Indian Ocean Tuna Commission
Commission des Thons de l'Océan Indien

IOTC
REGIONAL OBSERVER SCHEME

Draft Observer Manual

(Version November 2010)

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List of Abbreviations

BCM	Bait Casting Machine
COPEC	Contrôleurs des Pêches
CPCs	Contracting Parties, Cooperating non-Contracting Parties
CPUE	Catch per Unit Effort
CSW	Chilled Sea Water
DWFN	Distant Water Fishing Nations
EPIRB	Emergency Position Indicating Radio Beacon
EEZ	Exclusive Economic Zone
FAO	Food and Agriculture Organisation of the United Nations
GMDSS	Global Maritime Distress and Safety System
GRT	Gross Registered Tons
GT	Gross Tonnage
HF	High Frequency (radio)
IOTC	Indian Ocean Tuna Commission
IOC	Indian Ocean Commission
IMO	International Maritime Organisation
IUU	Illegal, Unreported and Unregulated (fishing activity)
LME	Large Marine Ecosystem
LOA	Length Overall (of the ship)
LSTLVs	Large Scale Tuna Longline Vessels
MF	Medium Frequency (radio)
MoU	Memorandum of Understanding
OBSPEC	Observateurs des Pêches
RFMO	Regional Fisheries Management Organisation
ROP	Regional Observer Programme
SART	Search and Rescue Transponder
SOLAS	International Convention for the Safety of Life at Sea, 1974
SIOFA	South Indian Ocean Fisheries Agreement
SWIOFC	South West Indian Ocean Fishery Commission
TAAF	Terres Australes et Antarctiques Françaises
UNCLOS	United Nations Convention on Law of the Sea 1982
VHF	Very High Frequency (radio)
VMS	Vessel Monitoring System

I. Introduction

This manual has been prepared for the Indian Ocean Tuna Commission (IOTC) Regional Observer Scheme in terms of its Resolution 10/04. It is intended to compliment existing observer programmes of Contracting Parties and Co-operating Non-contracting Parties (hereinafter CPCs) with the objective being to collect and verify catch data and other scientific data related to the fisheries for tuna and tuna-like species in the IOTC area.

The manual will also constitute an integral part of the training and briefing documentation issued to observers and will be a tool, both for preparing observers and for reference purposes when they are in the field. Notwithstanding this, observers will have to be familiar with both IOTC Resolution 10/04 On a Regional Observer Scheme and the adjoining annexes.

The manual provides reference material along with instructions detailing observer tasks, including observational requirements; sampling protocols; logbook entry protocols; and reporting procedures for observers deployed in the longline, purse seine, pole and line, and artisanal fisheries in the Indian Ocean. This manual should be considered as a living document that will change according to the evolution of the Programme and is intended to incorporate recommendations from the Scientific Committee and observers returning from the field.

II. Development of the Regional Observer Scheme

To meet the need for the conservation and management of marine living resources, the development of modern day observer programmes, is identified in the United Nations Convention on the Law of the Sea of 10 December 1982, Part 5, Articles 61 to 65. 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 (RFMO's), 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 programmes for monitoring, control and surveillance and scientific data collection.

Worldwide, scientific observer programmes are used in fisheries management to provide "independent" baseline information on fisheries. This is particularly important in the case of Regional Fisheries Management Organisations (RFMOs) managing highly migratory species and where member states include distant water fleets, domestic fleets and artisanal fisheries (exploiting territorial waters). 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.

The IOTC-Observer Scheme will be clearly separated between "High-seas" and "Artisanal" programmes. Both sectors have their own specific requirements and particular set of protocols and logistics. The Indian Ocean differs from the other oceans in that artisanal fisheries take as much as industrial fisheries. Artisanal fisheries use gill nets, troll lines and pole-and-line gears to target tuna and tuna-like species. Their importance has increased significantly in recent years and artisanal craft are ranging over progressively larger areas. The artisanal component is the most challenging and will be implemented only once the high seas component has been effectively implemented.

III. Rationale for the IOTC-Regional Observer Scheme

Taking into account the objectives of the agreements above and in terms of its mission as an intergovernmental organization under Article XIV of the FAO constitution, the IOTC is mandated to manage tuna and tuna-like species in the Indian Ocean and adjacent seas. In order to achieve these objectives, the Commission has identified the following functions and responsibilities, in accordance with the principles expressed in the relevant provisions of the United Nations Convention on the Law of the Sea:

- to keep under review the conditions and trends of the stocks;
- to gather, analyse and disseminate scientific information, catch and effort statistics and other data relevant to the conservation and management of the stocks and fisheries based on the stocks covered by the IOTC Agreement;
- to encourage, recommend, and coordinate research and development activities in respect of the stocks and fisheries covered by this Agreement, and such other activities as the Commission may decide appropriate, including activities connected with transfer of technology, training and enhancement, having due regard to the need to ensure the equitable participation of Members of the Commission in the fisheries and the special interests and needs of members in the region that are developing countries;
- to adopt, on the basis of scientific evidence, conservation and management measures to ensure the conservation of the stocks covered by this Agreement and to promote the objective of their optimum utilisation throughout the Area;
- to keep under review the economic and social aspects of the fisheries based on the stocks covered by this Agreement bearing in mind, in particular, the interests of developing coastal states.

The IOTC Regional Observer Scheme was adopted in Resolution 10/04 to meet these obligations and functions.

PART A : IOTC, REGIONAL DYNAMICS, COUNTRIES, FISHERIES & SPECIES

I. Background to IOTC, structure, members and dynamics.

A. IOTC Organisation

The IOTC is an intergovernmental organization that was established under Article XIV of the FAO constitution by the FAO Council in Rome on the 27th March 1993 and came into force on the 27th March 1996. The objective of the Commission is to promote cooperation among its Members with a view to ensuring, through appropriate management, the conservation and optimum utilisation of stocks covered by the IOTC Agreement and encouraging sustainable development of fisheries based on such stocks.

B. Functions and responsibility

In accordance with the principles expressed in the relevant provisions of the United Nations Convention on the Law of the Sea and in order to achieve these objectives, the Commission has the following functions and responsibilities:

- to keep under review the conditions and trends of the stocks and to gather, analyse and disseminate scientific information, catch and effort statistics and other data relevant to the conservation and management of the stocks and to fisheries based on the stocks covered by this Agreement;
- to encourage, recommend, and coordinate research and development activities in respect of the stocks and fisheries covered by this Agreement, and such other activities as the Commission may decide appropriate, including activities connected with transfer of technology, training and enhancement, having due regard to the need to ensure the equitable participation of Members of the Commission in the fisheries and the special interests and needs of Members in the region that are developing countries;
- to adopt, on the basis of scientific evidence, conservation and management measures to ensure the conservation of the stocks covered by this Agreement and to promote the objective of their optimum utilisation throughout the Area;
- to keep under review the economic and social aspects of the fisheries based on the stocks covered by this Agreement bearing in mind, in particular, the interests of developing coastal states.

C. Membership to the IOTC

The Commission is open to any Indian Ocean coastal countries and to countries or regional economic integration organisations which are members of the UN or one of its specialised agencies and are fishing for tunas or tuna-like species in the Indian Ocean. Currently, there are 26 Contracting Parties, (table 1 & 2) and four cooperating non-contracting parties, collectively termed CPCs.

Table 1. IOTC Contracting Parties

	Fisheries Management Authority
Australia	Australian Fisheries Management Authority
Belize	Ministry of Agriculture and Fishery
China	Bureau of Fisheries Management
Comoros	Direction Nationale des Ressources
Eritrea	Ministry of Fisheries
European Union	Community Fisheries Control Agency
France	Ministry of Agriculture and Fisheries
Guinea	Ministre de la Pêche et de l'Aquaculture
India	Ministry of Agriculture
Indonesia	Ministry of Ocean and Fisheries

Iran	Ministry of Agriculture
Japan	Ministry of Agriculture, Forestry and Fisheries
Kenya	Department of Fisheries
Madagascar	Ministry of Agriculture and Fisheries
Malaysia	Federal Department of Fisheries
Mauritius	Ministry of Agro-Industry and Fisheries
Oman	Ministry of Agriculture and Fisheries
Pakistan	Ministry of Food, Agriculture and Livestock
Philippines	Bureau of Fisheries and Aquatic Resources
Seychelles	Seychelles Fisheries Authority
Sri Lanka	Ministry of Fisheries
Sudan	Ministry of Animal Resources
Tanzania	Ministry of Natural Resources and Tourism
Thailand	Department of Fisheries
United Kingdom	Department of Food and Rural Affairs
Vanuatu	Department of Fisheries

Table 2. IOTC non-Contracting Cooperating Parties

	Fisheries Management Authority
Maldives	Ministry of Fisheries and Agriculture
Senegal	Ministry of Agriculture
South Africa	Marine and Coastal Management
Uruguay	Ministry of Livestock, Agriculture and Fisheries

D. Structure of the IOTC (Management powers of the IOTC)

The organisational structure of the IOTC, (figure 1) consist of the Commission, which is the primary decision making body and is supported by a Scientific Committee, Sub-commissions and a number of subsidiary specialist working groups. A permanent Secretariat provides the administrative support for the Commission and its subsidiary bodies.

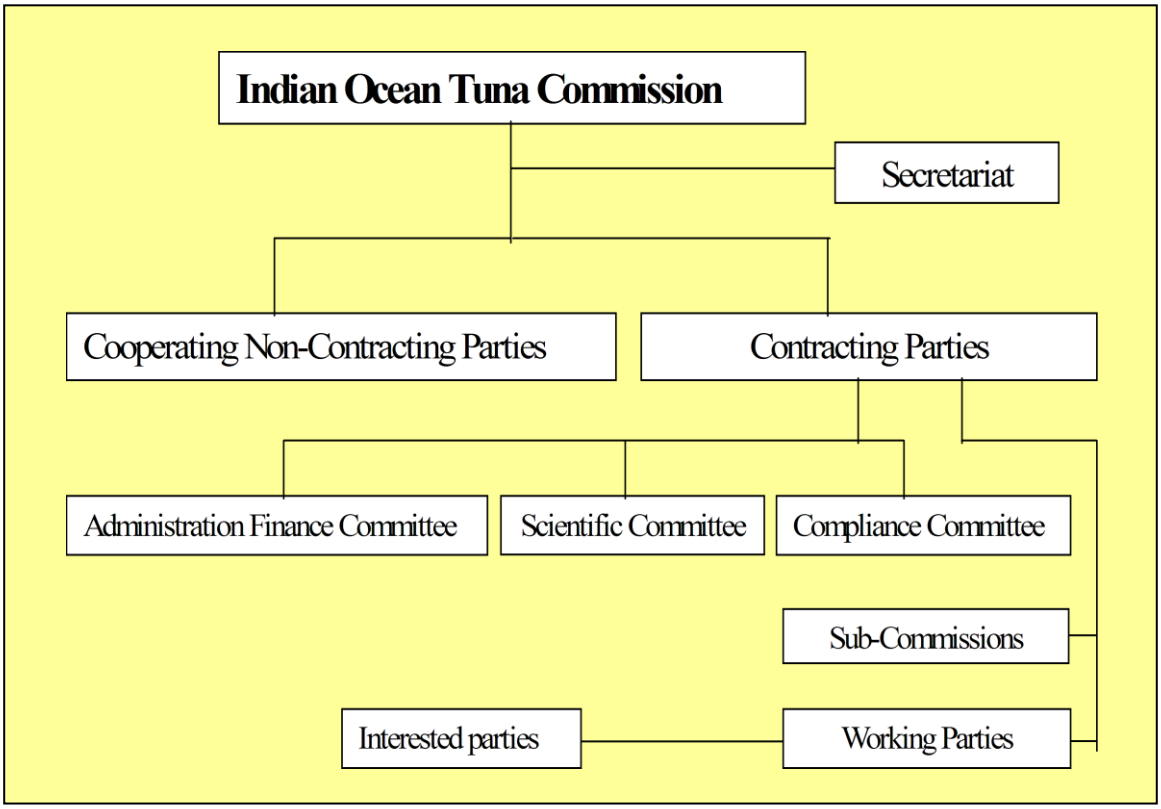

Figure 1. Structure of the Indian Ocean Tuna Commission

II. The Commission

The IOTC Commission heads up the organisation and is the only body authorised to take decisions that are binding on Commission Members. Qualifying parties wishing to accede to the Commission may do so by depositing with the Director-General of FAO an instrument formally accepting to be bound by the conditions of the IOTC Agreement.

Sessions of the Commission are normally held annually. In each Session, delegates of parties that have acceded are eligible to vote on decisions concerning the management of tuna and tuna-like species that are passed as resolutions and are binding on the Members.

Resolutions must be adopted by a majority of the Members present and voting. Individual members objecting to a decision are not bound by it. If objections to a measure are made by more than one-third of the Members of the Commission, the other Members are not bound by that measure; but this does not preclude any or all of them from giving effect to the measures. It is the responsibility of Members to ensure that action is taken under their national legislation to implement conservation and management measures, which become binding on it.

Recommendations accepted by the Commission concerning conservation and management of the stocks for furthering the objectives of this Agreement, need only be adopted by a simple majority of its Members present and voting. These are not binding and are acceded to on a voluntary basis by Members.

The Members of the Commission are also expected to cooperate in the exchange of information regarding any fishing for stocks covered by this Agreement by nationals of any State or entity, which is not a Member of the Commission.

III. Subsidiary bodies to the Commission

A. Scientific Committee

In terms of Article XII.1 of the Agreement, the Scientific Committee was established to act as an advisory body to the Commission. Each member of the Commission has the right to appoint to the Scientific Committee a representative who may if needed, be accompanied by experts and advisers, both with

suitable scientific qualifications. The Scientific Committee carries out its work at annual meetings held before those of the Commission.

The responsibilities of the Scientific Committee are:

- recommend policies and procedures for the collection, processing, analysis, and dissemination of fishery data;
- facilitate the exchange and critical review among scientists of information on research and operation of fisheries of relevance to the Commission;
- develop and coordinate cooperative research programmes involving Members of the Commission in support of fisheries management;
- assess and report to the Commission on the status of stocks of relevance to the Commission and the likely effects of further fishing and of different fishing patterns and intensities;
- formulate and report to the sub-commissions, as appropriate, on recommendations concerning conservation, fisheries management and research, including consensus, majority and minority views;
- consider any matter referred to by the Commission; and
- to carry out other technical activities of relevance to the Commission.

The Chairperson of the Scientific Committee, in consultation with the Secretariat of the Commission, may also convene working parties of scientists for the purpose of stock assessment, preparation of management advice and any other research in support of fisheries management. They shall be constituted of scientists who are directly involved in and/or who may significantly contribute to the proposed work of the working parties. These scientists may also include scientists from non-Members of the Commission that are eligible to become Members and experts in their individual capacity.

The procedures of the Scientific Committee and of its working parties shall be governed *mutatis mutandis* by the Rules of Procedure of the Commission.

B. The Secretariat

The Secretariat consists of the Secretary and such staff appointed by him/her and under his/her supervision. The Secretariat currently has five international staff as well as six local staff who are involved with the administration, database maintenance and support activities. The headquarters of the Secretariat are situated in Victoria, Mahé in the Seychelles.

The Director-General of the FAO appoints the Secretary of the Commission with the approval of the Commission, in accordance with the procedure set out by the Commission at its First Special Session. The Secretary is appointed for a term of three years renewable for two further terms of three years each.

The Secretary is responsible for implementing the policies and activities of the Commission and shall report thereon to the Commission. In the exercise of his functions, the Secretary has direct relations with all Members of the Commission as well as with the FAO Secretariat at all levels.

The duties of the Secretary include:

- drawing up a provisional agenda for each regular session of the Commission
- communication of information received from Members;
- receipt, collection, circulation, drafting and presentation of documents, reports, papers and resolutions for the sessions of the Commission, the sub-commissions, the Scientific Committee and other subsidiary bodies;
- maintaining records of the proceedings;
- facilitating the collection of data necessary to accomplish the objectives of the Commission;
- preparation of budget estimates and administering and reporting to the Commission on the financial and staffing resources of the Commission;
- performance of such other duties as the Commission may assign.

The Members for purposes of information and records shall send copies of all communications concerning the affairs of the Commission to the Secretary.

C. Compliance Committee

The Compliance Committee was established in 2002 by Resolution 02/03. The Committee reports, inter alia, to the Commission on the status of Member compliance with a range of compliance and enforcement related management measures, and provides technical advice on proposals for conservation and management measures.

D. Standing Committee on Administration and Finance

The Standing Committee was established in 2002 by Resolution 02/09. The Committee advises the Commission on administrative and financial matters and examines the operation of the budget and the proposed programme of work and budget for future years.

E. Sub-commissions

The Commission may establish sub-commissions to deal with one or more of the stocks covered by the Agreement. Sub-commissions are open to Members of the Commission, which are coastal States lying on the migratory path of the stocks concerned or are States whose vessels participate in the fisheries of these stocks. These bodies will become necessary when the Commission has determined that management of certain stocks is needed and will provide a forum for consultation and cooperation on matters related to the management of the stocks concerned and in particular:

- to keep under review the stocks concerned and to gather scientific and other relevant information relating to the stocks concerned;
- to assess and analyse the conditions and trends of the stocks concerned;
- to examine management options and recommend to the Commission appropriate management measures;
- to coordinate research and studies of the stocks;
- to report to the Commission on its findings; and
- to consider any matter referred to it by the Commission.

The procedures of the sub-commissions are also governed by the Rules of Procedure of the Commission. A simple majority can adopt recommendations and proposals of the sub-commissions, however preference would be to take the decision by consensus. Each member of the sub-commission will have the right to have its opinion included in reports.

F. Working Parties

The Working Parties are subsidiary bodies established by the Commission for specific purposes. The most common objective is to provide the Scientific Committee with analyses of the situation of the stocks as well as an assessment of possible management actions. Some Working Parties (such as the Working Party on Tagging or the Working Party on Data Collection and Statistics) are established with the purpose of analysing and producing recommendations on a specific technical problem.

Scientists attending in their individual capacity constitute the Working Parties and they do not represent any particular Member or non-Member countries. Their meetings are open to all interested parties with expertise in the relevant issues under the WP consideration.

The Second Session of the Scientific Committee agreed on basic terms of reference to guide the work of those Working Parties that are dedicated to analyse the condition of the resources for one or more species. These are :

- Review new information on the biology and stock structure of species of the relevant species, their fisheries and environmental data.
- Coordinate and promote collaborative research on the species and their fisheries.
- Develop and identify agreed models and procedures for the assessment of stock status of each species.
- Conduct stock assessments for each of each species or stock.

- Provide technical advice on management options, the implications of management measures and other issues.
- Identify research priorities, and specify data and information requirements that are necessary for the Working Party to meet its responsibilities.

The Working Parties established to date include:

- WPTT Working Party on Tropical Tunas
- WPB Working Party on Billfish
- WPNT Working Party on Neritic Tunas
- WPTmT Working Party on Temperate Tunas
- WPT Working Party on Tagging
- WPM Working Party on Methods
- WPEB Working Party on Ecosystems and By-catch
- WPDCS Working Party on Data Collection and Statistics
- WPTDA Working Party on Tagging Data Analysis
- WPFC Working Party on Fishing Capacity

IV. Geography and Political Dimension of the Indian Ocean Region

The area of competence of the Commission is the Indian Ocean, (defined for the purpose of the IOTC Agreement as being FAO statistical areas 51 and 57, figure 2) and adjacent seas, north of the Antarctic Convergence, insofar as it is necessary to cover such seas for the purpose of conserving and managing stocks that migrate into or out of the Indian Ocean.

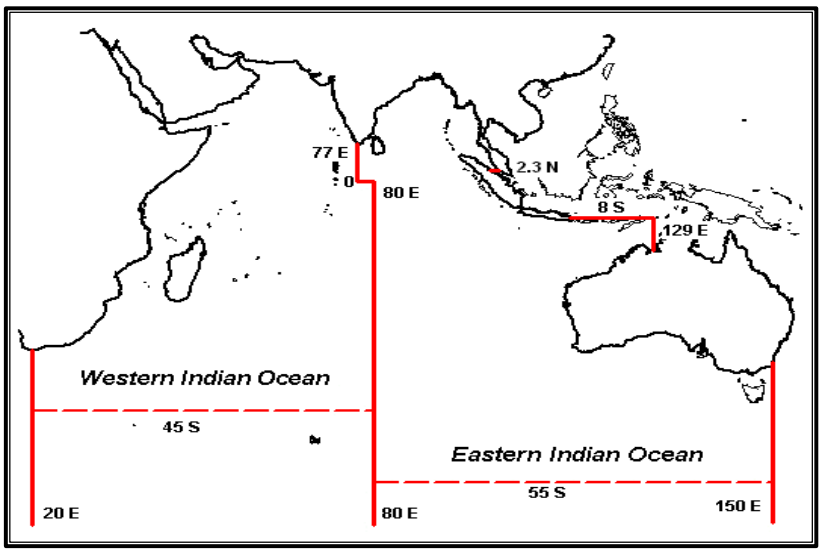

Figure 2. IOTC area of competence.

V. The main species under IOTC management

Sixteen species (table 3), are under the management mandate of IOTC. In addition, the Commission has instructed the Secretariat to collate data on non-target, associated and dependent species affected by tuna fishing operations.

Table 3. Species under IOTC Management

Scientific name	FAO English name	FAO French name
Thunnus albacares	Yellowfin tuna	Albacore
Katsuwonus pelamis	Skipjack	Listao; Bonite à ventre rayé
Thunnus obesus	Bigeye tuna	Patudo; Thon obèse
Thunnus alalunga	Albacore tuna	Germon
Thunnus maccoyii	Southern Bluefin tuna	Thon rouge du sud
Thunnus tonggol	Longtail tuna	Thon mignon
Euthynnus affinis	Kawakawa	Thonine orientale
Auxis thazard	Frigate tuna	Auxide
Auxis rochei	Bullet tuna	Bonitou
Scomberomorus commersoni	Narrow barred Spanish Mackerel	Thazard rayé
Scomberomorus guttatus	Indo-Pacific king mackerel	Thazard ponctué
Makaira mazara	Indo-Pacific Blue Marlin	Makaire bleu de l'Indo Pacifique
Makaira indica	Black Marlin	Makaire noir
Tetrapturus audax	Striped Marlin	Marlin rayé
Istiophorus platypterus	Indo-Pacific Sailfish	Voilier de l'Indo-Pacifique
Xiphias gladius	Swordfish	Espadon

The catch of the sixteen tuna and tuna-like species covered by the IOTC Agreement has repeatedly exceeded 1 million tonnes since 1993. Tunas represent 85% of this total. The Indian Ocean catch has increased from 18 % of the world-wide total ten years ago to 24% at present.

The producer value is estimated, very roughly, at between $2 and $3 billion annually. This does not take account of value-added from support industries and processing or social benefits such as employment and nutrition which are particularly important in artisanal fishery situations.

The Indian Ocean differs from the other oceans in that artisanal fisheries take as much as industrial fisheries. In coastal country catches (except for Maldives, Sri Lanka and Indonesia), neritic species predominate, while the distant water fishing nations (DWFNs) target tropical and temperate oceanic tunas and, to a lesser extent, swordfish.

Artisanal fisheries use gill nets, troll lines and pole-and-line gears to target tuna and tuna-like species. Their importance has increased significantly in recent years and artisanal craft are ranging over progressively larger areas.

Longlining started in 1952 in the western Indian Ocean and, by the mid 1970s, had spread over most of the ocean. This fishery now produces nearly 250,000 tonnes annually. Of the industrialised fishing methods, this gear produces the highest value as large fish are caught, much of which goes to the high priced sashimi market.

Purse seining started in the early 1980s and now produces nearly 360,000 tonnes. Most of the catch is destined to the canned fish market at relatively low prices. Canning, however, is an important activity in a number of Indian Ocean countries including Thailand, Seychelles, Mauritius and Madagascar.

VI. IOTC Fisheries and Operational Characteristics

IOTC fisheries are identified on the basis of geographical, scientific, technical and economic characteristics. These are defined by using the following criteria:

- Type of fishing craft involved and type of fishing gear/s used: fishing crafts are usually classified according to their shape and size; the type of gear used is related in most cases with the type of vessel and its size.
- Gear configuration, fishing mode and target species: fishing gears are usually configured in different ways depending on the type of species targeted.
- Type of operation: these are related with the economic scale of the fishery and can be broadly classified into three categories:
  - Industrial
  - Semi-industrial and
  - Artisinal.

Four main fisheries are described here:

A	Purse-seine fishery
B	Longline
C	Gillnet
D	Pole and Line

A. Purse Seine Fishery

Background and vessel

Tuna purse-seining is an active fishing technique that involves surrounding tuna schools with a net (figure 3), impounding the fish by pursing the net, and drying up the catch by hauling the net so that the fish are crowded in the bunt and can then be brailed out. The period from deployment of the net until the net is recovered onboard, is called a set.

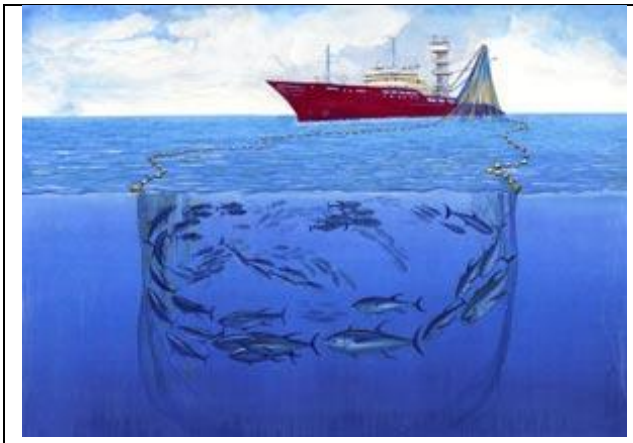

Figure 3. Purse-seine fishing operation (source: FAO)

Figure 4. Industrial purse-seiner in the Indian Ocean (photo: R. Manning)

Purse seining for tuna is a technique used by industrial and semi-industrial fleets throughout the Atlantic, Pacific and Indian Oceans. Smaller semi-industrial purse seiners are often multi-purpose vessels, fishing for sardines and mackerel in one season and for tuna in another. Tuna purse seiners vary considerably in size. Industrial tuna purse seiners (figure 4) are usually large vessels which length ranges between 45 and 85 m, sometimes over (up to 100-110 m), that are highly mobile and can change oceans regions rapidly in response to fishing conditions and market demands.

