

Identification of Fishing Gears and Operation

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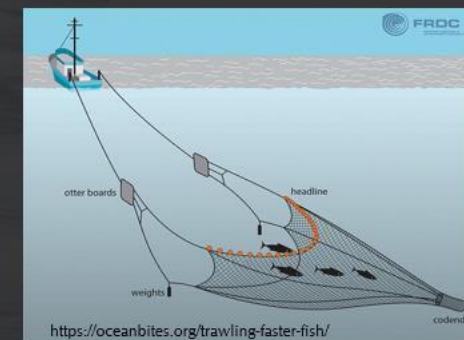
Gillnet Fishing

Trawl Fishing



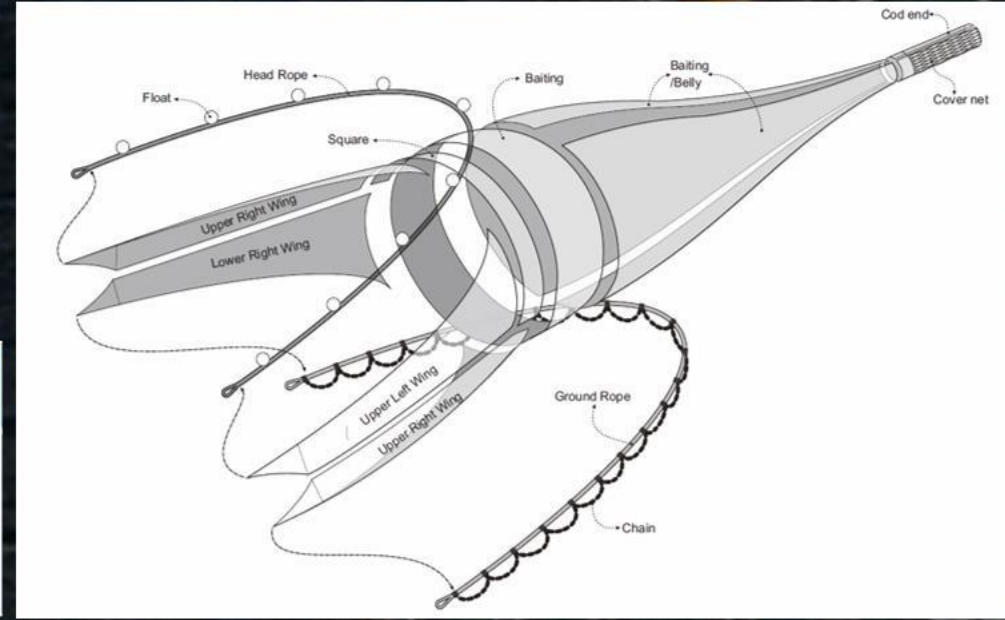
Definition of Trawl Net

- 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)

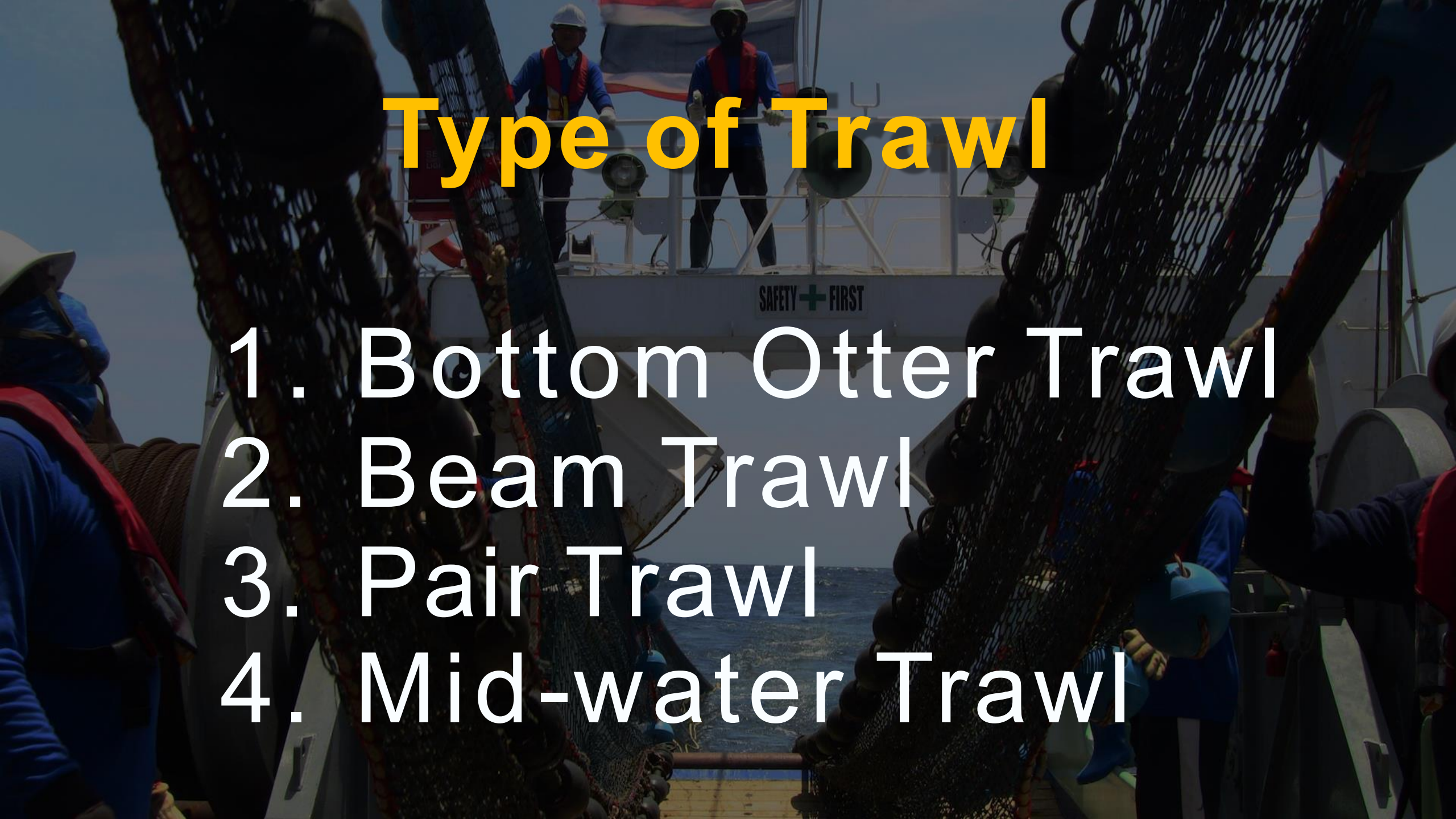


Trawl Net Anatomy

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 than lower part, thus creating an 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.

The background image shows the deck of a fishing vessel. Two crew members in blue shirts and red life vests are visible on an upper platform. Large fishing nets, likely otter trawls, are being hoisted by the vessel's machinery. The nets are dark and feature numerous floats. A sign on the vessel's railing reads "SAFETY + FIRST". The overall scene is set against a clear sky and the ocean.

Type of Trawl

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

1. Bottom Otter Trawl

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:

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.
 - 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.



2. Beam Trawl

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.



Beam Trawl Operation



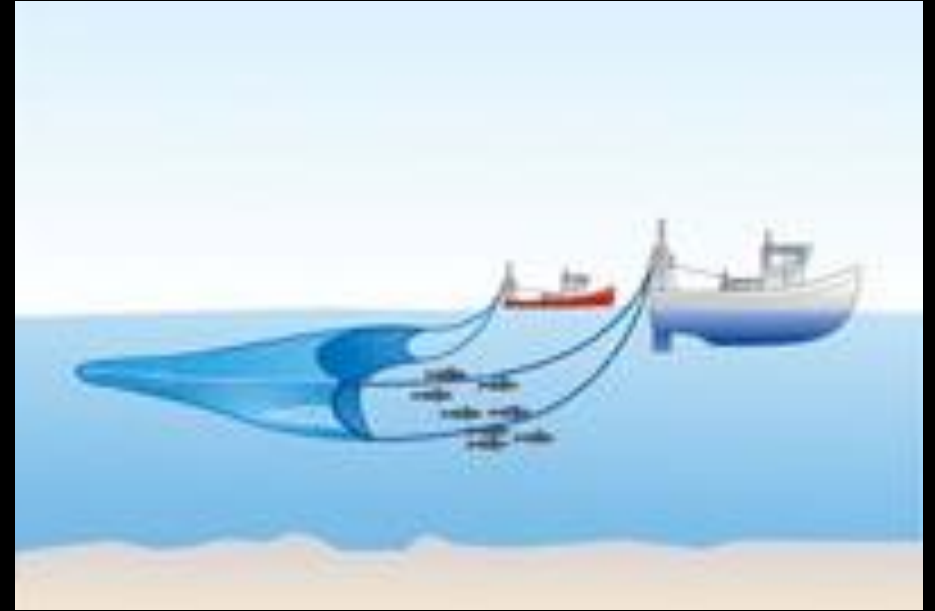
- Day and night times operation, 7-8 days/trip
- 7.5m beam, 2-8 trawl nets, 1 or 2 beams,
- 2-10 sinkers (ski 20-40kgs/each)
- 3.5-4.0 kts. towing speed for 1-1.5 hrs. duration
- 8-10 operations/day
- 30 min sorting, resting for 1 hr.
- Cruising speed 8 kts. for 2 hrs.
- 15-20 m depth, targeting for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

