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

Overview of the Pole & Line Fishery

IOTC ROS SFO TR14.1, 14.2, 14.3

Category: IOTC Fisheries: Pole & Line Fishery

[IOTC ROS SFO TR14]



This module aims to familiarize observers with tuna pole and line vessels, fishing gear and fishing operations as these will be used daily in their routine work.

Trainee performance is evaluated against the following agreed IOTC ROS competency standards:

- Candidate recognises the basic layout of pole-and-line vessels.
- Candidate is familiar with working and observation areas and common fishing operational scenarios for the pole-and-line fisheries.

Achieving these standard is demonstrated by the candidate capacity to:

- ✓ demonstrate working knowledge of the structure of a pole-and-line vessel;
- ✓ recognising (from photos or drawings) working and observation areas on pole-and-line vessels;
- ✓ be acquainted with the different components of the pelagic pole-and-line tuna and bait fishing gear;
- ✓ demonstrate knowledge of general procedures in pole-and-line tuna and bait fishing operations (setting, hauling, processing).;
- ✓ be able to identify distinct processing and storing methods used.



Pole and line fishery



IOTC SFO TR14

This module (IOTC SFO TR14) aims to familiarize Observers with tuna pole and line vessels, fishing gear and fishing operations that they will encounter daily in their routine work.

Key training topics

1. Fisheries background and vessels;
2. Target species.
3. Vessel structure / layout and configurations;
4. Working and observation areas on vessels with different configurations.
5. Fishing gear and related equipment, design and specifications
6. The different components of a man-made drifting and anchored FAD.
7. Search and detection (direct and indirect methods)
8. FAD usage
9. Fishing event (bait and tuna fishing),
10. Processing, storage and offloading methods.



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BACKGROUND AND VESSELS

- Pole-and-line (P&L) is an active fishing method
- Tuna are caught one-by-one using a single hook attached to a line and pole
- P&L vessels range in size on average from 20 to 40 m
- Fishery falls into three categories
 - artisanal
 - semi-industrial
 - industrial



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Artisanal P&L vessel © Vinod Malayilethu



Semi-industrial P&L vessel © Pepe Brix



Industrial P&L vessel © Pepe Bri

Pole-and-line is an active fishing method where tuna are caught one-by-one using a hook attached to a line and pole.

The vessels operating in this fishery, on average, range in size from 20 to 40 m in length and may be classified as artisanal, semi-industrial, or industrial depending on their size and range.

The fishery operates from near shore to the high seas, also depending on vessel size and ability to preserve the fish.



LAYOUT OF A POLE AND LINE VESSEL

Vessel layout varies according to vessel type, size and country

Two basic vessel layouts

1. bridge and accommodation located forward with fishing operations taking place on the starboard side and over the stern.
2. bridge and accommodation located close to the stern with fishing operations taking place on the starboard side and in a few cases over the bow.



There are two broad vessel designs and layouts:

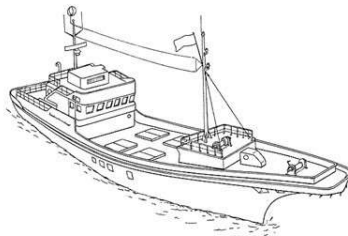
- Bridge and accommodation are located in the front third of the vessel: Common on the Maldives vessels and the European Union (EU) vessels. Fishing operations can then take place over sides and / or stern of the vessel. On the EU vessels the operations generally take place on the starboard side while on the Maldivian vessels operations can take place on both sides and over the stern.
- Bridge and accommodation located at the stern of the vessel: This is common for Indonesian vessels. Fishing operations take place forward of the bridge, also often on the starboard side. On some Japanese vessels the fishing operations may also take place over a broad bow structure.

Depending on the vessel layout, the crew operate from the deck supported by a low gunwale or on some vessels from steel racks mounted on the side of vessel just above the surface of the water.

