Report of the Tuna RFMO Expert Working Group:

Harmonisation of Longline Bycatch Data Collected by Tuna RFMOs

27 - 29 January 2015, Keelung, Taiwan

Summary. The so-called "Kobe Process", a series of informal joint meetings of the tuna Regional Fishery Management Organizations, has identified a number of issues that should be analyzed in order to improve harmonisation globally. The process identified harmonisation of bycatch data collected by the RFMOs as one such issue. This document is a report of a meeting of technical experts tuna longline fisheries, which provided the first opportunity for progress towards harmonisation of bycatch data for these fisheries. The objective of this meeting was to review the documentation of the data fields that are equivalent and those that are unique to particular RFMOs for the purpose of assisting with comparison across tuna RFMOs. The workshop findings should assist the Joint tuna RFMO Bycatch Technical Working Group with completing the data harmonisation aspects of its workplan.

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Meeting details

The second Kobe meeting of the tuna RFMOs established a joint technical working group on bycatch with a work-plan for this group approved at the third Kobe meeting in July 2011. Included in this work-plan is the "harmonisation of bycatch data collected by tuna RFMOs" with the intended purpose of identifying the minimum data standards and data fields that should be collected across all RFMOs with a view to allowing interoperability. In establishing the minimum standards it is recognised that these should maximise the detail recorded (where practical) so that data users can aggregate information to suit the questions asked. Harmonisation of data across tuna RFMOs is desired to allow for more comprehensive reporting on the status of bycatch species, to assist with the identification of factors that cause or increase bycatch, and to evaluate the performance of mitigation methods. At the same time, improvements in quality of the data collection should help stock assessments and other functions of t-RFMOs.

The International Seafood Sustainability Foundation (ISSF) has sponsored the "harmonisation of bycatch data collected by tuna RFMOs" by providing travel resources to support the attendance of tuna RFMO observer program managers and data managers at small expert workshops to review the definitions of the fields used in each RFMO's observer data forms. The output of these reviews being the documentation of the fields that are equivalent and those that are unique to particular RFMOs for the purpose of assisting with comparison across tuna RFMOs. The first of these workshops, which focussed on the harmonisation of purse-seine data fields, was convened from 5 - 9 March 2012, in Sukarrieta, Spain (ISSF Technical Report 2012-12). The second workshop was convened from 27 - 29 January 2015, in Keelung, Taiwan and focussed on the harmonisation of longline data fields. This report documents the outputs of this second meeting. The workshop findings should assist the Joint tuna RFMO Bycatch Technical Working Group with completing the data harmonisation aspects of its workplan.

The purpose of this meeting was fourfold:

1. To summarise across all tRFMO the data fields in existing observer forms that are common (by name and definition) and those that are RFMO unique;
2. To provide a forum for discussion on LL observer database structures to facilitate future data exchanges between tRFMOs;
3. To identify common issues that could be answered by tRFMO wide analyses of LL Observer data;
4. To identify common gaps in current LL observer data collection.

The following experts participated in the meeting: Karen Baird, Shelley Clarke, Paul de Bruyn, Eric Gilman, Martin Hall, Julia Huang, Kwang-Ming Liu, Sarah Martin, Colin Millar, Takahisa Mitsuhashi, Simon Nicol (Chair), Peter Sharples, Neville Smith, Karl Staisch, Nick Vogel, Peter Williams, Anton Wolfaardt and Ren-Fen Wu.

Issues pertinent for interoperability of observer data collected in the longline fisheries of tuna-RFMOs.

1. Data harmonisation

The harmonisation of observer-collected bycatch data across all tRFMOs would be most efficiently achieved by establishing a centralised repository for all organisations. This would ensure that data are provided using standardized data fields, under consistent definition of these data fields, and data

quality is controlled and maintained. This option may also provide cost savings to each tRFMO as replication of data management services for these data would be streamlined and thus minimised.
In the absence of a central repository the next best option would be the consolidation of bycatch data within each tRFMO Secretariat. Under this option not only would each tRFMO need to establish its own bycatch data standards and ensure that received data meet those standards, for cross tRFMO comparison and pooling, there would also need to be agreement on global data definitions and quality control standards.

If no centralisation of data is possible within each tRFMO Secretariat, data will then be held by national agencies. In this case, agreement on data definitions and quality control would be required between national agencies in order to facilitate regional or global analysis.

To assist with establishing agreements on harmonized data definitions and quality control standards the working group drafted "best practice" guidelines given in **Table 1**. The working group did not identify priority observer data fields. The working group has proposed a process to accomplish this, described in **Appendix 3**. The similarities and differences between the minimum data standards for each tRFMO are documented in **Table 2**. The data fields collected by each tRFMO are listed in **Appendix 1**.

ACTION: Each tRFMO should evaluate the table presented in **Appendix 1** and propose that all of the standards that it considers to be appropriate be adopted as best practice for the observer programs operating within their jurisdictions. The Secretariats of each tRFMO are requested to take note that as differences in definitions and standards may hamper cross-tRFMO analyses of observer data, steps should be taken to revise existing minimum data standards as appropriate. The tRFMO Secretariats should also request their Commissions to provide approval for their participation in a cross-tRFMO working group to assess the feasibility of utilising a single data repository for all tRFMO observer-collected bycatch data.

Table 1. Best Practice Guidelines for Observer data fields as developed by the expert working group

Data Header	Best Practice
Identification standards	***Vessel:*** *Each vessel must have a unique identifier(s) so that vessel can be included in the standardisation of data. The identifier(s) need to remove potential for error associated with one vessel being accounted for multiple times (eg due to name changes) or multiple vessels being accounted for as a single vessel (eg due to the same name). Noting that vessels for some fleets may cross tRFMO boundaries the identifiers must be sufficiently unique to track such movement.* ***Fishing Master:*** *In addition to vessel characteristics the standardisation of data is improved by including the effect of the fishing master. Providing each fishing master with a unique identifier(s), preferably a code, and ensuring the identifier(s) is a data requirement for observers to collect or validate (i.e. check that the vessel/fishing master pairing has not changed) would be the most efficient way of achieving this outcome.* ***Observer:*** *The quality of information collected is likely to vary among observers due to differing levels of experience and aptitude for the job. Issuing observers with a unique code would allow for data biases that may be due to experience or aptitude to be easily included in data standardisation. A central register that provides a unique identifier and records the skills and experience of the observer would be an efficient way of coordinating a unique code. This would remove the opportunity for incorrectly identifying an observer if they cross jurisdictional boundaries (ie. some observer programmes exchange observers) or change names.* ***Gear Description:*** *The terms used to describe the mainline, branchlines, leaders, hooks, floats, bait and threading can vary from programme to programme. Developing a*

Data Header	Best Practice
	complete catalogue that provides unique codes for all gear would simplify cross tRFMO comparison to identify the effectiveness of different gears and mitigation measures.
Trip Definition	***Vessel:*** *The clear reporting of when a trip commences and concludes is required to reduce the potential for inappropriate representation of trip data when cross tRFMO comparisons are undertaken. Sufficient data must be collected so that vessel trip can be defined according to different unloading strategies***.** ***Observer:*** *Data that identify the duration of the observer's trip must be collected so that the proportion of a vessel trip that was observed can be estimated.*
Mitigation	***Crew mitigation training:*** *To assist with evaluating the likely fate of animals discarded alive a data field documenting whether the crew member(s) who discarded the animal were trained in the application of safe handling guidelines is required.* ***Application of Safe Handling Guidelines and Mitigation Measures:*** Mitigation equipment available on the vessel should be recorded.
Vessel and Gear Attributes	***Vessel:*** *Include fields that describe the fish finding, setting and hauling capabilities of the vessel. Ideally this information should be available on a vessel register and the observer only need to confirm that nothing has changed.* ***Gear:*** *Fishing gear configuration typically needs only to be described once per trip (ideally using the catalogue codes - see #4 above) and then only if changed during the trip. Items critical to bycatch rates include hook type/size, weights, lights, and bait.*
Set/Haul	***Period of Observation:*** *Data fields for the set and haul should allow for hook by hook analyses. Critically important are data fields that determine the quantity of the set and haul that was observed.* ***Mitigation:*** *Mitigation measures used should be reported per set. Safe handling guidelines should be reported per individual discarded alive. In both cases options for reporting that no safe handling guidelines or mitigation measures were applied should be included to avoid any uncertainty on their application.* ***Catch:*** *All catch kept or discarded should be recorded, identified to lowest taxonomic classification and length measured.* ***Measurement:*** *The length measurement field should include a description of the point to point on the animal that was measured. The field should also describe whether the animal was dressed or damaged before measurement. Hook number and hooking position should also be recorded. If feasible, individuals should be sexed and the sex recorded. Any other biological sampling undertaken should be recorded.*

Table 2. The similarities and differences between the minimum data standards for each tRFMO as identified by the expert working group.

