

A DESCRIPTION OF FISHING GEAR AND PROCEDURES OF SETTING AND HAULING OF TROT AND SPANISH SYSTEM FOR TOOTHFISH IN A SCIENTIFIC RESEARCH PLAN IN THE DIVISION 58.4.1 OF INSUNG No.3

ABSTRACT

The Trot line and Spanish long line system was applied to a Scientific Research plan for No.3 INSUNG during the season 2012/2013. Through comparing Trot and Spanish fishing gears, we will demonstrate which gear and bait will produce the best results in the scientific research at SSRU 58.4.1. We will also explain the description of fishing gear and procedures of setting and hauling of Trot and Spanish system. However, the main purpose of this research is to study the reproductive ecology of the *D. mawsoni* such as the reproductive cycle, main spawning season fecundity and biological minimum size. However, last season (2012/13) No.3 INSUNG could not evaluate all of the objectives because of limited samples due to the harsh sea conditions.

I. Introduction

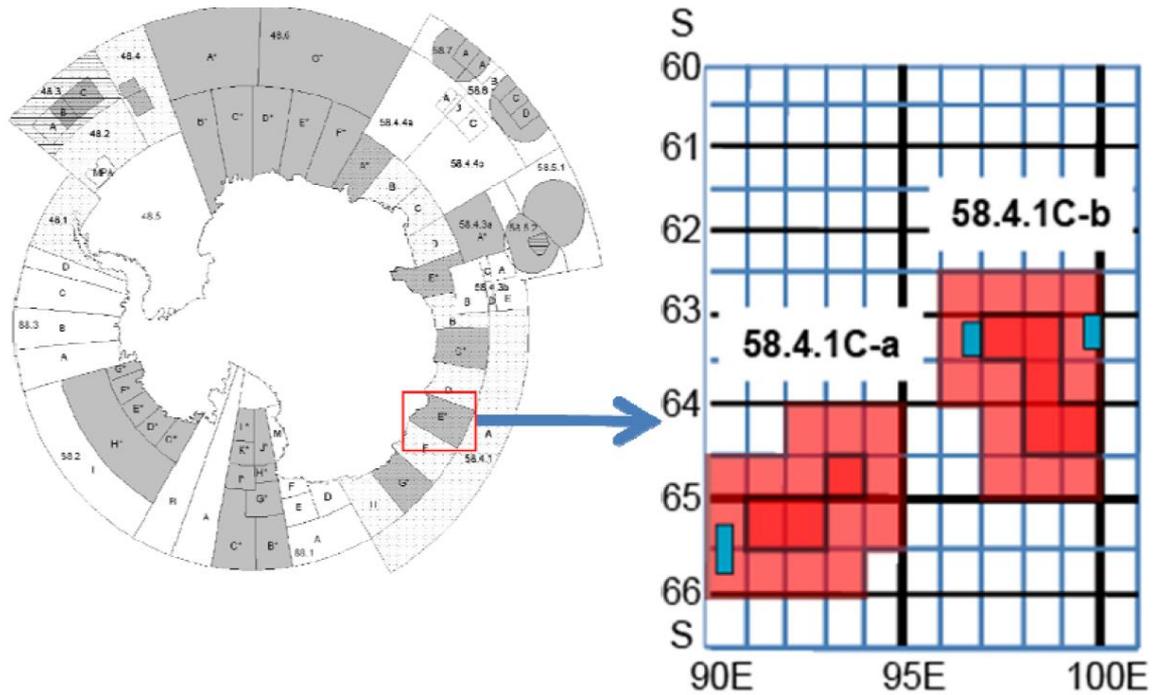
- We submitted the primarily results comparing catch rates between the trot line and Spanish line, and estimations of biological parameters based on the collected data from the first research at the meeting of SAM which was held at Germany this June. For the purpose of this multi-year research, we will collect the same data year by year, and we will submit comparison results among the estimated biomass for *Dissostichus* spp.
- **Fishing area** : The exploratory fishery in 2012/13 shall , subject to conditions in CM 41-01, Annex 41-01/B , take place in the research blocks bounded by coordinates (SSRU C,E) in according with CM 24-01, CM 21-02 paragraph 6(iii), CM 41-01, Annex A, B, C
- One set means Trotline setting and hauling with Spanish line setting and hauling. Each set is three miles apart from each other. A number of hooks at Trot line and Spanish line are 2,400ea each. Usually, the Spanish system is carried out after setting the trot line.
- Bait : Use the same bait (Trot line : SQU/ Spanish : SQU) for 1 Set
Next use the same bait (Trot line : SIX / Spanish : SIX) for 1 Set
- Bottle Test and Soaking time:
 - Bottle tests were implemented. The average time of sinking at 2012/2013 scientific research at SSRU 58.41(C.E) were:
 - Trot line: 0.5~0.77 m/sec
 - Spanish line: 0.38 ~0.5 m/sec