3. Pair Trawl

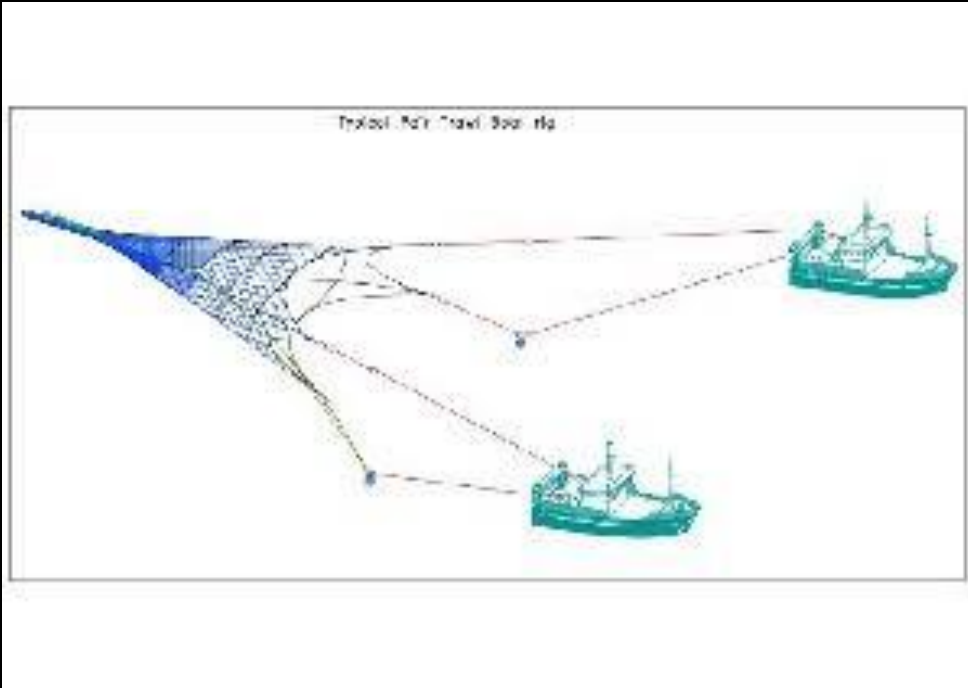
Key Features of Pair Trawl Fishing:

- **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.

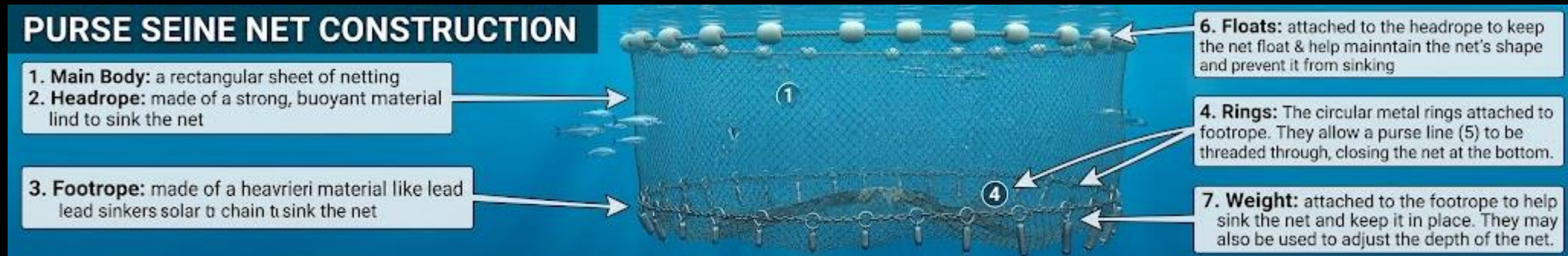
Purse Seine Fishing



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.



Purse Seine Fishing Operation

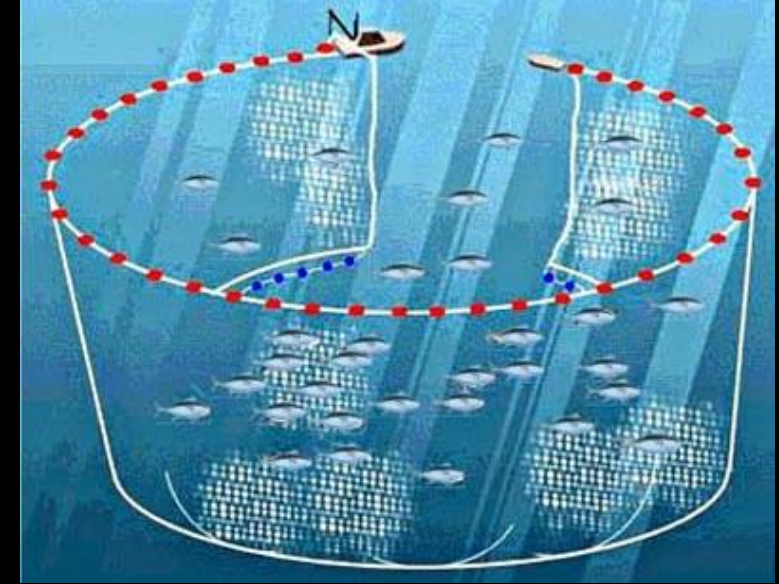
Purse seine fishing is a method used to capture large schools of fish. The process involves several steps:

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 board.