Variable	CCSBT	IATTC	ICCAT	IOTC	WCPFC
Vessel identification					
Vessel name	yes	yes	yes	yes	yes
Radio call sign	yes	yes	yes	yes	yes
Flag	yes	yes	yes	yes	yes
VMS				yes	yes
TUVI	planned	planned	planned	planned	planned
CLAV	planned	planned	planned	planned	planned
Vessel trip Definition					
Date ,time and port/transhipment of departure	yes	yes	yes	yes	yes
Date ,time and port/transhipment of return	yes	yes	yes	yes	yes
Total time lost	no	no	no	yes	no

Variable	CCSBT	IATTC	ICCAT	IOTC	WCPFC
Observer Information					
Observer name and Nationality	yes	yes	yes	yes	yes
Observer qualifications and skills	no	no	no	no	no
Observer Trip					
Date, time and location of embarkation	yes	yes	yes	yes	yes
Date, time and location of disembarkation	yes	yes	yes	yes	yes
Crew Information					
Name of fishing master	yes	yes	yes	yes	yes
Nationality and passport of fishing master	no	no	no	no	yes
Number of crew	no	no	no	no	no
Crew mitigation training					
Safe Handling Procedures	no	no	no	no	no
Mitigation techniques	no	no	no	no	no
Vessel Attributes					
Vessel fish hold capacity (cubic meters)	yes	yes	yes	yes	yes
Freezer and refrigeration type	yes	yes	yes	yes	yes
Tonnage (Gross Tonnage [GT or GRT] specify unit)	yes	yes	yes	yes	yes
Engine power	yes	yes	yes	yes	yes
Length	yes	yes	yes	yes	yes
Electronics	yes	yes	yes	yes	yes
Gear Attributes					
General (line shooter, main and branch line haulers)	yes	yes	yes	yes	yes
Main line (material)	yes	yes	yes	yes	yes
Branch line (material and description)	yes	yes	yes	yes	yes
Hook (type)	yes	yes	yes	yes	yes
Bait (type and threading)	no	no	no	no	no
Mitigation	no	no	no	yes	yes
Set/Haul					
Date, Time and Position of set and haul	yes	yes	yes	yes	yes
Gear (HbF, line description, shark lines, line shooter speed, light speed, bait type, bait threading)	yes	yes	yes	yes	yes
Mitigation Information (Tori Poles, Bird curtain, Weighted Lines, Underwater Set Chute, Bait dyed blue)	yes	yes	yes	yes	yes
Catch					
Species Name	yes	yes	yes	yes	yes
Time of landing	no	no	no	no	yes
Fate (landing/discard)	yes	yes	yes	yes	yes
Discarding	yes	yes	yes	yes	yes
Hook number	no	no	no	yes	yes
Hook location	no	yes	no	yes	no
Length of fish	yes	yes	yes	yes	yes
Weight of fish	yes	yes	yes	yes	yes
Sex	yes	yes	yes	yes	yes
Biological Samples	yes	yes	yes	yes	yes
Tag Information	no	no	no	yes	yes
Haul weight	yes	no	yes	no	no
Interaction type (species special interest)	no	no	yes	yes	yes
Shark fin weight	no	no	no	no	yes

2. Data exchange

The workshop agreed on the importance of establishing data exchange standards (i.e. inventories of existing data and existing observer data collection methods) to facilitate more systematic planning of analyses of bycatch interaction rates and mitigation effectiveness. This would also provide for regular review and refinement of the data collection programs. Starting to compile summarized data on observer coverage, and interactions/mortalities with bycatch organisms would be a useful first step towards developing these standards. In particular:

a. A table based on the CCSBT ERSWG data exchange template should be circulated to the tRFMOs with a request that each tRFMO provide the requested summarized data to the maximum extent possible given data holdings and data provision rules (example provided in **Table 3**).
b. Maps of the spatial and temporal distribution of observer effort (see **Appendix 2**) and observer coverage summaries as specified in point 3 below should also be provided.

Responses in the form of data summaries would be circulated among the tRFMO Secretariats. This information would provide immediate clarity to tRFMO members on the opportunities for cross tRFMO analyses associated with bycatch species. It would be expected that the template would undergo iterative refinement as cross tRFMO analyses are completed.

ACTION: The tRFMO secretariats compile summaries (as per **Table 3**) and request their respective Commissions to share these with all tRFMOs. The simplest means for sharing this information between the tRFMOs would be via a web repository hosted by one of the tRFMOs. Each tRFMO should determine if their summarised data is accessible to the general public or password secured.

Table 3.1 Proposed data exchange format for total fishing and observed effort per country, year, fishery and strata.

Calendar Year	Fishery Code	5*5 long-lat area	Total Effort	Total Observed Effort	Observer Coverage (%)

Table 3.2 Proposed data exchange format for observed and estimated captures/mortalities for each species, by country, year, fishery and strata.

Calendar Year	Fishery Code	Statistical Area	Species (or group)	Observed Captures (#)	Observed Capture Rate (per 1000 hooks)	Observed mortalities (#)	Observed mortality rate	Observed live releases	Estimated total number of mortalities (raised)
			Blue shark						
			Mako shark						
			Porbeagle shark						
			Oceanic whitetip shark						
			Silky shark						
			Thresher sharks						
			Hammerhead sharks						
			Other sharks						
			Green turtle						
			Hawksbill turtle						
			Flatback turtle						
			Loggerhead turtle						
			Kemp's ridley turtle						
			Olive ridley turtle						
			Leatherback sea turtle						
			Large albatrosses[1]						
			Dark coloured albatrosses[2]						
			Other albatrosses[3]						
			Giant petrels[4]						
			Other seabirds[5]						

[1] Including wandering, Tristan, New Zealand, antipodean ,southern royal and northern royal
[2] Including sooty and light-mantled
[3] Including black-browed, Campbell, grey-headed, Atlantic yellow-nosed, Indian yellow-nosed, Buller's, shy, Salvin's, Chatham and white-capped
[4] Including white-chinned petrel, grey petrel, flesh-footed shearwater etc.
[5] Including skua, etc.

3. Observer coverage

The workshop stressed the importance of observer programmes in assessing impacts to bycatch populations. It was acknowledged that current coverage levels required by RFMOs are arbitrary and may not be sufficient for some scientific purposes such as detection of rare events. A number of studies show that biases and lack of precision are present when observer coverage rates of effort are <100%. The capacity to detect rare events typically requires high observer coverage rates. Similarly, the number of vessels in a fleet has been demonstrated to influence the precision of data with a general conclusion that the smaller the fleet the higher the observer coverage rates required.

Observer placement should be based on a stratified sampling design with consideration given to characteristics of vessel, gear and fishing effort. In support of the "Data Exchange" recommendation above the following annual data summaries are proposed:

a. Observed and unobserved trips by vessels should be compared with regard to duration (number of sets and days per trip), number of hooks per set, spatial distribution of fishing effort, time of day of fishing operations, catch rates and species composition to verify that there are no changes in vessel activity or fishers' behaviour in the presence of the observer.
b. Comparison of observer trips with vessel data (logsheet, VMS where available) should be used to evaluate the spatial and temporal representativeness of the observer data.

The workshop also recommended analyses to estimate the optimal observer coverage rates for each fleet to ensure that bias is minimised and to provide tRFMOs with further guidance on implementation of observer programmes for scientific data collection. Although these types of analyses have been undertaken in the past, with a general finding of minimum coverage rates of 20%, the application of new statistical techniques for analysing observer data and the increasing array of questions being asked of observer data, may require different minima. E-monitoring programmes are strongly encouraged as a means of complementing observer programmes and may assist with increasing the observer coverage of some data fields.

