Indian Ocean Tuna Commission
Commission des Thons de l'Océan Indien
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IOTC
REGIONAL OBSERVER SCHEME (ROS)

Observer Manual

(Version 1.2 2015)

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List of Abbreviations

BCM	Bait Casting Machine
CMM	IOTC Conservation and Management Measure
COPEC	Contrôleurs des Pêches
CPCs	Contracting Parties and 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 (transhipment observers)
ROS	Regional Observer Scheme (scientific observers)
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 (ROS), as outlined in Resolution 11/04[1] (or any subsequent superseding Resolution). The manual will constitute an integral part of the training documentation issued to observers during preparation, and will also be a tool used for reference purposes when they are in the field. Notwithstanding this, observers should be familiar with IOTC Resolution 11/04 *On a Regional Observer Scheme* and all the Conservation and Management Measures (CMMs) linked to this Resolution.

The ROS manual provides reference material along with instructions detailing observer tasks, including observational requirements; sampling protocols; data entry protocols; and reporting procedures for observers deployed in the longline, purse seine, pole-and-line, and gillnet fisheries operating in the IOTC area of competence[2]. This manual should be considered a 'live' document that will change as the Scheme evolves through the incorporation of new recommendations from the Scientific Committee, based on the advice of the Working Parties and observers returning from the field.

II. Development of regional observer schemes

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

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

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

Worldwide, scientific observer schemes are used in fisheries management to provide 'independent' baseline information on fisheries. This is particularly important in the case of RFMOs managing highly migratory species and where member states comprise distant water fleets as well as domestic fleets which include artisanal fisheries (exploiting coastal waters, within 200nm of the shore). Regional observer schemes perform a valuable role in verifying catch and effort data collected through logbooks, but they also provide more detailed scientific information that is not captured in logbooks. This information contributes towards the assessment of stocks for management and conservation.

The Indian Ocean differs from the other oceans in that artisanal fisheries catch more than the industrial fisheries (69% of IOTC species are caught by artisanal fleets[3]). Artisanal fisheries are generally smaller-scale operations by vessels that operate within the EEZ, characterised by the use of gillnets, troll lines and pole-and-line gears, whereas industrial fisheries conduct larger scale operations and may operate offshore. Their importance, in terms of contribution to total tuna catches, has increased substantially in recent years with artisanal craft are ranging over progressively larger areas and catching larger quantities of tuna and tuna-like species. The artisanal component is the most challenging to monitor and so this part

[1] http://iotc.org/cmm/resolution-1104-regional-observer-scheme

[2] http://iotc.org/about-iotc/competence

[3] IOTC Nominal catch database (average 2010-2014)

of the scheme will be progressively initiated though the use of field samplers[4]. The IOTC ROS will comprise separate "industrial" and "artisanal" elements as the difference in the nature of the fleets means they require their own particular set of protocols. The distinction between the industrial and artisanal components is drawn in paragraph 2 of Resolution 11/04, where industrial vessels that require an onboard observer are classified as vessels ≥24 m overall length as well as vessels under 24 m if they fish outside their EEZ. While industrial vessels require onboard observer coverage, artisanal vessels may be observed at landing sites, as stated paragraph 4 of Resolution 11/04:

"The number of artisanal fishing vessels landings shall also be monitored at the landing place by field samplers[5]. The indicative level of the coverage of the artisanal fishing vessels should progressively increase towards 5% of the total levels of vessel activity (i.e. total number of vessel trips or total number of vessels active)".

At this time, this ROS manual only covers the industrial, at-sea, component of the observe scheme.

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 organisation under Article XIV of the FAO constitution, the mandate of the IOTC is 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 aim of the IOTC ROS is to *"collect verified catch data and other scientific data related to the fisheries for tuna and tuna-like species in the IOTC area of competence[6]".* This will provide independent, reliable, verified and accurate information on catch, effort, fishing practices and the fate of non-target species for a sample of all types of vessel operating within the IOTC area of competence. 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. The IOTC Regional Observer Scheme was adopted in Resolution 11/04 to support the Commission in meeting these obligations and functions.

[5] Field sampler: a person who collects information on land during the unloading of fishing vessels. Field sampling programmes can be used for quantifying catch, retained bycatch, collecting tag returns, etc.

[6] Paragraph 1 of IOTC Resolution 11/04 *On a regional observer scheme*.

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

I. Background to IOTC, structure, members and dynamics

A. Establishment

The IOTC is an intergovernmental organisation that was established by the FAO Council in Rome in 1993 and came into force in 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. IOTC Membership

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 (October 2015), there are 32 Contracting Parties, (Tables 1 & 2) and five Cooperating Non-Contracting Parties, collectively termed CPCs.

Table 1. IOTC Contracting Parties (Members: 2015)

Contracting Party	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, Islamic Republic of	Ministry of Agriculture
Japan	Ministry of Agriculture, Forestry and Fisheries
Kenya	Department of Fisheries
Korea, Republic of	Ministry of Oceans and Fisheries
Madagascar	Ministry of Agriculture and Fisheries
Malaysia	Federal Department of Fisheries
Maldives	Ministry of Fisheries and Agriculture
Mauritius	Ministry of Agro-Industry and Fisheries
Mozambique	National Fisheries Administration
Oman, Sultanate of	Ministry of Agriculture and Fisheries
Pakistan	Ministry of Food, Agriculture and Livestock
Philippines	Bureau of Fisheries and Aquatic Resources
Seychelles	Seychelles Fisheries Authority
Sierra Leone	Ministry of Marine Resources and Fisheries
Somalia	Ministry of Fisheries and Marine Resources
Sri Lanka	Ministry of Fisheries and Aquatic Resources Development

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
Yemen	Ministry of Fish Wealth

Table 2. IOTC Cooperating Non-Contracting Parties (CNCP)

CNCP	**Fisheries Management Authority**
Bangladesh	Ministry of Fisheries and Livestock
Djibouti	Ministry of Agriculture
Liberia	Bureau of National Fisheries
Senegal	Ministry of Agriculture
South Africa	Marine and Coastal Management

C. Organisational structure of the IOTC

The IOTC comprises a Commission, the primary decision making body, Sub-commissions (formed as necessary), supported by a Scientific Committee, Compliance Committee, Standing Committee on Administration and Finance, Technical Committee on Allocation Criteria, and a number of subsidiary specialist Working Parties[7]. The Commission is the only body authorised to take decisions that are binding on Members. It is the responsibility of Members to ensure that action is taken under their national legislation to implement Conservation and Management Measures (CMMs), which become binding on it.

Recommendations adopted by the Commission concerning conservation and management of the stocks for furthering the objectives of the IOTC Agreement, 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 the Agreement by nationals of any State or entity, which is not a Member of the Commission.

A permanent Secretariat provides the administrative support for the Commission and its subsidiary bodies. The IOTC Secretariat consists of the Executive Secretary, appointed by the Director-General of the FAO with the approval of the Commission, and staff appointed by him/her to support the Commission in the implementation of policies through administration activities, data management, capacity building, scientific and other support activities as requested by the Commission, the Scientific Committee and the Working Parties.

[7] Seven Working Party meetings were held in 2015

IV. Geography and Political Dimension of the Indian Ocean Region

The IOTC area of competence is the Indian Ocean (defined for the purpose of the IOTC Agreement as being FAO statistical areas 51 and 57; **Fig. 1**) 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.

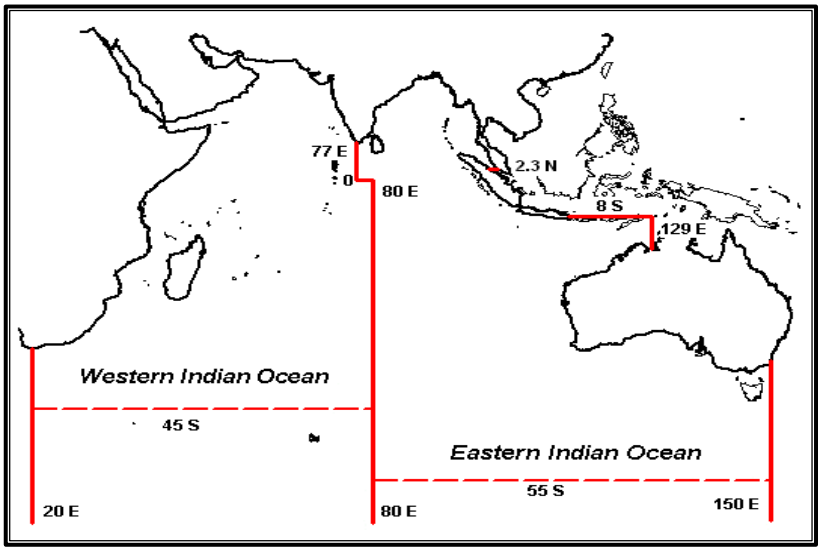


Fig. 1. IOTC area of competence.

V. The main species under IOTC management

Sixteen (16) species (listed in **Table 5**) are under the management mandate of the IOTC. In addition, the Commission has instructed the IOTC Secretariat to collate data on non-target, associated and dependent species affected by fisheries targeting tuna and tuna-like species in the IOTC area of competence. Note that one of the 16 species (Southern Bluefin tuna) was signed over to the Commission for the Conservation of Southern Bluefin Tuna (CCSBT)[8] for management purposes.

The catch of the 16 tuna and tuna-like species covered by the IOTC Agreement has repeatedly exceeded 1 million tonnes since 1993 of which tunas represent 85%. The Indian Ocean catch is currently about 20% of the world-wide total tuna production, making this the second largest region for tuna fishing after the western and Central Pacific Ocean.[9].

The producer value is estimated, very roughly, at $2–$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 fisheries.

Neritic species generally predominate in coastal country catches (with some notable exceptions of the Maldives, Sri Lanka and Indonesia), while the distant water fishing nations target tropical and temperate oceanic tunas and, to a lesser extent, billfish (mainly swordfish).

[8] www.ccsbt.org/site/

[9] ISSF. 2015. ISSF Tuna Stock Status Update, 2015: Status of the world fisheries for tuna. ISSF Technical Report 2015-03. International Seafood Sustainability Foundation, Washington, D.C., USA.

VII. Conservation and Management Measures (CMMs) relevant to scientific observers

The full compendium of IOTC CMMs can be downloaded from the website at: http://www.iotc.org/cmms and may be subject to change by the IOTC at future meetings of the Commission. Observers should be familiar with the Resolutions outlined below.

D. General

- Resolution 11/04 *On a Regional Observer Scheme*

IOTC Resolution 11/04 provides the foundations of the IOTC Regional Observer Scheme and covers the requirements which are binding on all CPCs.

- Resolution 12/02 *Data confidentiality policy and procedures*

All observer data collected and reported to the IOTC Secretariat is subject to the data confidentiality policy and procedures outlined in Resolution 12/02:

"Observer data grouped by 1° longitude by 1° latitude for surface fisheries and by 5° longitude by 5° latitude for longline, stratified by month and by fishing nation are considered to be in the public domain, provided that the activities /catch of no individual vessel can be identified within a time/area stratum"

E. Sharks

- *IOTC Resolution 05/05 Concerning the conservation of sharks caught in association with fisheries managed by IOTC*

"CPCs shall require their vessels to not have onboard fins that total more than 5 % of the weight of sharks onboard, up to the first point of landing. CPCs that currently do not require fins and carcasses to be offloaded together at the point of first landing shall take the necessary measures to ensure compliance with the 5 % ratio through certification, monitoring by an observer, or other appropriate measures".

- Resolution 13/06 *On a scientific and management framework on the conservation of shark species caught in association with IOTC managed fisheries*

Paragraph 4: CPCs shall require fishing vessels flying their flag and on the IOTC Record of Authorised Vessels or authorised to fish for tuna and tuna-like species managed by the IOTC on the high seas to promptly release unharmed, to the extent practicable, of oceanic whitetip sharks when brought alongside for taking onboard the vessel. However, CPCs should encourage their fishers to release this species if recognised on the line before bringing them onboard the vessels.

Paragraph 5. CPCs shall encourage their fishers to record incidental catches as well as live releases of oceanic whitetip sharks. These data shall be kept at the IOTC Secretariat.

Paragraph 7. Scientific observers shall be allowed to collect biological samples (vertebrae, tissues, reproductive tracts, stomachs, skin samples, spiral valves, jaws, whole and skeletonised specimens for taxonomic works and museum collections) from oceanic whitetip sharks taken in the IOTC area of competence that are dead at haulback, provided that the samples are a part of a research project approved by the IOTC Scientific Committee (SC)/the IOTC Working Party on Ecosystems and Bycatch (WPEB). In order to obtain the approval, a detailed document outlining the purpose of the work, number of samples intended to be collected and the spatio-temporal distribution of the sampling effect must be

included in the proposal. Annual progress of the work and a final report on completion shall be presented to the SC/WPEB.

- Resolution 13/05 *On the conservation of whale sharks* (*Rhinocodon typus*)

Paragraph 3: CPCs shall require that, in the event that a whale shark is unintentionally encircled in the purse seine net, the master of the vessel shall:

a) take all reasonable steps to ensure its safe release, while taking into consideration the safety of the crew. These steps shall follow the best practice guidelines for the safe release and handling of whale sharks developed by the IOTC Scientific Committee;

b) report the incident to the relevant authority of the flag State, with the following information:

i. the number of individuals;

ii. a short description of the interaction, including details of how and why the interaction occurred, if possible;

iii. the location of the encirclement;

iv. the steps taken to ensure safe release;

v. an assessment of the life status of the animal on release, including whether the whale shark was released alive but subsequently died.

Paragraph 7: CPCs shall report the information and data collected under paragraph 3(b) and paragraph 4 through logbooks, or when an observer is onboard through observer programs, and provide to the IOTC Secretariat by 30 June of the following year and according to the timelines specified in Resolution 10/02 [superseded by Resolution 15/02] (or any subsequent revision).

- Resolution 12/09 *On the conservation of thresher sharks (family Alopiidea) caught in association with fisheries in the IOTC area of competence*

Paragraph 2: Fishing Vessels flying the flag of an IOTC Member or Cooperating Non-Contracting Party (CPCs) are prohibited from retaining on board, transhipping, landing, storing, selling or offering for sale any part or whole carcass of thresher sharks of all the species of the family Alopiidae, with the exception of paragraph 7.

Paragraph 7: Scientific observers shall be allowed to collect biological samples (vertebrae, tissues, reproductive tracts, stomachs, skin samples, spiral valves, jaws, whole and skeletonised specimens for taxonomic works and museum collections) from thresher sharks that are dead at haulback, provided that the samples are part of the research project approved by the IOTC Scientific Committee (or IOTC Working Party on Ecosystems and Bycatch (WPEB)). In order to obtain the approval, a detailed document outlining the purpose of the work, number and type of samples intended to be collected and the spatio-temporal distribution of the sampling work must be included in the proposal. Annual progress of the work and a final report on completion of the project shall be presented to the IOTC WPEB and the IOTC Scientific Committee.

F. Seabirds

- Resolution 12/06 *On reducing the incidental bycatch of seabirds in longline fisheries*

Paragraph 1: CPCs shall record data on seabird incidental bycatch by species, notably through scientific observers in accordance with Resolution 11/04 and report these annually. Observers shall to the extent possible take photographs of seabirds caught by fishing vessels and transmit them to national seabird experts or to the IOTC Secretariat, for confirmation of identification.

G. Turtles

- Resolution 12/04 *On the conservation of marine turtles*

Paragraph 3: CPCs shall collect (including through logbooks and observer programs) and provide to the IOTC Secretariat no later than 30 June of the following year in accordance with Resolution 10/02 (or any subsequent revision), all data on their vessels' interactions with marine turtles. The data shall include the level of logbook or observer coverage and an estimation of total mortality of marine turtles incidentally caught in their fisheries.

Paragraph 6: CPCs shall require fishermen on vessels targeting species covered by the IOTC Agreement to bring aboard, if practicable, any captured marine turtle that is comatose or inactive as soon as possible and foster its recovery, including aiding in its resuscitation, before safely returning it to the water. CPCs shall ensure that fishermen are aware of and use proper mitigation, identification, handling and de-hooking techniques and keep on board all necessary equipment for the release of marine turtles, in accordance with handling guidelines in the IOTC Marine Turtle Identification Cards.

H. Cetaceans

- Resolution 13/04 *On the conservation of cetaceans*

Paragraph 2: Contracting Parties and Cooperating Non-Contracting Parties (collectively, CPCs) shall prohibit their flagged vessels from intentionally setting a purse seine net around a cetacean in the IOTC area of competence, if the animal is sighted prior to the commencement of the set.

Paragraph 3: CPCs shall require that, in the event that a cetacean is unintentionally encircled in a purse seine net, the master of the vessels shall:

a) take all reasonable steps to ensure the safe release of the cetacean, while taking into consideration the safety of the crew. These steps shall include following the best practice guidelines for the safe release and handling of cetaceans developed by the IOTC Scientific Committee;

b) report the incident to the relevant authority of the flag State, with the following information:
i. the species (if known);
ii. the number of individuals;
iii. a short description of the interaction, including details of how and why the interaction occurred,if possible;
iv. the location of the encirclement;
v. the steps taken to ensure safe release;
vi. an assessment of the life status of the animal on release, including whether the cetacean was released alive but subsequently died.

Paragraph 4: CPCs using other gear types fishing for tuna and tuna-like species associated with cetaceans shall report all interactions with cetaceans to the relevant authority of the flag State and include all the information outlined in paragraph 3b(i–vi).

Paragraph 7: CPCs shall report the information and data collected under paragraph 3(b) and paragraph 4, through logbooks, or when an observer is onboard through observer programs, and provide to the IOTC Secretariat by 30 June of the following year and according to the timelines specified in Resolution 10/02 (or any subsequent revision).

VIII. IOTC Fisheries and Operational Characteristics

IOTC fisheries are categorised 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, to 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 to the scale of the fishing operations and can be broadly classified as:
  - Industrial/ semi-industrial (vessel ≥24m overall length or fishing beyond EEZ)
  - Artisanal (vessels <24m fishing within EEZ).

Four main fisheries (defined by gear type) are described here:

A Purse-seine
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 a tuna school with a net (**Fig.** 2), impounding the fish by pursing the net, and drawing up the catch by hauling the net so that the fish are crowded in the bunt and can then be brailed out of the water.

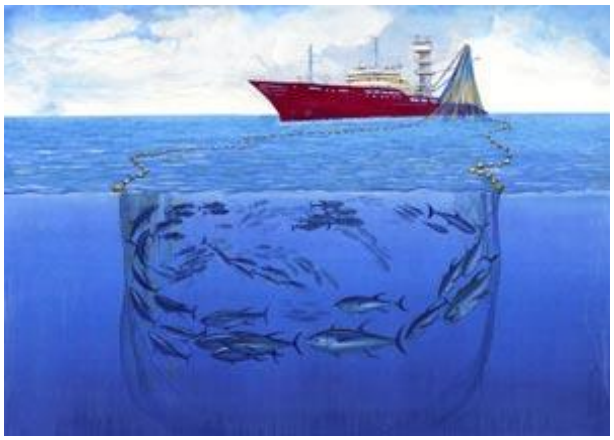


Fig. 2. Purse-seine fishing operation (source: FAO**)**

Fig. 3. 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. Tuna purse seiners vary considerably in size. Industrial tuna purse seiners (**Fig. 3**) are usually large vessels ranging in length between 45 and 85 m (sometimes reaching 100-110 m), that are highly mobile and can move rapidly between ocean regions in response to fishing conditions and market demands. Smaller semi-industrial purse seiners are often multi-purpose vessels, fishing for sardines and mackerel in one season and for tuna in another.

The primary characteristics of these vessels are:

- the capacity (fuel, water, accommodation, crew, etc.) to reach distant fishing grounds;
- the presence of a large skiff, often a few speed boats and sometimes a helicopter (not in the Indian Ocean).
- purse winches to purse the lead line after fish are inside net and a power block to haul back and stack the net.

- 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 2000 metric tonnes).

Industrial tuna purse-seine gear

Purse Seine: A wall of netting, that can measure 1500 to 2000m long and 120 to 250m 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 weigh 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 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.

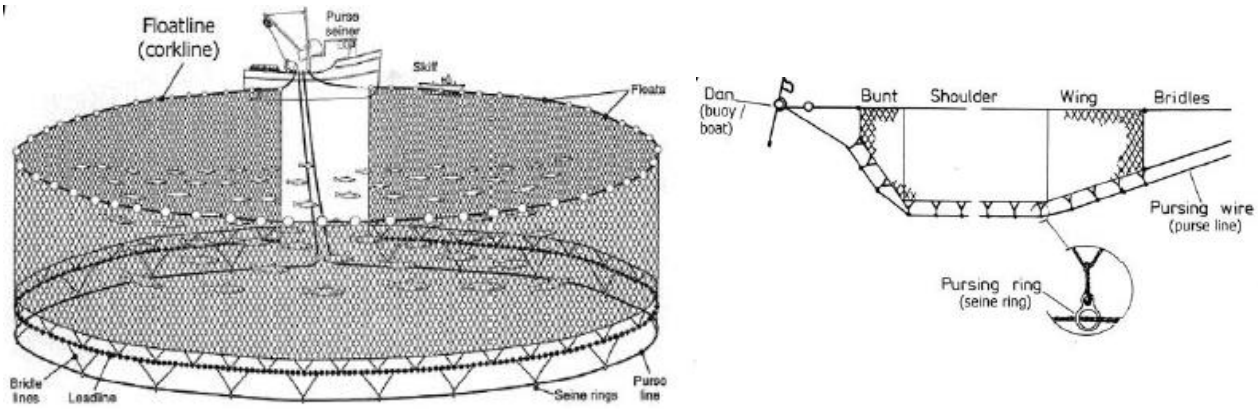


Fig. 4. Tuna purse seine gear components

The IOTC has categorised the different types of purse seine fisheries operating in the Indian Ocean and has allocated each a reporting code. These are listed in **Table 13**.

Target Species

As the purse seine catches fish above the thermocline, tuna and tuna-like fish inhabiting the surface and sub-surface zone (mixing area) are the target of this technique. Tuna purse seine vessels commonly target fish at depths of 60–70m, sometimes reaching up to 300m depth, although setting below 150m is rare. Fishing grounds range from the high seas to areas near the coast.

Target species include juvenile yellowfin, juvenile bigeye tuna and skipjack tuna, as well as small tuna-like fish such as frigate tuna and kawakawa in tropical waters. In temperate waters juvenile and adult bluefin tuna are targeted while feeding on baitfish or spawning (adults). Purse seine vessels are also occasionally used to harvest albacore in temperate waters, generally at night when they are feeding higher in the water column.

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

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 for tuna schools by the industrial tuna purse seiners can be either direct or indirect. The indirect search for tuna schools involves evaluating a range of environmental parameters and factors that influence the spatial and temporal distribution of tuna 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 macrophytes
- Currents.

The combination of these parameter values are used by skippers to decide on the fishing location in order to maximise the chance of finding schools of tuna.

Methods used to directly search for and detect of tuna schools include:

- The use of acoustic sonar and depth sounders to detect shoals of fish in the immediate vicinity of the vessel. These 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 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)

Fish Aggregating Devices

Many open ocean species associate with objects drifting on the surface, such as logs or branches causing the aggregation of otherwise sparsely distributed schools. This is advantageous for purse seine fishing operations as the schools, are more easily spotted, more stable and swim at a reduced speed, making them comparatively easy to catch. Consequently, fishing around floating objects is generally associated with a higher successful haul than targeting free swimming schools. Natural floating objects (LOG) have always been a component of the habitat of tropical tunas, and the use of these in fishing operations has developed over time. Initially reflectors and radio beacons were attached to logs to improve long range detection, and gradually purpose built fish aggregating devices (FADs) were developed[10]. These artificial constructions are now commonly used as part of purse seine fishing operations. FADs and LOGs are often attached to radio or satellite buoys, and some have sonar fish detection devices attached which transmit live information back to the fishing vessel (**Fig. 5**).

FADs can be set to drift in the open ocean or they might be anchored to the ocean floor. Anchored FADs (also called 'payaos') are used by some purse seine vessels, but more commonly used by pole-and-line fleets.

[10] Davies, T.K., Mees, C.C and Milner-Gulland, E.J., 2014. The past, present and future use of drifting fish aggregating devices (FADs) in the Indian Ocean. *Marine Policy*, 45:163-170.

