

History and Global Review of Purse Seines

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A purse seine is a kind of the encircling nets. This group includes all those types of nets used to capture fish by surrounding, or partially surrounding them with a mobile wall of netting so as to block escape. They differ from trawls and drag nets in that they are moved for only a short distance, encircling a small area, and are not towed for any length of time. Encircling nets can be classified according to their method of fishing as follows: shore-landing seines, vessel-landing seines and blocking seines. Beach seines and reef seines are a shore-landing type of encircling nets. Stop seines belong to the blocking group. 'Roundhaul' is a general term applied to long wall-like seines that are laid out in a circle around a school of fish in deep water. The two ends of the net are brought together, the opening at the bottom is at least partially closed to impound the school and the net is then pulled aboard a boat. This type of net is a vessel-landing seines of encircling nets. Under the general classification of roundhauls are lampara and purse seine.

The lampara has a large central bunt, and relative short wings of larger meshes. The two wings are pulled simultaneously. There is no pursing device other than the closing of the leadline as the net is pulled. The essential features are then a large central bunt, wings pulled together, graduated mesh sizes and no purse line or rings.

The purse seine is almost rectangular in shape and whereas the lampara type has large size meshes in the wings and fine meshes in the bunt the purse seine is almost entirely composed of fine meshed wing (depending on the size of species sought). The essential feature of this net is the closing by pulling a purse line which is threaded through a series of rings along the bottom of the net below the leadline so that the leadline is bunched or puckered. Sometimes a cork line is also inserted but this is to make for easier handling of the gear rather than assist in trapping the fish.

There is a net called 'ring net' among fishermen. This type is a hybrid which started as a modified lampara. It evolved toward the purse seine. The ring net resembles the lampara and differs from the purse seine in that it has the bunt, wings pulled together and graduated mesh sizes. It differs from the lampara and resembles the purse seine in that it has purse rings just along the bunt or centre part or around the whole leadline.

There are various other nets, the names of which erroneously suggest them to be roundhaul nets. For example, round lift nets, such as those used to catch bait, are occasionally called circle nets, but are in no sense roundhauls. A gill net depending on how

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it is set is sometimes also called a circle net. This net is not a roundhaul as it is not closed at the bottom, it is not pulled aboard the boat as a unit, and it entangles rather than impounds the fish. However, there are instances of deep gill nets used to encircle a school of fish, then the net with fish is hauled aboard the fishing vessel. The net so used ceases to be an entangling gill net and becomes an impounding roundhaul net. Failure to close the bottom of the net completely allows some fish to escape, but this inefficiency does not alter its roundhaul feature. When a net is laid out around a school of fish and is pulled onto a beach instead of onto a boat, the net is a beach seine.

Which fishing net was first developed by a man is not known, but certainly the beach seine is very old. This seine is merely a wall of webbing which is set out parallel to or in a semicircle from the shore and then both ends are pulled simultaneously onto the beach. The oldest Japanese writings, the *Koziki* (712 A.D.), the *Nihon Syo-ki* (720 A.D.) and the *Wa-Myo-Syo* (930 A.D.) etc. refer to fishing sardine with a beach seine. In the beach seine fishing, the lower edge of the net scrapes the bottom in shallow water and when the two ends are ashore, the fish are impounded. Further pulling onto the shelving beach brings the fish out of the water. Therefore, the sandy or muddy bottom in shallow water serves as the floor of this impounding devices. In deep water the fish could dive under the seine and escape, but by hanging in more webbing in the middle of the seine, a slight envelope (bunt, bag, sack or belly) was added which helped to impound those fishes that entered the bag. But again, there is nothing to stop them from leaving if the seine is in deep water. Success of this net depends, therefore, upon a good beach and shallow water. In most coastal areas the places that can be beach seined are pitifully scarce and so the ancients may have tried hauling the seine onto a boat but the fish could escape under the lower edge of the net and under the boat as the two wings were being pulled aboard. A deep bag had already been added on beach seines and it may have been that this suggested making the seine into a large bag with short wings so that it could be at least partially closed when the lead line was taken in. This large bag with a lead-line pulled in quickly, in advance of the cork line is the principle used in the lampara type of net (Scofield). Thus, the lampara type net might be developed rather in the coastal areas with an irregular floor or a steep slope, because the beach seining might be not able to made successfully there. In Japan, in the Ashikaga Syogunate era (1334-1573) a lampara type net was first developed along the coast of the Bungo Channel where there are very few shelving beaches. Since then, it is known well that various types of lamparas had been used in Japan before the nineteen

The 'Nuikiri-ami', the 'Tai-shibari-ami' and 'Hassaka-ami' used along the coast of Japan, are all old-fashion lampara type nets still used today. It seems likely that the lampara net with partial closing of the bottom of the net was tried out long before the development of the drawstring or pursing idea. The pursing of the net bottom seems to have been a relatively late development.

