Training Department of the Southeast Asian Fisheries Development Center
Training Department, Thailand

Commercial Fishing Gear and Operation Methods

Regional Training Course on Strengthening Capacity of Implementation for Monitoring Control and Surveillance (MCS) in Southeast Asia
September 16–19, 2024 SEAFDEC/TD, Samut Prakan, Thailand

Nopporn Manajit

ประมงพื้นบ้าน VS ประมงพาณิชย์

Artisanal Fishing and Commercial Fishing

"Artisanal fishing" means fishing operations in coastal seas in which a fishing vessel is used or in which a fishing gear is used without a fishing vessel, but in any case does not include commercial fishing.

"Commercial fishing" means fishing operations using a fishing vessel of a size from ten gross tonnage or a fishing vessel fitted with an engine of a horsepower as prescribed by the Minister.

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TRAWL FISHING

ISARA CHANRACHKIJ (isara@seafdec.org)


อวนลากคู่
38.12 %
Pair Trawl
อวนลากคานถ่าง
11.05 %
Beam Trawl
2,913
vessels
อวนลากแผ่นตะเฆ่
50.84 %
Otter Trawl

Definition of Trawl Net

https://seafish.org/gear-database/gear/

FAO (1990) definite trawl nets are tow nets consisting of a cone-shaped body, closed by bag and cod end and extended at opening by wings.

They can be towed by one or two boats and, according to the type, are used on the bottom or in mid-water. In certain cases, as in trawling for shrimp or flatfish, the trawler can be specially rigged with outriggers to tow up to four trawls at the same time (double rigging).

Trawling in mid-water trawl is more complex than bottom trawling because of the requirement in maneuver the trawl vertically and horizontally to intercept fish school

Bundit C. (1985) refer to Baranov (1977) defines the difference between trawl and other fishing gear of the filtering class, as follow: If the length of fishing path of the gear exceed the length of the gear itself by few times (not over 5), then it is consider seine type gear. Whether or not the gear in action reaches the surface of water. If the length of fishing part of the gear is several tens or even hundreds of times (up to 1000) longer that the gear itself, this is trawl type gear.

https://www.montereyfish.com/finfish-techniques

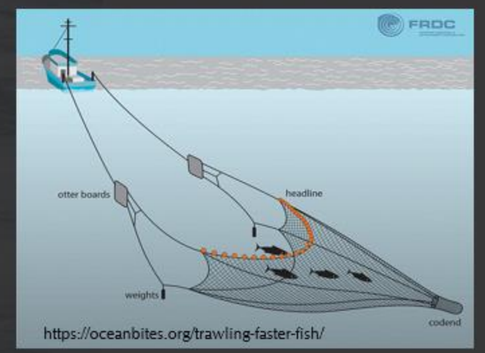
Definition of Trawl Net

- Trawl Nets are cone-shaped net (made from two, four or more panels) which are towed, by one or two boats, on the bottom or in midwater or at surface. The cone-shaped body ends in a bag or coded.
- The horizontal opening of the gear while its towing is maintained by beams, otter boards or by the distance between the two towing vessels (pair trawling).
- Floats and weights and/or hydrodynamic devices provide for the vertical opening. Two parallel trawls might be rigged between two otter boards (twin trawls).
- The mesh size in the codend or special designed devices is used to regulate the size and species to be captured. (FAO)

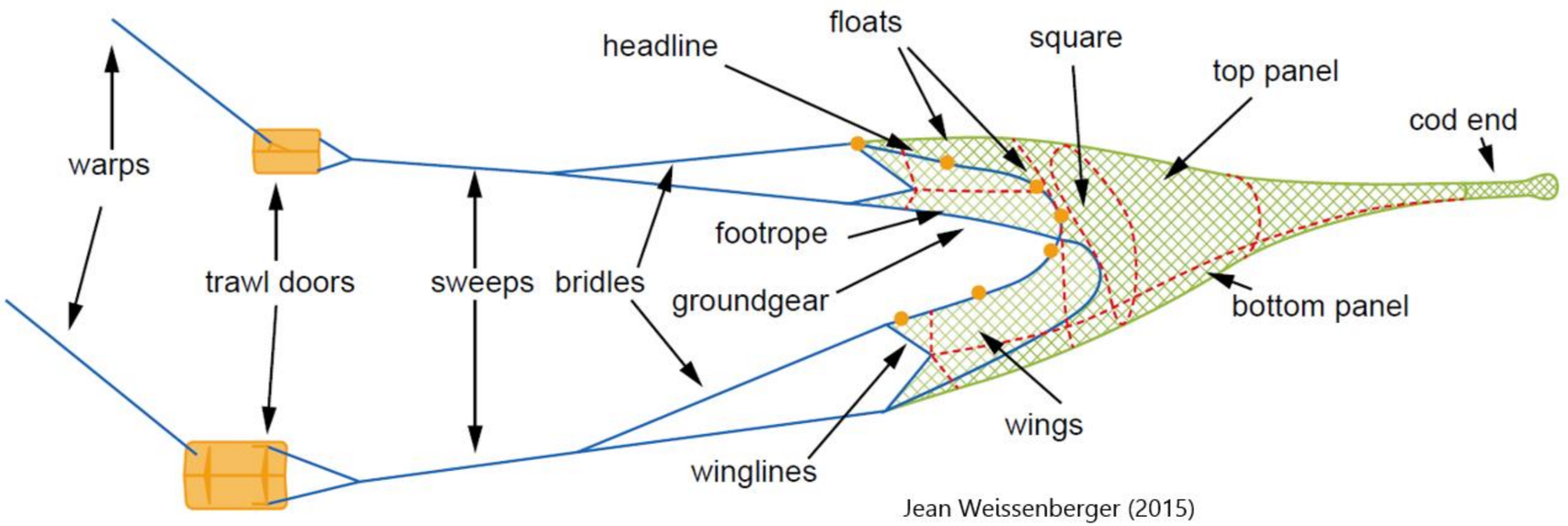

https://seafish.org/gear-database/gear/


http://www.fishingforthetruth.co.uk/environment/whitefish-demersal-trawling/


http://www.cornwallgoodseafoodguide.org.uk/fishing-methods/beam-trawling.php



https://oceanbites.org/trawling-faster-fish/



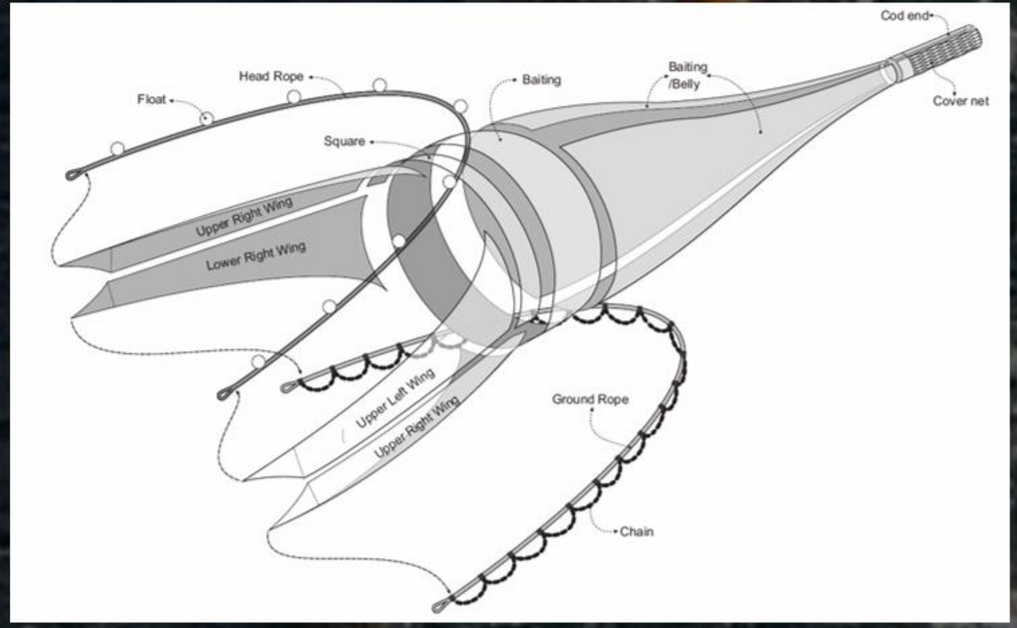
Jean Weissenberger (2015)

Anatomy of Trawl Net

Part	Definition
Towing line or Towing warp	Sections of steel wire rope or rope are used for towing trawl. They are inserted between trawler and otter board (trawl door).
Backstops	Sections of steel wire ropes or ropes between rear of otter board and sweep lines. There are 2 lines connect at upper and lower of otter board rear part. Backstops are used to adjust tilt of otter board (up and down) according to the condition.
Otter board pendant	Connection between sweep lines (sweeps) and warps when trawl door are disconnected from the gear during hauling operation.

Part	Definition
Otter Board (Trawl door)	Steel or wooden boards are used primary to provide lateral spreading force and to keep the net horizontally spread as the net is towed over the seabed, but it can also contribute substantially to keeping the net sweep and bridle in contact with the seabed. There are widely variety of wooden and steel otter board used for trawling which vary in shape from simple rectangular flat plates, oval shape, rectangular cambered otter board.
Sweep line or sweep	Sections of steel wire rope or rope are insert between otter board (trawl door) and wing of the trawl net in order to widen the fishing part at the trawl.

Trawl Net Anatomy



Part	Definition
Triangle Net	• Tip of wing net. • Sometime made vertical cut (Not triangle shape) • Part that tighten with bridle rope
Wing	• Foreside of net extended from net body. • Wing consisted of left wing and right wing. Each wing has upper wing part and lower wing part. • Upper part of wing tightened with head rope (float rope). • Lower part of wing tightened with ground rope. • Wing part generally is the biggest mesh size, but the twine size may the smallest
Net body	• Net body is horizontally asymmetric netting bag. Sometime upper part is larger that lower part, thus creating and overhang of netting, square. The square is designed to prevent the fish from escape upwards. • Upper part of the net body consisted of an isosceles trapezium-shaped square, Baiting, upper panel of the lengthener, and cod end part • Lower part consisted of belly, upper panel of the lengthener, and cod end. • In four-seam and six-seam side baiting will be added.
Cod end	• The end of a trawl net which retains the catch and the part of the net where most size-selection takes place. Cod end mesh sizes and structure (including shaffers) are usually regulated and may be preceded by a sorting grid to reduce bycatch.

Type of Trawl

1. Bottom Otter Trawl
2. Beam Trawl
3. Pair Trawl
4. Mid-water Trawl

Bottom Otter Trawl

Definition of Bottom Otter Trawl

Bottom otter trawl is a type of fishing gear used to catch demersal fish. It consists of a large, conical net that is towed along the seabed by two vessels. The net is held open by two spreading devices called "otter boards" that are attached to the headrope of the net.

The otter boards are designed to spread the net horizontally, allowing it to sweep across the bottom and capture fish. The net's codend, which is the tapered end, collects the catch.

Bottom otter trawling is a highly efficient method of fishing, but it can also have negative impacts on the seabed, including damage to marine habitats and bycatch of non-target species.

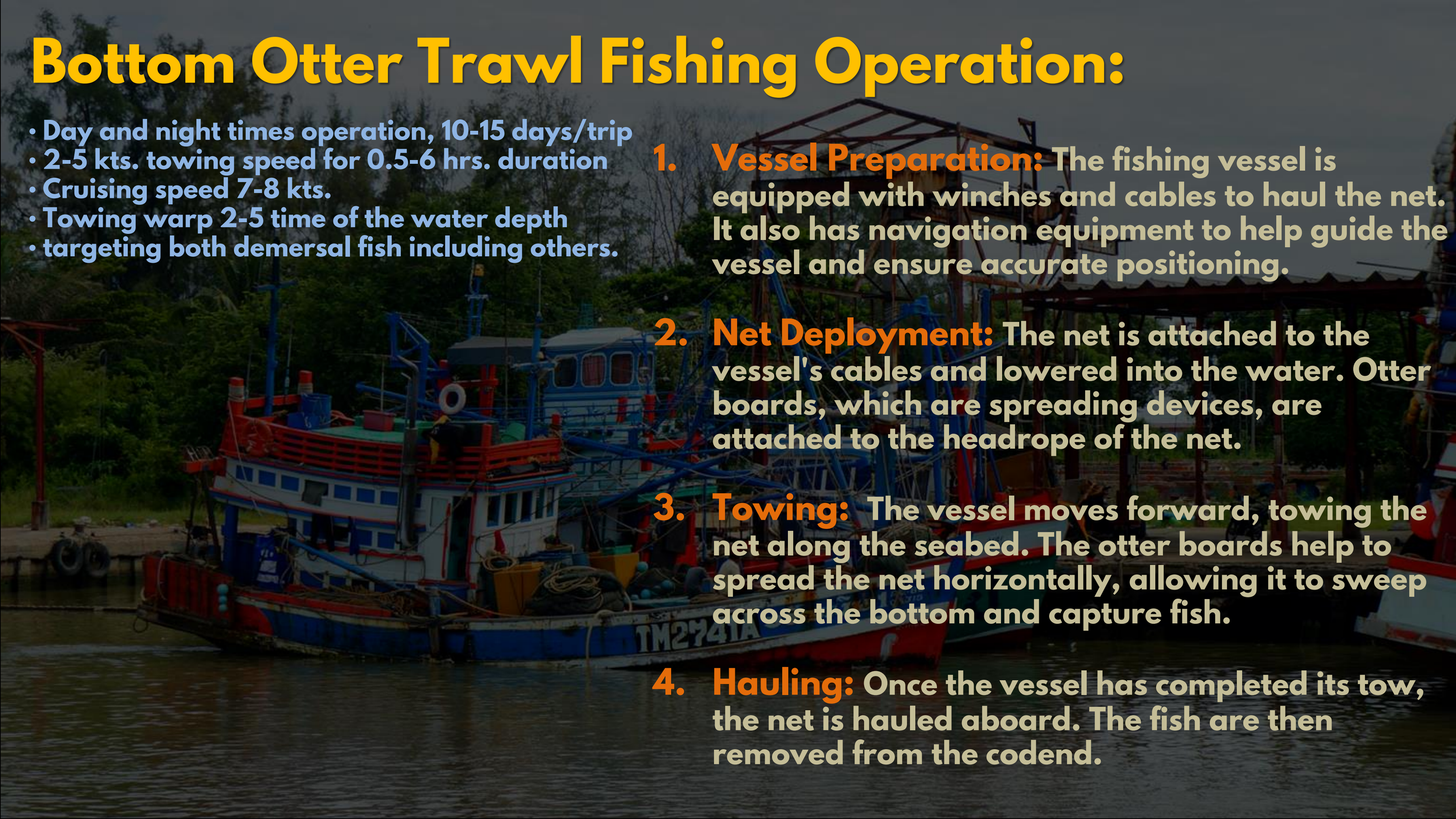
Key Features of Bottom Otter Trawl Fishing:

- **Efficiency:** Bottom otter trawling is a highly efficient method of catching large quantities of fish.
- **Versatility:** It can be used to target a wide range of demersal fish species.
- **Bottom Impact:** The net is designed to sweep along the seabed, which can have significant impacts on marine habitats. This can include damage to benthic organisms, disruption of sediment, and habitat degradation.
- **Bycatch:** Bottom otter trawling can also lead to the capture of non-target species, known as bycatch. This can include marine mammals, and sea turtles.
- **Gear Restrictions:** Many countries have implemented regulations to limit the use of bottom otter trawling in certain areas or to require the use of gear that reduces its environmental impacts.

To promote sustainable fishing practices, many countries have implemented measures to reduce the negative effects of this method.

Bottom Otter Trawl Fishing Operation:

- Day and night times operation, 10-15 days/trip
- 2-5 kts. towing speed for 0.5-6 hrs. duration
- Cruising speed 7-8 kts.
- Towing warp 2-5 time of the water depth
- targeting both demersal fish including others.



1. **Vessel Preparation:** The fishing vessel is equipped with winches and cables to haul the net. It also has navigation equipment to help guide the vessel and ensure accurate positioning.

2. **Net Deployment:** The net is attached to the vessel's cables and lowered into the water. Otter boards, which are spreading devices, are attached to the headrope of the net.

3. **Towing:** The vessel moves forward, towing the net along the seabed. The otter boards help to spread the net horizontally, allowing it to sweep across the bottom and capture fish.

4. **Hauling:** Once the vessel has completed its tow, the net is hauled aboard. The fish are then removed from the codend.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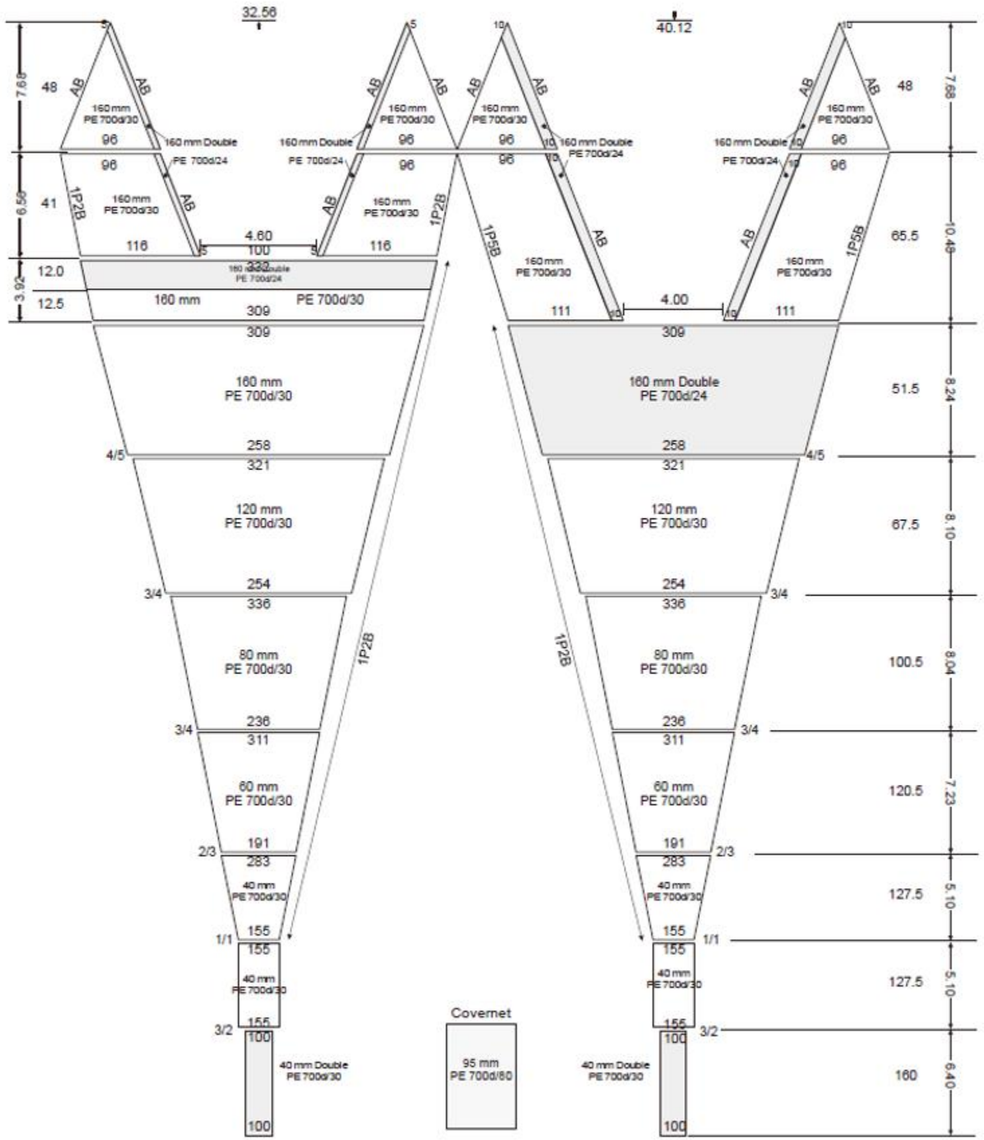
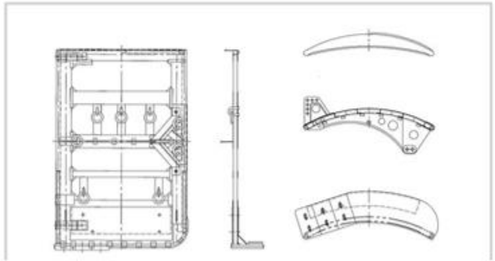
Trawl Net Plan

