DATA COLLECTION AND SHARING

PREPARED BY: IOTC SECRETARIAT, 15 JANUARY 2015

REVIEW AREA: *Conservation and management*

GENERAL CRITERION: *Data collection and sharing*

DETAILED CRITERIA:

1) Extent to which the IOTC has agreed formats, specifications and timeframes for data submission, taking into account UNFSA Annex I;
2) Extent to which IOTC Members and Cooperating Non-Contracting Parties, individually or through the IOTC, collect and share complete and accurate fisheries data concerning target stocks and non-target species and other relevant data in a timely manner;
3) Extent to which fishing data and fishing vessel data are gathered by the IOTC and shared among Members and other RFMOs;
4) Extent to which the IOTC is addressing any gaps in the collection and sharing of data as required;
5) Extent to which the IOTC has set standards for the collection of socio-economic data from the fisheries, as specified in the IOTC Agreement; and extent to which this information is used to inform decisions from the Commission;
6) Extent to which the IOTC has set security and confidentiality standards and rules for sharing of sensitive science and operational/compliance data.

SUPPORTING INFORMATION

1. *Extent to which the IOTC has agreed formats, specifications and timeframes for data submission, taking into account UNFSA Annex I.*

Formats, specifications and timeframes for data submissions are described in the Commissions various management measures covering fisheries data and vessel information. In addition, the IOTC Secretariat has created Guidelines and forms to facilitate the submission of data by IOTC CPCs.

Supporting information:

English	French
Appendix I	Annexe I
http://iotc.org/sites/default/files/Guidelines_Data_Reporting_IOTC1.pdf	http://iotc.org/sites/default/files/Directives_pour_la_declaration_des_donnees_a_la_CTOI.pdf
http://www.iotc.org/data/requested-statistics-and-submission-forms	http://www.iotc.org/fr/donnees/statistiques-des-p%C3%AAches-exigibles-et-formulaires-de-d%C3%A9claration-des-donn%C3%A9es
http://www.iotc.org/compliance/reporting-templates	http://www.iotc.org/fr/application/mod%C3%A8les-pour-la-d%C3%A9claration

2. *Extent to which IOTC Members and Cooperating Non-Contracting Parties, individually or through the IOTC, collect and share complete and accurate fisheries data concerning target stocks and non-target species and other relevant data in a timely manner.*

The timeliness, completeness and accuracy of data submissions by IOTC members vary. The IOTC Secretariat has the role of coordinating the submissions, and storing and managing the data required by the Commission. In doing this, the IOTC Secretariat interacts with CPCs, providing guidelines for data reporting, email reminders for data submissions and some data checking.

Each year the IOTC Secretariat produces a report to the Commission on the extent to which CPCs (and some non-members) report data in accordance with IOTC Resolution 01/05 *Mandatory statistical requirements for IOTC Members* and other IOTC Resolutions that contain provisions for CPCs to report data to the IOTC (e.g. data on incidental catches).

Supporting information:

English	French
Appendix II	Annexe II
http://www.iotc.org/sites/default/files/documents/proceedings/2007/sc/IOTC-2007-SC-07%5BE%5D.pdf	http://www.iotc.org/fr/documents/rapport-de-la-dixi%C3%A8me-session-du-groupe-de-travail-de-la-ctoi-sur-la-collecte-des-donn%C3%A9e-0
http://www.iotc.org/sites/default/files/documents/2014/07/IOTC-2014-CODAWS01-RE.pdf	http://www.iotc.org/sites/default/files/documents/2014/07/IOTC-2014-CODAWS01-RF.pdf
http://www.iotc.org/sites/default/files/documents/2014/11/IOTC-2014-WPDCS10-INFO2_-_Data_revisions_2014.pdf	
http://www.iotc.org/sites/default/files/documents/2014/11/IOTC-2014-WPDCS10-08_IOTC_Capacity_Building.pdf	

3. *Extent to which fishing data and fishing vessel data are gathered by the RFMO and shared among members and other RFMOs.*

The IOTC Secretariat plays a major role in the dissemination of IOTC data. Public domain data are made available by request or via the IOTC website to:

- The public
- Scientists/RFMOs/NGO's with relevant requirements
- IOTC Working Parties, Scientific Committee, Compliance Committee, the Commission as requested

The Secretariat also has data exchange procedures with CCSBT as the CCSBT and IOTC Areas overlap.

Supporting information:

English	French
http://www.iotc.org/data/datasets	http://www.iotc.org/fr/donn%C3%A9es/bases-de-donn%C3%A9es
http://www.iotc.org/vessels	http://www.iotc.org/fr/navires
http://www.iotc.org/compliance/statistical-document-programme	http://www.iotc.org/fr/application/programme-de-document-statistique
http://www.iotc.org/compliance/iotc-regional-observer-programme	http://www.iotc.org/fr/application/programme-regional-observateurs-ctoi

4. *Extent to which the RFMO is addressing any gaps in the collection and sharing of data as required.*

The Secretariat undertakes considerable work to validate the data. This is currently not an official role mandated by the Commission but one that the IOTC Secretariat undertakes on its own initiative as it considers such work contributes greatly to understanding the accuracy of the data. While the Secretariat's ability to correct data errors and fill gaps is limited, the data in the IOTC databases are subjected to an ongoing review process with the aim of obtaining data of the highest quality and accuracy. The IOTC database is also constantly compared and corrected using published information; including national statistical bulletins, national reports presented at scientific meetings, papers published in various scientific publications and data from the FAO statistical yearbook. All the changes effected in respect of the data from reporting countries are made in consultation with the respective national liaison officers and are fully documented.

The IOTC Secretariat also:

- has an ongoing programme to estimate unreported catches

- provides comprehensive reports on the status of the IOTC databases, including areas for improvements to the IOTC's technical bodies and the Commission
- is involved in various projects to improve fisheries data collection, management and storage.

Supporting information:

English	French
Appendix III	Annexe III
http://www.iotc.org/sites/default/files/documents/2014/11/IOTC-2014-WPDCS10-INFO2_-_Data_revisions_2014.pdf	
http://www.iotc.org/sites/default/files/documents/2014/07/IOTC-2014-WPTmT05-INF02_-_ALB_catch_est_WS.pdf	
http://www.iotc.org/sites/default/files/documents/2014/12/IOTC-2014-WPDCS10-INF03_-_TWN_Length_Review.pdf	
http://www.iotc.org/sites/default/files/documents/2014/11/IOTC-2014-WPDCS10-08_IOTC_Capacity_Building.pdf	
http://www.iotc.org/sites/default/files/documents/2014/11/IOTC-2014-WPDCS10-INF01_-_Report_on_Fishing_Capacity.pdf	

5. *Extent to which the IOTC has set standards for the collection of socio-economic data from the fisheries, as specified in the IOTC Agreement; and extent to which this information is used to inform decisions from the Commission.*

To date, the IOTC has not set standards for the collection of socio-economic data. While the IOTC Secretariat has produced forms to facilitate reporting of fish prices by IOTC CPCs, on a voluntary basis, to date levels of reporting have been very low.

Supporting information:

English	French
http://www.iotc.org/sites/default/files/documents/data/Form_7PR.zip	http://www.iotc.org/sites/default/files/documents/data/Form_7PR.zip

6. *Extent to which the IOTC has set security and confidentiality standards and rules for sharing of sensitive science and operational/compliance data.*

The IOTC adopted a new data confidentiality policy in 2012, which represent an extension to previous data confidentiality rules and procedures (1998). The new policy incorporates provisions for the handling and dissemination of all data managed at the IOTC Secretariat. Data in the IOTC databases that are not for release are flagged so as this information is only disseminated when the procedures indicated have been completed and approved by the IOTC Executive Secretary. What are lacking are confidentiality standards for sharing of research data collected under IOTC.

Supporting information:

English	French
http://www.iotc.org/cmm/resolution-1202-data-confidentiality-policy-and-procedures	http://www.iotc.org/fr/mcg/r%C3%A9solution-1202-politique-et-proc%C3%A9dures-de-confidentialit%C3%A9-des-donn%C3%A9es-statistiques

APPENDIX 1

UNSFA

Annex I STANDARD REQUIREMENTS FOR THE COLLECTION AND SHARING OF DATA

Article 1 General principles

1. The timely collection, compilation and analysis of data are fundamental to the effective conservation and management of straddling fish stocks and highly migratory fish stocks. To this end, data from fisheries for these stocks on the high seas and those in areas under national jurisdiction are required and should be collected and compiled in such a way as to enable statistically meaningful analysis for the purposes of fishery resource conservation and management. These data include catch and fishing effort statistics and other fishery-related information, such as vessel-related and other data for standardizing fishing effort. Data collected should also include information on non-target and associated or dependent species. All data should be verified to ensure accuracy. Confidentiality of non-aggregated data shall be maintained. The dissemination of such data shall be subject to the terms on which they have been provided.

2. Assistance, including training as well as financial and technical assistance, shall be provided to developing States in order to build capacity in the field of conservation and management of living marine resources. Assistance should focus on enhancing capacity to implement data collection and verification, observer programmes, data analysis and research projects supporting stock assessments. The fullest possible involvement of developing State scientists and managers in conservation and management of straddling fish stocks and highly migratory fish stocks should be promoted.

Article 2 Principles of data collection, compilation and exchange

The following general principles should be considered in defining the parameters for collection, compilation and exchange of data from fishing operations for straddling fish stocks and highly migratory fish stocks:

(a) States should ensure that data are collected from vessels flying their flag on fishing activities according to the operational characteristics of each fishing method (e.g., each individual tow for trawl, each set for long-line and purse-seine, each school fished for pole-and-line and each day fished for troll) and in sufficient detail to facilitate effective stock assessment;

(b) States should ensure that fishery data are verified through an appropriate system;

(c) States should compile fishery-related and other supporting scientific data and provide them in an agreed format and in a timely manner to the relevant subregional or regional fisheries management organization or arrangement where one exists. Otherwise, States should cooperate to exchange data either directly or through such other cooperative mechanisms as may be agreed among them;

(d) States should agree, within the framework of subregional or regional fisheries management organizations or arrangements, or otherwise, on the specification of data and the format in which they are to be provided, in accordance with this Annex and taking into account the nature of the stocks and the fisheries for those stocks in the region. Such organizations or arrangements should request non-members or non-participants to provide data concerning relevant fishing activities by vessels flying their flag;

(e) such organizations or arrangements shall compile data and make them available in a timely manner and in an agreed format to all interested States under the terms and conditions established by the organization or arrangement; and

(f) scientists of the flag State and from the relevant subregional or regional fisheries management organization or arrangement should analyse the data separately or jointly, as appropriate.

Article 3 Basic fishery data

1. States shall collect and make available to the relevant subregional or regional fisheries management organization or arrangement the following types of data in sufficient detail to facilitate effective stock assessment in accordance with agreed procedures:

(a) time series of catch and effort statistics by fishery and fleet;

(b) total catch in number, nominal weight, or both, by species (both target and non-target) as is appropriate to each fishery. [Nominal weight is defined by the Food and Agriculture Organization of the United Nations as the live-weight equivalent of the landings];

(c) discard statistics, including estimates where necessary, reported as number or nominal weight by species, as is appropriate to each fishery;

(d) effort statistics appropriate to each fishing method; and

(e) fishing location, date and time fished and other statistics on fishing operations as appropriate.

2. States shall also collect where appropriate and provide to the relevant subregional or regional fisheries management organization or arrangement information to support stock assessment, including:

(a) composition of the catch according to length, weight and sex;
(b) other biological information supporting stock assessments, such as information on age, growth, recruitment, distribution and stock identity; and
(c) other relevant research, including surveys of abundance, biomass surveys, hydro-acoustic surveys, research on environmental factors affecting stock abundance, and oceanographic and ecological studies.

Article 4 Vessel data and information

1. States should collect the following types of vessel-related data for standardizing fleet composition and vessel fishing power and for converting between different measures of effort in the analysis of catch and effort data:
(a) vessel identification, flag and port of registry;
(b) vessel type;
(c) vessel specifications (e.g., material of construction, date built, registered length, gross registered tonnage, power of main engines, hold capacity and catch storage methods); and
(d) fishing gear description (e.g., types, gear specifications and quantity).
2. The flag State will collect the following information:
(a) navigation and position fixing aids;
(b) communication equipment and international radio call sign; and
(c) crew size.

Article 5 Reporting

A State shall ensure that vessels flying its flag send to its national fisheries administration and, where agreed, to the relevant subregional or regional fisheries management organization or arrangement, logbook data on catch and effort, including data on fishing operations on the high seas, at sufficiently frequent intervals to meet national requirements and regional and international obligations. Such data shall be transmitted, where necessary, by radio, telex, facsimile or satellite transmission or by other means.

Article 6 Data verification

States or, as appropriate, subregional or regional fisheries management organizations or arrangements should establish mechanisms for verifying fishery data, such as:
(a) position verification through vessel monitoring systems;
(b) scientific observer programmes to monitor catch, effort, catch composition (target and non-target) and other details of fishing operations;
(c) vessel trip, landing and transshipment reports; and
(d) port sampling.

Article 7 Data exchange

1. Data collected by flag States must be shared with other flag States and relevant coastal States through appropriate subregional or regional fisheries management organizations or arrangements. Such organizations or arrangements shall compile data and make them available in a timely manner and in an agreed format to all interested States under the terms and conditions established by the organization or arrangement, while maintaining confidentiality of non-aggregated data, and should, to the extent feasible, develop database systems which provide efficient access to data.

2. At the global level, collection and dissemination of data should be effected through the Food and Agriculture Organization of the United Nations. Where a subregional or regional fisheries management organization or arrangement does not exist, that organization may also do the same at the subregional or regional level by arrangement with the States concerned.

APPENDIX 2

Report on IOTC data collection and statistics

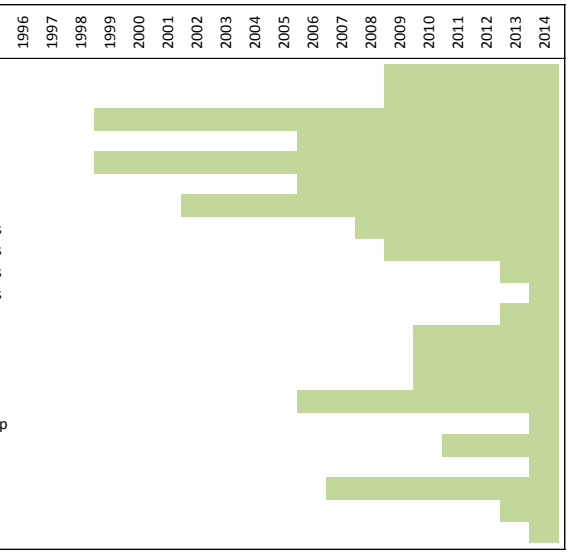
1. Summary of IOTC Data Requirements and timeline of implementation

Summary of IOTC Data Requirements applicable to species managed by the IOTC

Statistical Requirements Summary	Coastal fleets	Industrial surface and longline fleets		
	EEZ vessels less than 24 m LOA	Vessels with LOA ≥ 24 m and all high seas vessels		
Annual catches (NC+DI)	Nominal catches (weight) of IOTC Species, main species of pelagic sharks, and other bycatch, per IOTC Area, gear, species and Year			
	Discard levels IOTC species, sharks, seabirds, marine turtles, Cetaceans per IOTC Area, gear, species and Year (in number of weight)			
Active Crafts (FC)	Number of fishig craft per boat-gear type category per year	Individual vessel data for all fishing ships catching IOTC species		
Catch-and-Effort (CE)	CE Data by fishery (type of boat-gear), area and period	Surface fisheries: CE by fishery, 1° grid and month	#FADs [Anchored & Drifting: CE by 1° grid and month (PS-BB)]	Supply vessels Purse seine fishery: Effort 1° grid and month
		Longline fisheries: CE by fishery, 5° grid and month		
Size data (SF)	Individual lengths of IOTC species sampled, by fishery, species, 5° grid, and month			
Scientific observer data	Sample of catches in land to cover at least 5% vessel activities	Sample of catches at-sea to cover at least 5% fishing operations		
Socio-economic data	No standards have been set as yet			
Foreign fleets EEZ catch	Not applicable	CE data for foreign licensed fishing vessels (above CE standards)		

Timeline of implementation of IOTC Resolutions as an indication of the year since which they are in force.

	Resolution : Provisions on data	Applies to	
10/02	Minimum Data Requirements: NOMINAL CATCH	All Fisheries	IOTC species
			Main sharks
	Minimum Data Requirements: CATCH-AND-EFFORT	All Fisheries	IOTC species
			Main sharks
	Minimum Data Requirements: SIZE DATA	All Fisheries	IOTC species
			Main sharks
	Minimum Data Requirements: FADs and SUPPLIES	Purse seine	n/a
13/03	Minima data requirements LOGBOOK	Purse seine	IOTC and sharks
		Longline	IOTC and sharks
		Pole-and-line; Gillnet	IOTC and sharks
		Handline; Trolling	IOTC and sharks
13/08	FAD LOGBOOK and reporting requirements	Purse seine, Pole-and-Line	As 10/02
11/04	REGIONAL OBSERVER SCHEME	Coastal fleets	As 10/02
		Industrial fleets >=24m LOA	All species
		Industrial fleets <24m LOA	All species
05/05	Data requirements SHARKS	As 10/02	Main sharks
13/06	Data requirements OCEANIC WHITETIP SHARK	Authorized Vessels	Oceanic whitetip
12/09	Data requirements THRESHER SHARK	Authorized Vessels	Thresher sharks
13/05	Data requirements WHALE SHARK	Authorized Vessels	Whale shark
12/06	Data requirements SEABIRDS	Authorized Vessels	Seabirds
12/04	Data requirements MARINE TURTLES	Authorized Vessels	Marine turtles
13/04	Data requirements CETACEANS	Authorized Vessels	Cetaceans



2. Regional Workshop to support compliance with IOTC Data Requirements

In March 2014, a Regional Workshop to Support Compliance with IOTC Requirements for the Collection and Reporting of Fisheries Data to the IOTC was held in Flic en Flac, Mauritius. The workshop was organized in response to a request from the IOTC Scientific Committee for the IOTC Secretariat to assist IOTC CPCs to understand the IOTC data requirements.

The main objective of the workshop was to assess the performance of IOTC CPC's to comply with IOTC Mandatory Statistical Requirements and, where required, identify areas in which IOTC could assist its Members to ensure full compliance with IOTC Requirements for Statistics in the future. The IOTC Secretariat presented an overview of the procedures used at the Secretariat to process the information reported by the flag states and preparation of datasets for the assessments of stocks of IOTC and other species, as required by the Commission.

The Workshop identified a number of issues concerning the status of reporting of fisheries data to the IOTC, in particular –

- poor levels of reporting of fisheries data for the majority of coastal and industrial fisheries in developing coastal states in the IOTC Area, especially catch-and-effort, size frequency, and discard levels;

- poor implementation of provisions under the IOTC Regional Observer Scheme, concerning in particular the minimum levels of coverage set by the Commission for coastal and industrial fisheries;

- insufficient understanding of the IOTC data requirements and procedures required to prepare the IOTC datasets by most coastal countries.

In addition, the Workshop identified of a range of actions that could be implemented to address the issues identified, and recommended that the countries concerned address those recommendations as a matter of priority.

