SCIENTIFIC COMMITTEE
TWENTY-FIRST REGULAR SESSION

Nuku'alofa, Tonga
13 – 21 August 2025

Progress report: Review and reconciliation of size data collected in the WCPFC-CA for stock assessment purposes (WCPFC Project: 127)

WCPFC-SC21-2025/ST-WP-02
11th July 2025

Paul Hamer[1], Emmanuel Schneiter[1], Tiffany Vidal[1], Peter Williams[1]

[1] Oceanic Fisheries Programme of the Pacific Community (SPC)

Executive Summary

This progress report documents the results of phase 1 of the work on WCPFC SC project 127: *Review and reconciliation of size data collected in the WCPFC-CA for stock assessment purposes*, which is scheduled to finish in 2026. The phase 1 work constitutes a 'getting the house in order' review and compilation of sources of size composition data for tuna, billfish and sharks and provides information on these sources as guidance to stock assessment scientists. Conversion factors are also reviewed as a key part of generating size data in standard formats for stock assessments. More time was spent on conversion factors than originally anticipated, because of their importance in size data preparation and the difficulty in tracing their origins. The length-weight conversions that the assessment scientists implement often do get closely scrutinised, but the length-length and weight-weight conversions are rarely scrutinised by the assessment scientists, who may even be unaware of the extent to which these are used. The review shows that these conversions require more focus, and many should be updated with new regionally relevant data. The processes to generate the LF and WT_MASTER databases are outlined, as most stock assessment scientist (especially newer staff) do not know how these have been generated, but they really do need to be aware. This report will hopefully provide a useful reference document for assessment scientists and others to better understand the sources of size data and the generation of the SPC LF and WF_MASTER databases that consolidate the size data available for use in stock assessments.

For SC21's review, we have recommended work areas to focus on in a phase 2 that include further work on historical data quality/suitability, more focussed technical analysis of data coverage deficiencies (including possible oversampling) and identify any other issues with the current data collection sources, and improved statistical treatment of size data for use in stock assessments. These work areas could be potentially discussed/prioritised in a SWG at SC21. The phase 2 work would be reported to SC22. We suggest that there is also opportunity to improve the information provided along with the size data submissions to SPC/WCPFC under the SCIENTIFIC DATA TO BE PROVIDED TO THE COMMISSION. As such it would be worth developing a standard information form that can be completed and provided with size data submissions from at least the non-ROP (regional observer programme) and PICTs port sampling programs.

We invite the SC21 to note:

- The work done during phase 1 of this project.
- The need to improve the provision of supporting information with size data submissions and development of a standard set of information to be provided (**SC21 could task SPC to work with countries and TCC to develop and implement this through the Sci Data Requirements**).
- The recommendations for phase 2 work to focus on:
    1. Collation of further information on historic data quality for improving the LF, and WF_MASTER post consolidation process;
    2. Technical review of current-future size data collections, coverage, issues etc, for stock assessments, focusing on the key tuna in the first instance;
    3. Post LF and WF_MASTER data extraction, work on improvement of the data preparation workflow and methods for stock assessment models, including statistical standardisation approaches for size data.
- **Consider whether a SWG is required at SC21 to discuss phase 2 work priorities, the suggested list of information to be provided with non-ROP/PICT port sampling size data submissions (page 24), and consider additional resourcing requirements.**

Contents

Background

WCPFC stock assessments of tuna, billfish and sharks utilize size (length and/or weight) data to inform the models on fishing gear selectivity/vulnerability, recruitment, abundance and stock status trends. The SSP has recognized that there are difficulties faced by assessment scientists when considering the size composition data available for assessments as the scientists are not closely involved in the data collection process and are often new to the assessments (and the related data) they are tasked with. This unfamiliarity with data inputs and their sources and relative quality can cause problems and bottlenecks in developing assessments when unusual features are found in the data that can potentially be influential in model estimation.

As an example, an issue that has arisen in several recent assessments where historical data are available in both length and weight is that these data provide signals of population trends that are generally in conflict. The cause of such conflict is very difficult to diagnose and understand without an understating of the historical data collection processes (potential biases by data sources and over time), conversion used and the basis for those conversion factors, and more. Stock assessment scientists working under the timelines imposed for WCPFC assessments do not typically have the time to trace the history of size composition collections across any problematic data sets they are faced with and are forced to deal with size data at face value.

Size composition collections across the many country/flag programs that provide data to the WCPFC have also changed over time and while there are WCPFC requirements for these data provisions stock assessment scientists generally do not have an understanding of these requirements and the nuances of specific programs or changes. Also, information on changes to methods and protocols is not readily available or documented and reported along with side data submissions. Changes in size data collection programs, or contributions from different sources, can create artificial trends in size compositions that a model will interpret as population changes. Stock assessment scientists have difficulty interpreting temporal trends in size composition if the historic and current data collection programs and protocols are not well documented or the documentation is not readily available.

Recent assessments have started to focus more closely on size composition inputs and have recognized issues that require attention. For example, some size data are being provided in non-standard or misidentified size data 'bins'. These data must first be identified and then either removed from the overall data set or amalgamated at an appropriate 'lowest common denominator' bin size. This can reduce the data and/or information available to inform the assessment that would otherwise lead to modelling issues. Situations like this have created significant bottlenecks in the development of assessments, which are already very time poor. In the recent billfish assessments, it was noticed that PICT port sampled size data lacked smaller fish that were present in PICT observer samples (**Figure *1***). This likely due to the smaller fish being discarded, eaten onboard or otherwise not making it to the port sampling. The port sampling data may be non-representative of the true size composition of the catches and for this reason would be unsuitable for stock assessment but may still serve a purpose for quantifying landed catch volumes.

Other issues that require more attention are the provision of documentation of size data collection protocols, especially for data collected from sources other than the Regional observer (ROP) and Pacific Island port sampling programs. When there are uncertainties around size data collection sources and protocols, the default option is likely to not use the data, and this wastes a lot of people's time and effort, that could be devoted to other activities if the issues cannot be resolved.

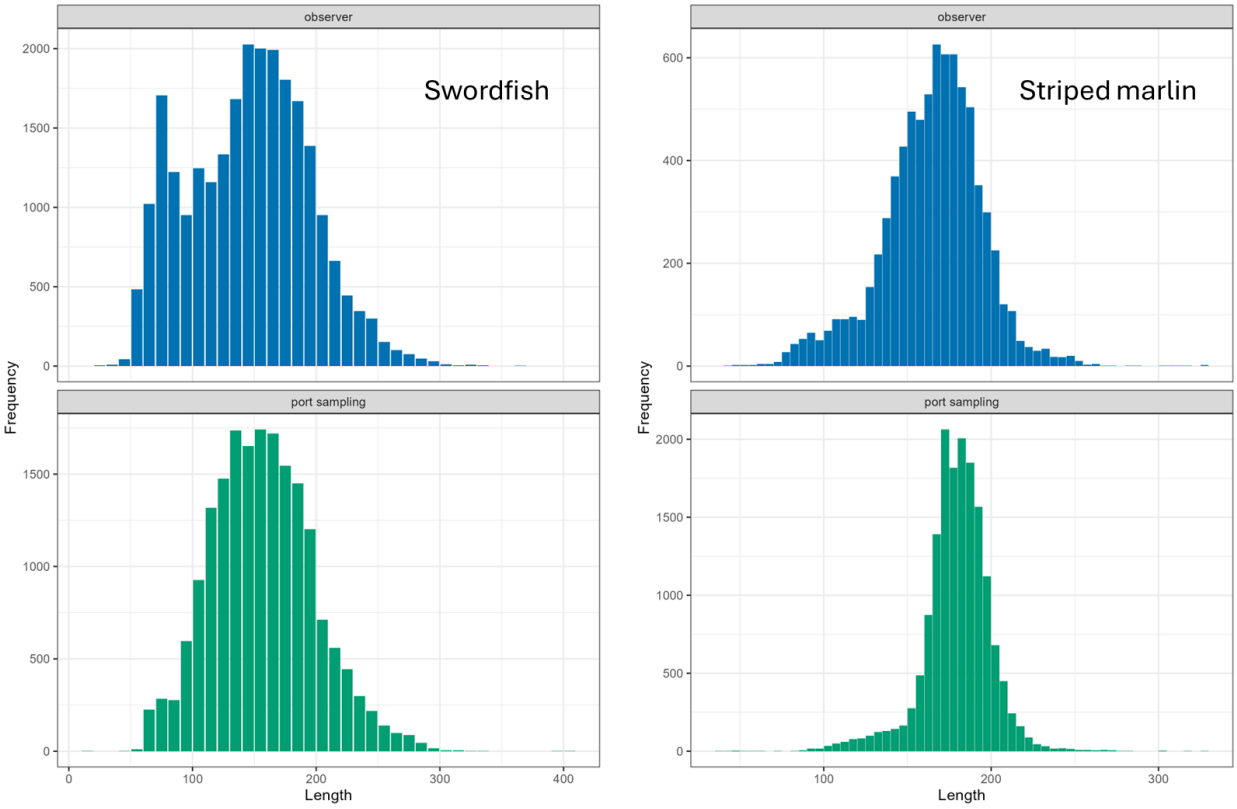


Figure 1 Comparison of aggregated length composition data collect by the PICT observer (top) and port (bottom) sampling programs for swordfish (left) and striped marlin (right), showing bias due to low representation of small fish in port sampling.

Size data collection sample requirements and priorities (species/areas/fisheries) also need review in relation to how they are used in stock assessment. The primary use of size data is in stock assessment, but the samples collection goals are not necessarily guided by the needs for the individual stock assessments and ongoing improvement. This can result in suboptimal use of resources for sample collection, under sampling in some areas/species/times, over sampling in others, spatio-temporal biases and patchiness that can be a challenge for assessment models.

The variety of size data measurements that are provided and the need to convert data both outside (i.e. length to length and weight to weight) and within the stock assessments to age compositions can create biases and modelling issues. Ideally, all fish would be measured with at least a common length metric using standard methods across all sampling programs. While this does seem theoretically feasible, it seems difficult in practice and adds noise and potential biases to size data that can lead to data conflict in stock assessments. Some (in some cases considerable) size data should be rejected for inclusion in assessments, but it is difficult for assessment scientists to make these decisions rapidly without the understanding or having readily available information on the data collection process and reliability.

While the SSP data team has conducted considerable work over many years to improve the quality of size data used for stock assessments, they cannot control what goes on at the measurement/collection source. There is a need to take stock of the current size data collection procedures, address issues faced when using the size data in assessments and provide guidance to improve or enhance the size data collections to satisfy the needs of stock assessments. SC project 127 was initiated to help provide guidance and documentation to stock assessment staff and WCPFC

members, and suggestions to improve size data collection and reporting to be more fit-for-purpose for stock assessment.

OBJECTIVES (as per original TOR)

1. Review the procedures used to collect and process size data for use in WCPFC stock assessments *(phase 1)*
2. Review the key historical approaches and changes in the collection of size composition data for tuna assessments and provide a summary guide on size data collection for stock assessment scientists *(phase 1 and 2)*
3. Identify any critical inadequacies in the current size data sampling or areas where oversampling might be occurring *(phase 2 work)*
4. Provide options for improving the provision and consistency of size composition data for application in stock assessments *(phase 1 and 2)*

SCOPE OF WORK (as per original TOR)

- Review the current/historical approaches and key changes in the collection of size composition data for tuna assessments and provide a summary guide on size data collection for stock assessment scientists.
- Identify any critical inadequacies in the current size data sampling or areas where oversampling might be occurring.
- Provide options for improving the provision and consistency of size composition data for application in stock assessments.
- Identify issues with size data provided to the WCPFC and confirm with the relevant CCMs.
- Liaise with individual CCMs to identify the best way to deal with discrepancies.

This phase 1 progress report deals mostly with aspects of objectives 1, 2 and 4 and represents the first phase of this initiative to inform WCPFC size data improvements for stock assessment. We also refer readers to a similar project conducted for longline size data in the Indian Ocean (IOTC) by Hoyle et al. (2021). That review covered size data collection for the Japanese, Korean, and Chinese Taipei longline fleets in the Indian Ocean. Information in that report, particularly historical accounts of sampling practices would be expected to be relevant to these fleets collecting size data in the Pacific Ocean.

Review of data sources and procedures used to collect and process size data for use in WCPFC stock assessments

Data sources

Size data that can be considered for stock assessments of Western and Central Pacific Ocean (WCPO) tuna, billfish and sharks are provided from numerous sources, which can include combinations of flags/countries, port and onboard sampling by observers or crew, fishing company/processor landings records, research and tagging cruises. Some are historical and others ongoing. Data sources might be combined into higher level groupings/aggregations before being provided to SPC, with limited associated spatial information. SPC manages an extensive database of size data sources. The databases referred to as LF_MASTER (length data) and WT_MASTER (weight data) contain standardised and consolidated data from these various sources in a format developed for the extraction of size data for stock assessments. The origins of the data in the LF and WF_MASTER files can be difficult to trace, or assess their quality, for the stock assessment scientist who typically only interacts with the consolidated LF and WF_MASTER data. This section aims to summarise the various sources of size data, and the categorisations used in the generation of the LF_MASTER and WT_MASTER databases as a reference for analysts. It also provides a description of the process followed by the SPC Data Management Team to create the consolidated LF and WF_MASTER data sets.

Table 1 Description of LF_MASTER and WT_MASTER high level data categories. A=aggregated, T=trip level, O=observer, P=port sampling, X = tagging programmes.

SIZE Data Category	Data Category Code	Description
Non-standard AGGREGATE data	**A**	Represents SIZE data that are provided by countries as a Western and Central Pacific Fisheries Commission (WCPFC) data submission, or historically, provided for assessments from DWFN fleets (i.e. mostly Japan, Korea, Chinese Taipei) prior to the establishment of the WCPFC. The data provided are at an aggregated resolution which are typically at the level of **GEAR, FLAG, YEAR and MONTH or QUARTER** (temporal) and various spatial aggregations (5x5°, 10x10°, 10x20° latitude/longitude). The data cannot be linked to operational level strata such as the trip or set. The data collection points for these aggregated data are often uncertain but are thought to be mostly collected at landing ports by fisheries agency employees, although some data were probably collected on the vessels by crew, researchers or observers at sea. **Non-standard** refers to these AGGREGATED data submissions not following consistent formats required by the SPC database, which requires SPC to reformat them to a consistent 'standard format' for the generation of the LF and WF_MASTER datasets.
Non-standard Trip-level data	**T**	Represents the aggregation of SIZE data that are originally provided as a WCPFC data submission, or historically, provided for assessments for DWFN fleets prior to the establishment of the WCPFC. The data provided have been collected from sampling specific vessel trip landings at ports and so are at a higher resolution than data category 'A'. The data have an aggregated resolution which are typically at the level of **GEAR, FLAG, Vessel trip (Vessel and trip dates), Date of port sampling, and in some cases, the dates of the departure and return of fishing trip, and broad area fished**. **Non-standard** refers to these TRIP data submissions not following consistent formats required by the SPC database, which requires SPC to reformat them to a consistent 'standard format' for the generation of the LF and WF_MASTER datasets.
Regional OBSERVER SIZE data (R_OB)	**O**	Represents the aggregation of all OBSERVER size (**lengths, as observers rarely weigh fish**) data held in **the SPC Regional - Pacific Island Countries and Territories (PICTs) Observer** database, and we also include Australia and New Zealand Observer programs in this grouping. The original OBSERVER data are at the on vessel fishing operational level and so time/area /set resolution of the original SIZE data collection are high and very accurate. These data are then aggregated to a resolution which are at the level of GEAR, FLAG, YEAR, SET TYPE (for purse seine), MONTH, 1°x1°.
Distant water/Philippines	**O**	These data have been grouped for the purpose of this summary. DW_OB in this paper represents the aggregation of all OBSERVER size (lengths, as observers rarely weigh fish) data held in the observer database from distant water programs, dominated by JP, KR, TW, CN, and also PH

OBSERVER SIZE data (DW_OB)		(domestic and HSP1). The original OBSERVER data are at the 'on vessel' fishing operational level and so time/area resolution of the original SIZE data collection are high and very accurate. These data are then aggregated to a resolution which are at the level of GEAR, FLAG, YEAR, SET TYPE (for purse seine), MONTH, 1°x1°. These programs provide data according to the WCPFC Regional Observer Program (ROP) data requirements (consistent with PICTs observers) and use the standard codes and formats required by SPC. They follow standard measurement protocols but may differ in how observer time is managed on vessels. None the less all observer programs aim for observers to measure as many fish as they can while on duty, and fish that can't be measured still get recorded as NM (not measured).
Regional PORT SAMPLING SIZE data	**P**	Represents the aggregation of SIZE data that have been collected through port sampling in PICTs (programs established under direction from SPC) and are originally provided as a WCPFC data submission, or historically, provided for assessments for DWFN fleets prior to the establishment of the WCPFC**.** The data provided include all flags sampled at PICT port sampling locations and have been collected from sampling specific vessel trip landings and so are at a higher resolution than data category 'A'. The data have an aggregated resolution which are typically at the level of **GEAR, FLAG, Vessel trip (Vessel and trip dates), Date of port sampling, and in some cases, the dates of the depart and return of fishing trip, and broad area fished.** These data are available in TUFMAN 2, and data prior to 2015 are being migrated from the legacy VFP (Visual Fox Pro) Regional Port Sampling database into TUFMAN 2.
Regional TAGGING data	**X**	Represents the aggregation of all TAG RELEASE size (length) data held in the SPC Regional Tagging database. The original TAGGING RELEASE data are at the fishing operational level and so time/area of the original SIZE data are very accurate. These data are then aggregated to a resolution which are at the level of GEAR, FLAG, YEAR, MONTH, 1°x1°.

Table 2 Description of LF_MASTER and WT_MASTER database origin SOURCEs (ORIGIN_ID). A=aggregated, T=trip level, O=observer, P=port sampling, X = tagging programmes

ORIGIN_ID Code	Grouping Category	Description	Length (L) or Weight (W)	Data Category Code	Historical only (No longer submitted = Y)
ESLL		Spanish Longline length data	L	**A**	
IAEP		US Purse seine data by EPO Statistical area for EPO	L	**A**	**Y**
IAPS		US Purse seine data for WCPO (IATTC)	L	**A**	**Y**
IAWP		US Purse seine data by Western Pacific Yellowfin Research Programme (WPYRG) areas for WCPO	L	**A**	**Y**
IPTP		Indo-Pacific Tuna Program (Indonesia)	L	**T**	**Y**
JBPL		Historic Japanese Pole-and-line data	L	**A**	**Y**
JBPS		Historic Japanese Purse seine data	L	**A**	**Y**
JPLL		Japanese longline size (LENGTH) data	L	**A**	
JPPL		Japanese PL port sampling	L	**A**	
JPPS		Japanese PS port sampling	L	**A**	
JPSJ		Japan length data (Skipjack)	L	**A**	**Y**
KRLL		Korean Longline Length data	L	**A**	
KRPS		Korean Purse seine size data	L	**A**	**Y**
LCEM		Landed Catch and Effort Monitoring System (Philippines)	L	**T**	**Y**
NSAP		Philippines National Stock Assessment Project (NSAP) size data	L	**T**	
NZPS		New Zealand Purse seine data	L	**A**	**Y**
OBPS		Historic Regional Observer Data - Purse seine	L	**O**	**Y**
PGPL		Historic Papua New Guinea (PNG) Pole-and-line data	L	**A**	**Y**
PHIL		Philippines pre-LCEM port sampling (IPTP protocol)	L	**T**	**Y**
PKSI		Indonesia - port sampling under WPEA (previously PKSI agency)	L	**T**	
AUOB	R_OB	AFMA (AFZ) Observer Data, Australia	L	**O**	

