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SCOPING STUDY OF SOCIO-ECONOMIC DATA AND INDICATORS OF IOTC FISHERIES

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ABOUT THIS REVISION

This revised report contains some additional information in Section 3 pertaining to Indonesia.

PURPOSE

To provide the Commission with the draft Scoping study of socio-economic data and indicators of IOTC fisheries for its consideration and prospective action.

BACKGROUND

At its 22nd session, the Commission adopted Resolution 18/09 which detailed the requirements for a scoping study on socio-economic data and indicators of IOTC fisheries.

The objectives of the study were to describe the economic and social aspects of the fisheries, bearing in mind, in particular, the interests of developing coastal States, and identify the availability of data and socio-economic indicators that would describe the respective CPCs economic and social aspects of fisheries, including but not limited to: socio-economic contribution to the fisheries, economic dependence on fishery resources; income from exports; employment conditions and interactions between fleet segments; impact of fishery resource rents, including fisheries agreements with third parties to the local economies in terms of income, investments and jobs.

The general terms of reference for this study are outlined in Annex 1 of the Resolution, and the Secretariat was tasked with facilitating the process of recruiting a consultant or consulting company to deliver the work. To this end, a call for tender was circulated via IOTC Circular 2018-35, and after a competitive evaluation process, Poseidon Aquatic Resource Management was selected to undertake the work.

The scoping study has been delayed due to a late start and slower than expected responses from CPCS for information, consequently the expected delivery of drafts of the report to the Commission according to the proposed schedule was not possible.

However, the report has now been made available and the IOTC chairperson has agreed that it would be beneficial for the consultants to be given time to present this study (as requested by the Commission in 2018). A delay at this stage would result in little additional information being available for the analysis in the future, and would simply delay the process of addressing socio-economic factors within the Commission by another year.

RECOMMENDATION/S

That the Commission:

a) **NOTE** paper IOTC–2019–S23–23 which contains the results and recommendations of the scoping study of socio-economic data and indicators of IOTC fisheries.

b) **DETERMINE** if a permanent Working Party on the Socio-Economic Aspects of the Fisheries the IOTC Area of the Competence is needed.

Scoping study of socio-economic data and indicators of IOTC fisheries

Draft Report

May 2019

POSEIDON
AQUATIC RESOURCE MANAGEMENT

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Acronyms

CFP	Common Fisheries Policy
CIF	Carriage Insurance and Freight
CP	Contracting Party
CNCP	Cooperating Non-Contracting Party
CPC	Contracting Parties and Cooperating Non-Contracting Party
CECAF	Fishery Committee for the Eastern Central Atlantic
CMM	Conservation and management measures
DCF	Data collection framework (of the EU)
EBFM	Ecosystem based fisheries management
EU	European Union
FFA	Forum Fisheries Agency
FTE	Full-time equivalent
GDP	Gross Domestic Product
GFCM	General Fisheries Commission for the Mediterranean
GT	Gross Tonnes
GVA	Gross Value Added
ICCAT	International Commission for the Conservation of Atlantic Tunas
IOTC	Indian Ocean Tuna Commission
JRC	Joint Research Centre
kW	Kilowatt
LL	Longline
NGO	Non-governmental organisation
NPOA-IUU	National Plan of Action to prevent, deter and eliminate Illegal, Unreported and Unregulated Fishing
PNA	Parties to the Nauru Agreement
PS	Purse seine
SCRS	Standing Committee Research Statistics (of ICCAT)
SFPA	Sustainable Fisheries Partnership Agreement
SMART	Specific, measurable, achievable, relevant, time-bound
STECF	Scientific, Technical and Economic Committee for Fisheries
TAAF	Terres australes et antarctiques françaises
WCPFC	Western and Central Pacific Fisheries Commission
WIO	West Indian Ocean

1. Introduction

1.1 Purpose of this document

This document is the output of an assignment completed by Poseidon Aquatic Resource Management Limited (www.consult-poseidon.com) to undertake a 'Scoping Study of Socio-Economic Data and Indicators of IOTC Fisheries'.

The document:

1. Presents the background and need for the scoping study (Section 1.2).
2. Outlines the approach and methodology to the study in terms of its scope and approach to data collection and indicators (Section 2).
3. Presents some background data on the socio-economic contribution of tuna fisheries in Indian Ocean Tuna Commission (IOTC) Contracting Parties and Cooperating non-Contracting Parties (CPCs) (Section 3).
4. Highlights the extent to which CPCs do/do not collect a range of different data, and if they do not whether they would be willing to do so. Information is also provided on the views of CPCs as to the role that IOTC might play in data collection and the frequency/use of any such data provided (Section 4).
5. Proposes some potential socio-economic indicators of use, and the views of CPCs about them (Section 5).
6. Provides some examples of economic and social data being collected by other regional organisations (Section 5.4).
7. Draws some conclusions and makes some recommendations (Section 6).

[An executive summary will be provided in the final version of this report following feedback from the IOTC Commission in May].

1.2 Background and objectives of the scoping study

The IOTC is an intergovernmental organisation responsible for the management of tuna and tuna-like species in the Indian Ocean. It promotes cooperation among its CPCs with a view to ensuring, through appropriate management, the conservation and optimum utilisation of stocks covered by the organisation's establishing Agreement and encouraging sustainable development of fisheries based on such stocks.

At its 22nd session, the IOTC adopted Resolution 18/09 which:

1. agreed a set of terms of reference for a scoping study of socio-economic aspects of IOTC fisheries.
2. instructed the IOTC Secretariat to facilitate the recruitment of a consultant or consulting company to delivery of the scoping study.
3. agreed that its CPCs should cooperate with the consultant undertaking the study.

It was further agreed in the Resolution that the Commission will review the results of the scoping study and determine if a permanent Working Party on the Socio-Economic Aspects of the Fisheries the IOTC Area of the Competence is needed, at its 23rd Session in 2019.

The need for the scoping study is underpinned and justified by:

- Article V of the Agreement to establish the IOTC[1]. This Article lays down the objectives, functions and responsibilities of the Commission, including: i) 'to promote cooperation among its Members with a view to ensuring, through appropriate management, the conservation and optimum utilization of stocks'; ii) to 'keep under review … other data relevant to the conservation and management of the stocks'; and iii) 'to keep under review the economic and social aspects of the fisheries based on the stocks covered by this Agreement bearing in mind, in particular, the interests of developing coastal states'.
- Article IV of the Agreement which requires the Commission to 'keep under review the economic and social aspects of the fisheries based on the stocks covered by this Agreement bearing in mind, in particular, the interests of developing coastal states'.
- The intention of the Commission to move to a more Ecosystem Based Fisheries Management (EBFM) approach, as highlighted in the 20th Session of the IOTC Scientific Committee report[2]. This Session noted that the development of an ecosystem report card is a first step in developing the EBFM approach, and that a requirement of the report card would be a process to develop and monitor simple indicators and then linking these to management objectives and actions.
- The EBFM approach recognises the need to maintain the ecosystem resources for their sustainable use, while recognising that humans are an integral part of the process. So, EBFM not only deals with all the ecological consequences of fishing and requirements for environmental sustainability, but it also explicitly deals with the social and economic implications (good and bad) generated by the management and institutional arrangements related to fisheries.
- The objective of the Commission to maintain stocks in perpetuity and with high probability, at levels not less than those capable of producing their maximum sustainable yield as qualified by relevant environmental and economic factors including the special requirements of developing States in the IOTC area of competence.

The objectives of the scoping study follow from the tasks laid out in the ToR, namely:

1. To describe the economic and social aspects of the fisheries, bearing in mind, in particular, the interests of developing coastal states, and identify the availability of data and socio-economic indicators that would describe the respective CPCs economic and social aspects of fisheries, including but not limited to: socio-economic contribution to the fisheries, economic dependence on fishery resources; income from exports; employment conditions and interactions between fleet segments; impact of fishery resource rents, including fisheries agreements with third parties to the local economies in terms of income, investments and jobs.
2. To evaluate and document what socio-economic data have been, and are currently collected by CPCs or other organisations that are in the public domain, on IOTC fisheries.
3. To evaluate and document what socio-economic data have been, and are currently collected by CPCs or other organisations but are not in the public domain on IOTC fisheries, where feasible under domestic law.
4. To evaluate if a) the data can be feasibly and uniformly collected, and b) would be adequate to calculate the indicators proposed. This should include, where feasible, a discussion on the data themselves, data quality, time periods and coverage rates.

[1] http://www.fao.org/fishery/docs/DOCUMENT/iotc/Basic/IOTCA_E.pdf
[2] https://www.iotc.org/documents/report-20th-session-iotc-scientific-committee

5. To make recommendations on indicators taking into consideration the available data. To make recommendations on data requirements and harmonisation.
6. To make recommendations on data management, reporting and associated costs to IOTC.

2. Approach and methodology

Summary of approach and methodology

1. A phased approach to the study allowed for a planning phase, a data collection phase, and an analysis and reporting phase. The study was completed between January and July 2019.
2. The methodology for the study was presented in an inception note prepared as part of the planning phase, which was agreed between the consultants and the IOTC Secretariat as an appropriate approach to addressing the terms of reference.
3. The study focussed on potential data and indicators specifically related the species under IOTC's mandate, and the economic and social contributions that could be attributed to catches made in the Indian Ocean.
4. A questionnaire (available in both English and French) was used to elicit the views of CPCs on a range of issues related to data and indicators, and to request data where they are being collected. Secondary sources and communication with other ongoing projects were also used in an attempt access additional data.
5. Seventeen completed questionnaires were returned to the consultants following a series of requests and reminders, and form the basis of the findings, conclusions, and recommendations in this report.

2.1 Timing and phasing of the study

The study was divided into three phases as follows:

Planning phase (January-February 2019): This phase was used to conduct background planning, and to reach an agreed and documented understanding with IOTC over the detailed arrangements and methodological tools for the study, and the form/content of outputs to be provided. The deliverable from the planning phase was an inception note (not explicitly required by the ToR), which formed the agreed methodological basis for completion of the study, and which included the questionnaire to be sent to CPCs (see Annex B: Study questionnaire).

Data collection phase (March-April 2019): This phase incorporated desk-based data collection to respond to the ToR. Data collection involved engagement with CPCs, those working on other relevant projects, and web-searches. Most importantly, a questionnaire (available in both English and French) was used to elicit feedback from CPCs about: a) data availability, and b) CPC views on expanding data being collected, potential socio-economic indicators, and data collection/management arrangements.

Analysis and reporting phase (May-July 2019): This phase focused on evaluative and analytical work following the data collection, including creation of excel database into which all questionnaire responses were entered for ease of analysis, as well as analysis of other reports and datasets. The analysis completed enabled a number of findings to be articulated, and for recommendations to be developed for consideration by the IOTC Commission at its meeting in India in June 2019.

2.2 Scope and general approach

The scope and approach to the study agreed in the inception note was as follows.

With regards to the scope of the study, the study was limited in all tasks to:

i) A focus on species under the mandate of the IOTC (hereafter referred to collectively as tuna and tuna-like species).

ii) Catches made in the Indian Ocean/IOTC area of competence. This point was critically important in developing the questionnaire used during the study (see below), as questions had to be carefully worded to relate specifically to tuna caught in the Indian Ocean.

The study covered 32 of the 33 CPCs. The following countries were included (* denotes CNCPs): Australia, Bangladesh, China, Comoros, Eritrea, European Union, France[3], India, Indonesia, Iran, Japan, Kenya, Korea, Liberia*, Madagascar, Malaysia, Maldives, Mauritius, Mozambique, Oman, Pakistan, Philippines, Senegal*, Seychelles, Sierra Leone, Somalia, Sri Lanka, South Africa, Sudan, Tanzania, Thailand, United Kingdom[4]. Due to the political instability in Yemen it was impractical to collect the data required for this Contracting Party and it was not included in the study.[5]

In considering the balance of information from CPCs, other projects, and other secondary information in the form of reports, the study focused primarily, but not exclusively, on interactions with contact points for the study in the CPCs as the means of collecting data and information, rather than using secondary sources or other projects. This approach was adopted because any secondary information sources and projects containing relevant data generally draw on data from the CPCs themselves. CPCs themselves are almost certainly the most likely to have the most up-to-date tuna-related data. However, secondary sources of information and other projects were reviewed where available and provided some useful data.

The study distinguished clearly in its approach between: i) indicators, and ii) data. Indicators are a measurement or value which provide an idea of what something is like, and must have, units of measurement. Data are what can be used to generate indicators, and indeed are required if indicators are to be measurable.[6] For this reason it made sense to adopt an interactive approach to data and indicators. On the one hand, it was important to understand all data that are available in order to inform the choice of indicators that might be generated using those data. However, in exploring what data are (or could be) available, the questionnaire to CPCs was also informed *a priori* about potential indicators that might be useful and what data would be needed for them, in order to include questions to CPCs about whether those data are indeed available or not.

The approach to indicators was based on the premise that they should be SMART (Specific, Measurable, Achievable, Relevant, Time-bound), and that in relation to the IOTC's and CPCs' requirements they should be:

- Based on data currently or potentially available for collection and provision from all (or at least most) CPCs;
- Simple but robust, with both data and indicators supported by definitions to ensure that CPC data provided, and indicators generated from the data, are directly comparable;
- Necessary and fit for purpose i.e. respond to the need to inform discussion and agreement over potential CMMs, sustainable fisheries management, and the EBFM; and
- Recognise the implications for CPCs in terms of the administrative burden for

[3] Answering for its non-EU territory only: French Southern and Antarctic Lands – TAAF.
[4] answering for its non-EU territory only.
[5] Note that Guinea has previously been, but is no longer an IOTC member.
[6] Point 1 of the ToR includes a list which is a mix of i) data (income from exports, employment conditions and interactions between fleet segments, income from fisheries agreements, jobs, investments), and ii) indicators (socio-economic contribution to the fisheries, economic dependence on fishery resources, impact of fishery resource rents).

governments or private sector in generating and providing data required for the indicators.

A list of possible indicators (as discussed in more detail later) was developed during the planning phase for feedback by CPCs as to their usefulness and feasibility. Indicators were included if considered of potential significance *in terms of management decision-making* by IOTC.

