AFRICAN UNION

A GUIDE TO MARINE OBSERVER DUTIES AND REPORTING ONBOARD COMMERCIAL FISHING VESSELS

AFRICAN UNION
INTERAFRICAN BUREAU
FOR ANIMAL RESOURCES

CapMarine
Capricorn Marine Environmental

Prepared by: C.J. Heinecken, M.J. Smith and S.J. Norman (Capricorn Marine Environmental)

Edited by: Dr. Mohamed Seisay, Dr. Aboubacar Sidibe and Dr. Simplice Nouala

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Requests for such permission should be addressed to:
The Director
African Union – Interafrican Bureau for Animal Resources (AU-IBAR)
Kenindia Business Park
Museum Hill, Westlands Road
P.O. Box 30786
00100, Nairobi, KENYA
Or by e-mail to: ibar.office@au-ibar.org

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ACRONYMS AND ABBREVIATIONS

ATF	Authorisation To Fish
CMM(s)	Conservation and Management Measures (s)
CPUE	Catch-per-unit-effort
EEZ	Exclusive Economic Zone
EPIRB	Emergency Position-Indicating Radio Beacon
FAD	Fish Aggregating Device
FAO	Food and Agriculture Organization of the United Nations
GMDSS	Global Maritime Distress Safety Systems
GPS	Global Positioning System
GRT	Gross Registered Tonnage
GT	Gross Tonnage
ICCAT	International Commission for the Conservation of Atlantic Tunas
ITCZ	Inter-tropical Convergence Zone
IOTC	Indian Ocean Tuna Commission
IMO	International Maritime Organisation
IUU	Illegal, Unreported and Unregulated (fishing activity)
LOA	Length Overall
LSTLVs	Large Scale Tuna Longline Vessels
MF & HF	Medium and High Frequency
MCS	Monitoring, Control and Surveillance
MoU	Memorandum of Understanding
OTC	Personal Flotation Device
PFD	Protected, Endangered and Threatened species
PFRS	Policy Framework and Reform Strategy for fisheries and aquaculture in Africa
PST	Personal Survival Techniques
RFMO	Regional Fisheries Management Organization
ROP	Regional Observer Program
SART	Search and Rescue Transponder
SOLAS	International Convention for the Safety of Life at Sea, 1974
SST	Sea Surface Temperature
TAC	Total Allowable Catch
UNCLOS	United Nations Convention on the Law of the Sea, 1982
TED	Turtle Excluder Device
VHF	Very High Frequency
VMS	Vessel Monitoring System

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INTRODUCTION

Developing a National or Regional Observer Scheme

The Policy framework and reform strategy for fisheries and aquaculture (PFRS) placed emphasis on the conservation and sustainable use of fisheries resources as enhancing regional cooperation in the management of the fisheries sector. The Pan African fisheries Policy framework underscored capacity building of African Union member states for effective participation for increased benefits from High Seas fisheries. Ensuring that fisheries institutions have adequate human resources to effectively implement international instruments governing the conservation and management of aquatic resources are major provisions in this policy arena.

The 2014 Joint Ministerial Conference of agriculture, rural development, fisheries and aquaculture encourage Member States to build capacity for collection, analysis and interpretation of biological, social and economic data for improved decisions making in fisheries management and aquaculture development.

The development of modern day observer programs, was identified in the United Nations Convention on the Law of the Sea of 10 December 1982, [Part 5, Articles 61 to 65], to meet the need for the conservation and management of marine living resources. The 1982 Convention laid the foundation for a new era in international fisheries law that was followed by several major agreements that were drawn up to enhance the legal status of the management and conservation of marine living recourses, the most important of these were;

- The 1993 Compliance Agreement;
- The 1995 The FAO Code of Conduct for Responsible Fisheries;
- The 1995 United Nations Fish Stocks Agreement.

These three instruments complement and mutually reinforce each other, highlighting the pivotal role of Regional Fisheries Management Organisations (RFMOs), in establishing a responsible international fisheries regime to promote and enhance data-collection and the exchange of data for assessing high seas resource potentials and developing profiles of all target and non-target stocks. Within these agreements, the framework was set for meaningful advances in fisheries management and establishing observer programs for monitoring, control and surveillance (MCS), and scientific data collection.

Worldwide, observer programmes are used in fisheries management to provide "independent" baseline information on fisheries. This is particularly important in the case of RFMOs managing highly migratory species and where member states include distant water fleets, domestic fleets and artisanal fisheries exploiting shared fish stocks both on the high seas and within areas of national jurisdiction. Regional Observer Programmes (ROPs) perform a valuable role in collating catch and effort data and monitoring within these regions. Similarly, scientific observers can also be deployed across all fishery sectors to collect information primarily for management, stock assessment, conservation and other "neutral" activities.

In a regional context, commercial fisheries resources are often **shared** between countries. These include migratory fish stocks (such as tuna) and straddling stocks (fish stocks that occur across international boundaries).

Enhanced knowledge of their offshore marine environment assists developing countries to implement national and regional strategies for managing shared fish stocks and conserving biodiversity.

Tasks of Observers

The tasks of observers are wide-ranging and depend largely on the requirements or objectives of a governmental fisheries department, or RFMO's. These can be broadly summarise into the following categories:

- Sea-Based Scientific Data Collectors – Fishery Specific e.g. tuna longline, crustacean trawl, or trap fishery;
- Compliance Observers –Focusing on compliance to national or regional Conservation and Management Measures (CMMs) ;
- Marine Mammal Observers (MMOs) – focusing on recording interactions of marine mammals with fishing and other industrial activities at sea. MMOs are routinely deployed on specialised seismic survey boats;
- Observers on specific "Experimental" or other projects (such as acoustic assessments of deep-water stocks or specific Ecosystem components).
- Land-Based Observers – used for port-sampling or collecting data from artisanal fisheries at landing sites.

Observer, especially sea-going observers, are often required to work unsupervised, and must have a comprehensive knowledge of the fishery being observed. Their objectives requiring them to record, inter alia, accurate data on:

- nature of the fishing operations;
- catch composition of fish brought onboard;
- size composition, sex ratio and reproductive status of target species;
- by-catch mortality and discard component;
- general trip details describing the target species, permit holder and areas fished;
- vessel specifications, fishing and electronic equipment;
- oceanography, weather and interactions with seabirds and marine mammals; and
- adherence to MarPol regulations.

DEFINING "THE OBSERVER"

Observers can be divided into two primary categories:

1. compliance officers, or inspectors
2. scientific observers

There are some fundamental differences in the legislative mandate in appointing compliance officers/ inspectors and scientific observers, as well as differences in the training, responsibilities and tasks of observers operating onboard a vessel at sea or on based on land.

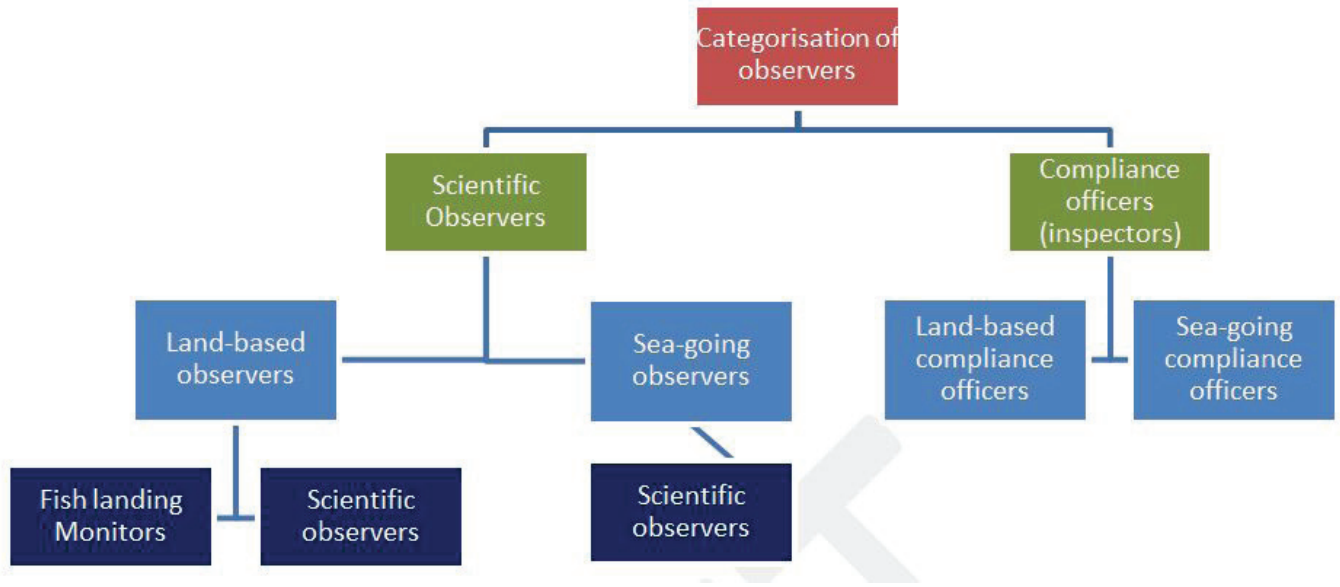
Scientific observers

Scientific observers on land or deployed onboard vessels are generically tasked to collect fisheries information. Sea-going observers are also often required to monitoring discarded by-catch and report on the environmental impacts of the fishery on other marine fauna such as seabird, marine mammals and, Endangered, Threatened and Protected (ETP) species. In most cases legislation supporting sea-going scientific observers requires the vessel to accommodate the observer to record such data while onboard but affords them no legal mandate to advise on or enforce any legal aspects written into the vessels authorization to fish. However, a scientific observer may be required report on adherence to compliance issues.

Compliance officers (Inspectors)

Compliance officers operating on land or at sea are appointed by the countries fisheries authorities and generally have a legal mandate to enforce the fisheries laws of the country. Sea-based compliance officers may be deployed onto vessels for the duration part of a trip to monitor fishing activities directly, and report on adherence to compliance measures in licence conditions issued by the State. In most cases compliance officers both on land and at sea have a legal mandate to enforce compliance measures or initiate legal proceedings against offending vessels.

The Organogram below further categorises Observers as land or sea based.



QUALIFICATIONS AND PREREQUISITES FOR SCIENTIFIC OBSERVERS

Scientific observers require a comprehensive background in different fisheries and the associated gear and target species associated with each species.

Land based observers have the advantage of having access to direct supervision and are generally employed in recording catch and effort data of landed catches or product. Access to landed catch may also provide some opportunity to record biometrics of landed catches.

Scientific observers that are deployed onboard a vessel at sea work unsupervised in a demanding environment. Their tasks are wide ranging, but are generally focused on collecting catch and effort data of the vessels fishing activities as well as monitoring discarded by-catch and fisheries impact on the environment. To achieve their objectives and be able to record accurate data while onboard, a scientific observer needs to have a high degree of personal integrity and stamina. Specific knowledge of sampling methodology, fish biology, fishing technology, ecosystems and statistical sampling strategies are essential.

