Report on IOTC data collection and statistics

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1. OVERVIEW

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

- IOTC Resolution 10/02: ***Mandatory statistical requirements*** *for IOTC Members and Cooperating Non-Contracting Parties (CPC's): Defines IOTC's data reporting procedures for* ***IOTC SPECIES*** *and* ***non-target, associated and dependent species****.*
- IOTC Resolution 05/05 *Concerning the conservation of* ***SHARKS*** *caught in association with fisheries managed by IOTC*
    - *Paragraph 1: Contracting Parties, Cooperating non-Contracting Parties (CPCs) shall annually* ***report data for catches of sharks, in accordance with IOTC data reporting procedures, including available historical data****.*
    - *Paragraph 2: The* ***ratio of fin-to-body weight of sharks*** *shall be reviewed by the Scientific Committee and reported back to the Commission in 2006 for revision, if necessary.*
- IOTC Recommendation 05/09 *On incidental mortality of* ***SEABIRDS***
    - *Paragraph 2: CPCs should be encouraged to* ***collect and voluntarily provide*** *Scientific Committee with all available information on interactions with seabirds, including* ***incidental catches in all fisheries under the purview of IOTC.***
- IOTC Resolution 10/06 *On reducing the incidental bycatch of* ***SEABIRDS*** *in* ***longline fisheries***
    - *Paragraph 7: CPCs shall provide to the Commission, as part of their annual reports, all available information on interactions with seabirds, including* ***bycatch by fishing vessels*** *carrying their flag or authorised to fish by them. This is to including* ***details of species*** *where available to enable the Scientific Committee to annually estimate seabird mortality in all fisheries within the IOTC area of competence.*
- IOTC Resolution 09/06 *On* ***MARINE TURTLES***
    - *Paragraph 2: CPCs shall collect (including through logbooks and observer programs) and provide to the Scientific Committee all data on their vessels' interactions with marine turtles in fisheries targeting the species covered by the IOTC Agreement. CPC shall also furnish available information to the Scientific Committee on successful mitigation measures and other impacts on marine turtles in the IOTC Area, such as the deterioration of nesting sites and swallowing of marine debris.*

The document describes the progress achieved in relation to the collection and verification of data, identifies problem areas and proposes actions that could be undertaken to improve them.

The report covers the following areas:

- Overview
- Availability of IOTC statistics for 2009 (timeliness and completeness of data)
- Status of the IOTC nominal catches (NC), catch and effort (CE) and size frequency (SF) databases (Progress and problem areas)
- Other IOTC data holdings: observer data, biological data, tagging data

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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 (IOTC Resolution 10/07; IOTC Resolution 10/08; IOTC Resolution 05/03; IOTC Resolution 08/02), data collected through sampling at the landing place or at sea by scientific observers (IOTC Resolution 10/04) or on imports of bigeye tuna from vessels under the flag concerned (IOTC Resolution 01/06).

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 and species. Information on the use of fish aggregating devices (FADs) and supply vessels is also collected.

Length frequency data: individual body lengths of IOTC species per fleet, year, gear, type of school, month and 5 degrees square areas.

2. AVAILABILITY OF IOTC STATISTICS FOR 2009

Tables 2i-2v (below) list the fleets for which the Secretariat received or estimated catches for the year 2009. The fleets are listed according to the size of their most recent catches. The standing of the catch, effort, size frequency and craft statistics information received is indicated using colours. Timeliness of reporting and data source are also shown. The availability and standing of statistics for tropical tunas (2i), temperate tunas (2ii), billfish (2iii), neritic tunas (2iv) and sharks, seabirds and sea turtles (2v) are presented separately. The availability of statistics on fishing crafts operating for each fleet is also presented in a separate table (2vi). Brief comments on bycatch, discards and Fishing craft statistics and active vessels are made at the end of this section.

Timeliness and completeness of data

IOTC statistics were available for 13 countries before the deadline of June 30 (cf. 15 in 2009). Partial statistics were provided in most cases. Requests were sent to over fifty countries[4] in March-April 2010. Second and third requests were needed in most cases. More statistics were available before the deadline than in 2009.

Table 1 shows the extent to which 2009 catch data was available in the IOTC Nominal Catches (NC) database by the deadline for data submission (30 June) and before the WPDCS Meeting (November 2009)[5]. 43% of the catch was available by 30 June and 66% of the catch was available by November. The proportion of statistics available for 2008 is shown for comparison. Levels of reporting were moderate in 2010, especially for nominal catch and catch-and-effort data.

Late reports compromise the validation, verification and utility of data, especially when data are submitted close to or during Working Party meetings.

Table 1. Proportion of the NC, CE and SF statistics available at the IOTC Secretariat compared to the total catches estimated for 2008 (as of 15th November 2010).

Statistics available for 2008	Estim. Catch	NC		CE		SF	
		BD	WP	BD	WP	BD	WP
IOTC species (x1,000 t)	1349	574	885	552	649	496	520
%Available for 2009		**43**	**66**	**41**	**48**	**37**	**39**
%Available for 2008		32	77	31	52	23	32
Tropical tunas (x1,000 t)	802	476	656	465	561	435	444
Temperate tunas (x1,000 t)	48	28	31	28	28	26	26
Billfish (x1,000 t)	62	39	45	28	30	26	26
Neritic tunas (x1,000 t)	437	31	154	31	31	9	24

Estim. Catch: Total catches estimated
NC: Amount of catch available
CE: Amount of catch for which catches and effort are available
SF: Amount of catch for which size frequency data are available
Available before the deadline for data submission (**BD**, 30th June) and at the time of the Working Party on Data Collection and Statistics Meeting (**WP**)

[4] Note that specific requests were sent to EC countries having vessels known to operate in the IOTC Area (France, Italy, Portugal, Spain and the UK)

[5] 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 available before the deadline or the SC represent over the totals estimated by the Secretariat. The amount of catches not reported is further reduced as countries that did not report statistics in time provide the missing datasets.

Table 2: Availability of IOTC statistics for the year 2009

Key Tables 2i - 2vi

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) Fair (whithin July) Poor (after 1st August)	**SO**	Data Source	Statistics fully available from flag country Statistics partially available from flag country Statistics available from sources other than flag country

2i – Tropical tunas (YFT, BET, SKJ)

Gear	Fleet	Availability of statistics					TI	SO	Comments
		Catch	Sps	NC	CE	SF			
PS	EUROPEAN COMMUNITY	175.7	SY						Information on number of FAD used not provided
	SEYCHELLES	68.3	SY						FAD and supply vessel informaiton not provided
	FRANCE-TERRITORIES	12.6	SY						Information on number of FAD used not provided
	THAILAND	11.0	SB						FAD and supply vessel informaiton not provided
	JAPAN	5.6	SB						FAD and supply vessel informaiton not provided
	IRAN I R	1.7	Y						Information on number of FAD used not provided
	AUSTRALIA	0.9	S						
	MALAYSIA	0.3	S						
	INDIA								
	INDONESIA								
LL	CHINA	3.1	BY						
	TAIWAN,CHINA	43.7	BY						SF not available from fresh-tuna longliners
	INDONESIA	15.4	BY						
	JAPAN	13.9	BY						
	INDIA	10.7	BY						NC not reported for all longliners
	OMAN	6.6	Y						
	SEYCHELLES	5.0	B						
	MALAYSIA	2.2	BY						NC not reported for all longliners
	KOREA REP	1.4	YB						
	EUROPEAN COMMUNITY	1.2	BY						No data available for France; No CE data available for Spain
	PHILIPPINES	0.9	BY						CE not collected according to IOTC minimum requirements
	SOUTH AFRICA	0.3	BY						
	THAILAND	0.2	BY						
	MAURITIUS	0.1	Y						
	AUSTRALIA	0.1	Y						
	BELIZE	0.1	Y						
	KENYA	0.0	BY						
	MADAGASCAR	0.0	BY						
	GUINEA	0.0	BY						
	TANZANIA	0.0	BY						
	SENEGAL	0.0	BY						
	NEI-FRESH[2]	5.5	YB						
	NEI-FROZEN[1]	2.3	BY						
Other fleets	SRI LANKA	121.2	SY						NC aggregated; CE and SF not by standard grid
	MALDIVES	86.8	SY						Complete CE and SF provided for WPTT; not officially released
	IRAN I R	65.7	SY						
	INDONESIA	52.2	S						
	INDIA	26.1	YS						
	MADAGASCAR	15.6	SY						
	YEMEN AR RP	13.7	Y						
	COMOROS	12.6	YS						
	PAKISTAN	10.3	YS						
	OMAN	7.0	Y						NC not by gear (aggregated)
	FRANCE-TERRITORIES	0.8	SY						
	EUROPEAN COMMUNITY	0.2	Y						
	TANZANIA	0.1	Y						
	MAURITIUS	0.1	Y						
	KENYA	0.1	Y						
	JORDAN	0.0	S						Catches not significant; not estimated
	UK-TERRITORIES	0.0	S						SF only available for YFT
	SOUTH AFRICA	0.0	Y						
	EAST TIMOR	0.0	Y						
	AUSTRALIA	0.0	Y						
	SEYCHELLES	0.0	Y						

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)
Conf	Catches confidential (included in NEI)
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

2ii – Temperate tunas (ALB, SBF)

Gear	Fleet	Availability of statistics					TI	SO	Comments
		Catch	Sps	NC	CE	SF			
PS	AUSTRALIA	4.3	S						
	EUROPEAN COMMUNITY	0.4	A						Information on number of FAD used not provided
	SEYCHELLES	0.0	A						FAD and supply vessel informaiton not provided
LL	INDONESIA	14.8	A						
	CHINA	0.4	A						
	TAIWAN,CHINA	14.2	A						SF not available from fresh-tuna longliners
	JAPAN	5.5	AS						Sample size represents less than 1 fish by ton caught
	INDIA	2.9	A						NC not by species and not reported for all longliners
	KOREA REP	1.0	SA						
	EUROPEAN COMMUNITY	0.8	A						No data available for France; No CE data available for Spain
	SEYCHELLES	0.5	AS						
	MALAYSIA	0.2	A						NC not reported for all longliners
	BELIZE	0.2	A						
	PHILIPPINES	0.1	A						CE not collected according to IOTC minimum requirements
	SOUTH AFRICA	0.0	AS						
	GUINEA	0.0	A						
	TANZANIA	0.0	A						
	SENEGAL	0.0	A						
	MADAGASCAR	0.0	A						
	THAILAND	0.0	A						
	AUSTRALIA	0.0	A						
	MAURITIUS	0.0	A						SF data not by IOTC grid & combined for domestic and foreign vessels
	NEI-FRESH	1.4	A						
	NEI-FROZEN	0.3	A						
OTH	INDIA	1.1	A						
	EUROPEAN COMMUNITY	0.0	A						
	SOUTH AFRICA	0.0	A						
	AUSTRALIA	0.0	S						

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

2iii – Billfish (SWO, MARL, SFA, SSP)

Gear	Fleet	Availability of statistics					TI	SO	Comments
		Catch	Sps	NC	CE	SF			
LL	CHINA	0.4	S						
	TAIWAN,CHINA	12.1	SM						SF not available from fresh-tuna longliners
	EUROPEAN COMMUNITY	5.8	S						Data not available for France; CE/SF incomplete for Spain
	INDIA	2.8	SM						NC not reported for all longliners
	INDONESIA	2.8	SM						
	JAPAN	1.9	SM						
	SEYCHELLES	1.0	S						
	OMAN	0.6	MF						
	GUINEA	0.5	S						
	TANZANIA	0.5	S						
	SENEGAL	0.5	S						
	AUSTRALIA	0.3	S						
	MAURITIUS	0.3	S						
	MALAYSIA	0.3	S						NC not reported for all longliners
	KENYA	0.3	S						
	SOUTH AFRICA	0.2	S						
	KOREA REP	0.2	S						
	THAILAND	0.1	S						CE only available for swordfish
	MADAGASCAR	0.0	S						
	BELIZE	0.0	S						
	PHILIPPINES	0.0	S						CE not collected according to IOTC minimum requirements
	NEI-FRESH	1.1	SM						
	NEI-FROZEN	0.5	SM						
Other fleets	IRAN I R	8.0	F						
	SRI LANKA	6.3	F						NC aggregated; CE and SF not by standard grid
	INDIA	6.1	F						
	PAKISTAN	3.1	M						
	INDONESIA	1.7	MF						
	MADAGASCAR	1.5	F						
	OMAN	1.2	F						
	COMOROS	0.6	F						
	TANZANIA	0.4	M						
	YEMEN AR RP	0.3	F						
	MAURITIUS	0.3	M						
	KENYA	0.2	F						
	UN ARAB EMIRATES	0.2	M						
	EUROPEAN COMMUNITY	0.1	M						
	FRANCE-TERRITORIES	0.0	M						
	SAUDI ARABIA	0.0	M						
	SEYCHELLES	0.0	F						
	UK-TERRITORIES	0.0	F						

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)
Conf Catches confidential (included in NEI)
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

2iv – Neritic tunas (FRZ, LOT, KAW, COM, GUT)