The sinking rate of trot line was higher than the Spanish line if one considers the influence of sea birds

- Soaking time at each haul was implemented at around 12 hours (± 6 hours),

1.1 Result for Fishing activity for 58.4.1 C

D. mawsoni for this study was collected at SSRU 58.4.1C within the CCAMLR Conservation Zone from February, 2013 to March, 2013 using No. 3 Insung as a part of Korean research plan for the exploratory fishery. Total of 84 toothfish (45 females and 39 males) were used for the analysis (Total 3.061kgs (58.4.1 C-B 114KG/ 2 fishes + 58.4.1 C-a 2,974kgs/86fishes))



1.2 Used bait



Bait : Humboldt squid SQU (*Dosidicus gigas*, Upper side) and pacific herring: SIX (*Clupea pallasii* Lower side)

II. Description of gear and operation

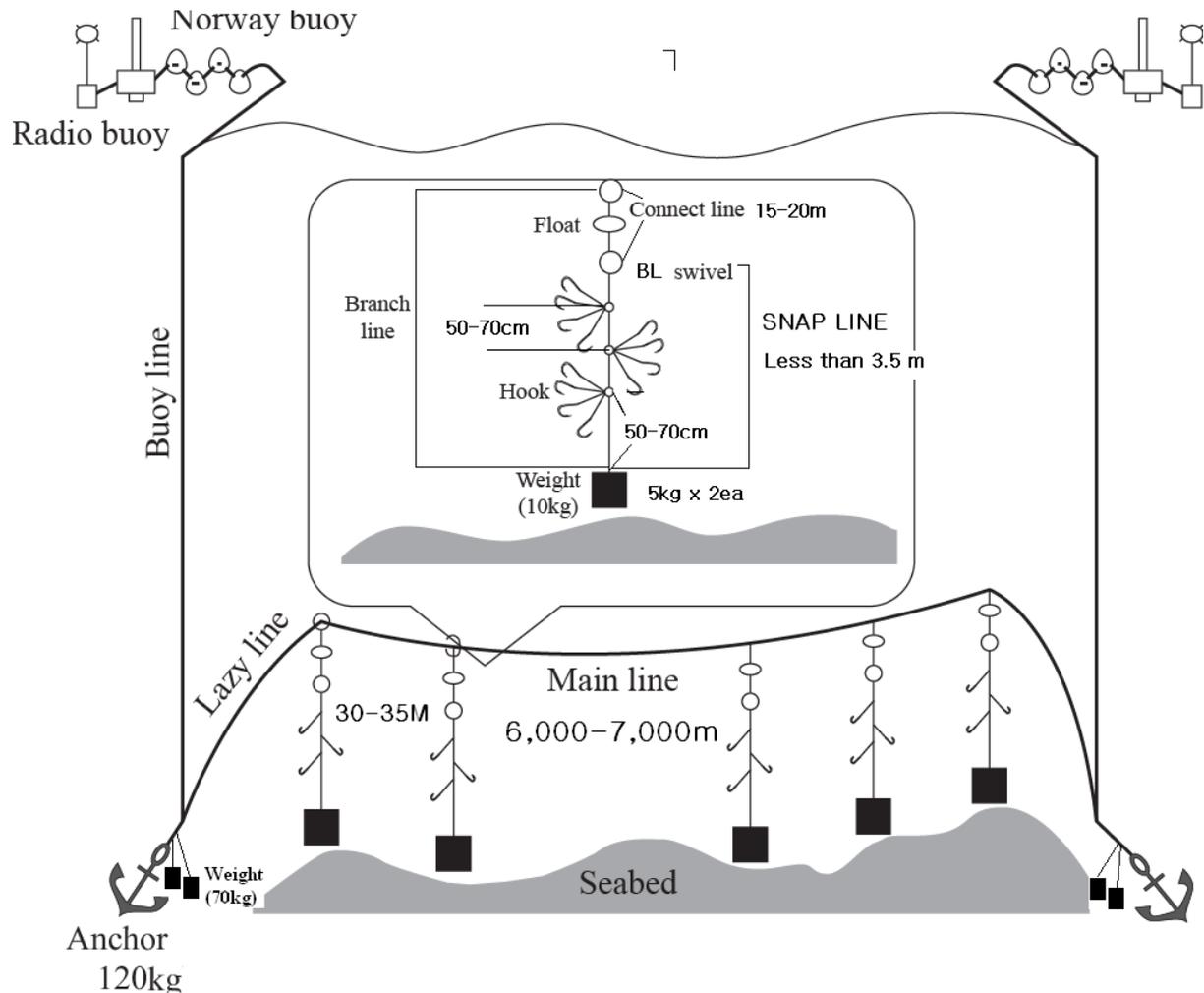
2.1 Structure of fishing gear for Trot line

