# REPORT ON IOTC DATA COLLECTION AND STATISTICS

**PREPARED BY: IOTC SECRETARIAT[1], 14 NOVEMBER 2013**

## Purpose

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

## Background

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

This document presents the status of data in the IOTC databases, including: the status of reporting and availability of datasets for the year 2012, as per the requirements set in IOTC Resolution 10/02 and other IOTC measures calling for IOTC CPCs to report data on their IOTC fisheries; an overview of the status of IOTC statistics over the time series; other datasets available at the Secretariat.

The report covers the following areas:

- Overview;
- Availability of IOTC statistics for 2012 (timeliness and completeness of data);
- Status of the IOTC databases for nominal catch (NC), catch and effort (CE) and size frequency (SF);
- Other IOTC data holdings: observer data, biological data, tagging data.

For questions regarding the content of the report, contact:
Miguel Herrera, IOTC Data Coordinator ( Miguel.Herrera@iotc.org; secretariat@iotc.org )

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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,*** *main* ***shark species*** *caught by IOTC fisheries****,*** *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 Resolution 13/06: *On A Scientific And Management Framework On The Conservation Of Shark Species Caught In Association With IOTC Managed Fisheries*
    - *Paragraph 5: CPCs shall encourage their fishers to record incidental catches as well as live releases of* ***OCEANIC WHITETIP SHARKS****. These data shall be kept at the IOTC Secretariat.*
- IOTC Resolution 12/09 *On the conservation of* ***THRESHER SHARKS*** *(family Alopiidae) caught in association with fisheries in the IOTC area of competence*
    - *Paragraph 4: CPCs shall encourage their fishers to record and report incidental catches as well as live releases. These data will be then kept at the IOTC Secretariat.*
    - *Paragraph 8: The Contracting Parties, Cooperating Non-Contracting Parties, especially those directing fishing activities for sharks, shall submit data for sharks, as required by IOTC data reporting procedures.*
- IOTC Resolution 13/05 *On the conservation of* ***WHALE SHARKS*** *(Rhincodon typus)*
    - *Paragraph 3: CPCs shall require that, in the event that a whale shark is unintentionally encircled in the purse seine net, the master of the vessel shall:*
        *b. report the incident to the relevant authority of the flag State, with the following information…*
    - *Paragraph 4: CPCs using other gear types fishing for tuna and tuna-like species associated with a whale shark shall report all interactions with whale sharks to the relevant authority of the flag State and include all the information outlined in paragraph 3b(i–v).*
    - *Paragraph 7: CPCs shall report the information and data collected under paragraph 3(b) and paragraph 4 through logbooks, or when an observer is onboard through observer programs, and provide to the IOTC Secretariat by 30 June of the following year and according to the timelines specified in Resolution 10/02 (or any subsequent revision).*
- IOTC Recommendation 05/09 *On incidental mortality of* ***SEABIRDS***[2]
    - *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 12/04 *On* ***MARINE TURTLES***
    - *Paragraph 3: CPCs shall collect (including through logbooks and observer programs) and provide to the IOTC Secretariat no later than 30 June of the following year in accordance with Resolution 10/02 (or any subsequent revision), all data on their vessels' interactions with marine turtles. The data shall include the level of logbook or observer coverage and an estimation of total mortality of marine turtles incidentally caught in their fisheries.*

[2] Both IOTC Recommendation 05/09 and Resolution 10/06 will be superseded by IOTC Resolution 12/06, which enters into force in July 2014

- IOTC Resolution 13/04 *On the conservation of **CETACEANS***
  - *Paragraph 3: CPCs shall require that, in the event that a Cetacean is unintentionally encircled in the purse seine net, the master of the vessel shall:*
    *b. report the incident to the relevant authority of the flag State, with the following information…*
  - *Paragraph 4: CPCs using other gear types fishing for tuna and tuna-like species associated with cetaceans shall report all interactions with cetaceans to the relevant authority of the flag State and include all the information outlined in paragraph 3b(i–v).*
  - *Paragraph 7: CPCs shall report the information and data collected under paragraph 3(b) and paragraph 4 through logbooks, or when an observer is onboard through observer programs, and provide to the IOTC Secretariat by 30 June of the following year and according to the timelines specified in Resolution 10/02 (or any subsequent revision).*
- IOTC Resolution 11/04 *On a Regional **OBSERVER SCHEME***
  - *Paragraph 9: CPCs shall provide to the Executive Secretary and the Scientific Committee annually a report of the number of vessels monitored and the coverage achieved by gear type in accordance with the provisions of this Resolution.*
  - *Paragraph 11: … The CPCs shall send within 150 days at the latest each report, as far as continuous flow of report from observer placed on the longline fleet is ensured, which is recommended to be provided with 1°x1° format to the Executive Secretary, who shall make the report available to the Scientific Committee upon request. …*

***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 12/05; IOTC Resolution 10/08; IOTC Resolution 05/03; IOTC Resolution 11/03; IOTC Resolution 13/07), data collected through sampling at the landing place or at sea by scientific observers (IOTC Resolution 11/04) 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 (one degree square for surface fisheries, five degrees square for longline fisheries, and the most convenient resolution for coastal fisheries) and species. Information on the use of fish aggregating devices (FADs) and supply vessels is also collected. The standards of reporting to the IOTC are defined in IOTC Resolution 10/02. IOTC Resolution 13/03 *On the recording of catch and effort data by fishing vessels in the IOTC area of competence* sets the minimal data requirement that IOTC CPCs shall implement for fleets using their flag or licensed to operate within their EEZs.

**Length frequency data:** individual body lengths of IOTC species per fleet, year, gear, type of school, month and 5 degrees square areas, as defined in IOTC Resolution 10/02.

**Biological data:** data used to derive length-weight, non-standard weights-live weight, non-standard measurements-standard lengths, sex-ratios, maturity, or any other data required for the assessments of IOTC and shark species, as defined in IOTC Resolution 10/02.

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

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

## 2. AVAILABILITY OF IOTC STATISTICS FOR 2010

Tables2i-2v (below) list the fleets for which the Secretariat received or estimated catches for the year 2012. 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 18 fishing parties before the deadline of June 30 (cf. 21 in 2012). Partial statistics were provided in some cases. Requests were sent to over fifty countries[3] in March-April 2013. Second and third requests were needed in most cases. Levels of reporting concerning statistics for the years 2011 and 2012 were generally poor before the deadline, in particular with regards to neritic tuna species. Five parties have not reported statistics to the IOTC at all for a period longer than three years (Sierra Leone; Yemen; Eritrea; Sudan; Guinea).

**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 (x1,000t) | 1,487 | 651 | 1,331 | 643 | 858 | 456 | 636 |
| %Available for 2012 | | **44** | **90** | **43** | **58** | **31** | **43** |
| %Available for 2011 | | 62 | 70 | 48 | 56 | 44 | 50 |
| Tropical tunas (x1,000t) | 782 | 505 | 737 | 505 | 556 | 408 | 455 |
| Temperate tunas (x1,000t) | 41 | 36 | 39 | 28 | 28 | 22 | 22 |
| Billfish (x1,000t) | 82 | 39 | 68 | 39 | 52 | 27 | 27 |
| Neritic tunas (x1,000t) | 583 | 72 | 487 | 71 | 222 | 0 | 133 |

**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**)

Table 1shows the extent to which 2012 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 2013)[4]. 44% of the catch was available by 30 June and 90% of the catch was available by November. The proportion of statistics available for 2011 is shown for comparison. Levels of reporting were moderate in 2012, 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.

- **FADs and supply vessels**: EU-Spain provided information on the amount of Fish Aggregating Devices (FADs) set by purse seiners under its flag, by type and quarter, for 2010, and 2011 (quarters 1-3). In addition, EU-Spain provided information on the activity of supply vessels for 2009-12. EU-France provided total numbers of FADs set by purse seiners under its flag for the year 2010, and 2011. France also indicated that it has not had supply vessels in operation in recent years. Australia indicated that purse seiners under its flag do not set FADs or use other vessels in support of fishing activities. No data was received for other fleets on FADs (France OT, Seychelles, Japan, Iran), or activities of supply vessels (Seychelles, Japan).

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

[4] 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.

- **By-catch levels**: Some CPCs (Iran, Pakistan, Madagascar, EU-PS, Australia, Korea, South Africa, EU-UK) provided partial estimates of bycatch levels for their fisheries for 2012, including bycatch levels for sharks, seabirds or marine turtles. In spite of the better reporting levels recorded for bycatch data during 2013, few statistics are still available for sharks, seabirds and sea turtles (Table 2v) (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.