A copy of the Workshop report can be found at:

http://www.iotc.org/meetings/regional-workshop-support-compliance-iotc-requirements-collection-and-reporting-fisheries

Availability of IOTC Statistics for 2013

Tables 2i-2v (below) list the fleets for which the Secretariat received or estimated catches for the year 2013, with fleets are listed according to the size of their most recent catches. The tables show the standing of the nominal catch (NC), catch-and-effort (CE), size frequency (SF) received, in addition to the timeliness of reporting and source of data.

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 table (**2vi**). Brief comments on bycatch, discards and Fishing craft statistics and active vessels can also be found at the end of this section.

Timeliness and completeness of data

IOTC statistics were available for 17 fishing parties before the deadline of June 30 (cf. 18 in 2013). Partial statistics were provided in some cases. Requests were sent to over fifty countries[1] in March-April 2014. Second and third requests were needed in most cases. Levels of reporting concerning statistics for the years 2012 and 2013 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 four years (Sierra Leone; Yemen; Eritrea; Sudan; Guinea).

Table 1 shows the extent to which 2013 catch data was available in the IOTC Nominal Catches (NC) database by the deadline for data submission (30 June) and before the Working Party on Data Collection and Statistics Meeting (December 2013)2. 74% of the catch was available by 30 June and 89% of the catch was available by November. The proportion of statistics available for 2012 is shown for comparison. Levels of reporting for 2013 improved for size frequency data, but worsened for catch-and-effort data.

Fig. 1 shows levels of reporting of nominal catch (NC), catch-and-effort (CE), and size frequency data (SF) over the period 2003-2013, before the deadline for data submission. While levels of reporting seem to have slightly improved since 2003 they remain at low levels across all datasets and years.

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

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

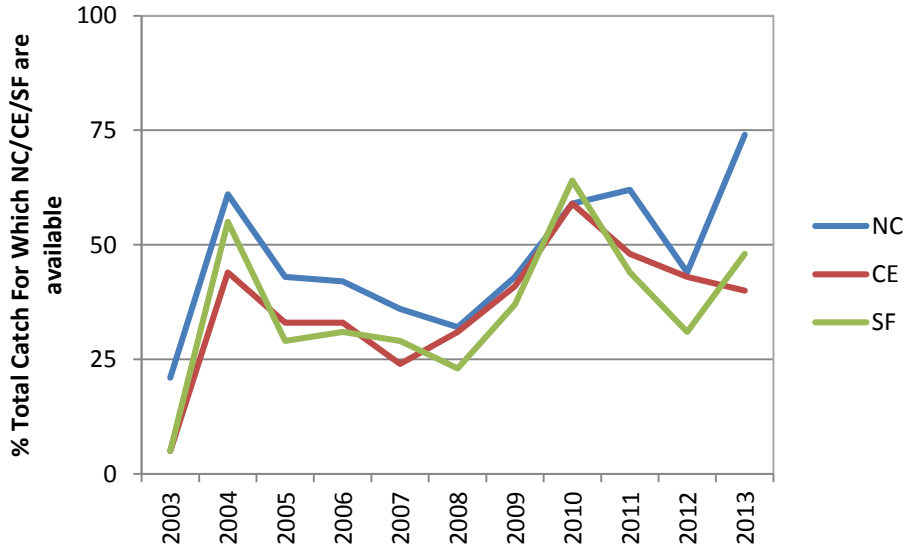
[2] Note that the IOTC Secretariat uses alternative sources to estimate the catches of non-reporting fleets; the percentages in this section represent the proportion that the NC, CE or SF available before the deadline or the SC represent over the totals estimated by the Secretariat. The amount of catches not reported is further reduced as countries that did not report statistics in time provide the missing datasets.

Table 1. Proportion of the NC, CE and SF statistics available at the IOTC Secretariat compared to the total catches estimated for 2013 (as of 15th November 2013).

Statistics available for 2013	Estim. Catch	NC		CE		SF	
		BD	WP	BD	WP	BD	WP
IOTC species (x1,000t)	1,695	1,254	1,503	681	814	805	834
%Available for 2013		74	89	40	48	48	49
%Available for 2012		44	90	43	58	31	43
Tropical tunas (x1,000t)	935	789	866	573	650	625	625
Temperate tunas (x1,000t)	44	41	42	30	31	29	29
Billfish (x1,000t)	94	64	78	38	41	24	24
Neritic tunas (x1,000t)	621	359	517	41	92	128	157

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)

Fig.1 Proportion of the NC, CE and SF statistics available before the deadline for data submission (30th June) at the IOTC Secretariat compared to the total catches estimated for 2003-2013.



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 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 2013[3]

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	Catch	Sps	NC	CE	SF	TI	SO	Comments
PS	EUROPEAN UNION	186.5	YS						
	SEYCHELLES	57.3	YS						
	FRANCE OT	25.8	YS						
	KOREA REP.	12.2	SY						
	IRAN ISLAMIC REP.	3.7	YS						SF not reported by IOTC grid
	SRI LANKA	2.0	SY						CE not reported by IOTC grid
	JAPAN	1.2	SB						
	MAURITIUS	0.9	SY						
	AUSTRALIA	0.0	S						
LL	CHINA	5.2	BY						Less than 1 fish measured per metric ton of catch
	TAIWAN,CHINA	34.0	BY						Less than 1 fish measured per metric ton of catch (fresh-tuna longliners)
	INDONESIA	28.0	YB						
	JAPAN	10.0	BY						Less than 1 fish measured per metric ton of catch
	SRI LANKA	9.9	YB						CE not reported by IOTC grid
	SEYCHELLES	7.7	BY						SF not reported for the deep freezing longline component
	NEI.FROZEN	5.2	BY						
	NEI.FRESH	3.7	YB						
	EUROPEAN UNION	1.6	BY						CE/SF EU-Spain only for Swordfish
	PHILIPPINES	1.1	BY						SF reported for BET only
	KOREA REP.	1.1	YB						Less than 1 fish measured per metric ton of catch (YFT)
	MALDIVES	1.0	YB						
	OMAN	0.9	Y						
	SOUTH AFRICA	0.3	YB						SF reported for foreign fishing vessels only
	THAILAND	0.3	BY						
	TANZANIA	0.3	YB						
	VANUATU	0.2	BY						
	MALAYSIA	0.1	YB						NC/CE not reported for Malay flagged vessels based outside Malaysia
	AUSTRALIA	0.1	BY						Less than 1 fish measured per metric ton of catch (YFT)
	MADAGASCAR	0.1	BY						
	BELIZE	0.0	BY						CE/SF for the same trip fully assigned to a unique IOTC Grid
	MAURITIUS	0.0	BY						
	FRANCE OT	0.0	BY						
	INDIA	0.0	Y						NC likely to be too low for a fleet the size of India's
Other fleets	MALDIVES	121.6	SY						Less than 1 fish measured per metric ton of catch
	INDONESIA	120.9	SY						
	SRI LANKA	91.7	SY						Data not fully reported by gear and species
	INDIA	68.9	YS						CE data only reported for India's pole-and-line fleet; not by Grid
	IRAN ISLAMIC REP.	63.7	SY						Less than 1 fish measured per metric ton of catch
	YEMEN	35.8	Y						
	PAKISTAN	11.6	YS						
	OMAN	7.7	Y						
	COMOROS	4.6	SY						Data collection resumed in 2014
	TANZANIA	3.6	Y						
	MOZAMBIQUE	2.1	B						
	MADAGASCAR	1.5	SY						
	FRANCE OT	0.8	SY						
	EUROPEAN UNION	0.2	SY						
	KENYA	0.1	YS						
	MAURITIUS	0.1	YS						
	JORDAN	0.0	SY						
	UK.TERRITORIES	0.0	Y						
	MALAYSIA	0.0	S						
	EAST TIMOR	0.0	Y						
	SOUTH AFRICA	0.0	Y						
	SEYCHELLES	0.0	Y						
	AUSTRALIA	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)
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] Note that Table 4 disregards blank reports, i.e. fishing parties that did not report statistics for a species group are not shown in the corresponding table.

2ii – Temperate tunas (ALB, SBF)

Gear	Fleet	Availability of statistics					TI	SO	Comments
		Catch	Sps	NC	CE	SF			
PS	AUSTRALIA	4.2	S						
	EUROPEAN UNION	0.3	A						
	FRANCE OT	0.1	A						
	SEYCHELLES	0.0	A						
	KOREA REP.	0.0	A						
LL	CHINA	1.0	A						Less than 1 fish per metric ton measured
	TAIWAN,CHINA	18.4	A						Less than 1 fish per metric ton measured on fresh-tuna longliners
	INDONESIA	7.8	A						
	JAPAN	3.2	AS						Size data from observer programme
	NEI.FRESH	1.4	A						
	KOREA REP.	1.0	AS						Size data from observer programme
	MALAYSIA	0.9	A						Data does not include activities of Malaysia flagged vessels in the East
	EUROPEAN UNION	0.5	A						CE/SF EU-Spain only reported Swordfish
	NEI.FROZEN	0.4	A						
	SEYCHELLES	0.3	A						
	PHILIPPINES	0.2	A						
	TANZANIA	0.2	A						
	MADAGASCAR	0.1	A						
	BELIZE	0.0	A						All CE/SF reported for each vessel and month recorded in a single grid
	SOUTH AFRICA	0.0	AS						SF reported for foreign vessels only
	AUSTRALIA	0.0	A						
	VANUATU	0.0	A						
	FRANCE OT	0.0	A						
	MAURITIUS	0.0	A						
	MALDIVES	0.0	A						
	THAILAND	0.0	A						
	INDIA								NC too low for a fleet the size of India's; CE incomplete (3 months only)
OTH	INDONESIA	3.2	A						Species and gear breakdown inconsistent over the time series
	EUROPEAN UNION	0.2	A						
	MAURITIUS	0.2	A						
	COMOROS	0.0	A						
	MOZAMBIQUE	0.0	A						
	SOUTH AFRICA	0.0	A						
	AUSTRALIA	0.0	A						

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			
	IRAN ISLAMIC REP.	0.2	MF						
	KOREA REP.	0.0	M						
LL	CHINA	1.0	SM						SF not reported for all billfish species
	TAIWAN,CHINA	11.8	SM						Less than 1 fish per metric ton measured on fresh-tuna longliners
	INDONESIA	8.0	SM						
	EUROPEAN UNION	7.8	SM						EU-Spain: CE/SF only for SWO
	SRI LANKA	4.6	SM						CE not by IOTC standard
	SEYCHELLES	1.8	SM						SF not reported for the deep-freezing longline component
	NEI.FROZEN	1.6	SM						
	JAPAN	1.1	SM						Less than 1 fish per metric ton measured; data from observers
	TANZANIA	0.8	SM						
	NEI.FRESH	0.5	MS						
	SOUTH AFRICA	0.3	SM						SF reported for foreign fleet only
	AUSTRALIA	0.2	SM						Less than 1 fish per metric ton measured;
	MALDIVES	0.2	SM						
	KOREA REP.	0.1	SM						SF from observers program
	PHILIPPINES	0.1	SM						
	MADAGASCAR	0.1	SM						
	VANUATU	0.1	SM						
	THAILAND	0.1	SM						
	OMAN	0.1	FM						
	MALAYSIA	0.1	MS						Data does not include activities of Malaysia flagged vessels in the East
	MAURITIUS	0.0	SM						SF reported for SWO only
	FRANCE OT	0.0	S						
	BELIZE	0.0	MS						All CE/SF reported for each vessel and month recorded in a single grid
	INDIA	0.0	FM						NC too low for a fleet the size of India's; CE incomplete (3 months only)
Other fleets	IRAN ISLAMIC REP.	14.1	FM						CE not reported by IOTC standard
	PAKISTAN	10.1	FM						
	INDIA	9.9	FM						
	SRI LANKA	8.2	FS						Data not fully reported by gear and species
	INDONESIA	4.4	MF						Species and gear breakdown inconsistent over the time series
	OMAN	3.1	FM						
	TANZANIA	1.4	F						
	MADAGASCAR	0.8	F						
	UN. ARAB EMIRATES	0.5	F						
	YEMEN	0.4	F						
	MALDIVES	0.4	F						NC/CE aggregated by species group
	COMOROS	0.3	SM						NC/CE/SF under preparation (IOTC-OFCF Project)
	KENYA	0.1	F						
	EUROPEAN UNION	0.1	SM						
	SEYCHELLES	0.0	M						
	SAUDI ARABIA	0.0	F						
	FRANCE OT	0.0	F						
	UK.TERRITORIES	0.0	F						
	MOZAMBIQUE	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)
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 ISLAMIC REP.	1.5	L						CE and SF not reported by IOTC grid
	SEYCHELLES	0.0	F						Statistics incomplete; refers mostly to discards
	EUROPEAN UNION	0.0	F						Statistics incomplete; refers mostly to discards
LL	SRI LANKA	0.1	C						CE not by IOTC standard
Other fleets	INDONESIA	190.4	FC						Species and gear breakdown inconsistent over the time series
	IRAN ISLAMIC REP.	126.5	LK						CE not reported by month; SF: less than 1 fish measured per mt
	INDIA	106.8	KC						
	PAKISTAN	36.7	KL						
	MALAYSIA	29.0	LK						Report size data for KAW only
	SRI LANKA	23.5	FK						Data not fully reported by gear and species
	OMAN	22.5	LK						
	YEMEN	17.8	KC						
	THAILAND	15.1	KL						
	MYANMAR	12.9	X						
	UN. ARAB EMIRATES	9.6	C						
	SAUDI ARABIA	6.8	CK						
	MADAGASCAR	6.0	CK						
	TANZANIA	4.1	CK						
	MOZAMBIQUE	3.2	CK						
	BANGLADESH	3.0	X						
	QATAR	1.8	C						
	MALDIVES	1.6	KF						
	EGYPT	0.5	KC						
	COMOROS	0.3	K						NC/CE/SF under preparation (IOTC-OFCF Project)
	DJIBOUTI	0.3	X						
	AUSTRALIA	0.3	C						
	KENYA	0.2	CK						
	SEYCHELLES	0.2	K						
	BAHRAIN	0.2	K						
	KUWAIT	0.1	C						
	ERITREA	0.1	C						
	EUROPEAN UNION	0.1							
	JORDAN	0.1							
	SUDAN	0.0							
	UK.TERRITORIES	0.0							
	MAURITIUS	0.0							

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 marine turtles*

Gear	Fleet	Species							Comments
		Sharks			ALV	OCS	Sea Birds	Marine Turtles	
		NC	CE	SF					
PS	EUROPEAN UNION						n/a		Catches of sharks and marine turtles as reported by observers (not raised)
PS	SEYCHELLES						n/a		
PS	FRANCE OT						n/a		Catches of sharks and marine turtles as reported by observers (not raised)
PS	IRAN I R						n/a		
PS	AUSTRALIA						n/a		
PS	JAPAN						n/a		
PS	KOREA REP						n/a		NC refers only to discards of silky shark
PS	SRI LANKA						n/a		
PS	MAURITIUS						n/a		
LL	CHINA TAIWAN,CHINA								
LL	EUROPEAN UNION								EU-France: NC/CE not by species; EU-Spain: no CE/SF data reported
LL	INDONESIA								ALV/OCS Fate of the sharks not specified
LL	JAPAN								
LL	SRI LANKA								CE not by IOTC grid; ALV/OCS Fate of the sharks not specified
LL	TANZANIA								
LL	OMAN								NC/CE not reported by species
LL	KOREA REP								ALV Fate of the sharks not specified
LL	SOUTH AFRICA								Discards of Seabirds and marine turtles reproted for foreign fleets
LL	SEYCHELLES								OCS Fate of the sharks not specified
LL	NEI-FROZEN								
LL	MOZAMBIQUE								
LL	NEI-FRESH								
LL	INDIA								NC/CE not by species; ALV/OCS reported for research boats
LL	FRANCE OT								
LL	MADAGASCAR								
LL	MALDIVES								
LL	THAILAND								
LL	BELIZE								CE/SF for the same trip fully assigned to a unique IOTC Grid
LL	PHILIPPINES								Refers only to Blue shark
LL	AUSTRALIA								
LL	MALAYSIA								NC/CE not by species
LL	VANUATU								
LL	MAURITIUS								NC not by species / CE refers only to shortfin mako
Other Offshore & Coastal	INDONESIA				n/a	n/a	n/a	n/a	NC not by species
Other Offshore & Coastal	YEMEN AR RP				n/a	n/a	n/a	n/a	
Other Offshore & Coastal	OMAN				n/a	n/a	n/a	n/a	NC/CE not by species
Other Offshore & Coastal	IRAN I R						n/a		
Other Offshore & Coastal	MADAGASCAR				n/a	n/a	n/a	n/a	
Other Offshore & Coastal	PAKISTAN				n/a	n/a	n/a	n/a	
Other Offshore & Coastal	SRI LANKA						n/a		NC/CE not reported for all fishing activities
Other Offshore & Coastal	BANGLADESH				n/a	n/a	n/a	n/a	
Other Offshore & Coastal	UN ARAB EMIRATES				n/a	n/a	n/a	n/a	
Other Offshore & Coastal	TANZANIA				n/a	n/a	n/a	n/a	
Other Offshore & Coastal	MALAYSIA				n/a	n/a	n/a	n/a	NC/CE not by species
Other Offshore & Coastal	SAUDI ARABIA				n/a	n/a	n/a	n/a	
Other Offshore & Coastal	ERITREA				n/a	n/a	n/a	n/a	
Other Offshore & Coastal	KENYA				n/a	n/a	n/a	n/a	
Other Offshore & Coastal	SUDAN				n/a	n/a	n/a	n/a	
Other Offshore & Coastal	SEYCHELLES				n/a	n/a	n/a	n/a	NC/CE not by species
Other Offshore & Coastal	EGYPT				n/a	n/a	n/a	n/a	
Other Offshore & Coastal	COMOROS				n/a	n/a	n/a	n/a	
Other Offshore & Coastal	FRANCE OT				n/a	n/a	n/a	n/a	
Other Offshore & Coastal	MAURITIUS				n/a	n/a	n/a	n/a	
Other Offshore & Coastal	EUROPEAN UNION				n/a	n/a	n/a	n/a	NC/CE Not by species
Other Offshore & Coastal	AUSTRALIA				n/a	n/a	n/a	n/a	
Other Offshore & Coastal	ERITREA				n/a	n/a	n/a	n/a	
Other Offshore & Coastal	JORDAN				n/a	n/a	n/a	n/a	
Other Offshore & Coastal	MALDIVES						n/a		Maldives banned catches of sharks in 2010
Other Offshore & Coastal	BAHRAIN				n/a	n/a	n/a	n/a	
Other Offshore & Coastal	DJIBOUTI				n/a	n/a	n/a	n/a	
Other Offshore & Coastal	SUDAN				n/a	n/a	n/a	n/a	
Other Offshore & Coastal	KUWAIT				n/a	n/a	n/a	n/a	
Other Offshore & Coastal	SOUTH AFRICA				n/a	n/a	n/a	n/a	
Other Offshore & Coastal	EAST TIMOR				n/a	n/a	n/a	n/a	
Other Offshore & Coastal	INDIA				n/a	n/a	n/a	n/a	
Other Offshore & Coastal	KENYA				n/a	n/a	n/a	n/a	
Other Offshore & Coastal	MOZAMBIQUE				n/a	n/a	n/a	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

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

Measures for seabirds and marine turtles apply only to CPCs having vessels authorized to operate in the IOTC Area of Competence.