2.3 Scoping study limitations

The ToR for the study and the methodology proposed in the inception note assumed that CPCs would engage actively with the consultants and respond in a timely manner to requests for information. Indeed, the inception note highlighted that a failure by CPCs to respond to data requests posed the biggest single risk to the successful delivery of the study outputs.

In IOTC Circular 2018-51 (17 December 2018), the Commission notified CPCs that the study had been contracted to Poseidon, and requested cooperation by CPCs with Poseidon, in the first instance by providing a contact point for the study by 31 December. Eight CPCs did so.

A follow up request for a contact point was made by the consultants on 17 January 2019, and by the end of January a further 7 CPCs had provided one.

On 25 February (5 March in the case of French-speaking countries), a questionnaire was sent to CPCs with a request to complete it by 15th March (22 March in the case of French-speaking countries). The questionnaire asked for information about whether a range of data are available, or could be provided if not, as well the views of CPCs on possible indicators and data collection arrangements.

For CPCs that had provided a contact point for the study, the questionnaire was sent to the individual concerned, For those CPCs that had not provided a contact point for the study, the consultants sent the questionnaire to CPC head delegates of IOTC (based on a list of contacts provided by the IOTC Secretariat).

Following three reminder emails and an extension of the time provided to return the questionnaires, 17 CPCs had provided completed questionnaires by the time data collection phase of the study was closed at the end of April/early May 2019.

The findings contained in this report on the views of CPCs are thus based on the 17 CPCs that chose to engage with the study[7].

As reported in the next section, the range of data collected by CPCs is generally limited or is not relevant[8]. The consultants wrote to CPCs that had returned questionnaires asking for the data they had indicated are available, but only 3 CPCs did so (providing only partial data).

The ToR for this study also suggested that contact be made with some ongoing projects and potential sources of data, namely:

- The Overseas Fisheries Cooperation Foundation of Japan (OFCF) pilot project on socio-economic aspect of fisheries
- United Nations Economic Commission for Africa https://uneca.org/
- the Global Socioeconomic Monitoring Initiative for Coastal Management (SocMon) http://www.socmon.org/default.aspx
- Ocean Partnerships for Sustainable Fisheries and Biodiversity Conservation http://www.fao.org/in-action/commonoceans/projects/ocean-partnerships/en/

[7] CPCs that returned questionnaires were: Australia, Bangladesh, the EU, France, Indonesia, Japan, Kenya, Korea, Madagascar, Maldives, Mozambique, Oman, Senegal, Seychelles, Sri Lanka, Sudan, the UK.
[8] Some CPCs have no tuna catching sector (e.g. Bangladesh), no foreign vessels fishing in their waters (e.g. Maldives, Indonesia), no ports (e.g. French austral territories) or no commercial activity at all (e.g. UK).

- The Sustainable Development Solutions Network (SDSN) Sustainable Development Goals (SDG) target 14.7 http://unsdsn.org/ and http://indicators.report/targets/14-7/

Contact was made with these sources, but they were of extremely limited/no use in terms of providing any data to describe the economic and social aspects of tuna fisheries in the CPCs, due either to the scope of their activities, or the stage of ongoing work.

A range of additional possible sources of data were therefore also explored to help address point 1 of the ToR and inform the scoping study more generally. These sources included:

- The World Bank 'SWIOFish project'
- The FAO project 'illuminating the hidden harvests of small-scale fisheries'
- FAO FishstatJ
- Work by The International Pole & Line Foundation
- The EU DG MARE / EU bookshop website for evaluation reports of tuna Sustainable Fisheries Partnership Agreements (SFPAs)
- The Forum Fisheries Agency Compendium of Economic and Development Statistics (2017)
- The IOTC catch database: http://iotc.org/sites/default/files/documents/2018/10/IOTC-2018-WPTT20-DATA03b_-_NC_scenario2_0.zip

However, taken as a whole, the data available from all these sources were of only limited use in informing a comprehensive description of the current economic and social contribution of tuna fisheries in IOTC CPCs. For this reason, information provided in Section 3 of this report is patchy and more limited than the consultants would have liked.

3. Economic and social benefits of tuna-fisheries in IOTC CPCs

Key findings

1. The availability of accurate and comprehensive data to determine the economic and social contribution of tuna fisheries in the Indian Ocean to CPCs, is extremely limited.
2. Principle economic benefits accrue in the form of:
   - i) national contributions to gross domestic product, balance of payments and foreign exchange.
   - ii) revenue to governments from licence fees they charge their own vessels and vessels from third countries (in the case of coastal states) and access payments.
   - iii) profits to business owners in catching sector, upstream input/supply businesses, and downstream processing/marketing/export businesses.
   - iv) income to individuals working in the catching, upstream, and downstream sectors.
3. Catching sector ex-vessel values of species under the mandate of the IOTC are in the order of US$ 4.76 billion in 2017. Contributions to GDP from upstream supply businesses, and downstream processing/marketing, may be at least the same order of magnitude.
4. Principle social benefits accrue from: i) employment in the catching, upstream, and downstream sector; and ii) contributions to food security. Not accounting for the export of tuna catches, in 2017 catches of tuna and tuna-like species, potentially available for food consumption, were 1.8 million tonnes.

[*Section 3 may be updated in the final version of this report, if more data are found to be available*]

3.1 Economic benefits

Tuna fisheries in the Indian Ocean make economic contributions to CPCs in a number of ways as discussed below. As noted earlier, there are few datasets available covering these issues comprehensively for all CPCs, so the information provided below is necessarily patchy and not comprehensive in terms of its coverage for all CPCs. Principal sources used include FAO datasets, some limited data provided by CPCs, evaluation reports of Sustainable Fisheries Partnership Agreements (SFPAs)[9], and analysis completed by the consultants. Even the limited figures provided however serve to highlight the importance of the tuna sector, and the economic benefits that flow from tuna catches made in the Indian Ocean.

National contributions to gross domestic product, balance of payments, and foreign exchange earnings

Data on tuna-specific contributions to the gross domestic product (GDP) of CPCs are not available from any one source or covering all CPCs, but some data are available. In the Seychelles the catching and processing of tuna was valued at US$ 38.8 million in 2017 representing 2.6% of GDP[10], while in Mauritius tuna contributions to GDP represent around

[9] https://ec.europa.eu/fisheries/cfp/international/agreements_en or https://publications.europa.eu/en/home
[10] European Union, 2019 (in press)

1.4% of GDP[11]. In the Maldives the contribution of the fisheries sector (almost entirely tuna-based) to GDP is estimated at 4.7% for 2017[12].

To provide more regionally comprehensive figures for catching sector contributions to GDP, the consultants used IOTC catches by CPC and species[13], coupled with price data for 2017 available from Atuna.com and the Forum Fisheries Agency (FFA), to estimate the ex-vessel value of landings of tuna and tuna-related species in CPCs. This analysis should be treated with caution as the average prices used per species can only be a 'guestimate', being based on prices from limited sources[14], and because prices used are aggregates for fishing methods and product form without an attempt to weight prices for individual CPCs based on catches made by different fishing methods and for different products (e.g. fresh, frozen). In addition, the use of import data may slightly inflate prices actually paid to vessels as they do not account for carriage insurance and freight (CIF). However, given the commodity-based nature of tuna, it may also be assumed that the prices used are broadly representative of prices achieved by vessels landing tuna caught in the Indian Ocean.

When considering all catches of species under the mandate of the IOTC, the ex-vessel/first sale value of catches in 2017 is estimated at US$ 4.76 billion.

Table 1: Indian Ocean catch volumes, estimated prices, and ex-vessel catch values for IOTC species, 2017

	yellowfin	bigeye	skipjack	albacore	southern bluefin	billfish	other	total
Volume (tonne)	409,151	90,500	524,282	38,713	6,948	104,412	627,235	1,801,242
Ex-vessel value ($)	1,433,050,687	177,470,626	1,092,604,703	102,319,310	83,374,258	760,538,401	1,110,310,264	4,759,668,250
Average price ($/t)	3,503	1,961	2,084	2,643	12,000	7,284	1,770	2,642

Notes: 1/ billfish = swordfish, marlin (blue, black and striped), indo pacific sailfish. /2 Other = longtail tuna, frigate tuna, bullet tuna, kawakawa, spanish mackerel, and king mackerel.

The ex-vessel values of catches made by fleets from different countries, are provided in the table overleaf. Indonesia, India and Iran each contribute more than 10% of total ex-vessel values estimated, with Spain, Sri Lanka, Seychelles and the Maldives all accounting individually for more than 5% of the total regional ex-vessel value of catches.

[11] COFREPECHE et al, 2015
[12] Ministry of Fisheries, Marine Resources and Agriculture, 2019 (draft)
[13] http://iotc.org/sites/default/files/documents/2018/10/IOTC-2018-WPTT20-DATA03b_-_NC_scenario2_0.zip
[14] Average species prices based on the following data: Yellowfin - Seychelles prices, Thai import prices, and Japanese port prices for purse seine caught yellowfin, and Japanese frozen and fresh import prices and USA frozen import prices for longline caught yellowfin. Skipjack – Seychelles prices, Thai import prices, Japanese port prices, and Philippines port prices, all for purse seine caught fish, and Japanese port prices for pole and line caught fish. Thai, Japanese and USA frozen import prices for albacore. Swordfish (used for all billfish) – Japanese fresh and frozen import prices and USA fresh and frozen import prices. In the case of southern blue fin tuna, no price data were identified, so the figure is based on one used in a previous Poseidon report (Macfadyen et al, 2016) and is likely to be especially at variance with actual values at the present time.

Table 2: Ex-vessel catch values for IOTC species by fleet nationality, 2017 (US$)

	Albacore	Bigeye tuna	Skipjack tuna	Southern bluefin tuna	Billfish	Yellowfin tuna	Other	Grand Total
South Africa	70,050	513,143	975	562,125	498,704	866,783	-	2,511,781
Saudi Arabia	-	-	-	-	24,200	-	14,879,450	14,903,650
Australia	49,577	116,348	3,351	48,920,988	1,145,963	231,834	527,156	50,995,217
Bahrain	8	25	943	-	-	1,720	136,375	139,071
Bangladesh	-	-	-	-	-	-	902,856	902,856
China	9,636,079	9,645,247	-	-	16,517,577	10,375,530	-	46,174,433
Comores	214,794	2,063,182	10,902,373	-	11,402,113	16,833,041	228,369	41,643,872
Republic Korea	367,377	2,506,158	22,896,908	360,000	2,360,016	28,594,410	88,508	57,173,377
Djibouti	449	1,314	50,378	-	-	91,844	879,354	1,023,340
Egypt	-	-	-	-	-	52,537	1,083,342	1,135,880
UAE	-	-	-	-	728,400	-	34,695,266	35,423,666
Eriteria	-	-	-	-	16,117	-	383,750	399,867
EU Italy	-	650,795	6,628,548	-	-	8,468,923	-	15,748,265
India	-	174,529	77,554,543	-	136,372,922	67,402,947	204,224,128	485,729,068
Indonesia	18,564,927	42,379,493	167,619,054	4,503,865	41,501,593	77,623,987	324,029,701	676,222,620
Iran	-	7,072,185	111,076,456	-	136,903,011	196,563,327	252,721,111	704,336,091
Japan	4,420,153	8,111,284	5,941,901	15,015,600	6,362,574	13,876,905	-	53,728,417
Jordan	14	158	70,638	-	3,127	87,114	180,057	341,108
Kenya	-	-	109,605	-	1,187,292	379,694	725,768	2,402,359
Kuwait	-	-	-	-	-	-	451,393	451,393
Madagascar	103,103	112,130	1,739,041	-	6,438,695	2,462,087	10,658,846	21,513,902
Malaysia	4,246,608	336,213	71,000	-	1,590,650	1,297,298	34,004,450	41,546,220
Maldives	9,224	2,106,960	185,111,452	-	4,376,465	172,885,800	891,490	365,381,391
Mauritius	883,328	2,965,807	17,755,736	-	2,729,941	28,077,850	2,441	52,415,103
Mozambique	2,223	100,282	102,741	1,020	1,641,005	589,359	8,077,589	10,514,218
Myanmar	-	-	-	-	-	-	19,825,866	19,825,866
Oman	9,404	7,930	115,655	-	11,872,672	68,207,672	67,476,735	147,690,068
Pakistan	-	-	11,427,244	-	58,216,121	26,384,900	67,672,616	163,700,881
Philippines	-	50,106	301,276	-	-	254,562	697	606,640
Qatar	1,317	3,853	147,705	-	-	269,278	3,649,694	4,071,846
UK terriritories	-	-	222	-	-	9,545	2,700	12,467
Seychelles	2,524,501	26,663,213	145,816,386	-	19,725,723	159,911,267	359,508	355,000,597
Sudan	-	-	-	-	-	-	59,507	59,507
Sri Lanka	325,089	10,446,715	82,452,132	-	142,902,655	133,015,399	11,584,892	380,726,882
Taiwan,China	59,420,049	27,239,604	433,105	14,010,660	90,373,244	31,924,411	476,768	223,877,842
Tanzania	-	-	773,112	-	19,537,873	13,672,313	5,951,191	39,934,488
Thailand	-	-	-	-	-	-	24,137,125	24,137,125
Timor Leste	-	31	5,067	-	-	11,729	361	17,188
EU Spain	355,521	24,510,164	175,957,078	-	22,565,599	191,222,992	18,960	414,630,314
EU France	398,140	9,132,247	67,289,246	-	285,190	105,275,144	16,806	182,396,773
EU France Reunion	693,077	389,825	123,710	-	5,887,297	1,970,579	-	9,064,489
EU Portugal	16,217	166,805	-	-	13,646,319	182,981	-	14,012,322
EU UK	8,081	4,879	-	-	2,050,024	72,175	-	2,135,159
Yemen	-	-	127,124	-	1,675,320	73,902,750	19,305,438	95,010,632
Grand Total	**102,319,310**	**177,470,626**	**1,092,604,703**	**83,374,258**	**760,538,401**	**1,433,050,687**	**1,110,310,264**	**4,759,668,250**

Source: consultant analysis based on IOTC catches and estimated average prices from table 1.

The estimates in the table above of sales values and contributions to GDP are for the catching sector only. Upstream and downstream contributions to GDP might be assumed to be at least of the same order of magnitude given income multipliers in businesses suppling the tuna sector with inputs, and those processing and marketing Indian Ocean-caught tuna.