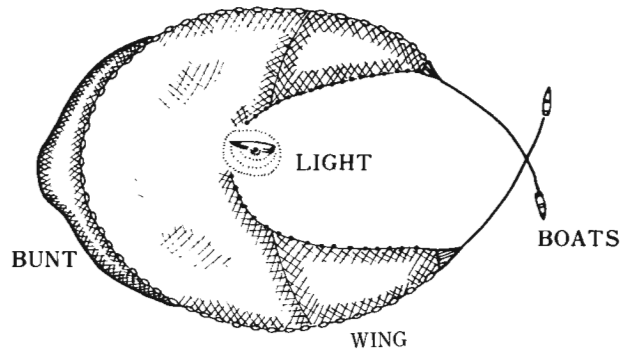


Fig. 1 'Nuikiri-ami'

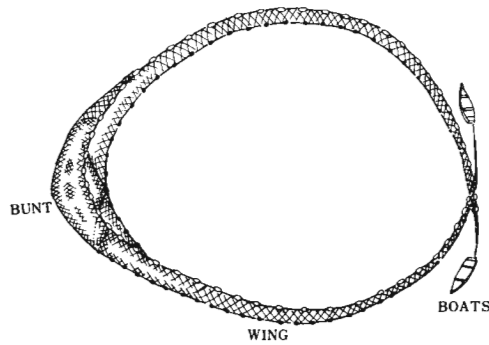


Fig. 2 'Tai-shibari-ami'

The use of extra ropes to the footrope to close the bottom of the purse must have been a rather inefficient and cumbersome method. It was used until someone struck upon the idea of passing a single rope through a number of iron rings attached to the footrope of the bunt section of the net. By hauling on this single rope the bottom of the net could be drawn together and thus closed before the net had been pulled on board the boat. So then the 'purse line' came into being. Just when the first purse line was used on a seine we do not know but it may have been used as much as 200 years ago. However, there are no written records to substantiate this. A roundhaul net which was used for saury in waters off Izu-hichi-to in Japan is of particular interest. This was an old-fashioned net, which had purse rings only among the central portion of the bag. When the wings of this net had been partly taken-in, the lead line could be quickly hauled in by pulling the ropes attached to the central rings so as to prevent escapement of fish through the bottom of the net. This net had only twelve rings.

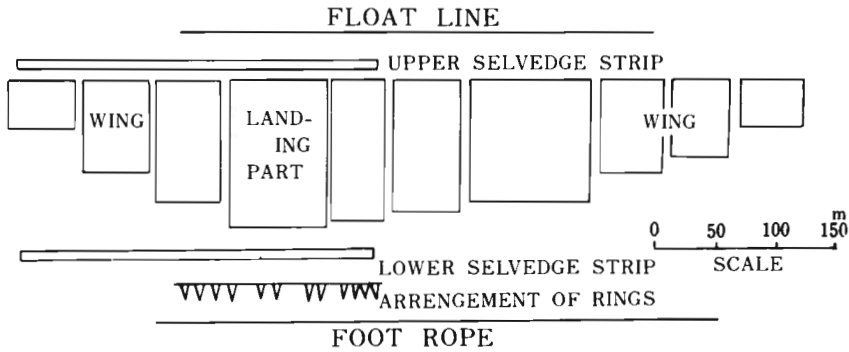


Fig. 3 Net-plane of the Izu-hichi-to 'partially-ringed seine'.

According to Scofield, closing the net bottom by pursing is said to have originated in 1826 in the Rhode Island menhaden fishery of the Atlantic Coast in U. S. A. This 1826 menhaden net was 65 fathoms long. By 1910, the purse seine was introduced to most parts of the world. The purse seine was adopted and greatly developed by the California sardine fishermen. In Japan, there are two different opinions of the purse seine appearance. Both are same in that it appeared first at the close of the nineteen century at Chiba Prefecture in eastern Japan. The one explains that it came originally in appearance from a Japanese lampara net, 'Rokunin-ami', used in Tokyo Bay since the latter half of the Tokugawa Shogunate era (1600-1867). This seine might resemble a boat haul seine, 'Hatta-ami', operating along coastal Japan today.

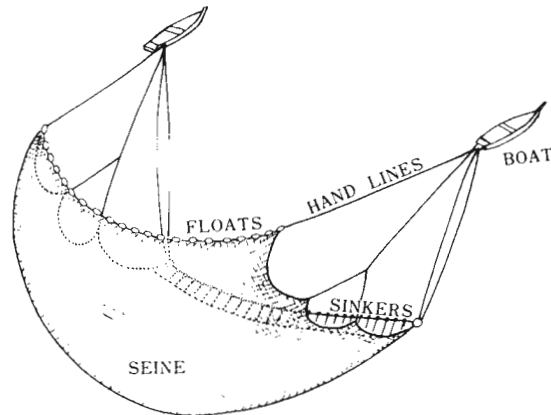


Fig 4 'Hatta-ami'

According to the other opinion, the pursing idea which is the distinctive feature of purse seining, is said to have been introduced in 1881 from California. Most of the purse seines used today in Japan are a compromise type between Japanese forms (being generally called 'Aguri-ami', which has been developed from Japanese lampara net such as 'Taisibari-ami', 'Nuikiri-ami', etc., and used since the middle of Tokugawa Shogunate era.)

and the introduced purse seine. Therefore, these are sometimes called 'Kairyō Aguri-ami' which can be translated as 'Improved Aguri-ami'.