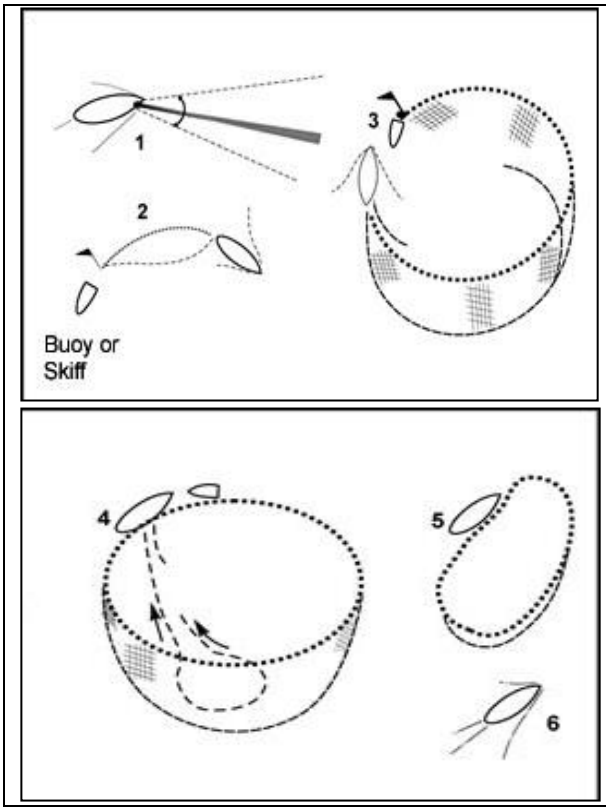
Fig. 5. Fish Aggregating Device (FAD) with radio buoy (photo: R. Manning)

Fishing set

Each fishing operation undertaken by a purse seiner, from the deployment of the net to its recovery onboard (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 until its port side is facing the school (most of the tuna purse seiners have deck arrangement for operating from the port side). The skiff is then deployed with the end of the seine attached to its rear.
3. **Circling:** The skiff then encircles the school at maximum speed with the net feeding out astern. Usually, the entire net is set and the fish are encircled within 4 to 8 minutes.
4. **Pursing:** Once the encirclement is complete, the extremity of the net that was attached to the skiff is transferred aboard the purse seiner and the two extremities of the purse line cable are hauled in with the winch as quickly as possible in order to close the bottom of the net (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 closed the tunas can still dive below the net or the purse seine vessel and escape. The pursing may take around 15 to 20 minutes for large purse seines.
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, take around an hour, if there are no incidents, depending on the size of the net and quantity of 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 at a time. The duration of this operation will obviously depend upon the quantity of fish in the net. The tunas are sent through trays and tubes arranged in the deck down to fish-wells. In the fish-wells, fish are usually stored in refrigerated brine at 0°C, but in larger vessels tuna are preserved in wells with brine at temperatures of -18°C or below. In the more artisanal purse seiners, tuna are generally kept in iced seawater.



1- The presence of a tuna school is confirmed by the sonar.
2- The skiff is deployed with the net.
3- The skiff 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 bottom of the net.
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.

Fig 6. Purse-seine setting sequence

A sorting bin, commonly known as a hopper, is often used to sort the catch before it is directed into wells for storage. The hopper typically holds the capacity of the vessel's brail of fish, which are loaded in the hopper one by one as the crew sorts through the catch. The crew can remove unwanted bycatch, mutilated or damaged catch, and other bycatch at this stage. A door or hatch is actuated with a hydraulic control and allows the catch to be dumped into the loading hatch of the vessel in a controlled manner. Since the hoper stalls the loading of the catch unto the wells, this is a good point for observers to evaluate catch composition for their reporting.

If a hopper is not used, the brails are emptied directly into the loading hatch of the wet deck. This makes it difficult to assess the type and amount of bycatch species in each brail.

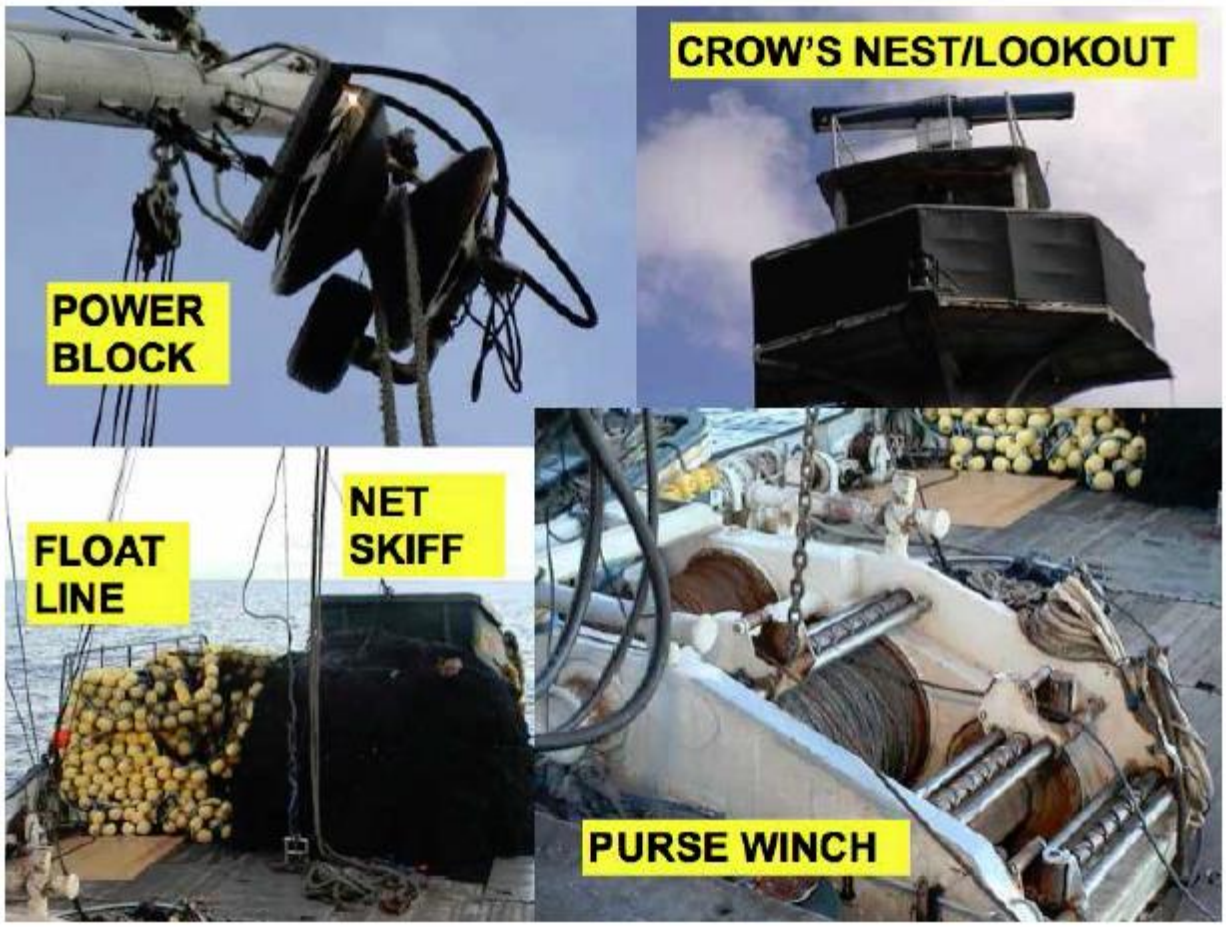


Fig 7. Fishing gear[11]

[11] Source: ISSF Observer Training Guidebook. Photo: SPC

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 not anchored and typically drift with the ocean currents.

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

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

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

The IOTC has nine recognised categories of longline fisheries, summarised in **Table 16**.

Fig 8. Large Scale Tuna Longline Vessel (LSTLV)[12]

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 (**Fig 9**). 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.

[12] photo: R. Manning

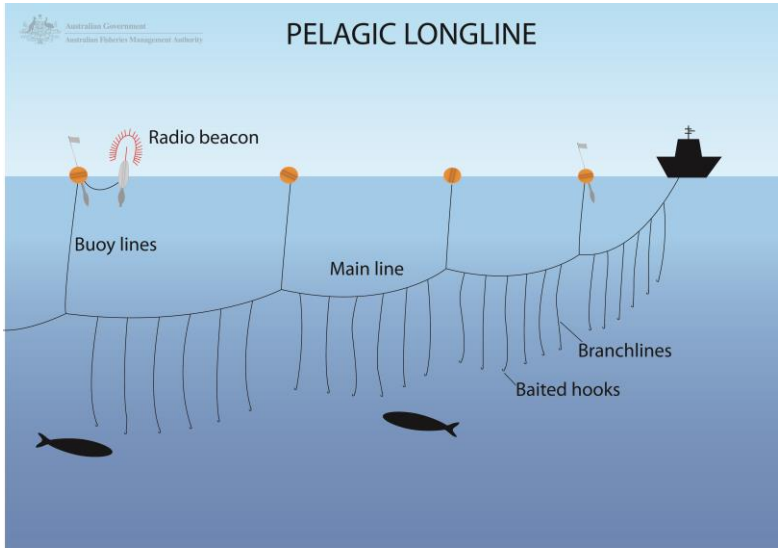


Fig 9. Pelagic longline[13]

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 (**Fig. 11**).

Branch lines: A typical branch line can vary between 10 m to 50 m in length and is 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 (usually up to four including the leader) and swivels attached. Multiple materials may include initial sections of nylon / polyester braid combination which are then attached to a length of monofilament leading to a hook. Barrel swivels are used to connect sections, some of which may be weighted with lead. Branch lines on LSTLVs 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" or baskets. On vessels using shorter longlines the branch lines and buoy lines may be wound up onto large reels and stacked on top of each 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 (**Fig. 12**).

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. The types of buoys used include:

- *Hard floats:* made from a rigid plastic which can withstand a high pressure should a large fish pull them under.
- *Bullet-buoys:* made of a soft polyurethane foam material.

[13] Australian Fisheries Management Authority

- Various "Marker-buoys," *GPS beacons*, *radio buoys*, *light buoys* and *radar reflectors* (highflyers) which 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.

The attachments of branchlines, hooks and buoys onto the main line and measurements required for data collection are shown in Fig 10.

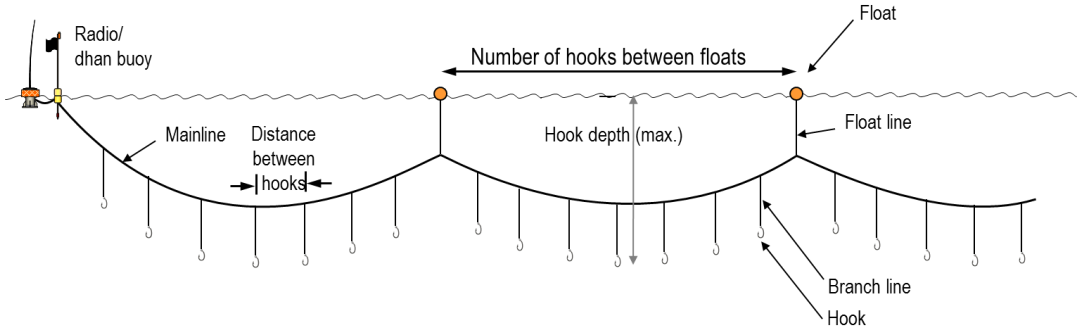


Fig 10. Longline gear configuration

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.

Lines hauler: A mainline hauler uses a 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, uniform coils and assists 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

Longline fisheries target fish in relatively deep water compared with surface fishing methods such as purse seine and pole and line operations. Target species include tuna, swordfish, oilfish and some shark species as well as a range of other oceanic species. The depth at which hooks are set influences the species and size composition of the catch. Some of the larger industrial longliners can set their hooks down to 300m depth to target larger, mature individuals of yellowfin, bigeye and southern bluefin tuna (termed deep-water or mid-water longlining). Shark mortality, through bycatch or direct targeting, often for fins, can be a contentious issue in this fishery.

Fig. 11. Monofilament line system.

Fig. 12. Type of hooks used on longline vessels.

Fig. 13. Radio buoy[14]

Fig. 14. poly foam "bullet" buoys, mainly used on monofilament line system.

Fig. 15. Rigid plastic buoys, mainly used by Asian industrial tuna longline vessels.

Fig. 16. Tub of monofilament branch lines.

[14] source: www.blueoceantackle.com

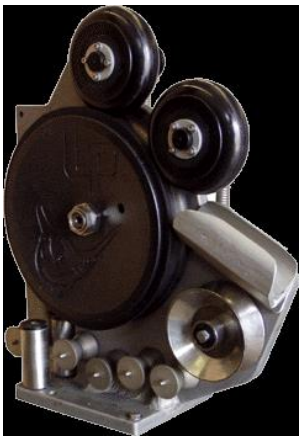


Fig. 17. Line setter

Fig. 18. Line hauler

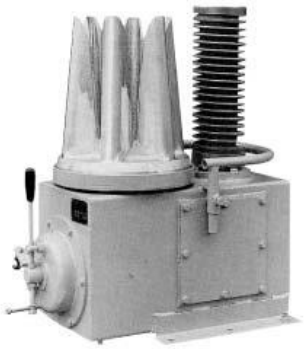


Fig. 19. Branchline coiler

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.

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 3000 hooks on a line. Branch lines are attached to the main line while setting the line and a buoy is then attached at intervals between baskets or a fixed number of branch lines. The composition 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. The rate at which branch lines and buoy lines are attached to the mainline, and therefore the spacing, is controlled from the wheelhouse by a synchronous series of "beeps." By modifying the line setter speed and therefore the length of mainline between float lines, the vessel speed, and by adjusting the length of the branch-lines, the depth at which hooks are set in the water column can be regulated.

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 2500 and 3000 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 predetermined 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 or 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, and is 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.

Seabird bycatch

The IOTC and its CPCs aims to achieve zero bycatch of seabirds for its fisheries, especially threatened albatrosses and petrel species in longline fisheries. Resolution 12/06 was established specifically to reduce the incidental bycatch of seabirds in longline fisheries. This resolution notes that scientific observers shall record data on seabird incidental bycatch by species which CPCs are to report annually. Observers are required to take photographs of seabirds caught by fishing vessels and transmit them to national seabird experts or to the IOTC Secretariat (secretariat@iotc.org) for confirmation of identification.

Resolution 12/06 requires CPCs to ensure that all longline vessels use at least two of the three mitigation measures in Table 3; (i) night setting, (ii) bird scaring lines or (iii) weighted branchlines; conforming to the minimum technical standards specified, where vessels operate in areas south of 25°South. These measures should also be considered for implementation in other areas, as appropriate, consistent with scientific advice. These requirements are consistent among all five tuna RFMOs for areas overlapping with albatross and petrel distributions. In addition to helping reduce the catch of seabirds, these techniques can also help minimize bait loss and ensure that baited hooks are available to the target species.

(i) Interactions with seabirds can be minimised by setting gear at night as many seabirds do not feed at that time. Night setting involves starting to set gear after nautical dusk and finishing setting before nautical dawn. Deck lighting should be kept to a minimum, using only as much

lighting as is needed to comply with navigational rules and best practices for safety. Note that if a setting extends into nautical twilight or daylight hours, this set is not considered to be night set; only if all hooks are set at night is the set considered a night set.

(ii) Another measure is the use of bird scaring lines (Tori lines) (Fig. 20). These lines should be 150 m long, and are towed from a high point near the stern from which streamers are suspended at regular intervals. The movement of the streamers deters birds from flying near the stern of the vessel and the line is most effective when the streamers are flapping directly over the baited hooks, however wind can alter this. The most effective arrangement is generally to fly two tori lines, one to port and one to starboard of the baited hooks[15]. The effectiveness of these may vary based on variables such as weather conditions, setting speed, vessel size as well as Tori line design. Due to this, ongoing improvement in the use of Tori lines is envisaged and so data collected on the varying levels of bird bycatch based on the different factors is essential for review of the effectiveness of the lines. Therefore, observed are required to collect detailed data consistent with the level of information provided in Table 3.

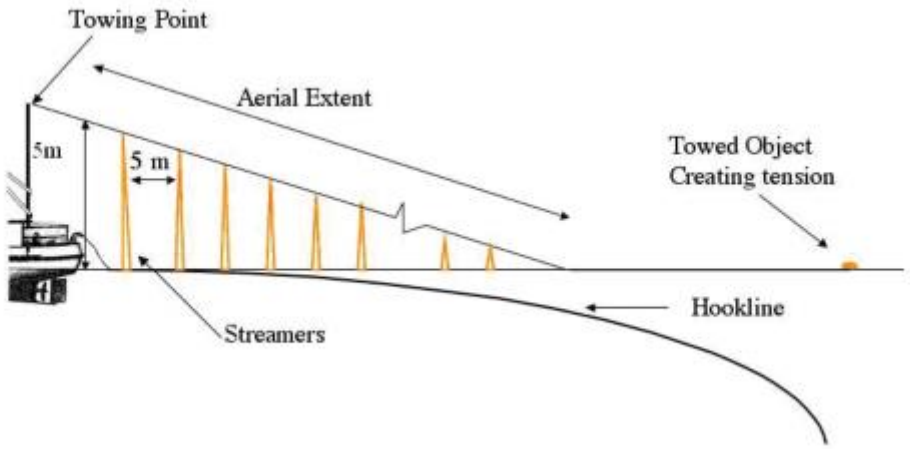


Fig. 20. Diagram of bird scaring (Tori) lines

(iii) Weighted branchlines are the third recommended measure. When a weight is attached to a branchline, the baited hook sinks more quickly in the water and therefore reduced the amount of time available for seabirds to access it. The weight should be at least 45 g and attached within 1 m of the hook, at least 60 g at less than 3.5 m from hook or at least 98 g at less than 4 m from the hook. There are some safety concerns regarding the use of leaded swivels as they may cause injury if they recoil back at the crew in the event of line breakage, however, other weighting systems have been developed which slide off the branchlines in the event of breakage and therefore reduce this risk.

[15] ISSF longline skippers guidebook

Table 3. Bird bycatch mitigation measures (Resolution 12/06)

Mitigation	Description	Specification
Night setting with minimum deck lighting	No setting between nautical dawn and before nautical dusk. Deck lighting to be kept to a minimum.	Nautical dusk and nautical dawn are defined as set out in the Nautical Almanac tables for relevant latitude, local time and date. Minimum deck lighting should not breach minimum standards for safety and navigation.
Bird-scaring lines (Tori lines)	Bird-scaring lines shall be deployed during the entire longline setting to deter birds from approaching the branch line.	For vessels greater than or equal to 35 m: • Deploy at least 1 bird-scaring line. Where practical, vessels are encouraged to use a second tori pole and bird scaring line at times of high bird abundance or activity; both tori lines should be deployed simultaneously, one on each side of the line being set. • Aerial extent of bird-scaring lines must be greater than or equal to 100 m. • Long streamers of sufficient length to reach the sea surface in calm conditions must be used. • Long streamers must be at intervals of no more than 5m. For vessels less than 35 m: • Deploy at least 1 bird-scaring line. • Aerial extent must be greater than or equal to 75 m. • Long and/or short (but greater than 1 m in length) streamers must be used and placed at intervals as follows: o Short: intervals of no more than 2 m. o Long: intervals of no more than 5 m for the first 55 m of bird scaring line. Additional design and deployment guidelines for bird-scaring lines are provided in **Annex 1** of this Resolution.
Line weighting	Line weights to be deployed on the snood prior to setting.	Greater than a total of 45 g attached within 1 m of the hook or; Greater than a total of 60 g attached within 3.5 m of the hook or; Greater than a total of 98 g weight attached within 4 m of the hook.

C. Pelagic 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. 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 other gillnets 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, particularly in artisanal fisheries, both in inland waters and in the marine environment. Drift nets were used extensively on the high seas by a number of countries in the 1980s to target tuna, however they were also associated with high 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 had 2812 vessels registered to fish with gillnets in 2014. The IOTC categorises gillnet fisheries as industrial, semi-industrial or artisanal (**Table 16**) based on the location and scale of the operation.

Gillnets generally comprise a series of panels with a weighted "footrope" attached along the bottom, and a "headline" along the top, 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 an integrated lead core rope. By modifying the balance of floats to the weighted footrope, the overall buoyancy of the net, and therefore its position in the water column, can be regulated. Some gillnets are designed to float at or near the surface (used for pelagic fish such as tuna) while others are set sub-surface and others still are made to stand at the bottom (used for demersal species) (**Fig. 21**). In shallow water, set nets and trammel nets are generally anchored to the seabed and the anchor lines determine the vertical orientation, while at sea, one end of the net may remain attached to the vessel. Drift nets are set on or just below the surface and are not anchored so they can drift with the currents. 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.

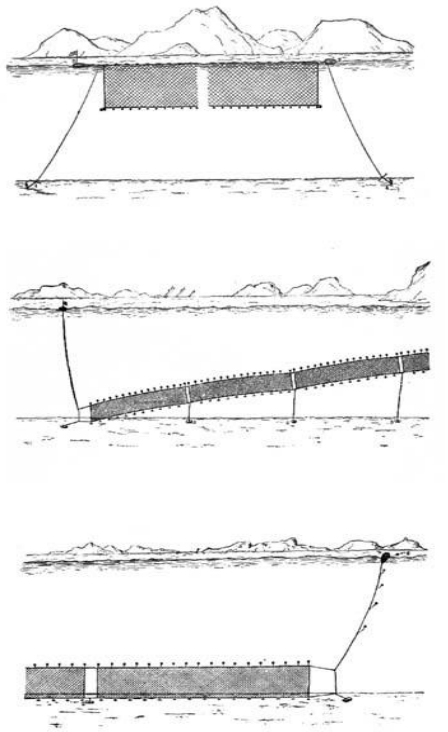


Fig. 21. Three variations on the placement and design of gillnet gear[16]

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 (

Fig. 22). The spacing between two points where the net is attached to the headline is called the bridge length. The hanging ratio determines the 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, stretched length of the net. This can be calculated by dividing the bridge length of a single mesh by its stretched length.

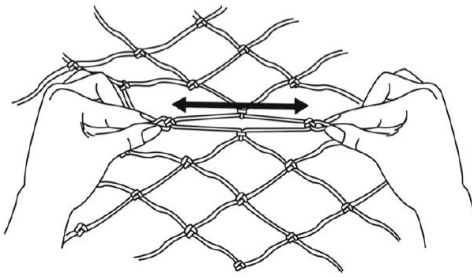


Fig. 22. Stretched mesh size (distance between two knots)[17]

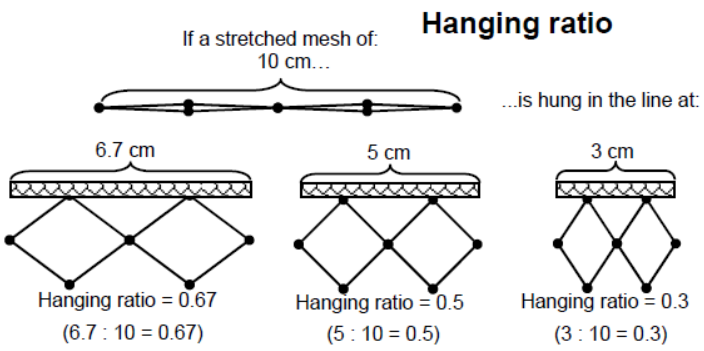


Fig. 23. Hanging ratio[18]

[16] Source: NOAA

[17] Source: ISSF manual, picture from SPC

[18] Source: IATTC (GTNGDF 02/2009)

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 observers will be required to record a range of data fields that include information on the specifications of the net/s, the setting strategy as well as vessel parameters. Nets can also be set in a range of configurations such as pulled straight, in a semi-circle or v-shape as well as many others. These are described in **Table 24.**

D. Pole and Line

Tuna swimming near the surface can be caught with hand-held fishing poles (**Fig. 24**). 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 from high-pressure nozzles to create the illusion of small baitfish teeming on the surface, and live bait is flung out to entice the tuna to the surface (chumming). Up to 20 powerfully built fishers 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 cast. Tuna are pulled from the water and landed on the deck.

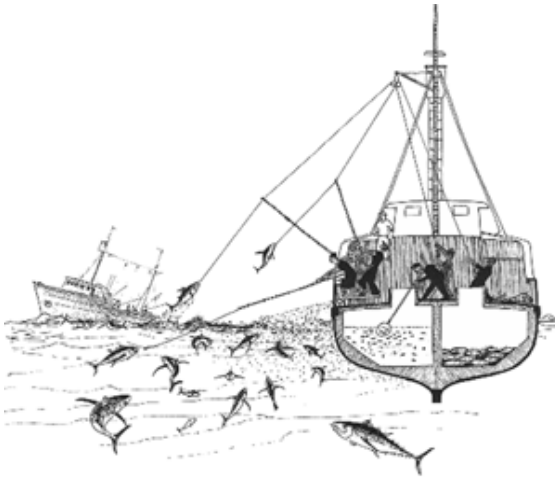


Fig. 24. Pole and line fishing operation[19]

Pole and line fishing vessels range from 20 to 40m in length, and may be artisanal or industrial, fishing in areas extending from coastal waters to the high seas. The bridge and accommodation are 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 where the catch is stored using various methods of refrigeration such as on ice, chilled sea water or frozen. The storage method often determines or is dependent on the range of the vessel. Live bait are stored in tanks filled with seawater. Powerful pumps are used to circulate the water, and each tank has an underwater light. As tanks are emptied of bait they are cleaned and used as fish holds. The IOTC recognises five categories of pole and line fisheries (**Table 16**).

Target Species

The catch is dominated by skipjack tuna and small yellowfin tuna, as well as tuna-like species occupying the upper surface waters while small bigeye tuna are also targeted at dawn and dusk. Nonetheless, 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 sheltered bait fishing ground, presenting some unique challenges to this fishing technique. Bait species include sardines, anchovies and small mackerels which are fished at night, often using lights.

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), deployed from the side of the boat, are used to

[19] source: FAO

catch the more delicate species of baitfish. Bait fish are loaded into the bait tanks of circulating water using scoop nets (dry) or buckets filled with water (wet).

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

- the use of acoustic sonar and depth sounders to detect shoals of fish in the immediate vicinity of the vessel and 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 artificial FADs or locating natural floating objects (LOGs) such as 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 as well as the size of the fish and the density of the school, while the echo sounder indicates the depth of the school. Both devices are monitored closely throughout the operation. As soon as the vessel is positioned above 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 (**Fig. 25**). Feathered jigs can sometimes replace live bait when a feeding frenzy is induced.

Fig. 25. Poling with sprayers on[20]

Hooked fish are pulled from the water rapidly and many tonnes 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 and special lines are strung from the ends of the poles to overhead blocks to increase 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. The boat will then drift with the school while various methods are used to encourage more tuna to aggregate under the boat until fishing recommences. Aggregation methods 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

[20] Photo: RTTP-IO/Y. Chocoloff

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 and 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

I. CPC responsibilities

Resolution 11/04 states that CPCs will be responsible for obtaining qualified national or international observers to achieve at least 5% required coverage of the number of operations/sets for each gear type onboard their flagged vessels.

