ESTIMATION OF EEZ CATCHES IN THE IOTC DATABASE: REPORT ON THE AVAILABILITY AND QUALITY OF CATCH ESTIMATES

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PURPOSE

To provide the Working Party on Data Collection and Statistics (WPDCS) with background on the IOTC Secretariat's methodology for estimating catches within Exclusive Economic Zones (EEZ), and particularly the level of uncertainty associated with EEZ catch estimates.

The report is split into the following sections:

- Description of the IOTC datasets available to derive time-area catches.
- Overview of the IOTC Secretariat's procedure to estimate catches within EEZ areas.
- Discussion of the IOTC EEZ catch estimates, including upper and lower bounds.
- Limitations of IOTC's current methodology for estimating catches by EEZ area.
- Recommendations for improving IOTC catch estimates within EEZ areas.

BACKGROUND

During the third Session of the Technical Committee on Allocation Criteria in 2016, the TCAC **RECOMMENDED** that the IOTC Secretariat:

> *'…facilitate a review of all available catch history data in the IOTC area of competence, with the purpose of collating information on a spatial and temporal basis, thereby permitting CPCs to better understand the catches made within individual EEZs and on the High Seas, over time, and also the development and refinement of estimation procedures, consistent with the rules of the Commission"* (para. 54, TCAC03 Report)

The IOTC Secretariat periodically undertakes reviews of the available catch series[2] in the IOTC database, and each year presents the main issues considered to impact negatively on the quality of catch estimates in the IOTC database for the consideration of the relevant subsidiary bodies.

The remaining discussion addresses the specific issue of the procedures for estimating catches within EEZs from the IOTC database, in particular drawing attention to the limitations of existing IOTC datasets and the range of uncertainty in the derived EEZ catch estimates.

IOTC DATA INPUTS IN ESTIMATES OF CATCHES BY FISHING AREA

Estimating catches within EEZ areas with accuracy requires access to fine-scale spatial information – ideally set-level fishing locations recorded in logbooks combined with VMS data or port sampling, for example, in order to validate the reliability of fishing activities in time and space.

With no access to fishing set-level data (i.e., logbooks), the IOTC Secretariat is reliant on estimating catches by fishing location (including catches within EEZ areas) from the nominal catch and catch-and-effort datasets in the IOTC database – both of which contain catches aggregated at higher spatial levels than logbook operational logbook data (see Box 1):

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[2] In recent years this has included revisions to the historical catch series for India, Indonesia, and Sri Lanka; for further details see '*Revision of catch statistics for India, Indonesia and Sri Lanka (1950-2011). Assignment of species and gears to the total catch and issues on data quality*', IOTC–2012–SC15–38.

i. **Nominal catches**: estimates of total annual catches by area (East/West Indian Ocean), by species, type of fishery (gear), and year.

ii. **Catch-and effort**: monthly time-area catches, by species, and type of fishery (area). The minimum standards that apply to the reporting of catches by area vary according to the type of fishery:

- Coastal fleets: geographic representative areas (such as EEZ, or port of landing)
- Longliners: 5° grid areas
- Surface fisheries (including purse seiners and baitboats): 1° grid areas

Both nominal catches and catch-and-effort in the IOTC database are considered to be incomplete to varying degrees – dependent on the fishery and species in question – due to non-reporting of data by IOTC CPCs. Incomplete catch series, in addition to reported catches considered to be unreliable or poor quality particularly for coastal small-scale/artisanal fisheries, compound the uncertainty in calculating catches within EEZ areas due to the lack of fine-scale spatial information.

Nevertheless, and at the request of the IOTC Technical Committee on Allocation Criteria, the IOTC Secretariat has in recent years explored the feasibility of the estimating catches in EEZ areas. Details of the procedure, including the limitations of the data and methodology applied, are outlined in the sections below.

Box 1: Definition of nominal catch and catch-and-effort IOTC datasets

- ***Nominal catch data:*** refers to estimates of total catches, in live weight by gear type, species and IOTC statistical area (Eastern or Western Indian Ocean), by flag of the reporting country. Data are aggregated by calendar year for tuna and tuna-like species and non-target species (by-catch).

  Catches represent the 'best scientific estimates' (or disaggregated catches[3]), that are adopted by the Scientific Committee, and which are the product of data reviews and, in some cases, estimation by the IOTC Secretariat - including the estimation of catches which are not reported by the flag countries concerned.

- ***Catch-and-effort***: refers to time-area catches and effort data reported according to the following standards:
  - **Surface fisheries**: refers to fisheries undertaken by tuna purse seiners, baitboats, and gillnetters in the IOTC record of authorized vessels. Data to be reported include catches in live weight per year, month, gear type, fishing mode, and species, as derived from fishing logbooks completed onboard fishing vessels, reported aggregated by 1° grid areas.
  - **Longline fisheries**: refers to fisheries undertaken by longliners in the IOTC record of authorized vessels. Data to be reported include catches in live weight per year, month, gear type, and species, as derived from fishing logbooks completed onboard fishing vessels, reported aggregated by 5° grid areas.
  - **Coastal fisheries**: refers to fisheries undertaken by fleets operating in coastal waters, all year round within the EEZ of their flag countries (and not in the IOTC Record of Authorized Vessels). Data to be reported include catches in live weight per year, by month, gear type, and species, as collected at the landing place through sampling, interviews, or by other means, reported aggregated by irregular area (e.g., EEZ or port of landing), for areas that are representative of the fisheries concerned.

[3] The best scientific estimates also disaggregate catches in the IOTC database reported to the IOTC Secretariat by countries as species or gear aggregates, which are then assigned by species or gear when the IOTC Secretariat has access to alternate sources of information such as statistical publications, fishery bulletins or other information.