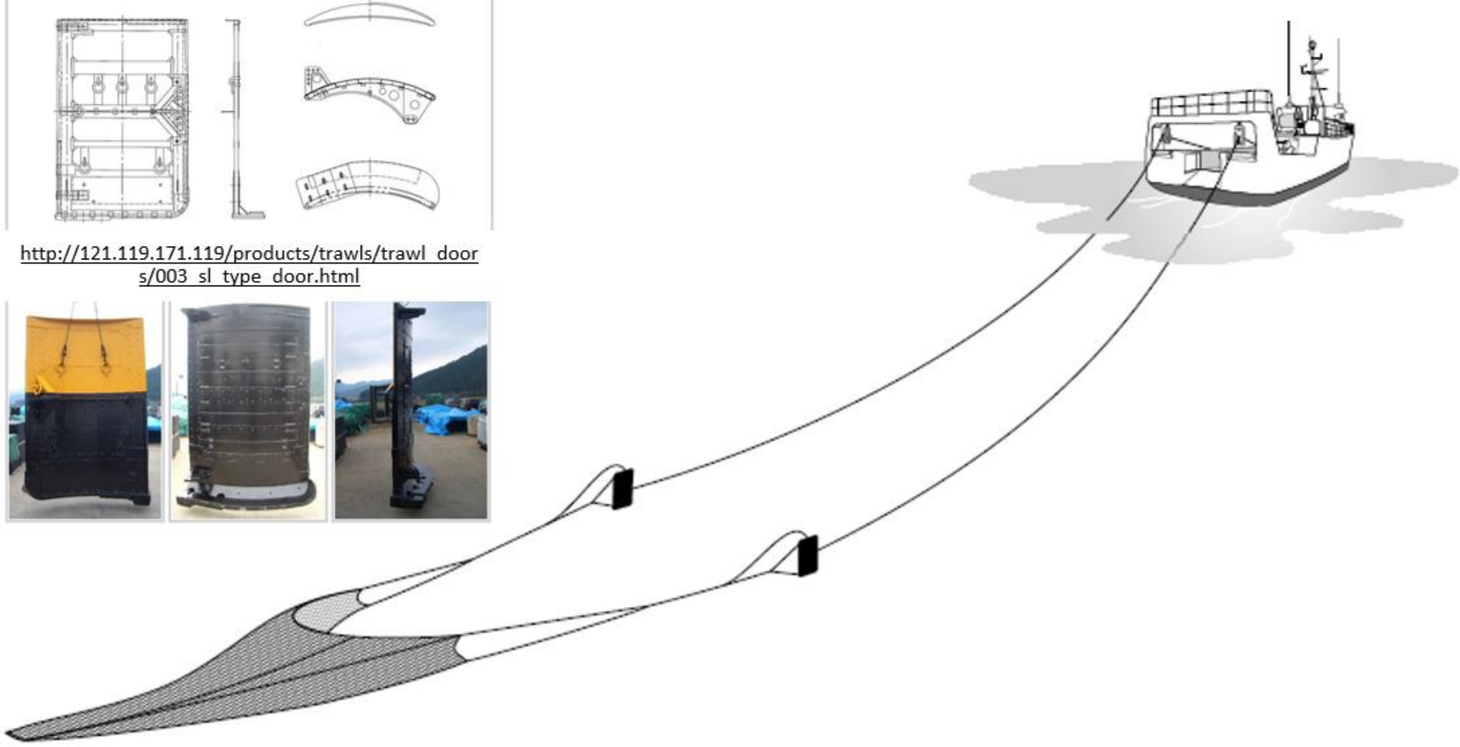


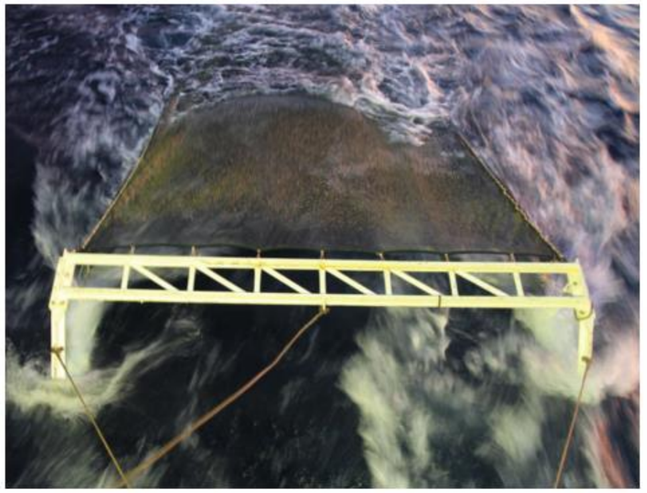
Bottom Otter Trawl

- Trawl net is two (2) net seams
- Head rope is 32.56 m. Ground rope is 40.12 m.
- Left wing and right wing line (or side seam) is 34.8 m.
- Total circumference of net mouth is 154.2 m.
- Total length from wing net to codend part is approximately 88 m.
- Codend mesh size 60 mm

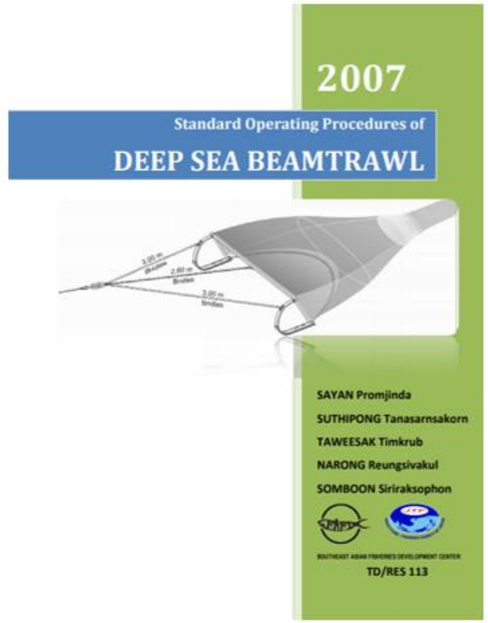


http://121.119.171.119/products/trawls/trawl_doors/003_sl_type_door.html

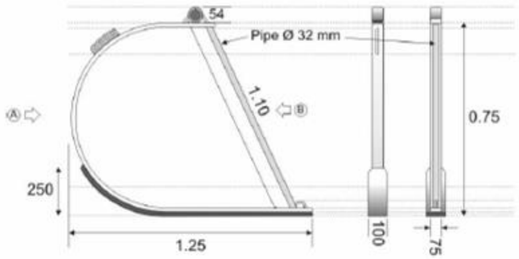


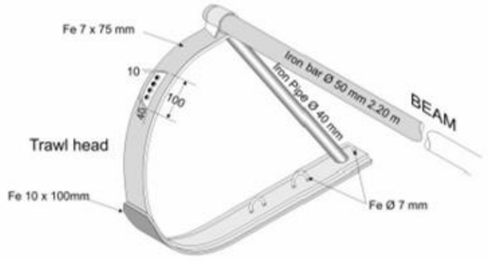


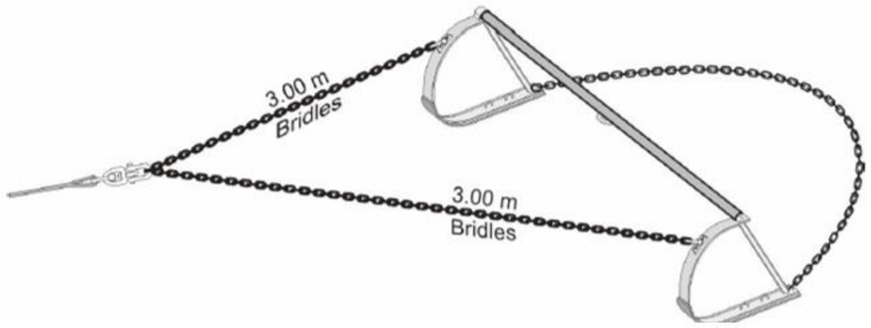
Beam trawl consists of a cone-shaped body ending in a bag or codend, which retains the catch. In these trawls the horizontal opening of the net is provided by a beam, made of wood or metal. Design of deep-sea beam trawl gear and its net were developed and modified from the fisherman in the Northern part and Northeast of the European water called Agassiz trawl.

