STICK-HELD DIP NET

Compiled by

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Stick-held dip net

Foreward

The stick-held dip net fishing has been widely operated in Japan since old times. The gear is suitable for small-scale fishing; it is easily operated at a lower cost and by smaller crews than some other types of gear such as purse seine, large set net etc.

Furthermore, the merit of this fishing is that it can be carried out by any type of fishing boat which is also used for other kinds of fishing.

For example, mackerel pike is commonly caught by stick-held dip net on board salmon gill net fishing boats during the period of salmon off season, around the northern part of Japan. The operation is done at night with fish luring lamps to attract the fish.

In Thailand, catching squid by stick-held dip net began after 1978. Before diffusion of this fishing, the squid had been mainly caught by trawl net or cast net fishing.

The squid cast net is one of the traditional fishing gears in Thailand. Although this gear is very effective for squid fishing, its size allows only a limited amount of catch.

After diffusion of electric luring lamps, the squid cast net was replaced by stick-held dip nets whose number is increasing year after year. As mentioned above, the stick-held dip net fishing is also one of the important fishing methods in Thailand.

1. Outline of the stick-held dip net

1.1 Description of the stick-held dip net

The stick-held dip net is one of the many types of lift nets used for catching pelagic fishes such as sardine, mackerel pike, horse mackerel, squid etc.

The net is composed of cod end, main net, side net and selvedge net. It is designed to scoop the fish which is attracted by the fish luring lamp or bait. The net is also provided with a number of small sinkers on the sinker line of the net and heavier sinkers to which about six or more ropes are connected along the front end of the net for hauling purposes.

At the opposite end, the net is connected to a bundle of bamboo poles to keep the upper part of the net afloat on the sea surface. On each side of the upper part of the net end, some floats are attached for the purpose of preventing the escape of fish during hauling operations.

Two bamboo poles are used for the purpose of stretching out the net during operation. These are taken off from the net when the net is hauled toward the boat. Also a number of rings are attached to boat sides of the net. Through these rings, some ropes are led for the purpose of pulling up the sides of the net immediately to prevent the escape of fish during hauling.
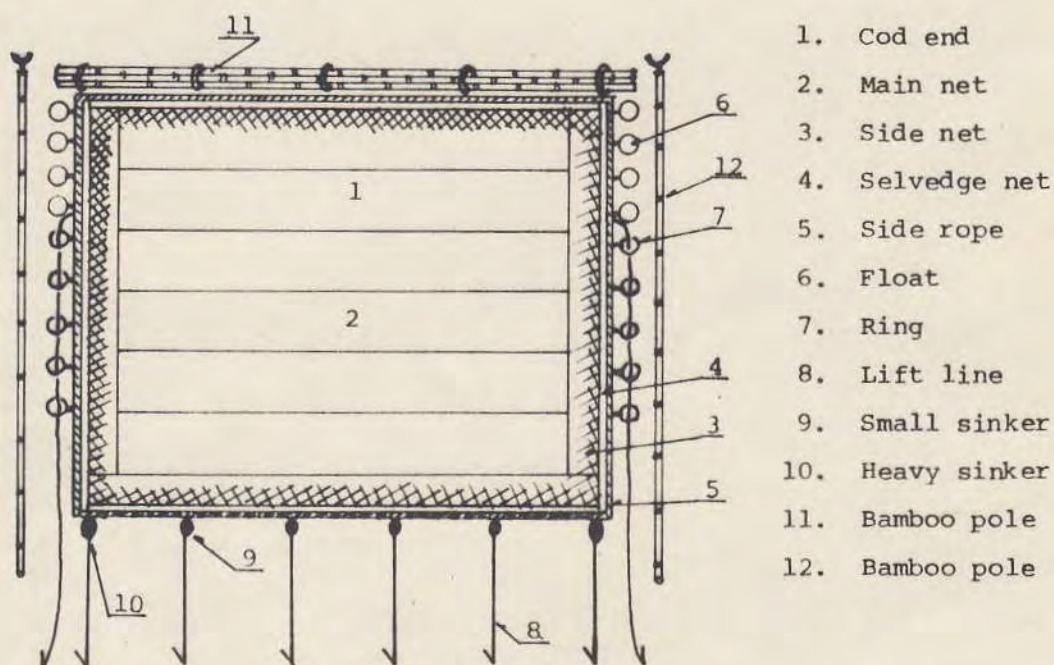
1. Cod end
2. Main net
3. Side net
4. Selvedge net
5. Side rope
6. Float
7. Ring
8. Lift line
9. Small sinker
10. Heavy sinker
11. Bamboo pole
12. Bamboo pole

Fig. 1. Sche-matic view of the stick-held dip net.

1.2   Operation method

Motorized fishing boats are now being used for operation of stick-held dip net. The net is set in fishing grounds where migratory schools of fish are mostly found.

The operation is done at either side of the boat in order to make the operation easier and more convenient.

The stick-held dip net is mainly operated with fish luring lamps to attract the fish during nigh-time operations. When the gear is operated in the daytime, some bait is used to attract fish. With these luring devices, fish are made to concentrate on either side of the boat where the net is set.

Hauling lines are then pulled by using the line hauler until the front part of the net is hauled up to the sea surface to prevent the fish from escaping. The bamboo poles are taken off from the net or pulled with the net toward the boat so that it will be easier to scoop the fish being caught.

The operation is done 20 to 80 times in a day by following the described procedure.

1.3   Fishing boat

As mentioned before, the fish most commonly caught by stick-held dip net in Japan is mackerel pike. Below is the description of the boat and the method employed in mackerel pike stick-held dip net fishing.

The fishing season of mackerel pike in Japan lasts five months, from August to December. During the rest of the year mackerel pike fishing is prohibited in Japan. Accordingly, there are no boats engaged exclusively in mackerel pike stick-held dip net fishing. Most boats engaged in this fishery are also used for salmon gill net fishing, skipjack pole and line or mackerel pole and line fishing, depending on the season.

The sizes of boats used vary from 10 to 300 GT. Therefore, there is no specific design of the boat but preferably the boat should have the following characteristics:

1)   Shallow draft

The fish should be able to pass underneath the bottom of the boat to the side where the net is. Therefore, shallow draft is recommended.

2) Shallow freeboard

   In order to operate easily, shallow freeboard is
   recommended.

3) Resistance against wind

   At the relative position between the boat and the
   net should be maintained during fishing operation,
   the boat should have resistance against wind.