- **Discard levels**: Table 2vii presents the information available for discards for the year 2012. Discard levels are only available for Australia, EU-France purse seiners (nil discards), EU-Portugal longliners (nil discards), France Overseas Territories purse seiners (nil discards), Isl. Rep. of Iran drifting gillnets, Republic of Korea longliners, Madagascar longliners, South Africa longliners, Sri Lanka all gears (nil discards), and the UK Overseas Territories (nil discards) in 2012. Discard rates are believed to be high for fisheries using longlines and oceanic gillnets, and moderate for purse seine sets on associated schools (mainly with FADs). However, the nets of FADs may also contribute substantially to ghost fishing.

**2vii – Discards**

| Fleet | Units | Catch |
|---|---|---|
| Australia LL | # Fish | ALB 23; BET 377; BLM 16; BUM 10; SBF 30; MLS 2; SWO 183; YFT 4; SKH: 11371; WAH 24 |
| EU-Portugal LL | | nil |
| EU-France PS | | nil |
| France-OT PS | | nil |
| Iran, Isl. Rep. | kg | Marine turtles (TUG) 24 |
| Korea Rep LL | # Fish | ALB 1107; SBF 682; YFT 15; SKH 193; DIM 53; DIX 31; MAI 10 |
| Madagascar LL | # Fish | Marine turtles (TUG) 1 |
| South Africa LL | # fish | DKK 1; TTL 1; DCR 18; DCU 11; DIC 4; DIM 5; PRO 74; TQH 11; TUG 1; TTH 1 |
| Sri Lanka | | nil |
| UK-OT (Chagos) | | nil |

- **Fishing craft statistics and active vessels (2vi)**: 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, new vessel records, and other sources.

# Table 2: Availability of IOTC statistics for the year 2012

## 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)<br>Fair (whithin July)<br>Poor (after 1st August) | **SO** | Data Source | Statistics fully available from flag country<br>Statistics partially available from flag country<br>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 | 144.9 | YS | | | | | | |
| | SEYCHELLES | 50.8 | YS | | | | | | |
| | FRANCE-TERRITORIES | 28.7 | YS | | | | | | |
| | IRAN I R | 2.9 | SY | | | | | | CE and SF not reported by IOTC grid |
| | KOREA REP | 2.9 | YS | | | | | | |
| | JAPAN | 2.2 | SB | | | | | | |
| | AUSTRALIA | 0.0 | S | | | | | | |
| LL | CHINA | 2.9 | BY | | | | | | Less than 1 fish per metric ton measured |
| | TAIWAN,CHINA | 47.8 | BY | | | | | | Less than 1 fish per metric ton measured on fresh-tuna longliners |
| | INDONESIA | 32.8 | BY | | | | | | |
| | SEYCHELLES | 11.1 | BY | | | | | | SF not reported for the deep-freezing longline component |
| | JAPAN | 11.0 | BY | | | | | | Less than 1 fish per metric ton measured |
| | NEI-FRESH | 3.1 | YB | | | | | | |
| | NEI-FROZEN | 2.8 | BY | | | | | | |
| | PHILIPPINES | 2.6 | BY | | | | | | SF available for BET only |
| | OMAN | 2.2 | Y | | | | | | NC not by species |
| | INDIA | 1.8 | YB | | | | | | NC too low for a fleet the size of India's; CE incomplete (3 months only) |
| | EUROPEAN COMMUNITY | 1.4 | BY | | | | | | CE/SF EU-Spain not reported for species other than Swordfish |
| | KOREA REP | 0.6 | YB | | | | | | Less than 1 fish per metric ton measured |
| | SOUTH AFRICA | 0.5 | BY | | | | | | SF reported for foerign fleet only |
| | BELIZE | 0.5 | BY | | | | | | All CE/SF reported for each vessel and month recorded in a single grid |
| | THAILAND | 0.4 | BY | | | | | | |
| | TANZANIA | 0.3 | YB | | | | | | |
| | VANUATU | 0.2 | BY | | | | | | CE not by IOTC standard |
| | AUSTRALIA | 0.2 | BY | | | | | | |
| | MALAYSIA | 0.1 | YB | | | | | | Data does not include activities of Malaysia flagged vessels in the East |
| | MADAGASCAR | 0.1 | BY | | | | | | |
| | MOZAMBIQUE | 0.0 | YB | | | | | | NC not fully by species; CE not reported by IOTC grid |
| | MAURITIUS | 0.0 | YB | | | | | | |
| Other fleets | SRI LANKA | 105.4 | SY | | | | | | Data not fully reported by gear and species |
| | MALDIVES | 93.2 | SY | | | | | | |
| | INDONESIA | 91.3 | SY | | | | | | Species and gear breakdown inconsistent over the time series |
| | IRAN I R | 44.1 | YS | | | | | | CE not reported by IOTC standard |
| | INDIA | 41.6 | YS | | | | | | |
| | YEMEN AR RP | 20.2 | Y | | | | | | |
| | PAKISTAN | 13.7 | YS | | | | | | |
| | COMOROS | 12.6 | SY | | | | | | Data collection discontinued after the end of support from IOTC-OFCF |
| | OMAN | 2.0 | Y | | | | | | CE not by IOTC standard |
| | MADAGASCAR | 1.5 | SY | | | | | | |
| | TANZANIA | 0.8 | Y | | | | | | |
| | FRANCE-TERRITORIES | 0.2 | SY | | | | | | |
| | KENYA | 0.1 | YS | | | | | | |
| | EUROPEAN COMMUNITY | 0.1 | Y | | | | | | |
| | MAURITIUS | 0.1 | Y | | | | | | |
| | JORDAN | 0.1 | S | | | | | | |
| | MALAYSIA | 0.0 | S | | | | | | |
| | UK-TERRITORIES | 0.0 | Y | | | | | | |
| | EAST TIMOR | 0.0 | Y | | | | | | |
| | AUSTRALIA | 0.0 | Y | | | | | | |
| | SOUTH AFRICA | 0.0 | Y | | | | | | |
| | SEYCHELLES | 0.0 | Y | | | | | | |
| | MOZAMBIQUE | 0.0 | Y | | | | | | NC/SFreported for sport fishing only |

