FEEDBACK ON THE PROPOSED UPDATES TO TROPICAL TUNA SPECIES EXECUTIVE SUMMARIES

PREPARED BY: IOTC SECRETARIAT[1], 21ST NOVEMBER 2017

PURPOSE

To provide the Working Party on Data Collection and Statistics (WPDCS) with feedback from the IOTC Secretariat on the proposed updates to tropical tuna species executive summaries (as presented during the WPTT19 meeting) and identify the most appropriate updates or additions to incorporate in future Executive Summaries.

BACKGROUND

During the 19th session of the Working Party on Tropical Tuna (WPTT19) held in Seychelles, October 2017, document IOTC-2017-WPTT19-23 ("*Proposals to revisions to the IOTC Tropical Tuna Executive Summaries*" by F. Marsac and A. Fonteneau) proposed a number of alternative (or additional) figures and information in relation to the tropical tunas Executive Summaries (supplementary information), during which the WPTT:

> *"*...**NOTED** the discussions following the presentation by the author, however, no consensus could be agreed on the proposals for the addition of new charts or changes to the existing format of the existing Executive Summaries (supplementary information). The WPTT **REQUESTED** that the proposed changes to the figures be discussed at the next session of the WPDCS to be considered by the SC prior to inclusion into the supplementary information to the Executive Summaries posted on the IOTC website.*"* (para. 82, WPTT19 Report)

The IOTC Secretariat, and participants of the WPTT, have already provided feedback on a number of the suggested changes to the Executive Summaries, **NOTING** in particular that many of the proposals are based on the *raised catch at size*, a data set that the IOTC Secretariat derives from officially reported data using different estimation techniques, including the adoption of *proxies fleets/strata* to account for missing information in the catch-and-effort and size-frequency data sets.

While the same highly estimated *raised catches* are used by scientists for stock assessment purposes, these are usually complemented by additional information (e.g., standardized CPUE series) that can mitigate the uncertainty introduced by this *synthetic* data set for a number of fleets and gears.

However casual users interpreting information based on highly estimated raised catches are unlikely to be fully aware of the process behind their production, and therefore be drawn to conclusions that not necessarily reflect the reality of the (often limited) information available to the Secretariat.

Several of the proposed changes to the Executive Summaries provide an insight into possible improvements of the supplementary information complementing the Executive Summaries, which are summarised for discussion during the WPDCS meeting.

RECOMMENDATION/S

That the WPDCS:

1) **NOTE** paper IOTC–2017–WPDCS13–INFO5 which provides a summary of proposed changes to the Executive Summaries (supplementary information).
2) **CONSIDER** the initial feedback and comments from the IOTC Secretariat (as detailed below) and **AGREE** on the format of future Executive Summaries (supplementary information).

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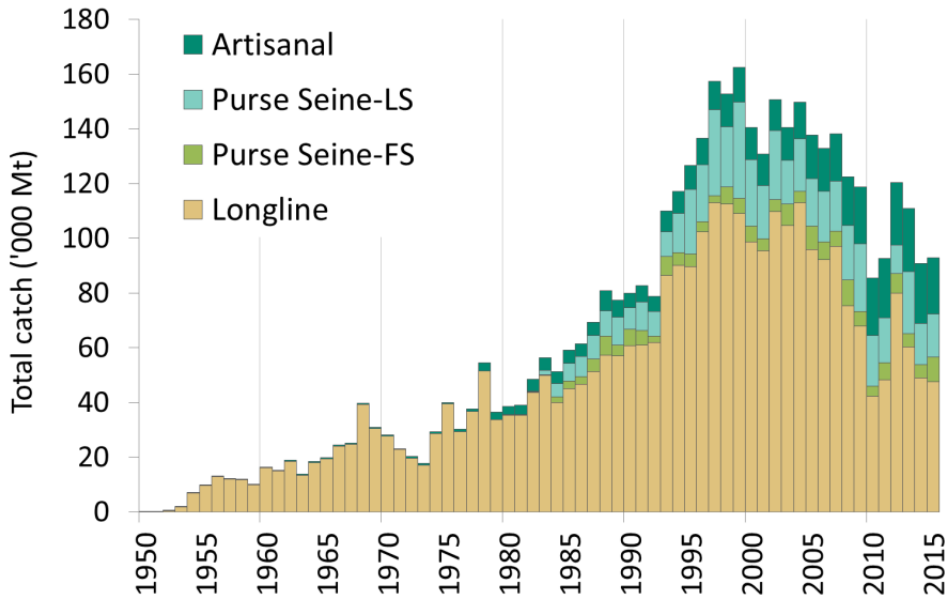
PROPOSED CHANGES COMMON TO ALL TROPICAL TUNA SPECIES

Nominal (total) catches by gear – NC01

Current

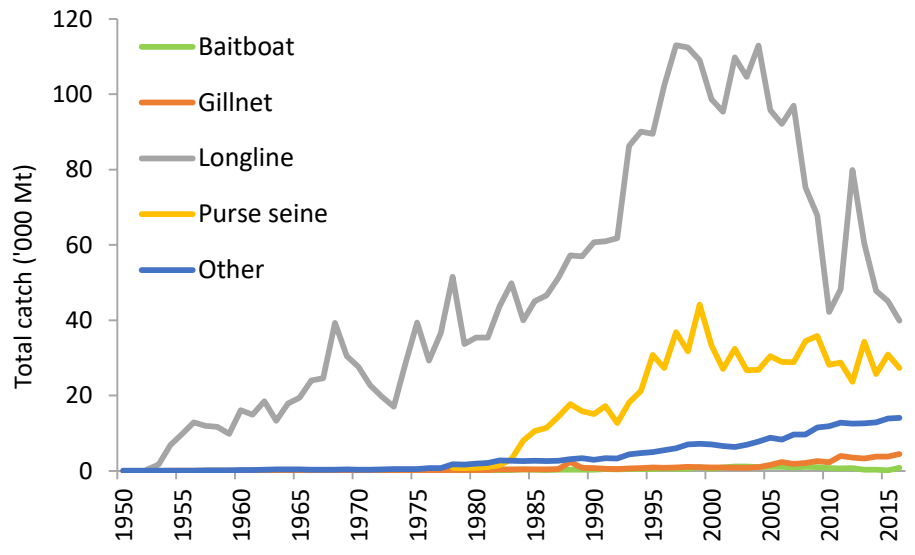


The current chart shows a breakdown of annual total catches, by main gear category. As such, it serves the double purpose of providing details about the extent of yearly catches and their composition in terms of catches by gears.

Pros: overall catch trends are evident, as is the relative contribution of each gear

Cons: it is difficult to compare – for the same year or across different years – the relative extent of catches recorded by different gears.

