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Proposal from Australia for additional or amended data fields for collection within WCPFC

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Australia

Australian Government
Department of Agriculture, Fisheries and Forestry

ABARES

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Australian Department of Agriculture Fisheries and Forestry
Australian Bureau of Agricultural and Resource Economics and Sciences

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Background

At the Eighteenth Regular Session of the Scientific Committee (SC18), SC18 agreed on a recommendation to improve the data available for stock assessments, which was endorsed by the Commission in December 2022. The recommendation is as follows (Para 33, SC18 Summary Report):

> *33. Noting the inconsistency in the data reporting requirements between the Scientific Data to be Provided by the Commission (SciData[1]), and other WCPFC reporting obligations (e.g., in CMMs), and the need to improve the data available for stock assessments, SC18 recommended that the Scientific Services Provider undertake a review of the minimum data reporting requirements and report to SC19 in 2023. SC18 requested CCMs to submit proposals for additional or amended data field, with associated justification, before 30th March 2023. For example, the proposal for including FAD minimum data fields recorded by vessel operators in the SciData which was presented to SC18 should be forwarded to SC19 for consideration.*

This short paper makes a proposal, with justification, for the collection of additional longline operational characteristics fields via logbooks. These gear descriptors will have broad future utility for catch rate standardisation across WCPFC tuna and billfish species, as well as for other purposes, particularly addressing questions of targeting and catchability.

1.1 Source of data

Longline operational catch/effort data (logbook).

1.2 Gear

Pelagic longline.

[1] https://www.wcpfc.int/doc/data-01/scientific-data-be-provided-commission

1.3 Proposed new or amended DATA FIELDS

The proposal is to expand the minimum reporting requirements for longline operational characteristics to include: a priori target species, light stick use, bait type, mainline length and gear settings that influence fishing depth (including branch line length, float line length, vessel speed and line setting (shooting) speed). There is a further proposal to add "transhipment at sea" as an additional item to the list of ACTIVITIES that is recorded at the DAILY level in the longline operational data (Section 1.3 in the ANNEX 1 of the *Scientific data to be provided to the Commission*.

1.4 Rationale and Justification

SC17 advised the Commission following the review of the stock assessment for Southwest Pacific Swordfish, that there was a need to expand minimum reporting requirements for longline operational characteristics. In that assessment it was noted that additional fields relating to fishing gear and methods should be included to improve the quality of abundance indices.

SC17 – Paragraph 88.3 (Research recommendations):

> *"In order to improve quality of abundance indices there is a need to expand minimum reporting requirements for longline operational characteristics to include: a priori target species, light stick use, bait type, setting time (or fraction of night-time soak), and gear settings that influence fishing depth (e.g., hooks between floats, branch line length, float line length, and/or line setting speed)."*

We note that all stock assessments of key tuna and billfish species in the WCPFC use standardised catch-per-unit effort indices of abundance as one of the primary informative data sources within the assessment models. Over time, abundance indices for all of the main tuna and billfish would benefit substantially from improved data collection of operational and gear characteristics as these have been demonstrated to affect targeting and catchability. With only 5% observer coverage required of the WCPFC longline fishery, the available observer data provides insufficient coverage of the suggested new fields, hence this proposal to have them collected by the fishing vessels through their mandatory logbook reporting. We note that logbooks are increasingly completed through e-reporting tools, which simplifies the inclusion of additional fields in comparison to hard-copy forms.

The rationale of each additional field is elaborated below. While some explanation and referencing has been provided this is not intended to be an exhaustive treatment of the issues.

Target species for the set

Targeting remains an important and highly influential consideration for standardising CPUE for the purpose of providing an index of abundance (e.g. Chang et al. 2011). Unlike single species fisheries where all effort is directed at the target species, in multi-species fisheries such as many longline fisheries in the WCPFC the effort is directed at a range of species. Consequently, the fishing effort needs to be adjusted so that the "effective" effort directed at any specific species of interest can be ascertained. If this is not undertaken correctly then the resulting index of resource abundance is likely to be biased and unreliable. Longline targeting practices have been dynamic in space and through time in response to changes in abundance and demand for alternative species (e.g Vidal et al. 2021). Without explicit information from skippers or fishing masters declaring their targeting intention, the target is often derived from the species composition of the catch which has the associated problem that this derived variable may be confounded with changes in abundance as well as subject to other problems (see Vidal et al. 2021).

