTC fisheries*, which supports the work of and builds on top of the outcomes of the Working Group on Electronic Monitoring Standards by, among other things:

- 1) Calling for the implementation of a Regional Electronic Monitoring Programme (REMP)
- 2) Requesting a review of both the EMS standards and the REMP in one year after the implementation of the latter
- 3) Assessing the feasibility of national EMS programmes to collect the minimum ROS data fields, and in case request the Scientific Committee to develop separate EMS minimum data fields

### ***Observation in-port***

There is currently no funding available for this project component and as such it has not yet been fully developed.

## IOTC Species ID guides

	1. Tuna & like	2. Billfish	3. Turtles	4. Sharks and rays	5. Seabirds
Persian	2	1	1	1	1
Arabic	2	2	2	2	2
Urdu	4				
Bahasa Indonesian	1	3	5	5	5
Swahili		4			
Spanish		5	3	3	3
Portuguese		6	4	4	4
Thai		7			
Sinhala	3	8			
Tamil		8			
Bahasa Malaysia	1				
Hindi	3				

**Table 2.** Summary of priority languages and species groups for translation and printing as identified by the SC16 and SC17 (1=high).

**Green** = translation and finalisation complete. **Yellow** = in progress; entries in **boldface** represent printed guides not available at the last WPEB.

### Progress to date

- Translation and printing of IOTC species ID guides into Persian has already been completed for tuna, sharks, billfish and turtles and these are now available on the IOTC website<sup>5</sup> (IOTC, IFO and WWF-Pakistan)
- Translation and printing of IOTC species ID guides into Arabic has been completed for tuna and tuna-like species and translation of the others is currently underway (IOTC and WWF-Pakistan)
- Translation and printing of tuna, billfish, turtles and shark ID guides into Urdu is complete and these are now available on the IOTC website (WWF-Pakistan)
- Translation and printing of tuna, billfish and turtles ID guides into Bahasa Indonesian is complete and these are now available on the IOTC website (OFCF)
- Translation of sharks and seabirds ID guides into Bahasa Indonesian and is complete, typesetting has been finalised and cards are ready to print (DGCF and IOTC)
- Translation of turtles ID guides into Spanish is complete and available on the IOTC website (IOSEA & IOTC)
- Translation of tuna and tuna-like species ID guides into Hindi is complete and cards have been typeset for printing (CMFRI and IOTC)
- Translation of tuna and tuna-like species ID guides into Malaysian is complete and cards available on the IOTC website and are ready for printing (IOTC)
- Translation of tuna, billfish and sharks and rays ID guides into Sinhala and Tamil has been completed and are available on the IOTC website (NARA, DFAR and FAO)

<sup>5</sup> <https://www.iotc.org/science/species-identification-cards>

- Translation of all IOTC species ID guides into Portuguese has been completed and cards have been printed and these are now available on the IOTC website (IIP, IPMA OFCF)
- Translation and printing of all IOTC species ID guides into Maldivian is underway (Ministry of Fisheries and Agriculture, Maldives)
- Translation of tuna and billfish ID guides into Thai has been completed (OFCF) and are available on the IOTC website.
- Translation of tuna and billfish ID guides into Swahili has been completed (OFCF). Billfish is finalised and is available on the IOTC website but tuna still requires typesetting and finalisation by FAO.

While a number of guides are now ready for printing and funding has been obtained for these, the major administrative hurdle which has delayed further progress is the need for all future publications (including language translations) to proceed through the 12-step FAO approval process which has also caused severe delays with some cards taking >8 months to progress through the system. Nevertheless, the Secretariat is seeking solutions to these issues and, once resolved, progress should be rapid.

## Cetacean ID guides

An Indian Ocean cetaceans ID guide has now been developed with inputs from an expert group of WPEB scientists. This has been translated into ten languages as requested by the WPEB13 (Arabic, French, Hindi, Indonesian, Persian, Sinhalese, Spanish, Swahili, Tamil and Urdu) which are currently undergoing typesetting. Several translations of the guide are now published on the IOTC website, and the Marine Mammal Commission has provided funding for the printing.

