In Western Europe we distinguish between four fishing methods that involve the use of nets:
• Trawl
• Danish seine
• Purse seine
• Mono net

These four methods and their most important variants will be explained briefly in the following. If you want to know more about, for example, the historical development of the nets or their more detailed structure, you can find information in the teaching material for the subject Fishing.

**Fishing methods**

The simplest way to catch a fish is to bait a hook, tie a line to it, throw the hook into the water and wait. However, it is rarely possible to make living from that kind of fishing. If you want to make fishing your full-time profession, you have to use other methods – and many of these will involve the use of nets in one way or another.

**Common terms**

When talking about different types of net, it is useful to know the most common terms for the individual parts of the net:

- **Bell**: the net itself in which the fish are caught.
- **Lines**: the horizontal edgings of the bag, often reinforced with a rope. There is a headline to which floats are often attached and a bottom line to which weights may be attached.
- **Lining**: the reinforcement of strong netting which in some fishing tools are inserted between the bag and the lines.
- **Breasts**: the vertical edgings of the bag, also reinforced by a rope.
- **Seam**: a joint between two net sections to be placed next to each other.
- **Bridles** (also called crowfeet): the lines which are attached to the head and bottom lines and which keep the fishing tool stretched out.
Trawl
A trawl can briefly be described as a large cone-shaped net which is towed behind one or two vessels. Trawling is an active fishing method (because the net is actively moved through the water), and it works by chasing the fish into the tool and keeping them there.
Trawls vary considerably in size, and unlike many other fishing methods trawling is not restricted to vessels of a certain size: Trawling can be carried out from very small boats to the largest fishing vessels.

Trawl types
Virtually no two trawls are the same. Their structure is determined by the size required by the fisherman and the fish he wants to catch. The trawls were originally made up of two panels, a top panel and a bottom panel, which were joined at the sides by lacings. Later the demand for higher trawls has led to some trawls being fitted with two side panels, resulting in four-panel trawls. Generally, trawls are classified according to whether they are towed along the sea bed, bottom trawls, or whether they are towed in mid-water, mid-water trawls.

Bottom trawls are towed along the sea bed. The top panel is usually longer than the bottom panel so it functions as a “roof” which prevents the fish from escaping upwards. At the sides the fish are retained by the net’s arms and wings.
It is important that the bottom trawl maintains good contact with the sea bed itself, which is usually achieved with the right trawl design, but in some cases it will be necessary to use different types of weights to keep the bottom line down. The trawl is kept open horizontally either by mounting so-called trawl doors made from large steel plates in front of the trawl. These are placed askew in the water, thus pulling the towing wires away from each other. The horizontal opening can also be maintained by having two vessels with a certain distance between them tow the trawl. Vertically the trawl is kept open by attaching some sort of buoyant unit to the head line, usually so-called floats.
Bottom trawls are used to catch, for example, Norway lobster, shrimp, plaice, cod, pollack, haddock and industrial fish such as Norway pout and sand eel, i.e. any animal that lives on or immediately above the sea bed.

FACT BOX
The North Sea Centre in Hirtshals is home to one of the few test tanks in the world. Here the net maker can test his trawls, and the fishermen can learn how to use them most effectively.
Mid-water trawls are towed in mid-water—away from the sea bed. They have a slightly different structure than bottom trawl as they have no “roof”, among other things. Many mid-water trawls have a square cross section, while others have a more rectangular opening. It depends on where they are used and the type of fish you want to catch. The vertical opening is created by an upward draw in the upper tails, while heavy weights are attached to the bottom tails. As with bottom trawls, the horizontal opening is created by trawl doors or by having two vessels tow the trawl between them. Mid-water trawls are used to catch shoal fish such as herring, sprat, mackerel and blue whiting.

There are all kinds of intermediate types between bottom trawls and mid-water trawls. Certain types of bottom trawl can be used in mid-water and are therefore similar to mid-water trawls. However, these trawls are still constructed as bottom trawls and are sometimes referred to as semi-pelagic trawls. In the same way, some types of mid-water trawl will be set on the sea bed during the towing. This can happen in cases where shoals of, for example, herring or blue whiting swim close to the sea bed.

