



Considerations about alternative definitions of total catches, discards and bycatch and their possible impact on the IOTC data submission forms

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Background

Current IOTC definitions of fisheries management key concepts such as *nominal / retained catch*, *bycatch* and *discards*, although well established and universally agreed by the scientific community, could at times partially reduce the effectiveness of the data management and analysis processes in place at the Secretariat.

This is particularly true in consideration of the recent improvements in the quality and extent of the standard data collection and submission procedures adopted by many CPCs, as well as in the overall data management and dissemination workflows pertaining both to CPCs and to the Secretariat.

A conceptual revision of the existing definitions, leading to improvements in data categorization and possibly (but not necessarily) to updates in the official definitions adopted by IOTC, could increase in the medium to long term the ability for scientists and policy makers to better understand the status of fisheries within the Indian Ocean, and ensure that scientific analysis and management advice are provided on the basis of the best possible information available.

Current IOTC definitions

Nominal / retained catch

The agreed definition of nominal (retained) catch – while not explicitly listed within the IOTC glossary of terms – is currently considered as “*the total quantity of fish landed at the end of a fishing trip*”. As such, it encompasses catches for both target and non-target species and implicitly includes bycatch as part of the reported quantities.

Bycatch

From the IOTC [glossary of terms](#), bycatch is currently defined as: “*All species, other than the 16 species listed in Annex B of the IOTC Agreement, caught or interacted with by fisheries for tuna and tuna-like species in the IOTC area of competence. A bycatch species includes those non-IOTC species which are (a) retained (byproduct), (b) incidentally taken in a fishery and returned to the sea (discarded); or (c) incidentally affected by interacting with fishing equipment in the fishery, but not taken.*”.

Discards

From the IOTC [glossary of terms](#), discards are currently defined as: “*Any part of the catch that is returned to the sea, whether dead or alive.*”

Current state of the art

Nominal / retained catch

The existing definition of nominal / retained catch has a broad scope of application as well as some known limitations: as it refers to all landed catches, it should include retained bycatch and exclude catches that have not been retained onboard, yet were not actually discarded either (e.g. catches used for crew consumption or as bait).

During the 14th Working Party on Billfish ([WPB14 report](#), para. 81) “*The WPB NOTED that there is no local market for billfish caught by the French purse seine fleet so these are either discarded or retained for crew consumption*”.

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While it is reasonable to consider that the fraction of total catches either used for crew consumption or as bait is not comparable to the overall retained catches, at the same time it could be expected that at least some of the industrial fleets operating within the Indian Ocean may be actively collecting (or may have collected in the past) detailed information about these catches.

This information – when available – could be used to complement and improve yearly estimates of total catches or bycatch (in the broader sense of the term) and therefore increase the understanding of fisheries operations and the quality of currently available data, thereby generating improved estimates of total mortality.

Bycatch

Currently, there is no IOTC data reporting form that is explicitly designed to report bycatch data to the Secretariat.

Bycatch (any species other than the 16 IOTC species) can be reported as either retained catch or discard, depending on their fate. Therefore, when estimating the total catches or total mortality of a single bycatch species, such as blue shark, information from both the retained catch and discard databases should be combined.

While the IOTC definition of bycatch is clear, the term is more commonly used in the literature to describe anything other than the catch that was the direct target of the fishery and therefore it might include a species listed as an IOTC species (e.g. a neritic tuna species).

Conversely, a species that is considered to be bycatch according to the IOTC definition, might potentially be the target of some fisheries (e.g. blue shark). Examples are provided below.

I.R. Iran gillnetters targeting neritic and tropical tunas have been reporting consistent catches of billfish since the early '90s (see [Figure 1](#) and [Table 1](#)).

Although tunas are the target of this fishery, seerfish and billfish are also caught in substantial quantities and consistently over time. While these are considered non-target species within this fishery, they are still reported as nominal / retained catches and this can cause some confusion with the commonly understood meaning of the term *bycatch* as referring to non-target catch.