Proposed

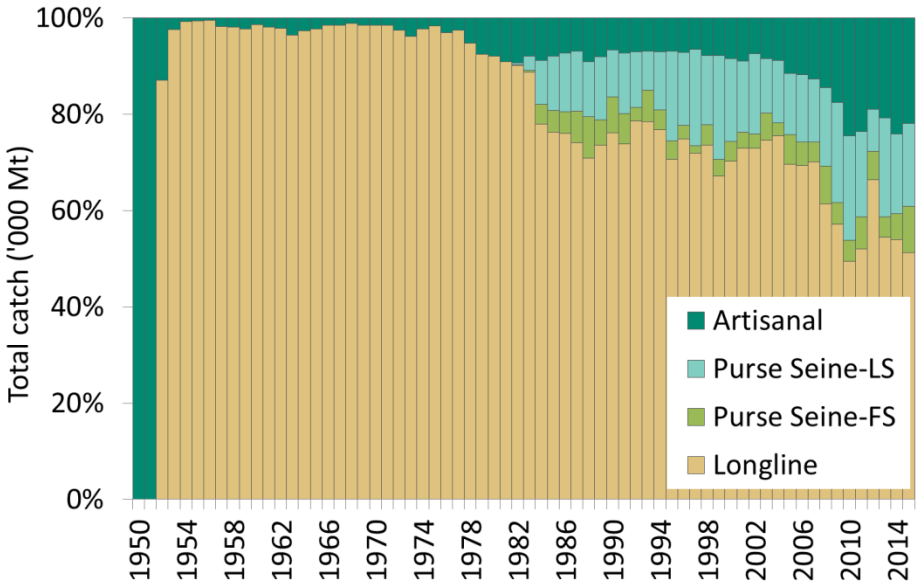


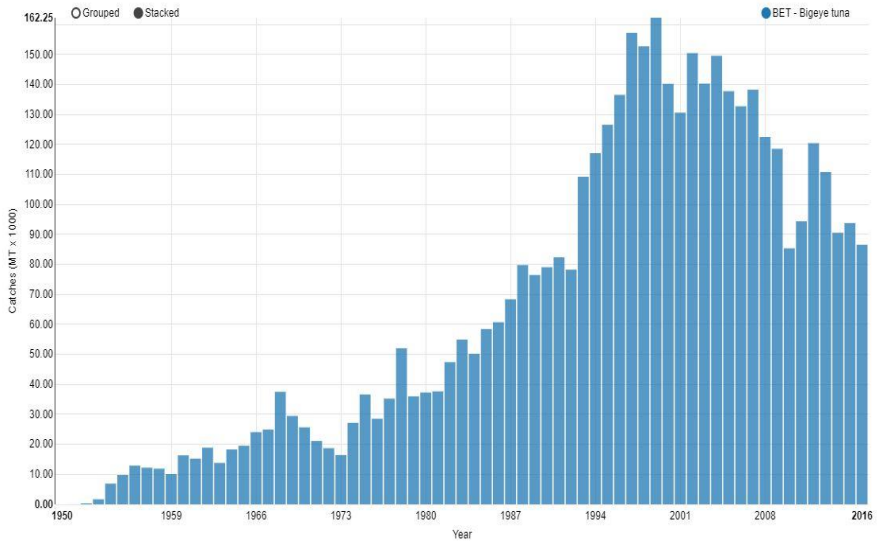
Proposed chart shows the absolute catches by year for a number of gears and gear categories. While enabling an immediate comparison of catches-by-gear over years, it does not clearly show the total amount of catches by year.

Pros: catches by gear over time, for a given gear, can be immediately compared

Cons: Total catches by year are not evident from the chart alone.

Comment / proposal by the IOTC Secretariat





It might also be considered to replace current single chart with a combination of two different charts: one showing the relative catches by gear / gear category as their fraction over yearly total catches and another showing the total catches by year (no gear / gear category breakdown).

The total yearly catch chart can also be presented as a line chart superimposed to the relative catches by gear and year.

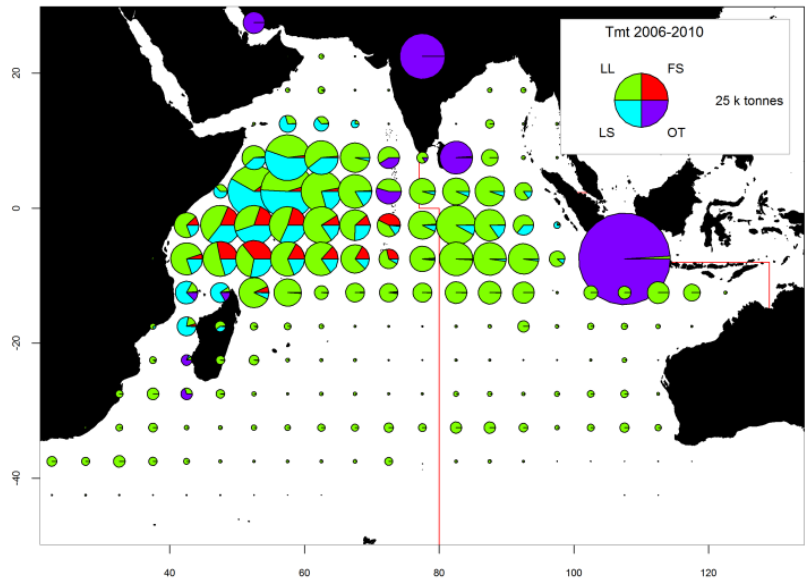
In any case, the WPDCS should agree about the list of gears / gear categories to be considered in the nominal catches breakdown for each tropical tuna species.

Currently, we are considering, by species:

- **Bigeye tuna**
  - *Artisanal*
  - *Purse Seine LS*
  - *Purse Seine FS*
  - *Longline*
- **Skipjack tuna**
  - *Purse Seine FS*
  - *Purse Seine LS*
  - *Gillnet*
  - *Pole-and-line*
  - *Others*
- **Yellowfin tuna**
  - *Purse Seine LS*
  - *Purse Seine FS*
  - *Gillnet*
  - *Longline (LL & FL)*
  - *Other*

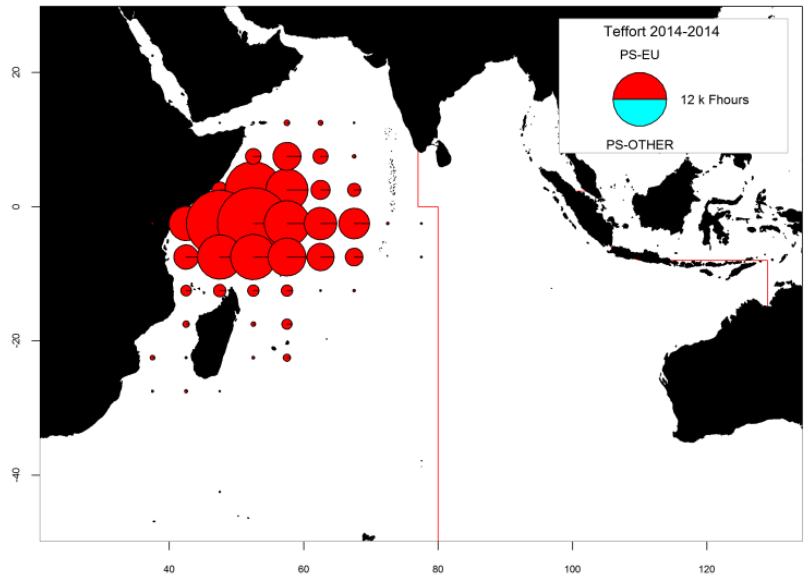
The IOTC Secretariat calls the WPDCS audience for feedback and suggestion on the charts to adopt.

Catch-and-effort spatial / temporal distribution – CE01

Current	
	The current data document has maps by decade (1950s, 1960s, 1970s, 1980s, 1990s, 2000s) then for the years during the "*piracy period*" (2007-2011) and the last 5 years of data which are mostly post-piracy now – so there is no real advantage of showing single years here, other than to provide better detail for recent catches and efforts.
Proposed	
"*6 maps for 1952-1979; 1980-2005; 2006-2010; 2011-2014; 2015; and last year reported in the dataset (e.g. 2016). This series would better depict the historical development (similar to the ICCAT report). Maps would use the same design (by gear) as the current set of maps.*"	The proposed choice of time periods is unclear (1980-2005 to account for the arrival / development of PS fleets?). The only reason to show charts for single years is due to events such as piracy – which had a very dramatic and very rapid effect on changes in LL & PS fishing effort. Aggregating the data as 2006-2010, and 2011-2014, would basically lose that information.
Comment / proposal by the IOTC Secretariat	
None in particular, if not requesting the audience to provide feedback to identify the most suitable time periods to display. **The IOTC Secretariat calls the WPDCS audience for feedback and suggestion on these charts.**	

Catch-and-effort spatial / temporal effort distribution for PS – CE02

Current



Current PS efforts are represented as pie charts with sizes proportional to the total effort and separate slices for the EU and assimilated fleets vs. all other PS fleets.

This data is based on the reported effort (i.e. not raised to total efforts)

Pros: Relatively easy to produce (does not require any preliminary step or estimation), although not overly aesthetically pleasing.

Cons: The size of the pie charts (proportional to catches) can at times hide information for certain grids. Resolution (5x5 degrees grids) is sub-optimal, as PS should provide data as 1x1 degrees grids.