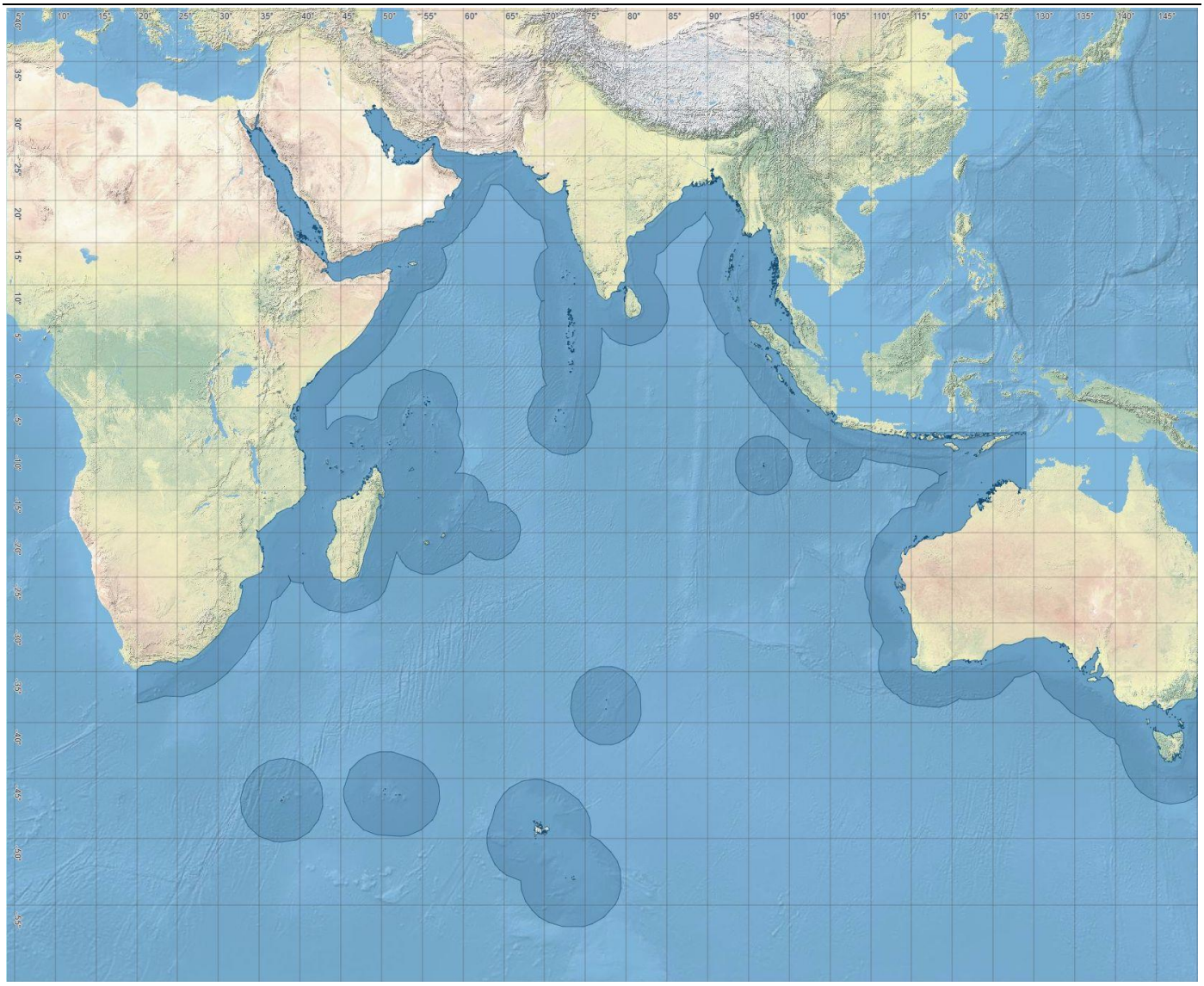


Fig 1. Exclusive Economic Zones (EEZ) within the Indian Ocean, overlaid with 5° grid areas. (Map © Esri - Source: US National Park Service).

METHODOLOGY FOR ESTIMATING CATCHES BY EEZ AREA

The procedure for estimating catches within EEZ areas by the IOTC Secretariat is essentially a two-step process:

- Step 1: Estimation of total catches by time-area: raising of time-area catches (as reported by catch-and-effort) to total catches (nominal catches) to account for gaps in catch-and-effort data.
- Step 2: Allocation of total catches (by time-area) within EEZ areas.

Step 1: Estimation of total catches by time-area

Catch-and-effort data are not reported by all fleets and, where available, coverage of catches can vary considerably depending on the species, fleet and time period concerned.

For this reason the IOTC Secretariat is obliged, in many cases, to adjust the catch-and-effort reported by CPCs, or estimate gaps in the data in order to produce total catches by time-area. Specifically:

i. Raising of time-area catches to total catches, where catch-and-effort represent a sample.

ii. Estimation of time-area catches for fleets/fisheries for which no catch-and-effort are available; for example by applying a spatial distribution of catches from proxy fleets (scaled to the total nominal catches of the fleet/fishery in question).

iii. Estimation of catches in weight, where catch-and-effort are reported in numbers.

The IOTC Secretariat applies the following procedures to estimate total catches by time-area, according to type of fishery:

Fishery	Description of estimation of total time-area catches
Artisanal fisheries	• All catches from artisanal fisheries (as reported by nominal catches) are fully assigned to the EEZ of the reporting country, on the assumption that coastal fisheries generally operate within the EEZs of their respective flag countries all year round. • No raising of catch-and-effort is required in this case, as catches are taken directly from nominal catches (by species, gear, fleet, year). • Examples: I.R. Iran (gillnets), Sri Lanka (coastal fisheries), India (coastal fisheries). • Issues: Assumes that nominal catches are complete and of sufficient quality.
Purse-seine fleets reporting under the EU sampling scheme	• Catch-and-effort reported to the IOTC Secretariat is reported as total (raised) catches, by 1° area. No additional adjustment is applied by the IOTC Secretariat. • Examples: EU-France/Spain and Seychelles purse seiners. • Issues: The catches provided to the IOTC Secretariat are already raised by the EU using a substitution scheme.
Fisheries reporting partial catch-and-effort data	• Catches are raised (extrapolated) to the total nominal catches. • Examples: Seychelles longliners. • Issues: Assumes that partial catch-and-effort are representative sample of total catches (i.e., in terms of spatial-temporal distribution of catches by species).
Fisheries reporting no catch-and-effort data (Industrial fisheries)	• Time-area catches are estimated using a substitution scheme, by assuming the spatial distribution of catches from fleets that operate in a similar way. Applies to industrial fisheries only, as artisanal catches are assumed to be located wholly within the EEZ area. • Issues: Depending on the availability of proxy information, the substitute areas or fleets used can be very broad, which has implications on the reliability of derived time-area catches.
Fisheries reporting catch-and-effort data (in numbers only) (Industrial fisheries)	• Time-area catches (in weight) are estimated using size frequency data available for time-area strata, to infer length distributions of catches (in numbers) to weights using the IOTC length-weight equations. • Examples: Japanese longline fleet. • Issues: Assumes that size frequency data are representative of the length distributions for each time-area strata. Also for time-area strata with no size frequency samples, length distributions are substituted using samples from neighbouring areas, which may be of varying reliability.

