Evaluating the ability of IOTC CPCs and other fishing parties in the Indian Ocean to produce close-to-real time estimates of catches of yellowfin tuna and bigeye tuna

PREPARED BY: IOTC SECRETARIAT[1], 28 NOVEMBER 2011

Abstract

This report presents the actions undertaken by the IOTC Secretariat to address the request from the Commission on the ability of coastal countries in the IOTC region to report catch data for their artisanal fisheries in close-to-real time, in particular catch data for of yellowfin tuna and bigeye tuna. Two timeframes for the reporting of close-to-real-time catches are defined, depending on the type of fishery. For industrial fisheries, close-to-real-time reporting of catches occurs when catches are reported within 30 days of the day of capture. For artisanal fisheries, close-to-real-time reporting of catches occurs when catches are reported within 60 days of the day of capture. Artisanal fisheries are defined as those undertaken by vessels (or any other types of fishing crafts) with LOA less than 24m and operated full time within the EEZ of their flag states. The report identifies deficiencies in data collection and reporting in the majority of the countries assessed noting that the reporting of catches as per the timeframes specified will not be possible in eleven out of the eighteen countries evaluated. Those countries will require significant amounts of time and resources to streamline their statistical systems if data by the proposed timeframe is to be reported in the future. Overall an estimated 35% of the combined catches of yellowfin tuna and bigeye tuna will not be reported in time unless the countries address the issues identified as a matter of priority. In the event of catches not being reported, the catches will need to be estimated. The use of such an approach will require the adoption of more conservative measures, to account for the uncertainty of the estimates, and mitigate the risk of exceeding any future catch limits set by the Commission.

Introduction

The Indian Ocean fisheries for tuna and tuna-like species are unique in that artisanal catches play an important role in the total catch (for yellowfin tuna and bigeye tuna combined estimated at ~25% of the total catch in 2010 (35% and 2% for yellowfin tuna and bigeye tuna respectively), making it very challenging to accurately derive the total catches of IOTC or other species by these fisheries. These difficulties became particularly relevant when the IOTC Members considered, at the 14th Session of the Commission, the adoption of a global quota system for some of the major species. One of the concerns at the time, was the difficulty of producing the close-to-real-time (Box 1) catch reporting necessary to accurately estimate each year the date when the catch limit would be reached by the combined fisheries acting on the stock in question (i.e. the date of closure). Although the ability to report timely, and questions about quality of data reported, affect both industrial and artisanal fisheries, the Commission noted the particular challenges faced by reporting systems that have to deal with small-scale fisheries spread over large coastlines, and decided that a special effort was necessary to improve the catch reporting systems for these fisheries.

Box 1: Definition of close-to-real time reporting

The term '***close-to-real time***' can be defined as catches that are reported within a specific timeframe from the day of capture. The timeframe of choice, however, may vary depending on the type of fisheries involved:

Industrial fisheries are usually undertaken by vessels fitted with communications equipment that would allow for the reporting of catch data at regular intervals. In contrast, the catches of artisanal fisheries are usually monitored by field samplers at unloading, with only part of the catches monitored (sampling). In this case catches are estimated at the end of each month meaning that the minimum possible delay in estimating catches will always be over 30 days.

[1] Miguel Herrera (secretariat@iotc.org)

On this basis and considering the type of fisheries that are involved, the following definitions are proposed for artisanal and industrial fisheries:

For industrial fisheries, close-to-real-time reporting of catches occurs when catches are reported within 30 days of the day of capture

For artisanal fisheries, close-to-real-time reporting of catches occurs when catches are reported within 60 days of the day of capture

This report presents the actions undertaken by the IOTC Secretariat to address the request from the Commission and the results obtained in 2011. The main objective of the study was to assess the capacity of coastal countries in the IOTC region to report close-to-real time catches to the Commission for their fisheries, in particular the amounts of yellowfin tuna and bigeye tuna taken by their artisanal fisheries. However, this request does not provide a clear guidance about which fleets shall be considered artisanal or which catch reporting timeframes should apply. The Secretariat made the following assumptions while assessing the fleets and timeframes associated with the Commission request: '***artisanal fisheries***' – widely used in IOTC Conservation and Management Measures, although no clear definition is provided. IOTC Resolution 11/04 establishes separate provisions for data collection for fishing fleets, including:

- the implementation of observer programmes by IOTC CPCs having large-scale fishing vessels in the area, or small-scale vessels that operate, fully or partially, outside the EEZ of their flag states;
- the implementation of sampling schemes in land, to monitor the activities of artisanal fisheries.

