
REPORT ON IOTC DATA COLLECTION AND STATISTICS

PREPARED BY: IOTC SECRETARIAT¹

Purpose

To provide the IOTC Working Party on Data Collection and Statistics with an overview of the status of data holdings in the IOTC Secretariat, in particular statistics of catch, effort, size frequency and other biological data for IOTC species, sharks, and other species that are caught incidentally by fisheries directed at IOTC species.

Background

Prior to each IOTC Working Party (WP) meeting the IOTC Secretariat prepares a number of tables, figures and datasets that highlight historical and emerging trends in the fisheries data held by the IOTC Secretariat. This information is used during WP to inform discussions around stock status and in developing advice to the Scientific Committee.

This document presents the status of data in the IOTC databases, including: the status of reporting and availability of datasets related to catches up to 2017, as per the requirements set in IOTC Resolution 15/02 and other IOTC measures calling for IOTC CPCs to report data on their IOTC fisheries; an overview of the status of IOTC statistics over the time series; other datasets available at the Secretariat.

The report covers the following areas:

1. [Overview of data collection and reporting related IOTC Resolutions](#)
2. [Timeliness and availability of IOTC statistics reported in 2018](#)
3. [Status of the IOTC databases for nominal catch \(NC\), catch and effort \(CE\) and size frequency \(SF\)](#)
4. [Status of IOTC Fishing Craft \(FC\) Statistics and Active Vessels \(AV\) Databases](#)
5. [Other IOTC data holdings: observer data, biological data, tagging data](#)

1. OVERVIEW

This document summarises the standing of a range of information received in accordance with IOTC resolutions and recommendations from its technical groups.

Table 1 presents an overview of the main IOTC datasets that need to be reported, while Table 2 provides a summary of the IOTC data related Resolutions and year in which each came into force. Appendix I includes more details on the Resolutions referred to below.

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Table 1. Summary of IOTC Data Requirements applicable to species managed by the IOTC.

	Coastal fleets: EEZ vessels less than 24 m LOA	Industrial surface and longline fleets: Vessels with LOA ≥ 24 m and all high seas vessels		
Annual catches (Nominal catch + Discards)	Nominal catches (weight) by IOTC species, main species of pelagic sharks, other bycatch, per IOTC area, gear, species and year			
	Discard levels of IOTC species, sharks, seabirds, marine turtles, cetaceans per IOTC area, gear, species and year (in number and weight)			
Active fishing craft statistics	Number of fishing craft per boat-gear type category, per year	Individual vessel data for all fishing ships catching IOTC species		
Catch-and-effort (CE)	CE data by fishery (type of boat gear), area and period	Surface fisheries: CE by fishery, 1° grid and month	FADs anchored and drifting: CE by 1° grid and month (PS-BB)	Supply vessels: Effort 1° grid and month
Size data	Individual lengths of IOTC species sampled by fishery, species, 5° area and month			
Scientific observer data	Samples of catches landed to cover at least 5% of vessel activities	Sample of catches at-sea to cover at least 5% of fishing operations		
Socio-economic data	No standards have been set as yet			
Foreign fleets EEZ catch	No applicable	CE data for foreign licensed fishing vessels (as per the CE standards above)		

Table 2. Timeline of implementation of IOTC Resolutions as an indication of the year since which they are in force. For more details refer to **Appendix I**.

Res.	Description	Fisheries applies to:	Species applies to:	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
15/02	Min. data reporting requirements: Nominal catch	All fisheries	IOTC species																						
			Main sharks																						
	Min. data reporting requirements: Catch-and-effort	All fisheries	IOTC species																						
			Main sharks																						
	Min. data reporting requirements: Size data	All fisheries	IOTC species																						
		Main sharks																							
	FADs and Supply vessels requirements	Purse seine	N/A																						
15/01	Minimum data requirements: Logbooks	Purse seine	IOTC species and main sharks																						
		Longline																							
		Pole-and-line; gillnet																							
		Handline; trolling																							
18/07	Non-fulfilment of data reporting obligations	All fisheries	All species																						
18/08	FAD logbook reporting requirements	Purse seine, pole-and-line	As 15/02																						
11/04	Regional Observer Scheme	Coastal fleets	As 10/02																						
		Industrial fleets >=24m LOA	All species																						
		Industrial fleets <24m LOA	All species																						
05/05	Data requirements: Sharks	As per 15/02	Main sharks																						
13/06	Data requirements: Oceanic whitetip shark	Authorised vessels	Oceanic whitetip																						
12/09	Data requirements: Thresher shark		Thresher sharks																						
13/05	Data requirements: Whale shark		Whale shark																						
12/06	Data requirements: Seabirds		Seabirds																						
12/04	Data requirements: Marine turtles		Marine turtles																						
13/04	Data requirements: Cetaceans		Cetaceans																						

Major data categories covered by the report

Nominal catches which are highly aggregated statistics for each species estimated per fleet, gear and year for a large area. If these data are not reported the Secretariat estimates a total catch from a range of sources (including: partial catch and effort data; data in the FAO FishStat database; catches estimated by the IOTC from data collected through port sampling; data published through web pages or other means; and data reported by other parties on the activity of vessels, data collected through sampling at the landing place or at sea by scientific observers, or on imports of bigeye tuna from vessels under the flag concerned.

Catch-and-effort data which refer to the fine-scale data – usually from logbooks, and reported per fleet, year, gear, type of school, month, grid (1° grid areas for surface fisheries, 5° grid areas for longline fisheries, and the most convenient resolution for coastal fisheries) and species. Information on the use of fish aggregating devices (FADs) and supply vessels is also collected. The standards of reporting to the IOTC are defined in IOTC Resolution 15/02. IOTC Resolution 15/01 *on the recording of catch and effort data by fishing vessels in the IOTC area of competence* sets the minimal data requirement that IOTC CPCs shall implement for fleets using their flag or licensed to operate within their EEZs.

Length frequency data: individual body lengths of IOTC species per fleet, year, gear, type of school, month and 5° grid areas, as defined in IOTC Resolution 15/02.

Biological data: data used to derive length-weight, non-standard weights-live weight, non-standard measurements-standard lengths, sex-ratios, maturity, or any other data required for the assessments of IOTC and shark species, as defined in IOTC Resolution 15/02.

Observer data: summaries of the data collected by observers on fishing vessels of IOTC CPCs implementing the Regional Observer Scheme (trip reports), as defined in IOTC Resolution 11/04.

Tag release and recovery data: information on the release and recovery of tunas with tags, as collected from the Regional Tuna Tagging Project-Indian Ocean (RTTP-IO), or other small-scale Projects implemented in the Indian Ocean.

2. TIMELINESS AND AVAILABILITY OF IOTC CATCH STATISTICS FOR YEARS 2012-2018

Timeliness and completeness of data

Late reporting of data compromises the validation and verification of data by the IOTC Secretariat, as well as the data available for stock assessments prior to Working Parties, especially when data are submitted close to, or during Working Party meetings.

In 2018, 22 fishing parties either fully or partially reported IOTC statistics (i.e., nominal catch, catch-and-effort and size data) by the data submission deadline of June 30 (21 in 2017, and 25 in 2016). Requests were sent to over fifty countries² in March-April 2018, and in most cases second and third requests were also issued. Five CPCs have not reported statistics to the IOTC at all for a period longer than four years (Sierra Leone; Yemen; Eritrea; Sudan; Guinea).

Figure 1 shows the proportion of nominal catch, catch-and-effort, and size data, by species group, reported by the deadline and before the WPDCS meeting towards the end of each year³, for 2012-2018. The following key points may be noted:

- Reporting coverage is highest for nominal catch, followed by catch-and-effort, while size data reporting levels are well below the levels reported by the other two datasets.

² Note that specific requests were sent to EU countries having vessels known to operate in the IOTC Area (France, Italy, Portugal, Spain and the UK).

³ Note that the IOTC Secretariat uses alternative sources to estimate the catches of non-reporting fleets; the percentages in this section represent the proportion that the NC, CE or SF reported before the deadline of the WPDCS compared to the total estimated by the Secretariat.

- Within each of the datasets (nominal catch, catch-and-effort, size data) levels of timeliness and reporting coverage vary substantially between species groups, e.g.,
 - i. catch-and-effort and size data are particularly poorly reported for neritic species (i.e., between 30% to 40%, compared to around 70% for tropical tunas) – mostly as the majority of neritic catches are accounted for by coastal artisanal fleets.
 - ii. similarly, the proportion of size data available for billfish species is also very low (≈20% to 55%), compared to tropical and temperate tunas.
- In recent years there have been improvements in the timeliness of reporting. However, in the last year (i.e., reference year 2017, to be reported by the deadline in 2018) 73% of nominal catch were fully or partially reported, compared to 81% in 2017 (for the reference year 2016) mostly as the result of late reporting by India and Maldives.
- However, improvements in the *timeliness* of data reported by CPCs to the IOTC Secretariat have not been accompanied by comparable increases in the *quality* of the information submitted, and data quality remains a major challenge for stock assessments of IOTC Species which in some cases remain highly uncertain.