Paragraph 5 states 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 10 and 11 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 cooperation 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 CPC registered vessels, expected minimum safety conditions, pre-sea safety checks and the onboard working protocol for the observer.

II. Other Observer Schemes in the region

A number of RFMOs have schemes or are developing schemes 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 schemes are expected to contribute to the development of observer capacity in the Indian Ocean region.

Schemes in the region that have been developed under the framework of other RFMOs include:

- 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 fishing within a specified geographic area. The range of these tuna covers parts of the Indian, Atlantic and Pacific Oceans and overlaps areas of competence of the IOTC, CCAMLR and WCPFC
- The 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.

Observer capacity has also been improved in the region through projects which have involved observer training such as the South West Indian Ocean Fisheries Project (SWIOFP), the Fisheries Regional Monitoring Programme of the Indian Ocean Commission, Observateurs des Pêches (OBSPEC) and Contrôleur des Pêches (COPEC).

III. Data Collection and Submission of Data to the IOTC

To fulfil its objectives in the management of fish stocks, the IOTC requires aggregated data to be submitted to the IOTC Secretariat for each vessel operating in the IOTC area of competence. This includes information on nominal catches, catch and effort and length frequency data as specified in Resolutions 15/01 and 15/02. In addition to these, Resolution 11/04 *on a Regional Observer Scheme* was established by the Commission to require each CPC to record and report more detailed scientific observer data in addition to these logbook data. Paragraphs 10 of the Resolution outlines the specific data collection requirements.

Para 10.

Observers shall:

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

IV. Defining "the Observer"

Scientific (fisheries) observers are independent specialists, deployed onboard commercial fishing vessels in accordance with a mandated regional fisheries observer scheme. Within this mandate observers can be used to supply unbiased data and report on technical, scientific, regulatory 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 accurate, *in situ* data on the location, catch composition and gear configuration of fishing operations, and are usually the only independent source of this information. Scientific observers are not employed in an enforcement role, as their main purpose is to collect accurate data to support effective management of the marine resources, which is to the long-term advantage of the fishing industry. However, as this takes place alongside 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 recognised observer when employed by a service provider approved by the CPC to provide observer services. 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 reported data. This will lead to the development of a regional pool of observers trained according to IOTC standards who may be called upon by other flag states.

V. Qualifications and prerequisites

Scientific observers working at sea are in a unique position, as they are not affiliated with the vessel 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 require a high level of integrity and personal self-motivation and will need appropriate 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 are required to:

- Have sufficient knowledge and experience to identify species and collect information on different fishing gear configurations;
- Have satisfactory knowledge of the IOTC conservation and management measures;
- Have the ability to observe and accurately record data collected under the scheme;
- Have the ability to collect biological samples; 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 and survival training meet the requirements of all domestic and foreign vessels on which they may be deployed. Once observers have completed training and are certified competent (consistent with the requirements detailed in section V), they will need to keep coordinators informed of all their contact details. Only once this is complete will the CPC will send the details (name, nationality and details of all medical and training certificates) of the observer to the IOTC Secretariat to register him/her as an IOTC observer.

VI. Observer Code of Conduct and Protocols

A. Code of Conduct

Observers are required to conform to an internationally recognised code of conduct to become certified. This requires that:

1) Observers may not participate in any activity which would cause a reasonable person to question the impartiality or objectivity with which the Regional Observer Scheme is administered.

- Observers may not have a direct financial interest in the observed fishery, other than the provision of observer services. This includes, but is not limited to, vessels or shore-side facilities involved in the catching or processing of the fishery products, 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 solicit or accept employment as a crew member or an employee of the vessel in any fishery while employed as an observer.
- Observers may not serve as observers on any vessel owned or operated by a person who previously employed the observer in any capacity.
- 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.

2) Observers may not participate in any activity which could impair the observer's ability to perform his/her duties. 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

3) Observers may not participate in any activity which could adversely affect the efficient accomplishment of the Scheme's mission.
   - Observers must refrain from engaging in any illegal actions according to the laws and regulations of the flag State that exercises jurisdiction over the vessel to which the observer is assigned.
   - Observers must avoid any behaviour that could adversely affect the confidence of the public in the integrity of observers, the IOTC Regional Observer Scheme or the IOTC.
   - Observers must record all scientific data accurately and honestly.
   - 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, in accordance with Resolution 12/02, and shall treat as confidential all information with respect to the fishing operations of the vessel on which they are deployed.

4) Observer involvement in vessel operations
   - 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 scheme.
   - In all aspects involving vessel operations 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 vessel operational activities or have any authority over any of the vessel 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 officers to ensure that their work does not interfere with normal fishing and operational activities.

VII. Observer Deployment Logistics

A. Request for an Observer

A CPC requesting an observer should advise the observer's controlling organisation at least three weeks in advance of the vessel's estimated time of departure whenever possible. This is considered the minimum period required to arrange travel logistics and for observers to take care of personal matters and suitably prepare themselves. 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, as per Appendix II.

A. Observers on Standby

When an observer request is received the observer will be advised and put on "Standby Status". Observers must confirm their availability and keep the controlling organisation informed of all their contact details.

It is accepted that the date and possibly the port of departure may have to be revised following the initial request, so a final confirmation of the port, date and time of departure must be sent within five days of the pending trip. In exceptional cases, full deployment may be arranged within five working days.

B. Observer Checklists

Following a CPC request, Observers will also be briefed on the specific data collection protocols and biological requirements for the trip and will be issued with the necessary forms and equipment to fulfil their tasks. 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
- Letter of Introduction
- Copy of the MoU
- Language Phrase Book(s)
- Mobile / Cell Phone
- Electronic database where applicable
- Safety Equipment issue

C. 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, operational health and safety gear for the observer 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

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

- IOTC species identification guides and other supplementary materials
- Observer Manual
- Data collection forms and trip reporting templates
- Laptop computer
- Camera
- Sampling Equipment
- 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

E. Observer briefing

Prior to being deployed observers will be given a formal briefing. The process will include ensuring 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

F. Deployment

Prior to embarking onboard a vessel, the observer will undertake a pre-sea safety inspection of the vessel, as per **Appendix II**. The object of this inspection is to confirm that all the required safety equipment is present onboard. The results of this inspection, together with a deployment report must be sent to their controlling agency within 24 hours of boarding. Should the minimum requirements of the checklist not be met the observer may not embark until they have contacted and been given authorisation to continue by their controlling organisation. 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.

Once the vessel has left port, observers will be required to send an "embarkation report" back to their controlling organisation within 24-hours (**Appendix III**).

G. Observer Return - Debriefing

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 during the trip. The observer's coordinator will be expected to conduct a preliminary review of the data and run routine error checks. The observer will present a preliminary version of the electronic trip report for discussion. This will provide the opportunity for the observer to discuss and explain missing, unusual or unexpected data.

VIII. Observer Reporting

The observer will be required to submit a series of reports to the controlling organisation at predetermined times throughout each trip (**Appendix III**). These include:

- Deployment Report (within 24-hours of the vessel sailing)
- Five-day status report

- Preliminary trip summary report and full set of data forms
- Final electronic trip report

A. 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 the line of communication between the observer and their controlling organisation. This report includes the outcome of the pre-sea inspection as details of flights and logistics prior to boarding.

If a report is not received within 24 hours of the due date, the observer coordinator will contact the vessel operator to send a message to the vessel to remind the observer of his/her 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.

B. Five-day Status Reports

Throughout 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 to report on the preceding five days. The report will provide a summary of fishing operations, catch and sampling undertaken during the period covered. 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. In situations where reports have previously been regularly received it may be deemed that there is a problem with the observer's well-being and appropriate action may be necessary.

C. Preliminary Trip Summary Report

At the conclusion of the trip, prior to disembarking, the observer must prepare a brief summary report of the trip. The report should include details of sampling, summaries of catches and processing, interactions with protected and threatened species and any notable incidences with respect to the vessel operations or weather. The observer will be expected to give a copy to the vessel Captain or Fishing Master and they will be advised to forward any comments they might have directly to the observer's controlling agency within a specific time period (to be defined by the controlling agency). This summary report will also form the basis for the observer debriefing.

D. Trip report

The post-trip reporting requirements are outlined in Resolution 11/04:

Para.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 150 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.*

Para.12 *The confidentiality rules set out in the resolution 98/02 [superseded by resolution 12/02] Data confidentiality policy and procedures for fine-scale data shall apply.*

Following the debriefing observers will submit the final electronic trip report, all data collection forms and any photos to their controlling organisation. Within 30 days of the completion of the trip, the data will be provided to the CPC flag state of the vessel and within 150 days, the data required for reporting to the IOTC (see 'part C: Data field Descriptions' for details) will be submitted to the IOTC Secretariat.

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 sections of the data collection forms under the relevant headings. Photographs and diagrams are important and observers are encouraged to include these where relevant with detailed labelling so that the photos can be linked to the appropriate data fields. The report also provides the observer with the opportunity to comment on the sampling methods. The information required for reporting may be submitted in any format provided it is electronic and covers all of the data reporting fields specified in Part C of this manual 'Data field descriptions', consistent with the data reporting templates.

IX. Sampling Strategies

E. Trip selection

Resolution 11/04 states that at least 5% of the number of operations/sets for each gear type and fleet must be sampled. When selecting which fishing trips to place observers on, these should be stratified wherever possible based on vessel size/type, spatial location of fishing operations, temporal variation in fishing operations and any other distinguishing factors between fishing trips of a fleet so that the sample is representative of the fleet.

F. Total catch estimation

To be successful as an observer, the estimation of sizeable quantities of fish is an important skill to learn. There are three ways to estimate a set's total catch[21]:

1. Weigh the entire catch (feasible if the catch is small)
2. Use the vessel estimate
3. Record the catch weight of samples and raise these, or take numbers and length measurement for conversion.

The first option is generally unavailable, and the second option introduces the possibility of bias, given the source of the data. The third option is independent, but is an approximation and requires careful observation to achieve better accuracy which will increase with the experience of the observer. Examples of this approach might be brail capacity x brail tally = total catch weight (where brail tally is the record of how full each brail was) or recording the total number of fish and taking their length measurements to convert to weight later. For those fish where length measurements could not be taken, a sample weight might be used, e.g. average weight of fish x total number of fish = total catch weight.

G. Sampling for species and size composition

Sampling procedures

Resolution 11/04 states that at least 5% of the number of operations/sets for each gear type and fleet must be sampled, however, specific sampling strategies are generally determined by the operational nature of the fishery and the feasibility of different levels of coverage. These will differ between surface fisheries where large quantities of fish are caught and processed within a few hours and longline fisheries where catches can be spread out over many hours during a day. Whatever type of within-set sampling takes place must be well documented as well as whether the reported data have been raised to the total catch or not.

[21] ISSFguidebooks.org/observer

Longline fisheries

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, the catch rate is generally low which makes it possible to sample a high percentage of the catch. For this reason, for longliners the species and the length are generally recorded for all of the catch, for all sets during a trip; or for long trips, this may be reduced to two out of every three sets during a trip. When the catch rate is higher, the species composition is usually more uniform so a smaller proportion of the fish can therefore be measured. A fairly systematic sampling approach such as every nth fish can be employed at this time. As this is fairly rare, the overall proportion of the catch measured should still be high (80% to 100%).

Surface fisheries

Surface fisheries such as purse-seiners and poling boats tend to target smaller, schooling fish and catch these in greater numbers over a shorter time period, within a fixed location. As the catch is often more homogenous in size and species composition, relatively smaller samples of the catch can be identified to species level and measured as part of a stratified sampling approach. Considering these factors the following rules of thumb can be used to take an appropriate sized sample:

- 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 (<15 kg). If a mode is not clearly discernible for length frequencies at this sample size, an additional sample should be taken if time allows.
- When mixed species are caught and catches potentially include fish from a number of different schools, the sample size should be increased to at least 100 fish for larger fish 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 and samples should be taken from different stocker ponds or wells. The reason for this is that catches may have been manually pre-sorted by crew by species and/or size. Even if this is not the case, then fish of different sizes and different species tend to separate within the net naturally so a single sample from the top or bottom of the net, or one well or brine tank could be biased towards either larger or smaller fish or a particular species.

In situations where catches are truly highly mixed and distinguishing between species is not necessary for commercial reasons and so the catch is not sorted, larger samples should be taken to accurately monitor catches. Identifying a relatively larger proportional sample of the catch less frequently can help improve estimates of total species and size composition of fish caught. The greater the variability in species and size composition, the greater the sample size required.

The methods used to select these fish can also vary. Samples are often taken via "grab" or "spill" sampling. "Grab sampling" is when an observer pulls by hand a selected number of fish from a pile. Because of the subconscious human tendency to select larger individuals, "spill sampling" is an alternative sampling strategy that may be used. Spill sampling is when the fish are tipped from a receptacle into a bin to avoid hand selection of individual fish and reduce potential bias.

Sampling bycatch

As providing information on bycatch is a key requirement of observers, all bycatch interactions should be recorded as far as possible, whether retained or discarded.

H. Biological sub-sampling

Biological sub-sampling is where the observer collects detailed biological information on a smaller proportion of the catch, such as sex, maturity stage, takes otolith and/or genetic samples. Potential methods to use for this might be systematic random sampling, such as selecting every nth fish from the original sample taken. Catches are also monitored for the recapture of tagged fish and so these fish may be selected for biological sub-sampling.

Potential methods used for selecting these individuals may be:

- Fixed number of each species

Of the random sample taken, the fish are identified to species level. Once the main species have been determined, a fixed number of fish of each species are measured to obtain a size frequency distribution for each species. An advantage of using this method is that all species should be evenly sampled, however, the main species may be under-sampled so priority species, such as bycatch may be selected prior to the trip.

- Mixed species sampling

Of the random sample, a small random subsample is taken and biological information extracted. 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.

- Priority species

Particular species may be selected by the observer scheme managers prior to the trip taking place based on specific research projects, or species targeted for stock assessment or review at a regional level. These may be selected purposefully from the random sample. This may also include certain bycatch species.

I. Sampling Equipment

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

Length measurement equipment required for tuna vessels

Lengths can be taken using 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 with a flexible tape.

Data recording

Observers are required to collect a vast amount of information covering a broad spectrum of data categories that include: vessel data, trip logistics, 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 collection forms. The forms are based on the IOTC minimum data collection requirements while the data reporting templates are based on the IOTC minimum data reporting requirements. There are also a number of 'recommended' fields for inclusion where the observer has sufficient time. These are all covered in detail in Part C of this manual 'data field descriptions'.

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 unique codes. Where a code does not adequately describe the information to be captured in a data field the observers should instead record the full details.

IOTC and FAO 3-alpha codes should be used to identify retained 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 or sample label numbers 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. Where it is not possible to obtain a sample or take a photograph, one of these codes for the higher taxonomic level should be used to identify the species group.

J. Species identification

It is the observer's responsibility to record all species that interact with the fishing gear, whether they are target species or bycatch, retained or discarded. There are a number of recommended resources available to assist with species identification. These include:

All species groups

- IOTC species identification guides. E-copies are available at: www.iotc.org/science/species-identification-cards or hard copies can be obtained on request from the IOTC Secretariat.[22]

Tuna

- FAO guide www.fao.org/docrep/009/ac478e/ac478e00.htm
- ISSF guide – chapter 3 p38
  www.dropbox.com/s/lxjbcilpqhqge8d/ISSF%20Purse%20Seine%20Observer%20Guidebook%20English%20v1_01.pdf?dl=1

Billfish

- www.fao.org/docrep/009/ac480e/ac480e00.HTM

Sharks and rays

- Deep Sea Cartilaginous Fishes of the Indian Ocean Vol. 1 and 2 Identification Guide to the Deep-Sea Cartilaginous Fishes of the Indian Ocean (FAO Fish Finder)
  www.fao.org/docrep/019/i3477e/i3477e.pdf
  www.fao.org/documents/card/en/c/956b9ba7-4c93-4722-a928-28b283febd96/
  www.fao.org/documents/card/en/c/42d8a473-21d8-48cd-83d7-9b7be0b1797f/
- Onboard guide for the identification of pelagic sharks and rays of the western Indian Ocean (Smart Fish, FAO, COI)
  www.iotc.org/sites/default/files/documents/2014/11/FAO_Onboard_Identification_Pelagic_Guide_Part_1.pdf.
  www.iotc.org/sites/default/files/documents/2014/11/FAO_Onboard_Identification_Pelagic_Guide_Part_2.pdf.

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www.iotc.org/sites/default/files/documents/2014/11/FAO_Onboard_Identification_Pelagic_Guide_Part_3.pdf.

www.iotc.org/sites/default/files/documents/2014/11/FAO_Onboard_Identification_Pelagic_Guide_Part_4.pdf.

www.iotc.org/sites/default/files/documents/2014/11/FAO_Onboard_Identification_Pelagic_Guide_Part_5.pdf.

Marine turtles

- NOAA marine turtle identification guide

  www.sefsc.noaa.gov/turtles/FO_Species_ID_Photography_Safety.pdf

  www.sefsc.noaa.gov/species/turtles/observers.htm#presentations
- ISSF guide – chapter 3 p69

  www.dropbox.com/s/lxjbcilpqhqge8d/ISSF%20Purse%20Seine%20Observer%20Guidebook%20English%20v1_01.pdf?dl=1

Seabirds

- http://bmis.wcpfc.int/docs/links/AFMA_2013_Seabird-ID-Guide-2013.pdf
- www.fpir.noaa.gov/SFD/SFD_seabird_guide.html
- www.acap.aq/en/resources/acap-species2
- Video on bird scaring line deployment http://youtu.be/9WG6drHNcrk

Marine mammals

- www.fao.org/docrep/009/t0725e/t0725e00.htm

Electronic species identification methods

Other sources of information on species ID include

- iSpot, the online community of species identification experts to assist with identification based on uploaded photos www.ispotnature.org/communities/global
- The FAO iSharkFin electronic species identification guide based on photos of shark fins www.fao.org/fishery/ipoa-sharks/iSharkFin/en

K. Measurements

Methods used

The methods used for measuring or estimating weights and lengths should be recorded for each entry in the comments sections of the forms. For weights it should be documented whether they are measured using spring scales, electronic (Marel) scales, estimated from captain records, visually estimated by the observer or any other method used, which should be described. The type of length measurement taken should also be described, i.e., whether calipers, tape measure, visual estimation or other methods are used. 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. If it is not possible to take the recommended length measurement due to damage, an alternative measurement could be taken. Where possible, multiple measurements should be recorded for the same specimen so that conversion factors between length types and between weight types can be derived.

Length measurements

It must be noted whether measurements taken are flat (calipers) or curved (i.e. with tape measure). A number of alternative units of measurement are available which should generally be used when the recommended measurements cannot be taken due to factors such as processing and depredation. A number of length measurements, including the recommended measurement, should be taken where possible so that length to length conversion equations can be derived.

Tuna

Tuna (Fig. 26) are generally measured for "upper jaw fork length" (UJFL) from the tip of the upper or top jaw to the fork of the tail. This is best measured as a straight line using calipers. 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 the upper jaw to the insertion of the first dorsal spine can be taken. It is important to note down clearly exactly which measurements have been taken.

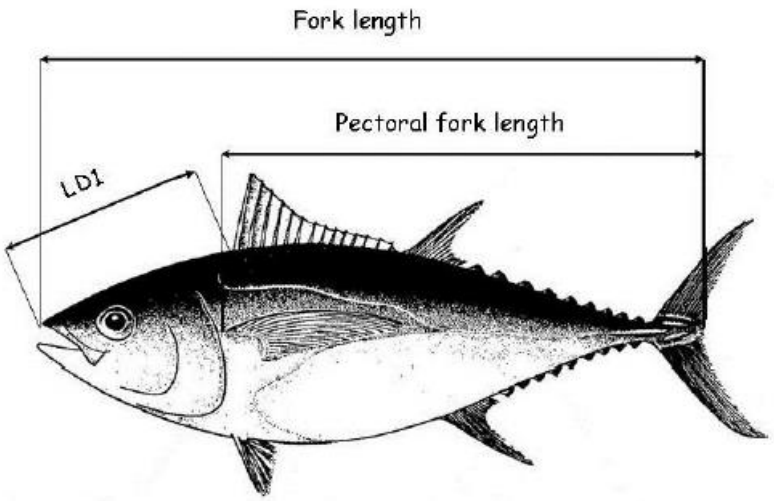


Fig. 26. Common length measurements used for tuna and tuna-like species

Billfish

Billfish (**Fig. 27**) 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)	length from posterior edge of the eye socket to the fork of the tail.
Pectoral-fork length (PFL)	length from the most anterior insertion of the pectoral fin to the fork of the tail.
Pectoral-dorsal length (PDL)	length from the most anterior insertion of the pectoral fin to the most anterior insertion of the second dorsal fin.
Pectoral-anal length (PAL)	length from the anterior insertion of the pectoral fin to the posterior rim of the anal sphincter.

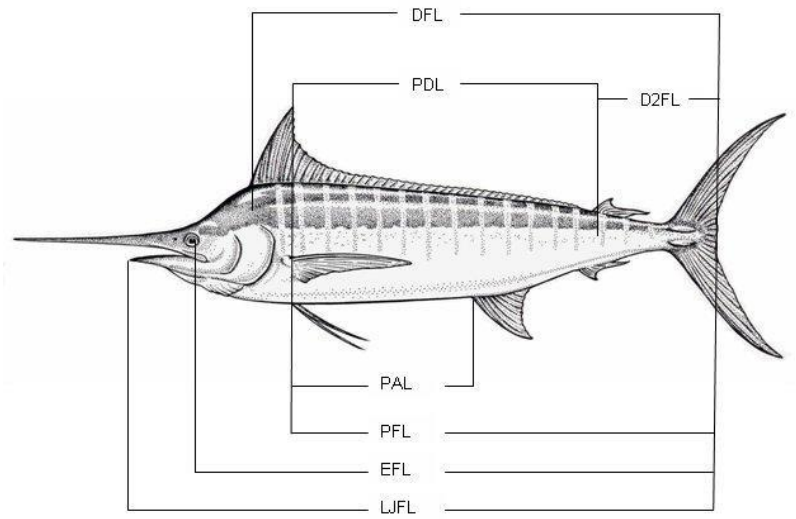


Fig. 27. Common length measurements used for billfish

Sharks

Sharks are preferably measured from the tip of the snout to the anterior portion of the caudal keel (precaudal length) or from the tip of snout to the fork of the tail (fork length) while rays are generally measured by width, from the tip of the pectoral fin to the tip of the pectoral fin across the widest point, in a straight line (**Fig. 28**).

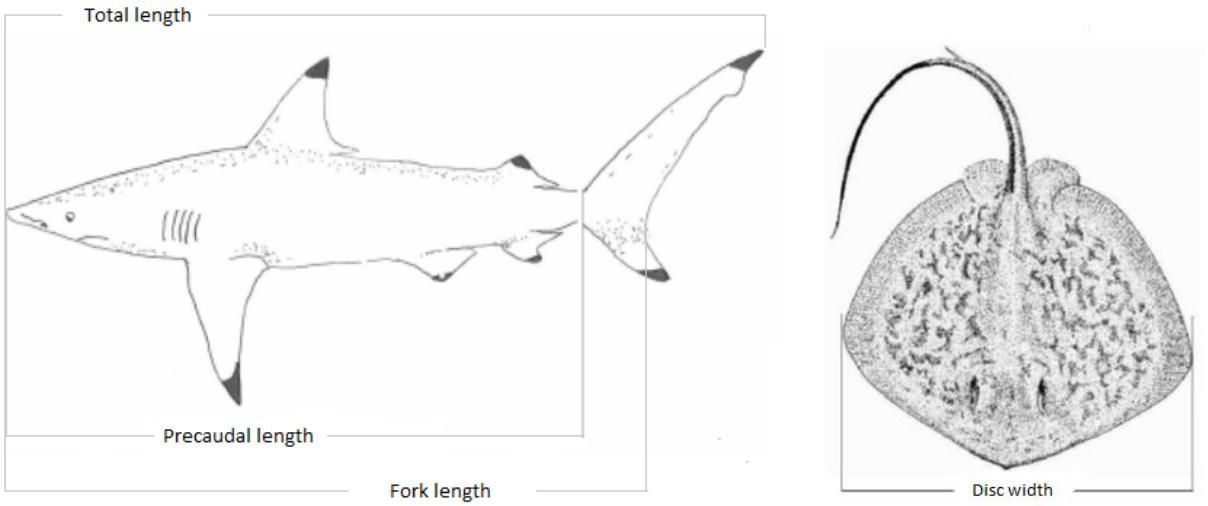


Fig. 28. Common length measurements used for sharks and rays

Marine turtles

Overall size for marine turtles is usually given as carapace length, either straight, measured using calipers, or curved, measured with a length of tape (**Fig. 29**). Because the precentral scute may be concave and because there is a distinct notch between the postcentral scutes in the Cheloniidae, measurements may be taken from the furthest point on the front margin of the carapace to the furthest part on the hind margin (tip to tip), or from the nearest point on the front margin to the notch in the rear margin (notch to notch). A curvilinear notch length should preferably be taken and the type of measurement taken should be recorded using the relevant code category.

