

REVIEW OF CONSERVATION AND MANAGEMENT MEASURES RELATED TO DATA AND STATISTICS

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Introduction

Under Article XI of the [Agreement](#) establishing the Indian Ocean Tuna Commission (IOTC), [Contracting Parties and Cooperating Non-Contracting Parties](#) (CPCs) are required to collect and report fisheries data in compliance with the [Conservation and Management Measures](#) (CMMs). The overarching objective of the paper is to provide participants at the 20th Working Party on Data Collection and Statistics (WPDCS20) with an overview of current data-related CMMs, along with the key data reporting obligations content and specific reporting forms developed by the Secretariat for each dataset. Additionally, the paper highlights potential inconsistencies in some CMMs and challenges faced by the CPCs in collecting and reporting data to the IOTC, supporting the WPDCS's work in reviewing CMMs and providing clear, science-based recommendations for the Scientific Committee's (SC) consideration. Reporting requirements related to the monitoring of landings and transshipments of fish products in fishing ports (Resolution [16/11](#)) and transshipments at sea (Resolution [23/05](#)) are not included in this document as they pertain to compliance purposes.

Generic Data-Related Resolutions

[Resolution 10/08](#) *Concerning a Record of Active Vessels Fishing for Tunas and Swordfish in the IOTC Area*

This Resolution applies to all CPCs with longline and surface fisheries and requires the reporting of a list of fishing vessels active in the year prior to reporting, including support vessels, along with information such as vessel identification, ownership, operator details, fishing gear, and characteristics (type, length, gross tonnage).

IOTC Form [Active Vessels](#) supports mandatory reporting of Active Fishery Vessels, including their descriptive fields and relevant metadata.

[Resolution 18/07](#) *On Measures Applicable in Case of Non-Fulfilment of Reporting Obligations in the IOTC*

This Resolution applies to all CPCs and mandates the reporting of the presence of IOTC species and the most commonly caught elasmobranch species in catches, as outlined in Annex II of [Resolution 15/01](#) for each gear group.

IOTC Form [1DR](#) supports mandatory reporting of [species presence in the catch](#) of each fishing fleet, organised by gear group and broad fishery category, along with relevant metadata.

[Resolution 15/01](#) *On the Recording of Catch and Effort Data by Fishing Vessels in the IOTC Area of Competence*

This Resolution applies to all CPCs with longline and surface fisheries and calls for the implementation of a data recording system (i.e., a bound paper or electronic logbook) on their fishing vessels. The Resolution specifies all the information and data that must be recorded for each fishing trip and operation of the fishing gear, including effort units and the taxa (i.e., species and species groups) for which data collection is mandatory vs. voluntary. In addition, the Resolution states that developing CPCs with coastal fisheries shall progressively implement a data recording system for vessels less than 24 m length overall operating inside the EEZ from 1 July 2016.

Resolution 15/02 *On Mandatory Statistical Reporting Requirements for IOTC Contracting Parties and Cooperating Non-Contracting Parties (CPCs)*

This Resolution applies to all CPCs and outlines the nature, source, unit, resolution, and reporting level of core fisheries datasets for each of the three main IOTC fisheries categories (longline, surface, and coastal), including retained catches, discards, efforts, and size frequencies. It covers the 16 tuna and tuna-like species under the IOTC mandate, as well as commonly caught elasmobranch species listed in Annex II of Res. [15/01](#) for each gear group. The Resolution also specifies data collection and reporting for support vessels assisting purse seine vessels, and for DFADs used in large-scale purse seine fisheries. Additionally, it provides recommendations on sampling strategies and target rates (e.g., 1 fish per metric tonne for size-frequency data), and calls for regular submission of documentation on extrapolation procedures for data from each fishery.

Resolution 19/02 *Procedures on a Fish aggregating devices (FADs) management plan*

This Resolution applies to all CPCs with fisheries using DFADs and mandates additional reporting of data related to the use of buoys and DFADs to complement the requirements established in Res. [15/02](#). First, CPCs must require vessels flying their flag and fishing on DFADs to annually submit data by 1° by 1° grid area and month, detailing the number of operational buoys followed by each vessel, as well as whether they were lost or transferred. Second, the Resolution requires CPCs to report daily information on the geographic position of each instrumented buoy monitored by their purse seine vessels.