Nevertheless, a proper accounting of any additional information in terms of catch classification within the data reported to the Secretariat could improve the way in which bycatch is managed, accounted and used for statistical and fisheries assessment purposes.

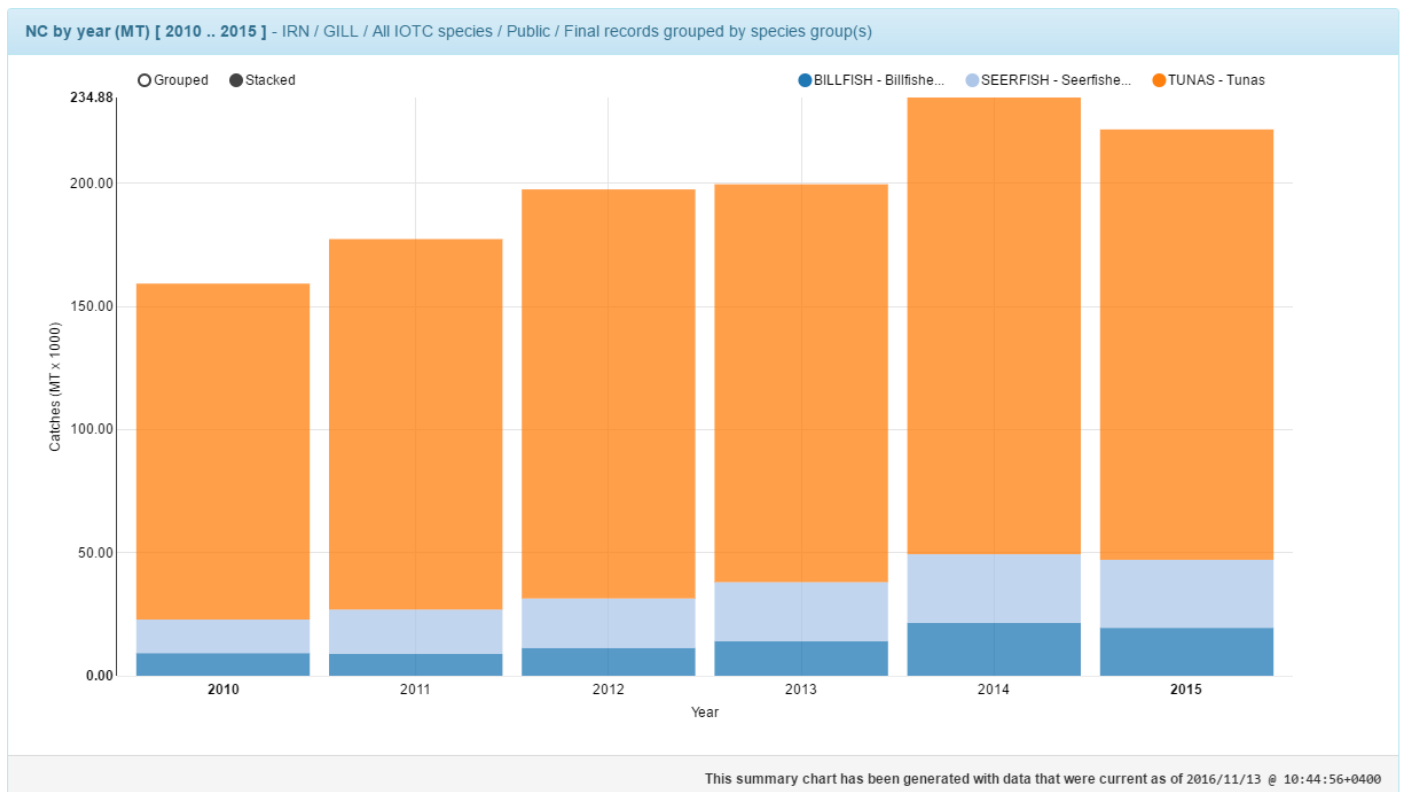


Figure 1. IRN gillnet catches (2010-2015) in MT, by species group and limited to the 16 IOTC species and their aggregates