4) Fish hold

   The fish hold should be partitioned into small
   chambers. A fish hold with small chambers is
   required as fish caught at different times should
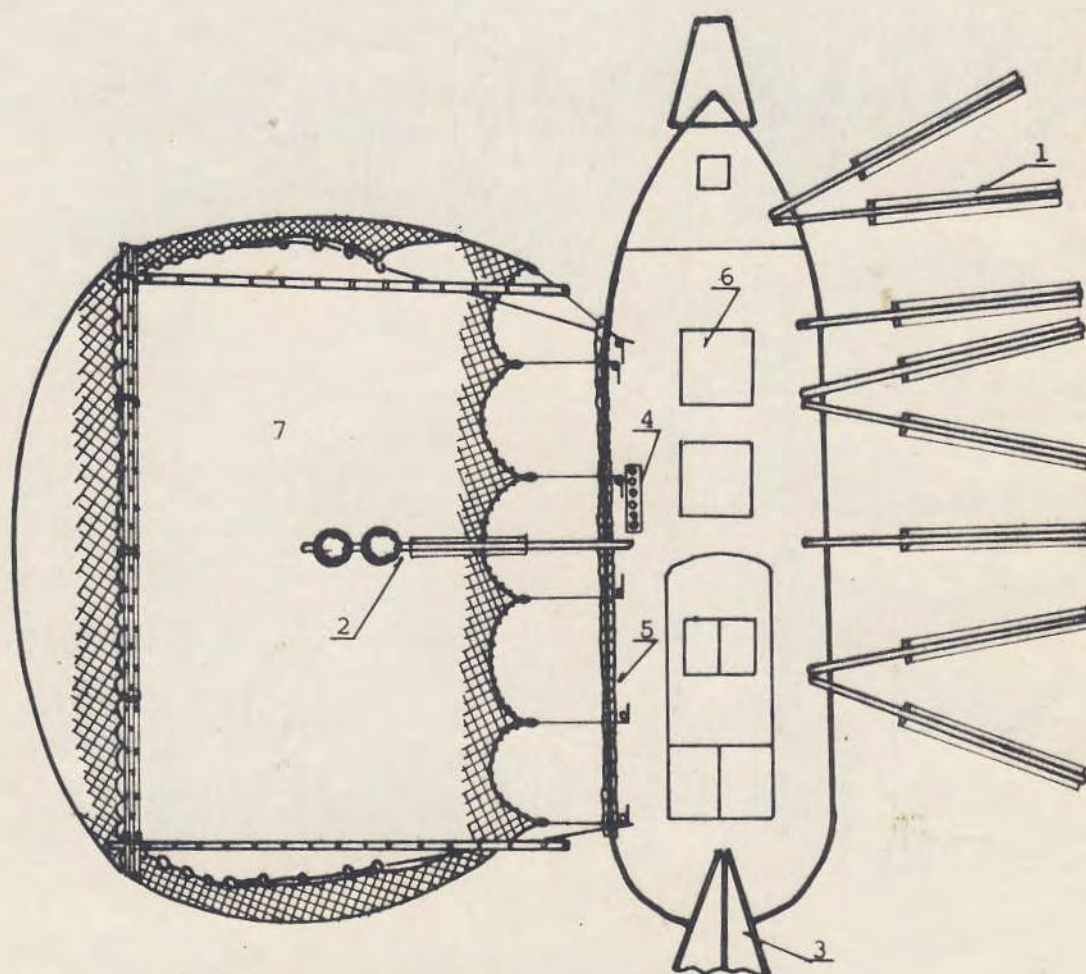   be kept in different chambers.

Fig. 2.   Fishing boat of stick-held dip net

1. Fish luring lamp (starboard side)   5. Roller
2. Fish luring lamp (port side)   6. Fish hold
3. Spanker   7. Net
4. 6 reel winch

Fishing equipment: The fishing boat should have some equipment installed on board:

1) Fish luring lamp

The success or failure of this fishing method depends on fish luring lamp. Therefore, the power of illumination should be large but within the regulation limit of 30 kw per boat. In general, the fish luring lamps are connected to 5 to 9 booms positioned 1.5 to 2.0 meters above the sea surface.

2) Winch and roller

A six-reel winch is provided for hauling the net towards the boat and two auxiliary winches are installed on boat sides of the stern. To take up the net to the deck, rubber rod-shaped rollers are provided on the bulwark top.
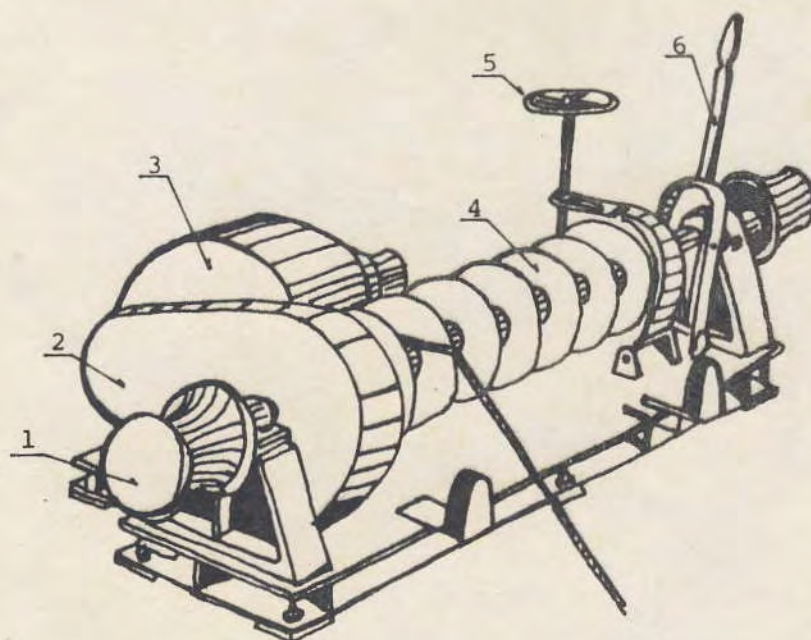
Fig. 3.   Illustration of 6-reel winch

1.	Warping drum	4.	6 reel
2.	Reduction gear	5.	Break handle
3.	Hydraulic motor	6.	Clutch lever

2.   Squid stick-held dip net in Thailand

2.1   Squid cast net

Before diffusion the squid stick-held dip net, squid had
been caught by trawl net or cast net for a long time in Thailand.
Trawl net catches mainly fish; squid caught at the same time is only
of secondary importance. Therefore, the present paper will show the
squid cast net (surveyed at Pranburi district in September 1979).

Pranburi is located 250 km south of Bangkok facing the
Gulf of Siam. About 200 small fishing boats 6-10 meters long with
30-40 HP outboard engines, are engaged in squid cast net fishing
around Pranburi.

Cast net is one of the traditional gears in Thailand and
it is operated in the night-time by 2 fishermen on board. Most of the
boats use gas lamps or oil lamps as the fish luring device but some
use electric fish lamps powered by a 2.5 kw generator.

Fishing grounds are situated in an area 3-4 hours journey
from the port. A set of drift nets is used as a sea anchor to drift
the boat slowly during operation.

Three gas or oil lamps or 3 bulbs of 500 Watt each are
placed on each side of the boat for fish attraction.

Normally the operation is done during the moonless night,
i.e. about 20 nights per month. The best squid season around Pranburi
is for 3 months from February to April. About 40 castings are done in
one trip, and the average catch is 50 kg per trip.

2.1.1 Operation method

The fishing boats leave their port in the
afternoon and reach the fishing ground before dark. After arriving
at the fishing ground, 3 fish luring lamps are lit to attract squid.

When a sufficient number of squid are attracted
around the boat, the cast net is thrown out by one fisherman while
the other fisherman keeps the boat in position most suitable for
operation.

When the foot side of the net has been closed in
the water, a ring made of lead is dropped into the water through the
net from the head of the net.

The foot side of the net is closed and bundled
by the ring so as to prevent the squid from escaping. Then the net
is hauled up slowly on board.

The operation is repeated about 40 times in the course of one night of fishing and finished before down. The boats return to their fishing port in the morning.

Most of the squid caught are sold to the squid processing factories around Pranburi district. At present, squid is also an important export commodity.

2.1.2 Fishing gear

The net is made of nylon 210 deniers 2-ply, and the stretched mesh size is 3.5 cm. The height of the net is 4.5 meters when stretched. A galvanized iron chain of 9.5 kg in weight is connected to the foot of the net as a sinker. The ring is made of lead; its weight is 2.7 kg and its outside diameter is 21 cm, inside diameter is 17 cm. In the head of the net a 6 meters length of polyethylene rope is connected as hand rope.