Gear	Fleet	Availability of statistics					TI	SO	Comments
		Catch	Sps	NC	CE	SF			
PS	IRAN I R	2.2	L						
	THAILAND	0.1	F						Statistics incomplete; refers mostly to discards
	EUROPEAN COMMUNITY	0.0	F						Statistics incomplete; refers mostly to discards
	SEYCHELLES	0.0	F						Statistics incomplete; refers mostly to discards
	INDIA								
	INDONESIA								
Other fleets	INDONESIA	117.6	KL						
	INDIA	105.0	CK						
	IRAN I R	80.7	LK						
	THAILAND	21.8	KL						
	MALAYSIA	18.6	KL						
	PAKISTAN	16.1	CL						
	OMAN	14.9	LC						
	YEMEN AR RP	11.2	KL						
	MADAGASCAR	10.5	CK						
	SRI LANKA	9.0	CK						NC aggregated; CE and SF not by standard grid
	MALDIVES	8.2	FK						Complete CE and SF provided for WPTT; not officially released
	SAUDI ARABIA	7.8	CK						
	UN ARAB EMIRATES	3.9	L						
	QATAR	2.6	C						
	BANGLADESH	1.6							
	KENYA	1.2	CK						
	COMOROS	1.1	K						
	TANZANIA	0.9	C						
	ERITREA	0.5	C						
	EGYPT	0.3	CK						
	AUSTRALIA	0.3	C						
	BAHRAIN	0.2	K						
	SEYCHELLES	0.1	K						
	KUWAIT	0.1	C						
	DJIBOUTI	0.1							
	JORDAN	0.1	K						
	EUROPEAN COMMUNITY	0.0	K						
	SUDAN	0.0	C						
	SOUTH AFRICA	0.0	G						
	UK-TERRITORIES	0.0	K						

Sps Longtail tuna (**L**), frigate tuna and/or bullet tuna (**F**), kawakawa (**K**), narrow-barred Spanish mackerel (**C**), Indo-Pacific king mackerel (**G**)

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

2v – Sharks seabirds and sea turtles

Gear	Fleet	Species					Comments
		Sharks			Sea Birds	Sea Turtles	
		NC	CE	SF			
PS	EUROPEAN COMMUNITY				n/a		NC presumed to be low
	SEYCHELLES				n/a		NC presumed to be low
	THAILAND				n/a		NC presumed to be low
	IRAN I R				n/a		NC presumed to be low
	AUSTRALIA				n/a		NIL bycatch
	FRANCE-TERRITORIES				n/a		NC presumed to be low
	JAPAN				n/a		NC presumed to be low
	MALAYSIA				n/a		NC presumed to be low
	INDIA				n/a		NC presumed to be low
	INDONESIA				n/a		NC presumed to be low
LL	CHINA						NC/CE refer to retained catches and is not by species
	TAIWAN,CHINA						NC/CE refer to retained catches and is not by species
	JAPAN						NC refers to retained catches
	INDONESIA						NC refers to retained catches and is not by species
	EUROPEAN COMMUNITY						No data available for France; No CE data available for Spain
	SEYCHELLES						NC/CE refer to retained catches and is not by species
	KOREA REP						NC/CE refer to retained catches and is not by species
	OMAN						NC/CE refer to retained catches and is not by species
	PHILIPPINES						
	MALAYSIA						NC/CE refer to retained catches and is not by species
	BELIZE						NC/CE refer to retained catches and is not by species
	MAURITIUS						NC/CE refer to retained catches and is not by species
	GUINEA						
	THAILAND						
	SOUTH AFRICA						
	AUSTRALIA						
	KENYA						
	SENEGAL						
	INDIA						
	MADAGASCAR						
	NEI-FROZEN[1]						
	NEI-FRESH[2]						
Artisanal	IRAN I R				n/a		NC presumed to be high for driftnets
	MALDIVES				n/a		NC presumed to be low
	INDONESIA				n/a		NC presumed to be high
	INDIA				n/a		NC presumed to be high
	SRI LANKA						CE and SF not by standard grid
	OMAN				n/a		NC Not by species
	YEMEN AR RP				n/a		NC presumed to be high
	PAKISTAN				n/a		NC presumed to be high for driftnets
	MALAYSIA				n/a		NC/CE Not by species
	THAILAND				n/a		NC presumed to be low
	MADAGASCAR				n/a		Catch levels unknown
	COMOROS				n/a		Catch levels unknown
	UN ARAB EMIRATES				n/a		NC presumed to be low
	SAUDI ARABIA				n/a		Catch levels unknown
	QATAR				n/a		NC presumed to be low
	TANZANIA				n/a		NC presumed to be low
	KENYA				n/a		NC presumed to be low
	EGYPT				n/a		NC presumed to be low
	FRANCE-TERRITORIES				n/a		Catch levels unknown
	SEYCHELLES				n/a		NC/CE Not by species
	EUROPEAN COMMUNITY				n/a		NC presumed to be low
	MAURITIUS				n/a		NC presumed to be low
	AUSTRALIA				n/a		
	KUWAIT				n/a		NC presumed to be low
	ERITREA				n/a		NC presumed to be low
	JORDAN				n/a		NC presumed to be low
	BANGLADESH				n/a		NC presumed to be low
	BAHRAIN				n/a		NC presumed to be low
	DJIBOUTI				n/a		NC presumed to be low
	SUDAN				n/a		NC presumed to be low
	UK-TERRITORIES				n/a		NC/CE Not by species
	SOUTH AFRICA				n/a		
	EAST TIMOR				n/a		NC presumed to be low

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

2vi – Fishing craft statistics and list of active vessels

Gear	Industrial purse seine (**PS**), industrial longline (**LL**) and artisanal gears (**ART**)	**Availability**	Fully available Partially available Not available
Catch	Recent catches amounting to (thousands of tonnes)		
Craft	Number of craft operated (2006) (blank if unknown)	**SO** Data Source	Statistics fully available from flag country Statistics partially available from flag country Statistics available from sources other than flag country
FC	Fishing craft		
AV	List of active vessels		

Gear	Fleet	Availability				SO	Comments
		Catch	Craft	FC	AV		
PS	EUROPEAN COMMUNITY	176.1	36				
	SEYCHELLES	68.3	9				
	FRANCE-TERRITORIES	12.6	2				
	THAILAND	11.1	4				
	JAPAN	5.6	2				
	AUSTRALIA	5.2	10				
	IRAN I R	3.8	8				
	MALAYSIA	0.3	1				
	INDIA		5				
	INDONESIA		4				
	SUPPLY VESSELS-NEI		12				Vessels support PS from EC, Seychelles and Thailand; number uncertain
LL	CHINA	3.9	32				
	TAIWAN,CHINA	70.0	537				
	INDONESIA	32.9	1,043				
	JAPAN	21.4	126				
	INDIA	16.4	126				Conflicting numbers of LL reported by two government agencies
	EUROPEAN COMMUNITY	7.7	79				
	OMAN	7.3	17				
	SEYCHELLES	6.5	35				
	MALAYSIA	2.7	35				
	KOREA REP	2.6	2				
	PHILIPPINES	0.9	7				
	GUINEA	0.6	3				
	TANZANIA	0.6	3				
	SENEGAL	0.6	3				
	SOUTH AFRICA	0.5	25				
	AUSTRALIA	0.4	4				
	MAURITIUS	0.4	8				
	KENYA	0.3	2				
	THAILAND	0.3	3				
	BELIZE	0.3	5				
	MADAGASCAR	0.1	3				
	NEI-FRESH	8.0	23				
	NEI-FROZEN	3.1	10				
Other Offshore & Coastal	INDONESIA	171.6			n/a		
	IRAN I R	154.4	6,611				
	INDIA	138.2			n/a		
	SRI LANKA	136.5	41,454				
	MALDIVES	95.0	1,016				
	PAKISTAN	29.5	2,401				
	MADAGASCAR	27.6			n/a		
	YEMEN AR RP	25.3			n/a		
	OMAN	23.2	14,942		n/a		
	THAILAND	21.8	755				
	MALAYSIA	18.6			n/a		
	COMOROS	14.3	4,327		n/a		
	SAUDI ARABIA	7.8			n/a		
	UN ARAB EMIRATES	4.1			n/a		
	QATAR	2.6			n/a		
	BANGLADESH	1.6			n/a		
	KENYA	1.5			n/a		
	TANZANIA	1.4			n/a		
	FRANCE-TERRITORIES	0.8			n/a		
	ERITREA	0.5			n/a		
	MAURITIUS	0.4			n/a		
	EGYPT	0.3			n/a		
	AUSTRALIA	0.3	35		n/a		
	EUROPEAN COMMUNITY	0.3			n/a		
	BAHRAIN	0.2			n/a		
	SEYCHELLES	0.1			n/a		
	KUWAIT	0.1			n/a		
	JORDAN	0.1			n/a		
	DJIBOUTI	0.1			n/a		
	SUDAN	0.0			n/a		
	SOUTH AFRICA	0.0	29		n/a		
	UK-TERRITORIES	0.0	47		n/a		
	EAST TIMOR	0.0			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

- **By-catch levels**: Australia and South Africa provided estimates of total bycatch levels for their fisheries for 2009, including bycatch levels for sharks, seabirds and marine turtles. In spite of the better reporting levels recorded for bycatch data during 2010, few statistics are still available for sharks, seabirds and sea turtles (Table v) (and other non-IOTC species caught by fleets targeting tunas and/or tuna-like species); for this reason, the quality of the data available is still poor. The statistics are seldom available by species and refer usually to the shark carcasses that are retained on board, not including the amounts of sharks that are discarded. Almost no statistics are available for other shark products, such as shark fins.
- **Discards levels**: Discard levels are only available for Australia, EU-France, EU-Portugal (nil discards), Sri Lanka (nil discards) and the UK (nil discards) in 2009. Discard rates are believed to be high for fisheries using longlines and oceanic gillnets (Iran, Pakistan) and moderate for purse seine sets on associated schools (mainly with FADs).
- **Fishing craft statistics and active vessels**: The number of vessels fishing for IOTC species in the Indian Ocean is thought to be more accurate in recent years thanks to the 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 Transhipment 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. The number of non-reporting vessels operating in the Indian Ocean was re-estimated this year from new information collected through the IOTC Sampling Programs and new vessel records.

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

General overview: Status of IOTC catch statistics by main fisheries and species groups

Tables 3a-3f show the presumed quality of the catches of tropical tunas, temperate tunas, billfish and neritic tunas for the entire time-series (1950-2009), by year (overall and by fishery). Figures 1a-1d show the proportion of catches that are presumed uncertain for the period 2003-2007, by main fleet and species group. The importance that the catches of each species group under each individual gear had over the total catches for that same group during the last decade (2000-2009), all gears combined, is presented in Figures 2a-2e. Figures 3a-3e show the proportion of catches that are presumed uncertain for the period 2003-2007, by main fleet and fishery. The catches for the last two years were excluded because they usually change for countries that report preliminary catches to the Secretariat, in particular countries having distant-water longline fisheries. The quality of the catches for these fleets is likely to improve in 2010-11, as more information is collected from the fisheries and reported to the Secretariat.

Table 3a: Overall status of IOTC catch statistics, by species group (1950-2009)

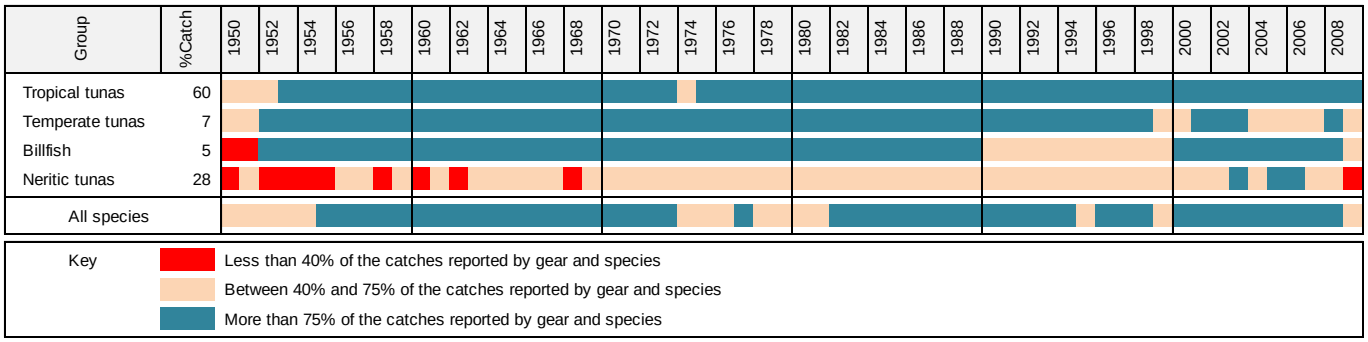
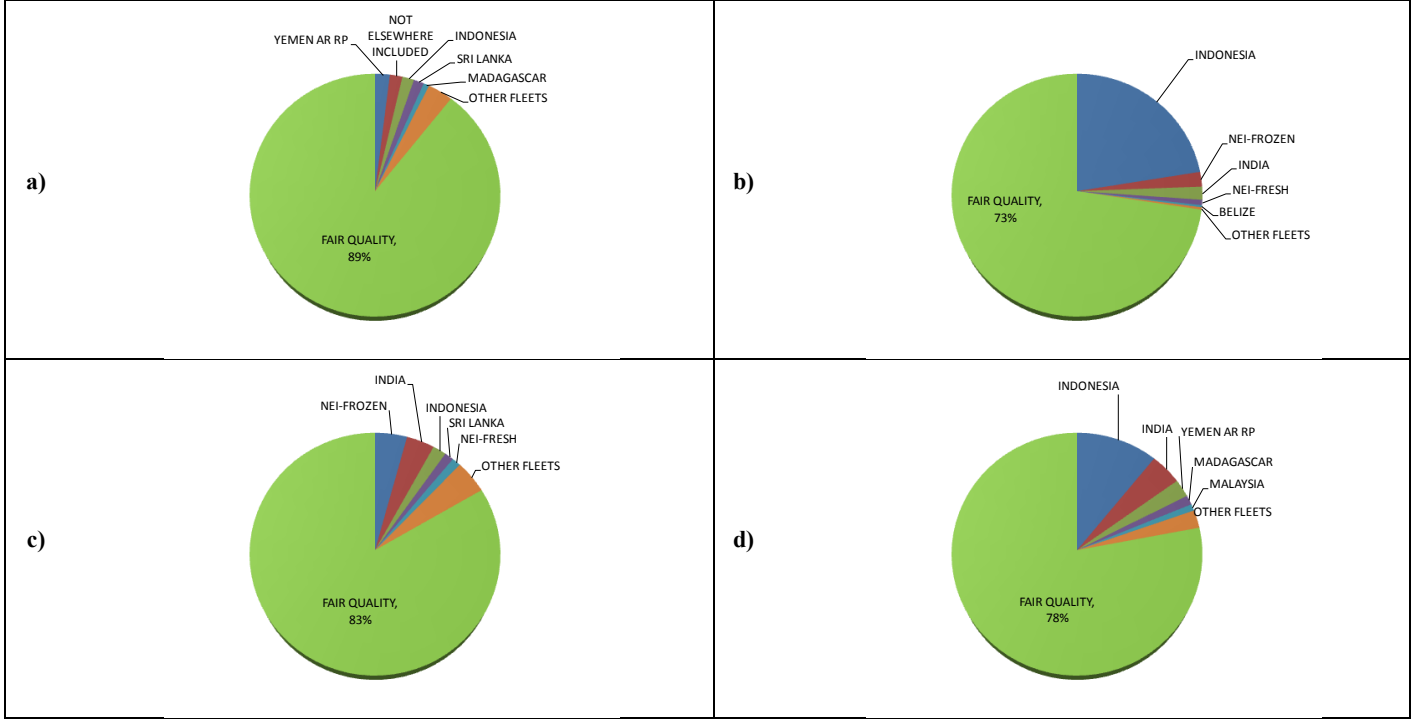