IOTC Form [3DA](#) supports mandatory reporting of [purse seine and support vessels' activities](#) on drifting floating objects (DFOBs) and buoys, along with relevant metadata.

Resolution 19/04 *Concerning the IOTC Record of Vessels Authorised to Operate in the IOTC Area of Competence*

This Resolution applies to all CPCs with longline and surface fisheries and requires the reporting of a list of fishing vessels authorised to operate in the IOTC Area of Competence, including support vessels, along with information such as vessel identification, ownership, operator details, fishing gear, and characteristics (type, length, gross tonnage)

IOTC Form [Vessels](#) supports mandatory reporting of Authorised Fishing Vessels, including their descriptive fields and relevant metadata.

Resolution 23/01 *On the Management of Anchored Fish Aggregating Devices (AFADs)*

This Resolution applies to all CPCs that deploy and use AFADs for fishing tuna and tuna-like species under the IOTC mandate, excluding recreational fisheries. The Resolution requires reporting on AFADs deployed within the EEZ of CPCs, including the date of deployment, GPS position, and UNI number. All AFAD-related activities (e.g., repair, intervention, and consolidation) as well as catches must be recorded and reported, along with the fishing position, date, and AFAD identifier. Catches should be reported for both IOTC species and bycatch species, including the disposition of the catch (i.e., whether retained, or discarded dead or alive).

IOTC Form [3AA](#) supports mandatory reporting of [AFAD-related activities](#), including catches retained and discarded, and relevant metadata.

Resolution 23/08 *On Electronic Monitoring Standards for IOTC Fisheries*

This Resolution applies to all CPCs and sets the terms and definitions pertaining to the implementation of EMS, consistent with this Resolution and Res. [24/04](#). The Resolution calls for the CPCs to share relevant information, approaches, and experiences, including those involving capacity building needs and any CPC-level knowledge exchange, with the SC and CC to support the implementation of the Regional Electronic Monitoring Program.

Resolution 24/04 *On a Regional Observer Scheme*

This Resolution applies to CPCs with longline and surface fisheries and requires a minimum of five percent observer coverage of all fishing vessel operations at sea to collect verified catch and other scientific data. It also mandates the

monitoring of catches at unloading by observers to identify the species composition of tuna species targeted by purse seine fisheries. The Resolution specifies that observers collect key data according to the ROS minimum standard data fields and IOTC observer forms. Additionally, the Resolution sets a five percent coverage target for artisanal fisheries, requiring that landings be monitored at landing sites by field samplers, with catch samples taken to estimate catch-at-size by boat type, gear, and species.

Species-Specific Data-Related Resolutions

Resolution 12/04 On the Conservation of Marine Turtles

The Resolution applies to CPCs with longline and surface fisheries and

IOTC Form [1IN](#) supports mandatory reporting of [interactions with endangered, threatened, and protected species](#), along with relevant metadata.

[Resolution 12/09](#) *On the Conservation of Thresher Sharks (Family Alopiidae) Caught in Association with Fisheries in the IOTC Agreement Area*

This Resolution applies to CPCs with longline and surface fisheries and prohibits the onboard retention, transshipment, landing, or storage of any part or whole carcass of thresher sharks from all species of the family Alopiidae, except in cases where sampling of individuals dead at haulback is conducted as part of an IOTC-approved research project. CPCs must require vessels flying their flag to promptly release thresher sharks unharmed, to the extent practicable, when brought alongside for boarding. CPCs should also encourage their fishers to record and report incidental catches, as well as live releases, to the Secretariat.

[Resolution 13/05](#) *On the Conservation of Whale Sharks (Rhincodon typus)*

This Resolution applies to CPCs with longline and surface fisheries and calls for the reporting of interactions with whale sharks, including information about the species, the number of individuals, a short description of each interaction, the location of the encirclement or entanglement, the steps taken to ensure safe release, and an assessment of the life status of the animal on release, including whether the whale shark was released alive but subsequently died.

IOTC Form [1IN](#) supports mandatory reporting of [interactions with endangered, threatened, and protected species](#), along with relevant metadata.