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

## 2ii – Temperate tunas (ALB, SBF)

| Gear | Fleet | Availability of statistics | | | | | TI | SO | Comments |
|---|---|---|---|---|---|---|---|---|---|
| | | Catch | Sps | NC | CE | SF | | | |
| PS | AUSTRALIA | 4.5 | S | | | | | | |
| | EUROPEAN COMMUNITY | 0.8 | A | | | | | | |
| | FRANCE-TERRITORIES | 0.3 | A | | | | | | |
| | SEYCHELLES | 0.1 | A | | | | | | |
| LL | CHINA | 1.8 | A | | | | | | Less than 1 fish per metric ton measured |
| | TAIWAN,CHINA | 12.5 | A | | | | | | Less than 1 fish per metric ton measured on fresh-tuna longliners |
| | INDONESIA | 8.3 | A | | | | | | |
| | JAPAN | 4.6 | AS | | | | | | Less than 1 fish per metric ton measured |
| | NEI-FRESH | 1.4 | A | | | | | | |
| | KOREA REP | 1.1 | A | | | | | | Less than 1 fish per metric ton measured |
| | MALAYSIA | 0.6 | A | | | | | | Data does not include activities of Malaysia flagged vessels in the East |
| | EUROPEAN COMMUNITY | 0.4 | A | | | | | | CE/SF EU-Spain not reported for species other than Swordfish |
| | TANZANIA | 0.2 | A | | | | | | |
| | INDIA | 0.2 | A | | | | | | NC too low for a fleet the size of India's; CE incomplete (3 months only) |
| | NEI-FROZEN | 0.1 | A | | | | | | |
| | PHILIPPINES | 0.1 | A | | | | | | |
| | SOUTH AFRICA | 0.1 | A | | | | | | |
| | MADAGASCAR | 0.1 | A | | | | | | |
| | BELIZE | 0.1 | AS | | | | | | All CE/SF reported for each vessel and month recorded in a single grid |
| | SEYCHELLES | 0.0 | A | | | | | | SF not reported for the deep-freezing longline component |
| | MOZAMBIQUE | 0.0 | A | | | | | | NC not by species CE not reported by IOTC grid |
| | AUSTRALIA | 0.0 | A | | | | | | |
| | VANUATU | 0.0 | A | | | | | | CE not reported by IOTC grid |
| | MAURITIUS | 0.0 | | | | | | | |
| | THAILAND | 0.0 | A | | | | | | |
| OTH | INDONESIA | 3.2 | A | | | | | | Species and gear breakdown inconsistent over the time series |
| | MAURITIUS | 0.2 | A | | | | | | |
| | COMOROS | 0.0 | A | | | | | | |
| | SOUTH AFRICA | 0.0 | A | | | | | | |
| | EUROPEAN COMMUNITY | 0.0 | | | | | | | |
| | 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 | SM | | | | | | Less than 1 fish per metric ton measured |
| | TAIWAN,CHINA | 15.1 | SM | | | | | | Less than 1 fish per metric ton measured on fresh-tuna longliners |
| | EUROPEAN COMMUNITY | 7.3 | SM | | | | | | EU-Spain: CE/SF only for SWO |
| | INDONESIA | 5.3 | SM | | | | | | |
| | SEYCHELLES | 2.3 | SM | | | | | | SF not reported for the deep-freezing longline component |
| | JAPAN | 1.4 | SM | | | | | | Less than 1 fish per metric ton measured |
| | TANZANIA | 0.8 | SM | | | | | | |
| | NEI-FROZEN | 0.8 | MS | | | | | | |
| | INDIA | 0.6 | MS | | | | | | NC too low for a fleet the size of India's; CE incomplete (3 months only) |
| | NEI-FRESH | 0.5 | MS | | | | | | |
| | SOUTH AFRICA | 0.3 | S | | | | | | SF reported for foreign fleet only |
| | MOZAMBIQUE | 0.3 | S | | | | | | NC not by species; CE not reported by IOTC grid |
| | AUSTRALIA | 0.2 | S | | | | | | |
| | OMAN | 0.1 | F | | | | | | NC not by species |
| | KOREA REP | 0.1 | S | | | | | | Less than 1 fish per metric ton measured |
| | MADAGASCAR | 0.1 | S | | | | | | |
| | PHILIPPINES | 0.1 | S | | | | | | |
| | VANUATU | 0.1 | S | | | | | | CE not by IOTC standard |
| | BELIZE | 0.1 | MS | | | | | | All CE/SF reported for each vessel and month recorded in a single grid |
| | MALAYSIA | 0.0 | MS | | | | | | Data does not include activities of Malaysia flagged vessels in the East |
| | MAURITIUS | 0.0 | S | | | | | | |
| | THAILAND | 0.0 | S | | | | | | NC and CE not reported for all Marlin |
| Other fleets | SRI LANKA | 11.8 | MS | | | | | | Data not fully reported by gear and species |
| | IRAN I R | 11.3 | FS | | | | | | CE not reported by IOTC standard |
| | PAKISTAN | 8.1 | F | | | | | | |
| | INDIA | 7.0 | FM | | | | | | |
| | INDONESIA | 3.2 | MF | | | | | | Species and gear breakdown inconsistent over the time series |
| | TANZANIA | 1.3 | F | | | | | | |
| | OMAN | 1.1 | F | | | | | | CE not by IOTC standard |
| | MADAGASCAR | 0.8 | F | | | | | | |
| | UN ARAB EMIRATES | 0.5 | M | | | | | | |
| | COMOROS | 0.3 | S | | | | | | NC/CE/SF under preparation (IOTC-OFCF Project) |
| | YEMEN AR RP | 0.3 | F | | | | | | |
| | KENYA | 0.1 | F | | | | | | |
| | EUROPEAN COMMUNITY | 0.0 | M | | | | | | NC/CE not reported by species |
| | FRANCE-TERRITORIES | 0.0 | F | | | | | | |
| | SAUDI ARABIA | 0.0 | F | | | | | | |
| | SEYCHELLES | 0.0 | F | | | | | | |
| | UK-TERRITORIES | 0.0 | F | | | | | | |
| | MOZAMBIQUE | 0.0 | | | | | | | NC reported for sport fishing only |

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

# 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 | | | | | | CE and SF not reported by IOTC grid |
| | SEYCHELLES | 0.0 | F | | | | | | Statistics incomplete; refers mostly to discards |
| | EUROPEAN COMMUNITY | 0.0 | F | | | | | | Statistics incomplete; refers mostly to discards |
| Other fleets | INDONESIA | 137.9 | FC | | | | | | Species and gear breakdown inconsistent over the time series |
| | IRAN I R | 130.3 | LK | | | | | | CE not reported by month; SF: less than 1 fish measured per mt |
| | INDIA | 127.1 | KC | | | | | | |
| | PAKISTAN | 37.3 | LK | | | | | | |
| | MALAYSIA | 29.0 | LK | | | | | | |
| | SRI LANKA | 25.1 | FK | | | | | | Data not fully reported by gear and species |
| | OMAN | 18.3 | LC | | | | | | CE not by IOTC standard |
| | THAILAND | 14.6 | KL | | | | | | |
| | YEMEN AR RP | 13.8 | KC | | | | | | |
| | MYANMAR | 12.9 | X | | | | | | |
| | UN ARAB EMIRATES | 10.2 | C | | | | | | |
| | SAUDI ARABIA | 7.0 | CK | | | | | | |
| | MADAGASCAR | 6.0 | CK | | | | | | |
| | BANGLADESH | 2.4 | X | | | | | | |
| | MALDIVES | 2.3 | K | | | | | | |
| | QATAR | 2.1 | C | | | | | | |
| | TANZANIA | 1.6 | C | | | | | | |
| | EGYPT | 0.6 | CK | | | | | | |
| | ERITREA | 0.4 | C | | | | | | |
| | COMOROS | 0.3 | KL | | | | | | NC/CE/SF under preparation (IOTC-OFCF Project) |
| | AUSTRALIA | 0.3 | C | | | | | | |
| | KENYA | 0.3 | CK | | | | | | |
| | KUWAIT | 0.1 | C | | | | | | |
| | SEYCHELLES | 0.1 | K | | | | | | |
| | DJIBOUTI | 0.1 | X | | | | | | |
| | JORDAN | 0.1 | K | | | | | | |
| | BAHRAIN | 0.0 | K | | | | | | |
| | SUDAN | 0.0 | C | | | | | | |
| | EUROPEAN COMMUNITY | 0.0 | | | | | | | |
| | UK-TERRITORIES | 0.0 | | | | | | | |
| | MAURITIUS | 0.0 | | | | | | | |
| | MOZAMBIQUE | 0.0 | | | | | | | NC reported for sport fishing only |

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

**Gear** Industrial purse seine (PS), industrial longline (LL) or other gears (pole-and-line; small purse seines, large and small gillnets, and small lines)

**1** Freezing longliners whose catches are not reported by the flag states concerned

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

# 2v – Sharks seabirds and sea turtles

| Gear | Fleet | Species | | | | | Comments |
|---|---|---|---|---|---|---|---|
| | | Sharks | | | Sea Birds | Marine Turtles | |
| | | NC | CE | SF | | | |
| PS | EUROPEAN COMMUNITY | | | | n/a | | Catches of sharks and sea turtles as reported by observers (not raised) |
| | SEYCHELLES | | | | n/a | | |
| | IRAN I R | | | | n/a | | |
| | AUSTRALIA | | | | n/a | | |
| | FRANCE-TERRITORIES | | | | n/a | | |
| | JAPAN | | | | n/a | | |
| | KOREA REP | | | | n/a | | |
| LL | CHINA TAIWAN,CHINA | | | | | | |
| | EUROPEAN COMMUNITY | | | | | | EU-France: NC/CE not by species; EU-Spain: no CE/SF data reported |
| | INDONESIA | | | | | | |
| | JAPAN | | | | | | |
| | TANZANIA | | | | | | |
| | OMAN | | | | | | NC/CE not reported by species |
| | KOREA REP | | | | | | |
| | SOUTH AFRICA | | | | | | Reported discard of Seabirds and sea turtles on foreign fleets |
| | SEYCHELLES | | | | | | |
| | NEI-FROZEN | | | | | | |
| | MOZAMBIQUE | | | | | | NC/CE not reported by species / reported nil interactions with seabirds/turtles |
| | NEI-FRESH | | | | | | |
| | INDIA | | | | | | NC too low for a fleet the size of India's; CE incomplete (3 months only) |
| | MADAGASCAR | | | | | | Reported by observer |
| | THAILAND | | | | | | |
| | BELIZE | | | | | | All CE reported for each vessel and month recorded in a single grid |
| | PHILIPPINES | | | | | | All sharks reported as Blue shark/ reported nil interactions with seabirds/turtles |
| | AUSTRALIA | | | | | | |
| | MALAYSIA | | | | | | All sharks reported as Blue shark/ reported nil interactions with seabirds/turtles |
| | VANUATU | | | | | | NC not reported by species |
| | MAURITIUS | | | | | | Reported nil interaction with sea turtles |
| Other Offshore & Coastal | INDONESIA | | | | n/a | | NC aggregated by species |
| | YEMEN AR RP | | | | n/a | | |
| | OMAN | | | | n/a | | NC/CE not by species |
| | IRAN I R | | | | n/a | | |
| | MADAGASCAR | | | | | | |
| | PAKISTAN | | | | n/a | | |
| | SRI LANKA | | | | n/a | | NC/CE not fully reported for all fleets |
| | BANGLADESH | | | | n/a | | |
| | UN ARAB EMIRATES | | | | n/a | | |
| | TANZANIA | | | | n/a | | |
| | MALAYSIA | | | | n/a | | NC/CE Not by species |
| | SAUDI ARABIA | | | | n/a | | |
| | ERITREA | | | | n/a | | |
| | KENYA | | | | n/a | | |
| | SUDAN | | | | n/a | | |
| | SEYCHELLES | | | | n/a | | NC/CE Not by species |
| | EGYPT | | | | n/a | | |
| | COMOROS | | | | n/a | | Under preparation (IOTC-OFCF Project) |
| | FRANCE-TERRITORIES | | | | n/a | | |
| | MAURITIUS | | | | n/a | | NC/CE Not by species |
| | EUROPEAN COMMUNITY | | | | n/a | | NC/CE Not by species |
| | AUSTRALIA | | | | n/a | | NC Not by species |
| | ERITREA | | | | n/a | | |
| | JORDAN | | | | n/a | | |
| | MALDIVES | | | | n/a | | Maldives banned catches of sharks in 2010 |
| | BAHRAIN | | | | n/a | | |
| | DJIBOUTI | | | | n/a | | |
| | SUDAN | | | | n/a | | |
| | KUWAIT | | | | n/a | | |
| | SOUTH AFRICA | | | | n/a | | |
| | EAST TIMOR | | | | n/a | | |
| | INDIA | | | | n/a | | |
| | KENYA | | | | n/a | | |
| | MOZAMBIQUE | | | | n/a | | |