The primary characteristics of these vessels are that:

- They have the capacity (fuel, water, accommodation, crew, etc.) to reach distant fishing grounds.
- They are facilitated with a large skiff, often with a few speed boats, and sometimes with a helicopter (not in the Indian Ocean).
- They are equipped with a purse winches to purse the lead line after fish are inside net and a power block to haul back and stack the net.
- They have the facility to efficiently freeze fish in brine tanks (or wells) at -20 °C, each with a capacity of 20 to 40 metric tonnes (total 800 to 2 000 metric tonnes).

Industrial tuna purse-seine gear

Purse Seine: A wall of netting, that can measure 1500 to 2000m long and 120 to 250 m in depth, equipped with a floatline along the upper edge, keeping the top of the net on the surface and a chain attached to bottom of the net to weight it down. Steel rings (purse rings) are attached to this chain and a steel cable (purse line) passes through these rings to close (purse) the net from below.

Purse Line: The steel cable passing through the purse rings which, when winched in (purses) the lower portion of the net.

Skiff: Powerful boat of 8m and with an engine of 600CV, used to assist in setting the net around a school of fish.

Hauling Device: A hydraulic power block attached to the end of a boom is used to haul the net back and restack it in the net bin ready for the next set.

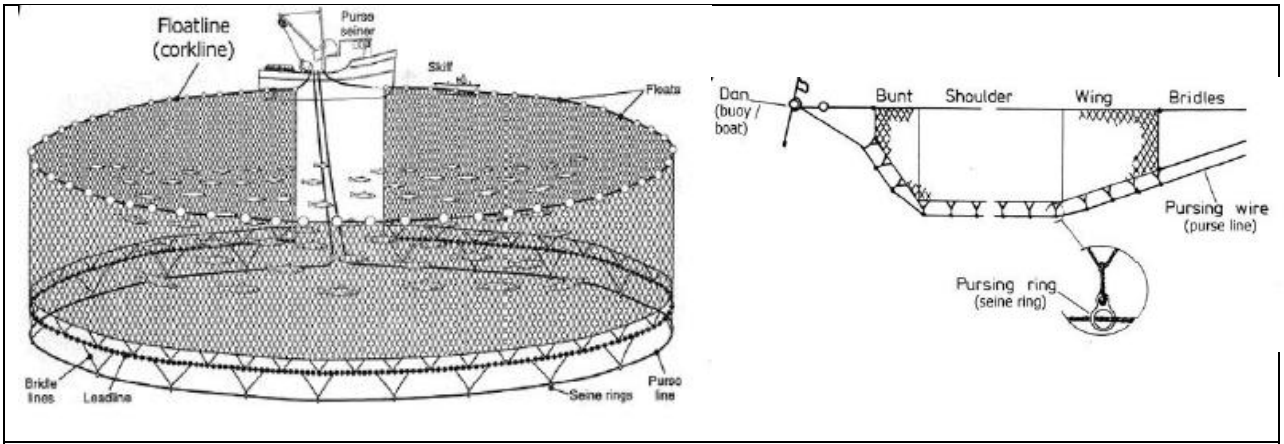

Figure 6. Tuna purse-seine gear components

The IOTC has categorised eight purse seine fisheries each with its own reporting codes. These are summarised in the table 4.

Table 4. Classification of purse-seine fisheries at the IOTC

IOTC Code	Category	Description
PS	Industrial	Tuna purse seine
PSFS	Industrial	Free-school tuna purse seine
PSLS	Industrial	Log-school tuna purse seine
PSPA	Industrial	Purse seine with payao
PSSP	Industrial	Supply vessel industrial purse seiner
PSSS	Semi-industrial	Small purse seines

PSRN	Artisanal	Ringnet
PSRP	Artisanal	Ringnet with payao

Target Species

As the purse seine catches fish above the thermocline, fish tuna and tuna-like fish inhabit in the surface and sub-surface zone (mixing area) are the target of this technique. Tuna purse-seiners target fish at or near the surface up to 300m depth, but setting below 150m is rare, and depths of 60 to 70m are the most common. Fishing grounds range from the high seas to near the coast.

Target species include, in tropical waters, juvenile yellowfin, juvenile bigeye and skipjack, together with some small tuna-like fish such as frigate tunas, bonitos, *etc*. In temperate waters, they catch juvenile and adult bluefin tuna when they are feeding on baitfish or spawning (for the adults). Also in temperate waters, purse seine is occasionally used to harvest albacore, generally during night when fish come to surface for feeding.

By-catch includes a range of other oceanic species, such as marlins, pelagic sharks and other pelagic species of fish. Incidental bycatch can include turtles, whale sharks and even whales or dolphins (most common in the Atlantic and Pacific Oceans).

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Purse Seine Operations

Tuna purse-seine operations are divided into two phases: the search and detection of the fish schools and the fishing event, itself.

Search and Detection

The search and the detection of tuna fish schools by the industrial tuna purse-seiners can be done directly or indirectly. The indirect search for tuna schools is done by evaluating different environmental parameters and factors that influence fish spatial and temporal distribution and abundance. These include:

- Water temperature
- Depth of the thermocline
- Water oxygen content
- Water colour and transparency
- Amount of total suspended matter
- Presence of chlorophyll and macrophyte
- Currents.

These parameters are used by skippers to decide on which place to go fishing in order to maximize their chances of finding schools of tuna.

Direct research and detection of tuna schools include:

- Acoustic sonar and depth sounders can detect shoals of fish in the immediate vicinity of the vessel and are used to assess the school before setting the net.
- Aerial searching for schools of tuna, using helicopters and fixed wing aircraft (not used in the Indian Ocean)
- Searching for seabirds associated with tuna
    - Bird radar - Purse seine vessel also are equipped with and monitor high frequency and long range radars that can detect concentrations of feeding seabirds and in certain conditions can detect the agitation on the sea the surface from feeding fish.
    - Binoculars - Spotters equipped with powerful binoculars (20X) are positioned in the crow's nest to search for indicators of fish in the immediate vicinity of the vessel.
- Searching for schools of dolphins that are associated with tuna (not used in the Indian Ocean).
- Locating or deploying fish aggregation devices, (FADs)

Artificial Fish Aggregating Devices (FAD) and natural logs (LOG) such as floating tree trunks or dead animals are objects around which schools of fish are likely to aggregate. Such floating objects attract different species of fish from small to large pelagic, including tuna.

Today fishing on FADs deployed by the purse seiner or their supply vessel are now favoured over other fishing methods. FADs and LOGs are often attached to radio or satellite buoys. Some have fish detection devices, *i.e.* sonar, attached, which transmit live information back to the fishing vessel

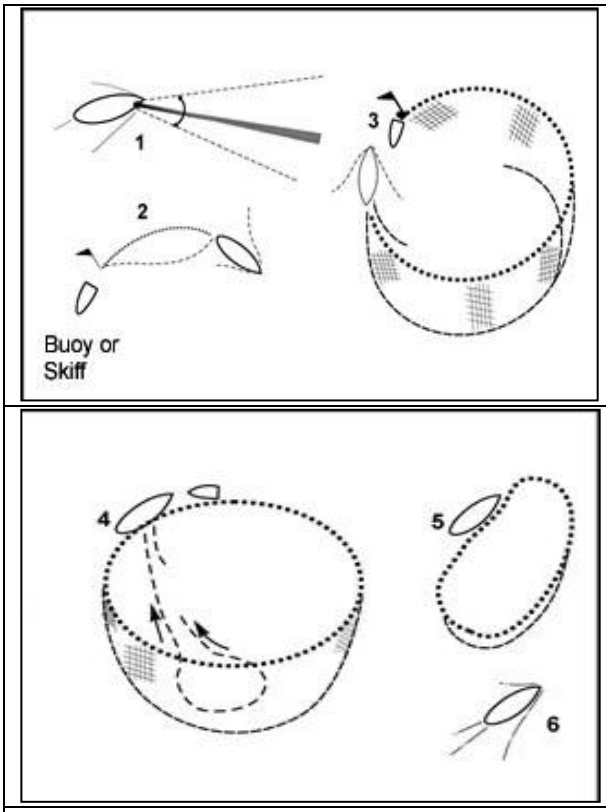
Figure 5. Fish Aggregating Device (FAD) with radio buoy (photo: R. Manning)

Fishing set

The fishing operations by a purse seiner, from the beginning of shooting the net up to the end of the hauling-back on board of the seine (ready for a new shooting), is called a "set" or "event".

Sequence of a set

1. **Detection**: The fishing vessel detects a school of tuna.
2. **Shooting:** Once the presence of a tuna school is confirmed by the sonar, the fishing vessel circles the school in order to present it's port side (most of the tuna purse seiners have deck arrangement for operating from the port side) and it deploys the skiff with the end of the seine attached to its rear.
3. **Circling:** The vessel then encircles the school at maximum speed with the net feeding out astern. Usually, all the purse seine is set and the circle is closed within 4 to 8 minutes.
4. **Pursing:** Once the encirclement is finished, the extremity of the net that stayed attached to the skiff is transferred aboard the purse seiner and the two extremities of the purse line cable are hauled with the winch as quickly as possible in order to close the net at its bottom (this is called "pursing" because it is similar to pulling the draw string of an old-fashioned purse). It is worth observing that, until the purse seine is not closed, the tunas can still dive below the net or the purse seine vessel and escape. The pursing may take for large purse seines around 15 to 20 minutes.
5. **Hauling:** The net is then pulled aboard the purse seiner with a hydraulic power block which is attached to the end of the boom and hanging above the deck. Under the power block, the net is stacked on the stern of the boat by fishermen in such a way that it will come smoothly off the stern at the beginning of the next set. As a whole, this operation will, if there is no incident, take around one hour, depending on the size of the net and catch.
6. **Brailing:** When most of the purse seine has been retrieved, the tunas have been grouped within a restricted area along the portside of the vessel. Then the fish are harvested from the purse seine using a large scoop-net called the "brailer" (brailing operation); several tonnes of fish are taken on board each time. The duration of this operation will obviously depend upon the quantity of fish in the net. The tunas go towards fish-wells through trays and tubes arranged in the deck. In the fish-well fish are in brine which cools the fish without delay and freeze it for long conservation at -18°C or even lower.



1- The presence of a tuna school is confirmed by the sonar.
2- The skiff is deployed with the net.
3- The vessel encircles the school at maximum speed.
4- Once the encirclement is finished, the skiff transfers the net cables to the purse seiner who purses the net at its bottom.
5- The net is hauled and the fish brailed aboard.
6- After brailing the fish aboard and storing the net and the skiff, the vessel is ready to re-start searching / fishing.

Figure 6. Purse-seine setting sequence

B. Pelagic Longline Fishery

Background and vessels

Longlining is a passive fishing technique that makes use of lines with baited hooks to attract and catch fish. Pelagic longline systems are drifting longlines because the gear is not anchored and typically drifts with the ocean currents while fishing.

Pelagic longlines target fish at or near the surface. Target species include tuna, swordfish and some shark species as well as a range of other oceanic species. Shark by-catch, fining or the targeting of sharks is a contentious issue. The depth that hooks are set at will often influence the catch. Some of the larger industrial longliners can set their hooks down to 300 m depth, to target larger mature individual yellowfin-, bigeye- and southern bluefin tuna (termed deep-water or mid-water longlining).

Large Scale Tuna Longline Vessels, (LSTLV') also classified as industrial tuna longliners, are usually large vessels with lengths ranging between 30 and 70 m. The primary characteristics of these vessels are that:

- They have the capacity (fuel, water, accommodation, crew, etc.) to reach distant fishing grounds and can operate on the high seas in extreme conditions, for months at a time without having to return to port.

- They have the facility to efficiently freeze and store high quality fish at low temperatures for the entire time that they are at sea

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The IOTC has categorised nine longline fisheries each with its own reporting code. These are summarised in the table 5.

Table 5. Classification of longline fisheries at the IOTC

IOTC Code	Category	Description
LLTU	Industrial	Tuna longline
LL	Industrial	Drifting longline (over 1800 hooks)
LLFR	Industrial	Drifting longline (up to 1800 hooks)
LLSK	Industrial	Shark longline
LLSW	Industrial	Swordfish longline (Florida longline)
LLEX	Industrial	Drifting longline (exploratory)
LLSI	Semi-industrial	Swordfish longline (semi-industrial)
LLGI	Semi-industrial	Gillnet/longline
LLCO	Artisanal	Small longline

Figure 6. Large Scale Tuna Longline Vessel (LSTLV) (photo: R. Manning)

A drifting longline (pelagic longline) consists of a mainline that is held near the surface or at a certain depth by regularly spaced buoys or float. Branch lines (also known as droppers, snoods or ganglions) with baited hooks are suspended from the main line at regular intervals along its length. The entire line can extend from 20 to over 120km.

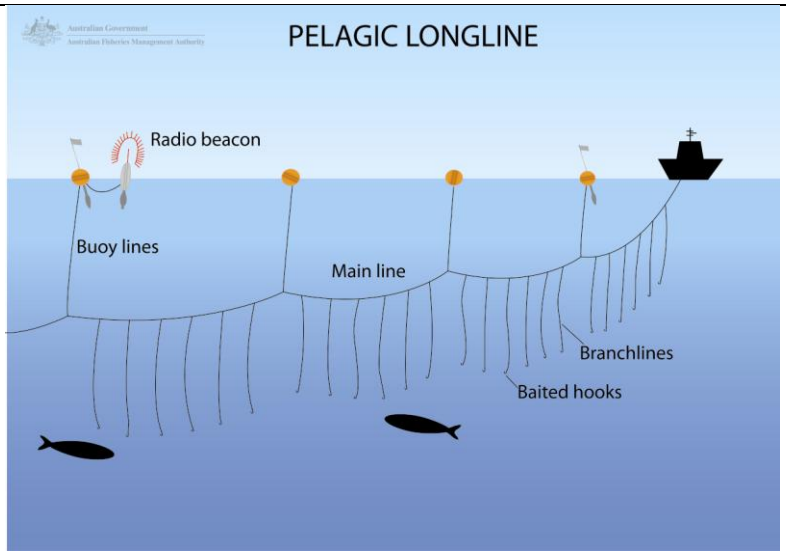


Figure 8. Pleagic longline (source: Autralian Management Authority)

Pelagic longline gear components

Mainline: There are two distinct longline systems, separated by the specifications and storage method of the mainline. The first system uses a multi-strand mainline that can consist of tarred rope or braided nylon monofilament. The mainline is stored in large coils or is layered down in a large bin or storage well. A "line hauler" on the starboard side hauls the line. The second system (sometimes termed "Mono" system) uses a monofilament nylon mainline approximately 6mm in diameter that is stored on a large drum or reel.

Branchlines: A typical branch line can vary between 30 m to 50 m in length and are attached to the mainline with a stainless steel tuna clip. Branch lines can be simple with one type of line material between the snap and the hook or they can be more complex with multiple types of line and swivels attached. Multiple materials usually include an initial section of nylon / polyester braid combinations which is then attached to a length of monofilament leading to a hook. Barrel swivels are used to connect

sections, some of which may be weighed with lead. On LSTLV's branch lines are generally prepared in coils and packed into baskets. On vessels using the mono-system the branch lines are generally of a uniform material and these are layered into large rectangular "tubs." On vessels using shorter longlines the branch lines and buoy lines may be wound up on to large reels one on top of the other.

Hooks: Different shapes and sizes of hooks are used depending on target species. The most common are the Japanese hook with a ring, circle hooks and "J"-hooks

Buoys (*Bullet-buoy, hard-floats, Radio-buoy, light-buoy*)*:* Buoys or floats are attached to the main line by buoy-lines at intervals to keep the mainline near the surface. The length of the buoy-lines can also be varied to influence the fishing depth. These include:

- *Hard floats:* are made from a rigid plastic and can withstand a high pressure should a large fish pull them under.
- *Bullet-buoys:* are made of a soft polyurethane foam material.
- Various "Marker-buoys," *GPS beacons, radio buoys, light buoys* and *radar reflectors* (highflyers) are used individually or in combinations to mark the location of the fishing gear and are attached at fixed intervals along the line. These also assist in locating the end of the line if it is accidentally broken

Lines setter: A line setter / shooter – is situated on the stern and is used to pull mainline from drum or its storage bin. It deploys the mainline at a consistent speed during setting, (m/s). By varying the line setter speed to the vessels setting speed the depth of the hooks can be controlled.

Lines hauler: Mainline hauler – uses hydraulic motor to assist with pulling gear on board. Vessels that use a multi-strand rope or braided nylon monofilament mainline that is stored in layers in a large bin or storage well will use a line hauler. The line hauler is generally positioned on the starboard side

Branch line hauler/coiler: A branch line hauler/coiler – winds branch lines into tight, consistent coils and assist in quickly recovering and packing branch lines for the next set

Bait casting machine: The bait casting machine is used to cast the bait away from the vessel outside of wake zone. It is generally situated on the stern rail on the port side of the line setter

Target Species

Longlines target fish much deeper than surface fishing method, (purse seine and pole and line). They target the larger mature individuals of species such as yellowfin, bigeye and southern bluefin. In some areas, non-tuna species such as swordfish and oilfish are specifically targeted. Shark bycatch, finning or the targeting of sharks is a contentious issue in this fishery.

Figure 7. Monofilament line system.

Figure 8. Type of hooks used on longline vessels.

Figure 9. Radio buoy (source: www.blueoceantackle.com).

Figure 10. poly foam "bullet" buoys, mainly used on monofilament line system.

Figure 11. Rigid plastic buoys, mainly used by asian industrial tuna longline vessels.

Figure 12. Tub of monofilament branch lines.

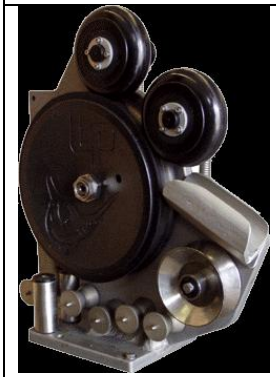
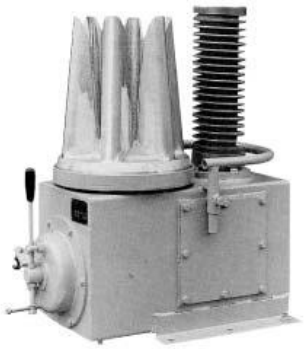


Figure 14. Line setter	Figure 15. Line hauler
	Figure 16. Branchline coiler

Longline operations

Various methods are available to Fishing Masters to determine the position of thermoclines and "fronts" between warm and cool water, where lines should be set. Fisheries information systems can provide vessels with satellite information on sea-surface temperature (SST), phytoplankton densities or sea height. In addition onboard echo sounders and temperature recorders are used to detect fish and determine the positions to set lines. Longliners from some companies may also work together and share information to follow schools of fish.

A longline is typically deployed from the stern of the vessel and the operation is termed "setting or shooting". On a larger industrial longliner a typical set will consist of 200 or more units or "baskets" 4 to 15 branch-lines in a basket setting a total of about 3 000 hooks on a line. Branch lines are stored separately in baskets or tubs and attached to the main line while setting the line. A buoy is then attached at intervals between baskets or a fixed number of branch lines. The make up of the branch lines in each basket can vary with respect to their position to the buoy. A radio buoy is attached after every (approximately) 20 baskets set that divides the line up into sections corresponding to the number of radio buoys set. The rate at which branch lines and buoy lines are attached to the mainline, and therefore the space, is controlled from the wheelhouse by a synchronous series of "beeps." The depth where the hooks are set in the water column is a crucial element, and this can be regulated mainly by modifying the intervals of the main line between float lines, the vessel speed and line setter speed as well as by adjusting the length of float-line and to a lesser extent, by modifying the length of the branch-lines.

Each hook is baited just before leaving the vessel. Common bait species used are horse mackerel, milkfish or squid. The vessel steams at between 9.5 knots and 11.5 knots. The longline is paid out from the aft storage wells on the upper deck through a series of PVC pipes and a hydraulic line feeder, situated on the lower deck amidships, at a rate of about 450 m per minute (27 km per hour). On average between 2 500 and 3 000 hooks are set over a total distance of about 100 km, taking about five or six hours to complete each set. At least five crew members are required for the setting. After the last radio buoy is set the line is left to "soak" for a predetermine time of 3 to 4 hours "soak time" before the start of the hauling operation.

Hauling longlines usually takes at least a full day (11 hours and more) depending on the number of hooks set and the catch rate. The last radio buoy set is usually the first to be hauled on board. It is located with the help of the radio direction finder or by radar, and is hauled on board and detached from the mainline. The mainline is threaded over roller guides and through the hydraulic mainline hauler. A crew member controls the speed of recovery. Line-hauling is conducted at a slower speed than setting, being influenced by the sea state and the rate of fish capture. On average the vessel steams along the mainline at an average speed of about 6 knots, with the line retrieved over the starboard side at a rate of between 150 and 250 m per minute. The mainline coils under its own tension from the hauler onto a conveyor belt which carries it across the deck from starboard to port side. Tangles in the mainline are removed as it moves along on the conveyor belt.

Branch lines are unclipped off the mainline as they come over the side of the vessel or after they go through the line hauler. The snoods are coiled, either by hand or with an automatic coiler, and are tied off around the hook with a loop of the line near the clip, then packed back into baskets ready for setting. These bundles or baskets and the buoys are placed at intervals onto a conveyor belt on the port side of the vessel. This takes them to the crew member who is packing the mainline into the aft wells and they are then stacked at the stern ready for the next set.

Hooked fish are brought alongside, gaffed and hauled aboard by the crew. All large tuna, billfish and sharks are landed using gaffs and harpoons hooks attached to bamboo poles, targeting the mouth or head of the fish to minimise damage to the trunk.

Target species are handled with great care to preserve the high quality demanded by the Japanese markets. The fish are meticulously cleaned to remove any traces of blood or viscera and then weighed prior to freezing. To preserve the quality of the fish, tuna are rapidly frozen in blast freezers (-55°C to -65°C) immediately after processing. After blast freezing they are transferred to the hold storage (-40^{o} C to -50°C). Hold capacity is determined by vessel size but for an average sized industrial LSTLV there is capacity of approximately 200 mt of catch. Longliners will unload their catch in port or at sea to refrigerated carrier vessels.

C. Gillnet Fishery

Gillnets consist of a series of net panels that are suspended in the water column. It is a passive method of fishing that does not use bait or actively trap fish. The fish swim into the net and become entangled. Gillnets can be broadly classified into several categories:

- set nets,
- trammel nets and
- drift nets

A trammel net consists of three layers of net. A slack, small mesh, inner panel of netting is sandwiched between two outer layers of netting, which are taught and have a larger mesh size. The inner panel may be made of twisted or monofilament nylon, whilst the outer panels are generally made of twisted nylon filament.

Both trammel and gill nets entangle fish in three different ways. The fish may become wedged, held by the mesh around the body; gilled, caught by the gills; and tangled, held by teeth, spines or other protrusions without necessarily penetrating the mesh. The mesh size of gillnets can be highly effective at selecting or regulating the size of fish caught. Fish that are smaller than the mesh of the net are able to pass through the net unhindered, while those, which are too large to push their heads through the meshes as far as their gills, are also less likely to be caught. Trammel nets also entangle fish in bags or pockets of netting. This occurs when fish swim through one of the outer panels, hit the inner panel, and are carried through to the other outer panel, which creates a bag or pocket, thereby trapping the fish. Trammel nets are therefore less selective in the size of fish caught.

Gillnets and trammel nets are widely used all over the world, both in inland and in the marine environment, especially with artisanal fisheries. Drift nets were used extensively on the high seas by a number of countries in the 1980's to target tuna. However they were also associated with high numbers of incidental capture of marine mammals and turtles. The use of drift nets longer than 2.5 kilometres on the high seas was banned by the United Nations in 1991. In 1993 the United Nations banned gillnets in international waters but their use is still permitted at the discretion of coastal states within their exclusive economic zone. The IOTC has 757 vessels registered to fish with gillnets. The IOTC categorises three gillnet systems each with its own reporting code (table 6).

Table 6. Classification of gillnet fisheries at the IOTC

IOTC Code	Category	Description
GIDR	Industrial	Driftnet
GIOF	Semi-industrial	Offshore gillnet
GI	Artisanal	Gillnet

Gillnets are generally made up out of a series of panels with a weighted "footrope" attached along the bottom, and a "headline", to which floats are attached. Panels of net are commercially available in "skeins" and a vessel can easily store a large number these on onboard to make up nets while at sea to replace lost or damaged nets. The headline, (float line) is buoyed using solid foam, oval or cylindrical buoys. The footrope is weighed using lead weights or integrated lead core rope. The relation of floats to the weighted footrope will determine if the net will float or sink.

In shallow water, set nets and trammel nets are generally anchored to the seabed and the anchor lines determine the vertical orientation, while drift nets are set on or just below the surface and are not anchored and allowed to drift with the currents (figure 14).

Gillnets are constructed out of both monofilament nylon and multifilament materials. The size of the mesh is determined by stretching the mesh and measuring the distance from knot to knot in either centimetres or millimetres. The spacing between two points where the net is attached to the headline is called the bridge length. The hanging ratio determines the depth and mesh tension on a panel of net. The hanging ratio is effectively the length of the net attached to the headline or footrope divided by the

maximum length of the net. This can be calculated by dividing the bridge length of a single mesh by its stretched length. The size and spacing of floats on the headline and weight on the footrope will also vary depending on where the net is to be positioned in the water column. A number of gillnet panels can be made up into a single net and several nets can be connected into a continuous net. Driftnets used on the high seas can extend up to 60 km.