Trot line : About 2,400ea hook are deployed on each set

- Lazy line(from anchor to before mainline) is 200m. Branch line(connect line + snap line) is connected to main line . At the bottom end of this branch line, 2 weights are connected and weight of them are 5kgs each (total 10kgs).
- Total 200 branch lines are connected to main line successively at interval of 30~35m.
- To each branch line, there are 3 clusters and each of them consists of 4hooks(total 12 hooks at branch line)
 - Attaching a small float on connect line makes fishing gear move vertically. Small float's buoyancy prevents fishing hooks and sinkers from contacting with the seafloor during fishing.
 - Therefore, we believe that the trot-line system can cause very low impact on VMEs and seabirds.
- It takes about 30 minutes to complete the setting and 2.5 hours for hauling for depth 800m- 1,500m



Figure 1 : Picture of fishing gears of Trot line



List of fishing gears	Type	Base on calculation	Length & Number (Approximately)
Main line	Polypropylene 20m/m (P.P)	30m x 200 B/K	6,000 m~7,000m
Buoy line	Polypropylene 20m/m		3,000m ~ 4,400 m
Branch line	Polyethylene 9m/m	18m~20m x 200 B/K	3,600m ~ 4,000 m
Hook line	Polyethylene 3m/m	60~ 70cm x200B/K x 12hook	1,440 ~ 1,680 m
Hook		12hook x 200B/K	2,400 EA
Sinker	70kg		5 EA
Sinker	5kg	200 B/K x 2EA	300~400 EA
Anchor	120kg		2 EA
Radio buoy			2 SET
Norway buoy	A-5 or A-6		6 EA
Swivel	BL	200 B/K x 1EA	200 EA
Swivel	20m/m		2 EA
FLOT BUOY	YE-20	200 B/K x 1EA	200 EA
Plastic float buoy & Eva float buoy	180m/m~200m/m		45EA~50EA

*Depending on sea-ice conditions (for preventing the loss of fishing gear), either plastic float buoy & eva float buoy or Norway buoy is used.

Figure 2 : Specification of fishing gears of Trot line

2.2 Structure of fishing gear for Spanish line

- Branch line(snap line) is attached to the main line. The Branch line functions as holding weights and aparejo line. Aparejo line extends horizontally and holds the swivels(5m/m) which connect the snood (hook line). Swivels are spaced at about 1.5 m intervals at aparejo line.
- About 2,400 hooks are deployed on each set in general and it takes about 20 minutes to complete the setting and 1.5 hours for hauling at depth 800m- 1,500m