Based on the above, the definition of artisanal fishing used in the context of this study is: *Artisanal fisheries are defined as those undertaken by vessels (or any other types of fishing crafts) with LOA less than 24m and operated full time within the EEZ of their flag states.*

The IOTC Secretariat considered the following type of information would be necessary to respond to the Commission's request:

1. What is the shortest delay in reporting catches from artisanal fisheries that is possible?
2. Which countries and for which fisheries catch data by month can be reported within the above time-frames?
3. For other countries and fisheries, what would be the cost of implementing programmes so that delays in reporting are reduced considerably?
4. What would be the priority fleets to target with those systems?
5. Are all countries having industrial fisheries in a position to report catches by month within the same time-frame?

Material and methods

Considering the limited time allocated to the execution of the above tasks and workload at the Secretariat, the Secretariat hired a Consultant to assist, in particular, in the execution of field activities. To this purpose, the IOTC Secretariat established a contract with Dr Guillermo Moreno, a fisheries scientist with extensive experience on Indian Ocean fisheries, including previous work for the large-scale Regional Tuna Tagging Programme-Indian Ocean, and additional work for the IOTC Secretariat in countries of the region. During his seven months of work at the Secretariat, Dr Moreno undertook extensive travel covering nine countries in the region, whose catch, on average, represents ~70% of the total catches of yellowfin tuna and bigeye tuna by the artisanal fisheries in the Indian Ocean. During this time he prepared nine Country Reports, covering the range of issues he was contracted to investigate, and a Report summarizing the main findings, conclusions, and recommendations for improvement of collection and reporting of fisheries data in the countries and fisheries covered.

In addition to the above work, constituting the bulk of this study, the IOTC Secretariat carried out a desktop study with the view to cover other fisheries that operate in the area. This covered the fisheries in other countries of the region, not covered by the consultant, and all distant-water fisheries operating in the area, the majority large-scale. To carry out these tasks the IOTC Secretariat used various sources, including: (i) National Reports presented by IOTC CPCs to meetings of the Scientific Committee, or any other reports presented to Working Party meetings; (ii) other documents and reports covering the fisheries and statistical systems available at the Secretariat; (iii) back-to-office reports corresponding to missions of Secretariat staff to countries in the region; and, primarily, (iv) information collected through the activities initiated by the IOTC-OFCF Project, which has covered most of the coastal countries of the region[2].

Results

Figures 1-4 and Tables 1 and 2, in the Appendix, present the status of data collection and reporting, and feasibility of close-to-real time reporting for artisanal fisheries, by fleet and type of fishery.

The following points summarize the results of the study:

In recent years (2006–2010), 35% of the catches of yellowfin tuna have been taken by artisanal fisheries in the Indian Ocean, while 65% was taken by industrial fisheries. In contrast, artisanal fisheries caught less than 2.5% of the catches of bigeye tuna during the same period (**Figure 1**). However, it should be noted that the contribution that artisanal fisheries make to the total catches of these species is unlikely to represent the reality, as some of the artisanal fisheries covered are thought to underestimate, in particular in the case of bigeye tuna, or to a lesser extent, overestimate, catches of these species; in addition, some countries do not report catches by species, hampering any efforts to estimate catches of yellowfin tuna and bigeye tuna reliably. Overall, the contribution that the catches of artisanal fisheries make to the total catches of yellowfin tuna and, especially bigeye tuna, is likely to be higher.

In general, the quality of the statistical systems in place for artisanal fisheries (**Figure 2**) was assessed to be poor (~70% of the catches from artisanal fisheries were assigned poor quality) or very poor (~5% of the catches); in contrast, the quality of the statistical systems used for industrial fisheries was assessed to be good (~85% of the catches from industrial fisheries were assigned good quality); overall ~25% of the catches (~110,000 t) were assigned poor, or very poor quality.

Seven out of the eighteen countries assessed (**Figure 3**) would require to allocate substantial funds (~3 million US$) to the restructuring of their data collection systems, so as to be able to produce the catch statistics as per the standards agreed by the Commission. Overall, around 6 million US$ would be required, well above the 400,000 US$ that the Commission initially allocated to these activities.