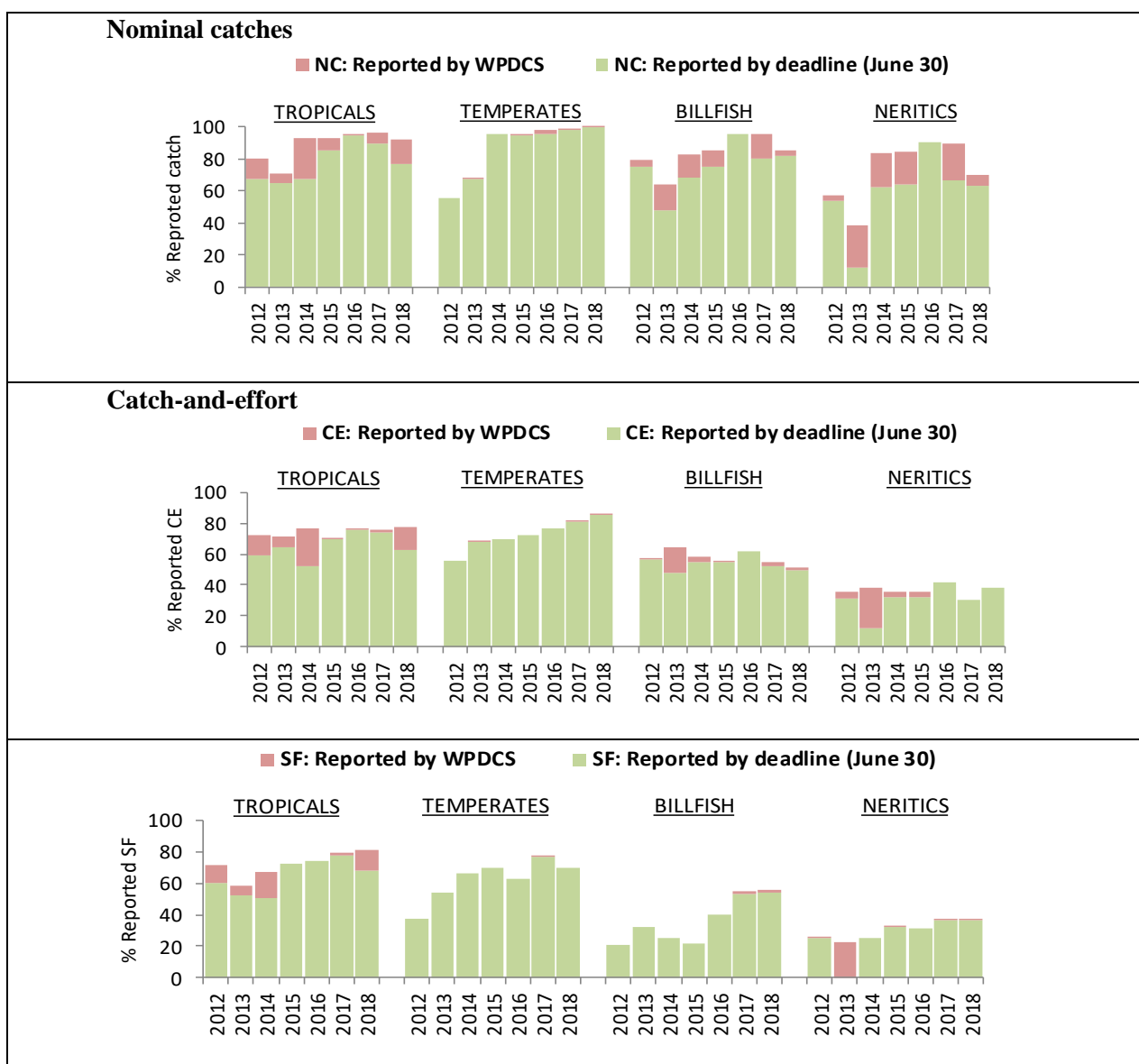


Fig.1 Timeliness of data: availability of data by the deadline for data submission (30 June) and at the time of the Working Party on Data Collection and Statistics Meeting each year, 2012-2018. Years refer to the year of reporting.

Definitions: NC: Proportion of total catch available; CE: Proportion of total catch for which catch-and-effort are reported; SF: Proportion of total catch for which size frequency data are reported.

Availability of IOTC datasets for reference year 2017

Tables 3i-3v list the fleets for which the Secretariat received or estimated catches for the reference year 2017, by main species groups and data sets (nominal catch, catch-and-effort and size frequency data). Fleets are listed according to the magnitude of their most recent catches, and timeliness of reporting and original data sources are also shown.

The availability of statistics on fishing crafts operating for each fleet is presented in a separate table (3vi). Brief comments on bycatch, discards, fishing craft statistics and active vessels are made at the end of this section.

Table 3: Availability of IOTC datasets reported in 2018 (for reference year 2017)⁴

Gear	Industrial purse seine (PS), industrial longline (LL) and artisanal gears (ART)	NC	Nominal Catch		Fully available
Catch	Recent catches amounting to (thousands of tonnes)	CE	Catch and Effort		Partially available
		SF	Size Frequency		Not available
TI	Timeliness		Good (before 1st July)		Statistics fully available from flag country
			Fair (within July)		Statistics partially available from flag country
			Poor (after 1st August)		Statistics available from sources other than flag country
SO	Data Source				

Table 3i. – Tropical tunas (YFT, BET, SKJ)

Gear	Fleet	Availability of statistics				TI	SO	Comments
		Catch	Sps	NC	CE			
P S	European Union	224.0	SY					
	SEYCHELLES	121.4	SY					
	KOREA REP.	18.2	SY					Less than 1 fish per metric ton measured
	MAURITIUS	17.5	SY					
	IRAN ISLAMIC REP.	4.3	SY					CE and SF not reported by IOTC standard
	JAPAN	3.9	S					
L L	PHILIPPINES	0.2	S					
	INDONESIA	40.2	YB					SF - From Port sampling; not reported by IOTC standard
	CHINA	7.9	BY					Less than 1 fish per metric ton measured
	TAIWAN, CHINA	23.2	BY					
	SRI LANKA	7.9	YB					Less than 1 fish per metric ton measured
	SEYCHELLES	7.8	YB					Less than 1 fish per metric ton measured for small longline/ No SF from industrial LL
	JAPAN	7.1	BY					SF from observer program only; less than 1 fish per mt
	KOREA REP.	2.2	Y					
	European Union	0.8	BY					EU-ESP reported CE only for SWO; SF: Less than 1 fish per MT measured.
	MALAYSIA	0.6	YB					
	SOUTH AFRICA	0.5	BY					NC, CE & SF data aggregated for local LL and chartered vessel
	MAURITIUS	0.4	YB					SF only reported for semi-industrial longline
	MALDIVES	0.3	YB					SF reported for 1 species only; less than 1 fish per MT measured
	INDIA	0.2	Y					
	OMAN	0.1	Y					
	AUSTRALIA	0.1	YB					
	MOZAMBIQUE	0.1	YB					Less than 1 fish per metric ton measured
	MADAGASCAR	0.1	BY					
	KENYA	0.0						
	NEI.FRESH	0.0						SF not reported for vessels greater than 24m
	NEI.FROZEN	0.0						
	BELIZE	0.0						
	PHILIPPINES	0.0						No activity in Indian Ocean in 2017
TANZANIA	0.0						No activity in Indian Ocean in 2017	
THAILAND	0.0						No activity in Indian Ocean in 2017	
VANUATU	0.0						No activity in Indian Ocean in 2017	
O t h e r f l e e t s	MALDIVES	138.9	SY					
	IRAN ISLAMIC REP.	108.8	YS					CE not by IOTC standard; Less than 1 fish per metric ton measured
	INDONESIA	92.6	YS					
	SRI LANKA	74.9	SY					SF not reported for all fisheries
	INDIA	56.3	SY					
	YEMEN	21.2	Y					
	OMAN	19.3	Y					CE not reported by IOTC standard;
	PAKISTAN	13.0	YS					Less than 1 fish per metric ton measured
	COMOROS	11.1	SY					Less than 1 fish per metric ton measured for some species
	TANZANIA	4.3	Y					NC & SF catch by gear & fishing area not clear
	MADAGASCAR	1.5	SY					
	European Union	0.6	YS					SF only reported for EU-Reunion
	KENYA	0.2	YS					
	MOZAMBIQUE	0.2	YS					CE Effort for coastal fisheries are likely to be incomplete
	MAURITIUS	0.1	YS					Less than 1 fish per metric ton measured
	JORDAN	0.1	SY					
	MALAYSIA	0.0	S					
	EGYPT	0.0	Y					
	EAST TIMOR	0.0	Y					
	UK.TERRITORIES	0.0	Y					
AUSTRALIA	0.0	SY						
SEYCHELLES	0.0	Y						
Bangladesh	0.0						Catches aggregated by Species	

Sps Yellowfin tuna (Y), bigeye tuna (B) and skipjack tuna (S)
 Gear Industrial purse seine (PS), industrial longline (LL) or other gears (pole-and-line; small purse seines, large and small gillnets, and small lines)
 1 Freezing longliners whose catches are not reported by the flag states concerned
 2 Fresh-tuna longliners whose catches are not reported by the flag states concerned

⁴ Note that Tables 4i-4v disregard blank reports, i.e. fishing parties that did not report statistics for a species group will not show in the corresponding table.