The procedures detailed above are only applied to the five major IOTC species (albacore, bigeye tuna, skipjack tuna, swordfish and yellowfin tuna) – for which data quality and coverage of nominal catches and catch-and-effort are considered to be adequate enough to provide a reasonable estimate of total time-area catches.

Step 2: Allocation of total catches (by time-area) within EEZ areas.

Time-area catches, raised to total catches, can then be used to *approximate* catches inside/outside EEZ areas by applying a number of allocation methods. Each method can result in relatively large differences in the estimates of catches within EEZ areas, depending on:

- The assumptions applied to the allocation of catches within IOTC grid areas intersected by EEZ boundaries.
- The proportion of IOTC 1^{o} or 5^{o} grid areas or statistical areas intersected by EEZ boundaries. Generally speaking, the greater the proportion of areas intersected by EEZ areas, the larger the uncertainty in allocating catches within EEZ areas.

While the true distribution of catches within EEZ areas cannot be derived from the IOTC database (without access to logbook level data), the range of likely estimates – i.e., upper and lower bounds of EEZ catch estimates – can at least be derived in order to quantify the range of uncertainty when estimating catches for each EEZ.

The following table includes a description of three methods of allocating catches within EEZ areas – intended for illustrative purposes, rather than a comprehensive list of allocation criteria:

EEZ_CATCH_LOW (lower bound)	Description: - Artisanal fisheries: Assigns all catches from coastal/artisanal fisheries within EEZ boundaries of each flag state. - Industrial fisheries: For all other gears, includes only time-area catches (by 1° or 5° grid) that are **fully** contained within a given EEZ (**Fig.2**). • Limitation: Estimates represent the proportion of total catches that occur entirely within EEZ areas. Excludes all catches which are intersected by EEZ boundaries, and therefore likely to underestimate catches within EEZ areas. • Represents the most conservative (i.e., lower bound) estimates of catches within each EEZ area.
EEZ_CATCH_MED (intermediate value)	Description: - Artisanal fisheries: Assigns all catches from artisanal gears within EEZ boundaries of each flag state. - Industrial fisheries: For all other gears, time-area catches (by 1° or 5° grids) are allocated to EEZ areas **proportional** to the area of the grid that falls within the EEZ area (**Fig.3a**). • Limitation: Assumes catches occur uniformly through each IOTC grid area, including areas intersected by EEZ boundary lines. • More likely are that catches occurring in areas intersected by EEZ boundaries are likely to occur close to the border *outside* of the EEZ (e.g., for fleets that do not have an access agreement with the coastal State and "fish the EEZ boundary line" (**Fig.3b**); in which case catches inside the EEZ area would be systematically overestimated (depending of the proportion of IOTC grid area within/outside the EEZ). • Catches inside EEZ areas are also known to exhibit strong seasonality, as well as inter-annual variability, however limited data is available in the IOTC database at sufficient temporal and spatial resolutions to support this assumption on a quantitative level. The implication is that the proportion of catches occurring inside/outside EEZ areas for intersected IOTC grids may fluctuate significantly by month, between years.
EEZ_CATCH_HIGH (upper bound)	Description: - Assigns all catches from artisanal gears fully within EEZ boundaries of each flag state. - For all other gears, raised time-area catches (by 1° or 5° grids) are 100% assumed to have taken place inside a given EEZ as long as they partially overlap for more than 0.1% (**Fig.4**). • Limitation: Assumes all catches occur within the EEZ for grid areas that overlap EEZ boundaries by as little as 0.1% of there are, which is highly unlikely. • Represents an upper bound for EEZ catches by assigning the maximum possible catches within EEZ areas based on catches available in the IOTC database.