ORIGIN_ID Code	Grouping Category	Description	Length (L) or Weight (W)	Data Category Code	Historical only (No longer submitted = Y)
CKOB	R_OB	Cook Islands Observer Programme	L	**O**	
FAOB	R_OB	FSM Arrangement Observer Programme	L	**O**	
FJOB	R_OB	Fiji Observer Programme	L	**O**	
FMOB	R_OB	FSM Observer Data	L	**O**	
HWOB	R_OB	Hawaii observer programme	L	**O**	
KIOB	R_OB	Kiribati Observer Programme	L	**O**	
MHOB	R_OB	Marshall Islands Observer Data	L	**O**	
NCOB	R_OB	New Caledonia Observer Programme	L	**O**	
NZOB	R_OB	New Zealand Observer programme	L	**O**	
PFOB	R_OB	French Polynesia Observer Programme	L	**O**	
PGOB	R_OB	PNG Observer Data	L	**O**	
PWOB	R_OB	Palau Observer Programme	L	**O**	
SBOB	R_OB	Solomon Islands Observer Data	L	**O**	
SPOB	R_OB	SPC Observer Data	L	**O**	
TOOB	R_OB	Tonga Observer Programme	L	**O**	
TTOB	R_OB	US Multilateral treaty Observer data	L	**O**	
CNOB	DW_OB	China Observer Data	L	**O**	
JPOB	DW_OB	Japan Observer Data	L	**O**	
KROB	DW_OB	Korea Observer Data	L	**O**	
PHOB	DW_OB	Philippines Observer Data	L	**O**	
TWOB	DW_OB	Chinese Taipei Observer Data	L	**O**	
SBPL		Historic Solomon Islands Pole-and-line data	L	**A**	**Y**
SRAU	SPAR	South Pacific Albacore Research Programme (SPAR) SPAR Data - Australian Contribution	L	**A**	**Y**
SRFJ	SPAR	SPAR Data - Fijian Contribution	L	**A**	**Y**
SRJP	SPAR	SPAR Data - Japanese Contribution	L	**A**	**Y**
SRNZ	SPAR	SPAR Data - New Zealand Contribution	L	**A**	**Y**
SRPF	SPAR	SPAR Data - French Polynesia Contribution	L	**A**	**Y**
SRUS	SPAR	SPAR Data - US Contribution	L	**A**	**Y**
SPGN		SPC Driftnet sampling in Noumea	L	**P**	**Y**
SPLL		Regional (PICTs) Port sampling data – Longline (LENGTHS)	L	**P**	
SPPL		Regional (PICTs) Port sampling data - Pole-and-line	L	**P**	
SPPS		Regional (PICTs) Port sampling data - Purse seine	L	**P**	
SPTR		Regional (PICTs) Port sampling data - Troll	L	**P**	
ARTP	TAG_	Regional and National Tagging Projects (TAG_) Albacore Research Tagging Project size data	L	**X**	**Y**
CS	TAG_	Coral Sea Tagging	L	**X**	**Y**
FJCT	TAG_	Fiji In-country Tagging	L	**X**	**Y**
HWTP	TAG_	Hawaiian Tagging Project (PFRP)	L	**X**	**Y**
IATT	TAG_	IATTC Tagging	L	**X**	**Y**
KACT	TAG_	FSM (Kapingamarangi) In-country Tagging	L	**X**	**Y**
KICT	TAG_	Kiribati In-country Tagging	L	**X**	**Y**
PTRP	TAG_	Philippines tuna research Project (Tagging)	L	**X**	**Y**
PTTP	TAG_	Pacific Tuna Tagging Project (Current)	L	**X**	

ORIGIN_ID Code	Grouping Category	Description	Length (L) or Weight (W)	Data Category Code	Historical only (No longer submitted = Y)
RTTP	TAG_	Regional Tuna Tagging Project	L	**X**	**Y**
SEED	TAG_	(Tag Seeding Experiments)	L	**X**	**Y**
SICT	TAG_	Solomon Islands In-country Tagging	L	**X**	**Y**
SMPI	TAG_	Ad hoc tagging in Pacific-Island countries (SPC)	L	**X**	**Y**
SSAP	TAG_	Skipjack Survey and Assessment Programme	L	**X**	**Y**
TTPS		US Multilateral treaty Port sampling data	L	**T**	**Y**
TWLL		Taiwanese Longline length data (includes fleets OS and DW)	L	**A**	
VNWP		Vietnam -- WPEA Port sampling project -- LENGTHS	L	**T**	
AUWT		Australian LONGLINE unloading weights	W	**A**	
GUWT		Guam LONGLINE unloading weights	W	**T**	**Y**
HWWT		Hawaiian LL/HL BET unloading weights	W	**A**	
IDWT		Indonesia -- WPEA LONGLINE / HANDLINE port sampling - WEIGHTS	W	**T**	
JPWT		Japanese LONGLINE Weight data	W	**A**	**Y**
NZWT		New Zealand LL unloading weights	W	**A**	
SBWT		Solomon Is. LONGLINE Trimarine (TMI) WEIGHT data	W	**A**	
SPPK		Regional LL Packing List data	W	**P**	**Y**
SPWT		Regional (PICTs) Port sampling data – Longline (WEIGHTS)	W	**P**	
TWWT		Taiwanese LL DWFN – WEIGHTS	W	**A**	
VNWT		Vietnam WPEA LONGLINE/HANDLINE Port sampling project WEIGHTS	W	**T**	

Generating the LF and WF_MASTER datasets

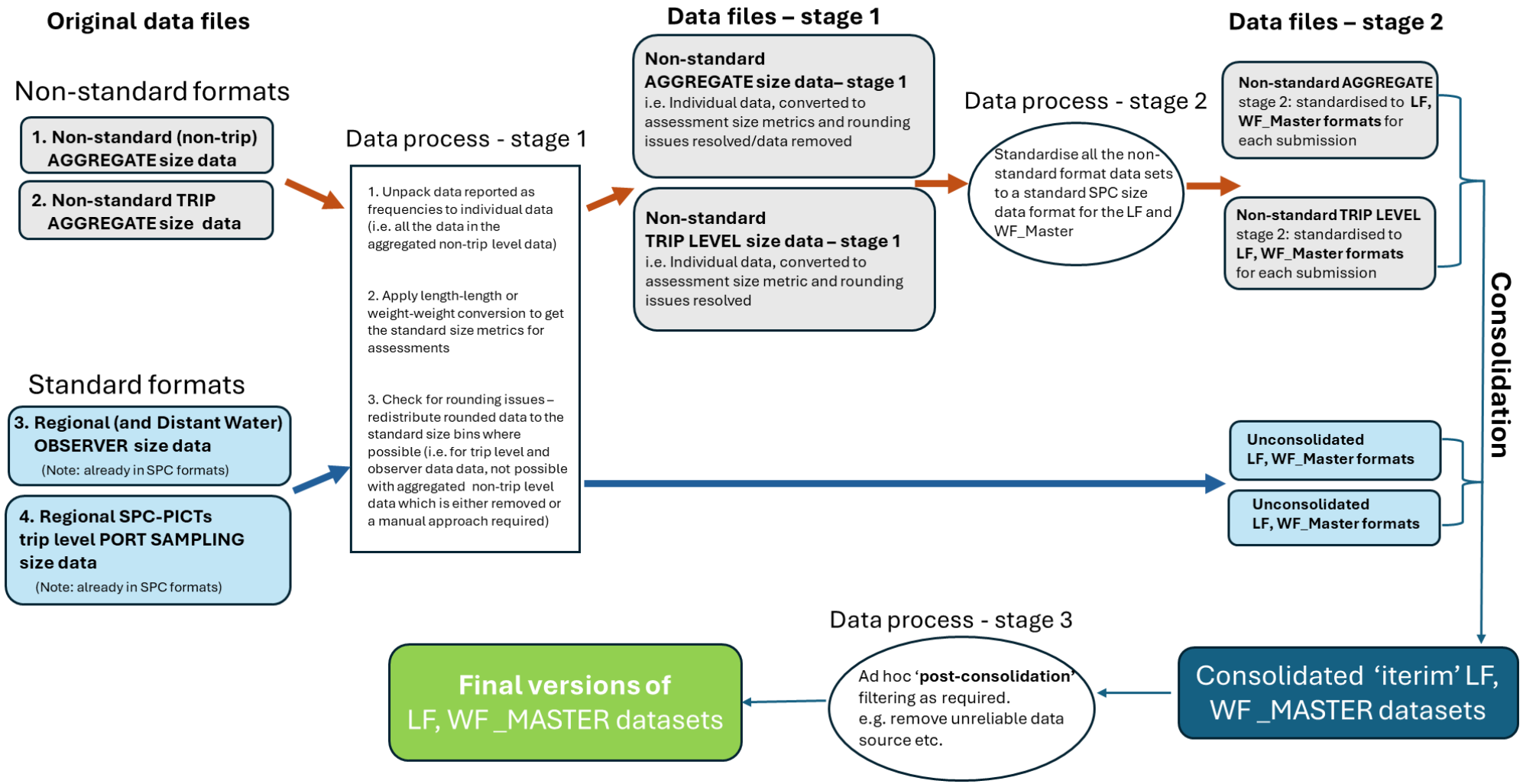
The databases that house the consolidated length and weight data used for stock assessments are the LF_MASTER and WF_MASTER respectively. **Figure 2** describes how the LF and WF_MASTER datasets are created from the variety of source (origin codes, **Table *2***) datasets available in the SPC databases. There are several main categories of original data sources:

- data that is provided using SPC standard formats and codes,
- data provided in other formats or using other codes that are not SPC standard formats and codes (i.e. Non-standard)
- data that is aggregated above trip level
- data that is provided at trip level

Generation of the LF and WF_MASTER datasets requires all these different data sources to be standardised to a common format and codes used for the LF and WF_MASTER. This process happens to each dataset before consolidation into the MASTER datasets. To achieve these standard formats, data that this not measured in the length or weight forms used in the stock assessments is converted using length to length or weight to weight conversion factors, discussed more later. Also, data that is provided in non-standard rounded bins (resolutions) is redistributed into standard bins using a redistribution procedure. This can only be done for trip level data. If rounding issues occur in aggregated data, the non-standard resolution data can be removed, or manual procedures conducted to resolve the issues if feasible. It is critical that the data are provided to SPC with protocols on measurement resolutions and that these do not change in an ad hoc manner within the source data without documentation and notification to SPC.

Size data from the LF and WF_MASTER datasets are extracted by assessment or supporting scientists and they apply a set of procedures to further curate the data and attribute it to the designated fisheries in the stock assessment model. These procedures are not considered in this phase 1 work but could be a focus of phase 2 work (below). The assessment fisheries are defined by combinations of gears, flags, model spatial regions (if spatial structured assessments) and/or fleet -areas (if in a fleets as area model). Only size data that are considered representative for the defined fisheries in the model and time strata (i.e. year-quarter) should be used in the stock assessment, but this is often not the case. Typically, the assessment scientists take the data from the LF_MASTER and WF_MASTER and attributed it to fisheries/strata. Anomalies are often identified after the data are attributed to the model fisheries and an ad hoc filtering is used to 'clean' the data, rather than dealing with problematic data at the source program, i.e. during the LF_MASTER post-consolidation filtering. As such, there is considerable work required to clean and prepare the size data for stock assessments. In this process a large amount of data that might be considered useful in the LF and WF_MASTER may be deemed unsuitable. Size data preparation for stock assessment models is a work in progress and the procedures, repeatability and efficiency, while improved in recent years, still need considerable attention and resources (see phase 2 work below). **However, it is important that assessment scientists have sufficient time and place more effort on understanding the size data sources and their reliability before aggregating them into stock assessments.**

Figure 2 Schematic describing the process for generating the consolidated LF and WF_MASTER datasets. **See Appendix 1 and 2** for details on LF and WF_Master data structures and data fields.



Size measurements- lengths

Tunas

The standard-length measurement used in stock assessments for all tuna is the upper jaw fork length (UF) (**Figure *3***). The is the standard measure applied by observers and port samplers when possible. Port samplers may also measure alternate lengths on dressed fish such as upper jaw to second dorsal fin (US) when the tail is removed, or pectoral fin to second dorsal fin when both head and tail are removed (PS). US and PS lengths are converted to UF in the LF_MASTER database generation (**Figure 2**) (see **Table *3*** for conversion factors).

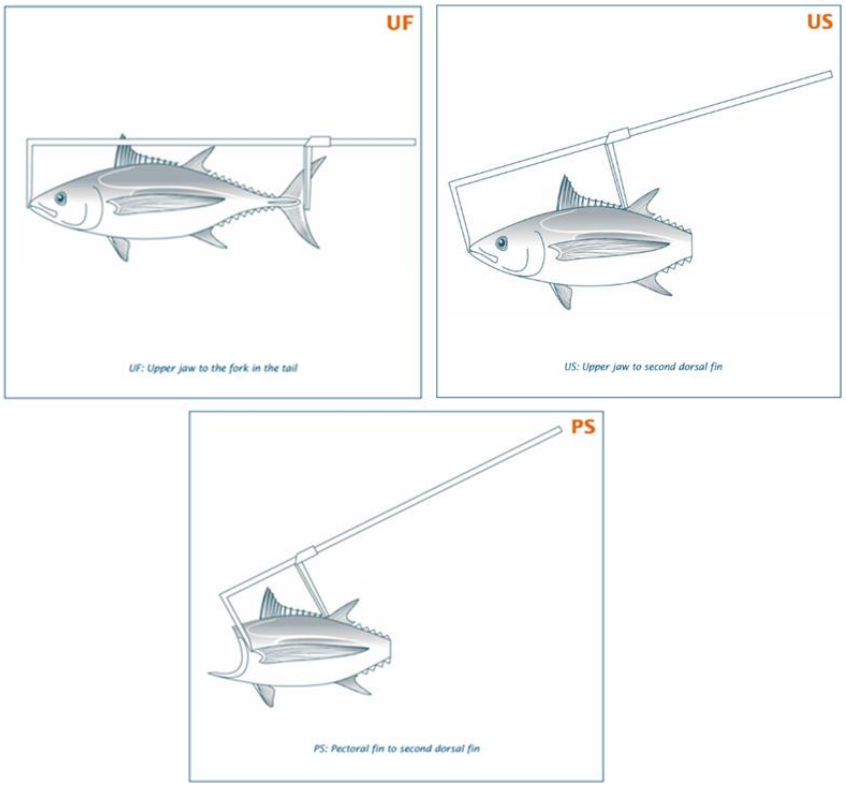


Figure 3 Measurement methods used for tuna: UF – upper jaw to fork, US – upper jaw to second dorsal fin, PS – pectoral fin to second dorsal fin.

Billfish

The standard-length measurement for billfish assessments varies between species. Striped marlin assessments use the eye orbital fork length measure (EO), whereas swordfish assessments use the lower jaw fork length (LF) (**Figure *4***). There is no documented reason why the assessments use different length measures, it is likely an historic decision perhaps related to the available data at the time. It would be simpler to use the same measurement method in the assessments of all billfish species. These differences create issues as often biological information such as growth curves are in one length form, but the assessments are in another length form – requiring conversion of growth curves, with the added risk of introducing bias due to conversions. Most whole billfish measured for length by all flags/observer programmes are measured by LF, but typically the heads are removed before landing at ports, and a processed weight rather than length is most commonly collected in port sampling. However, Japan has the common practice of removing the bill and a small part of the lower jaw, in the landed processed form. The retention of the head allows the EO length to be

measured both on vessels and at ports**. It might make sense to use LF as the standard measure in all billfish assessments and therefore only the Japanese data would then require conversion. The goal should be to minimise the requirement for size data conversions across the majority of data as these can introduce bias to the size data.** As noted, aside from Japanese vessel landings, other flags land billfish with the heads removed, and in these cases if lengths are measured (i.e., in port) the fish are measured by pectoral fin to fork length (PF).

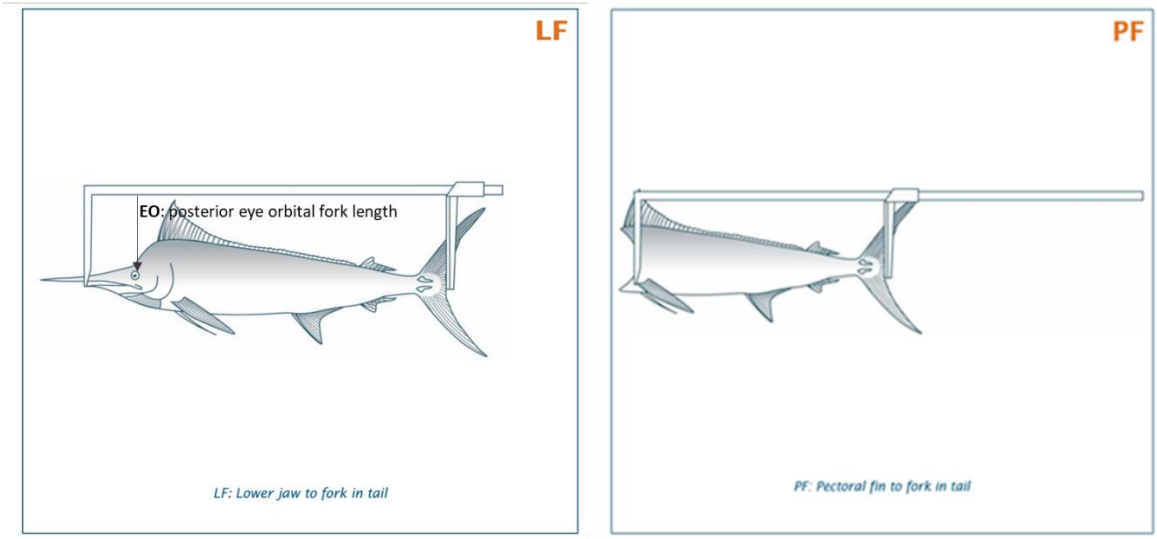


Figure 4 Measurement methods used for billfish: LF – lower jaw to fork, EO - eye orbital fork length, PF – pectoral fin to fork

Sharks

Virtually all shark length data are provided by observer programmes where the shark is measured unprocessed at capture. **The standard measure used in the assessments is the same as the observer measured method, which is the tip of the snout to the caudal fin fork (UF)** (**Figure *5***). Some measurements may be in total length (TL). TL would be converted to UF, if reliable conversion factors are available, or not used in assessments.

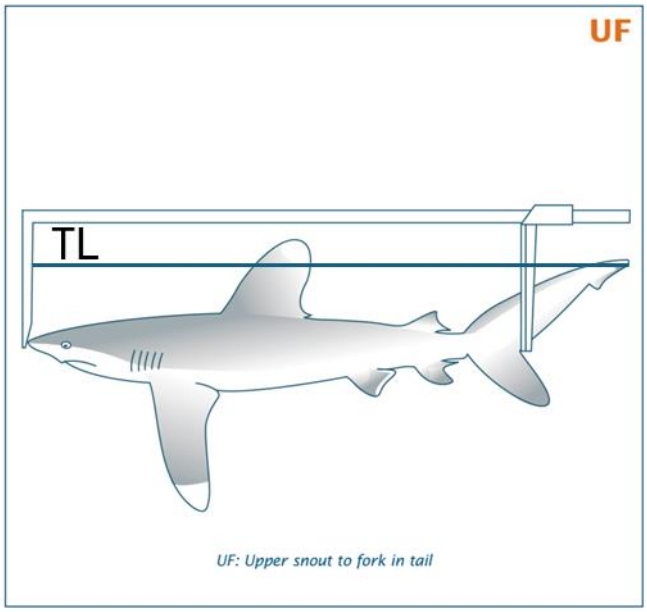


Figure 5 Measurement method used for sharks: UF -upper snout to fork, TL – total length.

Size measurements – weights

Weight data are used in some tuna (i.e. yellowfin and bigeye tuna) and both billfish (swordfish and striped marlin) assessments and can account for significant amounts of the size data from port sampling programs. Even though some sampling programs are now more focussed on collection of length measurements by observers (and in future perhaps through e-monitoring - EM), other programs moving to EM to replace observers (e.g. Australia) have now focussed on port sampling of weights of processed fish (i.e., Australia, New Zealand). All weight data are usually from port sampling programmes, as weighing fish accurately on a moving vessel is very difficult and inaccurate for observers. Weight data that are used in stock assessments is always input as 'whole weights - WW', but most of the raw weight data are collected in a processed form (e.g. gilled and gutted etc.) and requires conversion to WW to generate the WF_MASTER dataset. **Ideally all weight data should be provided to SPC in the original form so that SPC can apply its own standard conversion factors. Data that is pre-converted before being provided to SPC and does not have the accompanying data for the original form or provision of the applied conversion factors should not be used in stock assessments.**

Tunas

There are various processed forms of tuna that are measured for weight, depending on a flag's port sampling, markets, onboard storage – frozen, brined etc. (**Figure *6***, **Figure *7***). The most common forms include some form of gills and guts removed, with or without the head and/or tail and fins. All these forms are converted to whole weight (WW) for use in the stock assessments, see **Table *4*** for weight to weight conversion factors

a) Whole frozen albacore – with fins removed this would be classified as WW, as there is no SPC code for this form where only fins are removed.

b) Mixture of frozen forms, gilled and gutted (GG) headed, gutted and tailed (GX)

c) Gilled, gutted, tailed (GT) frozen yellowfin, with D-cut to remove gill cover, tail (cut off at 4th finlet) and fins are also removed. This is the Japanese form of processing for ultra-low temperature frozen forms, also used by other fleets including Chinese Taipei. Note there is a specific GT conversion for this Japanese form, table 6.

Figure 6 Different forms of frozen processed tuna measured for weights by port sampling. (Images a) and c) courtesy Russell Dunham)

Figure 7 The standard gilled and gutted (GG) form of fresh (brined/slurry) tuna weighed in ports, most common in Pacific Islands.

Billfish

Billfish are typically landed in processed form by commercial operators. Recreational landings have individual whole weights (by NZ) from club/tournament records using certified scales. The common commercial processed form is headed and gutted, with tail on but the fins trimmed down, and other fins removed (GX below) (i.e. Australia, NZ). The caudal peduncle is often retained to attach a rope to lift the fish (**Figure *8***). In NZ various trunk forms are weighed, but most common is referred to as headed, gutted and fins removed; referred to as HGF in NZ (NZ Fisheries (Conversion Factors) Notice 2014) which is assumed similar to head, gutted and tailed – referred to as GX in the SPC data codes for conversions to whole weight, and is the common form for billfish weighed by the Australian port sampling program.