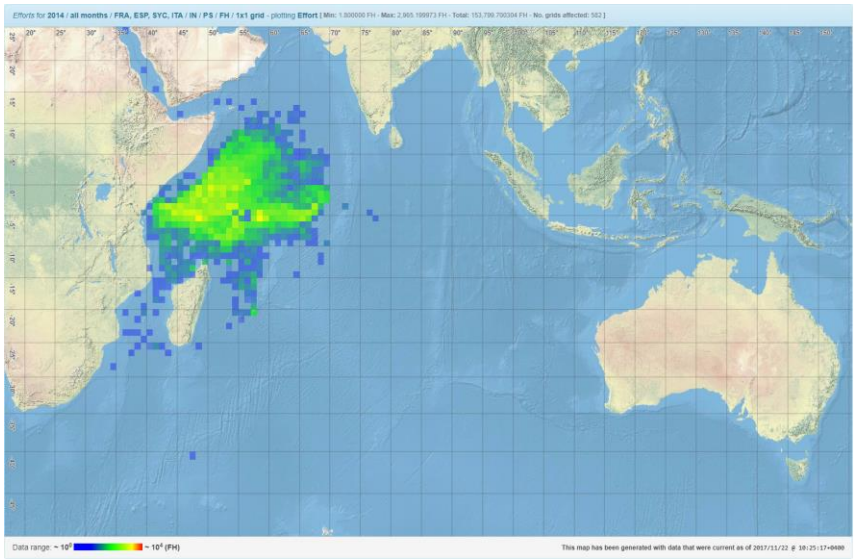
Proposed

The PS effort should be represented by 1° square instead of 5°

Pros: Increased resolution of catches by area.

Cons: the variable size of the pie charts can at times hide information for certain areas, and this could be even more pronounced if 1x1 degrees grids are adopted.

Comment / proposal by the IOTC Secretariat



Produce the chart as 1x1 degrees grids, using colour codes to display effort intensity (no more overlapping pie charts) and providing two separate charts, one for PS EU and one for PS Other.

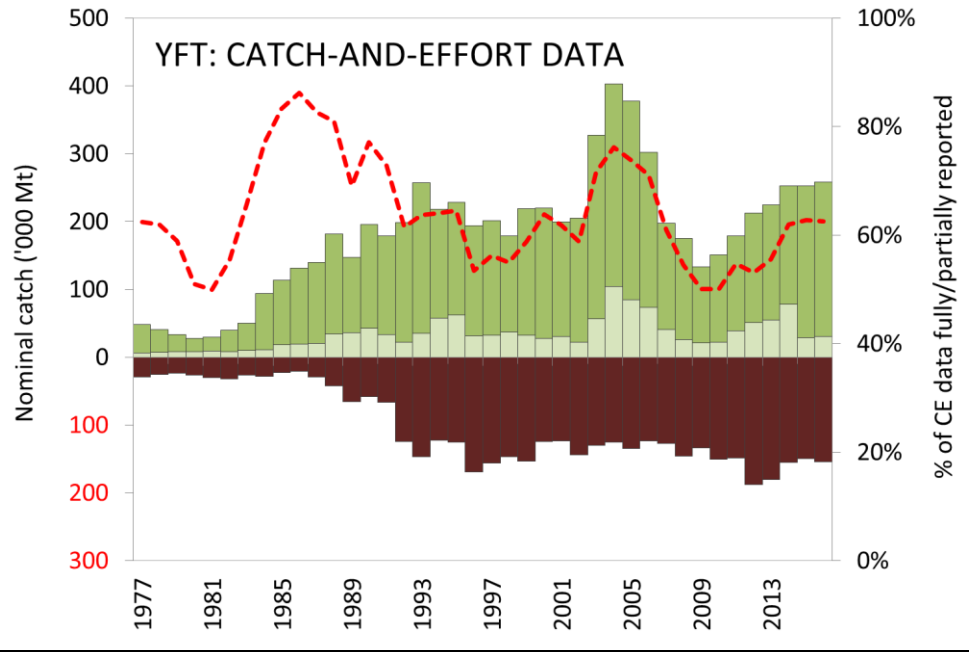
Pros: Easy to produce, colour coding (heatmap) conveys information better;

Cons: In principle, two separate charts should be produced for each year: one for EU PS and one for other PS. In reality, considering *fishing hours* as the effort measure, there are not that many years in which efforts for other PS fleets than EU have been recorded.

The IOTC Secretariat calls the WPDCS audience for feedback and suggestion on the charts to adopt.

Catch-and-effort coverage – CE03

Current



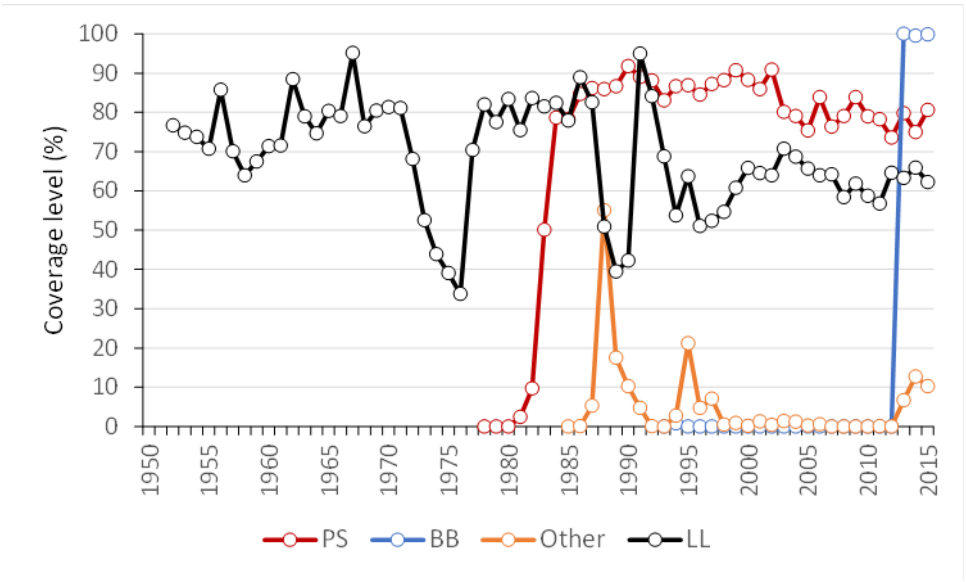
The IOTC Secretariat provides a number of charts (one for each data set, including catch-and-effort) showing the reporting coverage level in terms of IOTC data reporting standards.

The amount and proportion of reported catches is expressed as a percentage of total nominal catches by year.

Pros: Accounts for situations (e.g. Taiwan, China catch-and-effort) in which the reported catches are higher than the nominal catches for the same strata (overestimated)

Cons: Does not express the quality of the catch-and-effort data, and does not provides details of gears / fishery