### *Progress to date*

- English (**published, printed** and available on the IOTC website)
- French (**published, printed** and available on the IOTC website)
- Spanish (**published, printed** and available on the IOTC website)
- Indonesian (**published, printed** and available on the IOTC website)\*
- Sinhala (**published, printed** and available on the IOTC website)
- Persian (**published, printed** and available on the IOTC website)\*
- Tamil (**published, printed** and available on the IOTC website)
- Urdu (**published, printed** and available on the IOTC website)
- Arabic (revisions taking place)
- Swahili (revisions taking place)\*
- Hindi (revisions taking place)\*

\* These guides have been identified as having some issues with translation which are being dealt with by the Secretariat in association with cetacean researchers in the relevant CPCs.

## Appendices

**Appendix A:** [Update on the implementation of the IOTC regional observer scheme](#)

**Appendix B.1:** [Annual total effort and estimated observer coverage for longline fleets \(2018-2022\)](#)

**Appendix B.2:** [Average annual total effort and observer coverage for longline fleets \(2018-2022\)](#)

**Appendix C.1:** [Annual total effort and estimated observer coverage for purse seine fleets \(2018-2022\)](#)

**Appendix C.2:** [Average annual total effort and observer coverage for purse seine fleets \(2018-2022\)](#)

### Appendix A: Update on the implementation of the IOTC Regional Observer Scheme

CPCs	Vessels on active list (2022)					Accredited observers		Number of observed trips														Totals										
	LL	PS	GN	BB	Tot	Number	Last update	2012		2013		2014		2015		2016		2017		2018			2019		2020		2021		2022			
								O	E	O	E	O	E	O	E	O	E	O	E	O	E		O	E	O	E	O	E	O	E	O	E
<b>Contracting parties</b>																																
Australia		2		-	-	2	21		3				2	4		11		27		46		30		28		16		21		16	204	
Bangladesh		NO INFORMATION RECEIVED																														
China	CHN	78	-	-	-	78	4	2020-07	1		1		2		1		4		4		5		4		2		1		3		28	
	TWN, CHN	406	-	-	-	406	54		1		19		18		26		18		31		37		37		16		21			11	235	
Comoros		-	-	-	-	0	7		N/A		N/A		N/A		N/A		N/A		N/A		N/A		N/A		N/A		N/A		N/A		N/A	
Eritrea		NO INFORMATION RECEIVED																														
European Union	FRA	21	15	-	-	36	64		16	92	10	92	23	116	24	135		111		121		110		108		69		84		78	1189	
	ITA	-	1	-	-	1			N/A		N/A		N/A	6		4		1		11											22	
	PRT	2	-	-	-	2	6		1		1		1		1			1		1		1		1							8	
	ESP	8	15	-	-	23	9				1		2		24		15	19	2	3	35		40		23		35		72	271		
France (OT)		-	-	-	-	0	N/A	N/A	7		7		N/A		N/A		N/A		N/A		N/A		N/A		N/A		N/A		N/A		14	
India		4	-	-	-	4											N/A														0	
Indonesia		335	126	-	-	461	9						5				6		4		6		9		2		5		10	47		
Iran, Isl. Rep. of		-	5	1207	-	1212																									0	
Japan		43	-	-	-	43	30			10		6		13		6	2	9		9		11		12		5					83	
Kenya		6	-	-	-	6	5		N/A		N/A		N/A		N/A		1	N/A		6		4		2							13	
Korea, Rep. of		5	2	-	-	7	40		2		3		3		4		11		5		3		3								34	
Madagascar		-	-	-	-	0	7		5		7		7		5																	24
Malaysia		20	-	-	-	20																										0