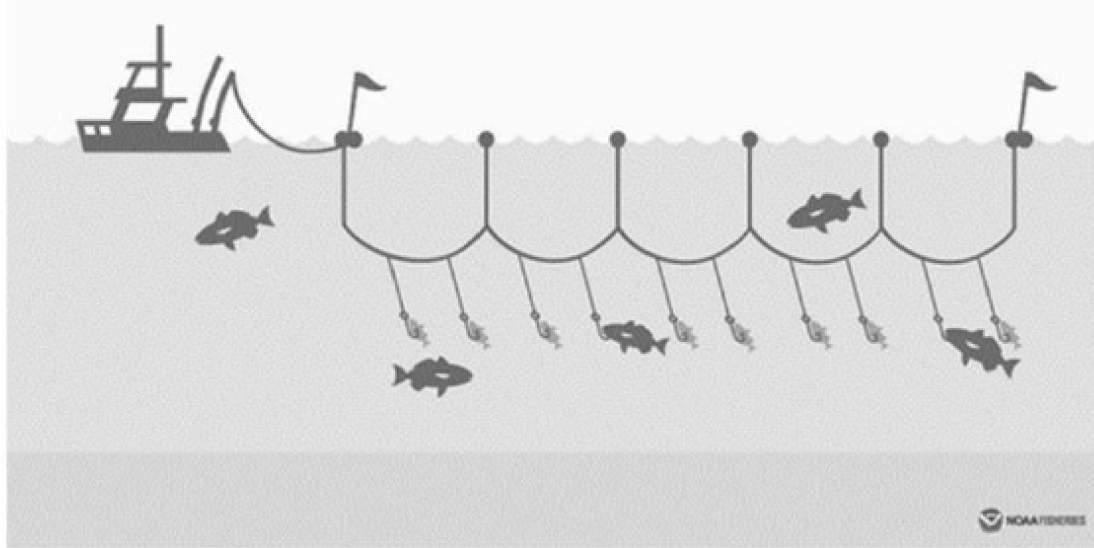
Longline Fishing



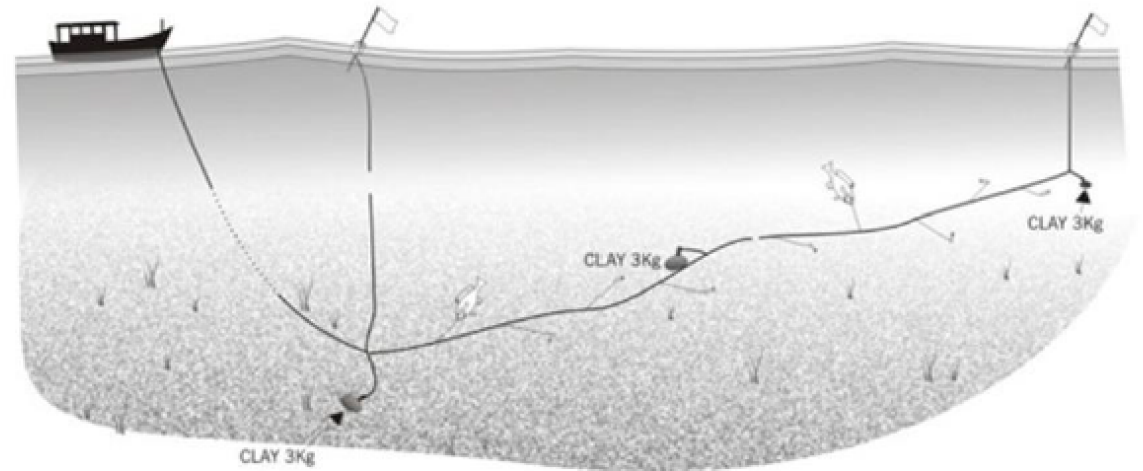
Description of Longline

- One of the most fuel-efficient catching method
- It is used to capture both demersal and pelagic fishes
- Use a long mainline are attached hundreds or thousand of branch lines
- 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
- The size of fish and the species caught is determined by hook size and the type of bait used

LONGLINE CAN BE DIVIDED INTO TWO BASIC TYPE (Masthawe et al., 1989)

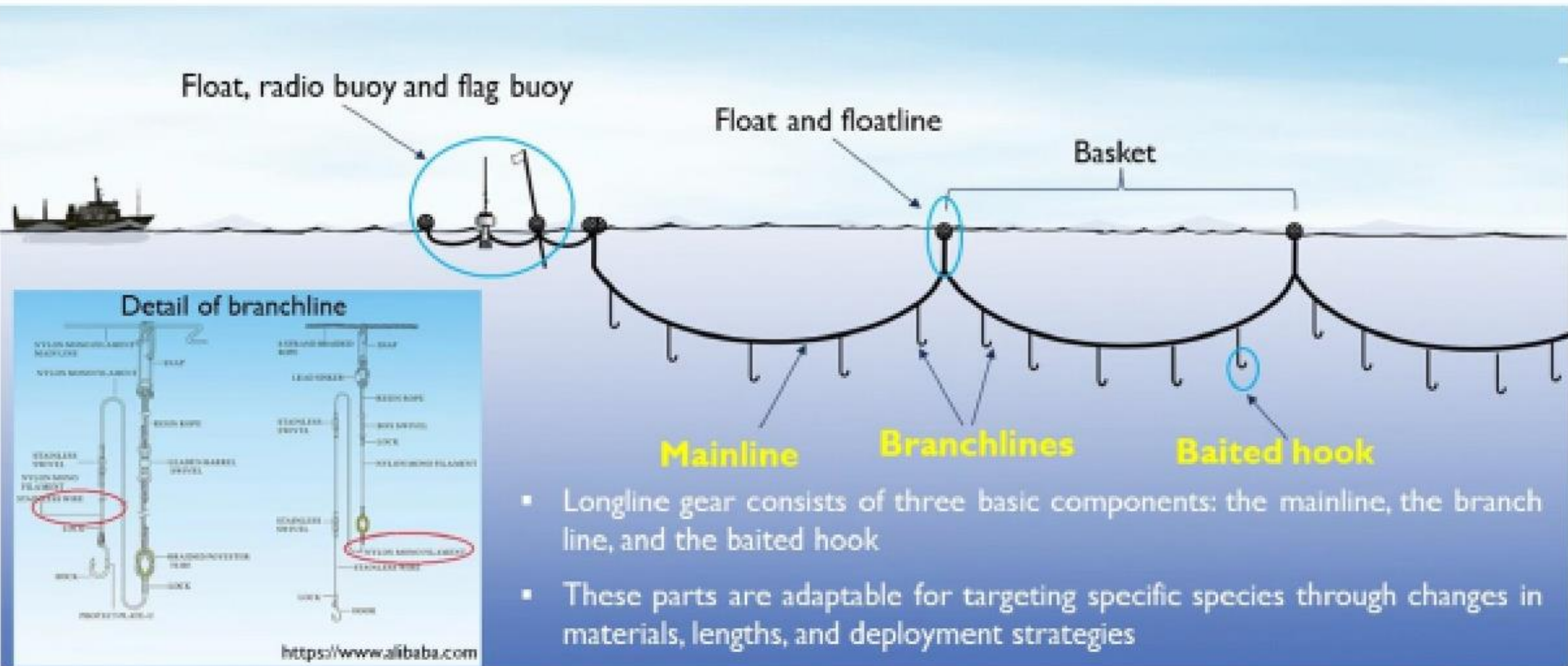


Drift longline : which uses floats to hang the main line at the desired depth in the surface or middle-depth water. This is a longline use for catching fish that migrate in the surface waters of slightly below, which the main catch consisting of tuna, skipjack, marlin, shark, etc. This category also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

BASIC CONSTRUCTION OF LONGLINE



BOTTOM VERTICAL LONGLINE

Bottom Vertical Longline

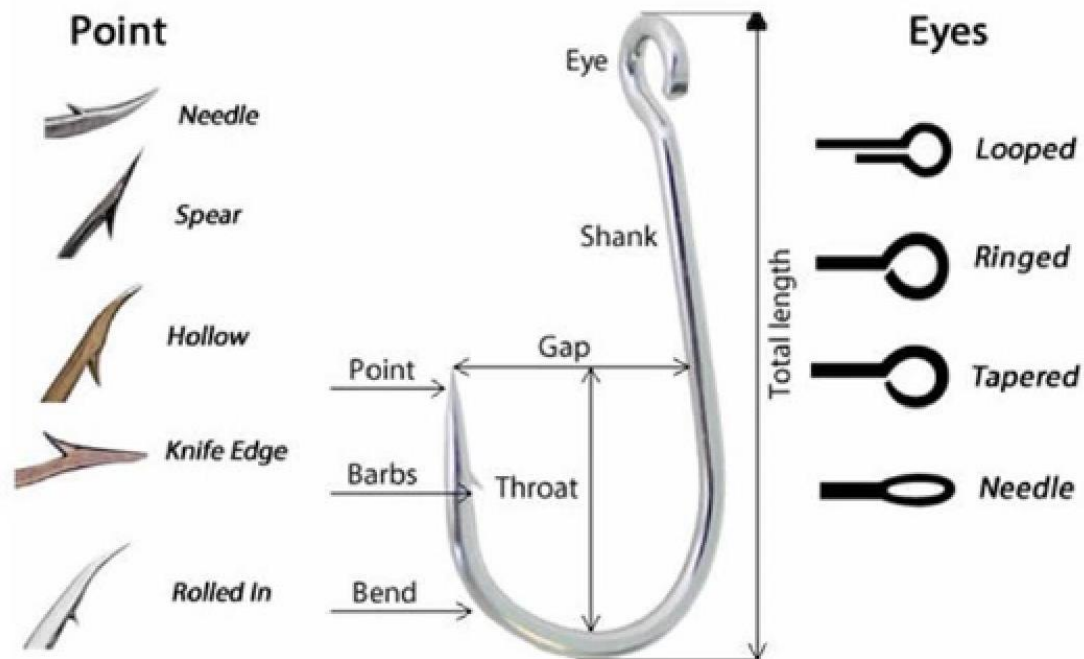


Bottom Vertical Longline is as the further refinement of bottom longline we can see a new variation called the vertical-line, in which the main line is floated about 10 meters from the sea bottom to allow the branch lines to hang down vertically to the bottom the method is an improvement on the bottom 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.