Figure 1: Amount of nominal catch (in %) presumed to be uncertain (average 2003-2007), by fleet, over the total catches estimated for: a) Tropical tunas; b) Temperate tunas; c) Billfish; and d) Neritic tunas



Surface fisheries: Purse seine

Table 3b: Status of IOTC catch statistics for purse seine fisheries (1950-2009)

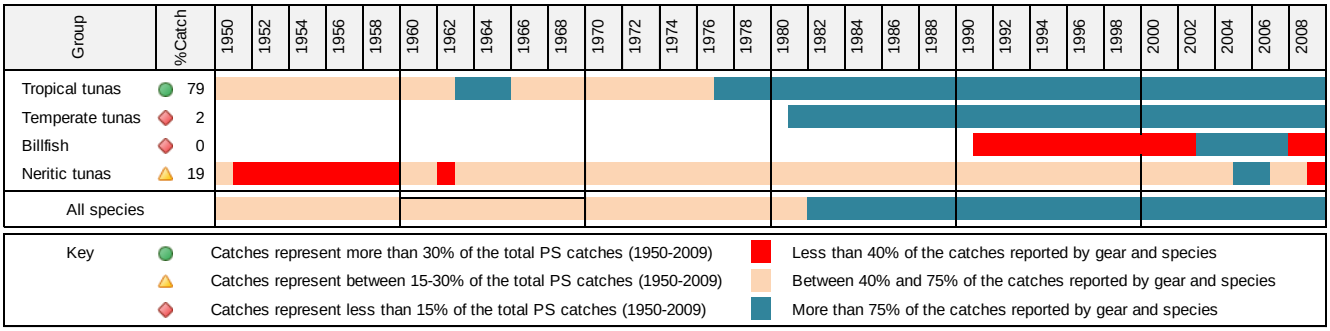


Figure 2a: Contribution (in %) that the purse seine catches for each species group made out of the total catches of that same group for all fisheries combined (2000-2009)

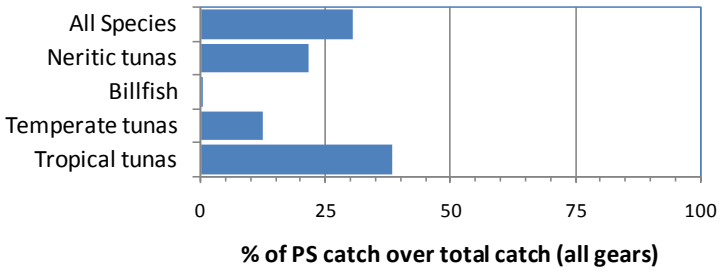
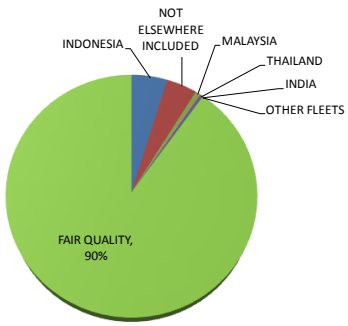


Figure 3a: Amount of PS catch (in %) presumed to be uncertain, by fleet, over the total PS catch (2003-2007)



Overall, the catches recorded for purse seine fisheries in the IOTC database are considered to be of **fair to good quality** (Table 3b). Purse seiners target tropical tunas or neritic tunas, depending on the type of fleet: over the time series (1950-2009) tropical tunas made 79% and neritic tunas 19% of the total purse seine catches (Table 3b).

Purse seine gears catch around 30% of the IOTC species in the Indian Ocean, especially tropical tunas (≈40%) and neritic tunas (≈20%) (Figure 2a).

90% of the catches of purse seine fisheries recorded in the IOTC database for recent years (2003-07) are considered to be of **good quality** (Figure 3a). The catches for the following purse seine fleets are considered to be of uncertain quality (2003-07):

- **Indonesia**: The Secretariat estimated the catches of 3 large purse seine vessels (targeting tropical tunas); in addition, the Secretariat estimated catches for the coastal purse seine fishery of Indonesia (target is neritic tunas) from the total aggregated catches reported by Indonesia; since 2006 Indonesia has been reporting catches by gear to the Secretariat.
- **NEI** and **Belize**: The catches of ex-Russian vessels, recorded under the flag of Belize and other unidentified flags, were estimated by the Secretariat in the past; since 2005 the vessels operate under the flag of Thailand and the catches are considered to be of better quality (Box 1C, page 28).
- **Malaysia**: The catches of a fleet of coastal purse seine vessels reported by Malaysia are not fully reported by species; this affects the quality of the catches of neritic tunas.
- **Thailand**: The catches of large and coastal purse seine vessels reported by Thailand are not fully reported by species; this affects the quality of the catches of both tropical tunas and neritic tunas.

Surface fisheries: Pole-and-line

Table 3c: Status of IOTC catch statistics for pole-and-line fisheries (1950-2009)

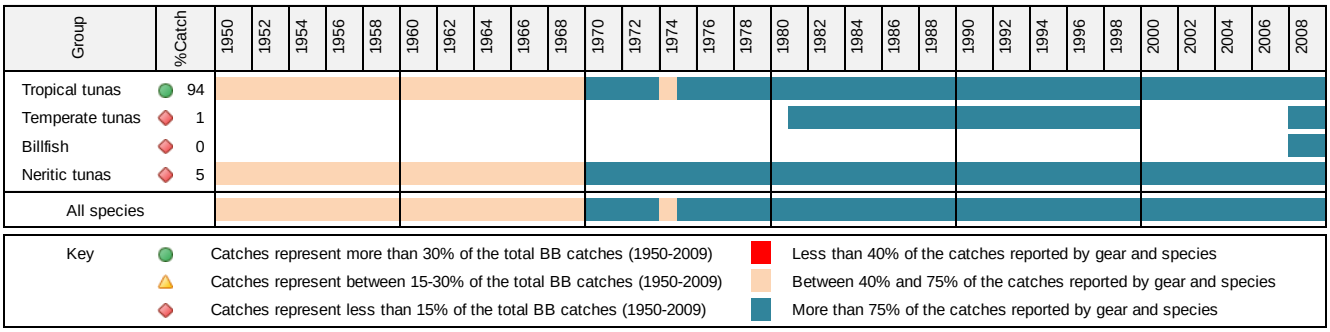


Figure 2b: Contribution (in %) that the pole-and-line catches for each species group made out of the total catches of that group for all fisheries combined (2000-2009)

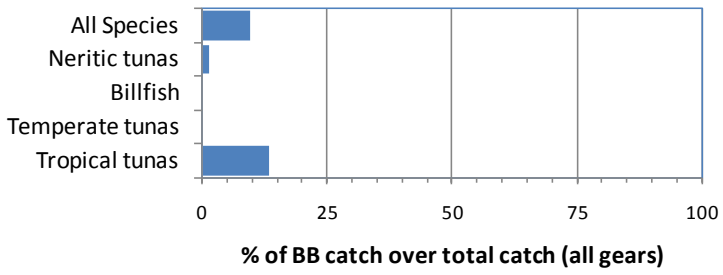
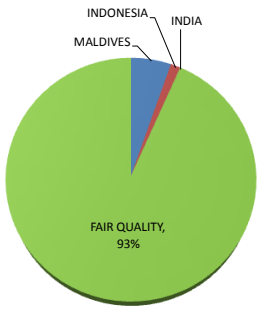


Figure 3b: Amount of BB catch (in %) presumed to be uncertain, by fleet, over the total BB catch (2003-2007)



Overall, the catches recorded for pole-and-line fisheries in the IOTC database are considered to be of **fair to good quality** (Table 3c). Baitboats target tropical tunas: over the time series (1950-2009) 94% of the baitboat catches were made of tropical tunas (Table 3c). **Pole-and-line gears catch around 10% of the IOTC species in the Indian Ocean**, especially tropical tunas (≈15%) (Figure 2b). **93% of the catches** of pole-and-line fisheries recorded in the IOTC database for recent years (2003-07) are considered to be of **good quality** (Figure 3b). The catches for the following baitboat fleets are considered to be of uncertain quality (2003-07):

- **Maldives**: A small proportion of the catches reported by Maldives are not by species, in particular some neritic tuna species.
- **Indonesia**: The Secretariat estimated catches for the pole-and-line fishery of Indonesia from the total aggregated catches reported by Indonesia; since 2006 Indonesia has been reporting catches by gear to the Secretariat.
- **India**: The Secretariat estimated catches for the pole-and-line fishery of India from the total aggregated catches for years in which India had not reported catches by gear; in recent years India has been reporting catches by gear to the Secretariat.

Surface fisheries: Gillnet

Table 3d: Status of IOTC catch statistics for gillnet fisheries (1950-2009)

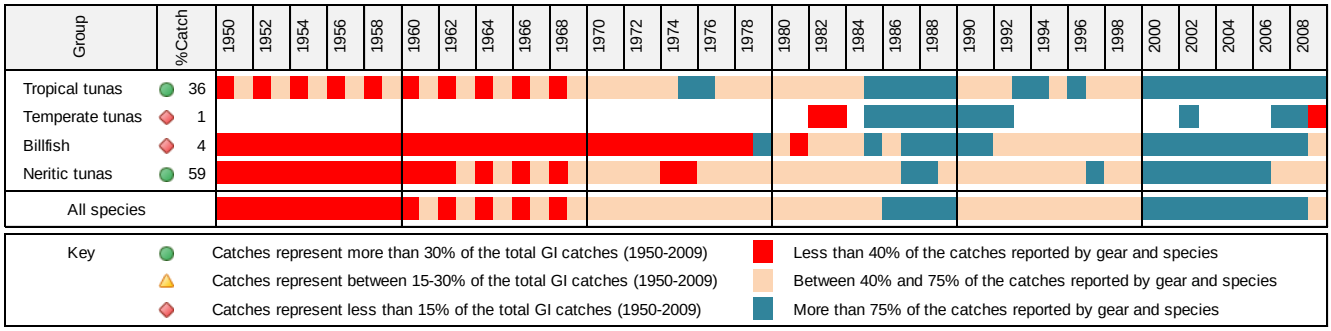


Figure 2c: Contribution (in %) that the gillnet catches of each species group made out of the total catches of that group for all fisheries combined (2000-2009)

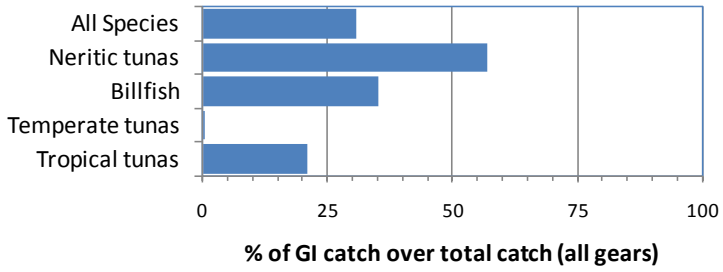
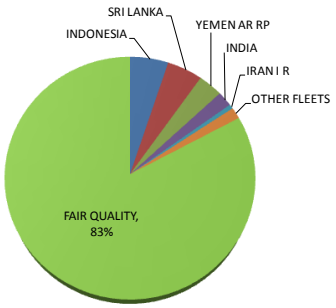


Figure 3c: Amount of GI catch (in %) presumed to be uncertain, by fleet, over the total GI catch (2003-2007)



Overall, the catches recorded for gillnet fisheries in the IOTC database are considered to be of **poor quality until the mid-1970's** and **fair to good quality** after then (Table 3d). Over the time series (1950-2009) 59% of the gillnet catches were made of neritic tunas and 36% of tropical tunas (Table 3d).

Gillnet gears catch around 30% of the IOTC species in the Indian Ocean, especially neritic tunas (≈55%), billfish (≈35%) and tropical tunas (≈20%) (Figure 2c).

83% of the catches of gillnet fisheries recorded in the IOTC database for recent years (2003-07) are considered to be of **good quality** (Figure 3c). The catches for the following gillnet fleets are considered to be of uncertain quality (2003-07):

- **Indonesia**: The Secretariat estimated catches for the gillnet 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.
- **Sri Lanka**: Sri Lanka does not report catches fully by species; in particular, the catches of marlins are reported aggregated (Box 3, page 30).
- **Yemen**: The Secretariat estimated catches for the gillnet fishery of Yemen using reports from the Ministry of Fish Wealth of Yemen and additional information collected through several missions of the IOTC-OFCF Project to Yemen. This affects the quality of the catches of neritic tunas (Box 2, page 29).
- **India**: The Secretariat estimated catches for the gillnet fishery of India from the total aggregated catches for years in which India had not reported catches by gear; this affects the quality of the catches of neritic tunas. In recent years India has been reporting catches by gear to the Secretariat.
- **Iran** and **Pakistan**: The amount of vessels under the flags of Iran and Pakistan using gillnets on the high seas has increased markedly in recent years. However, these vessels do not complete logbooks and the catches are estimated at the landing place, along with the catches of other vessels. The Secretariat believes that the quality of the catches for Iran may have worsened in recent years due to the insufficient monitoring of vessel activities for those vessels using driftnets on the high seas. In addition, the catches for Pakistan are thought to be very incomplete, not accounting for all the vessel activities (Box 3, page 31).