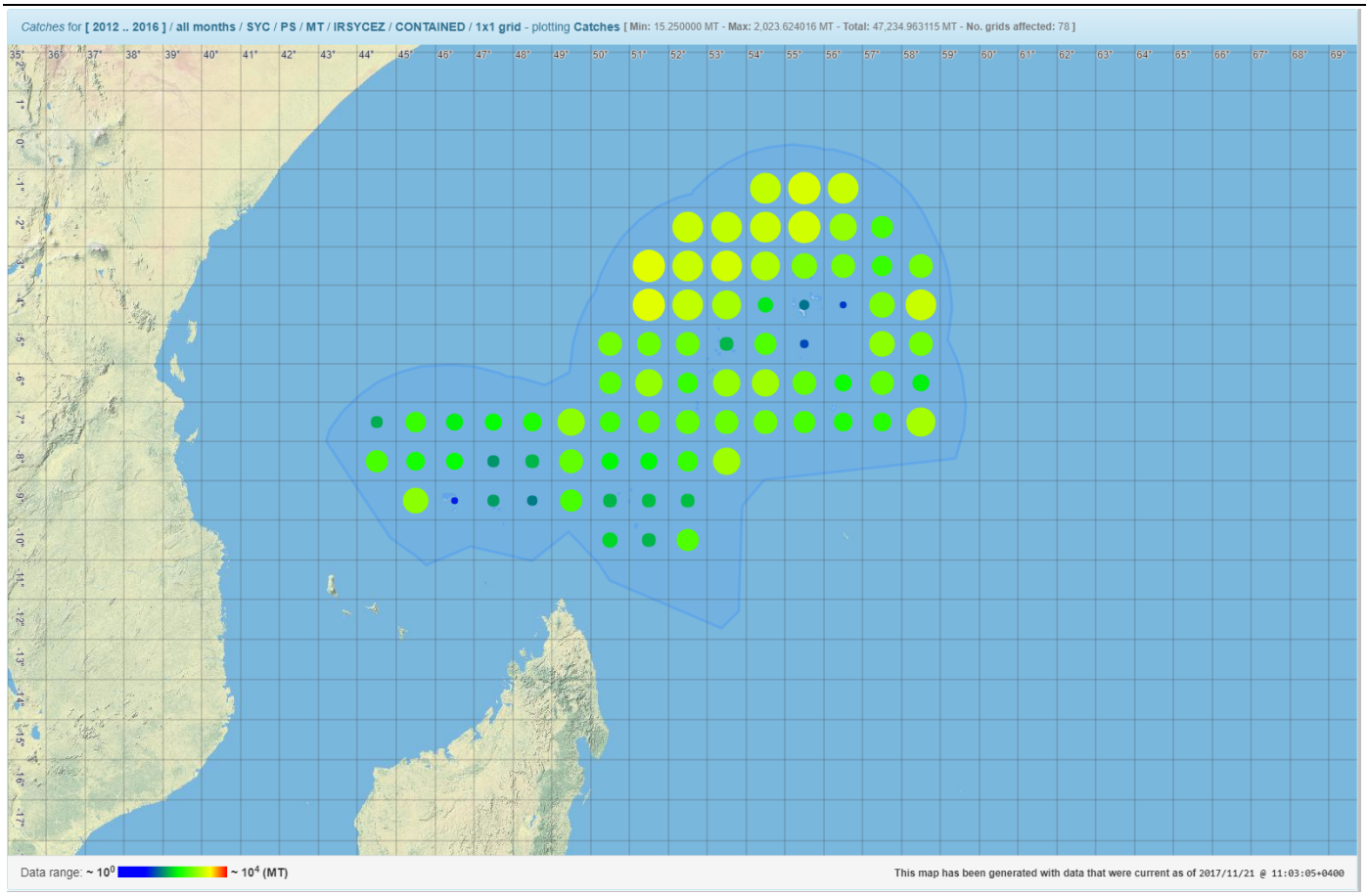


Fig 2. Seychelles purse-seiners catches (2012-2016) assigned to IOTC grids fully within Seychelles EEZ (EEZ_CATCH_LOW). Colours indicate the magnitude of catches.

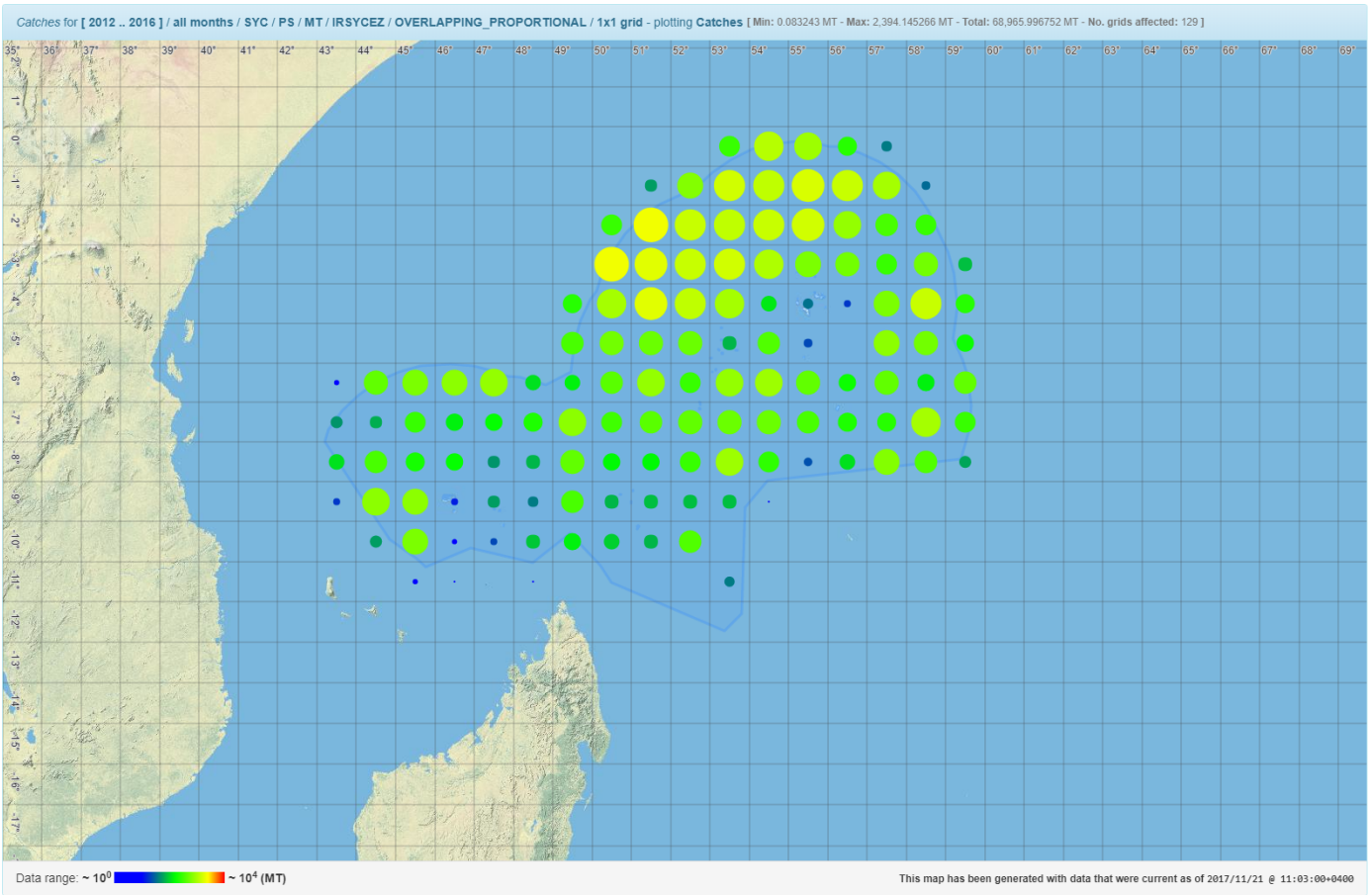


Fig 3a. Seychelles purse seine catches (2012-2016) proportionally assigned to IOTC 1° grids fully/partially within Seychelles EEZ (EEZ_CATCH_MED). Colours indicate the magnitude of catches.