CPCs	Vessels on active list (2022)					Accredited observers		Number of observed trips																							
	LL	PS	GN	BB	Tot	Number	Last update	2012		2013		2014		2015		2016		2017		2018		2019		2020		2021		2022		Totals	
	O	E	O	E	O	E	O	E	O	E	O	E	O	E	O	E	O	E	O	E	O	E	O	E	O	E	O	E			
<b>Contracting parties</b>																															
Malaysia	20	-	-	-	20																										0
Maldives	-	-	-	375	375	4													1	6	46	7								60	
Mauritius	13	4		-	17	8	2019-04					5	8	4	9	9														35	
Mozambique	6	-	-	-	6	11		1	N/A			7	3	2																13	
Oman	3	1	-	-	4														N/A											0	
Pakistan	-	-	-	-	0	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	
Philippines	-	-	-	-	0	N/A						N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	
Seychelles	79	13	-	-	92	78						7	66	63	91	83	44													354	
Somalia	NO INFORMATION RECEIVED																														
South Africa	20	-	-	-	20	30	2019-08	10	13	10	16	5	8	34	18	12	16													142	
Sri Lanka	761	148	313	-	1222	23				2	2	2				4	7	5	3											25	
Sudan	NO INFORMATION RECEIVED																														
Tanzania, United Rep.of	-	-	-	-	0								1	N/A	N/A	1														2	
Thailand	-	-	-	-	0	30	2019-11												N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0		
United Kingdom	-	-	-	-	0	2	2019-09									2	2	2	N/A										6		
Yemen	NO INFORMATION RECEIVED																														
<b>COOPERATING NON-CONTRACTING PARTIES</b>																															
Liberia	-	-	-	-	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Senegal	-	-	-	-	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	

Year = year in which considered observed trip began with the vessel sailing from its origin port

**Number of observed trips:**

E: number of trips whose observed data are reported in a structured electronic format,

O: number of trips whose observer data are reported in other formats, including non-structured electronic ones)

Observed trips for Madagascar include data collected by observers onboard foreign vessels

11 observed trips reported for EU,ITA in 2018, although no vessel flagged by EU,ITA was officially indicated as active during the year

	Not applicable (N/A) or no information received
	Data provided according to standards
	Data only partially provided according to standards
	Data not provided