ACTION: The tRFMO Secretariats should prepare or update observer coverage summaries and request their respective Commissions to share with all tRFMOs.

4. Unique identifiers/codes

The use of globally unique identifiers for vessel, fishing master, observer and gear would be highly desirable to assist with better standardisation of data. Vessel registers such as CLAV and IMO provide these unique identifiers for vessels. However, no fishing master or observer register currently exists therefore establishing one or ensuring that individuals can be identified through other data is necessary. Most observer programmes already have an identifier for the observer, however it will be necessary to standardise this identifier so that there is no possibility of each identifier being used for more than one observer. Establishing these identifiers would allow analysts to model the data by tracking when fishing masters change vessel or observers change name or jurisdiction.

Codes to characterize and standardize gear types could be generated by compilation of global LL gear into a manual with unique codes for each gear type. As e-reporting is increasingly becoming available an App based format may be the most appropriate. A small working group of the joint tRFMO bycatch WG was formed to prepare an example of the potential format for a longline gear catalogue (both paper and App format; see **Appendix 2** for an example)

ACTION: Each tRFMO is requested to comply with the best practice guidelines specified in **Table 1**.

5. Data quality and management

The workshop stressed the importance of data auditing to ensure the highest quality observer data is available for users. Cross tRFMO analyses would benefit from the application of consistent quality control measures to all data. Two important issues raised during the meeting were the need to ensure that reliability and versioning should be reported. Reliability is particularly important for species identification and what was used to identify the species should be reported. Similarly, the version of manuals used to define and describe data entry fields should be recorded.

E-reporting will provide opportunities for increased data quality at the point of data entry by allowing data range warnings to be defined for each field.

Opportunities are rare for those responsible for data quality and management to discuss shared issues. A more regular meeting (e.g. 2 years) where tRFMO data managers meet to maximise information sharing and system development would be highly beneficial to maintaining coherence between the data management systems of each t-RFMO.

ACTION: tRFMO Secretariats to request that version number of manuals used by observers are recorded on observer forms.

6. Data gaps

The group recommended developing a comprehensive list of variables that can be collected through observer programmes and have been documented to have significant effects on catch rates or survival rates across taxa susceptible to capture in pelagic longline fisheries. For each variable, the state of understanding of the factor's effect on longline catch and survival rates, and a review of each tuna RFMO's current observer data collection protocols would be compiled. This list could then serve to prioritize which variables are the most important to harmonize across tRFMOs for the sake of regional or global analyses. The meeting recommended that i) the presence of bite-offs and ii) whether hook and bait are present when hauled in be reported by observers. Most observer programmes currently do not record this information.

ACTION: A small working group was formed to specify the objectives of the literature review to develop the list of priority observer data fields in terms of their importance in determining bycatch hooking and survival rates. A concept note was drafted for presentation to the GEF-ABNJ tuna project for support (**Appendix 3**). The meeting agreed that Eric Gilman of Hawaii Pacific University would lead this effort. Eric is ideally suited to go ahead and do this work but funding is required for Eric as a consultant. Additional support will be provided by WCPFC (Shelley Clarke) and SPC (Simon Nicol).

7. E-Reporting and e-Monitoring

Current developments in electronic technology can enhance the efficiency of observer coverage. This includes current initiatives in on-board observer data processing and the application of video camera technology to assist with the estimation of bycatch composition and biomass. The application of this technology should help reduce the burden of monitoring and free the observer to collect more scientific information. The opportunities that e-reporting and e-monitoring provide are documented in **Table 4**.

Table 4. Opportunities provided by e-reporting and e-monitoring.

Data Header	E-Reporting	E-Monitoring
Vessel and Gear Attributes	*Database/catalogue for cross-checking and registering changes to vessel attributes or changes in gear*	*Visual record of Vessel and gear attributes available.* *Pre-trip port inspections with database/catalogue for cross-checking and registering changes to vessel attributes or changes in gear*
Trip Definition	*Auto time/date stamps for trip definitions, particularly when associated with VMS*	*Auto time/date stamps for trip definitions, particularly when associated with VMS*
Mitigation	*Standardised description of mitigation measures applied.* *Availability of E-Reference guides, to aid species identification, for example.*	*Record of mitigation for post-trip analysis, including species identification.*
Set/Haul	*Auto time/date stamp, GPS-generated positional data, standardised set configuration key, Auto Hook and float counts.*	*Auto time/date stamp, GPS-generated positional data, Visual record of set description and duration for post trip analyse, Auto-hook and -float counts.* *Ability to monitor long hauling periods (video of the complete haul period is captured).*
Catch	*Data Quality Control at time of data entry on-board – reduces errors.* *Availability of E-Reference guides, to aid species identification for example.* *Auto time/date stamp, GPS-generated positional data can be linked to each catch event* *Biological sampling queue*	*Information on Species, fate, length, etc. available visually for post-trip review/analyse.* *Digital measuring tool.* *Auto time/date stamp, GPS-generated positional data linked to each catch event* *Determines relative depth of hook from time (compared to time of successive floats) instead of counting hook number between floats*

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Appendix 1. Current observer long line data fields by tRFMO

Harmonisation of Effort Data

Part 1. Vessel Identification

The current "Minimum Data-field Standards" specified by each of the Tuna Regional Fisheries Management Organisations (t-RFMOs) are outlined in the Table below. However, if each t-RFMO fully participates in the TUVI database then the TUVI number is all that is required to uniquely identify vessels for inter-operability. This information would typically be collected at the TRIP level (that is once per TRIP).

WCPFC	IOTC	IOTC interim	IATTC	CCSBT	ICCAT (National observer programmes)	Notes
Name of vessel (including numbers) Flag State registration number (sourced from the vessel papers). International radio call sign (ICRS; issued to the vessel by the flag State in accordance with IMO regulations). Vessel owner/company Hull markings consistent with CMM 2004-03 WIN markings consistent with CMM 2004-03 WIN format for markings consistent with CMM 2004-03	Vessel name IOTC registration number Vessel type and main gear Stated on cover page of Observer Trip Report along with: Observer name; Nationality; IOTC Certification number; Trip started; and Trip ended.	Vessel name IOTC registration number Flag Port of registration Radio call sign Vessel type Main fishing gear	Vessel name Radio call sign Flag VMS TUVI CLAV	Vessel Name Vessel Call-sign Vessel flag country	Vessel name Vessel main gear	TUVI or IMO best option. Vessel effects critical to standardisation and need to remove chance of incorrect assignment of effort when two or more vessels have same name. In the absence of TUVI or IMO vessel name, flag state reg number and int radio call sign should be recorded. If vessel changes registration its important to know exact date and not just year

Part 2. Vessel Trip Information

The current "Minimum Data-field Standards" specified by each of the t-RFMOs are outlined in the Table below. Currently IOTC requires a 5-day status report. The clear reporting of when a trip commences and concludes is required to reduce the potential for inappropriate representation of trip data when inter-t-RFMO comparisons are undertaken.

WCPFC	IOTC	IOTC interim	IATTC	CCSBT	ICCAT (National Observer Programmes)	Notes
Date and time of departure Port of departure Date and time of return to port Port of return	Date of departure (dd/mm/yyyy) Port / Position of departure Arrival on fishing ground (dd/mm/yyyy) Start fishing (dd/mm/yyyy) End fishing (dd/mm/yyyy) Departure of fishing ground (dd/mm/yyyy) Date of return (dd/mm/yyyy) Port / Position of return Comments	Date of departure Departure location Arrival date Arrival location Remarks Date start fishing Date end fishing Total time lost (and reason)	Date ,time and port/transhipof departure Date ,time and port/transhipof departure	None – refer to observer info	Some require; Port of departure Date of departure Port of arrival Date of arrival	Defining a trip and amount of effort critical for standardisation. Time lost should be considered if it cant be deduced from other information

Part 3. Observer Information

The current "Minimum Data-field Standards" specified by each of the t-RFMOs are outlined in the Table below. The most important data are those that identify the duration of the observers trip and information that can be used to uniquely identify the observer for the purpose of interoperability.