Scientific Observer Training

Observer training normal takes place over several phases with basic introductory training taking place prior to them being deployed onboard a vessels, followed with more specific and advanced training as they gain experience and demonstrate their ability to work at sea. The generic observers training curriculum usually includes:

- fishing methods and related equipment;
- identification of commercial and by-catch species;

- fish and crustacean biology;
- catch and biological sampling methods;
- quota allocations and permit conditions; and
- health and safety aspects of their work.

Sea-going scientific observers would in addition be required to have knowledge of:
- vessel layout and nautical terminology;
- navigation and navigational aids;
- meteorology and oceanography;
- onboard data collection procedures;
- understanding of monitoring interactions with other marine fauna;
- marine mammal- and sea bird identification;
- international observer protocols; and
- sea survival -all observers must complete a practical basic survival course to prepare them for emergencies at sea.

Qualifications and prerequisites for compliance observers or inspectors

In addition to the basic knowledge of fisheries and fish species as required by scientific observers both sea-going and land based, a compliance observer requires a detailed knowledge of fisheries legislation as well as the procedures for recording evidence that would be legally sound should a vessel be prosecuted.

Observer Code of Conduct

Internationally there is recognised ethical code of conduct for observers and this is often written into the legislation allowing for the appointment of observers. This code of conduct requires that observers should not participate in any activity, which would:
- cause a reasonable person to question the impartiality or objectivity with which the Observer Program is administered;
- significantly impair the observer's ability to perform his/her duties;
- adversely affect the efficient accomplishment of the Program's mission;
- observers may not have direct financial interest in the observed fishery, other than the provision of observer services;
- observers may not solicit or accept, directly or indirectly, any gratuity, gift, favour, entertainment, loan or anything of monetary value from anyone who conducts activities that are regulated by the fishery, or who has interests that may be substantially affected by the performance or non-performance of the observers' official duties;
- observers may not serve as observers on any vessel or at any shore-side facility owned or operated by a person who previously employed the observer in any capacity;
- observers may not solicit or accept employment as a crew member or an employee of the vessel or shore-side processor in any fishery while employed as an observer;
- a person may not serve as an observer in a fishery during the 3 consecutive months following the last day of his/her employment as a paid crew member or employee in that fishery;
- observers may not engage in an activity that may give rise to the appearance of a conflict of interest that may cause another individual to question the observer's impartiality, fairness or judgment;
- observers must avoid any behaviour that could adversely affect the confidence of the public in the integrity of the observer programme;
- observers must diligently perform their duties;
  - » observers must accurately record their sampling data, write complete reports. if the observer

chooses to report any suspected violations of regulations relevant to conservation of marine resources or their environment that they observe, it must be done honestly;

» observers must preserve the confidentiality of the collected data and observations made on board the fishing vessels;

» observers must refrain from engaging in any illegal actions or any activities that would reflect negatively on their image, on other observers, or the observer program, as a whole. this includes, but is not limited to:
  - engaging in drinking of alcoholic beverages while on duty;
  - engaging in the use or distribution of illegal substances; and
  - becoming physically or emotionally involved with vessel personnel.

Sea-going observer conduct

Observers are not in the employ of vessel operators and are not directly involved with vessel operations. However, while onboard, observers must follow the protocols below:

- observers shall treat all information relating to the fishing operations of the vessel as confidential;
- observers shall comply with requirements established in the laws and regulations of the flag state; and
- observers shall respect the hierarchy and general rules of behaviour, which apply to all vessel personnel.

In particular the scientific observer protocol requires that:

- the observer is under the authority of the captain regarding vessel operation and safety at sea;
- the observer has no authority to advise or direct any of the vessels operational activities, nor has he/she any authority over the vessels personnel; and
- while the observer should be given access to all operational areas of the vessel necessary to complete their work including the bridge, navigation and communication equipment, they should try to secure co-operation with the officers to ensure that their activities do not hinder normal fishing and operations.

While onboard, Observers have officer status and are expected to conduct themselves in a professional manner at all times. Some of the rules are as follows:

- no working clothes in the accommodation or in the mess room, on some vessels shoes are not worn on the bridge or in the accommodation;
- on vessels where officer and crew eat in separate venues, you should eat with the officers. it is normal practice to change into clean clothes before going to the mess;
- the observer's living and working areas must be kept clean and tidy. cleanliness and tidiness are also a safety factor;
- the observer's gear must be kept clean and secured when not in use.

Observers must be aware and sensitive to the cultural practices of other members onboard. Cultural awareness must include:

- manners of approach and address to officers and crew;
- awareness of eating customs;
- awareness and respect of religious practices; and
- awareness of ablution and sanitary customs.

COMPLIANCE OFFICERS (INSPECTORS)

Compliance officers operating on land or at sea have a legal mandate to enforce legal requirements in accordance with the fisheries laws of their country or the Conservation and Management Measures (CMMs) of RFMOs to which their country is affiliated.

Sea-based compliance officers may be deployed onto vessels for part or the full duration of a fishing trip to monitor fishing activities directly, and report on adherence to compliance measures. They a legal mandate to enforce compliance measures both on land and at sea and can initiate legal proceedings against offending vessels.

For most countries at-sea compliance is effected from fisheries patrol vessels that are tasked with patrolling the waters within their countries EEZ or by agreement with members of an RFMO the high seas area of management of the RFMO. Compliance officers can board vessels at sea and inspect gear and catch or remain onboard for a predetermined period to monitor fisheries operations.

Tasks of Compliance Officers

The primary tasks of compliance officers are to collect information pertaining to fisheries operations to verify these are undertaken in accordance with the legal requirements for the fisheries regulations. These include inter alia:

- checking that vessel has onboard all legal documentation required in terms of legislation;
- check that vessel markings conform to legal requirements to those specified by relevant RFMO's;
- ascertain that the gear onboard conforms to the specifications of the authorisation to fish issued to the vessel;
- inspection of catch to check the vessel only has onboard species the vessel is legally allowed to retain;
- check fishing logs to confirm the vessel is operating within the areas it is legally permitted to operate; and
- check that fishing logs match the quantities retained onboard.

Standard Operating Procedures (SOPs)

To meet legal requirements for inspections compliance officers are trained to follow Standard Operating Procedures (SOPs) when boarding and inspecting vessels. The SOP provide a guide to the processes of inspection and in the event that a transgression if recorded it provides the procedure to recording all details in a manner that it will legally comply with requirements to arrest or prosecute an offending vessel. SOPs during an inspection for both an inspection in port or at sea boarding are similar (Table I).

Table 1: Standard Operating Procedures for on-board inspections in port or at sea

Standard Operating Procedures for on-board inspections in port or at sea	
Arrival on the carrier vessel	• presentation of inspectors' identifications and mandate • introduction and briefing with master by the inspection team leader
Request for documentation	Inspectors can request documentation to: • confirm vessel identity by inspection of registration certificates; • Vessels Authorisation to Fish (ATF) issued by its flag State for its EEZ and the High seas; • ATF from any coastal State that has provided the vessel with an ATF to fish in its EEZ; • vessels fishing and navigation logbooks; • freezer logbooks; • confirm quantities and species onboard; and • loading plan showing product location, quantities and species.
Gear inspection	• request details of gear on-board and cross reference to legal requirements in ATF • together with a vessel representative inspect all fishing gear and record measurement to conform to legal requirements • look for and identify any undeclared gear and not if it shows evidence of recent use
Fish hold inspection	• request accompaniment of vessel representative • follow all safety procedures for entering confined spaces • request full illumination of hold • wear protective clothing doe sub-zero temperatures • member of the inspection team to monitor entrance to hold at all times

Overall vessel inspection	• conduct overall inspection of vessel to check for storage of illegal products [i.e. shark fins]
Inspection of mitigation measures onboard	• verify that any mitigation measures to prevent by-catch of protected, endangered or threatened species required in the vessels licence conditions are in place and conform to required specifications

Inspections in port can be devided into two main proceedures. General vessel inspection similar to that of boarding and inspecting a vessel at sea or monitoring the offloading or transhipment of the catch (Table 2).

Table 2: SOP for port inspection procedures and monitoring offloading or transhipment of catch.

SOP for port inspection procedures and monitoring offloading or transhipment of catch.	
Arrival on the carrier vessel	Introduction and briefing with master by the inspection team leader and presentation of inspectors' identifications and mandate.
Request for documentation	Inspectors monitoring offloading must request: • confirm vessel identity by inspection of registration certificates; • Vessels Authorisation to Fish (ATF) issued by its flag State for its EEZ and the High seas; • ATF from any coastal State that has provided the vessel with an ATF to fish in its EEZ; • vessels fishing and navigation logbooks; • freezer logbooks; • confirm quantities and species onboard; and • loading plan showing product location, quantities and species • confirm quantities to be offloaded as reported in the vessels advanced request to enter port.
Request details of offloading plan and procedure	Request details of method and procedures that will be followed when offloading. Note sequence of holds to be offloaded, quantities and product origins.
Discuss planned sampling of catch for verifying weight and species composition	Discuss need for recording sample weights and species: • Determine where these can be undertaken to cause least disruption to offloading operations and effect on product quality, • Confirm that a hook scale will be used.
Inspection of hold before offloading operation	• Undertake an advanced inspection of hold and compartments where fish are stored to record to what capacity they are filled and take photographs.
Setup monitoring position(s)	• Select a position where the fish being hoisted out of the hold can be observed; counted and species identified and the hook scale can be read. • Consideration should be given to manning more than one position to observer offloading process. • When selecting a position note health & safety requirements with respect to fish falling from hoists or collapse of the crane. (These often occur). • Possible positions: • On the deck of the carrier being offloaded or transhipping, with full view of the hatch opening; • Note: position must allow opportunity to read hook scale, • Where one carrier is transhipping to another, a position on the receiving vessel can be set up with view of fish from the hold of the donor vessel to the receiving vessel.
Sampling for average weight	• At random intervals request a single or number of fish from a hoist to weigh. • Random number tables can be computer generated to facilitate these selections; • Weight using a hanging or platform scale depending on what's available and the size of the fish may be practical in some circumstances, • Request use of the hook scale for weighing samples of large fish.

SCIENTIFIC OBSERVERS

Duties of Scientific Observers

The main task of a scientific fisheries observer is to collect independent, reliable and accurate data on fishing operations that can be used by fisheries managers and scientists for the sustainable management of a country or RFMO fisheries. The three main categories of data are:

- operational information;
- biological information; and
- environmental information

Operational information

Operational data covers all operational aspects of the fishy being observed as well as the catch of the target species and associated bycatch. Essentially the aim is to collect all information on the effort put into the fishing activity and the associated catch for a unit of effort. Included are all aspects influencing operations to that can improve or be detrimental to the related catch.

While land-based observers will collect information on landed products a sea-going observer can record real-time catches and retained production and estimate discard of by catches or unwanted target species.

The basic categories of operational information capture include:

- vessel specifications, (size, processing and carrying capacity);
- electronic aids for navigation and location of fish;
- specifications of fishing gear;
- fishing effort (time spent in transit, searching and fishing; number of traps set or hours trawled);
- position, time, total catch per fishing event;
- weight and/or numbers of all species caught (catch composition);
- retained catch of target and by-catch species;
- fate of unwanted or discarded by-catch;
- fish or fish product landings and transhipments;
- IUU activity; and
- meteorological information that influences operations.