Beam trawls are kept open by the beam to which the top panel is attached. The bottom panel with the bottom line is similar to that attached to an ordinary bottom trawl. Beam trawls are used to catch flatfish, shrimp etc.
**Towing methods with trawl**

Today, there are many different trawling techniques. Different terms are used depending on the way the trawl(s) is/are towed:

**Single trawling** means that the trawl is towed behind a single vessel.

**Pair trawling** means that the trawl is towed behind two vessels – the opening in the trawl is created by the distance between the two ships.

**Twin trawling** means that one vessel tows two trawls at once. In some cases, a vessel can tow even more trawls: three, four or as many as eight trawls.

**Danish seine**

Danish seine fishing is an active fishing method (because the net/seine net is actively moved through the water), and it works in that the ropes which are placed on the sea bed in a large triangle chase the fish towards the path of the fishing tool when it is hauled in.

In order to achieve a good result with Danish seine fishing, relatively large areas with an even sandy or gravelly bottom are generally required. Danish seines are traditionally used in areas with a moderate water depth, but Danish seines have actually been developed for larger depths, for example for catching flatfish in the Skagerrak and elsewhere.

As the name indicates, the Danish seine is a Danish invention and is currently being used in different variants all around the world.

**How it works**

The Danish seine consists of the actual seine net and two seine netropes called arms, which can each be up to 3,500 m long. When the ship arrives at the fishing ground, a large anchor is dropped and the first seine rope is fastened to it. The ship sails out with the seine rope, turns 90°, sails on, lays out the actual seine net, turns 90° again and sails back towards the anchorage. In principle, the two seine net ropes and the seine net now demarcate a triangular area. The seine net winch on board the ship is used to pull at both “arms”.

Initially, this is done carefully so the ropes are moved along the sea bed – the movement and the resulting cloud of sand cause the fish to swim towards the centre of the demarcated area. Soon the seine net itself starts to move towards the cutter and the fish which find themselves within the ropes are caught in the seine net.

Danish seines are used to catch plaice, cod and haddock. A number of other species are caught as a bycatch.

**Fact Box**

**The Scottish method – fly shooting**

The Scottish have developed a variant of Danish seining. It differs from the traditional method in that it does not use an anchor but merely a large buoy to secure the first section of the seine rope, and in that the cutter, when it is back at the beginning of the first arm, does not haul in right away but slowly moves forward while the ropes and the seine net are pulled in. It can therefore be described as a cross between traditional Danish seining and trawling.
### Purse seine

Purse seines are very large tools which most of all resemble a giant curtain of netting which is laid out in a large circle around a shoal of fish, which the vessel has located in advance with its advanced electronic equipment for locating fish shoals. Purse seining is an active fishing method (because the net is actively moved through the water), and it works by surrounding the fish with the tool and trapping them inside it.

The purse seine is laid out in a circle around a shoal of fish. A wire running alongside the entire lower edge of the purse seine is pulled in, thus drawing together the opening downwards. The entire bottom part of the purse seine is lifted up to the side of the ship, and most of the net is pulled on board until the fish are accumulated such that they can be pumped up into the vessel.

Purse seines are used to catch shoal fish such as herring, mackerel, sprat and capelin. Purse seines are widely used elsewhere in the world to catch many different species of tuna, horse mackerel, sardines and anchovies. As mentioned earlier, purse seines are usually very large fishing tools. In the North Atlantic, the net is approx. three to four times as long as it is deep, and the largest nets are 600-800 m long and have a stretched depth of 180-200 m. This means that such a purse seine can cover 18-20 football fields. It is made from vertical net sections, which are called fishing lines in a purse seine. At the top, the headline is fitted with floats intended to keep the purse seine at the surface; at the bottom the bottom line is rigged with 6-8 tons of lead intended to make the purse seine sink rapidly around the shoal of fish.

### Mono nets

A net can simply be described as a wall of netting which is set on the sea bed or hangs in the water. The net is made from a thin, transparent material which the fish cannot see when they swim around searching for food or migrating from one area to another. When the fish swim into the net, they are caught in its mesh.