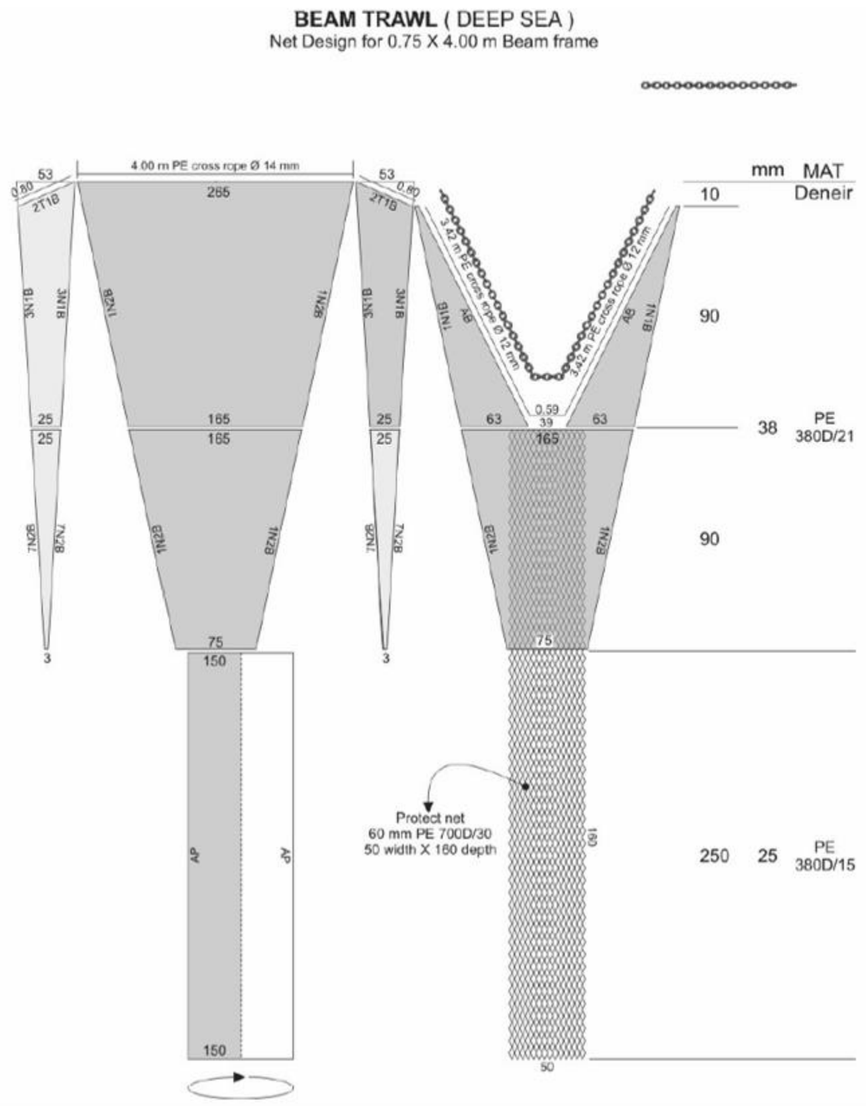


Standard Operating Procedures of Deep-Sea Beam Trawl TD/RES/113

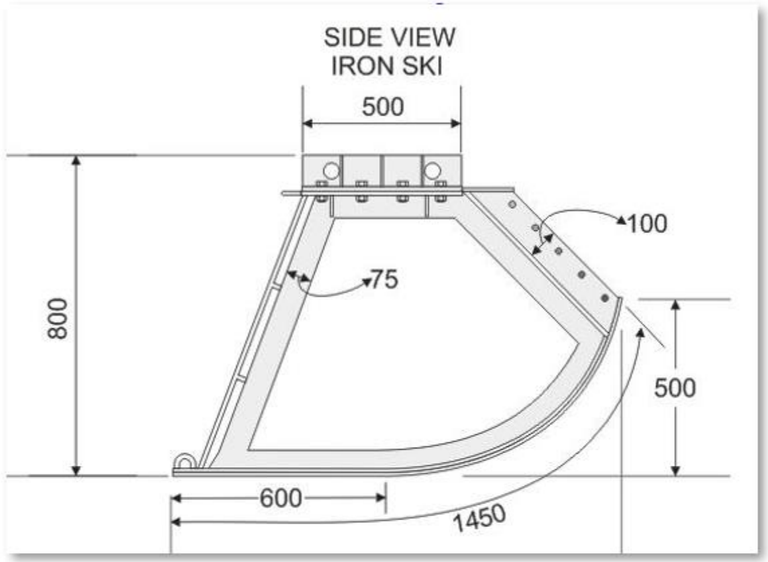


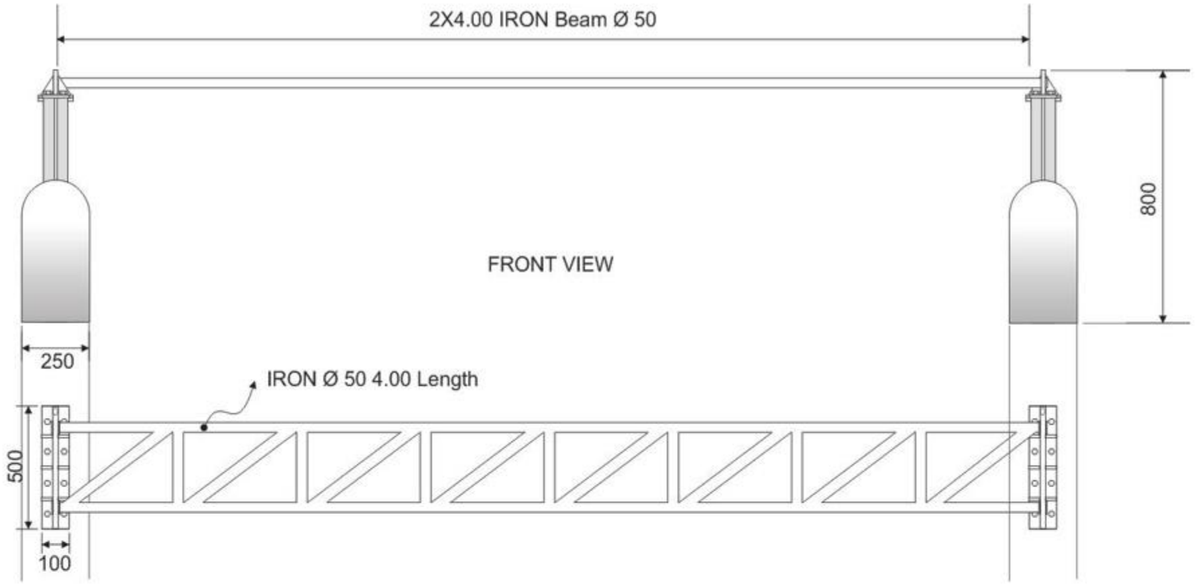




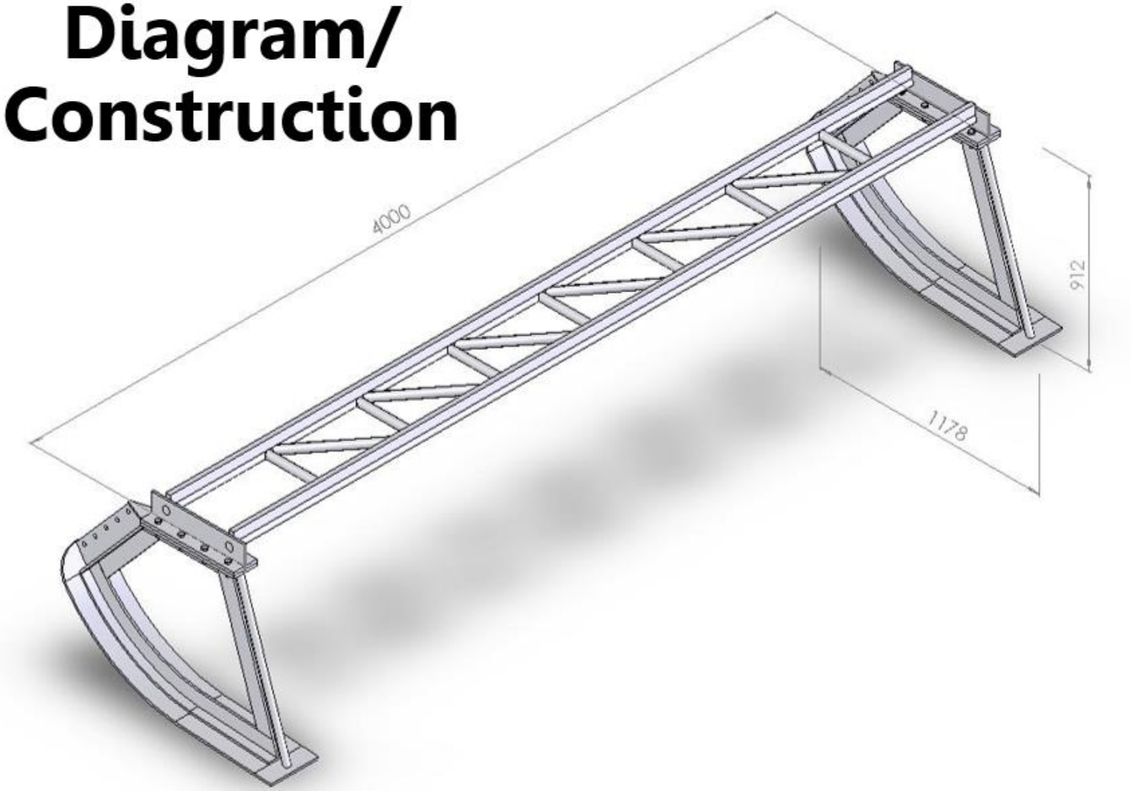


Beam trawl



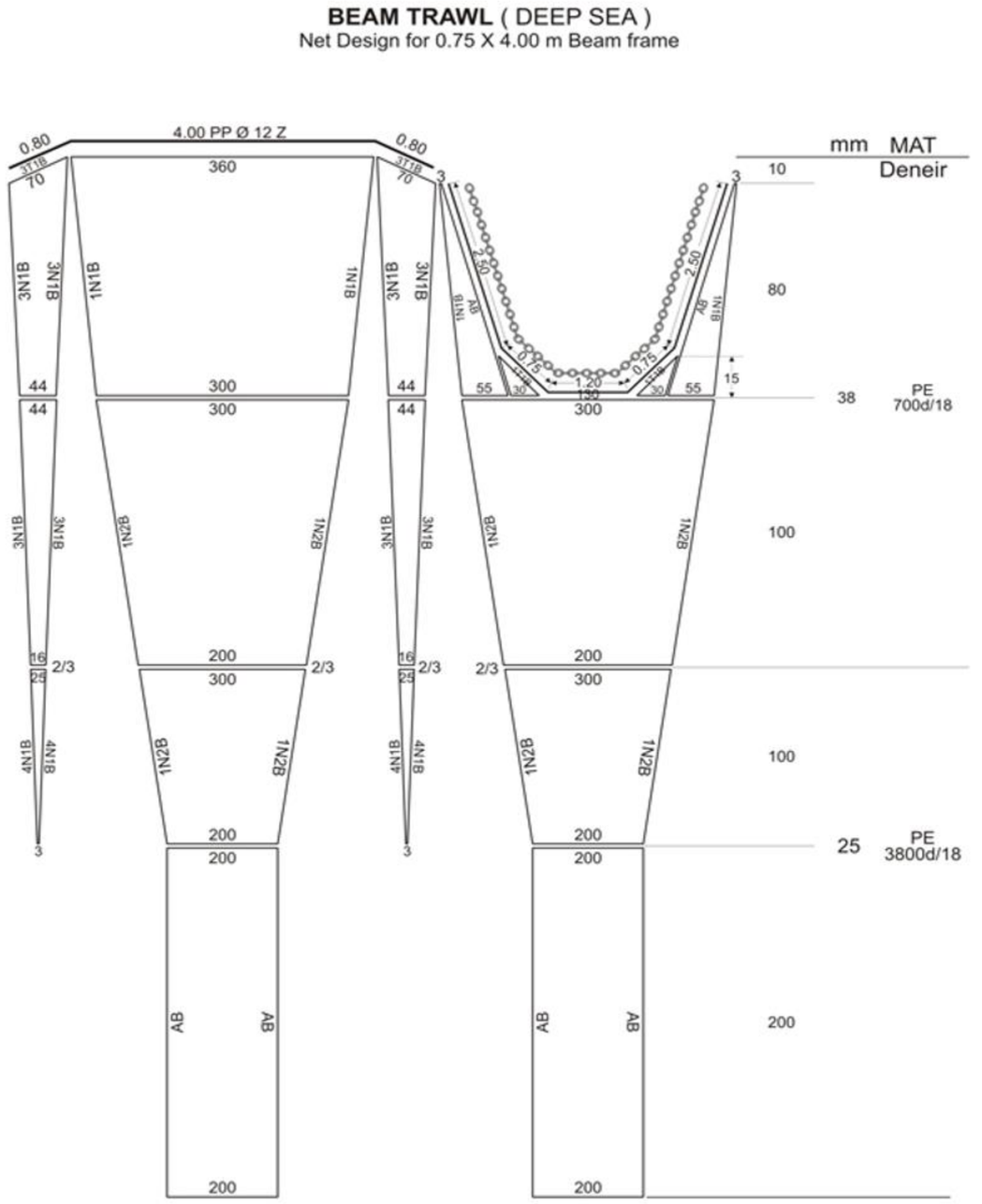


Diagram/ Construction



Beam trawl

- Head rope 4 m
- Ground rope 8.7 m (net spread 4 m)
- Sweep line : chain 5.5 meter
- PE 700 d/15, 380 d/15
- Mesh size 40 mm / 25 mm
- Net body is 15.1 m length



Beam Trawl Operation

- Day and night times operation, 7-8 days/trip
- 7.5m beam, 2-8 trawl nets, 1 or 2 beams,
- 2-10 sinkers (ski 20-40kgs/each)
- 3.5-4.0 kts. towing speed for 1-1.5 hrs. duration
- 8-10 operations/day
- 30 min sorting, resting for 1 hr.
- Cruising speed 8 kts. for 2 hrs.
- 15-20 m depth, targeting for shrimps.

1. **Vessel Preparation:** The fishing vessel is equipped with winches and cables to haul the net.

2. **Net Deployment:** The net is attached to the beam and lowered into the water.

3. **Towing:** The vessel moves forward, towing the net along the seabed. The beam helps to spread the net horizontally, allowing it to sweep across the bottom and capture fish.

4. **Hauling:** Once the vessel has completed its tow, the net is hauled aboard. The fish are then removed from the codend, the tapered end of the net.

Key Features of Beam Trawl Fishing:

- **Efficiency:** Beam trawling can be highly efficient for catching demersal species.
- **Bottom Impact:** The net is designed to sweep along the seabed, which can have significant impacts on marine habitats, including damage to benthic organisms and disruption of sediment.
- **Selectivity:** Beam trawling can be relatively selective for certain species, but it can also capture a wide range of other organisms.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Pair trawl

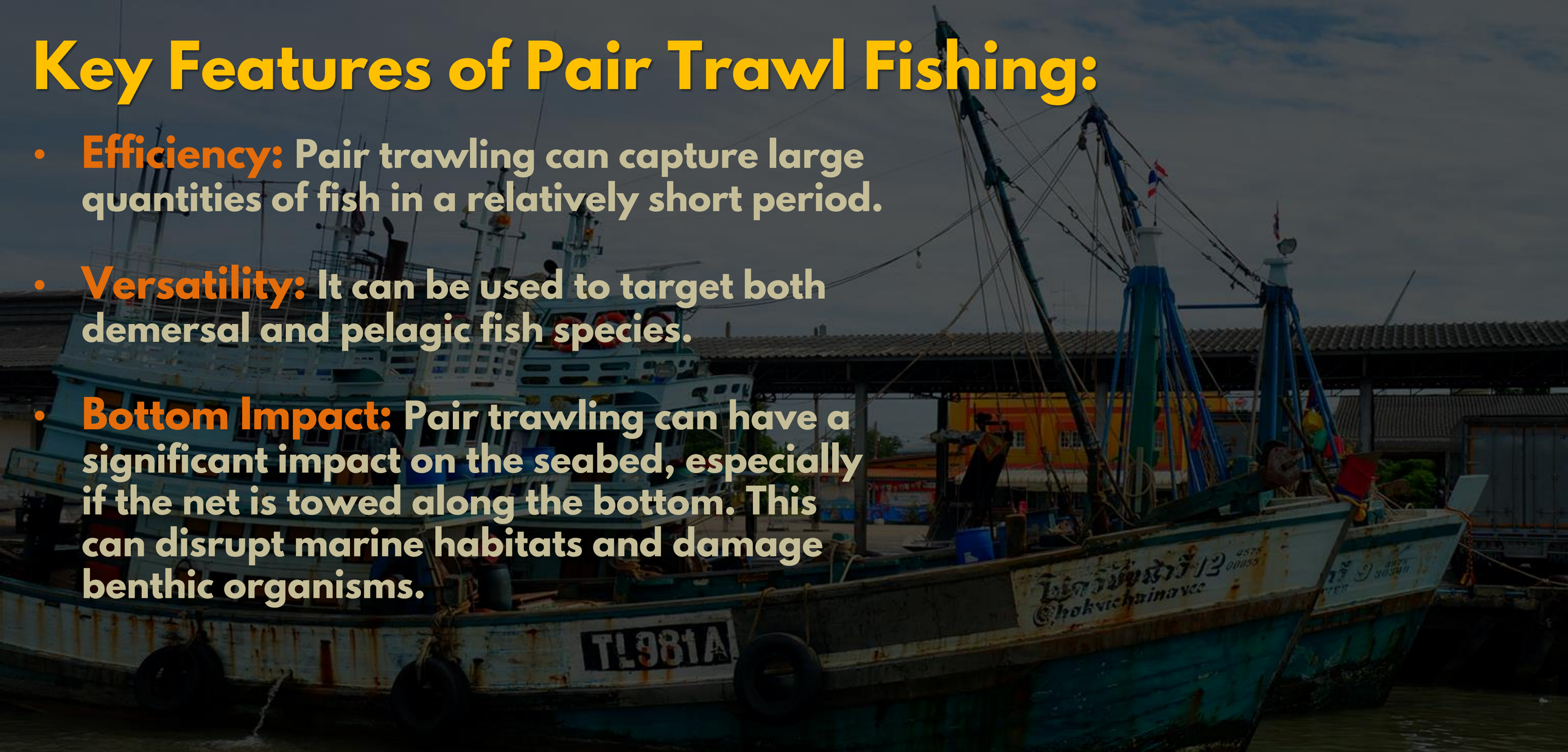
Definition of Pair Trawl

Pair trawling is a fishing method that involves two vessels towing a large net between them. The net, known as a trawl, is shaped like a cone and has a codend at the end to collect the catch. The two vessels maneuver the net through the water, sweeping the bottom or mid-water column to capture fish.

This method is commonly used to catch demersal fish (those that live on or near the bottom of the sea). However, it can also be used to target pelagic fish including shrimp and squid.

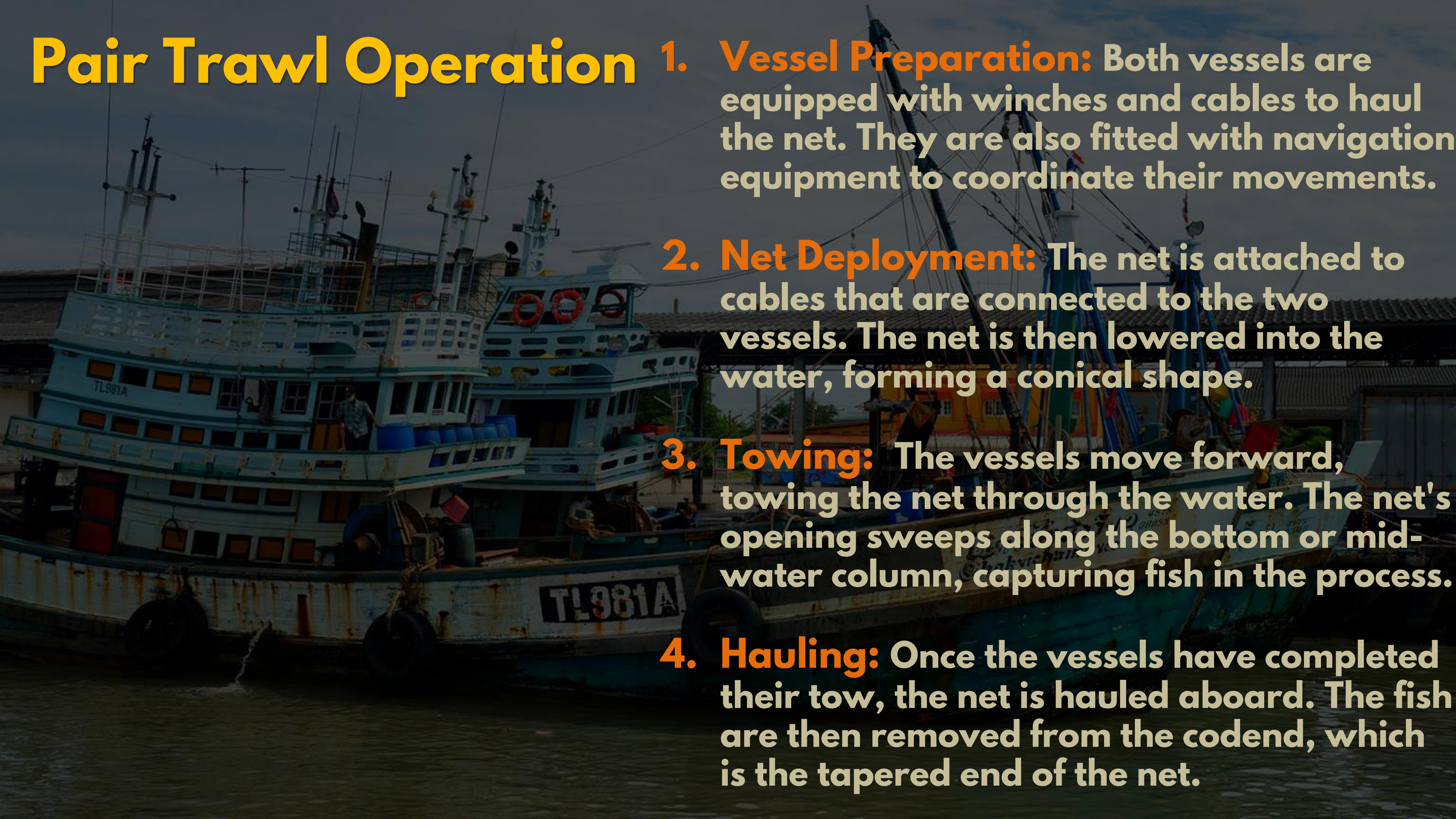
Key Features of Pair Trawl Fishing:

- **Efficiency:** Pair trawling can capture large quantities of fish in a relatively short period.
- **Versatility:** It can be used to target both demersal and pelagic fish species.
- **Bottom Impact:** Pair trawling can have a significant impact on the seabed, especially if the net is towed along the bottom. This can disrupt marine habitats and damage benthic organisms.



To mitigate the environmental impacts of pair trawling, many countries have implemented regulations to limit fishing areas, restrict the size of nets, and require the use of gear that reduces bottom impact.

Pair Trawl Operation



1. **Vessel Preparation:** Both vessels are equipped with winches and cables to haul the net. They are also fitted with navigation equipment to coordinate their movements.

2. **Net Deployment:** The net is attached to cables that are connected to the two vessels. The net is then lowered into the water, forming a conical shape.

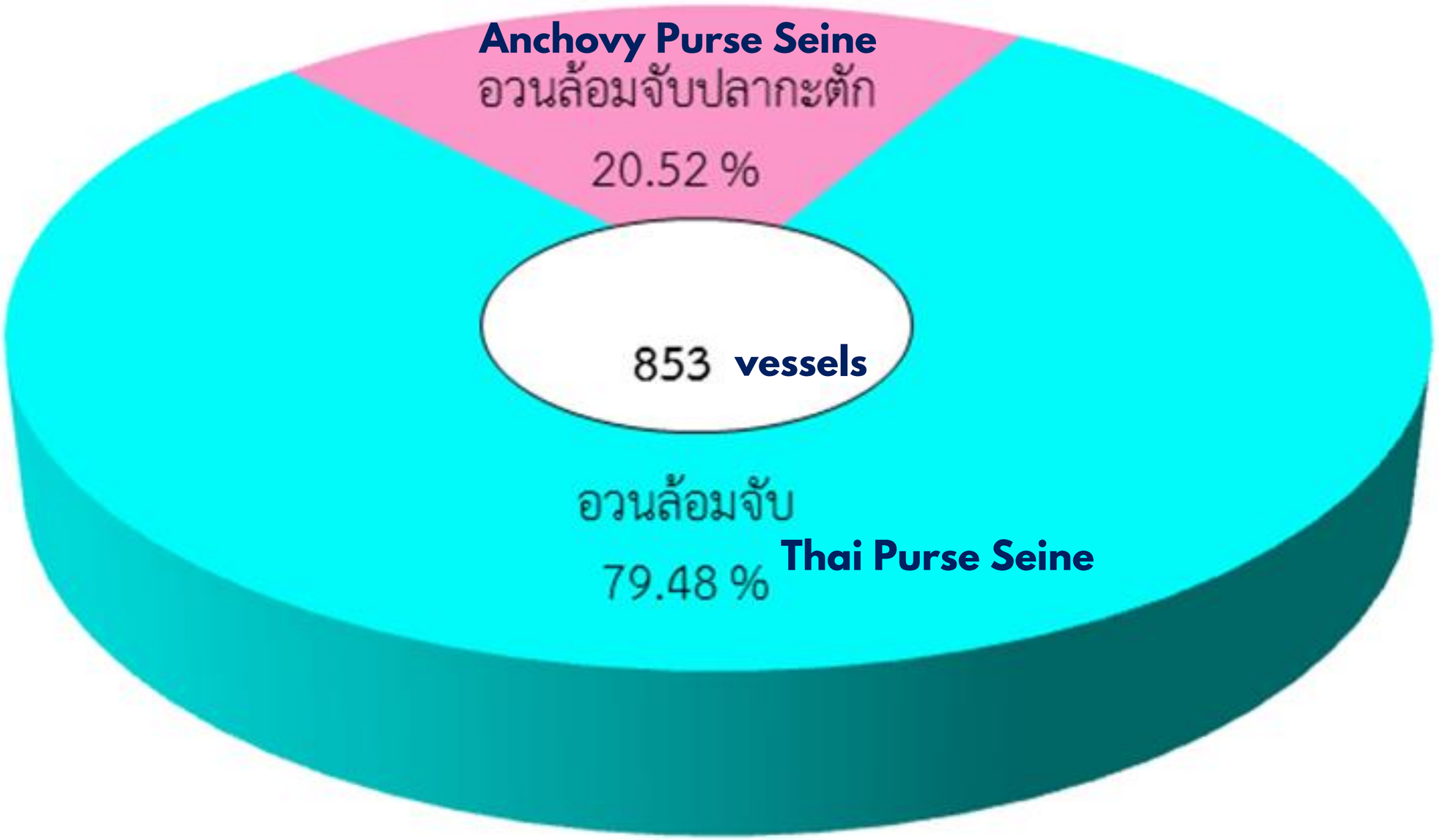
3. **Towing:** The vessels move forward, towing the net through the water. The net's opening sweeps along the bottom or mid-water column, capturing fish in the process.

4. **Hauling:** Once the vessels have completed their tow, the net is hauled aboard. The fish are then removed from the codend, which is the tapered end of the net.

Pair Trawl Operation

- Day&night times operation, 5-10 days/trip
- 2-3 kts. towing speed for 4-8 hrs. duration
- 3 operations/day
- Cruising speed 7-8 kts.
- 40 m depth, targeting both demersal and pelagic fish including squid cuttlefish and shrimps.

Purse Seine Fishing


Anchovy Purse Seine
อวนล้อมจับปลากะตัก
20.52 %
853 vessels
อวนล้อมจับ
79.48 %
Thai Purse Seine

Purse Seine Fishing

Definition of Purse Seine

A purse seine is a large net used to capture schools of fish. It's deployed around the entire area or school of fish, with floats along the top line and a lead line threaded through rings along the bottom.

Once the net is in place, a line is pulled through the rings, "pursing" the net closed at the bottom and preventing fish from escaping. This allows the catch to be hauled aboard or brought alongside the vessel.