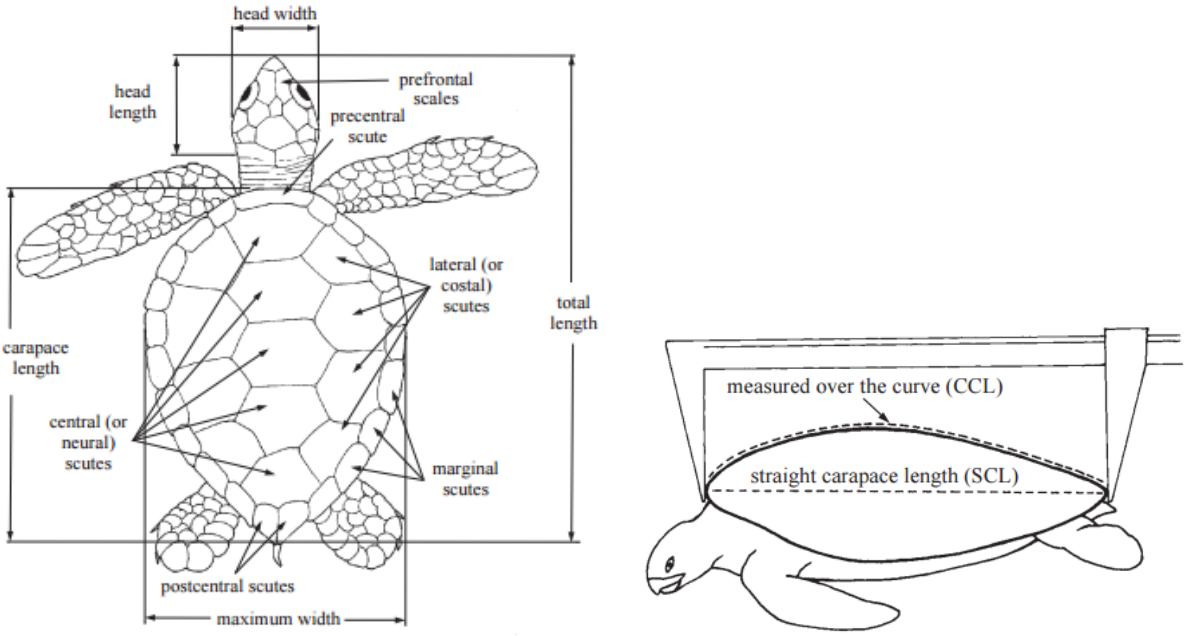


Fig. 29. Common length measurements used for turtles[23]

Birds

Length measurements for birds are generally made by laying the bird on its back and flattening out the head and neck gently and measuring a straight line between the tip of the bill and the tip of the tail. Other length measurements used include wing length (tip to the longest primary feathers), tail length, head length, tarsus (upper margin of the beak or bill) length and culmen length (Fig. 30).[24]

[23] Source: www.fao.org

[24] Rasmussen PC and Anderton JC (2005). *Birds of South Asia. The Ripley Guide. Volume 2*. Washington DC & Barcelona: Smithsonian Institution & Lynx Edicions. pp. 18–19.

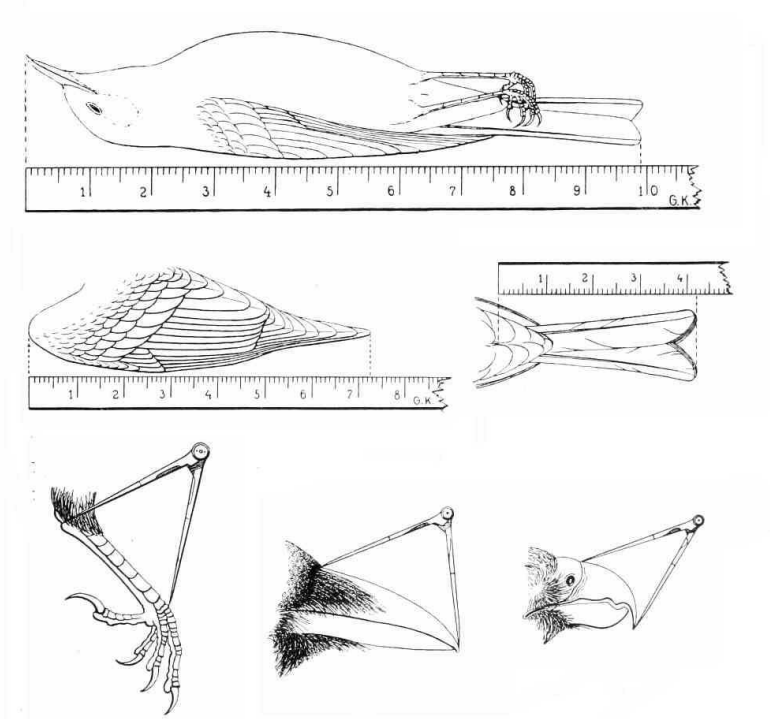


Fig. 30. Common length measurements used for birds (total, wing, tail, tarsus and culmen lengths)[25]

Size-class intervals

Lengths are recorded in 1 cm interval length classes, rounded to the lower centimetre. As an example, 40.1 to 40.9 cm is recorded as 40 cm and therefore a measurement of 39.9 cm is recorded as 39 cm.

L. Additional Biological sampling

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

Sex determination

When specified in the sampling programme the sex of the fish may also be required. On 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 longliners where most fish caught are adults, these can be determined by first taking the length measurements and then checking the gonads for sex while the crew are dressing the fish. Length provide an initial indication of sex as male and female billfish have significantly different growth rates, resulting in smaller males which rarely weigh more than 100kg.

Tuna and billfish

Tuna and billfish gonads are found in the ventral part of the body cavity. Ovaries are usually tubular, pink/red/orange or grey, and granular, while testes are flat, white/grey/pink and their ventral edges

[25] Source: www.archive.org/stream/dievgelhandbuc01reic#page/65/mode/1up Die Vogel : Handbuch der Systematischen Ornithologie. Volume 1

frequently have a wave-like outline. The male gonads in billfish have many nodules present on the external surface, while in tuna the testes are usually flatter and thinner with more fatty or connective tissue apparent. Cross sections of male gonads have a characteristic rectangular/triangular shape, are solid, and when sexually ripe, milt can be seen and the lumen is visible at the base or to one side of the gonad (**Fig. 31**). In contrast, the female gonads have a smooth external appearance with a rough surface, and the cross section has a characteristic oval shape with a lumen (opening) visible in the middle (**Fig. 32**).

Fig. 31. Cross section (left) and whole (right) views of male swordfish gonads (US National Marine Fisheries Service, Southeast Fisheries Science Centre).

Fig. 32. Cross section (left) and whole (right) views of female swordfish gonads (US National Marine Fisheries Service, Southeast Fisheries Science Centre). NB: Most tuna and swordfish >100 kg are female.

Sharks

The sex of sharks can be determined by the presence or absence of a pair of claspers on the pelvic fins. Claspers are very prominent in mature males, more subtle in juvenile males and completely absent in females (**Fig. 33**).

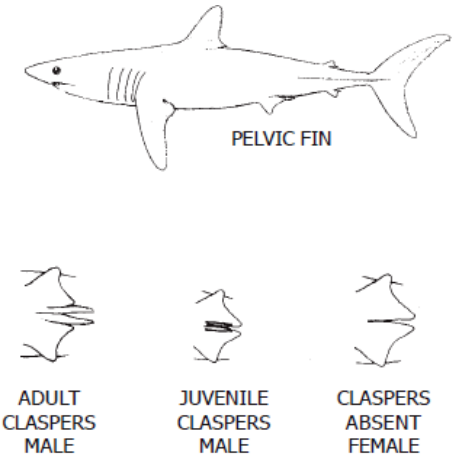


Fig. 33. Sex determination in sharks. Location of the pelvic fins (top) and ventral view of the pelvic fins (bottom).

Maturity

Maturity can be assessed through visual examination of the gonads and assigned a maturity stage form 1 to 5 (**Table 4**), however, the visual assessment of ovaries to determine maturity stage is felt to be an imprecise indicator of reproductive condition (West, 1990) so the use of histological and/or chemical methods is recommended. Whichever method is used should be fully documented.

Table 4. Maturity stages used for visual examination of large pelagic gonads

Stage	Criteria	
	Males	**Females**
I	Gonads small ribbon-like, not possible to determine sex by gross examination	Gonads small ribbon-like, not possible to determine sex by gross examination
1	**Immature**; testes extremely thin, flattened and ribbon-like, but sex determinable by gross examination	**Immature**; gonads elongated, slender, but sex determinable by gross examination
2	Enlarged testes, triangular in cross section, no milt in central canal	**Early maturing**; gonads enlarged but individual ova not visible to the naked eye
3	**Maturing**; milt flows freely if testes pinched or pressed	**Late maturing**; gonads enlarged, individual ova visible to the naked eye
4	**Ripe**; testes large, milt flows freely from testes	**Ripe**; ovary greatly enlarged, ova translucent, easily dislodged from follicles or loose in lumen of ovary
5	**Spent**; testes flabby, bloodshot, surface dull red, little or no milt in central canal	**Spawned**; includes recently spawned and post-spawning fish, mature ova remnants in various stages of resorption, and mature ova remnants about 1.0mm in diameter

M. Best practice bycatch handling methods for successful live release

The handling of catch and bycatch is the responsibility of the crew and not the observer. Nevertheless, it is a good idea for the observer to understand the best practice handling techniques for sampling purposes.

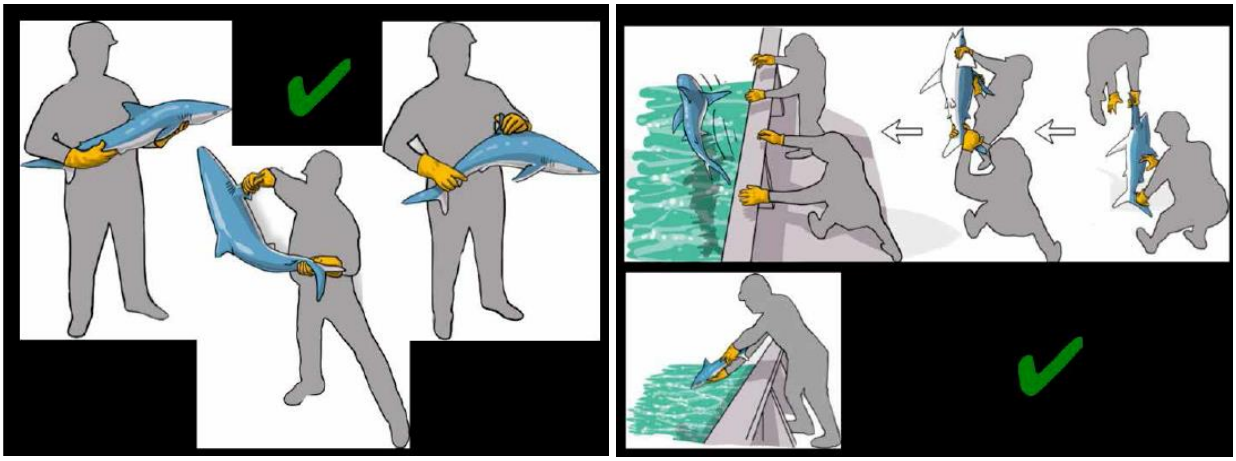
Sharks and rays

For large sharks that become hooked or entangled in longline gear, long-handled line cutters and dehookers should be used while the animal is still in the water, however, if the shark is relatively small it may be brought onboard carefully. Dehookers, bolt and line cutters can then be used to remove a hook, disentangle and animal or cut a leader if the hook is too deeply embedded.

Sometimes sharks will spin and roll themselves in a purse seine net, though they may otherwise still be unharmed. As the net is reeled in, the crew should look ahead to try to spot entangled sharks as early as possible. If a shark is lifted up in the net toward the power block, this becomes a dangerous situation for both the shark and the crew. If an entangled shark is seen, the crew should reduce the speed of the net reel (thus reducing tension in the net), and then attempt to carefully remove the animal, using knives or clippers if necessary to cut the net.

There are three ways to properly handle a small shark:
1. One hand on the dorsal (top) fin and the other holding the body from below
2. Both hands holding the body
3. One hand on the pectoral (side) fin and the other holding the tail. To release the shark, the head should be pointed down towards the water and the shark then dropped in (**Fig. 34a**).

For a medium-sized shark, one or two people should hold the dorsal and pectoral fins, with the other person holding the tail. To release the animal, the crew should drop (not throw) the shark over the side (Fig. 34b).



(a) **(b)**

Fig. 34. Proper handling of (a) small sharks (b) medium sized sharks[26]

Because a stingray's spine is located at the base of its tail, it is best to avoid the rear of the animal and grasp it near the head to avoid injury from its spine (**Fig. 35**). This also applies to small manta rays which can be safely carried with a person holding each wing.

[26] Poisson et al. 2012

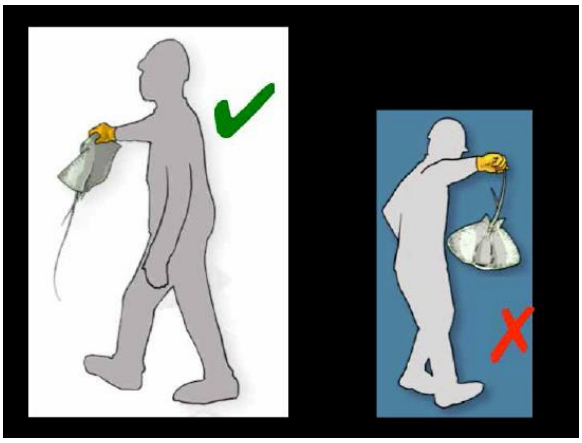


Fig. 35. Sting rays should be held by the body away from the person to avoid injury from its spine[27].

For large sharks, rays, and other large fish (e.g., moonfish), the crew can attempt to release them directly from the brailer, if feasible, by tipping one edge of it into the ocean. Alternatively, the animal can be returned to the sea using a piece of net, plastic tarp, or canvas that can be lifted by the vessel's crane. The material should be ready on deck before brailing, and when a large animal is encountered, it can be placed on the material, which is then hooked up to the crane and lifted over board.

During purse seine operations, large sharks, rays, and other large fish (e.g., moonfish) can be released directly from the brailer, if feasible, by tipping one edge of it into the ocean. Alternatively, the animal can be returned to the sea using a piece of net or tarpauline on the deck that is then lifted by the crane and released over the side (**Fig. 36**).

(a) **(b)**

Fig. 36. Methods for releasing manta rays (a) directly from the brail (b) using tarpaulin and crane[28].

Where sharks cannot be released immediately, they should be kept cool with a wet towel draped lightly over the head and with a fish in the mouth to prevent bites or a hose to allow it to breathe (Fig. 37). Sharks should not be held by the tail or gills and should not be stepped on, handled with a gaff or other sharp object or thrown on the ground as all of these can severely damage the internal organs (Fig. 38).

[27] Poisson et al. 2012

[28] Poisson et al. 2012

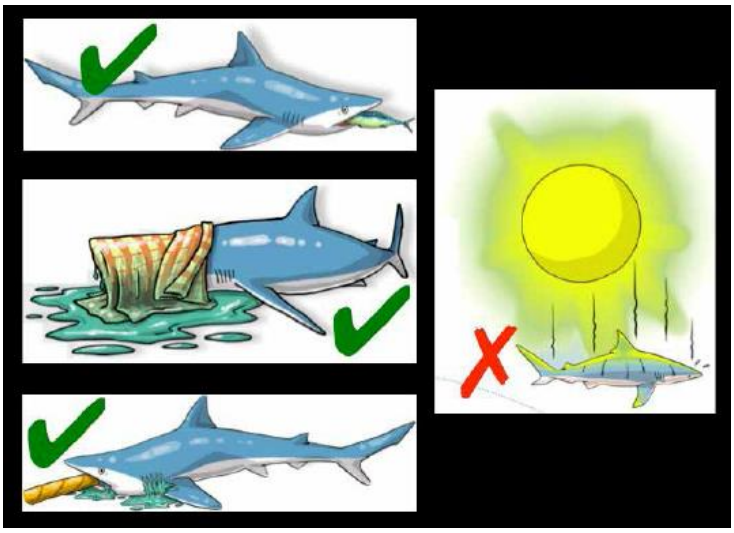


Fig. 37. Keep sharks cool, prevent bites and allow them to breathe[29]

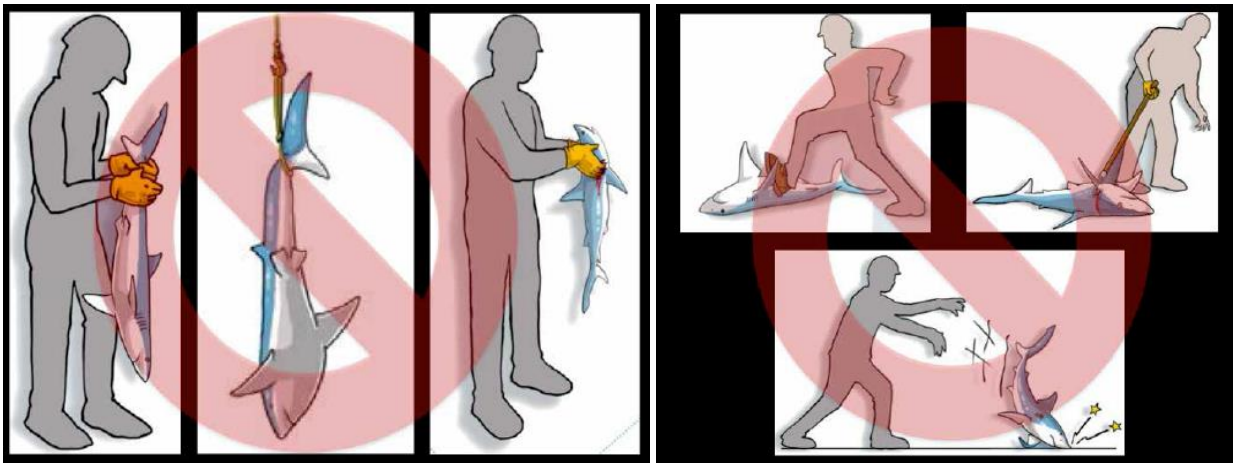


Fig. 38. Practices that can severely damage the internal organs of sharks[30]

Resolution 13/05 requires that vessels should not intentionally set a purse seine net around a whale shark in the IOTC area of competence, if it is sighted prior to the commencement of the set. If an incident does occur, all reasonable steps must be taken to ensure its safe release, while taking into consideration the safety of the crew. If an observer is onboard, they must record details of the interaction, including:

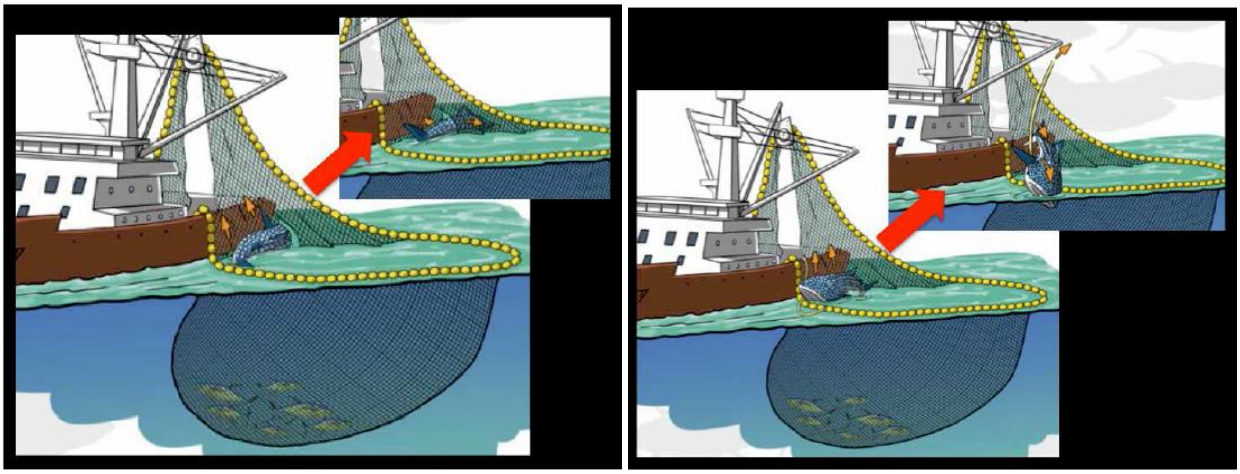
- the number of individuals;
- a short description of the interaction, including details of how and why the interaction occurred, if possible;
- the location of the encirclement;
- the steps taken to ensure safe release;
- an assessment of the condition of the animal on release, including whether the whale shark was released alive but subsequently died.

Caution must be taken to ensure that the whale shark is not further harmed during the release process. As illustrated in the gallery, there are two safe release methods and their application depends on the position of the whale and tunas in the net. If the whale shark is at the surface and separated from the tunas, the

[29] Poisson et al. 2012

[30] Poisson et al. 2012

animal can tear the net (or a crew member can cut a few meters of net in front of the animal's head), and then swim freely out of the net (**Fig. 39a**). An alternative technique requires the crew in charge of the net hauling operation to use the winch and the capstan to bring the whale shark close to the hull, onto the floatline, and then roll it outside the sack. In this case, a rope placed under the animal and attached to the floatline could help roll the whale shark out of the net (**Fig. 39b**). At no time should the animal be pulled by the tail, towed by a speedboat, or hauled up with the vessel's crane because this can cause severe injury to the animal **(Fig. 40**).



(a) **(b)**

Fig. 39. (a) the animal can tear the net or a crew member can cut a few metres of net in front of the animal's head, (b) alternatively the winch can be used to bring the whale shark close to the hull, onto the floatline, and it can then be rolled outside the bunt[31].

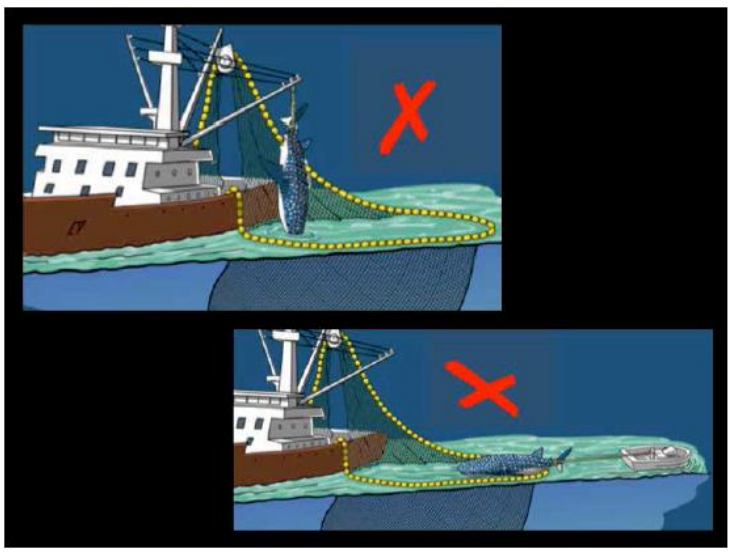


Fig. 40. A whale shark should NEVER be pulled by its tail[32].

[31] Poisson et al. 2012

[32] Poisson et al. 2012

Marine turtles

Turtles may become entangled in purse seine or gillnets. To maximise survival, these should be disentangled at the earliest possible stage, preferably before the net leaves the water. If necessary, knives or clippers can be used to cut the net.

A newly disentangled turtle may be stressed or exhausted by its ordeal so, if possible, the crew should allow it to rest for a few hours before releasing it. Turtles should be lifted by holding either side of the shell, not by the flippers (**Fig. 41**). Gaffs or other sharp objects should not be used and turtles should not be turned in a complete circle as this can cause the intestines to twist. The animal should be kept moist (the body can be covered with a wet towel, but not the nose and mouth, or it can be sprayed periodically with water) and at a temperature above 15°C. The turtle may be placed on an object such as a tyre to allow it to rest. When it is ready to be released, the crew should check that there is no fishing gear in the water, disengage the propeller and ensure that release takes place a suitable distance from propellers. Turtles should be release gently into the water, head first while holding either side of the shell. Turtles should not be dropped or thrown from any height.

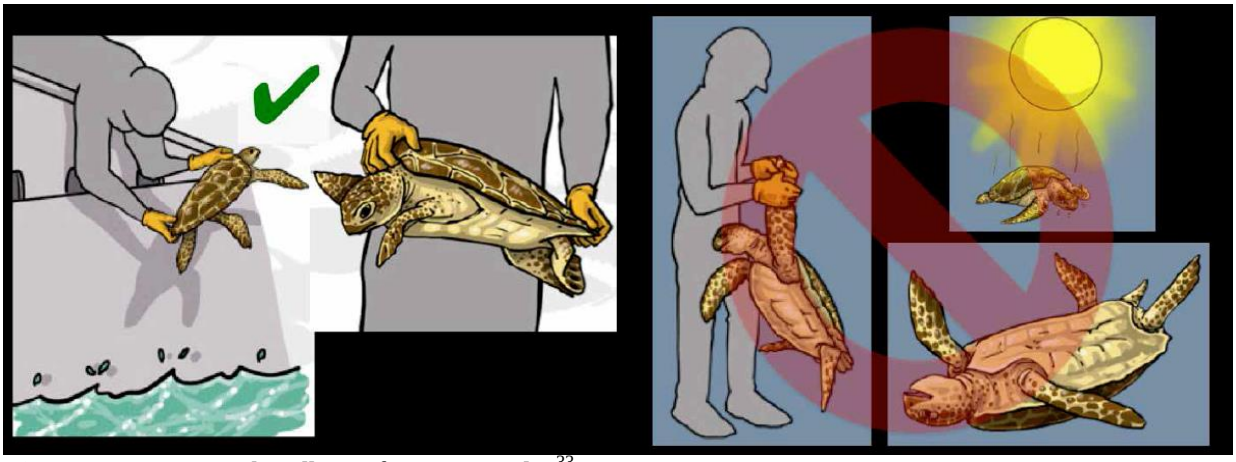


Fig. 41. Appropriate handling of marine turtles[33]

Guidelines for resuscitation

If a turtle appear unconscious, place the turtle right side up on a tilted surface so that its hind quarters are approximately 15cm (6inches) higher that its head to allow the water to drain out of its lungs (**Fig. 42**). The turtle should be protected from environmental conditions and periodically rocked from side to side by holding the outer edge of the carapace and lifting one side about 7.5cm (3 inches). The reflexes should be checked every three hours by touching the upper eyelid or pinching the tail. An unconscious but live turtle may not react to this; the onset of rigor mortis is often the only definitive indication that a turtle is dead. Turtles that revive and become active must be released over the stern of the boat when fishing gear is not in use, when the engine gears are in neutral position, and in areas where they are unlikely to be recaptured or injured by fishing gear or vessels. If the turtle does not respond after 24 hours it is likely dead and should be returned to the water in the same manner.