Table3iii. – Temperate tunas (ALB, SBF)

Gear	Fleet	Availability of statistics					TI	SO	Comments
		Catch	Sps	NC	CE	SF			
P S	AUSTRALIA	4.0	S						
	European Union	0.2	A						
	MAURITIUS	0.1	A						SF not reported by IOTC grid
	SEYCHELLES	0.1	A						
	KOREA REP.	0.0	A						
L L	CHINA	3.6	A						
	TAIWAN,CHINA	23.6	A						
	INDONESIA	5.2	A						
	JAPAN	2.9	AS						Size data from observer programme.
	MALAYSIA	1.6	A						
	SEYCHELLES	0.9	A						
	European Union	0.2	A						CE: EU-Spain only reported Swordfish; Less than 1 fish per mt for some fleets
	KOREA REP.	0.2	A						Less than 1 fish per metric ton measured
	AUSTRALIA	0.1	AS						
	SOUTH AFRICA	0.1	AS						NC, CE & SF data aggregated for local LL and chartered vessel
	MADAGASCAR	0.0	A						
	MAURITIUS	0.0	A						SF not reported for vessels more than 24m
	SRI LANKA	0.0	A						
	OMAN	0.0	A						
	MOZAMBIQUE	0.0	A						
	NELFRESH								
	NELFROZEN								
	TANZANIA								
	MALDIVES								No temperate tuna reported for industrial longline
	INDIA								
BELIZE								No activity in Indian Ocean in 2017	
PHILIPPINES								No activity in Indian Ocean in 2017	
THAILAND								No activity in Indian Ocean in 2017	
VANUATU								No activity in Indian Ocean in 2017	
O T H	INDONESIA	1.4	A						
	MAURITIUS	0.2	A						
	European Union	0.1	A						Less than 1 fish per metric ton measured
	SRI LANKA	0.1	A						
	COMOROS	0.1	A						Less than 1 fish per metric ton measured for some fisheries
	MALDIVES	0.0	A						
	AUSTRALIA	0.0	AS						
	SOUTH AFRICA								

Sps Southern bluefin tuna (S) and albacore (A)
Gear Industrial purse seine (PS), industrial longline (LL) or other gears (OTH: pole-and-line; small purse seines, large and small gillnets, and small lines)
 1 Freezing longliners whose catches are not reported by the flag states concerned
 2 Fresh-tuna longliners whose catches are not reported by the flag states concerned

Table 3iii – Billfish (SWO, BLM, BUM, MLS, SFA, SSP, SWO)

Gear	Fleet	Availability of statistics					TI	SO	Comments
		Catch	Sps	NC	CE	SF			
P S	European Union	0.1	M						Bycatch of billfish species reported by 1 EU fleet
	MAURITIUS	0.0	M						
L L	INDONESIA	30.7	SM						SF - From Port sampling; not reported by IOTC standard
	CHINA	2.3	SM						Less than 1 fish per metric ton measured
	TAIWAN,CHINA	12.5	SM						Less than 1 fish per metric ton measured
	European Union	5.8	SM						EU-Spain: CE only for SWO;
	SRI LANKA	2.9	SM						Only tuna and neritics species measured
	SEYCHELLES	2.7	SM						SF only reported for tuna species
	INDIA	1.9	SM						
	JAPAN	0.9	SM						Less than 1 fish per metric ton measured; data from observers
	MAURITIUS	0.4	SM						SF only reported for semi-industrial longline
	KOREA REP.	0.3	MS						
	MALAYSIA	0.2	SM						
	AUSTRALIA	0.2	SM						
	MOZAMBIQUE	0.1	SM						Less than 1 fish per metric ton measured
	MALDIVES	0.1	S						SF only for tuna species
	SOUTH AFRICA	0.1	MS						NC, CE & SF data aggregated for local LL and chartered vessel
	MADAGASCAR	0.0	SM						
	OMAN	0.0	S						CE not reported by IOTC standard
	KENYA	0.0							
	NELFRESH	0.0							
	NELFROZEN	0.0							
TANZANIA								No activity in Indian Ocean in 2017	
THAILAND								No activity in Indian Ocean in 2017	
BELIZE								No activity in Indian Ocean in 2017	
PHILIPPINES								No activity in Indian Ocean in 2017	
VANUATU								No activity in Indian Ocean in 2017	
O t h e r f l e e t s	IRAN ISLAMIC REP.	18.8	FM						CE not reported by IOTC standard
	INDIA	16.9	FM						
	SRI LANKA	16.7	SM						SF only reported for SFA species
	PAKISTAN	8.0	FM						
	INDONESIA	3.4	MF						
	TANZANIA	2.7	F						NC & SF catch by gear & fishing area not clear
	OMAN	1.6	F						
	COMOROS	1.6	FM						Less than 1 fish per metric ton measured for some fisheries
	MADAGASCAR	0.8	F						
	MALDIVES	0.5	SM						
	European Union	0.3	SM						
	YEMEN	0.2	F						
	KENYA	0.2	F						
	MOZAMBIQUE	0.1	M						CE: Effort for coastal fisheries, are likely to be incomplete
	UN. ARAB EMIRATES	0.1	F						
MALAYSIA	0.0	M							
SAUDI ARABIA	0.0	F							
ERITREA	0.0	F							
SEYCHELLES	0.0	F							
UK TERRITORIES	0.0								

Sps Swordfish (S), blue marlin and/or black marlin and/or striped marlin (M), Indo-Pacific sailfish (F) and short-billed spearfish (P)
Gear Industrial purse seine (PS), industrial longline (LL) or other gears (pole-and-line; small purse seines, large and small gillnets, and small lines)
 1 Freezing longliners whose catches are not reported by the flag states concerned
 2 Fresh-tuna longliners whose catches are not reported by the flag states concerned

Table 3iv – Neritic tunas (BLT, FRI, LOT, KAW, COM, GUT)

Gear	Fleet	Availability of statistics				TI	SO	Comments
		Catch	Sps	NC	CE			
P S	IRAN ISLAMIC REP.	1.9	L					CE and SF not reported by IOTC standard
	SEYCHELLES	0.1	F					Statistics incomplete; refers mostly to discards
	KOREA REP.	0.1	K					SF from Observer; less than 1 fish per metric ton
	THAILAND	0.0	K					Vessel not targeting tuna species
	European Union	0.0	F					Statistics incomplete; refers mostly to discards
LL	PHILIPPINES	0.0	F					
	INDIA	2.5	KC					
	China	0.0						
	TAIWAN, CHINA	0.3	L					
	INDONESIA	0.1	LC					
	SRI LANKA	0.0	F					
	European Union	0.0						
	MAURITIUS	0.0	B					
	AUSTRALIA	0.0						
	SOUTH AFRICA	0.0						NC, CE & SF data aggregated for local LL and chartered vessel
O t h e r f l e e t s	NEIFRESH	0.0						
	NEIFROZEN	0.0						SF only reported for 1 species
	INDONESIA	145.8	FC					
	IRAN ISLAMIC REP.	140.9	LK					CE not by IOTC standard; SF: less than 1 fish measured per mt
	INDIA	113.1	CK					
	PAKISTAN	38.2	LK					Less than 1 fish per metric ton measured
	OMAN	37.1	L					Downloaded data, missing gear information
	UN. ARAB EMIRATES	19.6	C					
	MALAYSIA	19.2	KC					Less than 1 fish per metric tonne measured
	THAILAND	13.6	KL					Less than 1 fish per metric tonne measured
	MYANMAR	11.2	CG					
	YEMEN	10.5	KC					
	SAUDI ARABIA	8.3	CK					
	SRI LANKA	6.6	FK					SF not reported for all fisheries
	MADAGASCAR	6.0	CK					
	MOZAMBIQUE	4.6	C					Less than 1 fish per metric tonne measured
	TANZANIA	3.4	C					NC & SF catch by gear & fishing area not clear
	QATAR	1.8	C					
	EGYPT	0.6	KC					
	MALDIVES	0.5	FK					
	BANGLADESH	0.5	CG					NC aggregated by species group
	KENYA	0.4	CK					
	AUSTRALIA	0.3	C					
	DJIBOUTI	0.3	X					
	KUWAIT	0.3	C					
	COMOROS	0.1	KL					
	ERITREA	0.1	C					
	JORDAN	0.1	K					
	European Union	0.1	X					SF only reported for EU-Reunion
	BAHRAIN	0.1	C					
SEYCHELLES	0.1	K						
SUDAN	0.0	C						
UK TERRITORIES	0.0	X						
MAURITIUS	0.0	X						

Sps Longtail tuna (L), frigate tuna and/or bullet tuna (F), kawakawa (K), narrow-barred Spanish mackerel (C), Indo-Pacific king mackerel (G), Seerfish(X)
Gear Industrial purse seine (PS), industrial longline (LL) or other gears (pole-and-line; small purse seines, large and small gillnets, and small lines)
1 Freezing longliners whose catches are not reported by the flag states concerned
2 Fresh-tuna longliners whose catches are not reported by the flag states concerned

Bycatch levels (Table 3v): Some CPCs (China, Sri Lanka, Maldives, Mozambique, Mauritius, Indonesia, Australia, Korea, Philippines, South Africa, EU) provided partial estimates of bycatch levels for their fisheries for 2017, including bycatch levels for sharks, seabirds or marine turtles. Despite better reporting levels recorded for bycatch data in 2018, few statistics are still available for sharks, seabirds, sea turtles and other non-IOTC species caught by fleets targeting tunas and/or tuna-like species: for this reason, the quality of the data available remains still poor. In the case of sharks, the statistics are seldom available by shark species and usually refer to the carcasses that are retained on board, not including the amounts of sharks that are discarded.