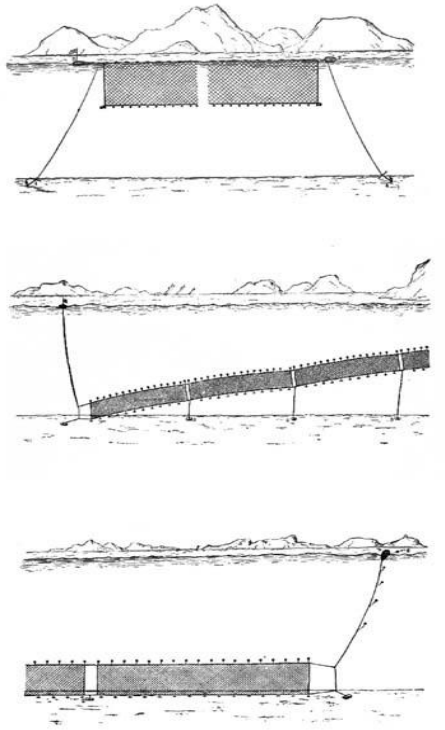


Figure 13. Three variations on the placement and design of gillnet gear (source: NOAA).

On small boats, gillnets are handled by hand while hydraulic net haulers and/or net drums are used on larger vessels to handle and store nets. To determine catch per unit effort in this fishery observers will be required to record a range of data fields that include information on the specifications of the net, the setting strategy as well as vessel parameters.

D. Pole and Line

Tuna swimming near the surface are caught with hand-held fishing poles (figure 15). The ends of the 2 to 3m poles are fitted with a short length of strong fishing line leading to a barbless hook. At the start of fishing water is sprayed outwards from high-pressure nozzles to create the illusion of small baitfish teaming on the surface, and live bait is flung out to entice the tuna to the surface (chumming). Up to 20 powerfully built fishermen stand on the deck of the pole and line vessel (bait boat) or on external platforms, fitted just above the water line. Live bait is attached to the hooks and the lines are swung out. Tuna are pulled from the water and dropped onto the deck.

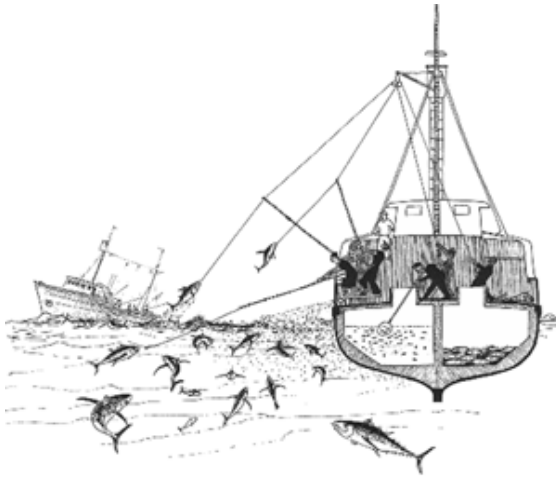


Figure 14. Pole-and-line fishing operation (source: FAO)

The pole and line fishery ranges from artisanal to industrial, and can occur from the coast to the high seas. Pole and line fishing vessels range from 20 to 40m. The bridge and accommodation is located in the front third of the vessel, and the aft gunwale is less than half a metre above the waterline. The fish hold is located under the deck aft, with the catch stored by various means, ice, chilled sea water (CSW) or frozen. The storage method often determins or is dependant on the range of the vessel. Tanks filled with seawater are used for storage of live bait. Powerful pumps circulate the water, and each tank has an underwater light. As tanks are emptied they are cleaned and used as a fish holds.

The IOTC has categorised five pole and line fisheries each with its own reporting code. These are summarised in the table 7.

Table 7. Classification of pole-and-line fisheries at the IOTC

IOTC Code	Category	Description
PLIN	Industrial	Industrial pole and line
PLOF	Semi-industrial	Offshore pole and line
PLME	Artisanal	Pole and line (mechanized boats)
PLNM	Artisanal	Pole and line (non-mechanized boats)
PL	Artisanal	Pole and line

Target Species

The catch is primarily skipjack and small yellowfin, as well as tuna-like species occupying the upper surface. Small bigeye tuna are also targeted at sunrise and sunset. Poling vessels also have the ability to catch larger tuna >40kg.

Pole and Line Operations

Similar to purse seine operations, the daily activity of pole and line vessels is taken up with searching for fish with actual fishing events taking place over a relatively short period of time. However unlike purse seiners, pole and line vessels also spend a significant amount of time catching live bait. The high seas tuna fishing grounds are often far from the bait fishing ground, presenting some unique challenges to this fishing technique. Fishing for bait takes place in sheltered waters, targeting sardines, anchovies and small mackerels. This is often done at night and lights are used to attract certain bait species. Underwater lights are also set at times.

Purse seine nets are normally used to catch the hardier species of bait fish and are deployed by the bait boat, skiffs, or from the beach. Lift nets (boke-ami nets) are used to catch the delicate species of baifish. These nets are deployed from the side of the bait boat. Bait fish are loaded by scoop nets (dry) or by buckets filled with water (wet) into the bait tanks of circulating water.

Methods of searching for tuna are similar to that of purse seiners and entail:

- Acoustic sonar and depth sounders to detect shoals of fish in the immediate vicinity of the vessel and are used to assess the school before setting the net.
- Searching for sea birds associated with tuna.
- Searching for schools of dolphins or other marine mammals
- Locating or deploying fish aggregation devices, FADs or locating floating objects such as floating tree trunks or dead animals around which schools of fish are likely to aggregate.

Once a school is sighted the vessel approaches at full speed. The sonar indicates whether tuna are present, the size of the fish and the density of the school. The echo sounder indicates the depth of the school. Both devices are monitored closely throughout the operation.

As soon as the vessel is positioned over the school, the sprayers are turned on. As the school nears the surface, the order is given to commence chumming. The combination of the spray agitating the surface and chum is used to get the fish into a feeding frenzy. Fishing commences when the tuna are observed near or on the surface starting with live bait (figure 16). Feathered jigs can sometimes replace live bait when a feeding frenzy is induced.

Figure 15. Poling with sprayers on (photo: RTTP-IO/Y. Chocoloff).

Hooked fish are pulled from the water rapidly and many tons can be landed in a short period of time. A single pole fisherman can comfortably land fish up to 15kg in weight. Poles are often paired for heavier fish. Special lines are also strung from the ends of the poles to overhead blocks for more lifting power when large fish are encountered.

When fishing on a FAD, the initial catch normally consists of rainbow runner and dorado. These fish occupy the top layer and have to be landed before the yellowfin and skipjack are caught.

At times fishing may be halted before the school is exhausted, and the boat drifts with the school. Various methods are used to encourage more tuna to aggregate under the bait boat before fishing recommences. These include:

- Fishing for short intensive periods.
- Turning on water sprayers and chumming between fishing sessions.
- Drifting day and night.
- Turning on powerful deck lights at night.

Pole and line boats often collaborate with purse seiners. After filling the fish hold they might seek an agreement from a purse seiner, before providing the location of a school. Bait boats working exclusively for a purse seiner do not land their own catch and are paid by the purse seine fishing company. They drift with a school of associated tuna until it is large enough to be commercially viable. Bait boats also deploy FADs on behalf of purse seiners.

The communication between groups of vessels working together can cover hundreds of miles, with the purse seiners providing valuable meteorological information to the smaller and more vulnerable pole and line vessels.

PART B : OBSERVER BASICS, PROTOCOLS, LOGISTICS, SAMPLING

In terms of the Resolution 10/04 paragraph 2, CPCs will be responsible for either establishing their own observer programmes and use national observers or contract international observers to achieve at least 5% required coverage onboard their flagged vessels.

The Obligations in terms of paragraph 5 require that CPCs shall:

- Have the primary responsibility to obtain qualified observers. Each CPC may choose to use either deployed national or non-national of the flag State of the vessel on which they are deployed;
- Endeavour that the minimum level of coverage is met and that the observed vessels are a representative sample of the gear types active in their fleet;
- Take all necessary measures to ensure that observers are able to carry out their duties in a competent and safe manner;
- Endeavour to ensure that the observers alternate vessels between their assignments. Observers are not to perform duties, other than those described in paragraphs 9 and 10 below;
- Ensure that the vessel on which an observer is placed shall provide suitable food and lodging during the observer's deployment at the same level as the officers, where possible. Vessel masters shall ensure that all necessary co-operation is extended to observers in order for them to carry out their duties safely including providing access, as required, to the retained catch, and catch which is intended to be discarded.

Where a CPC chooses to deploy international observers onboard its vessels, it is recommended that a Memorandum of Understanding (MoU) be established either with the flag state providing the observers or where applicable directly with the controlling organisation providing the observers services. The terms and conditions of the MoU will primarily establish the terms and conditions covering the logistics for the deployment of the observer onboard the CPCs registered vessels and expected minimum safety conditions and pre-sea safety checks and the observers working protocol while onboard.

I. Other Observer Programmes in the region

A number of Regional and sub-Regional Fisheries Management Organisations have programmes or developing programmes within and bordering the IOTC area of competence. Most of these involve species that are not managed by the IOTC or are restricted to specific fisheries. These programmes are expected to contribute to the development of Observer capacity in the Indian Ocean region.

Programmes in region that are currently developed under the framework of two RFMOs:

- The Convention for the Conservation of Southern Bluefin Tuna, (CCSBT). This convention applies only when parties are fishing for southern bluefin tuna (SBT), rather than applying to them fishing within a specified geographic area. The range of these tuna covers areas within the Indian, Atlantic and Pacific Oceans and overlap's areas of competence of the IOTC, CCAMLR and WCPFC
- Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) convention area extends south of the 45ºS latitude in the western Indian Ocean region and south of the 55ºS Latitude in the eastern Indian Ocean Region corresponding with the southern limits of the IOTC area of competence.

Several research projects in the Indian Ocean region have an observer component and should contribute to the Regional Observer Scheme

A. South West Indian Ocean Fisheries Project (SWIOFP)

The South West Indian Ocean Fisheries Project (SWIOFP) includes 9 countries (Comoros, France, Kenya, Madagascar, Mauritius, Mozambique, Seychelles, South Africa and Tanzania) of the South West Indian Ocean, with Somalia being a formal observer. The project covers two Large Marine Ecosystems (LME), the Agulhas and Somalia LMEs. Its main objectives are to fill existing science gaps in research on fisheries in the region, including issues related to capacity building. Four out of six components of the

project (crustaceans, demersal, pelagic and biodiversity) include the deployment of observers, and the project has made provisions for a total of 3,500 observer days. Of these 1,000 days are destined to cover the pelagic fisheries.

Five observers per country will be trained for three weeks under the project and SWIOFP is willing to use forms designed by IOTC as well as the IOTC Reporting Template for the pelagic component. Trained observers are also expected to be used by their respective countries for observer activities outside SWIOFP during the period of the project and after. In particular they can be used within the National Programme of the countries in the framework of the IOTC ROS.

B. Fisheries Regional Monitoring Programme (Plan Régional de Surveillance des Pêches) of the Indian Ocean Commission (IOC)

The Indian Ocean Commission (IOC) is an inter-governmental organization without a management mandate that includes Comoros, France (Réunion Island), Madagascar, Mauritius and Seychelles with an objective to promote sustainable development of the Western Indian Ocean Islands. The Indian Ocean Commission based in Mauritius is implementing a project funded by the Directorate General for Maritime Affairs and Fisheries of the European Union (DG-Mare) that will last until 2011. Within its different activities of monitoring and surveillance, a scientific observer component has been designed which will take place in the five IOC countries and will train three observers per country. Observers shall have a regional accreditation in order to be able to observe on any vessel – national or licensed – in all IOC waters. In addition to the training provided, the project will also assist the countries in the management of their observers. The main goal of this component is to help the IOC countries, all members of the IOTC, to comply with the IOTC Resolution 10/04.

C. Observateurs des Pêches (OBSPEC) and Contrôleur des Pêches (COPEC) programmes from the Terres Australes et Antarctiques Françaises (TAAF)

The TAAF administration is in charge of the scientific and logistical management of the Tropical Indian Ocean scattered islands (i.e. Europa, Tromelin, Juan de Nova, Glorieuses, Bassas de India), the Kerguelen and Crozet archipelagos, the sub-antarctic islands of St. Paul and Amsterdam and the Terre Adélie in the Antarctic. The TAAF is implementing two observer programmes, one in the scattered islands and Mayotte for the tuna and tuna-like species fisheries since 2006 (OBSPEC), and one in the Southern territories for the toothfish fisheries since 1979 (Contrôleur des Pêches – COPEC).

The OBSPEC project is a scientific observer project with the goal of recording scientific data on the catch, bycatch and discards, as well as controlling the activities and compliance in the TAAF waters. Observers are deployed onboard licensed vessels with a coverage of around 40%. Observers undertake a three week training course prior to their deployment.

In addition there are numerous ongoing research programmes in the region with funded Observer programmes. These include:

- South Indian Ocean Fisheries Agreement (SIOFA) – an agreement, (not yet in force) that will cover management of high seas species not covered by IOTC.
- the South West Indian Ocean Fisheries Project (SWIOFP),
- the Tanzanian Marine and Coastal Environment Management Project (MACEMP) and the Kenya Coastal Development Project (KCDP).

II. Data Collection and Submission of Data to the IOTC

To fulfil its objectives in the management of fish stocks, the IOTC requires statistical data to be submitted to the Secretariat both monthly and annually. Such data is to include, for each vessel operating in the IOTC are of competence, details on: the vessels specifications, gear, catch and effort data and biological sampling of the catch.

In addition to these statistical submissions, Resolution 10/04 on a Regional Observer Scheme, was accepted by the Commission to promote each CPC to collect verified catch data and other scientific data related to the fisheries for tuna and tuna-like species in the IOTC area.

The Resolution, paragraph 10 to 12 , specifically outlines the data collection requirements and data submission to the Executive Secretary with due consideration to the confidentiality rules set out in the Resolution 98/02.

The fundamental purpose and value of an observer programme is to provide independent, reliable, verified and accurate information on catch composition, fishing effort and practice on a wide range of vessels operating within the IOTC area of competence. Observers have the potential to best provide the most reliable and specific data on catch composition and the fate of target and non-target species. This information is essential to fisheries managers, research organisations and environmental agencies for stock assessments and the responsible management and conservation of living marine resources.

III. Defining "the Observer"

Scientific (fisheries) observers are independent specialists, deployed onboard commercial fishing vessels in accordance with a mandated regional fisheries observer programme. Within this mandate observers can be used to supply unbiased data and report on technical, regulatory, scientific and economic aspects pertaining to the operational side of the fishing industry.

Scientific observers working on fishing vessels during normal operations are in a position to verify and record accurately, *in situ* data on the location, catch composition and gear configuration of fishing operations, and are usually the only independent data-collection-source for this information. Scientific Observers are not employed in an enforcement role and their overall role is to collect accurate data for the efficient management of the marine resources, which is to the long-term advantage of the fishing industry. However, together with the standard data collection protocols, the presence of the observer onboard inherently allows recording the level of compliance within the fishery.

An individual is only considered an IOTC certified observer when employed by a recognised service provider recognised by the CPC to provide observer services and is acting within the scope of his/her employment. CPCs will provide a list of observers to the IOTC Secretariat and each observer will be allocated an IOTC registration number that must be included on the data forms and report.

IV. Qualifications and prerequisites

Scientific observers working at sea are in a unique position, as they are not affiliated with the vessels personnel and are required to work alone often for long periods, without direct supervision or assistance from their controlling organisation. To be successful in this environment, they required a high level of integrity and personal self-motivation and will need the academic qualifications and training to optimally accomplish the detailed tasks and responsibilities assigned to them.

Minimum health and education standards should apply as prerequisites to prior employment and training of observers. Mandatory certification, to be included in the observers training phase and prior to deployment onboard a vessel will include:

- A "Certificate of Medical Fitness" This form must comply to IMO (STCW-F) standards to ensure that the observer is able to endure normal conditions of life at sea and that their health status will not endanger the health and safety of the other people aboard;
- In-date Certificate for Survival Techniques and Occupational Health and Safety at Sea, ($STCW_{95}$ compliant);
- Evidence of proficiency in literacy and numeric competency in the languages of the national project.

In addition observers be will required to have:

- Sufficient knowledge and experience to identify species and collect information on different fishing gear configurations;
- Satisfactory knowledge of the IOTC conservation and management measures;
- The ability to observe and record accurately data to be collected under the programme;
- The ability to collect biological samples;
- Not be a crew member of the fishing vessel being observed; and
- Not be an employee of a fishing vessel company involved in the observed fishery.

CPCs must ensure that their observers are trained and their certificates of fitness and safety & survival training meet the requirements of foreign vessels on which they may be deployed.

V. Observer Code of Conduct and Protocols

A. Code of Conduct

To receive certification as an Observer they will be required to conform to an internationally recognised code of conduct. This requires that:

- Observers may not participate in any activity which would:
  - Cause a reasonable person to question the impartiality or objectivity with which the Observer Programme is administered;
  - Significantly impair the observer's ability to perform his/her duties.
  - Adversely affect the efficient accomplishment of the Programme's mission.
- Observers may not have direct financial interest in the observed fishery, other than the provision of observer services including, but not limited to, vessels or shore-side facilities involved in the catching or processing of the products of the fishery, companies selling supplies or services to those vessels or shore-side facilities, or companies purchasing raw or processed products from these vessels or shore-side facilities. The interests of a spouse or minor child are considered those of the observer.
- 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 IOTC, 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 IOTC Observer Programme or of the IOTC, including, but not limited to the following:
  - 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 Programme, 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
- Becoming physically or emotionally involved with vessel personnel

B. Observer protocols while onboard

Unless specified, Scientific Observers are not employed in an enforcement role and their overall function is to collect data to assist in the efficient management of the regional resources as specified by the IOTC Scientific Committee and its associated working groups. While onboard the observers will be signed onto the vessels articles but will not be in the employ of the vessels operators or be directly involved with the vessel operations. However the following protocols must be followed by the observer while onboard:

- Observers shall treat as confidential all information with respect to the fishing operations of the vessel on which they are deployed.
- Observers shall comply with requirements established in the laws and regulations of the flag State that exercises jurisdiction over the vessel to which the observer is assigned.
- Observers shall respect the hierarchy and general rules of behaviour, which apply to all vessel personnel, provided such rules, do not interfere with the duties of the observer under this programme.

In particular the observers' protocol requires that;

- In all aspects involving the vessel's operation and safety at sea the Observer will fall under the authority of the Captain.
- Scientific Observers will have no authority to advise or direct any of the vessels operational activities or have any authority over any of the vessels personnel.
- Scientific Observers should have access to all operational areas of the vessel necessary to complete their work including the bridge, navigation and communication equipment. However, the observer should attempt to secure co-operation with the officers to ensure that their work does not interfere with the normal fishing and operational activities.

VI. Observer Deployment Logistics

A. Observers on Standby

Once observers have completed training and are certified competent, they will need to keep coordinators informed of all their contact details. When an observer request is received the observer will be advised and put on "Standby Status".

Given the geographical location of operations and that observers must prepare for a deployment period extending up to four months, in a particularly demanding environment, requests for observers should optimally be receive at least three weeks in advance of the vessel's sailing date. This is considered the minimum period required to arrange travel logistics and for observers to take care of personal matters and suitably prepare themselves. Within this period observers will also be briefed on the data collection protocols and biological requirements for the trip, as well be issued with the necessary forms and equipment to fulfil their tasks. In exceptional cases or where observers have been placed on standby deployment could be arranged within five working days.

B. Request for an Observer

A CPC requesting an observer should as far as possible, advise the observer's controlling organisation at least three weeks in advance of the vessels estimated time of departure. It is accepted that the date and possibly the port of departure may have to be revised. A final confirmation of the vessels port and date and time of departure must be sent within five days of the pending trip. Request for observers should contain the following information:

- Vessel Name

- Vessel type
- Vessel operator
- Port and date of departure
- Port and estimated date of return
- Area of intended operation
- Target species
- Copy of the vessels safety certificate
- Copy of the vessel P&I insurance cover

Within the request period an MoU should be established with the vessel operator. The MoU will stipulate the terms and conditions for the observer's deployment and status onboard in terms of the IOTC Resolution. In addition it will provide a copy of the pre-sea safety checklist and the minimum requirements before embarkation will be permitted, as per Appendix II.

C. Observer Checklists

Given that individuals may be required to travel large distances to meet their vessel and facilities may be limited, it is recommended that Observers be prepared to travel with all essential items required for a trip. A provisional checklist includes:

- Passport
- Cash (reasonable amount to cover taxi, etc.)
- Credit card
- IOTC ID Card & Letter of Introduction
- Copy of the MoU
- Language Phrase Book(s)
- Mobile / Cell Phone
- Programme Manual
- Observer Data Forms
- Laptop Computer
- Electronic database where applicable
- Safety Equipment issue
- Sampling Equipment

D. Recommended Health & Safety equipment issue

- Immersion suit;
- Personal Floatation Device; (A minimum safety requirement for the vessel will be to supply the observer with a SOLAS approved Life Jacket);
- Strobe light;
- Signal mirror;
- Personal Emergency Position Indicating Radio Beacon (406 MHz EPIRB, preferably with integral GPS navigation receiver); and
- Dry bag to store gear and serve as an emergency "grab bag" onboard.

Taking into consideration the working environment onboard fishing vessels the observers operational health and safety gear should include *inter alia*:

- Safety helmet
- Waterproof boots with steel-cap toe and ankle protection
- Waterproof clothing
- Working gloves (sufficient to last a trip)
- Working Personal Floatation Device (This could be the same as issued above)
- Sun protection cream
- Suitable dark glasses

E. Professional Equipment to undertake the tasks allocated to them should include

- Species ID publication (FAO identification guides);
- Data recording forms
- Laptop computer with the database installed to ensure timely and submission of satisfactory data
- Camera
- Measuring board, callipers and tape to record length measurements
- Scales to weigh samples
- Waterproof paper or waterproof slates for on-deck recordings
- Knife and forceps

F. Observers briefing

Prior to being deployed observers will be given a formal briefing. The process will include checking that all items on the check-lists are in place and observers will sign for issued equipment. The objectives of the trip and any special sampling requirements will be discussed in detail. The observer will also be advised on the reporting requirements for the trip. The following documentation should be provided:

- Briefing notes outlining their assignments for the trip
- Travel itinerary and any necessary travel documents to enter the country and access the port where the vessel is docked. These will include *inter alia* contact name and numbers of the vessel agents and owner
- Depending on their contractual arrangements with their controlling organisation, the observer may be required to sign a contract for the deployment period
- Copy of the pre-sea safety check list
- Copy of the MoU with the vessel operators

G. Deployment

Prior to embarking onboard a vessel, the observer will have to undertake a pre-sea safety inspection of the vessel, as per Appendix II. The object of these inspections is to confirm that all the required safety equipment are present onboard. Should the minimum requirements of the checklist not be met the observer may not embark until they have contacted, reported and be given authorization by their controlling organisation. Observers are not considered as qualified safety inspectors and the minimum requirements are items of safety equipment that can be clearly ascertained as present or not.

Once embarked observers will be required to send an "embarkation report" back to their controlling organisation within 24-hours of the vessel leaving port, see Appendix III.

H. Observer Return - De-briefing

At the end of the trip the observer will be required to attend a formal debriefing. This process will include returning the issued equipment and presenting all the data collected for the trip. The observer's coordinator will be expected to run routine checks on the data. The observer will also have to present a preliminary report of their trip and this will be discussed with them.

VII. Observer Reporting

For each deployment an observer will be required to submit a series of reports at pre-determined times throughout the trip, see Appendix III. These include:

- Trip Report
- Deployment Report (within 24-hours of the vessel sailing)

- Five-day status report
- Preliminary trip summary report

A. Trip report

In terms of RESOLUTION 10/04 paragraphs 11-12

11	The observer shall, within 30 days of completion of each trip, provide a report to the CPCs of the vessel. The CPCs shall send within 90 days the report, which is recommended to be provided with 1°x1° format to the Executive Secretary, who shall make the report available to the Scientific Committee upon request. In a case where the vessel is fishing in the EEZ of a coastal state, the report shall equally be submitted to that Coastal State.
12	The confidentiality rules set out in the resolution 98/02 Data confidentiality policy and procedures for fine-scale data shall apply.

Following the observers debriefing and within 15 days of disembarking, observers will must submit a comprehensive trip report to their controlling organization. Within 30 days of the completion of the trip, a copy of the report will be provided to the CPC under who's authority the vessel was operating. The report format is given in Appendix III.

Observers are encouraged to keep detailed notebooks throughout their trips and record additional information that is not routinely captured by the data forms into the comments of the report under the relevant headings. Photographs and diagrams are important and observers are encouraged to include these where relevant, either or both in the body of the report or as an Appendix to the report. The report also provides the observer the opportunity to comment on the sampling requirements and make recommendations.

B. Deployment Report

Within 24 hours of the vessel sailing the observer must send a deployment report to their controlling organisation. The content will include confirmation of the contact details of the vessel and serves to set up and confirm that a line of communication exists between the observer and their controlling organisation. The outcome of the pre-sea inspection is given as well as details of their flight and logistics prior to boarding.

If a report is not received within 24 hours of the due time frame, the observer coordinator will contact the vessel operator to send a message to the vessel to remind the observer of their obligation in this respect. If a report is not received within a further 24-hours it will be assumed that there is no means of formal communication with the vessel and the vessel operators will be contacted to make arrangements either to establish these or request the immediate return of the observer. Taking into consideration that a breakdown in communication may also indicate an emergency situation with the vessel, emergency search and rescue operations may be initiated.