Proposed



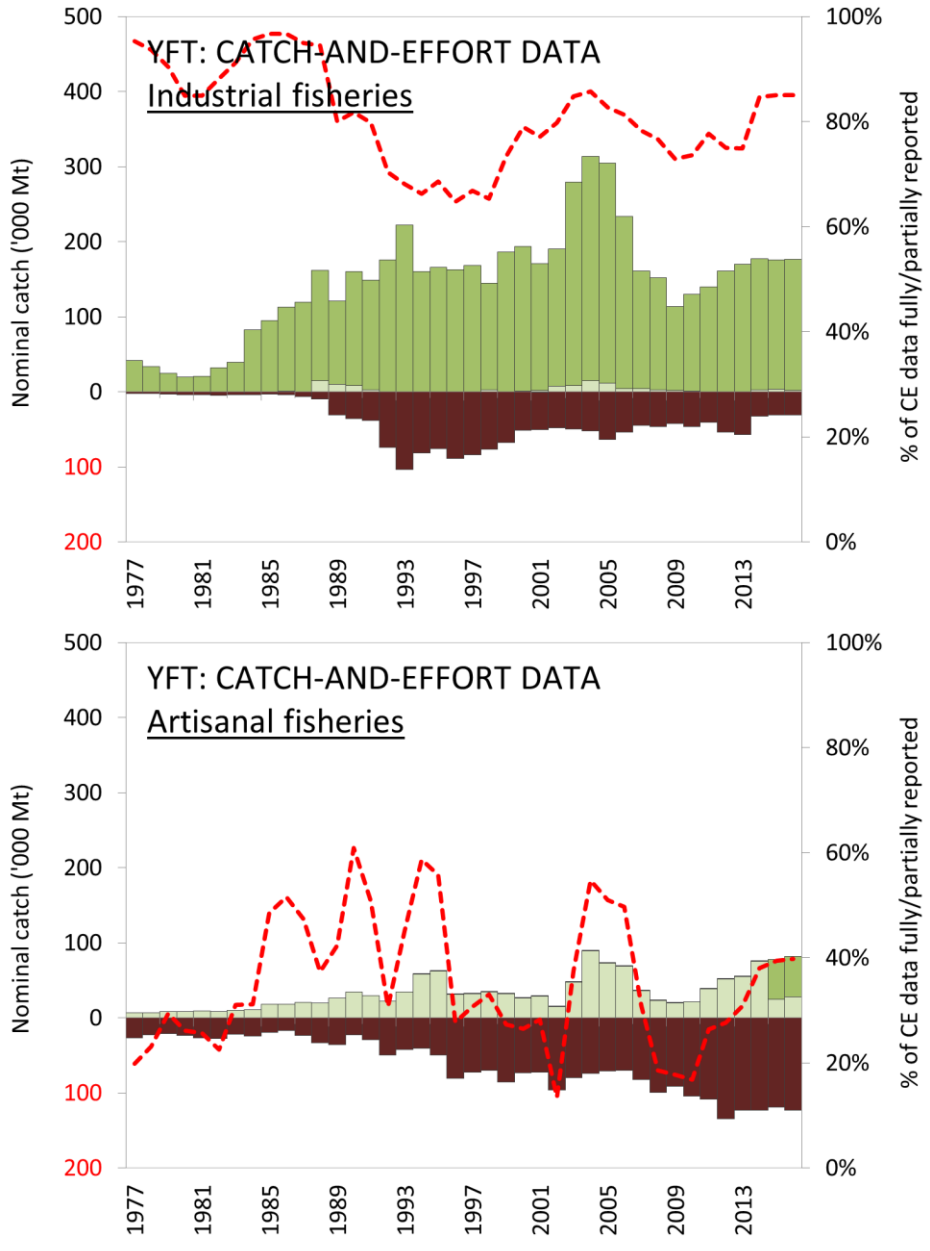
Proposed chart measures the coverage of catch-and-effort by gear in terms of the covered fraction (weight) of nominal catches for the corresponding strata.

Pros: the gear breakdown provides further insight in terms of the overall data quality and status.

Cons: not all fleets / gears report catch-and-effort in weight (e.g. Japan longlines) therefore it is not directly possible to determine the nominal catch coverage from the reported data.

Furthermore, some large fleets have been reporting catch-and-effort (in weight) that exceed the reported nominal catch for some years (e.g. Taiwan,China longliners). This means that for these particular fleet / gear combinations, the proposed coverage would be greater than 100% (the issue with Taiwan,China is currently being investigated and most likely linked to periods of low logbook coverage)

Comment / proposal by the IOTC Secretariat



In order to account for the advantages and avoid the issues identified with the proposed charts (in particular, the increased level of gear breakdown and the coverage identification problems for some fleet / gears) it could be considered to keep the same type of charts as currently available, but separately show the artisanal / industrial components and their coverage.

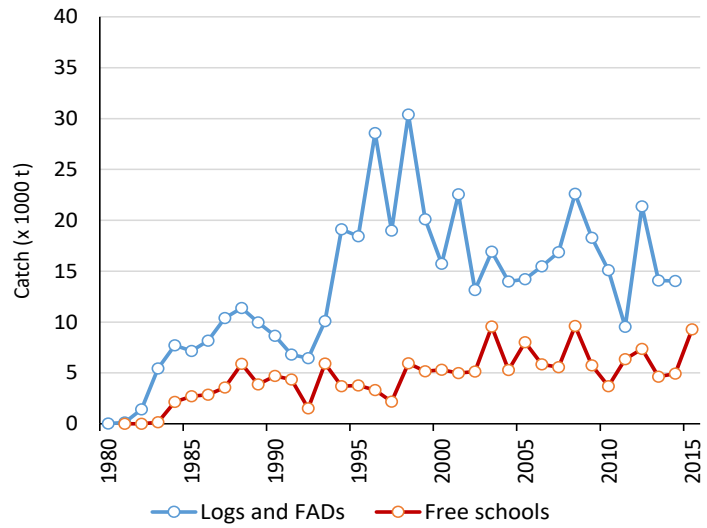
The IOTC Secretariat calls the WPDCS audience for feedback and suggestion on the charts to adopt.

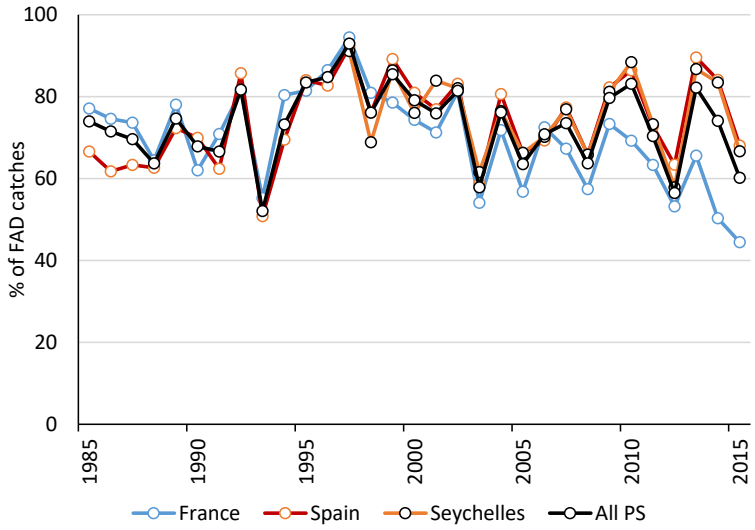
Purse seine catches by school type – CE04

Current

Overall catches by PS school type are already shown in the current nominal catches breakdown, whereas the log school fraction by year and fleet is not.

Proposed





Two charts should respectively provide details about overall catch magnitude by school type (log / free) and about the fraction of log catches over total by fleet.

Pros: Supporting users in identifying particular trends either in the absolute catch quantities by school type and in the proportion of log catches by fleet over time.

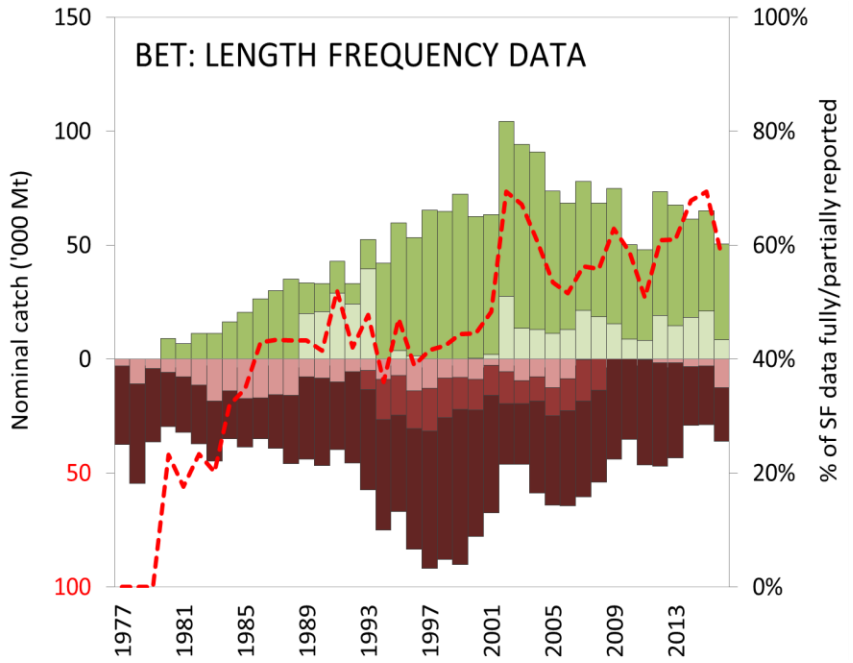
Cons: The first chart (absolute catches by school type) is redundant as the same information is basically available in the nominal catch breakdown by fishery (assuming that PS-LS and PS-FS are in the list of considered fisheries)