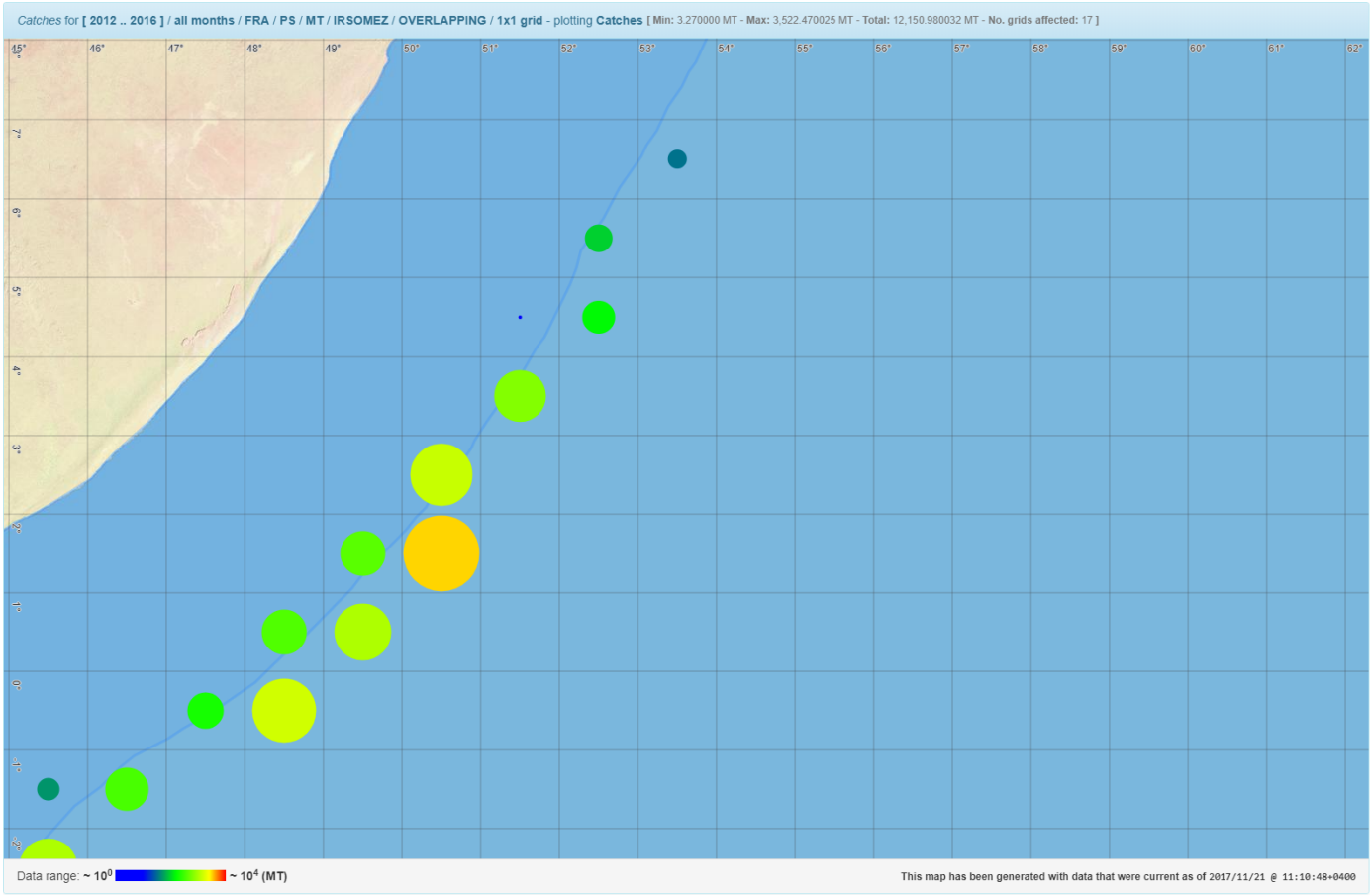


Fig 3b. French purse-seiners catches (2012-2016) proportionally assigned to IOTC 1° grids partially overlapping with Somalia EEZ (EEZ_CATCH_MED). Colours indicate the magnitude of catches.

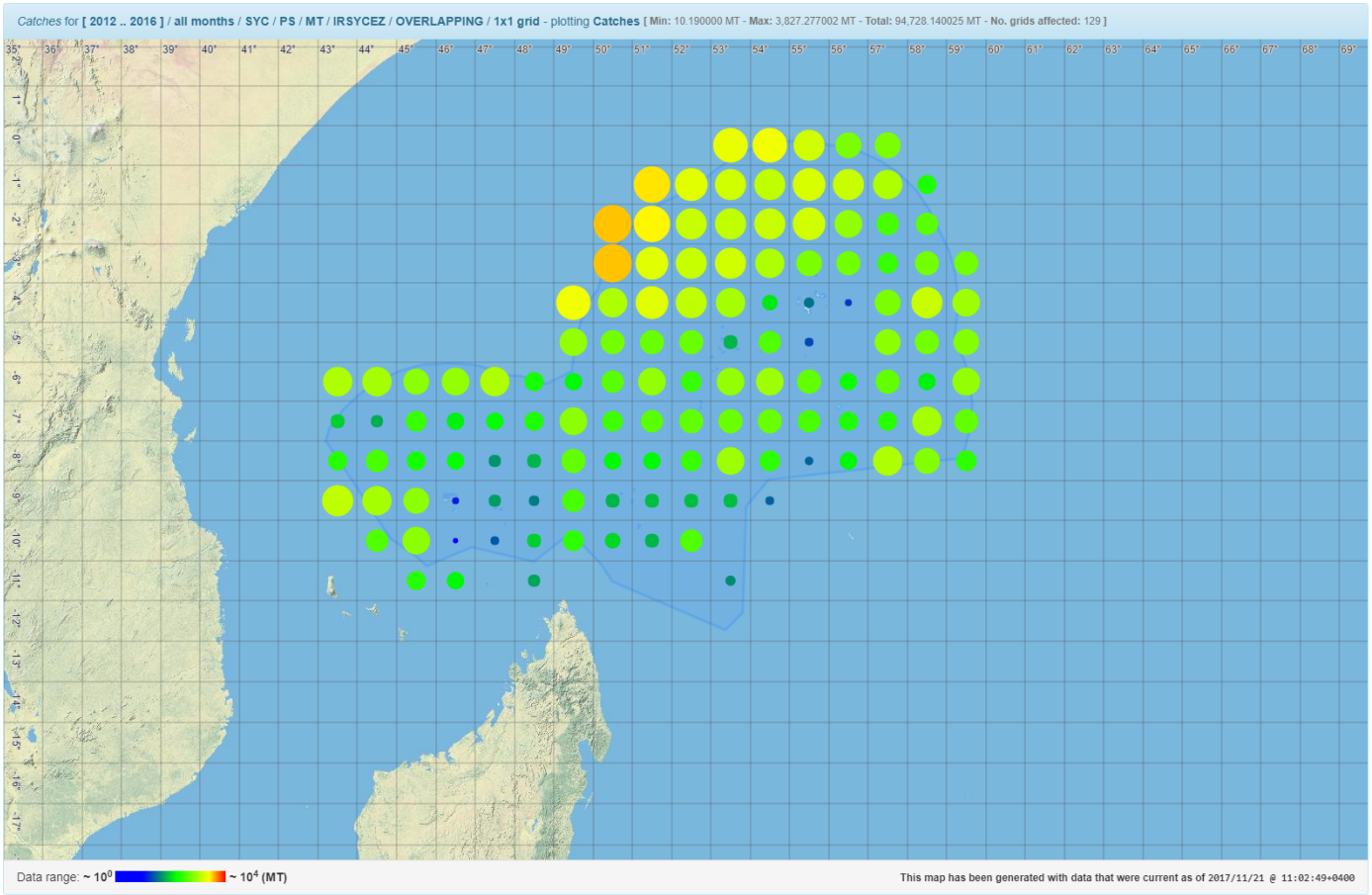


Fig 4. Seychelles purse-seiners catches (2012-2016) completely assigned to 1° grids fully or partially within Seychelles EEZ (EEZ_CATCH_HIGH). Colours indicate the magnitude of catches.