BIOLOGICAL INFORMATION

Biological information of target species and vulnerable by-catch is required by fisheries scientists and manager to assess the sustainability of a fishery. Basic biometric data collected by scientific observers from both target species and by-catch should include:

- lengths (size) of target and selected non-target species;
- sex, maturity and reproductive condition;
- stomach samples to determine diet;
- otoliths, scales or vertebral sections for age and growth studies; and
- tissue samples for genetic studies

Note *By-catch species are all species that include fish, sharks and invertebrates as well as seabirds and marine mammals caught together with the target species.*

Discards are the portions of the by-catch that is returned to the sea.

Ecological and environmental Information

Ecological information is used to monitor the overall effect of fishing on the environment and ecological impact on other species such as marine mammals and seabirds that are classified as protected or threatened. Equally important is recording data to assess the effectiveness of mitigation measures. Basic information categories include:

- catch and fate of seabirds, marine mammals, turtles;
- effectiveness of by-catch reduction devices (BRD) and turtle excluder devices (TED);
- general observations on sightings and abundance of seabirds, marine mammals and turtles; and
- presence of marine debris and vessels adherence to marine pollution protocols.

Sampling on trawlers : Catch and Effort sampling

Calculation of total catch weight

Fisheries Observers must be able to estimate or calculate the total catch of the vessel. The vessel logbook records the captain's visual estimation of the weight of the codend hauled onboard. Although these estimations can be very accurate, observers must be able to verify these estimates, using one of the following methods:

a. If the catch is emptied into baskets and bins, the weight of a few bins can be taken to get an average bin weight. The average bin weight is then multiplied by the total number of bins to estimate total catch weight.
b. On larger industrial trawlers the volume of the fish in the codend is estimated using the basic formulas below. Use one that corresponds closely to the shape of the codendas it is hauled onboard. Alternatively after the codend is emptied into the stocker ponds calculate the volume of fish in the stocker pond. Multiply this with the average weight of fish per cubic meter.
c. The density the fish (weight / cubic meter) can be determined by weighing several bins of fish of known volume and then raising this to a weight per cubic meter. This figure can then be multiplied by the estimated volume of the catch to get the total catch weight.

Codend Shape	Formula
Rectangle	Volume = L x W x H
Cylinder	Volume = πr2 x L
Oval	Volume = π x (short r) x (long r) x L
Wedge	Volume = ½ x (L x W x H)

W = Width L = Length H = Height r = radius π = pi (constant ~3.14)

Use a Perspex slate and pencil to record information in the factory or on the upper deck. A slate can be used in wet conditions at the sampling station. The information can later be transcribed onto data sheets.

Catch Composition

Collecting a random sub-sample on trawlers

The most accurate method of determining catch composition is to sample and measure the whole catch. This is seldom possible because catches are too large, and observers must therefore measure representative random sub-samples. The larger percentage of the catch the sub-sample makes up, the more accurate the data will be.

The sub-samples must be taken without any selection for size or species. Several sub-sampling strategies are available:

a. On small semi-industrial trawlers: Catches are emptied into bins or baskets and a representative percentage of the catch can be sampled by randomly selecting and sampling a bin or basket. The bin or basket must be taken before the crew starts sorting the fish.
b. On larger industrial trawlers: Catches are emptied into a hopper or stocker pond that opens onto the factory deck. A random unsorted sample can be collected from the conveyor belt where it leads directly out from the ponds. Stop the belt and remove all the fish on a section of the belt into a sampling bin.

Fish coming directly out of the ponds can be scooped up using a spade or bucket and placed into bins. This method does not disrupt the processing, but it may tend to "size-select" the smaller fish only. This method can be successfully used when fish are uniformly small (10-30 cm in length).

Fish can be removed from a moving belt by hand, but the disadvantage of this method is that larger fish that are easier to grasp are automatically "size-selected".

In all instances, observers should also aim to take several samples during the time that a catch is being processed. The bigger the sample is the greater the accuracy of the data will be.

Determining the catch composition

After taking the sample, sort it into species categories and then weighand count the fish in each category. The percentage that each species makes up of the sample weight is calculated as follows:

Species Weight divided by Total Sample Weight multiplied by One Hundred.

[(Spp Wt / Tot Smpl Wt) x 100]

For example, the Table shows the calculation by weight [(Sp wt / Total sample wt) * 100], and also by numbers [(Sp numbers / Total sample number) * 100].

Species	Weight (kg)	Number	Sp wt / Total wt	Sp no. / Total no.	Percentage X 100	
Hake *M. capensis*	56	13	0.24	0.11	23.93%	10.66%
Hake *M. paradoxus*	134	69	0.57	0.57	57.26%	56.56%
Kingklip	12	3	0.05	0.02	5.13%	2.46%
Jacopever	8	11	0.03	0.09	3.42%	9.02%
Short-nose Rat-tail	3	21	0.01	0.17	1.28%	17.21%
Smooth Rat-tail	6	4	0.03	0.03	2.56%	3.28%
Biscuit Skate	15	1	0.06	0.01	6.41%	0.82%
Total / Check	**234**	**122**	**1**	**1**	**100**	**100**

Sampling on tuna purse-seiners

Calculation of total catch weight

The total catch weight in an industrial tuna purse-seiner can be estimated using the volume of the tuna school detected by the sonar / sounder, the volume and number of brailers and the volume of fish loaded into the wells.

Sonar / sounder

The tuna school volume can be estimated by the indications given in the sonar / sounder. The observer should ask the fishing master for this information and compare the estimate with that of the other methods.

Fish-well

From the fish wells located in the lower deck, the tank capacity for a given species is calculated by multiplying its volume by the factor per species (volume and factor to be obtained from the factory manager).

Brailer Volume

Total catch weight is determined by multiplying the number of brailers with the brailer capacity per fish species. Brailer capacity for a given species must be requested from the factory manager.

Total Catch Volume = N° of brailers X brailer weight (t/brailer)

For example:

Species	N° of brailers	Brailer capacity	Level of fullness of brailer	Total weight per species and weight category
YFT (>10kg)	10	5.5 t	Full	55.5t
YFT (>10kg)	5	5.5t	Half-full	27.5t
SKP + YFT (<5kg)	7	6.5t	Full	45.5t
TOTAL CATCH VOLUME				**128.5 tons**

Catch Composition : Collecting a sample on tuna purse-seiners

Catches are emptied into a stocker pond on the upper deck, which opens onto the lower deck, from where it is conveyed to fish-wells to be frozen in brine.

Depending on fishing method, there are two sampling strategies that can be employed on tuna purse-seiners:

1. Stratified sampling
2. Proportional sampling

1. Stratified Sampling

Used when individual catches are restricted to only a few species of fish of homogenous size. Typical of free tuna schools. Each sample should consist of at least 50 fish for large fish (15 kg +) and 100 for smaller fish. If length frequencies do not show a clear mode, an additional sample should be taken.

2. Proportional Sampling

In a multi-species fishery, such as fishing under FADs, the catch (or species) composition is often recorded incorrectly because fishers cannot identify all species, and some species are discarded. Proportional sampling of the catch by observers can be used to determine actual species composition of catches, including the discard component. Length frequency of the different species can be measured. Sample size should be large and cover a broad size range - at least 100 fish for larger species (15kg+) and up to 200 for smaller species.

Methods for proportional sampling for species composition and length frequency data are:

a. Separate sampling for size and species

A fixed number of fish / species is measured to obtain the length frequencies / species. A separate random sample is then taken (either by weight or number of fish) to determine species composition of the catch. The random sample should be collected from the conveyor belt before the catch is sorted. Stop the belt and remove all the fish on a section of the belt into a sampling bin. Fish found under FADs tend to stratify by species and size. Several random samples should be collected along the duration of the brailing, to obtain a representative sample of the catch and correctly determine catch species composition.

Advantage: Small part of the catch is accurately sampled for length composition.
Disadvantage: Main species often under-sampled.

b. Mixed species sampling

A random sample of the catch is taken as a percentage of the total weight or number of fish caught. The random sample should be collected from the conveyor belt before the catch is sorted. Stop the belt and remove all the fish on a section of the belt into a sampling bin. The sample is sorted to species level, and length frequencies / species measured.

Advantage: Main species well sampled.
Disadvantage: Less abundant species often under-sampled.

c. Pre-sorted catch

Use only when random, unsorted samples cannot be obtained (i.e. on a purse seiner where fish are sorted directly into brine tanks). Obtain total catch figures from the vessel to calculate the actual species component. Species composition and length frequency of the catch can be recorded by sampling a fixed ratio of the different sorted components, for example 1 fish per ton or 1 fish out of every 1000 fish.

When sampling large seiners the sampling procedure should be repeated a number of times while the fish are being worked away or samples taken from different stocker ponds or wells. This is because fish of different sizes and species tend to separate in the net. A single sample from the top or bottom of the net may be biased towards either larger or smaller fish, or one species.

Determining the catch composition

Target catch composition can be determined through the use of the sampling methods described above. Bycatch composition will be determined with the help of the sampling methods described and the collection of random bycatch samples (when and if needed).

Some bycatch do not get passed down to the lower deck (i.e. whale sharks, sharks, dolphins, marlins, turtles, some under-sized fish) and are discarded directly from the main deck back into the sea. Observers must estimate the number and weight of discarded bycatch before they are discarded. Discuss how to sample this bycatch with the captain or crew (possibly it can be kept onboard until the observer has had time to sample it).

Sampling on long-liners (hooks and traps)

During longline fishing, fish or crustaceans are caught at greater depths and are spread out over a larger area, resulting in slower catch rates than on trawlers. A high percentage of the catch (80-100%) can be measured.

Fish (or lobsters, crabs) come onboard individually throughout the entire time that the line is hauled. Depending on the number of hooks or traps set and the estimated time required to haul a line, a set can be divided up into a fixed number of sampling units - a number of these units can be selected and sampled. The catch composition of the sampled portion can then be raised to obtain the total catch composition of the line.

By-catch on long-liners is lower than in trawlers. Often, bycatch can be retained while the line is being hauled, and weighed / measured at the end.

It is important to describe the fate of discarded or released by-catch species to determine their chance of survival.

BIOLOGICAL SAMPLING

Length, weight and size composition

Collection of samples

Three factors are taken into account by scientists when setting up sampling strategies for observers:

1. Type of sampling

The type of sampling undertaken could influence the size composition of fish sampled due to gear selectivity (i.e. gill nets versus trawls or line caught fish)

2. Area sampled

Sampling area should be selected to include all parts of the stock (e.g. in some areas there may only be juveniles)

3. Time of sampling

To eliminate seasonal bias to sampling (e.g. fast-growing species may be small in one season but much larger a few months later) sampling should include all seasons.

Collecting Length Measurements

Length frequency information shows the size structure of a fish population by sex, area and time, and forms the basis for the understanding the dynamics of fish populations. Length frequencies can be converted to age structure using an age-length keys for each species, and show the age of recruitment into a fishery. They can be used to compare populations occurring in different places (e.g. exploited and unexploited areas) or times (e.g. between years).