[33] Poisson et al. 2012. Good practices to reduce the mortality of sharks and rays caught incidentally by the tropical tuna purse seiners. Mitigating impacts of fishing on pelagic ecosystems: towards ecosystem-based management of tuna fisheries 15-18 October 2012 Montpellier, France.

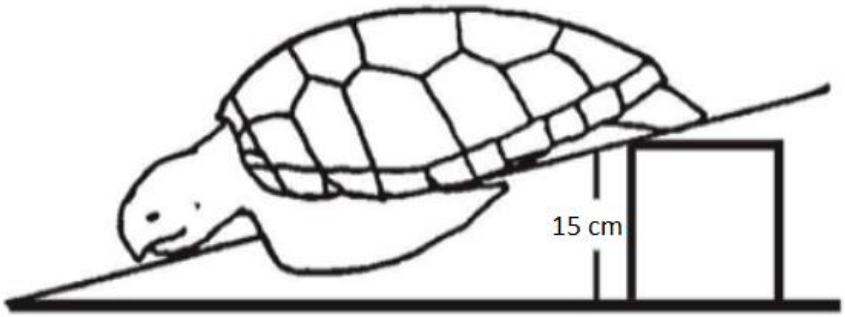


Fig. 42. Proper positioning of a turtle for resuscitation[34]

Seabirds

Most seabirds are caught in areas south of 25°S in which area two of the three recommended measures for bycatch mitigation must be used by logline vessels (IOTC Resolution 12/06). Nevertheless, interactions with seabirds must be recorded by observers in all areas and for all gear types.

Many seabirds are caught during line setting, and are therefore dead by the time gear is hauled, however, when live seabirds are found, the tension on the mainline should be released by slowing the vessel to a stop. The bird can then be eased to the side of the vessel by steadily bringing in the line. The bird can be brought onboard a vessel by using a long-handled dip net, where available. Seabirds can be quite large and will bite, so gloves, eye protection, long sleeves and the help of a crewmember are all useful. The correct way to handle a seabird is to:

- Hold it behind the head at the top of its neck
- Fold the feathers and wings back into their natural position against the body
- Not restrict its breathing by covering its nostrils or squeezing the body too tightly
- Cover its body with a towel to protect the bird's feathers from oils and other things that could damage it during handling

For cases where a seabird is lightly hooked in the bill, leg or wing, and the barb is visible then the excess line can be removed, the barb can be cut with bolt cutters and the remainder of the hook can be eased out. If the bird is more deeply hooked in the body or throat the line should be cut as close as possible to the bird, leaving the hook in place. Trying to remove a deeply embedded hook can do more damage than good. More guidance is available at: http://youtu.be/eLK1BPV_Wic.

[34] Northeast Fisheries Observer Program Biological Sampling Manual 2010

(a) **(b)**

Fig.43. The correct way to handle a seabird (a) and the incorrect way to handle a seabird (b)[35].

A bird's feathers must be dry for it to fly properly and it may take between 30 minutes and 4 hours for them to dry if wet. A cardboard box with a towel is a good place for it to rest and recuperate before being released. The bird should not be given any food or water. A fully recovered bird can:

- Stand on its feet
- Hold its head up
- React to sound
- Breathe without making a noise
- Retracts its wings into a normal position against its body

To release a bird, the vessel should be stopped and the bird set on the surface of the water and left until it is sufficiently clear before the motor is reengaged. The bird should not be thrown into the air.

N. Tagged Animals

If a tagged or banded animal is encountered, every effort should be made to recover the tag (if the individual is dead), or to record the information on it (e.g. for a turtle or seabird that will be released). The tag number, length, weight, sex, time and place of capture should all be recorded in the relevant data field sections of the observer forms where possible. In many cases, instructions on where to report recaptures appear on the tag and with these types of tags, there is often a reward associated with the returning the tag to the researchers who deployed it.

There are a variety of tag types in use, from simple numbered plastic tags to complex electronic tags:

- Plastic spaghetti or dart tags are attached on the back of the fish.
- Rototags are a two-piece, plastic cattle ear tag, which is inserted through the first dorsal fin.
- Sonic tags are miniature radio transmitting devices that are surgically implanted inside the tuna (since these are not visible externally, a conventional tag of a certain colour will be visible on the outside).
- Internal archival tags are implanted in the body cavity and record internal body temperature and the environment's temperature, pressure, and light.
- Smart Position or Temperature Transmitting (SPOT) tags are attached to the dorsal fin and send a signal to a satellite every time the animal surfaces.

[35] ISSF Longline skippers guidebook (a) John Paterson, ATF Namibia, (b) Juliano Cesar, Projecto Albatroz.

- Pop-up Satellite Archival Tags (PSAT) are inserted with an anchor and a tether into the dorsal musculature, recording temperature, pressure, and light, and they detach from the animal on a pre-programmed date.

PART C: Data field descriptions

I. Overview

This section details the minimum data collection and reporting fields. The description of the data fields in this section will assist the observer to understand the exact nature of the minimum information to be collected for the controlling organisation and to be reported to the IOTC Secretariat as well as when the observer wishes to record additional information. If the appropriate category is not available in the code tables, then a category should be added, bearing in mind that they should be clearly defined and mutually exclusive where possible.

Data can be reported to the IOTC Secretariat in one of the following formats:

i.) *any non-proprietary electronic format* (e.g., csv, xml, txt, doc, etc.); or

ii.) in an *electronic format*[36] that can be easily exported and processed into standard spreadsheet, database or statistical software (e.g., xls, dbase, mdb, etc.)

as long as the required data (data fields indicated in the data reporting templates and described below) are provided, at the specified resolution. This might be, for example, a csv export file, or an excel file as per the trip report template. The data field descriptions found below are consistent with those in the data collection forms and in the trip report templates.

[36] As per SC14 (para. 102)

Observer data collection forms and reporting templates by fishery

FISHERY	DATA COLLECTION FORMS	USAGE	DATA REPORTING TEMPLATES
Longline	Form Gen-1	Trip form completed once per trip	TripLL
	Form LL-2		
	Form LL-4	Operational form completed for each operational set	OpLL Catch LL
	Form Gen-5	Operational per occurrence completed as required for each event	N/A
	Form Gen-6		
Purse Seine	Form Gen-1	Trip form completed once per trip	TripPS
	Form PS-2		
	Form Gen-3	Daily activities form	N/A
	Form PS-4	Operational form completed for each operational set	OpPS BioPS
	Form Gen-5	Operational per occurrence completed as required for each event	N/A
	Form Gen-6		
Pole and Line	Form Gen-1	Trip form completed once per trip	TripPL
	Form PL-2		
	Form Gen-3	Daily activities form	N/A
	Form PL-4	Operational form completed for each fishing operation/event	OpPL CatchPL
	Form Gen-5	Operational per occurrence completed as required for each event	N/A
	Form Gen-6		
Gillnet	Form Gen-1	Trip form completed once per trip	TripGN
	Form Gill-2		
	Form Gill-4	Operational form completed for each operational set	OpGN CatchGN
	Form Gen-5	Operational per occurrence completed as required for each event	N/A
	Form Gen-6		

II. Data collection and reporting requirements

A. General

Trip Information

For data reporting purposes, a trip number should be provided as a unique identifier for the trip so all information can be grouped by trip. This should begin with the three-digit country code of the vessel flag, the two digit code of the main gear followed by 6 numerical digits. e.g. MOZLL000001.

At the start of the trip the time zone the vessel is using should be recorded (±GMT). Keep accurate track and record when time zones or the vessel times are altered. On some vessels they maintain the time zone of their flag state and all logbook times are recoded for this time zone.

Likewise, the units the vessel is using for geographical coordinates should be noted (e.g. (d)dd.dddd°, (D)DD°mm.mm or (D)DD°MM'ss") and all locations recorded under these units so they may be converted later as appropriate.

B. Form 1 - GEN

Data field	Description	Mandatory reporting[37]	Mandatory collection[38]	Recommended
Vessel information				
Vessel name	Record the vessel full name, including any numbers. For example "Fukuseki Maru No.5".	X		
Vessel type	This records the type of vessel (Table 13). For example a European type industrial purse seiner (PSEU). 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.	X		
Main gear	Main gear type/s (if more than one type of fishing gear is used) for the observed trip, e.g. drifting longline (up to 1800 hooks), LLFR (Table 16).	X		
National registration number	This is the number issued by country in which the vessel is registered.		X	
Vessel IOTC number	Record the vessel IOTC number as per the IOTC Record of Authorized Vessels. Check the Certificate of Registry that should be issued by the flag state to confirm that the name displayed corresponds to this and relevant safety certificates (should there be any discrepancies note these in the comments section).	X		
Port of registration	The name and geographical coordinates (specify units; preferably ±(d)dd.dddd°) corresponding to the port of registration of the vessel (also called home port), as per the vessel documents	X		
Licensed target species	Vessels will generally target a narrow range or aggregation of species and specified by the licences or permit conditions under which authority the vessel is operating (Table 5).			X

[37] Consistent with IOTC trip report template

[38] Consistent with IOTC data collection forms

Data field	Description	Mandatory reporting[37]	Mandatory collection[38]	Recommended
IMO or Lloyd's number	The IMO number refers to the number allocated to the vessel if it is registered to the International Maritime Organisation of the United Nations.			X
Port of departure	If the fishing vessel departed from port the name of the port and geographical coordinates corresponding to the port; if the vessel started a new trip at sea following a transhipment just record 'at-sea' plus the geographical coordinates corresponding to the location the trip started.	X		
Date / time vessel sailed	The date (YYYY-MM-DD) and time (hh:mm) the fishing vessel started the trip that is being observed, i.e. the date in which the fishing vessels sailed back to the fishing grounds from port or a transhipment location.	X		
Date / time vessel returned to port	The date (YYYY-MM-DD) and time (hh:mm) the fishing vessel ended the trip that is being observed, i.e. the date in which the fishing vessel arrived back in port or to a transhipment location. Where an observer disembarks before the vessel returns to its home port at the end of the trip then the observer can request the vessel ETA from the captain but this must be clearly reflected.	X		
Port of return	If the fishing vessel arrived in port record the name of the port or geographical coordinates corresponding to the port; if the vessel arrived at a transhipment location just record 'at-sea' plus the geographical coordinates corresponding to the location the transhipment started. If the observer disembarks before the vessel returns then the observer can request the information from the captain and record this.	X		
Observer and Deployment Details				
Observer name	Name of the scientific observer(s) that collected the data onboard the fishing vessel. The observer must print first and family names in full.	X		
Observer nationality	Record nationality as it appears in passport.	X		
Observer IOTC registration number	National agencies will submit a list of their observers to the IOTC Secretariat and each observer will then be allocated an IOTC registration number that must be used on all observer data submissions.	X		
Employer	Record the full name and address of the observer controlling organisation and/ or national fisheries organisation responsible for managing deployment Include postal and physical addresses and relevant telephone numbers and email addresses.	X		
Date / time embarkation	Record the date and time that the observer embarks onboard the vessel (DD:MM:YYYY:hh:mm). It is important to record the vessel's time and note the time zone (±GMT) that the vessel is using.	X		
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 (specify units; preferably ±(d)dd.dddd°).	X		
Date / time disembarkation	Record the date and time that the observer disembarks from the vessel (DD:MM:YYYY:hh:mm). The observer's embarkation and disembarkation may not coincide with the vessel trip information.	X		

Data field	Description	Mandatory reporting[37]	Mandatory collection[38]	Recommended
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 (specify units; preferably ±(d)dd.dddd°).	X		
Contact person(s)	Record full name, contact telephone and fax numbers and email of the contact person from the observer's controlling organisation.		X	
Observer trip information The vessel fishing details recorded must coincide with those while the observer was onboard. Note: it is quite possible that the vessel trip information will differ as an observer may embark after a vessel trip has commenced and the vessel has already been engaged in fishing. Similarly the vessel may continue to fish after the observer has disembarked. Any additional information or anomalous data not captured in the trip report should be noted in the 'comments' section (e.g. if the vessel does not return to port but transhipps catch at sea).				
Total number of fishing operations/sets	Record the total number of all fishing sets/events that took place during the trip for target species (not including operations for bait species)	X		
Total number of operations/sets observed	The total number of fishing events monitored by the observer (this number must be equal to the number of operation numbers provided for the trip)	X		
Details of sampling strategy	If not all of the sets that took place during the time the observer was onboard were monitored, describe the rationale and procedure used for sampling sets (e.g. the first two of every three sets were fully sampled). If 100% of sets were sampled, this is N/A.	X		
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.		X	
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.		X	
Dates searching	Record the dates the vessel was engaged in actively searching for fish.	X		
Dates active fishing	Record the dates the vessel actively fished (when the vessel had gear in the water). For some fishing events this may be for only a few hours of the day. Alternatively a single fishing event/set may span part of two days.	X		
Number of days lost	The total number of days where a vessel was unable to fish dues to factors such as adverse weather conditions, mechanical failure or other unforeseen events	X		
Reasons for time lost	Record the reasons a vessel was unable to fish: (i) adverse weather conditions, (ii) 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 or (iii) unforeseen events (*specify*).	X		
Vessel Owner and Personnel 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.				
Registered vessel owner	Record in full the owner's name, nationality and contact details. These can be obtained or cross-checked on the vessel registration		X	

Data field	Description	Mandatory reporting[37]	Mandatory collection[38]	Recommended
	forms.			
Charterer / operator	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 and contact details.		X	
Fishing Master name	Record the full name of the Fishing Master.		X	
Fishing Master nationality	Record the nationality of the Fishing Master.		X	
Skipper	Record the full name of the skipper. Note in some instances the fishing master and skipper may be the same person.		X	
Skipper nationality	Record the nationality of the skipper		X	
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.		X	
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 comments section.				
Flag	Name of country in which vessel is registered. Note this may not be the same as the nationality from which the vessel originates.	X		
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 an 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.	X		
Gross tonnage (GRT or GT)	Overall internal volume of the ship (GT), as per the IMO International Convention on Tonnage Measurement of Ships.	X		
Length overall (LOA)	Record the maximum length of a vessel's hull measured parallel to the waterline, in metres.	X		
Fish storage capacity	Record the capacity of a vessel to store its catch (hold or volume capacity in 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.	X		
Refrigeration methods(s)	Record the method/s used by the vessel to cool and preserve catch (e.g. blast freezing).	X		
Fish Storage Method(s)	Record the method used by the vessel to store catch. Note: a method to preserve fish may involve several processes, e.g. a fish may first be cooled in a blast freezer at a specific temperature for a time before being transferred to a holding facility for storage 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	X		

Data field	Description	Mandatory reporting[37]	Mandatory collection[38]	Recommended
	fish fresh on ice or in RSW.			
Blast freezer capacity	The volume of catch that can be blast frozen prior to storage, expressed in cubic metres	X		
Hull material	Record the hull material; steel, wood or glass-reinforced plastic (GRP) also known as fibre glass.		X	
Main engine Make/ Power	Record the make and power of the main engines.		X	
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.		X	
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.		X	
Vessel cruising/maximum speed	Record the vessel's average operational cruising and maximum speed capabilities in knots.			X
Vessel electronic equipment The presence, absence and functionality of the electronic equipment onboard can have a significant effect on a vessel's ability to detect and catch fish, and thus the catch per unit effort. Details of this equipment must be noted, including the make and model and a record must be kept of the frequency of gear usage in the 'comments' section. Additional comments or details on equipment should also be included.				
Position fixing equipment	Record presence/absence of position fixing equipment	X		
	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.		X	
Vessel Monitoring Systems (VMS)	Record if the vessel has a VMS installed	X		
	If present, describe if it has security seals in place and whether it is operational. Note the make and model		X	
Radars	Record presence/absence	X		
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. Note the make and model.		X	
Track plotters	Record presence/absence of plotters	X		
	Record make and model. Note if linked to an external GPS or have GPS built in		X	
Acoustic equipment	Record presence/absence of acoustic equipment	X		
	Record the make and the model of the acoustic depth sounder.		X	
	Record if the vessel has an acoustic sonar onboard and note its make, model, power and frequency range.		X	

Data field	Description	Mandatory reporting[37]	Mandatory collection[38]	Recommended
	Record if the vessel has an acoustic doppler current meter, the make and model. This is important to ascertain the current speed		X	
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. Note the make and model.		X	
Communications equipment	Record presence/absence	X		
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 an 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.		X	
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. Record the make and model.		X	
Services				
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. Note the make and model.		X	
Weather facsimile	Record if the vessel has a weather facsimile. Weather information may also be received from Fisheries Information Services systems. Note the make and model.		X	
Fisheries information services	Vessels may receive real-time information on some oceanographic features that will provide them with information on SST, phytoplankton densities or sea height. Note the make and model.		X	
Catch transhipped summary 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.				
Species/weight 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 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		X	

Data field	Description	Mandatory reporting[37]	Mandatory collection[38]	Recommended
	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. Also note the call sign displayed.		X	
Catch onboard at disembarkation summary				
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.		X	
Species/Processing code	Record a breakdown of the product onboard by species and product code using the IOTC/FAO codes (Table 30). 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 'comments' section.		X	
Waste management (MARPOL Agreement Annex 5)[39]				
Waste category	Record the category of the waste, organic, inorganic-burnable, (plastic) or un-burnable, (glass or metal).		X	
Storage/Disposal method	Record how the waste was disposed of; for example, incinerated, stored in sacks or disposed of overboard.		X	

C. Form 2-LL

Longline gear, setting and hauling specifications

This section is designed to capture detailed specifications of the different components of the longline gear used by the vessel. Detailed descriptions of any unique aspects of the gear should also be recorded in the 'comments' section. If not all sets/operations were observed, the rationale and process for sampling of sets, and remarks on lost gear such as floats, buoys and sections of line should also be noted here.

Data field	Description	Mandatory reporting	Mandatory collection	Recommended
Longline Type	Record the type of longline used, according to the IOTC categories (Table 16).	X		
Mainline length	Record the total operational length of the mainline in kilometres. This information can be obtained from the Captain or Fishing Master.	X		
Mainline material	Record the material the mainline is made out of, e.g. monofilament, braided monofilament or tarred rope (Table	X		

[39] Reporting of this information is now optional as per SC14 (para. 103)

Data field	Description	Mandatory reporting	Mandatory collection	Recommended
	18).			
Mainline diameter	Use callipers to measure the diameter of the mainline in millimetres.		X	
Line setter	Record if the vessel has a line setter fitted.	X		
	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.		X	
Line hauler	Record if the vessel has a line hauler fitted.	X		
	Record the make and model of the equipment used to haul in the mainline. Also describe the means of transfer and packing of the line into the line storage bin.		X	
Branch line storage	Record if the branch lines are prepared in coils and packed into baskets, or layers out in tubs, or coiled up onto reels.			X
Shark lines	Record if shark lines are used and, if so, note the length of shark lines onboard the vessel (in metres).			X
Length of floatlines	Record the length of the floatlines onboard the vessel (in metres).			X
Bait casting machine	Record if the vessel is fitted with a bait casting machine.	X		
	Record the make and model. Note if it is operational and how often it is used (always, often, rarely, never).		X	
Method of stunning fish	Record the method used to stun fish during hauling, e.g. percussive stunning, carbon dioxide narcosis, spiking or electrocution (Table 29).			X
Bait hooked twice	Record how often the hook was laced through the bait twice (always, often, rarely, never). This is thought to reduce turtle mortality.			X
Depredation mitigation device used	Record if any depredation devices are used and describe the type, e.g. "spiders" or "socks".			X
Branchline details				
Branchlines are generally made up of several sections which are composed of different materials (e.g. monofilament and wire on the last section that is attached to the hook) and with different lengths and diameters. There may be up to four sections of branchline, including the leader section. Different branchline configurations may also be used during the set, so more than one set-up may be described. Observers should keep a record of each specification. It will not be possible to measure this at the time of setting so observers will have to get this information during the hauling operations or when the branch lines are being made up.				
Branchline material	Record the branchline material for each of the four sections where section 1 is that closest to the mainline and section 4 is the leader; note that wire trace may be sheathed by a plastic or nylon coating (Table 18).	X		
Branchline diameter (mm)	Record the diameter (in millimetres) of the branchline for each of the four sections where section 1 is that closest to the mainline and section 4 is the leader.	X		

Data field	Description	Mandatory reporting	Mandatory collection	Recommended
Branchline length (m)	Record the length of the branchline (in metres) for each of the four sections where section 1 is that closest to the mainline and section 4 is the leader.			X
Tori line details				
Record the bird scaring measures used which are unlikely to change throughout the course of a trip. These data fields correspond to those mitigation measures listed in IOTC Resolution 12/06 (Table 3).				
Tori line length	Record the total length of the tori line in metres (not including streamers)	X		
Streamer type	Indicate the type of streamers which are used with the tori line (e.g. paired or single)	X		
Streamer line length	Record the length of individual streamer lines in metres (minimum and maximum where lengths vary).	X		
No. streamers per line	Record the number of streamers that are attached to a single tori line	X		
Attached height	Record the height in metres that the tori line is attached above the water level.	X		
Distance between streamers	Record the distance between streamers in metres.		X	
Streamers reach surface if no wind or swell	Record whether the streamers are long enough to touch the surface of the water in calm conditions.		X	
Towed objects	Record the total number and type of towed objects used to mitigate against bird bycatch.			X
Diagram	Sketch a diagram containing the key features as in the Fig. 1 in Resolution 12/06 (below).		X	

D. Form 4-LL

This form is designed to capture all the information required for every set/operation. 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 may 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 that might affect this.