Table 3v – Sharks seabirds and sea turtles*

Gear	Fleet	Species								Comments	
		Sharks			ALV	OCS	RHN	Cetaceans	Sea Birds		Marine Turtles
		NC	CE	SF							
P S	European Union									n/a	Refers only to discards
	SEYCHELLES									n/a	
	KOREA REP.									n/a	Refers only to discards
	MAURITIUS									n/a	
	IRAN ISLAMIC REP.									n/a	
	AUSTRALIA									n/a	
	JAPAN									n/a	
P S	PHILIPPINES									n/a	Refers only to discards
	THAILAND									n/a	
L L	INDONESIA										
	CHINA										
	TAIWAN, CHINA										
	European Union										EU-ESP: CE only reported for SWO; SF not available for all fleet
	SEYCHELLES										ALV/OCS Fate of the sharks not specified (Turtle, seabird, cetacean, RHN from NR)
	JAPAN										SF reported for foreign vessels only
	SRI LANKA										less than 1 fish per metric ton; ALV/OCS Fate of the sharks not specified
	INDIA										
	KOREA REP.										ALV/OCS refers to discards
	MALAYSIA										
	SOUTH AFRICA										
	MAURITIUS										
	MALDIVES										
	AUSTRALIA										OCS refers to all shark species
	MOZAMBIQUE										NC, aggregate by species; Report discard of BSH only
	MADAGASCAR										SF reported for one species only
	OMAN										(Turtle, seabird, cetacean, RHN from NR)
	NEI FRESH										
	NEI FROZEN										Maldives banned catches of sharks in 2010; NC refers to discards;
	TANZANIA										NC Aggregated for all species
	BELIZE	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No activity in Indian Ocean in 2016
	PHILIPPINES	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No activity in Indian Ocean in 2016
	THAILAND	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No activity in Indian Ocean in 2016
VANUATU	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No activity in Indian Ocean in 2016	
O t h e r O f f s h o r e & C o a s t a l	INDONESIA										
	YEMEN AR RP										
	OMAN										NC not by species
	IRAN I R										CE not by IOTC standard
	MADAGASCAR										
	PAKISTAN										NC not by species
	SRI LANKA										
	BANGLADESH										NC not by species
	UN ARAB EMIRATES										
	TANZANIA										
	MALAYSIA										NC/CE not by species
	SAUDI ARABIA										
	ERITREA										
	KENYA										
	SUDAN										
	SEYCHELLES										NC/CE not by species
	EGYPT										
	COMOROS										Sharks species reported only as BSH/OCS
	FRANCE OT										
	MAURITIUS										
	EUROPEAN UNION										NC/CE/SF not available for Mayotte
	AUSTRALIA										
	ERITREA										
JORDAN											
MALDIVES										Maldives banned catches of sharks in 2010	
BAHRAIN											
DJIBOUTI											
SUDAN											
KUWAIT											
SOUTH AFRICA											
EAST TIMOR											
INDIA										OCS refers to all shark species	
MOZAMBIQUE											

Catches of seabirds are not likely to occur (n/a) or may occur (?)
 1 Freezing longliners whose catches are not reported by the flag states concerned
 2 Fresh-tuna longliners whose catches are not reported by the flag states concerned

*ALV, OCS and RHN refer to thresher sharks, oceanic whitetip shark and whale shark, respectively, for which specific reporting requirements apply (ban on retention of catches and report on the number of sharks incidentally caught and released, and its fate; this measure is only in force for authorized vessels).

Measures for seabirds and marine turtles apply only to authorized vessels.

- **Fishing craft statistics and active vessels (Table 3vi):** The number of vessels fishing for IOTC species in the Indian Ocean is thought to be more accurate in recent years thanks to information collected after the implementation of IOTC Resolutions that call for countries to report yearly lists of domestic and foreign fishing vessels, information collected through the IOTC Transshipment Programme and market data provided by the International Seafood Sustainability Foundation (ISSF). Fishing craft statistics are generally available for industrial fleets whose catches are available. Craft statistics are not available, incomplete or inaccurate for many artisanal fleets.

Table 3vi – Fishing craft statistics and list of active vessels

Gear	Fleet	Availability				SO	Comments
		Catch	Craft	FC	AV		
P S	European Union	224.4	27				
	SEYCHELLES	121.6	13				
	KOREA REP.	18.2	3				
	MAURITIUS	17.7	3				
	IRAN ISLAMIC REP.	6.2	7				
	AUSTRALIA	4.0	6				
	JAPAN	3.9	3				
	PHILIPPINES	0.2	1				
	THAILAND	0.0	1				
	SUPPLY VESSELS-NEI		20				Reported by flag countries and/or third parties
L L	INDONESIA	85.4	215				
	CHINA	14.2	81				
	TAIWAN,CHINA	84.8	314				Reported incomplete active vessels
	European Union	12.6	41				Including semi-industrial longline
	SEYCHELLES	12.3	83				
	JAPAN	11.6	41				
	SRI LANKA	11.1	2				
	INDIA	5.5	4				
	KOREA REP.	3.0	13				
	MALAYSIA	2.7	19				
	SOUTH AFRICA	1.3	14				
	MAURITIUS	0.9	12				
	MALDIVES	0.4	4				
	AUSTRALIA	0.4	11				
	MOZAMBIQUE	0.3	4				
	MADAGASCAR	0.2	7				
	OMAN	0.2	1				
	NEI.FROZEN	0.0					
	NEI.FRESH	0.0					
	TANZANIA						
	BELIZE						No activity
	PHILIPPINES						No activity
	THAILAND						No activity
	VANUATU						No activity
	SENEGAL						No activity
	SIERRA LEONE						No information
GUINEA						No information	
O t h e r O f f s h o r e & C o a s t a l	IRAN ISLAMIC REP.	290.0	6,280				
	INDONESIA	261.8			n/a		
	INDIA	210.3	792		n/a		Not inclusive of small boats
	SRI LANKA	145.0	7,020				Number refers to high seas boats only
	MALDIVES	140.1	410				Number refers to high seas boats only
	PAKISTAN	66.2	815		n/a		
	OMAN	65.8	23,913		n/a		
	YEMEN	40.1			n/a		
	UN. ARAB EMIRATES	20.1			n/a		
	MALAYSIA	19.2	12,505		n/a		
	TANZANIA	16.8			n/a		
	MADAGASCAR	14.0			n/a		Refers to last boat survey conducted in 2014
	THAILAND	13.6	993		n/a		
	COMOROS	12.9			n/a		
	MYANMAR	11.2			n/a		
	SAUDI ARABIA	9.5			n/a		
	MOZAMBIQUE	7.8	25		n/a		Refers only to semi-industrial vessels
	QATAR	2.2			n/a		
	European Union	1.3	160		n/a		Missing FC for EU-Mayotte
	BANGLADESH	1.3			n/a		
	KENYA	1.1			n/a		
	EGYPT	0.6			n/a		
	DJIBOUTI	0.5			n/a		
	AUSTRALIA	0.3	50		n/a		
	ERITREA	0.3			n/a		
	MAURITIUS	0.3			n/a		
	KUWAIT	0.3			n/a		
	JORDAN	0.2			n/a		
	SUDAN	0.1			n/a		
	SEYCHELLES	0.1			n/a		
BAHRAIN	0.1			n/a			
UK.TERRITORIES	0.0	47		n/a		Refers to (sport) baitboat vessels only	
EAST TIMOR	0.0			n/a			
SOUTH AFRICA	0.0	3		n/a			
SOMALIA				n/a			

- 1 Freezing longliners whose catches are not reported by the flag states concerned
- 2 Fresh-tuna longliners whose catches are not reported by the flag states concerned

Discard levels (Table 3vii): presents the information available for discards for the reference year 2017: discard levels are only available for Australia longliners, EU,France and EU,Spain purse seiners and longliners, Republic of Korea purse seiners and longliners, Maldives longliners, Malaysia (nil), Mauritius purse seiners, Mozambique longliners, Seychelles semi-industrial longliners and purse seiners, South Africa longliners (foreign & local fleets), Sri Lanka (all gears), the UK Overseas Territories (nil discards), China and Taiwan,China longliners.

Discard rates are believed to be high for fisheries using longlines and oceanic gillnets, and moderate for purse seine sets on associated schools (mainly with FADs). However, the nets of FADs may also contribute substantially to ghost fishing.