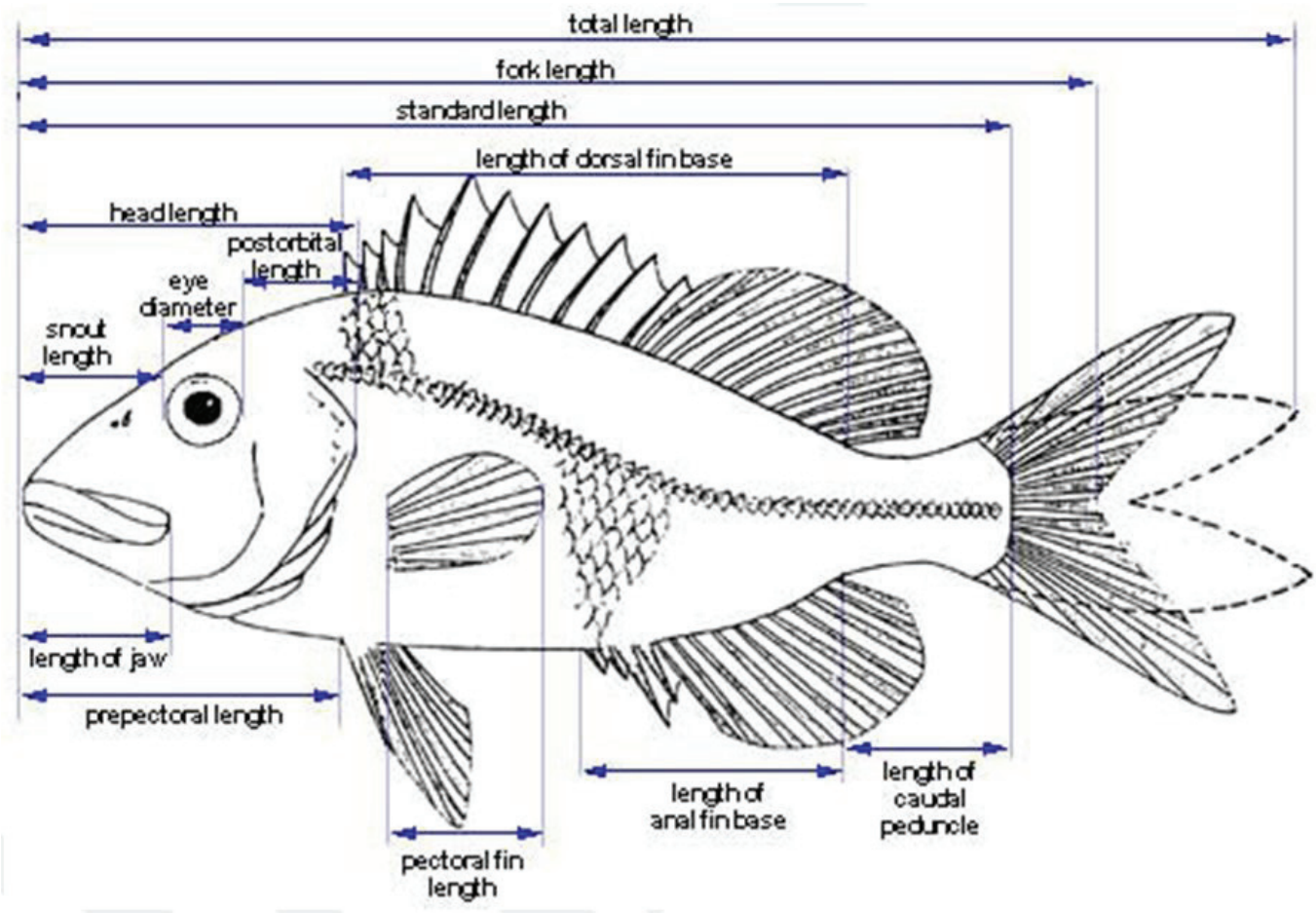
Measuring instruments

Calliper	Used to measure shellfish (lobsters, crabs, prawns, mussels). Three types are mechanical, digital and automatic acquisition calipers. Large mechanical calipers are used for large fish species such as tuna.
Measuring board	Used to measure fish, small sharks and cephalopods. Consists of a ridged board with a ruler graduated in mm, cm or ½ cm. One end has a stop so that fish can easily be positioned at the zero mark. Electronic measuring boards use mechanical electronic touch sensors to record measurements on a digital display and directly onto electronic data systems.
Tape measure	Used to measure curved surfaces, such as turtle curved carapace length or tuna / swordfish curved length.

Reference Measurements

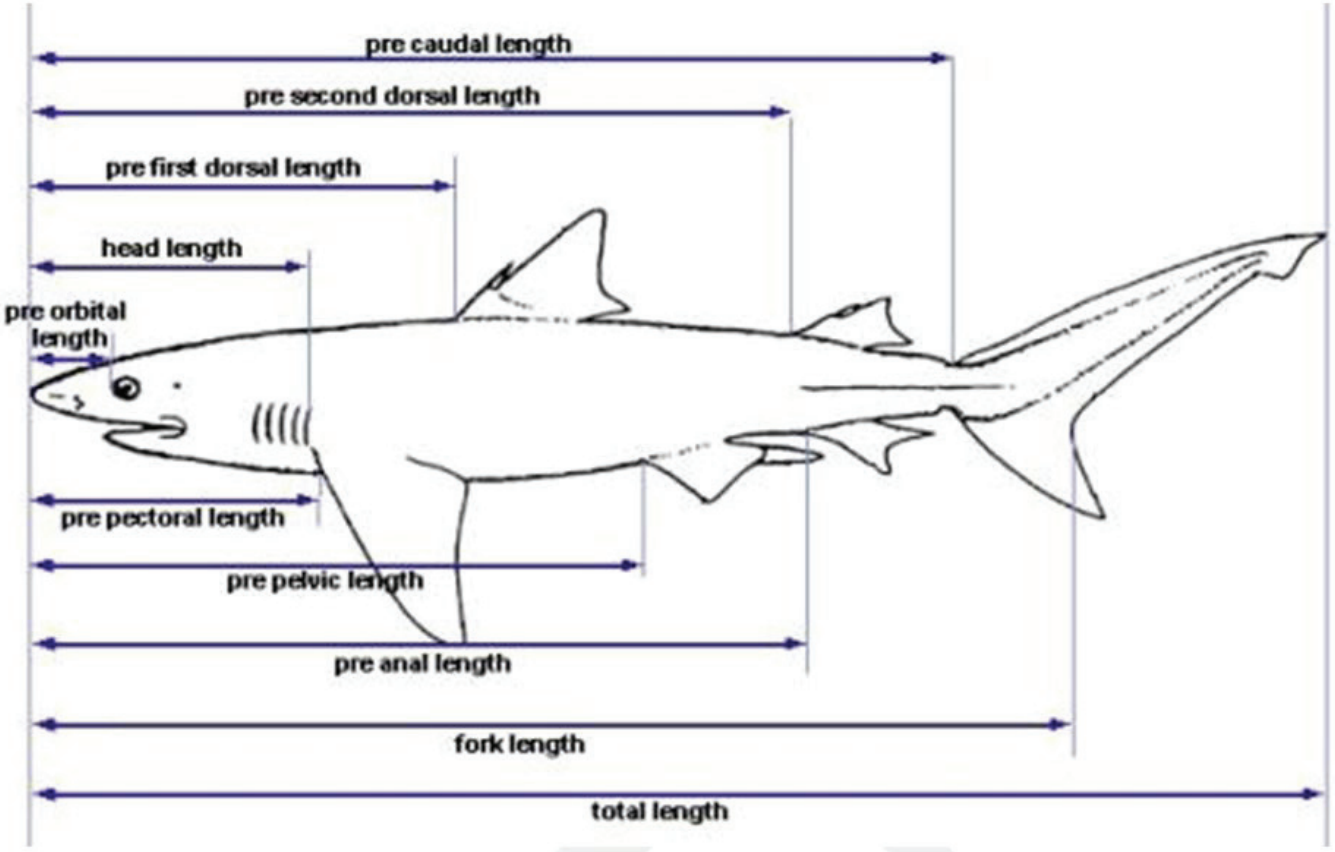
Different reference measurements are used for different faunal groups.

Bony fish	FL = Fork Length (tip of nose to fork in tail) TL = Total Length (tip of nose to extreme end of tail in a straight line) SL = Standard Length (tip of nose to flex in caudal peduncle)



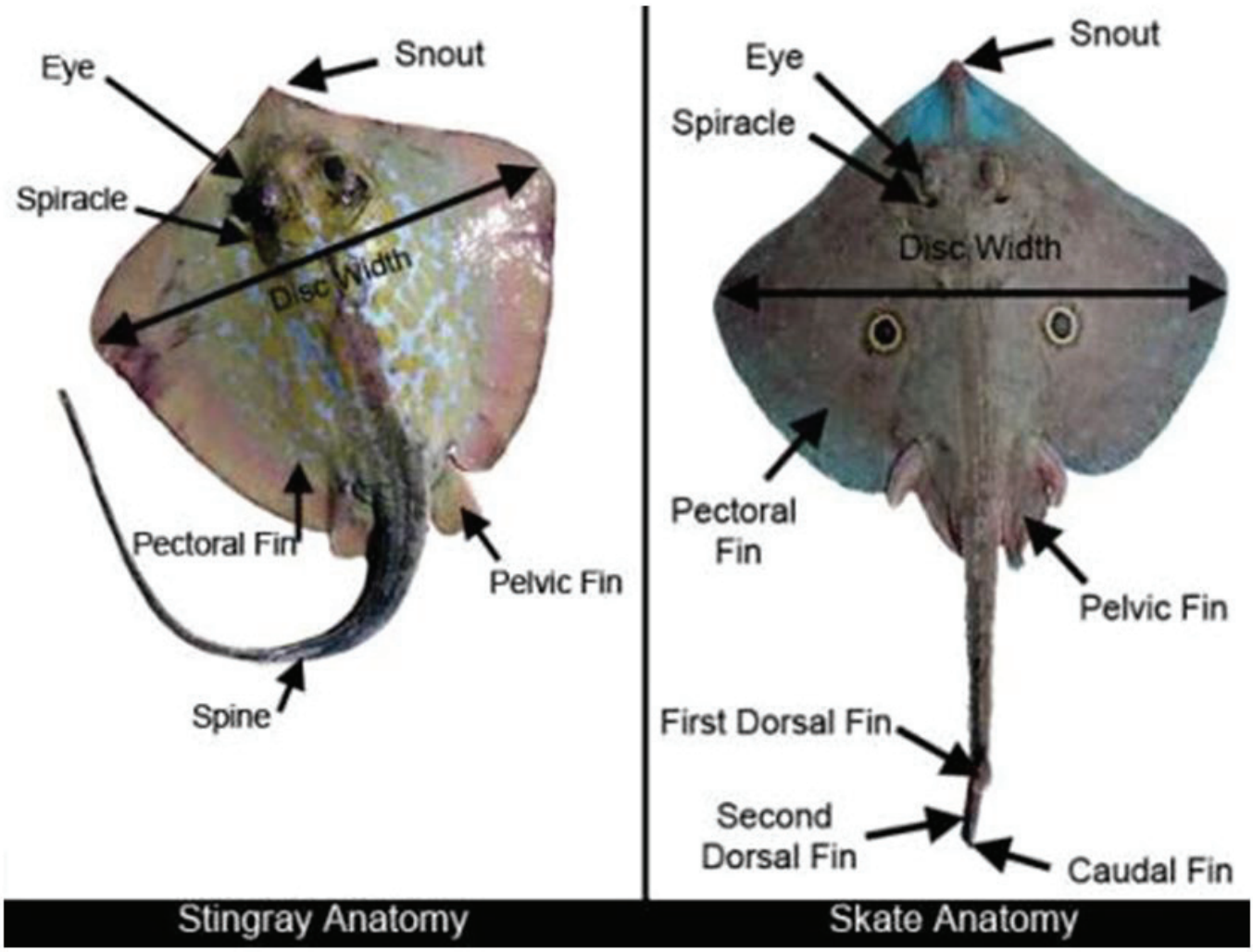
Sharks

FL = Fork Length (tip of nose to fork in tail)
TL = Total Length (tip of nose to extreme end of tail in a straight line)
PCL = Pre-caudal Length (tip of nose to pre-caudal notch in sharks – same as SL)



