



**Virtual Meeting 3 of HSBI WG**

7 August 2025 10:00 – 13:00 (Pohnpei time)

---

**Use of Volumetric Method for Estimating the Fish Quantity Onboard**

**Voluntary HSBI Regional Guides**

**TOOLS FOR HIGH SEAS BOARDING AND INSPECTIONS**

---

WCPFC-HSBIWG03-2025-03<sup>1</sup>

5 August 2025

Prepared by France

---

<sup>1</sup> This is an updated version of WCPFC-HSBIWG02-2025-WP03 *DRAFT Voluntary Guide on use of volumetrics method for estimating the fish quantity*. This version takes into account the discussions during HSBI WG2 meeting and some feedback submitted to France after the meeting.

# Voluntary HSBI Regional Guides

## TOOLS FOR HIGH SEAS BOARDING AND INSPECTIONS

- Estimation of catch on board by HSBI officers
  - Hold inspection
  - Estimation of how much fish in a hold using the volumetric method
- Logbook interrogation and comparison to catch estimation
  - Electronic and written

## HSBI Catch quantification Guide

### Document History

Version	Effective Date	Description of Revision	Prepared by	Reviewed by

### Contents

PURPOSE STATEMENT .....	1
Quantify and estimate catch weights in WCPFC HSBI activities.....	2
HSBI Catch quantification estimation.....	3
Accessibility of Catch quantification method information .....	6

### PURPOSE STATEMENT

1. The purpose of this Guide is to provide guidance to Authorised inspectors conducting catch quantification as part of WCPFC High Seas Boarding and Inspections (HSBI<sup>1</sup>). For CCMs wishing to estimate the catch weight during a HSBI, the development of this Guide also intends to:

---

<sup>1</sup> HSBI, refers to boarding and inspection and related activities conducted pursuant to CMM 2006-08 Western and Central Pacific Fisheries Commission Boarding and Inspection Procedures or any successor CMM.

- Provide guidance on tools and methods for catch quantifications during HSBI and the minimum standards for analysis.
  - Support the establishment of robust catch estimation methods to quantify and estimate the catch on board.
  - Ensure that catch estimates are credible and are using appropriate methods and procedures.
2. This guide refers to general considerations in the application of quantifying the catch<sup>2</sup> on board during a HSBI and the estimation and analysis process, which includes:
    - Catch document<sup>3</sup> analysis
    - Freezer and Fish Hold inspections
    - Verifying Catch
    - Quantifying catch
    - Weight estimations
    - Analysis
    - Reporting
  3. The application of this Guide will be voluntary and apply to HSBI activities within the WCPFC area of competence.
  4. This procedure is intended to guide inspectors in estimating the quantities of fish on board, when direct weighing or weighing by sampling is not possible.
  5. This guide can be modified in response to new information, technical innovations, and perspectives. It is expected that this guide will continue to evolve as the field develops.

### **Quantify and estimate catch weights in WCPFC HSBI activities.**

6. The aim of HSBI is to ensure compliance of a vessel with the WCPFC Convention and all applicable WCPFC CMM obligations.
7. A key function of an authorised inspectors during a HSBI is to identify potential misreporting, unreported transshipment, under reporting or record keeping errors.
8. Inspectors conducting HSBI activities can detect and confirm species on board at the time of inspection. They can do this by comparing the information in catch documents with a visual check, count or estimation of catch on board.
9. The purpose of quantifying catch is to verify what is declared on the log sheets is what is on board the fishing vessel. It is an important tool for Inspectors to assess if the catch is being recorded accurately, and in line with the relevant WCPFC CMMs.

---

<sup>2</sup> Catch refers to the target, bycatch or non-bycatch species.

<sup>3</sup> Catch documents can include logbooks, log sheets, observer reports, transshipment declarations, captain's notes, engineers' reports - both electronic or written.

10. The use of catch quantification during HSBI activities can assist with assessing compliance with vessel licensing and reporting obligations, including to:
- verify catch reporting/ catch log data
  - estimate total catch held on the vessel
  - assist a risk assessment for a more extensive sampling ie. Port inspection.
11. The general aim is to:
- measure the hold as accurately as possible to calculate the total hold space;
  - estimate the area of the hold filled with fish to estimate tonnage of fish;
  - compare estimated tonnage with the amount of fish recorded in the fishing logbook; and
  - determine if non-compliances can be linked to tonnage inconsistency
12. This is an initial estimate so you can check it against the logbook to identify any discrepancies. If discrepancies are found:
- a. this may inform or call for a more accurate approach, such as a port inspection or unload/offload, within the framework provided by WCPFC CMMs.
  - b. Inform the flag State and request an enquiry into the vessel

## HSBI Catch quantification estimation

*Table 1. Methods of estimating catch quantity*

Volumetrics	Subsample	Processed unit counts	Other?
Estimate fish in the hold where the volume of the hold is known, or can be calculated	weighing a subsample of a species then calculating average fish weight	counting the total number of individual (processed or whole), multiplied by the average weight (or an estimated weight) to find the total weight of the species	