Longline fisheries

Table 3e: Status of IOTC catch statistics for longline fisheries (1950-2009)

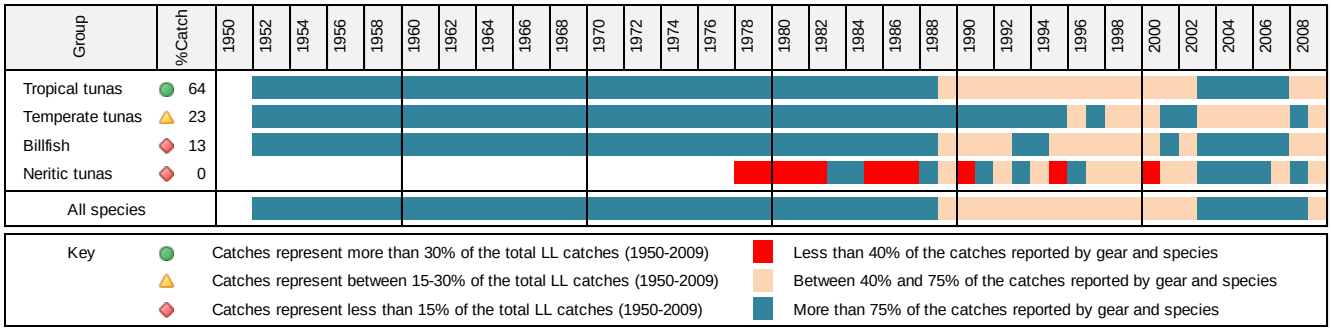


Figure 2d: Contribution (in %) that the longline catches of each species group made out of the total catches of that group for all fisheries combined (2000-2009)

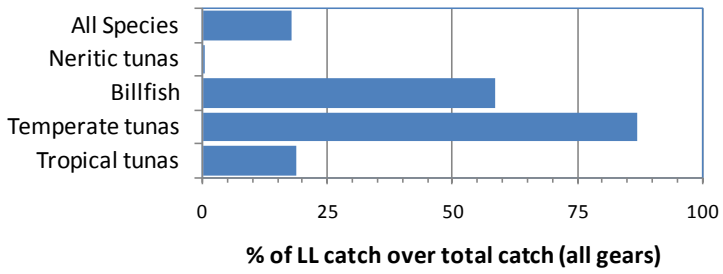
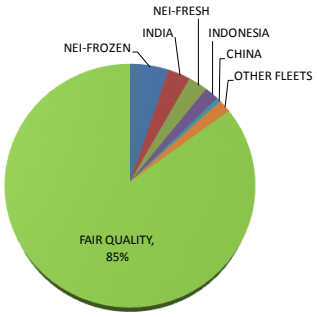


Figure 3d: Amount of LL catch (in %) presumed to be uncertain, by fleet, over the total LL catch (2003-2007)



Overall, the catches recorded for longline fisheries in the IOTC database are considered to be of **good quality until 1988 and since 2003** and **fair quality between 1989 and 2002** (Table 3e). Over the time series (1950-2009) 64% of the longline catches were made of tropical tunas, 23% of temperate tunas and 13% of billfish (Table 3e).

Longline gears catch around 20% of the IOTC species in the Indian Ocean, especially temperate tunas (≈85%), billfish (≈60%) and tropical tunas (≈20%) (Figure 2d).

85% of the catches of longline fisheries recorded in the IOTC database for recent years (2003-07) are considered to be of **good quality** (Figure 3d). The catches for the following longline fleets are considered to be of uncertain quality (2003-07):

- **NEI-Frozen**: The Secretariat estimates the catches of deep-freezing longline vessels that operate under flags of non-reporting countries using information provided by Third Parties. This category includes also the catches estimated for fleets under the flags of IOTC CPCs that do not report complete sets of catches to the Secretariat, in particular, India. This affects the quality of the catches of tropical tunas, temperate tunas and billfish (Box 1B, page 27).
- **India**: India does not report a complete set of catches for its longline fleets (see above); this affects the quality of the catches of tropical tunas and billfish.
- **NEI-Fresh**: The Secretariat estimates the catches of fresh-tuna longline vessels that operate under flags of non-reporting countries using information from both the IOTC-OFCF Project and Third Parties. This category includes also the catches estimated for fleets under the flags of IOTC CPCs that do not report complete sets of catches to the Secretariat, in particular, India, Malaysia and Indonesia. This affects the quality of the catches of tropical tunas, temperate tunas and billfish (Box 1A, page 25).
- **Indonesia**: The Secretariat estimated the catches of deep-freezing longline vessels and catches of albacore for Indonesia, using market data; in addition, a small component of the catches of fresh-tuna longliners are not reported by species; this affects the quality of the catches of tropical tunas, temperate tunas and billfish.
- **China**: China did not report catches fully by species before 2006; the catches reported since then are considered to be of good quality.

Other artisanal fisheries: Hand line, trolling and unidentified fisheries

Table 3f: Status of IOTC catch statistics for hand line, trolling and other unidentified fisheries (1950-2009)

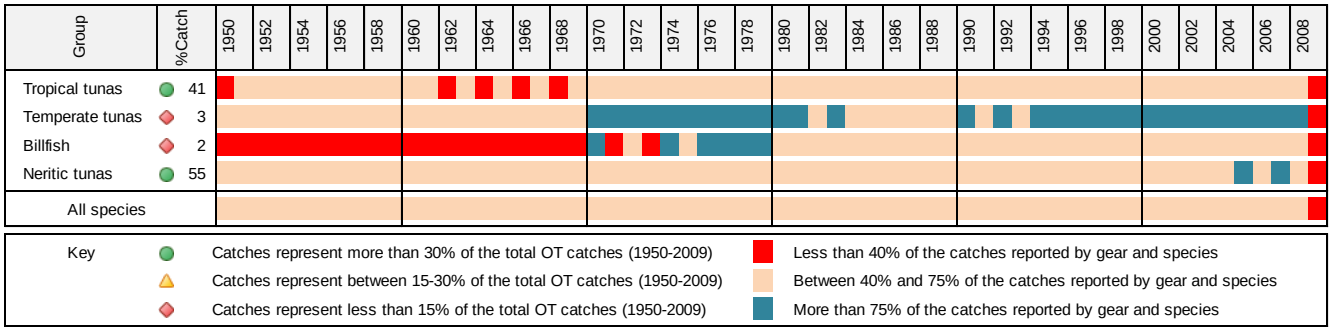


Figure 2e: Contribution (in %) that the hand line, trolling and unidentified gears catches of each species group made out of the total catches of that group for all fisheries combined (2000-2009)

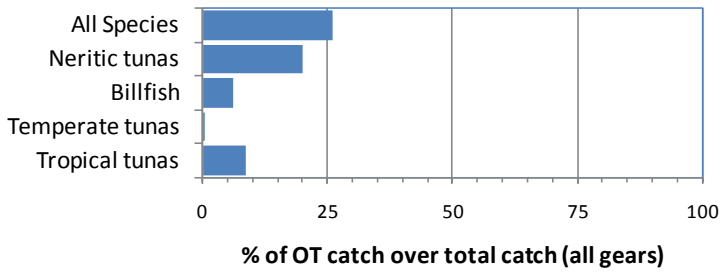
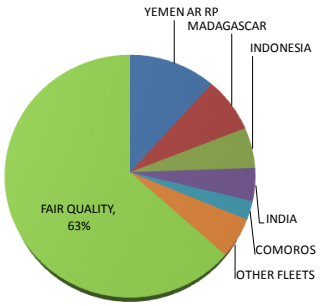


Figure 3e: Amount of OT catch (in %) presumed to be uncertain, by fleet, over the total OT catch (2003-2007)



This category includes the catches of IOTC species that are not reported by gear. The majority 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 to be of **poor to fair quality** (Table 3f). Over the time series (1950-2009) 55% of the catches under this category were made of neritic tunas and 41% of tropical tunas (Table 3f).

Hand line, trolling and other unidentified gears catch around 25% of the IOTC species in the Indian Ocean, especially neritic tunas (≈20%) and tropical tunas (≈10%) (Figure 2e).

63% of the catches of longline fisheries recorded in the IOTC database for recent years (2003-07) are considered to be of **good quality** (Figure 3e). The catches for the following fleets are considered to be of uncertain quality (2003-07):

- **Yemen**: The Secretariat estimated catches for the hand line fishery of Yemen using reports from the Ministry of Fish Wealth of Yemen and additional information collected through several missions of the IOTC-OFCF Project to Yemen. This affects the quality of the catches of tropical tunas (yellowfin tuna). (Box 2, page 29.)
- **Madagascar** and **Comoros**: Madagascar and Comoros have never reported catches for their fisheries. The Secretariat uses the catches estimated by the FAO for the Comoros and Madagascar; in the case of Madagascar, this involved breaking down the catches recorded as marine fish by species; this affects the quality of the catches of tropical tunas and neritic tunas. (Box 2, page 29.)
- **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.
- **India**: The Secretariat estimated catches for the hand line and trolling fisheries of India from the total aggregated catches for years in which India had not reported catches by gear; this affects the quality of the catches of neritic tunas. In recent years India has been reporting catches by gear to the Secretariat.
- **Other fleets**: Other fleets for which the catches are considered of uncertain quality are UAE, Tanzania, Mauritius and Kenya.

Main progress achieved during 2010

The main progress achieved in the collection and verification of the data in the IOTC Nominal catches (NC), by-catch (BY), catch and effort (CE) and size frequency (SF) databases are summarized below.

Status of the IOTC NC, CE and SF tables: Main Progress Achieved since the last SC Meeting

A/ Nominal catches	
1-. Improved species and gear breakdown	
Fishery	All
Period	1950-2009
Species	All
Details of activity	Disaggregation of catches recorded under gear and/or species aggregates in the IOTC database
Sources	Nominal Catches tables in the IOTC Database (WPTT-04-06)
Changes in data	The amount of catches in the IOTC database that are not recorded by gear or species has decreased significantly in recent years thanks to the more detailed statistics reported by some countries (notably Indonesia)
2-. Changes to total catches series	
Fishery	Line and other fisheries of **Madagascar**
Period	1950-2009
Species	Tropical tunas
Details of activity	Estimation of catches of tropical tunas using data from the FAO and IOTC databases. The IOTC Secretariat estimated catches of tropical tunas by year and species for the whole historical period; the catches of tropical tunas were estimated using the catches recorded as marine fish in the FAO database and the proportion that the catches of tropical tunas make out of the total catches of fisheries that use the same gears in the region, especially Comoros. This review affected significantly the catches of tropical tuna species, in particular yellowfin tuna and skipjack tuna
Sources	IOTC and FAO databases
Changes in data	Significant increase in the catches of tropical tunas recorded under line fisheries
	See also Box 2

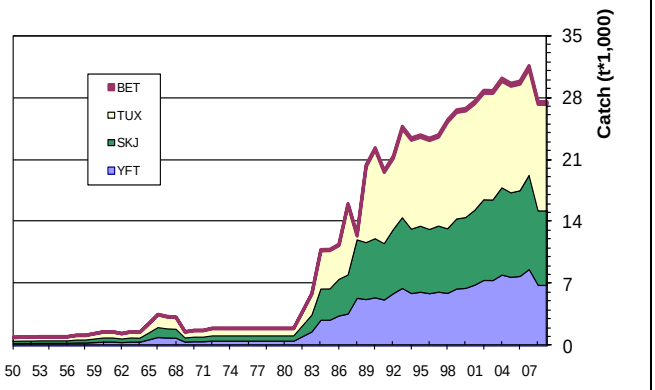


Figure 4: Catches of tropical tunas and other species estimated for the artisanal fishery operating in Madagascar, by species and year (1950-2009)

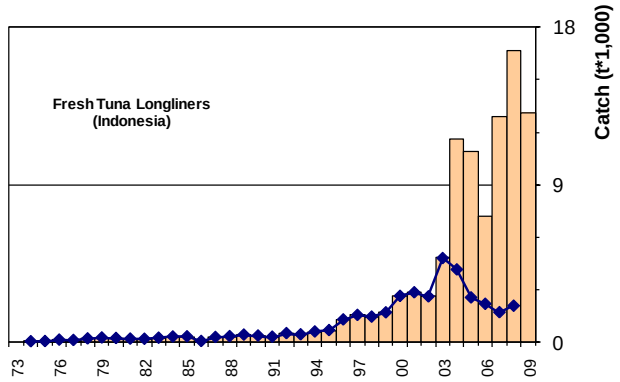


Figure 5: Catches of fresh-tuna longline vessels based in Indonesia (domestic and foreign) estimated in 2010 (orange bars) versus those estimated in 2009 (blue line) (1973-2009)

Fishery	**Indonesia**'s fresh-tuna longline fleet
Period	2003-09
Species	Albacore
Details of activity	The catches of albacore recorded for Indonesia in recent years were incomplete, not accounting for all vessel activities. The IOTC Secretariat estimated catches of albacore using data from the International Seafood Sustainability Foundation (ISSF) and market data from the Dinas Perikanan offices in Indonesia, in particular the office in Bali.
Sources	Directorate General for Capture Fisheries of Indonesia (DGCF)
Changes in data	Significant increase in the catches of albacore in the IOTC database
	See also Box 1A
Fishery	Purse seine fisheries of **EU-Spain**
Period	2000-09
Species	Tropical tunas
Details of activity	Spain reported a new catch data series following a review of the estimation procedure for its purse seine fleet
Sources	'Instituto Español de Oceanografía' Spain
Changes in data	No changes to database yet; data to be processed and input