C. Five-day Status Reports

Throughout their deployment observers will be required to send status reports to their controlling agency on specific dates. The monthly schedule for these will be the 1st , 6th , 11th , 16th , 21st and 26th days of the month. The report period will be for the preceding five day. The format of the report will be designed to obtain a summary of fishing operations, catch and sampling undertaken within the period. Following a similar procedure to the deployment report, should a report not be received by the time the next report is due the observer coordinator will start the process to establish contact via the vessels operators. If in a situation where reports have been regularly received it may be deemed that there is a problem with the observer's well-being and appropriate action may be necessary.

D. Preliminary trip summary report

At the conclusion of the trip and prior to disembarking, a observer must prepare a brief summary report of the trip. The report should include details of sampling, catch and processing summary, interactions with protected and threatened species and any notable incidences with respect to the vessels operations, weather or the observers work onboard. The report should be in the same format as the trip report. The observer will be expected to provide a copy to the vessel Captain or Fishing Master and they will be advised to forward any comments directly to the observers controlling agency within a specific time period (to be defined by the controlling agency). The preliminary report will also form the basis for the observer debriefing.

VIII. Onboard Work Schedule

The primary objectives and work schedule of observers will vary according to the fishery being observed and the data priorities determined by the Scientific Committee. In terms of Resolution 10/04 Paragraph 10, observers at sea will be required to:

- Record and report fishing activities, verify positions of the vessel;
- Observe and estimate catches as far as possible with a view to identifying catch composition and monitoring discards, by-catches and size frequency;
- Record the gear type, mesh size and attachments employed by the master;
- Collect information to enable cross-checking of logbooks entries, (species composition and quantities, live and processed weight and location); and
- Carry out such scientific work (for example, collecting samples), as requested by the Scientific Committee.

IX. Sampling Strategies

A. Onboard Data Capture and Sampling Procedures

During an assignment observers are required to collect a vast amount of information covering a broad spectrum of data categories that include: trip logistics, vessel data and fishing activities and catch. In addition to this is specific biological sampling of key species and recording the impact of the fishing activities on other marine fauna. To capture and record this information accurately, observers are required to complete a series of data forms and may also be required to capture the data onto electronic databases. Data forms are designed so that each field captures a specific item of data. Where data are either not available or not relevant then the observer is required to state this.

The basic information covering vessel specifications is similar for most vessels and fisheries and is normally trip-specific. Catch and effort data on the other hand, will be more specific to the different fisheries, target species and fishing gear and methods used, for example Purse-seiners, Long-liners or Pole fishing boats. Procedures for biological sampling may cover several fisheries but sampling strategies are often determined by the operational nature of the fishery and specific data collection requirements. Data collection protocols can be separated into several categories and these can be adapted to the vessel and specific fishery being monitored. These data categories include:

- Generic Data
- Specific Fisheries Vessel & Gear
- Biological Data Collection
- Environmental Monitoring

Generic data encompasses all vessel types and fisheries; including artisanal fisheries. These data are generally trip specific and headings in this category will include:

- Observer and Deployment Details
- Vessel Owners and Compliment

- Vessel Details
- Vessel Electronics
- Trip Information
- Catch Information

Fisheries specific data will cover vessel and gear parameters pertaining to the fishery and include catch and effort information which will be collected continuously during the trip for each fishing event. Data headings in this category will include:

- Operational vessel and gear details
- Catch per unit fishing effort
- Catch processing and storage
- By-catch and environmental mitigation measures
- Tagging and tag returns

To facilitate the data capture process, observers must use FAO and IOTC data codes when completing the data forms. The FAO and IOTC codes will in most cases correspond, however where no applicable FAO codes currently exist, the IOTC has defined their own codes. Where a code does not adequately describe the information to be captured in a data field the observers should rather record in full the detailed information.

IOTC and FAO 3-alpha codes should be used to identify catch and discarded species. If a species cannot be positively identified or a FAO or IOTC code is not available, the observer should record it either by its species name or the common name. If the observer cannot identify the species it must be recorded as unknown "UNK" and given a reference number. The same reference number should be used throughout the trip for that species. Where possible the observer should retain a sample and / or take a photograph of the unidentified organism. The observer trip report must provide a list of the "UNK" reference numbers together with a description and accompanying photographs for each of the unidentified organisms.

The IOTC has also developed codes to cover aggregations of a number of species when a breakdown of catches cannot be defined to the species level.

Biological sampling is generic to most fisheries. It includes recording the species composition of the catch and the length, weight, sex and maturity of the main species caught. Catches are also monitored for the recapture of tagged fish.

Depending on the catch method, there are two sampling strategies that can be employed for tuna and tuna like species:

1 Stratified sampling
2 Sampling a representative proportion of the catch

Stratified Sampling

Stratified sampling is possible where fish populations are clearly stratified by time or season, the areas fished and the gear used, but at the same time the individual catches are restricted to only a few species of fish that are relatively homogenous in size. This is typical to the surface fisheries, which includes purse-seining and poling. The actual sample size can be reduced to a relatively small proportion of each catch, for example 1 fish per 1000 or 1 fish per estimated ton caught. However, the sampling programme must be spread out to cover as evenly as possible all the areas and seasons fished. Such a sampling strategy could be employed to monitor the shoals of yellowfin and bigeye tuna caught by the purse-seine vessels as they migrate across the Indian Ocean basin into the Western Indian Ocean region.

Proportional Sampling

In a multi-species fishery the total catches are often known via the submission of vessel log books but the actual breakdown of the catch is not always recorded correctly often due to the difficulty of identifying the species or where the species difference is not important to the industry. In these situations proportional sampling of the catch onboard the vessel by observers can be used to determine the actual

species composition and size categories of fish caught, which will also include the discard component not normally recorded by the vessels reported catches and landings. At the same time the size frequency of the different species can be measured. Accuracy in this sampling method is increased by the sample size and the greater the variability the greater the sample size required.

Several methods can be used in proportional sampling to determine both the species composition and get representative length frequency data.

B. Separate sampling for size and species

A fixed number of fish of each species is measured to obtain the size frequency for that species. A separate random sample is then taken (either by weight or number of fish) to determine the species composition of the catch. The advantage of this method is that a minor component of the catch will be accurately sampled for its size composition. A disadvantage is that the main species may be under sampled.

C. Mixed species sampling

A random sample of the catch is taken in the form of a percentage of the total weight or number of fish caught. The sample is then sorted into its species component and the size frequency of each component measured. The advantage with this strategy is that the main species will be well sampled while a disadvantage is that the minor species component of the catch may be under sampled.

D. Pre-sorted catch

This sampling strategy may have to be followed where an observer does not have access or is unable to take a statistical random, unsorted sample and the catch is sorted into its species and / or a size component prior to it being sampled. This may occur on a purse seine vessel where fish are sorted directly into brine tanks. In this instance it is important to be able to obtain the total catch figures from the vessel to calculate the actual species component. The species component and length frequency of the catch can be recorded by sampling a fixed ratio of the different sorted components. The same as for stratified sampling, for example 1 fish per ton or 1 fish out of every 1000 fish.

E. Selecting and working samples

Sampling strategies and methods of selecting samples onboard a vessel are determined by the operational nature of the fishery and specific data collection requirements. These will differ between surface fisheries where large quantities of fish are caught and processed in a relatively short time, within a few hours and a longline fishery where catches can be spread out over many hours during a day.

The nature of the longline fishing operations results in fish being targeted at greater depths and spread out over a large geographical range. Larger adult fish from small shoals are targeted and catches show a greater variance in size and possible species composition. However, a slower catch rate often makes it possible for a high percentage of the catch to be sampled. Should the catch rate increase it is most likely that the species composition will become more uniform and a small proportion of the fish will then be measured. The overall proportion of the catch measured should still be high, 80% to 100%.

Surface fisheries like purse-seiners and poling boats tend to target and catch smaller schooling fish in greater numbers in a short time period and within a fixed location at a time. The catch is often more uniform in size and species composition. In these situations only smaller sub-samples of the catch can practically be measured. Considering these factors the following sampling strategies can be employed on surface fishing vessels.

For stratified sampling with a single species from a single school, each sample should consist of at least 50 fish for large fish (15 kg +) and at least 100 units for smaller fish. If a clear mode does not appear for length frequencies after the sample is finished an additional sample should be taken if time allows.

When mixed species are caught and fish from different schools are possibly included in the catch, then the sample size should be increased to at least 100 fish for larger fish (15kg+) and up to 200 units for smaller 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. The reason for this is that fish of different sizes and different species tend to separate within the net. A single sample from the top or bottom of the net could then be biased towards either larger or smaller fish or one species.

F. Sampling Equipment

The only specialised sampling equipment required for tuna sampling are to measure length. A good sharp knife can be used for most dissections, however on most tuna vessels especially long-liners only the crew are allowed to handle and processes the fish. Specialised core-drills may be used if otoliths have to be collected.

Length measurement equipment required for tuna vessels

Lengths can be taken using a large callipers (1.5 m) made out of hard wood, brass, aluminium or plastic. These give the most accurate measurement and are good for measuring small and medium size tuna. Small fish can also be measured on a measuring board. The most versatile means of measuring large tuna and the larger billfish is a flexible tape.

G. Measurements to be taken

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 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.

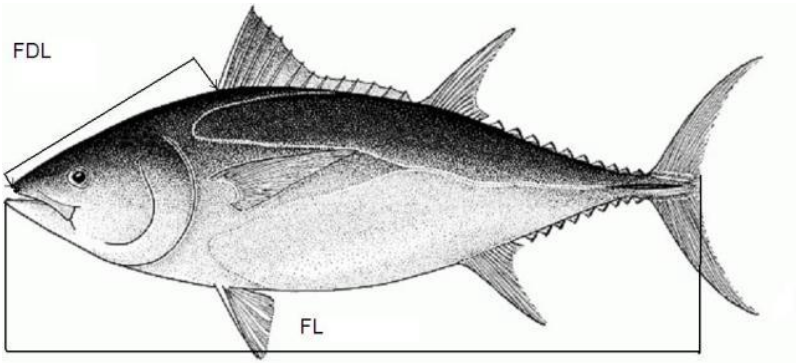


Figure 16. Tuna Length Measurements.

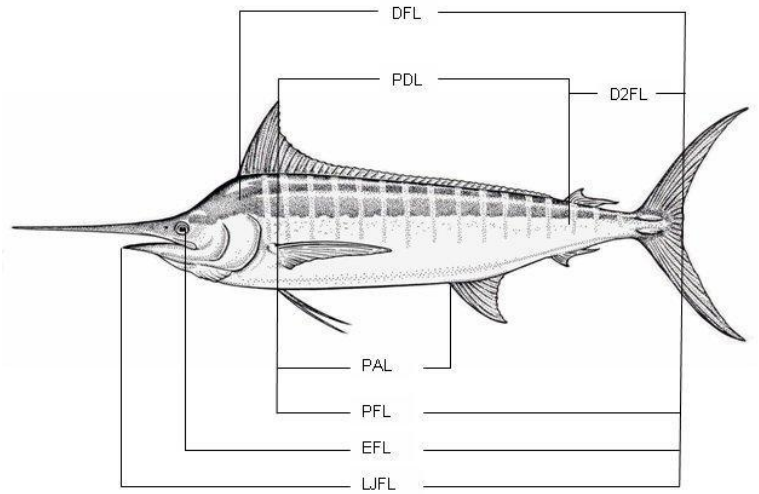


Figure 17. Billfish Length Measurements.

H. Size-class intervals

Most measurements are made to the nearest 1 cm (below). For example: 40.1 to 40.9 cm is recorded as 40 cm therefore a measurement of 46.4 cm would be recorded as 46 cm.

I. Additional Biological sampling procedures

When specified in the sampling programme the sex or gender of the fish may also be required. On the large purse-seiners the tuna caught are often juveniles and the fish are frozen whole and it is unlikely that sexing of the tuna will be required. However, on tuna loneliners where adult fish are mostly caught, these can be determined by first taking the length measurements and then checking the gonads for sex when the crew is dressing the fish.

Billfish are normally measured for both length and sex. It is well known that male and female billfish have significantly different growth rates with the larger fish mostly being female. Male billfish on average do not weigh much over 100kg. The gonads are found in the ventral part of the body cavity and for billfish there is a clear difference in the shape between male and female. The male gonads are relatively irregular in shape and some have many nodules present on the external surface. Cross sections have a characteristic rectangular shape and when sexually active milt can be seen. The lumen will be visible at the base or to one side of the gonad. The female gonads have a smooth external appearance and the cross section has a characteristic oval shape with a lumen visible in the middle.

Recording of non-target species and monitoring the catch and interactions with threatened and endangered species will be both fisheries and vessel specific. Such data will be recorded from direct observed events. The sampling strategies and procedures for environmental monitoring will also be determined on the priority of the data requirements determined by the programme.

PART C: Data field descriptions

I. General Considerations

Each data field on the data forms needs to be completed to reflect accurately the information required for that field. In some instances a single word or code is all that is required. However where a field requires text to record a name or address these need to be written out in full. When capturing data in an electronic database it is important to distinguish between text and numbers. When recording unit of measurements note clearly in which units the measurement was made. For example, units of distance can be in *kilometres, nautical miles*. If the unit is not specified on the form it must be included with the value that is entered.

The description of the data fields in this section will assist the observer to understand the exact nature of the information to be recorded; the reporting procedure when data is not available; or when the observer wishes to record additional information.

Time recording

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.

Forms breakdown per fishery

A. FISHERY	FORMS REQUIRED PER TRIP	USAGE
Longline	Form Gen-1	Trip form completed once per trip
	Form LL-2	
	Form LL-4	Operational Daily form completed for each operational set
	Form Gen-5	Operational per occurrence completed as required for each event
	Form Gen-6	
Purse Seine	Form Gen-1	Trip form completed once per trip
	Form Gen-2	
	Form Gen-3	Operational Daily form
	Form PS-4	Operational Daily form completed for each operational set
	Form Gen-5	Operational per occurrence completed as required for each event
	Form Gen-6	
Pole and Line	Form Gen-1	Trip form completed once per trip
	Form Gen-2	
	Form Gen-3	Operational Daily form
	Form PL-4	Operational Daily form completed for each operational set
	Form Gen-5	Operational per occurrence completed as required for each event
	Form Gen-6	
Gillnet	Form Gen-1	Trip form completed once per trip
	Form Gen-2	
	Form Gill-4	Operational Daily form completed for each operational set
	Form Gen-5	Operational per occurrence completed as required for each event
	Form Gen-6	

II. Forms

A. Vessel and Trip Information

This is a generic form that is designed to capture all the information from a single deployment. The form covers deployments onboard vessels in several IOTC fisheries involved in the Scientific Observer Scheme. The observer's embarkation and disembarkation may not coincide with the vessels trip information as recorded in the vessel's logbook. Observers should include in their reports details of the date and port of departure of the vessel if it does not coincide with their embarkation date and location.

Vessel name and IOTC number	Record the vessel full name and including any corresponding numbers. For example "Fukuseki Maru No.5". Also record the vessels IOTC number if it is included on the IOTC registry. Check the Certificate of Registry that should be issued by the flag state to confirm that the name displayed corresponds to these and relevant safety certificates. Should there be any discrepancies note these in the comment section.
Vessel type and Main gear	This records the type of vessel. For example a Large Scale Tuna Longline Vessel, (LSTLV) or Purse Seiner. In most cases a vessel is purpose-built and can only fish in a single sector using the specific gear for which it was designed. However, some vessels have the ability to fish in more than one sector by changing their gear and it is therefore important to also record the main gear, or different gears types (if more than one type of fishing gear is used) for the observed trip.
Target Species (*Data Recommended but not mandatory)*	Vessels will generally target a narrow range or aggregation of species and these will be specified by the licences or permit conditions under which authority the vessel is operating. Fish species caught other than the target species are categorised as by-catch.

Observer and Deployment Details

The observers' personal details must be recorded in this section together with the observers' embarkation and disembarkation information. In addition, observers will have to undertake a pre-sea safety inspection of the vessel before they embark. The results of this inspection, together with a deployment report must be sent to their controlling agency within 24 hours of boarding. If for any reason an observer refuses to board a full report detailing these reason are to be sent to their controlling agency within 12 hours, and sooner if possible. Any details or comments concerning the logistics of boarding a vessel that are not recorded on these forms must be noted on in the observer's trip report.

Observer	Observer must print first and family names in full.
Observer nationality	Record nationality and passport number as it appears in passport.
Observers IOTC certification details (agency and number)	National agencies will submit a list of their observers to the IOTC Secretariat and each observer will then be allocated a IOTC certification number that must used on forms data and reports.
Controlling Organisation	Record the full name and address of the observer's controlling organisation and/ or national fisheries organisation responsible for managing deployment. Include postal and physical addresses and relevant telephone and fax numbers and email addresses.
Contact person(s)	Record full name, contact telephone and fax numbers and email of the contact person from the observer's controlling organisation.
Date / time embarkation	Record the date and time that the observer embarks onboard the vessel. It is important to record the vessel's time and note the time zone (+GMT) that the vessel is using.
Location of embarkation	Record the port and country where the observer embarks. Note: if the observer embarks via a port launch within port limits, this is still recorded as a port embarkation. If the observer embarks at sea outside port limits via a vessel transfer, record "at sea" and record the position in Latitude and Longitude.
Date / time disembarkation	Record the date and time that the observer disembarks from the vessel.

Location of disembarkation	Record the port and country where the observer disembarks. Note: if the observer disembarks via a port launch within port limits then this is still recorded as a port disembarkation. If the observer disembarks at sea outside port limits via a vessel transfer, record "at sea" and record the position in Latitude and Longitude.

The vessels' activity days recorded below must coincide with those while the observer was onboard. *Note: It is quite possible that the vessels trip information will differ as an observer may embark after a vessels trip has commenced and the vessel has already been engaged in fishing. Similarly the vessel may continue to fish after the observer has disembarked.*

Total days spent in fishing area	Record the number of days the vessel is in the fishing area while the observer was onboard. Note this does not include transit time even if the area being transited is within the fishing area. This must be clearly recorded and discussed in the observer's trip report.
Total active fishing days/events	Record the number of observers days that the vessel actually fished. These will be days where the vessel had gear in the water. Note for some fishing activities this may be for only a few hours of the day. Alternatively a single fishing event (set) may cover part of two days.
Total days transiting to fishing areas	Record the number of days the vessel spent steaming or transiting to fishing areas while the observer was onboard.
Total days searching for fish	Record the number of observed days that the vessel was engaged in actively searching for fish. This is specifically important for purse seine and poling vessels. However a longline or gill net vessel may also spend time searching an area for signs of fish to decide where best to set their lines or nets.
Total days lost due to weather	Record the number of days where a vessel was unable to fish due to adverse weather conditions.
Total days lost due to gear or mechanical breakdown	Record the number of days where a vessel was unable to fish due to a mechanical breakdown or inoperative gear or processing plants that prevented the vessel from either steaming, using any of its gear or being able to process fish.
Total days lost to unforeseen events *(specify)*	Record the number of days where a vessel was unable to fish due to any unforeseen event. Record the details in full in the observer's trip report.

Vessel Owners and Personnel

The observer records details of the vessel owners and operators on these forms. All contact details must be accurately recorded. In some instances a vessel may be chartered by an organisation or operator that will conduct the fishing operations on licences or permits from several other entities or nationalities. These occur specifically in joint ventures between vessel owners and agents and permit holders from other national states. If these are details not fully captured on the forms they must be included in the observer's trip report.

Registered vessel owners	Record in full the owner's name, nationality, address and contact details. These can be obtained or cross-checked on the vessel's registration forms.
Charterers / operators	Where the vessel has been chartered and is operated and managed by a company other than the owner, record operator's full name (company or individual as appropriate), nationality, address and contact details.
Fishing Master	Record the full name of the Fishing Master.
Fishing Master nationality	Record the nationality of the Fishing Master.
Captain	Record the full name of the Captain. Note in some instances the fishing master and Captain may be the same person.
Captain nationality	Record the nationality of the Captain
Number of crew	Record the number of crew. This should be cross checked against the

	vessel's crew list. Also check the maximum crew compliment on the vessel's safety certificate.

Vessel Specific Details

Records details of the vessel specifications, and operational capabilities. Where data field are not relevant to a specific vessel these field must record "n/a to this vessel". If there are details about the vessel that are not captured on these forms and that impact on the vessel's operational ability or items that the observer would like to report on, these must be included in the observer's trip reports.

Flag	Name of country in which vessel is registered. Note this may not be the same as the nationality from which the vessel originates.
National register number	This is the number issued by country in which the vessel is registered.
IMO number *(if available but not mandatory)*	The IMO number refers to the number allocated to the vessel if it is registered to the International Maritime Organization of the United Nations.
International radio call sign (IRCS)	This is the number allocated to the vessel by the International Telecommunications Union. This should be displayed prominently on the vessel's side or superstructure. Where a vessel does not have a IRCS it should display the characters allocated to its Flag State by the International Telecommunications Union (ITU) followed by the licence or registration number that the Flag State has allocated to the vessel.
Vessel phone, fax and email	A vessel may have several contact numbers and email addresses depending on the satellite communications systems installed onboard. These should all be recorded, taking note of the ocean region code.
Gross tonnage (GRT or GT)	Record the gross registered tonnage or gross tonnage of the vessel. These can be checked against the vessels registration and safety certificates.
Length overall (LOA)	Record the overall length of the vessel.
Main engines Make/ Power	Record the make and power of the main engines.
Vessel cruising/maximum speed	*(Recommended but not mandatory)* Record the vessel's average operational cruising and maximum speed capabilities in knots.
Vessel range *(days at sea)*	Record the range of the vessel either in average time at sea or cruising distance. This is not directly related to the tonnage of fuel carried. However, if a figure for the range cannot be obtained, request information on the tonnage of fuel carried and the average cruising distance per ton of fuel. This is not an accurate reflection on the range of the vessel as fuel is used to run auxiliary motors for processing and fish preservation. Information on this would then also be sought.
Hull material	Record the hull material; steel, wood or glass-reinforced plastic (GRP) also known as fibre glass.
Total fish carrying capacity (t/m^3)	Record the capacity of a vessel to store its catch (hold or volume capacity in tonnes or cubic meters). Depending on the type of vessel and method of fishing and catch preservation, this can be recorded by volume and / or weight. Normally volume is converted to weight. Larger fish that are frozen and packed loose take up a high volume relative to their weight. In this instance the volume of the hold may be the limiting factor to determine a vessel's maximum tonnage. Smaller fish packed directly into a hold with ice, CSW or RSW will have a lower volume to weight ratio.
Fish Storage Methods	Record the method used by the vessel to preserve and store catch.
Blast Freezing	The catch is first rapidly frozen in a blast freezer then stored in a refrigerated hold.
Ice	The fish are packed into flake-ice.
CSW	The fish are stored in chilled seawater. The chilled seawater is made up from mixing ice with seawater to form ice slurry.
RW / Brine freezing	The fish are cooled and stored in refrigerated seawater (RW). The water is refrigerated using onboard compressors. The temperature of RW can be reduced to below 0^o C by increasing the salt content of the water. This is

	then termed "brine freezing".
Other	A vessel may use a combination of the above methods, if so record each of these. If a vessel used some other method for fish refrigeration or preservation then describe this in your trip report.

Electronics

The presence, absence and functionality of the electronic equipment onboard can have a significant effect on a vessels ability to detect and catch fish, and thus the catch per unit effort. Details of this equipment must be noted, and a separate record must be kept of which equipment was utilised during the fishing operations. The following codes must be used when completing these forms. Additional comments or details on equipment should also be included in the observer's trip reports.

Radios	Record the number of VHF, HF radios onboard, make and model and the power and frequency range. A vessel will often have several radios. VHF is used for short-range communications between vessels at sea or port communications. VHF also includes "Digital Selective Calling" (DSC) to alert other boats, ships, and shore stations with a single button press in an emergency situation. High Frequency (HF) radio frequencies range between 3 and 30 MHz and are used for long distance communication. These systems include radiotelephone and radiotelex (narrow-band direct printing) equipment, with calls initiated by digital selective calling (DSC). Worldwide broadcasts of maritime safety information are also made on HF narrow-band direct printing channels. Radios are also and integral part of the safety equipment onboard and are also specified if the vessel conforms to the GMDSS requirements. However, vessels under 300 gross tonnage (GT) are not subject to GMDSS requirements.
Satellite communication systems	These systems provide ship/shore, ship/ship and shore/ship telephone, telex and high-speed data services, including a distress priority telephone and telex service to and from rescue coordination centres. Satellite systems operated by the Inmarsat, overseen by IMSO, International Mobile Satellite Organization are also important elements of the GMDSS. The types of Inmarsat ship earth station terminals recognized by the GMDSS are: Inmarsat B, C and F77.
Fisheries information services	Vessels may receive real-time information on some oceanographic features that will provide them with information on sea-surface temperature (SST), phytoplankton densities or sea height.
Vessel Monitoring Systems (VMS)	Record if the vessel has a VMS installed. If present, does it have security seals in place and check if it is operational.
Global Positioning Systems (GPS)	Record model and make and if the vessel has one or more GPS units in operation. Note a GPS may be an independent unit or linked or incorporated into track plotters and acoustic systems.
Track plotters	Record make and model. Note if linked to an external GPS or have GPS built in.
Radars	Record power and frequency range of the radar systems in place. Vessels targeting surface fish often have high frequency radars to search for seabird activity or activity on the sea surface. These are usually not used for normal navigation purposes.
Acoustic depth sounder	Record the make and the model of the acoustic depth sounder.
Acoustic sonar	Record if the vessel has a sonar onboard and note its make, model, power and frequency range.
Weather facsimile	Record if the vessel has a weather facsimile. Weather information may also be received from Fisheries Information Services systems.
Sea Surface Temperature (SST)	Record if the vessel has a SST gauge on the bridge and or if the vessel has access to SST charts (most likely to be associated to Fisheries Information

	Services systems.
Expendable bathythermographs (XBT)	Record if the vessel has onboard and deploys expendable bathythermographs XTBs. These are usually mounted on the bridge wings and are used periodically to determine the depth of the thermocline.
Acoustic doppler current meter	Record if the vessel has an acoustic doppler current meter. This is important to ascertain the current speed

Observer Trip Information

The form captures the basic trip information and is used as part of the effort indicators for CPUE data. Additional information should be included in the trip report, noting especially any anomalous data that the form does not capture. *Note: This information may not coincide with the trip information recorded by the observer unless the observer was onboard for the entire trip.*

Port of departure	Record the port from which the vessel sailed. Note this may not coincide with the port where the observer embarks.
Date / time vessel sailed	Record the date and time (GMT) of sailing. Check the vessel's time and note the time zone that the vessel is using. Keep accurate track and record when time zones or the vessel times are altered. On some vessel's they maintain the time zone of their flag state and all logbook times are recoded for this time zone.
Date / time vessel returned to port (*Recommended but not mandatory)*	Record the date and time that the vessel's returns to port. Where an observer disembarks before the vessel returns to its home port at the end of the trip then the observer can request from the captain the vessel's ETA but this must be clearly reflected.
Port of return (*Recommended but not mandatory)*	Record the port where the vessel docks at the end of the trip and where it will offload its catch. Similarly if the observer disembarks before the vessel returns then the observer can request the information from the captain and record this.