LIMITATIONS OF THE CURRENT METHODOLOGY

The following issues are highlighted for the attention of the WPDCS that are considered to fundamentally affect the reliability of IOTC catch estimates within EEZ areas:

1. Reliability of IOTC artisanal catch estimates

   Artisanal fisheries account for over 60% of total catches of all IOTC species in Indian Ocean, with the majority of catches occurring within EEZ areas. However, the quality and coverage of data reported for artisanal catches are highly variable between developing coastal states, given the difficulties and costs required to monitor small-scale fisheries.

   In many cases the sampling of coastal fisheries (and associated raising to total catches) may not take into account all vessels or landing sites, particularly in the absence of a comprehensive vessel census and the logistical difficulties monitoring small-scale subsistence landings. Consequently, nominal catches in the IOTC database may underestimate actual catches occurring in coastal waters, although it is difficult to estimate the degree of under-reporting which may also vary between one coastal state to another.

2. Non-reporting of time-area catches (catch-and-effort)

   Catch-and-effort in the IOTC database are highly incomplete for some fleets and time periods – notably for the gillnet fisheries of I.R. Iran, Pakistan and Sri Lanka, which are known to operate in both coastal and offshore waters.

   At present, due to non-reporting or the lack of georeferenced catch-and-effort[4], all catches from gillnet vessels - including the proportion of offshore gillnet vessels estimated by the Secretariat – are assigned as coastal catches (**Fig.5**).

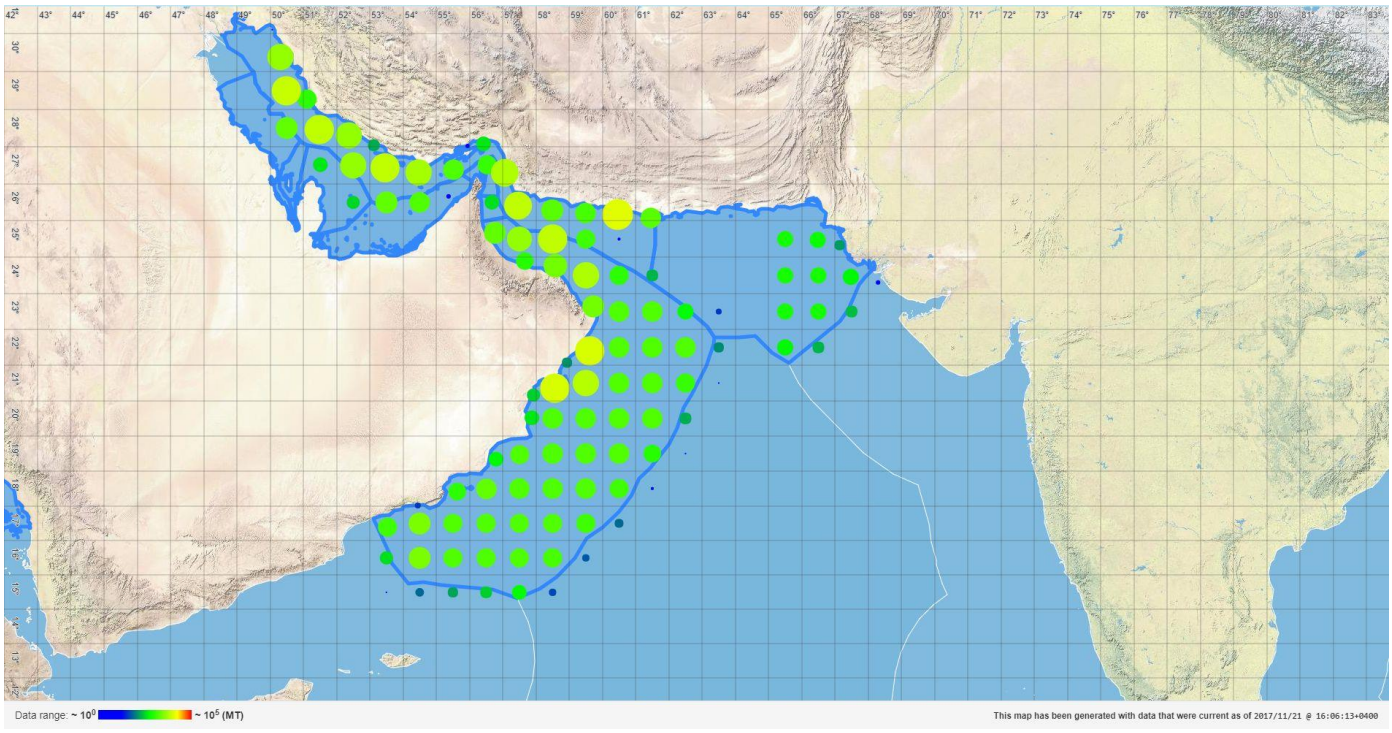


Fig 5. Map showing the distribution of gillnet catch-and-effort for I.R. Iran, Oman and Pakistan, 1990-2015. EEZs denoted by blue boundaries.

Estimating time-area catches for strata for which there are no reported catch-and-effort data can be highly problematic. The current approach by the IOTC Secretariat is to apply a substitution scheme using proxy information, however choosing the most similar fleet – based on the knowledge of the fishery – can be subjective, and the final choice may not always be the most obvious.

The quality of time-area catches estimated using proxy information can also be highly variable depending on the level of substitution required. In many cases, alternative information that could be used for substitution may be

[4] For example, I.R. Iran, which since 1996 has been reporting catch-and-effort by landing site only.

very limited, so that estimates of time-area catches are based on broad spatial areas or aggregations of fleets or fisheries, which reduces the reliability of estimates – particularly when calculating catches by precise areas such as EEZs.