[Resolution 13/06](#) *On a Scientific and Management Framework on the Conservation of Sharks in Association with IOTC Managed Fisheries*

This Resolution applies to CPCs with longline and surface fisheries and prohibits the onboard retention, transshipment, landing, or storage of any part or whole carcass of oceanic whitetip sharks, except in cases where sampling of individuals dead at haulback is conducted as part of an IOTC-approved research project. The Resolution further states that CPCs should encourage their fishers to record incidental catches and live releases of oceanic whitetip sharks, with these data to be submitted and maintained at the Secretariat.

IOTC Form [1DI](#) supports mandatory reporting of oceanic whitetip shark [discards](#), along with relevant metadata.

[Resolution 17/05](#) *On the Conservation of Sharks Caught in Association with Fisheries Managed by IOTC*

This Resolution applies to CPCs with longline and surface fisheries, requiring fishers to fully utilise their entire shark catches, except for species subject to IOTC landing prohibitions. It reiterates that shark catches must be reported in accordance with IOTC data reporting requirements and procedures outlined in Resolution [15/02](#), including all available historical data, estimates, discard life status (dead or alive), and size frequencies.

IOTC Forms [1RC](#), [1DI](#), [3CE](#), and [4SF](#) support mandatory reporting of shark [total retained catches](#), [discards](#), [geo-referenced catches and efforts](#), and [geo-referenced size frequencies](#), respectively, along with relevant metadata.

[Resolution 18/02](#) *On Management Measures for the Conservation of Blue Shark Caught in Association with IOTC Fisheries*

This Resolution applies to all CPCs whose vessels catch blue sharks in the IOTC Convention Area and reiterates that they must adhere to the data collection requirements set out in Resolution [15/01](#). It also mandates the implementation of data collection programmes to ensure the accurate reporting of blue shark catch, effort, size, and discard data to the IOTC, in full compliance with Resolution [15/02](#).

IOTC Forms [1RC](#), [1DI](#), [3CE](#), and [4SF](#) support mandatory reporting of blue shark [total retained catches](#), [discards](#), [geo-referenced catches and efforts](#), and [geo-referenced size frequencies](#), respectively, along with relevant metadata.

[Resolution 18/05](#) *On Management Measures for the Conservation of the Billfishes: Striped Marlin, Black Marlin, Blue Marlin and Indo-Pacific Sailfish*

This Resolution applies to all CPCs and prohibits the onboard retention, transshipment, or landing of any specimen of striped marlin, black marlin, blue marlin, or Indo-Pacific sailfish smaller than 60 cm in lower-jaw fork length. It mandates the immediate release of such specimens at sea in a manner that maximises their post-release survival while ensuring crew safety. The Resolution also reaffirms the data requirements set out in Resolutions [15/01](#) and [15/02](#).

IOTC Forms [1RC](#), [1DI](#), [3CE](#), and [4SF](#) support mandatory reporting of billfish [total retained catches](#), [discards](#), [geo-referenced catches and efforts](#), and [geo-referenced size frequencies](#), respectively, along with relevant metadata.

[Resolution 19/03](#) *On the Conservation of Mobulid Species Caught in Association with Fisheries in the IOTC Area of Competence*

This Resolution applies to CPCs with longline and surface fisheries, prohibiting the onboard retention, transshipment, landing, or storage of any part or whole carcass of mobulid rays, except in cases where sampling of individuals dead at haulback is conducted as part of an IOTC-approved research project. CPCs must require all fishing vessels, other than those engaged in subsistence fisheries, to promptly release mobulid rays alive and unharmed, to the extent practicable, as soon as they are sighted in the net, on the hook, or on deck, and to do so in a manner that minimises harm to the individuals. The Resolution also calls for the reporting of data on interactions with mobulid rays (e.g., number of discards and releases) by vessels through fishers' logbooks or fisheries observer programmes.

IOTC Form [1DI](#) supports mandatory reporting of mobulid [discards](#), along with relevant metadata.