The price of the net is about 1500 Baht (75 US$)

Particulars

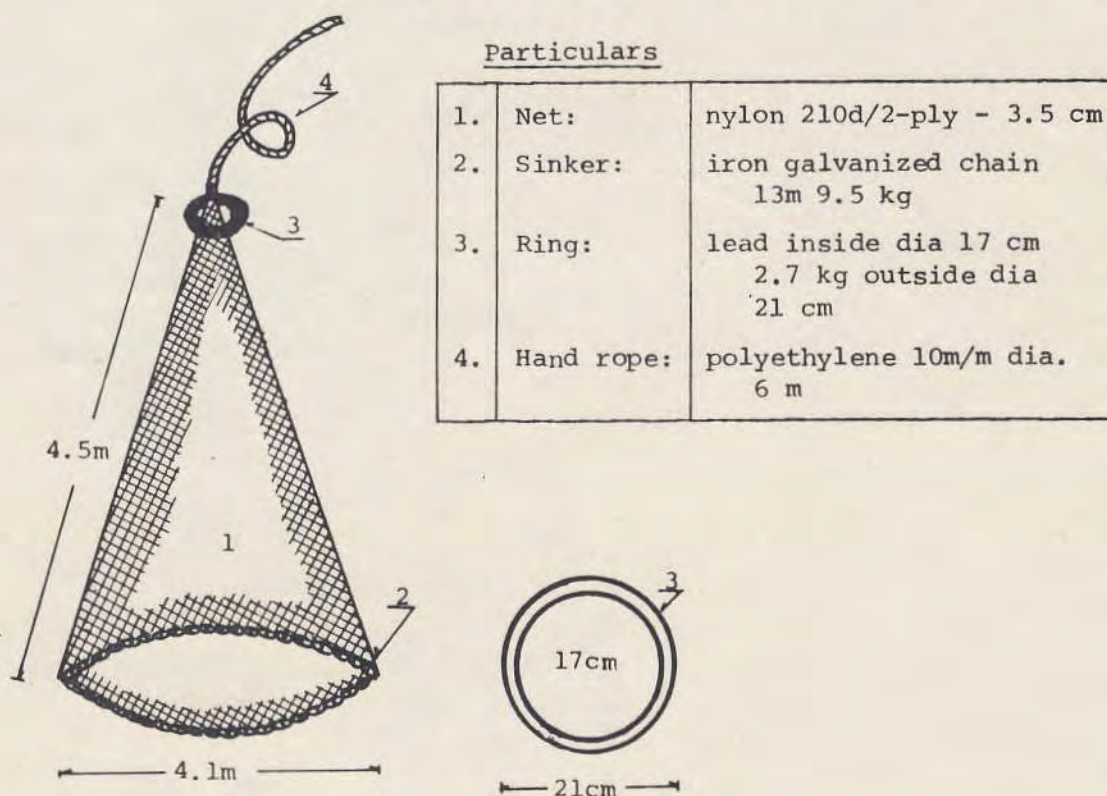| 1.	Net:	nylon 210d/2-ply - 3.5 cm
2.	Sinker:	iron galvanized chain 13m 9.5 kg
3.	Ring:	lead inside dia 17 cm 2.7 kg outside dia 21 cm
4.	Hand rope:	polyethylene 10m/m dia. 6 m

Fig. 4. Squid cast net

2.2   Squid stick-held dip net (Surveyed at Ban Phe district
       in November 1980)

There are two types of stick-held dip net in Thailand.
One is used by rather large boats (15 meters up), and in order to
catch squid, the net is pulled toward the boat.

The other types of net, which is used by small boats,
(14 meters down) catches squid by being pushed against the boat.

These two types of stick-held dip nets are quite similar
in construction. They are operated at the fishing grounds of 10-20
meters depth.

2.2.1 Pulling type net

After arriving at the fishing ground, the engine
is stopped. Then one set of the mid-water gill net (300-400 meters
long and 14 meters deep) is thrown out to the sea as a sea anchor,
and the end of the net is joined to the bow side of the boat.

Then all fish luring lamps except one red colour
lamp are switched on to attract the squid around the boat. (The
boat is equipped with 10 fish luring lamps and 1 red colour lamp.)

The squid are attracted around the boat after
some time. The net is set under water, then the ends of three lift
lines which are connected to the sinker lines are held by three
fishermen.

After checking these preparations, the master-
fisherman switches off all lamps at the same time (within 1-2 seconds).

Then one of the four lamps on the starboard side
is quickly switched on. All squid attracted around the boat will
then shift to the starboard side where the net is.

By reducing the illuminating power of the lamp
which had been switched on, the squid are attracted to come up to the
sea surface.

When the squid have been attracted near the sea
surface, the net is quickly hauled by three fishermen. The net is
pulled to the boat side, then the catch is lifted on board.

The whole operation is repeated 15-20 times in
the course of one night of fishing. The operation is done by 5
fishermen.

2.2.2 Pushing type net

This type of gear is operated at the same fishing ground as the pulling type net. A set of mid-water gill net also serves as a sea anchor.

After arriving at the fishing ground, all fish luring lamps on board are switched on for about 30-60 minutes.

Then after checking that the squid are attracted around the boat, the port side lamps and bow and stern side lamps are switched off. 4 lamps on the starboard side are kept lit. When all squid are attracted to the starboard side by the above procedure the net is set under the water. After that three of the four lamps on the starboard side are switched off. One lamp is left switched on and its illuminating power is reduced slowly.

When the squid come up to the surface, the net is pushed quickly by two fishermen.

The operation is repeated about 20 times in one night by 3 fishermen.

3.   Design of stick-held dip net

3.1   Factors to be considered in designing a stick-held dip net

3.1.1 Behaviour of fish:

Before designing the net, it is necessary to know the behaviour of fish. For example, some fishes such as mackerel pike, anchovy and squid are easily attracted around the boat by the fish lamp illumination. These fishes are caught with the stick-held dip net using fish luring lamp in the night-time.

On the other hand, mackerel and horse mackerel can be attracted around the boat with the aid of bait. The fish are caught with the stick-held dip net using bait in the daytime.

The shape of the net is slightly different for night-time and daytime operation.

3.1.2 Condition of the fishing boat:

As mentioned previously, many types of fishing boats are used for operation of the stick-held dip net. Therefore,

it is necessary to know the condition of the fishing boats, in particular size of the boat, size of the engine, number of fishermen, equipments on board etc.

The size of the net should be decided by the condition of the fishing boat.

3.1.3 Effective length of the boat:

Two bamboo poles are used for the purpose of stretching the net during operation. One bamboo pole projects from the bow side and the other one projects from the stern side.

Therefore, the boat should be long enough to allow for the proper distance between the poles.

About 80 percent of the boat length is usually considered as the effective length of the boat.

3.1.4 Shape of the net:

The shape of the net can be square, rectangular and trapezoid. The appropriate shape should be chosen by taking into consideration the type of boat and the behaviour of fish.

3.1.5 Material of the net:

It is a very important factor to select the best materials of which the net and ropes are made. The success or failure of the stick-held dip net depends on whether the net can withstand the influence of sea current and wind and keep a proper required shape in water during operation. The net is operated many times in a day or night. This means that the net is taken up on board and thrown out into the sea whenever the operation is done.

Therefore, the material of the net and rope should have the following properties.

    i)   High breaking strength,

    ii)   High abrasion resistance,

    iii)   High density (specific gravity),

    iv)   Low price.