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 UNION	186.8	23				
	SEYCHELLES	57.3	7				
	FRANCE OT	25.9	4				
	KOREA REP.	12.3	4				
	IRAN ISLAMIC REP.	5.7	7				
	AUSTRALIA	4.2	6				
	SRI LANKA	2.0	8				
	JAPAN	1.2	1				
	MAURITIUS	0.9	1				
	SUPPLY VESSELS-NEI		10				Reported by flag countries and/or third parties
LL	CHINA	7.5	36				
	TAIWAN,CHINA	69.9	451				
	INDONESIA	49.1	1,238				
	EUROPEAN UNION	16.4	52				
	SRI LANKA	15.8	7				
	JAPAN	15.5	72				
	SEYCHELLES	12.1	40				
	NEI.FROZEN	8.0	9				
	NEI.FRESH	6.3	34				
	KOREA REP.	2.4	9				
	TANZANIA	2.0	5				
	PHILIPPINES	1.5	9				
	MALAYSIA	1.2	5				
	MALDIVES	1.2	7				
	OMAN	1.2	9				
	SOUTH AFRICA	1.1	10				
	MADAGASCAR	0.4	8				
	VANUATU	0.4	3				
	AUSTRALIA	0.4	4				
	THAILAND	0.3	2				
	BELIZE	0.1	3				
	MAURITIUS	0.1	3				
	INDIA	0.0	7				
	SENEGAL	Nil	0				No activity
	SIERRA LEONE						No information
	GUINEA						No information
Other Offshore & Coastal	INDONESIA	343.7			n/a		
	IRAN ISLAMIC REP.	220.7	6,748				
	INDIA	192.7			n/a		
	SRI LANKA	143.0	4,279				Number refers to high seas boats only
	MALDIVES	123.7					
	YEMEN	67.8					
	PAKISTAN	63.5			n/a		
	OMAN	41.1	22,420		n/a		
	MALAYSIA	30.2	20,966		n/a		
	TANZANIA	15.3			n/a		
	THAILAND	15.1	1,015		n/a		
	MADAGASCAR	14.0			n/a		
	MYANMAR	12.9			n/a		
	UN. ARAB EMIRATES	11.4			n/a		
	COMOROS	8.1			n/a		
	SAUDI ARABIA	7.9			n/a		
	BANGLADESH	6.9			n/a		
	MOZAMBIQUE	5.4			n/a		
	QATAR	2.4			n/a		
	EUROPEAN UNION	1.5	151		n/a		
	KENYA	1.1			n/a		
	EGYPT	0.5			n/a		
	DJIBOUTI	0.4			n/a		
	ERITREA	0.3			n/a		
	AUSTRALIA	0.3	45		n/a		
	SEYCHELLES	0.3			n/a		
	MAURITIUS	0.2			n/a		
	FRANCE OT	0.1			n/a		
	BAHRAIN	0.2			n/a		
	KUWAIT	0.1			n/a		
	SUDAN	0.1			n/a		
	JORDAN	0.1			n/a		
	UK.TERRITORIES	0.0	47		n/a		
	EAST TIMOR	0.0			n/a		
	SOUTH AFRICA	0.0			n/a		
	SOMALIA				n/a		No information

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

- **FADs and supply vessels**: Japan voluntarily reported information on FADs and supply vessels, as requested in IOTC Resolution 13/08. EU-Spain and EU-France provided information on the amount of Fish Aggregating Devices (FADs) set by purse seiners under its flag, by type and quarter, for 2010-2013. In addition, EU-Spain provided information on the activity of supply vessels for 2009-13, and EU-France 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, or activities of supply vessels (including Seychelles, Iran, South Korea, Mauritius, Sri Lanka, and Indonesia).
- **By-catch levels**: Some CPCs (Iran, Sri Lanka, Maldives, EU-PS, Australia, Korea, South Africa, EU-UK) provided partial estimates of bycatch levels for their fisheries for 2013, including bycatch levels for sharks, seabirds or marine turtles. In spite of the better reporting levels recorded for bycatch data during 2014, 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.

2vii – Discards

Fleet	Gear type	Units	Catch (species or species group and numbers or kg of bycatch reported as recorded in column Units)
EU-Portugal	Longline		
EU-France	Purse Seine	# fish	Baleen whales nei (80), Green turtle (36), Hawksbill turtle (14), Loggerhead turtle (7), Marine turtles (7), Olive Ridley turtle (14), whale sharks (14)
		kg	Mackerel scad (86), Great barracuda (23), Ocean triggerfish (283), Silky shark (334), Tripletail (9)
France-OT	Purse Seine		nil
Australia	Longline	# Fish	Albacore tuna (171), Bigeye tuna (205), Black Marlin (62), Indo-Pacific Blue Marlin (11), Seerfishes NEI* (5), Skipjack (1), Swordfish (114) ,Tunas and Bonitos NEI* (1), Yellowfin tuna (27), Thresher sharks (84)
UK-OT			nil
Korea Rep	Longline	# Fish	Albacore (1293), Bigeye tuna (98), Skipjack (40), Southern bluefin tuna (126), Pomfrets nei (16), Butterfly kingfish(8), Opah (40), Black-browed Albatross (8), Blue shark (4028), Crocodile shark (476), Longfin mako (12), Pelagic Thresher Shark (12), Porbeagle (1679), Shortfin mako (112), Shy Albatross (24), Velvet dogfish (16), Yellow-nosed albatross (16);
	Purse Seine	# Fish	Marine Turtles (1)
	Purse Seine	kg	Silky Shark (6), Blue Marlin (4.78), Pomfrets nei (0.013), Common Dolphinfish (5.471), Wahoo (4.339)
Sri Lanka	Gillnet	# Fish	Marine Turtles (2)
	Longline	# Fish	Marine Turtles (5), Bigeye Thresher shark (41)
South Africa	Longline (foreign flags)	# fish	Atlantic Yellow-nosed Albatross (10), Black-browed Albatross (10), Green turtle (1), Leatherback turtle (1), Marine turtles (93), Shy Albatross (12), White-chinned Petrel (144), Yellow-nosed albatross (81)
Maldives	Longline	# fish	Hammerhead sharks nei (124), Mako sharks (544), Marine turtles (93), Oceanic whitetip shark (388), Sharks various nei (698) , Thresher sharks nei (426)

- **Discard levels**: Table 2vii presents the information available for discards for the year 2013. Discard levels are only available for Australia, EU-France purse seiners, EU-Portugal longliners (nil discards), France Overseas Territories purse seiners (nil discards), Isl. Rep. of Iran drifting gillnets, Republic of Korea longliners and purse seiners, South Africa longliners, Sri Lanka (all gears), Maldives longliners and the UK Overseas Territories (nil discards) in 2013. 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.
- **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 reported by IOTC CPCs and data collected through the IOTC Sampling Programs, and other sources.

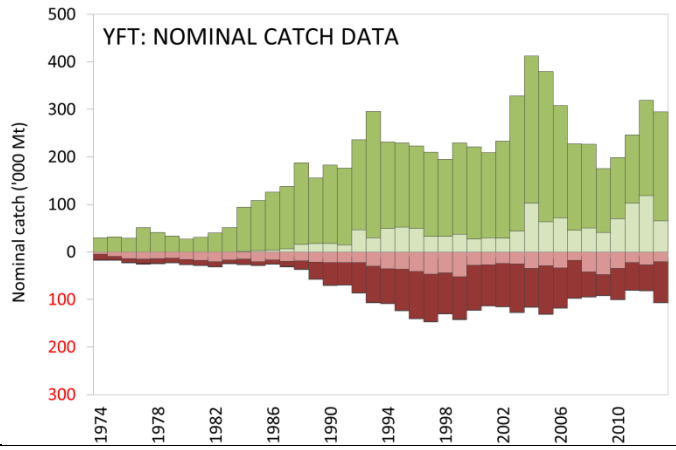
APPENDIX 3

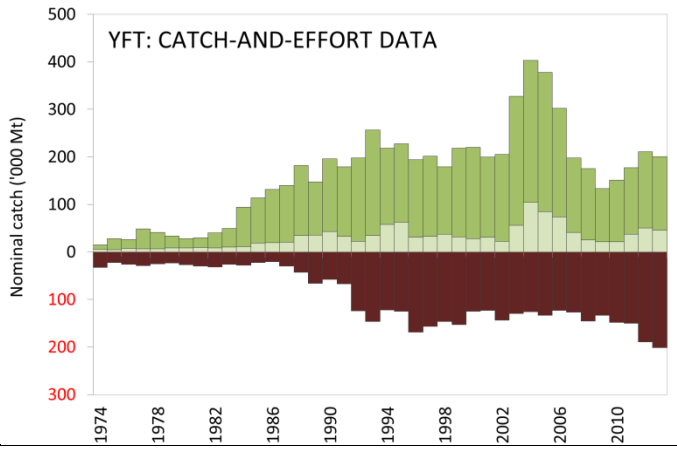
Uncertainty in the data – extracts from reports to the Scientific Committee and IOTC Working Parties in 2014

A summary of the standing of the data submitted to the Secretariat and derived indicators is provided for each of the tuna and tuna-related species under the mandate of the IOTC, in addition to the main species of sharks.

Data reporting coverage scores are assigned to each IOTC dataset (nominal catch, catch-and-effort, and length frequency) for each species, and indicate the amount of nominal catch associated with each dataset that is reported fully according to the standards set by IOTC Resolutions 10/02. Data that is fully reported by fleet is assigned a score of 0, compared to datasets which are partially reported and assigned a score of 2-6 (i.e., adjusted by gear and species by the IOTC Secretariat), while a score of 8 refers to the amount of nominal catch associated with non-reporting fisheries for each dataset that is not available.

Yellowfin tuna (YFT)





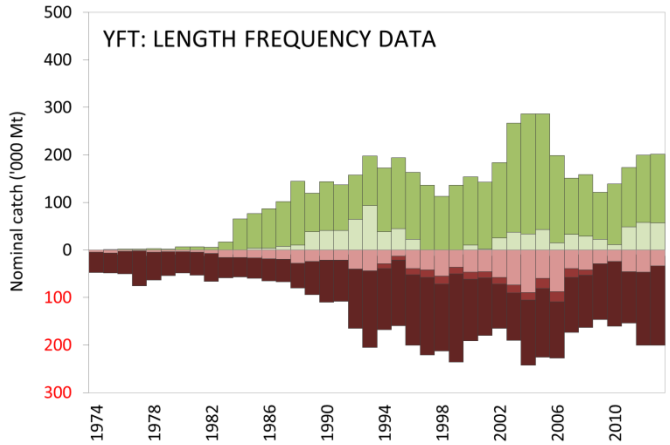


Fig. 2a-c. Yellowfin tuna: data reporting coverage (1974–2013).

Each IOTC dataset (nominal catch, catch-and-effort, and length frequency) are assessed against IOTC reporting standards, where: a score of 0 indicates the amount of nominal catch associated with each dataset that is fully reported according to IOTC standards; a score of between 2 – 6 refers to the amount of nominal catch associated with each dataset that is partially reported by gear and/or species (i.e., adjusted by gear and species by the IOTC Secretariat) or any of the other reasons provided in the document; a score of 8 refers to the amount of nominal catch associated with catch-and-effort data that is not available.

Data as of September 2014.

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)

Yellowfin tuna: Status of Fisheries Statistics at the IOTC

Retained catches are generally well known (**Fig. 2a**); however, catches are less certain for:

- many coastal fisheries, notably those from Indonesia, Sri Lanka, Yemen, and Madagascar
- the gillnet fishery of Pakistan
- non-reporting industrial purse seiners and longliners (NEI), and longliners of India.

Discard levels are believed to be low although they are unknown for most industrial fisheries, excluding industrial purse seiners flagged in EU countries for the period 2003–2007.

Catch–per–unit–effort (CPUE) Series: Catch-and-effort data are available from the major industrial and artisanal fisheries (**Fig. 2b**). However, these data are not available for some important fisheries or they are considered to be of poor quality for the following reasons:

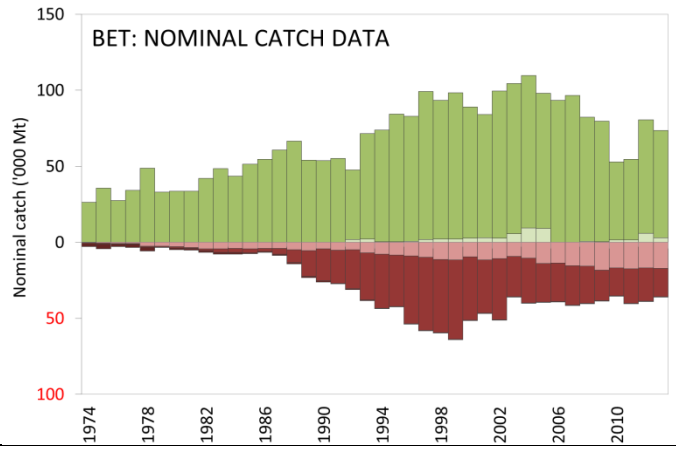
- no data are available for the fresh-tuna longline fishery of Indonesia, over the entire time series, and data for the fresh-tuna longline fishery of Taiwan,China are only available since 2006
- insufficient data for the gillnet fisheries of Iran and Pakistan
- the poor quality effort data for the significant gillnet/longline fishery of Sri Lanka
- no data are available from important coastal fisheries using hand and/or troll lines, in particular Yemen, Indonesia, and Madagascar.

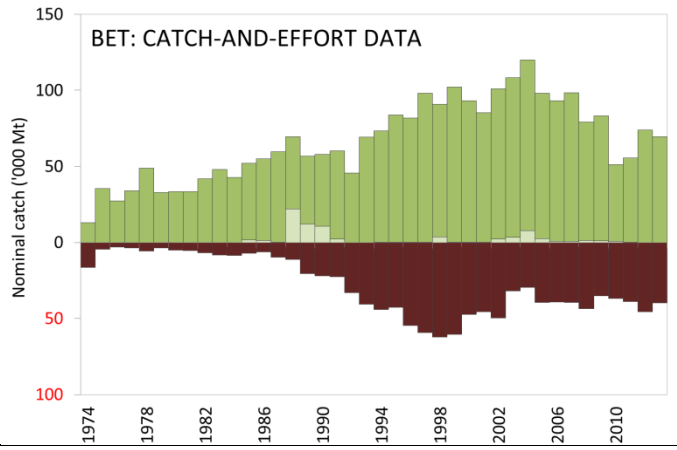
Trends in average weight: Can be assessed for several industrial fisheries but they are very incomplete or of poor quality for some fisheries, namely hand lines (Yemen, Comoros, Madagascar), troll lines (Indonesia) and many gillnet fisheries.

Catch-at-Size table: This is available (**Fig. 2c**) although the estimates are more uncertain in some years and some fisheries due to:

- size data not being available from important fisheries, notably Yemen, Pakistan, Sri Lanka and Indonesia (lines and gillnets) and Comoros and Madagascar (lines)
- the paucity of size data available from industrial longliners from the late-1960s up to the mid-1980s, and in recent years (Japan and Taiwan,China)
- the paucity of catch by area data available for some industrial fleets (NEI, Iran, India, Indonesia, Malaysia).

Bigeye tuna (BET)





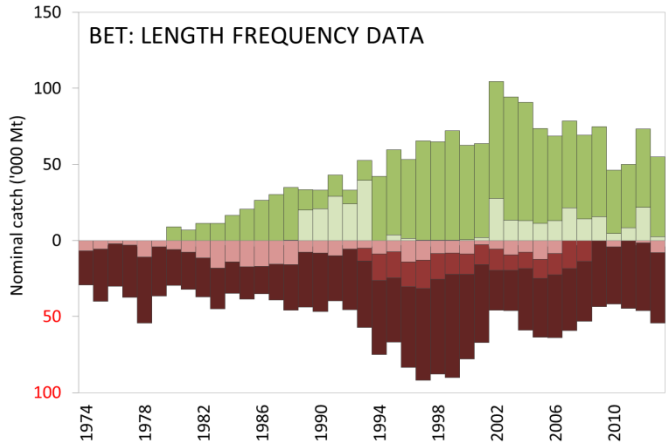


Fig. 3a-c. Bigeye tuna: data reporting coverage (1974–2013).

Each IOTC dataset (nominal catch, catch-and-effort, and length frequency) are assessed against IOTC reporting standards, where: a score of 0 indicates the amount of nominal catch associated with each dataset that is fully reported according to IOTC standards; a score of between 2 – 6 refers to the amount of nominal catch associated with each dataset that is partially reported by gear and/or species (i.e., adjusted by gear and species by the IOTC Secretariat) or any of the other reasons provided in the document; a score of 8 refers to the amount of nominal catch associated with catch-and-effort data that is not available.

Data as of September 2014.

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)

Bigeye tuna: Status of Fisheries Statistics at the IOTC

Retained catches are thought to be well known for the major fleets (**Fig. 3a**); but are less certain for non-reporting industrial purse seiners and longliners (NEI) and for other industrial fisheries (e.g. longliners of India). Catches are also uncertain for some artisanal fisheries including the pole-and-line fishery in the Maldives, the gillnet fisheries of Iran (before 2012) and Pakistan, the gillnet and longline combination fishery in Sri Lanka and the artisanal fisheries in Indonesia, Comoros (before 2011) and Madagascar.

Discard levels are believed to be low although they are unknown for most industrial fisheries, excluding industrial purse seiners flagged in EU countries for the period 2003–07.

Catch-per-Unit Effort Series: Catch-and-effort data are generally available from the major industrial fisheries. However, these data are not available from some fisheries or they are considered to be of poor quality, especially throughout the 1990s and in recent years (**Fig. 3b**), for the following reasons:

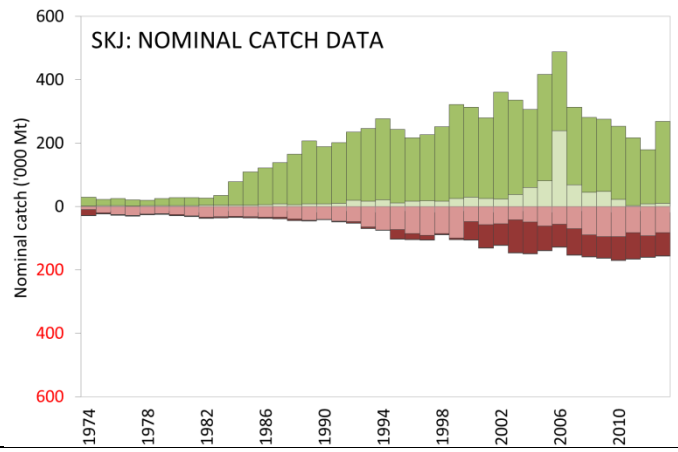
- non-reporting by industrial purse seiners and longliners (NEI)
- no data are available for the fresh-tuna longline fishery of Indonesia, over the entire time series, and data for the fresh-tuna longline fishery of Taiwan,China are only available since 2006
- uncertain data from significant fleets of industrial purse seiners from Iran and longliners from India, Indonesia, Malaysia, Oman, and Philippines.
- incomplete data for the driftnet fisheries of Iran and Pakistan and the gillnet/longline fishery of Sri Lanka, especially in recent years.

