

# Small Scale Tuna Longlining

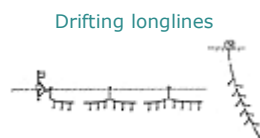
## Main Components

### Aquatic species

#### Target Species

- Skipjack tuna
- Albacore
- Yellowfin tuna
- Bigeye tuna
- Swordfish
- Atlantic bluefin tuna

### Gear types: Drifting longlines



A drifting longline consists of a mainline kept near the surface or at a certain depth by means of regularly spaced floats with relatively long snoods with baited hooks evenly spaced on it.

### Vessel types: Longliners



Hand operated longlining can be carried out with boats and vessels of every size.

## Characteristics

**Overview**Tuna longlining is defined as a passive fishing method, the gear is stationary and the encounter between gear and fish is a result of fish movement towards the gear. **Species Environment**The small scale longline target of various tuna species which spend much of their life deep below the surface water layers. Their habitat is determined by the temperature, availability of oxygen and food preferred by each species. Availability also depends on the velocity and direction of deep water currents, the presence and density of prey organisms and moon phase. When a longline is used in the traditional, non-selective way, its hooks are distributed throughout a 100 m deep water layer. The upper ones tend to catch yellowfin tuna, albacore, swordfish and marlins while the lower ones that reach depths where the water is cooler and contains less oxygen would catch such species as bigeye tuna. Scientists have determined from studies the preferred habitats of the main species caught with longlines. Most of tunas make wide vertical movements cyclic for day and night, and also the depth of habitat is quite variable according to the water temperature as well as size of fish of each species, it is impossible to generalize where those fish are available. Besides, the hooks set in the deeper zone still have chances to hit the fish near surface, while the line is being set or hauled. As a matter of fact, when the line is moving, it has even better chances to catch fish. In general, longline targeting yellowfin are set relatively shallower waters, near the thermocline. For albacore in the temperate waters, also near the thermocline. Swordfish line is also set shallow but during night. Bluefin lines are depend on the time and area (and size of target fish) but also in the intermediate depth. Bigeye line is set at the deepest. **Fishing Gear**The longline used, is made of monofilament 3-4 mm in diameter (the physical quality of such material should compromise strength, flexibility and elasticity). These lines, of oval or round cross-section, are transparent or coloured (blue is sometimes said to be less visible to fish). Secondary lines or branch lines (sometimes also made of monofilament of 2 mm diameter as in the USA) are 10 to 50 m long and accordingly spaced 60 to 100 m apart on the mainline. The secondary line often consists of several sections of different material:

- there may or may not be a short "loose line", less than 0.5 m, for the attachment of the secondary line to the mainline;
- a "branchline" made of polyethylene;

- finally just before the hook, a "leader" made of monofilament.

The attachment of secondary line or snoods to the mainline must be without knots (which reduce line strength) but with snap, ring and sleeves. When the line is targeting swordfish, a steel or monofilament branch line is used with fluorescent light sticks.

**Vessel Overview** In several countries in the Indian and Pacific Oceans, new tuna fleets are being set up: longliners 20-25 m and 15-16 m. Much of such development is to be credited to French ship owners/companies and shipyards. The qualities looked for in the new fishing units include: - autonomy i.e. the capacity to stay several weeks at sea when going to the fishing grounds or finding the fish which often takes up to a week; - enough speed, in relation to long distances and for the delivery of the tuna in good time and good condition; - important fishing power for the utilization of a great number of hooks, on very long distances and at any depth where the fish is found; - very good facilities for tuna processing and preservation; - easy manoeuvres and working conditions; - seaworthiness because sea conditions can be rather rough in offshore areas, especially during the monsoon seasons. As far as the position of the line drum is concerned, if the wheelhouse is forward, the drum is set just behind. If the wheelhouse is at mid-length of the vessel (or aft), the drum is just before. The shooter is installed at the extreme aft of the vessel. Generally, a second steering station is installed on the deck to facilitate easier control of the manoeuvres. Because of often far offshore navigation and in order to accurately locate and retrieve their drifting longlines, the new tuna boats, even small ones, are well equipped with the necessary electronic equipment. This often includes, for navigation: **autopilot**, satellite receiver/**GPS**, **plotter**, automatic direction finder (to retrieve the lines); for detection of tuna or its food: **colour echosounder**, preferably bi-frequency; for evaluation of the environment: temperature sensor. There are many less advanced types of vessels all around the world. The old type vessels still in use has less navigation capability or equipments. They have no drums and the lines are installed by coiling up, after detaching branch lines from main lines and then each unit of main lines. Some of them has freezers and others keep fish in iced seawater.