The materials which satisfy these requirements best are the following synthetic fibers:

1) Nylon (Polyamaid),

2) Vinylon (Polyvinyl alcohol),

3) Saran (Polyvinylidene chloride) and nylon mix twisted fiber,

4) Tetoron (Polyester).

3.1.6 Size of the netting twine and the rope and accessories used for the net.

The size of the netting twine, the rope and accessories should be selected with particular regard to the size of the net and boat and the target fish.

3.2 How to design a stick-held dip net

In accordance with the factors discussed in 3.1, the method of designing the net should include the following steps.

3.2.1 Step 1. Determine the length of the rope connected to the net.

1) The length of the rope connected to the front end of the net, (a), should be the same as the effective length of the boat, i.e. equivalent to the distance between the two outstretched poles.

2) The length of the rope connected to the foot end of the net (b) should be equal to (a) or 10 to 20 percent longer than the length of (a).

In the case of the same length of (a) and (b), the shape of the net will be square or rectangular.

If the length (b) is longer than the length (a), then the shape of the net will be trapezoid.
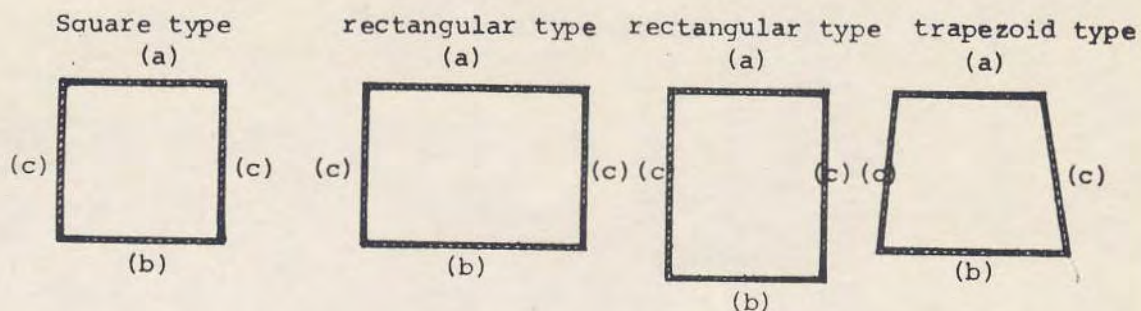
Fig. 5. Types of stick-held dip net

3) The length of the rope connected to the side
     of the net:

For the trapezoid: The length of the rope (c) is equal to a half of
     the sum of the length (a) and (b) or equal to length (b).

For the rectangular type: There are two rectangular types:
     One is long laterally and the other is short laterally.
     Therefore, rope (c) can be either longer or shorter than (a)
     and (b) as shown in Fig. 5.

For square type: The length of the rope (c) is equal to (a) and to
     (b).

Example: In the trapezoid type, if the effective length of the boat
     is 20 meters, then the length of the ropes (a), (b) and
     (c) of the net can be found as follows:

$$(a) = (b) \text{ or } 1.1 \times (a) \sim 1.2 \times (a) = (b)$$

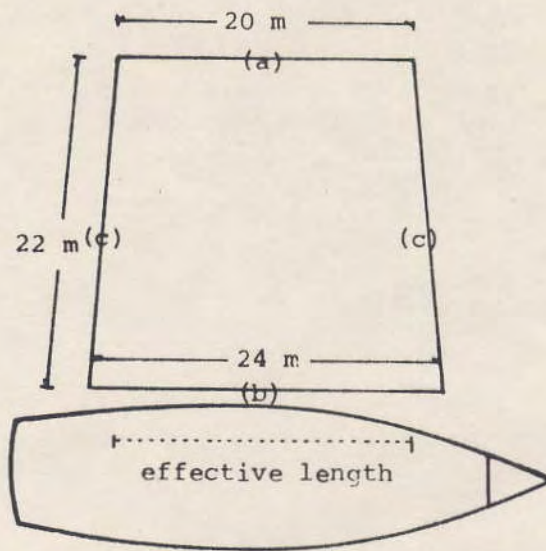$$(c) = (b) \text{ or } (c) = \frac{(a) + (b)}{2}$$

Fig. 6. Determining the length of the rope

The length (a) is the same as the effective length of the boat, i.e.

The length (b) is 10 to 20 percent longer than the length (a). If the length (b) is selected 20 percent longer than the length (a), then the length (b) will be 24 meters.

The length (c) is equal to a half of the sum of lengths (a) and (b). Therefore, the length (c) will be $\frac{20 + 24}{2} = 22$ (m)

3.2.2 Step 2. Determine the number of sections of the net.

> (1) The depth of one piece of net webbing is 5 meters or 7.5 meters.
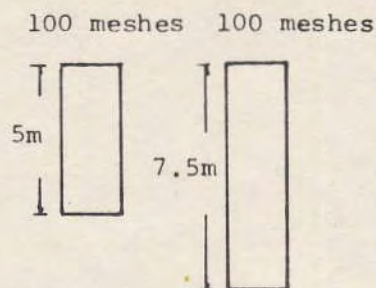
100 meshes   100 meshes

Fig. 7. Depth of one piece of
net webbing

> (2) The depth of net before hanging is 1.5 to 2.5 times the length (c).

Example: Depth of one piece of net webbing =   7.5 meters

Length (c)   = 22.0 meters

If we select twice the length of (c) for the depth of the net (2), then the depth (2) will be 44 meters. Therefore the number of sections of the net will be determined as follows:

44 meters ÷ 7.5 meters ≒ 6 (sections)

3.2.3   Step 3.   Determine the length of each section
by the carvature line drawn on the section
paper.

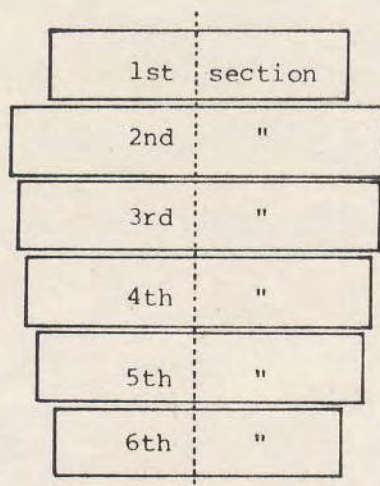| 1st	section
2nd	"
3rd	"
4th	"
5th	"
6th	"

Fig. 8.   Illustration of disposition
of sections

(i)   The length of the 1st section of the net is 1.5 to
2.5 times the length of the rope of the front end of
the net (a).

(ii)   The length of the 2nd and 3rd section should be longer
than the length of other sections in order to form a
pocket for the cod end in the net.

(iii) The length of the last section (6th section) should be
the shortest to reduce the current resistance and to
keep the net in good shape.

Example: According to step 2, 6 sections have been determined; the
length of each section will be found by the curvature line
drown on the section paper as follows:

If we choose twice the rope length (a) for the length of
the 1st section, then we will obtain 20 meters x 2 = 40 meters.

According to point (iii) above, the length of the 6th section should be less than 40 meters. Therefore, 38 meters could be chosen for the length of the 6th section.

(Note: Even though the length of the last section should be the shortest of all sections, the hanging ratio against the length of the rope (b) should be more than 35 percent.)

The lengths of the 1st and the 6th section are found by applying step 3. Then these two lengths are drawn to scale on the section paper.