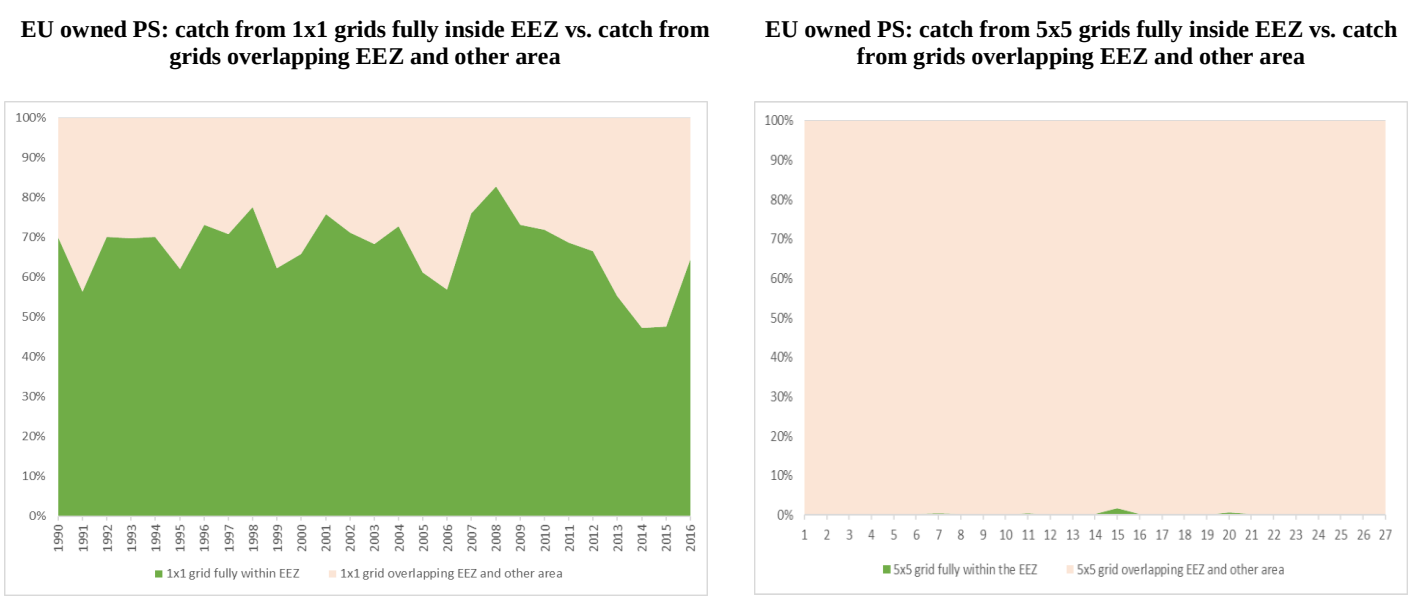
3. Overlap between IOTC time-area catches and EEZ boundaries.

IOTC EEZ estimates are limited by catch-and-effort data reported at a minimum of 1° and 5° grids that – especially in the case of 5° grid areas – are too broad a level to accurately estimate catches within/outside EEZs from the data alone. Generally speaking, the greater the proportion of areas intersected by EEZ areas, the larger the uncertainty in allocating catches within EEZ areas.

Appendix II shows the proportion of 1° and 5° grid areas which fall fully within the boundaries of individual EEZs.

In terms of the distribution of catches occurring in areas overlapping EEZ boundaries, **Fig.6** shows the proportion of EU purse seine catches that are recorded in grid areas falling fully within EEZ or high seas areas. Between 60% – 85% of catches are recorded in 1° square grids that fall fully within individual EEZ/high seas areas, while only 0% – 5% of catches are recorded on 5° square grids that fall fully within individual EEZ areas. This means that, for example, estimating longline catches (usually reported by 5° grids) in the EEZ will be much less precise that purse seine catches in the EEZs.

Fig 6. Proportion of catches occurring fully within in 1° and 5° grid areas of EEZ/high seas boundaries.



4. Raised catch-and-effort

Some industrial fleets (e.g., EU purse seiners or Japanese longliners) provide the IOTC Secretariat directly with raised catch-and-effort, but not the original (unraised) catches as derived from logbooks, or information on logbook coverage, which can create difficulties when assessing the precision of these estimates.

5. EEZ catch estimation methods

Three methods of allocating catches by EEZ area were introduced in the previous section – none of which are considered to be optimal, and are limited by the data available to the IOTC Secretariat – and which in some cases provide a wide range in catches estimates by EEZ area depending on the choice of method (Table 1).

Table 1 shows a list of selected EEZs with the greatest differences in catch estimates, for 2012-2015. In the case of Seychelles, the differences between the lower and upper bounds are almost 50,000 t; while Somalia EEZ catch estimates range from as little as ≈200 t up to over 38,000 t. **Appendix I** contains a complete list of IOTC catches by EEZ area for the same period.

Table 1. Average catches (2012-2015) by selected EEZ area and method.

Area	EEZ_catch_LOW	EEZ_catch_MED	EEZ_catch_HIGH	Range (HIGH - LOW)
Seychelles EEZ	33,317	61,153	82,829	49,512
Somalia EEZ (non-shared part)	209	8,985	38,257	38,048
Oman EEZ	8,967	28,695	41,247	32,279
Iran EEZ	24,630	28,442	56,862	32,232
France OT EEZ	1,836	9,059	27,529	25,693
India EEZ	56,889	64,093	77,703	20,814
Mauritius EEZ	2,376	9,269	23,109	20,734
Madagascar EEZ	6,492	13,804	23,097	16,605
Pakistan EEZ	13,103	19,524	29,690	16,587

CONCLUSIONS

While the IOTC Secretariat is able, in principal, to approximate catches within EEZ areas from the IOTC database, the catch estimates are considered to be ***highly uncertain***, due to:

i. Limitations in the spatial detail of time-area catches provided by CPCs (i.e., catches reported by 1° or 5° spatial resolution).
ii. Gaps in mandatory data reported by CPCs to the IOTC Secretariat (particularly catch-and-effort) for certain fleets and fisheries, over time;
iii. Alternative methods of allocating catches within EEZ areas, which in some cases can produce substantially different estimates within individual EEZ areas depending on the method of allocation used.

However future EEZ catch estimates can, and should improve, principally through improvements in data reporting by CPCs and the availability of alternative data sources.