[Resolution 23/06](#) *On the Conservation of Cetaceans*

This Resolution applies to all CPCs with longline and surface fisheries and requires that any unintentional encirclement of a cetacean in a purse seine net, or capture or entanglement in a gillnet, must be reported. The report should include information on the species, the number of individuals involved, a brief description of each interaction, the location of the encirclement or entanglement, the measures taken to ensure safe release, and an assessment of the animal's life status upon release, including whether it was released alive but subsequently died. Data may be collected through logbooks or observer programmes, and CPCs are also encouraged to use an Electronic Monitoring System (EMS) to enhance data collection as required by this Resolution.

IOTC Form [1IN](#) supports mandatory reporting of [interactions with endangered, threatened, and protected species](#), along with relevant reporting metadata.

[Resolution 23/07](#) *On Reducing the Incidental Bycatch of Seabirds in Longline Fisheries*

This Resolution applies to all CPCs with longline fisheries and calls for the reporting of interactions with seabirds (i.e., incidental bycatch) by species.

IOTC Form [1IN](#) supports mandatory reporting of [interactions with endangered, threatened, and protected species](#), along with relevant reporting metadata.

Improving Data-Related Resolutions

Various issues and potential improvements to the data components of certain CMMs have been identified through IOTC meetings and feedback from CPCs.

Spatial Reference Layers

In 2023, the ad-hoc Task Group on Geospatial of the Coordinating Working Party (CWP) on Fisheries Statistics reviewed the definitions of Water Jurisdiction Areas stemming from the UN Convention on the Law of the Sea (UNCLOS) and showed that the Exclusive Economic Zone (EEZ) has often been conflated with the National Jurisdiction Areas (NJAs) (see [IOTC2024-WPDCS20-INF02](#)). The key distinction is that EEZs exclude territorial waters (which are typically the 12 nautical miles closest to shore), while NJAs encompass both EEZs and territorial waters. Since domestic fisheries operating in territorial waters may catch tuna and tuna-like species, the term 'National Jurisdiction Area' (NJA) has recently been adopted by the Secretariat for data-related matters, while the term 'EEZ' continues to be used in many CMMs to represent what are effectively NJAs. For consistency, the Secretariat's data section has also adopted the term 'Areas Beyond National Jurisdiction (ABNJ)' instead of 'High Seas' which also appear in some CMMs. These terms can be used interchangeably in the context of tuna resources, as ABNJ includes both the high seas (water column) and the deep seabed beyond national jurisdiction ('the Area'), the latter being irrelevant for pelagic resources.

It is important to note that there is currently no global reference layer for NJAs available from the United Nations. The IOTC's standardised jurisdictional boundary layer for Indian Ocean National Jurisdiction Areas ([Indian Ocean National Jurisdiction Areas](#)) has been derived from the Maritime Boundaries Geodatabase of the Flanders Marine Institute (available online at <https://www.marineregions.org/>). The IOTC NJA spatial layer has been used to estimate historical catches in support of the work of the Technical Committee on Allocation Criteria (TCAC), and each CPC is encouraged to review the boundaries and provide feedback to the Secretariat for validation.

Terminology

Artisanal and industrial fisheries

Resolution [15/02](#) defines the three main categories of IOTC fisheries: longline, surface, and coastal. Coastal fisheries are those composed of fishing vessels not listed in the IOTC Record of Authorised Vessels (RAV; Res. [19/04](#)), meaning they do not operate in areas beyond national jurisdiction (or high seas). The term 'coastal' therefore refers to the area of operation relative to the distance from shore, implicitly considering vessel size, which relates to engine power and onboard systems for fish preservation. Resolution [15/02](#) also specifies that 'coastal' is equivalent to 'artisanal' in IOTC terminology. Conversely, the term 'industrial' is commonly used within IOTC to refer to longline or surface fisheries, although it is not mentioned in any CMM.

The interchangeable use of 'coastal' and 'artisanal' has caused some confusion among the CPCs, as they technically refer to different concepts: 'coastal' primarily refers to the area of operation, while 'artisanal' describes a type of fishing scale or method. Some coastal fishing vessels, particularly in the context of sport fisheries, can be highly industrialised in terms of technology, despite being considered part of the artisanal category. By contrast, some older fishing vessels, such as traditional dhows from I.R. Iran, may operate on the high seas far from shore and defined as industrial, yet remain very artisanal in their methods of operation.