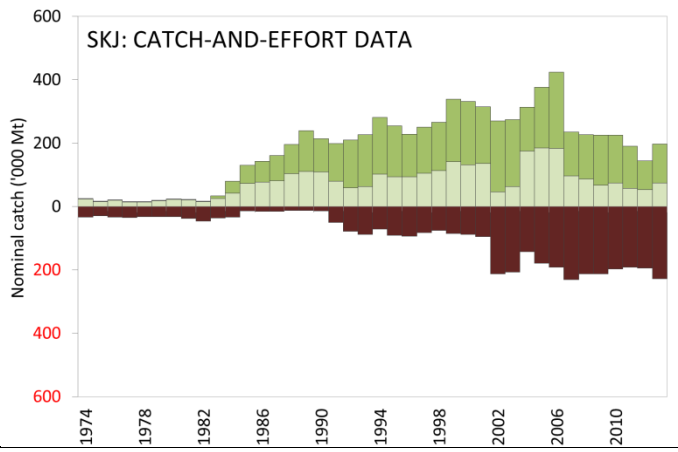
Trends in average weight can be assessed for several industrial fisheries although they are incomplete or of poor quality for most fisheries before the mid-1980s and for some fleets in recent years (e.g. Japan and Taiwan,China longline).

Catch-at-Size table: This is available but the estimates are more uncertain for some years and some fisheries due to (**Fig. 3c**):

- the paucity of size data available from industrial longliners before the mid-60s, from the early-1970s up to the mid-1980s and in recent years (Japan and Taiwan,China)
- the paucity of catch by area data available for some industrial fleets (NEI, India, Indonesia, Iran, Sri Lanka)

Skipjack tuna (SKJ)





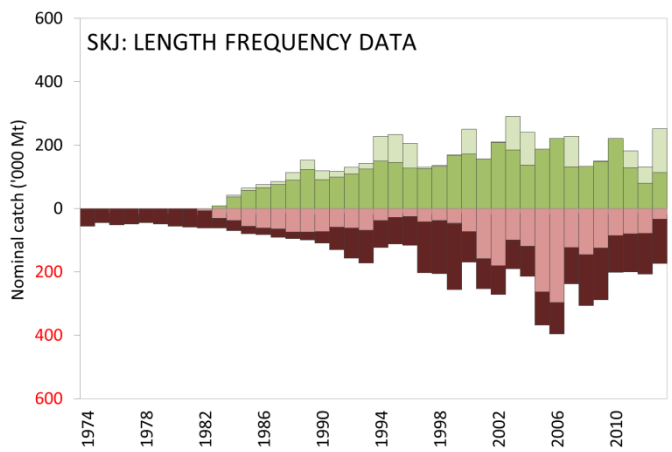


Fig. 4a-c. Skipjack tuna: data reporting coverage (1974–2013).

Each IOTC dataset (nominal catch, catch-and-effort, and length frequency) are assessed against IOTC reporting standards, where: a score of 0 indicates the amount of nominal catch associated with each dataset that is fully reported according to IOTC standards; a score of between 2 – 6 refers to the amount of nominal catch associated with each dataset that is partially reported by gear and/or species (i.e., adjusted by gear and species by the IOTC Secretariat) or any of the other reasons provided in the document; a score of 8 refers to the amount of nominal catch associated with catch-and-effort data that is not available.

Data as of September 2014.

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)

Skipjack tuna: Status of Fisheries Statistics at the IOTC

Retained catches are generally well known for the industrial fisheries but are less certain for many artisanal fisheries (**Fig. 4a**), notably because:

- catches are not being reported by species
- there is uncertainty about the catches from some significant fleets including the Sri Lankan coastal fisheries, and the coastal fisheries of Comoros and Madagascar.

Discard levels are believed to be low although they are unknown for most industrial fisheries, excluding industrial purse seiners flagged in EU countries for the period 2003–2007.

Catch–per–unit–effort (CPUE) Series: Catch and effort data are available from various industrial and artisanal fisheries (**Fig. 4b**). However, these data are not available from some important fisheries or they are considered to be of poor quality for the following reasons:

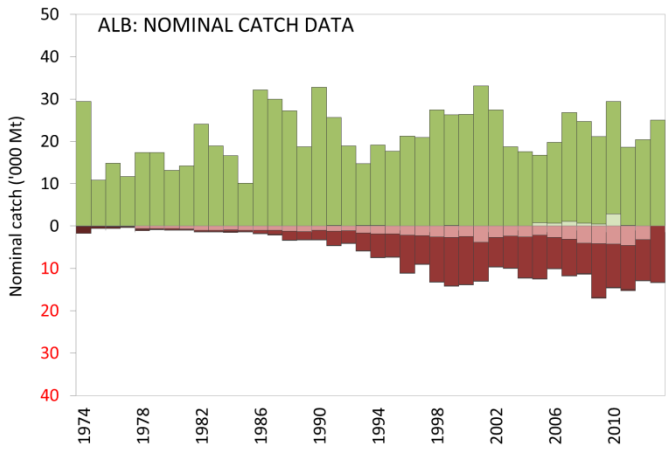
- insufficient data available for the gillnet fisheries of Iran and Pakistan
- the poor quality effort data for the gillnet/longline fishery of Sri Lanka
- no data are available from important coastal fisheries using hand and/or troll lines, in particular Indonesia, India and Madagascar.

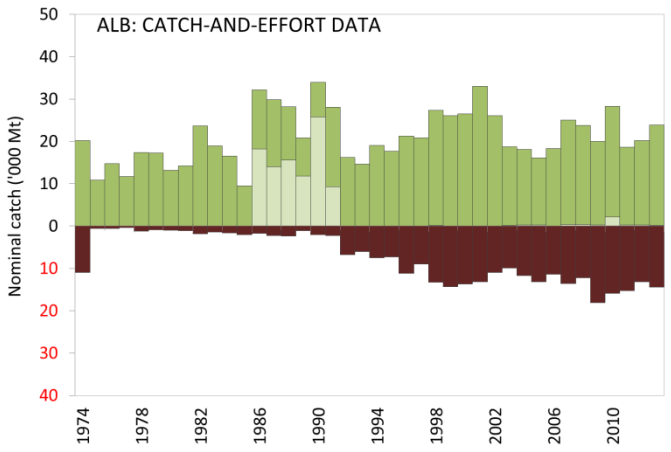
Trends in average weight cannot be assessed before the mid-1980s and are incomplete for most artisanal fisheries thereinafter, namely hand lines, troll lines and many gillnet fisheries (Indonesia).

Catch-at-Size table: CAS are available but the estimates are uncertain for some years and fisheries due to (**Fig. 4c**):

- the lack of size data before the mid-1980s
- the paucity of size data available for some artisanal fisheries, notably most hand lines and troll lines (Madagascar, Comoros) and many gillnet fisheries (Indonesia, Sri Lanka).

Albacore (ALB)





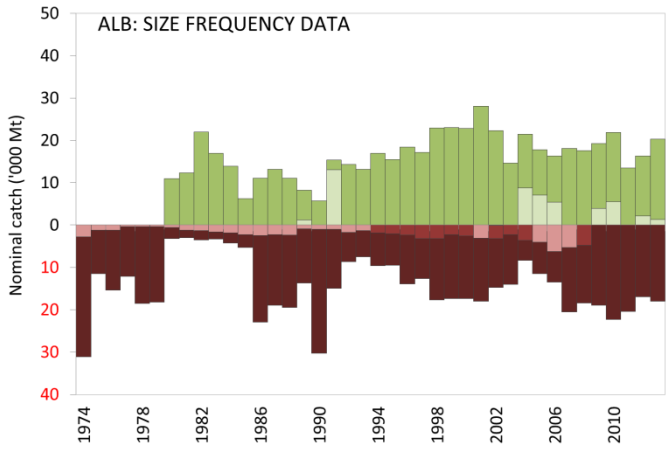


Fig. 5a-c. Albacore: data reporting coverage (1974–2013).

Each IOTC dataset (nominal catch, catch-and-effort, and length frequency) are assessed against IOTC reporting standards, where: a score of 0 indicates the amount of nominal catch associated with each dataset that is fully reported according to IOTC standards; a score of between 2 – 6 refers to the amount of nominal catch associated with each dataset that is partially reported by gear and/or species (i.e., adjusted by gear and species by the IOTC Secretariat) or any of the other reasons provided in the document; a score of 8 refers to the amount of nominal catch associated with catch-and-effort data that is not available.

Data as of September 2014.

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)

Albacore tuna: Status of Fisheries Statistics at the IOTC

Retained catches are fairly well known until the early-1990s (**Fig. 5a**), the quality of catch estimates since that time has been compromised due to poor catch reports from some fleets, in particular:

- Longliners of Indonesia: The catches of albacore for the longline fleet of Indonesia were revised in 2013 by the DGCF and the IOTC Secretariat, using previous reports from Indonesia and information obtained from canning factories cooperating with the International Seafood Sustainability Foundation (ISSF). While the new catch estimates are considered more reliable than the previous, the lack of catch-and-effort data and insufficient monitoring of albacore landings in Indonesia makes it difficult to validate such estimates. According to the new estimates Indonesia has been catching 32% (around 12,000 t in average over the period 2008-12) of the total catches of albacore in the Indian Ocean.
- Longliners of Malaysia: To date, Malaysia has reported incomplete catches of albacore for its longline fleet, as monitoring by Malaysia does not cover the large component of the longline fleet that is based in ports outside Malaysia (in particular in Mauritius). In recent years Malaysia has reported between 5 and 59 active longliners in the Indian Ocean, with catches of albacore ranging between nil and 2,000 t for the same period. An additional 500–2,000 t of albacore were estimated for Malay longliners not bases in Malaysia.
- Fleets using gillnets on the high seas, in particular Iran, Pakistan and Sri Lanka: Catches are likely to be less than 1000 t.
- Non-reporting industrial longliners (NEI): Refers to catches from longliners operating under flags of non-reporting countries. While the catches were moderately high during the 1990s, they have not exceeded 3,000 t in recent years.

Discard levels are believed to be low although they are unknown for industrial fisheries other than European (EU) purse seiners (2003–07).

Catch–per–unit–effort (CPUE) Series: Catch-and-effort data are available from various industrial fisheries (**Fig. 5b**). Nevertheless, catch-and-effort are not available from some fisheries or they are considered to be of poor quality, especially during the last decade, for the following reasons:

- uncertain data from significant fleets of longliners, including India, Indonesia, Malaysia, Oman, and Philippines;
- no data for fresh-tuna longliners flagged in Taiwan,China during 1990–2006;
- non-reporting by industrial purse seiners and longliners (NEI).

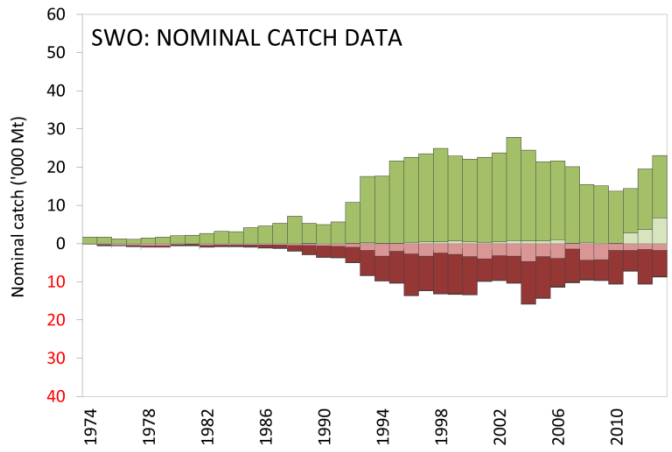
Trends in average weight can be assessed for several industrial fisheries although they are incomplete or of poor quality for some fisheries due to the issues identified above.

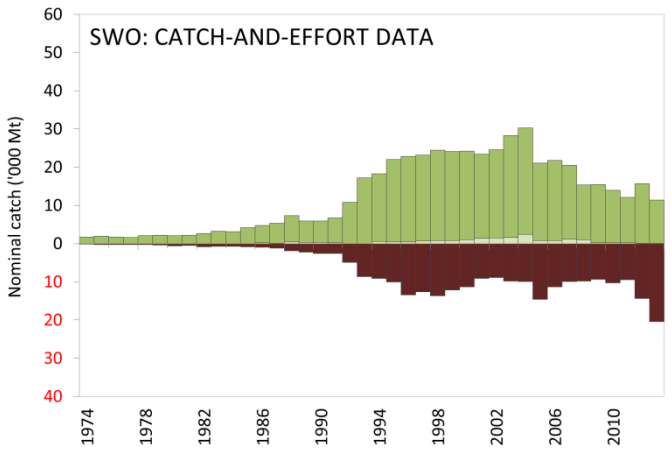
The **size frequency data** for the Taiwanese deep-freezing longline fishery for the period 1980–2012 is available. However, the lengths of albacore available for Taiwan,China since 2003 are very different from those available for earlier years, while length data and catch-and-effort data for the same time-periods and areas are also conflicting over most of the time series (Figs. 12a-b). In general, the amount of catch for which size data for the species are available before 1980 is still very low. The data for the Japanese longline fleet is available; however, the number of specimens measured per stratum has been decreasing in recent years. Size data are also available for industrial purse seiners flagged in EU countries and the Seychelles. Few data are available for the other fleets.

Catch-at-Size(Age) tables are available but the estimates are highly uncertain for some periods and fisheries (**Fig. 5c**) including:

- all industrial longline fleets before the mid-60s, from the early-1970s up to the early-1980s and most fleets in recent years, in particular fresh-tuna longliners;
- the complete lack of size samples from the driftnet fishery of Taiwan,China over the entire fishing period (1982–92)
- the paucity of catch by area data available for some industrial fleets (Taiwan,China, NEI, India and Indonesia).

Swordfish (SWO)





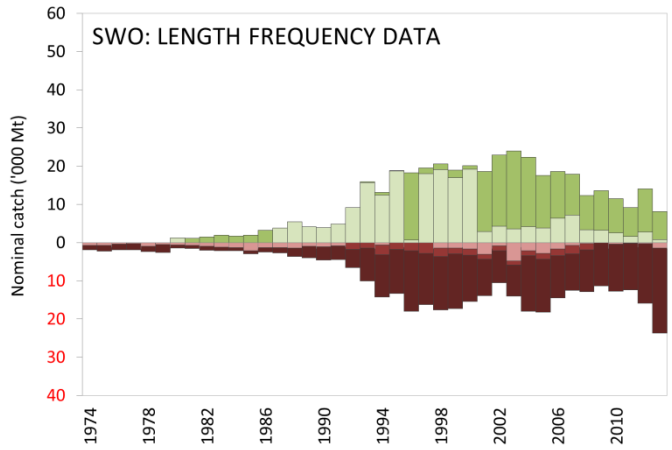


Fig. 6a-c. Swordfish: data reporting coverage (1974–2013).

Each IOTC dataset (nominal catch, catch-and-effort, and length frequency) are assessed against IOTC reporting standards, where: a score of 0 indicates the amount of nominal catch associated with each dataset that is fully reported according to IOTC standards; a score of between 2 – 6 refers to the amount of nominal catch associated with each dataset that is partially reported by gear and/or species (i.e., adjusted by gear and species by the IOTC Secretariat) or any of the other reasons provided in the document; a score of 8 refers to the amount of nominal catch associated with catch-and-effort data that is not available.

Data as of September 2014.

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)

Swordfish: Status of Fisheries Statistics at the IOTC

Retained catches are fairly well known (**Fig. 6a**); however catches are uncertain for:

- **Drifting gillnet** fisheries of **I.R. Iran** and **Pakistan**: The IOTC Secretariat used the catches of swordfish and marlins reported by I.R. Iran for the years 2012 and 2013 to rebuild historical catches of billfish for this fishery. However, catch rates and species composition for the Iranian and Pakistani gillnet fisheries differ and are also in contradiction with other estimates derived from sampling in Pakistan. Estimates of catches of swordfish by drifting gillnet in Pakistan and I.R. Iran have represented over 4% of the total combined catches of swordfish reported, from all fisheries.
- **Longline** fishery of **Indonesia**: The catches of swordfish for the longline fishery of Indonesia may have been underestimated over the time series due to insufficient sampling coverage. Although the new catches estimated by the Secretariat for the period 2003–09 are thought to be more accurate, swordfish catches remain uncertain, especially in recent years (where they represent around 12% of the total catches of swordfish in the Indian Ocean).
- **Longline** fishery of **India: India** has reported very incomplete catches and catch-and-effort data for its commercial longline fishery. Although the new catches estimated by the Secretariat are thought to be more accurate, catches of swordfish remain uncertain (catches of swordfish in recent years represent less than 4% of the total catches of swordfish in the Indian Ocean).
- **Longline** fleets from **non-reporting** countries (NEI): The Secretariat had to estimate catches of swordfish for a fleet of longliners targeting tunas or swordfish and operating under flags of various non-reporting countries. The catches estimated since 2006 are, however, low (they represent around 3% of the total catches of swordfish in the Indian Ocean).

Discards are believed to be low although they are unknown for most industrial fisheries, mainly longliners. Discards of swordfish may also occur in the driftnet fishery of Iran, as this species has no commercial value in this country.

Catch–per–unit–effort (CPUE) Series (Fig. 6b): Catch and effort series are available from some industrial longline fisheries. Nevertheless, catch and effort are not available from some fisheries or they are considered poor quality, especially since the early 90s (**Indonesia**, fresh-tuna longliners from **Taiwan,China**[4], Non-reporting longliners (**NEI**)).

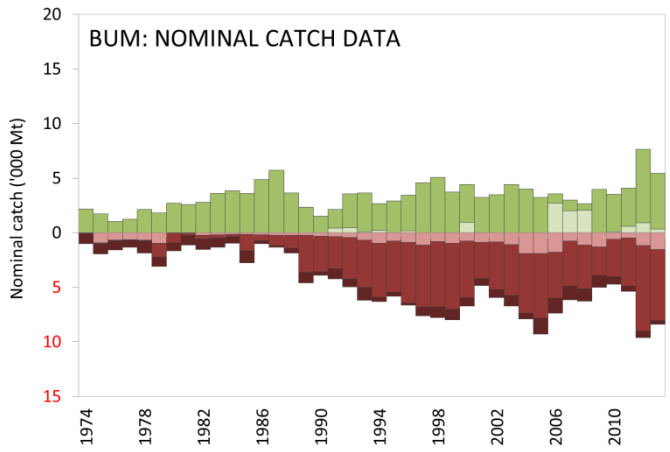
In addition, catch-and-effort data are not available for the gillnet and longline fishery of Sri Lanka and the drifting gillnet fisheries of **Iran** and **Pakistan**.

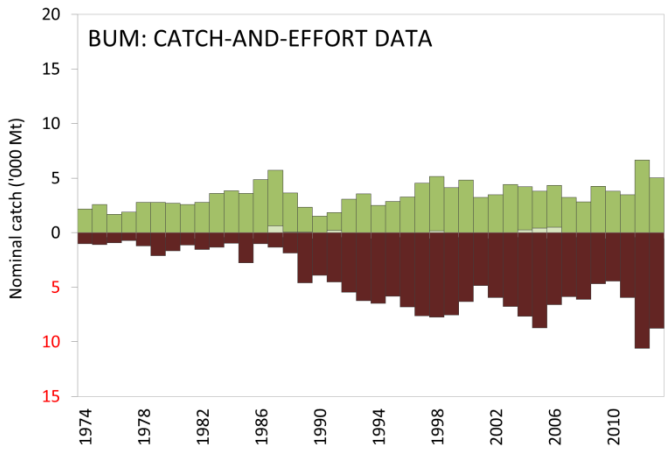
Fish size or age trends (e.g. by length, weight, sex and/or maturity): In general, the amount of catch for which size data for the species are available before 2005 is still very low and the number of specimens measured per stratum has been decreasing in recent years (**Fig. 6c**).