The length of the 2nd to 5th section can be determined by drawing the net shape on the section paper. The length of each section can be adjusted and corrected to reach the desired shape of net.
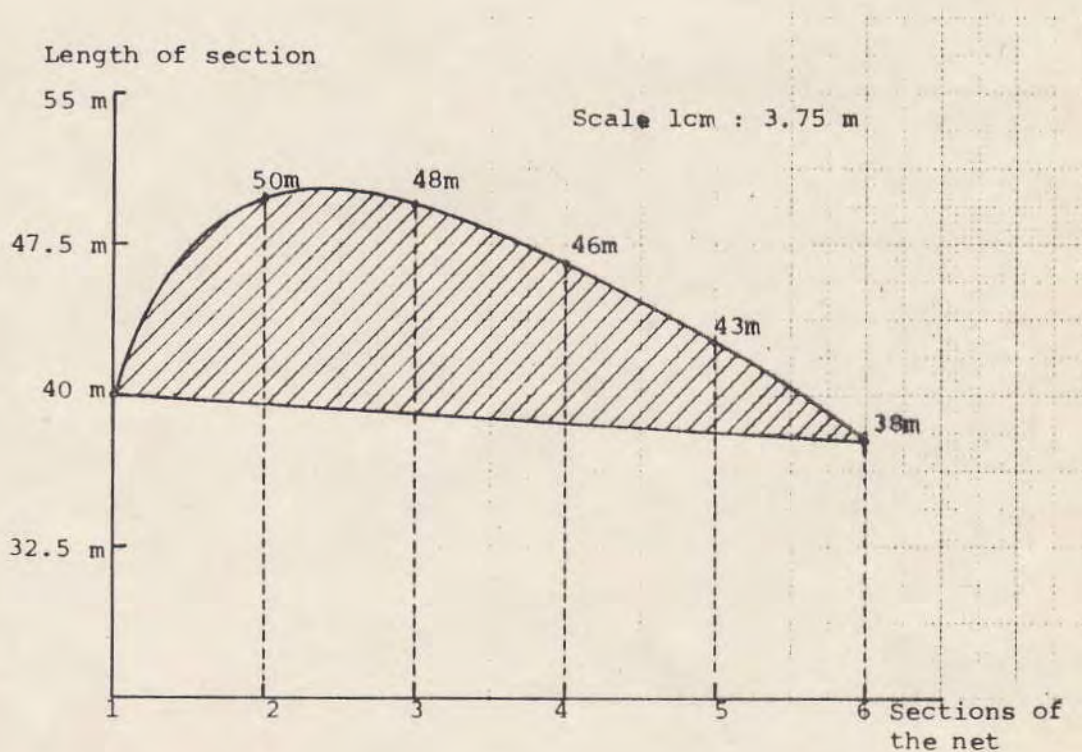

Fig. 9.   The shape of the net in water

According to the curvature on Fig. 9, the length of each section can be found as follows.

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1st section  =  40 meter
2nd    "     =  50    "
3rd    "     =  48    "
4th    "     =  46    "
5th    "     =  43    "
6th    "     =  38    "
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3.2.4 Step 4. Determine the net material and size and numbers of net pieces.

The size of the net and the materials used to construct the net should be chosen with regard to factors discussed in 3.1 above.

Example: Mackerel pike stick-held dip net

Particulars of the net material for 1st and 2nd section (cod end): Saran nylon mixed twine

12-ply - 22 cm mesh size - 100 meshes - 7.5 meters long.
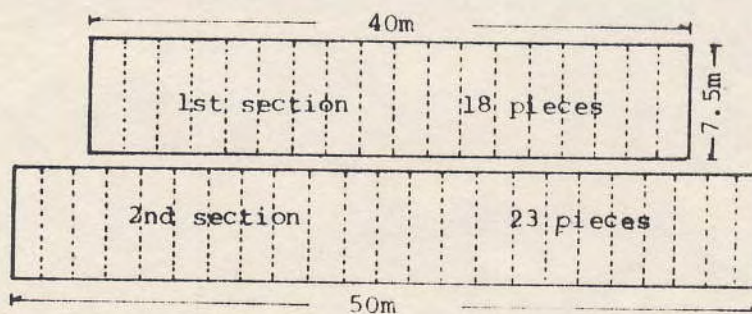

Fig. 10. Number of net pieces of 1st and 2nd section

According to step 3, the length of the 1st section and
the 2nd section is 40m and 50m respectively. Therefore,
the number of net pieces will be found as follows.

For the 1st section:

The width of one piece of the net is 2.2cm x 100 meshes
= 2.2 meters. Therefore, the number of net pieces will be found as
follows:

40m ÷ 2.2m ≑ 18 pieces.

For the 2nd section:

By the same procedure, the number of net piece will be 50 m
÷ 2.2m ≑ 23 pieces. Particulars of the net material for the 3rd -
6th section (main net):

Saran nylon mixed twine

9-ply - 2.2cm mesh size - 100 meshes - 7.5 meters long.

By the same procedure, the number of net pieces will be found as
follows.

3rd section: 48m ÷ 2.2m ≑ 22 pieces
4th section: 46m ÷ 2.2m ≑ 21 pieces
5th section: 43m ÷ 2.2m ≑ 20 pieces
6th section: 38m ÷ 2.2m ≑ 17 pieces

3.2.5   Step 5.   Determine the length of side net and
selvedge net.

1)   The length and depth of side net

Side net is necessary for the large type of
net. The side net is disposed between the main net and selvedge
net and its knot direction runs perpendicular to the mesh direction
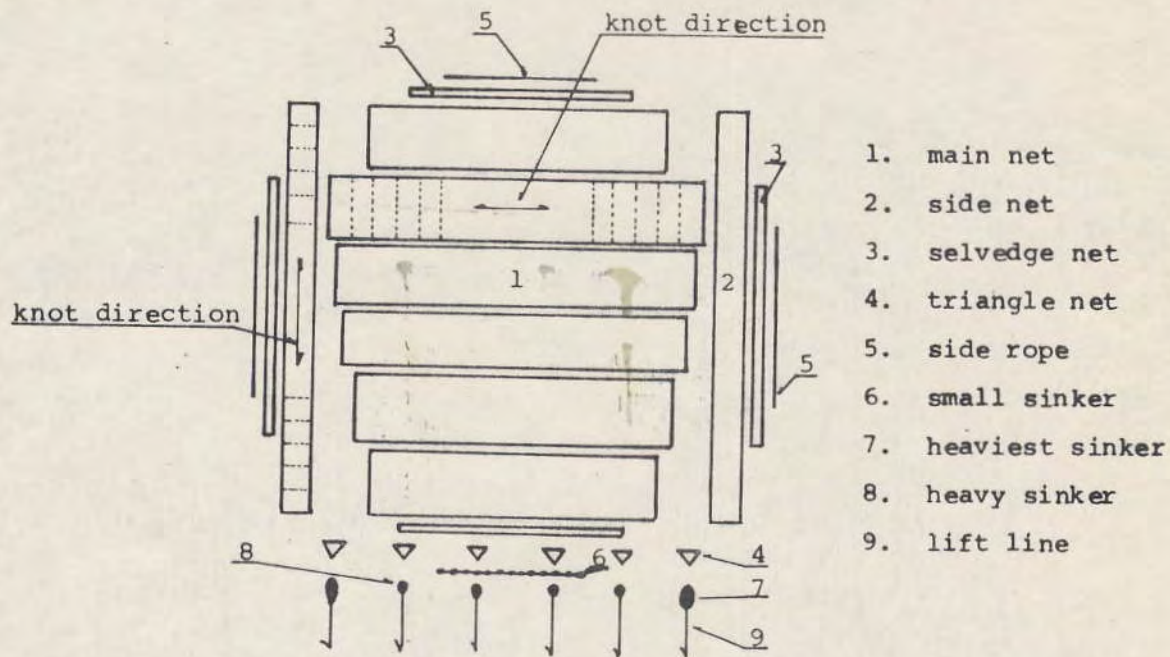of the main net.