The following issues are highlighted as a matter of priority for consideration of the WPDCS:

- That all CPCs to collect and report catch-and-effort data in accordance with IOTC Resolution 15/02 data reporting requirements, to ensure time-area catches are as complete and detailed as possible to ensure as accurate estimates of EEZ catches – within the spatial limits feasible using nominal catches and catch-and-effort.
- Implementation of improvements to the data collection systems, particularly for artisanal fisheries and port-based observer programs, to improve the accuracy of total catch estimates within coastal waters.
- Ensure compliance with Resolution 14/05, that countries to compile a licensing history of each EEZ, to improve understanding of the number of active fishing vessels operating in coastal waters over time.

RECOMMENDATION/S

That the WPDCS **NOTE** the report by the IOTC Secretariat on the availability, and levels of uncertainty, in catch estimates by EEZ area derived from the IOTC database.

Appendix I: 2012-2015 Average catches (t), by EEZ, by method of allocation. Range of EEZ catch estimates indicates the difference in catch estimates between EEZ_catch_HIGH and EEZ_catch_LOW.

Area	EEZ_catch_LOW	EEZ_catch_MED	EEZ_catch_HIGH	Range (HIGH - LOW)
Australia EEZ	31	1,670	5,995	5,964
Bangladesh EEZ	0	47	1,661	1,661
BIOT EEZ	89	1,494	9,610	9,521
Comoros EEZ	6,192	8,838	14,305	8,114
France OT EEZ	1,836	9,059	27,529	25,693
India EEZ	56,889	64,093	77,703	20,814
Indonesia EEZ	122,255	124,090	127,903	5,649
Iran EEZ	24,630	28,442	56,862	32,232
Kenia EEZ (non-shared part)	1,395	3,750	5,675	4,281
Madagascar EEZ	6,492	13,804	23,097	16,605
Malaysia EEZ	36	68	328	292
Maldives EEZ	116,416	117,486	127,430	11,014
Mauritius EEZ	2,376	9,269	23,109	20,734
Mozambique EEZ	917	4,700	9,792	8,875
Myanmar EEZ	0	2,213	9,019	9,019
Oman EEZ	8,967	28,695	41,247	32,279
Pakistan EEZ	13,103	19,524	29,690	16,587
Qatar EEZ	0	1,414	15,960	15,960
Réunion (EU-France) EEZ	411	1,920	6,147	5,736
Saudi Arabia EEZ	0	435	15,960	15,960
Seychelles EEZ	33,317	61,153	82,829	49,512
Somalia EEZ (non-shared part)	209	8,985	38,257	38,048
Somalia-Kenia shared EEZ	45	1,410	4,285	4,240
Somalia-Yemen shared EEZ	0	28	952	952
South Africa EEZ	8	1,166	6,458	6,450
Sri Lanka EEZ	88,378	89,735	94,173	5,795
Tanzania EEZ	5,626	8,333	13,581	7,955
Thailand EEZ	0	140	292	292
Timor-Leste EEZ	3	3	3	0
United Arab EEZ	0	13,905	15,960	15,960
Yemen EEZ (non-shared part)	31,495	31,990	36,543	5,048
Indian Ocean High Seas Area	229,133	317,105	384,941	155,808

Appendix II (a.) Proportion of 1° degree grids overlapping with any EEZ that are fully contained within the same EEZ boundaries.

Area	No. overlapping 1° grids	No. fully contained 1° grids	% 1° grids fully within EEZ
Australia EEZ	618	434	70.23%
Bahrain EEZ	5	0	0.00%
Bangladesh EEZ	15	7	46.67%
Comoros EEZ	24	4	16.67%
Djibouti EEZ	4	1	25.00%
Egypt EEZ	23	11	47.83%
Eritrea EEZ	19	7	36.84%
India EEZ	276	174	63.04%
Indonesia EEZ	228	143	62.72%
Iran (Islamic Republic of) EEZ	40	14	35.00%
Kenya EEZ	16	5	31.25%
Kuwait EEZ	6	1	16.67%
Madagascar EEZ	157	94	59.87%
Malaysia EEZ	15	4	26.67%
Maldives EEZ	95	55	57.89%
Mauritius EEZ	145	79	54.48%
Mozambique EEZ	80	45	56.25%
Oman EEZ	74	40	54.05%
Pakistan EEZ	32	18	56.25%
Qatar EEZ	11	1	9.09%
Saudi Arabia EEZ	51	21	41.18%
Seychelles EEZ	137	79	57.66%
Somalia EEZ	107	63	58.88%
South Africa EEZ	170	106	62.35%
Sri Lanka EEZ	68	34	50.00%
Sudan EEZ	11	3	27.27%
Tanzania (United Republic of) EEZ	35	21	60.00%
Thailand EEZ	20	6	30.00%
Timor-Leste EEZ	12	0	0.00%
United Arab Emirates EEZ	16	4	25.00%
Yemen EEZ	64	24	37.50%

Appendix II (b.) Proportion of 5° degree grids overlapping with any EEZ that are fully contained within the same EEZ boundaries.

Area	No. overlapping 5° grids	No. fully contained 5° grids	% 5° grids fully within EEZ
Australia EEZ	47	11	23.40%
Bahrain EEZ	1	0	0.00%
Bangladesh EEZ	4	0	0.00%
Comoros EEZ	3	0	0.00%
Djibouti EEZ	1	0	0.00%
Egypt EEZ	3	0	0.00%
Eritrea EEZ	3	0	0.00%
India EEZ	23	2	8.70%
Indonesia EEZ	20	3	15.00%
Iran (Islamic Republic of) EEZ	8	1	12.50%
Kenya EEZ	2	0	0.00%
Kuwait EEZ	2	0	0.00%
Madagascar EEZ	12	2	16.67%
Malaysia EEZ	4	0	0.00%
Maldives EEZ	9	1	11.11%
Mauritius EEZ	11	0	0.00%
Mozambique EEZ	8	2	25.00%
Oman EEZ	8	0	0.00%
Pakistan EEZ	4	1	25.00%
Qatar EEZ	2	0	0.00%
Saudi Arabia EEZ	9	1	11.11%
Seychelles EEZ	10	0	0.00%
Somalia EEZ	10	2	20.00%
South Africa EEZ	16	2	12.50%
Sri Lanka EEZ	7	0	0.00%
Sudan EEZ	2	0	0.00%
Tanzania (United Republic of) EEZ	6	2	33.33%
Thailand EEZ	2	0	0.00%
Timor-Leste EEZ	3	0	0.00%
United Arab Emirates EEZ	3	0	0.00%
Yemen EEZ	8	0	0.00%