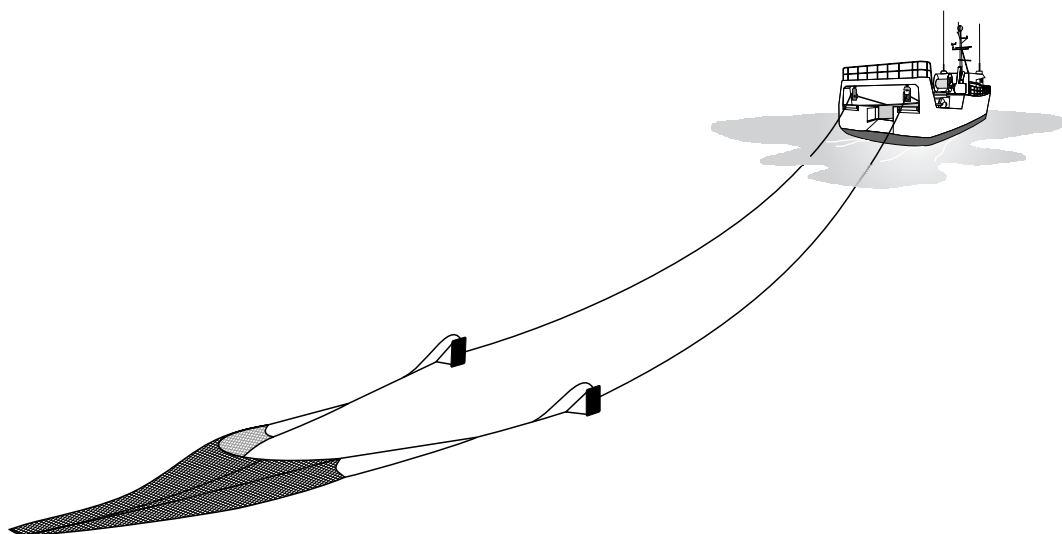


STANDARD OPERATIONAL PROCEDURE OF BOTTOM TRAWL



GENERAL AND PLANNING

Definition of Bottom Trawl Net Trawl nets, which are operated by dragging or towing the flexible net through the water by fishing craft. In particular otter board is operated from the stern of the vessel. Bottom trawl is operated by drawing the net along the sea bed to scoop up fish on or near the bottom, depending on manner in which the gear is constructed and rigged, its operating characteristic can be altered for use on various types of bottom and for many species of fish.

Trawl Net and Their Accessories SEAFDEC standard trawl net construction; refer to 2.3.1

Number of Fishing Station for the Resource Survey	<p>Respected to the Grid area which shown in 2, selection of the fishing station shall be designed as;</p> <p>Every grid of survey area or</p> <p>One fishing operation in every second one of series of assigned grid area or/and</p> <p>The area (grid) selection is depended on the available of survey budgetary or/and</p>
Number of the Operation on a Mapping Grid	<p>The number of operation for resource survey is designed whilst the process of research survey planning.</p> <p>1 operation or 2 operations or</p> <p>The number of operation on a grid is depended on research activities and designed whilst the process of research survey planning.</p>
Period of Trawl Fishing Operation	<p>Daytime or Daytime and night-time or</p> <p>If daytime and night-time is not any significant condition for survey, period of trawling shall be designed whilst the process of research survey planning.</p>

OPERATION

Fishing Operation Preparation	<p>Bottom condition is detected before start fishing operation by using essential fishing finder or echo sounder and</p> <p>Essential information of weather and oceanographic condition are collected</p>
Towing Time	<p>1 hour or shall be designed whilst the process of research survey planning.</p>
Depth of Operation	<p>The maximum depth is not more than 500 m. (According to the towing warp length, 1500 m.)</p> <p>Depth shall be detected by using fish finder or echo sounder, Recommended to record characteristic of bottom topography from the starting position to finishing position of the operation and</p> <p>Paper echo sounder (If any) is recommended.</p>



Speed of Operation Towing speed is constant at 3-4 knots and Recommend not to adjust towing speed during fishing operation except for the recovery of malfunctioning gear.

Speed measurement

Speed of trawl net itself relative to the water. (If speed sensor is fixed at the trawl net) or

Speed of vessel over the ground compare with the actual speed over the ground during the operation, calculated by the measure towing distance compare with the towing time. Unit of speed is measured by unit of knot (nautical mile per hour)

Towing direction Towing shall be straight direction and Recommend to avoid changing of towing direction except the towing direction is obstructed by some objects. Record the details of towing direction and time consuming of each direction

Recording the direction by 3-digit place.