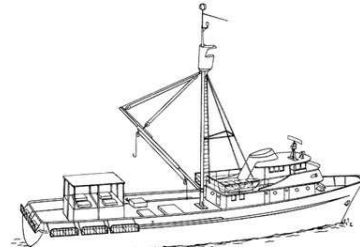


LAYOUT OF A POLE AND LINE VESSEL

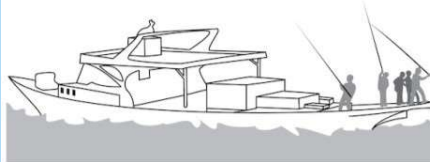
Vessel layout varies according to vessel type, size and country



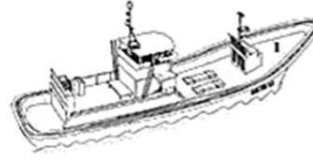
Japanese pole-and-line vessel (©FAO)



American pole-and-line vessel (© FAO)



Maldives pole-and-liner (©J. Lowe)



Indonesia pole-and-line vessel





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TARGET TUNA SPECIES



Photograph: Paul Hilton / Greenpeace

SKJ



ALB © Franklin Tavares



Juvenile YFT © Franklin Tavares



BET © Franklin Tavares



Target Tuna Species

Pole-and-line fishing for tuna is a very selective technique, with very low levels of bycatch compared to other major tuna fishing techniques.

P&L operating in the Indian Ocean, typically target:

- skipjack;
- yellowfin;
- smaller bigeye tuna; and
- various species occupying the upper surface waters (e.g. Mahi mahi)

Although the main target species are skipjack tuna (*Katsuwonus pelamis*), juvenile yellowfin and bigeye tuna can also be caught in schools associated with fish aggregation devices (FADs).

P&L vessel targeting un-associated / free schools can also catch larger yellowfin (*Thunnus albacares*) and bigeye (*Thunnus obesus*) well over 40 kg.

In temperate waters P&L vessels may also target albacore tuna (*Thunnus alalunga*).



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BAIT FISH SPECIES



Baitfish species taken in the tropical western Indian Ocean (Photo: G. Moreno)



Gold and blue fusilier (top) and mottled fusilier (bottom) (Photo: D. Itano)



Ocean anchovy (Photo: D. Itano)



Oxeye scad (Photo: D. Itano)



Spotted pilchard (Photo: internet)



Photo: Paul Hilton



Indian mackerel (Photo: internet)



Silver sprat (Photo: internet)



Cardinal fish (Photo: D. Itano)



Bait Fish Species

Pole-and-line vessels either capture their own baitfish, purchase baitfish from other fisheries, use cultured baitfish, or gain a baitfish supply through a combination of these activities.

The composition of baitfish species that pole-and-line fisheries use, also depends on the target tuna species and the location of the fishery:

- **Higher latitude pole-and-line fisheries** that target the temperate tuna species (albacore and bluefin tunas) generally harvest a small number of hardy baitfish species, e.g., temperate anchovies, sardines, herrings, and scads.
- **Temperate water fisheries** often rely on one or two dominant species.
- **Tropical fisheries** targeting skipjack and yellowfin tuna rely on a large assortment of nearshore and reef-associated species that are often delicate and difficult to maintain in captivity. Tropical bait fisheries may encounter over 15 useable species per haul, although the catch is normally dominated by fewer than five species.

Common bait species used in the Indian Ocean include:

- Anchovies – Engraulidae
- Sardines and herrings (Clupeidae)
- Sprats (Dussumieriidae)
- Cardinalfish (Apogonidae)

- Silversides (Atherinidae)
- Fusiliers (Caesionidae), relatively common
- Trevallies, scads, jack mackerels (Carangidae)
- Tunas, mackerels (Indian mackerel, *Rastrelliger spp.*)
- Fish families of lesser importance; Barracudas (Sphyraenidae), Ponyfish (Leiognathidae), Mulletts (Mugilidae), Goatfish (Mullidae) and Damselfish (Pomacentridae)

Using cultured fish for pole-and-line chum may be an option as an environmentally responsible alternative to harvesting wild coastal species or when wild baitfish are not seasonally available.

Projects and studies on the effectiveness of cultured chum peaked in the 1970s but were discontinued when pole-and-line fisheries declined. There is renewed interest in culturing baitfish species in