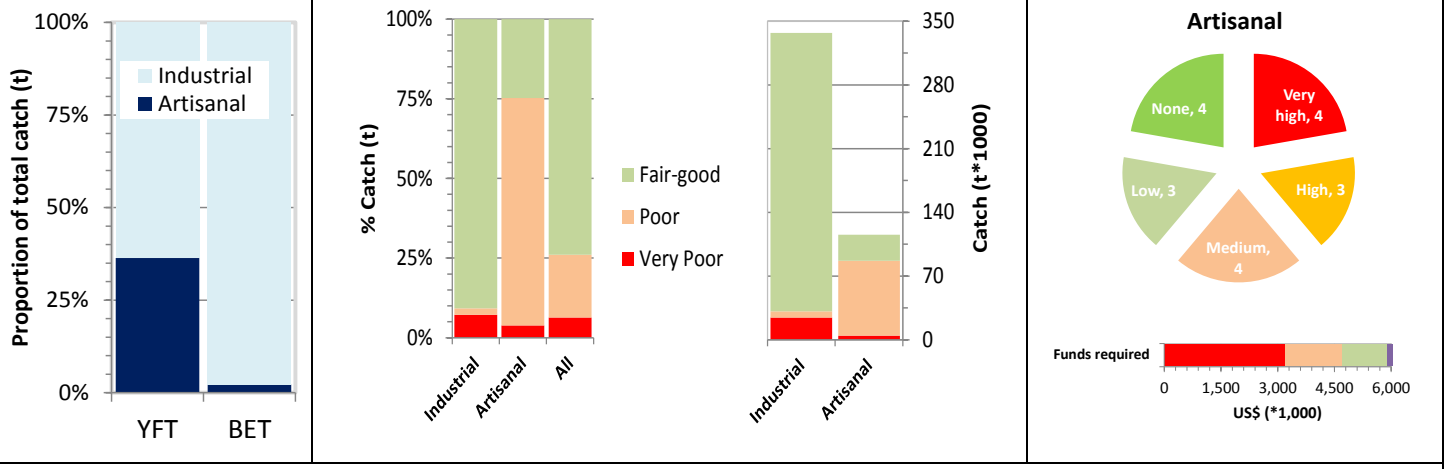
[2] A summary of the activities that the IOTC–OFCF Project has implemented, since its inception, is presented in document IOTC–2011–WPDCS08–11 (*IOTC-OFCF Project activities in 2011: Progress Report*)

Figure 1 (left): Proportion of the catches of yellowfin tuna and bigeye tuna taken by artisanal and industrial fisheries in the Indian Ocean from the total catches recorded for both species from 2006–2010.

Figure 2 (middle): Relative quality of the statistical systems used for Industrial and Artisanal fisheries in the Indian Ocean, as assessed from the sources available:

- Fair-Good: Catches from fleets for which the statistical systems are thought to be of fair to good quality (the scores assigned are 11 to 20)
- Poor: Catches from fleets for which the statistical systems are thought to be of poor quality (the scores assigned are 6 to 10)
- Very poor: Catches from fleets for which the statistical systems are thought to be of very poor quality (the scores assigned are 1 to 5).

Figure 3 (right): Estimated level of funding that countries having artisanal fisheries in the Indian Ocean would need to allocate to the strengthening of their statistical systems so as to be able to produce catch statistics by IOTC standards. The number of countries requiring additional funds (pie chart), and the amount of funds required (bar chart), by funding level category are displayed. Very high (Red: over 600,000 US$ required); High (Bright orange: 400,000-600,000 US$); Medium (Light orange: 100,000–400,000 US$); Low (Light gree: under 100,000 US$); None (Green: no funds required).