Comment / proposal by the IOTC Secretariat

If there is no special advice from the WPDCS audience, the IOTC Secretariat would suggest to **incorporate the proposed charts within the revised executive summary supporting information, possibly excluding the initial chart showing the overall catch magnitude by school type as this might be redundant.**

Size-frequency: available samples – SF01

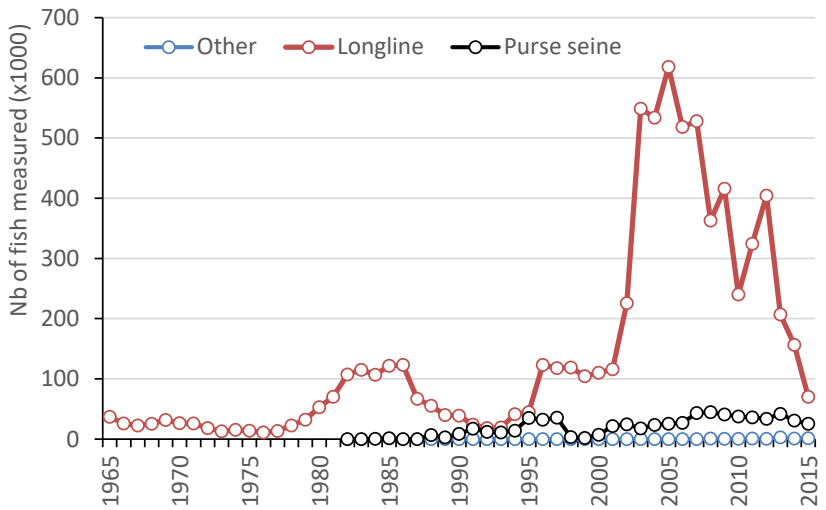
Current



No chart showing the number of available samples is currently disseminated by the IOTC Secretariat.

The closest type of information currently available is the reporting coverage level in terms of IOTC data reporting standards.

Proposed



Pros: Allows an immediate, visual comparison of the number of samples available by gear type;

Cons: While the IOTC Secretariat is informed by CPCs about whether or not their submitted size-frequency data are raised, sometimes this information is wrongly reported and therefore it might appear as if in some strata almost all fish is measured (coverage close to 100%).

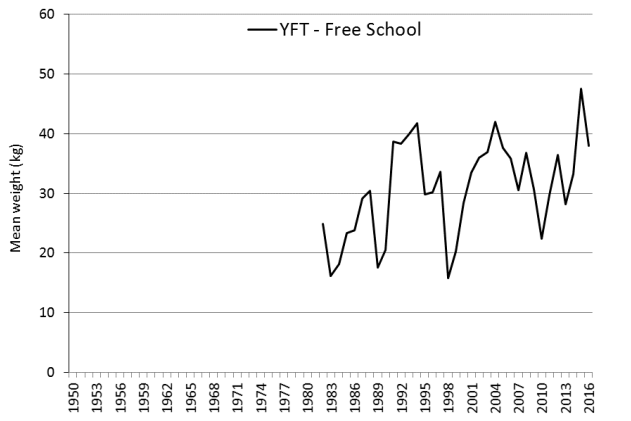
Furthermore, a number of fleet / gear combinations are known for having reported biased measurements that – for this reason – are not used for the assessment (e.g. YFT / BET samples from TWN LL in the 2000s).

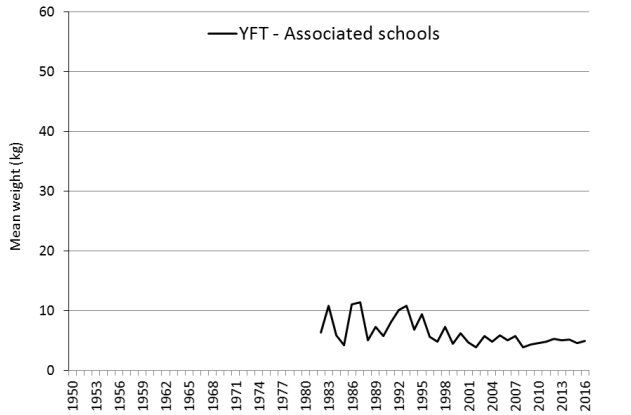
Comment / proposal by the IOTC Secretariat

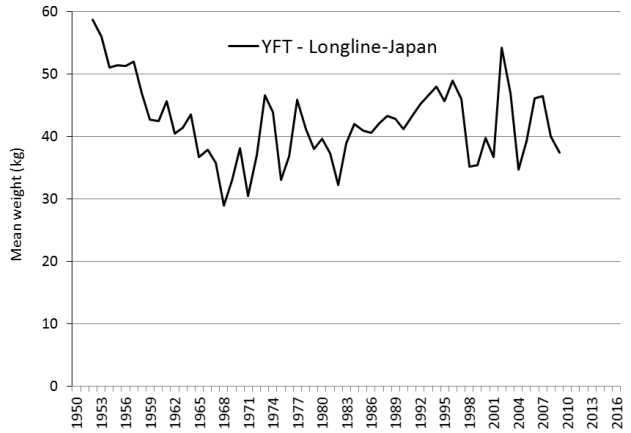
Until issues in the data quality of the submitted information are resolved with the collaboration of involved CPCs, adopting the proposed chart poses the concrete risk of disseminating information that could be used out of context, without fully knowledge of the data quality issues. For this reason, the IOTC Secretariat suggests **NOT to incorporate this chart within the revised executive summary supporting information.**

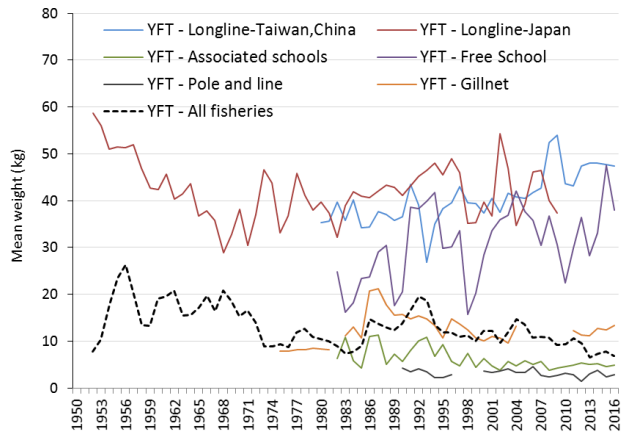
Average weights by gear – SF02

Current







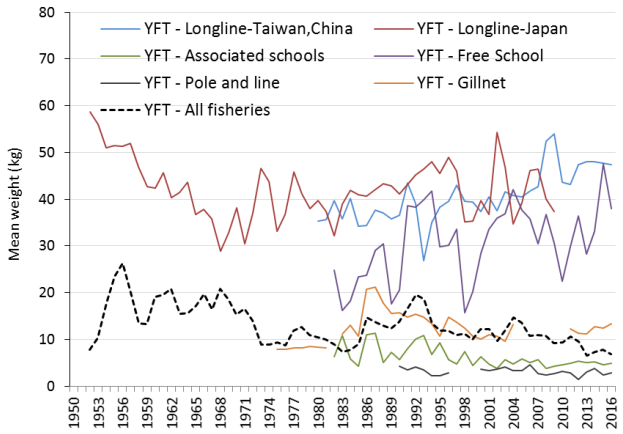


Average weights (from the raised catch at size dataset) are provide as separate charts by gear / fishery and as an overall chart with all information combined together for easier identification of trends and changes over time.

Pros: Enabling users to focus and analyze average weights for a specific gear

Cons: The **s**ame information is repeated multiple times (unnecessary redundancy)

Proposed



The advice is to remove the gear-specific average weight charts and leave only the combined one.