Data field	Description	Mandatory reporting	Mandatory collection	Recommended
Setting Operation				
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. This should be a four digit numerical code beginning 0001.	X		

Set start date	Record the date at the start of line setting (YYYY-MM-DD). Note that longline vessels often set lines at the night and the setting operation may continue beyond midnight and into the following day.	X		
Set start time	Record the start time of the setting operation (hh:mm). This is the time when the first dhan buoy and / or radio buoy is deployed.	X		
Set start location	Record the position in latitude and longitude for the start of the setting operation (specify units; preferably ±(d)dd.dddd°) to at least a resolution of 1° by 1°.	X		
End Setting time	Record the time that the last dhan buoy and / or radio buoy is deployed.		X	
End Setting date	Record the date at the end of line setting (YYYY-MM-DD).		X	
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.		X	
Setting speed	Record the vessel's average setting speed in knots. It will take several hours to set the line. Record the speed from the GPS several times during the operation and take the average.		X	
Line setter speed	Record the speed setting of the line setter (metres/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.		X	
Clip on time	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.		X	
Length of mainline set	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.	X		
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.	X		
Total number of floats set	Record the total number of floats/buoys deployed during the set. 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.			X

Number of hooks set between floats	Record the number of hooks (equivalent to the number of branch lines) set between floats. This will be the number of hooks stored in each 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.		X	
Line set type	Record whether the line was set slack or under tension to provide an indication of the line curvature underwater.			X
Branchline set interval	Record the distance between branch lines (the interval at which they were set along the mainline) in metres. This may be calculated from the time interval that branch lines were clipped onto the mainline and from the line setting speed.			X
Shallowest hook depth	Record the depth of the hook set closest to the surface in metres. The Fishing Master will be able to provide this figure for most large-scale vessels.			X
Deepest hook depth	Record the depth of the hook set closest to the bottom in metres. The Fishing Master will be able to provide this figure for most large-scale vessels.			X
Number of light sticks used	Record whether light sticks were attached and the total number of light sticks used during the operation.		X	
Colour of light sticks used	Record the colour of the light sticks used during the operation.		X	
Total number of radio/dhan buoys set	Record the total number of radio and /or dhan buoys deployed.		X	
Number of shark lines set	Record the number of shark lines set during the operation.			X
Mainline weights attached	Record if any weights were attached to the mainline. These may be clipped on at intervals.		X	
Mainline weighting	Record the total weight in kilograms of weights attached to the mainline.		X	
Target species	Record the target species for the set	X		
Bycatch mitigation measures In the comments section, note on points which might affect the effectiveness of the mitigation measures. This might include whether Tori lines are streamed for the entire setting operation or only part of it, whether the streamers cover the longline or if wind or some other factor prevents the streamers from overlying the line or if the measures were only used for part of a set.				
Number of Tori lines deployed	Record the total number of tori lines deployed during the setting operation.	X		
Low light night setting	Record whether minimum deck lighting used during night setting (Y/N). This is based on the extent that aft deck lights are directed astern of the vessel and additional deck lights that are switched off during setting.	X		
Branchline weighting	Record the average weight (in grams) of weights or sinkers attached to the branchlines. 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 (do not confuse	X		

	coated steel wire trace or integral weighted cord with attached weights). If not all lines are weighted, note the proportion in the comments section.			
Distance of weight from hook (cm)	Record the distance of the weights or sinkers from the eye of the hook in centimetres.	X		
Underwater setting	Indicate Y/N if the bait is protected on the branchlines until they are a certain depth below the surface			X
Other bycatch or depredation mitigation measures used	Record any other bycatch mitigation measures used, e.g. bird curtains or any measures used to prevent depredation and provide a brief description.			X
Number of branchlines set by type	Record the number of each type of branchline set.			X
Hook type	Record the type and size of hooks used according to the IOTC categories (Table 19).	X		
Number of hooks set by type	Record the number of each type of hook set.			X
Bait type	Record the type of bait used (Table 26)	X		
Bait species	Record the bait species used (Table 12)	X		
Bait ratio	Often bait is attached in a sequence for each set of branch lines between buoys. (For example; 2-fish, 3-squid, 2-fish). Record the approximate proportion of each bait type and species used across all hooks in the set	X		
Bait dye colour	Record the colour or colours that the different baits are dyed (e.g. blue to avoid bird bycatch). If none, write NONE.		X	
Hauling Operation 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 (DD:MM:YYYY).	X		
Start Hauling Time	Record the time that hauling starts (hh:mm)	X		
Start Hauling Position	Record the position in latitude and longitude for the start of the hauling operation (specify units; preferably ±(d)dd.dddd°) to at least a resolution of 1° by 1°. Hauling starts when the first radio or dhan buoy is hauled back onboard.	X		
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.		X	
Position of offal disposal	Record the position where offal and used bait was disposed (port side / starboard / aft)		X	
End Hauling Date	Record the date that hauling ends (DD:MM:YYYY).		X	
End Hauling Time	Record the time that hauling ends (hh:mm)		X	
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		X	

	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 retrieved hooks observed	Record the number of hooks observed for catch and bycatch composition. 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.	X		
Number of bite-off per leader type[40]	Record for each type of branchline set up previously identified (A,B,C,D) how many have had the hook bitten off.		X	
Sampling details	If not all hooks were observed within the set, include information on how hooks were selected for the sample, e.g. the first 30 hooks were selected, every third hook, all hooks within the set were observed etc.	X		
Bird scaring device at hauler	Record if a bird scaring device was deployed during hauling operations (Y/N and description). Observers should report on the construction and effectiveness of all devices used. Also describe how biological sub-samples were selected for more detailed measurements (length, sex, otoliths etc)		X	
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 also be recorded in between. Waves of both types, sea and swell, 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. Additional weather parameters that would be useful include sea surface temperature and barometric pressure.				
Date	Record the date of the observation (DD:MM:YYYY).		X	
Time	Record the time of the observation (hh:mm)		X	
Wind force	Record the force of the wind according to the Beaufort scale (Table 22)		X	
Wind direction	Record the direction from which the wind is blowing. Cardinal points (E, W, SW ….) or degrees are also used to record the wind direction.		X	
Sea height	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		X	

[40] As per SC14 (para. 100)

	to estimating wind strength.			
Sea direction	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 waves are generated locally by the prevailing wind and move in the same direction as the surface wind.		X	
Swell height	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.		X	
Swell 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. 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.		X	
Tag details				
Specimen ID	Note the specimen ID number to link this individual to the catch information.	X		
Tag release	Indicate Y/N whether this individual was re-released with a tag attached	X		
Tag recovery	Indicated Y/N whether a tag was recovered from this individual	X		
Tag number	Provide the tag number	X		
Tag type	Record the type of tag used (Table 37)	X		
Tag finder	Record the name and contact details of the person who recovered the tag	X		
Catch details The observer must record the catch hauled for every hook observed, line-by-line. All catch information must be recorded with the corresponding IOTC trip number and operation number so that it can be linked to the effort information collected. While it is not mandatory to report both weight pre and post-processing where it occurs, one form of weight measurement must be recorded. Note that with tagged specimens, full details must be provided for all data fields as far as possible.				
Specimen ID	This is a unique numeric ID which increases sequentially to identify an individual.	X		
Species code	If a species cannot be positively identified or a FAO code is not available (Table 5 - Table 11), 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 in the 'Comments' column. 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 description and accompanying photographs of each of the unidentified organisms in the "Comments" column.	X		

Fate	For each specimen record an IOTC fate code which includes whether it was retained or discarded and the reason, e.g. "Discarded – too small" (Table 35).	X		
Weight 1 (pre-processing)	Record the weight in kilograms of the unprocessed, round, whole, live weight of the specimen.			X
Weight code 2 (post processing)	Record the product code for each species according to the IOTC processing codes (Table 30).		X	
Weight 2 (post-processing)	Record the raw weight measurement in kilograms (kg) corresponding to the specified product type		X	
Scar	Record the type of scar present on the specimen based on the IOTC categories. This might be no scar, an unknown scar, a tag scar, cookie-cutter shark, shark/killer whale or some other identifiable scar type which can be specified (Table 32).	X		
Depredation	If the predator was observed and identified, record the species code. If no depredation was directly observed, indicate "Not observed". 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.	X		
Predator ID reliability	Note the likely accuracy and reliability of the species identified as associated with depredation (good/fair/poor)		X	
Hooking location	Record the geographical coordinates of the point at which the catch was hauled or the bycatch interaction took place (1 by 1 degrees)	X		
Hook type *(for bycatch)*	For bycatch species, record the type of hook the individual was hauled on, where possible (Table 19)			X
Bait *(for bycatch)*	For bycatch species, record the bait for the hook the individual was hauled on, where possible (Table 12)			X
Leader type *(for bycatch)*	For bycatch species, record the leader type the individual was hauled, where possible (Table 18)			X
Comments	Include any comments such as possible reasons for incidental capture. Note whether this was accidental due to the animal's presence in the area or as a result of the animal actively interacting with the catch or fishing gear.	X		
De-hooker/line cutter *(for bycatch)*	Record if a particular de-hooking or line cutting device was used to extract the hook from the bycatch		X	
Photo ID *(usually for bycatch)*	Note the photo code so that it can be linked back to the specimen for onshore examination.		X	
Condition *(for discards)*	Record the condition of the individual at the time of release (according to the categories for condition, e.g. alive – injured, distressed)	X		
Release details *(for discards)*	Provide details such as whether the release took place before or after landing, and with or without resuscitation.			X

Biological sample Other biological information such as age & growth may also be collected by the observer. Otoliths or spine clippings may be required from some species for age and growth studies. Some studies also request genetic sample which generally require a sample of tissue that is preserved in a preservative solution or has to be frozen. It is important that these clearly labelled, recording the date, species and length, sex and maturity information and position of capture. These should be clearly described in the sample collection section of the forms. Lengths should be recorded for all turtles, seabirds and marine mammals where possible. For tagged and sampled specimens, all categories should be completed in as much as detail as possible.				
Length code 1	Record the length code used for the measurement (e.g. caliper measurement of total length from the tip of the snout to the end of the tail). (Table 38)	X		
Length 1	Record the length (in centimetres) corresponding to the length type taken (length code 1) rounded to the lowest centimetre size bin.	X		
Length code 2	Record the length code used for the measurement (if different to length code 1). This field is to be completed where the observer has time. This will be used for developing standard length conversion equations (Table 38).			X
Length 2	Record the length (in centimetres) corresponding to the length type taken (length code 2) rounded to the lowest centimetre size bin.			X
Sex	Record the sex, male or female, where 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.	X		
Maturity stage (GSI)	Specify the stage of maturity of the specimen.	X		
Sample collected	Describe the collection of samples, including the type (e.g. otoliths, spine clippings, genetic samples) and location to be sent/stored. 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 record what samples were kept during the trip and where they are stored.	X		

E. Form 2-GIL

Gillnet gear, setting and hauling specifications

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

Data field	Description	Mandatory reporting	Mandatory collection	Recommended

Data field	Description	Mandatory reporting	Mandatory collection	Recommended
Gillnet details				
Total number of nets onboard	Record the number of nets which are held onboard the vessel	X		
Net drum/hauler	Record if a net hauler is present or absent. A net drum may also be used that both hauls and on which the net is stored.	X		
	Document the make and model of the net hauler		X	
Float type	Record the type of buoyancy aid that is attached to the net (e.g. polystyrene/ plastic)			X
Sinker type	Record the type of weight attached to sink net (e.g. lead or cement)			X
Individual sinker weight	Record the average weight of each sinker in grams.			X
Net specifications More than one net may be held onboard the vessel. Record the details below for each net stored onboard (in the appropriate column). Any other important information relevant to the gear used should be recorded in the comments section. Information such as lost gear or if the vessel has skeins of net in storage and makes up additional nets during a voyage to replace lost or damaged nets which should also be recorded.				
Total number of net panels	Record the number of panels making up the net.	X		
Net material	Record the material the net is made of (multifilament or monofilament)			X
Net length	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 panel length (in metres) multiplied by number of panels used in the net.	X		
Net depth	Record the total depth or height of the net (in metres)			X
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 and range. Note different nets may have different mesh sizes. Provide the range if different mesh sizes are used within a single net.	X		
Total number of nets	Record the total number of nets onboard the vessel	X		

F. Form 4-GIL

This form is designed to capture all the information required for every set/operation of gillnets.

Any additional information worth noting concerning the summary of the fishing operations should be captured in the comments section. This might include notes on the set up and deployment of gear, methods to attract fish, or interactions with other gear types, e.g. deployment in conjunction with longline gear.

Data field	Description	Mandatory reporting	Mandatory collection	Recommended

Data field	Description	Mandatory reporting	Mandatory collection	Recommended
Setting operation				
Set number	For each net set a unique number is allocated. Set numbers should be consecutive from the start of the first net set to the last net set of the observed trip. This should be a four digit numerical code beginning 0001.	X		
Set start date	Record the date at the start of net setting (YYYY-MM-DD). Note that vessels often set nets at dusk.	X		
Set start time	Record the start time of the setting operation (hh:mm). This is the time that a net panel first enters the water.	X		
Set start location	Record the position in latitude and longitude for the start of the setting operation (specify units; preferably ±(d)dd.dddd°) to at least a resolution of 1° by 1°.	X		
Setting speed	Record the speed of the vessel during setting (in knots).		X	
Set end date	Record the date at the end of net setting (YYYY-MM-DD).		X	
Set end time	Record the end time of the setting operation (hh:mm). This is the time that the last net panel has entered the water.		X	
Set end location	Record the position in latitude and longitude for the end of the setting operation to at least a resolution of 1° by 1° (specify units; preferably ±(d)dd.dddd°).		X	
Net type	Record which net type is used (based on the specifications detailed by the observer in form 2-GIL)	X		
Set type	Record how the net is set, e.g. if it is anchored (attached to the boat), left drifting or actively used to encircle the target school (Table 27).	X		
Vertical set	Record the level the net is set at vertically in the water column (Table 23)	X		
Hanging ratio	The ratio between the length of the float line and the length of the stretched mesh hanging on the float line (**Fig. 23**).	X		
Net configuration	Record the spatial configuration in which the net was set (Table 24)			X
Number of weights used	Record the total number of weights that are used to hang the net during this setting operation			X
Number of floats used	Record the total number of floats used to support the net during setting			X
Hauling operation				
Haul start date	Record the date at the start of net hauling (YYYY-MM-DD). Note that vessels often haul nets in the early morning after a night soak period.	X		
Haul start time	Record the start time of the hauling operation (hh:mm). This is the time that a net panel first leaves the water.	X		
Haul start location	Record the position in latitude and longitude for the start of the hauling operation to at least a resolution of 1° by 1° (specify units; preferably ±(d)dd.dddd°).	X		
Haul end date	Record the date at the end of net hauling (YYYY-MM-DD).		X	
Haul end time	Record the end time of the hauling operation (hh:mm). This		X	

Data field	Description	Mandatory reporting	Mandatory collection	Recommended
	is the time that the last net panel leaves the water.			
Haul end location	Record the position in latitude and longitude for the end of the hauling operation (specify units; preferably ±(d)dd.dddd°) to at least a resolution of 1° by 1°.		X	
Number of net panels retrieved	The total number of net panels retrieved at haul	X		
Number of net panels observed	The total number of hauled net panels that are observed	X		
Sampling details	Indicate whether the entire haul was observed, or if a sample was taken. Describe the process (e.g. random/stratified sample of panels observed). Describe if subsampling took place for collecting the different levels of biological information (e.g. otoliths, length measurements)	X		

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 also be recorded in between. Waves of both types, sea and swell, 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. Additional weather parameters that would be useful include sea surface temperature and barometric pressure.

Date	Record the date of the observation (DD:MM:YYYY).		X	
Time	Record the time of the observation (hh:mm)		X	
Wind force	Record the force of the wind according to the Beaufort scale (Table 22)		X	
Wind direction	Record the direction from which the wind is blowing. Cardinal points (E, W, SW ….) or degrees are also used to record the wind direction.		X	
Sea height	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.		X	
Sea direction	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 waves		X	

	are generated locally by the prevailing wind and move in the same direction as the surface wind.			
Swell height	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.		X	
Swell 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. 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.		X	
Tag details				
Specimen ID	Note the specimen ID number to link this individual to the catch information.	X		
Tag release	Indicate Y/N whether this individual was re-released with a tag attached	X		
Tag recovery	Indicated Y/N whether a tag was recovered from this individual	X		
Tag number	Provide the tag number	X		
Tag type	Record the type of tag used (Table 37)	X		
Tag finder	Record the name and contact details of the person who recovered the tag	X		

Catch details

The observer must record the catch disentangled from the net for every panel observed, fish-by-fish where possible. If this is not possible in certain circumstances, such as with a particularly high catch rate, then a combined catch weight by species can instead be given. If so, this should be noted in the 'specimen ID' data field. All catch information must be recorded with the corresponding IOTC trip number and operation number so that it can be linked to the effort information collected. While it is not mandatory to report both weight pre and post-processing where it occurs, one form of weight measurement must be recorded. Note that with tagged specimens, full details must be provided for all data fields as far as possible.

Specimen ID	This is a unique numeric ID which increases sequentially to identify an individual.	X		
Species	If a species cannot be positively identified or a FAO code is not available (Table 5 - Table 11), 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 in the 'Comments' column. 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 description and accompanying photographs of each of the unidentified organisms in the "Comments" column.	X		

Fate	For each specimen record an IOTC fate code which includes whether it was retained or discarded and the reason, e.g. "Discarded – too small" (Table 35).	X		
Weight code	Record the product code for each species according to the IOTC processing codes (Table 30).		X	
Weight	Record the raw weight measurement in kilograms (kg) corresponding to the specified product type		X	
Net material	Where possible, the material of the panel in which the individual is caught should be specified (Table 17)			X
Mesh size	Where possible, the size of mesh (mm) of the panel in which the individual is gilled/entangled should be specified (Fig. **22**).			X
Method of capture	Where possible, the way in which the individual interacted with the gillnet should be specified (e.g. whether it was gilled or entangled).			X
Scar	Record the type of scar present on the specimen based on the IOTC categories (Table 32). This might be no scar, an unknown scar, a tag scar, cookie-cutter shark, shark/killer whale or some other identifiable scar type which can be specified.	X		
Depredation	If the predator was observed and identified, record the species code. If no depredation was directly observed, indicate "Not observed". 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.	X		
Predator ID reliability	Note the likely accuracy and reliability of the species identified as associated with depredation (good/fair/poor)			X
Comments	Include any comments such as possible reasons for incidental capture. Note whether this was accidental due to the animal's presence in the area or as a result of the animal actively interacting with the catch or fishing gear.	X		
Photo ID *(usually for discards)*	Note the photo code so that it can be linked back to the specimen for onshore examination.		X	
Condition *(for discards)*	Record the condition of the individual at the time of release (according to the categories for condition, e.g. alive – injured, distressed)	X		
Release details *(for discards)*	Provide details such as whether the release took place before or after landing, and with or without resuscitation.			X

Biological sample Other biological information such as age & growth may also be collected by the observer. Otoliths or spine clippings may be required from some species for age and growth studies. Some studies also request genetic sample which generally require a sample of tissue that is preserved in a preservative solution or has to be frozen. It is important that these clearly labelled, recording the date, species and length, sex and maturity information and position of capture. These should be clearly described in the sample collection section of the forms. Lengths should be recorded for all turtles, seabirds and marine mammals where possible. For tagged and sampled specimens, all categories should be completed in as much as detail as possible.				
Length code 1	Record the length code used for the measurement (e.g. caliper measurement of total length from the tip of the snout to the end of the tail).	X		
Length 1	Record the length (in centimetres) corresponding to the length type taken (length code 1) rounded to the lowest centimetre size bin.	X		
Length code 2	Record the length code used for the measurement (different to length code 1). This field is to be completed where the observer has time. This will be used for developing standard length conversion equations.			X
Length 2	Record the length (in centimetres) corresponding to the length type taken (length code 2) rounded to the lowest centimetre size bin.			X
Sex	Record the sex, male or female, where 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.	X		
Maturity stage (GSI)	Specify the stage of maturity of the specimen.	X		
Sample collected	Describe the collection of samples, including the type (e.g. otoliths, spine clippings, genetic samples) and location to be sent/stored. 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 record what samples were kept during the trip and where they are stored.	X		

G. Form 2-PS

This form is designed to capture detailed specifications of the different components of the purse seine 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 'comments' section. Any additional information worth noting concerning the gear such as loss of sections of net or the presence of an escape panel) should also be recorded here.

Data field	Description	Mandatory reporting	Mandatory collection	Recommended

Data field	Description	Mandatory reporting	Mandatory collection	Recommended
Purse seine details 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 comments section of the electronic trip report.				
Maximum net length	Record the maximum length of the net (in metres). 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.	X		
Maximum net depth	Record the maximum fishing depth according to the net specifications (metres).	X		
Stretched mesh size	Record the average stretched mesh size of the main body of the net, knot to knot (in mm). Observers should measure at least 10 mesh lengths from the main body of the net and record the average.	X		
Support vessel	Record the presence or absence of a support vessel (Y/N)	X		
Brail size	Record the average weight of a full brail	X		
Power block	Record if a power block is present onboard (Y/N)	X		
	Record the make and model.		X	
Purse winch	Record if a purse winch is present onboard (Y/N)	X		
	Note make and model and if possible the wire specifications and retrieve speed. The vessel engineer should be able to assist with this information.		X	
Number of buoys onboard at embarkation	Record the total number of satellite and or radio buoys onboard at the time the observer boards the vessel.		X	
Number of buoys at sea at embarkation	Record the total number of satellite and or radio buoys that are reportedly deployed at sea at the time the observer boards the vessel (this information shall be requested from the Fishing Master).		X	
Number of FADs deployed	The total number of FADs deployed during the trip			X
Number of FADs investigated	The number of natural and artificial FADs investigated for which there was no fishing event.			X
Sampling operations	Provide details of the sampling strategy if <100% of sets were observed during the trip.	X		

H. Form 3-GEN

This form is for surface fisheries to log their daily activities, to be completed each time the activity changes or for a specific event or sighting. The set number should be recorded in the activity-specific comments box to maintain clarity between forms.

Data field	Description	Mandatory reporting	Mandatory collection	Recommended
Date	Record the date at the start of the activity (YYYY-MM-DD).		X	
Time	Record the time of the activity starts (hh:mm).		X	
Position (Latitude / Longitude)	Record the position latitude and longitude at of the start of the activity, noting whether the latitude is North or South of the equator (specify units; preferably ±(d)dd.dddd°).		X	
Activity code	Record one code for every activity change throughout the day (Table 20). If it seems that two different codes could be used, record only the most important one and note the other in comments column.		X	
School association	School sightings should be recorded as well as if they were free or associated to a FAD, natural LOG, animal, feeding on baitfish or unassociated.		X	
School detection	Record how the investigated school of object was found based on the code categories. If more than one method was used, use code that shows what first made vessel change course		X	
Object	Record the FAD or payao or buoy number here		X	
Object and school sightings	Keep note of the number floating or anchored objects and free schools (including those that were detected and not fished) observed throughout the day. Try to note if the objects have fish with them or not. This can be an approximate but realistic count kept through tally strokes.		X	
Comments	Record and comment on the day activities, including exceptional sightings. This would include sightings of marine mammals and turtles.		X	

I. Form 4-PS

This form is designed to capture all the information required for every set/operation for purse seiners. The comments section should contain any additional information worth noting concerning the summary of the fishing operations such as unusual set up and deployment of gear, or whether the vessel is working in conjunction with pole and line vessels.

Data field	Description	Mandatory reporting	Mandatory collection	Recommended
Set/operation number	Each time the net is deployed a unique number is allocated for the setting operation. Set numbers should be consecutive from the start of the first set to the last set of the observed trip. This should be a four digit numerical code beginning 0001. The vessel log may follow a different sequence.	X		

Data field	Description	Mandatory reporting	Mandatory collection	Recommended
	Observers should note this so that the reported sets can be compared to the observed sets.			
Set start date	Record the date at the start of the setting operation (YYYY-MM-DD).	X		
Set start time	Record the start time of the setting operation (hh:mm). This is the time the skiff is launched.	X		
Set start location	Record the position in latitude and longitude for the start of the setting operation to at least a resolution of 1° by 1° (specify units; preferably ±(d)dd.dddd°).	X		
Target Species	Record the species in the school being targeted.		X	
Time School detection	Record the time the school of fish was first detected.		X	
School detection method	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.		X	
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.		X	
FAD buoy number / ID	Where the school is associated with a FAD, record the FAD radio buoy number.		X	
Time start pursing	Record the time the purse winches start to purse the net.		X	
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).		X	
Time start brailing	Record the time that brailing starts.		X	
Time end brailing	Record the time that bailing ends		X	
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.		X	
Time Skiff onboard	Record the time when the skiff comes on board and the set is over.		X	
Sampling methods for (i) obtaining total catch estimates	Describe the sampling methods used for obtaining total catch estimates, e.g. grab/spill/other direct from brails, or from pre-sorted catch, if random or stratified, or if total enumeration was used.	X		
Sampling methods for (ii) biological sub-sample	Describe the sampling methods used for selecting biological samples. Note whether all species groups were sampled equally or if some groups were prioritised, e.g. particular bycatch species.	X		

Data field	Description	Mandatory reporting	Mandatory collection	Recommended
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 also be recorded and the time noted. Waves of both types, sea and swell, 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. Additional weather parameters that would be useful include sea surface temperature and barometric pressure.				
Date	Record the date of the observation (DD:MM:YYYY).		X	
Time	Record the time of the observation (hh:mm)		X	
Wind force	Record the force of the wind according to the Beaufort scale (Table 22)		X	
Wind direction	Record the direction from which the wind is blowing. Cardinal points (E, W, SW ….) or degrees are also used to record the wind direction.		X	
Sea height	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.		X	
Sea direction	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 waves are generated locally by the prevailing wind and move in the same direction as the surface wind.		X	
Swell height	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.		X	
Swell 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. 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.		X	

Data field	Description	Mandatory reporting	Mandatory collection	Recommended
Catch details Record all catches in this section as well as the methods of sampling and estimation/extrapolation used to get the total estimates.				
Specimen ID	This is a unique numeric ID which increases sequentially to identify an individual.	X		
Species code	Record the species 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 in the 'Comments' column. 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 description and accompanying photographs of each of the unidentified organisms in the "Comments" column.	X		
Fate	Record an IOTC fate code which includes whether it was retained or discarded and the reason, e.g. "Discarded – too small" (Table 35).	X		
Number	Record the number of individuals of the recorded weight.	X		
Weight code	Record the product code according to the IOTC processing codes (Table 30).	X		
Weight	Record the raw weight measurement in kilograms (kg) corresponding to the specified product type	X		
Well	Record which well in which this part of the catch was deposited.		X	
Sampling	Record the type of sampling undertaken for this row of data. This might be 'total enumeration' where all individuals have been recorded, 'sample extrapolated' where a sample has been taken and the information recorded in this row has already been extrapolated. Alternatively it may be 'unextrapolated sample' where a sample has been taken but no raising has yet been applied.			X
Sampling coverage	This provides the percentage of the sample taken from the total catch. For 'sample extrapolated' catches, the raising has already been undertaken based on this percentage, whereas for 'unextrapolated sample' the raising has yet to be undertaken and will be based on the number provided in this field. For 'total enumeration', this will always be 100%.			X
Condition (for discards)	For discards, record the condition of the individual at the time of release (according to the categories for condition, e.g. alive – injured, distressed)	X		
Release details *(for*	For discards, provide any relevant details, such as whether		X	

Data field	Description	Mandatory reporting	Mandatory collection	Recommended
discards)	the release took place before or after landing, if the animal escaped still entangled in some netting, if any resuscitation took place etc.			
Comments	Include any comments such as possible reasons for bycatch interactions.	X		
Biological sample				
Other biological information such as age & growth may also be collected by the observer. Otoliths or spine clippings may be required from some species for age and growth studies. Some studies also request genetic sample which generally require a sample of tissue that is preserved in a preservative solution or has to be frozen. It is important that these clearly labelled, recording the date, species and length, sex and maturity information and position of capture. These should be clearly described in the sample collection section of the forms. Lengths should be recorded for all turtles, seabirds and marine mammals where possible. For tagged and sampled specimens, all categories should be completed in as much as detail as possible.				
Specimen ID	Note the specimen ID number to link this individual to the tag information.	X		
Species code	As above	X		
Fate	As above	X		
Number	Record the number of individuals for which the information is provided.	X		
Weight code	Record the product code according to the IOTC processing codes.	X		
Weight	Record the raw weight measurement in kilograms (kg) corresponding to the specified product type	X		
Length code	Record the length code used for the measurement (e.g. caliper measurement of total length from the tip of the snout to the end of the tail) (Table 38).	X		
Length	Record the length (in centimetres) corresponding to the length type taken rounded to the lowest centimetre size bin.	X		
Sex	Record the sex, male or female, where possible (Table 33).	X		
Maturity stage	Specify the stage of maturity of the specimen.	X		
Sample collected	Describe the collection of samples, including the type and location to be sent/stored. 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 record what samples were kept during the trip and where they are stored.	X		
Tag details				
Specimen ID	Note the specimen ID number to link this individual to the biological information.	X		
Tag release	Indicate Y/N whether this individual was re-released with a tag attached	X		
Tag recovery	Indicated Y/N whether a tag was recovered from this individual	X		
Tag number	Provide the tag number	X		
Tag type	Record the type of tag used (Table 37)	X		
Tag finder	Record the name and contact details of the person who	X		

Data field	Description	Mandatory reporting	Mandatory collection	Recommended
	recovered the tag			

A. Form 2-PL

This form is designed to capture detailed specifications of the different components of the pole and line gear used by the vessel. Detailed descriptions of the actual make-up and any unique aspects of the gear, as well as any gear that is lost during the course of the trip should also be recorded in the 'comments' section.