### Appendix B.1: Annual total effort and estimated observer coverage for longline fleets (2018-2022)

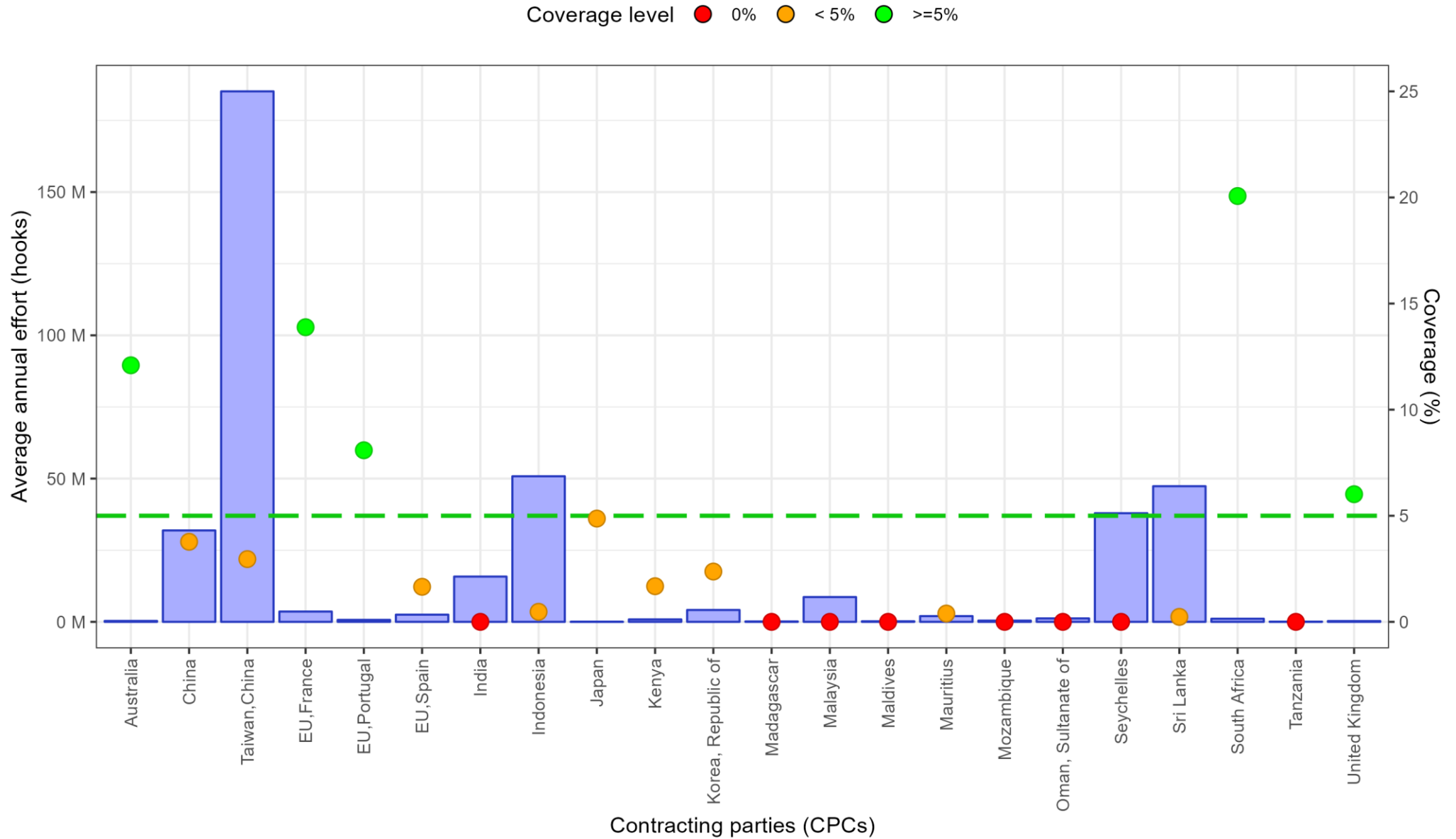
Contracting parties	Total effort (no. hooks, no. sets for Japan)					Observed effort (no. Hooks, no. sets for Japan)					Coverage rate					Average		Trend							
	2018	2019	2020	2021	2022	2018	2019	2020	2021	2022	2018	2019	2020	2021	2022	Effort	Coverage								
Australia	411,101	373,810	241,225	326,581	249,082	54,010	47,047	27,710	37,109	27,802	13.14%	12.59%	11.49%	11.36%	11.16%	320,360	12.09%								
Bangladesh, People's Republic of	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
China	32,987,773	26,380,951	27,858,657	34,043,659	38,273,218	1,681,983	1,814,426	966,347	288,750	1,268,709	5.10%	6.88%	3.47%	0.85%	3.31%	31,908,852	3.77%								
Taiwan,China	191,283,729	207,142,582	179,463,473	169,175,506	178,619,657	7,959,058	8,829,597	4,073,449	4,063,118	2,455,272	4.16%	4.26%	2.27%	2.40%	1.37%	185,136,989	2.96%								
Comoros	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
Eritrea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
EU,France	3,321,759	4,046,121	3,577,112	3,414,766	3,610,932	369,011	497,672	496,928	555,825	575,934	11.11%	12.30%	13.89%	16.28%	15.95%	3,594,138	13.89%								
EU,Italy	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
EU,Portugal	895,800	810,000	593,600	648,200	488,200	138,245	139,600	-	-	-	15.43%	17.23%	0.00%	0.00%	0.00%	687,160	8.09%								
EU,Spain	2,821,579	2,992,243	2,654,022	2,086,803	1,982,653	137,877	-	49,686	-	19,559	4.89%	0.00%	1.87%	0.00%	0.99%	2,507,460	1.65%								
EU,United Kingdom	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
France (OT)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
India	24,352,465	17,695,011	11,382,904	15,073,212	10,502,365	-	-	-	-	-	0.00%	0.00%	0.00%	0.00%	0.00%	15,801,191	0.00%								
Indonesia	25,902,040	40,039,552	46,437,985	33,688,363	107,996,068	251,891	264,421	86,845	199,704	401,210	0.97%	0.66%	0.19%	0.59%	0.37%	50,812,802	0.47%								
Iran, Islamic Republic of	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
Japan	6,975	6,572	6,900	7,373	7,373	754	805	154	-	-	10.81%	12.25%	2.23%	0.00%	0.00%	7,039	4.87%								
Kenya	588,723	852,588	619,371	1,109,750	1,109,750	68,807	2,400	682	-	-	11.69%	0.28%	0.11%	0.00%	0.00%	856,036	1.68%								
Korea, Republic of	6,052,850	5,899,410	4,980,671	2,131,036	1,667,422	214,244	277,326	-	-	-	3.54%	4.70%	0.00%	0.00%	0.00%	4,146,278	2.37%								