Species group	2010	2011	2012	2013	2014	2015	Total	%
Billfish	9,209	8,866	11,297	14,056	21,465	19,479	84,372	7.09%
Seerfish	13,629	18,049	20,107	23,962	27,923	27,614	131,284	11.03%
Tunas	136,448	150,440	166,149	161,620	185,487	174,806	974,951	81.89%
	159,286	177,354	197,553	199,638	234,876	221,899	1,190,606	

Table 1. IRN gillnet catches (2010-2015) in MT, by species group and limited to the 16 IOTC species and their aggregates

Similarly, swordfish longliners are also reporting catches of other IOTC species (and bycatch species), including substantial quantities of Albacore, Bigeye and Yellowfin tuna (see [Figure 2](#) and [Table 2](#)) which are non-target species in these fisheries but are nevertheless still reported as nominal / retained catches.

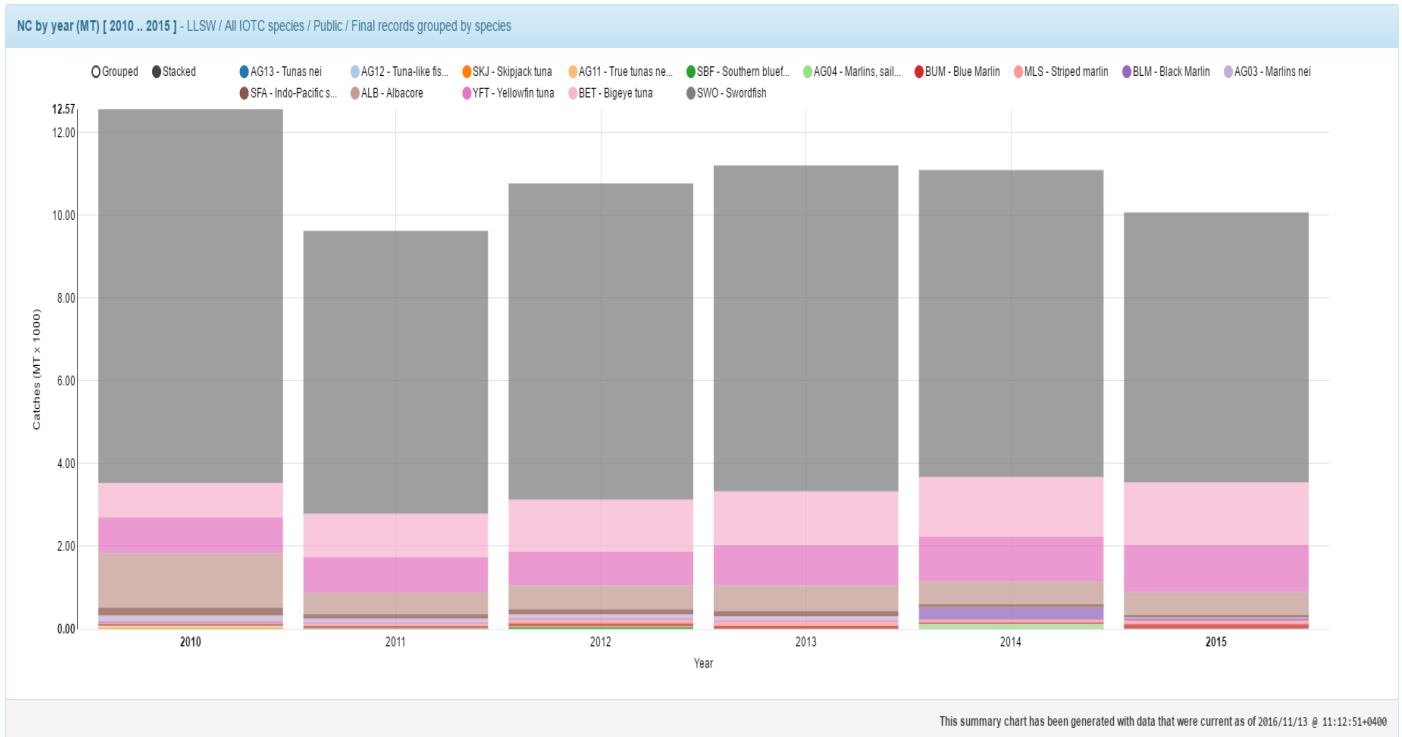


Figure 2. Swordfish longline catches (2010-2015) in MT, by species and limited to the 16 IOTC species and their aggregates

Species code	2010	2011	2012	2013	2014	2015	Total	%
AG03 – Marlins NEI	139	108	103	105	1	25	480	0.74%
AG04 – Marlins, sailfish, spearfish NEI	32	12	16	1	115	0	176	0.27%
AG11 – True tunas NEI	27	0	0	0	0	0	27	0.04%
ALB – Albacore	1,318	525	571	614	536	549	4,113	6.29%
BET – Bigeye tuna	836	1,053	1,254	1,296	1,445	1,507	7,392	11.31%
BLM – Black marlin	34	16	22	18	304	54	449	0.69%
BUM – Blue marlin	43	45	79	72	43	109	391	0.60%
MLS – Striped marlin	29	56	87	104	55	80	411	0.63%
SBF – Southern bluefin tuna	5	18	50	12	11	10	105	0.16%
SFA – I.P. Sailfish	188	104	127	126	81	67	693	1.06%
SKJ – Skipjack	20	2	1	0	1	2	26	0.04%
SWO – Swordfish	9,031	6,835	7,643	7,876	7,419	6,524	45,328	69.38%
YFT – Yellowfin tuna	862	852	821	982	1,086	1,140	5,742	8.79%
AG12 – Tuna-like fish NEI	0	0	0	0	1	4	4	0.01%
	12,565	9,626	10,773	11,207	11,097	10,070	65,338	

Table 2. Swordfish longline catches (2010-2015) in MT, by species and limited to the 16 IOTC species and their aggregates