Catch Summary Information

The observer must record a summary of the total catch retained by the vessel during time they are onboard. Should any of the fish products be transhipped to a carrier vessel or another fishing vessel the weight of each species must be recorded. Similarly they must also record the details of any fish products that may be transhipped from another fishing vessel to their vessel during the trip.

Weight/Species transhipped at sea	Record the species, weight and product code of all fish products observed being transhipped to either a carrier vessel or another fishing vessel during the trip. Record the processed weight, or estimated nominal weight of fish transhipped by species. Record if all or part of the catch or processed catch is transhipped at sea to another vessel. Where possible check if a transhipment declaration has been completed by the vessel and obtain a copy.
Carrier / Fishing Vessel details	Record the name and registration number of the vessels to which fish are transhipped or from which fish are received. Where possible record the vessels IOTC registration number. This can be requested from the Fishing Master and should also be recorded on the declaration form if it is filled in. Record also the call sign displayed.
Total processed weight of fish onboard at disembarkation	Record the total weight of product that is onboard the vessel at the time of observer disembarkation. Note this can be calculated from the sum of the product produced during the observed trip, less any product transhipped off the vessel or include any product received from another vessel. If any product was onboard prior to the time the observer

	embarked this should also be noted.
Weight/Species/Processing code	Record a breakdown of the product onboard by species and product code. Use the IOTC/FAO codes references in the observer manual. Where a specific code is not available or only an aggregation of species is available record as much detail as possible and include this description in the trip report.

B. Vessel-specific Gear Details

Purse Seine

The basic gear components on purse seine vessels will be similar. However the specification will differ depending on the size of the vessel and make and model of the equipment. Specifications such as depth and length of the net and retrieve speed of the purse winches will all affect the vessel's ability to catch fish. Basic details need to be captured on the data forms and these should be included and discussed in the observer's trip report.

Maximum Net depth (meters)	Record the maximum fishing depth according to the net specifications.
Maximum Net length (meters)	Record the maximum length of the net. This should correspond to the length of the topline. Note: the bottom line may exceed the topline length due to the design of the belly of the net.
Mesh length (stretched mesh (mm))	Record the average stretched length, knot to knot of the mesh in mm. Observers should measure at least 10 mesh lengths from the main body of the net and record the average.
Power Block Make & Model	Record details on the power block. Note make and model and torque.
Purse winch Make & Model	Record the details of the purse winches. Note make and model and if possible the wire specifications and retrieve speed. The vessel engineer should be able to assist with this information.
Number of buoys per type at embarkation on board	Record the number and details of satellite and / or radio buoys the vessel has onboard at the time the observer embarks.
Number of buoys per type at embarkation at sea	Record the number of satellite and /or radio buoys that are reportedly deployed at sea at the time the observer embarks. This information shall be requested from the Fishing Master.
Associated Supply vessel name(s)	Record the details of any supply vessels that interact or assist the vessel during the time the trip.

Pole and Line Vessels

Automatic poling (present or absent)	Record if the vessel has automatic poling machines and note number, make & model and if they are operational. Details should be given in the observers report.
Number of operational poles	Record the number of polling stations available.
Volume live bait tanks/ wells (m^3)	Record the number and volume of live bait tanks or wells.

Gillnet Vessels

Total number of net panels onboard	Record the number of operational nets (panels) onboard. The vessel may have skeins of net in storage and may make up nets during a voyage to replace lost or damaged nets.
Total length of net panel (metres)	Several panels can be connected to make up a total length of a net. The total length of a net can be calculated by the number of panels used in the net.
Stretched mesh size(s) (mm)	Record the stretched length, knot to knot of the mesh in mm. Observers should measure at least 10 mesh lengths from the main body of the net and record the average. Note different nets may have different mesh sizes. List the different mesh size when this is observed.
Net Hauler (present or absent)	Record if a net hauler is present and note make and model. A net drum may also be used that both hauls and on which the net is stored.

C. Pelagic Longline Gear and Operations Information

This is a generic form that is designed to capture specific details on the longline gear parameters onboard the vessel. This form is completed once per trip on pelagic longline vessels. It includes details of all the gear onboard the vessel associated with longline fishing and must be filled in even if this gear is not used or deployed during the time the observer is onboard. Where possible the observer must record the manufacturer's details and specifications and note any additions or modifications to the gear that are vessel specific. Additional information that is not captured by these data forms should be recorded in the observer's trip report.

Vessel name and IOTC number	This information must correspond to the information in the vessel data sheet. Record the vessel full name and including any corresponding numbers. For example "Fukuseki Maru No.5". Also record the vessels IOTC number if it is included on the IOTC registry.
Target Species	Record the species specified by the vessels licence or permit conditions. A permit or licence is normally issued by the flag state or the local fishing authority allowing the vessel to legally fish in the area. (Fish species caught that are not specified as target species are categorised as by-catch.

Longline Gear Specifications

This section is designed to capture detailed specifications of the different components of the longline gear used by the vessel. Detailed descriptions of the actual make-up and any unique aspects of the gear should also be recorded in the observer's report.

Longline Type	There are two distinct longline systems used in this fishery and these can broadly be differentiated by the specifications and storage method of the mainline. The first, (often termed the "Japanese" or oriental system) uses a multi-strand mainline that can consist of tarred rope or braided monofilament nylon. The mainline is stored in large coils or is layered down in a large bin or storage well. The line is hauled by a "line hauler". The second system (sometimes termed "Lingrin-Pitman" or "Mono" system) uses a single-strand monofilament nylon that is hauled back and stored on a large drum. The attachment of buoys and variable types of branch lines (also termed droppers or traces) used are similar for both systems
Mainline length	Write down the total operational length of the mainline. This can be recorded in nautical miles or kilometres. This information can be obtained

	from the Captain or Fishing Master.
Mainline material and diameter	Record the material the mainline is made out of i.e. monofilament, braided monofilament or tarred rope. Use callipers to measure the diameter of the mainline in millimetres.

Additional information to be recorded if available *(Recommended but not mandatory)*

Branch line storage (tubs / baskets / coiled)	Record if the branch lines are prepared in coils and packed into baskets, or layers out in tubs, or coiled up onto reels.
Branch line material(s) and diameter(s)	Record the different materials and diameter in (mm) used to make up the branch lines. Note the lengths and proportions of these materials may vary. Record the material specifications and basic make up of the branch line. This may be expressed as diagrams in the trip report.
Leader material(s) and diameter(s)	The leader is directly attached to the hook. Record the material,diameter and average length of the leader . Record if steel wire trace is attached directly to the hook. Do not confuse this with any other plastic coated steel wire trace used in other sections of the branch line. (Note; wire trace may be sheathed by a plastic or nylon coating).
Number of hooks / basket or tub	Record the number of hooks, (equivalent to the number of branch lines) in a basket, tub, or on a reel. Branch lines that are coiled are normally kept in baskets with a fixed number of branch lines of a specific make-up kept together in a basket. When branch lines are layered on top of each other in a tub, the number of branch lines in a tub can be determined by counting the hooks and clips attached around the edge of the tubs. Some vessels, often those using a monofilament mainline on a reel, also store their branch lines coiled up on reels. It will be necessary to ask the crew how many are coiled up on a single reel.
Hook types used & size	Record the different types and sizes of hooks used on the branch lines. Note there is a large variability in referencing hook types and size. Where possible try to obtain the actual manufacturer's specifications. If this is not possible note basic type i.e. Japan tuna, circle or "J"-hook, and measure the total hook length, front length and gap and note the off-set. Details of hook types used should also be discussed in the observer's trip report.

Operational Equipment

Operational equipment includes all the gear used to set and haul the line, as well the machinery used for the processing and the freezing of fish. It is also important to note when gear is present but not operational, or not used for any reason. Where possible record the make and model. Further descriptions can be included in the trip report.

Line setter	Record if the vessel has a line setter fitted, and note the make and model. Record the range of setting speeds, (m/s). Note if the line setter is operational, or not used for any reason. When the equipment is only used for part of the trip, provide reasons in the observer report.
Bait casting machine	Record if the vessel is fitted with a bait casting machine, (BCM). Note if it is operational and how often it is used.
Mainline hauler	Record the make and model of the equipment used to haul in the mainline. In the trip report also describe the means of transfer and pack the line to the

	line storage bin.
Fish storage; Refrigeration method	Describe the method used to preserve and store the product onboard. If more than one process is used onboard during the trip record the details of each. Note: a method to preserve fish may involve several processes. For example; a fish may first be placed into a blast freezer at a specific temperature for a time before being transferred to a holding facility at a different temperature. At the same time other species may be placed directly into a freezer hold with no intermediate blast freezing process. Vessels undertaking shorter trips may keep the fish fresh on ice or in RSW.

D. Surface Fishery Daily Activity Log (Purse seine and Pole & Line)

Vessel name and IOTC number	This information must correspond to the information in the vessel data sheet. Record the vessel full name and including any corresponding numbers. For example "Fukuseki Maru No.5". Also record the vessels IOTC number if it is included on the IOTC registry
Date	Record the current date of operations.

Daily Activity Log

This is completed each time the activity changes or for a specific event or sighting.

Time	Record the time of the activity starts. All times to be recorded in GMT.
Position (Latitude / Longitude)	Record the position of the start of the activity.
Activity Code	Record the code for the activity.
School Association / Detection	School sightings should be recorded as well as if they were free or associated to a FAD or a natural LOG, and how they were detected.
Object	Object sightings should be recorded.
Total number of fish schools detected for the day	Summarise the total number of schools of fish detected during the day. Note schools that were detected and not fished as well as fished schools to be counted.
Exceptional sightings	Record and comment on exceptional sightings. This would include sightings of marine mammals and turtles.

Observer Comments

Observers must include additional information on exceptional sightings and the vessels activities.

E. Fishing Event Purse Seine

This form is completed each time the net is deployed, (purse seine set).

Vessel name and IOTC number	This information must correspond to the information in the vessel data sheet. Record the vessel full name and including any corresponding numbers. For example "Fukuseki Maru No.5". Also record the vessels IOTC number if it is included on the IOTC registry.
Target Species	Record the species in the school being targeted .
Set Number	Set numbers run sequentially until the end of the observed trip. (first set = 1) The vessel's log may follow a different sequence. Observers should note this in their reports so that the reported sets can be compared to the observed sets.
Date & Time start set	Record the date and time (GMT) when the skiff is launched(start of set.)
Position (Latitude / Longitude)	Record the position corresponding to the start of the set.

Setting Sequence

Time School detection	Record the time the school of fish was first detected.
School Detection (Cue)	Record the detection code that best describes how the school was found. If more than one detection method was used or responsible for locating the fish use the code that first prompted the vessel to change course to investigate the school.
Type of school	Record if the school is associated with any FAD or objects or a free school.
School Association	Record code that best describes the association of the school targeted with any object or marine mammals or birds or if he school was detected as a free school un-associated.
Time start pursing	Record the time the purse winches start to purse the net.
Time net pursed	Record the time when the net is fully pursed (when the last purse ring through which the purse wire runs is onboard).
Time start brailing	Record the time that brailing starts.
Time end brailing	Record the time that bailing ends
Average weight of brail	Record the average estimated weight of a brail. Note some vessels may have more than one brailing net and the average for each may differ. Clearly record this if both are used.
Time Skiff onboard	Record the time when the skiff comes on board and the set is over.
FAD buoy number / ID	Where the school is associated with a FAD, record the FAD radio buoy number.
Number of tagged fish recovered	Record the number of tagged fish recovered. The details of the tagged fish must also be recorded on the tag recovery forms.
Retained Catch	Record the details, total estimated weight and number per species of the retained catch. Note the processing and storage codes.
Released & Discarded Catch	Record the details of the species discarded and note their condition, whether they were dead or their chance of survival, (note the fate code). Record in detail if released or discarded from the net or if landed onboard and then released Record the details of protected and endangered species on the relevant forms
Total number of fish (per species) sampled for biological parameters	Record the total number per species of fish sampled for biological parameters. Also record the number for each measurement and gender codes. Describe the sampling method. For example; stratified sampling of fish channelled to wells or sub-sampling of brails.

F. Fishing Event Poleand-Line

Note: two fishing events must be separated by a break of at last ten (10) minutes if the same school is targeted.

Vessel name and IOTC number	This information must correspond to the information in the vessel data sheet. Record the vessel full name and including any corresponding numbers. For example "Fukuseki Maru No.5". Also record the vessels IOTC number if it is included on the IOTC registry.
Date and time of start of the event	Record the current date and time (GMT) of start of the event.
Target Species	Record the species in the school being targeted .
Event Number	Each time the vessel activates its sprayers, starts chumming and actively catching fish, record this event with a unique event number. Event numbers should be consecutive from the start of the observed trip to the end of the trip. (If the vessel does not catch fish then scrap the event number and record this under daily activity. This will then form part of the time of the vessel was searching for fish.)
School Detection (Cue)	Record the detection code that best describes how the school was found. If more than one detection method was used or responsible for locating the fish use the code that first prompted the vessel to change course to investigate the school.
Type of school	Record if the school is associated with any FAD or objects or a free school.
School Association	Record code that best describes the association of the school targeted with any object or marine mammals or birds or if he school was detected as a free school un-associated.
Position (Latitude / Longitude)	Record the position in latitude and longitude.
Time Start	Record the time whichever the first activity, (spray / chumming / poling) that starts. This may not coincide exactly with the time the first fish is caught. However if no fish are caught then this will not be recorded as an event and the time will be recorded as part of the daily activity.
Time End	Record the time when fishing activity stops and the vessel starts a new activity, i.e. searching or steaming.
Number of operational poles	Record the number of poles active used to fish during the peak of the activity.
Bait used (no / yes (live or frozen))	Record if chum was used and if the chum consisted of live or chopped up frozen or thawed fish.
Bait species (if frozen bait used)	Record the species of any frozen bait used to chumm. This may be bait purchased or that the vessel has caught and frozen.
Type of lures used	If the vessel uses lures or jiggers in place of bait record the type and make and hook type.
Vessels estimated total catch weight / species	Record the total estimated weigh and number of fish caught for each species.
Number of tagged fish recovered	Record the number of tagged fish caught. The tag details to be recorded on the tag return forms.
Total number of fish (per species) sampled for biological parameters	Record the total number per species of fish sampled for biological parameters. Also record the number for each measurement and gender codes.
Retained Catch	Record the details, total estimated weight and number per species of the retained catch. Note the processing and storage codes.
Released & Discarded Catch	Record the details of the species discarded and note their condition, whether they were dead or their chance of survival, (note the fate code). The details of protected and endangered species will also be recorded on the relevant forms.

G. Pelagic Longline Set & Haul Information

Vessel name and IOTC number	This information must correspond to the information in the vessel data sheet. Record the vessel full name and including any corresponding numbers. For example "Skipjack III". Also record the vessels IOTC reference number if it is included on the IOTC registry.

Setting Operations

Pelagic longlines can vary in length depending on the conditions and the area where lines are being deployed. The length of the line directly determines the time required to set the line. An 80 nautical mile line could therefore take more than ten-hours to set. In general a fixed ratio of line buoys or floats to radio and dhan buoys is maintained together with a fixed number of branch lines attached a intervals between the line buoys. The observer can therefore calculate most of the spacing between buoys and line length by recording the time interval and the rate the line is set from the line setter speed or vessel speed. It is important to note any variability in the sequence of events and especially if there are any interruptions.

Mitigation measures deployed to minimise interaction with seabirds (Resolution 08/03) must be recorded and the observer must comment on their effectiveness in the trip reports.

Set Number	For each line set a unique number is allocated. Set numbers should be consecutive from the start of the first line set to the last line set of the observed trip.
Date start setting	Record the date at the start of line setting. Note that longline vessels often set lines at the night and the setting operation may continue beyond midnight and into the following day.
Start setting time	Record the start time of the setting operation. This is the time when the first dhan buoy and / or radio buoy is deployed.
Start Setting Position	Record the position in latitude and longitude for the start of the setting operation. It is important to note the latitude N (north) or S (south), especially when the vessel is working on or near the equator.
Setting speed (knots)	*(Recommended but not mandatory)* Record the vessel's average setting speed. It will take several hours to set the line. Record the speed from the GPS several times during the operation and take the average.
Line- setter speed (m/s)	Record the speed setting of the line setter (meters/second). The line setter speed together with time interval can be used to determine the spacing between branch lines and buoys on the main line.
Clip on time (seconds)	*(Recommended but not mandatory)*The cue to the crew to clip on a branch line or buoy is an audible "beep." The timing of this is usually controlled by the Fishing Master on the bridge. Record the average time interval in seconds between the "beeps" The average time between branch lines and buoys should be recorded.
End Setting time	Record the time that the last dhan buoy and / or radio buoy isdeployed.
End Setting Position	Record the position in latitude and longitude where the last buoys are deployed. As above it is very important to note the latitude N (north) or S (south), especially when the vessel is working on or near the equator. At this point re-check these especially if the vessel crossed the equator.
Total line length	Record the total length of the mainline set. This information can be obtained from the Fishing Master and be calculated by taking the total time to set the line and the average line setter speed. Where a line setter is not used then the vessels speed in knots can be converted to m/s and then use the total setting time to calculate the line length. (note; 1 nm = 1852 m) Take into account any interruption times. The observers should compare the information given

	by the Fishing Master to their own calculations.
Total number of hooks set	Record the total number of hooks set. This information can be obtained from the Fishing Master. Also if hooks are stored in baskets or tubs these can be counted at the end of the setting operation and multiplied by the average number of hooks stored in each. The total length of line set and spacing can also be used to determine the number of hooks set. The observer should use these means to cross check information given to them by the vessel personal.
Ratio of Hook type/ size	Record the type and size of hooks used. If more than one type of hook is used in a set record the ratio of the hook types.
Total number of steel wire leaders	Record the number of steel wire leaders used on the branch lines set.
Distance between hooks (meters)	Record the distance between branch lines. This can be calculated from the time interval that branch lines were clipped onto the mainline and from the line setting speed.
Number of hooks / basket or tub	Record the number of hooks (equivalent to the number of branch lines) in a basket, tub, or on a reel. Branch lines that are coiled are normally kept in baskets with a fixed number of branch lines of a specific make-up kept together in a basket. When branch lines are layered on top of each other in a tub, the number of branch lines in a tub can be determined by counting the hooks and clips attached around the edge of the tubs. Some vessel, often those using a monofilament mainline on a reel, also store their branch lines coiled up on reels. It will be necessary to ask the crew how many are coiled up on a single reel.
Average branch line lengths (meters)	It will not be possible to measure this at the time of setting and observers will have to get this information during the hauling operations when the branch lines are being made up. There could be several different types or construction of branch lines, made up from different materials. Observers should keep a record of the each specification. The average lengths can then be determined from the observed branch lines set.
Total number of radio/dhan buoys set	Record the total number of radio and /or dhan buoys deployed. This can be determined by counting the number of buoys in their holders before the start of setting and then again after setting. The Fishing Master will also be able to provide these figures.
Main-line weights attached (yes/no)	Record if any weighs are attached to the mainline. These may be clipped on at intervals.
Weight (kg)	Record the average weight in kilograms of weights attached to the mainline.
Branch-line weights attached (yes/no)	Record if any weights or sinkers are attached to the branch lines. These could be in the form of lead sinkers on the traces close to the hook or lead-weighted swivels between sections of the branch line. Note the ratio of weighed branch lines to un-weighted branch lines (do not confuse coated steel wire trace or integral weighted cord with attached weights.)
Distance of weight from hook	Record the distance of the weights from the hook.
Weight (g)	Record the average weight in grams of weights attached to the branchlines.
Light-sticks attached (yes / no)	Record if light sticks are attached to the branch lines.
Total number / Colour of light-sticks	Record the total number per colour of light-sticks used.
Bait species (1 / 2 / 3)	Record the different bait species used.
Bait ratios (% / % / %)	Record the approximate ratio of the different baits used. Often baits are attached in a sequence for each set of branch lines between buoys. (For example; 2-fish, 3-squid, 2-fish).
Bait dyed (yes/no)	Record whether the bait was dyed; which species was used and the ratio of dyed baits. It is also important for the observer to include this information in their trip report.
Dye colour	Record the colour or colours that the different baits are dyed. Note the colour related to the species of bait used. Also take note the time that the bait was soaked in the dye.

Deck lighting	Record the extent (in meters) that aft deck lights are directed astern of the vessel. Comment on any additional deck lights that are switched off during setting.
Tori / Bird scaring streamer line/s' deployed	Record if a bird streamer line (toriline) is used during the setting operation. Take note of the time the bird scaring line is streamed and recovered. Note if it is streamed for the entire setting operation. Details of the operational effectiveness of bird scaring lines should be discussed in the observer's trip report.
Number deployed	Record the number of bird scaring lines are streamed. Note that the bird scaring lines may be constructed differently with different length streamer and streamer spacing. Details of the bird scaring line are captured on specific forms. Observers should record and code the different types and record which of these lines were deployed.

Line Hauling Information

Lines hauling may commence immediately after setting or after a predetermined soak time. The operation may take place over an extended period as hauling is affected by the rate of catch and the weather. If the line breaks the vessel may have to search for and recover the broken end or locate the next radio buoy in the sequence. Hauling normally takes place at about six-knots with the vessel slowing or stopping to land fish.

Start Hauling Date	Record the date that hauling starts.
Start Hauling Time	Record the time that hauling starts
Start Hauling Position	Record the position in latitude and longitude for the start of the hauling operation. It is important to note the latitude N (north) or S (south), especially when the vessel is working on or near the equator. Hauling starts when the first radio or dhan buoy is hauled back onboard.
End Hauling; Date & Time	Record the date that hauling ends.
End Hauling Time	Record the time that haling ends.
End Hauling Position	Record the position in latitude and longitude where the last buoys are recovered onboard. As above, it is very important to note the latitude N (north) or S (south), especially when the vessel is working on or near the equator. At this point re-check these especially if the vessel may have crossed the equator.
Number of hook hauled observed	Record the number of hooks observed for catch composition and by-catch. Note this must not include the time that the observer spent on the deck measuring and collecting biological data on the catch. Observers should be in a position during these observations to record the hooks coming directly out of the water and record the fate of released species.
Bird scaring device at hauler (yes / no)	Record if a bird scaring device was deployed during hauling operations. Observers should report on the construction and effectiveness of all devices used.
Offal management	Record if the vessel has an offal and used bait disposal management plan. Note if these are retained for batch disposal at a later stage or disposed of ad hoc as they accumulate.
Position of offal disposal	Record the position where offal and used bait was disposed. (port side / starboard / aft)

H. Weather Observations

Observers must record the weather at the start of setting and hauling operations. Sudden changes in the weather or weather that affects the operations must be recorded. A summary must be provided in the observer trip report on the average weather conditions experienced during the trip as well as weather that influenced fishing operations. Specific parameters that must be recorded are:

Wind	Force & Direction.
Sea	Height & Direction. Sea waves are generated locally by the prevailing wind and move in the same direction as the surface wind.
Swell	Height & Direction. Swell waves have been generated elsewhere and have travelled out of the area where they were generated and have no relation to the prevailing wind direction.

Waves of both types, sea andswell, appear to travel in groups consisting of a number of waves of varying height with the higher wave occurring in the centre of the group. A relatively flat area consisting of a number of distinctly smaller waves separates groups or sets of waves. Wind waves have an irregular form while swell waves will have a more regular form. Note a large swell can often be present with little or no wind blowing and no sea waves present.

The sea direction is expressed as the direction from which the sea is coming. Cardinal points (E, W, SW ….) or degrees are also used to record the direction of the sea. Sea height is expressed in meters and is the height from the trough to the crest of the wave. This height has to be estimated by the Observer. One method is to look at an object on the sea surface (for example a bird or white patch from a recently broken wave) and watch it move as a number of waves pass and attempt to estimate the height of its vertical movement. As the heights vary from wave to wave an average is estimated. With time and experience you will become more accurate with your estimations. The wave height and sea condition also forms a cross-reference to estimating wind strength.

Swell direction and height is estimated in the same way as determining sea height and direction. However a swell will never break or have a "white cap" and has no relation to the prevailing wind. In many cases the swell direction will be different from that of the prevailing sea. If two wave forms are observed and their movement is in the direction of the surface wind, the system, which has the longer distance between crests and a more regular form, is considered to be the swell.

Additional weather parameters that would be useful include sea surface temperature and barometric pressure.