Madagascar	144,403	156,984	147,250	138,420	138,420	-	-	-	-	-	0.00%	0.00%	0.00%	0.00%	0.00%	145,095	0.00%								
Malaysia	9,708,037	9,171,941	9,621,849	8,129,875	6,635,884	-	-	-	-	-	0.00%	0.00%	0.00%	0.00%	0.00%	8,653,517	0.00%								
Maldives	828,434	165,327	-	-	-	-	-	-	-	-	0.00%	0.00%	-	-	-	198,752	0.00%								
Mauritius	1,445,477	1,553,466	129,500	-	6,877,244	39,200	-	-	-	-	2.71%	0.00%	0.00%	0.00%	0.00%	2,001,137	0.39%								
Mozambique	202,281	205,152	749,074	861,967	144,002	-	-	-	-	-	0.00%	0.00%	0.00%	0.00%	0.00%	432,495	0.00%								
Oman, Sultanate of	1,121,144	1,743,474	817,673	1,041,675	1,268,635	-	-	-	-	-	0.00%	0.00%	0.00%	0.00%	0.00%	1,198,520	0.00%								
Pakistan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
Philippines	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
Seychelles	41,498,974	39,953,285	40,551,445	39,851,995	27,746,812	-	-	-	-	-	0.00%	0.00%	0.00%	0.00%	0.00%	37,920,502	0.00%								
Somalia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
Sri Lanka	48,560,929	64,851,383	46,548,958	37,581,455	39,162,290	120,367	185,304	110,251	138,641	-	0.25%	0.29%	0.24%	0.37%	0.00%	47,341,003	0.23%								
South Africa	1,325,446	1,355,677	572,461	901,104	1,295,129	402,024	403,314	78,310	209,976	-	30.33%	29.75%	13.68%	23.30%	0.00%	1,089,963	20.07%								
Sudan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
Tanzania	-	11,663	10,212	21,979	352,506	-	-	-	-	-	-	0.00%	0.00%	0.00%	0.00%	79,272	0.00%								
Thailand	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
United Kingdom	498,100	621,600	270,000	-	-	45,437	38,163	-	-	-	9.12%	6.14%	0.00%	-	-	277,940	6.02%								
Yemen	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
<b>Cooperating non-contracting parties</b>																									
Liberia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
Senegal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
<b>Total</b>	<b>393,958,019</b>	<b>426,028,792</b>	<b>377,234,342</b>	<b>350,233,719</b>	<b>428,127,642</b>	<b>11,482,908</b>	<b>12,500,075</b>	<b>5,890,362</b>	<b>5,493,123</b>	<b>4,748,486</b>	<b>2.91%</b>	<b>2.93%</b>	<b>1.56%</b>	<b>1.57%</b>	<b>1.11%</b>	<b>395,116,503</b>	<b>2.03%</b>								
	<b>Total effort is ESTIMATED</b>					<b>Total effort is AS REPORTED</b>					<b>Observed effort is &gt; total effort</b>					<b>Observed effort is ≤ total effort</b>					<b>Coverage is</b>	<b>Unavailable</b>	<b>= 0%</b>	<b>&lt; 5%</b>	<b>≥ 5%</b>