Pros: No loss of information; reduces redundancy

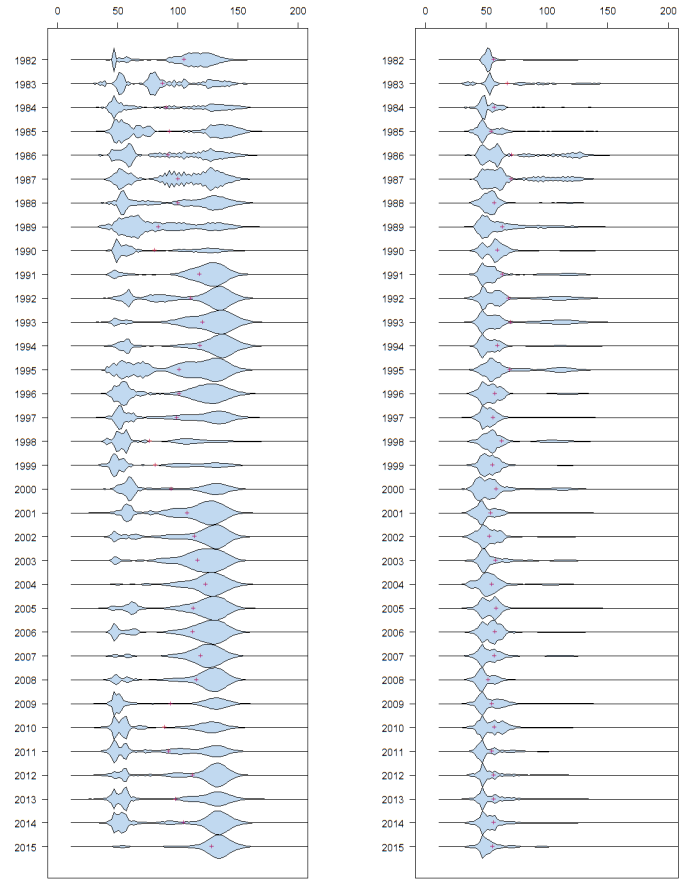
Cons: None?

Comment / proposal by the IOTC Secretariat

If there's no special advice from the WPDCS audience, the IOTC Secretariat would suggest to **incorporate the proposed chart within the revised executive summary supporting information.**

Purse seine size-frequency distribution – SF03

Current

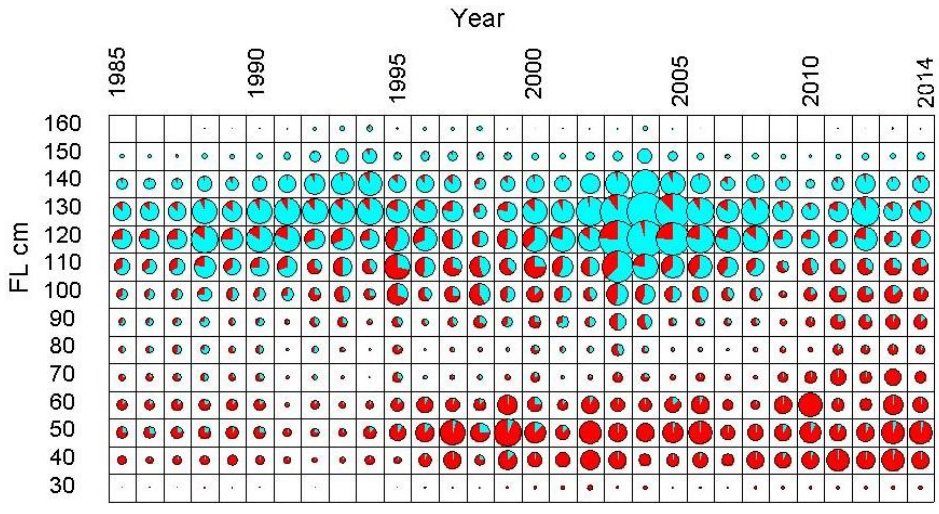


Size frequency for PS catches are currently displayed as (relative) violin plots by year and school type (*free school*, left, and *associated school*, right) showing also the average length by year and school type.

Pros: compact and easy to read representation of the required information;

Cons: as these charts show normalized size-and-frequency distribution, they do not clearly present the relative extent in terms of number of samples; furthermore, as of today, the data reported by European Union and assimilated fleets is not really *raw* but rather raised to total catches (closer in principle to a catch-at-size data set).

Proposed



A table-like, pie-chart based representation of size-frequencies for free and associated schools is proposed.

Pros: the magnitude of the samples by year and length class is shown; the format is apparently more compact as it collapses information for free and associated school types in a single chart;

Cons: less intuitive to be interpreted as it is difficult for readers to discern: the changes in overall size distribution between log-school and free-school as the two are combined, the distribution of specimens by size-class in a single school type by year when this is expressed as a proportion of each pie chart.

Comment / proposal by the IOTC Secretariat

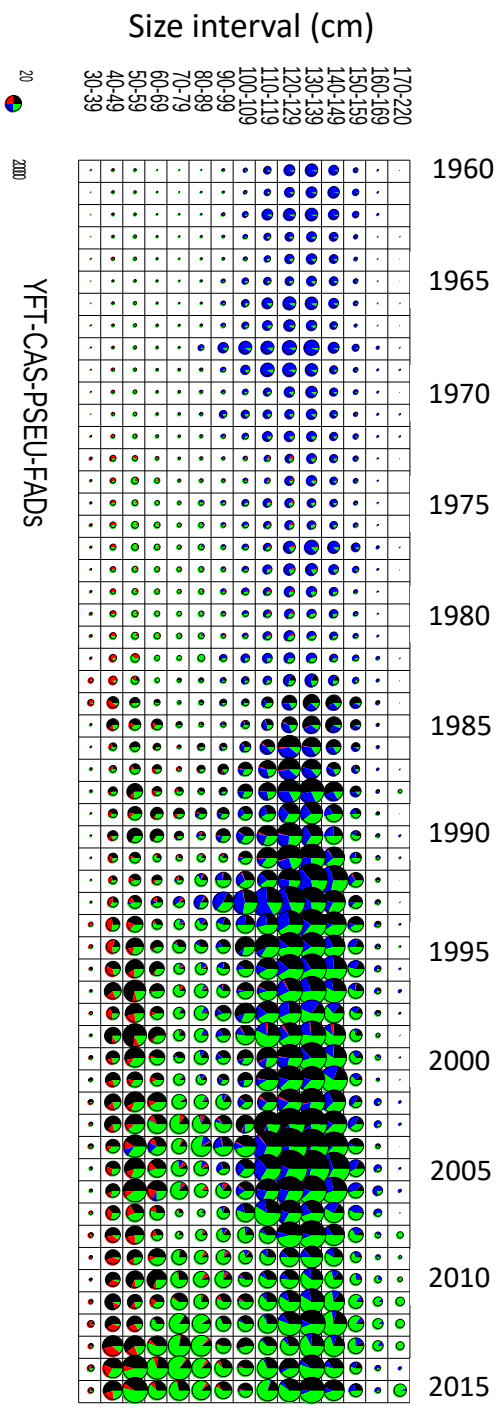
If there is no special advice from the WPDCS audience, the IOTC Secretariat would suggest to **NOT incorporate the proposed chart within the revised executive summary supporting information, noting that EU and assimilated PS fleets will provide a complete revision of their size-frequency data in order to submit real *raw* information soon (thus eliminating one of its long-standing issues).**

Distribution of catch-at-size – SF04

Current

Not available. Catch-at-size (for the five major species) are produced as a preliminary step prior to the production of the input data sets required for stock assessments. As such, the final result – especially for artisanal gears or for some known and relevant fisheries – is estimated and therefore partially uncertain.