WCPFC	IOTC	IOTC interim	IATTC	CCSBT	ICCAT (National Observer programmes)	Notes
Observer name Nationality of observer Observer provider – country and/or organization Date, time and location of embarkation Date, time and location of disembarkation	Observer name(First and Last Name) Nationality Controlling organization Contact address Boarding date (dd/mm/yyyy) Boarding Time (GMT) Boarding Location Disembarkation date (dd/mm/yyyy) Disembarkation time (GMT) Disembarkation Location Comments	Observer name IOTC registration number Nationality Employment organisation name Employment organisation address Boarding date Boarding location Disembarkation date Disembarkation location	Observer name and Nationality Date, time and location of embarkation Date, time and location of disembarkation	Observer's name Observer's organization Date observer embarked (24hr clock, UTC to the day) Date observer disembarked (24hr clock, UTC to the day)	Observers name	Ideally there would be an international register that issues a unique identifier for each observer. This register could also track observer experience and qualifications

Part 4. Crew Information

The current "Minimum Data-field Standards" specified by each of the t-RFMOs are outlined in the Table below. The most important data are those that identify the total crew number and uniquely identify the captain/fishing master. The creation of a joint t-RFMO captain/fishing master register may be an efficient way to achieve the "unique observer identity" (i.e. similar principal to TUVI). This information would typically be collected at the TRIP level (that is once per TRIP).

WCPFC	IOTC	IOTC interim	IATTC	CCSBT	ICCAT (National Observer programmes)	Notes
Name of captain Nationality of captain Identification document (passport) Name of fishing master Nationality of fishing master Identification document (passport) Vessel monitoring system	None	None	Name of fishing master Nationality and passport of fishing master (maintained in a separate database, not collected by obs.)	Name of captain Name of fishing master Number of people in crew (all staff, excluding observers)	Captains name	Who determines fishing strategy is important variable for standardising catch. An international register of fishing masters would be ideal

Part 5. Vessel and Gear Attributes

The current "Minimum Data-field Standards" specified by each of the t-RFMOs are outlined in the Table below. The characteristics of the vessel and gear assist with standardizing effort and the over-riding principal for data collection should be to maximize the detail to improve standardization. This information would typically be collected at the TRIP level (that is once per TRIP).

WCPFC	IOTC	IOTC interim	IATTC	CCSBT	ICCAT (National Observer programmes)	Notes
	Vessel attributes					
Vessel cruising speed to optimize fuel usage; not top speed of vessel Vessel fish hold capacity (metric Tons mT) Freezer type (Y/N to all types on board, many vessels have more than one type of freezer) Length (LOA specify unit) Tonnage (Gross Tonnage [GT or GRT] specify unit) Engine power (specify unit) Refrigeration method (Y/N to all types on board, many vessels have more than one type of refrigeration)	Vessel name Radio call sign Flag state Port of registration Vessel type Main fishing gear Owner Charterer Gross tonnage Length over all (m) Blast freezer capacity (m3) Fish storage capacity (m3) Refrigeration method Fish storage method	Gross tonnage Length over all (m) Blast freezer capacity (m3) Fish storage capacity (m3) Refrigeration methods Fish storage method	Vessel fish hold capacity (metric Tons mT) Freezer and refrigeration type (Y/N to all types on board, many vessels have more than one type of freezer) Tonnage (Gross Tonnage [GT or GRT] specify unit) Engine power (specify unit) Length (LOA specify unit)	Year vessel built Engine brake power (kw/hp) Overall length Gross tonnage Total freezer capacity (m^3) Fuel capacity (tonnes)	Vessel name – most national databases match the name to the vessel characteristics Some require haul direction/bearing and or speed	Reference to register of vessels. Obs duties to check that vessel characteristics haven't changed (capacity, freezer types) within OHS and skills. need a common list of port codes (ISO?)
	Gear Attributes					
Main Gear Mainline material Mainline length (miles or km) Mainline diameter (mm) Branch line material(s) Wire trace (Y/N) Mainline hauler (Y/N) Branch line hauler (Y/N) Line shooter (Y/N) Automatic bait thrower (Y/N) Automatic branch line	**Main Gear** Longline type(s) used (ITOC gear code) Line setter (Y/N) make & model Bait casting machine (Y/N) make & model Line hauler (Y/N) make & model	**Main Gear** Longline type(s) used (ITOC gear code) Line setter (Y/N) Bait casting machine (Y/N) Line hauler (Y/N) make & model	**Main Gear** Mainline hauler (Y/N) Branch line hauler (Y/N) Line shooter (Y/N) Automatic bait thrower (Y/N) Automatic branch line attached (Y/N)	**Main Gear** Bait thrower/line shooter used (Yes/No)	**Main Gear** Highly variable between Obs programmes. Eg. USA SEFSC PLL Obs Program in ATL has highly detailed data collection forms requesting String number Anchor info (including weight) Haul bearings	**Main Gear**

WCPFC	IOTC	IOTC interim	IATTC	CCSBT	ICCAT (National Observer programmes)	Notes
attached (Y/N)						
Mainline Attributes	**Mainline Attributes** Mainline material Mainline length (m) onboard Mainline diameter (mm)	**Mainline Attributes** Mainline material Mainline length Length of floatline (optional) Length of shark lines (optional) Bait hooked twice (optional)	**Mainline Attributes** material length (miles or km) diameter (mm) color	**Mainline Attributes** Mainline material (nylon, cotton thread, other)	**Mainline Attributes** Mainline details	**Mainline Attributes**
Branchline attributes	**Branchline attributes** Branch line storage (basket/tub/reel) Branch line 1 material(s) Branch line 1 diameter (mm) Branch line 2 material(s) Branch line 2 diameter (mm) Branch line 3 material(s) Branch line 3 diameter (mm) Branch line 4 material(s) Branch line 4 diameter (mm) Leader 1 material Leader 1 diameter (mm) Leader 2 material Leader 2 diameter (mm) Leader 3 material Leader 3 diameter (mm) Leader 4 material Leader 4 diameter (mm)	**Branchline attributes**	**Branchline attributes** 1-3 sections; for each section: Material, Length, Color	**Branchline attributes** Material of branch lines (nylon, cotton thread, other)	**Branchline attributes** Light stick use and colour Gangion - colour/diameter/length/count Swivels Leader details Dropline details	**Branchline attributes**
Float/Bouy Attributes	**Float/Bouy Attributes**	**Float/Bouy Attributes**	**Float/Bouy Attributes** Float quantity Float material (use code tables) Float diameter (cm)	**Float/Bouy Attributes** Material of buoy lines (nylon, cotton thread, other)	**Float/Bouy Attributes** Float description	**Float/Bouy Attributes**

WCPFC	IOTC	IOTC interim	IATTC	CCSBT	ICCAT (National Observer programmes)	Notes
			Float colour (use code tables)			
Hook Description Hook type(s) (J, circle, offset circle etc) Hook size(s)	**Hook Description** No. Hooks per basket/tub/reel Hook type(s) Hook size(s)	**Hook Description**	**Hook Description** Shape Size Offset Material Ring presence (Hook catalog #)	**Hook Description**	**Hook Description** No. of hooks and type	**Hook Description**
Bait attributes	**Bait attributes**	**Bait attributes**	**Bait attributes** Species Size Fresh/frozen Threading description	**Bait attributes**	**Bait attributes**	**Bait attributes**
Mitigation Tori pole (Y/N) Bird curtain (Y/N) Weighted branch lines (Y/N and record mass weight) Blue dyed bait (Y/N) Distance between bottom of the weight and eye of hook (m) Underwater setting shoot (Y/N) Disposal method for offal management	**Mitigation**	**Mitigation** Tori line length Streamer type Streamer length Number streamers per line Attached height Number of towed objects (optional) Method of stunning Depredation devices used	**Mitigation** Tori pole Bird curtain Weighted branch lines Blue dyed bait Distance between bottom of the weight and eye of hook Underwater setting shoot Disposal method for offal management	**Mitigation** Tori Pole used (Yes/No)	**Mitigation**	**Mitigation**
	Vessel electronics (preference for make(s) and model(s) to be specified for each piece of equipment)					