Data field	Description	Mandatory reporting	Mandatory collection	Recommended
Maximum number of operational poles (automatic)	The maximum number of automatic poles that can be operated from the baitboat, considering the size of the boat and the crew available.	X		
Maximum number of operational poles (manual)	The maximum number of manual poles that can be operated from the baitboat, considering the size of the boat and the crew available.	X		
Total volume of bait tanks	The total volume of the tanks used to keep the live bait, in cubic metres (m^3).	X		
Total quantity of bait used during trip	The total quantity (in kg) or bait used throughout the course of the entire trip (for all fishing events)			X
Total time spent bait fishing	The number of hours spent fishing for bait during the course of the trip			X
Number of FADs deployed	Record the total number of FADs deployed during the trip			X
Number of FADs investigated	Record the total number of natural and artificial FADs investigated for which there was no fishing event			X

A. Form 4-PL

This form is designed to capture details of each fishing event. Note that a fishing event is defined as poling activity which is separated from the previous poling activity by a period of at least 10 minutes if the same school is targeted more than once. Any additional information worth noting concerning the summary of the fishing operation should be recorded in the comments box. This might include comments on the set up and deployment of gear such as varying methods of chumming or collaborations with other pole and line or purse seine vessels etc.

Data field	Description	Mandatory reporting	Mandatory collection	Recommended

Fishing event/operation 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. This should be a four digit numerical code beginning 0001. (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).	X		
Fishing operation start date	Record the date at the start of the fishing operation (YYYY-MM-DD).	X		
Fishing operation start location	Record the position in latitude and longitude for the start of the fishing operation to at least a resolution of 1° by 1° (specify units; preferably ±(d)dd.dddd°).	X		
Target Species	Record the species in the school being targeted (Table 5).	X		
Time School detection	Record the time the school of fish was first detected.		X	
School Detection	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.		X	
Association type	Record code that best describes the association of the school targeted with any object or marine mammals or birds or if the school was detected as a free school un-associated (Table 28).		X	
Time start fishing	Record the time of 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 instead.	X		
Time end fishing	Record the time when fishing activity stops and the vessel starts a new activity, i.e. searching or steaming.		X	
Type of lures used	If the vessel uses lures or jiggers in place of bait record the type and make and hook type.		X	
Number of manual poles used	Number of manual poles used during the peak of the activity	X		
Number of automatic poles used	Number of automatic poles used during the peak of the activity	X		
Bait used	Y/N whether any bait was used during the fishing event	X		
Bait type	Indicate whether this is live or chopped up, frozen etc (Table 26)	X		
Bait species	Record the species of bait used (Table 12)	X		
Weight of bait used	Record the total quantity of bait used in the poling operation (in kg)			X
Number of hooks lost	Total number of hooks lost during the poling operation	X		
Number of lines observed	Total number of lines monitored by the observer during the poling operation	X		

Type of synthetic lure	If synthetic lures were used during the operation record the type		X	
Hook type	Record the code corresponding to the type of hooks used (Table 19)	X		
Hook number	Record the total number of hooks used in the poling operation	X		
Sampling details	Indicate whether the entire fishing operation was observed, or if a sample was taken. Describe the process (e.g. random sample of lines observed). Describe if subsampling took place for collecting the different levels of biological information (e.g. length measurements)	X		

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 also be recorded in between. Waves of both types, sea and swell, 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. Additional weather parameters that would be useful include sea surface temperature and barometric pressure.

Date	Record the date of the observation (DD:MM:YYYY).		X	
Time	Record the time of the observation (hh:mm)		X	
Wind force	Record the force of the wind according to the Beaufort scale (Table 22)		X	
Wind direction	Record the direction from which the wind is blowing. Cardinal points (E, W, SW ….) or degrees are also used to record the wind direction.		X	
Sea height	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.		X	
Sea direction	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 waves are generated locally by the prevailing wind and move in the same direction as the surface wind.		X	
Swell height	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.		X	
Swell 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. In many cases		X	

	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.			
Tag details				
Specimen ID	Note the specimen ID number to link this individual to the catch information.	X		
Tag release	Indicate Y/N whether this individual was re-released with a tag attached	X		
Tag recovery	Indicated Y/N whether a tag was recovered from this individual	X		
Tag number	Provide the tag number	X		
Tag type	Record the type of tag used (Table 37)	X		
Tag finder	Record the name and contact details of the person who recovered the tag	X		
Catch details The observer must record the catch hauled for every hook observed, line-by-line where possible. If this is not possible in certain circumstances, such as with a particularly high catch rate, then a combined catch weight by species can instead be given. If so, this should be noted in the 'specimen ID' data field. All catch information must be recorded with the corresponding IOTC trip number and operation number so that it can be linked to the effort information collected. While it is not mandatory to report both weight pre and post-processing where it occurs, one form of weight measurement must be recorded. Note that with tagged specimens, full details must be provided for all data fields as far as possible.				
Specimen ID	This is a unique numeric ID which increases sequentially to identify an individual.	X		
Species code	If a species cannot be positively identified or a FAO code is not available (Table 5 - Table 11), 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 in the 'Comments' column. 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 description and accompanying photographs of each of the unidentified organisms in the "Comments" column.	X		
Fate	For each specimen record an IOTC fate code which includes whether it was retained or discarded and the reason, e.g. "Discarded – too small" (Table 35).	X		
Weight 1 (pre-processing)	Record the weight in kilograms of the unprocessed, round, whole, live weight of the specimen.			X
Weight code 2 (post processing)	Record the product code for each species according to the IOTC processing codes (Table 30).		X	
Weight 2 (post-processing)	Record the raw weight measurement in kilograms (kg) corresponding to the specified product type		X	
Scar	Record the type of scar present on the specimen based on the IOTC categories. This might be no scar, an unknown scar, a tag scar, cookie-cutter shark, shark/killer whale or some	X		

	other identifiable scar type which can be specified (Table 32).			
Hooking location	Record the geographical coordinates of the point at which the catch was hauled or the bycatch interaction took place (1 by 1 degrees)	X		
Hook type *(for bycatch)*	For bycatch species, record the type of hook the individual was hauled on, where possible (Table 19)			X
Bait *(for bycatch)*	For bycatch species, record the bait for the hook the individual was hauled on, where possible (Table 12)			X
Leader type *(for bycatch)*	For bycatch species, record the leader type the individual was hauled, where possible (Table 18)			X
Comments	Include any comments such as possible reasons for incidental capture. Note whether this was accidental due to the animal's presence in the area or as a result of the animal actively interacting with the catch or fishing gear.	X		
De-hooker/line cutter *(for bycatch)*	Record if a particular de-hooking or line cutting device was used to extract the hook from the bycatch		X	
Photo ID *(usually for bycatch)*	Note the photo code so that it can be linked back to the specimen for onshore examination.		X	
Condition *(for discards)*	Record the condition of the individual at the time of release (according to the categories for condition, e.g. alive – injured, distressed)	X		
Release details *(for discards)*	Provide details such as whether the release took place before or after landing, and with or without resuscitation.			X
Biological sample Other biological information such as age & growth may also be collected by the observer. Otoliths or spine clippings may be required from some species for age and growth studies. Some studies also request genetic sample which generally require a sample of tissue that is preserved in a preservative solution or has to be frozen. It is important that these clearly labelled, recording the date, species and length, sex and maturity information and position of capture. These should be clearly described in the sample collection section of the forms. Lengths should be recorded for all turtles, seabirds and marine mammals where possible. For tagged and sampled specimens, all categories should be completed in as much as detail as possible.				
Length code 1	Record the length code used for the measurement (e.g. caliper measurement of total length from the tip of the snout to the end of the tail). (Table 38)	X		
Length 1	Record the length (in centimetres) corresponding to the length type taken (length code 1) rounded to the lowest centimetre size bin.	X		
Length code 2	Record the length code used for the measurement (if different to length code 1). This field is to be completed where the observer has time. This will be used for developing standard length conversion equations (Table 38).			X
Length 2	Record the length (in centimetres) corresponding to the length type taken (length code 2) rounded to the lowest centimetre size bin .			X
Sex	Record the sex, male or female, where 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.	X		
Maturity stage (GSI)	Specify the stage of maturity of the specimen.	X		

Sample collected	Describe the collection of samples, including the type (e.g. otoliths, spine clippings, genetic samples) and location to be sent/stored. 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 record what samples were kept during the trip and where they are stored.	X		

B. Form 5-GEN

This form is designed to capture information on vessels that are sighted by the observer during the trip.

Data field	Description	Mandatory reporting	Mandatory collection	Recommended
Date	Record the date of the sighting		X	
Time	Record the time when first sighting or detecting the vessel.		X	
Number of vessels	If there was more than one vessel sighted, record the total number of vessels.		X	
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.		X	
Relative position (direction/distance)	Record the distance (range) and compass bearing of the vessel from your position.		X	
Vessel details	Record the name, flag and call sign of the vessel. Note how the information was obtained: if the call sign and name were 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 vessel personnel. Record the activity of the vessel when it was sighted, fishing, steaming, drifting etc. or if this cannot be determined. Provide a short description of the vessel and note any outstanding descriptive features that are visible, radar towers, antenna and vessel colour(s).		X	
Photo taken	Record if photographs were taken (Y/N). 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.		X	

C. Form 6-GEN

This form is designed to capture information on all transhipments that take place during the trip. 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. 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.

Bear in mind that collecting this information is not mandatory if an observer is present on a carrier vessel monitoring the transhipment for the IOTC Regional Observer Programme (ROP)[41].

Data field	Description	Mandatory reporting	Mandatory collection	Recommended
Date	Record the date the transhipment takes place.		X	
Start time	Record the start time of the transhipment of fish (GMT).		X	
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.		X	
Position	Record the position where the transhipment takes place.		X	
Category	Record if transhipping to another vessel or receiving fish from a vessel.		X	
Product transhipped	Record details of the products being transhipped.		X	
Name of carrier/fishing vessel	Record the name and registration details of the carrier or fishing vessel.		X	

III. IOTC data codes

Observers are required to capture a significant amount of information corresponding to the data fields listed in section C of this manual. To facilitate the data capture process, observers must use FAO and IOTC data codes where these are applicable. The FAO and IOTC codes will usually correspond, however where there are, or previously have been no applicable FAO codes, the IOTC has defined its codes. These may also cover aggregations of a number of species when a breakdown of catches cannot be defined to species level. If a species is identified which has not been allocated a code, then the observers must make sure they have 100% confidence in the accuracy of the identification and afford it a code to be used consistently for the remainder of the trip. The observer should take note of any common names used by the crew and where possible take photographs and/or make a detailed sketch highlighting any diagnostic features. These should also be covered in the comments sections related to the information reported.

A. Species Codes

Table 5. Tuna and tuna-like species under the IOTC mandate

IOTC Code	English	French	Latin

[41] as per SC14 (para. 104)

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*

Table 6. Other bony fish species that may be caught incidentally in IOTC fisheries

IOTC Code	English	French	Latin
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*
MZZ	Other bony fishes NEI	Autres poissons osseux nca	*Osteichthyes*

Table 7. Species of sharks that are commonly caught in IOTC fisheries

Code	English	French	Latin
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*

Table 8. Other species of sharks that may be caught incidentally in IOTC fisheries

IOTC Code	**English**	**French**	**Latin**
AGN	Angel shark	Ange de mer commun	*Squatina squatina*
RMA	Alfred manta	Manta de récif	*Manta alfredi*
OXY	Angular rough shark	Centrine commune	*Oxynotus centrina*
SUU	Australian angelshark	Ange de mer australien	*Squatina australis*
MTM	Arabian smooth-hound	Emissole d'Arabie	*Mustelus mosis*
SHBC	Banded cat shark	Holbiche des plages	*Halaelurus lineatus*
BSK	Basking shark	pélerin	*Cetorhinus maximus*
ODH	Bigeye sand tiger shark	Requin noronhai	*Odontaspis noronhai*
HXN	Bigeyed sixgill shark	Requin vache	*Hexanchus nakamurai*
CCA	Bignose shark	Requin babosse	*Carcharhinus altimus*
BLR	Blacktip reef shark	Requin pointes noires	*Carcharhinus melanopterus*
CCL	Blacktip shark	Requin bordé	*Carcharhinus limbatus*
SBL	Bluntnose sixgill shark	Requin griset	*Hexanchus griseus*
NTC	Broadnose sevengill shark	Platnez	*Notorynchus cepedianus*
OQX	Brownbanded bambooshark	Requin-chabot bambou	*Chiloscyllium punctatum*
CCE	Bull shark	Requin-bouledogue	*Carcharhinus leucas*
RMT	Chilean devilray/sicklefin deveilday	Diable du Chili	*Mobula tarapacana*
ISB	Cookie cutter shark	Squalelet féroce	*Isistius brasiliensis*
BRO	Copper shark	Requin cuivre	*Carcharhinus brachyurus*
SHCW	Cow Shark	Requins griset	*Hexanchidae spp*
RMM	Devil fish	Diable de Méditerranée	*Mobula mobular*
DUS	Dusky shark	Requin de sable	*Carcharhinus obscurus*
MRL	Flapnose ray	Mourine javanaise	*Rhinoptera jacanica*
CCG	Galapagos shark	Requin des Galapagos	*Carcharhinus galapagensis*
RMB	Giant manta	Manta géante	*Manta birostris*

CCY	Graceful shark	Requin gracile	*Carcharhinus amblyrhynchoides*
SPK	Great hammerhead	grand requin-marteau	*Sphyrna mokarran*
ORR	Grey bambooshark	Requin-chabot gris	*Chiloscyllium griseum*
AML	Grey Reef Shark	Requin dagsit	*Carcharhinus amblyrhynchos*
CCM	Hardnose shark	Requin nez rude	*Carcharhinus macloti*
HCM	Hooktooth shark	Milandre harpon	*Chaenogaleus macrostoma*
SCK	Kitefin shark	Squale liche	*Dalatias licha*
GUQ	Leafscale gulper shark	Squale-chagrin de l'Atlantique	*Centrophorus squamosus*
NGB	Lemon shark	Requin citron	*Negaprion brevirostris*
CPU	Little gulper shark	Petit squale-chagrin	*Centrophorus uyato*
RME	Longhorned mobula	Diable pygmée	*Mobula eregoodootenkee*
RME	Longhorned mobula	Mante diable	*Mobula eregoodootenkee*
RHA	Milk shark	Requin à museau pointu	*Rhizoprionodon acutus*
CYT	Ornate dogfish	Aiguillat élégant	*Centroscyllium ornatum*
PSL	Pelagic stingray	Pastenague violette	*Pteroplatytrygon violacea*
LMD	Salmon shark	Requin-taupe saumon	*Lamna ditropis*
HXT	Sharpnose sevengill shark	Requin perlon	*Heptranchias perlo*
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*
RMO	Smoothtail mobula	Mante à queue lisse	*Mobula thurstoni*
RMO	Smoothtail mobula	Mante à queue lisse	*Mobula thurstoni*
SLA	Spadenose shark	Requin épée	*Scoliodon laticaudus*
RMJ	Spinetail mobula	Mante aiguillat	*Mobula japanica*
RMJ	Spinetail mobula	Mante aiguillat	*Mobula japanica*
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*
TRB	Whitetip reef shark	Requin corail	*Triaenodon obesus*
EUB	Winghead shark	Requin-marteau planeur	*Eusphyra blochii*
OSF	Zebra shark	Requin zèbre	*Stegostoma fasciatum*
CWZ	Carcharhinus sharks nei	Requins Carcharhinus nca	*Carcharhinus spp*

Table 9. Species of marine turtles that may be caught incidentally in IOTC fisheries

IOTC Code	English	French	Latin
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*

Table 10. Species of seabirds that may be caught incidentally by IOTC fisheries

IOTC Code	English	French	Latin
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*
MWE	Cape Gannet	Fou du Cap	*Morus capensis*
DAC	Cape/Pintado petrel	Damier du cap	*Daption capense*
DER	Chatham Albatross	Albatros des Chatham	*Thalassarche eremite*
PDM	Great-winged petrel	Pétrel noir	*Pterodroma macroptera*
PCF	Flesh-footed shearwater	Puffin à pieds pâles	*Puffinus carneipes*
DIC	Grey-headed Albatross	Albatros à tête grise	*Thalassarche chrysostoma*
TQH	Indian Yellow-nosed Albatross	Albatros indien à nez jaune	*Thalassarche carteri*
PCI	Grey petrel	Pétrel gris	*Procellaria cinerea*
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*

Table 11. 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*

Table 12. Bait species

IOTC code	Species English name	Species French name	Latin name
SQU	Various squids nei	Calmars, encornets nca	*Loliginidae, Ommastrephidae*
CLP	Herrings, sardines nei	Harengs, sardines nca	*Clupeidae*
MAX	Mackerels nei	Maquereaux nca	*Scombridae*
RSA	Japanese scad	Comète japonaise	*Decapterus maruadsi*
BSH	Blue shark	Peau bleue	*Prionace glauca*
SAX	Sauries nei	Balaous, bananes de mer nca	*Scomberesocidae*
JAX	Jack and horse mackerels nei	Chinchards noirs nca	*Trachurus spp*
RAG	Indian mackerel	Maquereau des Indes	*Rastrelliger kanagurta*
MSB	River sardine		*Mesobola brevianalis*
CHP	South American pilchard	Pilchard sudaméricain	*Sardinops sagax*
OMZ	Squids nei	Encornets nca	*Ommastrephidae*
MIL	Milkfish	Chano	*Chanos chanos*
BSR	Brazilian sardinella	Sardinelle de Brésil	*Sardinella brasiliensis*
ENR	Anchovies nei	Anchois nca	*Engraulis spp*
JAN	Japanese anchovy	Anchois japonais	*Engraulis japonicus*
SRH	Silver-stripe round herring	Hareng gracile	*Spratelloides gracilis*
PIL	European pilchard(=Sardine)	Sardine commune	*Sardina pilchardus*
JAA	Blue jack mackerel	Chinchard du large	*Trachurus picturatus*
SAA	Round sardinella	Allache	*Sardinella aurita*
SAE	Madeiran sardinella	Grande allache	*Sardinella maderensis*
MAC	Atlantic mackerel	Maquereau commun	*Scomber scombrus*
CJX	Fusiliers nei	Fusiliers nca	*Caesionidae*
APO	Cardinal fishes, etc. nei	Apogonidés nca	*Apogonidae*
SPD	Delicate round herring	Hareng rond	*Spratelloides delicatulus*
SIL	Silversides (sand smelts) nei	Athérinidés nca	*Atherinidae*
BOG	Bogue	Bogue	*Boops boops*
BOC	Boarfish	Sanglier	*Capros aper*
SNS	Longspine snipefish	Bécasse de mer	*Macroramphosus scolopax*
MAS	Chub mackerel	Maquereau espagnol	*Scomber japonicus*
MSD	Mackerel scad	Comète maquereau	*Decapterus macarellus*
BIS	Bigeye scad	Sélar coulisou	*Selar crumenophthalmus*
SAP	Pacific saury	Balaou du Japon	*Cololabis saira*

B. Vessel and gear codes

Table 13. Vessel type

IOTC Code	English Description	French Description
PSEU	European type industrial purse seiner	Senneur industriel type européen
PSUS	American type industrial purse seiner	Senneur industriel type américain
PSAS	Asian type industrial purse seiner	Senneur industriel type asiatique
PSWD	Wooden coastal purse seiner (small pelagics)	Senneur côtier en bois (petits pélagiques)
PSFG	Fiberglass coastal purse seiner (small pelagics)	Senneur côtier en polyester (petits pélagiques)
LLAS	Asian type steel tuna longliner	Palangrier en acier type asiatique
LLAF	Asian type fiberglass tuna longliner	Palangrier en polyester type asiatique
LLAW	Asian type wooden tuna longliner	Palangrier en bois type asiatique
LLES	European type steel swordfish longliner	Palangrier en acier type européen
PLES	European type steel baitboat	Canneur en acier type européen
PLAW	Asian type wooden baitboat	Canneur en bois type asiatique
MASD	Maldivian Masdhoani	Masdhoani maldivien
VADH	Maldivian Vadhu	Vadhu maldivien
DHOW	Arabian Dhow	Dhow arabe
PIRG	Pirogue	Pirogue
OCAN	Outrigger-Canoe (Madagascar)	Tangon-Canoë (Madagascar)
LAUN	Launch	Chaloupe
RWBO	Rowboat	Bateau à rames
SCHO	Seychelles Schooner	Schooner seychellois
WHAL	Seychelles Whaler	Whaler seychellois
BARQ	Barque (Reunion, Comoros)	Barque (Réunion, Comores)
VEDT	Vedette (Reunion, Comoros)	Vedette (Réunion, Comores)
SPOR	Sport boat	Bateau sportif
MLIN	Australian minor liner	Minor liner australien
DLIN	Australian drop liner	Drop liner australien
MULT	Fiberglass multipurpose	Bateau polyvalent en polyester
SUPP	Support vessel industrial purse seine	Bateau auxiliaire senneurs industriels
SHAS	Yemeni Shasha	Shasha yéménite
TRSS	Steel stern trawler	Chalutier pêche arrière en acier
TRSW	Wooden stern trawler	Chalutier pêche arrière en bois
TRSF	Fiberglass stern trawler	Chalutier pêche arrière en polyester

Table 14. Onboard storage/refrigeration of the catch

IOTC Code	English Description	French Description
NO	None	Aucun
ST	Salt	Sel
DR	Dried	Séché

SM	Smoked	Fumé
IC	Ice	Glace
CWS	Chilled with Sea Water (higher temp than refrigerated sea water)	Eau de mer refroidie
RW	Refrigerated sea water	Eau de mer réfrigérée
BR	Refrigerated brine (cooler than RW)	Saumure 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

Table 15. Electronic equipment

IOTC Code	English Description	French Description
AE	Acoustic equipment	
PFE	Position fixing equipment	
VMS	Vessel Monitoring System	
RAD	Radars	
CEQ	Communications equipment	
PLO	Plotters	

Table 16. Gear types

Code	Type of Operation	English name	French name
BS	Artisanal	Beach seine	Senne de plage
CN	Artisanal	Cast net	Épervier
DS	Artisanal	Danish seine	Senne danoise
DSD	Artisanal	Demersal Danish seine	Senne danoise démersale
GI	Artisanal	Gillnet	Filet maillant
GIDR	Industrial	Driftnet	Filet dérivant
GIOF	Semi-industrial	Offshore gillnet	Filet maillant hauturier
HL	Artisanal	Handline	Ligne à main
HLPA	Artisanal	Handline on anchored-FAD	Ligne à main sous épave ancrée
DL	Artisanal	Dropline (vertical handline)	Ligne à main vertical
DLLS	Artisanal	Dropline on anchored-FAD	Ligne à main vertical sous épave ancrée
HR	Artisanal	Harpoon	Harpon
LL	Industrial	Drifting longline (over 1800 hooks)	Palangre dérivante (au-dessus de 1800 hameçons)
LLCO	Artisanal	Small longline	Petite palangre
LLEX	Industrial	Drifting longline (exploratory)	Palangre dérivante (prospection)
LLFR	Industrial	Drifting longline (up to 1800 hooks)	Palangre dérivante (jusqu'au 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
LN	Artisanal	Liftnet	Carrelet

LNPA	Artisanal	Liftnet on anchored-FAD	Carrelet sous épave ancrée
PL	Artisanal	Pole and line	Pêche à la Canne
PLIN	Industrial	Industrial pole and line	Pêche à la canne industriel
PLPA	Artisanal	Pole-and-line on anchored-FAD	Pêche à la canne sous épave ancrée
PLFS	Artisanal	Free-school pole-and-line	Pêche à la canne banc libres à thons
PLDF	Artisanal	Dolphin associated school pole-and-line	Pêche à la canne à thons associés avec des dauphins
PLME	Artisanal	Pole and line (mechanized boats)	Pêche à la canne (bateaux motorisés)
PLNM	Artisanal	Pole and line (non-mechanized boats)	Pêche à la canne (bateaux non-motorisés)
PLOF	Semi-industrial	Offshore pole and line	Pêche à la canne (bateaux hauturiers)
PS	Industrial	Tuna purse seine	Senne tournante industrielle à thons
PSFS	Industrial	Free-school tuna purse seine	Senne tournante banc libres à thons
PSLS	Industrial	Log-school tuna purse seine	Senne tournante à thons sous épave
PSSA	Semi-industrial	Coastal purse seine on anchored-FAD	Senne tournante côtière sous épave ancrée
PSSF	Semi-industrial	Free-school coastal purse seine	Senne tournante côtière banc libres à thons
PSRN	Artisanal	Ringnet	Filet tournant
PSRP	Artisanal	Ringnet with anchored-FAD	Filet tournant sous épave ancrée
PSSP	Industrial	Support vessel industrial purse seiner	Bateau auxiliaire, senneur industriel
PSSS	Semi-industrial	Small purse seines	Petites sennes tournantes
SN	Artisanal	Setnet	Filet calé
SP	Artisanal	Sport fishing	Pêche sportive
TL	Artisanal	Trolling	Pêche à la traine
TLME	Artisanal	Trolling (mechanized boats)	Pêche à la traine (bateaux motorisés)
TLNM	Artisanal	Trolling (non-mechanized boats)	Pêche à la traine (bateaux non-motorisés)
TP	Artisanal	Trap	Madragues
TR	Semi-industrial	Trawl	Chaluts