Table 8. Beaufort wind scale

Beaufort No.	Name	Wind Speed (Knots)	Wave Height (Meters)	Visible Sea State
0	Calm	0 to 1	0	Sea like a mirror
1	Light Air	1 to 3	0.1 to 0.2	Ripples with appearance of scales: no foam crests: sea still has glassy appearance.
2	Light breeze	4 to 6	0.3 to 0.5	Small wavelets: crests have glassy appearance but do not break.
3	Gentle breeze	7 to 10	0.6 to 1.0	Large wavelets: crests begin to break: few scattered white horses.
4	Moderate breeze	11 to 16	1.5	Small waves, becoming longer: fairly frequent white horses.
5	Fresh breeze	17 to 21	2.0	Moderate waves, longer form: many white horses and scattered spray.
6	Strong breeze	22 to 27	3.5	Large waves forming, white foam crests extensive everywhere and spray.
7	Moderate gale	28 to 33	5.0	Sea starts to heap up and white foam breaking waves begin to be blown in streaks: spindrift begins to be seen.

8	Fresh gale	34 to 40	7.5	Moderately high waves of greater length, edges of crests break into spindrift: foam blown into well-marked streaks.
9	Strong gale	41 to 47	9.5	High waves; dense streaks of foam; sea begins to roll; spray begins to affect visibility.
10	Whole gale	48 to 55	12.0	Very high waves with overhanging crests; sea surface takes on white appearance as foam in great patches is blown in very dense streaks; rolling sea and visibility reduced.
11	Storm	56 to 64	15.0	Exceptionally high waves; sea covered with long white patches of foam. Small and medium sized vessels lost to view between waves. Visibility further reduced.
12	Hurricane	64 +	15 +	Air filled with foam and spray; sea completely white with driving spray; visibility greatly reduced.

I. Retained catches

Record all details of the species composition, weight per species and processing code of the retained catch. .

Species	Record the species of fish using the IOTC three figure alpha codes.
Processing Code	Record the product code for each species according to the IOTC processing codes. When the same species was processed into two or more products the observer must record separate details for each product for that species.
Number of fish	Record the number of fish for each of the categories above.
Total processed weight	Record the total product weight for each of the categories above.

J. Discarded and Released By-catches

The observer must record the number and fate of all species that are not retained onboard. The condition and fate of these must be noted.

Species	Record the species of fish using the IOTC three figure alpha codes. If a species cannot be positively identified or a FAO code is not available, the observer should record the species name or the common name known. If the observer cannot identify the species it must recorded as unknown "UNK" and given a reference number. The same reference number should be used throughout the trip for that species. Where possible the observer should retain a sample and / or take a photograph of the unidentified organism. This is especially important when organisms are cut off in the water. The observer trip report must provide a list of the "UNK" reference numbers together with a description and accompanying photographs of each of the unidentified organisms.
Number and Estimated weight of fish	Record for each species the number and estimated weight of fish that are discarded or released.
Fate	For each species discarded or released record a fate code taking into account any physical damage or stress that may affect survival.
Reason for discard	Record the reason that the fish was not retained. This may include damage caused by depredation from marine mammals or sharks, size etc.
Tagged Yes / No	Record if any of the fish released are tagged and record all the tag details for each fish.

K. Depredation (Information to be submitted to SC)

Fishing Event number	Record the corresponding set or fishing event number.
Predator Species	Record the species directly observed or deemed responsible for the depredation. Note that species observed in the area may not necessary be associated with depredation unless directly observed. Take note of any associated evidence of depredation such as oil slicks and feeding birds that may associate marine mammals with depredation. Similarly for shark and squid damage the species may be difficult to determine.
ID reliability code	Record the code that corresponds to the accuracy and reliability for identifying the species associated with depredation.
Suspected depredation on bait (yes/no)	Record if bait had been taken by predators, *e.g.* marine mammals, sharks, *etc.*.
Suspected depredation on fish (yes/no)	Record if fish have been taken by predators, *e.g.* marine mammals, sharks, *etc.*.
Mitigation measures	Record if any mitigation measures were used to prevent depredation by marine mammals.

L. Incidental Catches of Seabird, Turtle and Mammals

Any incidentals catches or direct interactions between the fishing gear and seabirds, turtles or marine mammals must be recorded in detail. For these forms the total number and fate per species must be recorded. .

Fishing event number	Record the sequential set or event number.
Species	Record the species using the FAO codes. When a code is not available record the common name and species name if known. Record a detailed description and take photographs when possible. The descriptions should also be described in the observers trip report.
Number caught	Record the total number per species caught:.
Reason for capture	Record the possible reason for capture. Note whether this was accidental due to the animals presence in the area or as a result of the animal actively interacting with the catch or fishing gear.
Release Fate (dead / alive)	Record the fate code of released species.
Resuscitation (yes/no)	Record whether it was possible to attempt or if attempts were made to resuscitate an animal that had drowned.
Sample retained (yes/no)	Record if a sample of dead species has been retained. If samples are retained they must be clearly labelled recording the date, position, vessel and fishing event information and the observer's name. Observers must also include in their report what samples were kept during the trip and where they are stored.
Turtle/Marine Mammal length	Record the lengths of turtles and marine mammals where this is possible. Detailed information on turtles include shell length, head width and tail length. Note if measured in straight line or over the curve. For marine mammals measure the total length.
Tag/Band number (details)	Record all the details of tags or bird bands recovered from dead animals or where possible captured animals that are released. It is important to also record the tag and bird band colours.

M. Biological Data Collection

Species	Record the IOTC species code. When a code is not available record the common name and full species name if known. If the species cannot be identified, note a detailed description of the fish and take photographs when possible. The descriptions should also be described in the observers' trip report.
Length (range of length measurements)	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 (centimetres).
Weight	Record the weight of the fish and note the units in which it was weighed. ("kg"-kilograms or "g"-grams).
Sex	Record the gender, male or female when this is possible. On some tuna longline vessels the observer may not be permitted to physically handle the fish. However the entrails can be obtained from the crew while they clean the fish.
Maturity *(Recommended but not mandatory)*	Record the maturity for species when this is required.
Age & Growth *(Recommended but not mandatory)*	Otoliths or spine clippings may be required from some species for age and growth studies. It is important that these clearly labelled, recording the date, species and length, sex and maturity information and position of capture.
Other (genetic samples, ID photographs)	Some studies also request genetic samples. These generally require a sample of tissue that is preserved in a preservative solution or has to be frozen. These must also be labelled with the fish biometrics and location. Some sampling programmes may also be required detailed photographs of the organisms.

N. Tag Recapture Details

Details of recaptured tagged organisms must be accurately recorded, especially the position in latitude and longitude and the tag numbers. Where possible take photographs of the fish or turtle, recording its condition. This is especially important if a tagged animal is released again.

Species	Record the species
Tag numbers/Type	Record the tag number as well as all the wording on the tag.
Location	Record the exact position of capture in latitude and longitude. It is important to record clearly whether north of south of the equator.
Position recording system	Record from what system the position was obtained. GPS or plotter.
Vessel name (flag)	Record the vessel name and flag state of the vessel on which the fish was caught.
Method of capture	Record how the fish was caught: longline, pure seine, pole & line or gillnet
Fish state	Record if the fish is fresh caught or had already been processed and note the processing code.
Length & length measurement code	Record the length and the measurement code that best describes how the fish was measured.
Weight	Where possible record the weight of the fish as accurately as possible. Note this is important even if the fish has already been processed.
Sex	Where possible record if the fish is a male or female
Sample retained (yes/no)	Note if the whole fish was retained and where it will be stored.
Finder's details	Record the finder's name and contact deails.

O. Fishing/Supply Vessel Sightings

Date	Record the date of the sighting
Time	Record the time (GMT) when first sighting or detecting the vessel.
Number of vessels in the area	If more than one vessel, record the number of vessels
Position	Record your position in latitude and longitude. Where possible also record the actual position of the vessel sighted. This is possible to determine on some radar and integrated track plotters. Be clear on the form which position is being recorded.
Position relative to your position (direction/distance)	Record the distance, (range) and compass bearing of the vessel from your position.
Vessel details (name, flag, activity)	Record the name, flag and call sign of the vessel. Note how the information was obtained:if the call sign, and name was visible on the vessel and recorded from these observations and or if communications were established with the vessel and the details were obtained directly from the vessels personal. Record the activity of the vessel when it was sighted, fishing, steaming, drifting etc. or if this cannot be determined.
Descriptive features	Provide a short description of the vessel and note any outstanding descriptive features that are visible, radar towers, antenna and vessel colour(s).
Photo taken (yes/no)	Record if photographs were taken. If possible take photographs of the vessels sighted and attempt to capture details of the bridge and antenna array, hull showing any dents or structural features and of fishing gear or equipment visible.

P. Transhipment (*Mandatory if no Observer is onboard the carrier vessel*)

Most commonly this will entail transhipping processed catch to a carrier vessel or another fishing vessel. If a transhipment of fish or fish products takes place to another vessel, (carrier or fishing vessel) or is received from a vessel then observers must record all the details of the transhipments. This is not mandatory if an observer is present on a carrier vessel monitoring the transhipment in terms of the IOTC-Regional Observer Programme.

Transhipment may occur on a purse seine vessel that has pursed more fish than the vessel's capacity that a second vessel will load fish from the net. This needs to be recorded on an event basis and must also be discussed in detail in the observer's trip report. .

Date	Record the date the transhipment takes place.
Start time	Record the start time of the transhipment of fish (GMT).
End time	Record the time the transhipment of fish ends (GMT). Note stores, bait or fuel may also be transhipped. The time and details of this must not be confused with the time hat fish or fish products are being transhipped.
Position	Record the position where the transhipment takes place.
Category	Record if transhipping to another vessel or receiving fish from a vessel.
Product transhipped	Record details of the products being transhipped.
Name of carrier/fishing vessel	Record the name and registration details of the carrier or fishing vessel.

Q. Waste Management *(Recommended but not mandatory)* MARPOL agreement annex5

Waste category	Record the category of the waste, organic, inorganic-burnable, (plastic) or un-burnable, (glass or metal).
Storage/Disposal method	Record how the waste was disposed of; for example, incinerated, stored in sacks or disposed of overboard.

III. IOTC data codes

In terms of the IOTC Regional Observer Scheme, Resolution 10/04 paragraph 10 observers will be required to capture a significant amount of information corresponding to the data fields listed in section C.I of this manual and the corresponding data forms. To facilitate the data capture process, observers must use FAO and IOTC data codes where these are applicable. The FAO and IOTC codes will in most cases correspond, however where there are no applicable FAO codes, the IOTC has defined their own codes. These may also cover aggregations of a number of species when a breakdown of catches cannot be defines to species level. For species where a code cannot be found, observers must attempt to identify the species to its level of 100% confidence. If this is not possible, the observers must afford it a code and this should be used consistently for the rest of the trip. Take note of common names used by the crew and where possible take photographs or make a detailed sketch highlighting any diagnostic features. These should also be covered in the observers' trip report.

A. Species Codes

Tuna and tuna-like species under the IOTC mandate

IOTC Code	English name	French name	Scientific name
YFT	Yellowfin tuna	Albacore	*Thunnus albacares*
BET	Bigeye tuna	Patudo; Thon obèse	*Thunnus obesus*
SKJ	Skipjack tuna	Listao	*Katsuwonus pelamis*
ALB	Albacore	Germon	*Thunnus alalunga*
SBF	Southern bluefin tuna	Thon rouge du Sud	*Thunnus maccoyii*
SWO	Swordfish	Espadon	*Xiphias gladius*
BLM	Black Marlin	Makaire noir	*Makaira indica*
BUM	Blue Marlin	Makaire bleu	*Makaira nigricans*
MLS	Striped marlin	Marlin rayé	*Tetrapturus audax*
SFA	Indo-Pacific sailfish	Voilier indo-pacifique	*Istiophorus platypterus*
LOT	Longtail tuna	Thon mignon	*Thunnus tonggol*
KAW	Kawakawa	Thonine orientale	*Euthynnus affinis*
FRI	Frigate tuna	Auxide	*Auxis thazard*
BLT	Bullet tuna	Bonitou	*Auxis rochei*
COM	Narrow-barred Spanish mackerel	Thazard rayé indo-pacifique	*Scomberomorus commerson*
GUT	Indo-Pacific king mackerel	Thazard ponctué indo-pacifique	*Scomberomorus guttatus*

Other bony fish species that may be caught incidentally in IOTC fisheries

IOTC Code	Species English name	Species French name	Species scientific name
BAU	Australian bonito	Bonite bagnard	*Sarda australis*
BAR	Barracudas	Brochets de mer	*Sphyraena spp*
ESCL	Black escolar	Escolier noir	*Lepidocybium flavobrunneum*
MAA	Blue mackerel	Maquereau tacheté	*Scomber australasicus*

BUK	Butterfly kingfish	Thon papillon	*Gasterochisma melampus*
DOL	Common dolphinfish	Coryphène commune	*Coryphaena hippurus*
DOT	Dogtooth tuna	Bonite à gros yeux	*Gymnosarda unicolor*
DBM	Double-lined mackerel	Thazard-kusara	*Grammatorcynus bilineatus*
AMB	Greater amberjack	Sériole couronnée	*Seriola dumerili*
RAG	Indian mackerel	Maquereau des Indes	*Rastrelliger kanagurta*
KAK	Kanadi kingfish	Thazard kanadi	*Scomberomorus plurilineatus*
KOS	Korean seerfish	Thazard coréen	*Scomberomorus koreanus*
SPF	Longbill spearfish	Makaire à rostre	*Tetrapturus pfluegeri*
OIL	Oilfish	Rouvet	*Ruvettus pretiosus*
LAG	Opah	Opah	*Lampris guttatus*
SAP	Pacific saury	Saurie	*Cololabis saira*
BRA	Pomfrets nei	Castagnoles	*Brama spp*
CFW	Pompano dolphinfish	Dorade	*Coryphaena equiselis*
RRU	Rainbow runner	Comète saumon	*Elagatis bipinnulata*
SSP	Short-billed spearfish	Makaire à rostre court	*Tetrapturus angustirostris*
STS	Streaked seerfish	Thazard cirrus	*Scomberomorus lineolatus*
BIP	Striped bonito	Bonite orientale	*Sarda orientalis*
WAH	Wahoo	Thazard bâtard	*Acanthocybium solandri*

Primary species of sharks that are caught in the IOTC fisheries

Code	English name	French name	Scientific name
ALS	Silvertip shark	Requin pointe blanche	*Carcharhinus albimarginatus*
ALV	Thresher Shark	Renard	*Alopias vulpinus*
BSH	Blue shark	Peau bleue	*Prionace glauca*
BTH	Bigeye thresher	Renard à gros yeux	*Alopias superciliosus*
CCP	Sandbar shark	Requin gris	*Carcharhinus plumbeus*
FAL	Silky shark	Requin soyeux	*Carcharhinus falciformis*
LMA	Longfin mako	Petite taupe	*Isurus paucus*
OCS	Oceanic whitetip shark	Requin océanique	*Carcharhinus longimanus*
POR	Porbeagle	Requin-taupe commun	*Lamna nasus*
PSK	Crocodile shark	Requin crocodile	*Pseudocarcharias kamoharai*
PTH	Pelagic Thresher Shark	Renard pélagique	*Alopias pelagicus*
RHN	Whale shark	Requin-baleine	*Rhincodon typus*
SMA	Shortfin mako	Taupe bleue	*Isurus oxyrinchus*
SPL	Scalloped hammerhead	Requin marteau halicorne	*Sphyrna lewini*
TIG	Tiger shark	Requin tigre commun	*Galeocerdo cuvier*
WSH	Great White shark	Grand requin blanc	*Carcharodon carcharias*
RMB	Giant manta	Manta géante	*Manta birostris*

Other species of sharks that may be caught incidentally in IOTC fisheries

IOTC Code	Species English name	Species French name	Species scientific name
OXY	Angular rough shark	Centrine commune	*Oxynotus centrina*
MTM	Arabian smooth-hound	Emissole d'Arabie	*Mustelus mosis*
SHBC	Banded cat shark	Holbiche des plages	*Halaelurus lineatus*
ODH	Bigeye sand tiger shark	Requin noronhai	*Odontaspis noronhai*
BLR	Blacktip reef shark	Requin pointes noires	*Carcharhinus melanopterus*
CCL	Blacktip shark	Requin bordé	*Carcharhinus limbatus*

NTC	Broadnose sevengill shark	Platnez	*Notorynchus cepedianus*
BRO	Copper shark	Requin cuivre	*Carcharhinus brachyurus*
DUS	Dusky shark	Requin de sable	*Carcharhinus obscurus*
CCG	Galapagos shark	Requin des Galapagos	*Carcharhinus galapagensis*
ORR	Grey bambooshark	Requin-chabot gris	*Chiloscyllium griseum*
AML	Grey Reef Shark	Requin dagsit	*Carcharhinus amblyrhynchos*
CCM	Hardnose shark	Requin nez rude	*Carcharhinus macloti*
SCK	Kitefin shark	Squale liche	*Dalatias licha*
CPU	Little gulper shark	Petit squale-chagrin	*Centrophorus uyato*
CYT	Ornate dogfish	Aiguillat élégant	*Centroscyllium ornatum*
DOP	Shortnose spurdog	Aiguillat nez court	*Squalus megalops*
ORI	Slender bambooshark	Requin-chabot élégant	*Chiloscyllium indicum*
CLD	Sliteye shark	Requin sagrin	*Loxodon macrorhinus*
CEM	Smallfin gulper shark	Squale-chagrin cagaou	*Centrophorus moluccensis*
SPZ	Smooth hammerhead	Requin marteau commun	*Sphyrna zygaena*
SMD	Smooth-hound	Emissole lisse	*Mustelus mustelus*
SLA	Spadenose shark	Requin épée	*Scoliodon laticaudus*
SKPN	Spinner Shark	Requin tisserand	*Carcharhinus brevipinna*
CCQ	Spot-tail shark	Requin queue tachet	*Carcharhinus sorrah*
ORZ	Tawny nurse shark	Requin nourrice fauve	*Nebrius ferrugineus*
GAG	Tope shark	Requin-hâ	*Galeorhinus galeus*
SSQ	Velvet dogfish	Squale-grogneur velouté	*Zameus squamulosus*
CCD	Whitecheek shark	Requin joues blanches	*Carcharhinus dussumieri*
RHA	White-eyed shark	Requin museau pointu	*Rhizoprionodon acutus*
OSF	Zebra shark	Requin zèbre	*Stegostoma fasciatum*
HXT	Sharpnose sevengill shark	Requin perlon	*Heptranchias perlo*
SBL	Bluntnose sixgill shark	Requin griset	*Hexanchus griseus*
HXN	Bigeyed sixgill shark	Requin vache	*Hexanchus nakamurai*
RME	Longhorned mobula	Mante diable	*Mobula eregoodootenkee*
RMJ	Spinetail mobula	Mante aiguillat	*Mobula japanica*
RMO	Smoothtail mobula	Mante à queue lisse	*Mobula thurstoni*

Species of marine turtles that may be caught incidentally in IOTC fisheries

IOTC Code	English name	French name	Scientific name
FBT	Flatback turtle	Tortue plate	*Natator depressus*
TUG	Green turtle	Tortue verte	*Chelonia mydas*
TTH	Hawksbill turtle	Tortue caret	*Eretmochelys imbricata*
DKK	Leatherback turtle	Tortue luth	*Dermochelys coriacea*
TTL	Loggerhead turtle	Caouane	*Caretta caretta*
LKV	Olive ridley turtle	Tortue olivâtre	*Lepidochelys olivacea*

Species of seabirds that may be caught incidentally on IOTC fisheries

IOTC Code	English name	French name	scientific name
DAM	Amsterdam Albatross	Albatros d'Amsterdam	*Diomedea amsterdamensis*
DQS	Antipodean Albatross	Albatros des Antipodes	*Diomedea antipodensis*
DCR	Atlantic Yellow-nosed Albatross	Albatros atlantique à nez jaune	*Thalassarche chlororhynchos*
DIM	Black-browed Albatross	Albatros à sourcils noirs	*Thalassarche melanophrys*
DIB	Buller's Albatross	Albatros de Buller	*Thalassarche bulleri*

TQW	Campbell Albatross	Albatros de l'île Campbell	*Thalassarche impavida*
DER	Chatham Albatross	Albatros des Chatham	*Thalassarche eremite*
DIC	Grey-headed Albatross	Albatros à tête grise	*Thalassarche chrysostoma*
TQH	Indian Yellow-nosed Albatross	Albatros indien à nez jaune	*Thalassarche carteri*
PHE	Light-mantled Albatross	Albatros fuligineux	*Phoebetria palpebrata*
MAH	Northern Giant Petrel	Pétrel de Hall	*Macronectes halli*
DIQ	Northern Royal Albatross	Albatros royal du nord	*Diomedea sanfordi*
DKS	Salvin's Albatross	Albatros de Salvin	*Thalassarche salvini*
PFT	Short-tailed Shearwater	Puffin à bec grêle	*Puffinus tenuirostris*
DCU	Shy Albatross	Albatros timide	*Thalassarche cauta*
PHU	Sooty Albatross	Albatros brun	*Phoebetria fusca*
PFG	Sooty Shearwater	Puffin fuligineux	*Puffinus griseus*
MAI	Southern Giant Petrel	Pétrel géant	*Macronectes giganteus*
DIP	Southern Royal Albatross	Albatros royal	*Diomedea epomophora*
DBN	Tristan Albatross	Albatros de Tristan	*Diomedea dabbenena*
DIX	Wandering Albatross	Albatros hurleur	*Diomedea exulans*
PCW	Westland Petrel	Pétrel de Westland	*Procellaria westlandica*
TWD	White-capped Albatross	Albatros à cape blanche	*Thalassarche steadi*
PRO	White-chinned Petrel	Puffin à menton blanc	*Procellaria aequinoctialis*

Species of sea mammals that occur within the IOTC Area of Competence

IOTC Code	Species English name	Species French name	Species scientific name
BDW	Andrews' beaked whale	Baleine à bec de Bowdoin	*Mesoplodon bowdoini*
BAW	Arnoux's beaked whale	Berardien d'Arnoux	*Berardius arnuxii*
BBW	Blainville's beaked whale	Baleine à bec de Blainville	*Mesoplodon densirostris*
BLW	Blue whale	Rorqual bleu	*Balaenoptera musculus*
DBO	Bottlenose dolphin	Grand dauphin	*Tursiops truncatus*
BRW	Bryde's whale	Rorqual de Bryde	*Balaenoptera edeni*
CMD	Commerson's dolphin	Dauphin de Commerson	*Cephalorhynchus commersonii*
DCO	Common dolphin	Dauphin commun	*Delphinus delphis*
BCW	Cuvier's beaked whale	Ziphius	*Ziphius cavirostris*
DDU	Dusky dolphin	Dauphin sombre	*Lagenorhynchus obscurus*
DWW	Dwarf sperm whale	Cachalot nain	*Kogia simus*
FAW	False killer whale	Faux-orque	*Pseudorca crassidens*
FIW	Fin whale	Rorqual commun	*Balaenoptera physalus*
PFI	Finless porpoise	Marsouin aptère	*Neophocaena phocaenoides*
FRD	Fraser's dolphin	Dauphin de Fraser	*Lagenodelphis hosei*
TGW	Ginkgo-toothed beaked whale	Baleine à bec de Nishiwaki	*Mesoplodon ginkgodens*
BYW	Gray's beaked whale	Baleine à bec de Gray	*Mesoplodon grayi*
BHW	Hector's beaked whale	Baleine à bec d'Hector	*Mesoplodon hectori*
HRD	Hourglass dolphin	Dauphin crucigére	*Lagenorhynchus cruciger*
HUW	Humpback whale	Baleine à bosse	*Megaptera novaeangliae*
DHI	Indo-Pacific hump-backed dolphin	Dauphin à bosse de l'Indopacifique	*Sousa chinensis*
IRD	Irrawaddy dolphin	Orcelle	*Orcaella brevirostris*
KIW	Killer whale	Orque	*Orcinus orca*
PIW	Long-finned pilot whale	Globicéphale commun	*Globicephala melas*
BNW	Longman's beaked whale	Baleine à bec de Longman	*Mesoplodon pacificus*
MIW	Minke whale	Petit rorqual	*Balaenoptera acutorostrata*

DPN	Pantropical spotted dolphin	Dauphin tacheté pantropical	*Stenella attenuata*
KPW	Pygmy killer whale	Orque pygmée	*Feresa attenuata*
CPM	Pygmy right whale	Baleine pygmée	*Caperea marginata*
PYW	Pygmy sperm whale	Cachalot pygmée	*Kogia breviceps*
DRR	Risso's dolphin	Grampus	*Grampus griseus*
RTD	Rough-toothed dolphin	Sténo	*Steno bredanensis*
BSW	Sherpherd's beaked whale	Tasmacète	*Tasmacetus shepherdi*
SHW	Short-finned pilot whale	Globicéphale tropical	*Globicephala macrorhynchus*
SRW	Southern bottlenose whale	Hyperoodon austral	*Hyperoodon planifrons*
EUA	Southern right whale	Baleine australe	*Eubalaena australis*
RSW	Southern right whale dolphin	Dauphin aptère austral	*Lissodelphis peronii*
SPP	Spectacled porpoise	Marsouin de Lahille	*Australophocaena dioptrica*
SPW	Sperm whale	Cachalot	*Physeter catodon*
DSI	Spinner dolphin	Dauphin longirostre	*Stenella longirostris*
TSW	Strap-toothed whale	Baleine à bec de Layard	*Mesoplodon layardii*
DST	Striped dolphin	Dauphin bleu et blanc	*Stenella coeruleoalba*

Target Species

The main species or groups of species (aggregates) that are targeted by IOTC fisheries.
(Note: *Species caught other than target species are referenced as "By-catch"*)