3vii – Discards

Fleet	Gear	Units	Catch
Australia	Longline	No. fish	Albacore (127); Bigeye tuna (839); Black Marlin (7); Blue Marlin (10); Blue shark (6014); Crocodile shark (3299); Giant Mantas (23); Hammerhead sharks nei (74); Indo-Pacific sailfish (1); Longtail skate (324); Oceanic whitetip shark (34); Porbeagle (129); Sharks various nei (150); Shortfin mako (426); Skipjack tuna (8); Southern bluefin tuna (1010); Striped marlin (7); Swordfish (200); Tiger shark (31); Wahoo (1); Yellowfin tuna (254);
China	Longline	No. fish	Bottlenose dolphin (2); Hammerhead sharks nei (578); Leatherback turtle (4); Loggerhead turtle (1); Longfin mako (690); Oceanic whitetip shark (1105); Silky shark (754); Thresher sharks nei (811);
EU,Spain	Purse Seine	Kg	Black Marlin (0.06); Blue Marlin (0.25); Devil Ray (1.61); Giant Mantas (13.63); Mobula nei (3.94); Oceanic whitetip shark (18.01); Pelagic stingray (0.01); Shortfin mako (0.05); Silky shark (179.23); Spinetail mobula (2.23); Stingrays & butterfly rays nei (0.02); Whale shark (2.34);
EU,France	Longline	No. fish	Albacore (85); Bigeye thresher (1); Bigeye tuna (108); Blue shark (1232); Cape fathead (4); Carcharhinus sharks nei (88); Common dolphinfish (3); Cookie cutter shark (1); Crocodile shark (7); Dolphins nei (3); Escolar (280); False killer whale (1); Green jobfish (1); Green turtle (2); Hammerhead sharks nei (21); Hawksbill turtle (1); Lancetfishes nei (504); Leatherback turtle (2); Loggerhead turtle (8); Long snouted lancetfish (119); Luminous flying squid (2); Mako sharks (15); Mantas, devil rays nei (7); Marine turtles (3); Mobula nei (1); Oceanic whitetip shark (84); Oilfish (240); Olive ridley turtle (2); Other non tuna-like fishes nei (3); Pelagic stingray (950); Porbeagle (1); Risso's dolphin (6); Sharks various nei (13); Sharptail mola (6); Shortfin mako (2); Silky shark (108); Silvertip shark (2); Smooth hammerhead (1); Snake mackerel (35); Snake mackerels and escolars nei (19); Sunfish (28); Swordfish (659); Thresher sharks nei (9); Tiger shark (11); True tunas nei (3); Wahoo (3); Yellowfin tuna (91);
		No. fish	Green turtle (9); Hawksbill turtle (9); Loggerhead turtle (6); Marine turtles (2); Olive ridley turtle (11); Whale shark (2);
	Kg	Batfishes (0.15); Bigeye trevally (0.544); Bigeye tuna (8.374); Black Marlin (11.256); Blue Marlin (16.634); Blue sea chub (1.016); Brassy chub (2.155); Bullet tuna (0.335); Carangids nei (0.023); Common dolphinfish (113.864); Cottonmouth jack (2.033); Flat needlefish (0.094); Frigate and bullet tunas (95.481); Frigate tuna (196.908); Globefish, porcupine fish (0.005); Great barracuda (11.731); Hound needlefish (0.006); Indo-Pacific sailfish (0.064); Kawakawa (9.287); Kyphosus sea chubs nei (0.3); Live sharksucker (0.001); Longfin batfish (0.55); Longfin yellowtail (0.441); Mackerel scad (22.78); Marlins, sailfish & spearfish nei (1.508); Mobula nei (2.56); Ocean triggerfish (182.124); Oceanic puffer (0.006); Oceanic whitetip shark (4.618); Pelagic stingray (0.103); Pilotfish (0.007); Pompano dolphinfish (0.498); Rainbow runner (225.203); Rays, stingrays and mantas nei (0.006); Scribbled leatherjac. filefish (0.107); Sharptail mola (0.115); Silky shark (292.856); Skipjack tuna (127.564); Spinetail mobula (38.429); Stingrays, butterfly rays nei (0.006); Striped marlin (6.749); Suckerfishes, remoras nei (0.001); Swordfish (0.801); Tripletail (5.918); Unicorn leatherjacket filefish (2.395); Others(0.235); Wahoo (36.904); Yellowfin tuna (125.895);	
Indonesia	Gillnet	No. fish	Green turtle (4); Olive ridley turtle (1);

	Longline	No. fish	Green turtle (2); Blue shark (37); Crocodile shark (80); Loggerhead turtle (2); Long snouted lancetfish (796); Olive ridley turtle (6); Shortfin mako (31); Shy Albatross (1); Silky shark (3); Sooty albatross (1); Thresher Shark (1);
Koea Rep	Longline	No. fish	Indo-Pacific sailfish (1); Albacore (4); Bigeye tuna (12); Blacktip reef shark (67); Blue Marlin (1); Blue shark (2698); Porbeagle (114); Sharks various nei (62); Shortfin mako (181); Silky shark (31); Skipjack tuna (1); Swordfish (5); Yellowfin tuna (157);
	Purse seine	No. fish	Oceanic whitetip shark (3); Olive ridley turtle (1); Sharks various nei (637); Silky shark (7);
		Kg	Black Marlin (6); Other non tuna-like fishes nei (2); Silky shark (8); Oceanic whitetip shark (0.06);
Sri Lanka	Gillnet	No. fish	Common dolphin (25); Green turtle (549); Hawksbill turtle (104); Leatherback turtle (15); Loggerhead turtle (39); Oceanic whitetip shark (1); Olive ridley turtle (329); Whale shark (1);
	Longline	No. fish	Common dolphin (8); Green turtle (45); Hawksbill turtle (7); Leatherback turtle (10); Long snouted lancetfish (115); Oceanic whitetip shark (23); Olive ridley turtle (34); Silky shark (12); Spinetail mobula (87); Thresher Shark (29);
	Ringnet	No. fish	Loggerhead turtle (2); Oceanic whitetip shark (1); Green turtle (33); Hawksbill turtle (2); Leatherback turtle (1);
Maldives	Longline	No. fish	Hammerhead sharks nei (34); Mako sharks (141); Marine turtles (56); Oceanic whitetip shark (86); Other seabirds (1); Sharks various nei (211); Silky shark (246); Thresher Shark (86);
Mozambique	Longline	No. fish	Marine turtles (4);
Mauritius	Purse seine	No. fish	Green turtle (2); Hawksbill turtle (1); Loggerhead turtle (1); Marine turtles (1); Olive ridley turtle (1);
		MT	Common dolphinfish (2.84); Frigate tuna (0.9); Marine fishes nei (0.2); Marlins nei (1.65); Ocean triggerfish (15.65); Rainbow runner (0.5); Skipjack tuna (27.4); Tunas nei (0.3); Yellowfin tuna (1.85);
Philippines	Purse seine	No. fish	Olive ridley turtle (1); Blue Marlin (1); Silky shark (33); Smoothtail mobula (1);
		Kg	Skipjack tuna (560); Yellowfin tuna (155);
EU,Portugal	Longline	No. fish	Loggerhead turtle (8);
Taiwan	Longline	No. fish	Olive ridley turtle (2); Leatherback turtle (1); Grey-headed Albatross (1); Loggerhead turtle (3); Sooty albatross (5); Sooty shearwater (2); Wandering Albatross (4); White-chinned Petrel (14); Yellow-nosed albatross (7);
South Africa	Longline	No. fish	Loggerhead turtle (2); Silky shark (15); Atlantic Yellow-nosed Albatross (3); Bottlenose dolphin (1); Scalloped hammerhead (2); Shy Albatross (15); White-chinned Petrel (63);



- **FADs and supply vessels** (Resolutions 17/08 and 15/02):

In 2018 submission form for activities of Floating Objects (FOBs) was amended to also record information on the *ownership* of the Floating Objects (FOBs). However not all CPCs with purse seine fisheries used the updated format to report FOBs activities and only EU, France and Philippines reported complete information including ownership of FOBs, while Mauritius reported complete FOBs activities for its supply vessels only.

Japan, EU, France, Mauritius, Philippines and Rep. of Korea are the only CPCs that have fully or partially provided information on FOBs and supply vessels as requested in IOTC Resolutions 17/08 and 15/02. A summary of the status of data reporting for FOBs and supply vessels is provided below:

- Six CPCs (EU, France, Rep. of Korea, Japan, Philippines, Seychelles and Mauritius) provided information on the activities on FOBs for purse seiners in 2017.
- EU, France, Rep. of Korea, Mauritius, Philippines and Japan have provided information on the activity of supply vessels, according to the reporting standards in Resolution 17/08, while EU, Spain has provided information on the number of supply vessels only.
- Australia has also indicated that purse seiners under its flag do not set FADs or use other vessels in support of fishing activities.

No data was received for other fleets on FOBs or activities of supply vessels from the remaining PS fleets (including I.R. Iran, Sri Lanka, and Indonesia).

3. STATUS OF THE IOTC NOMINAL CATCHES (NC), CATCH AND EFFORT (CE) AND SIZE FREQUENCY (SF) DATABASES

Tables 4a-f show the presumed quality of the nominal catches of tropical tunas, temperate tunas, billfish and neritic tunas for the last forty years (1978-2017), by species, and year (overall, Fig.4a. and by type of fishery Figs. 4b-f). Keys to the scoring system used to assess the quality of the statistics available for each species are presented below.

Figure 2 shows the proportion of nominal catches, catch and effort, and size frequency data that are presumed uncertain for the period 1978-2017, by main fleet and species group, including tropical and temperate tunas, billfish, and neritic tunas.

Figures 3a-3e present the importance that catches of each species group under each individual gear had over the total catches for that same group during the last decade (2008-2017), all gears combined. Figures 4a-4e show the proportion of catches that are presumed uncertain for the period 1978-2017, by type of dataset, main fleet and fishery: it is important to note that the quality of the statistics for the last two years is likely to improve in the future, as more information is collected from the fisheries and reported to the Secretariat.