To address this issue the proposal is for the primary target species (or group of species) be recorded in the longline logbook at the commencement of each set.

Lightsticks and bait type
In developing innovative approaches to improve CPUE standardisation in Australia's Eastern Tuna and Billfish Fishery, Campbell et al. (2017) found lightstick usage and bait type to be significant and influential factors for both tuna and billfish. These two factors are now routinely included in CPUE standardisation for this fishery.

Much of the recent research focus has been on the influence of bait type (and to some extent light stick usage) on bycatch of species such as sea turtles, sharks and seabirds. Gilman et al. (2020) provided a global synthesis of the effect of pelagic longline bait type on bycatch species selectivity.

To address this data deficiency the proposal is for light stick usage and bait type to be recorded in the longline logbook for each set.

Mainline length
The density of hooks along a mainline (as measure by the distance between hooks) can be influential on catch rates as the density of hooks will interact with the density of fish in the ocean. Campbell (2019) has shown that this effect to be highly influential on the catches of the principal tuna and billfish species caught on the domestic longline fishery off eastern Australia. Mainline length can also be used to calculate the line sag and hence depth of hooks along the longline between the floats (see below).

To address this data deficiency the proposal is for mainline length to be recorded in the longline logbook for each set.

Length of branch line, length of float line and vessel/line setting speed
Ducharme-Barth and Vincent (2020) noted the following in the CPUE analyses to support the WCPFC 2020 stock assessments of yellowfin and bigeye tunas:

> *"Longline fishers are able to manipulate the characteristics of their gear in order to target depths associated with particular species, often on a set-by-set basis. This is done through a combination of adjustments to the line setting speed, float line length, branch line length and HBF [hooks between floats]. Even still, variability in current, surface winds, and water density can result in longlines with the same "configuration" fishing at effectively different depths [see e.g. Bigelow et al. 2006]. Additionally, the material of the mainline will also affect the position of hooks in the water column though this is unlikely to change from set-to-set. This is information commonly recorded by onboard observers, however it is largely unavailable (except for HBF) in the operational longline data-set consolidated across all flags. As a result, HBF is the only available covariate which could be used to model the effects of gear configuration on bigeye tuna and yellowfin tuna catch rates."*

The absence of these influential operational and gear characteristics from the logbook data has also been noted in the WCPFC stock assessment work for South Pacific Albacore (Vidal et al. 2021) and for Southwest Pacific swordfish (Ducharme-Barth et al. 2021).

To address this issue the proposal is that four additional fields (Length of branch line, Length of float line, Vessel speed during setting and Speed of the line setter) be recorded in the longline logbook.

Additional activity code
Recording of the "Activity" data field is already a WCPFC requirement and this proposal is that an additional activity code pertaining to "No Fishing – Transhipment at Sea" be recorded. This information will allow to link other relevant types of data to the Carrier transhipment declaration

information and the transhipment observer data. This is not possible under the current activity codes and is required for the work of the Commission.

1.5 Suggested DATA FIELDs and PROTOCOL for collecting and JUSTIFICATION

It is proposed that the following operational data fields be included in the WCPFC "Scientific Data to be provided to the Commission" through the Longline operational catch/effort data.