Fig. 11.   Position of side net

1. main net
2. side net
3. selvedge net
4. triangle net
5. side rope
6. small sinker
7. heaviest sinker
8. heavy sinker
9. lift line

The depth of one piece of side net is half of the depth of the main net or the same as the depth of the main net, i.e. 3.7m or 7.5m in the case of 7.5m depth of the main net.

The length of the side net is the same as the total depth of the main net or a little shorter. Therefore, it will be found 7.5m x 6 = 45m or 43 - 44m.

2) Determine the length of selvedge net

The length of selvedge net will be determined by adding the length of the side net or the main net (when there is no side net) and side rope length, and dividing by two.

Example 1:   Length of side rope (c)   : 22 meters

                 Length of side net   : 45 meters

                 The length of side selvedge net will be found as follows:

$$\text{Length of side selvedge net} = \frac{22m + 45m}{2}$$

$$\doteqdot 34m$$

Example 2:   Length of rope (a)   : 20 meters

                 Length of 1st section   : 40 meters

$$\text{Length of upper selvedge net} : \frac{20m + 40m}{2}$$

$$= 30m$$

Example 3:   Length of rope (b)   : 24 meters

                 Length of 6th section   : 38 meters

$$\text{Length of lower selvedge net} = \frac{24m + 38m}{2}$$

$$= 31m$$

3.2.6 Step 6. Determine the accessories

      1) Lift line

         The length of lift line should be 3 to 4 times the length of rope (c)

      2) Sinker

         The sinkers attached to the outer lift lines should be heavier (20 - 30kg) than the others (10 - 15kg). 100-150 pieces of small sinkers (100 - 150g) are attached to the sinker line.
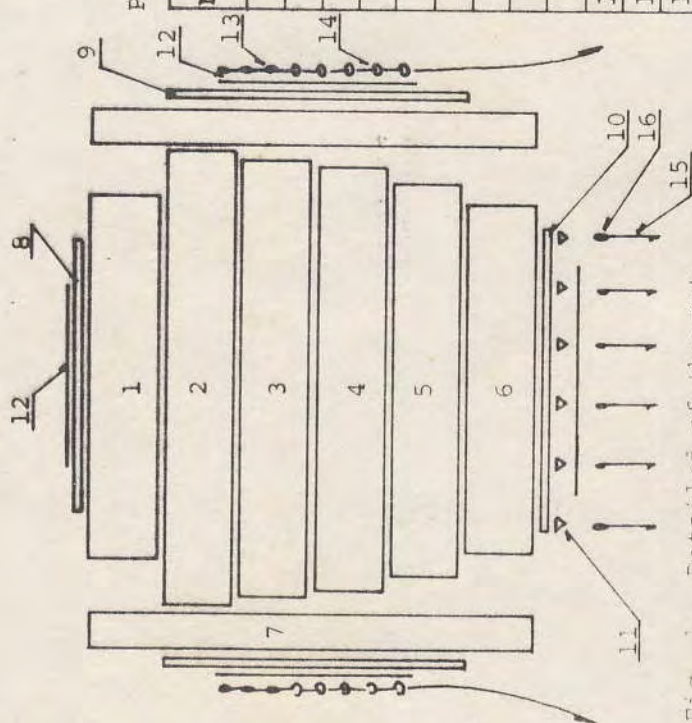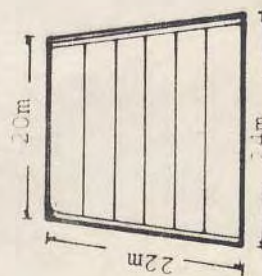
Stick-held dip net

Scale : 10 m : 1.2 cm

Particulars

No	Name	Twine	Size of mesh	No. of mesh	Length	No. of sheet
1	End (1)	SN/12	2.2 cm	100	7.5 m	18
2	End (2)	SN/12	2.2 "	"	"	23
3	Main 3rd	SN/9	2.2 "	"	"	22
4	Main 4th	"	"	"	"	21
5	Main 5th	"	"	"	"	20
6	Main 6th	"	"	"	"	19
7	Side net	SN/12	"	"	3.7 m	20 x 2
8	Selvedge	SN/24	3.5 cm	10	30 m	1
9	"	"	"	"	34 m	1 x 2
10	"	"	"	"	31 m	1
11	Triangle	SN/45	5.0 cm	1 ~ 10		6
12	Side line	Vinylon 10m/m dia S & Z			88 m	
13	Float	Synthetic 7 x 2½" x 1½"				5 x 2
14	Ring	2" cir. 10m/m dia				6 x 2
15	Lift line	Vinylon 12m/m dia 60 m				6 lines
16	Sinker	Lead Big size 20 kg ... 2 P'cs				
		" 15 kg ... 4 P'cs				
		Small size 100 g ... 100 P'cs				

* SN ..... Saran nylon mixed twine

Fig. 1. Detailed of the net

Fig. 2. View of the completed net

Mackerel pike stick-held dip net (small type)

Scale : none

Particulars
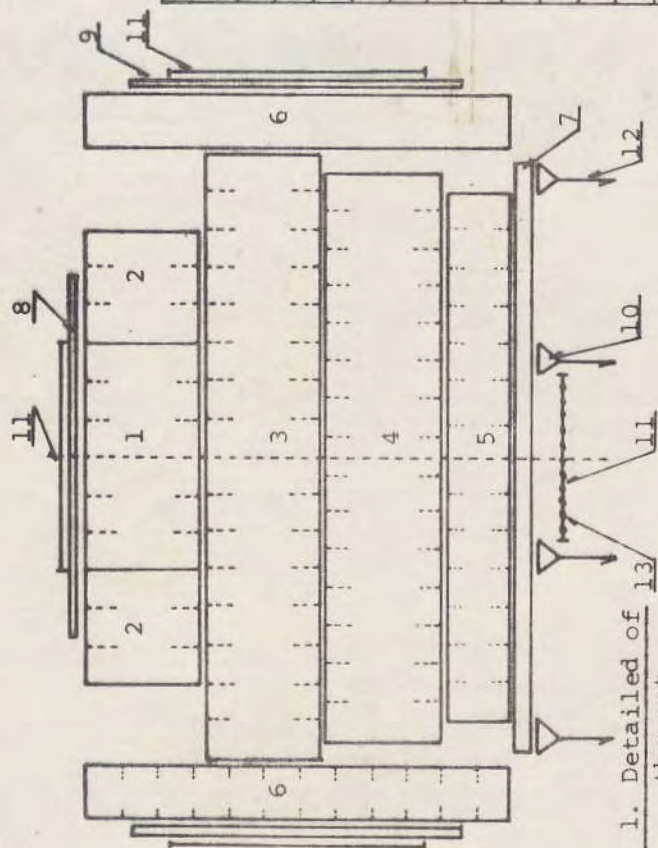
No.	Name	Twine	Size of mesh	No. of mesh	Length	No. of sheet
1	End Vinylon	20's/15	2.3	100	7.5m	6
2	Sub - end	20's/12	2.3	100	7.5	3x2
3	Main 2nd	20's/9	2.3	100	7.5	16
4	Main 3rd	20's/9	2.3	100	7.5	15
5	Main 4th	20's/9	2.3	100	3.8	14
6	Side	20's/9	2.3	100	3.8	12x2
7	Lower brim	20's/15	4.3	15	40.0	1
8	Upper set-wedge	20's/12	2.8	6	20.0	1
9	Side set-wedge	20's/12	2.8	6	20.0	1x2
10	Triangle	20's/45	4.3	1 - 15		4
11	Side line	Vinylon 6mm dia S&Z			35.5m	
12	Lift line	Vinylon 9mm dia			30m x 4	
13	Sinker	Lead 220c/P'ce				100 P'cs
14	Pole	Bamboo 10 cm dia 11 m				2 P'cs
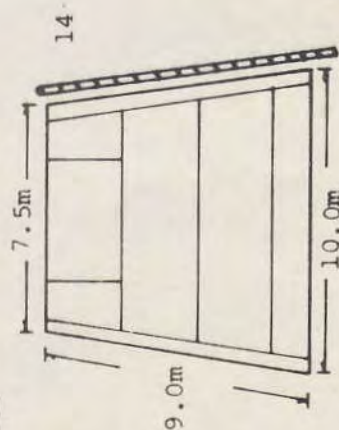
Fig. 1. Detailed of the net