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<br>Partially available<br>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<br>Statistics partially available from flag country<br>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 | 145.7 | 24 | | | | |
| | SEYCHELLES | 50.9 | 8 | | | | |
| | FRANCE-TERRITORIES | 29.0 | 5 | | | | |
| | IRAN I R | 5.1 | 7 | | | | |
| | AUSTRALIA | 4.5 | 5 | | | | |
| | KOREA REP | 2.9 | 3 | | | | |
| | JAPAN | 2.2 | 1 | | | | |
| | SUPPLY VESSELS-NEI | | 9 | | | | Reported by flag countries and/or third parties |
| LL | CHINA | 5.3 | 36 | | | | |
| | TAIWAN,CHINA | 81.5 | 370 | | | | |
| | INDONESIA | 48.7 | 1,278 | | | | |
| | JAPAN | 18.1 | 98 | | | | |
| | EUROPEAN COMMUNITY | 14.4 | 25 | | | | |
| | SEYCHELLES | 13.8 | 38 | | | | |
| | NEI-FRESH | 5.1 | 33 | | | | |
| | NEI-FROZEN | 4.0 | 10 | | | | |
| | OMAN | 2.9 | 8 | | | | |
| | INDIA | 2.8 | 24 | | | | |
| | PHILIPPINES | 2.7 | 14 | | | | |
| | KOREA REP | 2.3 | 7 | | | | |
| | TANZANIA | 1.9 | 8 | | | | |
| | SOUTH AFRICA | 1.2 | 13 | | | | |
| | MALAYSIA | 0.7 | 5 | | | | |
| | BELIZE | 0.6 | 6 | | | | |
| | MOZAMBIQUE | 0.5 | 1 | | | | |
| | THAILAND | 0.5 | 2 | | | | |
| | AUSTRALIA | 0.4 | 4 | | | | |
| | MADAGASCAR | 0.3 | 8 | | | | |
| | VANUATU | 0.3 | 2 | | | | |
| | MAURITIUS | 0.0 | 5 | | | | |
| Other Offshore & Coastal | INDONESIA | 248.4 | | | n/a | | |
| | IRAN I R | 209.5 | 6,753 | | | | |
| | INDIA | 179.5 | | | n/a | | |
| | SRI LANKA | 142.2 | 4,344 | | | | Number refers to high seas boats only |
| | MALDIVES | 100.7 | 750 | | | | |
| | PAKISTAN | 62.7 | | | | | |
| | YEMEN AR RP | 48.5 | | | n/a | | |
| | MALAYSIA | 30.2 | | | n/a | | |
| | OMAN | 28.4 | 19,943 | | n/a | | |
| | THAILAND | 14.6 | 991 | | n/a | | |
| | MADAGASCAR | 14.0 | | | n/a | | |
| | MYANMAR | 12.9 | | | n/a | | |
| | UN ARAB EMIRATES | 12.1 | | | n/a | | |
| | SAUDI ARABIA | 7.8 | | | n/a | | |
| | BANGLADESH | 6.4 | | | n/a | | |
| | TANZANIA | 5.7 | | | n/a | | |
| | COMOROS | 5.3 | | | n/a | | |
| | QATAR | 2.1 | | | n/a | | |
| | KENYA | 0.9 | | | n/a | | |
| | FRANCE-TERRITORIES | 0.8 | | | n/a | | |
| | ERITREA | 0.7 | | | n/a | | |
| | EGYPT | 0.6 | | | n/a | | |
| | AUSTRALIA | 0.3 | 46 | | n/a | | |
| | MAURITIUS | 0.2 | | | n/a | | |
| | EUROPEAN COMMUNITY | 0.2 | 198 | | n/a | | |
| | SEYCHELLES | 0.1 | | | n/a | | |
| | KUWAIT | 0.1 | | | n/a | | |
| | SUDAN | 0.1 | | | n/a | | |
| | JORDAN | 0.1 | | | n/a | | |
| | DJIBOUTI | 0.1 | | | n/a | | |
| | BAHRAIN | 0.0 | | | n/a | | |
| | SOUTH AFRICA | 0.0 | | | 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

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

Tables 3a-3f show the presumed quality of the nominal catches of tropical tunas, temperate tunas, billfish and neritic tunas for the last forty years (1973-2012), by species, and year (overall and by type of fishery). Keys to the scoring system used to assess the quality of the statistics available for each species are presented below. Figures 1a-1c show the proportion of nominal catches, catch and effort, and size frequency data that are presumed uncertain for the period 1973-2012, by main fleet and species group, including tropical and temperate tunas (i), billfish (ii), and neritic tunas (iii). 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 (2003-2012), all gears combined, is presented in Figures 2a-2e. Figures 3a-3e show the proportion of catches that are presumed uncertain for the period 1973-2012, by type of dataset, main fleet and fishery. It is important to note that the quality of the statistics for the last two years is likely to improve in the future, as more information is collected from the fisheries and reported to the Secretariat.

**Key to tables 3a-f and scoring system used to assess the quality of statistics of IOTC species available in the IOTC databases**

Key:

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

*e.g.;*

| Species | %Catch | YearYY |
|---|---|---|

$Species_1^n$ — % Catch, as defined above

- Availability and quality of **nominal catch** data
- Availability and quality of **catch-and-effort** data
- Availability and quality of **size frequency** data