- **Average fish weight** can be assessed for several industrial fisheries although they are incomplete or poor quality for most fisheries before the early-80s and in recent years (low sampling coverage and time-area coverage of longliners from Japan). The average weights of swordfish are variable but show no clear trend.
- **Catch-at-Size(Age)** data are available but the estimates are thought to have been compromised for some years and fisheries due to:
    - the uncertainty in the length frequency data recorded for longliners of **Japan** and **Taiwan,China**, for which average weights of swordfish derived from length frequency data and catch-and-effort data are very different.
    - the uncertainty in the catches of swordfish for the drifting gillnet fisheries of **Iran** and the longline fishery of **Indonesia**.
    - the total lack of size data before the early-70s and poor coverage before the early-80s and for most artisanal fisheries (**Pakistan**, **India**, **Indonesia**).
    - the paucity of size data available from industrial longliners since the early-1990s (**Japan**, **Philippines**, **India** and **China**).
    - the lack of time-area catches for some industrial fleets (**Indonesia**, **India**, **NEI**).
    - the paucity of biological data available, notably sex-ratio and sex-length-age keys.

[4] Catch-and-effort statistics for the fresh-tuna longline fishery of Taiwan,China are available since 2007, although logbook coverage levels are still low.

Blue Marlin (BUM)





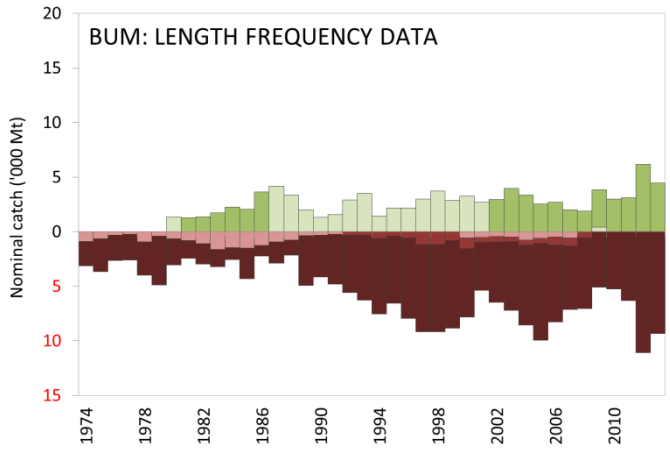


Fig. 7a-c. Blue marlin: data reporting coverage (1974–2013).

Each IOTC dataset (nominal catch, catch-and-effort, and length frequency) are assessed against IOTC reporting standards, where: a score of 0 indicates the amount of nominal catch associated with each dataset that is fully reported according to IOTC standards; a score of between 2 – 6 refers to the amount of nominal catch associated with each dataset that is partially reported by gear and/or species (i.e., adjusted by gear and species by the IOTC Secretariat) or any of the other reasons provided in the document; a score of 8 refers to the amount of nominal catch associated with catch-and-effort data that is not available.

Data as of September 2014.

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)

Blue Marlin: Status of Fisheries Statistics at the IOTC

Minimum catch estimates have been derived from very small amounts of information and are therefore highly uncertain. Difficulties in the identification of marlins also contribute to the uncertainties of the information available to the Secretariat.

Retained catches are poorly known for most fisheries (**Fig. 7a**) due to:

- catch reports often refer to total catches of all three marlin species combined or as an aggregate of all billfish species; catches by species are estimated by the Secretariat for some years and artisanal (gillnet/longline fishery of **Sri Lanka** and artisanal fisheries of **India**, **Iran** and **Pakistan**) and industrial (longliners of **Indonesia** and **Philippines**) fisheries.
- catches of non-reporting industrial longliners (**India**, **NEI**) and the gillnet fishery of **Indonesia** are estimated by the Secretariat using alternative information
- catches are likely to be incomplete for industrial fisheries for which the blue marlin is not a target species
- conflicting catch reports: Longline catches from the **Republic of Korea** are reported as nominal catches, and catch and effort reports are conflicting, with higher catches recorded in the catch and effort table. For this reason, the Secretariat revised the catches of blue marlin for the Republic of Korea over the time-series using both datasets. Although the new catches estimated by the Secretariat are thought to be more accurate, catches of blue marlin remain uncertain for this fleet.
- a lack of catch data for most sport fisheries.

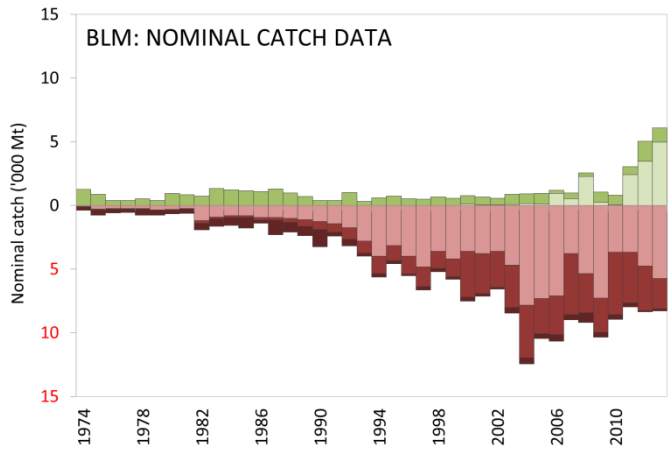
Discards are unknown for most industrial fisheries, mainly longliners. Discards of blue marlin may also occur in some gillnet fisheries.

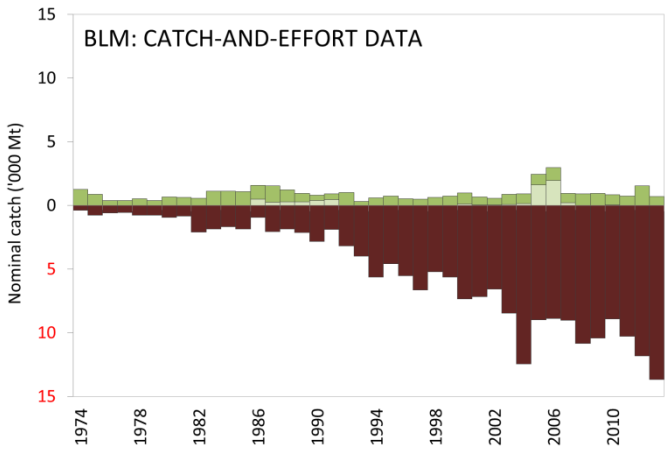
Catch–per–unit–effort (CPUE) Series (**Fig. 7b**): Nominal CPUE series are available from some industrial longline fisheries (primarily the Japanese longline fleet; **Appendix II**) although catches are likely to be incomplete (catches of non-target species are not always recorded in logbooks). No catch and effort data are available from sports fisheries, other than for partial data from the sports fisheries of Kenya; or other artisanal (gillnet fisheries of Iran and Pakistan, gillnet/longlines of Sri Lanka, gillnets of Indonesia) or industrial fisheries (NEI longliners and all purse seiners).

Fish size or age trends (e.g. by length, weight, sex and/or maturity; Fig. 7c): Average fish weight can only be assessed for the longline fishery of **Japan** since 1970 and **Taiwan,China** since 1980. However, the number of specimens measured on Japanese longliners in recent years is very low and miss-identification of striped and blue marlin may occur in some longline fisheries; while the length frequency distributions derived from samples collected by fishermen on Taiwanese longliners are likely to be biased for a number of reasons.

Catch-at-Size(Age) tables have not been built for blue marlin due to a lack of information reported by CPCs and the issues identified in some datasets. Fish size is derived from various length and weight information, however the reliability of the size data is reduced for some fleets and when relatively few fish out of the total catch are measured.

Black Marlin (BLM)





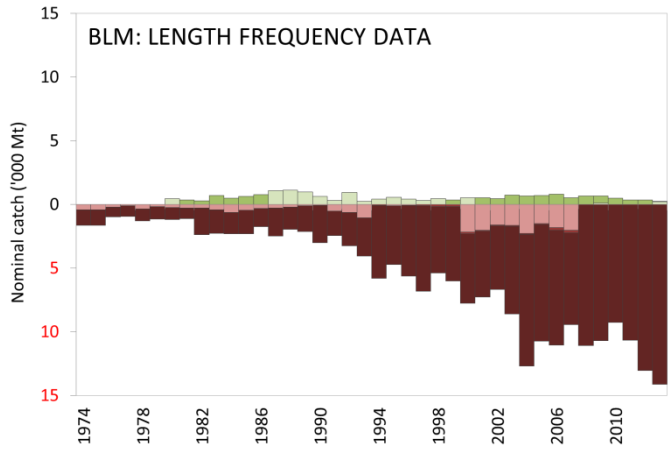


Fig. 8a-c. Black marlin: data reporting coverage (1974–2013).

Each IOTC dataset (nominal catch, catch-and-effort, and length frequency) are assessed against IOTC reporting standards, where: a score of 0 indicates the amount of nominal catch associated with each dataset that is fully reported according to IOTC standards; a score of between 2 – 6 refers to the amount of nominal catch associated with each dataset that is partially reported by gear and/or species (i.e., adjusted by gear and species by the IOTC Secretariat) or any of the other reasons provided in the document; a score of 8 refers to the amount of nominal catch associated with catch-and-effort data that is not available.

Data as of September 2014.

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)

Black Marlin: Status of Fisheries Statistics at the IOTC

Minimum catch estimates have been derived from very small amounts of information and are therefore highly uncertain. Difficulties in the identification of marlins also contribute to the uncertainties of the information available to the Secretariat.

Retained catches are uncertain for some fisheries (**Fig. 8a**), due to the fact that:

- catch reports often refer to total catches of all three marlin species combined; catches by species are estimated by the Secretariat for some years and artisanal (gillnet/longline fishery of **Sri Lanka** and artisanal fisheries of **India**, **Iran** and **Pakistan**) and industrial (longliners of **Indonesia** and **Philippines**) fisheries.
- catches of non-reporting industrial longliners (**India**, **NEI**) and the gillnet fishery of **Indonesia** are estimated by the Secretariat using alternative information.
- catches are likely to be incomplete for industrial fisheries for which the black marlin is not a target species.
- conflicting catch reports: Longline catches from the **Republic of Korea** are reported as nominal catches, and catch and effort reports are conflicting, with higher catches recorded in the catch and effort table. For this reason, the Secretariat revised the catches of black marlin for the Republic of Korea over the time-series using both datasets. Although the new catches estimated by the Secretariat are thought to be more accurate, catches of black marlin remain uncertain for this fleet.
- a lack of catch data for most sport fisheries.

Discards are unknown for most industrial fisheries, mainly longliners. Discards of black marlin may also occur in some driftnet fisheries.

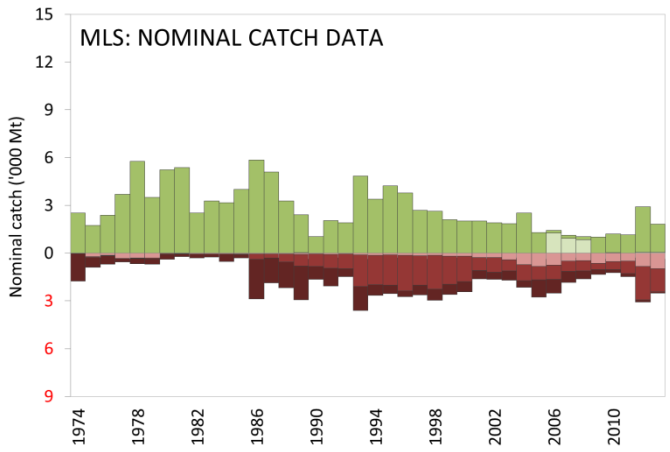
Catch–per–unit–effort (CPUE) Series (Fig. 8b): Standardised CPUE series have not yet been developed. Nominal CPUE series are however available from some industrial longline fisheries (primarily the Japanese longline fleet; **Appendix II**) although catches are thought to be incomplete (catches of non-target species are not always recorded in logbooks). No catch and effort data are available from sports fisheries, other than for partial data from the sports fisheries of Kenya; or other artisanal (gillnet fisheries of Iran and Pakistan, gillnet/longlines of Sri Lanka, gillnets of Indonesia) or industrial fisheries (NEI longliners and all purse seiners).

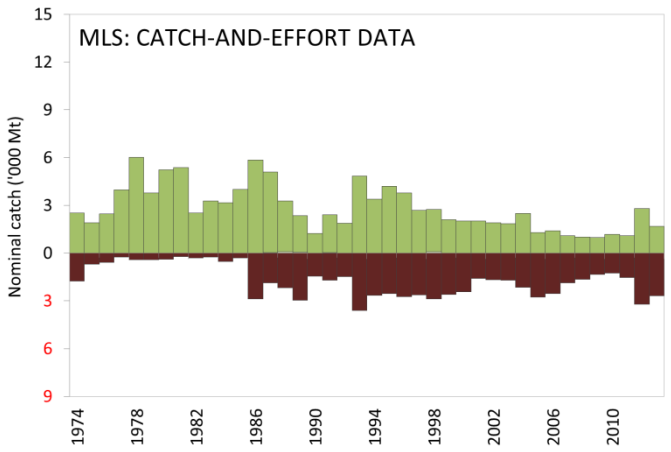
Fish size or age trends (e.g. by length, weight, sex and/or maturity; Fig. 8c): Average fish weight can only be assessed for the longline fishery of Japan since 1970 and Taiwan,China since 1980. The number of specimens measured on Japanese longliners in recent years is, however, very low, while the length frequency distributions derived from samples collected by fishermen on Taiwanese longliners are likely to be biased for a number of reasons.

Catch-at-Size(Age) tables have not been built for black marlin due to a lack of information reported by CPCs and the issues identified with some datasets. Fish size is derived from various length and weight information, however the reliability of the size data is reduced for some fleets or when relatively few fish out of the total catch are measured.

Sex ratio data have not been provided to the Secretariat by CPCs.

Striped Marlin (MLS)





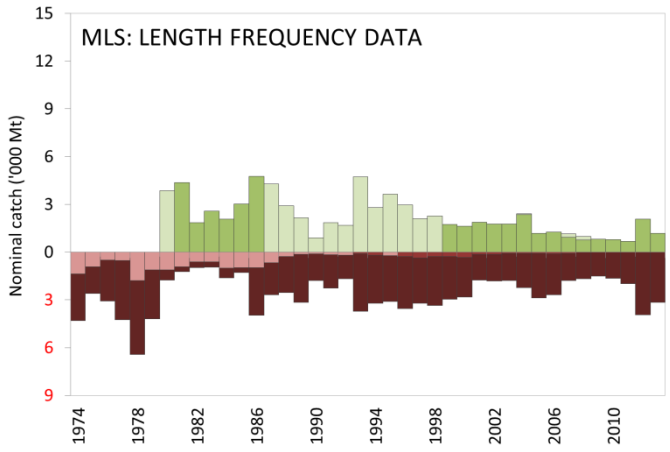


Fig. 9a-c. Striped marlin: data reporting coverage (1974–2013).

Each IOTC dataset (nominal catch, catch-and-effort, and length frequency) are assessed against IOTC reporting standards, where: a score of 0 indicates the amount of nominal catch associated with each dataset that is fully reported according to IOTC standards; a score of between 2 – 6 refers to the amount of nominal catch associated with each dataset that is partially reported by gear and/or species (i.e., adjusted by gear and species by the IOTC Secretariat) or any of the other reasons provided in the document; a score of 8 refers to the amount of nominal catch associated with catch-and-effort data that is not available.

Data as of September 2014.

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)

Striped Marlin: Status of Fisheries Statistics at the IOTC

Retained catches are reasonably well known (**Fig. 9a**) although they remain uncertain for some fleets:

- Catch reports refer to total catches of all three marlin species; catches by species have to be estimated by the IOTC Secretariat for some industrial fisheries (longliners of **Indonesia** and **Philippines**).
- Catches of non-reporting industrial longliners (**India**, **NEI**) estimated by the IOTC Secretariat using alternative information. As they are not reported by the countries concerned, catches are likely to be incomplete for some industrial fisheries for which the striped marlin is seldom the target species.
- Conflicting catch reports for the drifting gillnet fishery of Pakistan, with very high catches of striped marlins reported by alternative sources, as derived from sampling in different locations in Pakistan.
- Conflicting catch reports: The catches for longliners flagged to the **Republic of Korea**, reported as nominal catches and catches and effort, are conflicting with higher catches recorded in the catch and effort table. For this reason, the IOTC Secretariat revised the catches of striped marlin over the time-series using both datasets. Although the new catches estimated by the IOTC Secretariat are thought to be more accurate, catches of striped marlin remain uncertain for this fleet.

Discards are thought to be low although they are unknown for most industrial fisheries, mainly longliners. Discards of striped marlin may also occur in some driftnet fisheries.

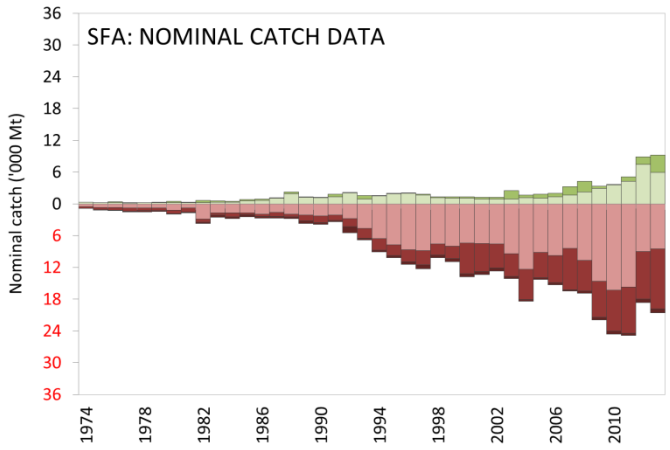
Catch–per–unit–effort (CPUE) series (Fig. 9b): Standardised CPUE series have not yet been developed. Nominal CPUE series are however available from some industrial longline fisheries (primarily the Japanese longline fleet; **Appendix II**) although catches are thought to be incomplete (catches of non-target species are not always recorded in logbooks). No catch and effort data are available from sports fisheries, other than for partial data from the sports fisheries of Kenya; or other artisanal (gillnet fisheries of I.R. Iran and Pakistan, gillnet/longlines of Sri Lanka, gillnets of Indonesia) or industrial fisheries (NEI longliners and all purse seiners).

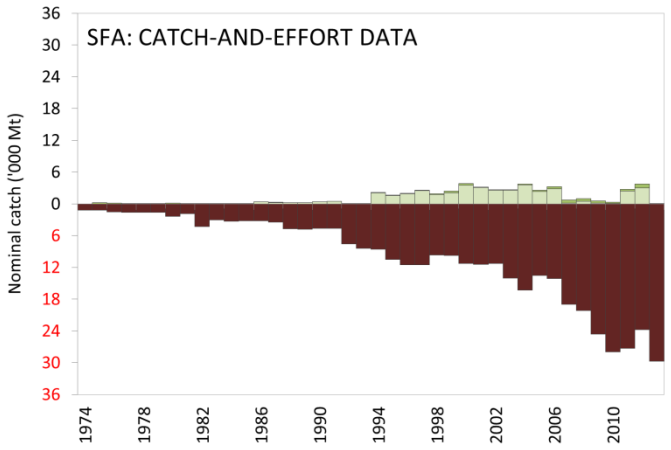
Fish size or age trends (e.g. by length, weight, sex and/or maturity, Fig. 9c): Average fish weight can only be assessed for the longline fishery of Japan since 1970 and Taiwan,China since 1980. However, the number of specimens measured on Japanese longliners in recent years is very low and miss-identification of striped and blue marlin may be occurring in the Taiwanese longline fishery; the length frequency distributions derived from samples collected on Taiwanese longliners differ greatly from those collected on longliners flagged in Japan.