This method is often used to catch pelagic fish

Construction of a Purse Seine Net

1. **Main Body:** a rectangular sheet of netting
2. **Headrope:** made of a strong, buoyant material
3. **Footrope:** made of a heavier material like lead or chain to sink the net
4. **Rings:** The circular metal rings attached to the footrope. They allow a purse line to be threaded through, closing the net at the bottom.
5. **Purse Line:** A strong line that is threaded through the rings on the footrope to close the net
6. **Floats:** attached to the headrope to keep the net float & help maintain the net's shape and prevent it from sinking
7. **Weight:** attached to the footrope to help sink the net and keep it in place. They may also be used to adjust the depth of the net.

The materials used must be strong enough to withstand the weight of the catch and the forces of the ocean, while also being flexible and durable. The net must be designed to efficiently capture fish without causing excessive damage to the catch or the environment.

Key Advantages of Purse Seine Fishing:

1. **Efficiency**: It can capture large quantities of fish in a short period
2. **Selectivity**: When used correctly, it can target specific species of fish
3. **Cost-Effective**: It can be a relatively inexpensive method of fishing

Environmental Concerns:

Bycatch: Purse seine fishing can sometimes lead to the capture of non-target species, known as bycatch. This can have negative impacts on marine ecosystems.

Habitat Destruction: The process of deploying and hauling the net can sometimes damage marine habitats, such as coral reefs.

Purse Seine Fishing Operation

Purse seine fishing is a method used to capture large schools of fish. The process involves several steps:

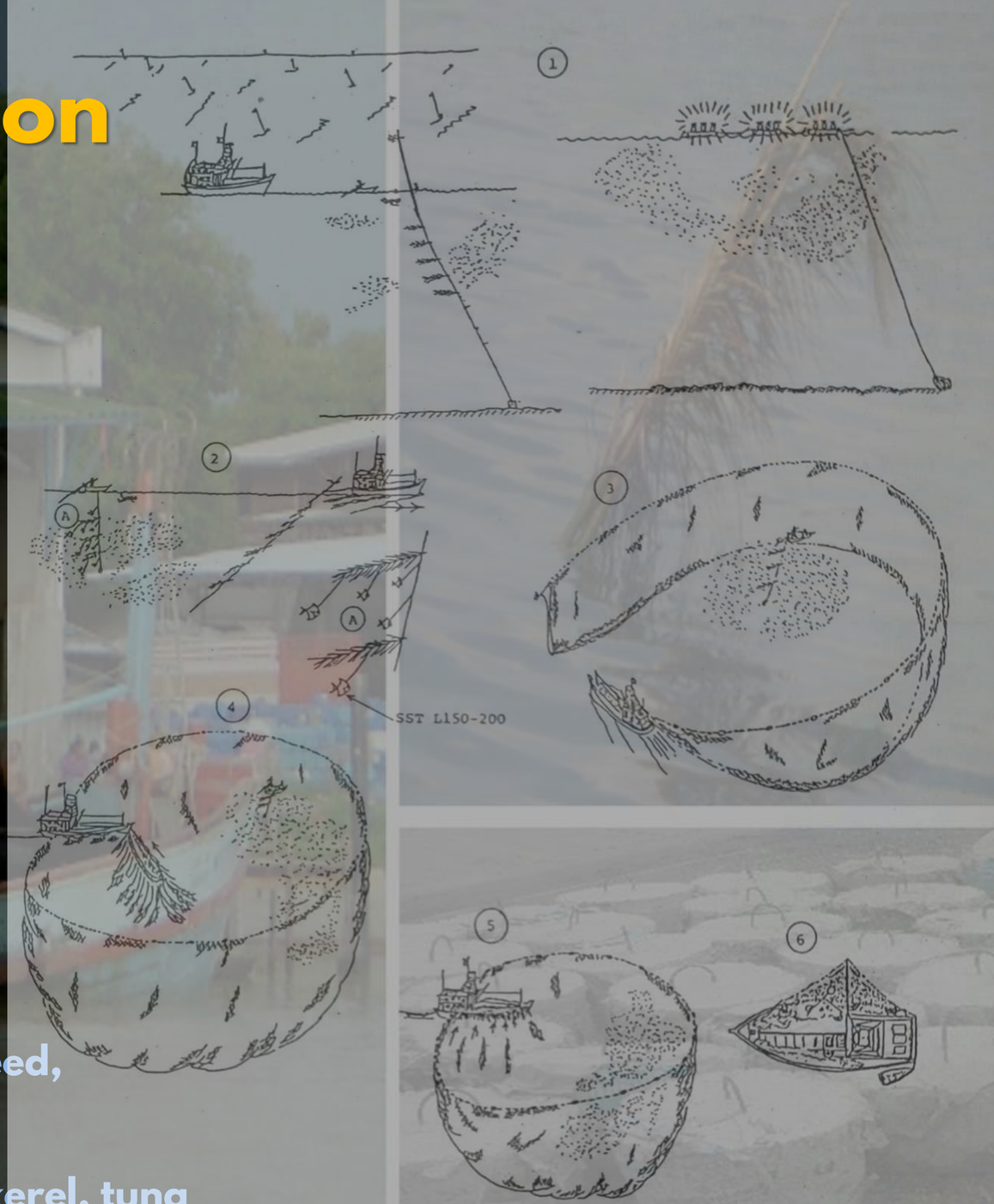
1.Spotting the School: The fishing vessel uses sonar, radar, or aerial surveillance to locate a school of fish.

2.Deployment: The purse seine net is deployed around the entire school. The headrope, with floats attached, is thrown overboard first, followed by the footrope with rings.

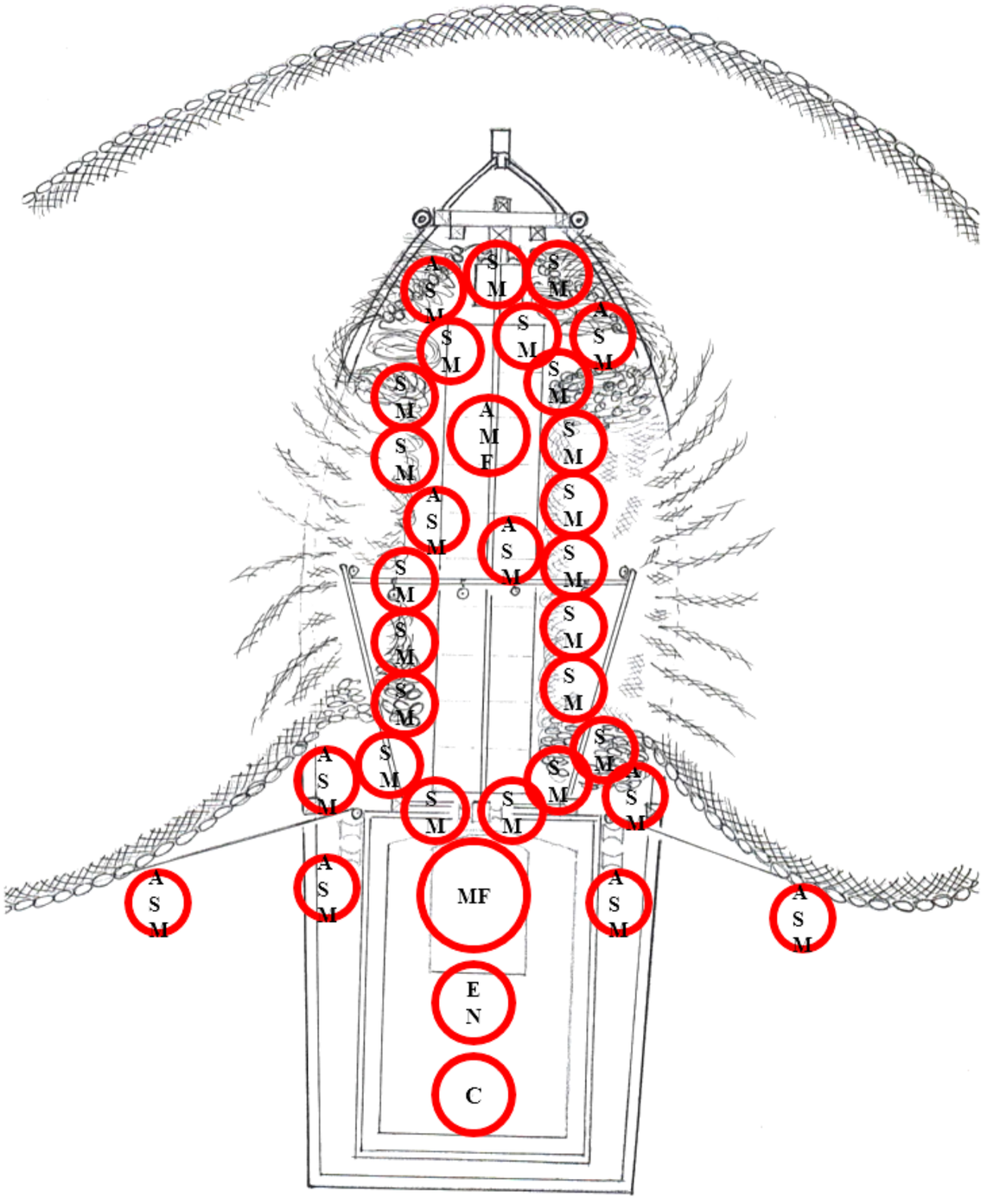
3.Purse Closing: Once the net is fully deployed, the purse line is pulled through the rings on the footrope. This closes the net at the bottom, trapping the fish inside.

4.Hauling In: The net is hauled aboard the vessel using brails. The fish are then removed from the net and stored on boar

Purse Seine Fishing Operation



- Day or night times operation, 8-15 days/trip
- 30-35 crews
- 3-4 hrs. light luring, 10-15 mins surrounding with 4-7 kts. speed,
- 2-4 operations/day
- Cruising speed 7 kts. for 2-3 hrs.
- 35-60 m depth, targeting for pelagic species like scads, mackerel, tuna



คนประมงประจำเรือ
Fishing crew on board

- MF ไต้ก๋ง (ไต๋) 1 per.
  Master Fisherman
- AMF ผู้ช่วยไต๋ (ยี่ชิ้ว) 1 per.
  Assistant MF
- EN ต้นกล (อินเนีย) 1 per.
  Engineer
- C พ่อครัว (จุมโพ่) 1 per.
  Cook
- AMF คนเรือประมงชำนาญการ 10-15 per.
  Able Seamen (Skillful Fishermen)
- SM คนเรือประมง 20-30 per.
  Seamen (Fishermen)

รวมคนประมงประจำเรือทั้งสิ้น
Total Fishing Crew 34-50 pers.

SAMPLING GEAR DESIGN FOR FISHERIES RESOURCE SURVEY

-LONGLINE GEAR-

Presenter: Santiphong Putsa
Research and Development Division, SEAFDEC/TD

MARINE ORGANISMS IN THE WATER COLUMN

- Living in pelagic, demersal and/or benthic

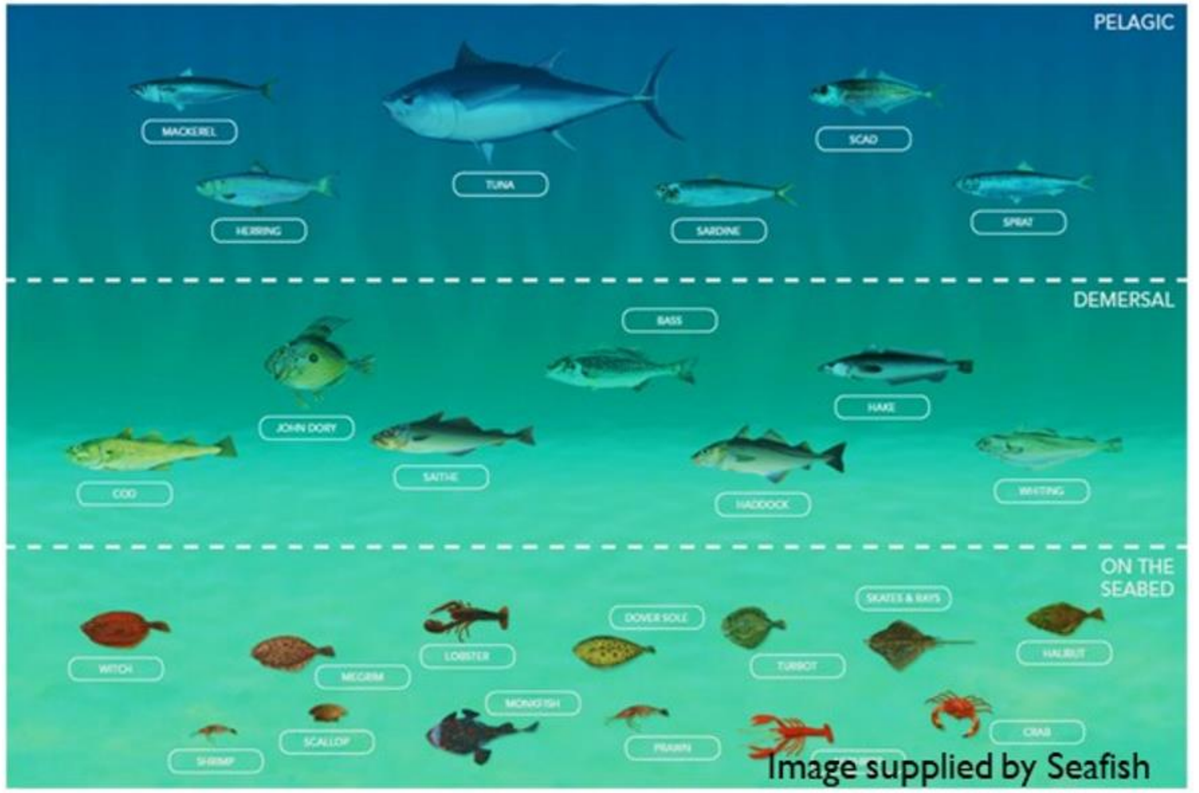
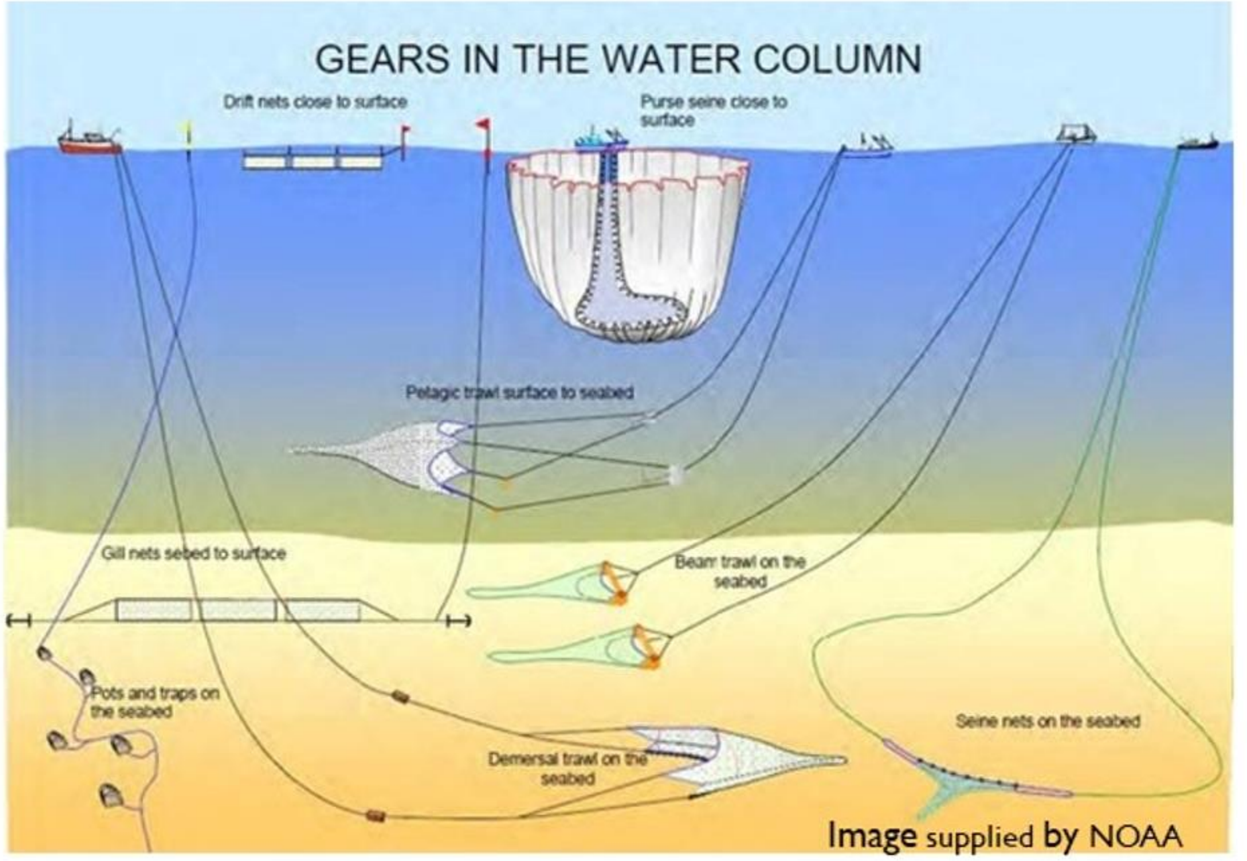


Image supplied by Seafish

- **Marine species** can be identified and grouped on the basis of some main living characteristics:
- **Pelagic species** live in mid-water or close to the surface with no, or very limited, interaction with the sea bottom;
- **Demersal species** live and feed close to the bottom of seas, but without necessarily staying and swimming directly onto the bottom; and
- **Benthic species** live on or even in the sea bottom and their biology is intrinsically related to the seafloor (Jean, 2015).