HOOKS USED IN LONGLINE FISHING

■ The anatomy of a fishing hook



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

■ Different types of hook



Gillnet Fishing



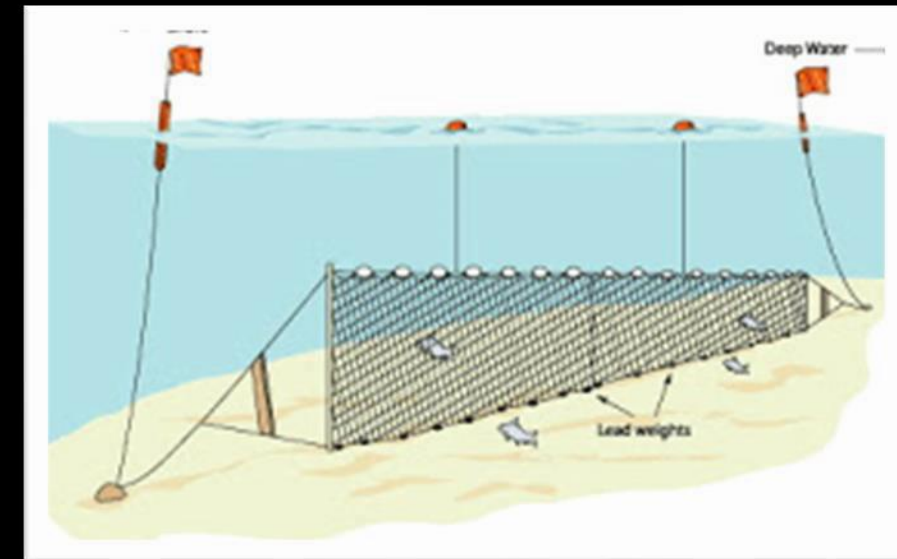
Definition of Gillnet

- Ref: Definition and classification of fishing gear categories, FAO Fisheries Technical Paper No. 222. Rev 1, 1990)
 - A net wall, with its low end weighted by sinkers, upper end suspended by floats
 - Set transversely to the path of migrating fish Fish are caught by trying to make their way through the net wall
 - Fish are gilled, entangled or enmeshed in the netting

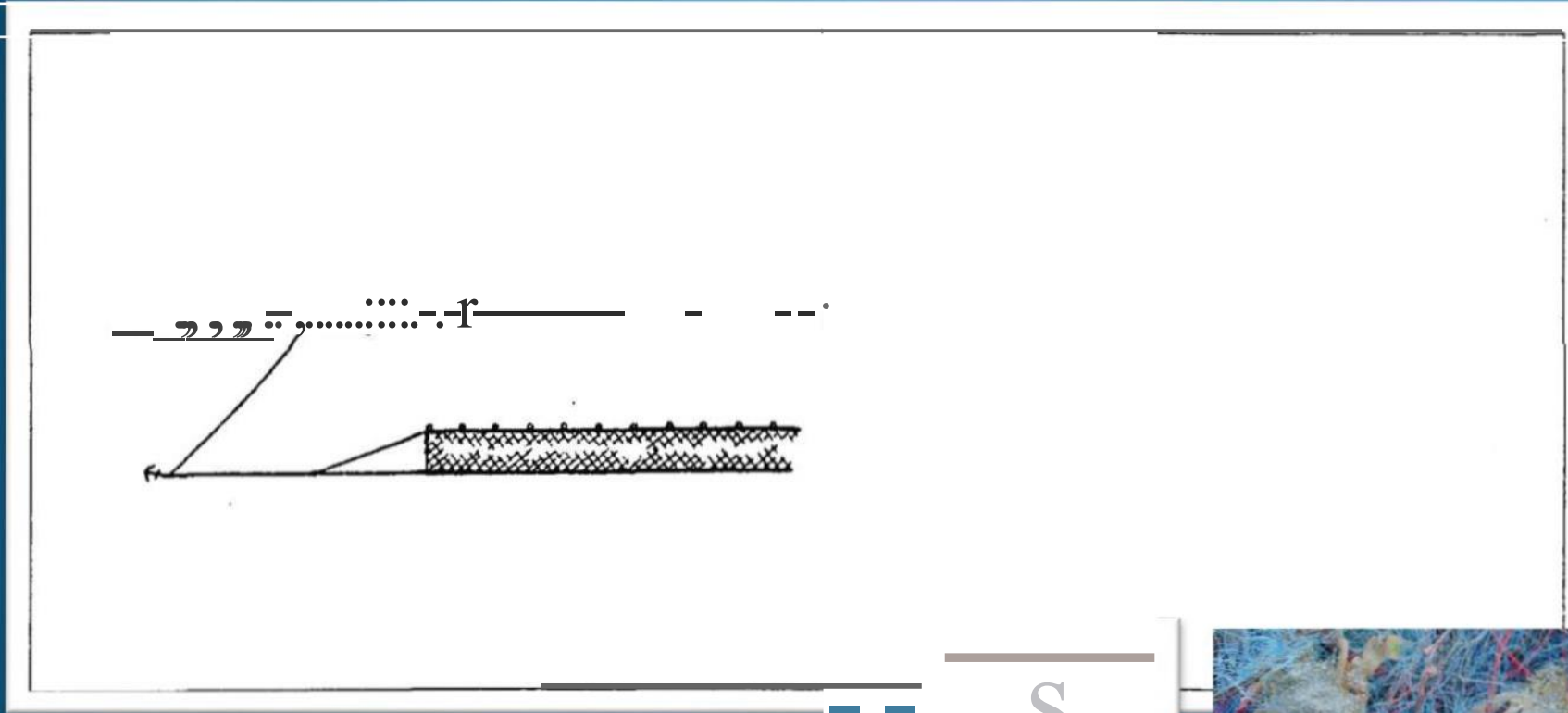


Classification

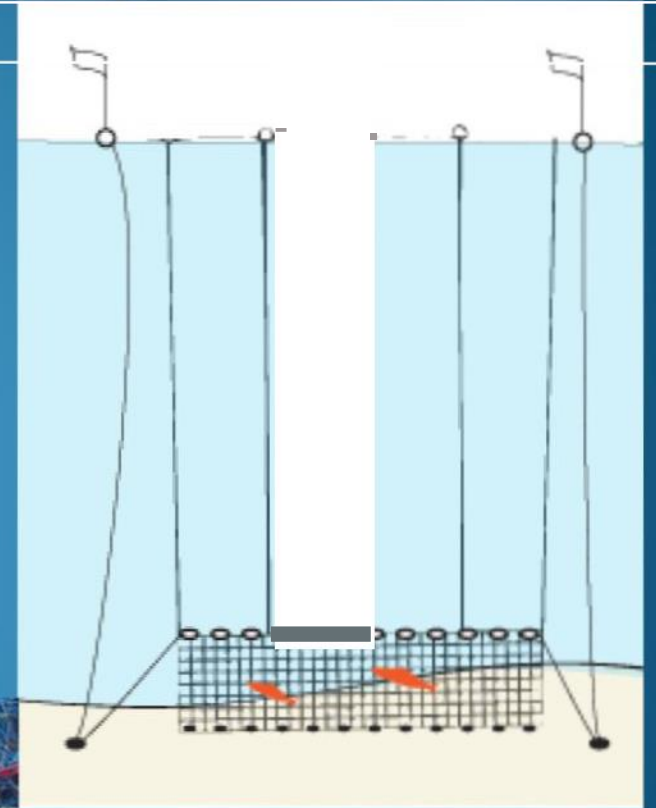
- Set Gillnets (Anchored)
- Drifting Gillnets (Driftnets)
- Encircling Gillnets
- Fixed Gillnets (on Stakes)
- Trammel Nets
- Combined Gillnets — Trammel Nets