Catch-at-Size(Age) tables have not been built for this species due to a lack of information reported by CPCs. Fish size is derived from various length and weight information, however the reliability of the size data is reduced when relatively few fish out of the total catch are measured or the samples collected are unreliable.

Sex ratio data have not been provided to the Secretariat by CPCs.

Indo-Pacific Sailfish (SFA)





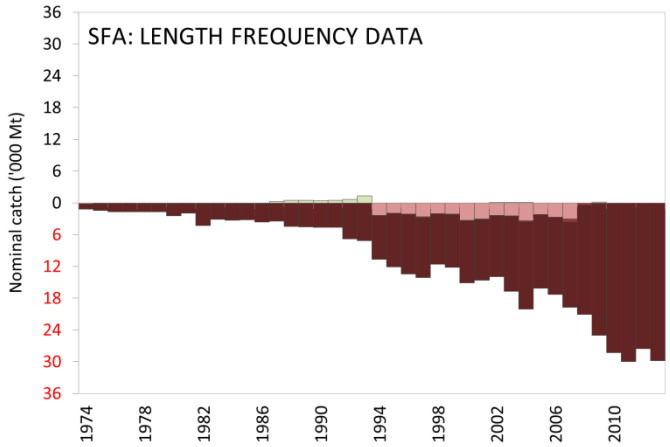


Fig. 10a-c. Indo-Pacific sailfish: data reporting coverage (1974–2013).

Each IOTC dataset (nominal catch, catch-and-effort, and length frequency) are assessed against IOTC reporting standards, where: a score of 0 indicates the amount of nominal catch associated with each dataset that is fully reported according to IOTC standards; a score of between 2 – 6 refers to the amount of nominal catch associated with each dataset that is partially reported by gear and/or species (i.e., adjusted by gear and species by the IOTC Secretariat) or any of the other reasons provided in the document; a score of 8 refers to the amount of nominal catch associated with catch-and-effort data that is not available.

Data as of September 2014.

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)

Indo-Pacific Sailfish: Status of Fisheries Statistics at the IOTC

Minimum catch estimates have been derived from very small amounts of information and are therefore highly uncertain. Unlike the other billfish, Indo-Pacific sailfish are probably more reliably identified because of the large and distinctive first dorsal fin that runs most of the length of the body.

Retained catches are poorly known for most fisheries (**Fig. 10a**) due to:

- Catch reports often refer to total catches of all billfish species combined; catches by species are estimated by the Secretariat for some artisanal (gillnet/longline fishery of **Sri Lanka** and artisanal fisheries of **India** and **Pakistan**) and industrial (longliners of **Indonesia** and **Philippines**) fisheries.
- Catches of IP sailfish reported for some fisheries may refer to the combined catches of more than one species of billfish, in particular marlins and shortbill spearfish (many coastal fisheries).
- Catches likely to be incomplete for some artisanal fisheries (e.g. gillnets of Pakistan, pole and lines of Maldives) due to under-reporting.
- Catches are likely to be incomplete for industrial fisheries for which the Indo-Pacific sailfish is not a target species.
- A lack of catch data for most sport fisheries.

Discards are unknown for most industrial fisheries, mainly longliners (for which they are presumed to be moderate-high).

Catch–per–unit–effort (CPUE) series (**Fig. 10b**): Standardised and nominal CPUE series have not yet been developed. No catch and effort data are available from sports fisheries, other than for partial data from the sports fisheries of Kenya; or other artisanal (gillnet fisheries of I.R. Iran and Pakistan, gillnet/longlines of Sri Lanka, gillnets of Indonesia) or industrial fisheries (NEI longliners and all purse seiners).

Fish size or age trends (e.g. by length, weight, sex and/or maturity; Fig. 10c): Average fish weight can only be assessed for the longline fishery of Japan since 1970 and the gillnet/longline fishery of Sri Lanka since the late 1980s (**Appendix II**). The number of specimens measured on Japanese longliners in recent years is, however, very low. Furthermore, the specimens discarded might be not accounted for in industrial fisheries, where they are presumed to be of lower size (possible bias of existing samples).

Catch-at-Size(Age) tables have not been built for this species due to a lack of information reported by CPCs. Fish size is derived from various length and weight information, however the reliability of the size data is reduced when relatively few fish out of the total catch are measured.

Sex ratio data have not been provided to the Secretariat by CPCs.

Longtail tuna (LOT)

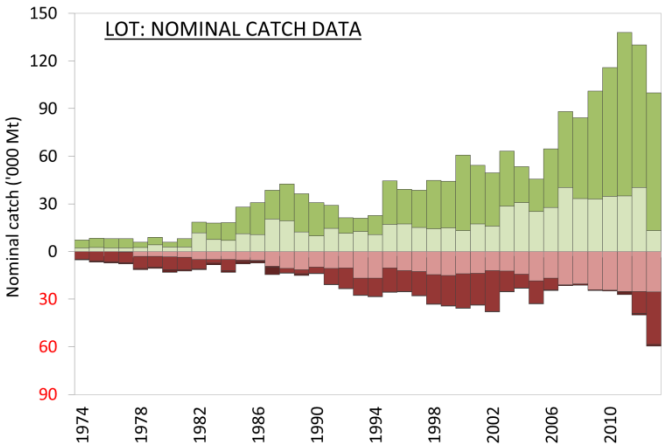


Fig. 11. Longtail tuna: data reporting coverage (1974–2013).

Each IOTC dataset (nominal catch, catch-and-effort, and length frequency) are assessed against IOTC reporting standards, where: a score of 0 indicates the amount of nominal catch associated with each dataset that is fully reported according to IOTC standards; a score of between 2 – 6 refers to the amount of nominal catch associated with each dataset that is partially reported by gear and/or species (i.e., adjusted by gear and species by the IOTC Secretariat) or any of the other reasons provided in the document; a score of 8 refers to the amount of nominal catch associated with catch-and-effort data that is not available.

Data as of September 2014.

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

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)

Longtail tuna: Status of Fisheries Statistics at the IOTC

Retained catches are uncertain (**Fig. 11**), notably for the following fisheries:

- Artisanal fisheries of Indonesia: Indonesia did not report catches of longtail tuna by species or by gear for 1950–2004; catches of longtail tuna, kawakawa and other species were reported aggregated for this period. In the past, the IOTC Secretariat used the catches reported since 2005 to break the aggregates for 1950–2004, by gear and species. However, a recent review by the IOTC Secretariat conducted by an independent consultant in 2012 indicated that catches of longtail tuna had been severely overestimated by Indonesia. While the new catches estimated for the longtail tuna in Indonesia remain uncertain, representing around 15% (30% in the past) of the total catches of this species in the Indian Ocean in recent years (2009–11), the new figures are considered more reliable than those existing in the past.
- Artisanal fisheries of India and Oman: Although these countries report catches of longtail tuna, until recently the catches have not been reported by gear. The IOTC Secretariat used alternative information to assign the catches reported by Oman by gear. The catches of India were also reviewed by the independent consultant in 2012 and assigned by gear on the basis of official reports and information from various alternative sources. The catches of longtail tuna from Oman and India represent around 14% of the total catches of this species in recent years (2010–12).
- Artisanal fisheries of Myanmar and Somalia: None of these countries have ever reported catches of longtail tuna to the IOTC Secretariat. While catch levels are unknown they are unlikely to be substantial.
- Other artisanal fisheries: The IOTC Secretariat had to estimate catches of longtail tuna for the artisanal fisheries of Yemen (no data reported to the IOTC Secretariat) and until recently Malaysia (with catches of the main neritic tunas aggregated and reported as longtail).

Discard levels are believed to be very low although they are unknown for most fisheries.

Catch–per–unit–effort (CPUE) series: Catch-and-effort series are available from some fisheries but they are considered highly incomplete (**Fig. 12**). In most cases the catch-and-effort data are only available for short periods of time. Reasonably long catches and effort series (extending for more than 10 years) are only available for Thailand small purse seine vessels and gillnet vessels.

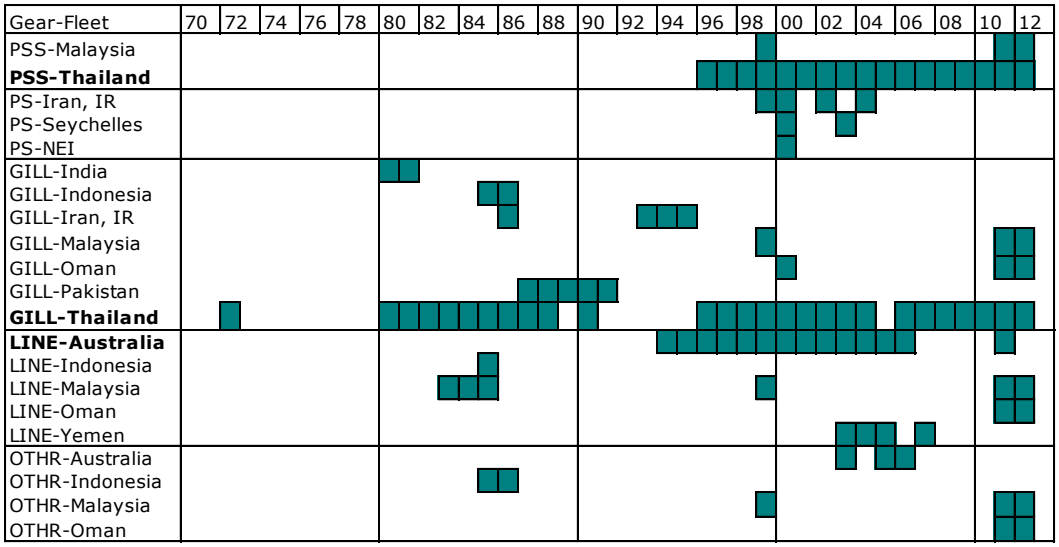


Fig. 12. Longtail tuna: Availability of catches and effort series, by fishery and year (1970–2012)[5]. Note that no catches and effort are available at all for 1950–1971.

Trends in average weight can only be assessed for Iranian gillnets but the amount of specimens measured has been very low for a number of years (i.e., below the minimum sampling standard of one fish per tonne of catch recommended by the IOTC Secretariat). The length frequency data available from the mid-eighties to the early nineties was obtained with the support of the IPTP (Indo-Pacific Tuna Programme); unfortunately, the data collection did not continue after the end of the IPTP activities.

[5] Note that the above list is not exhaustive, showing only the fisheries for which catches and effort are available in the IOTC database. Furthermore, catch-and-effort data are sometimes incomplete for a given year, existing only for short periods.

Catch-at-Size (Age) table: Catches-at-Size are not available for the longtail tuna due to the paucity of size data available from most fleets (**Fig. 13**) and the uncertain status of the catches for this species. No data are available for all other fisheries.

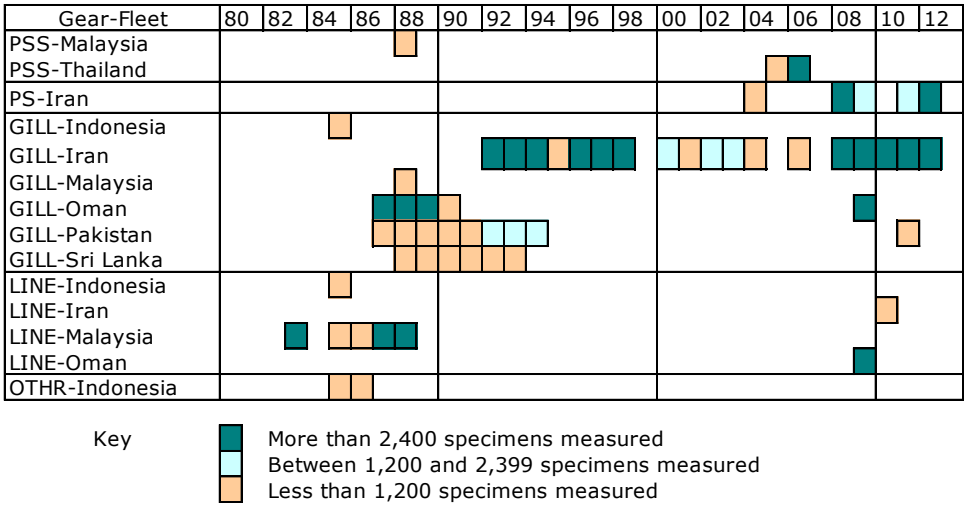


Fig. 13. *Longtail tuna: Availability of length frequency data, by fishery and year (1980–2012)[6]. Note that no length frequency data are available at all for 1950–1982.*

[6] Note that the above list is not exhaustive, showing only the fisheries for which size data are available in the IOTC database. Furthermore, when available size data may not be available throughout the year existing only for short periods

Frigate tuna (FRI)

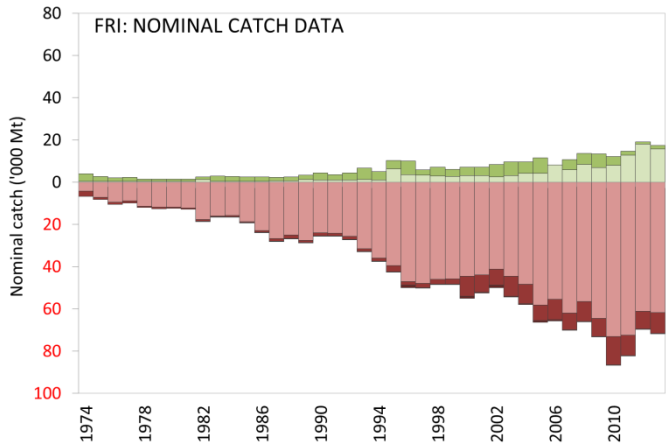


Fig. 14. Frigate tuna: data reporting coverage (1974–2013).

Each IOTC dataset (nominal catch, catch-and-effort, and length frequency) are assessed against IOTC reporting standards, where: a score of 0 indicates the amount of nominal catch associated with each dataset that is fully reported according to IOTC standards; a score of between 2 – 6 refers to the amount of nominal catch associated with each dataset that is partially reported by gear and/or species (i.e., adjusted by gear and species by the IOTC Secretariat) or any of the other reasons provided in the document; a score of 8 refers to the amount of nominal catch associated with catch-and-effort data that is not available.

Data as of September 2014.

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

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)

Frigate tuna: Status of Fisheries Statistics at the IOTC

Retained catches are highly uncertain (**Fig. 14**) notably for the following fisheries:

- Artisanal fisheries of Indonesia: Indonesia did not report catches of frigate tuna by species or by gear for 1950–2004; catches of frigate tuna, bullet tuna and other species were reported aggregated for this period. In the past, the IOTC Secretariat used the catches reported since 2005 to break the aggregates for 1950–2004, by gear and species. However, in a recent review by the IOTC Secretariat conducted by an independent consultant in 2012 he indicated that the catches of frigate tuna had been underestimated by Indonesia. While the new catches estimated for the frigate tuna in Indonesia remain uncertain, representing around 59% of the total catches of this species in the Indian Ocean in recent years (2010–12), the new figures are considered more reliable than those existing in the past.
- Artisanal fisheries of India and Sri Lanka: Although these countries report catches of frigate tuna until recently the catches have not been reported by gear. The catches of both countries were also reviewed by an independent consultant in 2012 and assigned by gear on the basis of official reports and information from various other alternative sources. The new catch series was previously presented to the WPNT in 2013, in which the new catches estimated for Sri Lanka are as much as three times higher than previous estimates. In recent years, the combined catches of frigate tuna for both countries have represented 24% of the total catches of this species in the Indian Ocean.
- Artisanal fisheries of Myanmar and Somalia: None of these countries have ever reported catches of frigate tuna to the IOTC Secretariat. Catch levels are unknown.
- Other artisanal fisheries: The catches of frigate tuna and bullet tuna are seldom reported by species and, when they are reported by species, usually refer to both species (due to misidentification, with all catches assigned to the frigate tuna).
- Industrial fisheries: The catches of frigate tuna recorded for industrial purse seiners are thought to be a fraction of those retained on board. Due to this species being a bycatch, and its catches are seldom recorded in the logbooks, nor can they be monitored in port. The EU recently reported catch levels of frigate tuna for its purse seine fleet, for 2003–07, estimated using observer data.

Discard levels are moderate for industrial purse seine fisheries. The EU recently reported discard levels of frigate tuna for its purse seine fleet, for 2003–07, estimated using observer data.

Catch–per–unit–effort (CPUE) series: Catch-and-effort series are available from some fisheries but they are considered highly incomplete (**Fig. 15**). In most cases catch-and-effort data are only available for short periods. Reasonably long catch-and-effort series (extending for more than 10 years) are only available for Maldives baitboats and hand and troll lines and Sri Lanka gillnets. The catches and effort recorded for Sri Lankan gillnets are, however, thought to be inaccurate due to the dramatic changes in CPUE recorded between consecutive years.

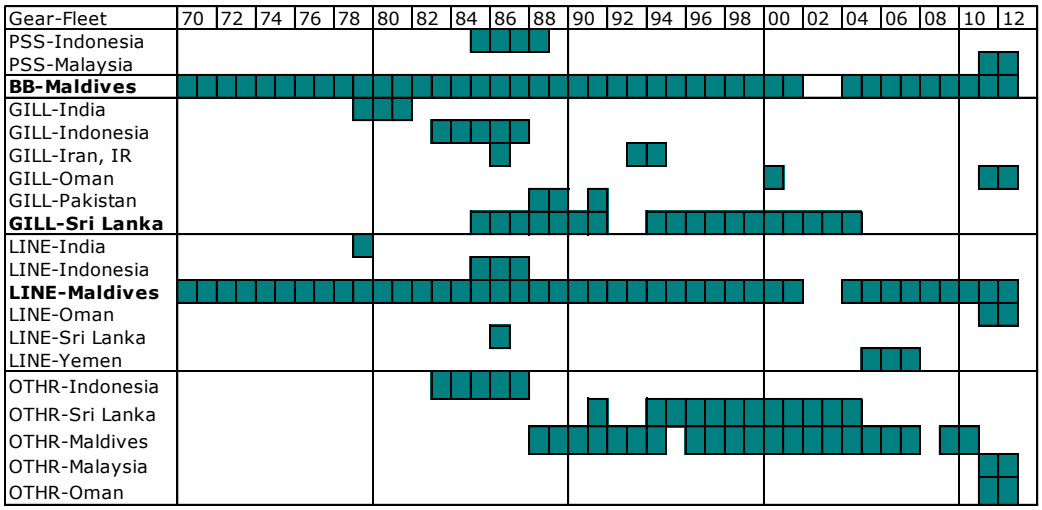


Fig. 15: *Frigate tuna: Availability of catches and effort series, by fishery and year (1970–2012)[7]. Note that no catches and effort are available at all for 1950–69.*

Trends in average weight can only be assessed for Sri Lankan gillnets and Maldivian pole-and-lines but the amount of specimens measured has been very low in recent years. The length frequency data available from the mid-eighties to the early nineties was obtained with the support of the IPTP (Indo-Pacific Tuna Programme). Unfortunately, the data collection did not continue in most countries after the end of the IPTP activities.

Catch-at-Size(Age) table: Catch-at-Size data are not available for the frigate tuna due to the paucity of size data available from most fleets (**Fig. 16**) and the uncertain status of the catches for this species. No data are available for all other fisheries.