WCPFC	IOTC	IOTC interim	IATTC	CCSBT	ICCAT (National Observer programmes)	Notes
Radars (Y/N) Depth sounder (Y/N) Global position system (Y/N) Track plotter (Y/N) Weather facsimile (Y/N) Sea surface temperature (SST) gauge (Y/N) Sonar (Y/N) Radio/satellite buoys (Y/N) Doppler current meter (Y/N) Expendable bathythermograph (XBT) (Y/N) Satellite communications services (phone/fax/email numbers) satellite numbers if Yes Fishery information services (Y/N) Vessel monitoring system(s) – indicate the type of system	Onboard acoustic equipment Position fixing equipment Vessel Monitoring System (Present/Absent) VMS unit and transmitter equipment type Radars Communication equipment Plotters Comments	Acoustic equipment Position fixing equipment Vessel Monitoring System Radars Communication equipment Plotters (all Y/N) Remarks	Global position system Sea surface temperature (SST) gauge Doppler current meter.	NNSS (Yes/No) GPS (Yes/No) Omega (Yes/No) Radio direction finder (Yes/No) Radar (Yes/No) Weather fax (Yes/No) Track plotter (Yes/No) NOAA receiver (Yes/No) Sounder (1=colour monitor; 2=monochrome monitor; 3=printer) Sonar (1=scanning; 2=PPI) Doppler current monitor (Yes/No) Sea surface temperature recorder (Yes/No) Bathy-thermograph (Yes/No) Bird radar (Yes/No)	Some require basic information on electronic equipment aboard, but not usually very detailed	

Part 6. Set/Haul-level information

This section represents the information collected at the level of each set/haul of the longline gear.

Variables to be collected at the SET/HAUL level. In some cases the entire haul cannot be observed and the notes on "SAMPLING PROTOCOL" indicate respective approaches to how/what the observer should do in these instances.

WCPFC/SPC/FFA	IOTC interim	IATTC	CCSBT	ICCAT (National observer programmes)	NOTES
SAMPLING PROTOCOL					
The observer identifies the period(s) when they are monitoring the haul (i.e. those "BASKETS" they have monitored) which can then be used to calculate the BASKETs NOT monitored, and therefore the observer coverage of the haul.	Sampling details (if <100% of set observed)		Date and time at the start of the observation period (translatable to 24 hour clock, UTC) Date and time at the end of the observation period (translatable to 24 hour clock, UTC)		Data collection should clearly identify the sampling protocol so that coverage can be determined for estimating catch/effort through raising to account for situations when observer cannot cover all catch/effort.
DATA FIELDS					
DATE / TIME / POSITION - Set start - Set end - Haul start - Haul Log (every hour during the HAUL) - Haul end	**DATE / TIME / POSITION** - Set start - Set end - Haul start - - - Haul end	**DATE / TIME / POSITION** - Set start - Set end - Haul start - - - Haul end	**DATE/TIME/POSN** - Set start - Set end - Haul start - - - Haul end	**DATE / TIME / POSITION** - Set start - Set end - Haul start - - - Haul end	The HAUL LOG provides higher resolution in the area covered by the gear and catch
GEAR - Total Baskets/floats SET - No. of Hooks between floats - Total Hooks SET - Total Baskets OBSERVED - Total Hooks OBSERVED - - Float-line length - Distance between branchlines - Length of branchline	**GEAR** - Total Floats SET (optional) - No. of Hooks between floats - Total Hooks SET - - Total Hooks OBSERVED - - - Length of mainline set - - - - Shallowest hook depth (optional) - Deepest hook depth	**GEAR** - - No. of Hooks between floats - Total Hooks SET - - Total Hooks OBSERVED - Number of hooks lost - - - - -	**GEAR** - Total Baskets (or floats) SET - No. of Hooks between floats - Total Hooks SET - - Total Hooks OBSERVED - Float-line length - Distance between branchlines - Length of branchline - - Intended depth of Shallowest hook - Intended depth of	**GEAR** - - - - - - - -	

WCPFC/SPC/FFA	IOTC interim	IATTC	CCSBT	ICCAT (National observer programmes)	NOTES
	(optional) - - - Branchline material - Branchline diameter - (NB: branchline information for up to four sections of branchline and up to four types of branchline) - Hook type used (up to four) - Number of hooks set by type (optional) - Number of bite-off per leader type (optional)		Deepest hook depth - Actually used mainline length (km)		
OTHER SET PARAMETERS - Line shooter speed - Vessel speed - Branchline set interval - Shark lines (no. and length) - - TDRs (Y/N) - No. of light sticks - Target species (up to 3) - Bait species (up to 5) - Bait type, kgs, hook no.s	**OTHER SET PARAMETERS** - Line shooter speed - - Branchline set interval - No. of Shark lines (optional) - Line set type - - No. of light sticks - Target species - Bait species - Bait type, ratio	**OTHER SET PARAMETERS** - Line shooter speed - Vessel speed - Branchline set interval - Shark lines (no. and length) - No. of light sticks - Bait species (up to 5) - Bait type	**OTHER SET PARAMETERS** - - - - - - - - - - - - - - Retrieval direction: start to end; OR end to start - Sea surf temperature	**OTHER SET PARAMETERS** - - - - - - - - - - Percentage of bait by bait categories that were Fish, Squid, Artificial, and Other - Bait status (live or dead)	
MITIGATION INFORMATION - Tori Poles (Y/N) - Bird curtain (Y/N) - Weighted Lines (Y/N) - - Underwater Set Chute (Y/N) - Bait dyed blue (Y/N) -	**MITIGATION INFORMATION** - Tori Poles (Y/N) - - Weighted Lines (Y/N) - Distance of weight from hook - Underwater Setting (optional) - Bait dyed blue (Y/N)	**MITIGATION INFORMATION** -Tori Poles (Y/N) -Bird curtain (Y/N) -Weighted Lines (Y/N) -Underwater Set Chute (Y/N) -Bait dyed blue (Y/N	**MITIGATION INFO** - - -	**MITIGATION INFORMATION** - - -	

WCPFC/SPC/FFA	IOTC interim	IATTC	CCSBT	ICCAT (National observer programmes)	NOTES
- -	- - Other bycatch mitigation measures used (optional) - Bird scaring device used during haul (optional)				
SET/HAUL SUMMARY	**SET/HAUL SUMMARY** This information is summarised at the trip level: - Total number of days in the fishing area (days) - Total number of days (days) - Days lost (weather, breakdown…) (days) - Steaming/Searching days (days) - Target species - Total number of sets/drifts - Number of hooks/panels - Number of hooks/panels lost - Total number of sets/drifts observed/sampled - Number of hooks/panels observed/sampled - Comments	**SET/HAUL SUMMARY**	**SET/HAUL SUMMARY** - Total number by species of caught and retrieved retained during the observed period - Total processed weight (kg) by species and Processed State of all species caught and retained during the observed period - Total number and weight when possible (whole weight, in kilograms) by species caught but discarded during the observed period and life status. - Wind speed (with unit) and direction (N, NNE, NE etc) of the operation - At the period of the wind measured for operation (e.g. Noon, start of set etc) - Comment: It is enough to collect the temperature at the start of set) At the period of the location and wind are measured for the operation (e.g. noon, start of set etc.	**SET/HAUL SUMMARY**	

Harmonisation of catch data

Part 7 Catch Information

Each of the t-RFMO requires that the observer estimate the weight of the catch and/or numbers of bycatch species. The weight categories differ between the t-RFMOs and this places restriction on the inter-operability of the data collected. Information on whether the catch is retained or discarded is collected by each t-RFMO.