Key to IOTC Scoring system

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

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

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

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

Key to colour coding

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

**Table 3a: Overall status of IOTC catch, effort, and size frequency statistics, by year and species (1973-2012)**

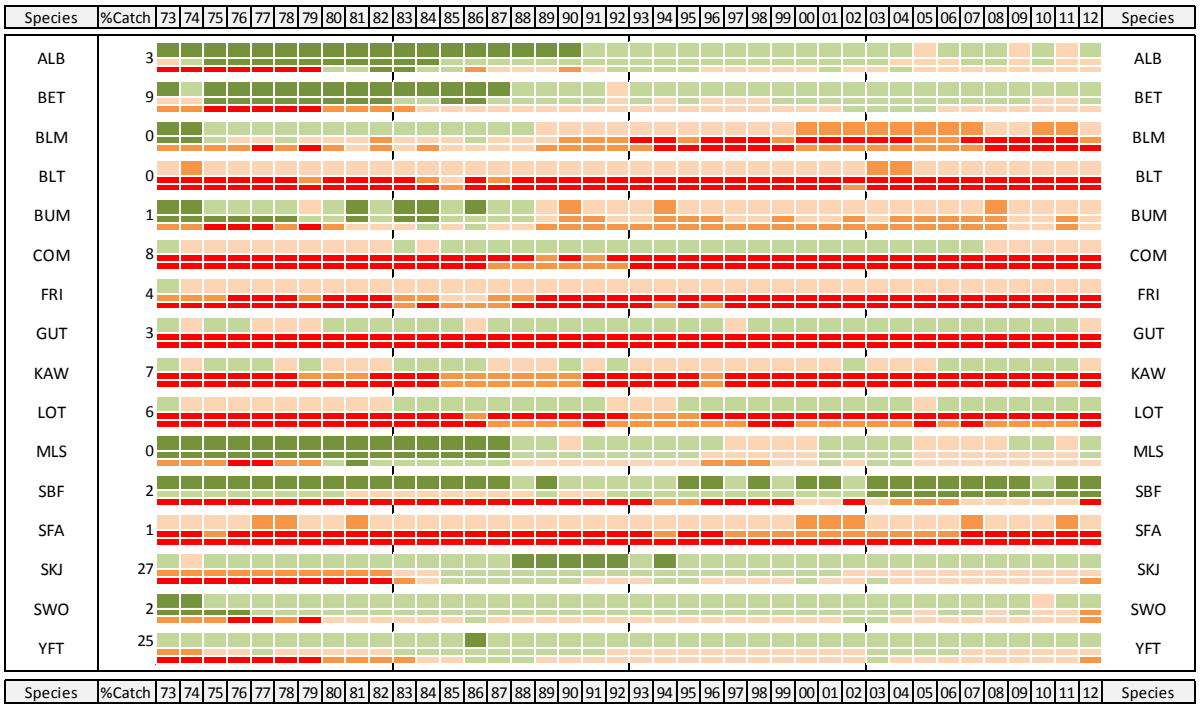
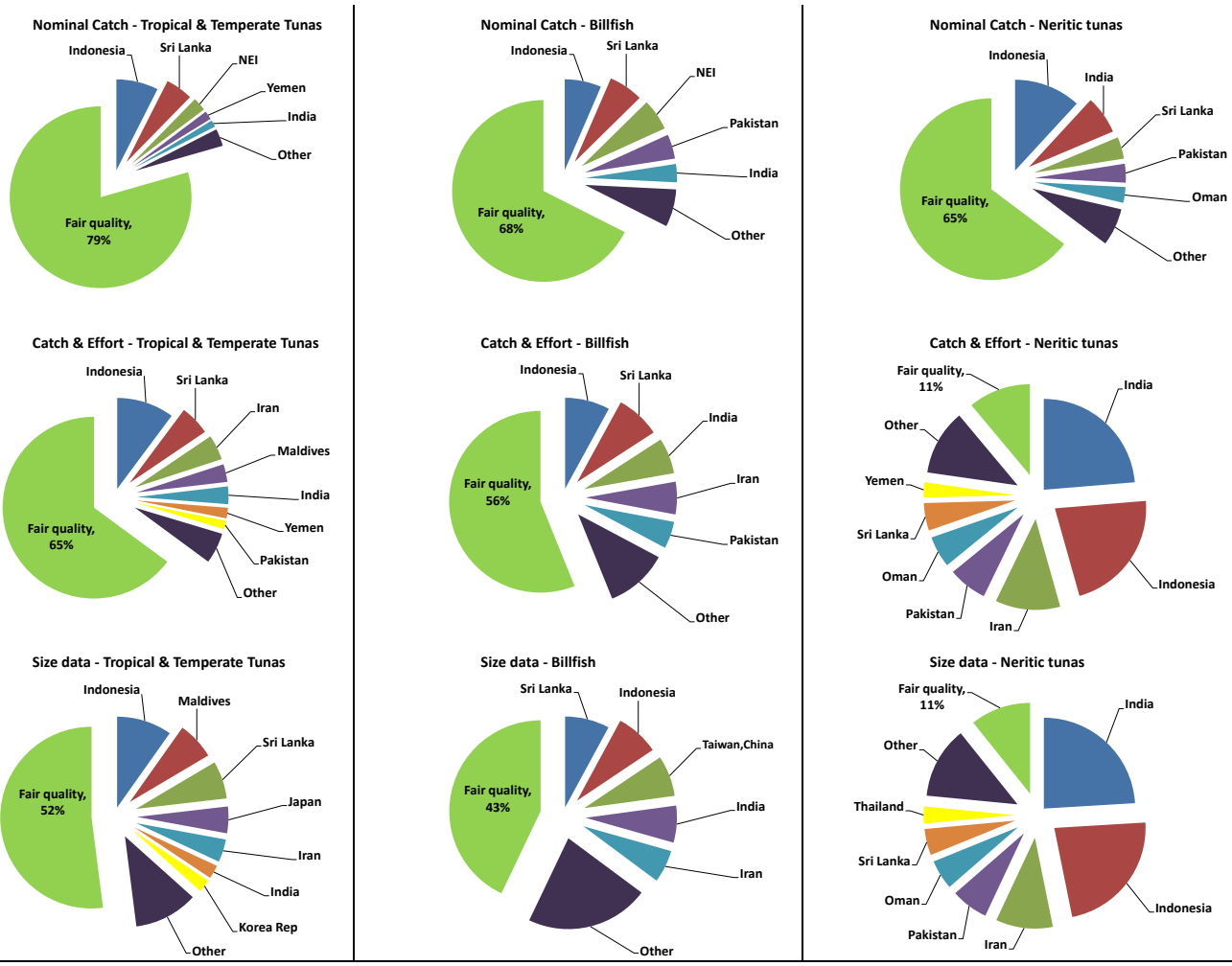



**Fig. 1a-i: Presumed uncertainty of the nominal catch (top), catch-and-effort (mid), and size data (bottom) available in the IOTC databases for tropical and temperate tunas (left), billfish (mid), and neritic tunas (right), and main fleets that contribute to that uncertainty, for the period 1973-2012 (all gears combined)**




***Surface fisheries: Purse seine***

**Table 3b: Status of IOTC catch statistics for purse seine fisheries, by year and species (1973-2012)**

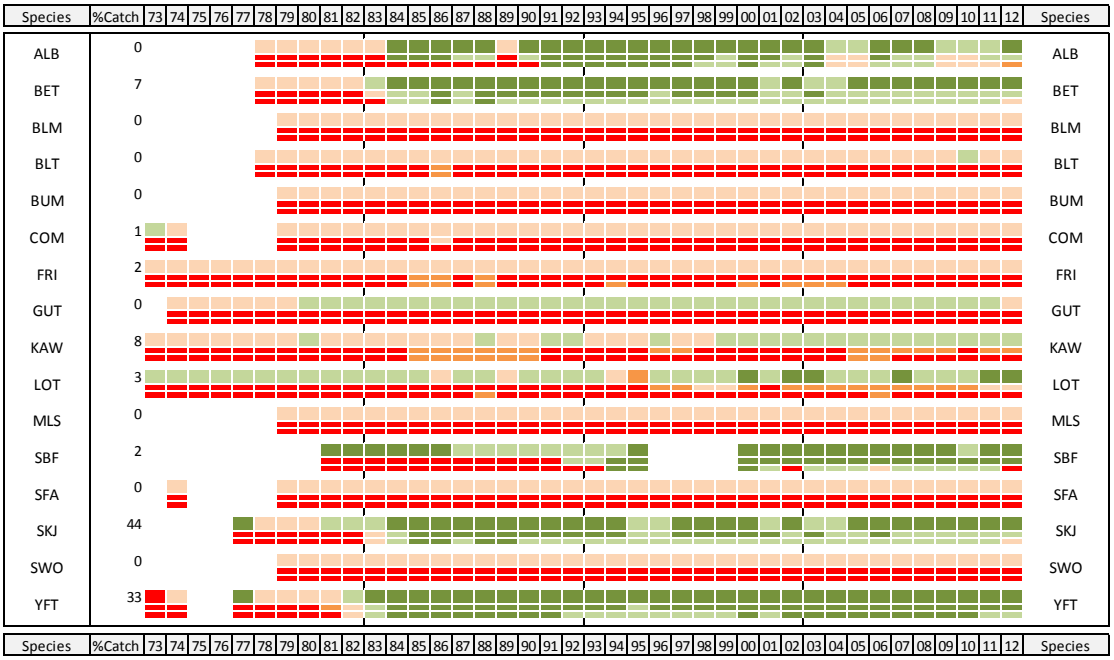



**Figure 2a: Contribution (in %) that the purse seine catches for each species group, and for all species combined, made out of the total catches of that same group, for all fisheries combined (2003-2012)**

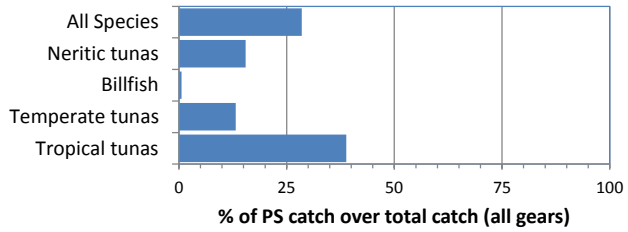
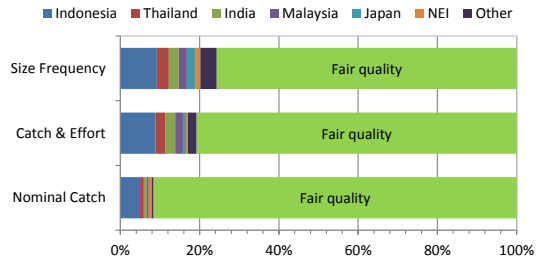



**Figure 3a: Amount of PS statistics (in %) presumed to be uncertain, by type of dataset and fleet, over the total PS catch (1973-2012)**




Overall, the nominal catches recorded for purse seine fisheries in the IOTC database are considered to be of **fair to good quality**, in particular for tropical and temperate tunas (Table 3b). Purse seiners target tropical tunas or neritic tunas, depending on the type of vessel, and area operated: over the last forty years (1973-2012) tropical tunas made 84% and neritic tunas 14% of the total purse seine catches (Table 3b).