Proposed

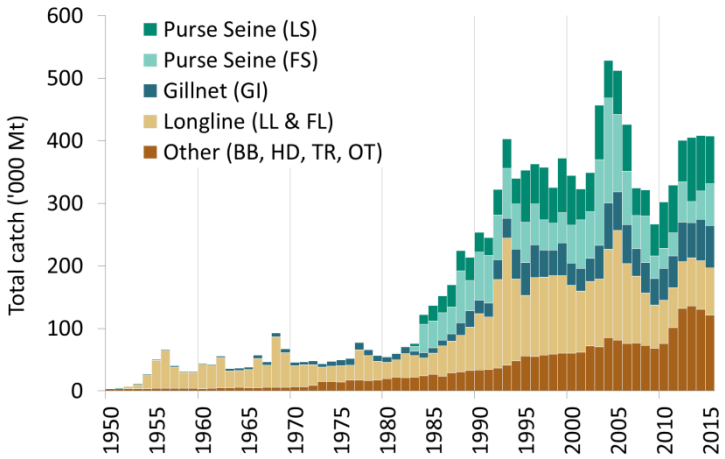


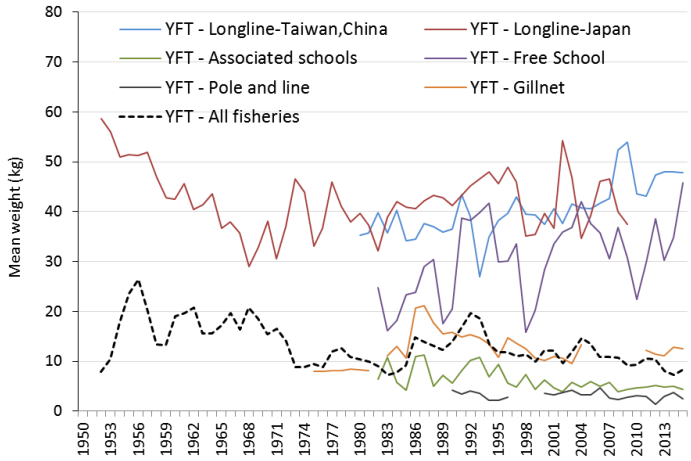
Columns are size interval (in FL - cm) while rows years. Black slices: purse seine; Red slices: pole and line; Blue slices: longline; Green slices: other gears. The pie size is proportional to the catches

Pros: Attempts to provide a general overlook of the catch-at-size data for a given species

Cons: It's not based on *reported* data and therefore it is subject to high uncertainty for some fleets and gears. It's also very difficult to interpret given the volume of information being presented and it is basically impossible to discern changes in average weight or size-distribution within individual gears

Comment / proposal by the IOTC Secretariat



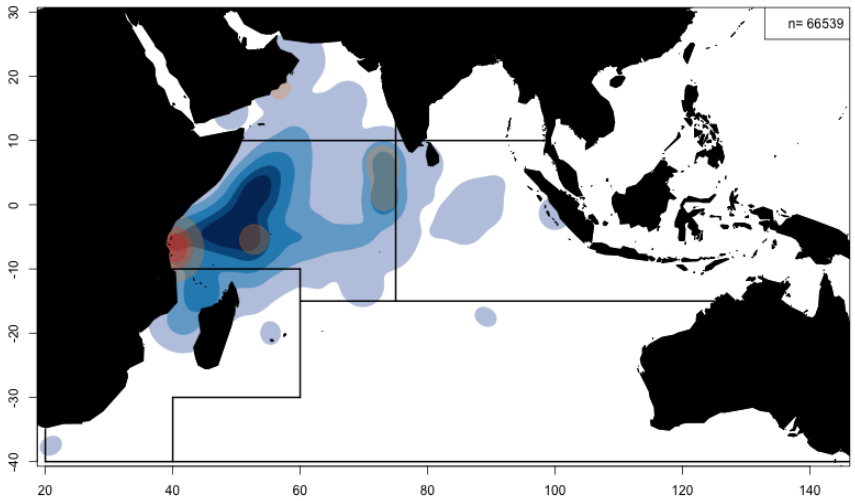


The proposed charts seem not to (easily) provide additional information than what could be inferred by the two current charts on the left (i.e. magnitude of catches and average weights by year and gear type).

The IOTC Secretariat would suggest to **NOT incorporate the proposed chart within the revised executive summary supporting information** while at the same time calling the WPDCS to provide alternative ways – if needed – of displaying the required information (taking into account the known limitation of the overall approach, based on estimated catch-at-size)

Tagging data (RTTP-IO) – TD01

Current

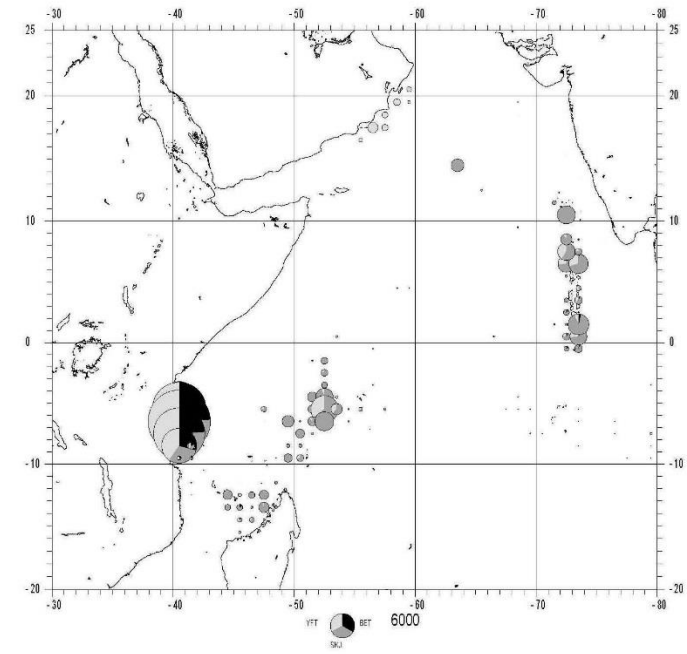


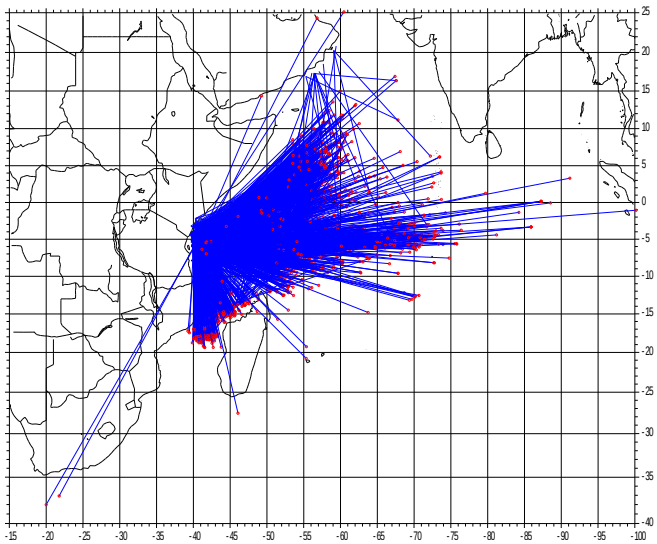
Tag releases and recaptures are shown as a density map that encompasses all years for which data is available in a single map.

Pros: Compact visualization, gives a reasonably accurate idea about the hot-spots of release and recapture

Cons: It is not really possible to understand fish movement across regions. It's a *static* map, where the time dimension is basically lost.

Proposed



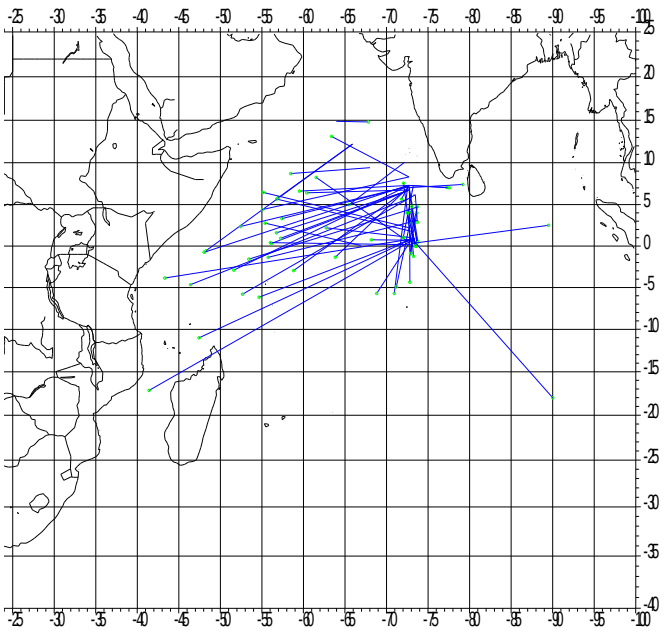


The proposal is to have two different types of charts, one (topmost) shows the released tags using pie charts whose size is proportional to the number of fish tagged and whose slices correspond to the fraction of tagged fish by species.