13. The most appropriate quantification method will depend on the type of vessel and the amount of catch on board.
14. It may be useful to use two methods in combination. Consider what fish are onboard, how they are stored and what information you have available to help decide what method(s) could assist.
15. The general principles and procedures for Catch Quantification in fisheries inspections:
- documentation and records
  - information gathering
  - hold measurements: density and conversion factors
  - compare catch information to catch estimates

**a) Documentation**

- The Catch Quantification analysis should be documented, including photographs and videos.
- Catch estimates are conducted with witnesses' present (Authorised inspectors, master, crew, boarding party).
- Authorised inspectors should ideally work in pairs or as a trio, to cover the tasks:
  - i. reviewing the logbooks and interviews the master for species, product types, and estimated catch
  - ii. performing the physical measurements of each fish hold.

**b) Procedural steps**

- Information gathering: Most fishing vessels have:
  - i. Vessel Plans
  - ii. Hull Survey certificates
  - iii. General arrangements
  - iv. Stability Book
- One of these should have the required information you need. Always check ships beam (width) for verification of vessels principal dimensions. This will confirm information on the plans belongs to that vessel.
- Obtain the ship's drawings (plans) for the various cargo holds if available and calculate the total cubic capacity of each cargo hold, measured in cubic metres .

**c) Measuring the hold – volumetrics**

- Obtain the hold volume by measuring interior dimensions
- Measure the volume occupied by the fish in the hold, or
- Measure the free air space in the hold and deduct it from the total volume of the hold.
- Obtain fish volume estimation by species
- Converting fish volume into fish weight
  - apply density factors. An estimate for the average density of whole fish in bulk is 1080kg/m<sup>3</sup>. Some examples:
    - Marlin (MLS): 1080 kg/m<sup>3</sup>
    - Bigeye tuna (BET): 1065 kg/m<sup>3</sup>
    - Pacific bluefin tuna (PBF): 1070 kg/m<sup>3</sup>
    - Albacore tuna (ALB): 1050 kg/m<sup>3</sup>
    - Skipjack tuna (SKJ): 1030 kg/m<sup>3</sup>
    - Swordfish (SWO): 1075 kg/m<sup>3</sup>
  - Apply processing conversion factor is fish is processed, species by species.

Species (FAO code)	Whole	Gutted	Gutted + Head off
Marlin (MLS)	1.00	1.10	1.30
Bigeye tuna (BET)	1.00	1.13	1.33
Pacific bluefin tuna (PBF)	1.00	1.14	1.34
Albacore tuna (ALB)	1.00	1.12	1.31
Skipjack tuna (SKJ)	1.00	1.10	1.28
Swordfish (SWO)	1.00	1.10	1.30
Sharks (CWZ)	1.00	1.10	2.00
Yellowfin tuna (YFT)	1.00	1.16	1.36

- Apply stacking factors, taking into account if stacking is loose (factor 0.45), medium (factor 0.51, mean value for frozen tuna), or tight (factor 0.54).

#### Example Calculation

Hold:  $8 \times 8 \times 2.5 \text{ m} = 160 \text{ m}^3$

Fill rate: 70%

Species: Bigeye tuna (BET), gutted

Density:  $1065 \text{ kg/m}^3$

Stacking factor: 0.51

Processing factor: 1.13

Usable volume:  $160 \times 0.7 = 112 \text{ m}^3$

Gross weight =  $112 \times 1065 = 119,280 \text{ kg}$

Stacked weight =  $119,280 \times 0.51 = 60,832.8 \text{ kg}$

Catch weight =  $60,832.8 \times 1.13 = 68,741 \text{ kg} \approx 68.7 \text{ tonnes}$

#### **d) Analysis of Results**

- Compare the result with the fishing logbook, captain's declarations, and landing data. Calculate the data and assess whether or not there are significant differences between the figures.
- If fishing logbook figure > catches onboard:
  - o look for concealed space where fish could be stored
  - o look for evidence that an undeclared transshipment occurred during the fishing vessel voyage, where the fishing vessel gave fish.
- If fishing logbook figure < catches onboard:
  - o look for evidence that an undeclared transshipment occurred during the fishing vessel voyage, where the fishing vessel received fish.
  - o look for species that might in particular be underreported

**e) Documentation and records of Catch estimations**

- The HSBI report is a document to record Catch estimation information.
- The master of the vessel signs the HSBI report which includes details of any Catch Quantification analysis.
- The inspector should observe, inspect and record as much as possible, including but not limited to the following information:
  - o Date of the Inspection
  - o Vessel name
  - o Location

## Accessibility of Catch quantification method information

16. To assist the catch quantification process during HSBI activities, it would be beneficial for the catch quantification procedures to be translated into languages that are in use on fishing vessels and/or as pictographs to bridge any language barriers.
17. Information accessibility of the HSBI Catch quantification process for the vessel master crew and for the HSBI Authorised inspectors could be supported via:
- HSBI Multi-language cards
  - The catch quantification procedures given/shown to master of vessel by HSBI Authorised inspectors.
  - The voluntary guide translated by CCMs