DIAGRAM OF FISHING GEAR IN THE WATER COLUMN

- The varied characteristics of fishing gear design its influence on what is actually caught

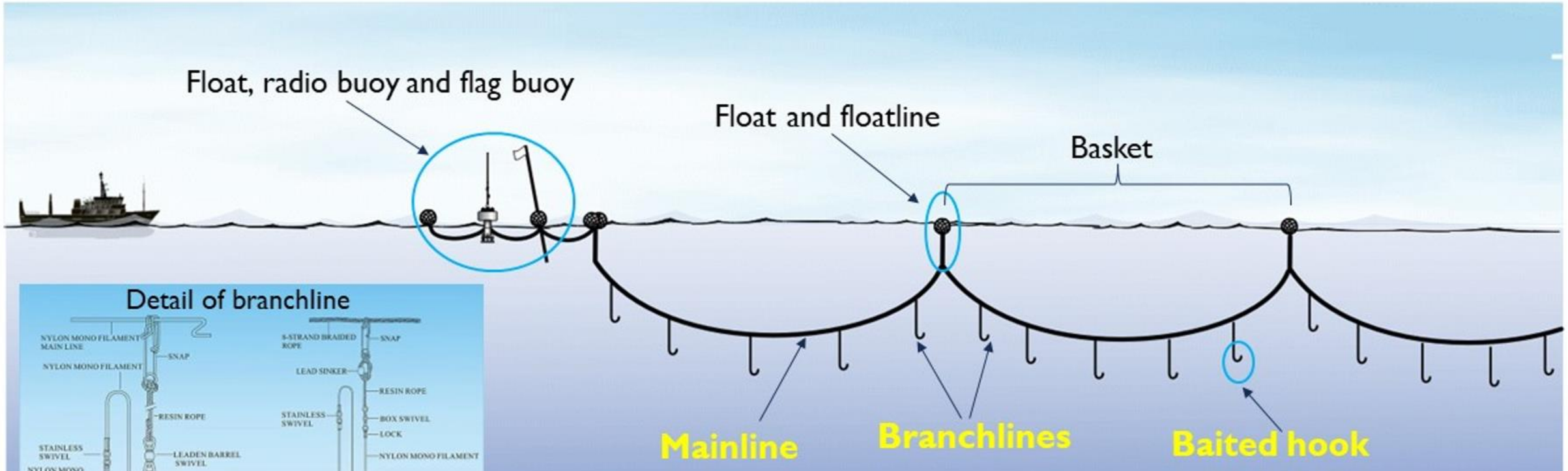


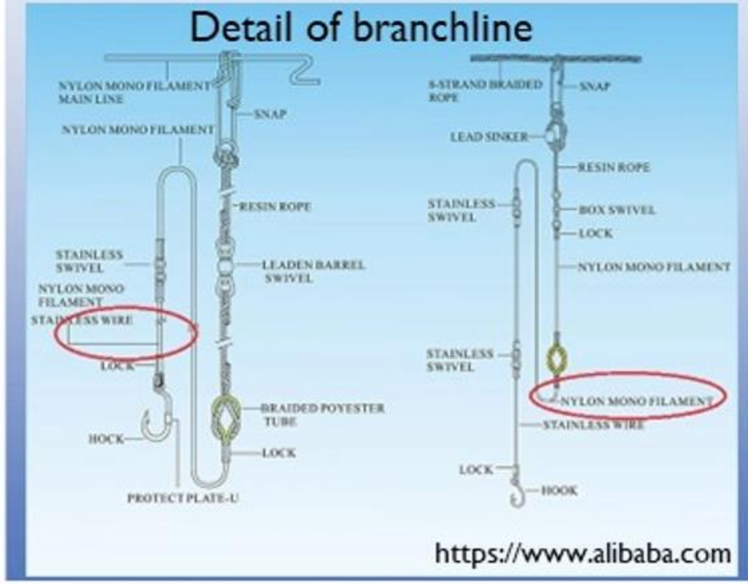
- There is a large range of types of fishing gear, with numerous variations of designs and size, and abundant possibilities for adaptation and technical adjustment.
- A fishing method enables only the targeted species and/or sizes to be caught and unwanted catches to be avoided
- The gear design, its characteristics and the material it is made of, all have a significant influence on what is actually caught (Jean, 2015).

DESCRIPTION OF LONGLINE

- Longline is one of the most fuel-efficient catching methods, it is used to capture both demersal and pelagic fishes.
- Uses a long mainline are attached hundreds or thousands of branch lines, each with a single baited hook to attract and catch fish in the fishing ground.
- Longline is set at the place where the school of fish is expected to be found. The scale of gear is comparatively larger than handline and pole-and-line fishing.
- The lines may be set vertically in the water column or horizontally along the bottom
- Usually set and hauled once daily, allowed to drift freely or set at the bottom for several hours while fishing.
- Longlines are set, either by hand or mechanically, while the boat steams away from the line and are usually hauled mechanically while the boat steams toward the line.
- The size of fish and the species caught is determined by hook size and the types of bait used

BASIC CONSTRUCTION OF LONGLINE

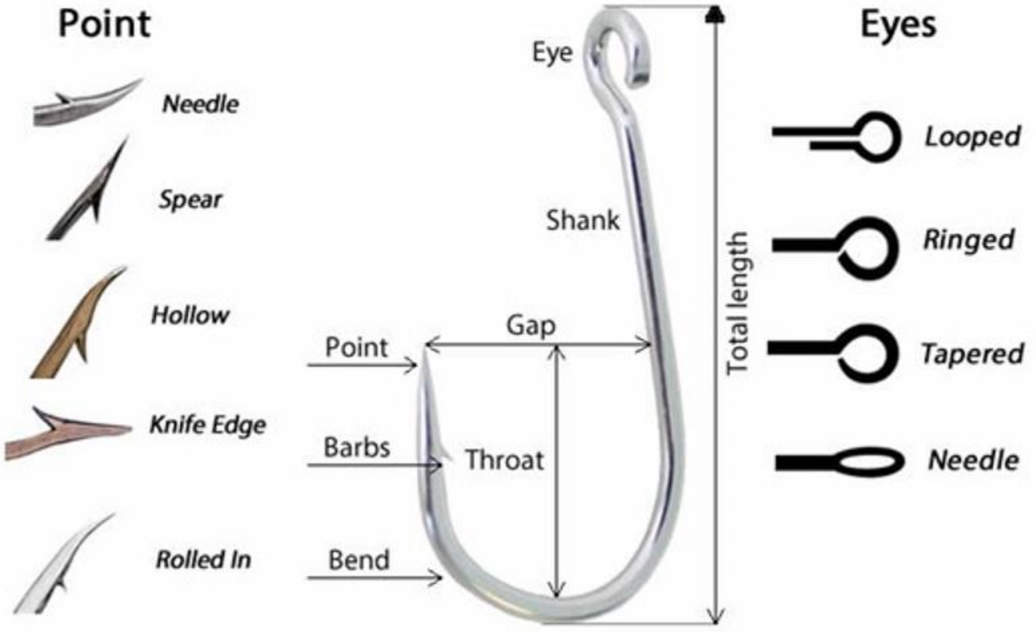




- Longline gear consists of three basic components: the mainline, the branch line, and the baited hook
- These parts are adaptable for targeting specific species through changes in materials, lengths, and deployment strategies

HOOKS USED IN LONGLINE FISHING

- The anatomy of a fishing hook



https://www.lehofishing.com/Choosing-a-Hook-id3058843.html

- Different types of hook

Tuna Circle Hook

Tuna Hook with Ring

Big-game Hook

Tuna & Swordfish Hook

BAIT USED IN LONGLINE FISHING

- **Bait selection**
  - Fishing ground locality
  - Freshness
  - Proper size
  - Brilliance or Mirror-like body feature

- **Baiting techniques**
  - Tighten or Secure bait with hook
  - Flexible waver in current (Simulation of alive fish is swimming)
  - Special accessory for increase effectiveness of bait: illuminator or light stick

- **Bait species: Key species of bait supply in Thailand**

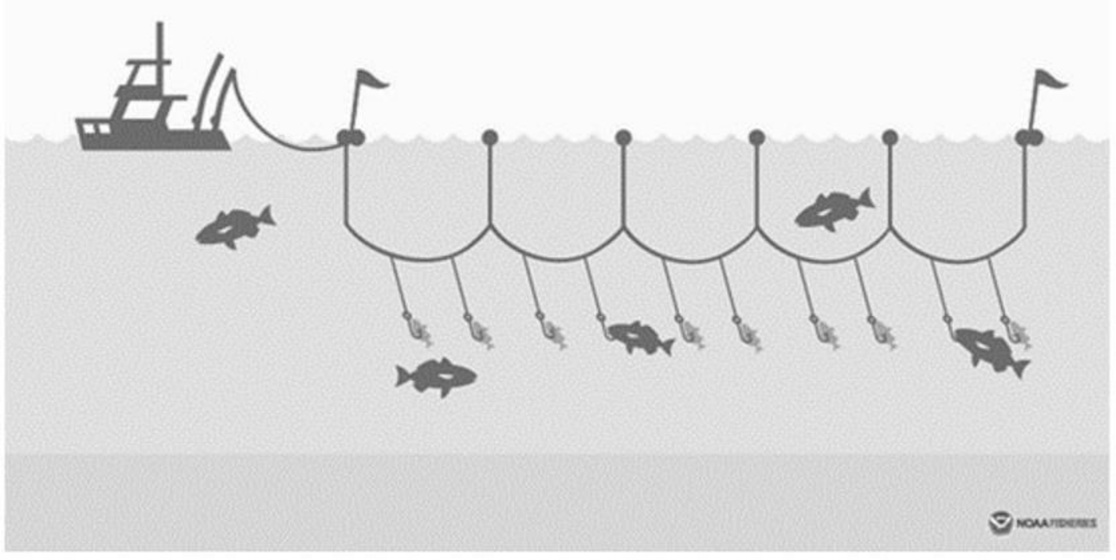
Scads (*Decapterus spp.*)

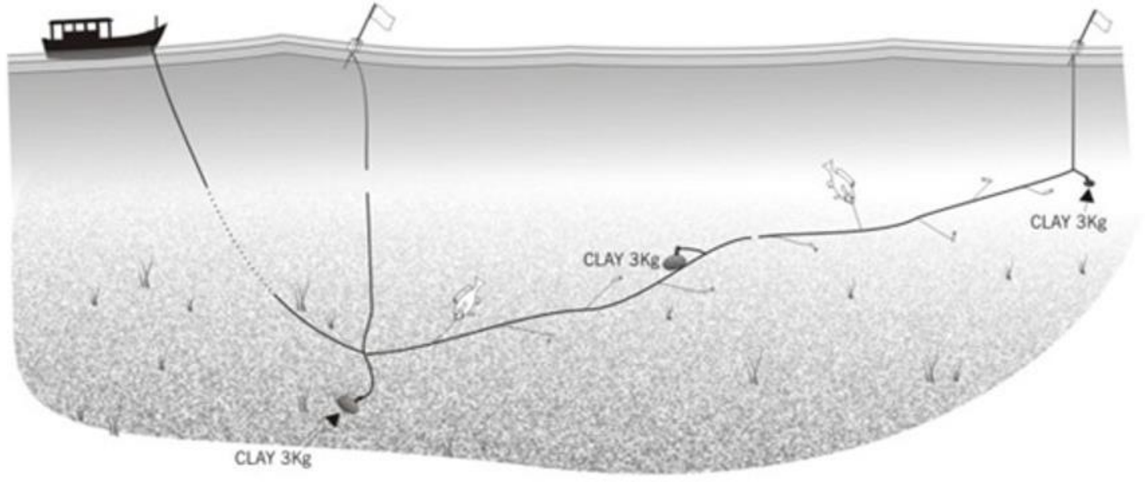
Indian Mackerel (*Rastrelliger spp.*)

Pacific Saury (*Cololabis saira*)

Oceanic Squid (*Illex Argentunus*)

LONGLINE CAN BE DIVED INTO TWO BASIC TYPE (Masthawee et al., 1989)

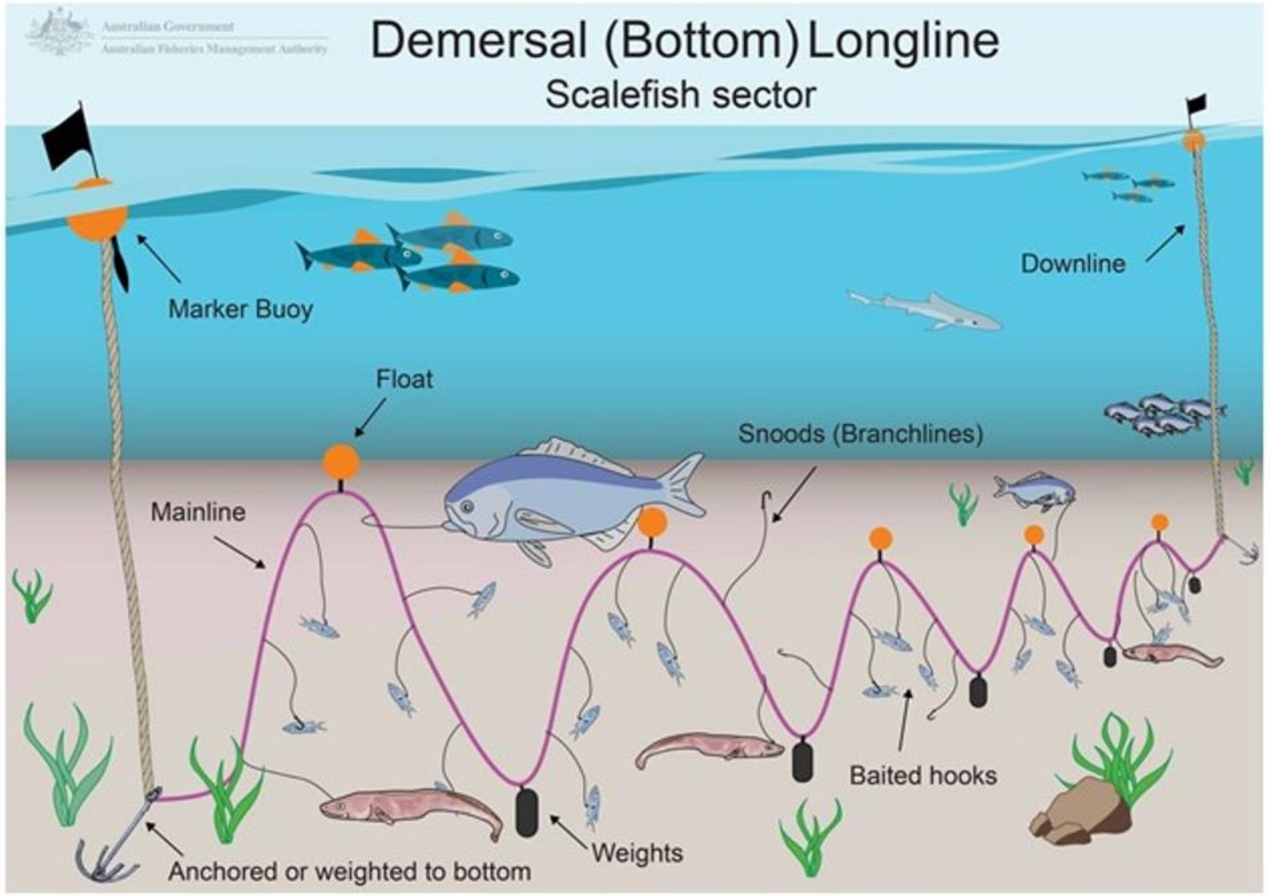




Drift longline : which uses floats to hang the main line at the desired depth in the surface or middle-depth water. This is a longline use for catching fish that migrate in the surface waters of slightly below, which the main catch consisting of tuna, skipjack, marlin, shark, etc. This category also includes middle-depth type longline used in catching mackerel, yellow tail, etc.

Bottom longline : which is set the way that the main line and branch lines just come in contact with the sea bottom. This is the most popular type of longline and it is used in the coastal regions of Southeast Asia. To catch a wide variety of different fish. The main catch includes fish of the grouper family, snapper family, flat fish, sea beam, croaker, etc.

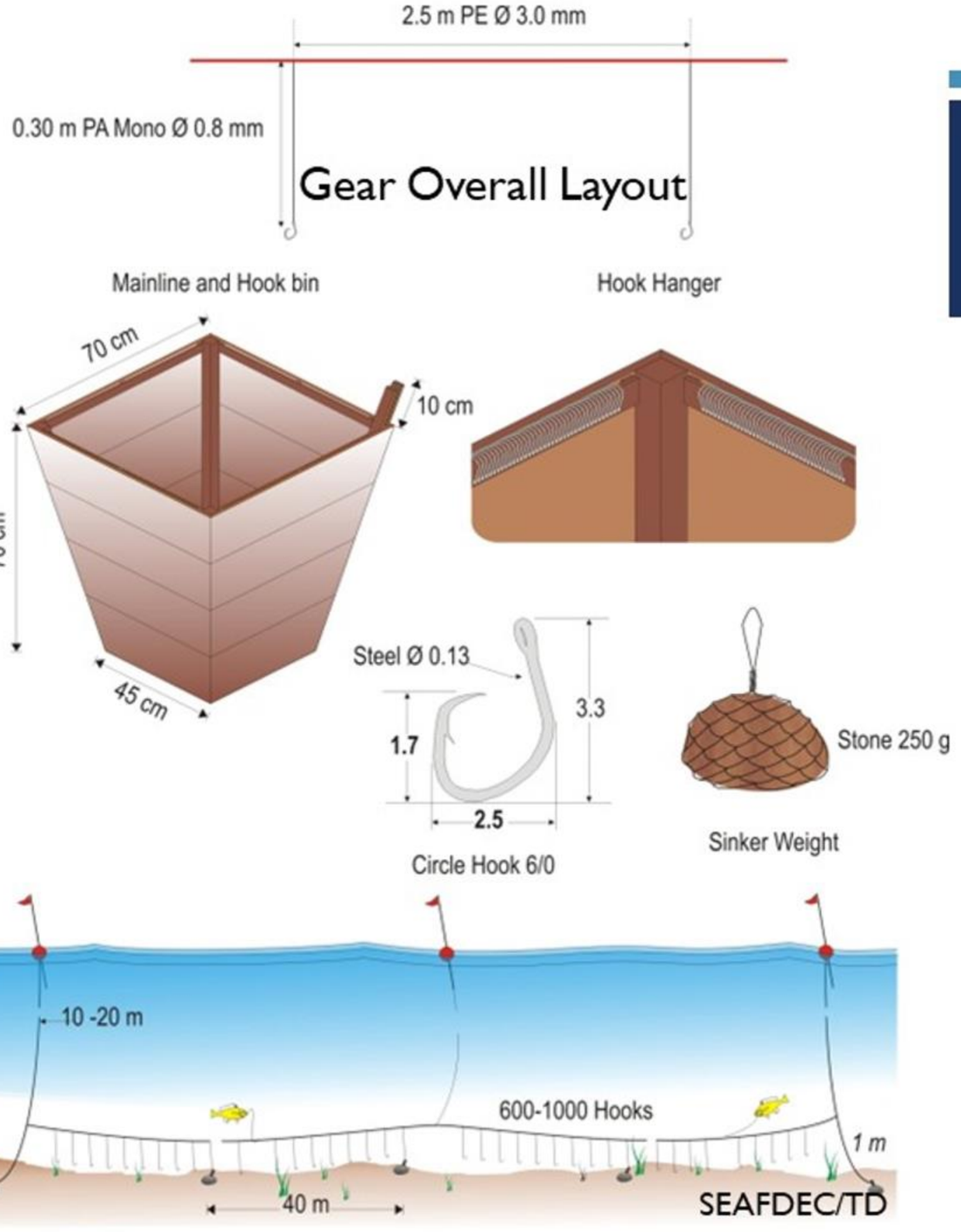
SET BOTTOM LONGLINE



https://www.afma.gov.au/fisheries-management/methods-and-gear/longlining

Demersal Longline (also known as bottom, set or anchored longlines) is used to target the bottom feeding fish. It can be very size selective simply by variation in hook size and the species can be regulated by the skipper's experience, the depth of water and the bait used.