English name	French name
Yellowfin tuna	Albacore
Bigeye tuna	Patudo (hon obèse)
Skipjack tuna	Listao
Yellowfin tuna and Bigeye tuna	Albacore et thon obèse
Yellowfin tuna and Skipjack tuna	Albacore et Listao
Albacore	Germon
Southern bluefin tuna	Thon rouge du Sud
Swordfish	Espadon
Marlins and sailfish	Marlins et voilier indo-pacifique
Longtail tuna	Thon mignon
Small tunas (Frigate tuna, bullet tuna, kawakawa)	Thons mineurs (auxide, bonitou, thonine orientale)
Narrow-barred Spanish mackerel	Thazard rayé indo-pacifique
Sharks	Requins

B. Vessel and gear codes

Vessel specification codes

IOTC Code	Type of measure	English Description	French Description
L005	Length Overall / Longueur hors-tout	LOA < 5 m	LHT < 5 m
L015	Length Overall / Longueur hors-tout	LOA ≥ 5 m and < 15 m	LHT ≥ 5 m et < 15 m
L024	Length Overall / Longueur hors-tout	LOA ≥ 15 m and < 24 m	LHT ≥ 15 m et < 24 m
L032	Length Overall / Longueur hors-tout	LOA ≥ 24 m and < 32 m	LHT ≥ 24 m et < 32 m
L045	Length Overall / Longueur hors-tout	LOA ≥ 32 m and < 45 m	LHT ≥ 32 m et < 45 m
L060	Length Overall / Longueur hors-tout	LOA ≥ 45 m and < 60 m	LHT ≥ 45 m et < 60 m
L080	Length Overall / Longueur hors-tout	LOA ≥ 60 m and < 80 m	LHT ≥ 60 m et < 80 m
L100	Length Overall / Longueur hors-tout	LOA ≥ 80 m and < 100 m	LHT ≥ 80 m et < 100 m
L120	Length Overall / Longueur hors-tout	LOA ≥ 100 m and < 120 m	LHT ≥ 100 m et < 120 m

L150	Length Overall / Longueur hors-tout	LOA ≥ 120 m	LHT ≥ 120 m
C002	Fish Carrying Capacity / Capacité de Transport de Poissons	FCC < 2 t	CTP < 2 t
C010	Fish Carrying Capacity / Capacité de Transport de Poissons	FCC ≥ 2 t and < 10 t	CTP ≥ 2 t et < 10 t
C050	Fish Carrying Capacity / Capacité de Transport de Poissons	FCC ≥ 10 t and < 50 t	CTP ≥ 10 t et < 50 t
C200	Fish Carrying Capacity / Capacité de Transport de Poissons	FCC ≥ 50 t and < 200 t	CTP ≥ 50 t et < 200 t
C400	Fish Carrying Capacity / Capacité de Transport de Poissons	FCC ≥ 200 t and < 400 t	CTP ≥ 200 t et < 400 t
C800	Fish Carrying Capacity / Capacité de Transport de Poissons	FCC ≥ 400 t and < 800 t	CTP ≥ 400 t et < 800 t
C912	Fish Carrying Capacity / Capacité de Transport de Poissons	FCC ≥ 800 t and < 1200 t	CTP ≥ 800 t et < 1200 t
C916	Fish Carrying Capacity / Capacité de Transport de Poissons	FCC ≥ 1200 t and < 1600 t	CTP ≥ 1200 t et < 1600 t
C920	Fish Carrying Capacity / Capacité de Transport de Poissons	FCC ≥ 1600 t and < 2000 t	CTP ≥ 1600 t et < 2000 t
C950	Fish Carrying Capacity / Capacité de Transport de Poissons	FCC ≥ 2000 t	CTP ≥ 2000 t
T001	Gross Tonnage / Tonnage brut	GT < 1 t	TB < 1 t
T015	Gross Tonnage / Tonnage brut	GT ≥ 1 t and < 15 t	TB ≥ 1 t et < 15 t
T100	Gross Tonnage / Tonnage brut	GT ≥ 15 t and < 100 t	TB ≥ 15 t et < 100 t
T200	Gross Tonnage / Tonnage brut	GT ≥ 100 t and < 200 t	TB ≥ 100 t et < 200 t
T500	Gross Tonnage / Tonnage brut	GT ≥ 200 t and < 500 t	TB ≥ 200 t et < 500 t
T910	Gross Tonnage / Tonnage brut	GT ≥ 500 t and < 1000 t	TB ≥ 500 t et < 1000 t
T920	Gross Tonnage / Tonnage brut	GT ≥ 1000 t and < 2000 t	TB ≥ 1000 t et < 2000 t
T935	Gross Tonnage / Tonnage brut	GT ≥ 2000 t and < 3500 t	TB ≥ 2000 t et < 3500 t
T950	Gross Tonnage / Tonnage brut	GT ≥ 3500 t and < 5000 t	TB ≥ 3500 t et < 5000 t
T970	Gross Tonnage / Tonnage brut	GT ≥ 5000 t	TB ≥ 5000 t

Electronic gear usage codes

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

Codes for onboard storage of the catch

IOTC Code	English Description	French Description
NO	None	Aucun
ST	Salt	Sel
IC	Ice	Glace
BR	Refrigerated brine	Saumure réfrigérée
RW	Refrigerated sea water	Eau de mer réfrigérée
FR	Cold storage between 0 and -30 degrees	Chambre froide entre 0 et -30 degrés
DF	Cold storage below -30 degrees	Chambre froide en-dessous de -30 degrés

Codes for onboard processing

IOTC Code	English Description	French Description
RD	None; Round (whole, live)	Aucune; entier

GG	Gilled-and-gutted (bill off)	Eviscéré (sans rostre)
HD	Headed-and-gutted	Etêté et éviscéré
PD	Headed and gutted and caudal peduncle-off	Etêté, éviscéré et sans pédoncule caudal
HT	Headed and gutted and tailed	Etêté, éviscéré et sans nageoire caudale
FL	Fish loins	Longes de poisson

Gear Types codes for Observed IOTC Fisheries

IOTC Code	Type of Operation	English name	French name
GI	Artisanal	Gillnet	Filet maillant
GIDR	Industrial	Driftnet	Filet dérivant
GIOF	Semi-industrial	Offshore gillnet	Filet maillant hauturier
LL	Industrial	Drifting longline (over 1800 hooks)	Palangre dérivante (plus de 1800 hameçons)
LLFR	Industrial	Drifting longline (up to 1800 hooks)	Palangre dérivante (jusqu'à 1800 hameçons)
LLGI	Semi-industrial	Gillnet/longline	Filet maillant/palangre
LLSI	Semi-industrial	Swordfish longline (semi-industrial)	Palangre à espadon (semi-industrielle)
LLSK	Industrial	Shark longline	Palangre à requins
LLSW	Industrial	Swordfish longline (Florida longline)	Palangre à espadon (palangre Florida)
LLTU	Industrial	Tuna longline	Palangre à thons
PL	Artisanal	Pole and line	Canneurs
PLIN	Industrial	Industrial pole and line	Canneurs industriels
PLME	Artisanal	Pole and line (mechanized boats)	Canneurs (motorisés)
PLNM	Artisanal	Pole and line (non-mechanized boats)	Canneurs (non-motorisés)
PLOF	Semi-industrial	Offshore pole and line	Canneurs hauturiers
PS	Industrial	Tuna purse seine	Senne tournante industrielle à thons
PSFS	Industrial	Free-school tuna purse seine	Senne tournante à thons sur banc libre
PSLS	Industrial	Log-school tuna purse seine	Senne tournante à thons sous épave
PSPA	Industrial	Purse seine with payao	Senne tournante avec payao
PSSP	Industrial	Supply vessel industrial purse seiner	Bateau auxiliaire, senneur industriel
PSSS	Semi-industrial	Small purse seines	Petites sennes tournantes

C. Activity codes

Surface Fisheries Activity Codes

CODE	ACTIVITY
PO	In port (for refuelling, loading goods, dropping or taking crew & scientists)
BA	Anchor for bait fishing (at night or during the day) or searching for bait (during the day or during the night) or drifting at night with lights to gather baits
BF	Bait fishing at night or during the day (the net is set or launched)
SD	Steaming during the day
SN	Steaming at night
SS	Searching with a school associated to the vessel
SE	Searching for tuna schools, logs or Fish Aggregating Devices (FADs)
CH	Chasing a tuna school (chumming can be part of this chasing activity)
FI	Fishing (tagging) tuna (chumming is successful, fish are poled on board)
DR	Drifting (reason not specified)
DS	Drifting during the day with a tuna school
DL	Drifting during the day near a log or a FAD
DG	Drifting or steaming at night with lights to gather tuna and/or with an associated school

DW	Drifting because of bad weather
DT	Drifting or at anchor or in port because of engine or other mechanical problems

Surface fisheries school sighting codes

1	Seen from vessel
2	Seen from helicopter
3	Marked with beacon
4	Bird radar
5	Acoustic – sonar / depth sounder
6	Info. from other vessel
7	FAD

D. Biological Sampling Codes

Types of measurements used by the IOTC and size intervals recommended

IOTC Code	English Description	French Description	Recommended. Interval
FL	Fork length	Longueur à la fourche	1 cm
TL	Total length	Longueur totale	1 cm
SL	Standard length	Longueur standard	1 cm
CF	Cleithrum-fork of the tail length	Longueur opercule-fourche de la queue	1 cm
CK	Cleithrum-keel length	Longueur opercule-carène	1 cm
EF	Eye-fork of the tail length	Longueur oeil-fourche de la queue	1 cm
DF	Base first dorsal fin-fork of the tail length	Longueur base de la première nageoire dorsale-fourche de la queue	1 cm
SF	Tip of snout-base first dorsal fin length	Longueur pointe du museau-base de la première nageoire dorsale	0.5 cm
PA	Base pectoral fin-base anal fin length	Longueur base de la nageoire pectorale-base de la nageoire anale	0.5 cm
PC	Base pectoral fin-fork of the tail length	Longueur base de la nageoire pectorale-fourche de la queue	1 cm
RD	Round (whole, live) weight	Poids vif (entier)	1 kg
GG	Gilled-and-gutted (bill off) weight	Poids éviscéré (sans rostre)	1 kg
HD	Headed-and-gutted weight	Poids étêté et éviscéré	0.5 kg
PD	Headed and gutted and caudal peduncle-off weight	Poids étêté, éviscéré et sans pédoncule caudal	0.5 kg
HT	Headed and gutted and tailed weight	Poids étêté, éviscéré et sans nageoire caudale	0.5 kg

Length Measurement codes

(Note units: mm-millimetres; cm-centimetres)

TL	Tip of the snout to the end of the tail
UJFL	Tip of the upper jaw to fork in tail
LJFL	Lower jaw to fork in tail
PFL	Pectoral fin to fork in tail
TW	(Skates & Rays) Total wingspan width
CL	(Turtles) carapace length
NM	Not measured

Sex (Gender) code

M	Male
F	Female
Unk	Not determined

Fate code for released or discarded fish and other marine fauna

D	Dead
A0	Alive (swam away) conditions not determined
A1	Alive and in good health condition
A2	Alive; minor injuries / stressed high probability of survival
A3	Alive; life threatening injuries / severe stress unlikely to survive
Unk	Condition not observed and unknown

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IOTC Secretariat. *Guidelines for the reporting of fisheries statistics to the IOTC*

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Collette, B.B. and C.E. Nauen, 1983. *FAO species, catalogue. Vol. 2. Scombrids of the world. An annotated and illustrated catalogue of tunas, mackerels, bonitos and related species known to date*. FAO Fish.Synop., (125)Vol.. 2: 137 p.

Nakamura, I., 1985. *FAO species catalogue. Vo1.5. Billfishes of the World. An annotated and illustrated catalogue of marlins, sailfishes, spearfishes and swordfishes known to date*. FAO Fish.Synop., (125)Vo1.5:65 p.

Weblinks

www.fao.org/fishery&aquaculture/countryprofile

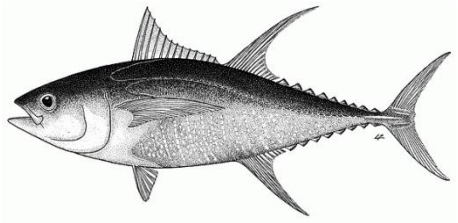
www.fao.org/fishery&aquaculture/fishery/fishfinder

www.fishbase.org

Appendix I Descriptions of the main species under IOTC management

Yellowfin Tuna (*Thunnus albacares*)

FAO-IOTC code YFT



Country	Name
China (People's Republic of)	Huang ci jin ciang yu
English	Yellowfin tuna, Yellowfin Tunny, Albacore,
French	Albacore, Thon, Thon rouge
Spanish	Rabil
Japan	Hatsu, Kihada, Kimeji (young), Kiwada

Geographical Distribution

This highly migratory species is found throughout the tropical regions of the three major oceans and its range extends to 45^{o} North and South of the equator. They are a pelagic species found almost exclusively in open waters within 100 m from the surface.

Biology

Key diagnostic feature is the very long second dorsal fin and anal fin, which in some may reach well over 20% of the FL. The pectoral fin is moderately long, usually reaching beyond the second dorsal fin origin but not beyond the end of its base.

Colour:black metallic dark blue changing through yellow to silver on the belly.

Maximum length: 239 cm. Common length: 150 cm.

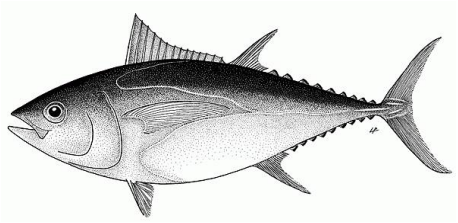
Peak spawning occurs during the summer.

Availability to the fishery

Juvenile yellowfin are more susceptible to the purse seine and pole & line fishery. Larger mature fish are targeted by the pelagic longline fishery, pole & line fishery, artisanal fishery and the recreational fishery.

Bigeye Tuna (*Thunnus obesus*)

FAO-IOTC code BET



Country	Name
English	Bigeye tuna
French	Patudo, Thon aux grands yeux, Thon obèse, Thon ventru
Spanish	Patudo
Japan	Bachi, Daruma, Darumeji, Mebachi, Mebuto

Geographical Distribution

Worldwide in tropical and subtropical waters. Pelagic, oceanic species, occurring from the surface to about 250 m depth. Major concentrations of *T. obesus* are closely related to seasonal and climatic changes in surface temperature and thermocline.

Biology

A large species, deepest near the middle of first dorsal fin base. Pectoral fins moderately long (22 to 31% of FL) in large individuals (over 110 cm of FL), but very long (as long as in *T. alalunga*) in smaller individuals (though in fish shorter than 40 cm they may be very short.).

Colour: lower sides and belly whitish; a lateral iridescent blue band runs along sides in live specimens; first dorsal fin deep yellow, second dorsal and anal fins light yellow, finlets bright yellow edged with black.

Maximum length: 0ver 200 cm. Common length: up to 180 cm

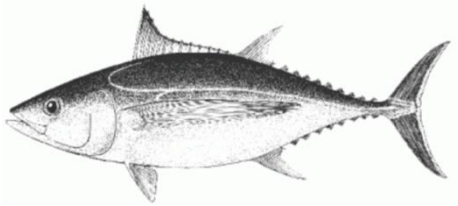
Spawning occurs throughout the year

Availability to the fishery

The most important fishing technique is pelagic longline. In Japan, its meat is highly priced and processed into sashimi as a substitution for bluefin tuna.

Albacore Tuna (*Thunnus alalunga*)

FAO-IOTC code ALB



Country	Name
China (People's Republic of)	Chang chi we
English	Albacore, Longfin tunny
French	Germon
Spanish	Albacora, Atún blanco
Japan	Binnaga, Tonbo

Geographical Distribution

A pelagic, oceanic species, cosmopolitan in tropical and temperate waters of all oceans, extending north to 50° North and 40° South of the equator. Albacore migrate within water masses rather than across temperature boundaries.

Biology

A medium size tuna. Its trunk profile is deepest at a more posterior point than in other tunas. Second dorsal fin clearly lower than first dorsal; pectoral fins remarkably long, usually 30% of fork length or longer in fish larger than 50 cm, reaching well beyond origin of second dorsal fin (usually up to second dorsal finlet).

Colour: a faint lateral iridescent blue band runs along sides in live fish; first dorsal fin deep yellow, second dorsal and anal fins light yellow, anal finlets dark; posterior margin of caudal fin white.

Maximum length: 127cm. Common length: 40 - 100cm

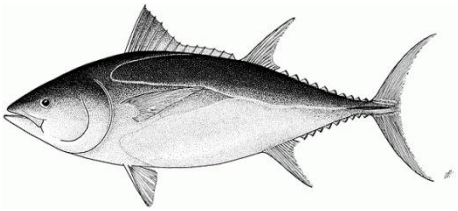
Spawning occurs throughout the year

Availability to the fishery

Larger fish caught on pelagic longlines. Surface methods of fishing (pole and line, purse-seining, trolling, live-bait) tend to catch smaller fish.

Southern Bluefin Tuna (*Thunnus maccoyii*)

FAO-IOTC code SBF



Country	Name
English	Southern bluefin tuna, Southern tunny
French	Thon rouge du Sud
Spanish	Atún rojo del Sur
Japan	Maguro, Indo (Goshu) maguro, Minami maguro

Geographical Distribution

Pelagic, oceanic in cold temperate waters, confined to temperatures between 5 – 20^{o} C for much of its life-span. Found in the Southern Ocean south of 30° S.

Biology

A large species. The trunk is deepest near middle of first dorsal fin base. Pectoral fins very short, less than 80% of head length (or between 20.2 and 23% of fork length) and never reaching the interspace between the dorsal fins.

Colour: lower sides and belly silvery white with colourless transverse lines alternated with rows of colourless dots (the latter dominate in older fish and visible only in fresh specimens). First dorsal fin yellow or bluish; anal fin and finlets dusky yellow edged with black; median caudal keel yellow in adults.

Maximum length: 225cm. Common length: 160 - 200cm.

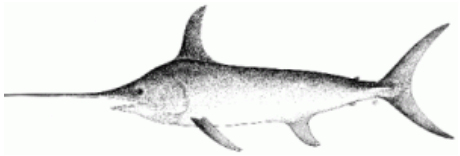
The spawning season extends throughout the southern summer from about September/October to March.

Availability to the fishery

The main longline fishing grounds extend from 10° to 170° West, with concentrations off Tasmania, New Zealand and South Africa. They shift seasonally associated with changes in hydrographical conditions. This species is prized for the sashimi markets of Japan.

Swordfish (*Xiphias gladius*)

FAO-IOTC code SWO



Country	Name
China (People's Republic of)	Chien-chi-yu, Ki-hi-khu, Tinmankhu
English	Swordfish, Broadbill
French	Espadon
Spanish	Pez espada
Japan	Meka, Andaachi, Dakuda, Ginzasu, Goto , Hirakucha, Izasu

Geographical Distribution

Cosmopolitan in tropical, temperate and sometimes cold waters of all oceans, including the Mediterranean Sea. The latitudinal range of this species extends from 25° N to 45°S in the Indian Ocean. Pelagic, oceanic species, usually found in surface waters warmer than 13° C.

Biology

Bill extremely long, its cross-section flat;; no pelvic fins; body without scales. Body elongate and cylindrical. Large eyes in adults. Two widely separate dorsal fins in adults (continuous in immature specimens), the first much larger than the second. Caudal fin large and lunate. Caudal peduncle with a large keel present on each side and a deep notch on both the dorsal and ventral surfaces. In its preadult stage, the swordfish undergoes drastic morphological changes with growth, which affect the body shape, the bill and particularly the dorsal, anal and caudal fins.

Colour: back and sides of body blackish-brown, gradually fading to light-brown on ventral side; membrane of first dorsal fin dark blackish brown; other fins brown or blackish-brown.

Maximum length: 445cm. Common length: 120 - 190cm

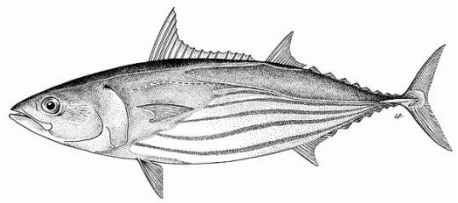
Spawning occurs throughout the year

Availability to the fishery

Primarily caught by longline vessels adding light sticks to the branch lines just above the hook.

Skipjack Tuna (*Katsuwonus pelamis*)

FAO-IOTC code SKJ



Country	Name
China (People's Republic of)	Then chien
English	Skipjack, Striped tuna, Bonito, Lesser tunny
French	Listao
Spanish	Listado
Japan	Hongatsuo, Katsuo, Katsuwo, Katuwo, Magatsuwo,

Geographical Distribution

Pelagic, oceanic species. Aggregations of this species tend to be associated with convergences, boundaries between cold and warm water masses. Depth distribution ranges from the surface to about 260 m during the day, but is limited to near surface waters at night.

Biology

The back is dark purplish blue, lower sides and belly silvery, with 4 to six very conspicuous longitudinal dark bands which in live specimens may appear as continuous lines of dark blotches.

Maximum length: 108 cm. Common length: 80 cm.

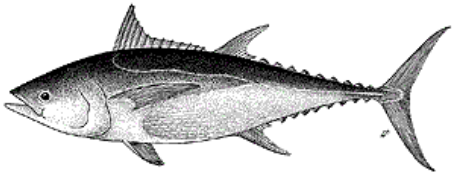
Skipjack tuna spawn in batches throughout the year in equatorial waters, and from spring to early fall in subtropical waters, with the spawning season becoming shorter as distance from the equator increases.

Availability to the fishery

Skipjack tuna is taken at the surface, mostly with purse seines and pole-and-line gear but also incidentally by longlines. Other (artisanal) gear include gillnets, traps, harpoons and beach seines. Skipjack make up about 40% of the world's total tuna catch and has replaced yellowfin as the dominant tuna species.

Longtail Tuna (*Thunnus tonggol*)

FAO-IOTC code LOT



Country	Name
English	Longtail tuna,
French	Thon mignon
Spanish	Atún tongol
Japan	Koshinaga

Geographical Distribution

Indo-West Pacific Ocean from Japan south through the Philippines to Papua New Guinea, New Britain, the northern three quarters of Australia (Twofold Bay, New South Wales to Freemantle, Western Australia), west through the East Indies to both coasts of India, southern Arabian Peninsula, the Red Sea and the Somalia coast.

Biology

A small species. The trunk deepest near middle of first dorsal fin base. Second dorsal fin higher than first dorsal; pectoral fins short to moderately long, 22 to 31% of fork length in smaller specimens (under 60 cm fork length) and 16 to 22% in larger individuals.

Colour: lower sides and belly silvery white with colourless elongate oval spots arranged in horizontally oriented rows; dorsal, pectoral and pelvic fins blackish, tip of second dorsal and anal fins washed with yellow; anal fin silvery; dorsal and anal liver finlets yellow with greyish margins; caudal fin blackish, with streaks of yellowish green.

Maximum length: 130cm. Common length: 40 - 70cm.

Spawning occurs throughout the year.

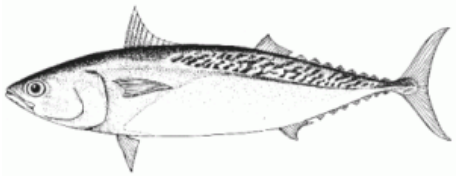
Note: Juveniles of this species, bluefin tuna, yellowfin tuna and bigeye tuna are very similar.

Availability to the fishery

Fishing gear includes trolls, driftnets, and longlines.

Frigate Tuna *(Auxis thazard*)

FAO-IOTC code FRI



Country	Name
English	Frigate tuna, Frigate mackerel, Leadenall
French	Auxide
Spanish	Melva
Japan	Hiramejika, Hirasoda, Hirasodakatsuo, Oboso, Suma

Geographical Distribution

Pelagic, oceanic species.

Biology

Pectoral fins short, but reaching past vertical line from anterior margin of scaleless area above corselet; corselet well developed and narrow in its posterior part (no more than 5 scales wide under second dorsal fin origin).

Colour: a pattern of 15 or more narrow, oblique to nearly horizontal, dark wavy lines in the scaleless area above lateral line.

Maximum length: 58cm. Common length: 25 - 40cm

In the southern Indian Ocean, the spawning season extends from August to April; north of the equator it is reported from January to April.

Availability to the fishery

Catches of the genus *Auxis* are usually not identified to species because of current problems in identification.

Bullet Tuna (*Auxis rochei*)

FAO-IOTC code BLT

Country	Name
English	Bullet tuna, Bullet mackerel
French	Bonitou
Spanish	Melva
Japan	Chiboh, Dainanpo, Magatsuwo, Manba, Mandara, Soda

Geographical Distribution

Pelagic, oceanic species

Biology

Pectoral fins short, not reaching vertical line from anterior margin of scaleless area above corselet; corselet well developed in its posterior part (more than 6 scales wide, usually 10 to 15) under second dorsal fin origin).

Colour: a pattern of 15 or more fairly broad, nearly vertical dark bars in the scaleless area. Maximum length: 50cm.

Common length: 15 - 25cm.

Spawning occurs throughout the year

Availability to the fishery

Catches of the genus *Auxis* are usually not identified to species because of current problems in identification.

Narrow Barred Spanish Mackerel (*Scomberomorus commerson*)

FAO-IOTC code COM

Country	Name
English	Narrow Barred Spanish Mackerel, Doggie, Kingfish
French	Thazard rayé indo-pacifique
Spanish	Carite estriado Indo-Pacífico
Japan	Yokoshimasawara

Geographical Distribution

Widespread throughout the Indo-West Pacific from South Africa and the Red Sea east through the Indo Australian Archipelago to Australia and Fiji and north to China and Japan.

Biology

Gillrakers on first arch few: 0 to 2 on upper limb; 1 to 8 on lower limb; 1 to 8 total. First dorsal fin with 15 to 18 spines, usually 16 or 17; second dorsal with 15 to 20 rays, usually 17 or 18, followed by 8 to 10 finlets; anal fin with 16 to 21 rays, usually 18 or 19 followed by 7 to 12 finlets, usually 9 or 10; pectoral fin rays 21 to 24. Lateral line abruptly bent downward below end of second dorsal fin.