Key to tables 4(a-f) and scoring system used to assess the quality of statistics of IOTC species available in the IOTC databases

Key:

Species	Species code (Albacore ALB; bigeye tuna BET; black marlin BLM; bullet tuna BLT; blue marlin BUM; narrow-barred Spanish mackerel COM; frigate tuna FRI; Indo-Pacific king mackerel GUT; kawakawa KAW; longtail tuna LOT; striped marlin MLS; southern bluefin tuna SBF; Indo-Pacific sailfish SFA; skipjack tuna SKJ; swordfish SWO; yellowfin tuna YFT)
%Catch	Contribution (in %) that the catches of the species make out of the total combined catches of all IOTC species, over the entire time series of catch
Yfirst	Availability and quality of data in the IOTC database for the year, species, and gear
Ylast	concerned, by type of dataset

e.g.:

Species	%Catch	YearYY
Species ₁ ⁿ	% Catch, as defined above	

Species ₁ ⁿ	% Catch, as defined above		Availability and quality of nominal catch data
			Availability and quality of catch-and-effort data
			Availability and quality of size frequency data

Key to IOTC Scoring system






Nominal Catch	By species	By gear
Fully available	0	0
Partially available (part of the catch not reported by species/gear)*	2	2
Fully estimated (by the IOTC Secretariat)	4	4

*Catch assigned by species/gear by the IOTC Secretariat; or 15% or more of the catches remain under aggregates of species

Catch-and-Effort	Time-period	Area
Available according to standards	0	0
Not available according to standards	2	2
Low coverage (less than 30% of total catch covered through logbooks)	2	
Not available at all	8	

Size frequency data	Time-period	Area
Available according to standards	0	0
Not available according to standards	2	2
Low coverage (less than 1 fish measured by metric ton of catch)	2	
Not available at all	8	

Key to colour coding

	Total score is 0 (or average score is 0-1)
	Total score is 2 (or average score is 1-3)
	Total score is 4 (or average score is 3-5)
	Total score is 6 (or average score is 5-7)
	Total score is 8 (or average score is 7-8)

Surface fisheries: Gillnet

Table 4(d.): Status of IOTC catch statistics for gillnet fisheries, by year and species (1978-2017)

Species	%Catch	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	Species
ALB	1	[Color-coded grid]																																								ALB
BET	1	[Color-coded grid]																																								BET
BLM	1	[Color-coded grid]																																								BLM
BLT	0	[Color-coded grid]																																								BLT
BUM	1	[Color-coded grid]																																								BUM
COM	20	[Color-coded grid]																																								COM
FRI	5	[Color-coded grid]																																								FRI
GUT	7	[Color-coded grid]																																								GUT
KAW	13	[Color-coded grid]																																								KAW
LOT	17	[Color-coded grid]																																								LOT
MLS	0	[Color-coded grid]																																								MLS
SBF	0	[Color-coded grid]																																								SBF
SFA	3	[Color-coded grid]																																								SFA
SKJ	20	[Color-coded grid]																																								SKJ
SWO	0	[Color-coded grid]																																								SWO
YFT	12	[Color-coded grid]																																								YFT

Fig. 3(c.): Contribution (in %) from gillnet catches over catches of all fisheries combined, for each species group and for all species combined.

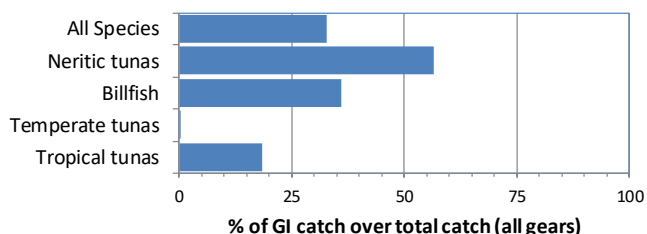
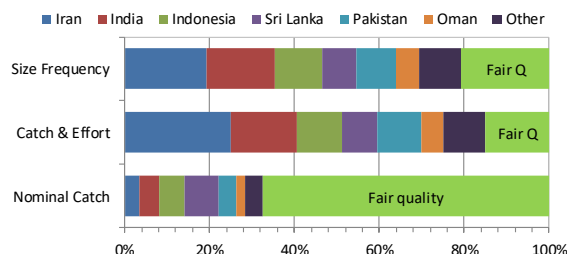


Fig. 4(c.): Amount of GI statistics (in % over the total GI catch 1978-2017) presumed to be uncertain, by type of dataset and fleet.



Overall, the nominal catches recorded for gillnet fisheries in the IOTC database are considered of **poor to fair quality**, depending on the fleet and time period (Table 4(d.)). Over the last forty years (1978-2017) around ~62% of the gillnet catches were composed of neritic tunas and ~33% of tropical tunas.

- During the last decade, **gillnet gears caught around 32% of the IOTC species in the Indian Ocean**, especially neritic tunas (~57%), billfish (~36%) and tropical tunas (~18%) (Fig. 3(c.)).
- Over the last forty years (1978-2017), **~67% of the nominal catches**, **~15% of the catch-and-effort**, and **~21% of the size frequency statistics** of gillnet fisheries recorded in the IOTC database are considered of **good quality** (Fig. 4(c.)).
- The statistics for the following gillnet fleets are considered of uncertain quality (1978-2017):
 1. **I.R. Iran:** Since 2018 I.R. Iran, with the assistance of the IOTC Secretariat, has submitted catch-and-effort data for its coastal fisheries according to the IOTC reporting standards (for data from 2007 onwards). Data for offshore gillnets is now disaggregated by month but not yet by grid / area.
 2. **India:** The Secretariat estimated catches for the gillnet fishery of India from the total aggregated catches for years in which the catches by gear for India were inconsistent, and this severely affected the quality of catches of neritic tunas. To date, India has not reported catch-and-effort and size data for its gillnet fisheries.
 3. **Sri Lanka:** Since 2014 Sri Lanka has been collecting logbook data from the offshore fisheries and started reporting catches for these same fisheries according to IOTC standards. Catches for the coastal fisheries are still uncertain.
 4. **Indonesia:** The Secretariat estimates catches for the gillnet fishery of Indonesia from the total reported aggregated catches: this severely affects the quality of the catch estimates for both tropical and neritic tunas. Since 2006 Indonesia has been reporting catches by gear and species, but the completeness and quality of the datasets reported remains uncertain. Indonesia has also not reported catch-and-effort and size data for its gillnet fisheries.
 5. **Pakistan:** In 2017 Pakistan provided revisions to the historical time series to IOTC Secretariat, incorporating information from WWF-Pakistan: the IOTC Secretariat is currently assisting Pakistan in the validation of the new catch series, which appears to be significantly different from the current estimates available in the IOTC database.
 6. **Oman:** To date, Oman has not provided size data and catch and effort are also not reported by IOTC standard.

Hand line, trolling and other small-scale fisheries

Table 4(f.): Status of IOTC catch statistics for hand line, trolling and small-scale line fisheries, by year and species (1978-2017)

Species	%Catch	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	Species
ALB	1	[Color-coded grid]																																								ALB
BET	4	[Color-coded grid]																																								BET
BLM	1	[Color-coded grid]																																								BLM
BLT	1	[Color-coded grid]																																								BLT
BUM	0	[Color-coded grid]																																								BUM
COM	10	[Color-coded grid]																																								COM
FRI	13	[Color-coded grid]																																								FRI
GUT	1	[Color-coded grid]																																								GUT
KAW	11	[Color-coded grid]																																								KAW
LOT	5	[Color-coded grid]																																								LOT
MLS	0	[Color-coded grid]																																								MLS
SBF	0	[Color-coded grid]																																								SBF
SFA	2	[Color-coded grid]																																								SFA
SKJ	17	[Color-coded grid]																																								SKJ
SWO	1	[Color-coded grid]																																								SWO
YFT	33	[Color-coded grid]																																								YFT

Fig. 3(e.): Contribution (in %) from hand line, trolling and other NEI gears over catches of all fisheries combined, for each species group and for all species combined (2008-2017).

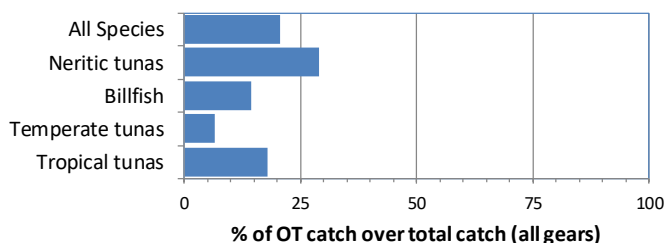
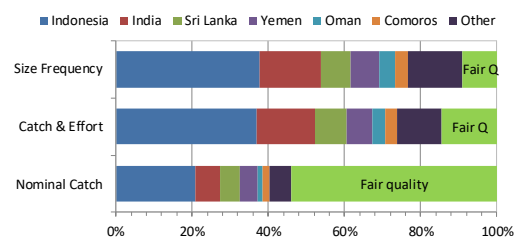


Fig. 4(e.): Amount of LI+OT statistics (in % over the total LI+OT catch 1978-2017) presumed to be uncertain, by type of dataset and fleet.



This category includes the catches of hand and troll lines and catches of other IOTC species that are not reported by gear. Most of the catches not reported by gear are likely to refer to coastal gillnets, hand line, trolling and other minor artisanal fisheries.