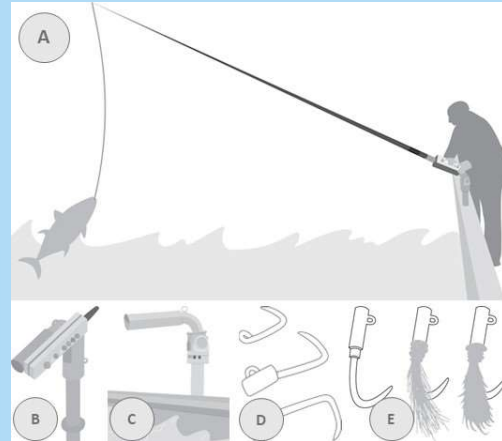
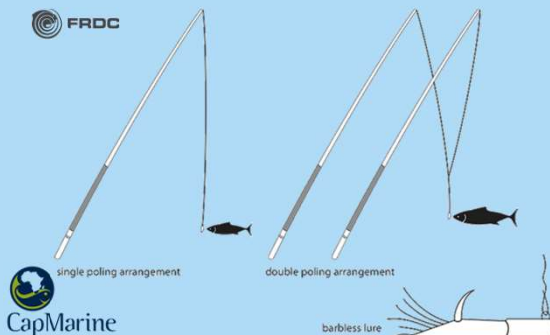
some regions to support pole-and-line fisheries as an environmentally responsible alternative to wild baitfish harvest. This can relieve pressure on wild stocks and nearshore resources.



POLE & LINE GEAR AND RELATED EQUIPMENT

A pole-and-line consists of a line attached to a pole and a short line with a hook, jig, or a barbless lure attached.

1. Manual poles (operated manually)
2. Automatic poles (mechanically operated)



A. Automatic pole; B. Automatic operation button; C. Articulated mechanical support; D. Indonesian handmade barbless hooks; E. South Africa handmade hooks (images adapted by S. Hampton & T. Athayde from AZTI, and G. Moreno photos); F. Manual poles (© FRDC).

Pole-and-line gear

A pole-and-line consists of a line attached to a pole at one end and a hook, jig or lure attached to the end of the line.

The make up and material of a pole and line varies widely dependant on country and target species. Most pole and lines are operated manually with more recent technology developing automatic poles.

A wide variety of hooks and jigs are used in the P&L fisheries depending on the species being targeted and country or vessel preference.

The hook design and jiggers (feathers or attachments to the hook) are important for the success of catching fish using a P&L. Hooks may need to be baited and keep the bait on until a fish strikes or a feathered jig is used to hide the hook and attract the fish.

The crew often make their own hooks and jiggers according to their experience and preference on artisanal and semi-industrial P&L vessels operating near shore targeting smaller fish (mainly skipjack), such as in Indonesia, Maldives and possibly in India).

Hooks used to target larger tuna species (such as albacore and yellowfin) are commercially manufactured, and the jiggers made up by the fishermen on-board the vessels.

Commonly all hooks used are barbless for quick release.

Observers will be expected to collect information on the type of pole used, their construction material as well as on the hook type and size, lures and jiggers used.



Manual Poles



Manual poles

Manual poles are usually held and operated by one fisher when targeting smaller species such as skipjack or other small tuna-like species. The fish are lifted clear of the water with the pole and dropped onto the deck behind. With a barbless hook the fish dehooks its self and the pole and hook are swung back over the side again.

When targeting larger fish (30 kg+ and up to 100 kg), a single line can be attached to two (2) poles each held by fishermen (exceptionally 3) to lift the fish out of the water and onboard.

Another method is to attach a cord to the top end of the pole that is run through a pulley on an overhead derrick (boom) and a second person hauls on the top end of the pole and line to lift the fish clear of the water while the person operating the pole swings it inboard.

Other methods used when targeting large fish is when the person operating the pole uses the pole horizontally and pulls on the pole to bring the fish to the side of the vessel where a another crew gaffes the fish out of the water. Crew usually work in pairs to fish this way. Very large fish, up to 100 kg can be caught in this way.



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Automatic Poles (images © AZTI)



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Automatic poles

In the last decade, new pole-and-line systems have been developed for automated mechanically operated pole systems. The poles are held by an articulated support that is fixed onto the gunwale. The pole is connected to a pulley that is in turn is connected to a spool run by a motor that reels and unreels the line, which is controlled via a program-logic controller.

The ship's captain can control the entire automatic system from a screen installed in the bridge. The system is complemented by a button panel that the fisher can use to reproduce pre-set variables including: pole size, fishing and reeling position, reeling and unreeling speed and position correction (AZTI, 2019).