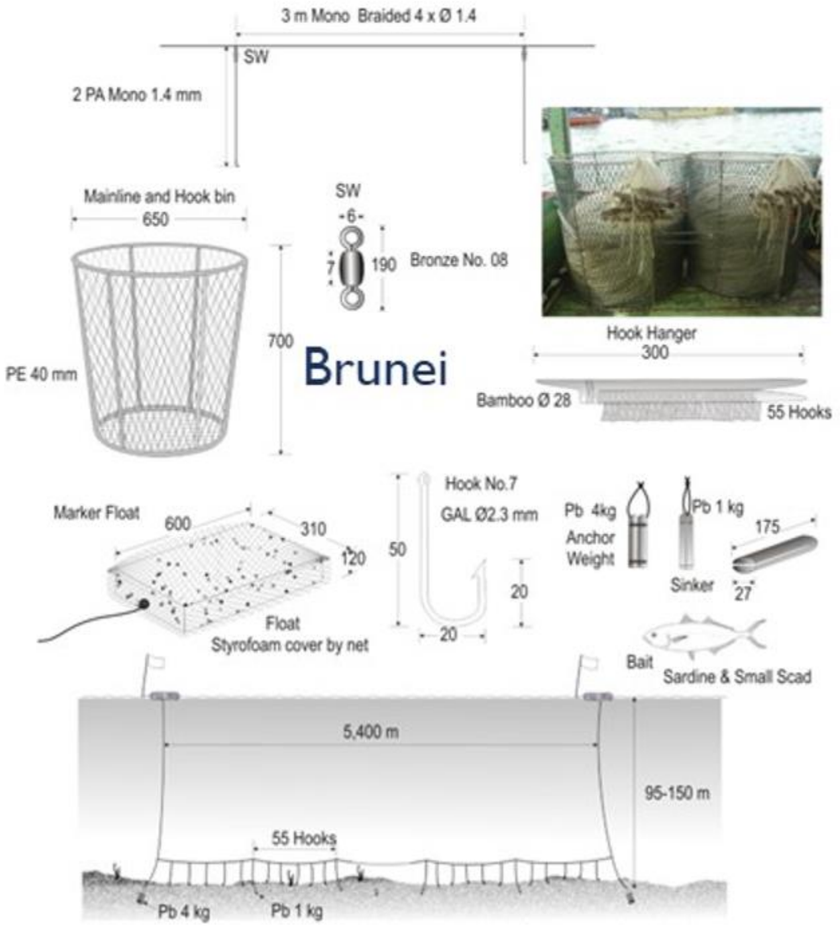
- Demersal longlines are fixed along the seafloor using anchors.
- The most common is the single-line system which consists of a single groundline with hooks attached by smaller lines called gangions.
- Demersal longline length ranges from a few hundred meters (small-vessel fisheries) to as long as 50 km in the larger vessel, industrial fisheries (FAO 2001-2010).
- In contrast to pelagic longlining, demersal operations often have shorter, more frequent branching lines (snoods) as well as shorter mainlines.

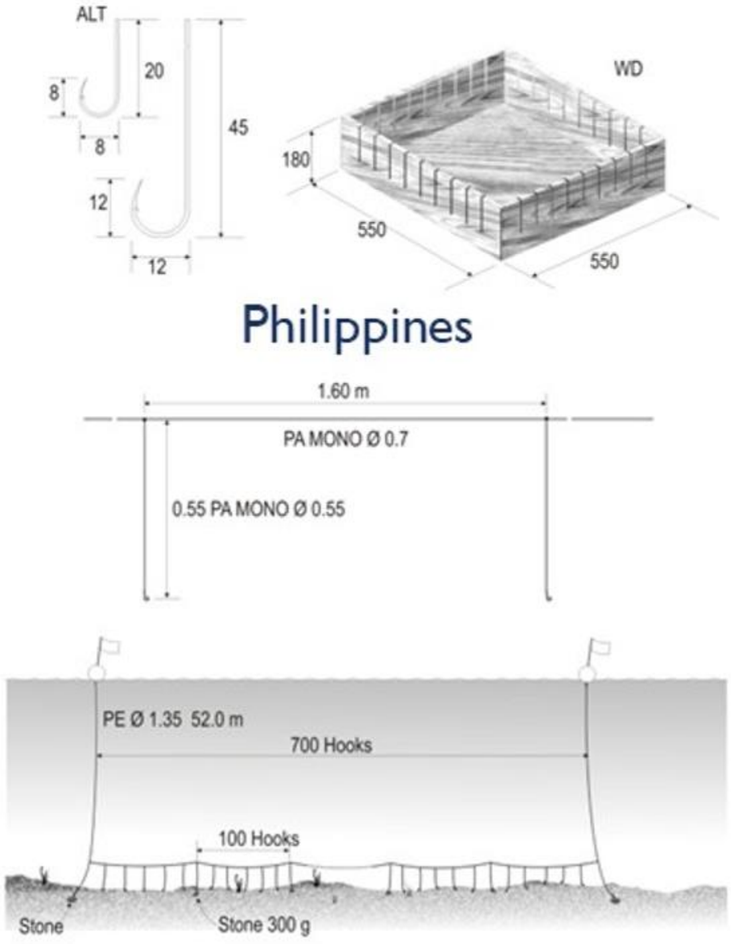


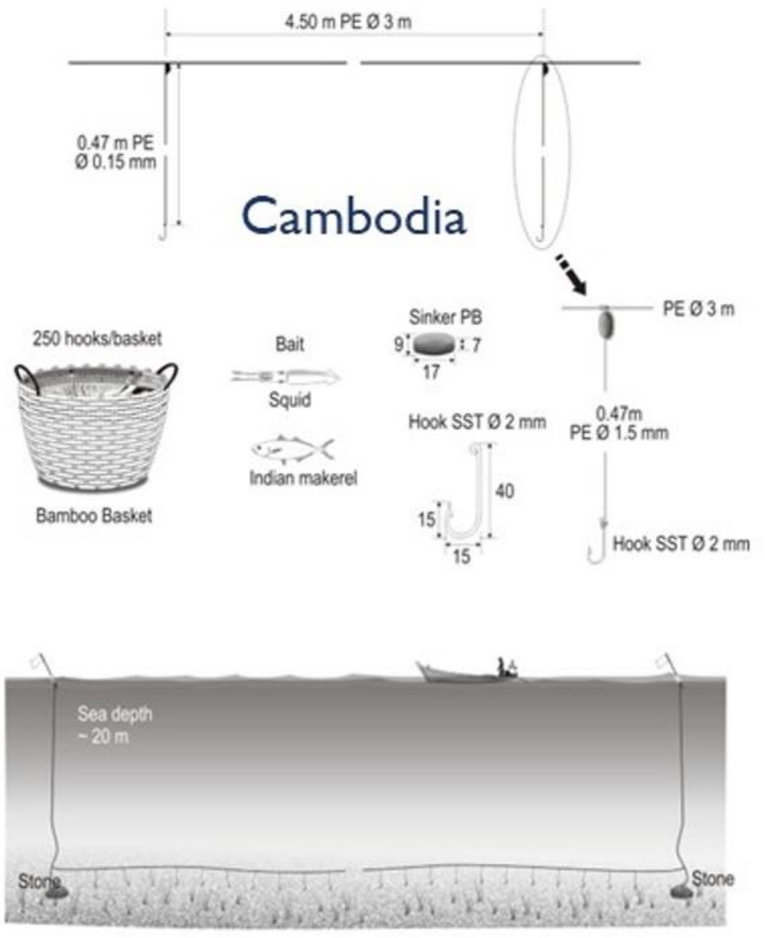
SET BOTTOM LONGLINE

- Main line is PE Ø3.0 mm
- Hook line is PA MONO Ø0.8 mm, 30 cm in length
- Distance between hook line is 2.5 m
- Float is PL Ø 300 mm
- Float line is 10-02 m
- The hook is circle hook no 6/0 (ST Ø 0.13), 600-1000 hooks in each line operation
- Sinker weight is stone 250 g (40 m of each interval)

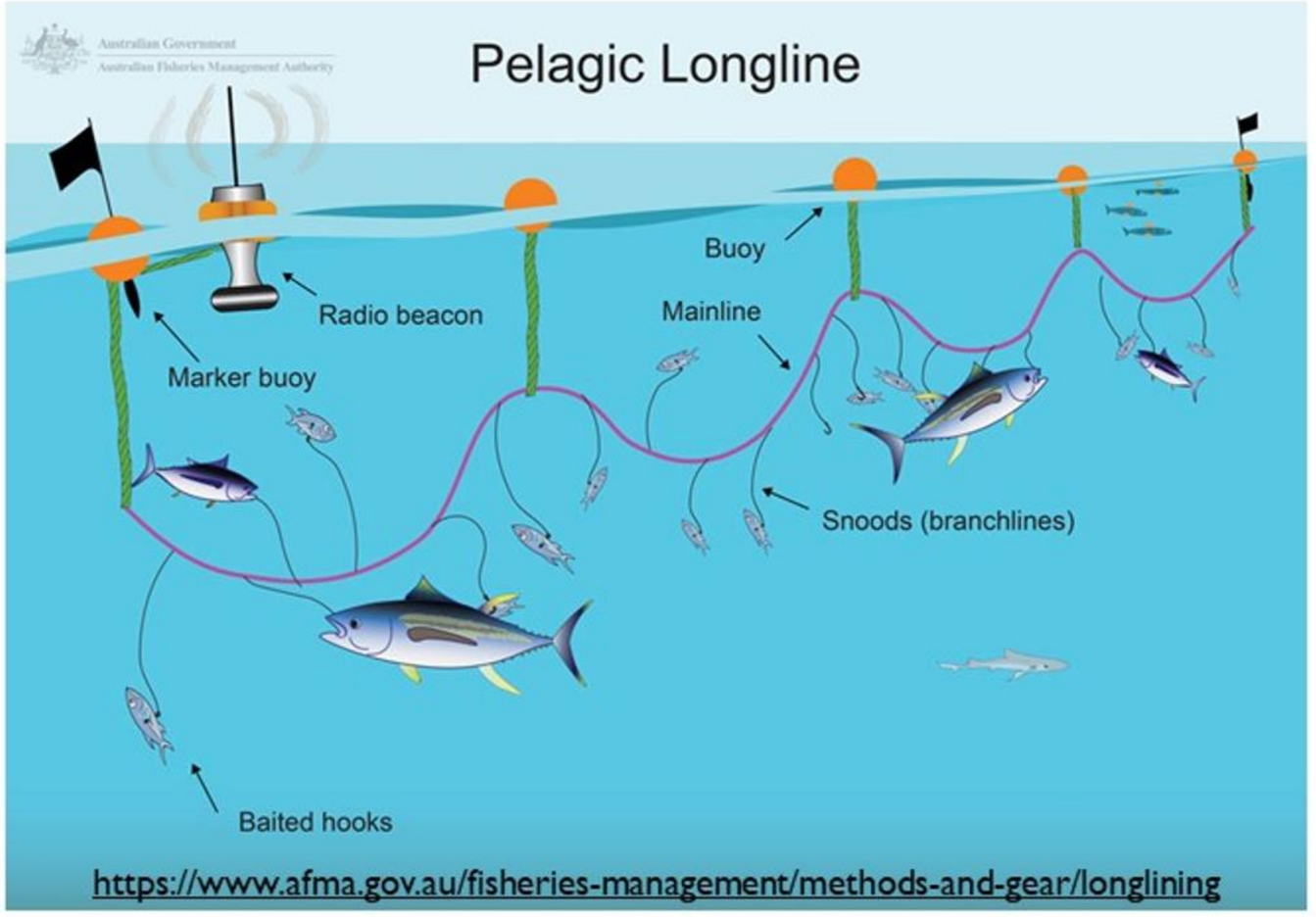
Set bottom longline are commonly used for small scale fisheries in SEA countries (Brunei, Cambodia, Indonesia, Malaysia, Myanmar, Philippines, Thailand, Vietnam)







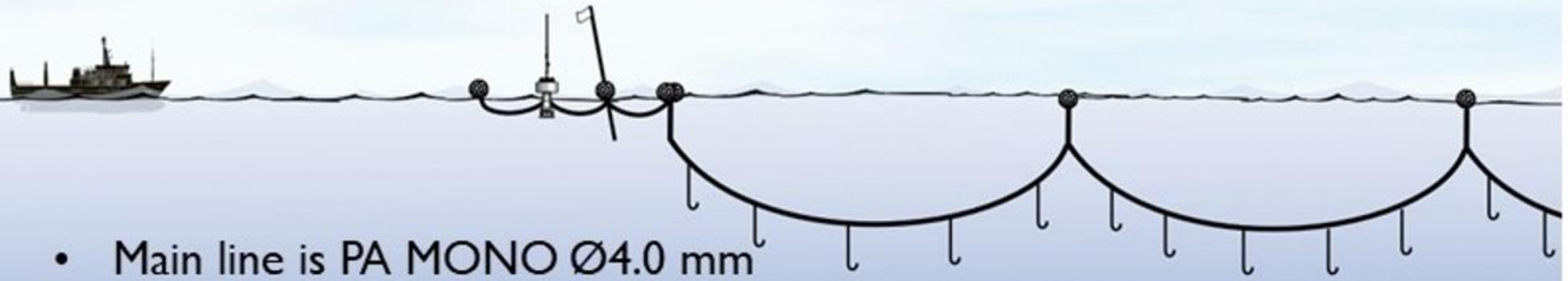
DRIFTING HORIZONTAL LONGLINE



Pelagic Longline is undertaken worldwide, to some degree, but tends to be concentrated in tropical regions where there are concentrations of the large pelagic species. The main target species are various species of tuna, billfish and swordfish.

- The gear is very similar to the demersal longlines, but they are not usually anchored, and are allowed to drift below the surface.
- The snoods are usually spaced further apart to suit the widely dispersed nature of the target species.
- The line is suspended below the surface by short lines with floats attached, spaced out along the main line. The length of these lines is set to hang the baited line at a suitable depth for the target species. (Seafish, 2015)

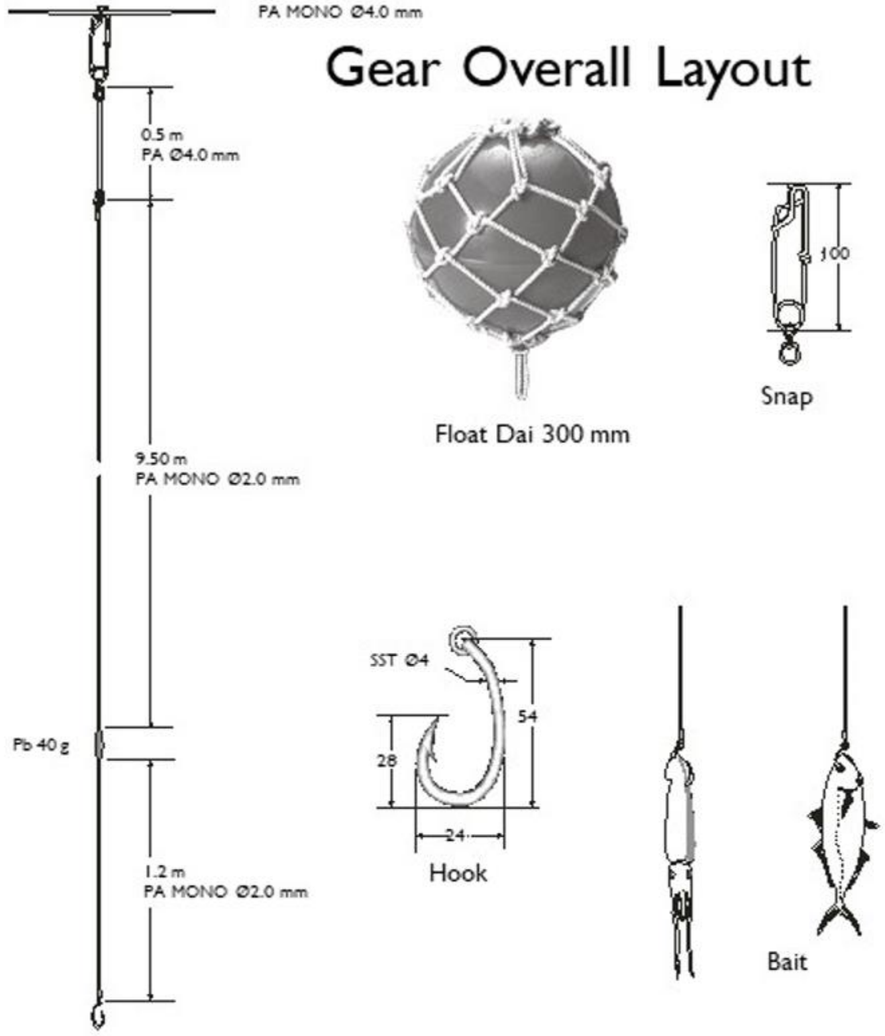
PELAGIC LONGLINE

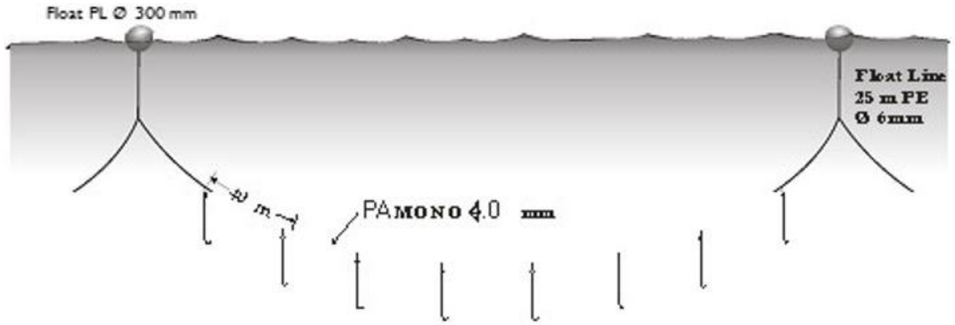


- Main line is PA MONO Ø4.0 mm
- Hook line is 10-15 m in length of PA MONO Ø2.0 mm with the sinker of Pb 40g is attached (8-15 branch lines/baskets)
- Distance between hook line is 40 m
- Float is PL Ø 300 mm
- Float line is 25 m of PE Ø6.0 mm
- The hook can be used circle hook, tuna hook, skipjack hook, tuna & swordfish hook