Observed catch information relates to that part of the catch that was actually observed by the observer during the hauling process

WCPFC	IOTC interim	IATTC	CCSBT	ICCAT (National observer programmes)	NOTES
GENERAL NOTES ON "CATCH" DATA COLLECTION					
Each individual catch (whether it be retained or discarded) is identified and recorded with the following variables. "Hook number" against the individual catch is the count hooks from the last float hauled on board to next float to determine hook number of the caught fish			All species should be reported with FAO species codes, or using National codes and providing a translation table to FAO species codes. **Observed Catch Information (applies to CCSBT)** – relates to that part of the catch that was actually observed by the observer during the hauling process. All information recorded here relates only to the period(s) that were observed. This data should be collected as per the hierarchies to prioritise data collection as circumstances prevail on the observed vessel. The hierarchies for data collected by species and SBT data are: fishing operation information (all vessel and shot info); Monitoring hauls (time and species caught; retained or discarded with life status); Biological sampling (length and whole and/or processed weight including processed state; presence of tag(s); sex; biological samples; photos). Prioritise monitoring of hauls and biological sampling procedures by species group as follows: SBT (1st); other tunas, billfishes, gasterochisma and sharks (2nd); all other species	Normally for each set or trip, at least the following info is collected. Additional biological information in some cases (see next Part). There is great variability in information required between national observer programmes	

WCPFC	IOTC interim	IATTC	CCSBT	ICCAT (National observer programmes)	NOTES
			(3rd).The current "Minimum Data-field Standards" specified by each of the t-RFMOs are outlined in the Table below.		
DATA FIELDS					
- Date/Time of individual catch - Hook number - Species code (FAO code) - Fate (code) (this covers retained/discarded and the processed state of the animal) - - - Condition when caught (code) - - Condition when discarded/released (code) - - - - - - - - Tag information - Tag no. - Tag type - Tag finder - Release/recovery info - Comments - (as much information as possible)	- - - Species code (FAO code) - Fate - - - Depredation (predator species if observed, optional) - - - Condition of discard (for discards) - Release details (for discards, optional) - Scar type - Hook type (optional) - Bait type (optional) - Leader type (optional) - Hooking location (optional) - Tag Information - Tag no. - Tag type - Tag finder - Release/recovery info - Comments	-Date/Time of individual catch -Species code (FAO code) -Fate (code) -Condition when caught (applicable to bycatch only, eg. birds, turtles, marine mammals) -Condition when discarded/released -Hooking position	- - - Species code (FAO / national code) - Fate - - - - Life status category (distinguish life status categories as: dead and damaged; dead and undamaged; alive and vigorous; or unknown.) - Condition of discard/release [Total number by species of SBT, and other tuna and tuna-like species caught, retained or discarded. Total processed weight (kg) and Processed State (RD=round/whole, GG=gilled & gutted, DR=dressed etc as per TIS codes) by species of SBT, and other species caught (i.e. all fish, birds, turtles etc.)]	- - - Species code (FAO code) - Fate (landed, discarded live or dead) - - - - - Condition - - - - - - - - - Weight and or number of each species per haul	

Part 8 Length & Biological Information

The current "Minimum Data-field Standards" specified by each of the t-RFMOs are outlined in the Table below.

WCPFC / SPC / FFA	IOTC interim	IATTC	CCSBT	ICCAT (National observer programmes)	NOTES
SAMPLING PROTOCOLS AND GENERAL NOTES					
SPC/FFA forms protocol expects that ALL landed fish should be measured SPC/FFA forms has the provision to record the WEIGHT (kgs) and the Weight measurement code (i.e. the processed state of the weighed fish), but weight measuring devices are rarely available in longline vessels. Uses Length and weight measurememt codes SEX -- (M, F, I=indeterminate if difficult to determine, U=unknown on whole fish no seen) SPC/FFA has the provision of collecting more detailed multiple length and weight information from each fish by using the LONGLINE CONVESION FACTORS data collection form (optional and only used for special projects as required)	A summary of the type and quantity of biological data collected are reported. A range of length measurements can be recorded for different fish species. Note clearly which measurements are recorded and in which units they were recorded. For example TL (total length) and cm (centimeters). Refer to IOTC code tables. In all cases fish should be measured on a horizontal flat surface. Fish, which have a crushed or broken snout or tail or are not frozen in a straight position should not be measured. Tuna (figure 17) are mostly measured for "fork length"(UJFL) from the tip of the upper or top jaw to the fork of the tail. In situations where the fish are too large for the available equipment or the tails have been cut off for production purposes then the "pre-dorsal length"(LD1) from the tip of he upper jaw to the insertion of the first dorsal spine can be taken. However, it is	IATTC currently do not require length measurements to be undertaken on the vessel and have implemented port sampling for these data. The diversity of unloading locations for the IATTC is believed to be low and the traceability of tuna catch high. Consequently length based information collected in port can be related back to the set. The traceability of catch in the WCPFC is more complex due to the occurrence of well sorting and high diversity of unloading locations and observers are required to undertake length measurements on the vessel. This includes measurement of discarded species and those of special interest which provides the opportunity to raise the catch data into finer resolution size increments. This is not possible for discarded species in the	Biological measurements of individual fish. Biological measurements are only required for SBT, but where possible, effort should be made to measure other species. For the purposes of SBT analyses, accurate size measurements of SBT are required. SBT should be selected in a manner to ensure within strata randomness. For example, for large numbers of fish caught in a single operation (e.g., a purse seine vessel) a systematic sampling may be appropriate. The actual number of fish should be spread throughout as many separate fishing operations as possible. For example, it is nearly always the case that sampling 20 fish (randomly) from each operation is much better than sampling 200 fish from every 10th operation. The required actual number of samples should be re-evaluated from time to time and as needs change. Samples taken, specifying: a unique identification number given to the sample; the type of	Weight or number of individuals per size bin Some programmes record the sampling for genetic information, histology, individual length or weight samples. Measurement types are not often standardised between programmes.	

WCPFC / SPC / FFA	IOTC interim	IATTC	CCSBT	ICCAT (National observer programmes)	NOTES
	importance to always note down clearly what measurements have been taken. Billfish (figure 18) are preferably measured from the tip of the lower jaw to the fork of the tail, (LJFL). The length of most billfish make it impractical to use callipers or a measuring board and the preferred measurements are taken with a flexible tape pulled over the contours of the body. On some commercial vessels it may not be possible to take the LJFL length as the fish are first dressed by the crew. Alternative measurements that can be taken in these situations are: Eye-fork length (EFL) Measurement is taken from the posterior edge of the eye socket to the fork of the tail. Pectoral-fork length (PFL) The length is taken from the most anterior insertion of the pectoral fin to the fork of the tail. Pectoral-dorsal length (PDL) The length is taken from the most anterior insertion of the pectoral fin to the most anterior insertion of the second dorsal fin. Pectoral-anal length (PAL) The length is taken from the anterior insertion of the pectoral fin to the posterior rim of the anal sphincter. Again it is important to note the means and type of measurements taken.	IATTC and inter-operability with the IATTC is poor for this data field.	samples taken, including: whole specimen, or samples of otoliths, scales, vertebrae, stomach, muscle, tissue, gonads, etc)		

WCPFC / SPC / FFA	IOTC interim	IATTC	CCSBT	ICCAT (National observer programmes)	NOTES
Length of fish Length measurement code Weight of fish Weight measurement code Sex Gonad sample info SEE CODE TABLES	Length 1 (sample) Length code 1 (sample) Length 2 (optional) Length code 2 (optional) Weight pre-processing (optional) Weight post-processing (optional) Weight code post-processing (optional) Sex (sample) Maturity stage (sample) Sample collected (sample) SEE CODE TABLES	Length of fish Length measurement code Weight of fish Weight measurement code Sex Biological sample info Tag Recovery Information	Length (for SBT, fork length measured on straight length, rounded up to the cm.) Length code (fork length, eye fork, etc lower jaw-fork length) Length unit Whole weight (kg), if possible, i.e. measured weight before processing as opposed to a calculated whole weight. Processed weight (kg) Processed State (RD=round/whole, GG=gilled and gutted, DR=dressed etc., as per TIS codes.) Sex (F=female, M=male, I=indeterminate, D= not examined) Samples of otoliths, scales, vertebrae, stomach, muscle, tissue, gonads, etc. SEE CODE TABLES	Weight or number of individuals per size bin Some programmes record the sampling for genetic information, histology, individual length or weight samples. SEE CODE TABLES Measurement types are not often standardised between programmes.	

Part 9 Species of Special Interest

The information collected by the t-RFMOs provides for some inter-operability between the datasets. General information describing the type of interaction and set details along with information on the species and fate when landed on the deck and when released is collected (with level of detail varying between t-RFMO). The IATTC and IOTC also collect specific information on turtle interaction. The current "Minimum Data-field Standards" specified by each of the t-RFMOs are outlined in the Table below.