In addition to sales and value-added from domestic sales of tuna, significant levels of processing occur in the region, mainly for export, for example[15]:

- Iran: has a number of canning plants, mainly sourcing gillnet-caught tuna from its own fleet, India, and Pakistan.
- Oman: Dhofar Fisheries and Food Industries Co SAOG process product from the local Omani artisanal gillnet fleet for processing/canning, and there is some processing of handline-caught yellowfin for Middle Eastern markets.

[15] As described in Macfadyen et al, 2016. It is not known if exports of tuna from Yemen are still taking place given the civil conflict in the country.

- Kenya and Madagascar: small canneries and loining plants process product from the purse seine fleet, either from landings made in the countries (to Mombasa or Diego Suarez, respectively) or with product transshipped from other landings locations. The main processing plant in Kenya (Wananchi Marine Products Ltd) processes product into semi-processed (cooked) tuna loins, mainly for export to Italian and Spanish canneries.
- India: there is processing of longline-caught yellowfin into loins.
- Indonesia: pole and line-caught tuna is destined for canning (either in Indonesia or for export in loined form to canneries elsewhere). Gillnet caught tuna is processed into cans. Handline-caught yellowfin is processed into frozen loins or whole fresh form for export. Indonesian longline catch is exported through export processors, with around 60% of yellowfin loined and 40% sold fresh/frozen, and with frozen albacore mainly destined for canning in Spain, with bigeye tuna to Japan. Purse seine-caught fish is canned at one a number of canneries in the country, or loined for export to canneries in the EU.
- Maldives: Maldivian-caught skipjack is processed into 'Maldive Fish'[16] for domestic consumption or export (mainly to Sri Lanka), into canned product in one of two canneries, or into frozen product destined for canneries in Thailand. Maldivian-caught yellowfin from the handline fishery is processed into fresh loins, fresh/chilled chunks, fresh/chilled whole, and frozen whole fish for export.
- Mauritius: Asian longline fleets in the West Indian Ocean (WIO) rely heavily on landing yellowfin and bigeye product in Port-Louis, and around 50% of longline catch in the WIO is transshipped in Port-Louis, with some loining taking place (at the Thon des Mascareignes plant). Asian vessels' frozen catch of yellowfin and bigeye tuna are predominantly destined for the Asian sashimi market. Two large canneries, Princes Tuna and Thon des Mascareignes, purchase purse seine caught product landed in Port-Louis, or which is transshipped from Seychelles.
- Seychelles: Purse seine-caught tuna is processed into canned product, and longline-caught yellowfin and bigeye into loins. Seychelles is the main regional hub for the purse seine fleet in the WIO. The vast majority of the frozen purse seine catch in the West Indian Ocean is either landed for processing in Seychelles at the Indian Ocean Tuna plant or transshipped through Victoria for processing elsewhere. About 73% of discharges in Seychelles by the WIO purse seine fleet – all flags - are transshipped (p. 32 in EU, 2019).
- Sri Lanka: there is some limited processing from the tuna gillnet fishery into cans, but significant levels of processing from the longline yellowfin fishery for export.
- Thailand: purse seine caught tuna is canned as sourced from throughout the Indian Ocean.

Exports generate both foreign exchange earnings and contribute to country balance of payments. Some examples are:

- In the Maldives the fish processing and export sector (almost all tuna-related) is worth US$ 195 million annually in export value[17].

[16] 'Maldive Fish' is produced by de-heading and gutting, boiling, sometimes wood smoking, and then sundrying skipjack loins.
[17] Ministry of Fisheries, Marine Resources and Agriculture, 2019 (draft).

- Data contained in SFPA evaluation reports indicate exports of tuna from the Seychelles of US$ 261 million in 2016[18], US$ 34.3 million from Madagascar in 2017[19], and US$ 320 million from Mauritius in 2015[20].
- Data for Indonesia for 2017 show that exports of various tuna products totalled 198,000 tonnes, valued at US$ 660 million[21].
- In Sri Lanka 2018 exports of 14,787 tonnes of processed tuna were valued at US$ 133 million (82% from yellowfin tuna exports, 15% from bigeye, and 4% from skipjack)[22].

FAO data also provide some indication of the importance of exports from coastal states, although data are only available for 2013, for volumes of processed product rather than whole live weight, and for pelagic species as a whole so may be less of an accurate reflection of tuna exports for those countries also exporting small-pelagic species. FAO data on export volumes do not allow for disaggregation by product type or species and therefore export values cannot be meaningfully estimated.

Table 3: Export volumes of pelagic species from IOTC coastal states (2013, tonnes)

	Tonnes
Australia	12,989
Bangladesh	183
Comoros	0
Eritrea	0
India	102,593
Indonesia	346,286
Iran	23,176
Kenya	11,962
Madagascar	1,453
Malaysia	73,836
Maldives	53,356
Mauritius	157,818
Mozambique	1
Oman	90,503
Pakistan	29,741
Seychelles	106,054
Somalia	0
South Africa	68,798
Sri Lanka	18,244
Sudan	0
Tanzania	36,516
Thailand	1,387,985
Yemen	94,218
Grand Total	**2,615,714**

Source: FAO. 2018. Fishery and Aquaculture Statistics. Global Fisheries commodities production and trade 1976-2016 (FishstatJ). Note that figures for Australia, Indonesia, Malaysia, and Thailand may include catches made outside of the Indian Ocean. France and the UK territories excluded. The volume figure for Indonesia is considerably higher than the volume for 2017 provided in the bullet above, due to the ban on foreign fishing introduced by the Indonesian government which came into effect after 2013.

[18] European Union, 2019 (in press).
[19] European Union, 2018.
[20] COFREPECHE et al, 2015.
[21] Data provided by the government to the consultants as part of this scoping study.
[22] Data provided by the government to the consultants as part of this scoping study.

Revenues to governments

Information on government revenues from payments by domestic and foreign vessels for access and licenses, taxes (on tuna-related business and individual income, sales, exports, etc), port and landing dues, and other management charges that may apply, are generally not widely available/published, although presumably should be known, or be knowable, to CPCs. However, some specific examples of some revenues generated are:

- US$ 11.3 million in Seychelles in 2018 of revenue generated by the Seychelles Fisheries Authority for the treasury account from fisheries related activities [23] (including US$ 3.3 million from EU public sector payments for access, and US$ 4.6 million from EU private sector vessel owners for access), and US$ 118 million (82% from fuel sales) in 2015 of revenue for the national exchequer generated by fishing vessels use the country's ports.
- US$ 2.3 million in Mauritius in 2014 with around half of this figure coming from private sector foreign longline vessel owners, with US$ 488,000 from EU public sector payments for access and US$ 165,000 from EU private sector vessel owners for access under the SFPA, and a further US$ 143,000 from domestic vessels [24].
- US$ 3.3+ million in Madagascar for payments by foreign vessels in 2018, with US$ 932,000 from EU public sector payments for access and US$ 1.16 million from EU private sector vessel owners for access under the SFPA[25].
- US$ 3.36 million in 2015 in Comores from EU public sector payments for access and US$ 133,000 from EU private sector vessel owners for access under the SFPA[26].
- US$ 150,000 to the government in Australia during its 2016/17 financial year from its domestic Indian Ocean concession holders[27].
- US$ 38,735 in Sri Lanka from licensing of 'high seas' vessels (US$ 31,323 from 1,065 'small' high seas long liners and 680 'small' high seas gillet net vessels, and the balance from 14 larger high seas longline vessels; coastal vessels do not have to pay license fees)[28].
- In Indonesia, the government earnt US$ 8.55 million from licences paid its domestic catching sector in 2018 (US$ 9,169 from the handline fleet, US$ 1,193,450 from the longline fleet, and US$ 7,524,710 from the purse seine fleet)[29].

Profitability and earnings in the catching, upstream, and downstream sectors

Data on profits and earnings to businesses in the upstream, catching and downstream processing sectors are generally not available, apart from some data on the EU distant water fleet, and some very limited information on income to individuals obtained as part of this study.

In Sri Lanka for 2013[30]:

- Average annual income of a multiday fishermen (crew member) is estimated at US$ 658.
- Average annual income of a multiday boat owner is estimated at US$ 3,292.

[23] European Union, 2019 (in press).
[24] COFREPECHE et al, 2015. Excludes EU sectoral support payments under the SFPA.
[25] European Union, 2018. Total figure of $3.3 million forecast from the 2018 Finance Bill.
[26] COFREPECHE et al, 2015b.
[27] Department of Agriculture and Water Resources / ABARES, 2018. Figure based on assumption that the management costs stated in the Fishery Status Reports overview are broadly representative of the levy payments from concession holders to government given the cost recovery system.
[28] Data provided by the government to the consultants as part of this scoping study.
[29] Data provided by the government to the consultants as part of this scoping study.
[30] Data provided by the government to the consultants as part of this scoping study. Vessel types are engaged in tuna fishing but not exclusively.

- Average annual income of a small-scale boat operator (fishermen) is estimated at US$ 459.
- Average annual income of a small scale boat owner (fishermen) is estimated at US$ 918.

In Korea, in 2017[31]:

- Average monthly crew earnings on purse seine vessels were US$ 8,083 (comprised of basic salary, overtime and incentives).
- Average monthly crew earnings on longline vessels are US$ 5,357 (comprised of basic salary, overtime and incentives).

For the EU fleet operating in the Indian Ocean, data are provided below.

Table 4: EU IOTC fleet economic data and indicators (2016)

	Spain			France	Portugal	Italy	EU Fleet
	PS	LL	Total	PS	LL	PS	
Number of vessels	16	14	30	12	5	1	48
GT	42,332	5,482	47,814	27,196	2,358	2,137	79,505
Catch volume ('000 tonnes)	140	7.7	147.7	66.3	1.8	4	219.8
Catch revenue (US$ million)	282.6	22.4	305.0	94.2	7.5	n/a	406.685
Gross value added (US$ million)	120.2	8.5	128.7	44.3	2.6	n/a	175.595
GVA to revenue	43%	38%	42%	47%	35%	n/a	43%
Gross profit ((US$ million)	81.0	4.6	85.5	16.0402	1.60402	n/a	103.2
Profit margin	29.0%	20.0%	28.1%	17.0%	21.6%	n/a	25.4%
Average ex-vessel price (US$/kg)	2.01	3.12		1.45	4.12	n/a	1.89
GVA/FTE ('000 US$/FTE)	136.7	29.2		131.3	34.2	n/a	110.9
Average gross profit/vessel ('000 U$)	5,193	316		1,338	322	n/a	2,194
Average annual crew wage (US$)	44,379	13,284		83,783	13,065	n/a	45,628

Source: Scientific, Technical and Economic Committee for Fisheries (STECF) – The 2018 Annual Economic Report on the EU Fishing Fleet (STECF-18-07). Notes: Figures based on expert ad hoc data and the data provided through the EU data collection framework (DCF) – see section 5.4 for more discussion on the DCF. PS = purse seine, LL = longline. EUR figures in STECF report converted to US$ at 1.1139 (rate from http://ec.europa.eu/budget/graphs/inforeuro.html)

3.2 Social benefits

Social contributions from tuna fisheries in the region fall into two main categories: employment in the catching, upstream, and downstream sectors; and contributions to food security[32]. There are few datasets available covering these issues comprehensively for all CPCs specifically for tuna-related activity and food supplies, so the information provided below is necessarily patchy and not comprehensive in terms of its coverage for all CPCs.

Employment

In the Maldives there are around 9,500 tuna fishermen[33], and in Indonesia 4,510 people employed in the tuna catching sector (4,354 people on longline vessels and 156 on purse seine vessels for the Indonesian vessels listed in the IOTC Record of Authorised Vessel). Indonesia also had an estimated 6,603 people involved in full time employment in processing establishments in 15 Indian Ocean provinces in 2017 (47% of them women), and 11,315 people employed on a part-time basis (64% women)[34]. In Sri Lanka there are 14,665 full-time

[31] Data provided by the government to the consultants as part of this scoping study.
[32] Through this report when referring to food security we refer to 'direct' food security where tuna fisheries result in catches that can be consumed, rather than 'indirect' where income made from tuna fisheries can be used at a governmental or individual level to purchase food items.
[33] https://www.fishagri.gov.mv/storage/documents/yhJQVCLxLb01SV7O3tqJEcTaimHB9Ff61wepjfJb.pdf
[34] Data for 2018 (catching sector) and 2017 (processing sector) provided by the government to the consultants as part of this scoping study. Processing sector employment data is for 132 processing plants that process tuna and non-tuna species, and which purchase tuna raw material not just from the Indian Ocean.

fishermen and 53,234 part time fishermen working on multi-day vessels and 2,940 full-time and 10,672 part-time fishermen on small coastal vessels both of which catch tuna along with other species. In Sri Lanka there are also an estimated 8,708 employees in upstream supply businesses (ice plants, boat yards, fishing gear suppliers, bait suppliers, engine suppliers, repair facilities) supporting the fish catching sector as a whole (including vessels targeting tuna). Sri Lanka also has an estimated 4,455 employees working in fish processing and export establishments, a number of which process/export tuna[35].

Employment data for the EU fleet in the Indian ocean is provided in the table below.

Table 5: EU IOTC fleet employment (2016)

	Spain			France	Portugal	Italy	EU Fleet
	PS	LL	Total	PS	LL	PS	
Total employed	623	216	839	199	n/a	n/a	1,038
FTE	879	288	1,167	338	76	n/a	1,581

Source: Scientific, Technical and Economic Committee for Fisheries (STECF) – The 2018 Annual Economic Report on the EU Fishing Fleet (STECF-18-07). Figures based on expert ad hoc data and the data provided through the EU data collection framework (DCF). PS = purse seine, LL = longline, FTE = Full Time Equivalent.

Data in SFPA evaluation reports[36] suggest that there are more than 2,000 employed in the tuna processing sector Seychelles, more than 1,700 in Madagascar, and more than 4,000 in Mauritius. These reports also include analysis which suggests that the activities of the EU fleet contribute to significant levels of upstream and downstream employment, along with employment coastal state nationals, as follows: 353 FTE in Seychelles, 169 FTE in Madagascar, and 5 FTE in Mauritius.

Food security

Contributions of the tuna sector to food security for any given year are not possible with any degree of accuracy, as would require complex calculations involving landings, exports of tuna with appropriate use of conversion factors for different export products to derive whole round weights, imports of tuna specifically for consumption rather than for processing, inventories/stock of processed product, non-food uses, re-exports of imports, and post-harvest losses. All such data would need to be available specifically for tuna.