**Handling Mode** On board these new longliner units, great attention is given to fish handling (for an optimal value of the product). Tuna are hauled aboard over the stern and either put through a freezing tunnel amidships, or deposited in "vivier systems" (refrigerated sea water tanks) placed on either side forward of the partly covered work deck. A worktable is often installed on the aft part of the vessel. Others also carefully handle fish as most of the fish go to fresh fish market. Fish can be air-blasted freezing or kept in iced water.

**Fishing Environment** Tuna support a very important commercial longline fishing throughout the tropical and temperate oceanic waters of the world. Tuna longlining is operated in off shore waters far away from the coastal area as well as in near coast waters.

**Fishing Operations** Lengths of longlines carried on board the new longliners include: 30 to 50 nautical miles of 3.0-3.6 mm diameter for vessels 15-16 m long; 50 to 100 nautical miles of 3.6 to 4.0 mm diameter for vessels greater than 20 m long. The deck crew for the fishing operation comprises three to 16 men. The length of the main line of old type longline varies from 10 to 100 km.

**1. Baiting** One of the crew members is in charge of preparing the branch lines (of variable length, but a maximum of 20 m, made of transparent 2 mm polyamide monofilament, stored in boxes of 400). This man takes the fishing hooks (Mustad tuna hooks No: 8/0 and 9/0) and passes them to his colleague on the other side of the shooter. While the latter fixes frozen squid, mackerel, saury or any other small fish to the hooks as bait, the former holds the clip at the end of the branch line. When he hears the signal from the beeper, which is situated below the shooter, he clips the branch line on to the main line. Then the hook is swiftly swung out by the second man.

**2. Shooting** The shooting speed is slightly higher than the speed of the boat, which is 5-6 knots. A transmitter buoy and a High Flyer (a large buoy equipped with a radar reflector on top) are attached to the furthest end of the main line. The shooter of the drift longline with belt was conceived and made by BOP, the manufacturer of the deck equipment. This device can shoot the mainline pay-out from the drum at a higher speed than that of the boat, if required. Confusion is avoided by a clear division of work. In the old type longliners, mechanical shooter is not used but the line is cast by its own flow as the boat cruises. The third man is in charge of the buoys (30 litre buoyancy, cone-shaped, made in America), which are stored in a bin at the upper deck level. The floats are easily accessible. The buoys are attached to the main line by a variable length of float line (depending on the depth to which the mainline is submerged every five hooks) and at a variable distance in between, depending on the depth at which the line is intended to be set. A transmitter buoy is attached in the middle of the longline to enable locating the line should it be cut by ships. The shooting operation of the longline takes 3½ -4 hours. When fully operational, 800 to 2000 hooks are fishing. The crew then take a break, while the boat drifts along in the vicinity of the transmitter buoy at the end of the drift longlines.

**3. Hauling** There is bustling activity, in case night line, just before daybreak (at about 6 am) as the crew prepare to draw in the drift longlines. The captain positions the boat almost parallel to the lines. From the front starboard, a deck hand hooks the first buoy with a gaff and pulls it on board. The boat then hauls in the drift longline at a speed of 3-4 knots using the steering helm, the engine throttle and gear box control situated outside the bridge. The captain can also adjust the hauling in speed of the main line on to the drum by means of a remote control on the railing. He passes the main line in a snatch block fixed at the end of the steel davit situated just above him. The main line next passes on to a second block fixed under the upper deck before it is rewound on the drum. When the first branch line is reached, the captain clips it off and immediately reclaims it to the circular rope, which runs from the block davit to the rear of the upper deck, parallel to the railing. The man in charge of stocking the branch lines then pulls in the rope to bring the branch lines towards him. The same process is used by the man in charge of handling the buoy lines. Small fish are gaff-hooked above the railing by the man handling the branch lines. When a fish weighs more than 150 kg, then the other crew lend a helping hand to haul in the fish onto the main deck through the open section of the bulwark. A small winch is used during this phase of the operation, which is sometimes a struggle. The hauling operation of the drift longlines lasts, on an average, 10 to 12 hours but if there is a large catch, it can take twice that time. For more

traditional type of small scale longliners, the line is hauled by line hauler and the mail line is coiled on the deck for storage. Branch lines are detached and also coiled and kept separately. The operating time really depends on the length of the line and catches, varies from 2-3 hours to 12 hours.