2-. Changes to total catches series	
Fishery	Non-reporting fresh tuna longliners operating under various flags (**NEI**)
Period	2005-2009
Species	Yellowfin tuna, bigeye tuna, swordfish
Details of activity	Re-estimation of the catches of non-reporting fresh tuna longliners thanks to the new information available. Most of the catches refer now to Indonesian and Malaysia vessels based in countries other than the flag country. The catches of non-reporting fresh-tuna longliners from India were also estimated using the number of vessels active (on the assumption that all authorized vessels were active during the year in which they were authorized) and average catches by vessel from a proxy fleet.
Sources	Number of vessel unloadings and catches unloaded reported by the Andaman Sea Fisheries Research and Development Centre (AFRDEC) of Thailand Number of vessel unloadings and catches unloaded reported by the Fisheries Research Institute (FRI) of Malaysia Number of vessel unloadings and catches unloaded reported by the Fisheries Research Institute (FRI) of Mauritius Number of vessel calls and landings recorded by the Ministry of Fisheries and aquatic resources of Maldives Number of calls of foreign vessels recorded by the Veterinarian Authority (AVA) of Singapore Number of vessels active IOTC-OFCF Project in Yemen Number of vessels operated reported by the Ministry of Agriculture of India Amounts transshipped by vessel from the IOTC Transhipment Programme Data on exports of albacore by vessel for canning provided by the International Seafood Sustainability Foundation (ISSF)
Changes in data	Moderate decrease in the catches of fresh-tuna longliners in recent years
	See also Box 1A
Fishery	Non-reporting deep-freezing longliners operating under several flags (**NEI**)
Period	2005-09
Species	Yellowfin tuna, bigeye tuna, albacore, swordfish
Details of activity	New review of the series of catches from data collected recently The catches of non-reporting deep-freezing longliners from India and Indonesia were also estimated using the number of vessels active (on the assumption that all authorized vessels were active during the year in which they were authorized) and average catches by vessel from a proxy fleet. IOTC Vessel Records and IOTC Activity Records
Sources	Number of vessels authorized reported by the Ministry of Agriculture of India Number of vessels authorized reported by the Ministry of Fisheries of Indonesia Amounts transshipped by vessel from the IOTC Transhipment Programme Data on exports of albacore by vessel for canning provided by the International Seafood Sustainability Foundation (ISSF)
Changes in data	Change in recent year catches. Current catches are slightly higher than those previously recorded
	See also Box 1B
	See also Box 3

B/ Bycatch	
Fishery	All
Period	1950-2009
Species	All shark species
Details of activity	The Secretariat estimated catches of sharks for some fisheries by using catch rates from other fisheries or other information available
Sources	IOTC Database and ancillary data
Changes in data	Increase in the catches of sharks recorded in the IOTC database; catches are still very preliminary

C/ Catches-and-Effort	
Fishery	Fresh-tuna longliners of **Taiwan,China**
Period	2007-2009
Species	Yellowfin tuna, bigeye tuna, albacore and other species
Details of activity	New catch-and-effort data for Taiwanese fresh-tuna longline vessels downloaded from the internet and input in the IOTC database, representing the first CE data input for this fishery.
Sources	Internet
Changes in data	New catch-and-effort data input in the IOTC database
Fishery	Longline fisheries of **EU-Portugal**
Period	1998-2009
Species	Swordfish, sharks and other species
Details of activity	Review of the historical catch-and-effort data series conducted by Portugal using different data sources, including daily records from logbooks and Vessel Monitoring System data
Sources	'Direcção-Geral das Pescas e Aquicultura' Portugal
Changes in data	New catch-and-effort data input in the IOTC database
Fishery	Purse seine fisheries of **EU-Spain**
Period	2000-09
Species	Tropical tunas
Details of activity	Spain reported a new catch-and-effort data series following a review of the estimation procedure for its purse seine fleet
Sources	'Instituto Español de Oceanografía' Spain
Changes in data	No changes to database yet; data to be processed and input
Fishery	All fisheries
Period	1950-2008
Species	Tropical tunas, albacore and swordfish
Details of activity	Catches per month and 5 degrees square grid raised to total catches (IOTC Executive Summaries)
Sources	IOTC Database; Background information
Changes in data	Information prepared for the WPTT and WPB; no new data input

D/ Size frequency	
Fishery	Pole-and-line and handline fisheries of **Maldives**
Period	2000-2009
Species	Yellowfin tuna, skipjack tuna, frigate tuna, bullet tuna, kawakawa and other species
Details of activity	New length frequency data available by month used by the WPTT
Sources	Marine Research Centre of Maldives
Changes in data	No changes to database yet; Maldives to further review the data
Fishery	Gillnet and handline fisheries of **Oman**
Period	2009
Species	Yellowfin tuna, longtail tuna, narrow-barred Spanish mackerel
Details of activity	Size data collected by the Ministry of Fish Wealth of Oman in cooperation with the IOTC-OFCF Project.
Sources	Ministry of Fish Wealth of Oman
Changes in data	New size data to be input in the IOTC database soon
Fishery	Gillnet/longline fishery of **Sri Lanka**
Period	2007-2009
Species	Yellowfin tuna, skipjack tuna, swordfish and other species
Details of activity	Size data collected by enumerators at the landing place
Sources	National Aquatic Resources Research and Development Centre
Changes in data	New size data input in the IOTC database
Fishery	Purse seine fisheries of **EU-Spain**
Period	2000-09
Species	Tropical tunas
Details of activity	Spain reported a new size frequency data series following a review of the estimation procedure for its purse seine fleet
Sources	'Instituto Español de Oceanografía' Spain
Changes in data	No changes to database yet; data to be processed and input
Fishery	All
Period	1950-2009
Species	Tropical tunas, albacore and swordfish
Details of activity	Building of Catch-At-Size and Catch-At-Age matrices
Sources	IOTC Database; Background information
Changes in data	Information prepared for the WPTT, WPB and WPDCS; no new data input

Problem Areas Identified

Despite the progress achieved regarding the statistics in the IOTC NC, BY, CE and SF databases in recent years, there are still several problems regarding the completeness and quality of the data which should be addressed. The main areas of concern regarding the statistics in these databases are summarized below.

Status of the IOTC NC, CE and SF databases: Problem Areas Identified

A/ Nominal catches 1-. Statistics not available from the flag country	
Reason/s Fishery/ies Period Species Proposed actions	Fisheries not monitored by the flag countries **NEI** fleets (various flags) 1980 to date Tropical tunas, temperate tunas and billfish Countries to continue collection and reporting of data from foreign vessels operating within their territory The Secretariat to identify the fleets for which important tuna catches have been unreported over the years (through retrieval of vessel and, especially, activity and port calls records)
	See also Box 1
Reason/s Fishery/ies Period Species Proposed actions	Statistical system unable to produce reliable estimates of catches (as regards IOTC species) **Yemen**, **Comoros**, **Madagascar**, **Kenya**, **Tanzania**, **Mozambique**, **Myanmar**, **Somalia** 1950 to date Mainly tropical tunas and neritic tunas Countries concerned to implement new data collection systems or strengthen the systems existing The Secretariat to liaise with other initiatives in the region (e.g. South West Indian Ocean Fisheries Project, Bay of Bengal Large Marine Ecosystem Project, etc.), concerning countries that participate on these initiatives to assess the way in which the statistics for such countries can be improved. The Secretariat to assist countries that have not completed the questionnaire on statistical systems, sent in 2009, to complete it and present the results to the WPDCS. The IOTC Secretariat to assist countries in the implementation of sampling for their coastal fisheries, to cover a minimum of 5% of the vessel activities. This to be carried out using funding from the IOTC-OFCF Project, IOTC or other donors. The IOTC Secretariat to assist countries in the implementation of observer programmes for their industrial fisheries, in particular through the organization of training sessions and workshops.
	See also Box 2
Reason/s Fishery/ies Period Species Proposed actions	Statistics probably available at the country level but not reported **India** (longline), **Egypt**, **United Arab Emirates** 1950 to date Mainly tropical tunas and neritic tunas Countries concerned to report the data available to the Secretariat The Secretariat to follow-up with these countries
	See also Box 1
2-. Statistics not fully available by gear and/or species	
Reason/s Fishery/ies Period Species Proposed actions	Statistical systems unable to produce detailed estimates of catches **India**, **Thailand**, **Malaysia**, **Sri Lanka**, **Pakistan** 1950 to date Neritic tunas, billfish Countries concerned to strengthen the existing data collection and processing systems The IOTC Secretariat to assist countries to strengthen their sampling systems to be able to produce estimates as per IOTC standards, where required.
	See also Box 3

B/ Bycatch (non-IOTC species) 1-. **Statistics not available from the flag country**	
Reason/s	Fisheries not monitored or insufficiently monitored for sharks or statistics not reported
Fishery/ies	Most longline fleets and oceanic gillnet fisheries of **Pakistan**, **Iran** and **Sri Lanka**
Period	1950 to date
Species	All sharks, seabirds and marine turtles caught incidentally on IOTC fisheries
Proposed actions	Countries concerned to implement new data collection systems, preferably observer programmes, or strengthen the existing and to report their by-catch statistics to the IOTC The Secretariat to assist countries that have not completed the questionnaire on statistical systems, sent in 2009, to complete it and present the results to the WPDCS. The Secretariat to identify the fleets for which important shark catches or other by-catches have been unreported over the years on the basis of the above or other information existing The IOTC Secretariat to assist countries in the implementation of sampling for their coastal fisheries, to cover a minimum of 5% of the vessel activities. This to be carried out using funding from the IOTC-OFCF Project, IOTC or other donors. The IOTC Secretariat to assist countries in the implementation of observer programmes for their industrial fisheries, in particular through the organization of training sessions and workshops.
2-. Statistics not available by gear and/or species	
Reason/s	Statistical systems unable to produce detailed estimates of catches
Fishery/ies	Most industrial fleets
Period	1950 to date
Species	All shark species
Proposed actions	Countries concerned to strengthen the existing data collection and processing systems, preferably observer programmes The Secretariat to identify the deficiencies in data collection and data processing in the countries concerned and, where required, to assist countries in the implementation of observer programmes for their industrial fisheries, in particular through the organization of training sessions and workshops.

C/ Discard levels 1-. **Statistics not available from the flag country or highly aggregated by gear and/or species**	
Reason/s	Most of the discards are unreported and when reported they are usually incomplete and highly aggregated
Fishery/ies	All, especially industrial fleets and oceanic gillnets (**Pakistan** and **Iran)**
Period	1952 to date
Species	Undersized or spoiled tunas (tropical tunas), Sharks, low-value or spoiled billfishes (sailfish, short-billed spearfish) and other fish species
Proposed actions	Countries concerned to collect data on industrial fisheries through observer programs The Secretariat to identify the fleets having high levels of discards and, where required, to assist countries in the implementation of observer programmes for their industrial fisheries, in particular through the organization of training sessions and workshops.

D/ Catch-and-Effort and Size frequency data 1-. **Statistics not available from the flag country or incomplete**	
Reason/s	Catch and effort (size frequency) statistics not collected by the flag country
Fishery/ies	Many artisanal, and Deep-freezing longliners from **India** (CE+SF), **Indonesia** (CE+SF), **Belize** (SF) and **Philippines** (SF) Fresh tuna longliners from **India** (CE+SF), **Taiwan,China** (SF), **Indonesia** (CE) and **Belize** (SF) Industrial purse seiners from the **EC** and **Seychelles** (FADs), **Iran** (CE+SF) Non-reporting longline fleets (**NEI**)
Period	1952 to date
Species	All IOTC species and sharks
Proposed actions	Countries concerned to implement/strengthen logbook systems and length frequency sampling on their fleets and report the data required to the Secretariat The Secretariat to retrieve any information that might be available from other sources, especially for fleets for which the retrieval of catch and effort (size frequency) records is considered important
Reason/s	Statistical systems unable to produce catch and effort (size frequency) statistics as per IOTC standards
Fishery/ies	Many artisanal, and Oceanic gillnets from **Iran** and **Pakistan** and gillnet/longline fishery of **Sri Lanka** Longliners from **Indonesia** (SF), **Belize** (CE), and **Philippines** (CE)
Period	1952 to date
Species	All IOTC species and sharks
Proposed actions	Countries concerned to strengthen logbook systems and length frequency sampling on their fleets and report the data required to the Secretariat The Secretariat to assist countries that have not completed the questionnaire on statistical systems, sent in 2009, to complete it and present the results to the WPDCS. The IOTC Secretariat to assist countries in the implementation of sampling for their coastal fisheries, to cover a minimum of 5% of the vessel activities. This to be carried out using funding from the IOTC-OFCF Project, IOTC or other donors. The IOTC Secretariat to assist countries in the implementation of observer programmes for their industrial fisheries, in particular through the organization of training sessions and workshops.
Reason/s	Catch and effort (size frequency) statistics collected by the flag country but no or incompletely reported to the IOTC
Fishery/ies	Artisanal fisheries of **India**
Period	1950 to date
Species	Neritic tunas
Proposed actions	India to report CE and SF data for its artisanal fleets as soon as possible
Reason/s	Low sampling coverage
Fishery/ies	Longliners of **Japan** (SF), **South Korea** (SF) and **China** (SF) Purse seiners of **Thailand** (SF)
Period	Various, notably in recent years
Species	Tropical tunas, billfish and albacore
Proposed actions	Countries concerned to increase sampling effort/coverage
Reason/s	SF statistics not reported by IOTC standards (5° square grid and month)
Fishery/ies	Longliners of **Japan** (SF) and Taiwan,China (SF up to 2006)
Period	Complete time-series
Species	Tropical tunas, temperate tunas, billfish and albacore
Proposed actions	Japan and Taiwan,Chinato provide size frequency data by 5° square grid and month (instead of 10°Lat-20°Lon and quarter), where required

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

The numbers of vessels fishing for 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. The estimate was not revised in 2010.