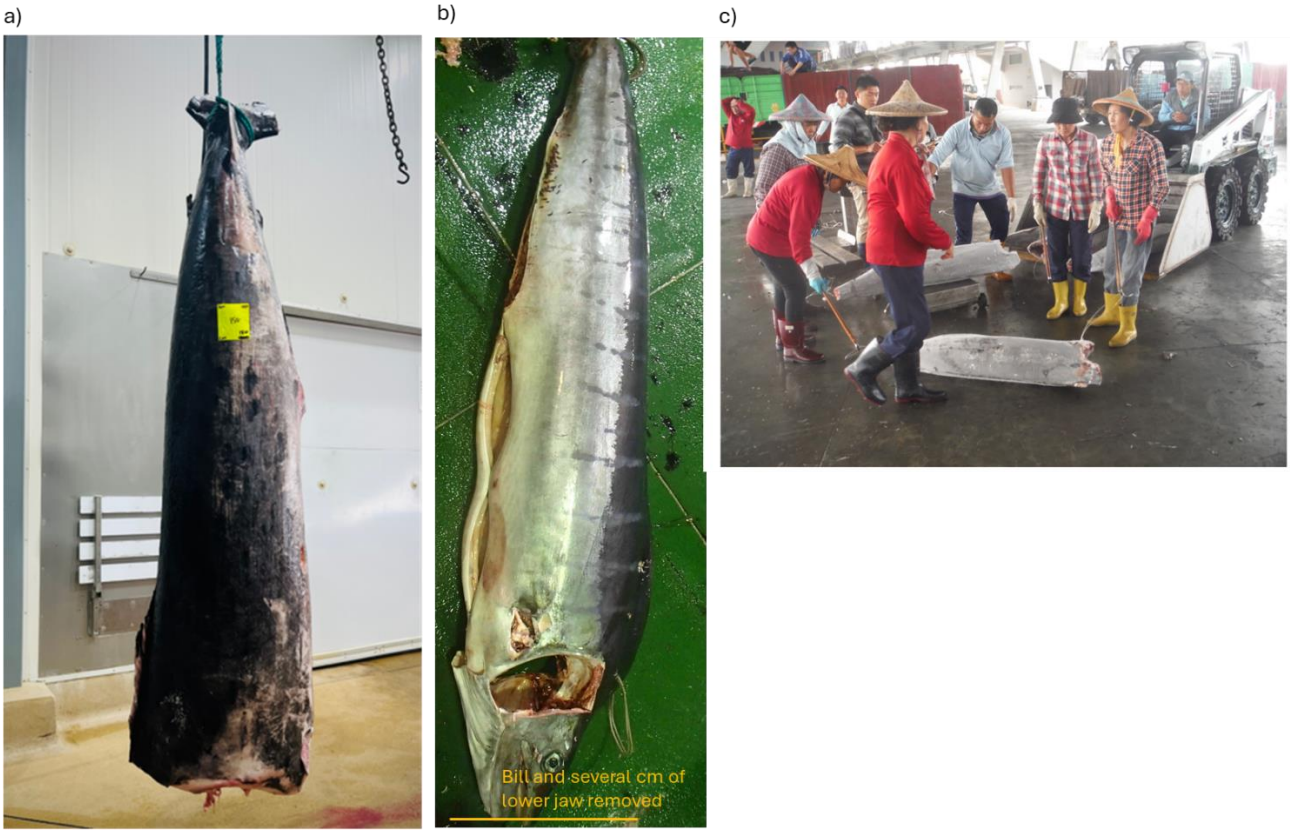


Figure 8 Different forms of processed billfish measured for weights by port sampling a) Headed, gutted and finned, tail caudal peduncle retained for lifting (GX), b) Japanese form for with gills removed including removal of gill cover, bill and a few cm of lower jaw removed, fins removed, note the tail caudal peduncle may (fresh domestic Japan fisheries) or may not (Pacific, frozen) be retained for lifting but is not seen in the image, c) frozen marlin being weighed at Donggang port Taiwan port headed, gutted, finned and tailed, a) swordfish, courtesy Leyla Knittweis NZ MPI, b) striped marlin, courtesy Kai Mikihiko, Japan FRA, c) taken from (Campling et al., 2017), photo credit Mike McCoy.

Conversion factors

Conversion factors are very important to standardise the size data inputs to common metrics and thereby allow more data sources to be used. Obtaining good conversation factors is critical but many of the conversion factors available are old or based on uncertain/unavailable data or sources. If conversion factors are not developed based on good measurement protocols, with sampling of suitable numbers of fish across the size range and the areas/populations/times relevant to the assessment, they can introduce biases to size data inputs. These biases can create serious issues for stock assessment models, and potentially impact derived quantities used for management advice. Morphometric relationships may vary for each species in space and time, and across size groups. This

means that historical conversion factors may become outdated, and conversion factors taken from literature/studies from other stocks or regions may not be representative of the assessed stock of the same species. Furthermore, if conversion factors are not developed from data collected across the full-size range that requires conversion, biases in conversion could be introduced for certain size classes that are not covered by the data used to calculate the conversion factor. Historical conversion factor values often just get carried forward across assessments, but information on the size ranges, sample numbers and uncertainty of the conversion factors is often not available, or difficult to track down, and the data sets are even more difficult if not impossible to locate.

Within age-structured stock assessment models if length and weight data are used, they are typically input and modelled as separate measurement types, and it is currently not standard practice in stock assessment to prior converted weight data to the common length metric before using it to the model. The models are age structured which means the population is modelled as numbers of fish in each age class (i.e. typically age is in quarters in tuna and billfish models, but often in years for other slower growing species with restricted seasonal spawning seasons). The catch at size data are converted to catch at age in the model using the catches for a fishery and the size composition of those catches, plus a growth curve (usually based on age at length samples rather than age at weight). When weight data are used in an assessment a length-weight conversion is applied in the model to convert the catch numbers at weight to catch numbers at length thereby enabling conversion to catch numbers at age. While the growth curve is consistent the application of biased or non-representative length-weight conversion parameters to weight compositions can lead to biased/non-representative catch numbers at age that are inconsistent with the catch numbers at age derived from fisheries or time periods (even for the same fishery) with length data – even if these fisheries use the same gear and are likely selecting for the same size (and age) fish. This can create issues of poor model fits, data conflicts and biased estimates of management quantities for stock assessment models that incorporate length and weight data. **Ideally all fish in an assessment would be measured using the same methods – length is preferred rather than weight; 1. Because fish weight at age will vary a lot more than length due to fish condition, spawning seasons, environmental changes etc., 2. Growth data are mostly available in terms of age at length.**

Unfortunately, the practicalities of getting size data from fishery catches across many fleets means that obtaining all data in length is not feasible, and much historic and current data from some sources is measured in weight. As a result, various conversion factors are required to utilize the available size data for WCPFC stock assessments.

The importance of conversion factors is the reason for the ongoing ***WCPFC Project 90: Better data on fish weights and lengths for scientific analyses*** (Macdonald *et al.*, 2023, 2024)**.** However, this work has understandably focussed on tuna. The majority of conversion factors for billfish, especially the weight-to-weight and length-to-length conversion are based on historic studies, with somewhat limited data, and data that are not available. The conversions require renewed attention and improvement, even updating with newly collected data. Further the length-weight relationships for billfish are restricted spatially and temporally and may not capture the variability that actually occurs over the broad areas and long time periods of WCPFC assessments. The limited spatial and temporal coverage limits the ability to understand the importance of incorporating variability in this key relationship in assessments.

Conversion factor reference tables are available in Tufman2.
https://fame.spc.int/resources/tools/tufman2

Application of conversion factors

Raw size data are provided in frequencies of individual measurements, mostly rounded to the nearest integer, at the various strata (LSTRAT/WSTRAT, typically 1 cm, 1 kg). The method for applying the conversion factors therefore requires a smoothing process whereby the frequency of samples for each size class in the original (raw) data is disaggregated to single fish measurements. The individual disaggregated data are then substituted with random numbers within the range of -0.5 to 0.5 of the original length or weight class and the conversion factors are applied to those values. This ensures that the standard size class calculated using the conversion factor is based on the original size class value (X) having an estimated distribution to one decimal place between (X - 0.5) and (X + 0.5), thus avoiding the calculated standard size value potentially excluding a size class. **Figure *9*** provides a basic example of how the process is done in the generation of LF_MASTER and WT_MASTER from sources where the raw length and weight require conversion to the standard metrics used in the stock assessments.

Original data (e.g. PF length, 1 cm resolution)	
Length	Frequency
134	5

Disaggregated lengths	**Random values assigned between 134-0.5 and 134+05** e.g. =RAND()*(134.5-133.5)+133.5
134	134.149
134	134.367
134	134.309
134	133.735
134	133.944

Apply conversion e.g. EO=(PF/0.7309)*0.862096 – 2.93	**Round to nearest cm**
155.2986	155
155.5558	156
155.4874	155
154.8103	155
155.0568	155

Figure 9 Example of the application of a conversion factor for striped marlin size data provided in PF length and converted to EO length which is the standard metric used for the stock assessment.

Not all data are provided in 1 cm strata, some length data are stratified at 2 cm or 5 cm intervals (i.e. LSTRAT = 2 or LSTRAT = 5) instead of the usual 1 cm intervals. In these cases, the conversion process for LENGTH data are further complicated and additional random weighting needs to include consideration of the LSTRAT data field, and also consideration of using the LSTRAT to ensure the converted value adheres to that LSTRAT value (i.e. the converted length is at intervals of LSTRAT).

The approach described above was first used by SPC for weight data in 2006 and is described (second last paragraph) in (Langley *et al.*, 2006) (https://meetings.wcpfc.int/node/6288). The approach has been used when conversion factors for both length and weight data have been required since that time.

Some weight data are provided as truncated (i.e. rounded down to the nearest integer (kg)) or rounded up. In these cases, for conversions to be applied, instead of assigning the random values

between -0.5 and + 0.5 of the weight class, the random values are assigned for the range 0 to +1 of the weight class. This applies to historic data**, the port sampling protocol now requires the weights to be recorded to one decimal place instead of the port sampler doing the rounding**. If the weight is rounded (e.g. historical data) then the smoothing is applied.

Length to length

Table *3* includes the length-to-length conversions that are typically applied by SPC to produce length data in the specified metrics for the assessments.

Table 3 Length to length conversions currently applied as standard by SPC to generate LF_Master. See table 5 of appendices for definitions of the length codes.

Species	Size category	From	To	Conversion equations a) Simple without disaggregation, random adjustments etc. b) Complete conversion procedure	Source
MLS	Length	PF	EO	a) EO = (PF/0.7309)*0.862096-2.93 b) b) LEN_{EO} = FLOOR(ROUND((LEN_{PF} + (Rand()*LSTRAT - (0.5*LSTRAT)) / 0.7309) * 0.862096 – 2.93 ,0) , 0) / LSTRAT) * LSTRAT	Unknown, not included in Tufman2, probably based PF-LF then LF-EO both from **SPC Observer data**
MLS	Length	LF	EO	a) EO=LF*0.862096-2.93 b) LEN_{EO} = FLOOR(ROUND((LEN_{LF} + (Rand()*LSTRAT - (0.5*LSTRAT)) * 0.862096 – 2.93 ,0) , 0) / LSTRAT) * LSTRAT	SPC observer data (n=498 fish, AU/NZ 1996/97, 1990-2007) WCPFC-SC20-2024/ST-IP-04
MLS	Length	PF	LF	a) LF=PF*1.17946 b) LEN_{LF} = FLOOR(ROUND(($LENP_{F}$ + (Rand()*LSTRAT - (0.5*LSTRAT)) * 1.17946 ,0) , 0) / LSTRAT) * LSTRAT	SPC Observer data, assume same 498 fish as above?
SWO	Length	PF	LF	a) LF=PF/0.7600 b) b) LEN_{LF} = FLOOR(ROUND((LEN_{PF} + (Rand()*LSTRAT - (0.5*LSTRAT)) / 0.7600 ,0) , 0) / LSTRAT) * LSTRAT	SPC conversion assume from observer data Equivalent in Tufman2 LF=1.31578*PF
SWO	Length	EO	LF	a) LF=EO/0.900 (same as EO*1.1111 in T2) b) LENLF = FLOOR(ROUND((LEN_{EO} + (Rand()*LSTRAT - (0.5*LSTRAT)) / 0.900 ,0) , 0) / LSTRAT) * LSTRAT	Unknown Alternative in Tufman2 is LF=EO*1.0753 + 6.898 from Campbell 2008 (note he had the conversion back to front in his paper - WCPFC-SC4-2008/SA-IP-3), this option was used in the 2017 assessment Takeuchi et al. (2017)
BUM	Length	PF	LF	a) LF=PF/0.8149 b) LEN_{LF} = FLOOR(ROUND((LEN_{PF} + (Rand()*LSTRAT - (0.5*LSTRAT)) / 0.8149 ,0) , 0) / LSTRAT) * LSTRAT	SPC conversion assume from observer data Equivalent to Tufman2 LF=1.22714*PF
BUM	Length	EO	LF	a) LF=EO/0.900 a) LEN_{LF} = FLOOR(ROUND((LEN_{EO} + (Rand()*LSTRAT - (0.5*LSTRAT)) / 0.900 ,0) , 0) / LSTRAT) * LSTRAT	Unknown (same as SWO?)
BLM	Length	EO	LF	a) LF=EO/0.900 b) LENLF = FLOOR(ROUND((LEN_{EO} + (Rand()*LSTRAT - (0.5*LSTRAT)) / 0.900 ,0) , 0) / LSTRAT) * LSTRAT	Unknown (same as SWO?)
BLM	Length	PF	LF	b) LF=PF/0.7750 b) LEN_{LF} = FLOOR(ROUND((LEN_{PF} + (Rand()*LSTRAT - (0.5*LSTRAT)) / 0.7750 ,0) , 0) / LSTRAT) * LSTRAT	SPC conversion assume from observer data Equivalent to Tufman 2 LF=1.29032*PF

Weight to weight

Table *4* includes the weight-to-weight conversions that are applied by SPC to produce whole weight (WW) data from different forms of processed weights.

Table 4 Weight to weight conversions currently applied as standard by SPC to generate WF_Master. See table 5 of appendices for definitions of the weight codes.

Species	Size category	From	To	Conversion equations a) Simple without disaggregation, random adjustments etc. b) Complete conversion procedure c) Recent updates	Source
ALB	Weight	GG	WW	a) WW=1.1 *GG b) WW = 1.1 * (GG +(Rand()-0.5)	Tufman2 Hawaii LL fishery processed catch sampling, reference unknown (Peter W had this one also WW=1.274959 *GG $^{0.960613}$ source unknown and not in Tufman2, confirm if should be updated, maybe from AUS?)
YFT	Weight	GG	WW	a) WW = 1.189346 * GG $^{0.972009}$ b) WW = 1.189346 * (GG + Rand()-0.5) $^{0.972009}$ c) **WW=1.1821*GG$^{0.9755}$** (new 2023, Macdonald et al. 2023)	a/b) from Langley et al. (2006) c)2023 updated – Macdonald et al. 2023, added to Tufman2 and should now be used.
YFT	Weight	GT	WW	a) WW= 1.298823 * GT$^{0.967869}$ b) WW = 1.298823 * (GT + Rand()-0.5) $^{0.967869}$	From Langley et al. (2006), Japanese freezer vessels, gill covers, fins and tails removed (Figure 4c)
BET	Weight	GG	WW	a) WW = 1.274959 * GG$^{0.960613}$ b) WW = 1.274959 * (GG + Rand()-0.5) $^{0.960613}$ c) **WW=1.1617*GG$^{0.9817}$** (new 2023 updated Macdonald et al. 2023)	a/b) from Langley et al. (2006) c)2023 updated – Macdonald et al. 2023, added to Tufman2 and should now be used.
BET	Weight	GT	WW	a) WW= 1.32641 * GT$^{0.968651}$ b) WW= 1.32641 * (GT + Rand()-0.5) $^{0.968651}$ (Langley et al. 2006)	From Langley et al. (2006), Japanese freezer vessels, gill covers, fins and tails removed (Figure 4c)
MLS[1]	Weight	GH	WW	a) WW= 1.17883743 *GX/GH$^{0.9984}$ b) WW= 1.17883743 *(GX/GH + Rand()-0.5)$^{0.9984}$	(Langley et al. 2006, from Australia sampling approx. 250 samples on Japanese vessels, fins likely trimmed, tail removed = GX??, Ashley Williams, CSIRO has the data)
MLS[2]	Weight	GG (Head on-bill removed including small bit of lower jaw-Japan, tail maybe removed for frozen form)	WW	a) WW= 1.098 *GG + 3.655 b) WW= 1.098 *(GG + Rand()-0.5) + 3.655)	Conversion provided by Japan FRA. This conversion is not in Tufman2 but should be applied to Japanese GG.

SWO[1]	Weight	GH	WW	a) WW= 1.3717 * GH b) WW= 1.3717 * (GH + + Rand()-0.5	Source Song and Liuxiong 2004 - Col. Vol. Sci. Pap. ICCAT, 56(3): 940-946 (2004), samples from Atlantic Ocean.
SWO[2]	Weight	GG (Head on-bill removed including small bit of lower jaw-Japan, gill covers likely removed. tail may be removed for frozen forms)	WW	a) WW= 1.548 * GG - 0.479 b) b) WW= 1.548 *(GG + Rand()-0.5) – 0.479)	Conversion provided by Japan FRA. This conversion is not in Tufman2 but should be applied to Japanese GG. (Ito 2005 ISC/05/MAR&SWO_WGs/3), Hawaii WW =1.14*GG, but GG form is unclear, and data amount/quality unknown)
SWO	Weight	GX (NZ – HGT) Head, fins and tail removed	WW	a) WW=1.45*GX	Ito 2005 Hawaii – data amount/quality unknown
SWO	Weight	GH (NZ – HGF) This form is mor typical – headed, fins removed, but tail caudal peduncle retained for lifting.	WW	a) WW=1.37*GX	Source Song and Liuxiong 2004 - Col. Vol. Sci. Pap. ICCAT, 56(3): 940-946 (2004), samples from Atlantic Ocean. Ito 2005 has WW = 1.39*GH, data amount/quality unknown

[1]Head removed - trunked weights, non-Japanese data.

[2] Head on – bill and part of upper and lower jaw removed, i.e. bill is cut about 1-2 cm in from the end of the lower jaw. Tails are removed for the freezer vessels. This processed weight form is only for Japanese data. The conversion factor is provided by Japan FRA.

Weight to length

Weight to length conversions are not applied to the data in LF_MASTER or WF_MASTER by the SPC data management team. As discussed above, if both weight and length data are used in an assessment the weight-length conversion occurs within the modelling process and the conversion factors are chosen and entered into the model by the stock assessment scientists.

The weight to length conversion factors are typically provided from sampling of whole weights and the specific length metric for the assessment on the same fish. The relationship between weight and length is allometric and takes the form:

weight (kg) = a * length (cm) ^{b} or length = (weight/a) $^{(1/b)}$

The stock assessment models require the a and b parameter (and ideally the uncertainty in these) that are specific for the species being assessed and the stock region. The a and b parameters for the weight-length relationship can vary in space and time, however the current assessment models do not model this variation and simply fix the a and b parameters. If the a and b parameters do vary in time and space, which is likely, fixing these parameters can cause issues for the models because the conversions from weight to length will be biased and can misrepresent the age compositions, again length data for stock assessments is preferred. A solution may be to convert the data outside the model and apply different spatial or temporally representative conversion factors.

Extensive sampling across a broad size range and area is required to obtain representative a and b parameters and to understand how they vary in space and time. The **WCPFC Project 90** has a component to improve data and understanding of weight-length relationship across the key species

where length and weight data are used in assessments: bigeye tuna, yellowfin tuna, striped marlin and swordfish. Below are some recent a and b parameter values used for stock assessment, but it should be noted that these are reviewed and often modified as new data are collected between assessments.

Table 5 Length to weight conversions applied as in the most recent stock assessments.

Species	Conversion	Region of assessment	a	b	Comments
Skipjack	WW to UF	Unknown	1.14e-05	3.1483	Cited in Teears et al. (2022). Needs follow-up to ascertain source??
Albacore	WW to UF	South Pacific	1.7075e-05	3.0483	Macdonald et al. 2023, added to Tufman2
Yellowfin tuna	WW to UF	Western and Central Pacific	1.9865e-05	2.9908	Updated for 2023 assessment (Macdonald et al. 2023), added to Tufman2
Bigeye tuna	WW to UF	Western and Central Pacific	3.0364e-05	2.9324	Updated for 2023 assessment (Macdonald et al. 2023), added to Tufman2
Striped marlin	WW to EO	Southwestern Pacific	5.425259e-07	3.5838	Based on 114 samples from Kopf et al 2012, updated bias corrected used in 2024 assessment (Castillo Jordan et al. 2024), added to Tufman2
Swordfish	WW to LF	Southwestern Pacific	2.774087e-06	3.303671	SPC observer data with 2025 updates from J Macdonald, added to Tufman2

Improving the provision and consistency of size composition data for application in stock assessments

Sampling programs, protocols and documentation

Given the many data sources available, and the historic origins of many of these, a challenge with this review has been ascertaining the practical approach used at the data collection sources. Uncertainties remain. Documentation is not available or difficult to track down and obtaining details on sampling methods and the various forms of measured or weighed fish has required many email exchanges. This is not only an issue for the WCPFC. As early as the mid-2010s it was raised in the IOTC (i.e. Working Party for Tropical Tunas (WPTT), in 2013 their Scientific Committee recommended "joint work on the documentation of procedures for the collection, processing and reporting of size

frequency data" (SC15.78) for the main longline fleets, given the potential impact on stock assessments (Hoyle *et al.*, 2021)). If the stock assessment scientist does not know how the size data were collected, informed decisions (and methods) on how to use it are difficult.