WCPFC	IOTC	IOTC interim	IATTC	CCSBT	ICCAT (National observer programmes)	Notes
Type of interaction (e.g. caught on line; swimming around) Date and time of interaction Latitude and longitude of interaction Species code of marine reptile, marine mammal or seabird (FAO codes) Vessel's activity during interaction Condition observed at start of interaction Condition observed at end of interaction Description of interaction (with vessel gear only) Number of animals sighted during interaction	Summary of incidental catches: Mitigation measures: Did the vessel operate south of 25^{o}S? List the mitigation measures used If tori lines were used: What was the number of sets where Tori lines were deployed? What was the percentage of sets which Tori lines were deployed? Were the Tori lines constructed according to IOTC guidelines? Comments		Type of interaction Date and time of interaction Latitude and longitude of interaction Species code (FAO codes) Vessel's activity during interaction Condition observed at start of interaction Condition observed at end of interaction Description of interaction (with vessel gear only) Number of animals sighted during interaction Length (cm) Length measurement code Sex Condition when landed on deck Condition when released If SIGHTED, then -Species -Activity -Distance from vessel	Both the monitoring of hauls and the biological sampling procedures should be prioritised among species groups as follows: 1st priority = SBT 2nd priority = Other tunas, billfishes, Gasterochisma, and sharks 3rd priority = all other species	Most require Date of interaction Set number Condition at release/discard Others require (eg. EU.France) Lat/Lon of observation Time of observation Size class Distance from boat Activity of animal Interaction with fishing activity Captures (injured/uninjured) Mortalities	
	Sharks					

WCPFC	IOTC	IOTC interim	IATTC	CCSBT	ICCAT (National observer programmes)	Notes
Length (cm) Length measurement code (for species) Gender (if possible) Estimated shark fin weight by species Estimated shark carcass weight by species Condition when landed on deck Condition when released Tag recovery information Tag release information			Estimated shark fin weight by species Estimated shark carcass weight by species		Some require No of captures by species Length (cm) TL/SL/FL/IDL Weight (kg) Sex No of embryos Sex ratio of embryos Stomach contents	
	Rays					
	Seabirds					
Length (cm) Length measurement code (for species) Gender (if possible) Condition when landed on deck Condition when released Tag recovery information Tag release information	Year Month Species Square number (1^{o}x1^{o}) Fate: Dead; or Released alive Comments				Lat/Lon of observation Time of observation Size class Distance from boat Activity of animal Interaction with fishing activity Captures (injured/uninjured) Mortalities	
	Marine Mammals caught					

WCPFC	IOTC	IOTC interim	IATTC	CCSBT	ICCAT (National observer programmes)	Notes
Length (cm) Length measurement code (for species) Gender (if possible) Condition when landed on deck Condition when released Tag recovery information Tag release information	Year Month Species Square number (1^{o}x1^{o}) Fate: Dead; or Released alive Comments				Lat/Lon of observation Time of observation Size class Distance from boat Activity of animal Interaction with fishing activity Captures (injured/uninjured) Mortalities	
	Sea Turtles					
Length (cm) Length measurement code (for species) Gender (if possible) Condition when landed on deck Condition when released Tag recovery information Tag release information	Year Month Species Square number (1^{o}x1^{o}) Fate: Dead; or Released alive Comments				Lat/Lon of observation Time of observation Size class Distance from boat Activity of animal Interaction with fishing activity Captures (injured/uninjured) Mortalities	
	Depredation					
	Number of sets with observed depredation Percentage of sets with observed depredation Percentage of catch per species damaged by depredation Was fish loss attributed to predator but not directly observed? (Yes/No) List of predator species observed: Comments					

WCPFC	IOTC	IOTC interim	IATTC	CCSBT	ICCAT (National observer programmes)	Notes
	Tag recovery information – Some of the data recorded here duplicates data that already exists in the previous categories of information. This is necessary because tag recovery information may be sent separately to other observer data.					
	Tag No. Species Length (cm) Length type Weight (kg) Weight type Position recovery: Lat: N/S Long: E Finder details Comments (e.g. Full label on tag, tag type)			Observer's name Vessel's name Vessel's call sign Vessel flag Collect and provide the actual tags Tag colour Tag numbers (The tag number is to be provided for all tags when multiple tags were attached to one fish. If only one tag was recorded, a statement is required that specifies whether or not the other tag was missing) Date and time of capture (UTC) Location of capture (latitude+N/S and longitude+E/W to 1 minute of accuracy) Length (fork length, rounded up to the nearest cm) Processed Weight (kg.) Processed State RD=round/whole, GG=gilled and Gutted, DR=dressed etc., as per TIS codes Details of samples taken, specifying: a unique identification number given to the sample; the type of samples taken, including: whole	Some require Tag No. Species Length (cm) Length type Weight (kg) Weight type Position recovery: Lat: N/S Long: E	

WCPFC	IOTC	IOTC interim	IATTC	CCSBT	ICCAT (National observer programmes)	Notes
				specimen, or samples of otoliths, scales, vertebrae, stomach, muscle, tissue, gonads, etc.) Sex (F=female, M=male, I=indeterminate, D=not examined) Condition of recaptured fish and life status Whether tags were found during a period of fishing that was being observed (Y/N) Reward information (e.g. name and address where to send reward)		
	Summary of biological data collected					
	Species Total number of individuals sampled Number measured Number weighed Number sexed Maturity stage recorded Otoliths collected Other (specify) Carcass retained				Most require No. sampled Length/weight Sex Maturity Some require Age Isotopes lipid Contaminants Stomach contents Otoliths collected	
	Biological sample storage location					

WCPFC	IOTC	IOTC interim	IATTC	CCSBT	ICCAT (National observer programmes)	Notes
	Sample type Species Number collected Location to be sent/stored					
	Biological sub-sampling methodologies: description of sub-sampling methodology used during trip					
	Tagging information					
	Species Tag type Number of animals tagged Comments					

Part 10 Additional information

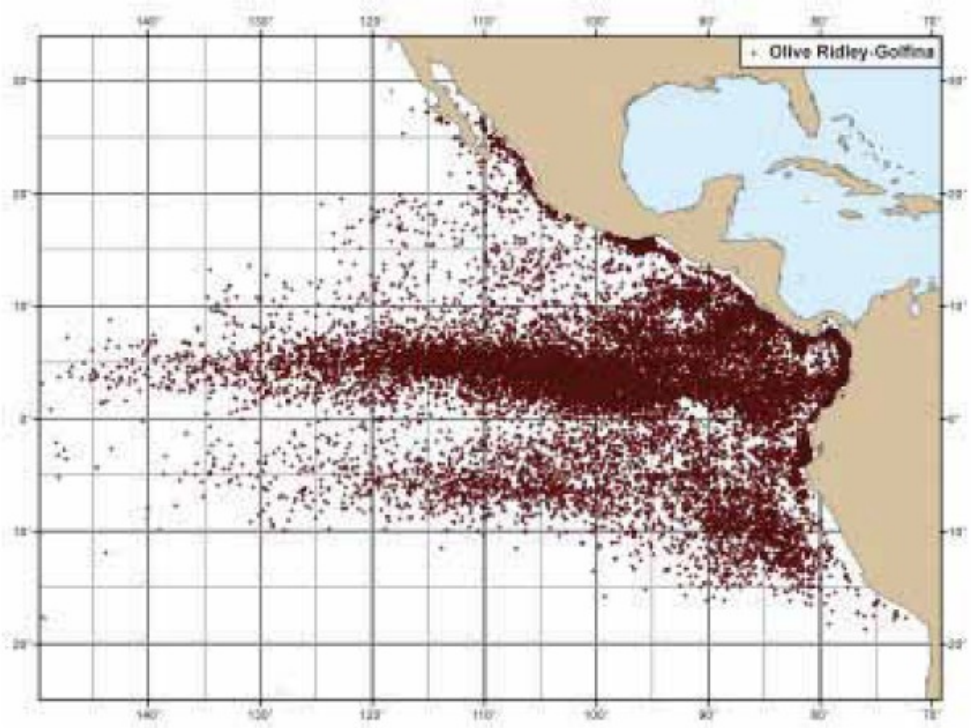
Additional information provided by specific tRFMO forms is outlined in the Table below.