**Notes:** Data for Japan is expressed in number of sets (total effort for 2022 has been repeated from 2021); data reported by Australia has been collected exclusively through EMS

**Total effort:** Total number of hooks set by longliners, by vessel flag and year, including:

- **AS REPORTED:** total effort extracted from the yearly submissions of catch-and-effort data for the fleet
- **ESTIMATED:** total effort not originally available, and estimated using the nominal catches available and sampled effort or catch rates from other fleets or year periods

Appendix B.2: Average annual total effort and observer coverage for longline fleets (2018-2022)





### Appendix C.1: Annual total effort and estimated observer coverage for purse seine fleets (2018-2022)

Contracting parties	Total effort (no. fishing days)					Observed effort (no. fishing days)					Coverage rate					Average									
	2018	2019	2020	2021	2022	2018	2019	2020	2021	2022	2018	2019	2020	2021	2022	Effort	Coverage	Trend							
Australia	115	125	117	131	112	-	-	-	-	-	0.00%	0.00%	0.00%	0.00%	0.00%	120	0.00%								
Bangladesh, People's Republic of	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-							
China	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-							
Taiwan,China	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-							
Comoros	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-							
Eritrea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-							
EU,France	1,583	1,469	1,520	1,829	1,633	925	815	402	369	245	58.43%	55.48%	26.45%	20.17%	15.00%	1,607	34.30%								
EU,Italy	542	349	332	595	390	339	-	-	-	-	62.55%	0.00%	0.00%	0.00%	0.00%	442	15.35%								
EU,Portugal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-							
EU,Spain	3,353	3,397	3,505	2,938	2,800	760	774	492	695	1,068	22.67%	22.78%	14.04%	23.66%	38.14%	3,199	23.69%								
EU,United Kingdom	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-							
France (OT)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-							
India	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-							
Indonesia	78,836	107,858	124,637	133,437	242,724	-	-	-	-	-	0.00%	0.00%	0.00%	0.00%	0.00%	137,498	0.00%								
Iran, Islamic Republic of	61	53	16	6	-	-	-	-	-	-	0.00%	0.00%	0.00%	0.00%	-	27	0.00%								
Japan	32	3	10	-	-	29	-	9	-	-	90.63%	0.00%	90.00%	-	-	9	84.44%								
Kenya	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-							
Korea, Republic of	222	274	220	258	222	-	-	-	-	-	0.00%	0.00%	0.00%	0.00%	0.00%	239	0.00%								
Madagascar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-							
Malaysia	-	16,013	12,919	11,824	3,482	-	-	-	-	-	-	0.00%	0.00%	0.00%	0.00%	8,848	0.00%								
Maldives	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-							
Mauritius	259	358	324	306	344	67	95	-	-	-	25.87%	26.54%	0.00%	0.00%	0.00%	318	10.18%								
Mozambique	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-							
Oman, Sultanate of	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-							
Pakistan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-							
Philippines	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-							
Seychelles	2,787	2,923	3,222	2,135	2,934	1,453	873	-	-	-	52.13%	29.87%	0.00%	0.00%	0.00%	2,800	16.61%								
Somalia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-							
Sri Lanka	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-							
South Africa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-							
Sudan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-							
Tanzania	-	-	-	-	165	-	-	-	-	-	-	-	-	-	0.00%	33	0.00%								
Thailand	35,411	36,303	39,901	38,238	42,461	-	-	-	-	-	0.00%	0.00%	0.00%	0.00%	0.00%	38,463	0.00%								
United Kingdom	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-							
Yemen	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-							
<b>Cooperating non-contracting parties</b>																									
Liberia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-							
Senegal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-							
<b>Total</b>	<b>123,201</b>	<b>169,125</b>	<b>186,723</b>	<b>191,697</b>	<b>297,267</b>	<b>3,573</b>	<b>2,557</b>	<b>903</b>	<b>1,064</b>	<b>1,313</b>	<b>2.90%</b>	<b>1.51%</b>	<b>0.48%</b>	<b>0.56%</b>	<b>0.44%</b>	<b>193,603</b>	<b>0.97%</b>								
	Total effort is <b>ESTIMATED</b>					Total effort is <b>AS REPORTED</b>					Observed effort is > total effort					Observed effort is ≤ total effort					Coverage is	Unavailable	= 0%	< 5%	≥ 5%

**Total effort:** total number of days fished by tuna purse seiners, by vessel flag and year, including:

- **AS REPORTED:** total effort extracted from the yearly submissions of catch-and-effort data for the fleet
- **ESTIMATED:** total effort not originally available, and estimated using the nominal catches available and sampled effort or catch rates from other fleets or year periods

Appendix C.2: Average annual total effort and observer coverage for purse seine fleets (2018-2022)