1. Set Gillnets (Anchored)

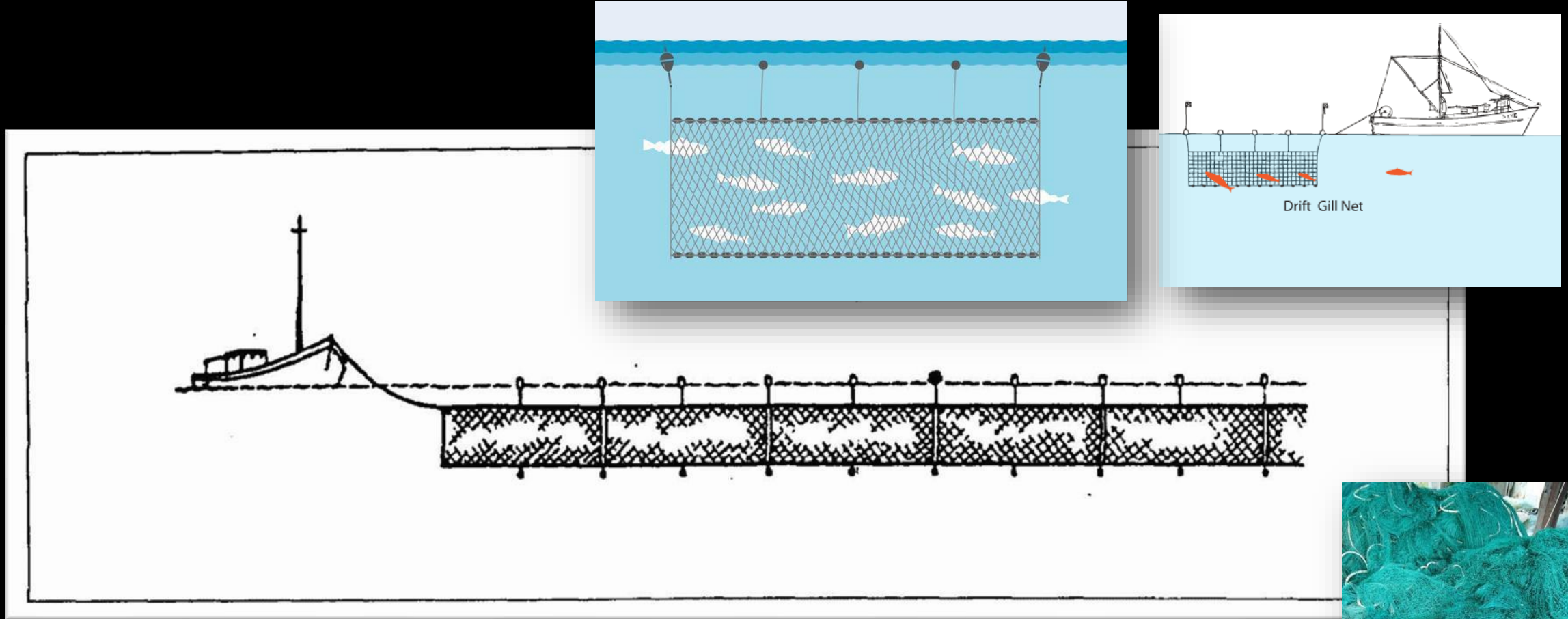


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- ❑ Nets anchored to the bottom or certain distance by anchors/heavy objects

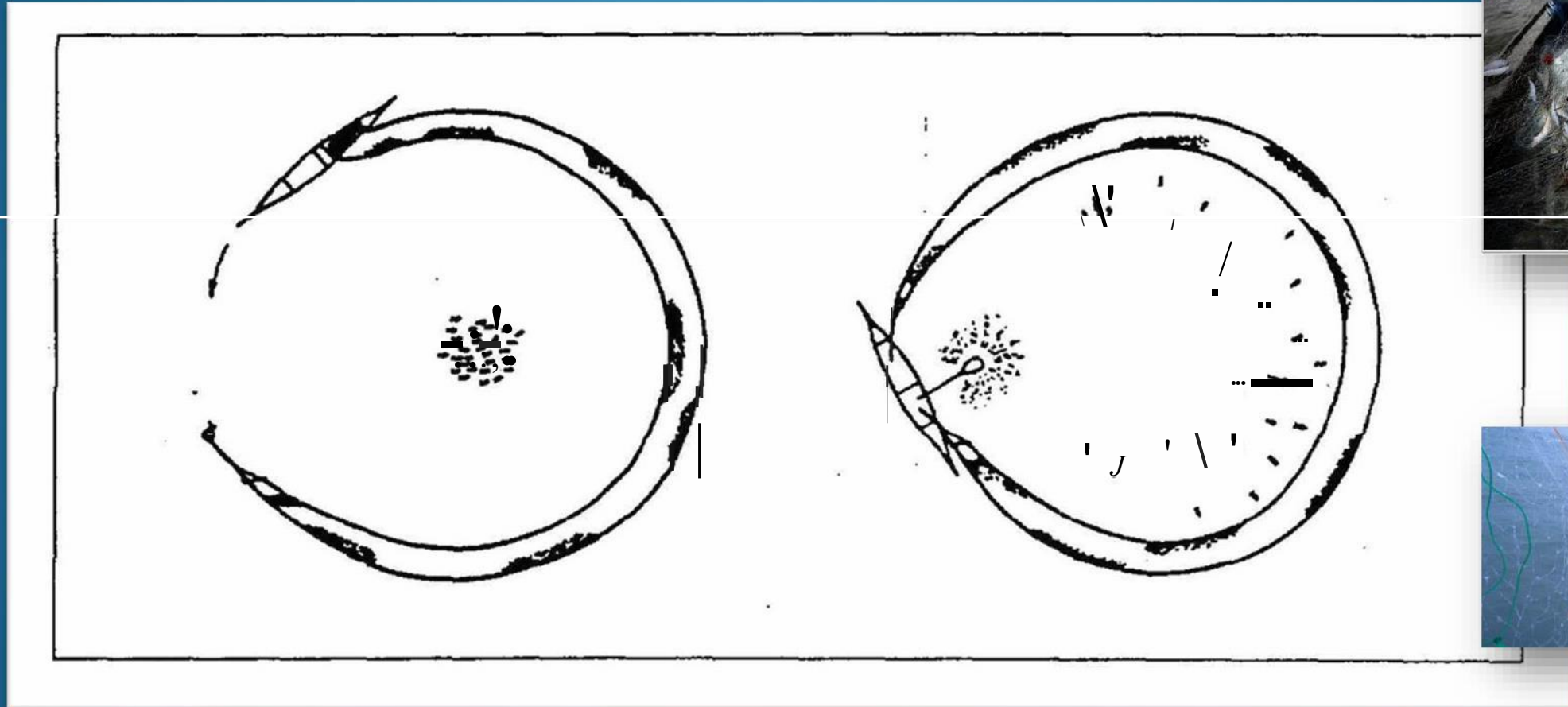
2. Drifting Gillnets (Driftnets)



- ❑ Nets are maintained near the surface by floats,
- ❑ Nets drift freely with the current or with the boat