Fig. 2 Size of completed net
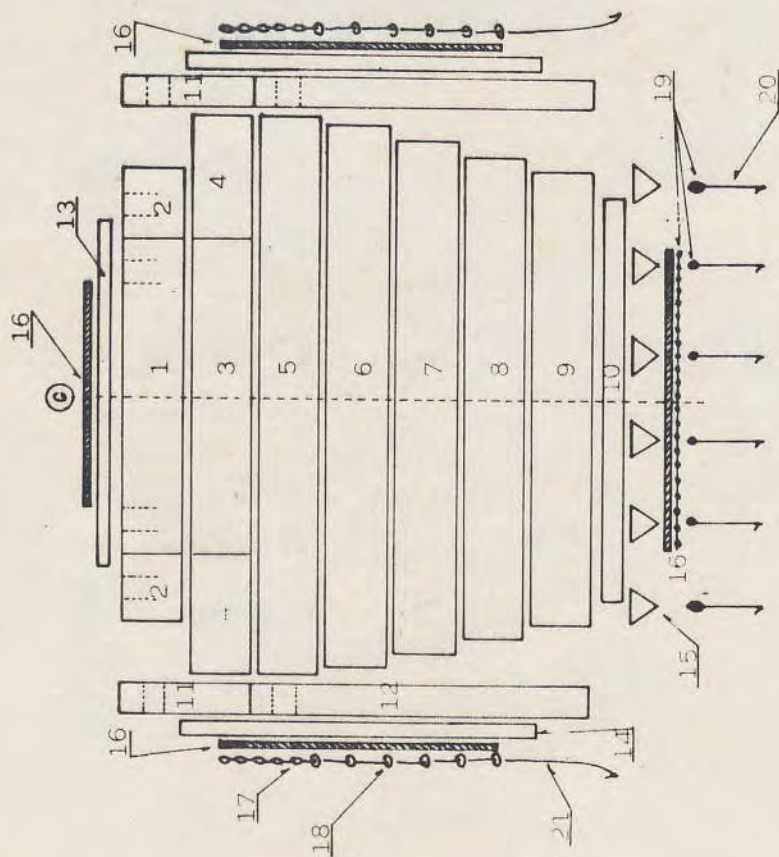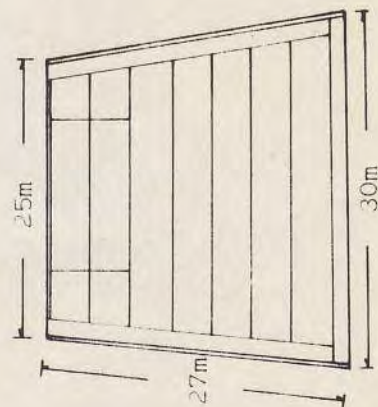
Mackerel pike stick held dip net

Particulars

No.	Name	Twin	Size of mesh	No. of mesh	Length	No. of sheet
1	End (1)	N210d/18	2.3 cm	100	7.5 m	14
2	Sub-end (1)	N210d/15	2.7 "	100	7.5 "	3 x 2
3	End (2)	N210d/18	2.3 "	"	"	14
4	Sub-end (2)	N210d/15	2.7 "	"	"	6 x 2
5	Main 3rd	SN/12	2.3 "	"	"	28
6	" 4th	SN/12	2.3 "	"	"	27
7	" 5th	"	3.3 "	"	"	17
8	" 6th	"	3.3 "	"	"	15
9	" 7th	"	4.3 "	"	"	10
10	" 8th	SN/24	6.0 "	50	40 m	1
11	Side net	SN/15	2.7 "	100	3.5 m	6 x 2
12	"	SN/12	3.3 "	100	3.5 "	11 x 2
13	Selvedge	SN/45	4.3 "	10	40 m	1
14	"	"	4.3	10	38 "	1 x 2
15	Triangle	SN/60	6.0	1 - 12		6
16	Side line	Vinylon 10m/m dia. S & Z			110 meters	
17	Float	7 x 2½" x 1½"				5 x 2
18	Ring	2½" Cir. 10m/m dia.				6 x 2
19	Sinker	Lead 20 kg 4	100g.			150 Pcs.
		30 kg 2				
20	Hauling line	Vinylon 16m/m dia. 90m				6 lines
21	"	Vinylon 16m/m dia.120m				2 lines

Note : N .... Nylon
SN .... Saran nylon mixed twine

Fig. 1. Detailed of the net

Fig. 2 View of the completed net

Sardine stick-held dip net

Scale : none
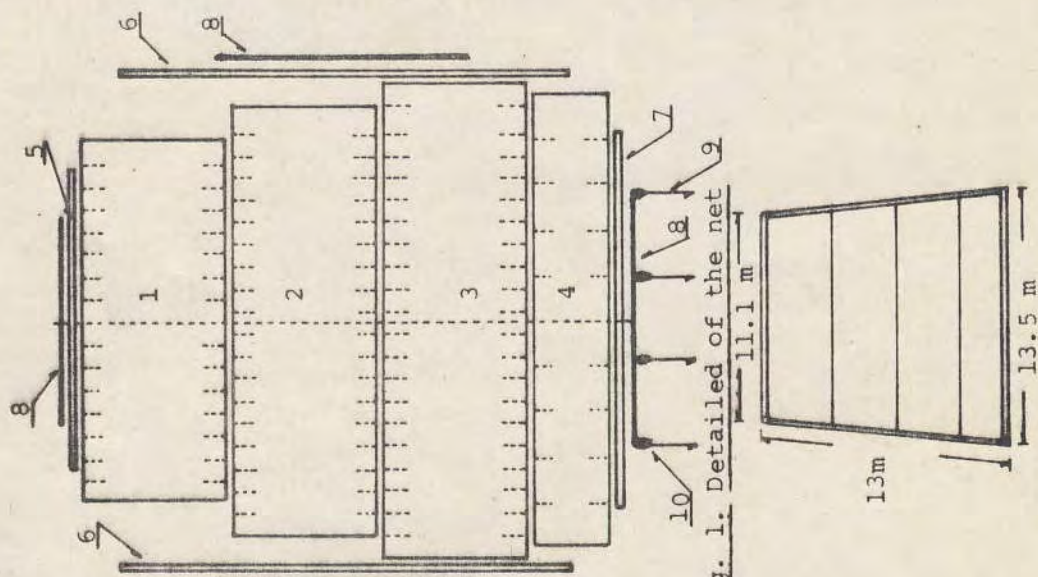
Particulars

No.	Name	Twine	Size of mesh	No.of mesh	Length	No. of sheet
1	End	nylon 210d/4	1.2cm	100	7.5 m	16
2	Main 1st	210d/4	1.2	100	7.5	19
3	Main 2nd	210d/4	1.2	100	7.5	21
4	Lower brim	210d/6	2.3	100	3.8	10
5	Upper sel-vedge	210d/15	3.0	6	15.0	1
6	Side vedge	210d/15	3.0	6	19.0	1x2
7	Lower sel-vedge	210d/15	3.0	6	19.0	1
8	Side line	Vinylon 6m/m dia S&Z			50.6 m	
9	Lift line	Vinylon 9m/m dia Z			40m x 4	
10	Sinker	Lead 7.5 Kg/P'ce			4 P'cs	
11	Pole	Bamboo 6 ~ 7 cm dia			13 m	