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POLE & LINE GEAR AND RELATED EQUIPMENT

Materials used in poles construction:

- A. bamboo
- B. stick of chestnut or quince tree
- C. fiberglass
- D. carbon fibre



© Franklin Tavares



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© Paul Hilton/Greenpeace



© POPA - Azores

Materials used in poles construction include:

- bamboo (traditional and most common on artisanal and smaller vessels)
- stick of chestnut or quince tree (traditional in the Madeira and Azores P&L fisheries)
- Fiberglass
- carbon fibre (more recent)

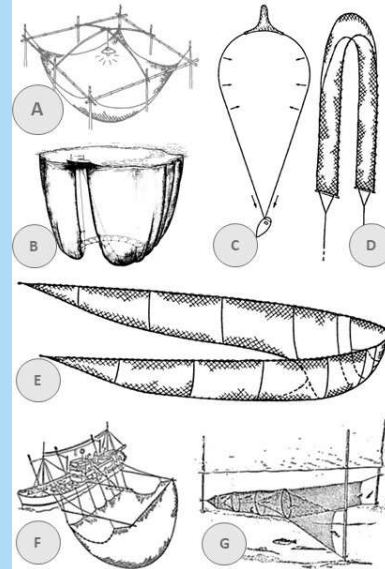


BAIT FISHING GEAR AND RELATED EQUIPMENT

Catching and keeping live bait is an essential part of P&L operations

Gear used to catch live bait include:

- A. stationary lift nets
- B. boat operated ring nets
- C. boat-operated seine nets
- D. beach nets
- E. boat operated lampara nets
- F. boat operated lift nets
- G. drive-in type nets (fish traps)



Bait fishing gear

With few exceptions, most tropical P&L operations in the IOTC area use live bait to attract schools of fish and incite them into a feeding response, and considerable effort is spent in sourcing live bait.

The vessel may itself become involved with catching live bait using various fishing gears and techniques or may operate in association with other vessels that focus on collecting live bait and transfer bait to the P&L vessel.

Frozen dead bait is sometimes used, but not considered as effective as live bait.

Vessels targeting albacore tuna in more temperate areas may use frozen bait.

A variety of net types are used to collect baitfish, both by the P&L vessels themselves and by other fisheries supplying live baitfish to P&L operations.

An important factor in all bait nets relates to mesh size, which must be small enough to avoid gilling or damaging the small fish and still remain practical for pursing and hauling.

Common baitfish nets used include beach seines, boat-operated seines (lampara nets, small purse seines or ring nets), various types of lift nets, as well as drive-in type nets (fish traps).



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BAIT FISHING GEAR AND RELATED EQUIPMENT



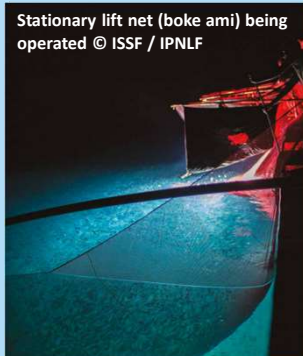
Bagan transferring bait from holding pens to fishing vessel © ISSF / IPNLF



Bagan with a stationary lift net (boke ami) and a bait holding pen © ISSF / IPNLF



Lift net © POPA - Azores



Stationary lift net (boke ami) being operated © ISSF / IPNLF



Bait holding pen © G. Moreno



Purse-seine net © POPA - Azores



Lampara net © POPA - Azores

Seine nets

Seine nets are essentially a long net and depending on its construction and the way it is used can be described as various types of net:

- a beach seine is used from the shore and is set around a shoal of fish, or set blindly and hauled back to the beach by hand;
- lampara nets are a surrounding net (without purse lines), shaped like a spoon (the lead line is much shorter than the float line) with two lateral wings and a central bunt with small mesh to retain the catch, which can be used off a vessel or deployed with two vessels;
- purse seine or ring net have a purse wire or rope, where the net is set around a school of fish and the bottom of the net is closed by hauling in on the purse rope and the net then hauled back concentrating the fish into a “bunt” section.

Lift nets

Lift nets can be relatively large, consisting of a horizontal netting panel framed by wood or metal bars and the net shaped like a bag or cone with the opening facing upwards. They can be operated from stationary installations situated along the shore or from a vessel. The operation entails submerging the net to required depth and then lifting it rapidly to the surface to trap the fish. Powerful lights and or bait are used to attract fish to a point over the net.

Depending on the size of the net and scale of operation it can be hauled out of the water by hand or mechanically.

Drive-in nets

Drive-in nets are often stationary, which can be used from the shore or from a boat. This gear is used to capture the fish, usually in shallow waters. The fish are chased or driven into the trap by

making a noise or other means of disturbance.

Observers will be expected to collect information on the net type used, their construction material as well as on their mesh size.



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