- Overall, the catches recorded for these fisheries in the IOTC database are considered of **poor quality** (Table 4(f.)). Over the last forty years (1978-2017) over 41% of catches under line fisheries were made of neritic tunas and over 54% of tropical tunas.
- **Hand line, trolling and other unidentified gears catch over 21% of the IOTC species in the Indian Ocean**, especially neritic tunas (~29%), tropical tunas (~18%), and billfish (~14%) (Fig. 3(e.)).
- Over the last forty years (1978-2017), **54% of the nominal catches, 15% of the catch-and-effort, and 9% of the size frequency statistics** of these fisheries recorded in the IOTC database are considered of **good quality** (Fig. 4(e.)).
- The catches for the following fleets are considered of uncertain quality (1978-2017):
 1. **Indonesia:** The Secretariat estimated catches for the handline and trolling fishery of Indonesia from the total aggregated catches reported by Indonesia; this affects the quality of the catches of both tropical tunas and neritic tunas. Since 2006 Indonesia has been reporting catches by gear and species to the Secretariat. To date, Indonesia has not reported catch-and-effort and size data for line and other NEI fisheries.
 2. **India:** The Secretariat estimated catches for the hand line and trolling fisheries of India from the catch by species and split gears as catches for years in which the catches reported by gear for India are inconsistent; this affects the quality of the catches of neritic tunas. To date, India has not reported catch-and-effort and size data for line and other NEI fisheries.
 3. **Sri Lanka:** Since 2014 Sri Lanka is collecting logbook data from the offshore fisheries. However, catches for coastal fisheries are still uncertain.
 4. **Yemen:** No data reported by Yemen. Catches have been estimated based on data published by FAO.
 5. **Comoros:** No data reported for the historical time series, up to 2012. Improvements in data collection and reporting occurred have been noted since assistance provided by the IOTC-OFCF Project in 2012; notably improvements in the catch estimation and reporting of size frequency data.
 6. **Oman:** Oman does not report catches by gear and, to date, has not provided size data as per the IOTC requirements.

4. STATUS OF THE IOTC FISHING CRAFT STATISTICS (FC) AND ACTIVE VESSELS (AV) DATABASES

The number of vessels targeting IOTC species in the IOTC Area of Competence are used to:

- Derive input-fishing capacity in the Indian Ocean.
- Estimate the catches of fleets that operate under the flags of countries that do not report data to the IOTC.
- Assess the completeness of the catches reported by IOTC CPCs completing those catches when the fleets concerned are not fully monitored by their flag countries.

During 2009, the Secretariat participated in a study to estimate **input-fishing capacity** for the fleets fishing for IOTC species in the Indian Ocean during 2006-08; the results of this study were presented to the IOTC Scientific Committee in 2009.

In 2013 the IOTC Secretariat worked with an independent consultant to update previous estimates of input fishing capacity in the Indian Ocean and complete information for 2009 and following years. The study included a full review of the IOTC numbers of industrial vessels, as defined by the Commission⁵, over the entire time-series; and an attempt to estimate numbers of small-scale fishing craft fishing that fished for tunas in the Indian Ocean during the same period. The Report prepared by the Secretariat is available⁶ and was presented at the 16th Meeting of the IOTC Scientific Committee (Busan, December 2013). In 2014/15 the IOTC Secretariat updated the fishing craft statistics series to incorporate estimates up to 2014 and update past estimates, where necessary.

NEI category: numbers of vessels

The numbers of vessels operating under the flags of **countries that do not report their catches** to the IOTC are estimated from data reported by other countries. Those data include:

- IOTC IUU list (IOTC Resolution 11/03);
- Identification, dimensions and other vessels attributes, by vessel, for those foreign vessels that owed fishing licenses to operate within the Economic Exclusive Zone (EEZ) of the reporting country (as specified in IOTC Resolution 14/05);
- Identification and total catches unloaded, by species and vessel, for those foreign vessels using ports in the territory of the reporting country (as specified in IOTC Resolution 10/11 & 05/03);
- Identification and total catches transhipped, by species and vessel, for vessels participating in the IOTC Transshipment Programme (as specified in IOTC Resolution 14/06);
- Data provided by other parties, including data on the imports of tuna for canning, by species and vessel, from processors cooperating with the International Seafood Sustainability Foundation (ISSF) or other initiatives.

The catches for those fleets are estimated by using the estimated vessel numbers (obtained as above) and the catch data for vessels from other (reporting) fleets that operated in the same areas and targeted the same species. The catches of this component are recorded under the NEI category.

Partially reported fleets

In addition, the Secretariat estimates catches for countries that report only partial statistics for their fleets. This refers to the **catches of fleets of IOTC CPCs** that are not fully monitored by their flag states. The catches reported by these countries are assumed incomplete because the average catches estimated by vessel by year are significantly lower than

⁵ The term industrial vessel includes all large-scale vessels (vessel length overall is 24 m or greater) that fished for IOTC species within the IOTC Area of Competence during the year concerned; and all small-scale vessels that fished for IOTC species within the IOTC Area of Competence, and where fishing occurred partially or fully beyond the Economic Exclusive Zones of their flag countries during the year concerned.

⁶ IOTC Secretariat, 2013. Estimation of fishing capacity by tuna fishing fleets in the Indian Ocean. Report presented at the 16th Meeting of the Scientific Committee of the Indian Ocean Tuna Commission, Busan, Rep. of Korea, 2-6 December 2013. *IOTC–2013–SC16–INF04: 88 pp.*

those estimated for similar fleets of other countries, on the assumption that the same levels of activity apply to both fleets. This applies to the following fleets:

- Longline fleet of **India**: Up to 100 longliners have been operating in India in recent years, including fresh-tuna longliners and deep-freezing longliners.
- Longline fleets of **Indonesia**: Indonesia do not monitor the catches of vessels under its flag that are unloaded in ports outside its territory.

The additional catches estimated for these countries are also included into the NEI category.

Fishing craft statistics: data availability

- Data from **artisanal** (small-scale) fisheries are scarce and inconsistent in many cases. On the contrary, the statistics of large-scale and medium-scale fleets are thought to be fairly complete:
- **Purse seine fleets**: The number of purse seiners fishing for tropical tunas on the high seas (usually referred to as “industrial”) is well known. At present, this fleet is flagged mainly in countries of the European Union, Seychelles, I.R. Iran, Mauritius, Japan, Philippines and the Republic of Korea.
- **Longline fleets**: There are many longline fleets fishing tuna in the Indian Ocean, mainly under the flags of Australia, , China, Taiwan,China, the EU, India, Indonesia, Japan, the Republic of Korea, Madagascar, Malaysia, Mauritius, Mozambique, Oman, Philippines, Sri Lanka, Seychelles, South Africa, ~~Tanzania~~, Thailand and other longliners operating under various flags of non-reporting countries. The total number of non-reporting longliners is estimated whenever the Secretariat receives new data from third parties (NEI category).
- **Oceanic gillnet fisheries of I.R. Iran and Pakistan**: The number of oceanic gillnet vessels operating in the Indian Ocean is well known for I.R. Iran and poorly know for Pakistan.
- **Offshore gillnet/longline fishery of Sri Lanka**: The number of offshore gillnet/longline vessels that operate under the flag of Sri Lanka is well known.
- **Pole-and-line fishery of Maldives**: The number of pole-and-line vessels that operate under the flag of Maldives is well known.

5. OTHER IOTC DATA HOLDINGS

a. Biological data

The IOTC Secretariat compiles datasets and information relating to IOTC species and main species of sharks, as identified by the Commission, including the data used to derive standard measurements for IOTC species and other biological information of interest to the IOTC. The IOTC Secretariat periodically updates the available equations as it receives updates from the Working Parties.

In 2013 a summary of the range of length-weight equations available for each of the main IOTC species was presented to the WPDCS⁷, in addition to separate reports were presented for the consideration of each species Working Party in 2014⁸, as requested by the IOTC Scientific Committee. In 2016 the European Union also conducted studies on the length-weight relationship of tropical tunas from the purse seine fishery; the length-weight conversion factors for tropical tuna species have been updated⁹.

b. Observer data

⁷ Geehan, J. & Pierre, L. (IOTC Secretariat), 2013. Biological data on tuna and tuna-like species gathered at the IOTC Secretariat: Status Report. Document presented at the 9th Meeting of the Working Party on Data Collection and Statistics of the Indian Ocean Tuna Commission, Busan, Republic of Korea, 29-30 November 2013. *IOTC–2013–WPDCS09–13*.

⁸ Herrera, M, Geehan, J. & Pierre, L. (IOTC Secretariat), 2014. Review of the statistical data and fishery trends for billfish. Document presented at the 12th Meeting of the Working Party on Billfish of the Indian Ocean Tuna Commission, Yokohama, Japan, 21-25 October 2014. *IOTC–2014–WPB12–07*.

⁹ Chassot E, Assan C, Esparon J, Tirant A, Delgado de Molina A, Dewals P, Augustin E, Bodin N, 2016: IOTC-2016-WPDCS12-INF05 - Updating_LW_TT_PS

In terms of Resolution 11/04 *on a Regional Observer Scheme*, there are increasing number of regional and national observer reports submitted to IOTC. However, CPCs are still facing difficulties to implement and/or report the information as requested by the resolution. The IOTC Secretariat is in the process of piloting an electronic data collection and management interface to support the data entry, validation and reporting of ROS data to the IOTC Secretariat. The information available under the ROS is also routinely summarized and during the annual meeting of the IOTC Scientific Committee.

c. Field sampling

IOTC Resolution 11/04 contains also provisions covering the monitoring of artisanal fisheries:

“The number of the artisanal fishing vessels landings shall also be monitored at the landing place by field samplers¹⁰. The indicative level of the coverage of the artisanal fishing vessels should progressively increase towards 5% of the total levels of vessel activity (i.e. total number of vessel trips or total number of vessels active).”