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:

- Numbers of foreign fishing craft operated, by gear and year of operation;
- 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 10/08);
- 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 05/03);
- Identification and total catches transhipped, by species and vessel, for vessels participating in the IOTC Transhipment Programme (as specified in IOTC Resolution 08/02);
- 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.

In addition, the Secretariat completes the catches reported in cases where those catches are believed underreported. 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 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**: More than 100 longliners have been operating in India in recent years, including fresh-tuna longliners and deep-freezing longliners. However, the catches reported by India for this component represent only the catches reported in the logbooks completed by some of the vessels operating. The Secretariat has used the total number of vessels to estimate additional catches for this fleet, separately for fresh-tuna longliners and deep-freezing longliners.
- Longline fleets of **Indonesia** and **Malaysia**: Indonesia and Malaysia do not monitor the catches of vessels under their flag that are unloaded in ports outside their territory. The Secretariat estimates these catches using information provided from third parties.
- Longline fleet of **Philippines**: The catches of bigeye tuna reported by Philippines for its longline fleet in the Indian Ocean have been consistently lower than the amounts of Indian Ocean bigeye tuna imported by Japan from this fleet. The Secretariat has been estimating additional catches for this country using the information available from Japan. However, the new catches estimated are probably still lower than the actual catches of Philippines longliners as the estimates assume that every bigeye tuna caught by Philippines is exported to Japan. These catches may need to be further revised in the future.

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

Finally, the Secretariat estimated catches for the longline fleet of **Tanzania**. Tanzania has never reported catches for the three longliners that operate under its flag. The catches were estimated by using these numbers and the catch data for vessels from other fleets, assuming that those operated in the same areas and targeted the same species. In this case, the catches estimated were assigned to Tanzania.

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 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. This fleet is flagged mainly from the European Community, Seychelles, Iran, Japan and Thailand.

Longline fleets: There are many longline fleets fishing tuna in the Indian Ocean, mainly under the flags of Australia, Belize, China, Taiwan,China, the EC, India, Indonesia, Japan, Kenya, the Republic of Korea, Madagascar, Malaysia, Mauritius, Oman, Philippines, Senegal, 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.

Oceanic gillnet fisheries of Iran and Pakistan: The number of oceanic gillnet vessels operating in the Indian Ocean is well known for 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.

Main Progress Achieved during 2010

The progress achieved in the collection and verification of the data in the IOTC FC and AV databases is summarized in the Table 3 below.

Table 3: Status of the IOTC FC, VR and FTVA databases: main progress achieved

DB	FLAG/S	SOURCES	PERIOD	DETAILS	MAIN RESULTS
FC	Non reporting DWFNs	IOTC Active Vessels List	2009	Review to complete the craft statistics	Number of non-reporting deep-freezing longliners better known: Around 20 in recent years
	Non- reporting Fresh-tuna longliners	IOTC Sampling Programmes WASKI Indonesia DGCF Indonesia CSIRO Australia RIMF Indonesia	2009	Review to complete the number of fresh tuna longliners operating in the Indian Ocean	Number fresh tuna longliners input: Around 1,000 boats in all in recent years. Current numbers are decreasing.
	Fresh-tuna longliners from Taiwan,China	Active vessel data downloaded from the internet	2008-09	Number of longliners operating in the Indian Ocean published	Drop in the number of large-scale and small-scale longline vessels in operation
	Commercial Longline fleet	FSI India	2008-09	India provided revised numbers of longline vessels under its flag; the Secretariat received conflicting datasets from two different institutions in India	Vessels input to fishing craft statistics. The new data is thought to be more complete although the numbers reported by India are still under review and may change in the future
AV	Fresh-tuna longliners from Taiwan,China	Data downloaded from the internet	2008-09	Number of longliners operating in the Indian Ocean reviewed and published	Drop in the number of large-scale and small-scale longline vessels in operation
	Baitboats from Maldives	MFAR Maldives	2009	First report of vessels authorized to operate in the Indian Ocean (same as active list)	New data to be input
	Offshore vessels from Sri Lanka	DFAR Sri lanka	2009	First report of vessels authorized to operate in the Indian Ocean (same as active list)	New data to be input
	All Industrial	AVA Singapore NARA Sri Lanka MAF Oman AFDEC Thailand (IOTC) CSP Madagascar DGCF Indonesia FRC Albion Mauritius SFA Seychelles Fisheries Administration Mozambique Fisheries Department Kenya DPMA France TAAF MRAG BIOT Imports from canning factories (ISSF)	2000-09	Reporting of foreign tuna fleets putting in to ports, licensed to operate within the EEZ of these countries, participating on the IOTC Transhipment Programme or ISSF	New vessel and activity records input

DB	FLAG/S	SOURCES	PERIOD	DETAILS	MAIN RESULTS
ALL	All industrial fleets and oceanic fleets	IOTC Active vessel list IOTC vessel unloading list IOTC Authorized Vessel List IOTC-OFCF Project Fishing craft statistics	2006-08	Estimation of input-fishing capacity in the Indian Ocean	Total number of large-scale vessels fishing in the Indian Ocean and number of medium-scale vessels that fish sometimes outside the EEZ of their flag countries estimated. Changes to Fishing Craft Statistics are expected in the future.

Problem Areas Identified

The main area problems identified in the IOTC database concerning the tuna fleets operating in the Indian Ocean are summarised in the Table 4 below. Several alternative actions to undertake to reduce these uncertainties are proposed in the right column.

Table 4: Status of the IOTC FC, VR and FTVA databases: problem areas identified

DB	PROBLEM	FLAG/S	PERIOD	REASON/S	PROPOSED ACTION/S
FC	Series incomplete for some longline fleets	India, Indonesia and NEI (various flags)	1980 to date	No data available for some periods	Promote compliance by the flag states concerned Promote the collection of information on the activities of foreign vessels from IOTC CPCs (fresh-tuna longliners)
	No data or data inconsistent regarding some artisanal fleets	Indonesia, Yemen	1950 to date	Statistics not available	Identify the reasons why the statistics are not provided (questionnaire)
				Statistical systems unable to produce reliable fishing craft statistics	Identify the deficiencies in data collection and processing in the countries concerned (questionnaire)
	Lack of detailed information	Indonesia, Pakistan, Sri Lanka	1950 to date	Incomplete data (vessel size, mechanization, etc. not available)	Promote compliance by the flag states concerned
AV	Data not available	Oceanic vessels of Pakistan, Sri Lanka and other countries	Recent years	Fleets not fully monitored by the flag countries	Promote compliance by the flag states concerned Promote the collection of information on the activities of foreign vessels from IOTC CPCs (fresh-tuna longliners)
	Information incomplete or inconsistent	Indonesia, India	Recent years	Ship names, identification or characteristics mistakenly recorded Ship characteristics inconsistent between reports Lack of information about ship activity in the Indian Ocean (vessels bearing licenses to operate but not actually operating)	

5. OTHER IOTC DATA HOLDINGS

a. Biological data

Table 5 shows other datasets available at the IOTC Secretariat:

Table 5: Biological data available at IOTC

TYPE OF DATA	RAW DATA	PERIOD	SOURCE
Length-length-weight data of tuna and billfish caught by fresh tuna longliners in the Indian Ocean	Available	2000-06	AFDEC Thailand (IOTC Sampling Programmes) NARA Sri Lanka (IOTC Sampling Programs) RIMF Indonesia (IOTC Sampling Programs) FRI Malaysia (IOTC Sampling Programs) IFREMER Reunion-France (PPR Programme) BRS (Pelagic Observer Program)
Length-length-weight-sex-maturity of tuna and tuna-like species caught by longliners and purse seiners within the EEZ of Chagos	Available	1996-06	MRAG United Kingdom (observer data)
Length-weight-sex data of tuna species caught by longliners from the republic of Korea	Available	2001-03; 2007	MOMAF Korea
Length-length-weight-sex of sharks caught as a by-catch by Spanish longline vessels	Available	2006-07	IEO Spain
Compilation of biological data collected during several years at the IOT canning factory (Seychelles)	Not available	1984-2006	IRD and SFA (IOTC-2006-WPTT-09)
Biological data available from Atlantic: -Length-length-weight data of tuna and billfish -Relationships between straight and curved body measurements -Length-length-weight data of sharks Biological data available from Pacific: -Length-length-weight data of billfish	 Not available Available Available Not available Not available	 1992-04 1992-04 - 2004	 ICCAT, Literature NMFS Pelagic Observer Program NMFS Pelagic Observer Program Literature SPC, Literature
Length-weight-sex data of Bigeye species caught by longliners from the India	Not available	2003-09	IOTC-2010-WPTT-41
Length-sex data of Yellowfin species caught by Purse seine fisheries in Western and Central Indian Ocean	Not available	2009	IRD-Seychelles (IOTC-2010-WPTT-48)
Length-weight-sex data of sharks species caught by Soviet longliners in Indian Ocean	Not Available	1961-89	IRD France (IOTC-2009-WPEB-06)

b. Observer data

The Secretariat has received limited information concerning the observer programmes that are currently ongoing in the Indian Ocean. The observer programmes and information available are summarized in Table 6:

Table 6: Observer programmes in the IOTC Region and type of data available at the Secretariat

PROGRAMME	PERIOD	DATA COLLECTED	INFORMATION AVAILABLE AT THE IOTC SECRETARIAT
Japan	May 2006 – February 2007	Length; Sex for Billfish; Tunas; Shark	IOTC-2007-WPEB-12
Spanish surface longline	2005	Weight- round weight – fin weight of sharks	IOTC-2008-WPEB-08 And raw data
Australia	April 2003-June 2004	Length – sex ; Billfish	IOTC WPB Australian Observer Reportv4
Seychelles (Observers on Longliners operating around Seychelles Waters)			IOTC-2006-WPTT-25
European Community-PS	2003 to date		Observ_WPTT-03-06
Korea	2007	Length – weight- sex; Tunas; Billfish; Sharks	Raw data
South Africa	1998 to date	Length , biological sample ; Target and By-catch species	Total levels of seabird bycatch Shark bycatch Biological data sharks (raw data)
China	2006 to date	Biological data, environmental measurement	Raw data 2006-07
Taiwan China	2001 to date	Biological data of target species and bycatch	IOTC-2008-SC-INF31
United Kingdom Territories	1996-2006	Biological data	Raw data

In 2009 and 2010, the IOTC adopted Resolutions 09/04 and 10/04 on a Regional Observer Scheme. The Resolutions make provision for a Regional Observer Scheme, based on national implementation, to start on 1st July 2010.

The objective of the IOTC observer scheme shall be to sample catches and collect scientific data related to the fisheries for tuna and tuna-like species in the IOTC area.

At least 5 % of the number of operations/sets for each gear type by the fleet of each CPC while fishing in the IOTC Area of 24 meters overall length and over, and under 24 meters if they fish outside their EEZs shall be covered by this observer[6] scheme. For vessels less than 24 meters if they fish outside their EEZ, the above mentioned coverage should be achieved progressively by January 2013.

The number of the artisanal fishing vessels landings shall also be monitored at the landing place by field samplers[7]. 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).

The Secretariat held a workshop in May 2010 in order to set the minimum data requirements for observer projects under the framework of the scheme and to develop an IOTC Observer Manual, forms and an Observer Trip Report Template for the reporting of the collected data.

During this workshop, several on-going observer projects, or progressing initiatives were presented including:

- The South West Indian Ocean Fisheries Project (SWIOFP)
- The Fisheries Regional Monitoring Programme of the Indian Ocean Commission
- The 'Observateurs des Pêches' Project (OBSPEC) of the 'Terres Australes et Antarctiques Françaises' (TAAF)

So far, the Secretariat has not received any data from CPCs in relation with the Regional Observer Scheme.

c. 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, and several pilot and small-scale tuna tagging projects, funded by the DG-Fish (ex DG-Mare) and the government of Japan. During those projects, more than 200,000 tuna, skipjack, yellowfin and bigeye, were tagged and released in the whole Indian Ocean. Tag recovery scheme have been developed in most of the coastal countries and in the main fishing nations in order to ensure the reporting of a maximum of the recaptured tagged tunas.

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 and is in the public domain. The data is available on request to IOTC. At the moment, all the data from the RTTP-IO is stored in a special database developed for the project. The data of the small-scale and pilot projects is yet to be reviewed and computerized in the same database. There are also plans to include the data from past projects, including Jamarc and Maldives, within the same system.

[6] Observer: a person that collects information on board fishing vessels. Observer programmes can be used for quantifying species composition of target species, bycatch, by-products and dead discards, collecting tag returns, *etc.*

[7] 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.*

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:

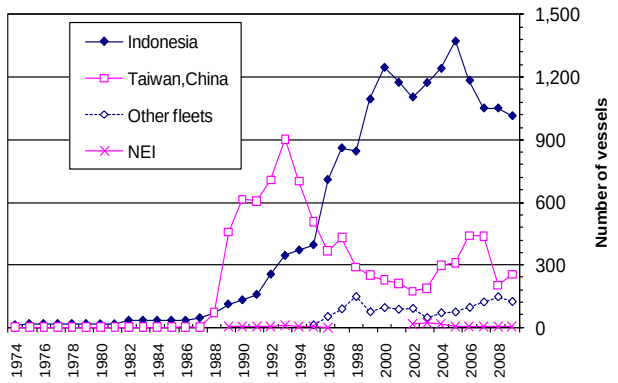
- Species
- Fork length and/or weight at recovery
- If found during fishing: date and position of recovery
- If found during processing: estimated date and position of recovery
- Date of reporting
- Country of reporting
- Gear
- Place and process where found
- Name of the vessel (*confidential*)
- Name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

The tagging data generated by the RTTP-IO were used for the yellowfin assessment in 2008, 2009 and 2010 and for the first time in an exploratory assessment of the bigeye tuna stock in 2010. Growth curves for the three species and natural mortality rates have also been derived from the tagging data, however, these studies will have to be updated before the next Session of the WPTT in order to include the latest tag recoveries.