URL for Download: http://hdl.handle.net/20.500.12067/1469

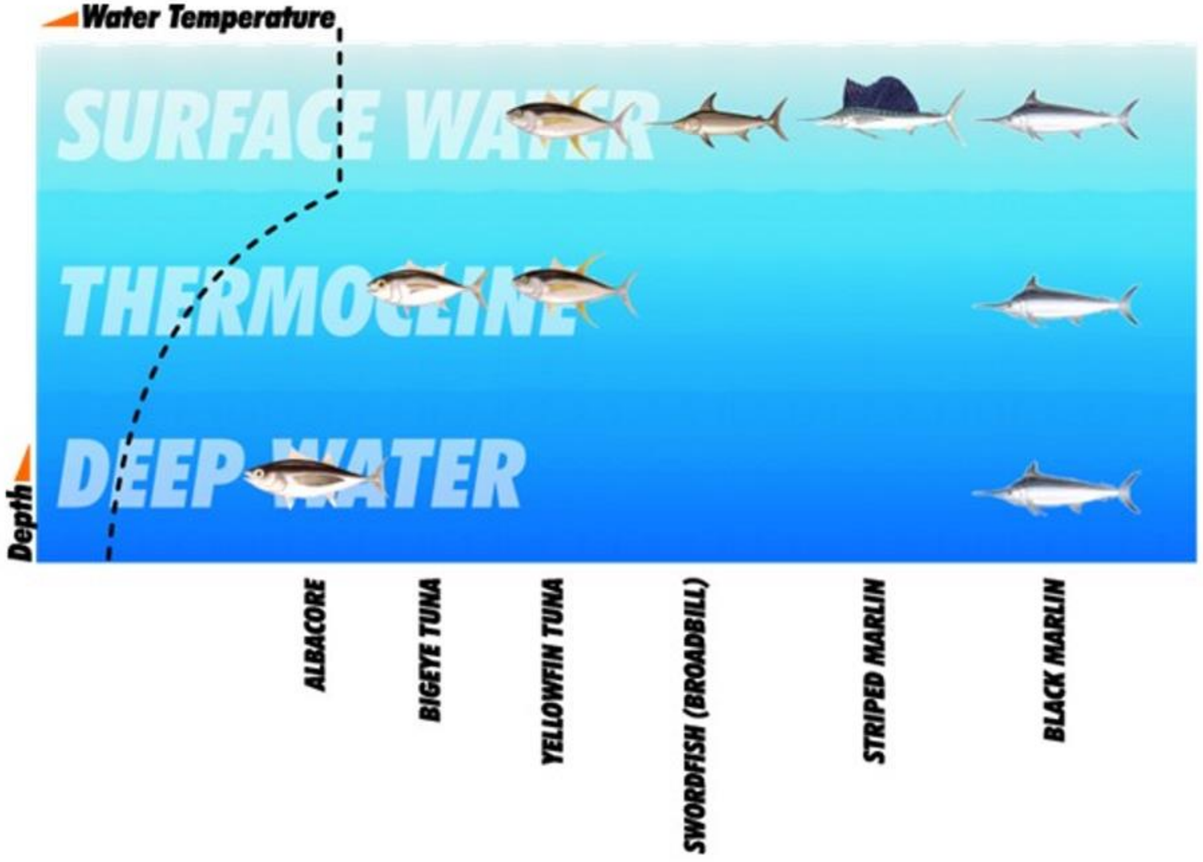
Gear Overall Layout

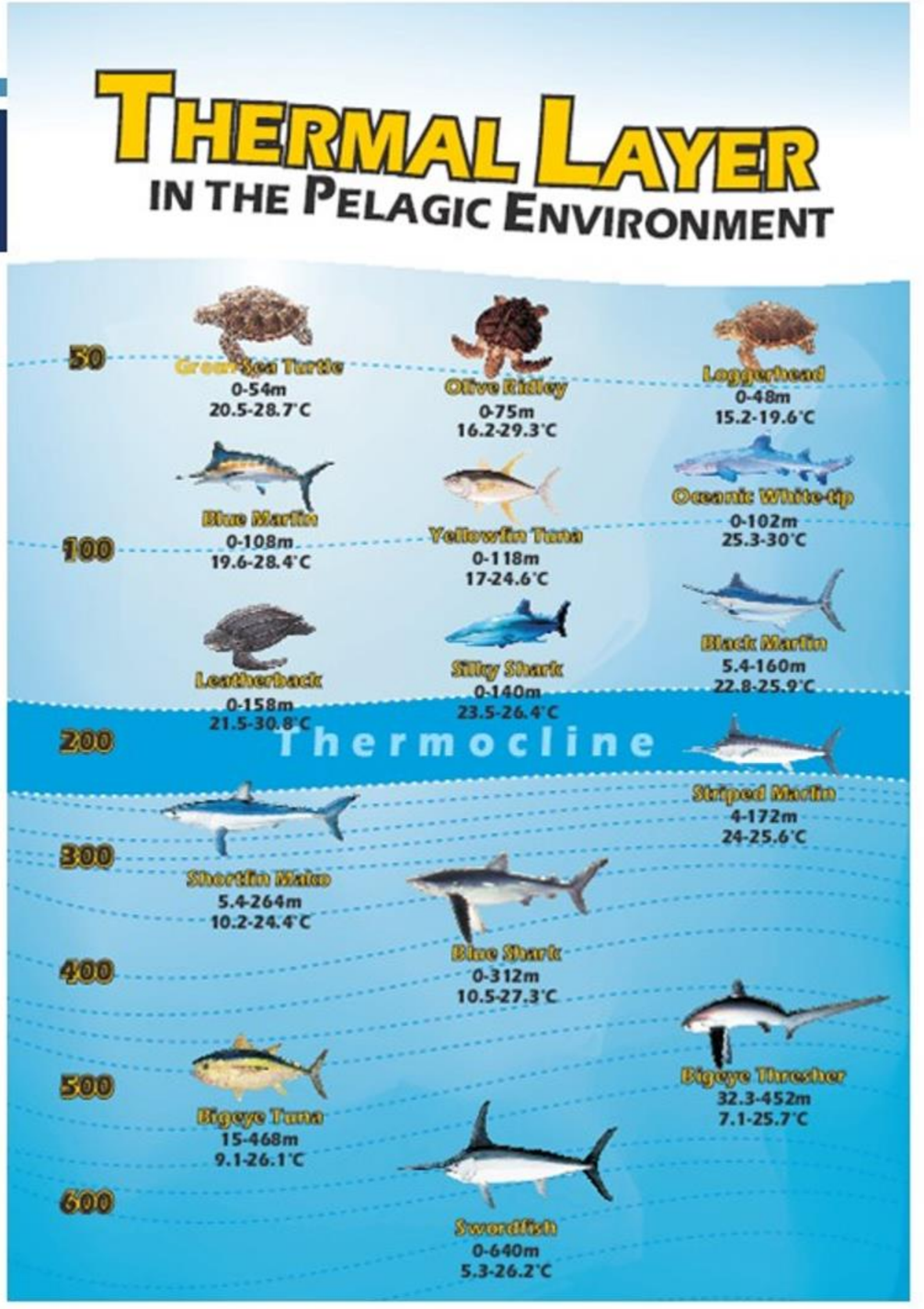




TARGET CATCH

- Swimming layer of target species
  - Sea surface temperature or thermocline layer
  - Feeding organisms





TARGET CATCH

- Main parameters for location and catching target species (Beverly et. al., 2003)

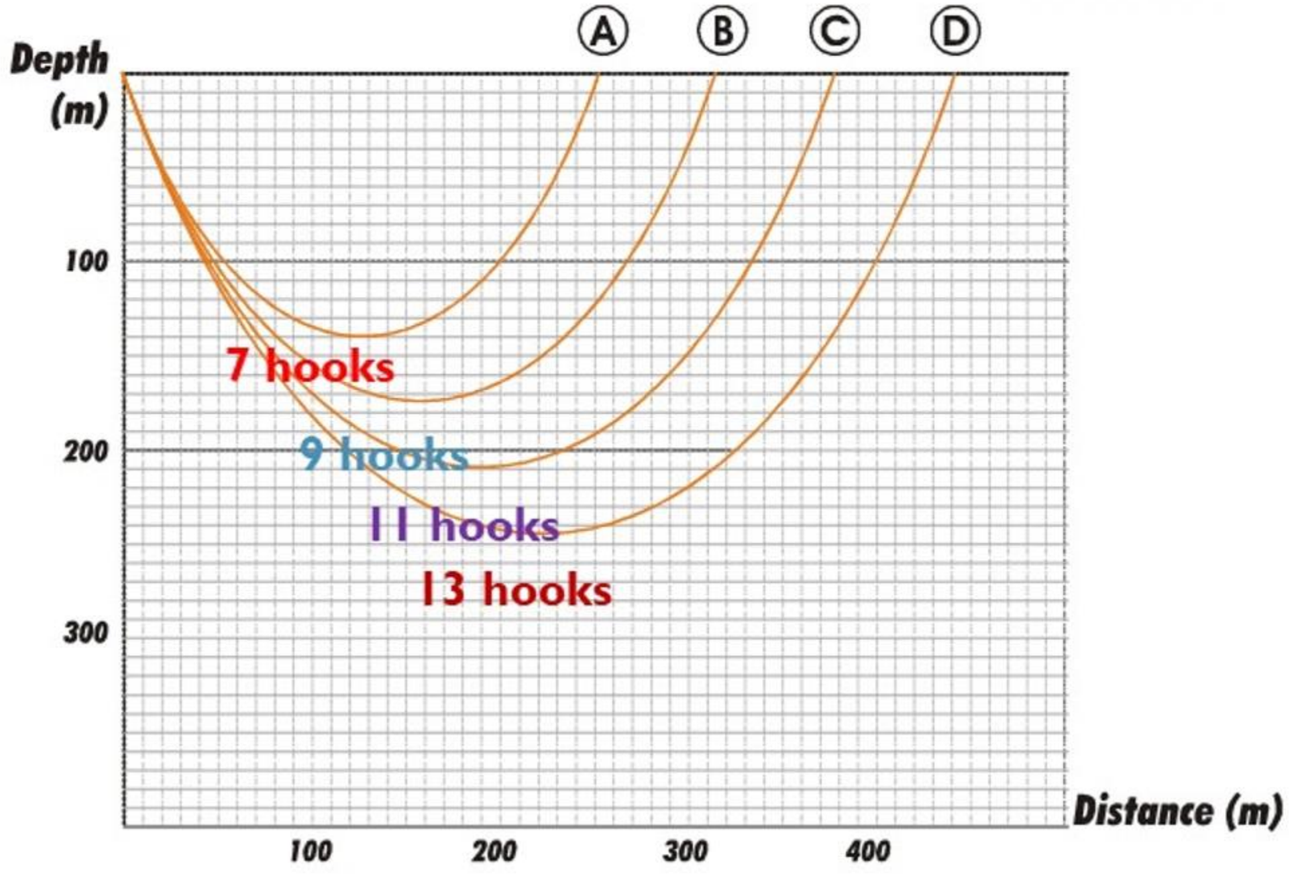
Species	Capture depth	Temp. range	Best baits	Season	Set/haul times
Bigeye tuna	50-600 m, thermocline	10-17°C	Saury, bigeye scad, pilchard, squid	Winter	0400-0800/ 1400-1800
Yellowfin tuna	50-250 m, mixed and intermediate layer	18-28°C	Saury, bigeye scad, milkfish, squid	Summer	0400-0800/ 1400-1800
Albacore tuna	50-600 m, thermocline	10-17°C	Saury, pilchard, sardine	Late summer, autumn, early winter	0400-0800/ 1400-1800
Broadbill swordfish	50-150 m, mixed and intermediate layer	18-22°C	*Illex* spp. Squid, lightsticks	Late winter and spring	1800-2000/ 0600-0800
Striped marlin	50-250 m, mixed and intermediate layer	20-23°C	Saury, bigeye scad, milkfish, squid	Late winter and spring	0400-0800/ 1400-1800

FISHING DEPTH AND HOOK DEPTH SETTING

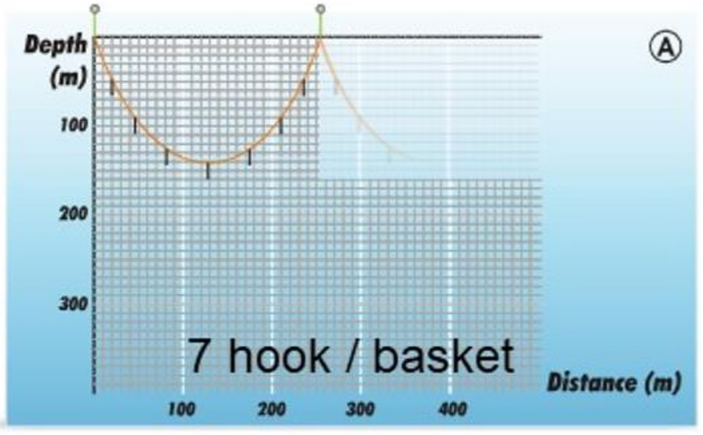
- Mainline and hook depth setting

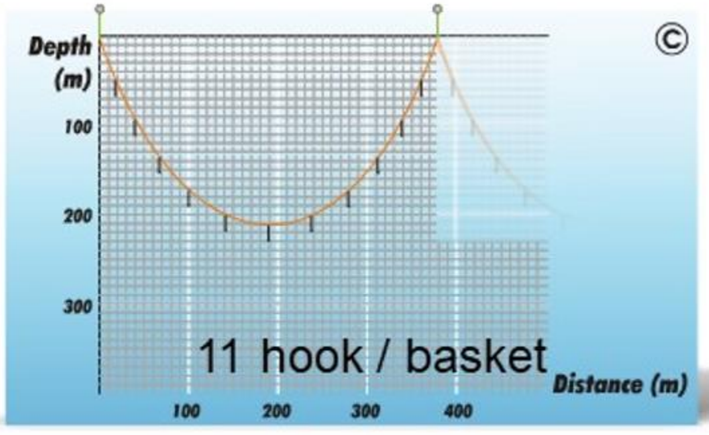
  - Depth layer of hooks in basket should cover the target species swimming layer
  - If same designed longline was deployed under the same circumstance the only thing made the hook layer different is the number of hook per basket

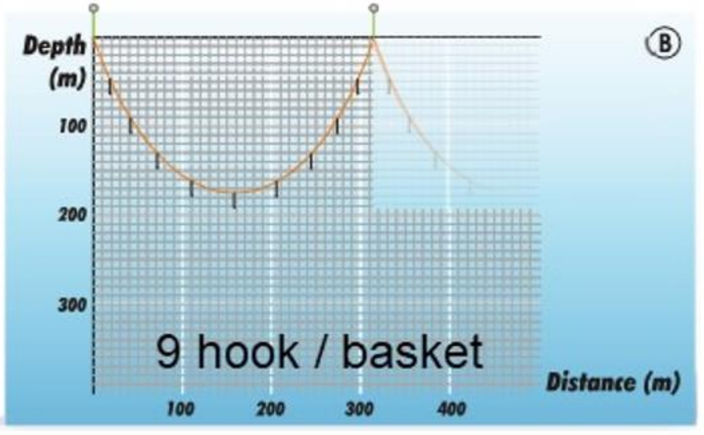
  - **Example**
    - Length of float line = 25 m.
    - Length of hook line = 15 m.
    - Hook line interval distance = 50 m.
    - Boat speed = 7 kt.
    - Shooting interval time of hook line = 9 sec.

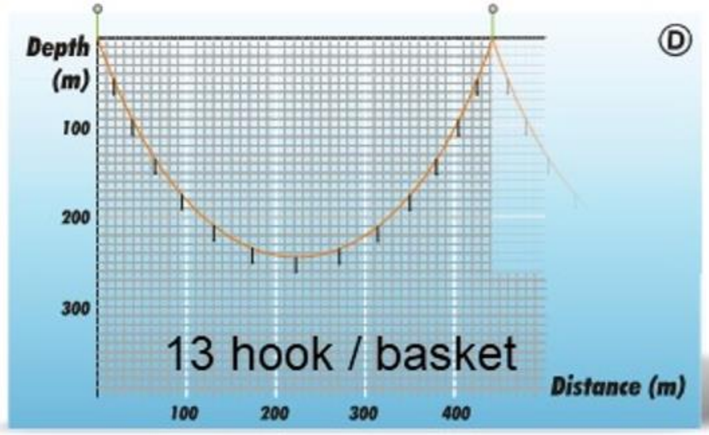


FISHING DEPTH AND HOOK DEPTH SETTING









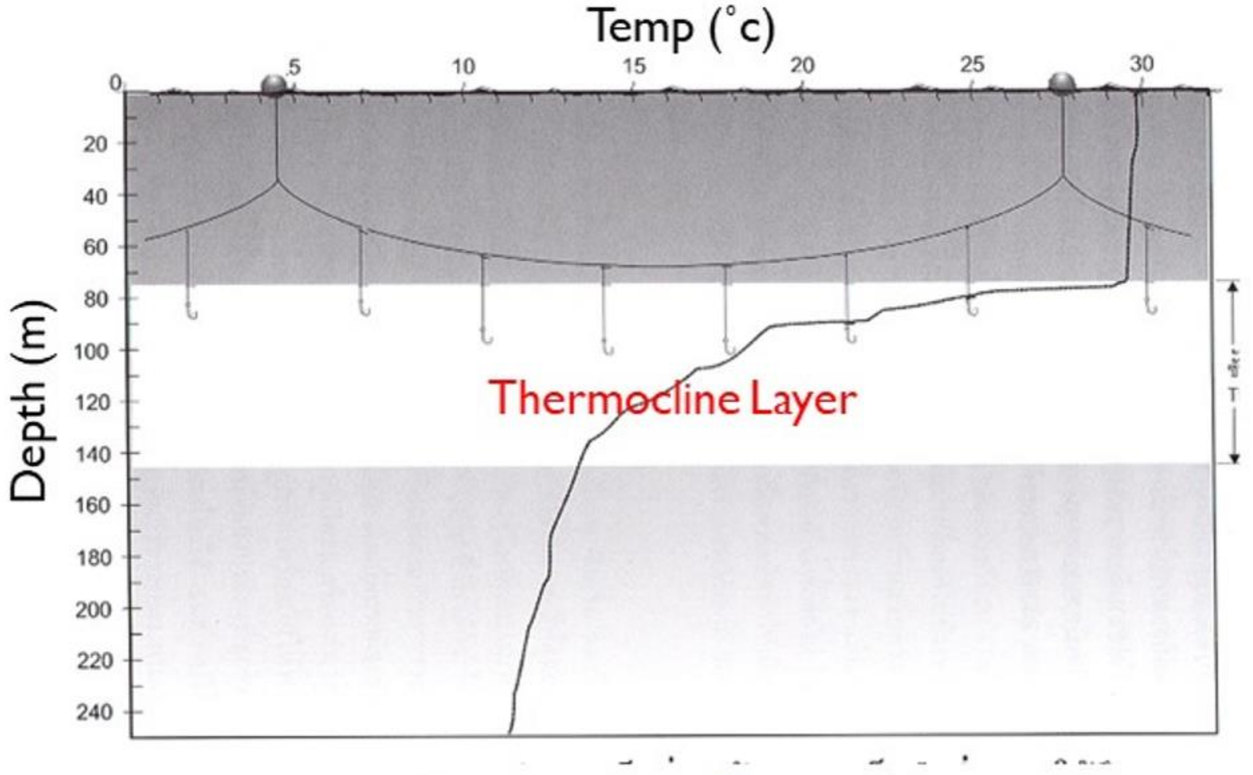
- ***Example A***, a set composed of 7 hook lines
  - Length of hook line = 15 m
  - Length of float line = 25 m
  - Hook line interval = 50 m
  - Length of mainline (50 x 8) = 400 m
  - Shrinkage = 0.63
  - Float interval distance (400 x 0.63) = 252 m
  - The sag of mainline (top to bottom) = 140.3 m
  - Therefor, the deepest hook will be at