Properly understanding *bycatch* and *non-targeted* species trends is crucial to improve the understanding of involved fisheries. In some instances, and for certain analyses, it may be useful to determine what the *bycatch* is in terms of its common meaning of *non-target* catches; however this has not been possible with the IOTC datasets to-date.

Nevertheless, this information could already be collected in many cases, as the data form for reporting nominal catches ([Form 1 RC](#)) expects that target catches are (optionally) specified. This information on targeting is ready to be incorporated within the new IOTC database and linked to actual catches as appropriate: in the future, it will be possible to filter the datasets based on target and non-target catches as well.

There are many cases (especially when considering historical time-series) where no explicit information about target species by fleet and fishery has been reported or is known: these could be revised on a case-by-case basis to evaluate whether the information exists, or to identify the most likely species targeted by the fishery in combination with the area and year of operation.

Indeed, during the [WPB14](#) it was noted that (para. 94) “*billfish were a target species group for the [Taiwan,China] longline fisheries prior to ~1970, whereas tropical tunas have been targeted since, while now they’re considered as bycatch*”.

Similar anecdotal information – when available for other relevant fisheries – could help the Secretariat in the categorization of historical data (where most of the information gaps are).

For a successful and effective adoption of targeting information to derive trends for scientific or management purposes, national scientists and deputed fisheries management organizations from each CPCs should liaise with the Secretariat to provide information on the species groups that have been targeted historically by each fishery.