Rays

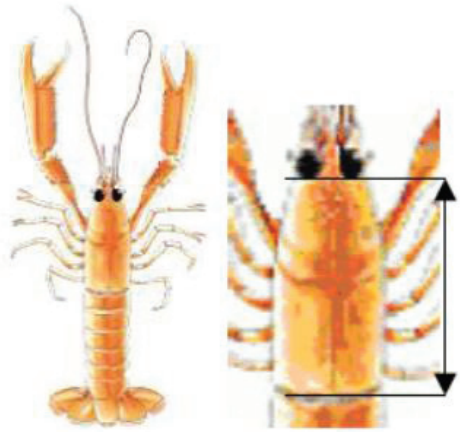
DW = Disk Width (wingspan in skates and rays)

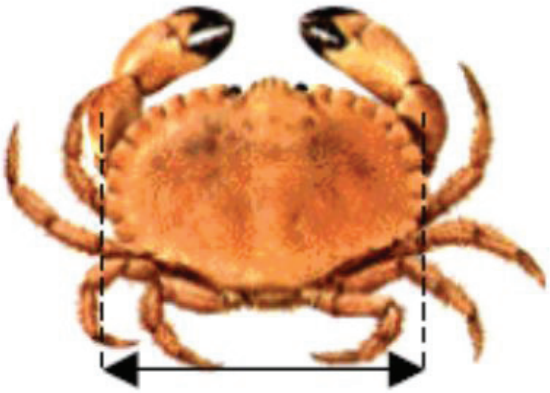


Crustaceans

POCL = Post-Orbital Carapace Length (from the back of the eye-socket to the posterior edge of the carapace in langoustines)

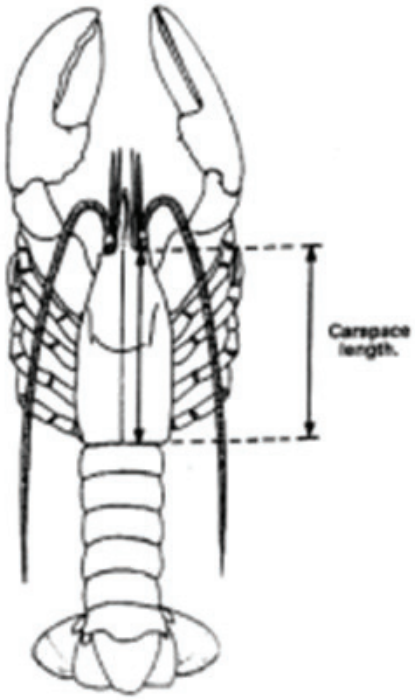
CW = Carapace width (width of the carapace of crabs in the widest part)

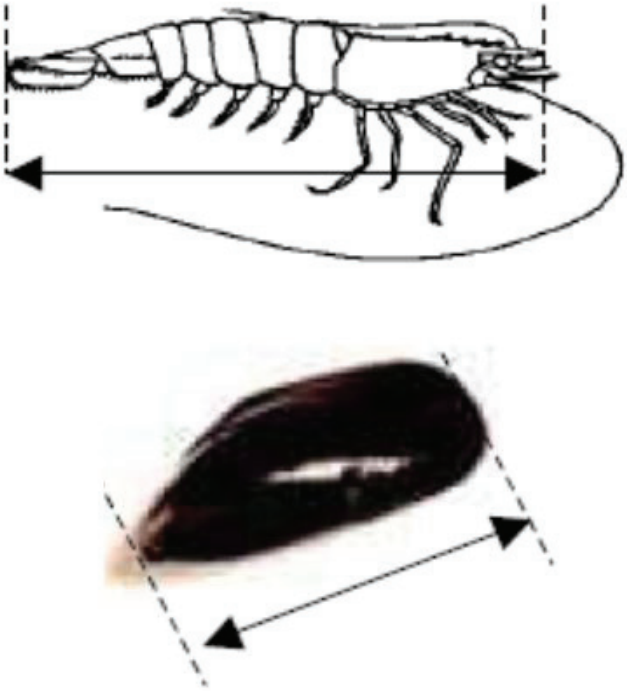




CL = Carapace length (length front to back of carapace for lobsters and some prawn species)

TL = Total length (for small prawn spp and other shellfish such as mussels etc.)





Where both FL and TL are measured, a linear regression between the two lengths can be used to calculate a conversion factor. This is useful where fish are processed at sea. If tails are cut off during processing, a conversion factor from UJL and FL can be used to convert measurements of processed (without tail) fishes to FL.

Units

The unit used (mm, cm) depends on the size of the fish, and the goal is to be precise to 0.5% of the overall length. All measurements to be taken to the lower unit (cm, ½ cm or mm inferior).

Measure to the lower cm : reading 12,9 cm ⇒ note 12 cm
Measure to the lower ½ cm : reading 12,9 cm ⇒ note 12,5 cm
Measure to the lower mm : reading 5,6 mm ⇒ note 5 mm

Collecting Weight Measurements

Fish must be weighed correctly on an accurate scale (check accuracy of your scale using an item of known exact weight). Even so, weighing of fish at sea on small vessels may be difficult. The length/weight relationships are used to estimate biomass in fisheries where only lengths are measured. It is used in growth equations to express growth in terms of mass, and in yield-per recruit and spawning biomass per recruit assessments.

Measuring instruments

Mechanical scales	Used when there is no access to electronic scales or when the surrounding conditions are unfavorable (i.e. excessive motion because of rough seas; wet measuring area). Must be calibrated before use.
Electronic scales	Used in good working conditions, such as a dry lab. Not usually taken to sea. Electronic motion compensated scales are used on specialised research vessels where accurate weights are required for smaller samples or species (i.e. determining GSI or weighing small crustacean species.).

Hand scales	Often used by observers at sea. Water proof and covers a variety of weight ranges and levels of precision (i.e. weight range from 1kg to 10kg and precision from 5g to 250g).

Normally fish are weighed "in the round" i.e. whole or total weight. This can introduce a bias if the stomach is very full or if the gonads are very large. "Gutted weight" is a more standard, less variable measurement.

Reproductive Biology

- **Determination of spawning season/area**

To determine a spawning season/area, the Gonad Somatic Index (GSI) is used. GSI = (gonad mass / total fish mass) * 100

- **Gonad development**

Described using both gross anatomical and histological observations (follow development of the gonad from early juvenile to mature adult and from inactive through the reproductive cycle to the spent condition).

- **Size/age at maturity**

Used in fisheries management to set the minimum size limit (i.e. theoretically allows the fish at least one chance to spawn before being recruited into the fishery).

- **Determination of sex ratio**

Proportion of males to females. Gives information on social structure of population, including spawning aggregations, sexual segregation, and migrations. Important for sex changing fish where the populations may be skewed due to over-fishing.

- **Determination of fecundity (counting the number of eggs)**

Total number of eggs carried by mature females (externally by lobsters, crabs and internally by fishes). Mostly, fecundity increases with size. Difficult to determine in sequential spawners (> 1 batch of eggs).

- **Reproductive behaviour**

Based on observations of fish in natural- or captive environments. Can often be inferred from general life history of a species. Include mating behaviour (group vs pair), spawning (pelagic vs demersal), sex change (social structure), migration (resident vs migratory; determine from tagging studies), etc.

- **Gonad sampling**

To determine the sex of a fish and its stage of sexual maturity. The gonads are located in the ventral part of the fish, are elongate, and often flattened in males but rounded in females. Gonad size and colour varies from male to females and with maturity stage. To collect fish gonads follow the guide below :

1. Ventrally open the fish by making a cut parallel to the spine slightly forward and above the anus;
2. Move stomach and intestines to the side;
3. Locate the gonads located in the peritoneum (membrane that lines the abdominal wall and surface of viscera);
4. Carefully remove the gonads without damaging them;
5. Determine sex and maturity stage.

To determine the sex of sexually mature fishes is relatively easy because ovaries (in females) are generally tubular (presence of lumen) and granular, while testes (in males) are flat, white, and frequently have nodules.

Oocytes of females are sometimes visible to the naked eye. In immature fish, the gonads are filaments and are sometimes very small so that the sex cannot be determined.

To determine maturity stage a scale based on macroscopic criteria is used: it includes gonad size, color, consistency, their vascularization, the presence or absence of oocytes visible to the naked eye in females, and the presence of milt in a cross sectional cut of male gonads.

Age and growth

Observers may be expected to collect otoliths for age and growth studies.

Extracting otoliths:

Open the skull of the fish (use knife or saw) to access cavities containing otoliths. This can be done in several ways:

- Dorsal cross-section - most commonly used, on all types of fish (any species, individual size or cranial morphology).
- Transversal cross-section - performed by separating the body of the fish's head, may be more practical on certain species (i.e. swordfish, tuna).
- Ventral cross-section- through the gills; does not damage the appearance of a fish.
- After cutting, remove the brain and tissue to access the semicircular canals and extract the otoliths using tweezers. Clean the otoliths and store in clearly labelled paper envelopes.

Feeding Biology

Fish may be generalists (feed on a wide range of prey items) or specialists (feed on specific types of organisms). Where requested, the stomach (or other parts of the digestive tract) must be collected and frozen in well-labelled plastic bags. Specific instructions on sampling method and storage to be given by the scientist requesting the samples.

Genetics

Genetic samples to be collected on request. Detailed instructions on which part of the body to sample (fin clip, muscle, or walking leg in lobster), how many samples required per site, and storage methods (90% alcohol or frozen) to be given by the scientist requesting the samples.

Taxonomy and species identification

Observers must often identify species caught – incorrect species identification can lead to many problems not least of which is the incorrect recording of a species that might have catch limits. Further fisheries scientists might need rare bycatch species identified requiring careful keying out using detailed guides.

A hierarchical classification system exists that shows the relationships between all living organisms on earth. All animals belong to the Kingdom Animalia, all bony fishes belong to the Class Osteichthyes. All tunas belong to the Family Scombridae, and a single "type of fish" is then described by its Genus and Species names: i.e. Katsuwonus pelamis.