According to FAO, an artisanal fishery is a *“traditional fishery that involves fishing households (as opposed to commercial companies), using relatively small amounts of capital and energy, relatively small fishing vessels (if any), making short fishing trips close to shore, mainly for local consumption”* (FAO 2005). The concept of 'artisanal' therefore encompasses dimensions beyond the area of operation and removing the equivalence between 'coastal' and 'artisanal' would enhance understanding from the CPCs.

Artisanal fisheries are also commonly referred to as 'small-scale fisheries' (SSF), although no universal definition for describing SSFs (Smith and Basurto 2019; Kjellefold et al. 2022). To better describe the diversity of SSFs and artisanal fisheries catching tuna and tuna-like species in the Indian Ocean, the Secretariat has conducted some surveys with the

CPCs based on the FAO fishery matrix (IOTC Secretariat 2022, 2023). An update of the work providing an overview of the spectrum of IOTC artisanal fisheries is available in IOTC-2024-WPDCS20-10.

Additionally, in the context of the new definitions of IOTC fisheries (available from the [IOTC Fisheries Identification Wizard](#)), the following terms could be adopted to clarify “[fishery types](#)” and reduce confusion by distinguishing between area of operation and the level of industrialisation:

- Replace ‘SS’ (Small-Scale) by ‘SSS’ (*Small, Small-Scale*) for cases where fish is caught in areas under national jurisdiction (AUNJ) of the flag state, by vessels with a length overall of less than 15 m, and sold at landing sites, at markets, to processing factories, or exported
- Replace ‘SI’ (*Semi-Industrial in NJA*) by ‘MSS’ (*Medium, Small-Scale*) for cases where fish is caught in areas under national jurisdiction (AUNJ) of the flag state, by vessels with a length overall between 15 m and 24 m, and sold at landing sites, at markets, to processing factories, or exported
- Replace ‘IS’ (*Semi-Industrial in ABNJ*) by ‘SLS’ (*Small, Large-Scale*) for cases where fish is caught in areas beyond national jurisdiction (ABNJ) of the flag state, by vessels with a length overall less than 24 m, and sold at landing sites, at markets, to processing factories, or exported
- Replace ‘IN’ (*Industrial*) by ‘LLS’ (*Large, Large-Scale*) for cases where fish is caught by vessels with a length overall of 24 m and above, and sold at landing sites, at markets, to processing factories, or exported.

Subsistence fisheries

Subsistence fishery refers to a fishery where the catch is consumed directly by the fishers' families, rather than being sold to intermediaries or at larger markets (FAO 1999). Resolution [19/03](#) explicitly references subsistence fisheries, noting that fishing vessels engaged in subsistence fishing are permitted to retain mobulid rays for consumption. Assessing the importance of subsistence fisheries in the IOTC is critical, as they provide a livelihood safety net, helping to alleviate poverty, malnutrition, and gender inequality among populations dependent on marine resources (Viridin et al. 2023). Their contribution to food security, alongside that of commercial small-scale fisheries in developing coastal States – particularly in small island developing State CPCs – has been discussed within the Technical Committee on Allocation Criteria ([IOTC-2024-TCAC13-REF02](#)). To address the current lack of information on IOTC subsistence fisheries, the ‘purpose’ component of IOTC fisheries includes a code ‘SUB’ (*Subsistence*) for cases where fish is caught exclusively for consumption by fishers and their households (see [Fishery Purposes](#)). Given that subsistence fisheries are generally not monitored or reported in fishery statistics (Macinko and Schumann 2007), estimating their catch magnitude and composition may require developing specific surveys at the national level. As some fisheries may serve both commercial and subsistence purposes, introducing a code ‘SCO’ (*Subsistence-Commercial*) could be useful to reflect cases where these purposes are intertwined, indicating the fishery includes a subsistence component.

Data Collection

Paragraph 11 of Resolution [15/01](#) indicates that “*the data recording systems for vessels less than 24 metres of developing CPCs operating inside the EEZ shall be implemented progressively from 1 July 2016*”. Since no timeline of implementation is set in the Resolution, it might be necessary to (i) review the status of the development and implementation of data recording systems for IOTC coastal fisheries and (ii) update the Resolution accordingly.