The table below is thus not a true measure of food security, but simply provides data on catches and population in 2017 to derive an indicator of tuna catches per person.

[35] Data for 2018 provided by the government to the consultants as part of this scoping study.
[36] See SFPA-related references previously mentioned.

Table 6: CPC catches and population (2017)

	Catch (tonnes)	Population ('000)	kg / person
South Africa	651	55,436	0.01
Saudi Arabia	8,409	32,742	0.26
Australia	4,678	24,641	0.19
Bahrain	78	1,418	0.06
Bangladesh	510	164,827	0.00
China	13,794	1,388,232	0.01
Comores	12,865	825	15.59
Republic Korea	20,972	50,704	0.41
Djibouti	548	911	0.60
Egypt	627	95,215	0.01
UAE	19,700	9,397	2.10
Eriteria	219	5,481	0.04
EU Italy	5,931	59,797	0.10
India	190,640	1,342,512	0.14
Indonesia	320,353	263,510	1.22
Iran	274,589	80,945	3.39
Japan	14,747	126,045	0.12
Jordan	161	7,876	0.02
Kenya	734	48,466	0.02
Kuwait	255	4,099	0.06
Madagascar	8,539	25,612	0.33
Malaysia	21,611	31,164	0.69
Maldives	140,368	375	374.32
Mauritius	18,759	1,281	14.64
Mozambique	5,058	29,537	0.17
Myanmar	11,200	54,836	0.20
Oman	59,286	4,741	12.50
Pakistan	59,238	196,744	0.30
Philippines	243	103,796	0.00
Qatar	2,212	2,338	0.95
UK terriritories	4	2,500	0.00
Seychelles	133,089	97	1372.05
Sudan	34	42,166	0.00
Sri Lanka	109,155	20,905	5.22
Taiwan,China	59,539	23,405	2.54
Tanzania	10,319	56,877	0.18
Thailand	13,636	68,297	0.20
Timor Leste	6	1,237	0.00
EU Spain	154,771	46,070	3.36
EU France	67,202	64,938	1.03
EU France Reunion	1,891	873	2.17
EU Portugal	2,017	10,264	0.20
EU UK	308	65,511	0.00
Yemen	32,297	28,119	1.15
Total	1,801,242	4,644,762	0.39

Source: IOTC for catch volumes, and https://www.populationpyramid.net/population-size-per-country/2017/ for population.

4. Economic and social data collection in CPCs – current and potential

In this section we present the findings from the questionnaire responses (17 in total) on data currently available in different CPCs, and where data are not currently collected what the views of CPCs are as to whether they would be prepared to collect data in the future. We also report the views of CPCs about the potential need for such data to be provided to the IOTC and with what frequency.

Key findings

1. Except for data on domestic landings by species, across all other data types there are a significant proportion/number of CPCs that do not currently collect data.
2. For CPCs with a tuna fleet active in the Indian Ocean, just over half that responded collect data on catching sector employment, but few do so on tuna-related upstream or downstream sector employment. Very few CPCs record data in full-time equivalents (FTEs), or have data disaggregated by gender, age, or nationality/vessel flag.
3. The lack of data in upstream and downstream sectors being collected by CPCs pertaining to specific fleet types, suggests that unless data collection systems were expanded to provide for such disaggregation, data may not be especially useful in determining the upstream or downstream related impacts on employment of management decisions that pertained to specific fleet types.
4. Tuna price data by species (both retail, and ex-vessel/first sale) are only collected by around half of the CPCs that returned questionnaires.
5. Few CPCs collect data on sector profits, given that such data may be important in determining/justifying the need for management decisions, the potential impacts of those decisions and the ability of the sector to weather any short term reductions in catches that may result, and evaluating ex post the effectiveness of management decisions (for example in re-building stocks and increasing sector profitability).
6. For CPCs that don't currently collect different types of referred to above, many do not favour expanding data collection, primarily due to the costs and impact on workload that would be involved. The reluctance to expand data collection is especially marked in non-coastal states, in part because of the difficulties (and therefore associated costs) of disentangling data specifically related to tuna fisheries in the Indian Ocean from data related to fleet activity in other oceans. Taking questionnaire responses as a whole there were very divergent views over whether or not to expand data collection, but nevertheless considerable awareness over the practical challenges and costs that would be associated with expanding data collection.
7. With respect to whether it might be appropriate for the IOTC to request economic and social data from all CPCs to provide a complete regional data set, or whether it should be left for CPCs to collect and use data as they choose in discussions about management decision-making, there were strongly held and opposing views by different CPCs and no strong majority for either position but more favouring an IOTC role than leaving data collection to CPCs.

8. In considering whether the provision or use of any relevant data should be a 'one-time' exercise to inform allocation discussions, or whether regular provision of data to IOTC on a yearly or bi-annual basis could be useful to inform other IOTC discussions, views were mixed, but with more CPCs in favour of regular provision/use of data than not (assuming data were to be collected and used at all).

4.1 Data availability

Catching sector employment

Catching sector employment could be very directly affected by management decisions at the IOTC level, and employment data could itself represent important information feeding in to management decision-making given that it represents a measure of the social contribution of the sector to CPCs.

Four of the 17 respondents have no tuna catching sector active in the Indian Ocean (UK for its non-EU territories, France for its non-EU territories, Senegal, and Bangladesh). Of the 13 that do, 8 collect data on catching sector employment (with 6 doing so on a yearly basis, and 2 irregularly), and most of these (7 of 8) have data specific to employment of different types of tuna vessels (e.g. purse seine, longline, etc) that would allow for data to be useful in assessing the potential impacts of management decisions on specific fleet types. For the 5 that do not collect catching sector employment data at present, 2 said they would be prepared to do so and 3 said they would not. Reasons given for not wanting to expand data collection included the potential costs, the fact that the scope of data collection is already agreed/defined, and in one case the relatively low level of tuna-related fishing activity.

The quality of catching sector employment is generally compromised by a lack of disaggregation of employment by types. Few CPCs categorise employment by whether it is full-time, part-time or occasional (only 4 of the 13 CPCs that have an active tuna catching sector) or record employment in Full-Time Equivalents (FTEs), meaning that total employment numbers may not be a robust measure of the social contribution of the sector.

Furthermore, few CPCs record employment by gender (only 3 of the 13 CPCs that have an active tuna catching sector) although such employment could be expected to be very low and in most cases non-existent, or by age (only 2 of the 13 CPCs that have an active tuna catching sector). Only 4 of 10 CPCs that report they have nationals working on vessels flagged by other CPCs report that they collect data on such employment, and only 4 of 13 on foreign nationals working as crew on vessels they flag. Of those that currently don't collect these different types of disaggregated employment data, in all cases more said they would not want to do engage in such disaggregated data collection than said they would, mainly for the same reasons as stated above and/or because they feel that the issues are not important/pertinent.

Upstream sector employment

The upstream sector supplying inputs to the catching sector, may comprise of vessel and engine suppliers and repair businesses, fuel and gear suppliers, those providing other port-based services such as stevedores, vessel agents, ice suppliers, and businesses providing crew supplies. In countries with significant non-tuna fleets, these businesses may not exclusively supply the tuna sector, making it more problematic for countries to collect upstream sector employment specifically related to tuna fisheries, but also potentially cushioning them from the impact of IOTC tuna-related management decisions.

Four of the 17 respondents (Indonesia, Seychelles, Madagascar, and Sri Lanka) reported that they do collect tuna-specific employment related data, 2 on an annual basis and 2

irregularly. However, except for Indonesia which reported it has disaggregated data, no other countries have data disaggregated by full/part time, gender, or age.

For countries that currently do not collect such data, only 4 reported they would be willing to do so. The even weaker inclination to expand data collection than for catching sector employment, is due to the same factors and primarily due to the cost, but also to the complexities in many countries that would arise from trying to disentangle upstream employment related to tuna activity from that due to the activities of other non-tuna fleets.

Downstream sector employment

Four of the 17 respondents (UK territories, France - TAAF, Senegal, and Bangladesh) have no downstream processing sector for tuna caught in the Indian Ocean. For the 13 that do, only 5 collect data on downstream-related employment, again with some doing so regularly and some irregularly. Of the 8 that don't collect this type of data, exactly half said they would be prepared to expand data collection and half said they would not.

No CPCs reported data being collected by age-group apart from Oman (with yearly data collection, but Seychelles, Oman and Indonesia reported that they collect data on downstream employment by gender, with Seychelles and Oman also having data by nationality. Only Seychelles and Sri Lanka reported that they have data on employment by different type of fleet supplying the downstream sector, and which would allow for assessment of downstream impacts from management decisions that were specific to different fleet types. For all these types of disaggregated data, more than half of the CPCs that don't currently collect data reported that they would not be willing to do so.

Retail prices

Fish prices paid by consumers, are one factor affecting the affordability of fish to consumers (along with average earnings, purchasing power, etc) and thus have a bearing on food security. For the 13 CPCs with active tuna fleets in the Indian Ocean and with fish being landed into them by commercial operators for local consumption, 8 collect data on prices by species. The frequency of data collection and publication varies, but average yearly prices are in almost all cases available. However, none of the 5 countries (a mix of coastal and non-coastal states) not currently collecting data reported they would be willing to do so in the future.

Fish landings

All CPCs must report catch data by fleet type and species to IOTC on an annual basis, with data contained in the IOTC database and publicly available. These catch volumes can on their own provide *some* measure of food security to the countries flagging the vessels. However the contribution to food security, and the impact of any management decisions on it, cannot be *fully* determined based on catch volumes alone without knowing where fish is landed, and how much tuna landed in any CPC is then exported (see below) making it unavailable for local consumption.

Bangladesh, Senegal, and France (austral territories) have no landings of tuna caught in the Indian ocean. All other countries responded that they have yearly data on domestic landings (by species), except for Japan which reported it does not.

Ex-vessel/first sale prices

First sale prices paid to vessels for catches of different tuna species (e.g. in US$/kg or tonne), are potentially useful data, as when coupled with catch volumes indicate the value of catches by different CPCs, and also the overall revenues (before costs) to private sector fishing vessels/companies.

Management decisions at a regional level impacting on catch volumes (both positively or negatively in the short- or longer-term) may have only small impacts on first sale prices themselves (depending on price elasticity of supply), especially given the commodity nature of some species such as skipjack, unless such decisions had large impacts on catch volumes. However, such data could be important in determining the economic impacts of management decisions that affected catch levels. Such data may also be useful for CPCs at a national level (when coupled with other data on costs) to inform decisions about licence or access fees to be charged both to domestic vessels, and foreign vessels paying for access to fish in their waters.

Of the 13 CPCs that responded to the questionnaire and which have a tuna catching sector operating in the Indian Ocean, 7 collect ex-vessel price data and 6 do not. Three of the 6 that do not reported that they would be prepared to collect data in the future (all were coastal states), while three (all non-coastal states) reported they would not be willing to do so because of the additional workload and cost implications.

Crew earnings

Crew earnings could be directly affected by management decisions that impact on catch volumes, potentially decreasing them (subject to price elasticities of supply) if catch volumes were to decline as a result, or increasing them (potentially in the longer-term) if management decisions served to re-build stocks.

Of the 13 responding CPCs that have a tuna catching sector active in the Indian Ocean, 6 reported that they collect data on crew earnings, but data collection by these countries is not consistent in terms of periodicity, with some collecting data yearly, some every 5 years, and some irregularly. This would make data use in management decision-making problematic unless the frequency of data collection was standardized (and made annual/bi-annual).

For those CPCs that don't currently collect such data, 3 said they would not be prepared to do so, for the same reasons as for other types of data, but also because some consider such data to be private and not appropriate for dissemination. For those that do collect such data, 3 CPCs reported that crew earnings are recorded separately for different fleet types (which would be necessary if data were to be used to determine potential impacts of management decisions pertaining on specific fleet types).

Seven CPCs reported that they do not have nationals working on vessels flagged by other CPCs, while for the other 10, only 2 (Madagascar and Kenya) reported that they collect data on earnings of their nationals on such vessels.

Export volumes and values

Exports could be directly affected by management decisions at the IOTC level, with associated impacts on the benefits derived from those exports.

Ten of the 13 responding CPCs that have a tuna catching sector collect data on tuna exports (in both volume and value terms), with 9 of them having data by species. However, the CPCs that don't collect data reported they are unwilling to expand data collection due to the costs and administrative burden of doing so, especially given the difficulty for non-coastal states of determining the origin of catch in exports for the Indian Ocean as opposed to

exports from other oceans.

Profits

Almost all management decisions can be expected to have some bearing on profits made in the catching sector, given that those decisions have the intention to modify or control the activities of vessels and therefore have an impact on them. And in many cases impacts on upstream and downstream businesses from management decisions can also be envisaged given inter-relationships between them and the catching sector. Data on profits could be potentially useful both ex ante in assessing the ability of the sector to cope with management decisions, and also ex post in evaluating the impacts of management decisions. Data on profits is typically determined as part of costs and earnings data collection, although in some cases for larger businesses can be determined from published accounts if available.

It is thus surprising that so few CPCs reported that they collect such data for different fleet types (only the EU, Indonesia and the Maldives), or in the upstream (only Indonesia and Madagascar) and downstream sectors (Indonesia, Madagascar and the Maldives). The explanation for so few CPCs collecting costs and earnings and profitability data is probably the costs associated with data collection that typically has to be based on questionnaires, as well as the reluctance by many private sector operators to provide such data as it is considered commercially sensitive and may have implications on their taxes. Indeed, for the CPCs that do not wish to expand data collection to cover such issues (5 of 11 CPCs with tuna catch sectors which don't currently collect data), reasons included the cost and a reluctance to amend existing and agreed data collection arrangements, but also the issue of commercial sensitivity.

Government revenues

Management decisions in support of healthy fish stocks should result in the ability of CPCs to obtain increased resource rents should they chose to do so, and for Governments to obtain revenues from the sector. These revenues may stem from access and licensing fees (imposed on both domestic and foreign vessels), port fees, and taxation (on tuna-related businesses and individual income, sales, exports, etc). However, it could be argued that such data, while important within a national context and while being impacted by management decisions, do/should not themselves have a huge bearing in informing those management decisions. Revenues are as much determined by the levels of charges imposed from country to country (which are a question for national policy), as by the status of stocks, and so different in nature to other data such as private sector employment or profits which are more directly impacted by management decisions and which may serve to inform them.