Kingdom → Phylum → Subphylum → Superclass → Class → Subclass → Super-order → Order → Family → Genus → Species

Observers are advised or prepared with appropriate taxonomic guides – where species cannot be identified photographs should be taken and if possible whole samples retained (frozen). The following data should be

recorded if you find a rare or unidentified species:

- Location and gear (ie. Trawl, longline)
- Date and time
- Depth and habitat (if possible)
- Nearest identification name (i.e. order, family)
- Sex and if a male a picture of the claspers will be useful for maturity staging.
- Measure total or fork length in centimetres or millimetres.

Three photographs should be taken whenever possible: One showing the left side of the fish, another from above (dorsal view) and one from below (ventral view). The photos should be taken first since many species lose their coloration after exposure to air.

DATA FORMS, ONBOARD DATA COLLECTION AND RECORDING

Data Capture

Observers are required to collect a vast amount of information covering many data categories. To facilitate the capture of this data they should be provided with standardized data capture forms (ANNEXURE 1).

All data fields on data forms must be competed accurately, whether a single word or code, or text to record a name or address.

Specific points to note in recording data are that

- when capturing data in an electronic database it is important to distinguish between text and numbers;
- when recording the unit of measurements, note the units the measurement was made in (i.e. units of distance can be in kilometres, or nautical miles);
- all times on data forms must be recorded in GMT, (Greenwich Mean Time). Observers may encounter on some national forms the term UTC (Coordinated Universal Time). Note GMT and UTC, are the same.

The recommended data forms are:

- general trip information form;
- pelagic long-line gear and operations information;
- purse seine fishing set log;
- demersal fish /prawn / shrimp trawling;
- long-line trapping;
- weather observations;
- retained catches;
- discarded and released by-catches
- depredation;
- incidental catches of seabirds, turtles and mammals;
- biological data collection;
- tag recapture details;
- fishing/supply vessel sightings
- Transhipment (Mandatory if no Observer is onboard the transhipment vessel); and
- Waste Management. (Recommended but not mandatory)

OBSERVER LOGISTICAL MANAGEMENT

Reporting Procedures

Observers are required to submit a series of reports at pre-determined times throughout a trip. Observer Report templates are provided in **Annexure 2**. Reporting procedures provide the logistical coordinator of the observer to monitor the progress the observer is making onboard. It also provides the observer the opportunity to ask questions should they be in unsure of any aspect while at sea.

The Captain of the vessel must receive copies of all reports sent from the vessel. Observers should request assistance from the captain to send reports.

Deployment Report

Within 24 hours of sailing, the observer must send a deployment report to the controlling agency (or coordinator), confirming the contact details of the vessel, and that a line of communication exists between observer and coordinator. It must include the outcome of the pre-sea inspection and logistic details.

If a report is not received within 24 hours, the coordinator will contact the vessel operator and request that the vessel be contacted and the observer reminded. If the report is not received within a further 24 hours, the vessel operators will be contacted to make arrangements to establish a communications link or request the immediate return of the observer. Codes can be set up for observers to communicate distress to the coordinator without alerting the Captain of the vessel, for instance, wish your boss "happy birthday" when you know this is not correct. The coordinator will then communicate directly with the observer to resolve the problem is – possibly through a phone call.

Weekly Status Reports

Observers are required to send status reports to the coordinator on specific dates. The report period will be for the preceding 5 to 7 days. The format of the report will summarize fishing operations, catch and sampling undertaken. Similarly to the procedures above, if no weekly report is received by the time the next report is due, the coordinator will start the process to establish contact via the vessel operators.

Preliminary trip summary report

At the conclusion of the trip and before disembarking, the observer must prepare a brief summary report of the trip that includes details of sampling, catch and processing summary, interactions with protected and threatened species, and notable incidences regarding vessel operations, the weather, and performance of the observer tasks onboard. The report is in the same format as the trip report, and a copy must be given to the Captain or Fishing Master. Comments by them can be forwarded to the coordinator within a specific time period. The preliminary report forms the basis for the observer debriefing.

Trip report

Within 15 days of disembarking and debriefing, a comprehensive trip report must be submitted to the coordinator. Observers must keep detailed notebooks throughout their trips and record additional information. This will assist them to add content to their reports at the end of the trip. Include photographs and diagrams where relevant, either in the body of the report or as an Appendix. The report also provides the observer the opportunity to comment on the sampling requirements and make recommendations.

ANNEX 1: Data forms and fields

The following data sheets and sampling forms are illustrated in ANNEX 3:

Form 1	Vessel and Trip Information
Form 2	Demersal trawl gear (for prawns/shrimps and demersal fishes)
Form 3	Drop-line set & haul information
Form 4	Demersal Trawl Log
Form 5	Pelagic Long-line set & haul information
Form 6	Demersal Long-line set & haul information
Form 7	Long-line trapping set and haul information
Form 8	Biological sampling form for Crustaceans (lobsters, prawns, crabs)
Form 9	Biological sampling form for fish

Form 1: Vessel and Trip Information Sheet

Form 1: Vessel and Trip Information Sheet This is a generic form covering deployments of all scientific observer and must be completed once during a trip			
Vessel name:		Observer Name:	
IMO No. (if available) or Reg. No.		Obs N°	
Fishing Sector(code)		Trip N°:	

CODES: DT- Demersal trawl; PS- Purse-seine; LLH- Longline hooks, LLT- Longline traps; DL- Drop line; HL - Hand line

Observer and Deployment Details			
Observer name (full name)		Date / time embarkation	
Observer nationality		Location of embarkation	
Passport number		Date / time disembarkation	
Observer IOTC number (if available)		Location of disembarkation	
Controlling organisation (name address & contact numbers; phone/fax/email)			
Logistics coordinator (name address & contact numbers; phone/fax/email)			

Vessel Details

Identification

Name:	
National Registration N°:	
IMO N° (if available)	
IOTC N° (if available)	
Call Sign	
Flag	

Contact

Vessel phone	
Vessel fax	
Vessel email address	

Licenses

[Country / Date]	[Sp]
Vessel type	

Characteristics

Vessel range (days at sea)	
Main fishing gear used	
Gross tonnage (GRT or GT to be specified)	
Length overall (LOA)	
Hull material (Steel/GRP/Wood)	
Main engines(make)	
Power ()	
Vessel cruising speed (knots)	
Vessel maximal speed (knots)	

Hold and freezing capacity

Hold capacity volume (m^3) / tonnage	
No. fish wells / storage tanks	
Capacity storage tanks	

Fish Storage Methods(√)

Blast Freezing	Salt
Ice(flake / crushed	Brine
Chilled Sea Water (ice)	Refrigerated Sea Water
Other (describe):	

Vessel Electronic Systems

Gear description / model / power			Usage Code
Communication	Radios (frequency range/power)		
	Satellite communication systems		
	VMS (present / absent / security seal in-place)		
	Other systems (describe)		
Navigation	Global Positioning Systems (GPS)		
	Track plotters		
	Radars (model & range)		
	Other systems (describe)		
Fish Detection & Gear Monitoring	Acoustic sonar (frequency & power)		
	Acoustic depth sounder (frequency & power)		
	Fisheries information services		
	Weather facsimile		
	Sea Surface Temperature (SST) facsimile		
	Sea Surface Temperature (SST) gauge		
	Expendable bathythermograph (XBT)		
	Doppler current meter		
	Other systems(describe)		

Gear usage codes

ALL	used all the time	RAR	rarely used
TRA	used only in transit	BRO	broken now but used normally
OIF	used often but only in fishing	NOL	no longer ever used
SIF	used seldom, only in fishing		
Notes			

Vessel Owners and Crew Compliment details

Registered owners		Owners address	
Contact details (phone/fax/email)			
Fishing master (full name)		Fishing master nationality	
Captain (full name)		Captain nationality	
Number of crew (by nationality of passports)			

Form 2: Demersal Trawl Gear (prawn / shrimp and demersal fishes)

Form 2: Demersal Trawl Gear (prawn / shrimp and demersal fishes) Form is to be completed for every trip. Multiple forms can be completed to describe different nets if more are used.						
Vessel name	Vessel type	Flag (country name)	Reg. No.	RFMO No. (if available)	Call Sign	Target Sp. Code
Select trawl type: (√) fish ☐ prawn/shrimp ☐ stern ☐ side ☐ beam ☐ shallow ☐ mid water ☐ deep water ☐						

Out-rigger fitted (Yes / No)		Single / Multiple nets		Total No. of nets that can be deployed	
Trawling position (tick)	Stern	Port side		Starboard side	
		Inside	Outside	Inside	Outside
		1)	2)	3)	4)

Net opening mechanism (doors / beam / frame)			Beam Length (width)		
Doors type (square / oval/ "v" / pelagic)			Stack height (height)		
Door weight (kg)			Beam material		
Footrope Chains (Yes / No)	Length (m)			Wt/m (kg)	

Net specifications			
Net Manufacturer		Net design	
Modified Netdescribe)			
Head rope length(m)		Foot rope length(m)	
Opening width(m)		Opening height(m)	

	Material	Mesh size (mm)	Length(m)
Wings			
Net body			
Codend			
Trial Net specifications			
Head rope length(m)		Foot rope length(m)	
Opening width(m)		Opening height(m)	
Target Species or species groups			
Target species or species groups (Fish; shallow water prawns; deep-water prawns; langoustines; other)			
Depth range targeted (Meters, minimum and maximum depths)			

Describe any other rigging attached to the net (Elephant ears, chock ring, Lazy line, codend chaffing gear, other)
Photo / sketches wherever possible

Describe By-catch Reduction Devices (BRD) (Fish eye, radial escape, square mesh windows)
Photo / sketches wherever possible

Describe Turtle Exclusion Devices (Soft, hard shape, material)
Photo / sketches wherever possible

Form 3: Drop-line set & haul information

Form 3: Drop-line set & haul information			
Vessel name:		Observer Name:	
IMO No. (if available) and / or Reg. No.		Observer N°	
Fishing Sector(code)	DL - Droplines	Trip N°:	

Dropline - Operational gear details					
Hydraulic line-hauler (Yes(type)/No)		No. of dropline rigs that can be deployed		Depth-rating of rigs(m)	
Mainline length			Mainline material spec.		
No. of hooks / rig			Hook type/ size		
Buoy line length			Buoy line material spec.		
Snood length			Snood material		
Radio buoys (make, model, frequency)			Pressure buoys (make, diameter)		
Bait type and quantity (kg)			Storage of catch (ice, frozen, none)		

Dropline Effort				
Setting	Latitude		Longitude	
	Time start set		Depth (m)	
	Hook type/size:		Line length set (m)	
	No. hooks set:		Bait type:	
	Wind:		Sea state	
	Current:		Substrate (reef / sand)	
Hauling	Latitude		Longitude	
	Time start haul		Depth (m)	
	Gear intact: (Yes / No)		No. hooks haul:	
	Wind:		Sea state	
	Current:		No. of fish predated:	
Comments				

Catch Composition – (All catch (including discards) to be measured)					
Species	No. discarded	Wt. discarded	No. retained	Wt. retained	No. biologically sampled