The latter (two charts below) show the apparent movements of tagged samples between tagging and recovery locations for specimen being tagged in distinct areas of the Indian Ocean (Western IO vs. Central IO). N.B. only movements longer than 1500 nautical miles are represented.

Pros: clearer identification of tagging locations and extent, using one single chart for multiple species (topmost chart); captures (albeit not perfectly) the *time* dimension through the apparent movements (bottom two charts)

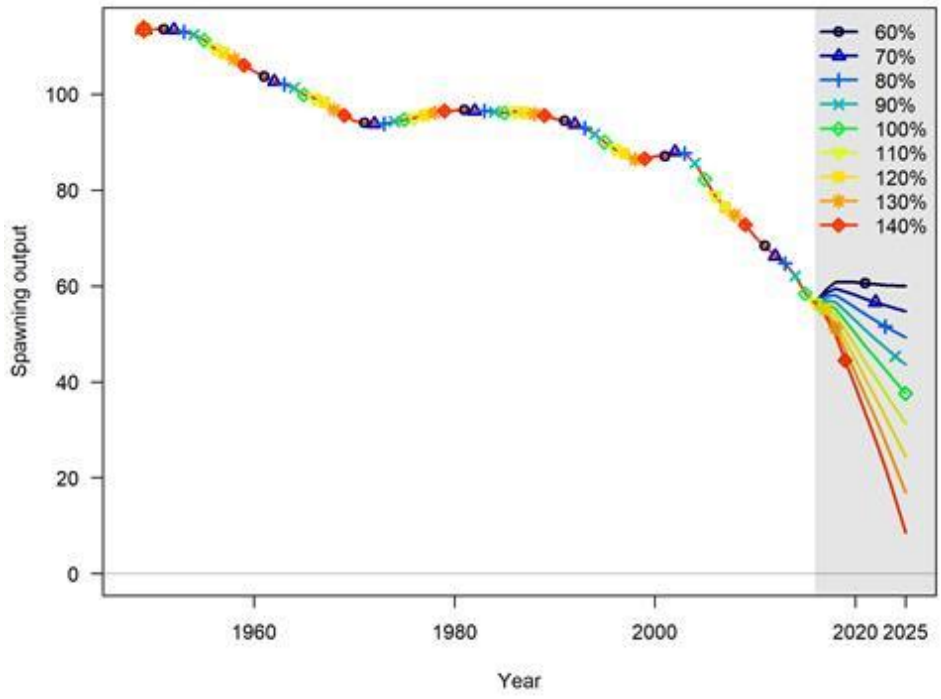
Cons: Recovery locations are difficult to discern inside the mega-cluster artefacts



Comment / proposal by the IOTC Secretariat

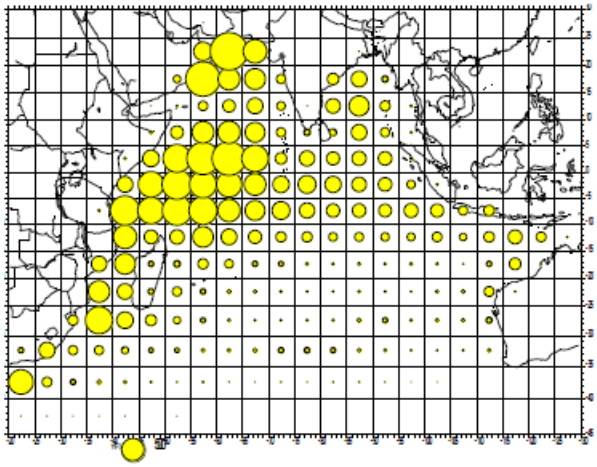
Feedback from the audience during the WPTT19 seem to confirm the preference to keep current tagging data charts as they are now – as the proposed ones seems too cluttered to be of practical usage. For this reason, the IOTC Secretariat suggests **NOT to incorporate this chart within the revised executive summary supporting information.**

Stock status information – SS01

Current	
None	
Proposed	
	Addition of stochastic catch projections (similar to the one provided for blue shark)
Comment / proposal by the IOTC Secretariat	
None in particular, if not the need to ensure that the stochastic catch projections are either readily available or easy to produce from the stock assessment outputs. With this assumption, the IOTC Secretariat suggests **to incorporate this chart within the revised executive summary supporting information.**	

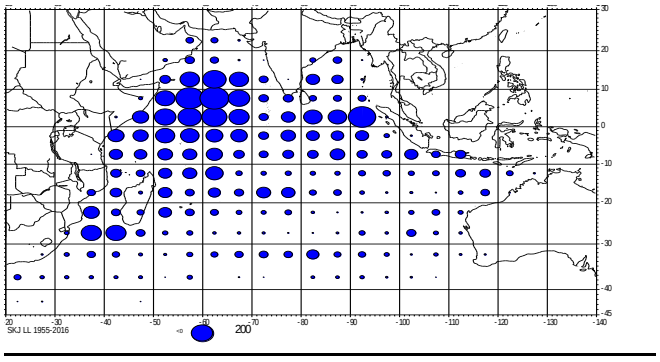
PROPOSED CHANGES SPECIFIC FOR YELLOWFIN TUNA SUPPORTING INFORMATION

Time-area catches of adult Yellowfin tunas – YFT01

Current	
No geo-spatial information about adult yellowfin tuna catches is currently available in the executive summary supporting information.	
Proposed	
	The charts will display estimated time-area catches (in tonnes) of adult yellowfin (LF > 100 cm), for all gears in the period 1960-2016. **Pros:** The map will indicate the geographical range of the habitat utilized by the spawning stock; **Cons:** It is based on raised (estimated) catch-at-size and as such it might not be fully reliable for a number of gear – fleet combinations. Furthermore, displaying circles proportional to the catch magnitude might render the chart difficult to read / analyze in some areas (western IO).
Comment / proposal by the IOTC Secretariat	
If there is no special advice from the WPDCS audience, the IOTC Secretariat would suggest to **incorporate the proposed chart within the revised executive summary supporting information, possibly using colour keys by regular grid instead of proportional circles**	

PROPOSED CHANGES SPECIFIC FOR SKIPJACK TUNA SUPPORTING INFORMATION

Distribution of Skipjack catches by Longline fisheries – SKJ01

Current	
No geo-spatial information about skipjack catches in numbers is currently available in the executive summary supporting information.	
Proposed	
	This chart shows the average Skipjack catches (in numbers) for LL fisheries in the 1955-2016 period. **Pros**: The map easily identifies the geographical range of recorded Skipjack captures in numbers; **Cons:** Apparently, it will be based on reported catch-and-effort data and as such it might not be covering the totality of catches. Furthermore, displaying circles proportional to the catch magnitude might render the chart difficult to read / analyze in some areas (western IO).
Comment / proposal by the IOTC Secretariat	
If there is no special advice from the WPDCS audience, the IOTC Secretariat would suggest to **incorporate the proposed chart within the revised executive summary supporting information, possibly using colour keys by regular grid instead of proportional circles**	

WPDCS response (by update reference number and proposed updates)

Update ref.	Keep current	Introduce update	Update as proposed by IOTC
NC01	<No. votes>	<No. votes>	<No. votes>
CE01	…	…	…
CE02			
CE03			
CE04			
SF01			
SF02			
SF03			
SF04			
TD01			
SS01			
YFT01			
SKJ01			