Of the 13 CPCs that returned questionnaires and which have a catching sector, 11 reported that they collect data on license fees paid to them by their own vessels to fish in Indian Ocean waters[37] (Japan does not because data are not recorded separately for different ocean areas and it would not wish to do so).

The study questionnaire also explored whether coastal states collect data on fees paid by third country vessels for access, and any port dues. Of the 13 coastal states that returned questionnaires, a surprisingly large number (7) do not have third country vessels fishing in their waters and so this question was not applicable. Of the 6 that do, 5 have data on foreign vessels fees from access to resources (Australia does not as distinguishable from foreign vessel payments for access to national waters in other ocean areas). Eight of the 17 CPCs returning questionnaires have port facilities and foreign vessels visiting their ports. Of those,

[37] One CPC mis-interpreted the question. EU data collected through the Data Collection Framework and published in STECF Annual Economic Reports.

5 collect port revenues from visiting vessels, while Mozambique and Madagascar don't but reported they would be prepared to do so.

4.2 CPC views on management arrangements for data collection and reporting, the role of the IOTC, and more generally on expanding data collection

The questionnaire sent to CPCs as part of this scoping study asked for views on whether it is appropriate and necessary for the IOTC to request economic and social data from all CPCs to provide a complete regional data set, or whether it should be left for CPCs to collect and use data as they choose in discussions about management decision-making. Of 13 CPCs that provided an answer to this question, 8 felt that the IOTC should have a role while 5 felt that it should be a matter solely for CPCs should they wish to do so (with coastal and non-coastal states showing up in both responses).

Furthermore in considering whether the provision of economic and social data to IOTC would only be potentially useful in the context of discussions on allocation and would best only be provided as a 'one-time' exercise, or whether regular provision of data to IOTC on a yearly or bi-annual basis could be useful to inform other IOTC discussions, to track trends in socio-economic contributions of tuna fisheries, etc., 5 CPCs felt it should be a one-time only exercise, while 9 viewed a more regular data collection exercise as being useful. One felt that socio-economic data/indicators should have no bearing on allocation criteria.

So on both these issues, there was no overwhelmingly dominant view.

On the issue more broadly of expanding data collection in CPCs of tuna-related data for use within the IOTC context, a number of interesting qualitative comments were made by CPCs. Some points made included:

- A decision as to whether to expanding data collection would need to be determined based on an exact specification of the data requirements to properly and accurately assess the additional workload entailed and the feasibility. In this context, a very carefully targeting expansion to include a limited amount of prioritized data could be more realistic and gain more support than if a large number/range of additional data was proposed for collection. (the comments made in section 5 below about the perceived useful of different indicators, could provide the basis for such prioritization and specification when coupled with the articulation of data needs for different indicators).
- Objective and standardized criteria would need to be developed and agreed in advance, with careful guidance definitions of all data to be collected so that it was done so in a standardized and comparable fashion.
- Attention/care would need to be paid for some types of data about data protection and commercial sensitivities.
- Many CPCs already appear to struggle to provide catch and effort data, which may be considered more central/fundamental for the operations of the IOTC. So assistance should be provided to this area first before considering any expansion of the data collection.
- Expanded data collection arrangements would come at a cost, which would have to be budgeted/paid for, but the availability of funds can not be certain across all CPCs – whether because governments don't have the spare resources, or would not wish to make additional resources available.
- Any expansion of data collection would potentially need to be accompanied not just

by additional financial resources, but also by considerable levels of capacity development and training in some countries.

- Some countries are in the process of expanding data collection, so there could be opportunities to include the collection of data useful at the IOTC level. Indeed in cases where CPCs do amend/review data collection coverage, they could/should consider data of use within the IOTC context.

Overall, these points and others made in the questionnaire returns, paint a picture of very divergent views over whether or not to expand data collection, but nevertheless with considerable awareness over the practical challenges and costs associated with expanding data collection.

5. Potential economic and social indicators

Key findings

1. The ranking[38] of the usefulness of different indicators could provide the basis for prioritisation of data to be collected that would be needed to construct the indicators.
2. Average economic indicator scores are higher for the usefulness of indicators, than for the feasibility of data collection that would be required. The same applies for social indicators. Lower feasibility scores are consistent with the responses presented in section 4 on the reluctance of many CPCs to expand data collection and/or the challenges of doing so in terms of costs and resources.
3. Overall there is a high level of support for all economic indicators when considering their usefulness, but with indicators of different forms of government revenue and business profitability from tuna fisheries being considered of less importance than other economic indicators
4. Overall there is a high level of support for all social indicators in terms of their usefulness. The indicators considered most useful are also the 3 considered most feasible in terms of data collection. The low feasibility ranking for an indicator of employment on third country vessels and on crew earnings are probably due to the potential need to rely on other CPCs and the need for potentially costly and resource-intensive questionnaires.
5. CPCs suggested a range of other indicators not proposed by the consultants as being useful. Perhaps most notable and frequent in terms of suggestions were the usefulness of an indicator of tuna-related contributions to GDP, state management and research-related costs, and indicators of dependency (for example of coastal communities and/or households on tuna-related activities, of total employment on tuna-related employment).

The questionnaire sent to CPCs included a list of indicators developed by the consultants with a request for views as to

a) how useful each would be (very, moderately, a little, not at all), and
b) how feasible it would be to collect the data they would need (very, moderately, a little, not at all).

Indicators were proposed which the consultants felt could be of potential use either:

i) in informing ex ante the potential impact of management decisions at the IOTC level, for example the impact of reduced catches in the short-term or maintained or increased catches in the long-term through management decisions aimed at stock maintenance and/or recovery, or

ii) which could be used to evaluate ex post the impacts of those management decisions i.e. management decisions could be expected to have a bearing on the indicators i.e. how would potential changes in catches (either if reduced following catch restrictions, or if increased after effective management measures bring

[38] The qualitative views of the CPCs that provided questionnaire responses as to the usefulness of indicators, and the feasibility of data collection for the indicators, were turned into numeric values, with 'very' = 4, 'moderately' = 3, 'a little' = 2, and 'not at all' = 1. Through this approach it was possible to rank the usefulness of indicators and feasibility of data collection for the different indicators, and to gain an overall impression of CPC support for them

about improvements in stock status) potentially impact on socio-economic conditions in CPCs, as revealed through the indicators.

The indicators proposed could thus be linked to management objectives and actions and would allow for an EBFM approach that would explicitly recognise the social and economic implications (good and bad, short-term and long-term) generated by the management and institutional arrangements related to fisheries. However, the questionnaire provided the opportunity for CPCs to propose other indicators not included in the list proposed by the consultants, which they felt might be relevant and useful.

5.1 Economic indicators

The following table below provides the economic indicators proposed. Columns in the table articulate:

- the indicator name
- the unit of measurement
- an explanation of what the indicator is a measure of
- the data that would need to be collected to generate the indicator
- some additional notes.

Table 7: Potential economic indicators

Ind. No.	Possible economic indicator name	Unit	Being a measure of / Description	Data required	Notes
1	Landings in CPCs of tuna caught in the Indian Ocean	$	Value of landed catch from IOTC fisheries in CPCs by national vessels	Ex-vessel prices and landed volumes (by species)	Can be coupled with other fisheries/species data to derive importance of tuna sector in total fisheries landings. Can be used for landings in coastal and non-coastal states
2	Landings of tuna in coastal states caught by third country vessels in the Indian Ocean	$	Value of catch from IOTC fisheries landed by third countries in IOTC coastal states	Ex-vessel prices and landed volumes (by species)	Can be coupled with other fisheries/species data to derive importance of tuna sector in total fisheries landings. And also a measure of competitiveness/attractiveness of domestic processing sector to foreign vessels
3	Exports by CPCs of tuna catches made in the Indian Ocean	$	Contribution to foreign exchange earnings and balance of payments from catches in the Indian Ocean by CPC vessels	Exported prices and exported volumes (by species)	Can be coupled with national export data to derive relative importance of domestic tuna catches in exports.
4	Net profit in catching sector from tuna catches in the Indian Ocean	$ and $/tonne	Profitability of CPC tuna fleets operating in the Indian Ocean	Costs and earnings data (by fleet type)	Likely only from periodic surveys. Data required on i) income, ii) fishing costs e.g. fuel cost, crew share cost, food costs, other fishing costs such as ice, iii) non-fishing/fixed costs e.g. maintenance, licenses, etc, iv) depreciation, interest/finance costs. May be commercially sensitive.
5	Net profit from provision of inputs to the tuna catching sector in the Indian Ocean	$	Profitability of supplying the IOTC tuna catching sector, and income multiplier effects in CPCs of catching sector on upstream businesses	Costs and earnings data for input suppliers and % of business related to tuna fisheries	Likely only from periodic surveys. Input businesses may well supply non-tuna fisheries in countries with mixed species making data unreliable unless % of business turnover can be attributed to tuna species. May be commercially sensitive.

Ind. No.	Possible economic indicator name	Unit	Being a measure of / Description	Data required	Notes
6	Net profit from processing tuna caught in the Indian Ocean	$ and $/tonne	Profitability of downstream processing of tuna caught in IOTC fisheries, and income multiplier effects in CPCs of the catching sector in IOTC fisheries on downstream processing	Costs and earnings data for processors and % of business related to tuna fisheries	Likely only from periodic surveys. Processing companies in countries with mixed fisheries may process multiple types of species. May be commercially sensitive.
7	Total access/license fees paid by domestic tuna fishers	$	Resource rents being generated for governments from their nationals engaged in the IOTC tuna fishery	Payments made to government by domestic tuna fishers in different fleet types and species	Can be coupled with tonnages caught to derive resource rents per tonne of fish. Applicable to coastal and non-coastal states
8	Total access fees paid by foreign tuna vessels to coastal states	$	Resource rents being generated for coastal state governments from third countries from the IOTC tuna fishery	Payments made by third country governments/ companies (from different fleet types and species)	Can be coupled with tonnages caught to derive resource rents per tonne of fish
9	Port revenues from third country tuna fleets visiting/landing in coastal states	$	National income in IOTC coastal states from port-related activity due to third country tuna vessels	Payments made by third country vessels	Revenues may be derived from multiple sources e.g. landing dues, berthing fees, etc. This indicator also provides a measure of competitiveness / attractiveness of services compared to other landings locations. Applicable for coastal states
10	Income taxes to governments from tuna-related activity	$	National income in IOTC CPCs from income taxes in upstream, catching and downstream sector from the IOTC tuna fishery	Payments made by businesses to governments	Can be coupled with national income tax generation to derive contribution of tuna activity

The qualitative views of the CPCs that provided questionnaire responses as to the usefulness of indicators, and the feasibility of data collection for the indicators, were turned into numeric values, with 'very' = 4, 'moderately' = 3, 'a little' = 2, and 'not at all' = 1. Through this approach it was possible to rank (using an average of CPC scores) the usefulness of indicators and the feasibility of data collection for the different indicators, and to gain an overall impression of CPC support for them.

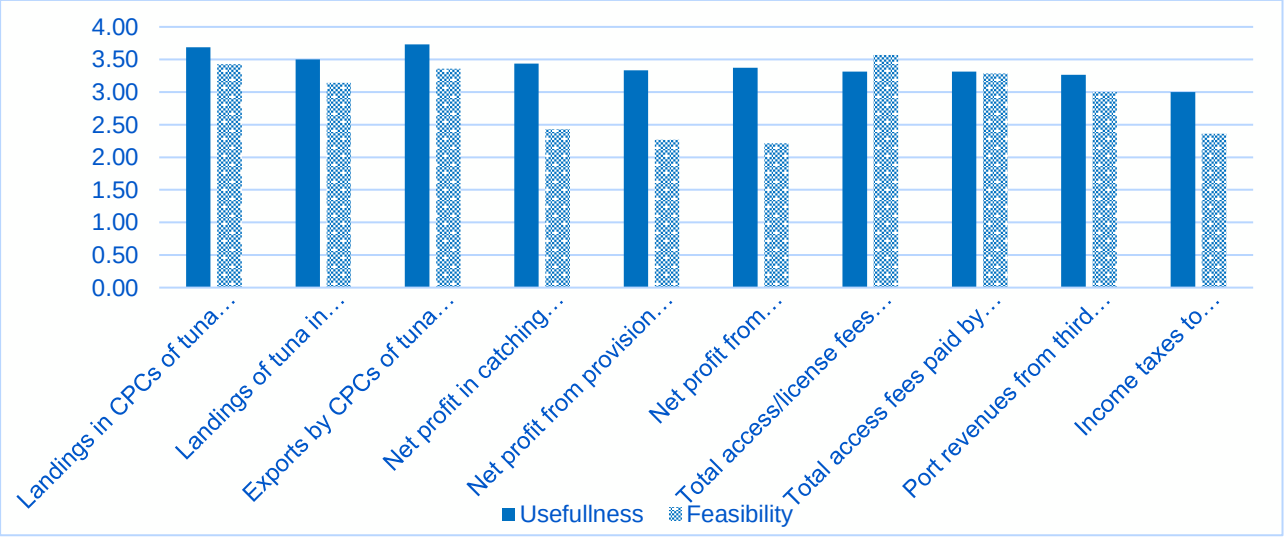
The results of the analysis are presented below.