BOX 1: ESTIMATION OF CATCHES OF NON-REPORTING FLEETS

A/ FRESH TUNA LONGLINE FLEETS

Figure 6: Number of fresh-tuna longliners operating in the Indian Ocean from 1974-2009

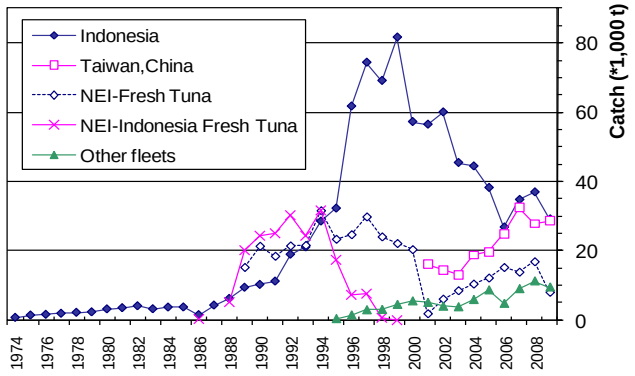


2008-09 numbers are preliminary

'Other fleets' includes Belize, China, India, Malaysia, Maldives and Oman

'NEI' includes Bolivia, Equatorial Guinea and Honduras

Figure 7: Estimated catches in the Indian Ocean of fresh tuna longliners by flag country (1974-2009)



2008-09 catches are preliminary

'NEI-' includes catches estimated for non reporting fleets based in Indonesia ('NEI-Indonesia Fresh tuna') or elsewhere ('NEI-Fresh Tuna')

'Other fleets' includes Belize, China, India, Malaysia, Maldives and Oman

The estimated numbers of fresh tuna longliners operating in the Indian Ocean sharply increased after the mid-1980's, reaching around 2,000 vessels in 2003 (Figure 6). Prior to 2004 few countries reported fisheries statistics for its fresh tuna longliners. In recent years, the majority of these longliners have apparently been operating under the Indonesian and Taiwan,China flag. The drop in the number of Taiwanese vessels and catches (Figure 6-7) observed between 1993 and 2000 is due to re-flagging of many vessels to Indonesia. The Secretariat received reports indicating that several Indonesian vessels changed its flag back to Taiwan,China and are currently based in ports other than Indonesia's. This is confirmed by the large numbers of Taiwanese fresh-tuna longliners recorded since 2006, as much as 440 (data available from the internet). Taiwan,China has been estimating catches for its fresh-tuna longline fleet since 2006. Other than the catches of albacore, the catches estimated for 2001-07 are close to those that the Secretariat was estimating before for Taiwanese vessels (Figure 8).

Belize, China, Indonesia, Malaysia and Oman submit catches for its fresh-tuna longline fleets routinely. However, **Indonesia** and **Malaysia** do not monitor the activities or the catches of all fresh-tuna longliners under its flag, but only those of vessels based in ports within its territory. The reports that the Secretariat receive on the activities of foreign vessels in countries of the IOTC region appear to indicate that significant numbers of Indonesian and Malaysian fresh-tuna longliners are not based in their flag countries.

The catches of albacore estimated using port sampling data in Indonesia are likely to be incomplete, not accounting for all vessel activities. Albacore is generally preserved frozen and may be unloaded selectively at-sea, to cargo freezers, or in land, to freezing plants; at present the DGCF of Indonesia collects only samples of fresh or frozen fish unloaded through processing plants. For this reason , the IOTC Secretariat used alternative datasets to estimate catches of albacore for Indonesian longliners, including export statistics, from DINAS Perikanan offices in Indonesia, and data on exports of albacore provided by canning factories under the ISSF. The catches of albacore estimated are much higher than previous estimates, especially since 2003 (Figure 5)

India has never reported complete catches for its 75-130 commercial longliners, that have been operating in the Indian Ocean since 2004. India reported a list of 133 longliners operating under its flag in 2008, to be included in the IOTC Record of Authorized Vessels. The list, still under review, contains both deep-freezing longliners and fresh-tuna longliners. At present, the Secretariat estimates the catches for each component separately.

The estimation of number of vessels and catches has been improving over time, thanks to the information collected through the Sampling Programs that were implemented by the IOTC-OFCF in key ports of landing of these vessels in the Indian Ocean. The amount of historical and current information collected through these cooperation schemes has helped to improve the estimates in Thailand, Malaysia, Sri Lanka and Indonesia. The collection of past information should continue to allow better estimates of historical catches in countries like Indonesia. It is important to note that, although Malaysia, Indonesia and Thailand no longer receive support from the IOTC-OFCF Project to monitor their fisheries, these countries have allocated funds to maintain the sampling activities and routinely report the statistics for their longline fleets to the IOTC. Mauritius also reports data to the Secretariat concerning the activities of foreign fresh-tuna longliners within its EEZ and the catches unloaded in Port Louis.

Belize, China, Taiwan,China, Indonesia, Malaysia and Oman have provided catches for their fresh-tuna longline fleets in recent years. Catches and effort are only available for Belize, China, Taiwan,China (since 2007), Malaysia and Oman. Size data are available for Indonesia and Taiwan,China (IOTC-OFCF sampling and Indonesia's and Thailand's sampling)

Current catches have been estimated at about 80,000 tonnes (10,000 t are estimated for non-reporting fresh-tuna vessels), mostly yellowfin tuna (YFT), albacore (ALB) and bigeye tuna (BET) (Figure 9).

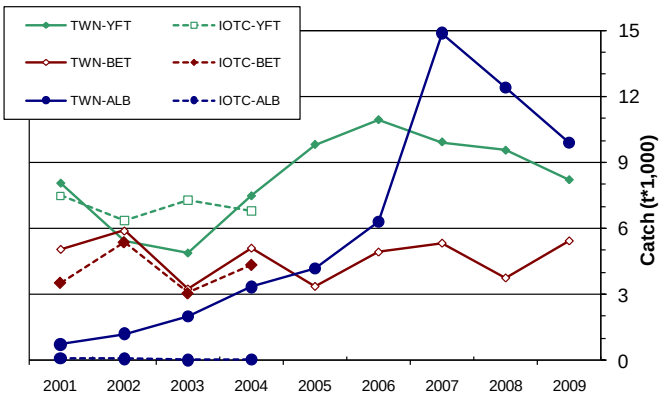


Figure 8: Catches available for Taiwanese fresh-tuna longliners for 2001-08 versus the catches previously estimated by the Secretariat

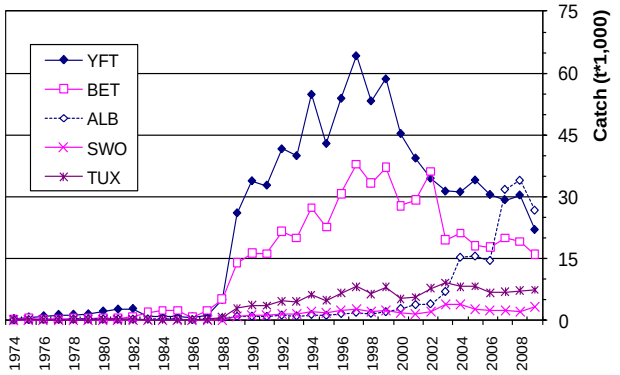
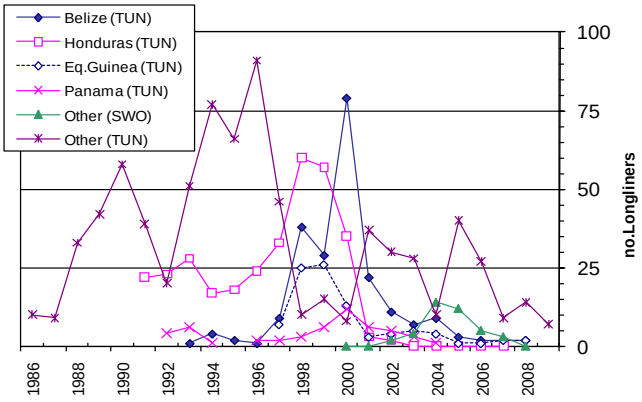


Figure 9: Total catches in the Indian Ocean estimated for fresh tuna longline fleets, by year and species

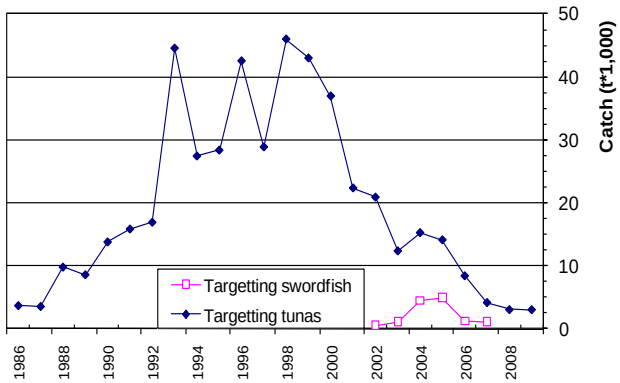
B/ NON REPORTING DEEP-FREEZING LONGLINE FLEETS

Figure 10: Number of non-reporting deep-freezing longliners estimated to operate in the Indian Ocean, by flag country and year



Note: Belize is an IOTC Member since 2007 and has reported catches for its longline fleet in recent years

Figure 11: Estimated catches of non-reporting deep-freezing longliners according to the type of operation



The numbers of non-reporting deep-freezing longliners by flag are estimated by using data collected from various sources (Figure 10). The main sources for these data are the fishing craft statistics and the IOTC lists of active vessels. The catches estimated for 2009 are still preliminary (Figures 11-12). The main reason is that the Secretariat is waiting to complete the lists of active vessels with information reported from parties regarding the vessels calling to its ports and the catches unloaded.

Around 15 non-reporting longliners are believed to be operating in the Indian Ocean in recent years, with total catches estimated at 2,500 tonnes. Honduras, Equatorial Guinea and Panama were the flags most used by non-reporting longliners over the last decade with an increasing number of vessels operating under other flags as Togo, Mongolia, Namibia, Cambodia, Bolivia and Georgia in recent years. The catch series was estimated according to average catches per vessel and species composition for the Taiwanese or Spanish fleet during that period, assuming that most of the vessels operating under flags of non-

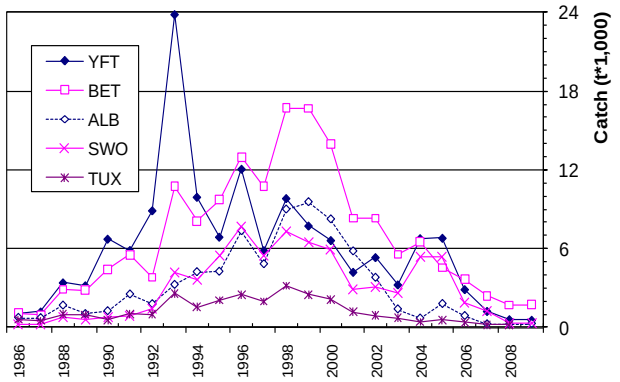


Figure 12: Total catches by species in the Indian Ocean estimated for non-reporting deep-freezing longline fleets

reporting countries operate in a similar manner to vessels from Taiwan,China or Spain, respectively. Although there are many indications to support this, the assumption that the vessels from non-reporting countries are exploiting the same time-area strata than the Taiwanese or Spanish over time could be wrong for some flags and periods.

The lack of catch-and-effort and size frequency records from non-reporting vessels is of concern.

The dramatic drop in the number of non reporting longliners vessels operating and catches estimated since 2001 is not fully understood (Figure11). This could be due to the re-flagging of vessels recorded before under this category to flags of reporting countries. The increase in the number of longliners operating in the Indian Ocean reported by Philippines, Seychelles, India, Malaysia, Indonesia, Oman and other coastal countries in recent years would support this assumption.

Indonesia, **Malaysia** and **India** have not reported complete statistics for its deep-freezing longliners. The numbers of longliners using the flag of these countries has been increasing in recent years, as many as 75 longliners in recent years. The Secretariat has estimated catches for longliners of India, Indonesia (Figure 15) and Malaysia recently, basing on the numbers reported and the average catches by species by vessel for Taiwan,China for the same period.

It is important to note that the catch rates of large-scale vessels that operate under the flag of Taiwan,China have decreased significantly in recent years. Such decrease has coincided with a drop in the average size of the Taiwanese fleet, with smaller vessels involved in the fishery in recent years. Taking into account that the drop in average vessel size has not been noted for any of the fleets above, the catches estimated in recent years for this component may be too low. The secretariat will revise these catches as soon as more information is available.

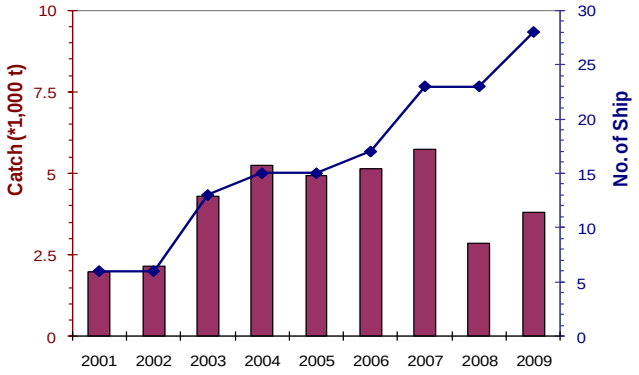


Figure 13: No of ships and total catches per species in the Indian Ocean estimated for the deep freezing longline fishery operating in Indonesia

C/ NON REPORTING INDUSTRIAL PURSE SEINE FLEETS

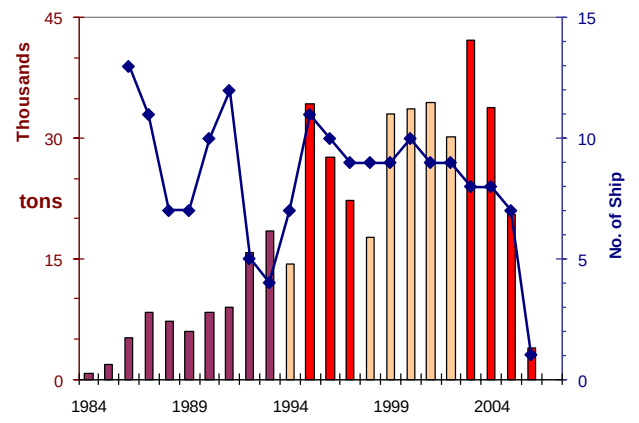
Between 1 and 11 non-reporting purse seiners operated in the Indian Ocean between 1995 and 2006 under several flags. The catches of these vessels, mainly of skipjack, ranged between 30,000 and 40,000 tonnes (Figure 14).