The requirement for better information on sized data collections is behind the WCPCFC SCIENTIFIC DATA TO BE PROVIDED TO THE COMMISSION requirements for the provision of size data, listed below (key requirements bold underlined by authors):

> **5. Size composition data**
>
> Length and/or weight composition data that are **representative of catches by the fisheries** shall be provided to the Commission at the **finest possible resolution of time period and geographic area and at least as fine as periods of quarter and areas of 20° longitude and 10° latitude.**
>
> The length size class intervals are defined as follows:
>
> • Skipjack tuna – 1cm
>
> • Albacore tuna – 1cm
>
> • Yellowfin tuna – ideally 1cm, but not more than 2 cm
>
> • Bigeye tuna – ideally 1cm, but not more than 2 cm
>
> • Billfish – ideally 1cm, but not more than 5 cm
>
> The weight size class intervals are defined as follows:
>
> • Tuna and Billfish species - 1kg
>
> CCMs shall indicate **whether lengths and/or weights are rounded up or rounded down** to the unit specified.
>
> The **statistical and sampling methods that are used to derive the size composition data shall be reported to the Commission, including reference to whether sampling was at the level of fishing operation or during unloading, details of the protocol used, and the methods and reasons for any adjustments to the size data.** Where feasible, this shall also be applied to all historical data.
>
> **Information on operational changes in the fishery that are not an attribute in the data provided is to be listed and reported with the data provision.**

The requirement above to report: '***statistical and sampling methods that are used to derive the size composition data shall be reported to the Commission, including reference to whether sampling was at the level of fishing operation or during unloading, details of the protocol used, and the methods and reasons for any adjustments to the size data',*** is apparently not routinely followed by CCMs and there is no repository held by the WCPFC or even at SPC with size data collection protocols and methods provided by CCMs, or notes on changes or adjustments that may have occurred to data from particular sources at particular areas and times. While observer programs typically have good documentation on data collection protocols, methods and structured training, this is often lacking for historical collections and some port sampling sources. Quality control of data from both observer and port sampling also appears limited. Further, there are some programs that rely on skippers and

crew to measure fish, including estimation of size by eye. These data may be useful for some purposes but may not be useful in stock assessments.

We recommend that at least all current and ongoing non-ROP and PICTs port sampling size data sources used in WCPFC assessments provide formal documentation to SPC to create a size data collection 'protocols and information' repository. Even if protocols are not in English, they still should be provided. Imagery to validate the measurement methods (callipers, rulers, tapes, scales used etc.) and their correct use and interpretation of the standard measurement codes for length and weight measurements would also be useful (Appendix 4) to ensure appropriate conversions are being applied.

As a first step to improve documentation and reporting of size data collections **we recommend** that when size data submissions are provided, they are accompanied by a standard set of information regarding the size data collections, to align with the WCPFC size data requirements (above). This may be a discussion for other relevant WCPFC committees (i.e. TCC), with involvement/advise of the Tuna Fishery Data Collection Committee (DCC).

We suggest as a start (for review and refinements) the following information would be important to capture with each size data submission:

1. **Point/platform of sampling:** vessel, port-unloading, processor, transhipment, recreational, others.
2. **Who measured the fish:** trained ROP observer, trained port sampler, crew/skipper, fishing company staff etc…
3. **Pre-sorting:** have the measured fish been sorted in any way prior to measurement? Specify the sorting process prior to measuring. This could also include documenting if it is thought that fish have been discarded dead/eaten by crew/offloaded before landing (often small fish do not make it to port sampling – this is an issue).
4. **Measurement devices and methods**: reported clearly with each data submission, photos/diagrams of devices in use added.
5. **Protocols:** is a sampling protocol available to share with SPC. If so, please attach with the data submission. If not, specify sampling protocol (i.e. how are fish selected to be measured, time/area strata).
6. **Adherence to protocols and changes to sampling locations:** have the standard protocols been followed in the most recent year, if not what changed? i.e. situations like resource limitations, COVID etc. can require modification, for example reduced sampling rates. Also, reduction/change in port locations sampled, or frequency of sampling etc.
7. **Quality control at the source:** is there quality control/refresher training on the sampling protocols/methods?
8. **Standard measurement codes if not SPC/ROP code (i.e. Appendix table 5):** provide the measurement codes used and descriptions if non-standard SPC/ROP codes.
9. **No data are pre-converted:** are the data all in the raw measured form, is the raw form clearly included for all measured/weighed fish?
10. **Point of contact:** provide a point of contact for scientist to seek further information on this size data?

This list of 10 suggestions is for discussion and refinement towards providing a suitably informative and practical set of information to accompany size data submissions, in line with the WCPFC size data requirements. **This list could be discussed in a SWG at SC21.**

Recommendations for phase 2 work

Historically, and probably even recently, size data collection programs have been developed within the logistical, financial/resources/operational and practical constraints at the time but probably lacked the technical awareness/input on what is required/desirable for modern stock assessment models, CPUE analysis and the spatial fishery characteristic of each stock being assessed. While there will always be limitations to size data collection capacity, stock assessment scientists should be involved from the outset to ensure that what can be collected is optimised. Phase 2 can bring stock assessment expertise into the review and improvement planning for size data collection.

- **Phase 2 work area 1 – Further information on historic data quality (LF, WF_MASTER post consolidation):** this work would build on the phase 1 work in this progress report and delve deeper into the more uncertain historical data sets listed in the summary tables to improve the documentation and understanding of historical data collections and assess their suitability to use in stock assessments. The outcomes of this work would feed into the LF and WF_MASTER generation 'post-consolidation' processing/filtering step. This is the step where data sources that have been reviewed and considered not suitable for stock assessments are removed. The current post-consolidation procedures are described in Appendix table 3. These would be revised and updated under this work area.

- **Phase 2 work area 2 – Technical review/analysis of current-future size data collection:** A second phase of this project could look more closely at the ongoing key size data collection sources (starting with the key tuna) and provide advice on refinements or where enhancements would be desirable, and stock assessors should be central to that work. This work would involve spatial/seasonal and fleet/flag analysis of current size data collections to identify strengths and weakness of the current data collections in relation to the representativeness and coverage required for stock assessment of each species. The work may also highlight sources where oversampling is occurring and where resources might be better deployed to fill gaps.

- **Phase 2 work area 3 – Post LF and WF_MASTER data preparation for stock assessment models:** this work was not covered in the phase 1 work because the details are specific to each assessment. However, there is a need to review and improve the procedures and methods applied to generate the final size frequency data that is applied to the assessment models. The current process applies a series of steps to reaggregate the data from LF and WF_MASTER at the required spatial region for the assessments and then at the defined fisheries, year-quarter and spatial strata. Various ad hoc filters are applied to remove likely non representative samples at strata level, and size frequencies go through a spatial statistical reweighting process that aims to adjust the size frequencies to be more representative of the catches (for extraction fisheries) or the abundance (for the CPUE index fisheries) (Peatman *et al.*, 2020; Teears *et al.*, 2022). However, not all data can be reweighted if the size data does not have spatial information to relate to spatial catch or CPUE. Furthermore, there are many model fisheries that contain data from multiple flags that may have different amounts of samples at different times, fishing areas and selectivities, that can create variability/bias in size data. These multi-flag data have typically been pooled and the flag ignored, and the same can be said about vessel effects for size data collected from many different vessels for individual flag fisheries. An important part of this work area would be to develop more standard and repeatable approaches to prepare size data for

assessments, with a focus on statistical standardisations of size data (Maunder *et al.*, 2020; Thorson, 2014) to improve representativeness of catch compositions and size data for CPUE indices.

Species by species – reference tables on size data collections

Size data for tunas and billfish comes from a diversity of sources and includes both length and weight data. However, size data for sharks is all in length and is almost exclusively from observer programs, with the exception of blue shark where several thousand length records are available from historic Spanish (ES) longline catches.

As a guide for stock assessment scientists, the following tables describe the size composition data available from the various source programs for each species. Note: each table is standalone, so there is repetition in many source descriptions, but this allows the individual tables to be copied into other relevant reports and modified independently. Definitions for gear codes are in Appendix 6.

Skipjack (SKJ)

Weight data are not used in the skipjack stock assessment. Skipjack length data are available from many sources. **Table *6*** describes the skipjack length data (these are ideally at 1 cm resolution) available in the LF_MASTER as of July 4, 2025.

Table 6 Summary of **length** data available for skipjack tuna by main sources with notes on the collection programs. Gear and flag codes are in Appendix table 6 and 7, respectively.

Source	GEAR(s)	FLAG	Year from	Year to	SKJ Size (LENGTH) samples	NOTES on data collection and processing for LF_MASTER
IAPS	S	US	1981	1983	1,050	US fleet IATTC purse seine data for the WCPFC Area. Lengths are understood to be standard (UF = "Upper jaw to fork length"), no other length types are considered. These data existed as aggregated size data compiled prior to 1990 (before databases were established) and original data are not available.
IPTP	P, S, T	ID	1985	1991	154,676	Indo Pacific Tuna Programme (IPTP) port sampling data for several gears in Indonesia, mainly collected during the 1980s. The data collection protocol was developed by FAO Statisticians and subsequently adapted and used in Indonesia under the Indonesia Philippines Data Collection Project (IPDCP) and then the WCPFC administered Western Pacific East Asia (WPEA) Project (see SOURCE = 'PKSI' below). Lengths are understood to be UF = "Upper jaw to fork length", no other length types are considered. The original data are available.
JBPL	P	JP	1978	1979	24,798	Historic Japanese Pole-and-line size data. Lengths are understood to be UF = "Upper jaw to fork length", no other length types are considered. These data existed as aggregated size data compiled prior to 1990 (before databases were established) and the original data are not available.
JPLL	L	JP	1948	2024	5,060	Japanese longline data, most would be port-based. Lengths are understood to be UF = "Upper jaw to fork length", no other length types are considered. Length data are provided as an aggregated WCPFC data submission, or historically, provided for assessments for DWFN fleets prior to the establishment of the WCPFC.
JPPL	P	JP	1965	2024	428,585	Japanese pole and line port sampling. Lengths are understood to be standard (UF = "Upper jaw to fork length"), no other lengths are considered.

Source	GEAR(s)	FLAG	Year from	Year to	SKJ Size (LENGTH) samples	NOTES on data collection and processing for LF_MASTER
						Prior to 1990 data exist as aggregated size data (before databases were established) and original data are not available.
JPPS	S	JP	1967	2024	33,891	Japanese purse seine port sampling. Lengths are understood to be standard (UF = "Upper jaw to fork length"), no other lengths are considered. Prior to 1990 data exist as aggregated size data (before databases were established) and original data are not available.
JBPS	S	JP, US	1976	1981	8,526	Historic Japanese purse seine size data. Lengths are understood to be UF = "Upper jaw to fork length", no other length types are considered. These data existed as aggregated size data compiled prior to 1990 (before databases were established) and the original data are not available.
JPSJ	L, P, S	JP	1970	2022	3,895,697	Japanese length data submissions, firstly provided for the work of the SCTB, and then under the WCPFC requirements covering their the Longline, pole-and-line and purse seine fisheries. Although most of the skipjack length samples are from their pole-and-line fishery. Lengths are understood to be UF = "Upper jaw to fork length", no other length types are considered. The original data are available.
KRLL	L	KR	2006	2024	4,572	Korean longline fishery samples, probably port sampling – but needs confirmation. Lengths are understood to be UF = "Upper jaw to fork length", no other length types are considered. The original data are available.
KRPS	S	KR	1993	2024	25,633	Korean purse seine fishery samples. Substantial size data for this fleet are now available through the implementation of 100% purse seine observer coverage (R_OB); therefore few data have been provided under this source since 2009. Lengths are understood to be UF = "Upper jaw to fork length", no other length types are considered. The original data are available.
LCEM	K, N, O, R, S	PH	1993	1994	215,608	Philippines - Landed Catch and Effort Monitoring (LCEM) project port sampling size data for several small-scale fishing gears for the domestic Philippines tuna fisheries. The IPTP data collection protocol (or adaption thereof) was used, and the data are stored in the LCEM Database. Lengths are understood to be UF = "Upper jaw to fork length", no other length types are considered. The original data are available.
NSAP	H, K, R, S, T	PH	1997	2025	3,024,391	Philippines National Stock Assessment Project (NSAP) port sampling size data for several small-scale fishing gears for the domestic Philippines tuna fisheries. Data with standard lengths UF = "Upper jaw to fork length" are only considered. The original data are entered and managed in the NSAP TUFMAN2 Database system. SPC applies a process for extracting aggregate NSAP data from the NSAP T2 Database system for input to LF_MASTER. There are manuals available for the NSAP Data Collection and the NSAP Database System.
NZPS	S	NZ	1978	1981	138,584	Historical NZ purse seine size data. Lengths are understood to be UF = "Upper jaw to fork length", no other length types are considered. These data existed as aggregated size data compiled prior to 1990 (before databases were established) and original data are not available.
PGPL	P	PG	1984	1985	11,661	Historical PNG pole-and-line size data. Lengths are understood to be UF = "Upper jaw to fork length", no other length types are considered. These data existed as aggregated size data compiled prior to 1990 (before databases were established) and original data are not available.

Source	GEAR(s)	FLAG	Year from	Year to	SKJ Size (LENGTH) samples	NOTES on data collection and processing for LF_MASTER
PHIL	K, O, R, S	PH	1980	1987	78,201	Historic Philippines domestic fisheries port sampling size data for several small-scale fishing gears for the domestic Philippines tuna fisheries. The IPTP data collection protocol (or adaption thereof) was used, and the data stored in a similar format as the LCEM data (see above). Lengths are understood to be UF = "Upper jaw to fork length", no other length types are considered. The original data are available.
PKSI	H, K, L, O, P, S, T	ID	2010	2024	862,878	Indonesia Port Sampling data collected in recent years, firstly through the Indonesia Philippines Data Collection Project (IPDCP) and in more recent years, the WCPFC-administered Western Pacific East Asia (WPEA) Project. In the early part of the period of this data collection, the agency in Indonesia with responsibility for overseeing the data collection and management was 'PKSI', hence the origin name of this SOURCE OF DATA. Data with lengths UF = "Upper jaw to fork length" are only considered. The original data are entered and managed through a database system maintained by the Indonesian Ministry of Maritime Affairs and Fisheries (MMAF) and the aggregated data are submitted to the WCPFC each year. Data at the level of vessel trip may be available on request. The size data stored under the PKSI source, has been managed by BRIN (contact: Pak Bayu) (and their predecessors) for which the protocol is essentially the WPEA Indonesian data collection. We note that significant amounts of port sampling data are also collected through various NGO programs, but these data are not yet included in the Indonesia size data submissions to the WCPFC. **It is recommended that Indonesia, with SPC assistance through the WPEA project, review the protocols of the NGO data collection and quality and determine if it can be included in future Indonesia size data submissions to the WCPFC as a separate data source.**
R_OB	L	All_flags	1979	2025	223,817	Individual fish length data are collected from the Regional Observer data collected through (i) SPC Member National Observer Programmes, (ii) PNA Observer Programme. Data are UF = "Upper jaw to fork length", no other measurement types considered. Original data are available in Tufman 2 database or the SQL SERVER OBSV_MASTER and OBSV_FULL databases. Data are collected according to the Regional Observer Program (regional observer program: https://www.wcpfc.int/regional-observer-programme) requirements and minimum data reporting standards. For Pacific Island Regional observer guides: PIRFO-manuals
R_OB	P	All_flags	1998	2006	151,609	
R_OB	S	All_flags	1982	2025	16,476,544	
DW_OB	L	JP, TW, CN, KR, PH	2002	2024	137,103	Individual fish length data from National Observer programmes for non-SPC members (JP, TW, CN, KR, PH) where data are submitted as a WCPFC member obligation. Data with standard lengths UF = "Upper jaw to fork length" are only considered. Data are collected according to the WCPFC ROP (regional observer program: https://www.wcpfc.int/regional-observer-programme) requirements and minimum data reporting standards.
DW_OB	S	JP, TW, CN, KR, PH	2012	2025	3,953,743	
SBPL	P	SB	1971	1992	333,716	Historical Solomon Islands pole-and-line size data. Lengths are understood to be UF = "Upper jaw to fork length", no other length types are considered. These data existed as aggregated size data compiled, mostly prior to 1990 (before databases were established) and original data are not available.
SPLL	L	SPLL	1991	2025	132,284	Individual fish length data are collected from the Regional Port Sampling in Pacific Island Countries and
SPPL	P	SPPL	1991	1997	23,522	

Source	GEAR(s)	FLAG	Year from	Year to	SKJ Size (LENGTH) samples	NOTES on data collection and processing for LF_MASTER
SPPS	S	SPPS	1993	2015	1,323,574	Territories (PICTs). Data with lengths UF = "Upper jaw to fork length" are only considered. Original raw data are available in the Port Sampling databases and since 2015 for LONGLINE, in the Tufman 2 database system. Note that samples from the purse seine fishery port sampling (source = "SPPS") for vessel trips where there is observer data have been excluded, particularly since the implementation of 100% observer coverage to avoid duplication and there are very few samples since 2013 for source SPPS. The port sampling protocol was developed in 2002 and has not been revised since: oceanfish.spc.int-fisheries-monitoring-172-port-sampling
TAG_	P	TAG_	1977	2001	254,648	Historic size data from Tag RELEASES only. Latest data loaded covers tagging programmes prior to 2001 (SSAP and RTTP primarily). The GEAR/FLAG will be the GEAR/FLAG of the tagging which are mainly P&L/JP and P&L/TV**.** Note the size data for tagged fish in LF_MASTER is not used in the assessment. Size data for tagged fish is extracted from the TAG_MASTER database used to generate the tag data inputs for the assessments.
TTPS	S	US	1987	2016	735,293	US Multilateral Treaty Port Sampling (non-standard) data using the NMFS data collection protocol. Data lengths UF = "Upper jaw to fork length" are only considered. Original raw data are available in the VFP Port Sampling databases and since 2015, in the Tufman 2 database system. Note that samples for this source do not have the SET TYPE information available. Since 2010 samples from increased observer coverage with set type recorded became available. Therefore, samples from this port sampling source collected since 2010 are not used in assessments because PS SKJ fisheries data in the assessments require a breakdown by SET TYPE. Alternatively, data from 2010 onwards from this port sampling source can be excluded from the LF_MASTER process to avoid any potential duplication with observer collected size data.
TWLL	L	TW	2005	2016	4,149	Data are collected by the captains on TW DWFN and **STLL (offshore=OS)** LL vessels (pers. Comm, Yi-Jay Chang, 12/11/2024). Few SKJ size data are understood to have been collected by this source. Lengths are understood to be UF = "Upper jaw to fork length", likely estimated by skippers/crew, who measure the first 30 fish (irrespective of species) form a set, no other length types are considered. Data are no longer provided but are understood to be now available in observer data (see above DW_OB for TW fleet). The original data are available.
VNWP	G	VN	2010	2017	347,765	Vietnam Gillnet port sampling. Lengths are understood to be UF = "Upper jaw to fork length", no other length types are considered. The original data are available. SPC port sampling protocols are applied, with sampling before catches are sorted by size.

Yellowfin tuna (YFT)

Yellowfin tuna have both length and weight data available, and both are used in the stock assessment. Length data are available from many sources. Table 9 describes the yellowfin tuna length data (mostly measured to 1 cm resolution) available in the LF_MASTER. Table 10 describes the yellowfin tuna weight data available in the WF_MASTER.

Table 7 Summary of **length data** available for yellowfin tuna by source with notes on the collection programs. Gear and flag codes are in Appendix table 6 and 7, respectively.