Data Resolution

Species resolution

Annex II of Resolution [15/01](#) provides a list of commonly caught elasmobranch species subject to the same data reporting obligations as the 16 IOTC species. However, the species list varies by gear type, despite monitoring and reporting being intended as gear independent. Data should be collected at the species level, when possible, but the Annex does not provide species-specific codes for mako sharks, hammerhead sharks, and thresher sharks. Finally, collecting data on large species groups of unknown composition such as ‘other sharks’, ‘other bony fishes’, ‘seabirds’, ‘marine mammals’, ‘other rays’, and ‘marine turtles’ is of limited scientific value.

Spatial Resolution

Resolution [15/02](#) lacks clarity regarding the spatial resolution to be applied when reporting size-frequency data for coastal fisheries. Paragraph 4c of the Resolution allows catch and effort data from coastal fisheries to be reported *“using an alternative geographical area if it better represents the fishery concerned”*. By definition, this means that the lowest spatial resolution for data reporting corresponds to the National Jurisdiction Area (NJA) of the CPC coastal State as available from the reference layer [Indian Ocean National Jurisdiction Areas](#). This is primarily due to the widespread lack of recording systems to collect information on fishing grounds for small fishing vessels, in contrast to longline and surface fisheries.

For geo-referenced size-frequency data, however, paragraph 5 of the Resolution initially states that *“Size data shall be provided for all gears and for all species according to paragraph 4”*, implying that the same spatial resolution as catch and effort data should be applied. However, the paragraph further specifies that *“Length data by species, including the total number of fish measured, shall be submitted by a 5° grid area by month, by gear and fishing mode”*, indicating that the spatial resolution of reporting should align with that of longline and surface fisheries.

There is a discrepancy between the spatial resolution of the IOTC ROS data collection forms designed at the operational level and the resolution specified in paragraph 19 of Resolution [24/04](#): *“The data referenced in paragraph 18 shall be provided by 1°x1° square and month. CPC shall endeavour to send these data in an electronic format suitable for automated data extraction”*. The aggregation of the data is made for dissemination purpose according to Resolution [12/02](#) on Data Confidentiality policy and procedures while ROS data should be collected and reported at the operational level to the Secretariat.

Data Reporting

Buoy purchases

It is not clear from Resolution [24/02](#), which is set to enter into force on 2 March 2025, whether there are some reporting requirements pertaining to the number of acquired instrumented buoys. Paragraphs 18 and 19 of the Resolution define the maximum number of instrumented buoys that CPCs may acquire annually when paragraph 51 requires the IOTC Secretariat to *“submit a report, on an annual basis, to the IOTC Compliance Committee on the level of compliance by each CPC with this Resolution”*.

By contrast, the currently active Resolution [19/02](#) explicit refers, in paragraph 26, to the accessibility of information on buoy purchases: *“The IOTC Secretariat shall submit a report, on an annual basis, to the IOTC Compliance Committee on the level of compliance of each CPC with operational buoy limits, annual limits of instrumented buoys purchased”*. At its 6th session, the WGFAD noted that *“the Secretariat does not have any procedure in place to monitor the numbers of buoys purchased annually and recommended the SC to request the submission of this information from the CPCs with large-scale purse seine fisheries in the future following paragraph 26 of Res. 19/02 and any subsequent superseding Resolution”* ([IOTC-2024-WGFAD06-R](#)). Clarification is needed regarding the reporting of buoy purchases to the IOTC and their inclusion in the compliance assessment procedure.

Chartering Agreement

Resolution [19/07](#) currently lacks details on the content, format, and timeline for datasets to be collected and reported by the chartering CPC from the start of operations under the chartering agreement. Paragraph 3.7 of the Resolution indicates that *“The chartering CP shall report to the IOTC all catches, including bycatch and discards, and other information required by the IOTC”*. Additional requirements explicitly addressing the data reporting obligations of flag States, including total retained catch, catch and effort, size frequencies, and FAD-related and buoy position data in the case of purse seine fisheries, may need to be extended to Chartering States.

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