Colour: sides silvery grey marked with transverse vertical bars of a darker grey; bars narrow and slightly wavy, sometimes breaking up into spots ventrally; bars number 40 to 50 in adults but are usually fewer than 20 in juveniles up to 45 cm fork length; cheeks and lower jaw silvery white; first dorsal fin bright blue rapidly fading to blackish blue; pectoral fin light grey turning to blackish blue; caudal fin lobes, second dorsal, anal, and dorsal and anal finlets pale greyish white turning to dark grey. Juveniles have the anterior membranes of the first dorsal jet-black contrasting with pure white posteriorly.

Maximum length: 220cm. Common length: to 90cm.

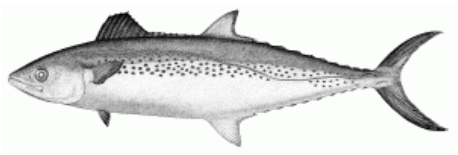
The spawning season in east Africa extends from October to July, off Madagascar.

Availability to the fishery

This species is caught by commercial, artisanal, and recreational fisheries.

Indo-Pacific King Mackerel (*Scomberomorus guttatus*)

FAO-IOTC code GUT



Country	Name
English	Indo-Pacific King Mackerel, Spotted Spanish mackerel
French	Thazard ponctué indo-pacifique
Spanish	Carite del Indo-Pacífico
Japan	Taiwansawara

Geographical Distribution

Along the shores of continental Indo-West Pacific from Wakasa Bay, Sea of Japan and Hong Kong south to the Gulf of Thailand and west to the Gulf lying between the Arabian peninsula and Iran.

Biology

Depth of body less than in *S. koreanus*. Gillrakers on first arch moderate: 1 or 2 on upper limb; 7 to 12 on lower limb; 8 to 14 total. First dorsal fin with 15 to 18 spines, usually 16 or more; second dorsal with 18 to 24 rays, usually 20 to 22, followed by 7 to 10 finlets; anal fin with 19 to 23 rays; followed by 7 to 10 finlets, usually 8; pectoral fin rays few, 20 to 23, modally 21. Lateral line with many fine auxiliary branches extending dorsally and ventrally in anterior third, gradually curving down toward caudal peduncle.

Colour: sides silvery white with several longitudinal rows of round dark brownish spots (smaller than eye diameter) scattered in about 3 irregular rows along lateral line. First dorsal fin membrane black up to the 8^{th} spine, white posteriorly, with the distal margin black; pectoral, second dorsal and caudal fins dark brown; pelvic and anal fins silvery white.

Maximum length: 76cm. Common length: 48 - 52cm.

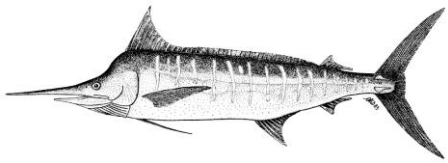
Spawning occurs from April to July around Rameswaram Island between India and Sri Lanka.

Availability to the fishery

Caught by commercial and artisanal fisheries. Sold fresh or salted.

Indo-Pacific Blue Marlin (*Makaira mazara*)

FAO-IOTC code BLZ



Country	Name
English	Indo-Pacific Blue Marlin, Blue marlin
French	Makaire bleu de l'Indo-Pacifique
Spanish	Aguja azul de Indo-pacifico
Japan	Genba, Katokui, Katsuokui, Kudamaki, Kuro, Kuroka,

Geographical Distribution

Highly migratory pelagic, oceanodromous species. It is the most tropical billfish species and is common in equatorial waters. Not usually seen close to land masses or islands, unless there is a deep drop-off of the shelf. Remain mostly within the upper 37 m. Believed to form small-scale schools of at most 10 individuals. Larger fish tend to swim solitarily. Depth range 0 - 200m..

Biology

Body elongated and not very compressed; upper jaw produced into a robust but not very long beak; two dorsal fins, the height of the first less then the greatest body depth, short anteriorly, taller in the middle, then becoming shorter posteriorly; pectoral fins falcate and flexible, with 21 to 23 rays; body densely covered with small, embedded scales with 1 or 2 sharp points.Bill long, extremely stout and round in cross section. Nape conspicuously elevated. No gill rakers. Caudal peduncle with strong double keels on each side and a shallow notch on both the dorsal and ventral surfaces.

Colour: back dark blue, with 15 bluish bars across the flanks; belly pale silver; membrane of first dorsal fin blue black, with dark spots.

Maximum length: 500cm. Common length: 350cm

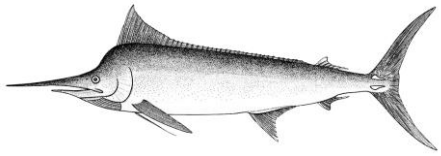
Note: Many scientists do not view *Makaira mazara* and *Makaira nigricans* as distinct species, and consider the the latter species a single pantropical occurring in the Atlantic, Pacific and Indian Oceans.

Availability to the fishery

Commercial longline and recreational game-fishing. Incidental by-catch of other fisheries.

Black Marlin (*Makaira indica*)

FAO-IOTC code BLM



Country	Name
China (People's Republic of)	Kyau-shit-á, Lih-ch'ih-Ch'i-yü;
English	Black Marlin
French	Makaire noir
Spanish	Aguja negra
Japan	Genba, Katahari, Shiro, Shiroka, Shirokajiki, Shirokawa

Geographical Distribution

The black marlin is distributed throughout the tropical and subtropical waters of the Pacific and Indian oceans where the main population and the spawning grounds occur, but it also occasionally enters temperate waters to 45°S in the Indian Ocean. This is a pelagic and oceanic species that is usually found in surface waters at temperatures ranging from 15° to 30°C. Often in nearshore waters close to land masses, islands, and coral reef areas. *M. indica* usually occurs nearer to the surface than most other billfishes (except the sailfish).

Biology

Body not very compressed; nape highly elevated; height of anterior lobe of first dorsal fin smaller than greatest body depth; second dorsal fin slightly forward of second anal fin; pectoral fins rigid, not adpressible against sides of body. . Caudal peduncle fairly scaled.

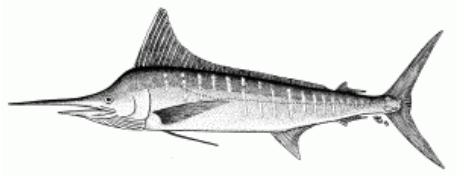
Maximum length: greater than 448cm. Common length: 170cm.

Availability to the fishery

The commercial catch of *Makaira indica* is taken mostly by surface longlining.

Striped marlin (*Tetrapturus audax*)

FAO-IOTC code MLS



Country	Name
China (People's Republic of)	Chi zuo fo yii, Hung ju chi yii, Hung ju ting pan
English	Striped marlin
French	Marlin rayé
Spanish	Marlin rayado
Japan	Achinoiyo, Achinoiyu, Achinuigu, Akinoio, Akinoiyo

Geographical Distribution

T. audax occurs mainly in the tropical, subtropical and temperate waters of the Pacific and Indian oceans. As far south as 45°S in the south-western Indian Ocean and 35°S in the south eastern Indian Ocean. A pelagic and oceanic species, which is abundant in the western Arabian Sea.

Biology

Body elongate and fairly compressed. Bill stout and long,round in cross section; nape fairly elevated. Two dorsal fins, the first with 37 to 42 rays, usually with a pointed anterior lobe, higher than body depth anteriorly. Second dorsal fin with 5 or 6 rays, its position slightly backward in respect to the second anal fin. Two anal fins, the first with 13 to 18 rays, the second with 5 or 6 rays. Caudal peduncle well compressed (laterally) and slightly depressed (dorsoventrally), with a pair of keels on each side and a shallow notch on both, the dorsal and ventral surfaces. Anus situated just in front of first anal fin origin. Lateral line single and obvious, curving above base of pectoral fin and then continuing in a straight line toward the caudal fin base.

Colour: body blue-black dorsally and silvery white ventrally, with about 15 rows of cobalt-coloured stripes, each consisting of round dots and/or narrow bands. First dorsal fin dark blue; other fins usually dark brown, sometimes tinged with dark blue; bases of first and second anal fins tinged with silvery white.

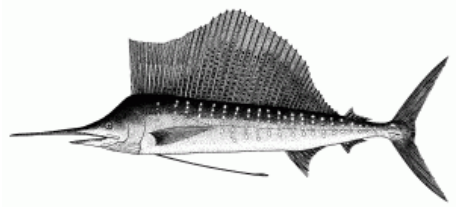
Maximum length: exceeding 350cm. Common length: 290cm.

Availability to the fishery

The commercial catch of *T. audax* is taken mostly by surface longlining, while harpooning may account for up to 1% of the total catch in recent years.

Indo-Pacific Sailfish (*Istiophorus platypterus*)

FAO-IOTC code SFA



Country	Name
China (People's Republic of)	Ho-soan-ki-hi, Tong-fangchiyii, Yu-san-chi-yu, Yu-san-yu
English	Indo-pacific sailfish, Bayonet fish,
French	Voilier indo-pacifique
Spanish	Pez vela del Indo-Pacífico
Japan	Akitaroo, Atsutaro, Banba, Baren, Barin, Bashoo, Byoobu

Geographical Distribution

I. platypterus is widely distributed in the tropical and temperate waters of the Pacific and Indian oceans. Latitudinal range is 45°S in the western Indian Ocean, and 35°S in the eastern Indian Ocean. This species shows a strong tendency to come close to the shore, even though a few individuals have been caught in the central parts of the oceans. In the Indian Ocean, off East Africa, the abundance and distribution of *I. platypterus* is positively correlated with the northeast monsoons.

Biology

First dorsal fin sail-like and remarkably higher than greatest body depth. The second small with 6 or 7 rays. Pelvic fins extremely long, almost reaching to anus, depressible into a groove. Caudal peduncle with double keels on each side. Anus situated near to first anal fin origin. Body fairly compressed. Bill long, slender and round in cross section; jaws and palatines with small, file-like teeth. No gillrakers; right and left branchiostegal membranes united to each other, free from isthmus. Lateral line single and well visible.

Colour: body dark blue dorsally, light blue splattered with brown laterally, and silvery white ventrally; about 20 rows of longitudinal stripes on sides, each stripe composed of many light blue round dots.

Maximum length: exceeding 340cm. Common length: 104 to 240cm

Availability to the fishery

Indo-Pacific sailfish are often taken as by catch by tuna longliners. They are also caught by commercial fishermen with surface driftnets, and by trolling, harpooning and gillnets.

Appendix II Pre-Sea Safety Checklist

Pre-Sea Safety Inspection Checklist

Observer		Date		Signature	
Vessel Agent		Date		Signature	
Port / Position					

Vessel Details:

Vessel Name		
Captain Name/Fishing Master		
Call Sign		
Flag		
Size GRT		
LOA		
Vessels Compliment		
Vessel contact Number	Telephone	
	Fax	
	Inmarsat (A/C/M) & No.	
Vessel Owners / Charteres	Name	
	Telephone	
	Fax	
	Mobile	

Safety Equipment:

Safety Certificate In-date (Y/N)		Issuing Authority	
Flares: Location		If checked No. / Exp Date	
First Aid Materials: Location		Name of Medical Officer	

Life Rafts				
Type	Number	Capacity	Hydrostatic release *Y / N*	Date Next Service Due
Life Jackets				
Type Inflatable/Packed	Number onboard	Location Cabin /Muster Station/ Both		SOLAS Approved Yes/ No
Fire Extinguishers				
Positioned in main corridor's (Y/N)		Charge seals intact (Y/N)		
Positioned on bridge (Y/N)		Charge seals intact (Y/N)		
Immersion Suits *(only required by vessels operation south of 30^{o} S)*				
Type	Number onboard	Location Cabin /Muster Station/ Both		SOLAS Approved Yes/ No

GMDSS

Radio Equipment	HF Operational yes or no	MF Operational yes or no	VHF Operational yes or no	INMARSAT Operational yes or no	NAVTEX Operational yes or no

EPIRB			
Type / Manufacturer	Number of units on board	Location	Release method manual / float free

SART's			
Type / Manufacturer	Number of units on board	Location	Release method manual / float free

Accommodation:

Vessel Emergency Evacuation and Muster Stations Lists – Displayed (Y/N)	
Cabin - Single or Sharing	

General Comments:

MINIMUM SAFETY REQUIREMENTS

The following items that will be checked as part of the "Pre-Sea Inspection" will be considered as the minimum compulsory requirements. Should any of these items not comply the Observer will not be permitted to embark onboard the vessel.

Safety Certificate (Safety Management Certificate)

The vessel must have onboard a current and valid Safety Certificate that does not expire for a period of at least four months from the date of embarkation of the observer.

Check that including the observer onboard that the full compliment does not exceed the limit for the number shown on the safety certificate.

Life Rafts

The Life rafts must have the capacity to accommodate the full crew compliment including the observer.

Life Rafts must be within their serviceable date, which must cover the expected maximum duration of observer deployment.

All Life Rafts must be fitted with a Hydrostatic Release mechanism.

Life Jackets

There must be a total number of life jackets onboard, readily available at the emergency muster stations, to accommodate each of the compliment onboard the vessel.

All Life Jackets must comply with IMO – SOLAS LSA standards.

Immersion Suits

For a vessel that will operate south of 30^{o} S there must be a total number of Immersion Suits onboard, readily available at the emergency muster stations to accommodate each of the compliment onboard the vessel. All Immersion Suits must comply with IMO – SOLAS LSA standards.

Appendix III Observer Report Formats

IOTC Regional Observer Scheme

OBSERVER TRIP REPORT

Observer name :	
Nationality :	
IOTC Certification No. :	

Vessel name :	
IOTC Registration No. :	
Vessel type :	

Trip started :	
Trip ended :	

I. Trip summary

A brief outline of the work carried out, including any specific tasks undertaken that are additional to those specific in the IOTC Scientific Observer Manual. 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 issue:

(problem that could have been faced by the observer during his deployment)

Observer tasks:

Observer logbooks/forms

II. Scientific Observer and vessel details

A. Scientific Observer 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

B. Vessel details

Vessel name	**Radio CallSign**	**Flag State**	**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*

III. Cruise Itinerary

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 grounds (dd/mm/yyyy)** / /
Date of return (dd/mm/yyyy) / /	**Port / Position of return**		

Comments

IV. Fishing Operations

C. 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			

D. 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 Onboard
Stretched mesh size (mm)	**Supply Vessel(s)** **Y / N** Name(s)	**Purse Winch** Make Model	

Comments

Pole and Line

Maximum No. of operational poles	**Total volume of bait tanks** (m^3)	**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.*			

E. Retained Catch Details (all species) per calendar months

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

Comments

F. Processing Details

Species	Processing Code	Comments

Comments

G. Fish discards

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

Comments

V. Summary of meteorological details

Briefly describe the predominant weather and sea conditions during the trip. Note specifically adverse conditions that affected the fishing operations.

VI. 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.

VII. Summary of incidental catches

A. Mitigation Measures

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

If Tori lines were used:

What was the number of sets where the Tori lines were deployed?	
What was the percentage of sets 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

B. Seabirds caught

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

C. Marine Mammals caught

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

D. Sea turtles caught

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

E. 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

F. 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		

VIII. Summary of biological data collected

A. Biological Data Collection summary

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

B. Biological Sample Storage Location

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

C. Biological Sub-sampling Methodologies

Description of the sub-sampling methodology used during the trip

D. Tagging information

Species	Tag type	No. animals tagged	Comments

IX. Lost Fishing Gear

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

X. Vessel Sightings

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

XI. General Comments

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

Guide to writing the Observer Trip Report

The main purpose of a scientific report is to synthesise and communicate on the information that was collected. Good report writing skills are part of effective communication. Such report, unlike verbal communication, is a lasting document, which can be referred to in the future. When writing a report it can be assumed that your intended reader has a general understanding of the topic but no specific knowledge of the details.

The specific purpose of the "Observer Trip Report" is to provide a comprehensive summary of observations and sampling undertaken during an observer trip. Tables capture data on specific items such as gear, catch and number of sampled fish, *etc*... However the observer is also expected to provide comment on the data recorded that includes information that is not routinely captured by data forms or the tables in the report. Specific items of information reported on during the trip should also be highlighted to draw attention to these when the data is analysed.

General style

- Strive for logic and precision and avoid ambiguity, especially with pronouns and sequences
- **ONLY** use the International Metric System of measurement and abbreviate measurements without periods (*i.e.* cm and kg)

	International Metric System
Length	millimetre (mm) centimetre (cm) metre (m)
Area	square metre (m^2)
Volume	litre (l) cubic metre (m^3)
Weight	gramme (g) kilogramme (kg) ton (t)

- 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 the report, the exact format of particular items is less important than consistency of application. 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.
- Have a neutral person review and critique your report before submission.
- Make a list of the acronyms used in the report and their definition/meaning

I. Trip Summary

The trip summary should give a concise and clear summary of the report. **Write this section of the report last, once the other sections have been completed**. It should not be longer than a single page and should provide the reader with the most important information for a particular cruise. Follow the headings of the report when writing the trip summary and use the following guidelines:

- The 1st paragraph should give details on the vessel, the flag state, the name of the observer(s), his/her nationality, the target species, the areas fished and the period(s) when fishing occurred.
- The 2nd paragraph should give a short summary of the cruise itinerary (dates and ports of departure and return etc.)
- The 3rd paragraph should give a short summary of fishing operations – the number of days fished & days lost, the number of sets/trawls, the number of hooks/pots set, the fishing depth, bait types used and the number of hooks/hauls observed.

- The 4th paragraph should give details on catches (weights and products). Mention the catch by weight and number of the target species and some details on by-catches. Mention the conversion factors (observer and vessel).
- The 5th paragraph should give a short summary of biological sampling done by the observer (e.g. length, weight, maturity, otoliths, tagging etc.)
- The 6th paragraph should give details on bird and turtles mortalities, entanglements, mitigation measures, marine mammal entanglements and interactions *etc*.
- The 7th paragraph should mention any vessel sightings (important for IUU vessels) and difficulties encountered (with operational issues and observer tasks.)
- Keep your writing impersonal, in the third person and avoid the use of the first person (*i.e.* I or we).
- Use the past tense and be consistent within the report - do not change between past and present tense.

II. Guide to some specific formats in Observer Reports

1. Date format:

Only use the following format: dd/mm/yyyy (*eg.* 25/12/2010 for the 25th December 2010)

2. Species names:

As much as possible, species CODE should be used to fill the table, but using species codes in the text of the report should be avoided and instead species names should be used. If there is no code for a particular species, the whole latin species name should be used. If the species cannot be identified, an Id picture should be taken and common name could be used.

The Latin names for individual species are written using a system termed "binomial nomenclature". Each species is identified by a combination of "two names": its *genus name* and its *specific epithet*. A familiar example is that of human beings, ***Homo sapiens***.

III. Simple Rules for Writing Latin Names in Papers

- The first time a species is mentioned in the title and in the text it should be written out in full, *e.g. Thunnus albacares.*
- The genus name (1st of the two names) should <u>always</u> start with a capital letter.
- The specific epithet (2nd of the two names) should <u>always</u> be with a small letter.
- The species names should always be in *italics.*
- Avoid using species codes in the text of the report instead of species names or common names.
- After the species name has been written out in full the first time, it must be abbreviated as follow: *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…
- If you need to mention the species name many times in your report you may find it better to use the common name.
- Common names should be written in small letters, *e.g.* giant petrels <u>and not</u> Giant Petrels.

3. Reporting on one degree (1^o) Grid area

The corner of the $\mathbf{1^o}$ square closest to 0° Latitude, (equator) and 0° Longitude, (Greenwich meridian) is recorded as:

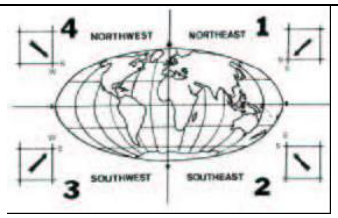
Latitude: Indicate by (two digits)

Longitude: Indicate by (three digits)

Preceded by the geographical quadrant.

Record the Major geographic quadrants divided by the Equator (latitude 0°) and the Greenwich meridian (longitude 0°), as follows:

1: for Northeast
2: for Southeast
3: for Southwest
4: for Northwest



In the Indian Ocean, only **1** and **2** will apply.

For example:

The 1^o grid covering an area from 04^o S to 05^o S Latitude and 067^o E to 068^o E Longitude would be recorded in the report tables as"2 04 067" or "204067".

Grid Size	Quadrant	Degrees Latitude	Degrees Longitude
1	2	04	067

4. Formatting of text

Body text should use the following font: Times New Roman, regular, size 11

Paragraphs should be aligned to the left and line spacing should be single.

Observer's 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 Five-Day Status Report Format

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)*

Appendix 4 Proposed IOTC Observer training curriculum

Recruitment

Candidates for observer training should be assessed and ideally have the following specific skills and work experience prior to being accepted for observer training;

- Numeric, literacy and logic skills
- Ability to work alone
- Physical fitness
- Capacity to live in potentially hostile environments, and ability to maintain standards of conduct
- Preferably at sea experience

Compulsory pre-requisite training for observers prior to them being registered as IOTC certified observers to include:

1 Basic Sea Survival, Familiarization and Personal Safety and Social Responsibility Training (STCW95 A-VI/1-1; A-VI/1-4 & A-Vl/1 *IMO requirements*) includes instruction on:

- Introduction to safety and survival;
- Emergency situations;
- Evacuation;
- Survival craft and rescue boats;
- Personal life saving appliances;
- Survival at sea

Prepare observers to react in emergency situations where there is an imminent danger to flooding, fire or having to abandoning the vessel at sea.

2 Fitness to Work at Sea

Prior to deployment all observers are required to have an in-date high seas medical certificate as well as inoculations required for tetanus, yellow fever and typhoid, depending on the ports of embarkation and disembarkation.

Proposed basic observer training curriculum

CPCs should include the following basic content in their training of observers. Assessment criteria that the observer has acquired these skills should be provided with the submission of candidates to the IOTC for accreditation.

Modules	Output
The role of the Observer	Describe the role of observers and the objectives of different categories of observers. (Scientific-data collection officers / Compliance – monitoring)
Observer Protocols	In the context of data collection note the value of their work in fisheries management.
Conduct on board	Introduce onboard expected observer conduct. Protocol when interacting with the officers and crew.
Cultural awareness	Cultural training, provide a list of do and don'ts Elements of communication and conflict resolution
Ship layout and terminology	Describe the basic layout of fishing vessel of different designs and used in the different fisheries. Understand the common use of nautical terminology. Provide advice where relevant information can be collected that the observer will be required to record. Explain working and observation areas and where best to carry out routine sampling and monitoring observations. Provide a breakdown of the different personnel onboard their responsibilities and seniority.
Observer Health and Safety practices	Explain importance and procedure to undertake a pre-sea safety inspections and vessel safety tour.
(In-house training) Supports formal certified survival training.	Introduce observers to safe working practices onboard a vessel. Run through safety protocols, emergency communication and contact information. Advise observers on various health issues that can be experienced onboard and personal first aid. Provide advise on dangers in collecting samples or moving around onboard a vessel engaged in active fishing Advise observers on the procedures to follow and potential dangers that may be encountered during personnel transfers from one vessel to another.
Fishing methods, gear and related equipment	Present a detailed description of different fishing methods, equipment and the terminology and functions of each of the gear components. • Purse Seine • Pelagic Longline • Pole and Line • Gillnet Describe different target species and by-catch associated with the different fishing methods used Observers need to know what gear components to measure and how to take such measurements.
Species identification *Identification of commercial fish and crustacean species and the main by-catch species caught per fishing sector*	Observers need to be taught the basic nomenclature for recording family, genus and species and the danger of incorrect identification from using common names The main species targeted in the Indian Ocean region will be covered together with the most prevalent by-catch species. Observers will be taught methods to identify fish, from specific diagnostic features using ID guides provided. Method of recording and preserving samples of un-identified species will be described.
Sampling methodologies	Provide instruction to estimate weight / numbers of catch from various techniques (volume of hold / volume of wells / brails etc.)
Observer gear, care and maintenance	Provide instruction on the use and calibration of sampling equipment and recording data in working situations and the care and maintenance of sampling equipment.

Navigation and navigational aids	Provide instruction on the basics of navigational theory to understand positioning, (latitude and longitude), course and speed. Provide instruction to record position and depth data from various electronic navigation systems such as, GPS, plotters, echo-sounders and sonar.
Oceanography and Meteorology	Provide instruction on basic oceanography of the Indian ocean region covering currents, sea surface temperatures (SST) and regional up-welling. This should include methods of recording wind strength and speed, sea and swell and SST.
Onboard data collection and recording Data forms and electronic data recording	Provide instruction for recording data on prescribed data forms and correct methods of completing these forms. Note the need for accuracy and methods to cross check data. (Additional Instruction on electronic data bases to cover data capture from data sheets should be considered)
Communication and reports- ▪ Trip reports, submission - timeline and circulation ▪ Report writing formats	Provide instruction on writing and submitting reports and report writing techniques Note the formats and the optional methods of sending these back to their controlling authority. Observers need training in radio communication protocols (VHF, HF & Inmarsat)
Sea Bird, Marine Mammal and Turtle identification and sampling strategies Shark identification and sampling strategies	Provide instruction on using field guides for seabird, marine mammal and turtle and shark identification.
Monitoring interactions of fishing gear with non-target marine fauna (seabirds, marine mammals, turtles, dugongs, sharks).	Provide instruction on the risk of interactions between fishing gear and various marine fauna, (especially protected and critically endangered species).
Monitoring effectiveness of bycatch mitigation measures.	Note the various methods of observing for, and recording these. Details on mitigation measures to prevent interaction with other marine fauna need be covered, including *inter alia* the use of, • bird scaring lines, • increasing line sink-rates • escape panels in purse seine nets • circle hooks.