Source	GEAR(s)	FLAG	Year from	Year to	YFT Size (LENGTH) samples	NOTES on data collection and processing for LF_MASTER
IAPS	S	US	1981	1983	890	US fleet IATTC purse seine data for the WCPFC Area. Lengths are understood to be standard (UF = "Upper jaw to fork length"), no other length types are considered. These data existed as aggregated size data compiled prior to 1990 (before databases were established) and original data are not available.
IAWP	S	US	1984	1987	4,542	US Purse seine data from the Western Pacific Yellowfin Research Programme (WPYRG) areas for the WCPO. Lengths are understood to be UF = "Upper jaw to fork length", no other length types are considered. These data existed as aggregated size data compiled prior to 1990 (before databases were established) and original data are not available.
IPTP	P, S, T	ID	1985	1991	16,585	Indo Pacific Tuna Programme (IPTP) port sampling data for several gears in Indonesia, mainly collected during the 1980s. The data collection protocol was developed by FAO Statisticians and subsequently adapted and used in Indonesia under the Indonesia Philippines Data Collection Project (IPDCP) and then the WCPFC administered Western Pacific East Asia (WPEA) Project (see SOURCE = 'PKSI' below). Lengths are understood to be UF = "Upper jaw to fork length", no other length types are considered. The original data are available.
JBPS	S	US	1976	1981	10,777	Historic Japanese book data – old purse seine size data, which actually has more than just JP data. Lengths are understood to be UF = "Upper jaw to fork length", no other length types are considered. These data existed as aggregated size data compiled prior to 1990 (before databases were established) and original data are not available.
JPLL	L	JP	1948	2024	2,863,673	Japanese longline data, mostly port samples. Lengths are understood to be UF = "Upper jaw to fork length", no other length types are considered. Length data are provided as an aggregated WCPFC data submission, or historically, provided for assessments for DWFN fleets prior to the establishment of the WCPFC.
JPPL	P	JP	1965	2024	73,573	Japanese P\pole-and-line port sampling size data. Lengths are understood to be UF = "Upper jaw to fork length", no other length types are considered. Data prior to 1990 is aggregated (before databases were established) and original data are not available.
JPPS	S	JP	1967	2024	85,967	Japanese port sample purse seine length data submission, firstly provided for the work of the SCTB, and then under the WCPFC requirements covering their purse seine fisheries. Lengths are UF = "Upper jaw to fork length", no other length types are considered.
KRLL	L	KR	2006	2024	142,451	Korean longline fishery samples, probably all port sampling – but needs confirmation. Lengths are understood to be UF = "Upper jaw to fork length" no other length types are considered. The original data are available.
KRPS	S	KR	1993	2024	3,541	Korean purse seine fishery samples. With substantial size data for this fleet now available through the implementation of 100% purse seine observer coverage there are few data provided from this source since 2009. Lengths are understood to be standard (UF = "Upper jaw to fork length"), no other length types are considered.
LCEM	H, K, N, O, R, S	PH	1993	1994	245,503	Philippines - Landed Catch and Effort Monitoring (LCEM) project port sampling size data for several small-scale fishing gears for the domestic Philippines tuna fisheries. The IPTP data collection protocol (or adaption thereof) was used, and the data are stored in the LCEM Database. Lengths are understood to be UF = "Upper jaw to fork length", no other length types are considered. The original data are available.

Source	GEAR(s)	FLAG	Year from	Year to	YFT Size (LENGTH) samples	NOTES on data collection and processing for LF_MASTER
NSAP	H, K, R, S, T	PH	1997	2025	2,301,650	Philippines National Stock Assessment Project (NSAP) port sampling size data for several small-scale fishing gears for the domestic Philippines tuna fisheries. Data with standard lengths UF = "Upper jaw to fork length" are only considered. The original data are entered and managed in the NSAP TUFMAN2 Database system. SPC applies a process for extracting aggregate NSAP data from the NSAP T2 Database system for input to LF_MASTER. There are manuals available for the NSAP Data Collection and the NSAP Database System.
PGPL	P	PG	1984	1985	6,033	Historical PNG pole-and-line size data. Lengths are understood to be UF = "Upper jaw to fork length", no other length types are considered. These data existed as aggregated size data compiled prior to 1990 (before databases were established) and original data are not available.
PHIL	K, O, R, S	PH	1980	1987	66,162	Historic Philippines domestic fisheries port sampling size data for several small-scale fishing gears for the domestic Philippines tuna fisheries. The IPTP data collection protocol (or adaption thereof) was used, and the data stored in a similar format as the LCEM data (see above). Lengths are understood to be UF = "Upper jaw to fork length", no other length types are considered. The original data are available.
PKSI	H, K, R, S, T	ID	2010	2024	316,598	Indonesia Port Sampling data collected in recent years, firstly through the Indonesia Philippines Data Collection Project (IPDCP) and in more recent years, the WCPFC-administered Western Pacific East Asia (WPEA) Project. In the early part of the period of this data collection, the agency in Indonesia with responsibility for overseeing the data collection and management was 'PKSI', hence the origin name of this SOURCE OF DATA. Data with lengths UF = "Upper jaw to fork length" are only considered. The original data are entered and managed through a database system maintained by the Indonesian Ministry of Maritime Affairs and Fisheries (MMAF) and the aggregated data are submitted to the WCPFC each year. Data at the level of vessel trip may be available on request. The size data stored under the PKSI source, has been managed by BRIN (contact: Pak Bayu) (and their predecessors) for which the protocol is essentially the WPEA Indonesian data collection. We note that significant amounts of port sampling data are also collected through various NGO programs, but these data are not yet included in the Indonesia size data submissions to the WCPFC. **It is recommended that Indonesia, with SPC assistance through the WPEA project, review the protocols of the NGO data collection and quality and determine if it can be included in future Indonesia size data submissions to the WCPFC as a separate data source.**
R_OB	L	All_flags	1979	2025	896,038	Individual fish length data are collected from the Regional Observer data collected through (i) SPC Member National Observer Programmes, (ii) PNA Observer Programme. Data are UF = "Upper jaw to fork length", no other measurement types considered. Original data are available in Tufman 2 database or the SQL SERVER OBSV_MASTER and OBSV_FULL databases. Data are collected according to the Regional Observer Program (regional observer program: https://www.wcpfc.int/regional-observer-programme) requirements and minimum data reporting standards. For Pacific Island Regional observer guides: PIRFO-manuals
R_OB	S	All_flags	1982	2025	4,093,759	
R_OB	P	All_flags	1998	2006	15,333	
DW_OB	L	JP, TW, CN, KR, PH	2000	2025	520,245	Individual fish length data from National Observer programmes for non-SPC members (JP, TW, CN, KR, PH) where data are submitted as a WCPFC member obligation. Data with standard lengths UF = "Upper jaw to fork length" are only considered. Data are collected according to the WCPFC ROP (regional observer program: https://www.wcpfc.int/regional-observer-programme) requirements and minimum data reporting standards.
	S	JP, TW, CN, KR, PH	2012	2025	1,341,765	

Source	GEAR(s)	FLAG	Year from	Year to	YFT Size (LENGTH) samples	NOTES on data collection and processing for LF_MASTER
SBPL	P	SB	1971	1992	27,869	Historical Solomon Islands pole-and-line size data. Lengths are understood to be UF = "Upper jaw to fork length", no other length types are considered. These data existed as aggregated size data compiled, mostly prior to 1990 (before databases were established) and original data are not available.
SPLL	L	SPLL	1991	2025	2,154,302	Individual fish length data are collected from the Regional Port Sampling in PICTs. Data with lengths UF = "Upper jaw to fork length" are only considered. Original raw data are available in the Port Sampling databases and since 2015 for LONGLINE, in the Tufman 2 database system. Note that samples from the purse seine fishery port sampling (source = "SPPS") for vessel trips where there is observer data have been excluded, particularly since the implementation of 100% observer coverage to avoid duplication and there are very few samples since 2013 for source SPPS. The port sampling protocol was developed in 2002 and has not been revised since: oceanfish.spc.int-fisheries-monitoring-172-port-sampling
SPLL	H	SPLL	1991	2019	2,235	
SPPL	P	SPPL	1991	1997	10,051	
SPPS	S	SPPS	1993	2015	188,262	
TAG_	J	TAG_	1977	2001	7,194	Historic size data from Tag RELEASES only. Latest data loaded covers tagging programmes prior to 2001 (SSAP and RTTP primarily). The GEAR/FLAG will be the GEAR/FLAG of the tagging which are mainly P&L/JP and P&L/TV**.** Note the size data for tagged fish in LF_MASTER is not used in the assessment. Size data for tagged fish is extracted from the TAG_MASTER database used to generate the tag data inputs for the assessments.
TAG_	P	TAG_	1977	2001	49,900	
TAG_	L	TAG_	1977	2001	260	
TAG_	S	TAG_	1977	2001	321	
TAG_	T	TAG_	1977	2001	3,400	
TTPS	S	US	1987	2016	705,106	US Multilateral Treaty Port Sampling (non-standard) data using the NMFS data collection protocol. Data lengths UF = "Upper jaw to fork length" are only considered. Original raw data are available in the VFP Port Sampling databases and since 2015, in the Tufman 2 database system. Note that samples for this source do not have the SET TYPE information available. Since 2010 samples from increased observer coverage with set type recorded became available. Therefore, samples from this port sampling source collected since 2010 are not used in assessments because PS SKJ fisheries data in the assessments require a breakdown by SET TYPE. Alternatively, data from 2010 onwards from this port sampling source can be excluded from the LF_MASTER process to avoid any potential duplication with observer collected size data.
TWLL	L	TW	2005	2016	502,184	Data are collected by the captains on TW DWFN and STLL (offshore=OS) LL vessels (pers. Comm, Yi-Jay Chang, 12/11/2024). Few SKJ size data are understood to have been collected by this source. Lengths are understood to be UF = "Upper jaw to fork length", likely estimated by skippers/crew, who measure the first 30 fish (irrespective of species) form a set, no other length types are considered. Data are no longer provided but are understood to be now available in observer data (see above DW_OB for TW fleet). The original data are available.
VNWP	G	VN	2010	2017	51,123	Vietnam Gillnet and Longline port sampling. Lengths are understood to be UF = "Upper jaw to fork length", no other length types are considered. Note there is no longline fishery anymore. Vietnam handline fishing for larger tuna (primarily yellowfin) has mostly replaced longline fishing since 2014 as the main target method (only about 3 dedicated tuna longliners left in 2025). The original data are available.
VNWP	L	VN	2010	2017	82,849	

Table 8 Summary of **weight data** available for yellowfin tuna by source with notes on the collection programs. Gear and flag codes are in Appendix table 6 and 7, respectively.

Source / Origin	GEAR	FLAG	Year from	Year to	YFT Size (WEIGHT) samples	NOTES on data collection and processing for WT_MASTER
AUWT	L	AU	1997	2023	1,003,951	Aggregated data provided by Australia. Data are collected at ports of landing on the East Coast of Australia. Data provided are broken down by AREA (which we understand is related to broad areas related to the port of landing), year and month. We attempt to assign 10°x10° lat/lon on the assumption that the fishing area is in proximity to the port/area of landing. Data are available in Australia to link the port samples to trips. A request has been made to link these size data to the fishing trip so we can determine more accurate spatial assignment to the weight data. The data provided are processed weight and CSIRO (Ashley Williams) confirmed that the processing is gilled and gutted (GG), gill cover retained (Pacific style). A conversion factor for GG to whole weight is applied to each individual fish weight, **Table 4**. Original Raw data are available.
GUWT	L	TW, JP	1989	2011	2,805,430	Original data represents port sampling of Longline vessel landings in Guam. This sampling has since stopped (but check the end year as some uncertainty). The trunk form is assumed to have been gilled and gutted (GG), but worth to confirm that it is not Japan style GT. A conversion factor from GG to whole weight (WW) is applied to each individual, **Table 4**. Original Raw data are available.
HWWT	H	US	1991	2024	257,062	Weights collected by US Hawaii HDAR Commercial Marine dealer are in pounds to the nearest half-pound weight. NOTE: HDAR uses its own conversion factors to convert processed weights in pounds to whole weights in pounds to one decimal place (Note: need to check these conversion factors against SPC conversion factors). The following conversion from lbs to kgs are applied by SPC when these data are loaded. Wt_kgs = round((wt_lbs + Rand()- 0.5) * 0.4536 ,0) Original Raw data are available.
HWWT	L	US	1991	2024	864,780	
HWWT	T	US	1991	2024	8,793	
IDWT	H	ID	2011	2023	199,234	Indonesia Port Sampling data collected in recent years through the WCPFC-administered Western Pacific East Asia (WPEA) Project. YFT that are weighed at ports are in the GG form (tail on) (advice from Pak Bayu 21/6/2025). The data are converted to WW by SPC. The original data are entered and managed through a database system maintained by Indonesia Maritime Affairs and Fisheries (MMAF) (Pak Bayu) and aggregated data are submitted to the WCPFC each year. Data at the level of vessel trip may be available on request.
IDWT	O	ID	2011	2024	12,653	
IDWT	L	ID	2011	2024	51,912	
JPWT	L	JP	1951	2019	5,239,871	Aggregated port sampling data provided by Japan. Spatial information (LAT x LON) are provided. The data provided are processed weight based on advice from Japan for their frozen fish – gilled (gill cover removed), gutted, finned and tailed (GT) - also see Langley et at (2006), Japanese specific conversion factor GT to WW in **Table 4**, **Figure 6**. Original Raw data are available.
NZWT	L	NZ	2006	2011	893	Longline - port sampling? – needs more information, assume GG, but very few samples anyway.
SBWT	L	SB	2016	2019	291,893	Individual fish weight data from the Solomon Is. LONGLINE Trimarine (TMI). The data have been provided as many EXCEL files which have required an automated process to load but also a manual data entry at SPC into a MS ACCESS database to consolidate and standardise their data for import. There are additional data since 2019 that are potentially available. There was discussion of the possibility of SPC providing some tool to TMI to organise these data (contact Russell Dunham). Note that the individual fish weight data are provided to kg at one decimal place. The processing confirmed by Russell D is similar to the processing for frozen fish by Japanese (see **Figure 6**). Based on this information, the conversion from Japanese GT to WW should be applied, **Figure 6**. NOTE: Go back and check that correct conversions have been applied (may have been GG). The original data are available.
SPPK	L	PG	1997	2005	136,412	Regional LL Packing List data, individual weights from companies. Could be a undervalued source to explore.
SPWT	L	SPWT	1991	2025	1,686,274	Individual fish weight data are collected from the Regional Port Sampling in PICTs. However, there are more LENGTHs from this data source than WEIGHTs, so the LENGTH data take priority and the YFT WEIGHT data from this source are not (yet) consolidated into the WT_MASTER database. The data are converted from GG to WW, but some data from

Source / Origin	GEAR	FLAG	Year from	Year to	YFT Size (WEIGHT) samples	NOTES on data collection and processing for WT_MASTER
						some ports, i.e. FSM, maybe Japanese frozen, GT – need check, but the trunk form should be recorded. Original raw data for YFT weights are available in the VFP Port Sampling databases since 2015, and since then the Tufman 2 database system.
TWWT	L	TW	2014	2024	517,783	Individual fish weights data are understood to be collected at ports of landing from Chinese Taipei longline vessels. Weights are processed weights, if frozen the form is GT (tail off and gill flaps removed same as Japanese GT form) and if landed fresh (ice slurry) the fish is whole including the guts (confirmed by Ren-Fen Wu, 20/6/2025). The original data are available.
VNWT	L, G	VN	2010	2017	82,907	Vietnam Longline port sampling. Weights are for ice chilled, gilled and gutted (GG), with fins removed, the conversion (GG) to whole weight (WW) is applied. Note there is no longline fishery anymore. Vietnam handline fishing for larger tuna (primarily yellowfin) has mostly replaced longline fishing since 2014 as the main target method (only about 3 dedicated tuna longliners left in 2025). The original data are available.

Bigeye tuna (BET)

Bigeye tuna have both length and weight data available, and both are used in stock assessment. Length data are available from many sources. **Table 9** *describes the bigeye tuna length data (mostly measured to 1 cm resolution) available in the LF_MASTER.*

Table *10* describes the bigeye tuna weight data available in the WF_MASTER.

Table 9 Summary of length data available for bigeye tuna by source with notes on the collection programs. Gear and flag codes are in Appendix table 6 and 7, respectively.

Source	GEAR(s)	FLAG	Year from	Year to	BET Size (LENGTH) samples	NOTES on data collection and processing for LF_MASTER
IAPS	S	US	1981	1983	100	US fleet IATTC purse seine data for the WCPFC Area. Lengths are understood to be standard (UF = "Upper jaw to fork length"), no other length types are considered. These data existed as aggregated size data compiled prior to 1990 (before databases were established) and original data are not available.
JPLL	L	JP	1948	2024	2,819,058	Japanese longline data, likely represent mix of vessel and port-based measures – needs more confirmation especially historical data collections. Lengths are understood to be UF = "Upper jaw to fork length", no other length types are considered. Length data are provided as an aggregated WCPFC data submission, or historically, provided for assessments for DWFN fleets prior to the establishment of the WCPFC.
JPPL	P	JP	1965	2024	46,167	Historic Japanese Pole-and-line size data. Lengths are understood to be standard (UF = "Upper jaw to fork length"), no other length types are considered. These data existed as aggregated size data compiled prior to 1990 (before databases were established) and original data are not available.
JPPS	S	JP	1967	2024	26,232	Japanese purse seine size (length) data submission, firstly provided for the work of the SCTB, and then under the WCPFC requirements covering their purse seine fisheries. Lengths are understood to be UF = "Upper jaw to fork length", no other length types are considered. The original data are available.
KRLL	L	KR	2006	2024	212,638	Korean longline fishery samples, probably port sampling – but needs confirmation. Lengths are understood to be UF = "Upper jaw to fork length", no other length types are considered. The original data are available.
KRPS	S	KR	1993	2008	917	Korean purse seine fishery samples, assume from ports. With substantial size data for this fleet now available through the implementation of 100% purse seine observer

Source	GEAR(s)	FLAG	Year from	Year to	BET Size (LENGTH) samples	NOTES on data collection and processing for LF_MASTER
						coverage there are no data since 2008.. Lengths are UF = "Upper jaw to fork length", no other length types are considered. The original data are available.
LCEM	H, K, O, R, S	PH	1993	1994	23,066	Philippines - Landed Catch and Effort Monitoring (LCEM) project port sampling size data for several small-scale fishing gears for the domestic Philippines tuna fisheries. The IPTP data collection protocol (or adaption thereof) was used, and the data are stored in the LCEM Database. Lengths are understood to be UF = "Upper jaw to fork length", no other length types are considered. The original data are available.
NSAP	H, K, R, S, T	PH	1997	2025	135,693	Philippines National Stock Assessment Project (NSAP) port sampling size data for several small-scale fishing gears for the domestic Philippines tuna fisheries. Data with standard lengths UF = "Upper jaw to fork length" are only considered. The original data are entered and managed in the NSAP TUFMAN2 Database system. SPC applies a process for extracting aggregate NSAP data from the NSAP T2 Database system for input to LF_MASTER. There are manuals available for the NSAP Data Collection and the NSAP Database System.
PHIL	K, O, R, S	PH	1980	1987	4,028	Historic Philippines domestic fisheries port sampling size data for several small-scale fishing gears for the domestic Philippines tuna fisheries. The IPTP data collection protocol (or adaption thereof) was used, and the data stored in a similar format as the LCEM data (see above). Lengths are understood to be UF = "Upper jaw to fork length", no other length types are considered. The original data are available.
PKSI	H, K, L, O, P, S, T	ID	2010	2024	25,978	Indonesia Port Sampling data collected in recent years, firstly through the Indonesia Philippines Data Collection Project (IPDCP) and in more recent years, the WCPFC-administered Western Pacific East Asia (WPEA) Project. In the early part of the period of this data collection, the agency in Indonesia with responsibility for overseeing the data collection and management was 'PKSI', hence the origin name of this SOURCE OF DATA. Data with lengths UF = "Upper jaw to fork length" are only considered. The original data are entered and managed through a database system maintained by the Indonesian Ministry of Maritime Affairs and Fisheries (MMAF) and the aggregated data are submitted to the WCPFC each year. Data at the level of vessel trip may be available on request. The size data stored under the PKSI source, has been managed by BRIN (contact: Pak Bayu) (and their predecessors) for which the protocol is essentially the WPEA Indonesian data collection. We note that significant amounts of port sampling data are also collected through various NGO programs, but these data are not yet included in the Indonesia size data submissions to the WCPFC. **It is recommended that Indonesia, with SPC assistance through the WPEA project, review the protocols of the NGO data collection and quality and determine if it can be included in future Indonesia size data submissions to the WCPFC as a separate data source.**
R_OB	L	All_flags	1979	2025	639,441	Individual fish length data are collected from the Regional Observer data collected through (i) SPC Member National Observer Programmes, (ii) PNA Observer Programme. Data are UF = "Upper jaw to fork length", no other measurement types considered. Original data are available in Tufman 2 database or the SQL SERVER OBSV_MASTER and OBSV_FULL databases. Data are collected according to the Regional Observer Program (regional observer program: https://www.wcpfc.int/regional-observer-programme) requirements and minimum data reporting standards. For Pacific Island Regional observer guides: PIRFO-manuals
R_OB	S	All_flags	1993	2025	891,533	
R_OB	P	All_flags	1998	2006	879	
DW_OB	L	JP, TW, CN, KR, PH	2002	2025	413,512	Individual fish length data from National Observer programmes for non-SPC members (JP, TW, CN, KR, PH) where data are submitted as a WCPFC member obligation.