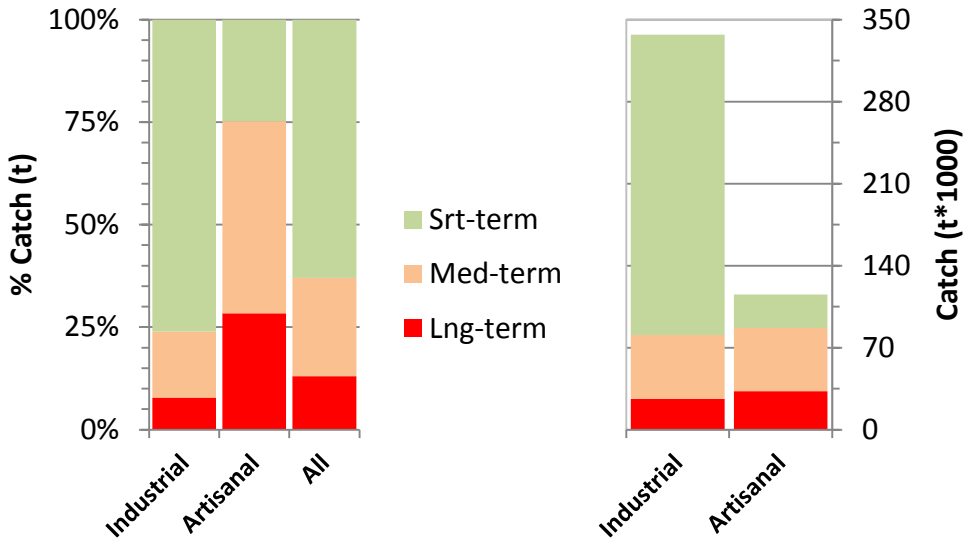


NOTE: The charts in the mid upper panel show the total catches of yellowfin tuna and bigeye tuna, for the period 2006–2010, assigned to each category; the chart on the left shows percentages while that on the right shows absolute values

The feasibility of close-to-real time reporting of catches of yellowfin tuna and bigeye tuna by countries having artisanal fisheries (**Figure 4**) was assessed to be poor or very poor (~75% of the countries are unlikely to be able to produce close-to-real time catches in the near future), with timeframes estimated to be one year or over, provided that, as a matter of priority, human and financial resources are allocated to the restructuring of their statistical systems. In the case of industrial fisheries, the results of the study tend to indicate that the majority of the catches could be reported in time (~75%). However, in terms of absolute catches, the amounts that would not be reported in time are similar for artisanal and industrial fisheries; overall, this represents around 35% of the total catches of yellowfin tuna and bigeye tuna (~170,000 t).

Figure 4: Feasibility of close-to-real time reporting of catches of yellowfin tuna and bigeye tuna by countries having artisanal and/or industrial fleets fishing in the Indian Ocean. Feasibility is expressed as the amount of time that countries are expected to invest to upgrade their statistical systems so as catch data can be reported in close-to-real time:

- **Short-term**: Amount of catch that will be reported on time in the event of implementation of a quota system
- **Medium-term**: Amount of catch that will NOT be reported on time in the event of implementation of a quota system, the countries involved requiring between one and two years to strengthen their data collection and reporting systems so as catch reports can be produced in time
- **Long-term**: Amount of catch that will NOT be reported on time in the event of implementation of a quota system, the countries involved requiring more than two years to strengthen their data collection and reporting systems so as catch reports can be produced in time.



NOTE: The above charts show the amount that the catches of yellowfin tuna and bigeye tuna pooled, for the period 2006–2010, were assigned to each category; the chart on the left show percentages while that on the right shows absolute values.

DISCUSSION AND CONCLUSIONS

The answer to the question posed by the Commission is that the majority of the countries having artisanal fisheries in the region cannot report catches of yellowfin tuna and bigeye tuna in close-to-real time. As indicated in the previous section, at present, 75% of the catches of yellowfin tuna and bigeye tuna by the artisanal fisheries of the region cannot be reported as per the timeframe proposed in Box 2 (**Figure 4**). In addition, it is also unlikely that the countries concerned can address the situation in the near future, as this would require allocating a substantial amount of time and resources to the task (**Figure 3**), which is not available at present. Five of the countries assessed will require an estimated more than five years to be able to report the catches in time, while six countries will require between two and five years. In addition to the previous point, an attempt is made here to provide answers to the questions outlined previously in the report, and these are outlined in Box 3.

BOX 3: Response to the questions formulated previously in the report (The definition of the task)