Form 4: Demersal Trawl Log

Form 4: Demersal Trawl Log **To be completed for each trawl together with the catch composition on the reverse side. Note trawls are numbered consecutively from the first trawl of the trip to the last trawl of the trip irrespective of if they are sampled.**			
Vessel name	Observer	Trawl type *	Target Sp. Code

* *Prawn / shrimp / fishes / shallow water / deep water / mid water*

Trawl Number / Trial Nets				
Net Number				
Trawl Sampled (Yes/No)				
Endangered Spp. mitigation (Tori line/ TEDs / BEDs)				

Shooting away	Date Start				
	Time Net Deployed				
	Time Fishing Start				
	Start Latitude (start fish)				
	Start Longitude (start fish)				
	Start Bottom Depth				
Trawl	Trawl Speed (knots)				
	Vertical Opening				
Hauling net	End Bottom Depth				
	Time Fishing End				
	End Latitude (end fish)				
	End Longitude (end fish)				
	Time codend on board				
	Date, net on board				

Wind direction					
Wind force (Beaufort scale)					
PET Catch number					
PET Fate					
Total Catch Weight of Target:spp (kg)					
Total Weight Discarded Spp. (kg)					
Total Catch Weight Retained (kg)					
TOTAL CATCH					

Catch composition sample weights: Randomly selected sample of total catch									
Species ↓	Trawl number →								
		No	Kg	No	Kg	No	Kg	No	Kg
Target species									
Bycatch species									

By Catch Retained Sample								
Species ↓ Trawl number →								
	No	Kg	No	Kg	No	Kg	No	Kg

By Catch Discarded Sample								
Species ↓ Trawl number →								
	No	Kg	No	Kg	No	Kg	No	Kg

Form 4a. Demersal Trawl Environment Impact Forms

Demersal Trawl Environment Impact Forms

This form is to be completed for every trawl together with the catch composition.

Note trawls are numbered consecutively from the first trawl of the trip to the last trawl of the trip irrespective of if they are sampled.

Note unusual event and quantities including seal, sea urchins, birds, jelly fish, etc

Record all large by-catch / rare / exceptional catch (reference list)

Vessel name	Observer	Trawl type *	Target Sp. Code

* *Prawn / shrimp /l fishes / shallow water / deep water / mid water*

Trawl No. / Number Events				
Birds (mortality)				
Seal (mortality)				
Sea urchins				
Jelly fish				
Comments				

Catch Composition Sample weights: Random Sample (cont)									
Species ↓	Trawl number →								
		No	Kg	No	Kg	No	Kg	No	Kg

Additional sheet as needed

By Catch Discarded Sample								
Species ↓ Trawl number →								
	No	Kg	No	Kg	No	Kg	No	Kg

Form 5: Pelagic Long-line Set & Haul Information

Form 5: Pelagic Long-line Set & Haul Information **To be completed for each line set**			
Vessel name:		Observer Name:	
IMO No. (if available) and / or Reg. No.		Observer N°	
Trip N°:			

Setting Information							
Line Number							
	Date (dd/mm/yy)	Time (hh:mm)	Setting speed (knots)	Branchline Spacing time (seconds)	Line- setter speed (m/s)	Position	
						dd/mm/(N/S)	*d d d / m m (E/W)*
Start Setting	/ /	:					
End Setting	/ /	:					

Total line length set (meters / kilometres / nautical miles)		Total number of hooks set	
Number of branch lines between buoys		Average branch line lengths (meters)	
Total number of line buoys set		Distance between line buoys (meters / kilometres / nautical miles)	
Total number of radio buoys set		Distance between dan-buoys (meters / kilometres / nautical miles)	
Total number of dan-buoys set		Distance between dan-buoys (meters / kilometres / nautical miles)	
Main-line weights attached (yes / wt.(g) / no)		Weight spacing (meters)	
Branch-line weights attached (yes / wt.(g) / no)		Distance of weight from hook (meters)	
Steel trace (yes / no)		% of hooks with steel trace	

Bait species	1)	Bait ratios	1)
	2)		2)
	3)		3)
Bait dyed		Dye colour	
Light-sticks attached (yes / no)		Number / Colour of light-sticks	
Tori / Bird scaring streamer line/s' deployed (yes / no)		Number deployed	

Weather & Sea Observations - Setting							
Wind	Dir:	**Swell**	Dir:	**Sea**	Dir:	**Sea Surface Temp**	C°:
	Force:		Height:		Height:		

Line Hauling Information				
	Date (dd/mm/yy)	Time (hh:mm)	Position	
			dd/mm (N/S)	ddd/mm (E/W)
Start Hauling		:		
End Hauling		:		
Haul interrupted (yes / no)			Total interruption time	
Number of hauled hooks observed for by-catch			Number of hooks observed for biological measurements	
Offal management (retained / batch disposal / ad hoc disposal)			Position of offal disposal (port side / starboard / aft)	
Bird scaring device at hauler (yes / no)				

Weather & Sea Observations - Hauling							
Wind	Dir:	**Swell**	Dir:	**Sea**	Dir:	**Sea Surface Temp**	C°:
	Force:		Height:		Height:		

Retained catches			
Species	**Processing Code**	**Number of fish**	**Total wt.**

Discarded / Released Fish & Shark By-catches				
Species	Number DEAD	Number LIVE	Number sampled	Tagged Yes / No

Damaged fish		
Species	**Number**	**Mauled by mammal, shark or squid.**

Pelagic Long-line Set & Haul - Environmental Observations This form is completed for each line set			
Vessel name:		Observer Name:	

Marine Mammal Observations			
Species	Number Marine Mammals per sighting	Observed taking fish (yes / no)	Number taken

Incidental Catches of Seabird, Turtle and Mammals			
Species	Number caught	Release Fate (dead / alive)	Sample retained (yes/no)

Tag Recapture Details							
Species	**Tag colour**	**Tag number and wording**		**Re-capture position (Latitude & Longitude)**		**Biological parameters**	
		1	2	*dd/mm/(N/S)*	*ddd/mm (E/W)*	Length (mm)	Sex

Form 6: Demersal Long-line Set & Haul Information

Form 6: Demersal Long-line Set & Haul Information **This form is completed for each line set**			
Vessel name:		Observer Name:	
IMO No. (if available) and / or Reg. No.		Observer N°	
Trip N°:			

Set Number	Date	Time	Depth	Set Speed	Position (deg min.min)	
	(dd/mm/yy)	(hh:mm)	m\f	Knots	dd^{0}mm'ss(N/S)	ddd^{0}mm'ss(E/W)
Start Setting	/ /	:				
End Setting	/ /	:				

Weather & Sea Observations - Setting							
Wind	Dir:	**Swell**	Dir:	**Sea**	Dir:	**Sea Surface Temp**	C°:
	Force:		Height:		Height:		

Set Gear Details			
Total line length set (meters / kilometres / nautical miles)		Total number of hooks set	
Total number of pots/ cases baskets set		Number of hooks per pot / case	
Number of stones/ weights per set		Average stone / weight (kg)	
Number of pressure floats per set		Diameter of floats (cm)	
Bait species	1)	Bait ratios	1%)
	2)		2%)
	3)		3%)
Tori / Bird scaring streamer line/s' deployed (yes / no)		Number deployed	

Hauling Information					
	Date	Time	Depth	Position (deg min.min)	
	(dd/mm/yy)	*(hh:mm)*	*m\f*	dd^{0}mm'ss(N/S)	ddd^{0}mm'ss(E/W)
Start Hauling	/ /	:			
End Hauling	/ /	:			
Total number of hooks hauled			Number of hooks lost		
Haul interrupted (yes/no)			Total interruption time		
Offal dumped on same side as hauling during(yes/no)					

Weather & Sea Observations - Hauling							
Wind	Dir:	**Swell**	Dir:	**Sea**	Dir:	**Sea Surface Temp**	C°:
	Force:		Height:		Height:		

Retained catches			
Species	Processing Code	Number of fish	Total wt.

Discarded / Released Fish & Shark By-catches				
Species	Number DEAD	Number LIVE	Number sampled	Tagged (yes/no)

Damaged fish		
Species	Number	Mauled by mammal, shark or squid.

Marine Mammal Observations			
Species	Number Marine Mammals per sighting	Observed taking fish (yes / no)	Number taken

Incidental Catches of Seabird, Turtle and Mammals			
Species	Number caught	Release Fate (dead / alive)	Sample retained (yes/no)

Form 7. Long-line trapping set and haul information

Form 7: Long-line trapping set & haul information

(1 sheet per long-line set)

Vessel and gear details				
Vessel name:				Comments:
Line Number:				
Gear-type:				
Date set:		Time set:		
Date hauled:		Time hauled:		
Soaktime of gear:				

Fishing location					
Country:					
Area name:					
Position and depth of line:					
1st anchor: Lat1:		Long1:		Depth1:	
2nd anchor: Lat2:		Long2:		Depth 2:	

Fishing Effort:	
Trap-type:	
Number of traps set :	
Number of traps hauled:	
Number of traps lost:	

Total catches & species composition:						
Estimated Total weight of catch:						
	Species name	Weight (kg)	Caught (number)	Measured (number)	Gen sample Yes/No	Comment
Lobsters:						
1						
2						
3						
4						
5						
6						
Crabs & other crustaceans:						
1						
2						
3						
4						
Cephalopods:						
1						
2						
3						
Others						
1						
2						
3						

Form 8: Biological Sampling form for Crustaceans (lobsters, crabs, prawns)

Form 8: Biological Sampling form for Crustaceans (lobsters, crabs, prawns) To be completed for each long-line hauled			
Vessel name:		Observer Name:	
Date		Long-line or trawl?	
Country / Area		Line/trawl number	

No.	**Species Code**	**Measure type (CL/TL/CW)**	**Length(mm)**	**Sex (M/F/I)**	**Shell hardness(X if soft)**	**Berry stage (1-4)**	**Gonad stage (1-4)**	**Genetic sample No.**
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								

Form 9: Fish Biological Data Form

(Complete for each set/trawl and fishing locality where catch is sampled)

Vessel name:		**Fishery**		**Observer Name:**	
Country / Area		**Date**	**Line /trawl Number**	**Form No**	(_____of_____)

Fish No.	Species	Measure (TL/FL/SL) (Other specify)	Length (mm/cm)	Weight (g/kg)	Sex	Maturity Stage	Otolith reference No.	Genetic reference No.	Remarks
1									
2 3									
4									
5									
6									
7									
8									
9 10									
11									
12									
13									
14 15									
16									
17									
18									
19 20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									

ANNEXURE 2: Observer report templates

Observer Deployment Report *(To be submitted within 24-hours of the vessels departure from port)*		
Date		
Observer		
Vessel Name / Call sign		
Company		
Captain / Fishing Master		
Vessel Contact Details	Number	
	Email	

Deployment Details	
Briefing Date	
Contract "Start Date"	
Flight No.s (Observers must retain their flight boarding passes)	
Departure date from	
Departure time from	
Landing date at destination	
Landing time at destination	
Safety Inspection completed (yes /no)	
Boarding date	
Sailing Date	
Sailing Time	
Port of departure	
Comment	

Observer Weekly Report

Observer Weekly Report	
Vessel Name / Call sign	
Observer	
Date / Report Period	
Location at time of report	

No. sets sampled in period		
Number and / or weight per species retained or discarded (Increase number rows as required)		
Species	Retained	
	Released	
Number and / or weight per species sampled (Increase number rows as required)		
Species	Retained	
	Released	
Streamer Line measured	Yes / No	
Seabird Marine mammal interactions (Give brief details)		
IUU vessels sighted or detected (Give details, date / time / position)		
Lost gear recovered (Give details)		

General Comments (comment on any items considered important for immediate attention)

Observer Trip Report

Guidelines to writing a Trip Report

A "Trip Report" is a comprehensive summary of observations and sampling undertaken during a trip. Tables capture data on specific items such as gear, catch and number of sampled fish. Observers are also expected to comment on the data recorded, particularly information not routinely captured by data forms or tables. Specific items of information reported on during the trip should be highlighted to draw attention to these when the data is analysed.