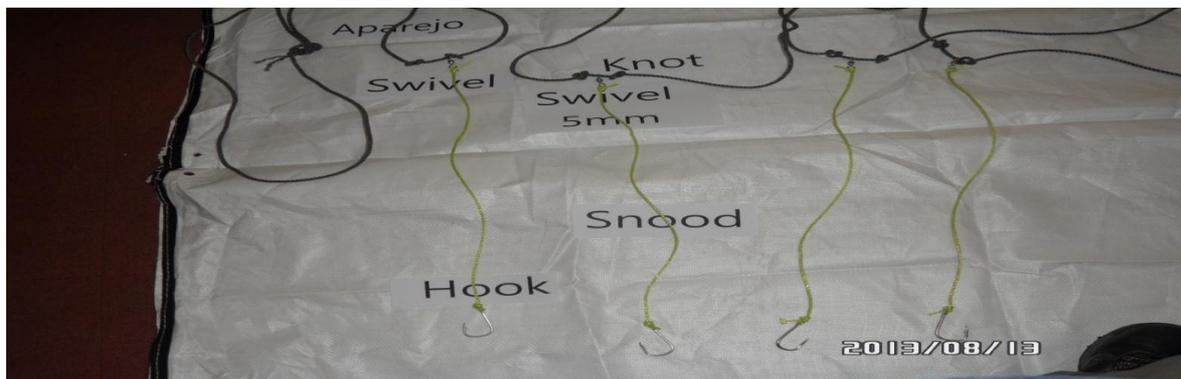
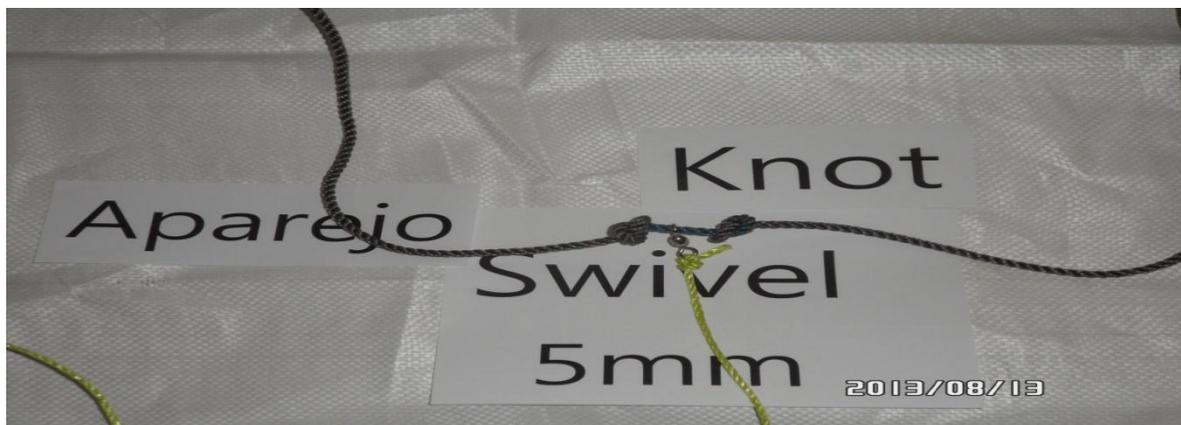
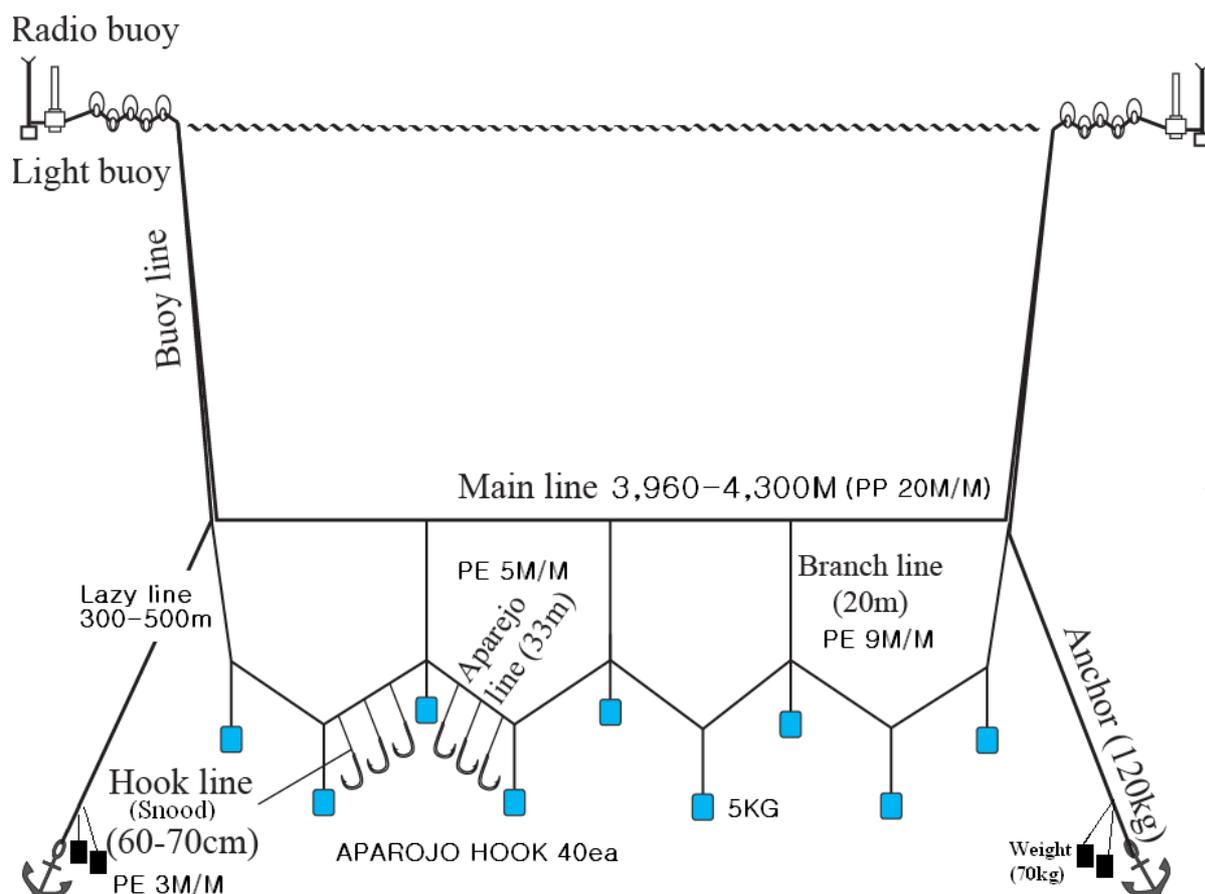