During the last decade, **purse seine gears have reported around 30% of the catches of IOTC species in the Indian Ocean**, especially tropical tunas (≈40%), neritic tunas (≈15%), and temperate tunas (≈13%, the majority southern Bluefin tuna) (Figure 2a).

Over the last forty years (1973-2012), **92% of the nominal catches**, **81% of the catch-and-effort**, and **76% of the size frequency statistics** of purse seine fisheries recorded in the IOTC database are considered to be of **good quality** (Figure 3a). The statistics for the following purse seine fleets are considered to be of uncertain quality (1973-2012):

- **Indonesia**: 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, but the completeness and quality of the datasets reported remains uncertain. To date, Indonesia has not reported catch-and-effort and size data for its purse seine fisheries.
- **Thailand**: The catches of large and coastal purse seine vessels reported by Thailand are not fully by species; this affects the quality of the nominal catches and catch-and-effort of both tropical tunas and neritic tunas. To date, Thailand has not reported size data for its purse seine fisheries. The Thai large PS fleet is not operating any more in the Indian Ocean (in the Atlantic Ocean since July 2010).
- **India**: To date, India has not reported catch-and-effort and size data for its purse seine fisheries.
- **Malaysia**: To date, Malaysia has not reported size data for its purse seine fisheries.
- **Japan**: To date, Japan has not reported size data for its purse seine fisheries.
- **NEI**: 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. However, the amount of size data available for this fleet is very low.

### *Surface fisheries: Pole-and-line*

**Table 3c: Status of IOTC catch statistics for pole-and-line fisheries, by year and species (1973-2012)**


**Figure 2b: Contribution (in %) that the pole-and-line catches for each species group, and for all species combined, made out of the total catches of that same group, for all fisheries combined (2003-2012)**

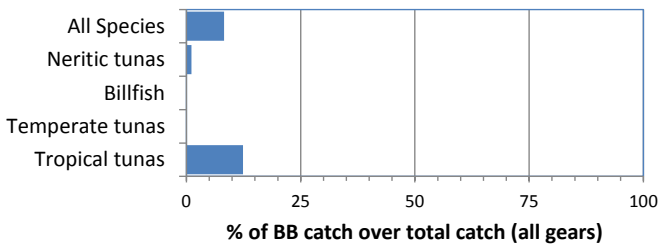
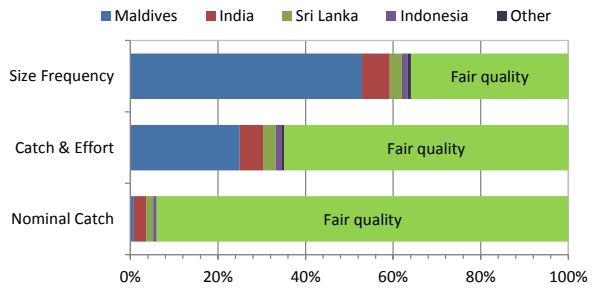



**Figure 3b: Amount of BB statistics (in %) presumed to be uncertain, by type of dataset and fleet, over the total BB catch (1973-2012)**




Overall, the nominal 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 in the Indian Ocean: over the last forty years (1973-2012) 94% of the baitboat catches were made of tropical tunas (Table 3c).

During the last decade, **pole-and-line gears caught around 8% of the IOTC species in the Indian Ocean**, especially tropical tunas (≈12%) (Figure 2b).

Over the last forty years (1973-2012), **94% of the nominal catches, 65% of the catch-and-effort**, and **36% of the size frequency statistics** of pole-and-line fisheries recorded in the IOTC database are considered to be of **good quality** (Figure 3b). The statistics for the following baitboat fleets are considered to be of uncertain quality (1973-2012):

- **Maldives**: A small proportion of the catches and catch and effort reported by Maldives are not by species, in particular some neritic tuna species. In addition, to date Maldives has not provided catch-and-effort and size data fully by the IOTC standards.
- **India** (Lakshadweep): 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. To date, India has not reported catch-and-effort and size data for its pole-and-line fisheries.
- **Sri Lanka:** The majority of the nominal catches reported by Sri Lanka are not by gear and some are not by species. To date, Sri Lanka has not reported catch-and-effort and size data for its pole-and-line fisheries.
- **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, but the completeness and quality of the datasets reported remains uncertain. To date, Indonesia has not reported catch-and-effort and size data for its pole-and-line fisheries.

## *Surface fisheries: Gillnet*

**Table 3d: Status of IOTC catch statistics for gillnet fisheries, by year and species (1973-2012)**

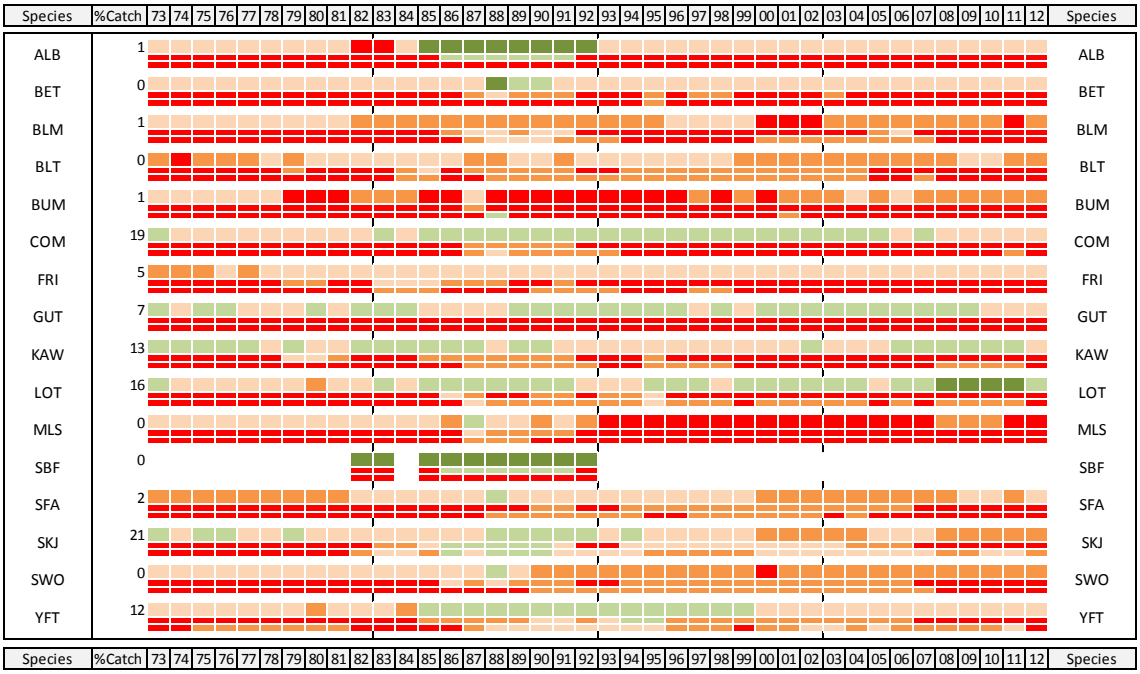



**Figure 2c: Contribution (in %) that the gillnet catches for each species group, and for all species combined, made out of the total catches of that same group, for all fisheries combined (2003-2012)**

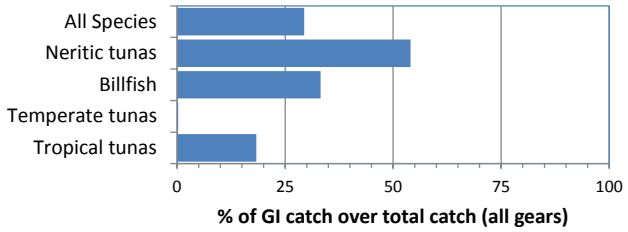
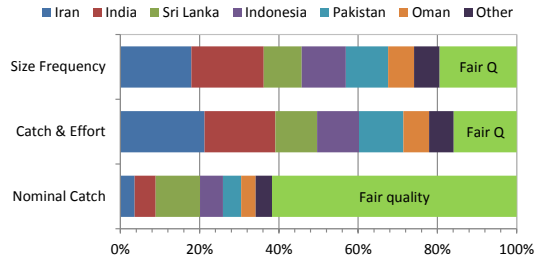



**Figure 3c: Amount of GI statistics (in %) presumed to be uncertain, by type of dataset and fleet, over the total GI catch (1973-2012)**




Overall, the nominal catches recorded for gillnet fisheries in the IOTC database are considered to be of **poor to fair quality,** depending on the fleet and time period (Table 3d). Over the last forty years (1973-2012) 60% of the gillnet catches were made of neritic tunas and 33% of tropical tunas (Table 3d).