1. *What is the shortest delay in reporting catches from artisanal fisheries that is possible?*
   The majority of the countries having artisanal fisheries in the Indian Ocean region are not in a position to report close-to-real time catches for the species under consideration. Considering that the catches of artisanal fisheries are usually derived from samples collected from the fisheries, the best case scenario would be catches estimated within 10-15 days of the end of the month where the catches occurred. This timeframe, however, will be extremely difficult to achieve in the case of some artisanal fisheries, in particular in those where tunas represent a bycatch.
2. *Which countries and for which artisanal fisheries catch data by month can be reported within a reasonable time-frame?*
   Seven of the eighteen countries assessed (**Table 1**) could be in a position to report catches for their artisanal fisheries within the timeframe specified in Box 1; however, those seven countries catch only 25% of the total catches of yellowfin and bigeye tuna in the Indian Ocean (**Figure 4**).
3. *For other countries and fisheries, what would be the cost of implementing programmes so that delays in reporting are reduced considerably?*
   The amount of funds required to the restructuring of the statistical systems in countries having poor data collection and reporting, as identified in the study (**Table 1**), is substantial, estimated at around six million US$, well above the 400,000 US$ allocated by the Commission.
4. *What would be the priority fleets to target with those systems?*
   As identified in the report of the Consultant the countries that need the most urgent assistance with their current sampling and reporting methodologies are India, Indonesia, Maldives, and Sri Lanka. In addition to those, the artisanal fisheries of Yemen and Pakistan also need urgent attention. However, the situation in the last two countries may prevent any intervention in the near future, especially noting that Yemen is not a Member of the Commission. Initially, it is thought that any funds allocated to improving the statistical systems in Maldives, Sri Lanka, and Indonesia, in this order, will be more cost-effective.
5. *Are all countries having industrial fisheries in a position to report catches by month within the same time-frame?*
   As presented in the previous section, and **Figure 4**, the feasibility of reporting of close-to-real time catches by the industrial fisheries in the region is high, with 75% of the catches likely to be reported as per the proposed timeframe. However, in terms of absolute catches, the contribution of artisanal and industrial fisheries is very similar. In this case, the longline fisheries of India and Malaysia, and the oceanic driftnet fisheries of Pakistan, are in need of urgent attention (**Table 2**).

In conclusion, in the event of implementation of close-to-real time reporting by the Commission, it is likely that 35% or more of the catches of the species concerned will not be reported as per the timeframe proposed and will need to be estimated using data from previous years, or a combination of these data and data available from similar fisheries for which catches are reported in time. The use of such an approach will probably require the adoption of more conservative measures, to account for the uncertainty of the estimates, and mitigate the risk of exceeding any catch limits set by the Commission.

APPENDIX

Status of collection and reporting of data for artisanal and industrial fisheries in the Indian Ocean

Key to Tables 1-2:

Catches YFT-BET (2006-10): Combined catches of yellowfin tuna and bigeye tuna for the period 2006-10:

- HIGH Over 5000 t (HGH)
- MEDIUM (500-5000 t; MED)
- LOW (10-500 t; LOW)/Very low (<10 t; VLW)

Source: main data sources:

- Moreno: Pilot project to improve data collection for tuna, sharks and billfish from artisanal fisheries in the Indian Ocean (Moreno, G., 2011)
- OFCF: Information collected by the IOTC-OFCF Project;
- DOC: Information in National Reports or other documents available at the IOTC; na not assessed

Quality Statistical system: Quality of the statistical system as assessed by the Consultant, or by the Secretariat, using the same criteria.

- Very poor (Red; VP)
- Poor (Orange; P)
- Fair (Light green; F)
- Good (Green; G)

Feasibility of close-to-real time estimates: Amount of time that the country will require to strengthen data collection and reporting so as catches can be reported by the timeframes specified for artisanal and industrial fisheries.

- Long term, 5 or more years (Red; LT);
- Medium term, 2 to 5 years (Orange; MT);
- Short term, less than two years (Green; ST)

Level of funding required: Estimated level of funding that would be required to improve the statistical systems in countries unable to produce statistics as per the timeframes proposed in Box 1:

- Very high, over 600,000 US$ (Red; VH);
- High, 400,000-600,000 US$ (Orange; H);
- Medium, 100,000-400,000 US$ (Light green; M);
- Low, under 100,000 US$ (Green; L);
- No funds required (White; N)

Institutions referred to in On-going activities:

- FO: Fisheries organization of Iran (SHILAT)
- MoFAMR Ministry of Fisheries, Agriculture and Marine Resources of the Maldives
- FD: Fisheries Department of Kenya
- IDPPE: Institute for Small-Scale Fisheries Development of Mozambique
- DAFF/ACIAR: Department of Agriculture Fisheries and Forestry of Australia / Australian Centre for International Agricultural Research
- OFCF: Overseas Fishery Cooperation Foundation of Japan, through the IOTC-OFCF Project
- IOTC: IOTC Secretariat, using accumulated funds from the Commission

Table 1: Status of collection and reporting of data for artisanal fisheries in IOTC coastal countries; level of funding required to address the deficiencies identified in their statistical systems; and feasibility of reports to the IOTC in close-to-real time concerning the catches of yellowfin tuna and bigeye tuna by their fisheries.