**4. Tuna processing and storage**When the fish is on deck, it is up to the processor to act. The processor is both the key and most hard working man on board. On American drift longliners, he is paid the highest wages, which is not the case in the Reunion Islands and in many other small scale longline fishing. Working on deck, where sometimes, the minimum temperature is 30 Celsius degree, he has to cut and bleed the fish according to the very strict practices of sashimi (a process by which an ultra-fresh product is obtained for the Japanese raw fish market). The processor next goes below deck, into the 23 cubic meter hold which is at 0 Celsius degree. The sashimi fish is put in a small tank, containing sea water mixed with ice (the latter falls freely from an ice machine located on the main deck) to lower the temperature of the fish. They are then wrapped in paper, so that they do not get scratched, packed in ice and stored in one of four compartments in the fish-hold. The processor of the longliners must be a skilled and hardy person, because he has to work at great speed for many hours. For traditional longliners, which are actually bulk in this type of fishing, the fish are generally cut the gill and tail to blood. The fish are stored either in the sea-water with ice or just covered with ice in the fish well.

**Fishery Overview**Small scale longlining is taking place widely in the world. The new modernized small scale longline is seen in the Indian Ocean in a limited area. Also in the Indian Ocean, a very large fleet of conventional small scale longliners are operated by Indonesian and other countries. Those are targeting yellowfin and bigeye tunas. In the east China Sea to the eastern Indian Ocean, old type longliners fish bluefin tuna in spring time. In the Gulf of Mexico and off east coast of the United States of America bigeye and yellowfin catches are made by U.S longliners. Off south America in the Pacific, fishery exists for yellowfin and bigeye tunas and swordfish. Off Brazil, fishing exists for yellowfin, bigeye and albacore tunas and swordfish. Around Hawaii and some other central Pacific islands, this type of fishing takes place for yellowfin and bigeye as well as for swordfish. In the Mediterranean Sea, particularly in eastern Mediterranean and Adriatic Sea, small scale longliners fish albacore and bluefin tuna.

Longlining targets definite species (taking into consideration fishing depth, sea temperature etc.) according to the season and their migratory movements and in general catches big fish. Traditionally tuna longlining has been carried out on board rather large vessels, more than 40 m. Small and medium size longliners, ranging between 15-25 m, are being put into operation for tuna fishing in many countries throughout the tropical and temperate oceanic waters of the world.**Fishery Overview**Nowadays in the USA, small longliners 16 m long are now used for fishing swordfish in the Western Atlantic within territorial waters. The same type of vessels is present in many areas of the Indian and Pacific Oceans and already used by the following fleets: France, Australia, Japan, USA. There is an increasing interest for small longliners in general with plans to set up new fleets in: Sri Lanka (more than hundred units), Indonesia (23 m long, 240 HP, fish hold 32 m cubic meters), Bangladesh, in the Pacific islands (Marshall, Tonga, etc).**IssuesDiscard** Are generally selective for large pelagic fish at depth. On the other hand, it is not quite selective on species. Their by-catches include, marlines, pelagic, [sharks](#), [turtles](#) and seabirds (especially albatrosses and petrels). Those by-catches can be important for certain areas and also depends on the depth of the line (e.g. swordfish longline is set near surface at night and hence more by-catches of turtles in some area). Sea birds are generally caught while line is coming up. Pelagic sharks are predators of fish captured on the line and hence fishermen try to avoid as much as possible. In the regards, FAO [IPOA's](#) on Seabirds and Sharks are adopted and implemented by many countries and RFMBs. Researches are going on to mitigate turtles while the techniques are established to mitigate sea birds. Another potential problem which longline may have for managements of fish is that it is multispecies fishing. Therefore, if one tuna species become under a very strict quota control, that might limit the fishing for other species as the catch of the regulated species is unavoidable or otherwise, the fishing for other species might cause problem in keeping the catch of regulated species under the quota. Only solution is to select area, time, and depth to be more or less selective to a certain species.