Net fishing is a passive fishing method (because the fishing tool stands stationary in the water while it catches the fish) – i.e. the fisherman does not “do” anything once the net has been set.

### Set gillnets and driftnets

Mono nets can be set near the sea bed or anywhere between the sea bed and the surface. It is the relationship between the weight on the bottom line and the purse float on the headline that determines whether the net is near the sea bed, near the surface or in the middle of the water column. A single net is usually 50-70 m long. During fishing, several nets will be joined to form what is referred to as a fleet. In ordinary bottom fishing...
15-20 nets can form a fleet. If fishing is being carried out more locally, for example around shipwrecks, the fleets are shorter and may only consist of five nets.

Set gillnets are prevented from drifting with the current by means of an anchor (also referred to as a grapnel) at either side of the fleet. An anchor and a buoy will also be placed on some sections of the long fleets. This also makes it easier to retrieve and collect a fleet where a buoy has been hit by another vessel and disappeared. Sometimes a trawler may accidentally tow its trawls through a fleet and destroy a small or large portion of it.

Driftnets are not fastened with anchors but drift (as the name indicates) around in the water with the current. Driftnets have floats attached to them, and by using short or long straps on the floats, the net can be made to hang vertically anywhere between the surface and the sea bed – depending on the type of fish you want to catch.

**Fact Box**

Many believe that pound nets are the same as set gillnets. They are not! A pound net is a fishing tool that consists of a net attached to poles which have been driven into the sea bed. Pound nets almost work like a large trap where a long row of nets lead the fish away from the coast and into a fish trap or a yard of netting which is constructed in such a way that the fish cannot find their way out again. From here the fish are hauled on board the cutter. Pound nets can be used along the coast in the Danish coastal waters but are today only used to a lesser extent and along more sheltered coasts and in inlets.
**Three ways to get caught**
The fish can in principle get caught in the mesh of the net in three different ways:

- The fish gets caught by its gills which act as barbs when it tries to withdraw.
- The fish squeezes its body into a mesh and is unable to move backwards or forwards.
- The fish hits the net with its mouth or, for example, a fin, and in attempting to free itself becomes even more entangled in the net. Typically, its tail gets caught between the meshes.

Set gillnets are used to catch cod, plaice, Dover sole, turbot, pollack, hake, herring etc. Driftnets are used to catch salmon, and to a lesser degree, herring.

**FACT BOX**

A trammel net is a special type of net. It consists of three layers of netting: a small-meshed net in the middle sandwiched between two large-meshed nets. When the fish swims into the trammel net, it swims through the first layer of large meshes and then pulls a pocket of the small-meshed net through the last layer of large meshes, thereby catching it in a pocket. Trammel nets are highly effective and good at retaining many different sizes and types of fish. However, it also makes it more difficult to clear the nets, because it takes a long time to remove each fish.

**FACT BOX**

**Exploratory fishing**
New nets are continuously being developed for the fishing industry for a variety of reasons. A new net can provide the following benefits, for example:

- Improved fishing quality
- Less waste
- Reduced fuel consumption
- Fewer repairs and longer useful life
- Improved environmental friendliness

Part of the development in fishing tools follows from new rules on the conservation of the resources of the sea – the so-called “technical conservation measures”.

When you want to develop a new net, you can apply for funding from the EU and the Danish government for exploratory fishing. You might also want to contact a net maker. Net makers have years of experience in how different nets work, and they can also test new nets in a test tank.

Read more about exploratory fishing at www.dffe.dk.

Note that you can also apply for funding for exploratory fishing with other rigging, applications, areas and species.

**Other fishing tools**

There are many other fishing tools than those described here. Fishermen all around the world have always showed great ingenuity in their efforts to catch fish for food. However, very few fishing tools other than those mentioned here have found use in the highly efficient commercial fishing industry. Most of the other tools are passive such as lines, basket traps, fish traps and hooks. Some operate by capturing the fish in a trap from which it cannot escape (for example fish traps), while others use some sort of bait (for example a hook with bait and basket traps).