General style

- Strive for logic and precision and avoid ambiguity
- Keep the writing impersonal; avoid the use of the first person (i.e. I or we).
- Use past tense and be consistent within the report - do not change between past and present tense.
- Note: "data" is plural and "datum" is singular; species is singular and plural
- Divide paragraphs correctly and use starting and ending sentences that indicate the purpose of the paragraph. A report or a section of a report should not be one long paragraph.
- Every sentence must have a subject and a verb
- Italicise all scientific names (genus and species)
- Use the metric system of measurement and abbreviate measurements (i.e. cm and kg)
- Spell out all numbers beginning sentences or less than 10 (i.e. "two explanations of six factors").
- Write numbers as numerals when greater than ten (i.e. 156) or associated with measurements (i.e. 6 mm or 2 g)

Within a report, the exact format is less important than consistency. For example, if you indent paragraphs, be sure to indent them all; use a consistent style of headings throughout (e.g., major headings in bold with initial capitals, minor headings in italics, etc.); write "%" or "percent" but do not mix them, and so on. In other words, establish a template and stick to it.

Trip Summary Report

The summary is a concise and clear summary of the report. Write this section of the report last. The summary should not be longer than a single page and should provide the reader with the most important information from a particular cruise. Follow the headings in your report when writing the trip summary and use the following guidelines:

- Paragraph 1 gives details on the vessel, flag state, name of the observer(s) and nationality, target species, areas fished and period(s) when fishing occurred.
- Paragraph 2 is a short summary of the cruise itinerary (dates and ports of departure and return etc.).
- Paragraph 3 is a short summary of fishing operations – the number of days fished and lost, number of sets/trawls, number of hooks/pots set, fishing depth, bait types used and number of hooks/hauls observed.
- Paragraph 4 summarizes catches (weights and products). Give catch by weight and number of the target species caught. Provide details on by-catch. Mention conversion factors used (observer and vessel).

- Paragraph 5 is a short summary of biological sampling done (length, weight, maturity, otoliths, tagging etc.)
- Paragraph 6 gives details on bird mortalities, entanglements, mitigation measures, marine mammal entanglements and interactions etc.
- Paragraph 7 lists vessel sightings (IUU vessels) and difficulties encountered with observer tasks.

Formats for Observer Reports

Date format

- Use one of the following formats:
  - 10 December 2005
  - 10th of December 2005 (with this format it is important to use of before the month)
  - 10/12/05 (dd/mm/yy) or 10/12/2005 (dd/mm/yyyy)

Do not switch between different date formats in the text of the report (use shorter format in tables)

Species names

- Each species is identified by a combination of "two names": its genus name and species name.
- The first time a species is mentioned in the title and in the text it is written out in full, e.g. Thunnus albacares (in italics; genus name with Capital letter, species name with lowercase) - thereafter, abbreviate as follows: T. albacares (, i.e. the genus has been abbreviated to the first letter and a full stop.
- Always write the species name after the common name when mentioning a fish, bird or mammal for the 1st time, e.g…..''wandering albatross, Diomedea exulans, were observed…''

Formatting of text

- Body text should use the following font: Times New Roman, regular, size 12
- Paragraphs should be aligned to the left and line spacing should be single
- Numbering: Numbers smaller than 10 should be written out in full.
- Latitude: Indicate by (two digits) - 27˚S
- Longitude Indicate by (three digits) - 027˚E
- Record the Major geographic quadrants divided by the Equator (latitude 0°) and the Greenwich meridian (longitude 0°), as follows: 1 = NE, 2 = SE, 3 = SW, 4 = NW.

Full Observer Trip Report – recommended format

Observer name :	
Nationality :	
RFMO Certification No. :	

Vessel name :	
RFMO Registration No. :	
Vessel type :	

Trip started :	
Trip ended :	

Trip summary

A brief outline of the work carried out. It should include a brief summary from each section or highlights points that the observer would like the reader to take special note of.

Operational issues:

Observer tasks:

Observer logbooks/forms :

Scientific Observer and vessel details

Observer name:	Nationality:
Controlling organization:	Contact address:

BOARDING		DISEMBARKATION	
Date (dd/mm/yy)	Time (GMT)	Date (dd/mm/yy)	Time (GMT)
Location		Location	
Comments			

Vessel details

Vessel name	Radio CallSign	FlagState	Port of registration
Vessel type	Main fishing gear	Owner	Charterer
Gross tonnage	Length Over All (m)	Blast freezer capacity (m^3)	Fish Storage capacity (m^3)

ELECTRONIC EQUIPMENT *Record details such as "make, model and power" of the electronic equipment used on the bridge for navigation, communication and general fishing operation. Also note the average "usage code" of the equipment during the trip.*
Onboard acoustic equipment
Position fixing equipment
Vessel Monitoring System PRESENT / ABSENT VMS unit and transmitter equipment type
Radars
Communication equipment
Plotters
Comments Comments on any unique equipment that may have had a significant effect on fishing operations

Cruise Itinerary

Date of departure (dd/mm/yy) / /	Port / Position of departure		
Arrival on fishing ground ((dd/mm/yy) / /	Start fishing (dd/mm/yy) / /	End fishing (dd/mm/yy) / /	Departure of fishing grounds (dd/mm/yy) / /
Date of return (dd/mm/yy) / /	Port / Position of return		
Comments			

Fishing Operations Summary

Total number of days in the fishing area Days	Total number of days fished 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	
Bait used (type / species) 1/ 2/ 3/		Bait ratio 1/ % 2/ % 3/ %	
Comments			

Gear Description : Longline

Longline type(s) used (IOTC gear code)	Line Setter Y / N Make Model	Bait casting machine Y / N Make Model	Line Hauler Y / N Make Model
Mainline Material Length (m) onboard Diameter (mm)	Branch line storage (basket / tub / reel)	No. Hooks per basket / tub / reel	Hooks Type(s) Size(s)
Branch line 1 Material (s) Diameter (mm)	Branch line 2 Material (s) Diameter (mm)	Branch line 3 Material (s) Diameter (mm)	Branch line 4 Material (s) Diameter (mm)
Leader 1 Material Diameter (mm)	Leader 2 Material Diameter (mm)	Leader 3 Material Diameter (mm)	Leader 4 Material Diameter (mm)
Refrigeration method		Fish storage method	
Comments Comment on the set-up and use of the gear. Note differences in branch lines construction.			

Purse-seine

Max. Net length (m)	Max. Net depth (m)	Power Block Make Model	No. of Buoys per type at embarkation At sea
Stretched mesh size (mm)	Supply Vessel(s) Y / N Name(s)	Purse Winch Make Model	Onboard
Comments			

Pole and Line

Maximum No. of operational poles	Total volume of bait tanks (m3)	Automatic poling Y / N
Comments		

Gillnet / Trammel nets

Total No. of Net Panels onboard	Total Length of Net panels (m)	Stretched mesh size(s) (mm)	Hanging ratio
Max. Deployable Net Length / Day (m)	Net Anchored Drifting	Nets set on Surface Sub-surface Bottom	Net drum / hauler Y / N Make Model
Comments Record strategy of setting nets, and whether they actively encircle fish. Note if nets are set on surface or sub-surface and are anchored or drifting.			

Retained Catch Details (all species) per calendar months

Year	Month	Species	Square number (1°x1°)	Processing code	Processed weight (kg)
Comments					

Processing Details

Species	Processing Code	Comments
Comments		

Fish discards

Year	Month	Species	Square number (1°x1°)	Number or Weight (kg)	Reason
Comments					

Summary of meteorological details Briefly describe the predominant weather and sea conditions during the trip. Note specifically adverse conditions that affected the fishing operations.
Summary of fishing strategy Provide a brief description of the fishing methods and strategy. Include a description of the use of FADs and the use of electronic aids to locate or determine areas fished

Summary of incidental catches

Mitigation Measures

	Y / N
Did the vessel operate south of 25°S?	
List of mitigation measures used	1/ 2/ 3/ …

If Tori lines were used:

What was the number of sets on where the Tori lines were deployed?	
What was the percentage of sets on which Tori lines were deployed?	%
Were the Tori lines constructed according to the guidelines recommended by IOTC?	

Comments Comment of the construction, streamer length and material, aerial extent and effectiveness of the tori lines

Seabirds caught

Year	Month	Species	Square number (1°x1°)	Fate	Comments
				Dead: Released alive:	
				Dead: Released alive:	
				Dead: Released alive:	

Marine Mammals caught

Year	Month	Species	Square number (1°x1°)	Fate	Comments
				Dead: Released alive:	
				Dead: Released alive:	
				Dead: Released alive:	

Sea turtles caught

Year	Month	Species	Square number (1°x1°)	Fate	Comments
				Dead: Released alive:	
				Dead: Released alive:	

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?	Y / N

List of predator species observed 1/ 2/ 3/ …

Comments

Tag Recovery information

Tag No.	Species	Length (cm)	Length type	Weight (kg)	Weight type	Position of recovery	Finder details	Comments (eg. Full label on tag, tag type)
						Lat: N / S Long: E		
						Lat: N / S Long: E		
						Lat: N / S Long: E		
						Lat: N / S Long: E		

Summary of biological data collected

Species	Total No. individuals sampled	No measured	No weighted	No. Sexed	Maturity stage recorded	Otoliths collected	Other (specify)	Carcass retained

Biological Sample Storage Location

Sample type	Species	No. collected	Location to be sent/stored

Biological Sub-sampling Methodologies

Description of the sub-sampling methodology used during the trip

Tagging information

Species	Tag type	No. animals tagged	Comments

Lost Fishing Gear

Include information on lost fishing gear, such as length of line lost, amount of net, and other gear such as floats

Vessel Sightings

Was fishing/supply vessels sightings being recorded? Y / N

General Comments

Provide a description and/or comment on fishing activities or incidences that are not routinely captured by the data sheets.

African Union – Inter-African Bureau for Animal Resources
(AU-IBAR)
Kenindia Business Park
Museum Hill, Westlands Road
PO Box 30786
00100 Nairobi
Kenya
Tel: +254 (20) 3674 000
Fax: +254 (20) 3674 341 / 3674 342
Email: ibar.office@au-ibar.org
Website: www.au-ibar.org