Warp length



Tension meter

Warp length is released 3-5 times of the sea depth

The warp length is recorded when the brake of trawl winch is fastened and

Warp length is measured by the unit of meter(m) and

Recommend not to adjust towing warp during fishing operation except for the malfunction of gear or operation is occurred and

Warp length is measured by checking warp counter meter, compare with the length marker on the towing warp

Recommended to check the warp tension by using tension meter and measure by the unit of Kilogram (Kg)



Wire counter meter

Monitoring Devices Net depth shall be detected by Depth sensor; SCANMAR measurement is unit of meter and

Net spreading shall be detected by distance sensor; SCANMAR. Measurement is unit of meter and

In order to calculate the sweeping area, Clinometers shall be used to

Depth sensor and Distance sensor



check the spreading of otter board by measure the warp angle using, The calculation shall be compared with the information by distance sensor.

Bottom topography shall be detected by essential hydro-acoustic equipment and the detection shall be done over the whole area of fishing operation.

Information Recording The recording of Starting fishing time

Start recording the towing time when trawl net reaches at the sea bottom (If depth sensor : Scanmar or other is fixed at the trawl net) or Start recording the towing time when the brake of trawl winch is fastened (If depth sensor: Scanmar or other is not fixed at the trawl net).



The recording of Finishing fishing time

Recording the finishing of towing time when trawl net is lifted from the sea bottom (If depth sensor: Scanmar or other is fixed at the trawl net) or

Recording the finishing towing time when start hauling the trawl warp (If depth sensor: Scanmar or other is not fixed at the trawl net).

The recording of Fishing position

Fishing position shall be recorded by using the GPS (Global Positioning System) or an equally accurate navigation system for position measurement and

Position recording by unit of Latitude and Longitude.

The recording of Start fishing position

Recording the starting position when trawl net reaches at the sea bottom (If depth sensor: Scanmar or other is fixed at the trawl net) or

Recording the starting position when the brake of trawl winch is fastened (If depth sensor: Scanmar or other is not fixed at the trawl net).

The recording of Finishing fishing position

Recording of finishing position when trawl net is lifted from the sea bottom. (If Depth sensor: SCANMAR or other is fixed at the trawl net) or

Recording the finishing position when start hauling the trawl warp. (If depth sensor: SCANMAR or other is not fixed at the trawl net).

Gear malfunction

If the malfunctioning of gear or operation is occurred trawl fishing operation should be cancelled and re-operate in the same area.

Record the malfunction of the gear or operation into the Fishing logsheet.

BIOLOGY AND OCEANOGRAPHY RELATED MEASUREMENT

Catch Sampling and Recording Procedure

Respected to the standard sampling and operation procedure by FAO, see Appendix B



Measurement Procedure

Refer to Appendix A
Catch hauled on board shall be classified to specie. Common name and scientific name shall be recorded into fishing logsheet.



Sampled Fish shall be measured by total length in unit of centimeter(cm), with one decimal place.

Sampled Fish shall be measured the width in unit of centimeter(cm), with one decimal place in order to find out the selective of trawl net.

Sampled squid shall be measured by mantle

length in unit of centimeter(cm), with one decimal place.

Shrimp, mantis shrimp and lobster catch shall be measured by the length between eyes to telson in unit of centimeter (cm), with one decimal place.

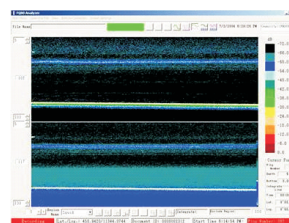
Unformed catch, i.e. jelly fish, octopus and etc., shall be weighted in the unit of Kilogram(kg), with two decimal place.

Catch hauled on board shall be weight in unit Kilogram(kg), with two decimal place.

Indicator of Abundance

Catch Per Unit Effort (CPUE) shall be measured by Kilogram/Hour (Kg/hr)

Catch Per Unit Area (CPUA) shall be measured by Kilogram/Square Nautical mile (Kg/nmi²)



Stock assessment shall be investigated by Scientific Echo Sounder.

Indicator of Abundance

Sea water temperature related to the depth shall be collected by XBT or CTD



Oceanographic Data Collection

Sea water salinity related to the depth shall be collected by

XCTD of CTD

Type of bottom should be collected by grab Core or Grab.

Benthos and other micro-organism shall be collected by Grab