Figure 3 : Picture of fishing gear of Spanish line



List of fishing gears	Type	Base on calculation	Length & Number (Approximately)
Main line	Polypropylene 20m/m (P.P)	60 B/K x 66M	3,600m~4,300m
Buoy line	Polypropylene 20m/m		3,000m ~ 4,400 m
Branch line	Polyethylene 9m/m	18m~20m x 60 B/K	1,080m ~ 1,200 m
Aparejo line	Polyethylene 5m/m	66M x 60 B/K	3,960 m
Hook line	Polyethylene 3m/m	60~70 cm	1,440~1,680 m
Hook		40 hook x 60B/K	2,400 EA
Sinker	70kg		4 EA
Sinker	5kg	2EA x60 B/K	120 EA
Anchor	120kg		2 EA
Radio buoy			2 SET
Norway buoy	A-5 or A-6		6 EA
Swivel	5m/m	40EA x60 B/K	2,400 EA
Swivel	20m/m		2 EA
Plastic float buoy & Eva float buoy	180m/m~200m/m		45EA~50EA

*Depending on sea-ice condition(for preventing the loss of fishing gear), either plastic float buoy & eva float buoy or Norway buoy is used.

Figure 4 : Specification of fishing gears of Spanish line

3. Terminology and material fishing gear

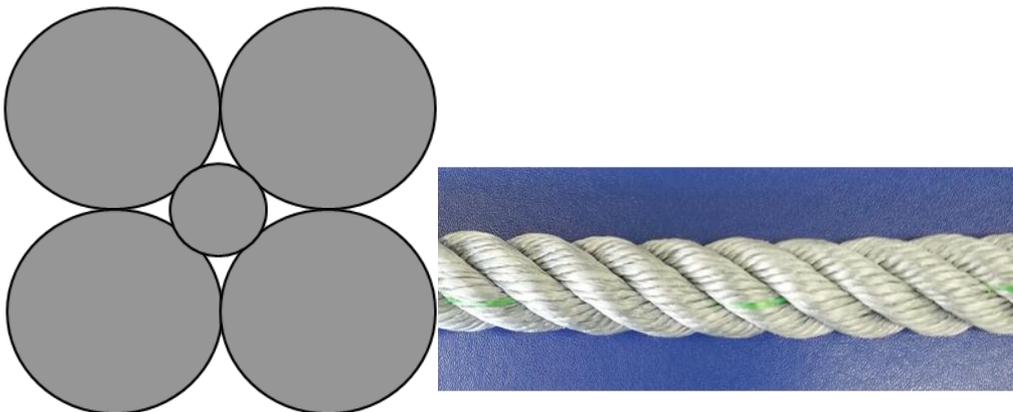
3.1 Main line The primary section of the line extends horizontally parallel to the bottom, and snap lines and lazy lines are attached (Diameter: 20mm)