The catches were estimated from two different sources:

- No catch data available (1995-97; 2003- 2006): The estimate was conducted taking into account past average catch rates for the ex Soviet Union fleet (to which most of these vessels belonged to) and species composition for the European fleet, assuming that the two fleets exploit the same areas. This assumption could be biased for periods in which the European vessels operate in the EEZs of third countries, which could not be the case with the ex-Soviet vessels. Only one vessel remained in operation in 2006, under the flag of Equatorial Guinea. The Secretariat has not received any reports of activity of this vessel for 2007 and therefore catches have not been estimated for this year. The other vessels now operate under the flag of Thailand.
- Catch data available (1998-2002): The total catches and number of sets per day and area (1 degree square) were provided for the period 1998-2002[8]. The catches of EC purse seiners were used to estimate catches per species and type of set (free or log school). The catches estimated for these years are thought more accurate.

Detailed information about the fleet and catch estimates of non-reporting fleets has been provided in documents presented to the species Working Parties since 2000.

Figure 14: Number of ships and total catches per species in the Indian Ocean estimated for non-reporting industrial purse seine fleets



The catches of the ex Soviet vessels (brown pattern) are also shown for reference

The catches of NEI-PS are shown in red or light orange depending on the estimation procedure (see text on the right)

[8] Catches for 1997 and 2003 were also provided although only for several months.

BOX 2: NO STATISTICAL SYSTEM: YEMEN, COMOROS AND MADAGASCAR

Following a recommendation from the SC the IOTC Secretariat undertook three missions to **Yemen** in 2007-08, and its main results were reported to the WPTT meetings (IOTC-2007-WPTT-INF02 and other documents). The data collected from some national and foreign institutions, mainly estimates of total catches (by species or aggregated) and number of operated crafts for several regions and years, is very conflicting, with some institutions publishing catches being as much as twice or even higher than those from other sources. Nevertheless, the information collected was sufficient for the Secretariat to be able to derive new estimates of catches for the artisanal fleets operating in Yemen (Figure 17).

In 2007, the Secretariat revised the catch estimates for artisanal boats operating in Yemen for 2003-2006, notably those for yellowfin tuna, longtail tuna, kawakawa and narrow-barred Spanish mackerel. The new estimates are probably more realistic than the previous although they are still uncertain due to a scarcity of information and numerous assumptions needed to complete the series. More details about the estimation were provided in a document presented to a previous Working Party on Tropical Tunas (IOTC-2005-WPTT-06). The new catches of yellowfin estimated are more than 30 times higher than those previously in the IOTC database.

The catches were revised again in 2008 basing on new information collected from the Ministry of Fish Wealth of Yemen. The total catches estimated by the MFW are considered unreliable due to the procedure used by the MFW to convert the numbers of yellowfin tuna and other species monitored (total enumeration) into weight. The trend in the catches was, however, considered realistic and was used to adjust the catches previously estimated by the Secretariat. The new catches of yellowfin tuna estimated are in line with the catches estimated for other countries, showing a sharp decrease in the catches of yellowfin tuna since 2005. No catches have been estimated for 2008 and 2009 as yet, the catches in the IOTC Database representing a repetition of those that were estimated for 2007.

The IOTC-OFCF Project plans to support the Ministry of Fish Wealth of Yemen for the collection of data on the total numbers of fish unloaded by species and total number of vessel trips by month and numbers and type of vessels based in each Governorate for as many years as possible, had to be cancelled in 2009 due to the situation in Yemen. The situation in Yemen has not improved since then.

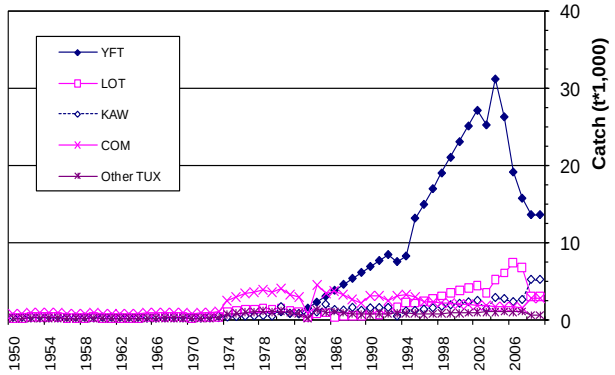


Figure 15: Total catches per species in the Indian Ocean estimated for the artisanal fishery operating in Yemen

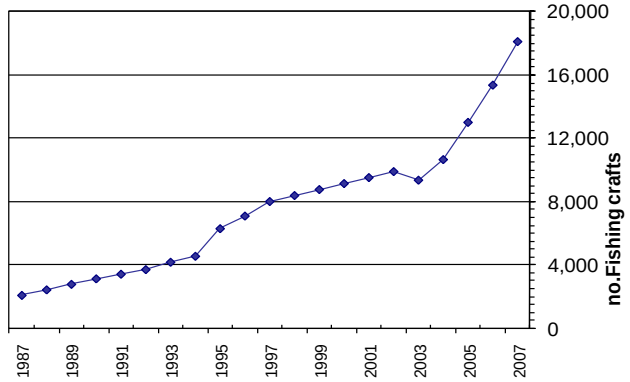


Figure 16: Total number of crafts estimated for the artisanal fishery operating in Yemen

Comoros (Figure 17) and **Madagascar** (Figure 18) have never reported statistics to the IOTC and have indicated in several occasions that they do not have a statistical system for the collection of data from their fisheries. The IOTC Secretariat has been using the catches published by the FAO for these countries but these figures are considered highly unreliable.

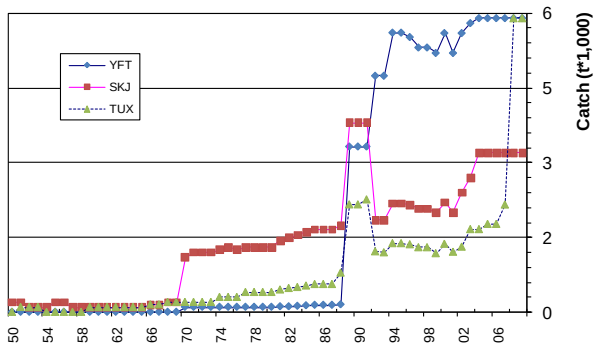


Figure 17: Total catches in the Indian Ocean for the artisanal fishery operating in Comoros, by species and year

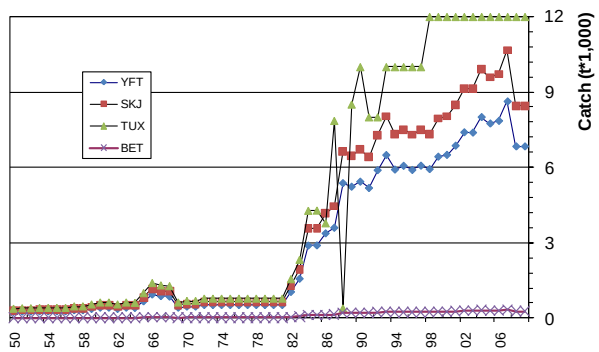


Figure 18: Total catches in the Indian Ocean for the artisanal fishery operating in Madagascar, by species and year

In 2010 the IOTC Secretariat conducted a review intended to break the catches of marine fish that **Madagascar** reported to the FAO, in aggregated form, by species. The Secretariat used information from other fisheries using troll lines in the region, including Comoros and India. The ratio catches of species other than tropical tunas, especially narrow-barred Spanish Mackerel (COM), catches of tropical tunas from other fisheries was used to derive catches of yellowfin tuna (YFT), skipjack tuna (SKJ) and bigeye tuna (BET) for Madagascar, In addition, the catches of COM were broken by species, on the assumption that they contained catches for more than one species of neritic tuna. The combined catches of yellowfin tuna and skipjack tuna estimated have been around 15,000 tons in recent years (Figure 18). The catches estimated are considered highly uncertain.

The IOTC-OFCF Project will assist **Comoros** in 2011 to the execution of a frame survey and sampling of coastal fisheries. This will allow Comoros to produce statistics for its fisheries as per IOTC standards since 2011 and revise previous estimates using this information.

BOX 3: INSUFFICIENT MONITORING GILLNET FLEETS: SRI LANKA, PAKISTAN AND IRAN

Important tuna and tuna-like fisheries have been in existence in **Sri Lanka** since well before 1950. Catch data are available for Sri Lanka since 1950 (Figure 21). Nevertheless, the quality of the data available at the IOTC Secretariat for this country is compromised for the following reasons:

- Catches may be incomplete, especially in the early years of the fishery.
- Catches are not available by gear type
- Species are often misidentified or mislabelled, in particular the species of marlins

Although the IOTC/OFCF/NARA sampling implemented in 2005 did not cover all fisheries the catches estimated for 2005 and 2006 using this information are believed to be more precise.

The catches for 2007-09 are, however, likely to be uncertain due to the significant drop in sampling effort after the end of the IOTC-OFCF cooperation. This situation is likely to compromise future estimates of catches in Sri Lanka.

Figure 19 shows the new catches estimated for the gillnet and longline fishery of Sri Lanka in 2005-06 versus the catches in the IOTC database before and after this period.

It is important to note that the catches estimated for 2005-06 are significantly lower than the catches reported by Sri Lanka before and after this period. Although the main reason behind this is likely to be the tsunami that hit Sri Lanka in December 2004, there may be other issues that affected the quality of the estimates. For this reason, an examination and possible revision of the Sri Lankan catch series from 1994-2004 is required. This review is expected to take a significant amount of time and resources from the Secretariat.

The IOTC Secretariat and Sri Lanka are currently assessing the type of activities that need to be carried out in Sri Lanka to address the recommendations issued by the IOTC Scientific Committee in the area of statistics. Initially, the Ministry of Fisheries and Aquatic Resources of Sri Lanka and the IOTC Secretariat have agreed that the IOTC-OFCF Project will assist MFAR in the implementation of a new Centralized Database System and the IOTC will assist the National Aquatic Resources Research and Development Centre (NARA) to strengthen sampling of coastal and offshore fisheries.

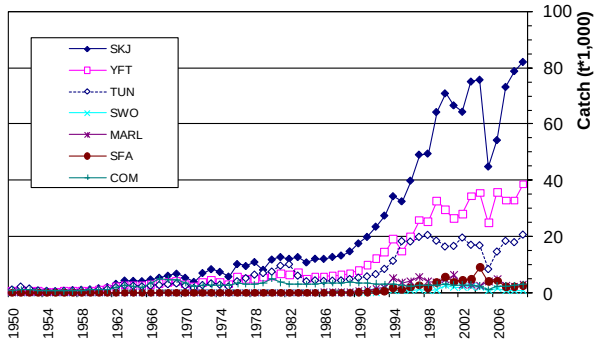


Figure 19: Total catches per species in the Indian Ocean estimated for the gillnet and longline fishery operating in Sri Lanka in 2005-06 and catches in the IOTC database before and after those years (1950-2008)

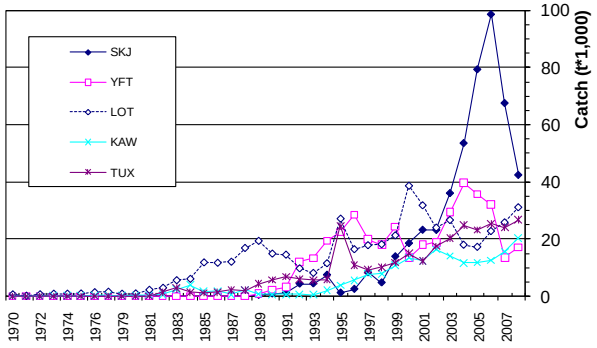


Figure 20: Total catches per species in the Indian Ocean estimated for the gillnet fishery operating in Iran for 1970-2008 (Catches in 2008 carried forward as 2009 catches)

Iran (Figure 22), **Pakistan** (Figure 23) and **Sri Lanka** (Figure 21) have been reporting catches for their gillnet fisheries for a number of years. While most of the catches in the past came from coastal waters, in recent years catches on the high seas have increased substantially. As many as 750 gillnet vessels from Iran have been operating on the high seas in recent years. The numbers of gillnet/longline vessels from Sri Lanka and gillnet vessels from Pakistan that operate on the high seas are unknown.

While Iran and Pakistan have not reported catch-and-effort data in recent years, the datasets reported by Sri Lanka are incomplete, not containing catch-and-effort by IOTC area (1° square grid).

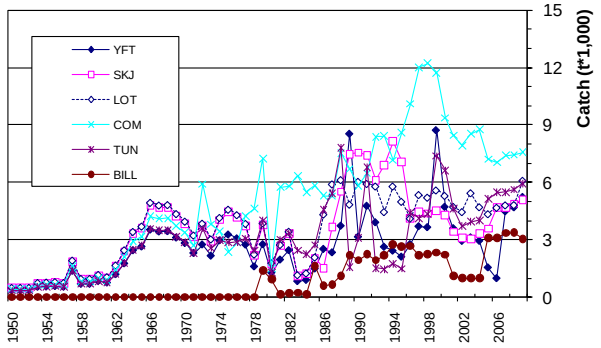


Figure 23: Total catches per species in the Indian Ocean estimated for the gillnet fishery operating in Pakistan for 1950-2009