Fig. 1. Detailed of the net

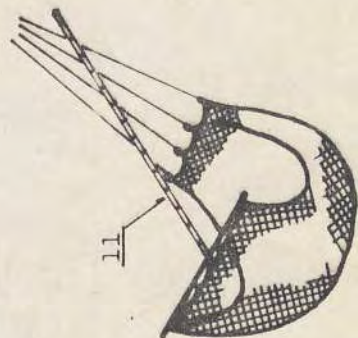Fig. 2. Size of completed net

Fig. 3. Schematic view of the net

Squid Stick-Held Dip Net used by SEAFDEC Training Boat "PLATOO"

Particulars

| No.	Name	Twine	Size of mesh	No. of mesh	Length	No. of sheet
1	End (1)	210d/4	2.5 cm	100	35 m	1
2	End (2)	"	"	"	39 m	1
3	Main 3rd	"	"	"	40 m	1
4	Main 4th	"	"	"	39 m	1
5	Main 5th	"	"	"	38 m	1
6	Main 6th	"	"	"	37 m	1
7	Main 7th	"	"	"	36 m	1
8	Main 8th	"	"	"	34 m	1
9	Main 9th	"	"	"	33 m	1
10	Selvedge	210d/6	3 cm	6	25 m	1
11	Selvedge	"	"	"	26 m	1
12	Selvedge	"	"	"	16 m	2
13	Side line	Vinylon 6 mm dia			90 m	1 line
14	Sinkers	Lead 3 kg x 4 pcs; 4 kg x 2 pcs				
15	Lift line	Vinylon 10 mm dia				6 pcs
16	Floats	7" x 2" dia (round)				90 pcs
17	Pole	Bamboo 10 m				2 pcs

Fig. 1. Detailed of the net
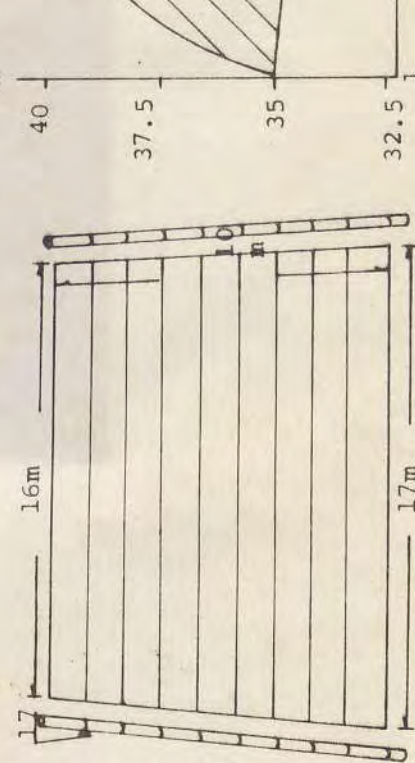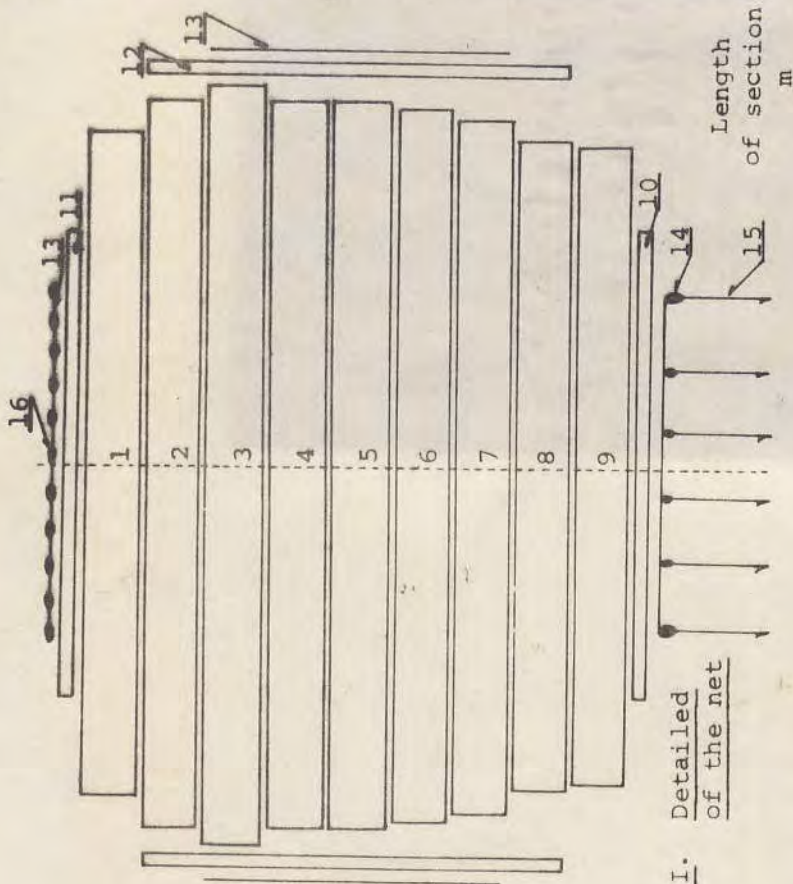
Fig. 2. Size of completed net
Scale 1 : 180
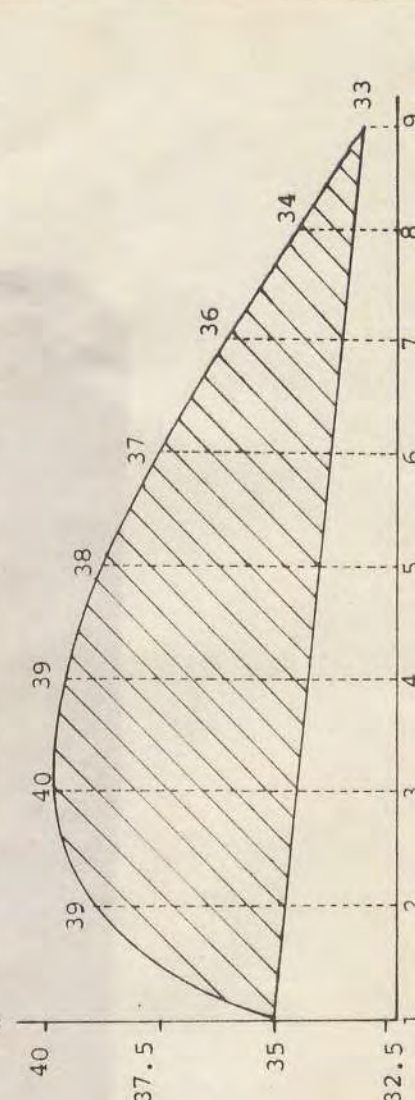
Fig. 3. Figure of the net under water
Scale 1 : 170