Depending on the status and extent of the data collection and reporting systems pertaining to each CPCs, bycatch information should be reported as:

- Data submitted through IOTC [Form 1 RC](#) for all CPCs that can provide aggregated information by year and Indian Ocean area only, with a proper accounting of the target species for a given fishery for which bycatch has been recorded. To be treated as publicly available data for dissemination purposes unless explicitly requested by the reporting CPC;
- Data collected and reported by CPCs implementing observer programs, as per the observer data reporting requirements². To be treated as confidential and not publicly disseminated unless in a highly aggregated form.
- Any other available format, depending on the case
- Data submitted through IOTC [Form 1 DI](#) for all CPCs that can provide aggregated information by year and Indian Ocean area only. To be treated as publicly available data (for dissemination purposes) unless explicitly requested by the reporting CPC;

[Resolution 15/02](#) - *Mandatory statistical reporting requirements for IOTC contracting parties and cooperating non-contracting parties (CPCs)*, states that (para. 3) “*Concerning cetaceans, seabirds and marine turtles data should be provided as stated in Resolutions 13/04 on Conservation of Cetaceans, Resolution 12/06 on reduction the incidental bycatch of seabirds in longline fisheries and Resolution 12/04 on the conservation of marine turtles (or any subsequent superseding resolutions).*”

As a first step toward the proper accounting of bycatch and non-target species catches, the Secretariat is expected to derive the required information from both the nominal (retained) catch and the discarded catch data as provided by CPCs or retrieved from additional sources of information.

All catches that are not retained (including bycatch species and IOTC species) should be reported through IOTC [Form 1 DI](#), specifically designed for the recording of discarded catch information.

This form can report the results of fisheries interactions with concerned species in terms of the extent of specimen involved (either in number – as should be the case for seabirds, marine turtles, marine mammals, whale sharks and discards reported by longliners and gillnetters – or in weight, for any other species and discards reported by purse seiners) and their fate (released dead or alive) as per [Resolution 15/01](#) - *On the recording of catch and effort data by fishing vessels in the IOTC area of competence*.

Furthermore, additional information could also come from data collected by observers onboard and provided to the Secretariat mostly in aggregated form.

² www.iotc.org/science/regional-observer-scheme-science

Nominal / retained catch conceptual model

The *International Commission for the Conservation of Atlantic Tunas* (ICCAT) provides, in Chapter 4 of its field manual [CH4-ENG], a detailed categorization model for all quantities involved in the estimation of nominal catch (Figure 3).