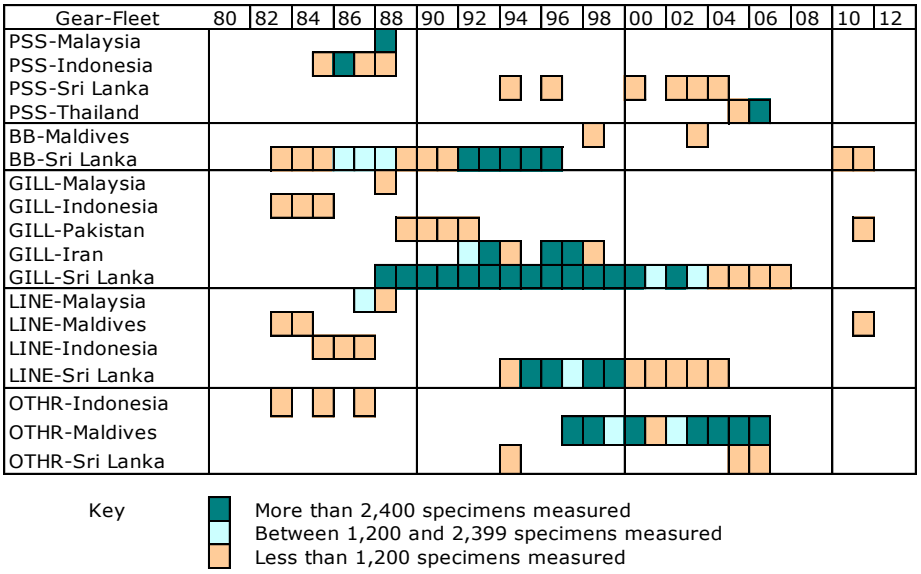


Fig. 16: *Frigate tuna: Availability of length frequency data, by fishery and year (1980–2012)[8]. Note that no length frequency data are available at all for 1950–82.*

[7] Note that the above list is not exhaustive, showing only the fisheries for which catches and effort are available in the IOTC database. Furthermore, when available catches and effort may not be available throughout the year existing only for short periods

[8] Note that the above list is not exhaustive, showing only the fisheries for which size data are available in the IOTC database. Furthermore, when available size data may not be available throughout the year existing only for short periods

Bullet tuna (BLT)

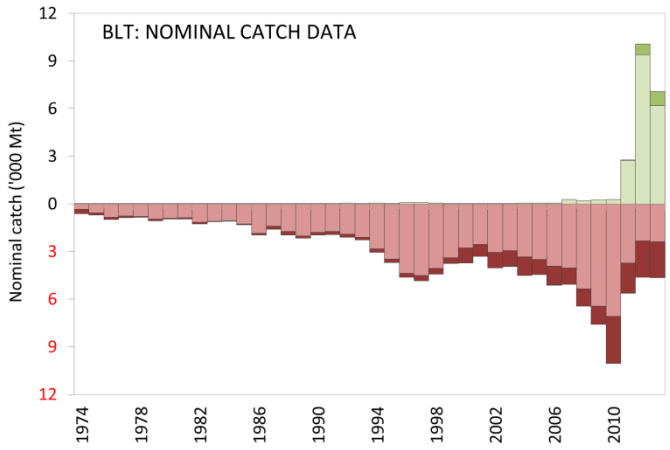


Fig. 17. Bullet tuna: data reporting coverage (1974–2013).

Each IOTC dataset (nominal catch, catch-and-effort, and length frequency) are assessed against IOTC reporting standards, where: a score of 0 indicates the amount of nominal catch associated with each dataset that is fully reported according to IOTC standards; a score of between 2 – 6 refers to the amount of nominal catch associated with each dataset that is partially reported by gear and/or species (i.e., adjusted by gear and species by the IOTC Secretariat) or any of the other reasons provided in the document; a score of 8 refers to the amount of nominal catch associated with catch-and-effort data that is not available.

Data as of September 2014.

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

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)

Bullet tuna: Status of Fisheries Statistics at the IOTC

Retained catches are highly uncertain for all fisheries (**Fig. 17**) due to:

- Aggregation: Bullet tunas are usually not reported by species, but are instead aggregated with frigate tunas or, less frequently, other small tuna species.
- Mislabelling: Bullet tunas are usually mislabelled as frigate tuna, with their catches reported under the latter species.
- Underreporting: the catches of bullet tuna by industrial purse seiners are rarely, if ever, reported.

It is for the above reasons that the catches of bullet tunas in the IOTC database are thought to be highly uncertain and represent only a small fraction of the total catches of this species in the Indian Ocean.

Discard levels are moderate for industrial purse seine fisheries. The EU recently reported discard levels of bullet tuna for its purse seine fleet, for 2003–07, estimated using observer data.

Catch–per–unit–effort (CPUE) Series: Catch-and-effort series are not available for most fisheries (**Fig. 18**) and, when available, they are usually considered to be of poor quality for the fisheries having reasonably long catch-and-effort data series, for example the gillnet fisheries of Sri Lanka.

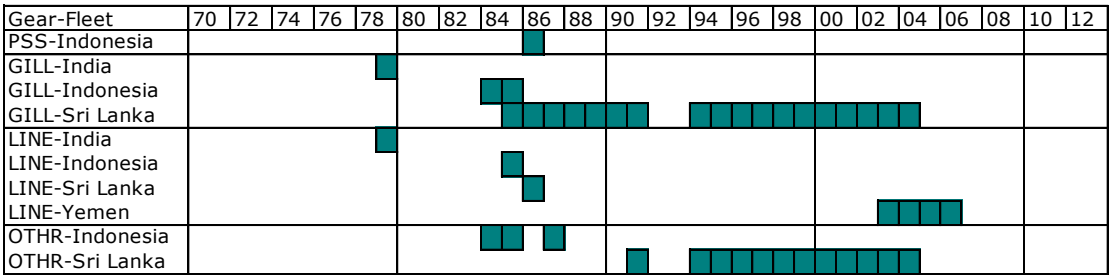


***Fig. 18**. Bullet tuna: Availability of catches and effort series, by fishery and year (1970–2012)[9]. Note that no catches and effort are available at all for 1950–78.*

Trends in average weight cannot be assessed for most fisheries. Reasonable long series of length frequency data are only available for Sri Lankan gillnets and lines but the amount of specimens measured has been very low in recent years (Fig. 28).

Catch-at-Size(Age) table: Catch-at-Size data are not available for the bullet tuna due to the paucity of size data available from most fleets (**Fig. 19**) and the uncertain status of the catches for this species.

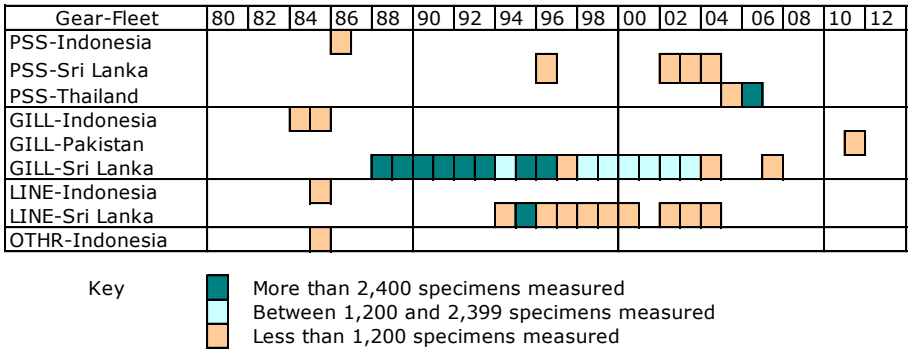


***Fig. 19.** Bullet tuna: Availability of length frequency data, by fishery and year (1980–2012)[10]. Note that no length frequency data are available at all for 1950–83.*

[9] Note that the above list is not exhaustive, showing only the fisheries for which catches and effort are available in the IOTC database. Furthermore, when available catches and effort may not be available throughout the year existing only for short periods

[10] Note that the above list is not exhaustive, showing only the fisheries for which size data are available in the IOTC database. Furthermore, when available size data may not be available throughout the year existing only for short periods

Kawakawa (KAW)

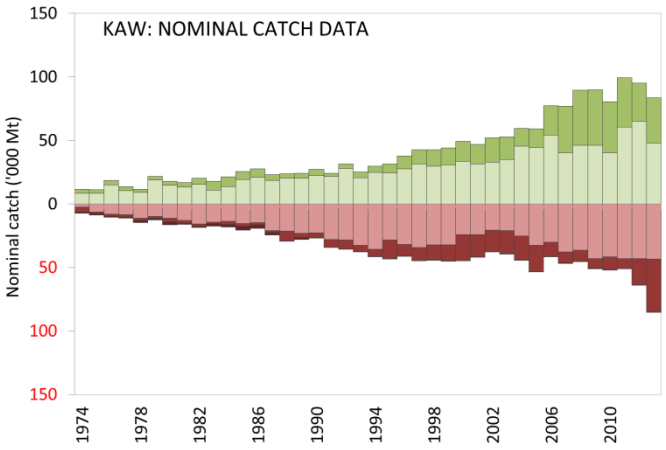


Fig. 20. Kawakawa: data reporting coverage (1974–2013).

Each IOTC dataset (nominal catch, catch-and-effort, and length frequency) are assessed against IOTC reporting standards, where: a score of 0 indicates the amount of nominal catch associated with each dataset that is fully reported according to IOTC standards; a score of between 2 – 6 refers to the amount of nominal catch associated with each dataset that is partially reported by gear and/or species (i.e., adjusted by gear and species by the IOTC Secretariat) or any of the other reasons provided in the document; a score of 8 refers to the amount of nominal catch associated with catch-and-effort data that is not available.

Data as of September 2014.

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

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)

Kawakawa: Status of Fisheries Statistics at the IOTC

Retained catches are uncertain (**Fig. 20**) notably for the following fisheries:

- Artisanal fisheries of Indonesia: Indonesia did not report catches of kawakawa by species or by gear for 1950–2004; catches of kawakawa, longtail tuna and, to a lesser extent, other species were reported aggregated for this period. In the past, the IOTC Secretariat used the catches reported since 2005 to break the aggregates for 1950–2004, by gear and species. However, a review by the IOTC Secretariat conducted by an independent consultant in 2012 indicated that the catches of kawakawa had been overestimated by Indonesia. While the new catches estimated for kawakawa in Indonesia remain uncertain, representing around 26% of the total catches of this species in the Indian Ocean in 2010–12 (compared to around 38% in previous years, prior to the review of Indonesia's catch series), the new figures are considered more reliable than those previously recorded in the IOTC database.
- Artisanal fisheries of India: Although India reports catches of kawakawa they are not always reported by gear. The catches of kawakawa in India were also reviewed by the IOTC Secretariat in 2012 and assigned by gear on the basis of official reports and information from various other alternative sources. The catches of kawakawa in India have represented 22% of the total catches of this species in the Indian Ocean in 2010-12 (compared to around 17% in previous years, prior to the review of India's catch series).
- Artisanal fisheries of Myanmar and Somalia: None of these countries have ever reported catches to the IOTC Secretariat. Catch levels are unknown.
- Other artisanal fisheries: The catches of kawakawa are usually not reported by species, being combined with catches of other small tuna species like skipjack tuna and frigate tuna (e.g., coastal purse seiners of Thailand, and until recently Malaysia).
- Industrial fisheries: The catches of kawakawa recorded for industrial purse seiners are thought to be a fraction of those retained on board. Due to this species being a bycatch, its catches are seldom recorded in the logbooks, nor are they monitored in port. The EU recently reported catch levels of frigate tuna for its purse seine fleet, for 2003–07, estimated using observer data.

Discard levels are moderate for industrial purse seine fisheries. The EU recently reported discard levels of kawakawa for its purse seine fleet, for 2003–07, estimated using observer data.

Catch–per–unit–effort (CPUE) series: Catch-and-effort series are available from some fisheries but they are considered highly incomplete (**Fig. 21**). In most cases catch-and-effort data are only available for short periods. Reasonably long catch-and-effort data series (extending for more than 10 years) are only available for Maldives baitboats and troll lines and Sri Lanka gillnets. The catch-and-effort data recorded for Sri Lankan gillnets are, however, thought to be inaccurate due to the dramatic changes in CPUE recorded between consecutive years.

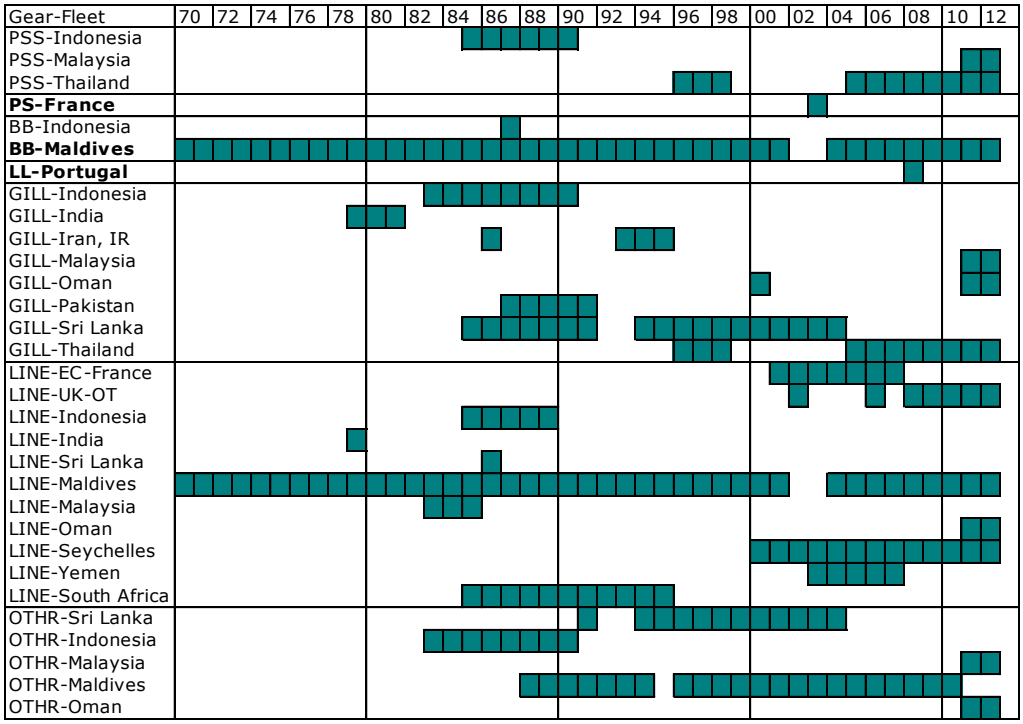


Fig. 21. *Kawakawa: Availability of catches and effort series, by fishery and year (1970-2012)[11]. Note that no catches and effort are available at all for 1950–69.*

Trends in average weight can be assessed for Sri Lankan gillnets but the amount of specimens measured has been very low in recent years. The length frequency data available from the mid-eighties to the early nineties was obtained with the support of the IPTP (Indo-Pacific Tuna Programme); unfortunately, the data collection did not continue after the end of the IPTP activities. In addition since 1998 there has been some sampling of lengths from Iranian gillnets (collected from vessels operating in the Arabian Sea), although average lengths and distribution of lengths of samples are significantly larger than specimens reported by other fleets.

Catch-at-Size(Age) table: Catch-at-Size data are not available for the kawakawa due to the paucity of size data available from most fleets (**Fig. 22**) and the uncertain status of the catches for this species. Length distributions derived from the data available for gillnet fisheries are shown in Fig. 38. No data are available for all other fisheries.

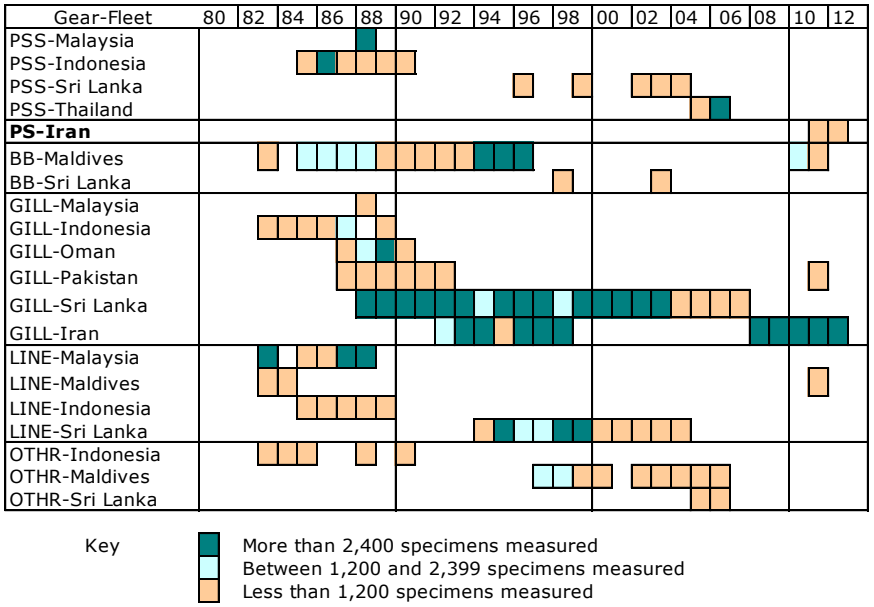


Fig. 22. *Kawakawa: Availability of length frequency data, by fishery and year (1980-2012)[12]. Note that no length frequency data are available at all for 1950–82.*

[11] Note that the above list is not exhaustive, showing only the fisheries for which catches and effort are available in the IOTC database. Furthermore, when available catches and effort may not be available throughout the year existing only for short periods

[12] Note that the above list is not exhaustive, showing only the fisheries for which size data are available in the IOTC database. Furthermore, when available size data may not be available throughout the year existing only for short periods

Narrow-barred Spanish mackerel (COM)

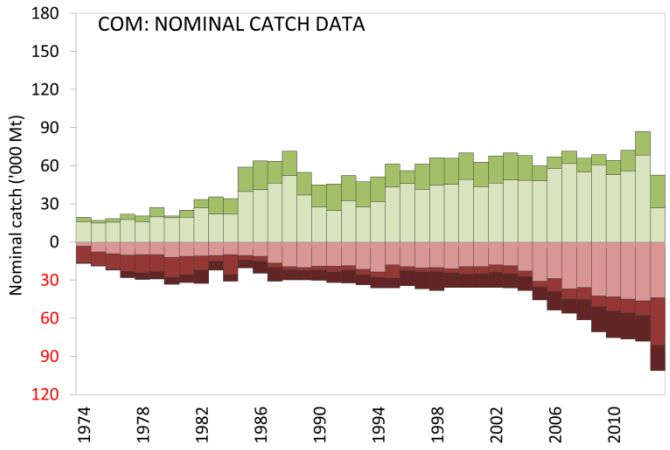


Fig. 23. Narrow-barred Spanish mackerel: data reporting coverage (1974–2013).

Each IOTC dataset (nominal catch, catch-and-effort, and length frequency) are assessed against IOTC reporting standards, where: a score of 0 indicates the amount of nominal catch associated with each dataset that is fully reported according to IOTC standards; a score of between 2 – 6 refers to the amount of nominal catch associated with each dataset that is partially reported by gear and/or species (i.e., adjusted by gear and species by the IOTC Secretariat) or any of the other reasons provided in the document; a score of 8 refers to the amount of nominal catch associated with catch-and-effort data that is not available.

Data as of September 2014.