Source	GEAR(s)	FLAG	Year from	Year to	BET Size (LENGTH) samples	NOTES on data collection and processing for LF_MASTER
	S	JP, TW, CN, KR, PH	2012	2025	110,051	Data with standard lengths UF = "Upper jaw to fork length" are only considered. Data are collected according to the WCPFC ROP (regional observer program: https://www.wcpfc.int/regional-observer-programme) requirements and minimum data reporting standards.
SBPL	P	SB	1971	1992	406	Historical Solomon Islands pole-and-line size data, port samples. Lengths are UF = "Upper jaw to fork length", no other length types are considered. These data existed as aggregated size data compiled, mostly prior to 1990 (before databases were established) and original data are not available.
SPLL	L	SPLL	1991	2025	1,694,401	Individual fish length data are collected from the Regional Port Sampling in Pacific Island Countries. Data with lengths UF = "Upper jaw to fork length" are only considered. Original raw data are available in the Port Sampling databases and since 2015 for LONGLINE, in the Tufman 2 database system. Note that samples from the purse seine fishery port sampling (source = "SPPS") for vessel trips where there is observer data have been excluded, particularly since the implementation of 100% observer coverage to avoid duplication and there are very few samples since 2013 for source SPPS. The port sampling protocol was developed in 2002 and has not been revised since: oceanfish.spc.int-fisheries-monitoring-172-port-sampling
SPLL	H	SPLL	2019	2025	264	
SPPS	S	SPPS	1993	2015	37,598	
TAG_	J, L, P, S, T	TAG_	1977	2001	28,134	Historic size data from Tag RELEASES only. Latest data loaded covers tagging programmes prior to 2001 (SSAP and RTTP primarily). The GEAR/FLAG will be the GEAR/FLAG of the tagging which are mainly P&L/JP and P&L/TV**.** Note the size data for tagged fish in LF_MASTER is not used in the assessment. Size data for tagged fish is extracted from the TAG_MASTER database used to generate the tag data inputs for the assessments.
TTPS	S	US	1987	2016	268,844	US Multilateral Treaty Port Sampling (non-standard) data using the NMFS data collection protocol. Data lengths UF = "Upper jaw to fork length" are only considered. Original raw data are available in the VFP Port Sampling databases and since 2015, in the Tufman 2 database system. Note that samples for this source do not have the SET TYPE information available. Since 2010 samples from increased observer coverage with set type recorded became available. Therefore, samples from this port sampling source collected since 2010 are not used in assessments because PS SKJ fisheries data in the assessments require a breakdown by SET TYPE. Alternatively, data from 2010 onwards from this port sampling source can be excluded from the LF_MASTER process to avoid any potential duplication with observer collected size data.
TWLL	L	TW	2005	2016	1,020,802	Data are collected by the captains on TW DWFN and **STLL (offshore=OS)** LL vessels (pers. Comm, Yi-Jay Chang, 12/11/2024). Few SKJ size data are understood to have been collected by this source. Lengths are understood to be UF = "Upper jaw to fork length", likely estimated by skippers/crew, who measure the first 30 fish (irrespective of species) form a set, no other length types are considered. Data are no longer provided but are understood to be now available in observer data (see above DW_OB for TW fleet). The original data are available.
VNWP	G, L	VN	2010	2017	47,314	Vietnam Gillnet and Longline port sampling. Lengths are understood to be UF = "Upper jaw to fork length", no other length types are considered. Note there is no longline fishery anymore. Vietnam handline fishing for larger tuna (primarily yellowfin) has mostly replaced longline fishing since 2014 as the main target method (only about 3 dedicated tuna longliners left in 2025). The original data are available.

Table 10 Summary of **weigh**t data available for bigeye tuna by source with notes on the collection programs. Gear and flag codes are in Appendix table 6 and 7, respectively.

Source	GEAR	FLAG	Year from	Year to	BET Size (LENGTH) samples	NOTES on data collection and processing for WT_MASTER
AUWT	L	AU	1997	2024	405,445	Aggregated data provided by Australia. Data are collected at ports of landing on the East Coast of Australia. Data provided are broken down by AREA (which we understand is related to broad areas related to the port of landing), year and month. We attempt to assign 10°x10° lat/lon on the assumption that the fishing area is in proximity to the port/area of landing. Data are available in Australia to link the port samples to trips. A request has been made to link these size data to the fishing trip so we can determine more accurate spatial assignment to the weight data. The data provided are processed weight and CSIRO (Ashley Williams) confirmed that the processing is gilled and gutted (GG), Pacific style with tail and gill covers not removed. A conversion factor to whole weight is applied to each individual fish weight. Original Raw data are available.
GUWT	L	TW, JP	1989	2023	2,332,882	Original data represents port sampling of Longline vessel landings in Guam. This sampling has since stopped (but check the end year as some uncertainty). The trunk form is assumed to have been gilled and gutted (GG), but worth to confirm that it is not Japan style GT. A conversion factor from GG to whole weight (WW) is applied to each individual. Original Raw data are available.
HWWT	H	US	1992	2024	103,012	Weights collected by US Hawaii HDAR Commercial Marine dealer are in pounds to the nearest half-pound weight. NOTE: HDAR uses its own conversion factors to convert processed weights in pounds to whole weights in pounds to one decimal place (Note: need to check these conversion factors against SPC conversion factors). The following conversion from lbs to kgs are applied by SPC when these data are loaded. Wt_kgs = round((wt_lbs + Rand()- 0.5) * 0.4536 ,0) Original Raw data are available.
HWWT	L	US	1991	2024	3,642,184	
IDWT	H	ID	2011	2024	4,348	Indonesia Port Sampling data collected in recent years through the WCPFC-administered Western Pacific East Asia (WPEA) Project. YFT that are weighed at ports are in the GG form (tail on) (advice from Pak Bayu 21/6/2025). The data are converted to WW by SPC. The original data are entered and managed through a database system maintained by Indonesia Maritime Affairs and Fisheries (MMAF) (Pak Bayu) and aggregated data are submitted to the WCPFC each year. Data at the level of vessel trip may be available on request.
IDWT	L	ID	2011	2024	6,679	
IDWT	O	ID	2011	2024	1,087	
JPWT	L	JP	1951	2019	4,799,583	Aggregated port sampling data provided by Japan. Spatial information (LAT x LON) are provided. The data provided are processed weight based on advice from Japan for their frozen fish – gilled (gill cover removed), gutted, finned and tailed (GT) - also see Langley et at (2006), Japanese specific conversion factor GT to WW in **Table 4**, **Figure 6**. Original Raw data are available.
NZWT	L	NZ	1950	2024	17,072	Need to find more about this source??
SBWT	L	SB	2016	2019	64,458	Individual fish weight data from the Solomon Is. LONGLINE Trimarine (TMI). The data have been provided as many EXCEL files which have required an automated process to load but also a manual data entry at SPC into a MS ACCESS database to consolidate and standardise their data for import. There are additional data since 2019 that are potentially available. There was discussion of the possibility of SPC providing some tool to TMI to organise these data (contact Russell Dunham). Note that the individual fish weight data are provided to kg at one decimal place. The processing confirmed by Russell D is similar to the processing for frozen fish by Japanese (see **Figure 6**). Based on this information, the conversion from Japanese GT to WW should be applied, **Figure 6**. NOTE: Go back and check that correct conversions have been applied (may have been GG). The original data are available.
SPPK	L	PG	1997	2005	32,772	Regional LL Packing List data. These packing list data likely just apply GG in the conversion, needs to be check. It may be unclear what the weighed carcass forms are.
SPWT	L	SPWT	1991	2024	1,385,102	Individual fish weight data are collected from the Regional Port Sampling in PICTs. However, there are more LENGTHs from this data source than WEIGHTs, so the LENGTH data take priority and the YFT WEIGHT data

Source	GEAR	FLAG	Year from	Year to	BET Size (LENGTH) samples	NOTES on data collection and processing for WT_MASTER
						from this source are not (yet) consolidated into the WT_MASTER database. The data are converted from GG to WW, but some data from some ports, i.e. FSM, maybe Japanese frozen, GT – need check, but the trunk form should be recorded. Original raw data for YFT weights are available in the VFP Port Sampling databases since 2015, and since then the Tufman 2 database system.
TWWT	L	TW	2014	2024	694,952	Individual fish weights data are understood to be collected at ports of landing from Chinese Taipei longline vessels. Weights are processed weights, if frozen the form is GT (tail off and gill flaps removed same as Japanese GT form) and if landed fresh (ice slurry) the fish is whole including the guts (confirmed by Ren-Fen Wu, 20/6/2025). The original data are available.
VNWT	L	VN	2010	2017	17,629	Vietnam Longline port sampling. Weights are for ice chilled, gilled and gutted (GG), with fins removed, the conversion (GG) to whole weight (WW) is applied. Note there is no longline fishery anymore. Vietnam handline fishing for larger tuna (primarily yellowfin) has mostly replaced longline fishing since 2014 as the main target method (only about 3 dedicated tuna longliners left in 2025). The original data are available.

Albacore tuna (ALB)

Albacore tuna have both length and weight data available. For the south Pacific albacore assessment only length data are used in stock assessment. Length data are available from many sources.

Table *11* describes the albacore tuna length data (mostly measured to 1 cm resolution) available in the LF_MASTER. **Table *12*** describes the albacore tuna weight data available in the WF_MASTER.

Table 11 Summary of length data available for albacore tuna by source with notes on the collection programs. Gear and flag codes are in Appendix table 6 and 7, respectively.

Source	GEAR(s)	FLAG	Year from	Year to	ALB Size (LENGTH) samples	NOTES on data collection and processing for LF_MASTER
IAEP	L	IATTC	1971	2019	297,431	IATTC Albacore tuna longline data for the Eastern Pacific Ocean (EPO). Lengths are understood to be standard (UF = "Upper jaw to fork length"), no other length types are considered. **These data are provisions on request to the IATTC for South Pacific Albacore assessments.** The original data are available.
JPLL	L	JP	1948	2024	345,552	Japanese longline data, likely represent mix of vessel and port-based measures – needs more confirmation especially historical data collections. Lengths are understood to be UF = "Upper jaw to fork length", no other length types are considered. Length data are provided as an aggregated WCPFC data submission, or historically, provided for assessments for DWFN fleets prior to the establishment of the WCPFC.
KRLL	L	KR	2006	2024	9,066	Korean longline fishery samples, probably port sampling – but needs confirmation. Lengths are understood to be UF = "Upper jaw to fork length", no other length types are considered. The original data are available.
NSAP	H, K, R, T	PH	1997	2024	31,941	Philippines National Stock Assessment Project (NSAP) port sampling size data for several small-scale fishing gears for the domestic Philippines tuna fisheries. Data with standard lengths UF = "Upper jaw to fork length" are only considered. The original data are entered and managed in the NSAP TUFMAN2 Database system. SPC applies a process for extracting aggregate NSAP data from the NSAP T2 Database system for input to LF_MASTER. There

Source	GEAR(s)	FLAG	Year from	Year to	ALB Size (LENGTH) samples	NOTES on data collection and processing for LF_MASTER
						are manuals available for the NSAP Data Collection and the NSAP Database System.
R_OB	L	All_flags	1979	2025	1,740,110	Individual fish length data are collected from the Regional Observer data collected through (i) SPC Member National Observer Programmes, (ii) PNA Observer Programme. Data are UF = "Upper jaw to fork length", no other measurement types considered. Original data are available in Tufman 2 database or the SQL SERVER OBSV_MASTER and OBSV_FULL databases. Data are collected according to the Regional Observer Program (regional observer program: https://www.wcpfc.int/regional-observer-programme) requirements and minimum data reporting standards. For Pacific Island Regional observer guides: PIRFO-manuals
R_OB	S	All_flags	1982	2025	3,677	
DW_OB	L	JP, TW, CN, KR, PH	2002	2025	1,598,494	Individual fish length data from National Observer programmes for non-SPC members (JP, TW, CN, KR, PH) where data are submitted as a WCPFC member obligation. Data with standard lengths UF = "Upper jaw to fork length" are only considered. Data are collected according to the WCPFC ROP (regional observer program: https://www.wcpfc.int/regional-observer-programme) requirements and minimum data reporting standards.
SPLL	L	SPLL	1991	2025	2,831,763	Individual fish length data are collected from the Regional Port Sampling in Pacific Island Countries. Data with lengths UF = "Upper jaw to fork length" are only considered. Original raw data are available in the Port Sampling databases and since 2015 for LONGLINE, in the Tufman 2 database system. The port sampling protocol was developed in 2002 and has not been revised since: oceanfish.spc.int-fisheries-monitoring-172-port-sampling
SPLL	H	SPLL	2019	2025	266	
SPAR	G	(various)	1988	1990	51,524	South Pacific Albacore Research Programme (SPAR). Contributions for various fleets for the high seas Driftnet fishery. Data with standard lengths (UF = "Upper jaw to fork length")
SPAR	L	(various)	1962	1997	442,651	South Pacific Albacore Research Programme (SPAR). Contributions for various fleets for the LONGLINE fishery. Data with standard lengths (UF = "Upper jaw to fork length")
SPAR	T	(various)	1987	2006	91,275	South Pacific Albacore Research Programme (SPAR). Contributions for various fleets for the TROLL fishery. (Some early WCPFC submissions were loaded under this source of data). Data with standard lengths (UF = "Upper jaw to fork length")
SPGN	G	JP	1989	1989	1,438	SPC sampling of driftnet vessels transhipping in Noumea port. Data with standard lengths (UF = "Upper jaw to fork length")
SPTR	T	NZ	1997	2024	109,488	South Pacific Troll port sampling data – NEW ZEALAND Troll fleet. Regular WCPFC submissions from New Zealand. Data with standard lengths (UF = "Upper jaw to fork length") are only considered. Original raw data and import procedures are available. These data are imported in the VFP Port Sampling databases. Needs to be transferred to TUFMAN 2.
SPTR	T	US	1994	1998	3,993	South Pacific Troll port sampling data – US Troll fleet. Data with standard lengths (UF = "Upper jaw to fork length") are only considered. No recent submissions, although landings for SPAC albacore into north-west US coastal ports may be available for sampling in the future.

Source	GEAR(s)	FLAG	Year from	Year to	ALB Size (LENGTH) samples	NOTES on data collection and processing for LF_MASTER
TAG_	JT	TAG_	1986	2001	17,354	Size data from Tag RELEASES only from Albacore Tagging Programme (ARTP). Latest data loaded covers tagging. Note the size data for tagged fish in LF_MASTER is not used in the assessment. Size data for tagged fish is extracted from the TAG_MASTER database used to generate the tag data inputs for the assessments. Tag data have not been used in recent assessments. Original data are available in TAG_MASTER database on SQL SERVER.
TWLL	L	TW	2005	2016	129,524	Data are collected by the captains on TW DWFN and **STLL (offshore=OS)** LL vessels (pers. Comm, Yi-Jay Chang, 12/11/2024). Few SKJ size data are understood to have been collected by this source. Lengths are understood to be UF = "Upper jaw to fork length", likely estimated by skippers/crew, who measure the first 30 fish (irrespective of species) form a set, no other length types are considered. Data are no longer provided but are understood to be now available in observer data (see above DW_OB for TW fleet). The original data are available.

Table 12 Summary of **weight** data available for albacore tuna by source with notes on the collection programs. Gear and flag codes are in Appendix table 6 and 7, respectively.

Source	GEAR	FLAG	Year from	Year to	ALB Size (LENGTH) samples	NOTES on data collection and processing for WT_MASTER
AUWT	L	AU	1997	2024	60,019	Aggregated data provided by Australia. Data are collected at ports of landing on the East Coast of Australia. Data provided are broken down by AREA (which we understand is related to broad areas related to the port of landing), year and month. We attempt to assign 10°x10° lat/lon on the assumption that the fishing area is in proximity to the port/area of landing. Data are available in Australia to link the port samples to trips. A request has been made to link these size data to the fishing trip so we can determine more accurate spatial assignment to the weight data. The data provided are processed weight and CSIRO (Ashley Williams) confirmed that the processing is gilled and gutted (GG), Pacific style with tail and gill covers not removed. A conversion factor to whole weight is applied to each individual fish weight. Original Raw data are available.
HWWT	L	US	1991	2023	212,770	Weights collected by US Hawaii HDAR Commercial Marine dealer are in pounds to the nearest half-pound weight. NOTE: HDAR uses its own conversion factors to convert processed weights in pounds to whole weights in pounds to one decimal place (Note: need to check these conversion factors against SPC conversion factors). The following conversion from lbs to kgs are applied by SPC when these data are loaded. Wt_kgs = round((wt_lbs + Rand()- 0.5) * 0.4536 ,0) Original Raw data are available.
SPPK	L	PG	1997	2005	15,161	Regional LL Packing List data. Note the need to confirm weighed forms and conversions, are these reliable know etc. It is all assumed GG.
SPWT	L	SPWT	1991	2025	155,977	Individual fish weight data are collected from the Regional Port Sampling in PICT countries. However, there are more LENGTHs from this data source than WEIGHTs, so the LENGTH data take priority and the ALB WEIGHT data from this source are not (yet) consolidated into the WT_MASTER database. The weight of ALB is assumed to be mostly WHOLE WEIGHT form if frozen fish so no conversion factor is applied at this stage, but may also have gilled and gutted for fresh fish, e.g. NC. The different measurement codes should be reliably reported for the port sampling. Original raw data for ALB weights are available in the VFP Port Sampling databases and since 2015, in the Tufman 2 database system. The port sampling protocol was developed in 2002 and has not been revised since: oceanfish.spc.int-fisheries-monitoring-172-port-sampling
TWWT	L	TW	2014	2024	260,142	Individual fish weights data are understood to be collected at ports of landing from Chinese Taipei longline vessels. Weights are processed

Source	GEAR	FLAG	Year from	Year to	ALB Size (LENGTH) samples	NOTES on data collection and processing for WT_MASTER
						weights, if frozen the form is GT (tail off and gill flaps removed same as Japanese GT form) and if landed fresh (ice slurry) the fish is whole including the guts (confirmed by Ren-Fen Wu, 20/6/2025). The original data are available.

Striped marlin (MLS)

Striped marlin have both length and weight data available, and both are used in stock assessment. Length data are available from many sources.

Table *13* describes the striped marlin length data (mostly measured to 1 cm resolution) available in the LF_MASTER. Table 16 describes the striped marlin weight data available in the WF_MASTER.

Table 13 Summary of length data available for striped marlin by source with notes on the collection programs. Gear and flag codes are in Appendix table 6 and 7, respectively.

Source / Origin	GEAR	FLAG	Year from	Year to	MLS Size (LENGTH) samples	NOTES on data collection and processing for LF_MASTER
JPLL	L	JP	1948	2024	12,709	Data are collected onboard vessels by skipper/crew and observers. Japan (Kai-san, Nov. 2024) confirms that all these measurements are EO for all billfish, so no conversion of length is required for MLS for the stock assessment as it uses EO. (*However, since 2014 (when detailed observer data was first provided as a different source of data), there may be double-counting between JPLL and JPOB sources of data, based on Kai-san's message. If this is the case, then we need to exclude JPLL MLS Length data 2014-2022 in the generation of LF_MASTER.* Note that size (length) data for the other billfish species are not loaded on the basis that they are provided under the JPOB data source (Japanese Observer programme). The original data are available.
KRLL	L	KR	2006	2024	815	Data are collected onboard Korean longline fishing vessels by crew (pers. comm. Youjung Kwon, Dec. 2024), and the lengths are the lower jaw- fork length – LF, which requires conversion to EO by SPC for use in the MLS assessment. Data collected by vessels are supported through periodic or ad hoc captain training sessions and industry consultations, where the importance of accurate data collection and proper methods are emphasized. The quality of the measurement is suggested to be high by Korea, but no protocols available, and low sample numbers. The original data are available.
R_OB	L	All_flags	1979	2025	55,740	Individual fish length data are collected from the Regional Observer data collected through (i) SPC member National Observer Programmes, (ii) PNA Observer Programme. For MLS assessments, the standard length measurement is EO (Eye orbital to fork length). Length measurements for PF and LF are also considered, where available, and require conversion to EO for the assessments, see **Table 3**. Around 60% of the observer data has MLS measurements of LF, around 40% measurements for EO and very small amount as measurements for PF length code. Original data are available in TUFMAN 2 database or the SQL SERVER OBSV_MASTER and OBSV_FULL databases.
R_OB	S	All_flags	1993	2025	1,575	
DW_OB	L	JP, TW, CN, KR, PH	2002	2025	13,910	Individual fish length data from National Observer programmes for non-SPC members (JP, TW, CN, KR, PH) where data are submitted as WCPFC member obligation. Data are LF (Lower jaw to fork length) except for JP which are EO (eye orbital fork length).
SPLL	L	All_flags	1991	2025	21,089	Individual fish length data are collected from the Regional Port Sampling in PICTs. For MLS assessments, the standard-length measurement is EO (eye orbital to fork length). Length measurements for PF and LF are also considered, where available, and require conversion to EO by SPC for the assessments, see **Table 3**. **More than 95% of the MLS lengths from this source are PF length code.** Original raw data are available in the VFP Port Sampling databases and since 2015, in the Tufman 2 database system.
TWLL	L	TW	2005	2016	13,088	Data are collected by the captain/crew on TW DWFN and STLL (offshore) LL vessels using the lower jaw fork length (LF) measurement for billfishes (pers. Comm, Yi-Jay Chang, 12/11/2024), but are mostly estimated by eye by skipper/crew rather than measured with devices, first 30 fish of a set

Source / Origin	GEAR	FLAG	Year from	Year to	MLS Size (LENGTH) samples	NOTES on data collection and processing for LF_MASTER
						(irrespective of species) measured, accuracy is questionable, no other length types are considered. Since the MLS lengths are LF, they require conversion to EO by SPC for use in the assessment, see **Table 3**. Data are stratified at 5 cm intervals. Data are no longer provided but are understood to be now available in observer data (see above DW_OB/RG_OB for TW DWFN and STLL fleets). The original data are available.