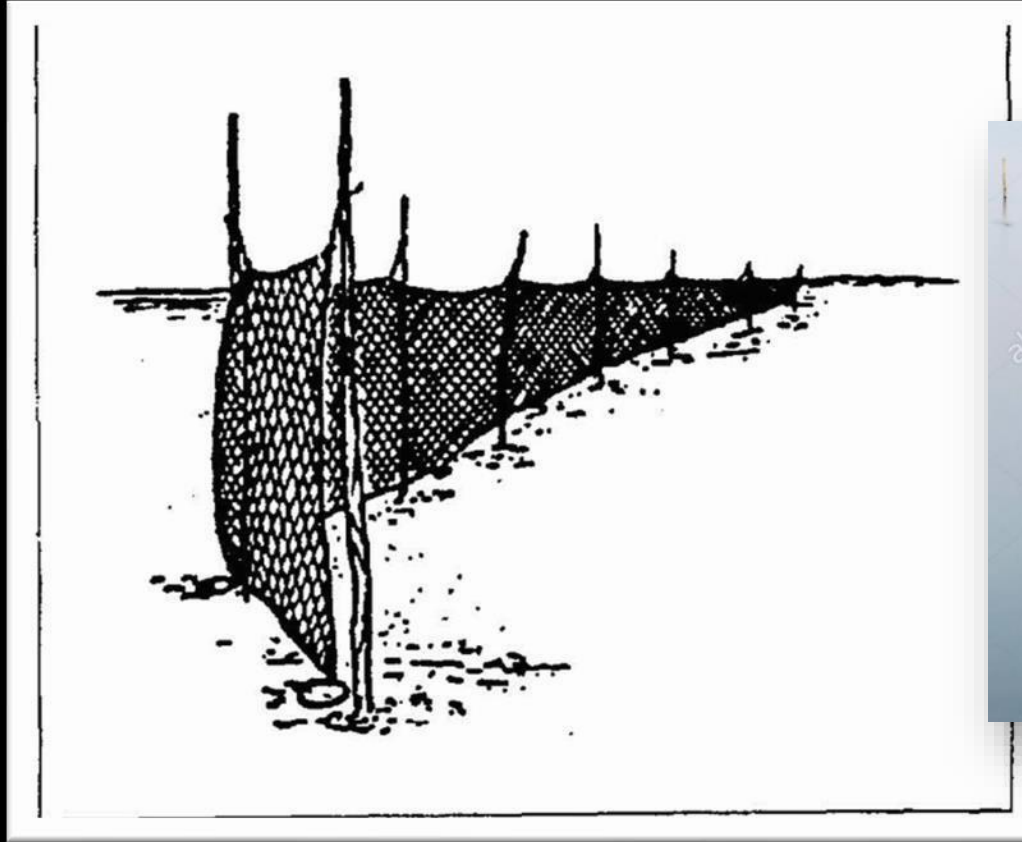


3. Encircling gillnets



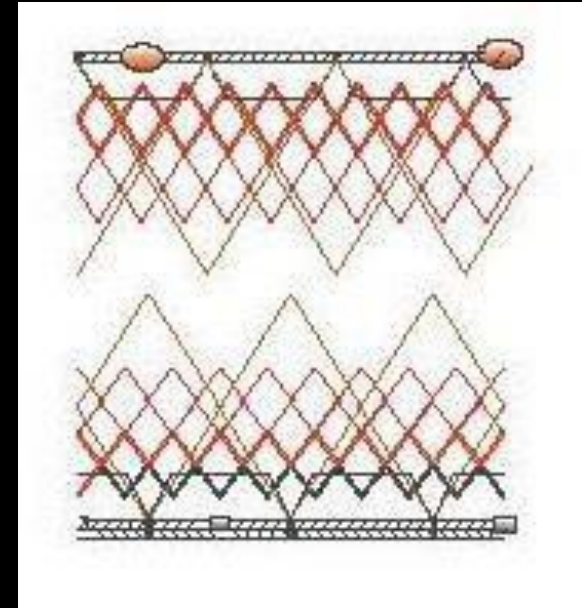
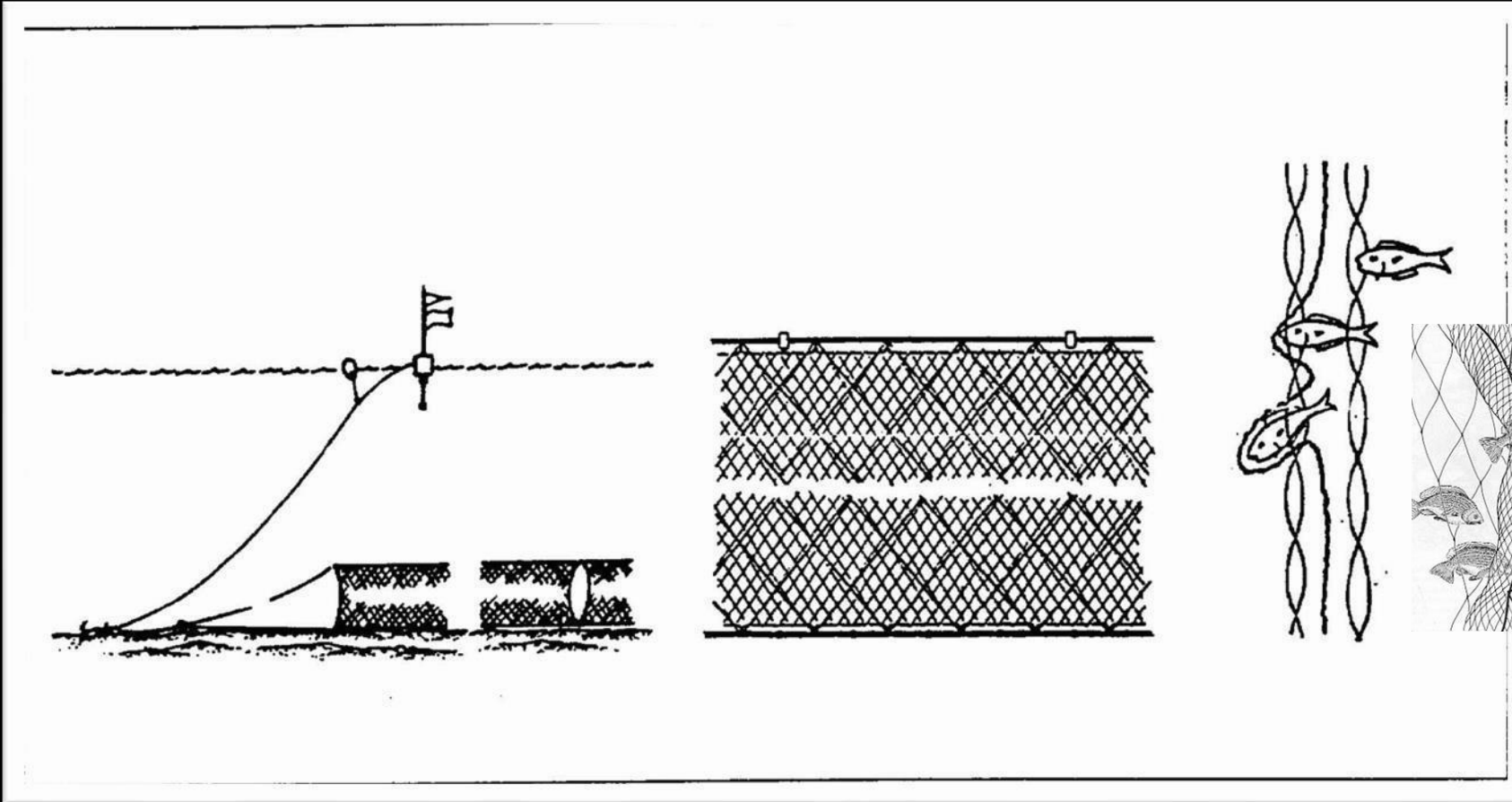
- ❑ Generally used in shallow water with float line at the surface
- ❑ Fish are encircled by net, and noise, other means are used to force them to gill/entangle