In order to assess the level of coverage of artisanal fleets by coastal countries in the IOTC Region, in 2011 the IOTC Secretariat initiated a Pilot Project. To this purpose, the Secretariat hired the services of a Consultant, who prepared a report covering the fisheries in nine coastal countries in the Region, having important catches of tropical tunas (70% of the total catches estimated for coastal countries). The report of the Consultant is available at the Secretariat and was summarized in a document presented to the IOTC Scientific Committee in 2011 (IOTC-2011-SC14-38).

Since the last IOTC WPDCS Meeting the IOTC Secretariat has coordinated capacity building activities in some of the countries covered in the above report. These actions followed requests from local institutions, as well as priorities identified by the IOTC Working Parties and Scientific Committee and were possible thanks to financial support from the IOTC and its partners, including the Overseas Fisheries Cooperation Foundation of Japan, WWF and the European Union. Capacity building activities were implemented in Indonesia, Tanzania, and Mauritius with more details about these activities provided in a separate document¹¹.

d. Tagging data

Since 2002, the Secretariat has been coordinating and supervising the Indian Ocean Tuna Tagging Programme (IOTTP). This programme was a combination of a main tagging project, the Regional Tuna Tagging Project in the Indian Ocean (RTTP-IO), funded by the EU (9th EDF, DG-Dev), and several pilot and small-scale tuna tagging projects funded by the DG-Fish (ex DG-Mare) and the government of Japan.

The specific objective of this programme was to reinforce the scientific knowledge of tropical tuna stocks and the rate of exploitation in the Indian Ocean by obtaining the crucial model parameters for stock assessment.

All the tagging and recapture data is hosted at IOTC Secretariat and available upon request to the Executive Secretary: at present, all data from the RTTP-IO is stored in a standalone database specifically developed for the project that was enriched, in 2012, with data from past tagging projects implemented in Maldives in the 1990s.

As of November 2018 this database contains 219,121 releases and 34,340 recoveries.

¹⁰ Field sampler: a person that collects information on land during the unloading of fishing vessels. Field sampling programmes can be used for quantifying catch, retained bycatch, collecting tag returns, *etc.*

¹¹ Geehan, J (IOTC Secretariat), 2016. IOTC Capacity Building Activities in Support of developing coastal IOTC CPCs: 2016 Activities. Document presented at the 12th Meeting of the Working Party on Data Collection and Statistics of the Indian Ocean Tuna Commission, Seychelles, 28-30 November 2016. *IOTC–2016–WPDCS12–09*.

Tagging data contains the following information:

- Tag series and tag number
- Species
- Fork length
- Data and position of tagging
- Type of tag
- Tagger
- Gear
- Information on the school
- Quality codes

Recovery data contains the following information:

- Species
- Fork length and/or weight at recovery
- If found during fishing: date and position of recovery
- If found during processing: estimated date and position of recovery
- Date of reporting
- Country of reporting
- Gear of recapture
- Place and process where found
- Name of the vessel (*confidential*)
- Name and details of recoverer (*confidential*)
- Reward given (*confidential*)
- Name of staff collecting data and checking data

Every year the IOTC Secretariat prepares and makes available the files including the tagging data to be used for the assessments of tropical tuna species, as required by the WPTT. The tagging data generated by the RTTP-IO, and the broader IOTTP, have been used in the assessments of tropical tuna species since 2008.

Growth curves for the three species and natural mortality rates have also been derived from the tagging data and were updated for some species (i.e., growth rates for yellowfin tuna and skipjack tuna, exploitation rate and natural mortality for skipjack tuna).

APPENDIX I

Resolutions containing requirements for the collection and/or reporting of data to the IOTC

- IOTC Resolution 15/02: **Mandatory statistical requirements for IOTC Members and Cooperating Non-Contracting Parties (CPC's): Defines IOTC's data reporting procedures for IOTC SPECIES, main shark species caught by IOTC fisheries, and non-target, associated and dependent species.**
- IOTC Resolution 17/08: *Procedures on a fish aggregating devices (FADs) management plan, including Limitation On Number Of FADs, More Detailed Specifications Of Catch Reporting From FAD Sets, & Development Of Improved Designs To Reduce Incidence Of Entanglement Of Non-Target Species.*
- IOTC Resolution 15/01: *On the recording of catch and effort data by fishing vessels in the IOTC area of competence: Establishes minima data requirements for the collection of operational catch and effort data on authorized vessels, including the species for which those requirements apply. Data requirements are set for industrial purse seine, longline, drifting gillnet, pole-and-line, trolling, and handline. This Resolutions calls also port states that license foreign fishing vessels to collect logbooks on fishing by those vessels within their EEZs and report this information in aggregated form to the IOTC Secretariat.*
- IOTC Resolution 17/05 *Concerning the conservation of SHARKS caught in association with fisheries managed by IOTC*
 - *Paragraph 2: CPCs shall take the necessary measures to require that their fishermen fully utilise their entire catches of sharks, with the exception of species prohibited by the IOTC. Full utilisation is defined as retention by the fishing vessel of all parts of the shark excepting head, guts and skins, to the point of first landing.*
 - *Paragraph 2: a) Sharks landed fresh: CPCs shall prohibit the removal of shark fins on board vessels. CPCs shall prohibit the landing, retention on-board, transshipment and carrying of shark fins which are not naturally attached to the shark carcass until the first point of landing.*
 - *b) Sharks landed frozen: CPCs that do not apply sub-paragraph 3 a) for all sharks shall require their vessels to not have on board fins that total more than 5% of the weight of sharks on board, up to the first point of landing. CPCs that currently do not require fins and carcasses to be offloaded together at the point of first landing shall take the necessary measures to ensure compliance with the 5 % ratio through certification, monitoring by an observer, or other appropriate measures.*
- IOTC Resolution 13/06¹²: *On A Scientific And Management Framework On The Conservation Of Shark Species Caught In Association With IOTC Managed Fisheries*
 - *Paragraph 5: CPCs shall encourage their fishers to record incidental catches as well as live releases of OCEANIC WHITETIP SHARKS. These data shall be kept at the IOTC Secretariat.*
- IOTC Resolution 12/09 *On the conservation of THRESHER SHARKS (family Alopiidae) caught in association with fisheries in the IOTC area of competence*
 - *Paragraph 4: CPCs shall encourage their fishers to record and report incidental catches as well as live releases. These data will be then kept at the IOTC Secretariat.*
 - *Paragraph 8: The Contracting Parties, Cooperating Non-Contracting Parties, especially those directing fishing activities for sharks, shall submit data for sharks, as required by IOTC data reporting procedures.*
- IOTC Resolution 13/05 *On the conservation of WHALE SHARKS (Rhincodon typus)*
 - *Paragraph 3: CPCs shall require that, in the event that a whale shark is unintentionally encircled in the purse seine net, the master of the vessel shall:*
 - b. report the incident to the relevant authority of the flag State, with the following information...*

¹² This Resolution was objected to by India and therefore is non-binding to India.

- *Paragraph 4: CPCs using other gear types fishing for tuna and tuna-like species associated with a whale shark shall report all interactions with whale sharks to the relevant authority of the flag State and include all the information outlined in paragraph 3b(i–v).*
- *Paragraph 7: CPCs shall report the information and data collected under paragraph 3(b) and paragraph 4 through logbooks, or when an observer is onboard through observer programs, and provide to the IOTC Secretariat by 30 June of the following year and according to the timelines specified in Resolution 10/02 (or any subsequent revision).*
- IOTC Resolution 12/06 *On reducing the incidental bycatch of **SEABIRDS** in **longline fisheries***
 - *Paragraph 1: CPCs shall record data on seabird incidental bycatch by species, notably through scientific observers in accordance with Resolution 11/04 and report these annually.*
- IOTC Resolution 12/04 *On **MARINE TURTLES***
 - *Paragraph 3: CPCs shall collect (including through logbooks and observer programs) and provide to the IOTC Secretariat no later than 30 June of the following year in accordance with Resolution 10/02 (or any subsequent revision), all data on their vessels' interactions with marine turtles. The data shall include the level of logbook or observer coverage and an estimation of total mortality of marine turtles incidentally caught in their fisheries.*
- IOTC Resolution 13/04 *On the conservation of **CETACEANS***
 - *Paragraph 3: CPCs shall require that, in the event that a Cetacean is unintentionally encircled in the purse seine net, the master of the vessel shall:*
 - b. report the incident to the relevant authority of the flag State, with the following information...*
 - *Paragraph 4: CPCs using other gear types fishing for tuna and tuna-like species associated with cetaceans shall report all interactions with cetaceans to the relevant authority of the flag State and include all the information outlined in paragraph 3b(i–v).*
 - *Paragraph 7: CPCs shall report the information and data collected under paragraph 3(b) and paragraph 4 through logbooks, or when an observer is onboard through observer programs, and provide to the IOTC Secretariat by 30 June of the following year and according to the timelines specified in Resolution 10/02 (or any subsequent revision).*
- IOTC Resolution 11/04 *On a Regional **OBSERVER SCHEME***
 - *Paragraph 9: CPCs shall provide to the Executive Secretary and the Scientific Committee annually a report of the number of vessels monitored and the coverage achieved by gear type in accordance with the provisions of this Resolution.*
 - *Paragraph 11: CPCs shall send within 150 days at the latest each report, as far as continuous flow of report from observer placed on the longline fleet is ensured, which is recommended to be provided with 1°x1° format to the Executive Secretary, who shall make the report available to the Scientific Committee upon request.*