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

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)

Narrow-barred Spanish mackerel: Status of Fisheries Statistics at the IOTC

Retained catches are uncertain (**Fig. 23**) notably for the following fisheries:

- Artisanal fisheries of Indonesia and India: Indonesia and India have only recently reported catches of Spanish mackerel by gear, including catches by gear for the years 2005–08 and 2007–08, respectively. In the past, the IOTC Secretariat used the catches reported in recent years to break the aggregates for previous years, by gear and species. However, in a review conducted by the IOTC Secretariat by an independent consultant in 2012 the catches of narrow-barred Spanish mackerel were reassigned by gear. In recent years, the catches of narrow-barred Spanish mackerel estimated for Indonesia and India component represent around 50% of the total catches of this species in recent years.
- Artisanal fisheries of Madagascar: To date, Madagascar has not reported catches of narrow-barred Spanish mackerel to the IOTC. During 2012 the IOTC Secretariat conducted a review aiming to break the catches recorded in the FAO database as narrow-barred Spanish mackerel by species, on the assumption that all catches of tunas and tuna-like species had been combined under this name (the review used data from various sources including a reconstruction of the total marine fisheries catches of Madagascar (1950–2008), undertaken by the Sea Around Us Project). The new catches estimated are thought to be very uncertain.
- Artisanal fisheries of Somalia: Catch levels are unknown.
- Other artisanal fisheries UAE do not report catches of narrow-barred Spanish mackerel by gear. Although most of the catches are believed to be taken by gillnets, some narrow-barred Spanish mackerel may be also caught by using small surrounding nets, lines or other artisanal gears. In addition, Thailand report catches of narrow-barred Spanish mackerel and Indo-Pacific king mackerel aggregated.
- All fisheries: In some cases the catches of seerfish species are mislabelled, the catches of Indo-Pacific king mackerel and, to a lesser extent, other seerfish species, labelled as narrow-barred Spanish mackerel. Similarly, the catches of wahoo in some longline fisheries are thought to be mislabelled as narrow-barred Spanish mackerel. This mislabelling is thought to have little impact in the case of the narrow-barred Spanish mackerel but may be important for other seerfish species.

Discard levels are believed to be low although they are unknown for most fisheries.

Catch–per–unit–effort (CPUE) series: Catch-and-effort series are available from some fisheries but they are considered highly incomplete (**Fig. 24**). In most cases catch-and-effort data are only available for short periods. Reasonably long catch-and-effort data series (extending for more than 10 years) are only available for Sri Lanka gillnets. The catches and effort recorded are, however, thought to be unrealistic due to the dramatic changes in CPUE recorded in 2003 and 2004.

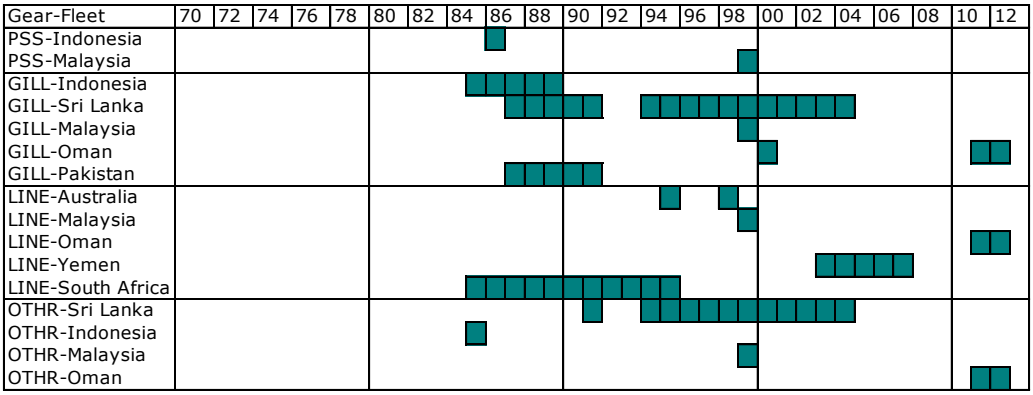


Fig. 24: *Narrow-barred Spanish mackerel: Availability of catches and effort series, by fishery and year (1970–2012)[13]. Note that no catches and effort are available at all for 1950–84, and 2008–10.*

Trends in average weight can only be assessed for Sri Lankan gillnets (from the late-1980s until the early 1990s), and Iranian gillnets from the late 2000s. The length frequency data available from the mid-eighties to the early nineties

[13] Note that the above list is not exhaustive, showing only the fisheries for which catches and effort are available in the IOTC database. Furthermore, when available catches and effort may not be available throughout the year existing only for short periods

was obtained with the support of the IPTP (Indo-Pacific Tuna Programme); unfortunately, data collection did not continue after the IPTP activities came to an end.

Catch-at-Size(Age) table: Catch-at-Size data are not available for the narrow-barred Spanish mackerel due to the paucity of size data available from most fleets (**Fig. 25**) and the uncertain status of the catches for this species. No data are available for all other fisheries.

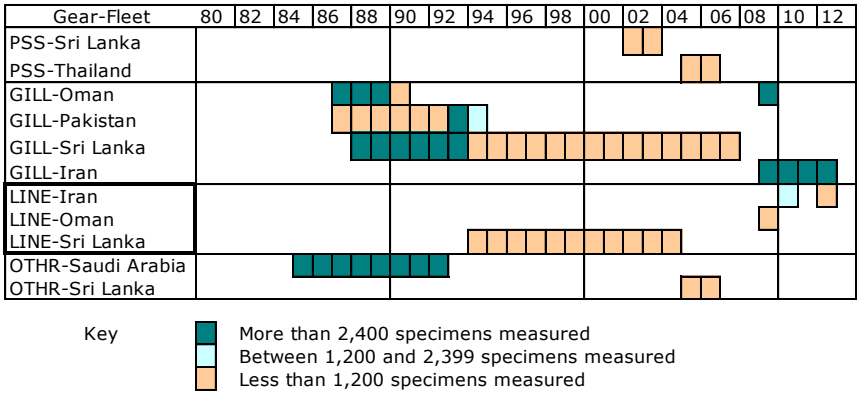


Fig. 25: *Narrow-barred Spanish mackerel: Availability of length frequency data, by fishery and year (1980–2012)[14]. Note that no length frequency data are available at all for 1950–84.*

[14] Note that the above list is not exhaustive, showing only the fisheries for which size data are available in the IOTC database. Furthermore, when available size data may not be available throughout the year existing only for short periods

Indo-Pacific king mackerel (GUT)

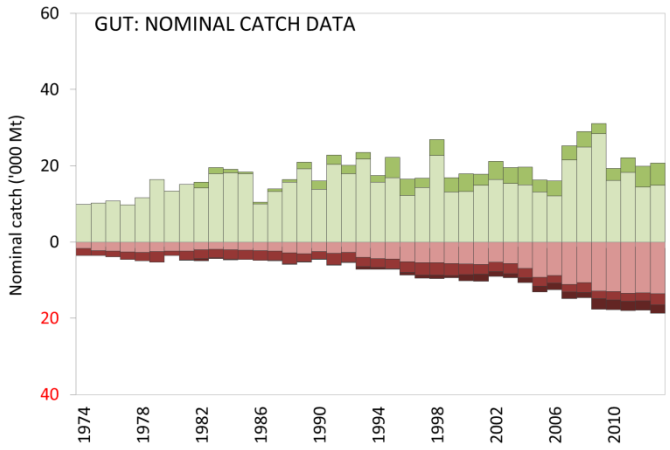


Fig. 26. Indo-Pacific king mackerel: data reporting coverage (1974–2013).

Each IOTC dataset (nominal catch, catch-and-effort, and length frequency) are assessed against IOTC reporting standards, where: a score of 0 indicates the amount of nominal catch associated with each dataset that is fully reported according to IOTC standards; a score of between 2 – 6 refers to the amount of nominal catch associated with each dataset that is partially reported by gear and/or species (i.e., adjusted by gear and species by the IOTC Secretariat) or any of the other reasons provided in the document; a score of 8 refers to the amount of nominal catch associated with catch-and-effort data that is not available.

Data as of September 2014.

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

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)

Indo-Pacific king mackerel: Status of Fisheries Statistics at the IOTC

Retained catches are highly uncertain for all fisheries (**Fig. 26**) due to:

- Aggregation: Indo-Pacific king mackerels are usually not reported by species being aggregated with narrow-barred Spanish mackerel or, less frequently, other small tuna species.
- Mislabelling: Indo-Pacific king mackerels are usually mislabelled as narrow-barred Spanish mackerel, their catches reported under the latter species.
- Underreporting: the catches of Indo-Pacific king mackerel may be not reported for some fisheries catching them as a bycatch.

It is for the above reasons that the catches of Indo-Pacific king mackerel in the IOTC database are thought to represent only a small fraction of the total catches of this species in the Indian Ocean.

Discard levels are believed to be low although they are unknown for most fisheries.

CPUE Series: Catch-and-effort series are not available for most fisheries and, when available, they refer to very short periods (**Fig. 27**). This makes it impossible to derive any meaningful CPUE from the existing data.

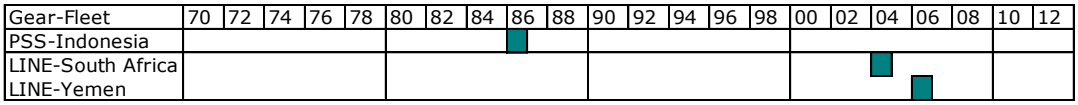


***Fig. 27. Indo-Pacific king mackerel**: Availability of catches and effort series, by fishery and year (1970–2012)[15]. Note that no catches and effort are available at all for 1950–85*

Trends in average weight cannot be assessed for most fisheries. Samples of Indo-Pacific king mackerel are only available for the coastal purse seiners of Thailand and gillnets of Sri Lanka but they refer to very short periods, while the number of specimens sampled is also very small.

Catch-at-Size(Age) table: Catch-at-Size data are not available for the Indo-Pacific king mackerel due to the paucity of size data available from most fleets (**Fig. 28**) and the uncertain status of the catches for this species.

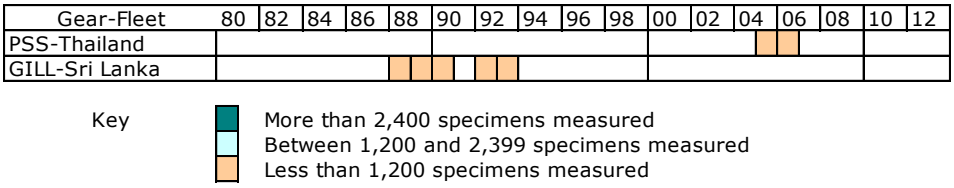


***Fig. 28. Indo-Pacific king mackerel**: Availability of length frequency data, by fishery and year (1980–2012)[16]. Note that no length frequency data are available at all for 1950–82).*

[15] Note that the above list is not exhaustive, showing only the fisheries for which catches and effort are available in the IOTC database. Furthermore, when available catches and effort may not be available throughout the year existing only for short periods

[16] Note that the above list is not exhaustive, showing only the fisheries for which size data are available in the IOTC database. Furthermore, when available size data may not be available throughout the year existing only for short periods

Non-IOTC species: Status of Fisheries Statistics at the IOTC

There are a number of key issues regarding the data quality and coverage of non-IOTC species (e.g., sharks, seabirds, marine turtles and marine mammals), which are summarized below:

SHARKS

1. **Catch-and-Effort data from gillnet fisheries:**
   - Drifting gillnet fisheries of Iran and Pakistan: To date, Iran and Pakistan have not reported catches of sharks, by species, for their gillnet fisheries.
   - Gillnet/longline fishery of Sri Lanka: Sri Lanka has not reported catch-and-effort data for sharks as per the IOTC standards.
   - Driftnet fishery of Taiwan,China (1982–92): Catch-and-effort data does not include catches of sharks by species.
2. **Catch-and-Effort data from Longline Fisheries:**
   - Historical catches of sharks from major longline fisheries: To date, Japan, Taiwan,China, Indonesia and Rep. of Korea, have not provided estimates of catches of sharks, by species, for years before 2006.
   - Fresh-tuna longline fisheries of Indonesia and Malaysia: Indonesia and Malaysia have not reported catches of sharks by IOTC standards for longliners under their flag. In addition Indonesia has not reported catch-and-effort data for its longline fishery to date.
   - Freezing longline fisheries of EU-Spain, India, Indonesia, Malaysia, and Oman: These countries have not reported catch-and-effort data of sharks by species for longliners under their flag.
3. **Catch-and-Effort data from coastal fisheries:**
   - Coastal fisheries of India, Indonesia, Madagascar, Sri Lanka and Yemen: To date, these countries have not provided detailed catches of sharks to the IOTC, in particular Thresher and other pelagic shark species caught by their coastal fisheries.
4. **Discard levels from surface and longline fisheries:**
   - Discard levels of sharks from major longline fisheries: To date the EU(Spain), Japan and Indonesia, have not provided estimates of total discards of sharks, by species, in particular thresher sharks and oceanic whitetip sharks, although the EU, Japan and Rep. of Korea are reporting observer data.
   - Discard levels of sharks for industrial purse seine fisheries: To date, the European Union (before 2003), Iran, Japan, Seychelles, and Thailand, have not provided estimates of total quantities of discards of sharks, by species, for industrial purse seiners under their flag, although the EU and Japan are reporting observer data.
5. **Size frequency data:**
   - Gillnet fisheries of Iran and Pakistan: To date, Iran and Pakistan have not reported size frequency data for their driftnet fisheries.
   - Longline fisheries of India, Malaysia, Oman and Philippines: To date, these countries have not reported size frequency data for their longline fisheries, including length frequency of discards of thresher sharks.
   - Coastal fisheries of India, Indonesia, Madagascar, Sri Lanka and Yemen: To date, these countries have not reported size frequency data for their coastal fisheries.
6. **Biological data:**
   - Surface and longline fisheries, in particular China, Taiwan,China, Indonesia and Japan: The Secretariat had to use length-age keys, length-weight keys, ratios of fin-to-body weight, and processed weight-live weight keys for sharks from other oceans due to the general paucity of biological data available from the Indian Ocean.

General issues with the data across the majority of fleets that are apparent from this summary include:

- Unreported catches

Although some fleets have been operating since 1950, there are many cases where historical catches have gone unreported as many countries were not collecting fishery statistics in years prior to 1970. It is therefore thought that important catches of sharks might have gone unrecorded in several countries. There are also a number of fleets which are still not reporting on their interactions with bycatch species, despite fleets using similar gears reporting high catch rates of bycatch (***Table 3***).

- Errors in reported catches

For the fleets that do report interactions, there are a number of issues with these estimates. The estimates are sometimes based on retained catches rather than total catches, and so if discarding is high then this is a major source of error. Errors are also introduced due to the processing of the retained catches that is undertaken. This creates problems for calculating total weight or numbers, as sometimes dressed weight might be recorded instead of live weights. For high levels of processing, such as finning where the carcasses are not retained, the estimation of total live weight is extremely difficult.

- Poor resolution of data

Historically, shark catches have not been reported by species but simply as an aggregated total, however, the proportion of catches reported by species has increased substantially in recent years. Misidentification of shark species is also common. Processing creates further problems for species identification, requiring a high level of expertise and experience in order to be able to accurately identify specimens, if at all. The level of reporting by gear type is much higher and catches reported with no gear type allocated form a small proportion of the total.

The main consequence of this is that the estimation of total catches of sharks in the Indian Ocean is compromised by the paucity of the data available.

OTHER BYCATCH

1. Incidental catches of SEABIRDS:

- Longline fisheries operating in areas with high densities of seabirds. Levels of reporting of seabird bycatch remain low across all fisheries and time-periods (***Table 3***).

2. Incidental catches of MARINE TURTLES:

- Gillnet fisheries of Pakistan: to date, there have been no reports on incidental catches of marine turtles for the driftnet fisheries.
- Longline fisheries of Malaysia, Oman, Philippines, and Seychelles: To date, these countries have not reported incidental catches of marine turtles for their longline fisheries.
- Purse seine fisheries of the EU (excluding 2003–07 and EU-France), Iran, Japan, Seychelles, and Thailand: To date these countries have not reported incidental catches of marine turtles for their purse seine fisheries, including incidental catches of marine turtles on Fish Aggregating Devices.

While the CPCs that have not provided any information have been mentioned specifically here, there are still many CPCs that are providing data that are not consistent with the IOTC minimum reporting standards. This includes not reporting bird bycatch data by species and not providing an estimation of the total mortality of marine turtles incidentally caught in their fisheries.

Table 3. *Datasets provided by industrial fleets according to IOTC reporting requirements. Grey cells indicate which fleets have reported data for IOTC species, whereas green cells indicate which fleets have provided the bycatch data specified. Results are based on the nominal catch, catch –and-effort and size frequency data held within the databases at the IOTC Secretariat on October 1st 2014 and information on seabirds, marine turtles, mammals and thresher sharks is taken from National Reports to the Scientific Committee or other documents[17].*

	BAIT BOAT AUSTRALIA	BAIT BOAT KOREA REP	BAIT BOAT MADAGASCAR	BAIT BOAT EU (SPAIN)	GILL NET IRAN I R	GILL NET PAKISTAN	GILL NET TAIWAN,CHINA	LONG LINE AUSTRALIA	LONG LINE BELIZE	LONG LINE CHINA	LONG LINE EU (FRANCE)	LONG LINE FRANCE (OT)	LONG LINE GUINEA	LONG LINE HONG KONG	LONG LINE INDIA	LONG LINE INDONESIA	LONG LINE IRAN I R	LONG LINE JAPAN	LONG LINE KENYA	LONG LINE KOREA REP	LONG LINE MADAGASCAR	LONG LINE MALAYSIA	LONG LINE MALDIVES	LONG LINE MAURITIUS	LONG LINE MOZAMBIQUE	LONG LINE OMAN	LONG LINE PAKISTAN	LONG LINE PHILIPPINES	LONG LINE EU (PORTUGAL)	LONG LINE SENEGAL	LONG LINE SEYCHELLES	LONG LINE SOUTH AFRICA	LONG LINE EU (SPAIN)	LONG LINE SRI LANKA	LONG LINE TAIWAN,CHINA	LONG LINE TANZANIA	LONG LINE THAILAND	LONG LINE EU (UK)	LONG LINE VANUATU	LONG LINE YEMEN AR RP	PURSE SEINE AUSTRALIA	PURSE SEINE BELIZE	PURSE SEINE EU (FRANCE)	PURSE SEINE FRANCE (OT)	PURSE SEINE IRAN I R	PURSE SEINE JAPAN	PURSE SEINE KOREA REP	PURSE SEINE MALAYSIA	PURSE SEINE MAURITIUS	PURSE SEINE SEYCHELLES	PURSE SEINE EU (SPAIN)	PURSE SEINE SRI LANKA	PURSE SEINE THAILAND
Historic data (<2006)																																																					
NC Main spp (≥2006)																																																					
NC OTHER spp (≥2006)																																																				
CE Main spp (≥2008)																																																				
CE OTHER spp (≥2008)																																																				
SF Main spp (≥2008)																																																				
SF OTHER spp (≥2008)																																																				
Estimates of thresher shark catch & SF (≥2010)																																																				
Seabirds (≥2011)																																																				
Marine turtles (≥2010)																																																				
Marine mammals (≥2013)																																																				

[17] Additional reported data sources: Iran port sampling report for gillnets, discard reporting forms from Sri Lanka, Korea, South Africa, Maldives and France and observer reports for Japan longline and EU (France and Spain) purse seine fleets.