4. Fixed Gillnets (on Stakes)



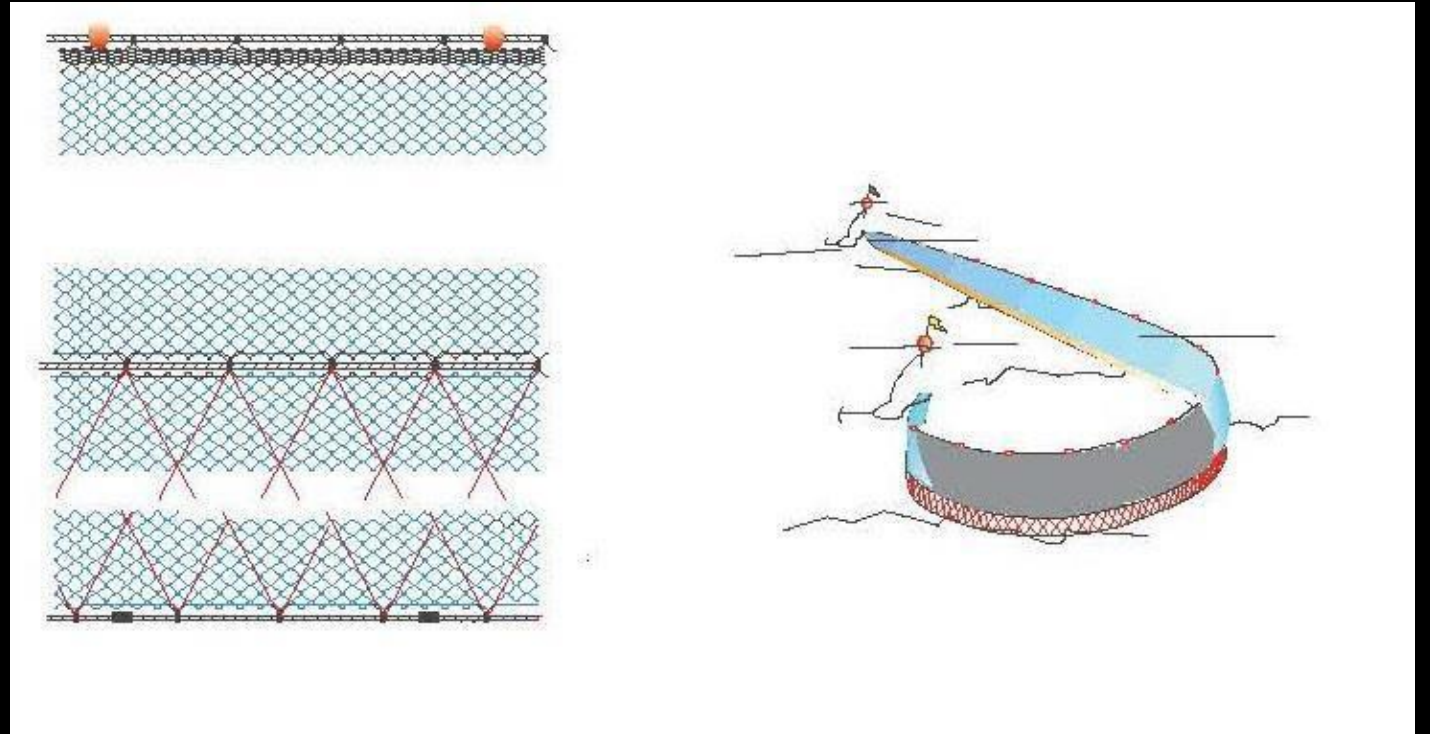
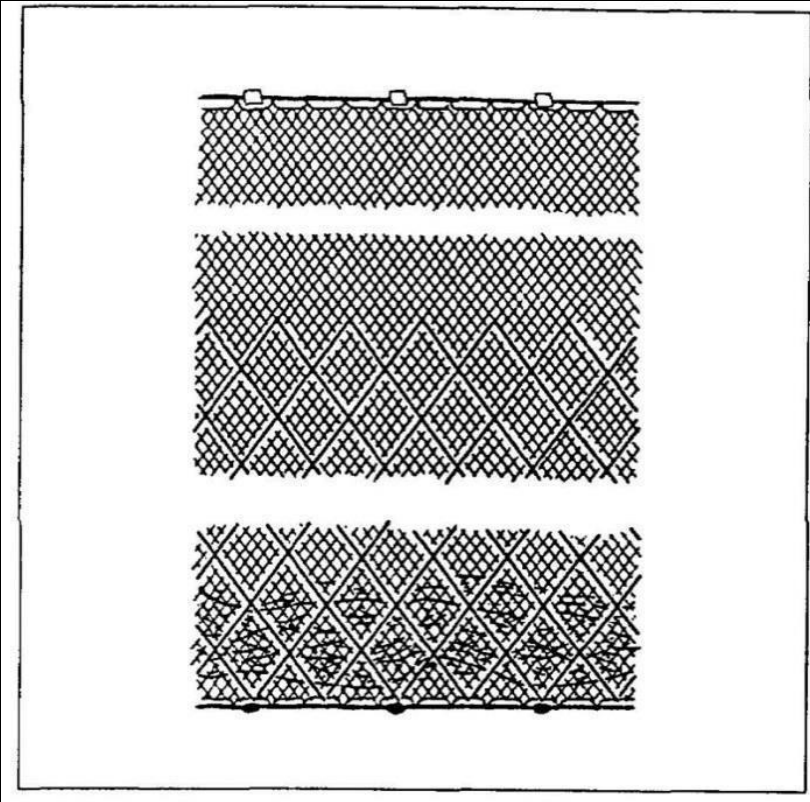
- ❑ Used in tidal and coastal waters
- ❑ Nets are mounted on stakes driven into the bottom
- ❑ Fish are collected at low tide

5. Trammel Nets



- ❑ 3 layers of netting, 2 outer layers being of a larger mesh size, loosely hung inner netting panel
- ❑ Set on the bottom
- ❑ Fish entangled in the inner small meshed wall after passing through outer wall

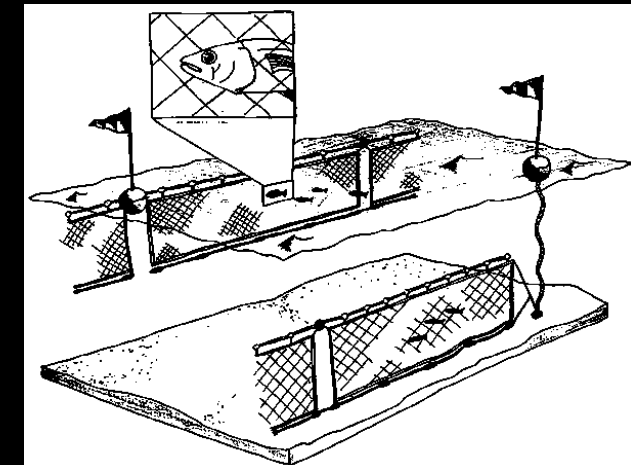
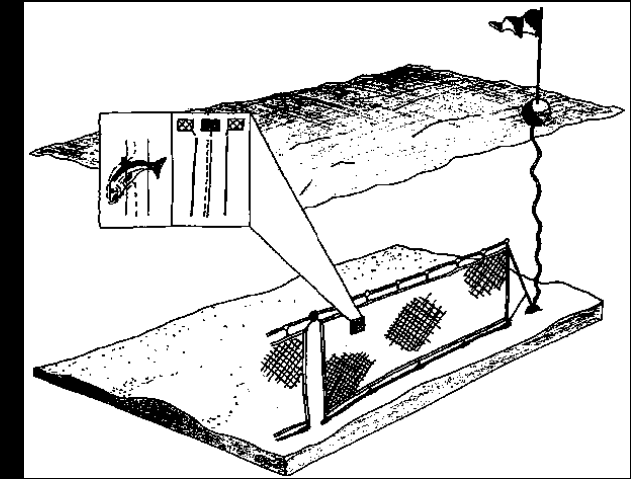
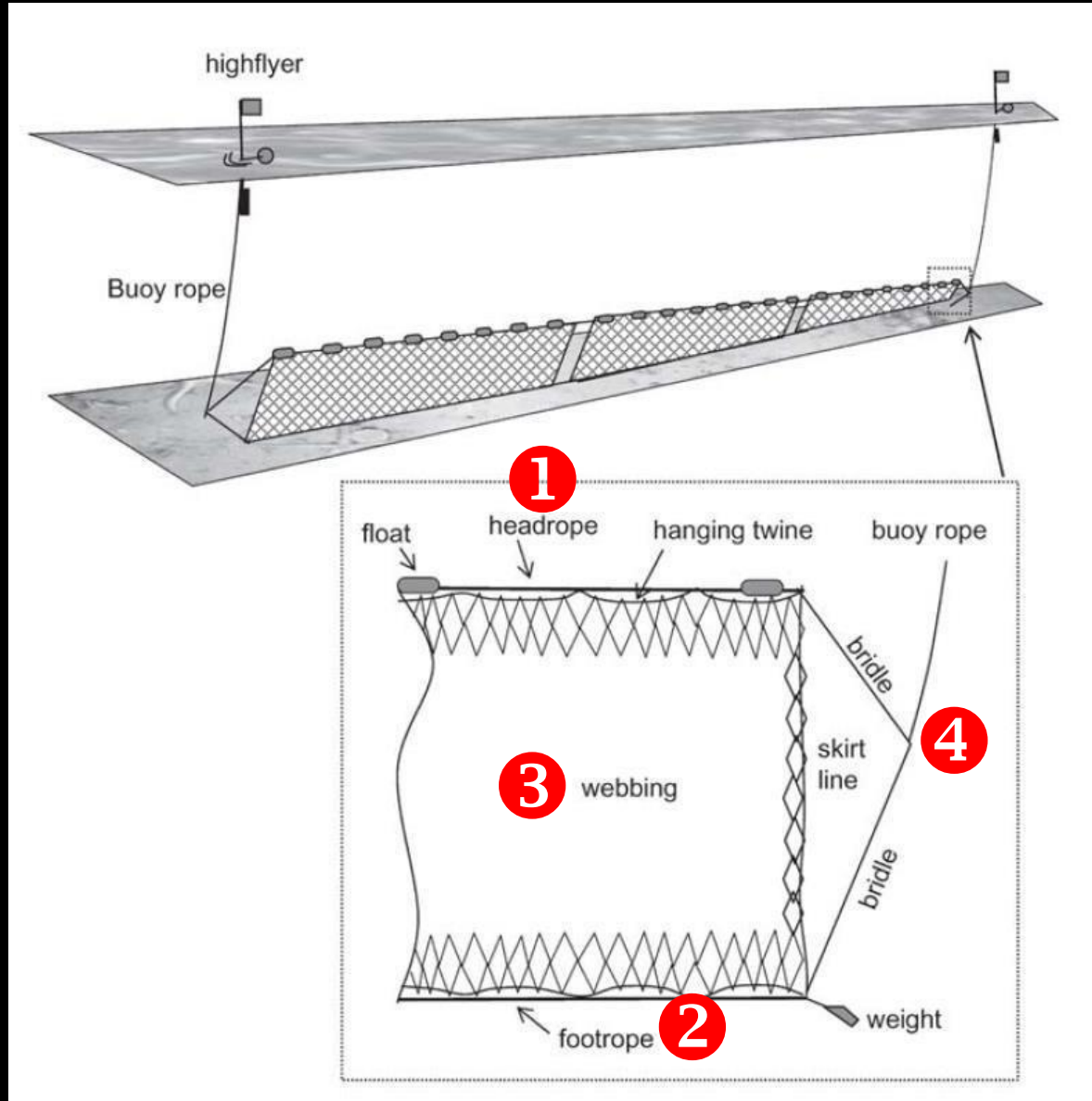
6. Combined Gillnets — Trammel Nets