WCPFC	IOTC	IOTC interim	IATTC	CCSBT	ICCAT (French & Spanish)
<u>Vessel & Aircraft Sightings</u>: UTC Date and time of sighting Observers vessel latitude and longitude position Where possible sighted vessel or aircraft name Where possible sighted vessel or aircraft call-sign Flag of sighted vessel if possible Other vessel markings Type of vessel (e.g. purse-seine, long line etc) Compass bearing from observers vessel to sighted vessel Estimated distance from observers vessel to sighted vessel Activity of sighted vessel e.g. steaming, fishing, drifting etc. Comments	Summary of meteorological details				
	Summary of fishing strategy				
	Vessel sightings: were fishing/supply vessels sightings being recorded? (Yes/No)				
	Lost fishing gear: include information on lost fishing gear, such as length of line lost and other gear such as floats.				
Vessel Trip Summary: Observer name & nationality Observer trip number (used on all forms) Observer Provider/Programme Name of vessel Vessel call sign Vessel gear type Coastal state license, when applicable Vessel certificate of registration WCPFC authorization (WIN number if supplied) Nationality of any boarding inspection vessel	General comments: provide a description and/or comment on fishing activities or incidences that are not routinely captured by the data sheets.				

Appendix 2. Example distribution maps and gear catalogues

A2.1 Example map of fishing effort and observed captures, 2010–11, for white-chinned petrel in New Zealand: https://data.dragonfly.co.nz/psc/v20121101/white-chinned-petrel/trawl/all-vessels/eez/2011/

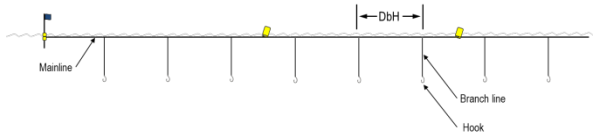
A2.2. Example map showing sets with presence of olive ridley turtles in the Eastern Pacific Ocean, 1993-2008 (From Hall and Roman 2013):



A2.3. Example longline gear catalogue:

1 **Type B: Mainline has positive buoyancy**

- Mainline lies on the sea surface (does not show catenary shape).
- All the hooks are set at almost the same depth.
- Float line length does not influence the hook depth if connected.

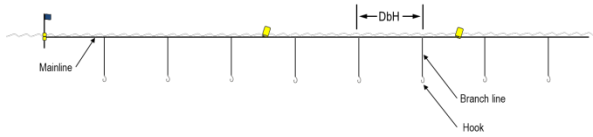


Number of floats	
MLbF: Distance between floats	
HbF: Number of Hooks between Floats	
DbH: Distance between Hooks	

Length of 1 unit (basket) = HbF x DbF

1 **Type B: Mainline has positive buoyancy**

- Mainline lies on the sea surface (does not show catenary shape).
- All the hooks are set at almost the same depth.
- Float line length does not influence the hook depth if connected.

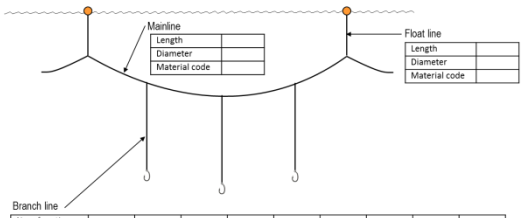


Number of floats	
MLbF: Distance between floats	
HbF: Number of Hooks between Floats	
DbH: Distance between Hooks	

Length of 1 unit (basket) = HbF x DbF

2 **Type A: Mainline has negative buoyancy**

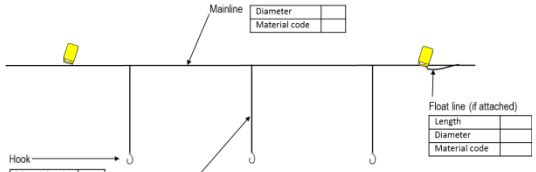
- Mainline usually shows a catenary shape
- The deepest hook is located in the middle of neighboring floats.



No. of sections									
Length									
Diameter									
Material code									

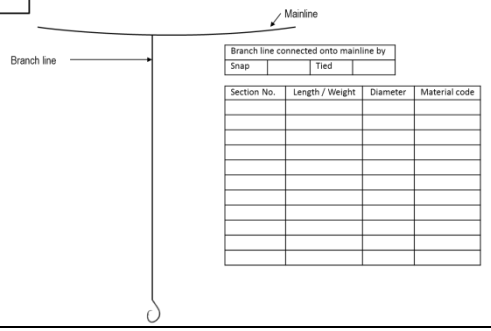
2 **Type B: Mainline has positive buoyancy**

- Mainline lies on the sea surface (dose not show catenary shape).
- All the hooks are set at almost same depth. Hook material code from catalog
- Float line length does not influence ~~the~~ hook depth if connected.



No. of sections						
Length						
Diameter						
Material code						

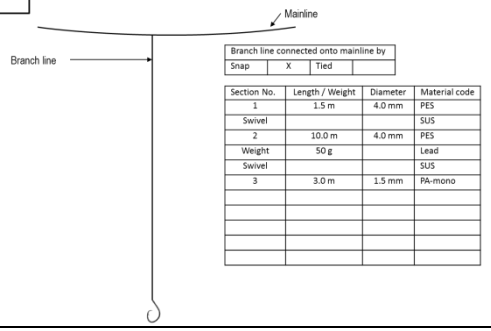
3 **Branch line (Gangion) configuration**



Branch line connected onto mainline by			
Snap		Tied	

Section No.	Length / Weight	Diameter	Material code

3 **Branch line (Gangion) configuration** ***Example***



Branch line connected onto mainline by			
Snap	X	Tied	

Section No.	Length / Weight	Diameter	Material code
1	1.5 m	4.0 mm	PES
Swivel			SUS
2	10.0 m	4.0 mm	PES
Weight	50 g		Lead
Swivel			SUS
3	3.0 m	1.5 mm	PA-mono

Appendix 3: Concept Note for Priority Bycatch Data Fields and Specification for Tuna Longline Observer Programmes

BACKGROUND

Participants in a meeting of experts on harmonization of longline data collected by tuna RFMOs (ISSF Technical Report 2015-08) identified a need for a systematic review of existing information collected by the tuna RFMO longline observer programmes in order to identify priority gaps in data that hamper our understanding of bycatch interaction and mortality rates. As a starting point, the group proposed to develop a comprehensive list of variables that can be collected through observer programmes and have been documented to have significant effects on interaction or mortality rates across taxa susceptible to capture in pelagic longline fisheries.

APPROACH

For each variable the following would be compiled and assessed:

- evidence that it has a significant effect on interaction or mortality rates of elasmobranchs, sea turtles, seabirds, and/or marine mammals;
- the state of understanding of the mechanism for this interaction or mortality;
- the key measurable indicators that can reflect the probability of interaction or mortality;
- a description of each tuna RFMO's current observer data collection protocol relating to this variable;
- a preliminary recommendation for a harmonized approach to collection of essential data by observers given such factors as, *inter alia*, ease of collection, expected data quality, overall scientific importance and statistical power issues; and
- the variable's relative priority in terms of bycatch monitoring and management.

The resulting list will be used as a starting point to prioritize efforts to harmonize key observer data collection fields across the tuna RFMOs.

TIMELINE

Relevant peer-reviewed and grey literature will be compiled and reviewed using the WCPFC's Bycatch Management Information System (BMIS), the Consortium for Wildlife Bycatch Reduction's Bycatch Reduction Techniques Database, and other published and unpublished compendiums and collections. Information on each t-RFMO's current data fields compiled for the recent Keelung expert meeting (Appendix 2) will be verified with each t-RFMO. The study will be submitted to tuna RFMO meetings dealing with observer data, as well as circulated to the Keelung expert group for review and comment, with the aim that specific proposals for harmonization can be adopted by tuna RFMOs or can serve as the basis for further discussion towards this goal. It is estimated that the study will require an estimated 6 weeks of work for an indicative budget of $18,000 US.