Table 8: CPC views on the usefulness and feasibility of economic indicators

Economic indicators	Usefulness		Feasibility	
	Score	Rank	Score	Rank
1. Landings in CPCs of tuna caught in the Indian Ocean by their own vessels	3.69	2	3.43	2
2. Landings of tuna in coastal states caught by third country vessels in the Indian Ocean	3.50	3	3.14	5
3. Exports by CPCs of tuna catches made in the Indian Ocean	3.73	1	3.36	3
4. Net profit in catching sector from tuna catches in the Indian Ocean	3.44	4	2.43	7
5. Net profit from provision of inputs to the tuna catching sector in the Indian Ocean	3.33	6	2.27	9
6. Net profit from processing tuna caught in the Indian Ocean	3.38	5	2.21	10
Total access/license fees paid by domestic tuna fishers	3.31	7=	3.57	1
7. Total access fees paid by foreign tuna vessels to coastal states	3.31	7=	3.29	4
8. Port revenues from third country tuna fleets visiting/landing in coastal states	3.27	9	3.00	6
9. Income taxes to governments from tuna-related activity	3.00	10	2.36	8
Average	**3.40**		**2.91**	

Source: consultant analysis of CPC questionnaires. Notes: maximum possible score for any indicator is 4. Scores are comprised of the average of responses across CPCs that returned a questionnaire and provided answers for different indicators

Figure 1: CPC views on the usefulness and feasibility of economic indicators (scores)



Source: consultant analysis of CPC questionnaires. Notes: maximum possible score for any indicator is 4. Scores are comprised of the average of responses across CPCs that returned a questionnaire and provided answers for different indicators

The analysis and presentation above of the views of CPCs about possible economic indicators, highlights:

- For 9 of the 10 indicators, average indicator scores are higher for the usefulness of indicators, than for the feasibility of data collection that would be required, representing the cost and resource implications of data collection.
- Overall there is a high level of support for all indicators when considering their usefulness, with all indicators scoring 3 or more, from a maximum possible score of 4.
- The top three indicators in terms of usefulness are all in the top 5 ranking of feasibility, but while net profit in the tuna catching sector is ranked as the 5th most useful indicator, its feasibility is ranked lowest.
- The rank for the most useful indicators, could provide the basis for prioritisation of data to be collected (and a potentially expanded data collection framework for those countries that don't currently collect the data) that would be necessary to construct the indicator. So data on ex-vessel prices and landed volumes (by species) could be given priority because of their need for indicators 1 and 2 which had a high usefulness rank, along with data on exported price and volumes (by species) which would be needed for indicator 3. Conversely, data on profits and revenues to businesses and governments may be considered of lower priority given the lower rank of indicators 4 to 9.
- The relatively low usefulness rank for the indicators related to government revenues (economic indicators 7-10), may reflect and mirror the comments made in section 3 that these types of indicators have less potential bearing or relevance as input to management decision-making.
- The low feasibility rank for indicators related to profitability, reflect the potential cost and time that would be required to collect data through questionnaires, the technical nature of the information that would need to be collected, and the potential reluctance by those in the sector to provide accurate information.

5.2 Social indicators

The table below provides the social indicators proposed by the consultants and commented on by CPCs for their usefulness and feasibility.

Table 9: Potential social indicators

	Possible social indicator name	Unit	Being a measure of	Data required	Notes
1	Employment in CPCs' own tuna catching sector operating in the Indian Ocean on vessels they flag	FTE	Number of people directly dependent on domestic tuna catching sector in CPCs	Numbers of people employed (and their full-time, part-time or occasional nature by fleet type)	Should also ideally be disaggregated by gender and age, and linked to specific gear types (e.g. purse seine, longline, etc). Can be coupled with national employment data to derive relative importance of tuna fisheries
2	Employment in CPCs' on third country tuna vessels operating in the Indian Ocean	FTE	Number of people from coastal states directly dependent on third country vessels	Numbers of people employed (and their full-time, part-time or occasional nature by fleet type)	Should also ideally be disaggregated by gender and age, and linked to specific gear types (e.g. purse seine, longline, etc). Can be coupled with national employment data to derive relative importance
3	Employment in CPCs in businesses supplying tuna fleets operating in the Indian Ocean	FTE	Number of people in CPCs directly dependent on businesses supplying the tuna catching sector, and employment multiplier effects of catching sector activity	Numbers of people employed (and their full-time, part-time or occasional nature)	Should also ideally be disaggregated by gender and age. Can be coupled with national employment data to derive relative importance of tuna fisheries. Could relate to employment from servicing foreign vessels if they land in a country
4	Employment in CPCs in businesses processing/marketing tuna caught in the Indian Ocean	FTE	Number of people directly dependent on downstream tuna sector processing in CPCs, and marketing and employment multiplier effects of catching sector activity	Numbers of people employed (and their full-time, part-time or occasional nature)	Should also ideally be disaggregated by gender and age. Can be coupled with national employment data to derive relative importance of tuna fisheries. Could relate to employment from foreign vessel landings if there are any in a country

	Possible social indicator name	Unit	Being a measure of	Data required	Notes
5	Tuna caught in the Indian Ocean available for local consumption in coastal states	Tonnes	Contribution of CPC catching sector (coastal and non-coastal states) to food security in coastal states	Tonnes of domestic landings + tuna imports/third country landings (live weight), minus tonnes (live weight) of exports (from indicator 3)	Can be coupled with data on protein and micro-nutrients per kg of tuna, and national data on protein consumption, to derive absolute and relative importance/contribution of tuna to national food security. Can also be coupled with data on population to derive data on tuna consumption per capita
6	Annual crew earnings in tuna catching sector for fleets operating in the Indian Ocean	$/yr/person	Attractiveness of tuna catching sector as a form of employment, and contribution to household wellbeing	Average crew earnings per year (by fleet type)	Can be coupled with catch volumes to derive crew earnings per tonne of landed tuna. And earnings can be compared to earnings in other sectors
7	Retail sale prices of tuna from the Indian Ocean	$/kg	Affordability of tuna from IOTC fisheries to consumers in CPCs	Prices per kg at retail markets (by species)	Can be coupled with data on costs per kgs of other protein sources, and income levels, to assess protein affordability

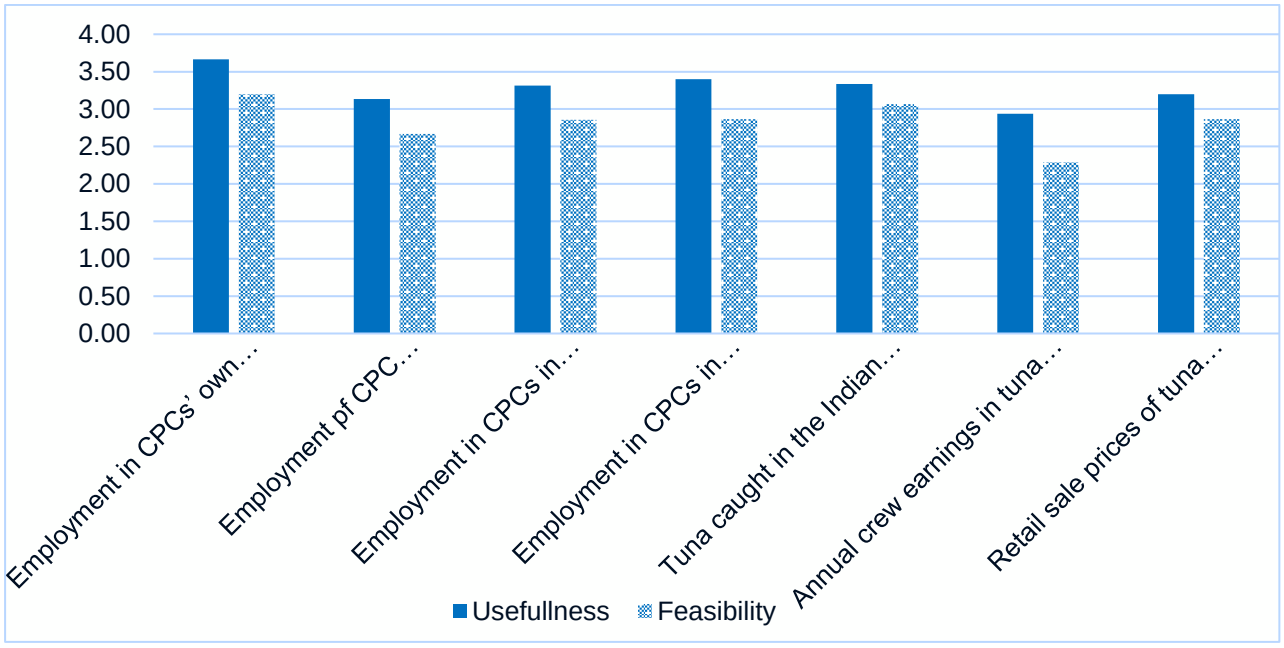
Notes: a number of CPCs suggested in their responses to data availability (reported on in section 3) that FTE is not appropriate/useful as the measurement unit for employment, preferring instead straight numbers or employment by full-time or part-time categorisation.

Table 10: CPC views on the usefulness and feasibility of social indicators

Social indicators	Usefulness		Feasibility	
	Score	Rank	Score	Rank
1. Employment in CPCs' own tuna catching sector operating in the Indian Ocean on vessels they flag	3.67	1	3.20	1
2. Employment of CPC nationals on third country tuna vessels operating in the Indian Ocean	3.13	6	2.67	6
3.Employment in CPCs in businesses supplying tuna fleets operating in the Indian Ocean	3.31	4	2.86	5
4. Employment in CPCs in businesses processing/marketing tuna caught in the Indian Ocean	3.40	2	2.87	3=
5.Tuna caught in the Indian Ocean available for local consumption in coastal states	3.33	3	3.07	2
6.Annual crew earnings in tuna catching sector for fleets operating in the Indian Ocean	2.94	7	2.29	7
7.Retail sale prices of tuna from the Indian Ocean	3.20	5	2.87	3=
Average	**3.28**		**2.83**	

Source: consultant analysis of CPC questionnaires. Notes: maximum possible score for any indicator is 4. Scores are comprised of the average of responses across CPCs that returned a questionnaire and provided answers for different indicators

Figure 2: CPC views on the usefulness and feasibility of social indicators (scores)



Source: consultant analysis of CPC questionnaires. Notes: maximum possible score for any indicator is 4. Scores are comprised of the average of responses across CPCs that returned a questionnaire and provided answers for different indicators

The analysis and presentation above of the views of CPCs about possible social indicators, highlights:

- For all 7 indicators, scores are higher for their usefulness than for their feasibility in terms of data collection requirements.
- CPCs view all social indicators as having a high level of usefulness, with all except for one having an average score of over 3, from a maximum score of 4.

- CPCs collectively view employment in the catching sector as more important than employment in upstream or downstream sectors as an indicator, potentially because of the fact that at least in the upstream sector businesses may supply tuna and non-tuna vessels.
- The indicators considered most useful are also the 3 considered most feasible in terms of data collection, suggesting that these could be the basis for a limited expanded data collection framework should one be agreed.
- The low feasibility ranking for indicator 2 (employment on third country vessels) and indicator 6 (crew earnings), are probably due to the potential need to rely on other CPCs for data for indicator 2, and the need for potentially costly and resource-intensive questionnaires that would be required for indicator 6 along with potential reluctance by crew to divulge accurate information about their earnings.

5.3 Other economic and social indicators

The indicators proposed in the tables above, and about which the CPCs were asked for their views in the questionnaires, were those considered by the consultants as being of potential relevance. So the questionnaire also provided space for CPCs to propose additional indicators which they thought might be worth considering.

Only 7 CPCs included any comment on additional indicators that might be of use. Some proposals made for additional indicators/data included:

- Share of the state budget that access fees represent.
- Management and research costs, in order to measure the level of government subsidies/support to tuna fishery.
- Tuna sector contribution to GDP.
- Per capita consumption of tuna (see also note on social indicator 5 in Table 9 which also suggested this point).
- Proportion of people employed in the tuna sector in relation to total employment of the country.
- Contributions to household incomes in coastal communities of tuna-related activity, and dependency on tuna-related activity compared to other income generating activities.
- The percentage of coastal populations depending to some capacity on the tuna-related sector.
- Number of different types of facilities available to tuna vessels.

5.4 Economic and social data and indicators in other regional organisations

A range of economic and social indicators and data are collected on an annual basis by the Forum Fisheries Agency (FFA) and published in its Compendium of Economic and Development Statistics. These are presented below, and provide some objective measure of data that can feasibly collected/generated in a consistent manner across multiple countries and which are considered of use in a regional fisheries management context. FFA collects data using a correspondent/consultant in each country, which is usually, but not always in the Fisheries Ministry. FFA then uses data in support of its members who make sovereign decisions about their tuna resources and participate in regional decision-making on tuna management through agencies such as the Western and Central Pacific Fisheries

Commission (WCPFC). The data are based on a combination of data provided by the country correspondents and specific work by FFA to derive figures.

- Catch volume and values by species by species, gear type, and area.
- Prices in US$/tonne by tuna species mainly of import data[39], but also of ex-vessel prices at some ports.
- Prices for marine diesel oil (from different sources).
- Country level data on catch volumes and values.
- Country level data on:
    - Harvest sector contribution to GDP (US$)
    - Combined harvest and onshore processing sector contribution to GDP (US$)
    - License and access revenue (US$)
    - Onshore processing volumes (tonnes)
    - Employment (number)
    - Exports to main markets (US$)
    - Balance of payments (US$)
    - Employment earnings (US$)
    - Local purchases (US$)

In the European Union (EU), fisheries management relies on a range of economic and social data collected, managed and supplied by EU countries in the form of annual reports, as required by Regulation (EU) 2017/1004 of 17 May 2017. A Joint Research Centre (JRC) assembles the data, stores it in databases, analyses its quality and coverage, and makes it available to the Scientific, Technical and Economic Committee for Fisheries (STECF) working groups. The STECF provides advice to the European Commission, which then makes proposals to the European Parliament and the Council of the European Union on policy and management. Evaluation of policy and management decisions also rely heavily on these data. Data collected and resulting indicators include a range of economic and social issues on different sub-sectors as follows[40]:

- *For the fishing fleet*: fleet capacity (number, GT, kW); fishing effort (days at sea, fishing days, GT fishing days, kW fishing days); employment (total and FTE, jobs per vessel, jobs per GT); average crew wages; weight and value of landings (and per fishing and sea day); fuel use (litres per tonne of fish landed); and economic performance of the fleet (revenues, different cost types); and economic performance indicators (income, gross value added, gross profit, net profit, all as a proportion of income). Generally all such data and indicators are available for different fleet types/categories.
- *For the processing sector:* structure *(*number of businesses of different sizes based on employment numbers); employment (number and FTE, and gender); indicators of FTE per enterprise, average wage, labour productivity.