    = Sag depth + Hook line length + Float line length

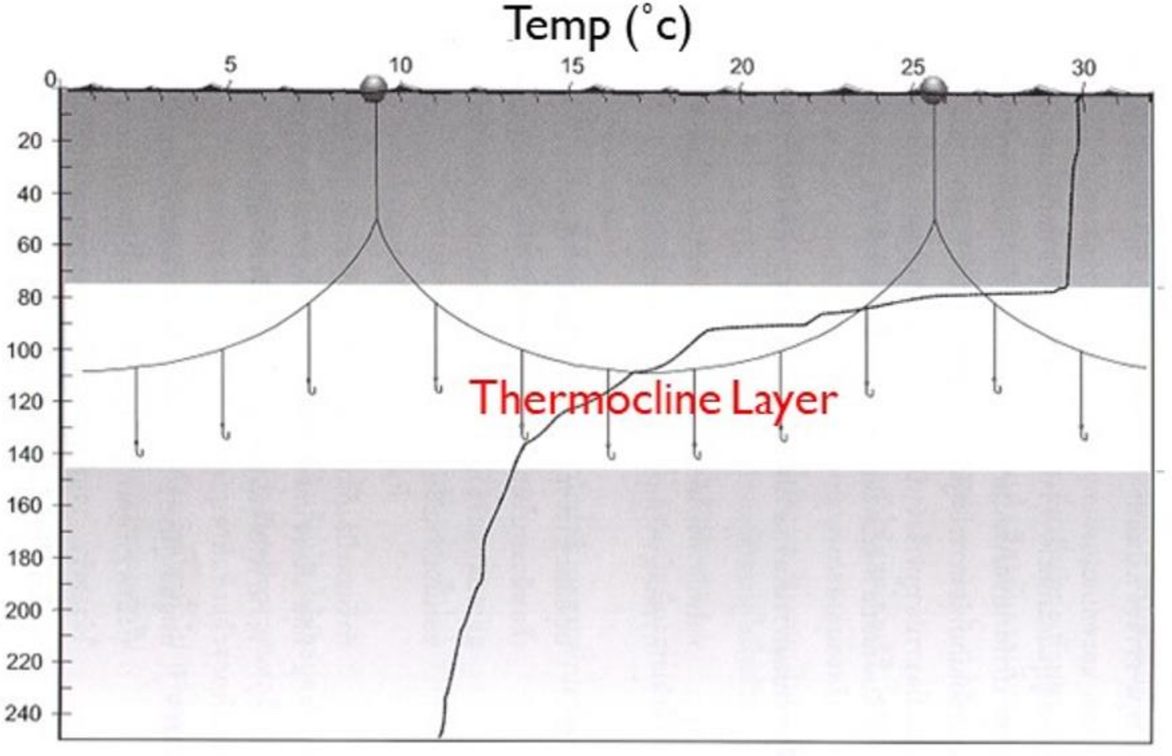
    = 140.3 + 15 + 25

    = **180.3 m**

FISHING DEPTH AND HOOK DEPTH SETTING

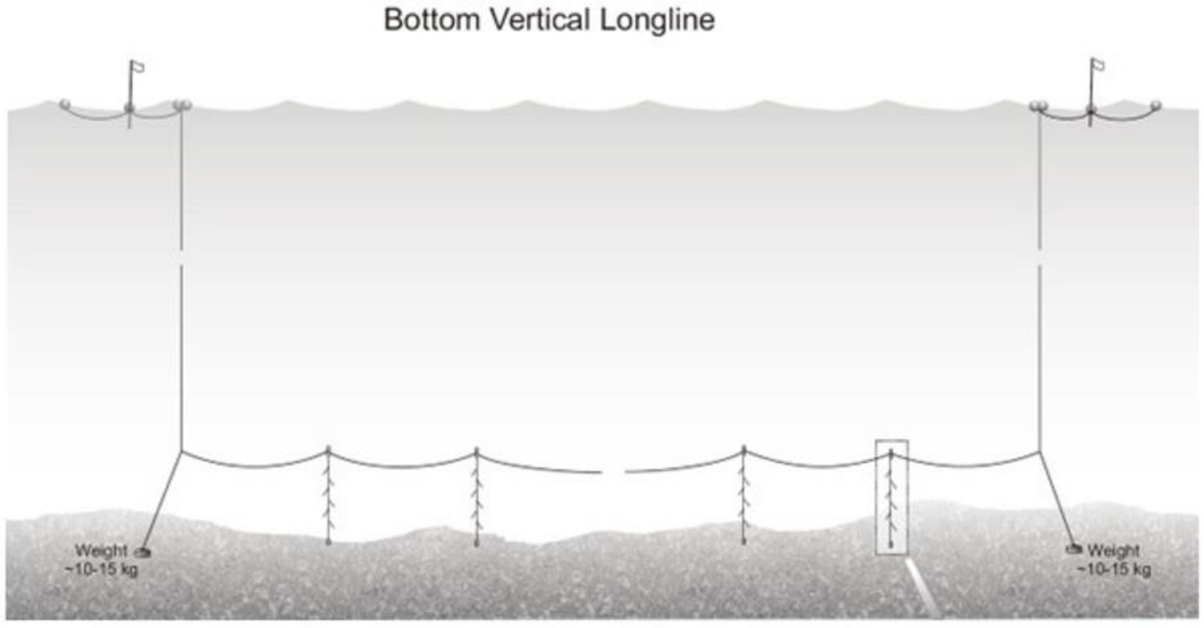


Vessel Speed : Fast
Line Speed : Slow



Vessel Speed : Slow
Line Speed : Fast

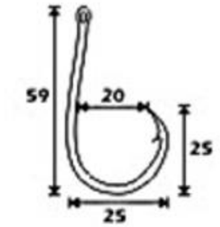
BOTTOM VERTICAL LONGLINE

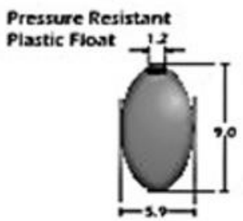


Bottom Vertical Longline is as the further refinement of bottom longline we can see a new variation called the vertical-line, in which the main line is floated about 10 meters from the sea bottom to allow the branch lines to hang down vertically to the bottom the method is an improvement on the bottom longline having the advantage of being able to be set even in areas with rocky reef bottom

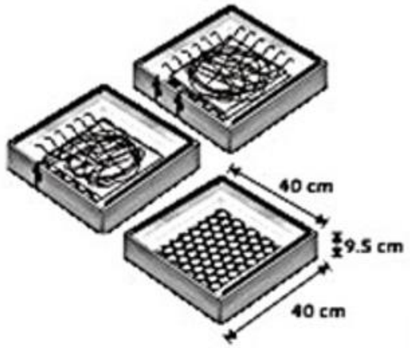
- Setting the main line close to the bottom and connecting it to branch lines have an appearance similar to vertical lines.
- The mainlines is suspended at some distance above the bottom, depending on the length of branch line.
- If a branch line get caught by some obstacle at the bottom, only that particular line get damaged or lost without a risk to the rest of the gear.

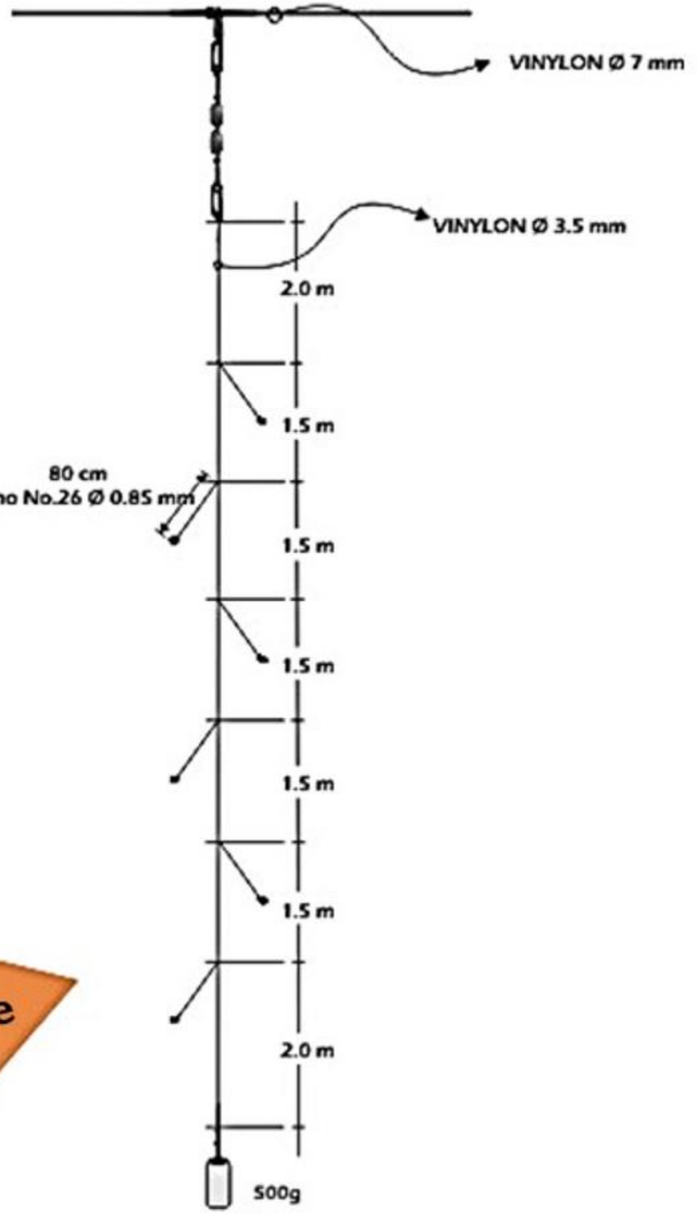
BOTTOM VERTICAL LONGLINE



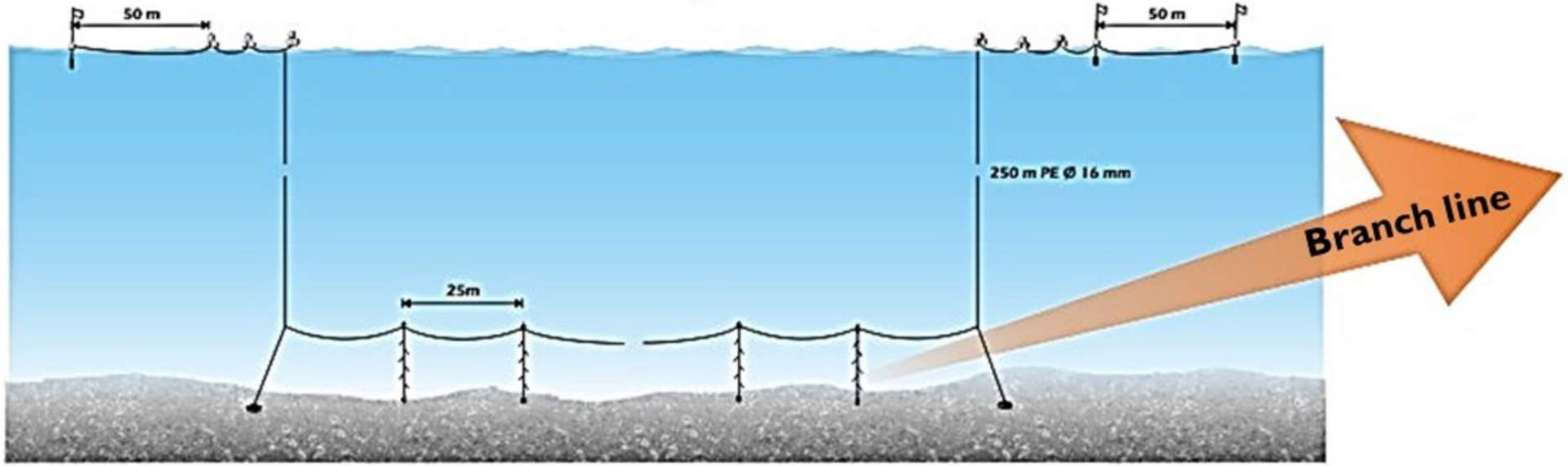


Cement sinker
500g





- Main line is Vinylon Ø7.0 mm
- Branch line is 10-15 m in length of Vinylon Ø3.5 mm attached with 500 g cement sinker at the end (1.5 m hook interval and 6 hook/branch line)
- Distance between branch line is 25 m
- Float line is 250 m of PE Ø16.0 mm
- The hook is SST Circle hook are using



STANDARD OPERATION PROCEDURES

Fishing Operation Preparation	• **PLL** : before fishing operation, oceanographic survey shall be conducted in order to examine thermocline characteristic. Master Fisherman and Researcher concerned shall adjust the hook layer follow the thermocline information. • **BVL** : fishing ground shall be surveyed by hydroacoustic equipment
Period of Operation	• Fishing operation could conduct in nighttime or daytime.
Immersion time	• **PLL** : Immersion time of the gear shall be at least 6 hours and not exceed 15 hours • **BVL** : Immersion time of the gear shall be at least 2 hours and not exceed 6 hours • Calculated from time spent on shooting divided by two plus time spent on hauling divided by two and plus waiting time (period between finished shooting to start hauling)
Depth of Operation	• **PLL** : Depth of water at least 300 meters. • **BVL** : Depth of water between 50-300 meters (Rocky bottom, hard coral ground is preferred)
Shooting Speed and casting details	• Vessel's shooting course and speed shall be able to adjust during an operation but consideration for the rule of safety • Line setter speed shall be able to adjust during an operation but consideration for the rule of safety • Length of line setting shall be recorded in the fishing log • Shooting course shall be record in unit 'degree' with three digits places

STANDARD OPERATION PROCEDURES

Information Recording	**Speed measurement:** Shooting speed shall be recorded from average speed over ground during shooting. Unit of speed shall be measured by unit of Knot (nautical mile per hour) **Start fishing time:** when any part of the gear reaches the sea **Finish fishing time:** the time that the last part of the gear shot overboard **Start hauling time:** the time when any part of the gear hauled up on board **Finish hauling time:** the time when all part of the gear was hauled on board **Fishing position:** fishing position shall be recorded by using the GPS or an equally accurate navigation system and recording in terms of Latitude and Longitude **Start fishing position:** the position that the gear reaches the sea **Finish fishing position:** the position that the last part of the gear shot overboard **Start hauling position:** the position that any part of the gear is hauled onboard **Finish hauling position:** the position that all part of the gear are onboard ***Set bottom longline and Bottom vertical longline is a kind of stationary fishing gear, so that information of start hauling position and finish hauling position are not required***
Monitoring devices	• Time-Depth Recorder (TDR) with neutralized buoyancy should be attached to the mainline with rope as the same length of hook line in selected position to detect actual depth of the hook ***No monitoring devices are required to attach with Set bottom longline and Bottom vertical longline***
Gear malfunction	• The malfunction or lost of gear, mainline usually found entangled during hauling operation. Details should be recorded numbers of branch line entangled and record the malfunction of the operation or gear into the fishing log sheet.

STANDARD OPERATION PROCEDURES

Catch sampling and recording	• Fish hauled on board shall be individually classified and measured (recommended not to sampling but if catches of each species is more than 100 samples, samples 100 fish for the measurement) • Catch data should included order of branch line and hook which caught that fish, in the consequence of hook line on the branch line. (the first hook count from the top to the bottom)
Samples measurement	• Fish hauled on board shall be identified to species. Common name and Scientific name shall be recorded in logsheet. • Fish hauled on board shall be measured the total length, and girth length in the unit of centimeter(cm) with one decimal place. • Fish hauled on board must be weighted in the unit of Kilogram(kg) with one decimal place. • Sampling of stomach content of each specie hauled on board shall be determined and recorded • Fish, which fall off the hook during hauling, shall be counted in the hook rate if researcher or crew could identify its specie. Weight estimation shall be accepted if possible. • Other data (if any) should be recorded such as position of hooking, condition of catch (dead, alive or bitten by other fish) and etc.

STANDARD OPERATION PROCEDURES (FISHING LOGSHEET)

PELAGIC LONGLINE FISHING LOGSHEET
Operation No. 7

Recorded by O.Sukanya
Certified by

Cruise no: 71-1/2004		Name of Vessel				Air temp:	32.8	° C
Survey station No: 7		M.V.SEAFDEC				Air pressure:	1010	mbar
Date: 22-Nov-04						Humidity :	-	%
Moon age: 10 phase 82		Start shooting 22/11/04		Finish shooting 22/11/04		Water		
Wind		Time	1655	Time	1800	Surface temp:	27.3	°C
Spd (kt)	Direction	Lat.	12_40.78 N	Lat.	12_34.29 N	100 m. temp :	20.9	°C
6.2	NE 60	Long.	96_12.03 E	Long.	96_05.11 E	Thermocline :	30-200 m.	
Weather cond: BC		Start hauling 23/11/04		Finish hauling 23/11/04		Current		
Sea condition: Slight		Time	0605	Time	0905	Depth	Spd (kt)	Direction
Gear		Lat.	12_30.93 N	Lat.	12_36.99 N	10	0.1	NW/N 330
No. hook/basket: 10		Long.	96_02.54 E	Long.	96_07.82 E	50	0.3	SE/E 127
Total hook no: 458		Memorandum: 1) Speed of vessel: 8 knots				100	0.4	NE/N 41
Immersion time: 13.08 Hrs.		2) Setting distance: 9.3 nm course 226 °				Total catch in number: 16		
Type of bait: Scad		3) Mainline paid out: 20,272 m (Setting machine)				Total catch in weight: 673.5 kg.		
		4) Sea depth: 2,105 m(chart)						
		5) Depth of hook: 168 m						

No.	Species	Length (cm)	Weight (kg)	Remarks
1	*Xiphias gladius*	202	23.00	FL = 189
				SL = 175
				BL = 130
				EFL = 192
				HL = 39
				BD = 26
				Girth = 67
				Sex = Male

BOTTOM VERTICAL LONGLINE FISHING LOGSHEET
Operation No.

Recorded by
Certified by

Cruise No:		Name of Vessel				Air temp:		° C	
Survey station No:		M.V.SEAFDEC 2				Air pressure:		mbar	
Date:						Humidity :		%	
Moon age:		Start shooting		Finish shooting		Water			
Wind		Time		Time		Surface		° C	
Spd (kt)	Direction	Latitude		Latitude		Bottom		°C	
		Longitud		Longitud		Thermoclin			
Weather cond:		Start hauling		Finish hauling		Current			
Sea condition: Slight		Time		Time		Depth	Spd	Directio	
Gear		Latitude		Latitude		10			
Total hook no:		Longitud		Longitud		50			
No. hook/branch line:		Memorandum:				100			
Immersion time:		Sea depth :				Total catch in number:			
		Total distance	nm	Setting course					
Type of bait:		Shooting speed				Total catch in weight:			

No.	Species	Number	Weight (kg)	Remarks

STANDARD OPERATION PROCEDURES

INDICATOR OF ABUNDANCE

- Hook rate shall be calculated by individual number of target fish caught per 1,000 hooks deployed. (Concerned researcher must specify 'target fish' and 'non-target fish' in research proposal)
- Number of hook to use in hook rate calculation shall be counted from the hook hauled on board.

SUMMARY

Types of Gear	Area of Operation	Target Catch
1. Set Bottom Longline	- Mainline are fixed along the seafloor using anchors. - Operate close to the bottom for demersal fish	- Sea beam, sea bass, groupers, sharks, and snapper etc.
2. Drifting Horizontal Pelagic Longline	- Not anchored but drifts freely in the sea - Operated close to the surface in middle water layers for pelagic fishes	- Tuna, sword fish, marlin, billfish, mackerel and shark
3. Vertical Longline	- To catch fish with wide vertical distribution in deep sea and shallow waters in areas where FADs are deployed	- Tunas and other pelagic fish living around FADs
4. Bottom Vertical Longline	- The main line is floated from the sea bottom to allow branch lines hang down vertically - Having advantage to be set even in rocky, reef bottom area	- The demersal fish and the fish which dwell near or at the bottom such as snapper, groupers, sea beam, and sharks etc.

THANK YOU