During the last decade, **gillnet gears caught around 30% of the IOTC species in the Indian Ocean**, especially neritic tunas (≈55%), billfish (≈35%) and tropical tunas (≈20%) (Figure 2c).

Over the last forty years (1973-2012), **62% of the nominal catches, 16% of the catch-and-effort**, and **19% of the size frequency statistics** of gillnet fisheries recorded in the IOTC database are considered to be of **good quality** (Figure 3c). The statistics for the following gillnet fleets are considered to be of uncertain quality (1973-2012):

- **Iran**: To date Iran has not provided catch-and-effort and size data fully by the IOTC standards.
- **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. To date, India has not reported catch-and-effort and size data for its gillnet fisheries.
- **Sri Lanka**: Sri Lanka does not report catches fully by species; in particular, the catches of marlins are reported aggregated. To date, Sri Lanka has not provided catch-and-effort and size data fully by the IOTC standards.
- **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, but the completeness and quality of the datasets reported remains uncertain. To date, Indonesia has not reported catch-and-effort and size data for its gillnet fisheries.
- **Pakistan**: Pakistan does not report catches fully by species and has only reported catches to the IOTC in recent years. To date, Pakistan has not reported catch-and-effort and size data for its gillnet fisheries.
- **Oman**: Oman does not report catches fully by gear. To date, Oman has not provided catch-and-effort and size data fully by the IOTC standards.

### *Longline fisheries*

**Table 3e: Status of IOTC catch statistics for longline fisheries, by year and species (1973-2012)**

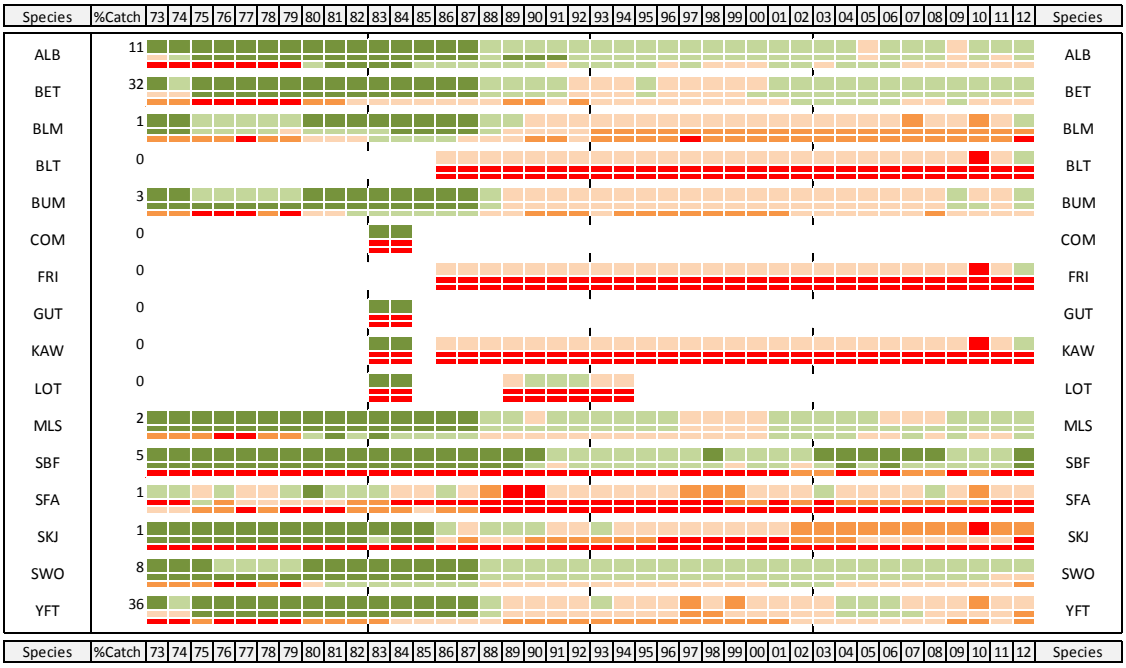



**Figure 2d: Contribution (in %) that the longline catches for each species group, and for all species combined, made out of the total catches of that same group, for all fisheries combined (2003-2012)**

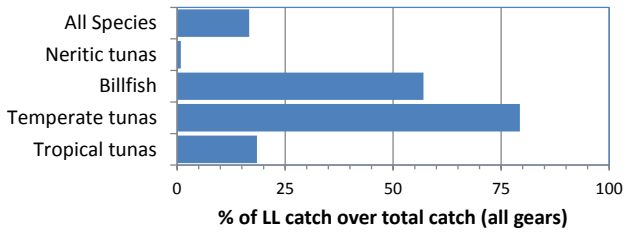
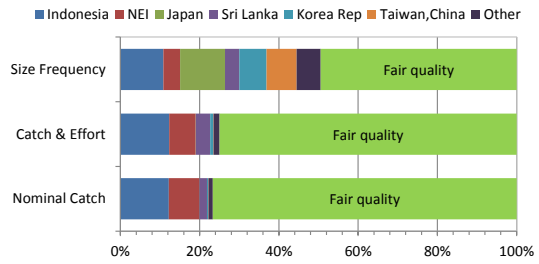



**Figure 3d: Amount of LL statistics (in %) presumed to be uncertain, by type of dataset and fleet, over the total LL catch (1973-2012)**




Overall, the catches recorded for longline fisheries in the IOTC database are considered to be of **good quality until the late-1980's and fair quality since then,** for most species (Table 3e). Over the last forty years (1973-2012), 69% of the longline catches were made of tropical tunas, 16% of temperate tunas and 15% of billfish (Table 3e).

During the last decade, **longline gears caught around 17% of the IOTC species in the Indian Ocean**, especially temperate tunas (≈79%), billfish (≈57%) and tropical tunas (≈18%) (Figure 2d).

Over the last forty years (1973-2012), **77% of the nominal catches, 75% of the catch-and-effort**, and **49% of the size frequency statistics** of longline fisheries recorded in the IOTC database are considered to be of **good quality** (Figure 3d). However, the quality of statistics in recent years has worsened, in particular as refers to the availability of catch-and-effort and size frequency data. The statistics for the following longline fleets are considered to be of uncertain quality (1973-2012):

- **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. To date, Indonesia has not reported catch-and-effort data for its longline fisheries and size data has not been reported as per the IOTC requirements.
- **NEI**: The Secretariat estimates the catches of deep-freezing 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. Catch-and-effort and size data are usually not available for this component, in particular deep-freezing longliners.
- **Sri Lanka**: Sri Lanka does not report catches by gear and, to date, Sri Lanka has not provided catch-and-effort and size data fully by the IOTC standards.
- **Japan, Republic of Korea, and Taiwan,China**: Japan, the Republic of Korea and Taiwan,China have not provided size data for their longline fisheries over the entire time series and, where size data are available, the amount of fish measured is often below the minimum number set by the Commission (one fish measurement per metric ton of catch, by species).

### *Hand line, trolling and other small-scale fisheries*

**Table 3f: Status of IOTC catch statistics for hand line, trolling and other small-scale line fisheries, by year and species (1973-2012)**

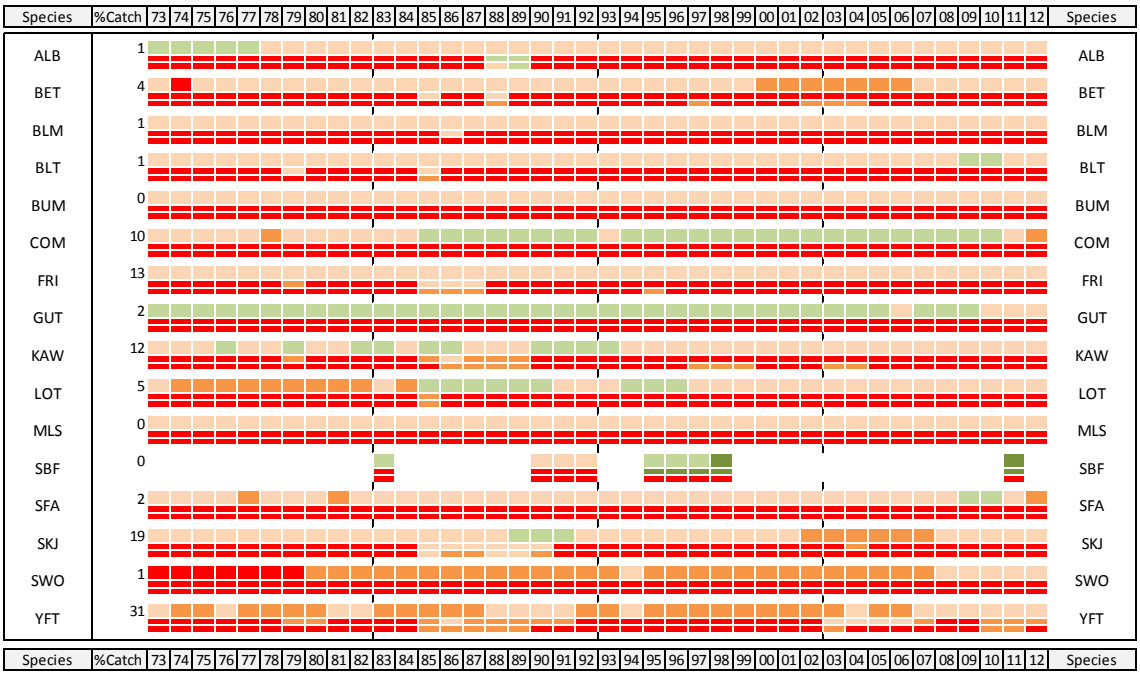



**Figure 2e: Contribution (in %) that the hand line, trolling and other NEI gears catches for each species group, and for all species combined, made out of the total catches of that same group, for all fisheries combined (2003-2012)**