Table 14 Summary of **weight** data available for striped marlin by source with notes on the collection programs. Gear and flag codes are in Appendix table 6 and 7, respectively.

Source / Origin	GEAR	FLAG	Year from	Year to	MLS Size (WEIGHT) samples	NOTES on data collection and processing for WT_MASTER
AUWT	L	AU	1997	2024	51,258	Aggregated data provided by Australia. Data are collected at ports of landing on the East Coast of Australia. Data provided are broken down by AREA which is related to broad area representing the port of landing, year and month. In the past, we have attempted to assign 10°x10° lat/lon on the assumption that the fishing area is in proximity to the port/area of landing, but a request was made to CSIRO/AFMA to link these size data to the fishing trip so more accurate spatial assignment is made to the weight data (i.e. 10x10 lat/lon assignment according to where the fish were caught). The data provided are processed weight and CSIRO (Ashley Williams) confirmed that the processing is headed, and gutted, with fins and tailfins removed, but caudal peduncle attached for lifting. It is not clear what the best conversion is for this form is, as there is no conversion for headed, gutted, finned but tail caudal peduncle retained (i.e. **Figure 8a)**. The conversion factor GX to WW is probably the most suitable to apply, this should be checked. The MLS assessment has two fishery areas, north and south of 30°S, hence it is required to separate the port sample data to these two areas. To allows this disaggregation SPC requested that AUS provide: -The MLS sampling data broken down by trip (i.e. Vessel name, vessel id, departure and return date). These new fields have been provided. -The addition of 10°x10° lat/lon areas to apply to the sampled data. While the new fields have been provided, where a vessel trip was conducted over more than one 10°x10° lat/lon area (i.e. it appears in these cases that the maximum is two areas for the trip) it is uncertain which region the size data came from. There are two options to deal with this; assign the data to the most northern area of the two 10x10 areas pending further discussion with CSIRO on potentially obtaining more information. This was previously the default option. OR a second option has been added to denoted where this situation occurs the actual area of sampling is recorded in SPC database as 'Uncertain'. There may be better approaches to dealing with this issue, for example, have two lat10/lon10 fields, or we attempt to link to logbook data, which may be cumbersome/problematic, and better for AUST to provide the spatial information in the size data in any event. Stock assessments fro MLS apply the fishery separation north and south of 30°S should not use size data with 'uncertain' sampling area. Given more time, and once an appropriate structure of the AU LL size data submission structure has been decided (to include spatial information), it is no doubt a good time to request the complete historical AU LL SIZE data for all species which would be presumably be loaded with new scripts (into the new SQL SERVER / FISH_MASTER system). Original Raw data are available.
HWWT	H	US	1991	2024	3,698	Weights collected by US Hawaii HDAR Commercial Marine dealer are in pounds to the nearest half-pound weight. NOTE: HDAR uses its own conversion factors to convert processed weights in pounds to whole weights in pounds to one decimal place (Note: need to check these conversion factors against SPC conversion factors). The following conversion from lbs to kgs are applied by SPC when these data are loaded. Wt_kgs = round((wt_lbs + Rand()- 0.5) * 0.4536 ,0) Original Raw data are available.
HWWT	L	US	1991	2024	224,591	
JPWT	L	JP	1951	2019	43,044	Aggregated individual weight data provided by Japan. Data are collected at port. Spatial information (LAT x LON) are provided. The data provided are

Source / Origin	GEAR	FLAG	Year from	Year to	MLS Size (WEIGHT) samples	NOTES on data collection and processing for WT_MASTER
						processed weights. **The Japanese form for processing billfish is unique**: gilled, gutted, and upper jaw – including the bill and tip of lower jaw removed (i.e. at the point of 1 - 2 cm back from the tip of lower jaw) (**Figure 8b**). This is a form of gilled and gutted (GG), but has a different conversion factor provided by the Japanese, see **Table 4**. (Advice provided by Kotaro Yokawa, FRA, 20/5/2025). Original Raw data are available.
NZWT	Y	NZ	1950	2003	9,104	Data from recreational fishery provided NZ (need check, MLS non retention for NZ longline started 1988) – need to locate original data, weighed as whole weights at landing points. Conversions not required. Weights are considered highly accurate, use fishing tournament certified scales. Note that from 1988 onwards tournament anglers were encouraged to return smaller fish <90 kg WW, weights of smaller fisher were estimated by anglers, so the data post 1988 should be treated as a separate data set for stock assessment as it would be biased towards the larger fish (>90 Kg) (see Kopf et al. 2010).
SPWT	L	SPWT	1991	2024	9,103	Individual fish weight data are collected from the Regional Port Sampling in PICTs. However, there are more LENGTHs from this data source than WEIGHTs, so the LENGTH data take priority in the assessments. The form would be mostly headed and gutted (GH). The original raw data for MLS weights are available in the VFP Port Sampling databases and since 2015, in the Tufman 2 database system.

Swordfish (SWO)

Swordfish have both length and weight data available, and both are used in stock assessment. Length data are available from many sources.

Table *15* describes the swordfish length data (mostly measured to 1 cm resolution) available in the LF_MASTER.

Table 16 describes the swordfish weight data available in the WF_MASTER.

Table 15 Summary of length data available for swordfish by source with notes on the collection programs. Gear and flag codes are in Appendix table 6 and 7, respectively.

Source / Origin	GEAR	FLAG	Year from	Year to	SWO Size (LENGTH) samples	NOTES on data collection and processing for LF_MASTER
ESLL	L	ES	2004	2019	1,045,142	Data are collected by observers, but the ES observer data submission is in a non-standard format so are not yet imported into our Regional observer database and exist as a distinct specific source of data that are processed and imported separately into LF_MASTER. Size data are LF at 5cm intervals, and observers are instructed to measure " straight lower jaw fork length ". However, depending on size of the fish the measurement may be conducted with other lengths, in accordance with the conversion charts on board endorsed by the flag of the vessel. Tapes are used for large fish. According to one of the observer reports, the lengths taken by the observer are as per WCPFC ROP data collection recommendations which is “lower jaw – fork length (LF)”, which is the standard for the assessments, so no conversion factor is applied. However, from communications with Spanish colleagues from SC Francisco Abascal and industry contact Pedro Martins, 11/4/2025, there may be other forms of measurement as noted above that would require conversions. SPC need the length measurement methods are recorded and ascertain that raw lengths are provided with no prior conversions. If prior conversions are applied SPC need to have this documented. The original data are available.
KRLL	L	KR	2006	2024	8,723	Data are collected onboard Korean longline fishing vessels by crew (pers. comm. Youjung Kwon, Dec. 2024), and the lengths are the lower jaw- fork length – LF, which do not require conversion for the SWO assessment. Data collected by vessels are supported through periodic or ad hoc captain training sessions and industry consultations, where the importance of accurate data collection and proper methods are emphasized. The quality of the measurement is suggested to be high by Korea, but no protocols have been provided. The original data are available.

Source / Origin	GEAR	FLAG	Year from	Year to	SWO Size (LENGTH) samples	NOTES on data collection and processing for LF_MASTER
R_OB	L	All_flags	1979	2025	169,026	Individual fish length data are collected from the Regional Observer data collected through (i) SPC member National Observer Programmes, (ii) PNA Observer Programme and (iii) National Observer programmes for non-SPC members where data are submitted as WCPFC member obligation. For SWO assessments, the standard-length measurement is LF (Lower jaw to fork length). Length measurements for PF and EO are also considered, where available, and are converted to LF by SPC for use in the assessment. Around 93% of the observer data has SWO measurements of LF, around 6% measurements for EO and very small amount (1%) as measurements for PF length code. Original data are available in TUFMAN 2 database or the SQL SERVER OBSV_MASTER and OBSV_FULL databases.
DW_OB	L	JP, TW, CN, KR, PH	2002	2025	54,989	Individual fish length data from National Observer programmes for non-SPC members (JP, TW, CN, KR, PH) where data are submitted as WCPFC member obligation. Data with standard lengths, LF (Lower jaw to fork length) except for JP which are EO (eye orbital fork length).
SPLL	L	All_flags	1991	2025	25,917	Individual fish length data are collected from the Regional Port Sampling in PIC countries. For SWO assessments the standard-length measurement is LF (Lower jaw to fork length). Length measurements for PF and EO are also considered, where available, and are converted to LF by SPC for use in the assessment. More than 98% of the SWO lengths from this source are PF length code. Original raw data are available in the VFP Port Sampling databases and since 2015, in the Tufman 2 database system.
TWLL	L	TW	2005	2016	26,656	Data are collected by the captain/crew on TW DWFN and STLL (offshore) LL vessels using the lower jaw fork length (LF) measurement for billfishes (pers. Comm, Yi-Jay Chang, 12/11/2024) but are thought to be mostly estimated by eye rather than measured with devices, accuracy is questionable, no other length types are considered. Since the SWO lengths are LF, they do not require conversion by SPC for use in the assessment. Data are stratified at 5cm intervals. Note that these measurements are not recommended for the assessment as they are not measured with a measurement device. Data are no longer provided but are understood to be now available in observer data (see above R_OB for TW DWFN and STLL fleets). The original data are available.
VNWP	L	VN	2010	2017	1,785	Vietnam Longline port sampling. Measurements are understood to be lower jaw, fork length (LF), so there is no conversion factor applied. These data are not used in south Pacific assessments. The original data are available.

Table 16 Summary of weight data available for swordfish by source with notes on the collection programs. Gear and flag codes are in Appendix table 6 and 7, respectively.

Source / Origin	GEAR	FLAG	Year from	Year to	SWO Size (WEIGHT) samples	NOTES on data collection and processing for WT_MASTER
AUWT	L	AU	1997	2024	497,475	Aggregated data provided by Australia. Data are collected at ports of landing on the East Coast of Australia. Data provided are broken down by AREA which is related to broad area representing the port of landing, year and month. In the past, we have attempted to assign 10°x10° lat/lon on the assumption that the fishing area is in proximity to the port/area of landing, but a request was made to CSIRO/AFMA to link these size data to the fishing trip so more accurate spatial assignment is made to the weight data (i.e. 10x10 lat/lon assignment according to where the fish were caught). These data fields have been provided. The process to add this additional spatial information is ongoing. The data provided are processed weight and CSIRO (Ashley Williams) confirmed that the processing is headed, and gutted, fins including tail fins removed (GX). They are converted WW by SPC, see **Table 4**. Original Raw data are available in the subdirectories under.

<table>
<tr><th>Source / Origin</th><th>GEAR</th><th>FLAG</th><th>Year from</th><th>Year to</th><th>SWO Size (WEIGHT) samples</th><th>NOTES on data collection and processing for WT_MASTER</th></tr>
<tr><td>HWWT</td><td>L</td><td>US</td><td>1991</td><td>2024</td><td>212,287</td><td>Weights collected by US Hawaii HDAR Commercial Marine dealer are in pounds to the nearest half-pound weight. NOTE: HDAR uses its own conversion factors to convert processed weights in pounds to whole weights in pounds to one decimal place (Note: need to check these conversion factors against SPC conversion factors). The following conversion from lbs to kgs are applied by SPC when these data are loaded.
Wt_kgs = round((wt_lbs + Rand()- 0.5) * 0.4536 ,0)
Original Raw data are available.</td></tr>
<tr><td>NZWT</td><td>L</td><td>NZ</td><td>1950</td><td>2024</td><td>69,519</td><td>Weight data collected at unloading for the NZ longline fishery. The data provided could be in various forms, and they are provided with NZ standard codes, which are not the same as the SPC codes and require conversion to the SPC codes and then the appropriate SPC conversion factors are applied by SPC to convert to WW, see table 6. Data beyond 2011 have recently been loaded for use in the 2025 assessment. Advice from NZ staff is that the full tail is rarely removed, typically it is trimmed to remove the fins but the caudal peduncle retained for lifting by tail rope. HGF is the most common NZ form.

<table>
<tr><th>NZ code</th><th>NZ description</th><th>SPC code</th><th>SPC description</th></tr>
<tr><td>HGU</td><td>Headed and gutted</td><td>GH</td><td>Headed, gutted</td></tr>
<tr><td>GRE</td><td>Green or Whole</td><td>WW</td><td>Whole Weight</td></tr>
<tr><td>HGF</td><td>Headed, gutted and finned (note: tail is trimmed but not removed)</td><td>GX</td><td>Gutted, headed, tailed</td></tr>
<tr><td>GGO</td><td>Gilled and gutted, tail on</td><td>GG</td><td>Gilled and gutted</td></tr>
<tr><td>GGT</td><td>Gilled and gutted, tail off</td><td>na</td><td>never occurs ?</td></tr>
<tr><td>HGT</td><td>Headed, gutted and tailed (assume tail removed)</td><td>GX</td><td>Gutted, headed, tailed</td></tr>
<tr><td>GUT</td><td>Gutted</td><td>GO</td><td>Gutted only, not gilled</td></tr>
<tr><td>FIL</td><td>Fillets</td><td>FW</td><td>Fillets weigh</td></tr>
</table>

Original Raw data are available.</td></tr>
<tr><td>SPWT</td><td>L</td><td>SPWT</td><td>1991</td><td>2025</td><td>25,622</td><td>Individual fish weight data are collected from the Regional Port Sampling in PICTs. However, there are more LENGTHs from this data source than WEIGHTs, so the LENGTH data take priority and the SWO WEIGHT data from this source are not used in the assessments. The form would be mostly headed, gutted and tails trimmed, fins removed (GX). Original raw data for SWO weights are available in the VFP Port Sampling databases and since 2015, in the Tufman 2 database system.</td></tr>
<tr><td>VNWP</td><td>L</td><td>VN</td><td>2010</td><td>2017</td><td>1,810</td><td>Vietnam Longline port sampling. Weights are assumed to be processed weights, but no conversion factor been applied as these data have not been used in assessments. The original data are available.</td></tr>
</table>

Blue marlin (BUM)

Blue marlin have only length data available. SPC does not currently do a stock assessment for blue marlin. Length data are available from limited sources, mostly observer programs and port sampling in Pacific Islands.

Table *17* describes the blue marlin length data available in the LF_MASTER.

Table 17 Summary of **length** data available for blue marlin by source with notes on the collection programs. Gear and flag codes are in Appendix table 6 and 7, respectively.

Source / Origin	GEAR	FLAG	Year from	Year to	BUM Size (LENGTH) samples	NOTES on data collection and processing for LF_MASTER
KRLL	L	KR	2006	2024	17,445	Data are collected onboard Korean longline fishing vessels by crew (pers. comm. Youjung Kwon, Dec. 2024), and the lengths are the lower jaw- fork length – LF, which do not require conversion for the SWO assessment. Data collected by vessels are supported through periodic or ad hoc captain training sessions and industry consultations, where the importance of accurate data collection and proper methods are emphasized. The quality of the measurement is suggested to be high by Korea, but no protocols have been provided. The original data are available.
R_OB	L	All_flags	1979	2025	37,919	Individual fish length data are collected from the Regional Observer data collected through (i) SPC member National Observer Programmes, (ii) PNA Observer Programme. The common length measurement is LF (Lower jaw to fork length. Length measurements for PF and EO are also considered, where available. Around 96% of the observer data has BUM measurements of LF, only 4% measurements for EO and PF length codes. Original data are available in TUFMAN 2 database or the SQL SERVER OBSV_MASTER and OBSV_FULL databases.
R_OB	S	All_flags	1987	2025	5,858	
DW_OB	L	JP, TW, CN, KR, PH	2002	2025	39,894	Individual fish length data from National Observer programmes for non-SPC members (JP, TW, CN, KR, PH) where data are submitted as WCPFC member obligation. Data with standard lengths, LF (Lower jaw to fork length) except for JP which are EO (eye orbital fork length).
SPLL	L	All_flags	1991	2025	31,893	Individual fish length data are collected from the Regional Port Sampling in PICTs. The common length measurement for port sampled fish is PF as the heads are typically removed. Around 99% of the BUM lengths (for either LF, PF or EO measurements) from this source are PF length code. However, there are nearly as many measurements for PS (pectoral fin to second dorsal fin) as for PF, but these are not included due to the lack of an accurate conversion factor. Developing a PS to LF conversion would be valuable. Original raw data are available in the VFP Port Sampling databases and since 2015, in the Tufman 2 database system.
TWLL	L	TW	2005	2016	78,018	Data are collected by the captain/crew on TW DWFN and STLL (offshore) LL vessels using the lower jaw fork length (LF) measurement for billfishes (pers. Comm, Yi-Jay Chang, 12/11/2024) but are thought to be mostly estimated by eye rather than measured with devices. The skipper/crew measure the first 30 fish per set irrespective of species. Accuracy is questionable, no other length types are considered. These data are no longer provided but TW BUM data may be available in observer data (see above R_OB for TW fleet). The original data are available.

Black marlin (BLM)

Black marlin have only length data available. SPC does not currently do a stock assessment for black marlin. Length data are available from limited sources, mostly observer programs and port sampling in Pacific Islands. **Table *18*** describes the blue marlin length data available in the LF_MASTER.

Table 18 Summary of length data available for black marlin by source with notes on the collection programs. Gear and flag codes are in Appendix table 6 and 7, respectively.

Source / Origin	GEAR	FLAG	Year from	Year to	BLM Size (LENGTH) samples	NOTES on data collection and processing for LF_MASTER
KRLL	L	KR	2006	2024	54	Data are collected onboard Korean longline fishing vessels by crew (pers. comm. Youjung Kwon, Dec. 2024), and the lengths are the lower jaw-fork length – LF, which do not require conversion for the SWO assessment. Data collected by vessels are supported through periodic or ad hoc captain training sessions and industry consultations, where the importance of accurate data collection and proper methods are emphasized. The quality of the measurement is suggested to be high by Korea, but no protocols have been provided. The original data are available.
R_OB	L	All_flags	1979	2025	6,311	Individual fish length data are collected from the Regional Observer data collected through (i) SPC member National Observer Programmes, (ii) PNA Observer Programme. The common length measurement is LF (Lower jaw to fork length). Length measurements for PF and EO are also considered. Around 97% of the observer data has BLM measurements of LF, only 3% measurements for EO and PF length codes. Original data are available in TUFMAN 2 database or the SQL SERVER OBSV_MASTER and OBSV_FULL databases.
R_OB	S	All_flags	1982	2025	2,943	
DW_OB	L	JP, TW, CN, KR, PH	2002	2025	2,207	Individual fish length data from National Observer programmes for non-SPC members (JP, TW, CN, KR, PH) where data are submitted as WCPFC member obligation. Data with standard lengths, LF (Lower jaw to fork length) except for JP which are EO (eye orbital fork length).
SPLL	L	All_flags	1991	2025	7,388	Individual fish length data are collected from the Regional Port Sampling in PIC countries. For BLM, the common length measurement for port sampled fish is PF as the heads are typically removed. Around 99% of the BLM lengths (for either LF, PF or EO measurements) from this source are PF length code. Original raw data are available in the VFP Port Sampling databases and since 2015, in the Tufman 2 database system.
TWLL	L	TW	2005	2016	7,378	Data are collected by the captain/crew on TW DWFN and STLL (offshore) LL vessels using the lower jaw fork length (LF) measurement for billfishes (pers. Comm, Yi-Jay Chang, 12/11/2024) but are thought to be mostly estimated by eye rather than measured with devices. The skipper/crew measure the first 30 fish per set irrespective of species. Accuracy is questionable, no other length types are considered. These data are no longer provided but TW BLM data may be available in observer data (see above R_OB for TW fleet). The original data are available.

Blue shark (BSH)

Blue shark have only length data available. Stock assessments for blue shark in southwest Pacific are conducted by SPC, or consultants contracted by SPC, using the standard-length measure of UF – upper snout to caudal fork length. Length data are available from limited sources, mostly observer programs in Pacific Islands and the Spanish fleet that catch blue shark and swordfish in the southwest west Pacific.

Table 19 describes the blue shark length data available in the LF_MASTER.

Table 19 Summary of length data available for blue shark by source with notes on the collection programs. Gear and flag codes are in Appendix table 6 and 7, respectively.

Source / Origin	GEAR	FLAG	Year from	Year to	BSH Size (LENGTH) samples	NOTES on data collection and processing for LF_MASTER
ESLL	L	ES	2004	2019	3,628	Data are collected by observers, but their data submission is in a non-standard format so are not yet imported into our Regional Observer database and exist as a distinct specific source of data that are processed and imported separately into LF_MASTER. Size data are at 5cm intervals. According to one of the observer reports, the lengths taken by the observer are as per ROP data collection recommendations which is "Upper Jaw to fork length (UF) which is the standard for the assessments, so no conversion factor is applied. Confirmation through Francisco Abascal and ES fleet industry representative (June 27, 2025) indicate that UF is always used. The original data are available.
R_OB	L	All_flags	1979	2025	112,709	Individual fish length data are collected from the Regional Observer data collected through (i) SPC member National Observer Programmes, (ii) PNA Observer Programme. For BSH assessments, the standard-length measurement is UF (Upper jaw to fork length). No other length measurements are considered for conversion at this stage. Original data are available in TUFMAN 2 database or the SQL SERVER OBSV_MASTER and OBSV_FULL databases.
DW_OB	L	JP, TW, CN, KR, PH	1991	2025	169,513	Individual fish length data from National Observer programmes for non-SPC members (JP, TW, CN, KR, PH) where data are submitted as WCPFC member obligation. Data with standard lengths UF (Upper jaw to fork length).