Within the General Fisheries Commission for the Mediterranean (GFCM), CPCs are required to provide data and information based on binding recommendations[41]. With regards to economic and social information Recommendation GFCM/41/2017/6 on the submission of data on fishing activities in the GFCM area is the result of the progressive implementation of the Data Collection Regulation Framework. This recent recommendation requires CPCs to submit new socio-economic data to allow for improved analyses. These data, available by catching sector vessel group include:

- Landed values at first sale by species
- Fishing cost structures - variable costs (personnel, energy, maintenance, commercial

[39] Import data can be coupled with estimations of carriage, insurance and freight costs to derive ex-vessel values
[40] Similar types of data are collected on the aquaculture sector
[41] FAO. 2018. The State of Mediterranean and Black Sea Fisheries. General Fisheries Commission for the Mediterranean. Rome. 172 pp. License: CC BY-NC-SA 3.0 IGO.

costs, other), fixed costs, capital costs
- Catching sector total employment

These data and other FAO data are used by the GFCM to provide indicators:

- Using revenues less operating costs, estimates of gross cash flow are calculated for vessel groups.
- As an indicator of productivity, the average production in terms of value at first sale for each fisher is presented, offering an indication of the efficiency of production.
- Submission of data on FTE is optional but is used where available to provide a better indicator of remuneration by FTE.
- A standardized trade balance (STB) is calculated[42] as indicator towards understanding if a country is a net importer or exporter of fishery products.
- The total value of traded fish product (imports plus exports) is provided for CPCs[43].

International Commission for the Conservation of Atlantic Tunas (ICCAT) CPCs are required to consider socio-economic data in their annual reports, but specific requirements for relevant data are not in force. Guidelines for the preparation of annual reports indicate that 'Section 1 of the report should provide complementary information relating to the data submitted to ICCAT on total catches, effort, CPUE and size-frequency data and briefly describe trends in tuna fisheries during the preceding year. Attention should be given to changes in fishing patterns or new developments in fisheries, as well as *socioeconomic factors* [our emphasis] which influence or explain such changes and developments'[44].

In addition, ICCAT's sub-committee on ecosystems has been considering the feasibility of data and indicators that may reflect the socio-economic benefits and reliance on ICCAT resources[45]. The Standing Committee Research Statistics (SCRS) Science Strategic Plan 2015-2020[46] includes a strategy to 'include in the national sampling programs the collection of socio-economic information from the large pelagic fisheries by developing protocols for the collection of socio-economic data for large pelagic fisheries and upgrading ICCAT databases to include data other than biological data' and a data collection target of 'developing protocols for the collection of socio-economic data' in the context of ecosystems advice.

Some indicators considered and presented by Tsuji et al (2018)[47] in this context, all potentially possible using exclusively FAO data[48], were:

- Value of tuna produced in the ICCAT area (US$ '000)
- Contribution of tuna in total fish value produced in the ICCAT area (%)
- Contribution of tuna produced in the ICCAT area in total fish production value (%)
- Cash earning with export/ re-export of tuna and sharks produced in the ICCAT area (US$ '000)
- Contribution of tuna and shark export/re-export from ICCAT in total cash earning for fish and fish commodities (%)

[42] calculated as a percent ratio between the simple balance (exports minus imports) and the total volume of trade (exports plus imports).
[43] the available data are aggregated by country within the FAO Fishery commodities global production and trade database and they do not consist solely of fish products originating from capture fisheries in the GFCM area of application. As such, these data also include the value of traded fish products from aquaculture, from other FAO major fishing areas (especially in the case of Egypt, France, Morocco, the Russian Federation and Spain, which border multiple FAO fishing areas) as well as re-exports.
[44] https://www.iccat.int/Documents/Recs/compendiopdf-e/2012-13-e.pdf
[45] Collect. Vol. Sci. Pap. ICCAT, 75(2): 276-284 (2018). Tsuji, S. et al : Socio-economic aspects of the ICCAT fisheries.
[46] https://www.iccat.int/Documents/SCRS/STRATEGIC-PLAN_EN.pdf
[47] Collect. Vol. Sci. Pap. ICCAT, 75(2): 276-284 (2018). Tsuji, S. et al : Socio-economic aspects of the ICCAT fisheries.
[48] https://comtrade.un.org/data

Immediately evident from the lists of data and indicators above, is that the data collected and indicators derived are in many cases very similar to those proposed by the consultants as being of potential use within an IOTC context, and which have already been discussed in this report. Also of interest is the increasing recognition of the importance of economic and social data in informing management-decisions, especially in the context of ecosystem based fisheries management.

6. Conclusions and recommendations

6.1 Conclusions

The conclusions that can be drawn from the evidence and findings presented in earlier sections of this scoping study report are as follows.

1. Improved economic and social data available to the IOTC would certainly support better management decisions.
2. Articles IV and V of the Agreement to establish the IOTC provide justification and a mandate for IOTC to be involved with collection of economic and social data on aspects of tuna fisheries pertaining to the CPCs. The Articles could be interpreted as requiring an involvement by the IOTC in such issues.
3. The intention of the IOTC is to move to a more ecosystem based fisheries management approach, as highlighted in the 20th Session of the IOTC Scientific Committee report, and the EBFM not only deals with the ecological consequences of fishing and requirements for environmental sustainability, but also with the social and economic implications (good and bad) generated by the management and institutional arrangements related to fisheries. This implies the need for economic and social data to be available at a regional level to feed into IOTC management decisions.
4. The fact that this scoping study was commissioned by the IOTC itself indicates at least a potential interest by CPCs in economic and social data and some associated indicators, being available and used by the IOTC.
5. Current collection of both economic and social data by CPCs is patchy, and far from consistent in terms of what is being collected by different CPCs. To be useful for management, at least a basic set of prioritised data would need to be provided by all CPCs.
6. Other regional organisations are engaged in the collection and use of economic and social data, and increasingly so. These data are found to be very useful in a management decision-making context, and are increasingly being recgonised as required for ecosystem based fisheries management. However, the arrangements for the collection, storing, analysis and then use of data, require significant resources at country level, and support from related institutions/bodies as data has to be interpreted before it can be used in policy and management decisions.
7. It would be possible to generate some indicators without needing to expand data collection by CPCs, using publicly available data sets (e.g. from FAO, import statistics). For example, import data can be used to estimate ex-vessel prices (allowing for carriage insurance and freight costs) and when coupled with catch data CPCs already, can provide the basis for generating estimates of landed values by species.
8. However, CPCs consulted as part of this scoping study are not unanimously in favour of expanding data collection, or indeed of it being a requirement to provide data to the IOTC (either as a once-off exercise as input to discussions on allocation, or on a more regular basis). The reasons for this reluctance generally relate to the increased costs and manpower requirements that would be required, difficulties administratively of getting approval for changing current data collection arrangements, a recognition that many CPCs already find existing data collection requirements (not just for the IOTC

but more generally) a significant administrative burden, and the fact that expanded data collection obligations for CPCs would need in some cases to be accompanied by training support.

6.2 Recommendations

Based on the findings and conclusions, recommendations for consideration by the IOTC Commission are as follows[49]:

1. Consider and agree on whether given the potential benefits, despite the associated costs and challenges, a set of economic and social data should be required of CPCs for provision to IOTC, or alternatively whether CPCs should be left to decide themselves whether they wish to expand data collection and use such data in allocation discussions.
2. If agreement is reached that CPCs should collect and provided a set of economic and social data to the IOTC, consider and agree whether this should be as a once off exercise, or on a regular basis.
3. If agreement is reached that CPCs should collect and provide a set of economic and social data to the IOTC, discuss and take a decision over appropriate institutional arrangements, and in particular whether a Working Party on economic and social aspects of the fisheries the IOTC area of the competence is needed. This working party could be temporary if data are to be used just in allocation discussions, or permanent if regular data collection is agreed. Either way, take the necessary procedural and practical steps to establish such a working party.
4. Even if a decision is taken not to expand CPC data provision, consider and agree whether a working party could build on the content of this scoping study to generate a range of indicators using other existing sources of data.
5. If such a working party is formed, it should consider and make proposals to the CPCs for their consideration on what data and indicators should be chosen/included. Guidance on data and indicator definitions should also be provided to ensure a consistent approach to data and indicators across CPCs.

[49] As a scoping study only, and as consultants, we do not view it as appropriate to make recommendations about specific data and indicators to be collected. Having noted the potential benefits of improved data in the conclusions, and having considered a range of possible data and indicators, it is more proper for the IOTC Commission and potentially a working party established for the purpose, to consider and agree the data that might be collected in the future and the indicators that should be derived.

Annex A: References and sources of information

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Tsuji, S. et al : Socio-economic aspects of the ICCAT fisheries. Collect. Vol. Sci. Pap. ICCAT, 75(2): 276-284 (2018).

Annex B: Study questionnaire

IOTC scoping study on socio-economic data and indicators of IOTC fisheries: Questionnaire
Introduction

At its 22nd session, the IOTC adopted Resolution 18/09 which detailed the requirements for a scoping study on socio-economic data and indicators of IOTC fisheries. In IOTC Circular 2018-51, the Commission notified CPCs that the study had been contracted to the consultancy company Poseidon Aquatic Resource Management Limited, and requested cooperation by CPCs with Poseidon.

This questionnaire has been prepared by Poseidon as a critical part of the scoping study. The purpose of the questionnaire is to determine what data on IOTC tuna fisheries are currently collected and available at national level (or could be collected in the future), and to seek the views of CPCs on potential indicators which could be useful by the IOTC for management purposes. Each CPC is being asked to complete this questionnaire and to provide information related to its own country.

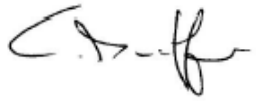
For the purpose of this study please consider 'tuna-fisheries' to mean all species under the mandate of the IOTC and note that all questions relate to tuna fisheries in the Indian Ocean only, and their upstream and downstream impacts in CPCs.

For all questions, please provide answers about data availability not just from your institution, but from all sources in your country.

We would be grateful if you could provide a response by 15th March 2019, with answers provided in the questionnaire below, and this file returned by email to **graeme@consult-poseidon.com**.

If you have any questions as you complete the questionnaire, please feel free to write to me at the email address above and I will respond immediately.

We acknowledge that the questionnaire may take some time to complete. However, a lack of response by CPCs, or incomplete questionnaires, will have a negative impact on the quality and potential value of the scoping study. We are thus dependent on your good will in this exercise and thank you in advance for your time and support. Please also note that based on your responses we will ask you later to provide the data you say are currently available.



Graeme Macfadyen, Director, Poseidon

Section 1: Contact details of those completing questionnaire

CPC/country name	
Designation (e.g. Mr., Mrs, Ms, Dr. etc)	
Name (first name, family name)	
Organisation	
Position in Organisation	
Email address	
Phone number	
Skype address	

Section 2: Data on social aspects of tuna fisheries

Qu.1 Data availability on employment in the <u>catching sector</u> specifically for <u>tuna vessels operating in the IOTC area of competence</u>. Please complete the table below

Column	A	B	C	D	E
Question	Yes/No (or n/a[50])	If 'Yes', what is the most recent year of data	If 'Yes' what is the frequency of data collection e.g. yearly, 5-yearly, irregular	If 'No' to column A, would you expand data collection to collect and publish these data (Yes/No)	If 'No' to column D, please say why
Are data available for total employment in the tuna catching sector?					
Are employment data available by full-time, part-time and occasional employees					
Are employment data converted/recorded in Full-Time Equivalents					
Are employment data available by gender?					
Are employment data available by age or age-groups?					

[50] Please enter n/a if the question is not applicable to you as a CPC. For example, if you have no nationals employed on vessels flagged by third countries, or if you are a CPC with no tuna vessels

Are employment data available by fleet type e.g. purse seine, longline, etc?					
Are employment data available for employment of your nationals on domestic vessels you flag?					
Are employment data available for employment of your nationals on foreign/third country vessels?					
Are employment data available for employment of foreign nationals on domestic vessels you flag?					
Please supply any additional comments/notes here on your answers above if you need to, and to explain if you have entered n/a					

Qu.2 Data availability on employment in the <u>upstream supply sector</u> specifically from <u>supplying tuna fleets fishing in the IOTC area of competence</u>. (These are suppliers of inputs to the catching sector such as gear suppliers, boatyards, etc). Please complete the table below

Column	A	B	C	D	E
	Yes/No (or n/a)	If 'Yes', what is the most recent year of data	If 'Yes' what is the frequency of data collection e.g. yearly, 5-yearly, irregular	If 'No' to column A, would you expand data collection to collect and publish these data (Yes/No)	If 'No' to column D, please say why
Are data available for total employment in the upstream sector supplying the tuna fleet operating in the Indian Ocean?					
Are data available by full-time, part-time and occasional?					
Are employment data converted into Full-Time Equivalents?					
Are employment data available by gender?					
Are employment data available by age or age-group?					

Are employment data available by businesses supplying different fleet types e.g. purse seine, longline, etc?					
Please supply any additional comments/notes here on your answers above if you need to, and to explain if you have entered n/a					
If employment data in the upstream sector are not available, is information (qualitative and/or quantitative) available on the types or numbers of upstream businesses supplying the tuna sector? If yes, please provide some examples.					