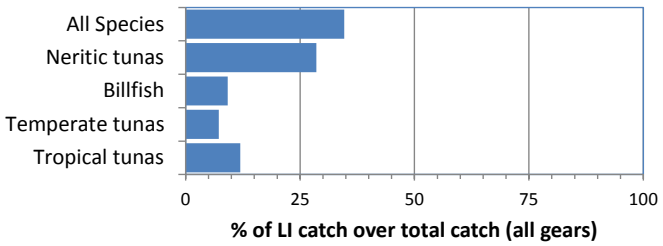
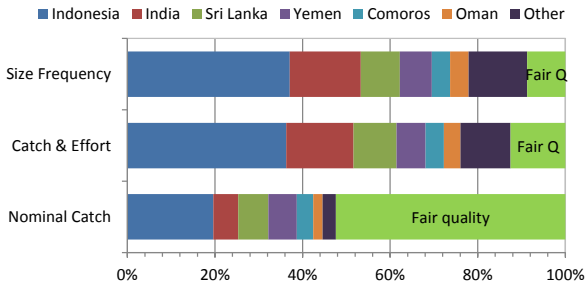



**Figure 3e: Amount of LI+OT statistics (in %) presumed to be uncertain, by type of dataset and fleet, over the total LI+OT catch (1973-2012)**




This category includes the catches of hand and troll lines and catches of other 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 quality** (Table 3f). Over the last forty years (1973-2012), 43% of the catches under line fisheries were made of neritic tunas and 54% of tropical tunas (Table 3f).

**Hand line, trolling and other unidentified gears catch around 35% of the IOTC species in the Indian Ocean**, especially neritic tunas (≈29%), tropical tunas (≈12%), and billfish (9%) (Figure 2e).

Over the last forty years (1973-2012), **52% of the nominal catches, 13% of the catch-and-effort**, and **9% of the size frequency statistics** of these fisheries recorded in the IOTC database are considered to be of **good quality** (Figure 3e). The catches for the following fleets are considered to be of uncertain quality (1973-2012):

- **Indonesia**: The Secretariat estimated catches for the handline and trolling fishery of Indonesia from the total aggregated catches reported by Indonesia; this affects the quality of the catches of both tropical tunas and neritic tunas. Since 2006 Indonesia has been reporting catches by gear and species to the Secretariat. To date, Indonesia has not reported catch-and-effort and size data for line and other NEI fisheries.
- **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. To date, India has not reported catch-and-effort and size data for line and other NEI fisheries.
- **Sri Lanka**: Sri Lanka does not report catches by gear and, to date, has not provided catch-and-effort and size data.
- **Yemen**: To date, Yemen has not reported statistics to the IOTC.
- **Comoros**: Comoros did not report statistics for the majority of the time-series.
- **Oman**: Oman does not report catches by gear and, to date, has not provided size data as per the IOTC requirements.

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

The 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. In 2013 the IOTC Secretariat worked with an independent Consultant to update previous estimates of input fishing capacity in the Indian Ocean and complete information for 2009 and following years. The study included a full review of the IOTC numbers of industrial vessels, as defined by the Commission[5], over the entire time-series; and an attempt to put together numbers of small-scale fishing craft fishing that fished for tunas in the Indian Ocean during the same period. The Report prepared by the Secretariat is available[6] and will be presented at the 16th Meeting of the IOTC Scientific Committee (Busan, December 2013).

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

- IOTC IUU list (IOTC Resolution 11/03);
- Identification, dimensions and other vessels attributes, by vessel, for those foreign vessels that owed fishing licenses to operate within the Economic Exclusive Zone (EEZ) of the reporting country (as specified in IOTC Resolution 13/07);
- Identification and total catches unloaded, by species and vessel, for those foreign vessels using ports in the territory of the reporting country (as specified in IOTC Resolution 10/11 & 05/03);
- Identification and total catches transhipped, by species and vessel, for vessels participating in the IOTC Transhipment Programme(as specified in IOTC Resolution 12/05);
- 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 estimates catches for countries that report only partial statistics for their fleets. This refers to the **catches of fleets of IOTC CPCs** that are not fully monitored by their flag states. The catches reported by these countries are assumed incomplete because the average catches estimated by vessel by year are significantly lower than those estimated for similar fleets of other countries, on the assumption that the same levels of activity apply to both fleets. This applies to the following fleets:

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

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

[6] G. Moreno & Herrera, M. (IOTC Secretariat), 2013. Estimation of fishing capacity by tuna fishing fleets in the Indian Ocean. Report presented at the 16th Meeting of the Scientific Committee of the Indian Ocean Tuna Commission, Busan, Republic of Korea, 2-6 December 2013. *IOTC–2013–SC16–INF04: 88 pp.*

- Longline fleet of **Tanzania**: Tanzania has never reported catches for the three longliners that operate under its flag.

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

***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. At present, this fleet is flagged mainly from the European Community, Seychelles, Iran, Japan and the Republic of Korea.

**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.

## 5. OTHER IOTC DATA HOLDINGS

### a. Biological data

The IOTC Secretariat compiles datasets and information relating to IOTC species and main species of sharks, as identified by the Commission, including the data used to derive standard measurements for IOTC species and other biological information of interest to the IOTC. The information available is summarized in a separate document[7].

### b. Observer data

The Secretariat has received limited information concerning the past and current sub-regional and national observer programmes in the Indian Ocean, the latest falling under the IOTC Regional Observer Scheme (cf. Resolution 11/04 *on a Regional Observer Scheme*). The information available is summarized in a document that will be presented at the 16th meeting of the IOTC Scientific Committee[8].

### c. Field sampling

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

[8] IOTC Secretariat, 2013. Update on the implementation of the IOTC Regional Observer Scheme. Document presented at the 16th Meeting of the Scientific Committee of the Indian Ocean Tuna Commission, Busan, Republic of Korea, 2-6 December 2013. *IOTC–2013–SC16–14.*

IOTC Resolution 11/04 contains also provisions covering the monitoring of artisanal fisheries: *"The number of the artisanal fishing vessels landings shall also be monitored at the landing place by field samplers*[9]*. The indicative level of the coverage of the artisanal fishing vessels should progressively increase towards 5% of the total levels of vessel activity (i.e. total number of vessel trips or total number of vessels active)."*

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

### d. Tagging data

Since 2002, the Secretariat has been coordinating and supervising the Indian Ocean Tuna Tagging Programme (IOTTP). This programme was a combination of a main tagging project, the Regional Tuna Tagging Project in the Indian Ocean (RTTP-IO), funded by the EU (9$^{th}$ EDF, DG-Dev), and several pilot and small-scale tuna tagging projects, funded by the DG-Fish (ex DG-Mare) and the government of Japan. During those projects, more than 200,000 tropical tuna -skipjack, yellowfin and bigeye - were tagged and released in the whole Indian Ocean. Tag recovery schemes have been developed and implemented in most of the coastal countries and in the main distant water fishing nations in order to ensure the reporting of a maximum of recaptured tagged tunas. As a result, around 35,000 tuna have been recaptured and reported to the Secretariat, which represent a global recovery rate of around 17%.

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.

[9]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 of recapture
- Place and process where found
- Name of the vessel (*confidential*)
- Name and details of recoverer (*confidential*)
- Reward given (*confidential*)
- Name of staff collecting data and checking data

The tagging data generated by the RTTP-IO and the broader IOTTP, have been used in the assessments of tropical tuna species since 2008. Growth curves for the three species and natural mortality rates have also been derived from the tagging data, and were updated for some species (growth for yellowfin and skipjack, exploitation rate and natural mortality for skipjack).