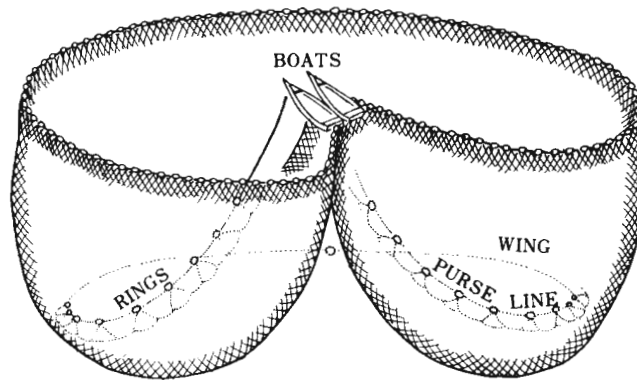


Fig 5 'Kairyō Aguri-ami'

Before 1903, Japanese purse seining had not been prospering. These nets were made of a hemp or straw, and operated by two powerless boats in inshore water or bay. Since 1903, at which time a seine made of cotton twine was first used in waters off Aomori Prefecture of northern Japan, catches by purse seines have been increased extensively. This great increase was due to both the advents of powered craft and cotton seine.

The modern purse seine may be as much as 400 fathoms long and 30 fathoms deep in size. These are made of various synthetic materials such as Nylon (Polyamide), Vinyon (Polyvinyl alcohol), Tetoron (Polyester), Saran (Polyvinylidene chloride), Tevicon (Polyvinyl chloride) and their mixtures.

There are two main methods of setting a purse seine, the two boat method and the one boat method. In the two boat method the net is laid either on the stern of one boat only or half on the stern of one boat and half on the stern of the other while they are tied together. In the first case one boat sets the whole net in the water while the other vessel picks up the first end from the water. In the second case each vessel sets a half of the net after they are cast off from each other. In both cases the two vessels tow an end of the net each until they come together. This towing is for only a very short period and is to pull the net out to its full length and shape and to surround the largest area possible.

In the one boat method a small dinghy or skiff is used to assist the main vessel. The net is usually laid on a turntable on the stern of the vessel. The first end of the net is made fast to the dinghy which then pulls in the opposite direction while the main vessel sets the net in a circle. In this case the dinghy acts only as a drag to prevent the net from bunching up in the water and to make it easier for the main vessel to pick up the first end again. Once the two ends are both aboard the main vessel the purse line is winched in and the surrounded fish are then trapped. The enclosed fish are then removed

by means of a brail net while the rest of the purse seine is being gradually hauled in. Sometimes, especially in the case of fish caught for reduction to fish meal, a pump is used to suck them on board the vessel.

Two inventions which have had a marked influence on the development of modern purse seine must be mentioned here. The first is the power block and net hauler. These are a hydraulically operated type of net winch which consist of a V-shaped sheave which can accommodate the whole width of a purse net. A power block is hung from a derrick or mast. A net hauler is set on one side of stern of vessel. The first power block was produced in California in 1954. Since then its use has spread to almost every purse seine fishery in the world. To haul a purse seine without mechanical assistance demands a large crew or plenty of manpower and it is difficult to pull in a long, bulky net with conventional winching methods. The power-block provided the answer to this problem and made it possible to haul in a large purse seine quickly with the minimum of manpower and without damaging the net in any way.

The other device is the 'sonar' or asdic type echo sounding machine. It is essential in purse seining that large fish schools be located and their density and direction of movement be quickly ascertained. The net must be shot in the path of a moving school of fish and not behind them. At first shoals of fish were spotted by eye from the bow, bridge of the fishing vessel. Then with the advent of the echo sounder it became possible to locate shoals of fish not visible by eye from above the surface. However, the first echo sounding machines could only identify shoals of fish when they were directly under the vessel fitted with the transmitter and transducer. With the sonar type fish finding device it is possible to scan an area of sea horizontally from the vessel of a radius about 300 meters. With experience, once a shoal has been located it is possible with this equipment to determine the direction in which the fish are moving. The first asdic type fish finders were installed in commercial fishing vessels around 1950.

A variety of other devices and methods are used with purse seines. Mainly sardine, pilchard, mackerel, are attracted to the surface at night by means of artificial lights hung from free floating buoys or small boats. After the fish congregate around such a light a purse seine is set around them.

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