Silky shark (FAL)

Silky shark have only length data available. Stock assessments are conducted by SPC, or consultants contracted by SPC, for silky shark in western and central Pacific using the standard-length measure of UF – upper snout to caudal fork length. Length data are available from limited sources, mostly observer programs in Pacific Islands and distant waters fleets. **Table *20*** describes the silky shark length data available in the LF_MASTER.

Table 20 Summary of length data available for silky shark by source with notes on the collection programs. Gear and flag codes are in Appendix table 6 and 7, respectively.

Source / Origin	GEAR	FLAG	Year from	Year to	FAL Size (LENGTH) samples	NOTES on data collection and processing for LF_MASTER
R_OB	L	All_flags	1979	2025	124,728	Individual fish length data are collected from the Regional Observer data collected through (i) SPC member National Observer Programmes, (ii) PNA Observer Programme. For FAL assessments, the standard-length measurement is UF (Upper jaw to fork length), some data might be provided as TL and requires conversion or is not used. No other length measurements are considered for conversion at this stage.

Source / Origin	GEAR	FLAG	Year from	Year to	FAL Size (LENGTH) samples	NOTES on data collection and processing for LF_MASTER
R_OB	S	All_flags	1987	2025	149,805	Original data are available in TUFMAN 2 database or the SQL SERVER OBSV_MASTER and OBSV_FULL databases.
DW_OB	L	JP, TW, CN, KR, PH	2002	2025	19,066	Individual fish length data from National Observer programmes for non-SPC members (JP, TW, CN, KR, PH) where data are submitted as WCPFC member obligation. Data with standard lengths UF (Upper jaw to fork length).

Mako shark (MAK)

Mako shark have only length data available. Stock assessments for short fin mako shark in southwestern Pacific are conducted by SPC, or consultants contracted by SPC, using the standard-length measure of UF – upper snout to caudal fork length. Length data are available from limited sources, mostly observer programs in Pacific Islands and distant waters fleets.

Table *21* describes the mako shark length data available in the LF_MASTER. This table includes measurements for the long-finned Mako shark (LMA), the short-finned mako shark (SMA) and the Mako shark (MAK - genus level) records. Most data with species ID is short fin mako.

Table 21 Summary of length data available for mako shark by source with notes on the collection programs. Gear and flag codes are in Appendix table 6 and 7, respectively.

Source / Origin	GEAR	FLAG	Year from	Year to	MAK Size (LENGTH) samples	NOTES on data collection and processing for LF_MASTER
R_OB	L	All_flags	1979	2025	MAK 2,279 LMA 1,507 **SMA 10,755**	Individual fish length data are collected from the Regional Observer data collected through (i) SPC member National Observer Programmes, (ii) PNA Observer Programme. For MAK assessments, the standard-length measurement UF (Upper jaw to fork length), some TL data might be provided but requires conversion or is not used. No other length measurements are considered for conversion at this stage. Original data are available in TUFMAN 2 database or the SQL SERVER OBSV_MASTER and OBSV_FULL databases. 74% are SMA.
DW_OB	L	JP, TW, CN, KR, PH	2002	2024	MAK 0 LMA 1,104 SMA 6,121	Individual fish length data from National Observer programmes for non-SPC members (JP, TW, CN, KR, PH) where data are submitted as WCPFC member obligation. Data with standard lengths UF (Upper jaw to fork length).

Oceanic whitetip shark (OCS)

Oceanic whitetip shark have only length data available. Stock assessments for oceanic whitetip shark are conducted by SPC, or consultants contracted by SPC, using the standard-length measure of UF – upper snout to caudal fork length. Length data are available from limited sources, mostly observer programs in Pacific Islands and distant waters fleets.

Table *22* describes the oceanic whitetip shark length data available in the LF_MASTER.

Table 22 Summary of length data available for oceanic whitetip shark by source with notes on the collection programs. Gear and flag codes are in Appendix table 6 and 7, respectively.

Source / Origin	GEAR	FLAG	Year from	Year to	OCS Size (LENGTH) samples	NOTES on data collection and processing for LF_MASTER
R_OB	L	All_flags	1979	2025	11,962	Individual fish length data are collected from the Regional Observer data collected through (i) SPC member National Observer Programmes, (ii) PNA Observer Programme. For OCS assessments, the standard-length measurement is UF (Upper jaw to fork length), some data might be provided as TL and requires conversion or is not used. No other length measurements are considered for conversion at this stage. Original data are available in TUFMAN 2 database or the SQL SERVER OBSV_MASTER and OBSV_FULL databases.
R_OB	S	All_flags	1987	2025	2,688	
DW_OB	L	JP, TW, CN, KR, PH	2022	2025	4,375	Individual fish length data from National Observer programmes for non-SPC members (JP, TW, CN, KR, PH) where data are submitted as WCPFC member obligation. Data with standard lengths (UF = "Upper jaw to fork length") are only considered.

References

Campling, L., Lewis, A., & McCoy, M. (2017). *The Tuna Longline Industry in the Western and Central Pacific Ocean and its Market Dynamics*. Honiara: Pacific Islands Forum Fisheries Agency.

Hoyle, S., Chang, S., Fu, D., Itoh, T., Lee, S. I., Lucas, J., … Lee, M. K. (2021). *Review of size data from Indian Ocean longline fleets, and its utility for stock assessment.* IOTC-2021-WPTT23-07.

Langley, A., Okamoto, H., Williams, P., Miyabe, N., & Bigelow, K. (2006). *A summary of the data available for the estimation of conversion factors (processed to whole fish weights) for yellowfin and bigeye tuna*. WCPFC-SC2-2006/ME-IP-03. Manila, Philippines, 7–18 August 2006.

Macdonald, J., Williams, P., Roupsard, F., Sanchez, C., Bell, L., Chang, S.-K., … Nicol, S. (2023). *Project 90 update: Better data on fish weights and lengths for scientific analysis*. WCPFC-SC19-ST-IP-04.

Macdonald, J., Bell, L., Ghergariu, M., Sanchez, C., Contreras, B., Judd, P., … Williams, P. (2024). *Project 90 update: Better Data on Fish Weights and Lengths for Scientific Analyses*. WCPFC-SC20-ST-IP-04.

Maunder, M. N., Thorson, J. T., Xu, H., Oliveros-Ramos, R., Hoyle, S. D., Tremblay-Boyer, L., … Piner, K. R. (2020). The need for spatio-temporal modeling to determine catch-per-unit effort based indices of abundance and associated composition data for inclusion in stock assessment models. *Fisheries Research*, *229*, 105594.

Peatman, T., Ducharme-Barth, N., & Vincent, M. (2020). *Analysis of purse-seine and longline size frequency data for bigeye and yellowfin tuna in the WCPO*. SC16-SA-IP-18.

Teears, T., Aoki, Y., Matsubura, N., Tsuda, Y., Castillo Jordon, C., Hampton, J., … Hamer, P. (2022). *Background analyses and data inputs for the 2022 skipjack tuna stock assessment in and central Pacific Ocean*. WCPFC-SC18-2022/SA-IP-05.

Thorson, J. T. (2014). Standardizing compositional data for stock assessment. *ICES Journal of Marine Science*, *71*, 1117–1128.

Appendices

1. LF_MASTER Database structure

This table stores all of the LENGTH Data collected from a variety of sources and in a variety of stratifications (Time, Area, Length).

Field Name	Picture	Description
ID	N(8)	Primary key (Internal use only)
YR	N(4)	Year
QTR	N(2)	Quarter
MON	N(2)	Month
GR	C(1)	Gear type (see GEAR Table)
ORIGIN_ID	C(4)	Origin (see ORIGIN Table)
FLAG_ID	C(2)	Flag (see ENTITY Table)
FLEET_ID	C(2)	Fleet (see ENTITY Table)
LAT_SHORT	C(3)	Latitude (see ASTRAT for resolution)
LON_SHORT	C(4)	Longitude (see ASTRAT for resolution)
AREA_ID	C(3)	Area (see ENTITY, if latitude/longitude not available, this represents an EEZ)
TSTRAT	C(1)	Time Stratification (see STRATIFICATION Table)
ASTRAT	C(1)	Area Stratification (see STRATIFICATION Table)
SCHTYPE_ID	C(1)	School type (Purse seine only) 'U' – Unassociated 'A' – Associated 'L' – Log 'F' – Drifting or Anchored FAD 'M' – Marine mammal (EPO) 'O' – Other (not specified)
SP_ID	C(3)	Species ID (Refer to SPECIES Table)
LEN	N(3)	Length (cm - refer to LSTRAT)
LSTRAT	C(1)	Length stratification (1 = 1cm ; 2 = 2cm; 5 = 5 cm)
FREQ	N(8)	Frequency
STRAT_ID	N(8)	Link to the LF_LEN_EFF table (see below)

LF_LEN_EFF Database structure

This table stores the original Vessel trip information that is linked to the LF_MASTER database by the STRAT_ID field. This database table is used as the basis for understanding the coverage of the corresponding size data. The process for generating this table involves setting a value in the STRAT_ID data field in the LF_MASTER table which links to the lf_len_eff.dbf database table which contains the corresponding vessel trip information where the size data originated. These data are used by TomP as a basis for his model that filters out size data with small sample size and other processing before the data are used in assessments. This process is only possible for OPERATIONAL Port sampling and Observer data.

Field Name	Picture	Description
STRAT_ID	N(8)	Primary key (Internal use only)
VESS_ID	N(5)	VFP Boat_id or the VESSELNAME field used to link to the original Data (port sampling or observer data)
TRIP_DATE	DATE	Trip – First date
OPN_DATE	DATE	Fishing operation date (Observer data only)

2. WT_ MASTER Database structure

This table stores all of the WEIGHT FREQUENCY Data collected and submitted from a variety of sources and in a variety of stratifications (Time, Area).

Field Name	Picture	Description
ID	N(8)	Primary key (Internal use only)
YR	N(4)	Year
QTR	N(2)	Quarter
MON	N(2)	Month
GR	C(1)	Gear type (see GEAR Table)
ORIGIN_ID	C(4)	Origin (see ORIGIN Table)
FLAG_ID	C(2)	Flag (see ENTITY Table)
FLEET_ID	C(2)	Fleet (see ENTITY Table)
LAT_SHORT	C(3)	Latitude (see ASTRAT for resolution)
LON_SHORT	C(4)	Longitude (see ASTRAT for resolution)
AREA_ID	C(3)	Area (see ENTITY)
MLS_REGION	C(1)	Indicates which stock assessment region for Aust LL MLS data(N, S, X or blank)
TSTRAT	C(1)	Time Stratification (see STRATIFICATION Table)
ASTRAT	C(1)	Area Stratification (see STRATIFICATION Table)
SP_ID	C(3)	Species ID (Refer to SPECIES Table)
WT	N(3)	Weight kgs)category (1 kgs resolution)
FREQ	N(8)	Frequency

ORIGIN reference database table -WT_ MASTER

This table stores the ORIGIn details of the size data.

Field Name	Picture	Description
ORIGIN_ID	C(4)	Key field for ORIGIN
ORIGIN_NO	N(3)	Number refering to Origin (used internally)
ORIGINDESC	C(50)	Description of Origin
TYPE	C(1)	Type of data (L - Length data; W - Weight data)

3. Post consolidation processes in generation on LF and WF_MASTER

Once the first phase of generating interim standardised data tables with the structure of the LF and WF MASTER database table is completed, all of these interim database tables are CONSOLIDATED into the new version of the LF_MASTER database, and the current post-consolidation processing steps listed in the table below are undertaken to produce the final version of the new LF and WF_MASTER database.

Post-consolidation steps on the LF_MASTER Database

Source data - Process description	Notes
Position data tidy-up - 00S to 00N - Assigns an approximate 10x10 best approximating the EEZ when there is no lat/lon data - Set the ASTRAT field to '5' where origin_id = 'SPLL' AND astrat = 'T' AND INLIST(flag_id,'NC','PF','FJ','TO','WS','CK','NU','SB','TW','CN')	The database table that contains the best 10x10 approximation for each EEZ is g:\tuna_dbs\LWFREQ\DBF\Area10x20.dbf
Remove dubious lengths - Any length = 0cm - ALB < 20 cm and > 130cm - BET< 10cm and > 210cm - YFT < 10 cm and > 210cm - SKJ < 10cm and > 110cm -	
Temporal data tidy-up - Remove data where QTR = 0 - Removes data where Year is < 1940 and > [current year + 1] -	
Special requested deletions / modifications i. April 2021 -- Remove TW LL vessel measurement data on advice by Nicholas through Simon Hoyle (see IOTC study) ii. STANDARDISE on FLAG/FLEETS for MUFDAGER o Set Fleet_id to blank for the following FLAGs ('CN','FJ','KR','PW','VN','VU','WS') o Remove data for the following FLAGs (rare bogus data) – (blank,'AN','BM','BO','CO','CY','HN','GT','HR','PE','NI','VC','VE','KY') o Set FLAG_ID = 'US' and Fleet_id = 'AS' where FLAG_ID = 'AS' o Set Fleet_id = 'DW' where FLAG_ID = 'JP' and Fleet_id = 'JP' o Set Fleet_id = ' ' where FLAG_ID = 'JP' and Fleet_id = 'SP' o Set FLAG_ID = 'TV' where FLAG_ID = 'SP' o iii. iv. Force all HWOB size data in the south pacific to ASOB with fleet_id = 'AS'	i. DELETE all FOR origin_id = 'TWLL' AND INLIST(sp_id,'ALB','SWO') AND RIGHT(lat_short,1) = 'S'
Generate the special LF Effort file which is stored in . This database table is used as the basis for understanding the coverage of the corresponding size data. The process involves setting a value in the STRAT_ID data field in the LF_MASTER table which links to the lf_len_eff.dbf database table which contains the corresponding vessel trip information where the size data originated. These data are use by TomP as a basis for his model that filters out size data with small sample size and other processing before the data are used in assessments. This process is only possible for TRIP-level and OPERATIONAL Port sampling and Observer data.	See code in g:\tuna_dbs\admin_lfreq\prg\gen_lf_99.prg

Post-consolidation steps on the WT_MASTER Database

Source data - Process description	Notes
Position data tidy-up - Set the ASTRAT field to '5' where origin_id = 'SPLL' AND astrat = 'T' AND INLIST(flag_id,'NC','PF','FJ','TO','WS','CK','NU','SB','TW','CN')	The database table that contains the best 10x10 approximation for each EEZ is g:\tuna_dbs\LWFREQ\DBF\Area10x20.dbf
Special requested deletions / modifications i. STANDARDISE on FLAG/FLEETS for MUFDAGER o Set Fleet_id to blank for the following FLAGs ('CN','FJ','KR','PW','VN','VU','WS') o Set FLAG_ID = 'US' and Fleet_id = 'AS' where FLAG_ID = 'AS' ii. Force all HWOB size data in the south pacific to ASOB with fleet_id = 'AS'	i.

4. Contents of STRATIFICATION codes database (ASTRAT and TSTRAT)

strat_type	strat_id	strat_desc	strat_short
A	0	Ten degree squares	10x10
A	1	One degree squares	1x1
A	4	Four by 10 degree rectangles (Japanese size data - 1948-1964)	4x10
A	5	Five degree squares	5x5
A	A	Data provided in broad sub-areas (defined as an EZ in the AREA_ID field) - database table AREA10x20 provides the 10x20 approximation for these EEZs	AREAS
A	C	Data provided for fishing over wide areas; best estimate provided	AREAS
A	F	Five by 10 degree rectangles	5x10
A	T	Ten by 20 degree rectangles	10x20
A	U	Positional data not available	UNK
A	V	Grids other than one, five or ten degree squares	VARIES
A	X	Positions to the nearest minute	MINUTE
A	Z	Data provided in sub-areas	AREAS
D	M	Stratified by depth in metres	
D	U	Not stratified by depth	
T	D	Daily	
T	M	Month and Year	
T	N	Temporal data available at vessel trip level	
T	Q	Quarter and Year	
T	R	Quarter only (Quarterly)	
T	S	Monthly only (Seasonal)	
T	U	Temporal data not available	
T	W	Week and Year	
T	Y	Yearly	

5. Contents of MEASUREMENT codes (Length/Weight) Reference Database table

meas_type	meas_id	meas_desc	meas_id_old
L	AN	Anal fin length	
L	BL	Bill to fork in tail	
L	CC	Curved Carapace Length	CL
L	CK	Cleithrum to anterior base caudal keel	
L	CL	Carapace length (redundant-do not use)	
L	CW	Carapace width	
L	CX	Cleithrum to caudal fork	
L	EO	Posterior eye orbital to caudal fork	
L	EV	Posterior eye orbital to vent	
L	FF	1st dorsal to fork in tail	
L	FS	1st dorsal to 2nd dorsal	
L	GI	Girth	
L	LF	Lower jaw to fork in tail	
L	NM	Not measured	
L	PF	Anterior base of Pectoral fin to fork in tail	
L	PS	Pectoral fin to 2nd dorsal	
L	SC	Straight Carapace Length	CL
L	SL	Tip of snout to end of caudal peduncle	
L	TH	Body Thickness (Width)	
L	TL	Tip of snout to end of tail	
L	TW	Body width	
L	UF	Upper jaw to fork in tail	FL
L	US	Upper jaw to 2nd dorsal fin	SD
W	CW	Captain's Estimate	
W	FN	Weight of all fins (sharks)	
W	FW	Fillets weight	
W	GF	Gilled, gutted, headed, flaps removed	
W	GG	Gilled and gutted weight	GW
W	GH	Gutted and headed weight	HG
W	GO	Gutted only (gills left in)	
W	GT	Gilled, gutted and tailed	
W	GX	Gutted, headed and tailed	
W	NM	Not measured	
W	OW	Observer's Estimate	
W	TW	Trunk weight	
W	WW	Whole weight	

6. Gear codes

- G Drift Gillnet
- H Handline
- J Handline or gears other than pole-and-line used in tagging experiments
- K Handline (targeting small tunas in the Philippines)
- L Longline
- N Gillnet (small-scale)
- Multiple gears
- P Pole–and–Line
- R Ringnet
- S Purse Seine
- T Troll
- Y Recreational Fishery

7. Flag codes

CODE	VESSEL NATIONALITY
AS	AMERICAN SAMOA
AU	AUSTRALIA
BZ	BELIZE
CK	COOK ISLANDS
CN	CHINA, PEOPLE'S REPUBLIC OF
EP / IA	EASTERN PACIFIC FLEET (not stratified by fishing nat:
ES	SPAIN
FJ	FIJI
FM	FEDERATED STATES OF MICRONESIA
FR	FRANCE
GU	GUAM
HN	HONDURUS
ID	INDONESIA
HW	HAWAII, USA
JP	JAPAN
KI	KIRIBATI
KR	REPUBLIC OF KOREA
MH	MARSHALL ISLANDS
MX	MEXICO
NR	NAURU
NC	NEW CALEDONIA, FRANCE
NU	NIUE
NZ	NEW ZEALAND
PA	PANAMA
PF	FRENCH POLYNESIA
PG	PAPUA NEW GUINEA
PH	PHILIPPINES
PW	VAN CAMP – PALAU
RU	RUSSIA
SB	SOLOMON ISLANDS
SP	SPC RESEARCH CRUISE VESSEL
SU	USSR
TO	TONGA
TV	TUVALU
TW	CHINESE TAIPEI
US	UNITED STATES OF AMERICA
VN	VIETNAM
VU	VANUATU
WS	SAMOA

Note on definition of the Chinese Taipei Longline fleets

The following is taken from Campling et al. (2017).

Box 4.1

A note on [Chinese Taipei's] longline vessel categorization Domestically, [Chinese Taipei] groups vessels by 'CT' number which are categories of gross tonnage (GT). This characterization has not changed for decades, although characteristics of vessels have mostly trended towards increased capacity within categories. The CT3 and CT4 categories represent vessels from 20-50 GT, and CT4 is 50-99 GT respectively. Those over 100 GT fall into the LTLL category and are designated CT-5, CT-6 and CT-7 depending on GT. For purposes of internal administration, the Taiwan Fisheries Agency groups vessels by size of vessel, fishing area and target species. As an example, for large scale longliners operating in the Atlantic there is a northern albacore target group, a southern albacore target group, and a bigeye target group.

Longliners described as STLL by the Taiwan Fisheries Agency that are active in the WCPO (see Table 4.1) belong primarily to the CT3 and CT4 class of vessels. CT3 vessels are typically fresh fish vessels, using either refrigerated seawater (RSW) or ice, with freezer holds for bycatch. According to government officials they expect the numbers of these smaller vessels to diminish in the future due to market, operational and economic factors.