DATA FIELD	PROTOCOL	JUSTIFICATION and Notes
Target species for the set	Print the primary target species, or group of species, for this set (do this before setting the gear).	New SET LEVEL data field. Justification: Provides a fisher derived indication of species targeting with potential utility to improving CPUE standardisation. Notes: Propose this be introduced as exploratory to determine its utility over several years. Easier to collect through ER systems. Target species should be specified using FAO Species code.
Number of lightsticks used in set	Print the total number of lightsticks used in the set.	New SET LEVEL data field. Justification: Lightsticks may be used to increase catch rates when targeting particular species (such as Swordfish) but may also be used to increase catch rates for some tuna (such as bigeye). Lightstick usage data can be used to improve CPUE standardisation. Notes: Easier to collect through ER systems.
Bait type used in set	Print the type of bait used for the set. Example types: Squid (class Cephalopoda) Sardine or Pilchard (family Clupeidae) Mackerel (family Scombridae) Mixed Mackerel and Sardine …	New SET LEVEL data field. Justification: Alternative bait types may be used to increase catch rates when targeting particular species of tuna or billfish. Bait type can be used to improve CPUE standardisation of operational data. Notes: Bait type could be specified using FAO Species code. Propose that the bait type categories be derived from longline observer data. Easier to collect through ER systems. There is the potential to also record the usage of live bait if this is a widespread practice in WCPO longline operations

DATA FIELD	PROTOCOL	JUSTIFICATION and Notes
Mainljne length	Print the mainline length (in kilometers) used in the set.	New SET LEVEL data field. Justification: Used together with the number of hooks deployed in the set to measure the density of hooks along the mainline (as measured by the distance between hooks). Alternative density of hooks along a mainline will interact with the density of fish in the ocean and as such will be influential on CPUE.
Length of branch line	Print the average length in metres of the branch lines in the set. This is the total length from the mainline to the hook.	New SET or TRIP LEVEL data field Justification: The length of the branch line (amongst other factors) changes the depth that is fished by the attached hook and hence catchability for a species. Length of branch line can be used to improve CPUE standardisation of operational data. Notes: The proposed definition of 'branch line' would include the snood. It is understood that for most trips the branch lines would not change so there is the potential to collect this at the TRIP Level. However, confirmation of this through a review of observer data would first be warranted. Easier to collect through ER systems.
Length of float line	Print the average length in metres of the float lines in the set. This is the total length from the float to the mainline.	New SET or TRIP LEVEL data field. Justification: The length of the float line (amongst other factors) changes the depth that is fished by the longline and hence catchability for a species. Length of float line can be used to improve CPUE standardisation of operational data. Notes: It is understood that for most trips the float lines would not change so there is the potential to collect this at the TRIP Level. However, confirmation of this through a review of observer data would first be warranted. Easier to collect through ER systems.

DATA FIELD	PROTOCOL	JUSTIFICATION and Notes
Vessel speed during setting	Print the average speed in knots of vessel during line setting	New SET LEVEL data field. Justification: The speed of vessel can be used together with other information (including speed of line setting and mainline length) to derive some understanding of line sag and hence the depths being fished by the hooks and hence catchability for a species. This information can be used to improve CPUE standardisations. Notes: It is unclear how much vessel speed during setting varies within a trip. There may be some potential to collect this at the TRIP Level, however, further investigation of observer data would first be warranted. Likely easier to collect through ER systems.
Speed of the line setter	Print the speed in knots of the line setter (i.e. the line shooter speed). Note this is NOT the vessel speed.	New SET LEVEL data field. Justification: The speed of line setting can be used together with other information (including vessel speed and mainline length) to derive some understanding of line sag and hence the depths being fished by the hooks which and hence catchability for a species. This information can be used to improve CPUE standardisations. Notes: It is unclear how much speed of line setting varies within a trip. There may be some potential to collect this at the TRIP Level, however, further investigation of observer data would first be warranted. Likely easier to collect through ER systems.
ACTIVITY	Record the date, position and the ACTIVITY CODE for any day when a transhipment at sea occurs.	New code for the ACTIVITY field. The ACTIVITY data field is already a requirement under SCIDATA, and this proposal is for an additional ACTIVITY code to require the date, position and

DATA FIELD	PROTOCOL	JUSTIFICATION and Notes
		ACTIVITY CODE corresponding to “No Fishing – Transhipment at Sea” to be recorded. Justification: This information will allow a link to other relevant types of data to the Carrier transhipment declaration information and the transhipment observer data, which is not currently possible and is required for the work of the Commission.

1.6 References

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Acknowledgement of Country

We acknowledge the Traditional Custodians of Australia and their continuing connection to land and sea, waters, environment and community. We pay our respects to the Traditional Custodians of the lands we live and work on, their culture, and their Elders past and present.