Country	Catches YFT-BET (2006-10)	Source	Quality of Statistical System	Level of funding required	Feasibility close-to-real time estimates	On-going activities
Sri Lanka	HGH	Moreno	P	H	MT	OFCF support to data management
Iran	HGH	Moreno / OFCF	F	VH	ST	OFCF support to data management / FO implementation of logbook system
Indonesia	HGH	Moreno	P	VH	MT	DAFF/ACIAR support to management of Rumpons (anchored FADs)
Maldives	HGH	Moreno	P	M	MT	MoFAMR implementation of logbook system and Database
Yemen	HGH	OFCF	P	VH	LT	
Oman	HGH	OFCF	G	N	ST	
India	HGH	Moreno	P	VH	LT	
Comoros	HGH	OFCF	G	L	ST	IOTC &OFCF support to revamping of statistical system
Pakistan	HGH	DOC	P	H	LT	
Madagascar	MED	Moreno	VP	M	LT	
Tanzania	LOW	Moreno	VP	M	LT	
Mauritius	LOW	DOC	F	L	ST	
France OT	LOW	DOC	G	N	ST	
Kenya	LOW	Moreno	VP	H	MT	FD revamping of statistical system
EU-Reunion	LOW	DOC	G	N	ST	
Djibouti	LOW	DOC	P	L	MT	SMARTFISH support to revamping of statistical system
UK OT	LOW	DOC	G	N	ST	
Mozambique	LOW	Moreno	P	M	MT	IDPPE Data collection in place
Other countries	VLW	na	na	na	na	

Table 2: Status of collection and reporting of data for industrial fisheries operated in the IOTC area; and feasibility of reports to the IOTC in close-to-real time concerning the catches of yellowfin tuna and bigeye tuna by these fisheries.

BB: Large-scale baitboat; **GI**: High seas driftnet; **ELL**: Swordfish longline; **FLL**: Fresh-tuna longline; **LL**: Deep-freezing longline; **PS**: Tuna purse seine

Country	Importance Catches YFT-BET (2006-10)	Quality of Statistical System	Feasibility close-to-real time estimates	Remarks
EU-PS	HGH	G	ST	
Taiwan,China-LL	HGH	G	ST	
Seychelles-PS	HGH	G	ST	
Japan-LL	HGH	G	ST	
Indonesia-FLL	HGH	F	MT	Low coverage logbook data; poor monitoring of some vessels
Taiwan,China-FLL	HGH	F	MT	Low coverage logbook data
NEI-FLL	HGH	VP	LT	Non-reporting fleets
India-LL	HGH	VP	LT	Very poor monitoring of vessel activities and catches
Iran, Isl.Rep.-GI	HGH	F	MT	Low coverage logbook data
China-LL	HGH	G	ST	
Seychelles-LL	HGH	G	ST	
France OT-PS	HGH	G	ST	
Maldives-BB	HGH	F	ST	Low coverage logbook data
Oman-LL	MED	F	MT	Catches refer to Omani EEZ only
NEI-LL	MED	VP	LT	Non-reporting fleets
Iran, Isl.Rep.-PS	MED	F	ST	Logbook report not validated
Korea, Rep.-LL	MED	G	ST	
Indonesia-LL	MED	P	MT	Poor monitoring of vessel activities and catches
Philippines-LL	MED	P	MT	No logbook system in place
Pakistan-GI	MED	VP	LT	Very poor monitoring of vessel activities and catches
Malaysia-FLL	MED	P	LT	Lack of monitoring of vessels based in foreign ports
India-FLL	MED	VP	LT	Very poor monitoring of vessel activities and catches
Japan-PS	MED	G	ST	
EU-ELL	MED	G	ST	
Oman-FLL	MED	F	MT	Catches refer to Omani EEZ only
China-FLL	LOW	G	ST	
South Africa-ELL	LOW	G	ST	
Thailand-LL	LOW	F	ST	Logbook report not validated
Belize-LL	LOW	F	ST	Logbook report not validated
Other fleets	VLW	na	na	

Source: Moreno 2011 (Iran, Maldives); IOTC Scientific Committee & IOTC Secretariat (all countries)