Table 17. Gillnet material

Code	English Description	French Description
MO	Monofilament	Monofilament
MU	Multifilament	Multifilament

Table 18. Line material types[42]

Code	English Description	French Description
MNL	Monofilament line	Ligne monofilament
GLW	Galvanized wire	Câble galvanisé
SSW	Stainless steel wire	Câble en acier inoxydable
TR3	3 strand tarred rope (red or black)	Cordage goudronné à trois torons (rouge ou noir)
BRL	Braided line	Cordage tressé

[42] www.spc.int/DigitalLibrary/Doc/FAME/Manuals/Beverly_09_LLTerminalGear.pdf

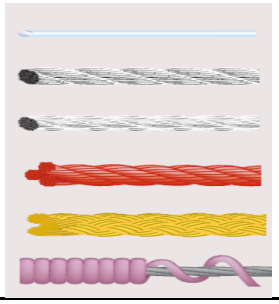
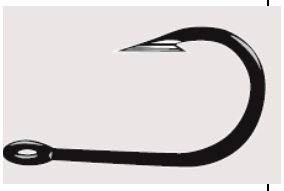
SKW	Sekiyama wire	Fil Sekiyama	

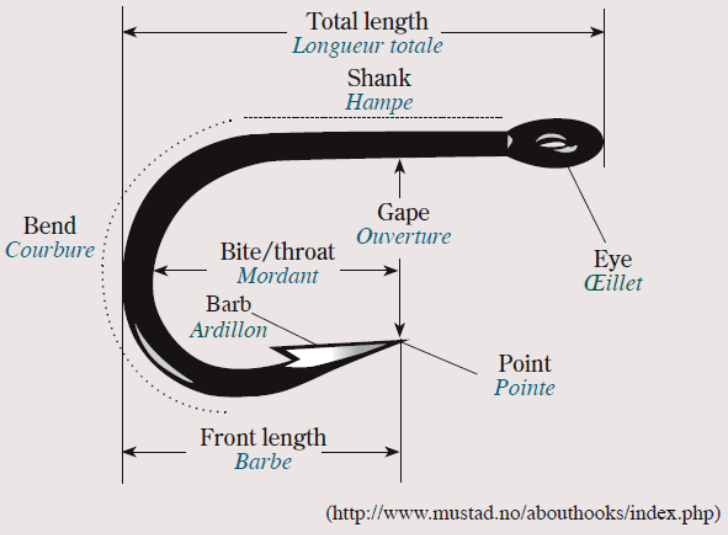
Table 19. Hooks[43]

Code	English Description	French Description	
C11	Circle hooks 11/0	Hameçons autoferrants 11/0	
C12	Circle hooks 12/0	Hameçons autoferrants 12/0	
C13	Circle hooks 13/0	Hameçons autoferrants 13/0	
C14	Circle hooks 14/0	Hameçons autoferrants 14/0	
C15	Circle hooks 15/0	Hameçons autoferrants 15/0	
C16	Circle hooks 16/0	Hameçons autoferrants 16/0	
C18	Circle hooks 18/0	Hameçons autoferrants 18/0	
H32	Japan tuna hooks 3.2	Hameçons à thons Japonais 3.2	
H34	Japan tuna hooks 3.4	Hameçons à thons Japonais 3.4	
H36	Japan tuna hooks 3.6	Hameçons à thons Japonais 3.6	
H38	Japan tuna hooks 3.8	Hameçons à thons Japonais 3.8	
H40	Japan tuna hooks 4.0	Hameçons à thons Japonais 4.0	
H42	Japan tuna hooks 4.2	Hameçons à thons Japonais 4.2	
J08	J Hooks 8/0	Hameçons en J 8/0	
J09	J Hooks 9/0	Hameçons en J 9/0	
J10	J Hooks 10/0	Hameçons en J 10/0	
J12	J Hooks 12/0	Hameçons en J 12/0	
S01	Spanish hooks 1	Hameçons Espagnols 1	
S02	Spanish hooks 2	Hameçons Espagnols 2	
S03	Spanish hooks 3	Hameçons Espagnols 3	
S04	Spanish hooks 4	Hameçons Espagnols 4	
T32	Teracima hooks 3.2 sun	Hameçons Teracima 3.2 sun	
T34	Teracima hooks 3.4 sun	Hameçons Teracima 3.4 sun	
T36	Teracima hooks 3.6 sun	Hameçons Teracima 3.6 sun	
T38	Teracima hooks 3.8 sun	Hameçons Teracima 3.8 sun	

It is important that longline terminal gear is correctly identified as it has an effect, not only on target species catch rates, but on catch rates and post-release survival of bycatch species including marine turtles. Japan tuna hooks and Teracima hooks are measured in 'sun', a Japanese measurement equivalent to just over 3 cm. This refers to the length of material in the hook from eye to point. Circle hooks and J hooks are sequentially numbered— the larger the number, the larger the hook—, but circle hooks and J hooks with the same number are not the same size. Spanish hooks (a type of J hook) are numbered in a descending order—the larger the

[43] www.spc.int/DigitalLibrary/Doc/FAME/Manuals/Beverly_09_LLTerminalGear.pdf

hook, the smaller the number.



Hook identification[44]

C. Activity codes

Table 20. Surface Fisheries Activity Codes

Code	Activity
PO	In port (for refuelling, loading goods, dropping or taking crew & scientists)
BA	Anchored for bait fishing or searching for bait (during the day or during the night) or drifting at night with lights to attract bait
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 with the vessel
SE	Searching for tuna schools, logs or FADs
CH	Chasing a tuna school (chumming can be part of this activity)
FI	Fishing target species
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
NC	Net cleaning set
DF	Deploy - raft, FAD, payao
RF	Retrieve - raft, FAD, payao
DB	Deploy radio buoy/beacon
RB	Retrieve radio buoy/beacon
TR	Transhipping or bunkering

[44] www.spc.int/DigitalLibrary/Doc/FAME/Manuals/Beverly_09_LLTerminalGear.pdf

D. Operation codes

Table 21. Location units

Code	English Description	French Description
(d)dd.dddd°	Decimal degree	
(D)DD°mm.mm	Decimal minute	
(D)DD°MM'ss"	Decimal second	

Table 22. Beaufort wind scale

Beaufort No.	Name	Wind Speed (knots)	Wave Height (metres)	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.

Table 23. Depth of net deployment

Code	English description
NSU	Surface
NSS	Sub-surface
NBO	Bottom

Table 24. Net configuration

Code	Description
1	-

2	)
3	O
4	Π
5	N
6	V

Table 25. Surface fisheries school sighting codes

Code	English description
SV	Seen from vessel
SH	Seen from helicopter
MB	Marked with beacon
BR	Bird radar
AS	Acoustic – sonar / depth sounder
IV	Info. from other vessel
FAD	FAD
OTH	Other (specify)

Table 26. Bait type

Code	English description
BLI	Live bait
FRC	Frozen/chopped
THC	Thawed/chopped
FRW	Frozen/whole
THW	Thawed/whole
BOT	Other

Table 27. Net setting strategy

Code	English description
NAN	Net anchored (i.e. remains attached to boat)
NDR	Net is left drifting
GEN	Encircling

Table 28. School association[45]

Code	English description	French Description
FSU	Unassociated (free school)*	Banc libre
FSB	feeding on baitfish (free school)	
LS	Drifting log, debris, dead animal	Epave naturelle, cadavre d'animal
DFAD	Drifting rafts, FAD	Radeau artificiel (Dispositif Concentrateur de Poissons) dérivant
AFAD	Anchored raft/payao	Radeau artificiel (Dispositif Concentrateur de Poissons) ancré
LW	Live whale	Baleine vivante

[45] http://iss-foundation.org/2012/04/19/fad-free-defined/

LWS	Live whale shark	Requin baleine vivant
OTH	Other (specify)	Autre (spécifier)
DOL	Dolphin associated	Dauphins associés
NTA	No tuna associated (blank set)	
SM	Seamount (common for P&L)	

E. Catch codes

Table 29. Stunning methods

Code	English Description	French Description
CO2	Carbon dioxide narcosis	Le dioxyde de carbone narcose
PS	Percussive stunning	
SP	Spiking	
ELC	Electrocution	électrocution

Table 30. Processing/product type codes

IOTC Code	English Description	French Description
RD	None; Round (whole, live)	Poids vif (entier)
GG	Gilled-and-gutted (bill-off)	Poids éviscéré (sans rostre)
HD	Headed-and-gutted	Poids étêté et éviscéré
PD	Headed and caudal peduncle-off	Poids étêté, éviscéré et sans pédoncule caudal
HT	Headed and tailed	Poids étêté, éviscéré et sans nageoire caudale
HG	Headed, gutted and tailed	Etêté, éviscéré et sans nageoire caudale
FL	Fish loins	Longes de poisson
GT	Gilled, gutted and tailed	
GO	Gutted only (gills left)	
FW	Fillet	
FT	Fins and trunk (shark)	
SF	Fins (shark)	

Table 31. Purse seine sample extrapolation method

Code	English Description	French Description
TE	Total enumeration: All individuals caught in the operation are taken into consideration	Exhaustivité: Tous les individus de l'espèce capturés durant l'opération sont pris en consideration
SE	Sample extrapolated: A sample or more is taken and is extrapolated to the total catch of the operation	Echantillon extrapolé: Un échantillon ou plusieurs est prélevé et est extrapolé à la capture de l'opération
SNE	Unextrapolated sample: A sample or more is taken but is not extrapolated to the total catch of the operation	Echantillon non extrapolé: Un échantillon est prélevé mais n'a pas été extrapolé à la capture de l'opération

Table 32. Scar code

IOTC Code	English Description	French Description
NS	No scar	
TS	Tag scar	
SK	Shark/killer whale	
MM	Marine mammal	
CC	Cookie-cutter shark	
BA	Depredation on bait	
OT	Other (specify)	
UNK	Unknown	

Table 33. Sex code

M	Male
F	Female
UNK	Not determined

Table 34. Method of capture by gillnet

Code	English Description	French Description
GI	Gilled	
EN	Entangled	

Table 35. Fate of incidental captures

Code	English Description
DTS	Discarded - too small. Fish of no commercial value due to being of small size
DUS	Discarded - Unwanted species (e.g. with no commercial value or other than target species)
DRB	Discarded - retention ban on the species (IOTC or flag state measures)
DFL	Discarded - vessel fully loaded
DUD	Discarded – due to IOTC retention ban
DPQ	Discarded - poor quality. Fish in very poor condition (e.g. due to gear damage or depredation)
DDL	Discarded - too difficult to land
DFR	Discarded trunk - fins retained (shark only)
RCP	Retained - crew consumption (due to depredation)
RCC	Retained - crew consumption (not due to depredation)
RFL	Retained - for landing
RFR	Retained trunk - fins retained (shark only)
RFT	Retained for at-sea-transhipment
ESC	Escaped

Table 36. Condition of incidental captures

Code	English description
A0	Alive but unknown condition

A1	Alive - active, healthy
A2	Alive - injured, distressed
A3	Alive - very weak, dying
D	Dead
U	Condition unknown

Table 37. Tag codes

Code	**English description**
TC	Conventional (plastic spaghetti or dart tags are attached on the back of the fish)
TR	Rototags (a two-piece, plastic cattle ear tag, which is inserted through the first dorsal fin)
TS	Sonic tags (miniature radio transmitting devices that are surgically implanted inside the tuna. Since these are not visible externally, a conventional tag of a certain colour will be visible on the outside).
TP	Pop-up tags (Pop-up Satellite Archival Tags are inserted with an anchor and a tether into the dorsal musculature, recording temperature, pressure, and light, and they detach from the animal on a pre-programmed date).
TI	Internal archival tags (internal archival tags are implanted in the body cavity and record internal body temperature and the environment's temperature, pressure, and light).
TT	Smart Position or Temperature Transmitting tags are attached to the dorsal fin and send a signal to a satellite every time the animal surfaces
TO	Other (specify)

Table 38. Length measurement descriptions[46,47,48] *(Note units: cm-centimetres)*

IOTC Code	Tools	Type	Description
CKL	Caliper	Cleithrum-keel length	Projected straight distance between the point on the cleithrum that provides the shortest possible measurement to the anterior portion of the caudal keel. The cleithrum is the semi-circular bony structure at the posterior edge of the gill opening[49].
D2FL	Caliper	Second dorsal fork length	Projected straight distance between the most anterior insertion of the second dorsal fin and the fork of the tail
DFL	Caliper	Dorsal fork length	Projected straight distance between the most anterior insertion of the dorsal fin and the fork of the tail
EFL	Caliper	Eye fork length	Projected straight distance from the caudal margin of orbit to the fork of the tail
FL	Caliper	Fork length	Projected straight distance from the tip of the upper jaw (snout) to the shortest caudal ray (fork)
IDS	Caliper	Interdorsal space	First dorsal-second dorsal (projected straight distance between the most posterior insertion of the first dorsal fin and the most anterior insertion of the second dorsal fin)
LD1	Caliper	Pre-dorsal length	Length to the first dorsal fin (projected straight distance from the tip of the snout to the anterior based of the first dorsal fin)
LJFL	Caliper	Lower jaw fork length	Projected straight distance from the tip of the lower jaw to the shortest caudal ray (fork of the caudal fin)
P1A	Caliper	Pectoral anterior margin	Projected straight distance between the tip and the base of the anterior margin of the pectoral fin (shark fin)
PAL	Caliper	Pectoral-anal length	Projected straight distance between the most anterior insertion of the pectoral fin to the most posterior rim of the anal sphincter
PDL	Caliper	Pectoral dorsal length	Projected straight distance between the most anterior insertion of the pectoral fin and the most anterior insertion of the second dorsal fin
PFL	Caliper	Pectoral fork length	Projected straight distance between the most anterior insertion of the pectoral fin and the fork of the tail
PPS	Caliper	Pectoral-pelvic space	Projected straight distance between the most posterior insertion of the pectoral fin to the most anterior insertion of the pelvic fin

[46] IOTC-2013-WPDCS09-13 Rev_1

[47] 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.

[48] 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.

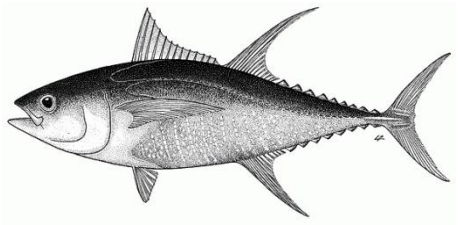
[49] Location of the cleithrum

TL	Caliper	Total length (relaxed)	Projected straight distance from the most forward point of the head to the tip of the tail when the tail is left in the 'natural position' (unsqueezed)
CKLT	Tape measure	Curved cleithrum keel length	Projected curved body distance between the point on the cleithrum that provides the shortest possible measurement to the anterior portion of the caudal keel. The cleithrum is the semi-circular bony structure at the posterior edge of the gill opening.
D2FLT	Tape measure	Curved second dorsal fork length	Projected curved body distance between the most anterior insertion of the second dorsal fin and the fork of the tail
DFLT	Tape measure	Curved dorsal fork length	Projected curved body distance between the most anterior insertion of the dorsal fin and the fork of the tail
EFLT	Tape measure	Curved eye fork length	Projected curved body distance from the caudal margin of orbit to the fork of the tail along the contour of the body in a line that runs along the top of the pectoral fin and the top of the caudal keel
FLT	Tape measure	Curved fork length	Projected curved body distance from the tip of the upper jaw (snout) to the shortest caudal ray (fork)
IDST	Tape measure	Curved interdorsal space	Projected curved body distance between the most posterior insertion of the first dorsal fin and the most anterior insertion of the second dorsal fin
LD1T	Tape measure	Curved pre-dorsal length	Projected curved body distance from the tip of the snout to the anterior base of the first dorsal fin
LJFLT	Tape measure	Curved lower jaw fork length	Projected curved body distance from the tip of the lower jaw to the shortest caudal ray (fork of the caudal fin)
P1AT	Tape measure	Curved pectoral anterior margin	Projected curved body distance between the tip and the base of the anterior margin of the pectoral fin (shark fin)
PALT	Tape measure	Curved pectoral anal length	Projected curved body distance between the most anterior insertion of the pectoral fin to the most posterior rim of the anal sphincter
PDLT	Tape measure	Curved pectoral dorsal length	Projected curved body distance between the most anterior insertion of the pectoral fin and the most anterior insertion of the second dorsal fin
PFLT	Tape measure	Curved pectoral fork length	Projected curved body distance between the most anterior insertion of the pectoral fin and the fork of the tail
PPST	Tape measure	Curved pectoral pelvic space	Projected curved body distance between the most posterior insertion of the pectoral fin to the most anterior insertion of the pelvic fin
TLT	Tape measure	Total length (relaxed)	Projected curved body from the most forward point of the head to the tip of the tail when the tail is left in the 'natural position' (unsqueezed)
PCL	Caliper	Precaudal Length	Projected straight distance from the most forward point of the head to the anterior portion of the caudal keel (sharks).
PCLT	Tape measure	Precaudal Length	Projected straight distance from the most forward point of the head to the anterior portion of the caudal keel (sharks).
TWT	Tape measure	Total width	Total disc width (for skates and rays)

TW	Caliper	Total width	Total disc width (for skates and rays)
CLXT	Tape measure	Carapace Length	Total carapace length – maximum length from the anterior-most part of the carapace to the posterior-most tip of the carapace on the same side (turtles)
CLX	Caliper	Carapace Length	Total carapace length – maximum length from the anterior-most part of the carapace to the posterior-most tip of the carapace on the same side
CLNT	Tape measure	Carapace Length	Total carapace length – notch to notch (turtles)
CLN	Caliper	Carapace Length	Total carapace length - notch to notch (turtles)
TL	Caliper	Total length	Tip of bill to tip of tail (birds)
WL	Caliper	Wing length	Bend of the wing to the tip of the longest primary feathers (birds)
TI	Caliper	Tail length	Base of tail to tip of longest feathers (birds)
TS	Caliper	Tarsus length	Inner bend of the tibiotarsal articulation to the base of the toes (often marked by a difference in scalation) (birds)
CL	Caliper	Culmen length	Tip of the upper mandible and the other at base of the skull (birds)

Appendix 1

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.

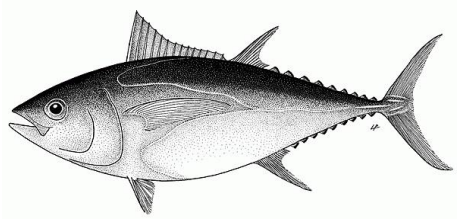
Peak spawning occurs during the summer.

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
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

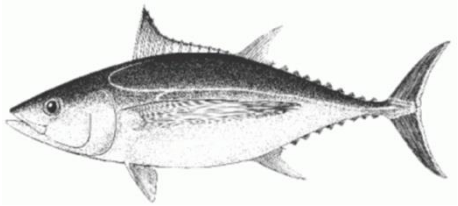
Spawning occurs throughout the year

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	Chang chi we
English	Albacore, Longfin
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

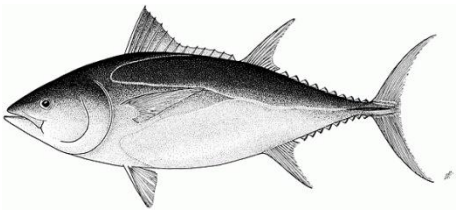
Spawning occurs throughout the year

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

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.

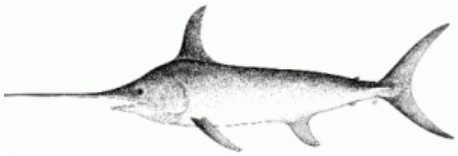
The spawning season extends throughout the southern summer from about September/October to March.

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	Chien-chi-yu, Ki-hi-khu, Tinmankhu
English	Swordfish, Broadbill
French	Espadon
Spanish	Pez espada
Japan	Meka, Andaachi, Dakuda, Ginzasu, Goto , Hirakucha,

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

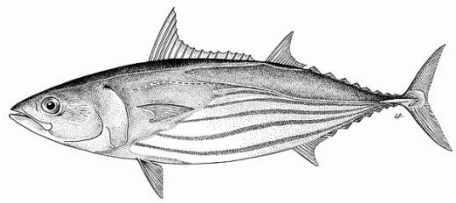
Spawning occurs throughout the year

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	Then chien
English	Skipjack, Striped tuna, Bonito, Lesser tunny
French	Listao
Spanish	Listado
Japan	Hongatsuo, Katsuo, Katsuwo, Katuwo,

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.

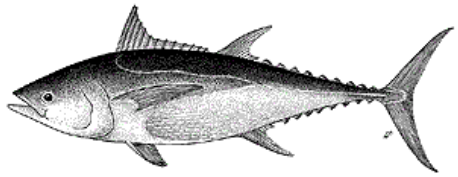
Skipjack tuna spawn in batches throughout the year in equatorial waters, and from spring to early fall in subtropical waters, with the spawning season becoming shorter as distance from the equator increases.

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
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.

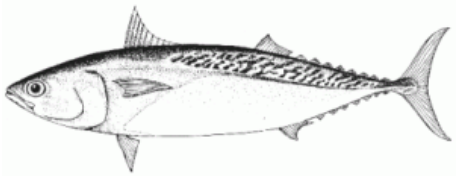
Note: Juveniles of this species, bluefin tuna, yellowfin tuna and bigeye tuna are very similar.

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,

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

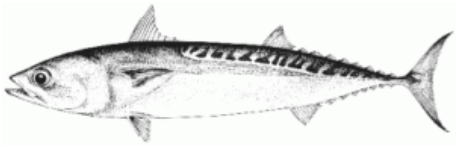
In the southern Indian Ocean, the spawning season extends from August to April; north of the equator it is reported from January to April.

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,

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.

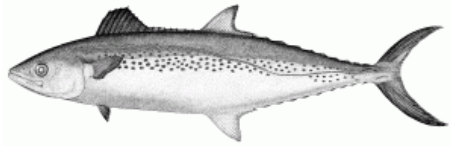
The spawning season in east Africa extends from October to July, off Madagascar.

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
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 8th 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.

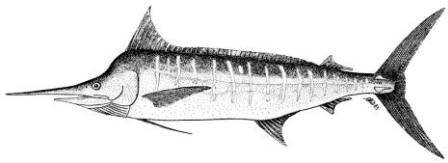
Spawning occurs from April to July around Rameswaram Island between India and Sri Lanka.

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,

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

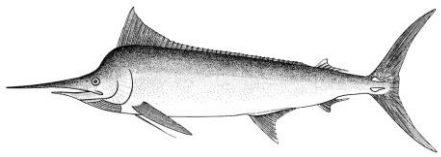
Note: Many scientists do not view *Makaira mazara* and *Makaira nigricans* as distinct species, and consider the the latter species a single pantropical occurring in the Atlantic, Pacific and Indian Oceans.

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	Kyau-shit-á, Lih-ch'ih-Ch'i-yü;
English	Black Marlin
French	Makaire noir
Spanish	Aguja negra
Japan	Genba, Katahari, Shiro, Shiroka, Shirokajiki,

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.

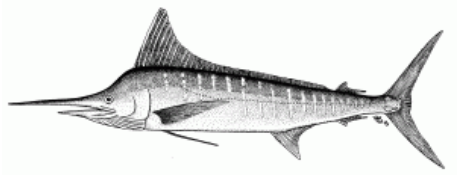
Maximum length: greater than 448cm. Common length: 170cm.

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	Chi zuo fo yii, Hung ju chi yii, Hung ju ting
English	Striped marlin
French	Marlin rayé
Spanish	Marlin rayado
Japan	Achinoiyo, Achinoiyu, Achinuigu, Akinoio,

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.

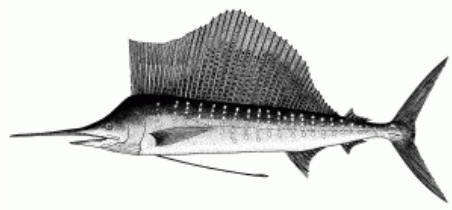
Maximum length: exceeding 350cm. Common length: 290cm.

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	Ho-soan-ki-hi, Tong-fangchiyii, Yu-san-chi-yu, Yu-
English	Indo-pacific sailfish, Bayonet fish,
French	Voilier indo-pacifique
Spanish	Pez vela del Indo-Pacífico
Japan	Akitaroo, Atsutaro, Banba, Baren, Barin, Bashoo,

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.

IX. 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 / Charterers	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° S)*				
Type	Number onboard	Location		SOLAS Approved

		Cabin /Muster Station/ Both	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.

X. Appendix III Reporting

Observer Deployment Report

(To be submitted within 24-hours of the vessels departure from port)

Date		
Observer		
Vessel Name / Call sign		
Company		
Captain / Fishing Master		
Vessel Contact Details	Number	
	Email	

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

Observer 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)*

Electronic trip report and data collection forms

Observer data collection forms and the electronic trip reporting template can be found at: www.iotc.org/science/regional-observer-scheme-science

XI. Appendix IV Observer training

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 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 accredited candidates to the IOTC.

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 advice 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- Electronic trip reports, submission - timeline and circulation	Observers need training in radio communication protocols (VHF, HF & Inmarsat) Provide instruction on completing the observer trip reporting templates based on IOTC reporting procedures. Note the formats and the optional methods of sending these back to their controlling authority.
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.