- ❑ Set on the bottom
- ❑ Lower part: a trammel net, catching demersal fish
- ❑ Upper part: a gillnet, catching pelagic fish, semi-demersal fish
- ❑ Often used as sampling gear for resource surveys/selectivity of gillnets

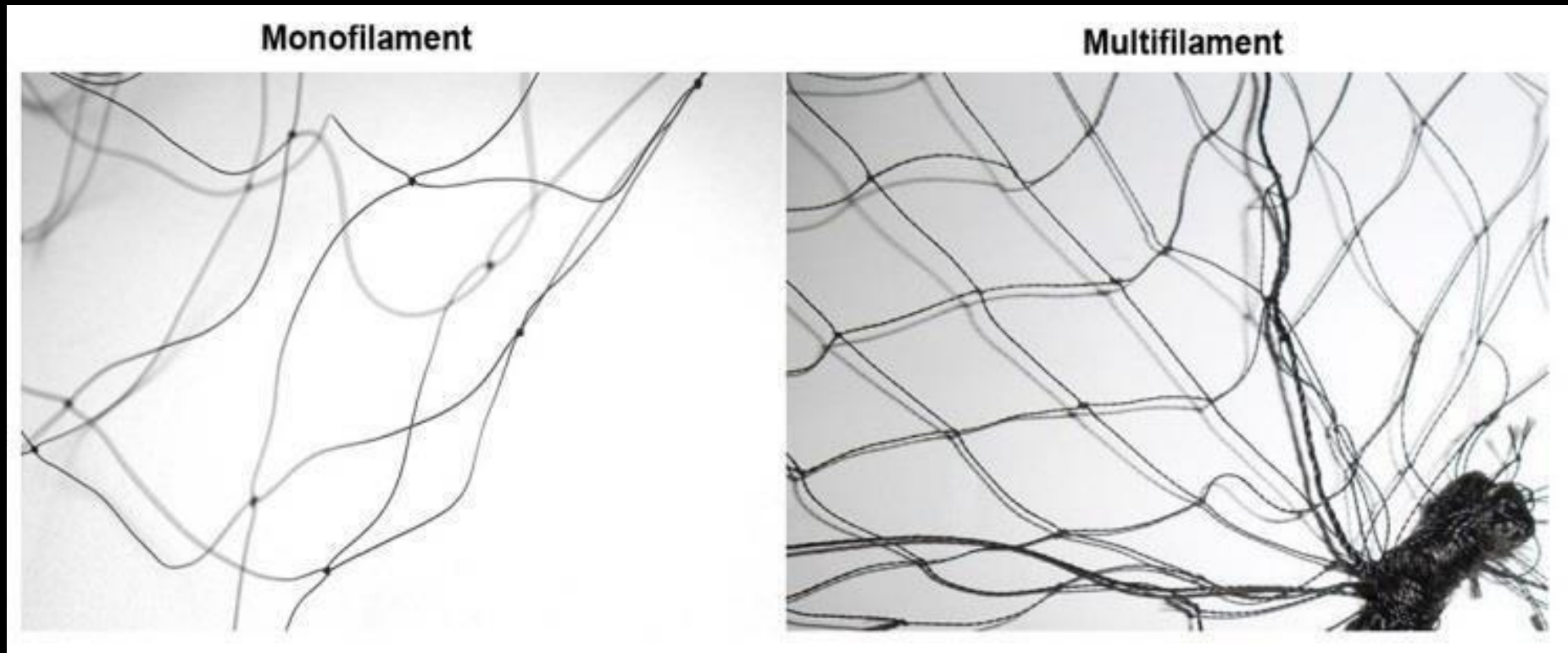
Gillnet Structure

- ① Headrope
- ② Footrope
- ③ Webbing
- ④ Bridle, buoy lines and markers
- ⑤ Others



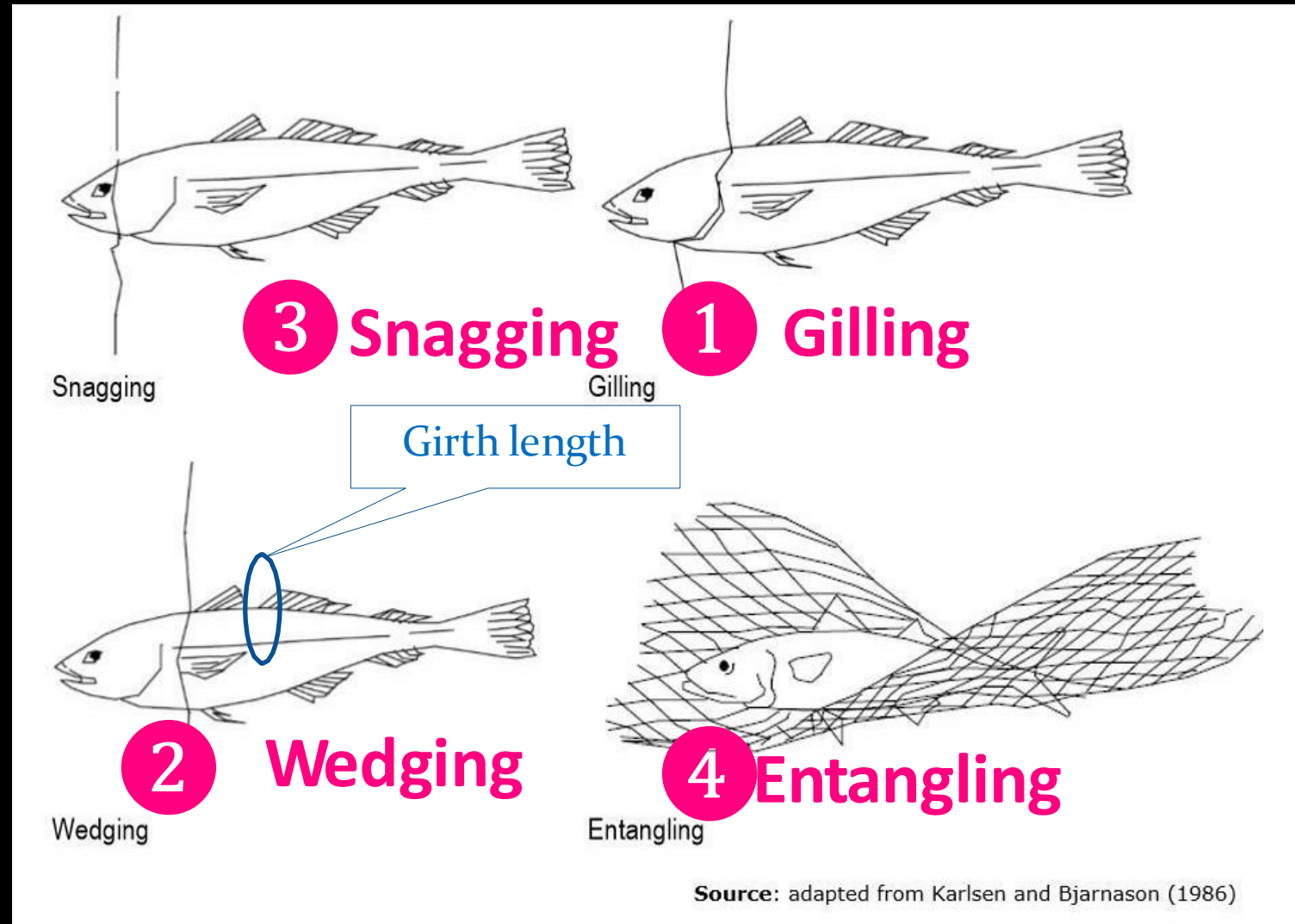
Gillnet netting materials

- Early days: Natural fiber *e.g.* cotton
- Present: Synthetic fiber mainly 'Nylon'



Capture mechanisms of gillnet

- ① Gilling
- ② Wedging
- ③ Snagging
- ④ Entangling







Thank You