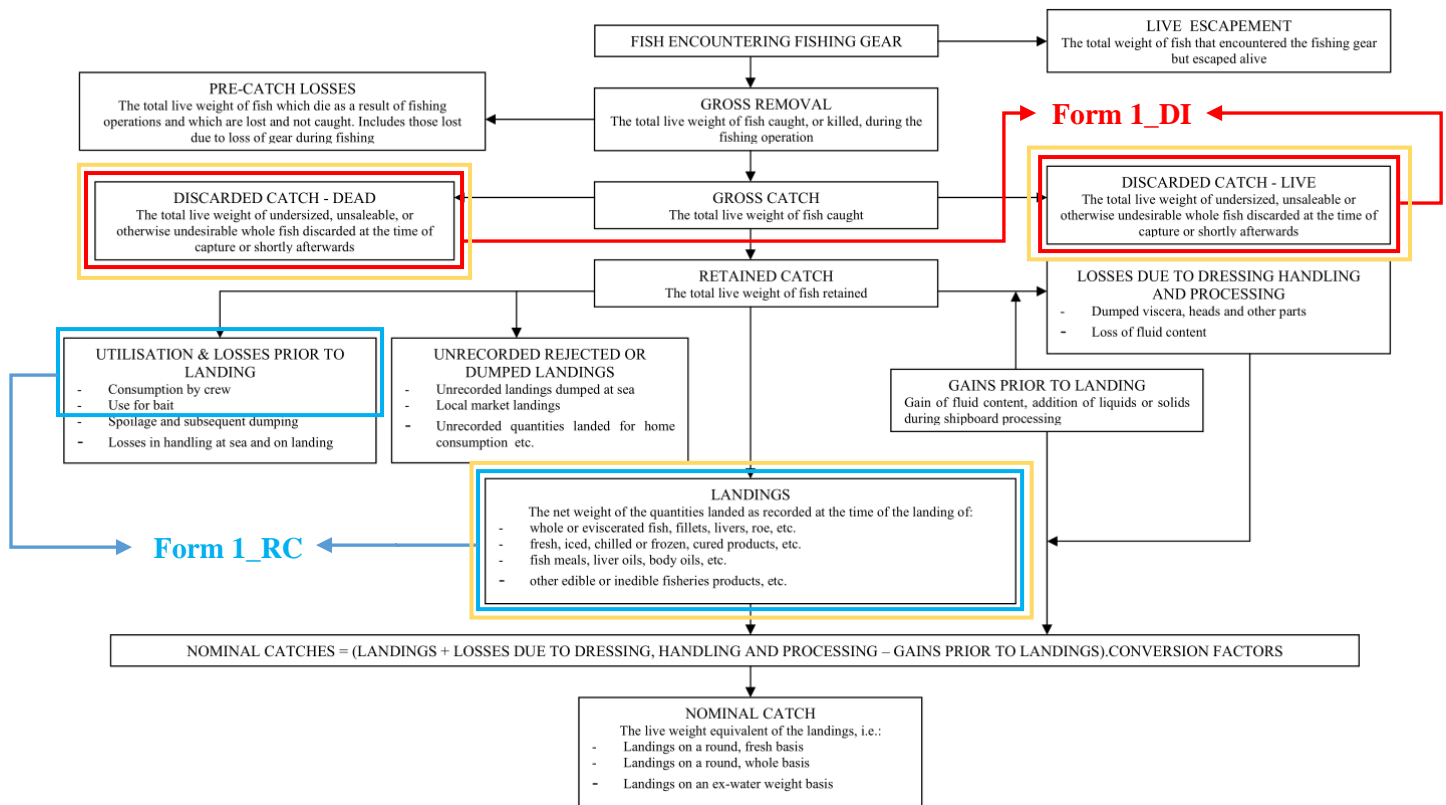


Figure 3. ICCAT diagrammatic representation of the concepts involved in the estimation of nominal catch

Concepts and definitions referenced by this categorization are not tRFMO-specific and could serve as a starting point for further refinements and extensions (if needed).

Highlighted in Figure 3 are the components that can be currently reported to the Secretariat by using the available forms for Discards ([Form 1_DI](#), in red) and Retained / Nominal catches ([Form 1_RC](#), in light blue).

Components that can be potential sources of Bycatch information (both in terms of catches of non-targeted species and discards / interactions) are marked in yellow.

Catches used for crew consumption or as bait, in particular, are hereby defined as a component of the *retained*: therefore they should be considered as quantities to be reported through [Form 1_RC](#), once this is extended as proposed.

Updates to the IOTC data collection forms

Nominal / retained catches

Supporting information for improved nominal catch classification

The proposal to incorporate information about the categorization of reported nominal catches should require the addition of a new ‘category’ field (to be considered optional) with the following possible values:

- RET - Retained (default value, when non specified)
- CCON – Used for crew consumption
- BAIT – Used as bait

Impacts on data reporting for CPCs

CPCs that are already categorizing their nominal catches based on the classification above (or any other equivalent classification) should start reporting this additional information by means of [Form 1_RC](#).

Conversely, any other CPCs or specific fishery for which all collected data is lacking this level of detail could continue reporting nominal catch data as already done so far.

Supporting information for target catch classification

Recent updates to the nominal catch data reporting form (following the adoption of [Resolution 15/02](#)) have accounted for the need of collecting *target species* information through the addition of a new data field within [Form 1 RC](#).