Qu.3 Data availability on employment in the <u>tuna processing/trading sector</u> specifically from <u>tuna caught in the IOTC area of competence</u>. Please complete the table below

Column	A Yes/No (or n/a)	B If 'Yes', what is the most recent year of data	C If 'Yes' what is the frequency of data collection e.g. yearly, 5-yearly, irregular	D If 'No' to column A, would you expand data collection to collect and publish these data (Yes/No)	E If 'No' to column D, please say why
Are data available for total employment in the downstream tuna processing/marketing sector based on catches made in the Indian Ocean?					
Are data available by full-time, part-time and occasional?					
Are employment data converted into Full-Time Equivalents?					
Are employment data available by gender?					
Are employment data available by age or age-groups?					
Are employment data available for separately for nationals and for foreign workers?					
Are employment data available for businesses receiving fish from different fleet types (e.g.					

purse seine, longline, etc?) and/or processing different species					
Are employment data available disaggregated by small and large-scale processing?					
Please supply any additional comments/notes here on your answers above if you need to, and to explain if you have entered n/a					

Qu. 4 Data on contribution to food security from tuna catches <u>in the IOTC area of competence</u>

Column	A	B	C	D	E
	Yes/No (or n/a)	If 'Yes', what is the most recent year of data	If 'Yes' what is the frequency of data collection e.g. yearly, 5-yearly, irregular	If 'No' to column A, would you expand data collection to collect and publish these data (Yes/No)	If 'No' to column D, please say why
Are data available on retail prices of tuna by species, for tuna caught in the Indian Ocean					
Are data available for total domestic landings (in tonnes) of tuna caught in the Indian Ocean?					
Are data on domestic landings (tonnes) of tuna caught from Indian Ocean fisheries available by species?					
Are data available for landings or imports of tuna (tonnes) by/from third countries?					
Are data on landings or imports of tuna (tonnes) by/from third countries available by species?					
Please supply any additional comments/notes here on your answers above if you need to, and to explain if you have entered n/a					

Qu. 5 Data on crew earnings from tuna catches made <u>in the IOTC area of competence</u>

Column	A	B	C	D	E
	Yes/No (or n/a)	If 'Yes', what is the most recent year of data	If 'Yes' what is the frequency of data collection e.g. yearly, 5-yearly, irregular	If 'No' to column A, would you expand data collection to collect and publish these data (Yes/No)	If 'No' to column D, please say why
Are data available on average annual crew earnings of your nationals employed on tuna vessels you flag that are operating in the Indian Ocean?					
Are data available on average annual crew earnings of your nationals employed on third country tuna vessels operating in the Indian Ocean?					
Are data available on average annual crew earnings of foreign nationals employed on tuna vessels you flag that are operating in the Indian Ocean?					
Are data available on average annual crew earnings of those employed on tuna vessels you flag operating in the Indian Ocean for different fleet types? E.g. purse seine, longline, etc					
Please supply any additional comments/notes here on your answers above if you need to, and to explain if you have entered n/a					

Section 3: Data on economic aspects of tuna fisheries

Qu. 6 Data on landings to CPCs of tuna caught in the Indian Ocean (in addition to questions already posed as part of question 4)

Column	A	B	C	D	E
	Yes/No (or n/a)	If 'Yes', what is the most recent year of data	If 'Yes' what is the frequency of data collection e.g. yearly, 5-yearly, irregular	If 'No' to column A, would you expand data collection to collect and publish these data (Yes/No)	If 'No' to column D, please say why
Are data available for the ex-vessel sales prices (per kg or tonne) paid for different tuna species that are caught in the Indian Ocean? i.e. prices paid to vessels/fishermen at the point of landing					
Are data available for the landed values (in US$ or local currency) for different tuna species that are caught in the Indian Ocean?					
Please supply any additional comments/notes here on your answers above if you need to, and to explain if you have entered n/a					

Qu. 7 Data on exports from CPCs of tuna caught in the Indian Ocean

Column	A	B	C	D	E
	Yes/No (or n/a)	If 'Yes', what is the most recent year of data	If 'Yes' what is the frequency of data collection e.g. yearly, 5-yearly, irregular	If 'No' to column A, would you expand data collection to collect and publish these data (Yes/No)	If 'No' to column D, please say why
Are data available for the volume of exports for different species of tuna caught in the Indian Ocean?					
Are data available for the export sales prices (per kg or tonne) of different tuna species caught in the Indian Ocean?					
Are data available for the total export values (in US$ or local currency) of tuna caught in the Indian Ocean?					
If Yes, are data available on export values by species (rather than by product/HS code)					
Please supply any additional comments/notes here on your answers above if you need to, and to explain if you have entered n/a					

Qu. 8 Data on profitability in upstream, catching, and processing sector, <u>from catches made in the Indian Ocean</u>

Column	A	B	C	D	E
	Yes/No (or n/a)	If 'Yes', what is the most recent year of data	If 'Yes' what is the frequency of data collection e.g. yearly, 5-yearly, irregular	If 'No' to column A, would you expand data collection to collect and publish these data (Yes/No)	If 'No' to column D, please say why
Are costs and earnings data[51] available for different fleet types e.g. purse seine, longline, etc, to show profits ($ and $/tonne)					
Are costs and earnings data available for businesses supplying inputs to the tuna fleet operating in the Indian Ocean, to show profits ($)					
Are costs and earnings data available for businesses processing and selling tuna caught in the Indian Ocean, to show profits ($ and $/tonne)					
Please supply any additional comments/notes here on your answers above, for example on the different categories of costs/earnings collected (if any)					

[51] For example, showing operational and net profits derived from data on i) income, ii) fishing costs e.g. fuel cost, crew share cost, food costs, other fishing costs such as ice, iii) non-fishing/fixed costs e.g. maintenance, licenses, etc, iv) depreciation, interest/finance costs.

Qu. 9 Data on government revenues from tuna activities in the Indian Ocean

Column	A	B	C	D	E
	Yes/No (or n/a)	If 'Yes', what is the most recent year of data	If 'Yes' what is the frequency of data collection e.g. yearly, 5-yearly, irregular	If 'No' to column A, would you expand data collection to collect and publish these data (Yes/No)	If 'No' to column D, please say why
Are data available on government revenues from access and license fees paid by domestic vessels to fish for tuna in the Indian Ocean?					
If 'Yes' are these available disaggregated by species and fleet type?					
Are data available on government revenues from access and license fees paid by third country vessels to fish for tuna in the Indian Ocean?					
If 'Yes' are these available disaggregated by species and fleet type?					
Are data available on port revenues in IOTC coastal states from visiting third country tuna fleets?					
Are data available on government revenues from income taxes on upstream, catching, and or processing sectors?					
Please supply any additional comments/notes here on your answers above, and specifically on the issue of whether you would be prepared to make such data public.					

Section 4: Views on indicators and role of IOTC

In the two tables below, you will find some possible economic and social indicators. All indicators are potentially of use if collected at national level, either: i) in informing ex-ante the potential impact of management decisions at the IOTC level, for example the impact of reduced catches in the short-term or maintained or increased catches in the long-term through management decisions aimed at stock maintenance and/or recovery, or ii) which could be used to evaluate ex-post the impacts of those management decisions i.e. management decisions could be expected to have a bearing on the indicators.

Note also, that many of these indicators could be compared with national level figures (e.g. on employment, exports, imports) to generate additional indicators of dependency.

Qu. 10. How i) useful and ii) feasible do you think the national-level indicators proposed in the tables below are?

In the two right-hand columns we would like your views on i) 'how useful' you think each indicator would be: and ii) 'how feasible' you think each indicator would be given the data requirements shown in the tables, the potential costs of data collection, and your answers earlier in the questionnaire about data availability.

Ind. No.	Possible economic indicator name	Unit	Being a measure of / Description	Data required	Notes	Useful? (not at all, a little, moderately, very)	Feasible? (not at all, a little, moderately, very)
1	Landings in CPCs of tuna caught in the Indian Ocean by their own vessels	$	Value of landed catch from IOTC fisheries in CPCs by national vessels	Ex-vessel prices and landed volumes (by species)	Can be coupled with other fisheries/species data to derive importance of tuna sector in total fisheries landings.		
2	Landings of tuna in coastal states caught by third country vessels in the Indian Ocean	$	Value of catch from IOTC fisheries landed by third countries in IOTC coastal states	Ex-vessel prices and landed volumes (by species)	Can be coupled with other fisheries/species data to derive importance of tuna sector in total fisheries landings. And also a measure of competitiveness and attractiveness of domestic processing sector to foreign vessels		

Ind. No.	Possible economic indicator name	Unit	Being a measure of / Description	Data required	Notes	Useful? (not at all, a little, moderately, very)	Feasible? (not at all, a little, moderately, very)
3	Exports by CPCs of tuna catches made in the Indian Ocean	$	Contribution to foreign exchange earnings and balance of payments from catches in the Indian Ocean by CPC vessels	Exported prices and exported volumes (by species)	Can be coupled with national export data to derive relative importance of domestic tuna catches in exports.		
4	Net profit in catching sector from tuna catches in the Indian Ocean	$ and $/tonne	Profitability of CPC tuna fleets operating in the Indian Ocean	Costs and earnings data (by fleet type)	Likely only from periodic surveys. Data required on i) income, ii) fishing costs e.g. fuel cost, crew share cost, food costs, other fishing costs such as ice, iii) non-fishing/fixed costs e.g. maintenance, licenses, etc, iv) depreciation, interest/finance costs. May be commercially sensitive.		
5	Net profit from provision of inputs to the tuna catching sector in the Indian Ocean	$	Profitability of supplying the IOTC tuna catching sector, and income multiplier effects in CPCs of catching sector on upstream businesses	Costs and earnings data for input suppliers and % of business related to tuna fisheries	Likely only from periodic surveys. Input businesses may well supply non-tuna fisheries in countries with mixed species making data unreliable unless % of business turnover can be attributed to tuna species. May be commercially sensitive.		
6	Net profit from processing tuna caught in the Indian Ocean	$ and $/tonne	Profitability of downstream processing of tuna caught in IOTC fisheries, and income multiplier effects in CPCs of the catching sector in IOTC fisheries on downstream processing	Costs and earnings data for processors and % of business related to tuna fisheries	Likely only from periodic surveys. Processing companies in countries with mixed fisheries may process multiple types of species. May be commercially sensitive.		

Ind. No.	Possible economic indicator name	Unit	Being a measure of / Description	Data required	Notes	Useful? (not at all, a little, moderately, very)	Feasible? (not at all, a little, moderately, very)
7	Total access/license fees paid by domestic tuna fishers	$	Resource rents being generated for governments from their nationals engaged in the IOTC tuna fishery	Payments made to government by domestic tuna fishers in different fleet types and species	Can be coupled with tonnages caught to derive resource rents per tonne of fish. Applicable to coastal and non-coastal states		
8	Total access fees paid by foreign tuna vessels to coastal states	$	Resource rents being generated for coastal state governments from third countries from the IOTC tuna fishery	Payments made by third country governments/ companies (from different fleet types and species)	Can be coupled with tonnages caught to derive resource rents per tonne of fish		
9	Port revenues from third country tuna fleets visiting/landing in coastal states	$	National income in IOTC coastal states from port-related activity due to third country tuna vessels	Payments made by third country vessels	Revenues may be derived from multiple sources e.g. landing dues, berthing fees, etc. This indicator also provides a measure of competitiveness / attractiveness of services compared to other landings locations		
10	Income taxes to governments from tuna-related activity	$	National income in IOTC CPCs from income taxes in upstream, catching and downstream sector from the IOTC tuna fishery	Payments made by businesses to governments	Can be coupled with national income tax generation to derive contribution of tuna activity		

	Possible social indicator name	Unit	Being a measure of	Data required	Notes	Useful? (not at all, a little, moderately, very)	Feasible? (not at all, a little, moderately, very)
11	Employment in CPCs' own tuna catching sector operating in the Indian Ocean on vessels they flag	FTE	Number of people directly dependent on domestic tuna catching sector in CPCs	Numbers of people employed (and their full-time, part-time or occasional nature by fleet type)	Should also ideally be disaggregated by gender and age, and linked to specific gear types (e.g. purse seine, longline, etc). Can be coupled with national employment data to derive relative importance of tuna fisheries		
12	Employment in CPCs' on third country tuna vessels operating in the Indian Ocean	FTE	Number of people from coastal states directly dependent on third country vessels	Numbers of people employed (and their full-time, part-time or occasional nature by fleet type)	Should also ideally be disaggregated by gender and age, and linked to specific gear types (e.g. purse seine, longline, etc). Can be coupled with national employment data to derive relative importance		
13	Employment in CPCs in businesses supplying tuna fleets operating in the Indian Ocean	FTE	Number of people in CPCs directly dependent on businesses supplying the tuna catching sector, and employment multiplier effects of catching sector activity	Numbers of people employed (and their full-time, part-time or occasional nature)	Should also ideally be disaggregated by gender and age. Can be coupled with national employment data to derive relative importance of tuna fisheries. Could relate to employment from servicing foreign vessels if they land in a country		
14	Employment in CPCs in businesses processing/marketing tuna caught in the Indian Ocean	FTE	Number of people directly dependent on downstream tuna sector processing in CPCs, and marketing and employment multiplier effects of catching sector activity	Numbers of people employed (and their full-time, part-time or occasional nature)	Should also ideally be disaggregated by gender and age. Can be coupled with national employment data to derive relative importance of tuna fisheries. Could relate to employment from foreign vessel landings if there are any in a country		

	Possible social indicator name	Unit	Being a measure of	Data required	Notes	Useful? (not at all, a little, moderately, very)	Feasible? (not at all, a little, moderately, very)
15	Tuna caught in the Indian Ocean available for local consumption in coastal states	Tonnes	Contribution of CPC catching sector (coastal and non-coastal states) to food security in coastal states	Tonnes of domestic landings + tuna imports/third country landings (live weight), minus tonnes (live weight) of exports (from indicator 3)	Can be coupled with data on protein and micro-nutrients per kg of tuna, and national data on protein consumption, to derive absolute and relative importance/contribution of tuna to national food security. Can also be coupled with data on population to derive data on tuna consumption per capita		
16	Annual crew earnings in tuna catching sector for fleets operating in the Indian Ocean	$/yr/person	Attractiveness of tuna catching sector as a form of employment, and contribution to household wellbeing	Average crew earnings per year (by fleet type)	Can be coupled with catch volumes to derive crew earnings per tonne of landed tuna. And earnings can be compared to earnings in other sectors		
17	Retail sale prices of tuna from the Indian Ocean	$/kg	Affordability of tuna from IOTC fisheries to consumers in CPCs	Prices per kg at retail markets (by species)	Can be coupled with data on costs per kgs of other protein sources, and income levels, to assess protein affordability		

Qu. 11. If you have any thoughts about other indicators which you think might be useful, please provided them

Answer here:

Qu. 12. Please provide any thoughts you have may have about whether you think it is appropriate and necessary for the IOTC to request economic and social data from all CPCs to provide a complete regional data set for use in indicators such as those proposed above, or whether you think it should be left for CPCs to collect and use data as they choose in discussions about management decision-making.

Answer here:

Qu.13. Please provide your views on whether you think the provision of economic and social data to IOTC would only be potentially useful in the context of discussions on allocation and would best only be provided as a 'one-time' exercise, or if you think regular provision of data to IOTC on a yearly or bi-annual basis could be useful to inform other IOTC discussions, to track trends in socio-economic contributions of tuna fisheries, etc.

Answer here:

Qu.14. Please provide your overall views on how realistic it would be to expand data collection on tuna fisheries at the national level, considering costs, man-power, logistics, institutional responsibilities, etc.

Answer here:

Thank you for your time in completing this questionnaire

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