Data providers (CPCs) are therefore expected to optionally submit (by year, quarter, fishery and area and as part of the mandatory submission of nominal catch data on a yearly basis) an indication of the species targeted by all involved fisheries, alongside the retained catches reported for all species caught in the same strata.

Currently, the list of target species available to [Form 1 RC](#) users is as follows:

- ALB – Albacore
- BET – Bigeye tuna
- COM – Narrow-barred Spanish mackerel
- FRZ – Small tunas (Frigate tuna, Bullet tuna, Kawakawa)
- LOT – Longtail tuna
- MARL;SFA – Marlins and Sailfish
- SBF – Southern bluefin tuna
- SKH – Sharks
- SKJ – Skipjack tuna
- SWO – Swordfish
- YFT;SKJ – Yellowfin tuna and Skipjack tuna
- YFT;BET – Yellowfin tuna and Bigeye tuna
- YFT – Yellowfin tuna

and contains the majority of commercial species (or species combinations) for which targeting fisheries are known to exist, with the option for CPCs to update the list depending on their target species

CPCs already submitting data to IOTC through [Form 1 RC](#) should consider this optional field and provide all the information at their availability in terms of known target species for their fisheries.

Nominal catch data reported with the proper specification of target species will still be used to account for total nominal catches by year, fishery, area and CPC, while at the same time providing supporting information for the proper identification of bycatch trends and levels.

Revisions to historical time series for major fleets and fisheries (in terms of identification of likely target species by fleet, fisheries and year) are expected to be carried on by the Secretariat in the next future, in coordination with all involved CPCs.

Discards***Supporting information for discarded catch reporting***

Currently, the IOTC database contains little to no discard information: during recent years, discard data have been rarely provided and if so, they were either missing relevant details or were reported in highly aggregated form or in electronic formats not well suited for processing (e.g. tables within Word or PDF documents).

CPCs should acknowledge the availability of [Form 1 DI](#) and depending on the case (see paragraphs above) they might use this form to report all discard data in accordance with the extent of their data collection and reporting systems.

Observer data

CPCs implementing observer programs should be collecting detailed information on total catches, including both retained and discarded catches as well as information on species targeting.

Data exchange

Recent efforts – mainly driven by CCSBT – resulted in the proposal of a specific data collection and exchange protocol for bycatch (BDEP) that is currently subject to evaluation among other tRFMOs (see also [IOTC-2016-WPDCS12-28](#)).

Further evolutions in data exchange protocols (including adoption of the BDEP format) could provide additional mechanisms for the dissemination and exchange of required information.

Impacts on discard data reporting for CPCs

In terms of possible impacts in reporting requirements for CPCs:

- No impact for all CPCs and fisheries that can only provide discards information on an aggregated basis (as already considered in the list of mandatory data submission requirements, to be provided through [Form 1 DI](#));

- Different level of impact for all CPCs and fisheries that either have already implemented observer programs or are considering the adoption of BDEP and similar protocols.

References

- ❖ [IOTC Science Glossary](#) – Online document available for download from the IOTC website
- ❖ [Resolution 15/01](#) – *On the recording of catch and effort data by fishing vessels in the IOTC area of competence*
- ❖ [Resolution 15/02](#) – *Mandatory statistical reporting requirements for IOTC contracting parties and cooperating non-contracting parties (CPCs)*
- ❖ [IOTC-2016-WPB14-R|E|](#) – Report of the 14th Session of the Working Party on Billfish, Victoria, Seychelles, 6-10 September 2016
- ❖ IOTC-2016-WPDCS12-28 – A bycatch data exchange protocol for the Indian Ocean
- ❖ [Form 1 RC](#) – Data reporting form for retained (nominal) catches – Online Excel file available for download from the IOTC website
- ❖ [Form 1 DI](#) – Data reporting form for discarded catches – Online Excel file available for download from the IOTC website
- ❖ [CH4-ENG](#) – ICCAT field manual: *Chapter 4. Data for Assessment and Research*, Online PDF file available for download from the ICCAT website