- Length of Mainline of Trot line : 6,000 m~ 7,000m
- Length of Mainline of Spanish line : 3,960m~-4,300m

3.2 Buoy line Vertical line that is connected to lazy line. The length of the buoy line is normally equal or 200m more than the depth of water

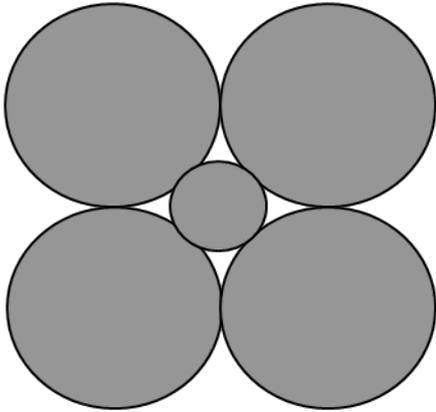
3.3 Lazy line : A Section of line that connects the main line with the buoy line.
The length is 300~500m and works to prevent kinks with the branch line.

- Material for those three lines: Polypropylene 4 S/T 20MM (SECTIONAL VIEW)-
Trot line and Spanish system



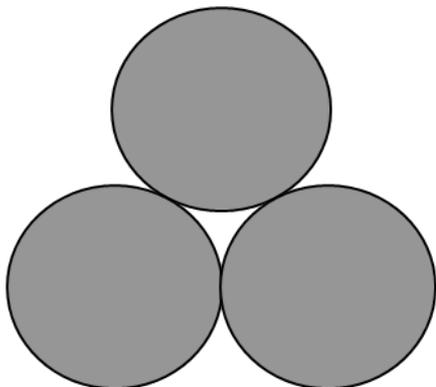
3.4 Branch line (SECTIONAL VIEW)

- PE 4 S/T 9MM(polyethylene)



3.5 Aparejo line : Only used at the Spanish long line

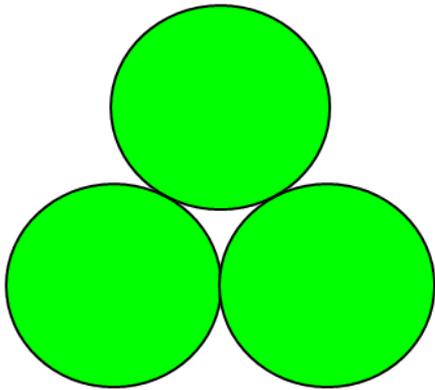
- A section of line to which the snood and hooks are attached vertically
- PE (polyethylene) 3 S/T 5MM





3.6 Hook line (SNOOD)

- FILM 3 S/T 3MM



3.7 Anchor first weight (120kg)

The anchors(120kg) are tied by sinkers(70kgs)



Figure 5 ANCHOR 120KG

3.8 Sinker(70kg)

An additional weight to immobilize the down line. It located beside the Anchor (70kg x4ea -1set)



Figure 6. Sinker Weight 70kg

3.9 RADIO BUOY (PRSC-30, SEL- CALL BUOY UNIT)

Frequency(1.9MHZ, 2MHZ). Radio buoy was highly visible with vessel identification marks



Figure 7. Radio buoy



Figure 8. GPS Buoy(M2P)

3.10 Norwegian buoy and plastic float buoy & eva float buoy:

Buoyant highly visible with vessel identification marks



*Depending on sea-ice conditions (for preventing the loss of fishing gear), either plastic float buoy & eva float buoy or Norway buoy is used.

Figure 9. Norwegian buoy and Plastic float buoy & Eva float buoy

3.11 Sinker (5kg)

To each bottom end of drop line, a weight of 10kgs(5kg x 2ea) is set

○Trot line : 300~ 400 ea/ 1Set / ○ Spanish line : 120ea / 1Set



Figure 10 Sinker 5kg

3.12 Hook

- 1) Trot line (1Set : 2,400ea)
It linked to the branch line
- 2) Spanish line (1Set : 2,400ea)
It linked to hook line



Figure 13 HOOK

The circle- type hooks. Circle 32x65x3 mm, made of steel in South Korea

3.13 Float Buoy

- Small float's buoyancy makes fishing gear move vertically. The small float's buoyancy prevents fishing hooks and sinkers making contact with the seafloor during setting, hauling, and soaking process. Therefore, we carefully estimate that the trot-line system can cause very low impact on VMEs and seabirds

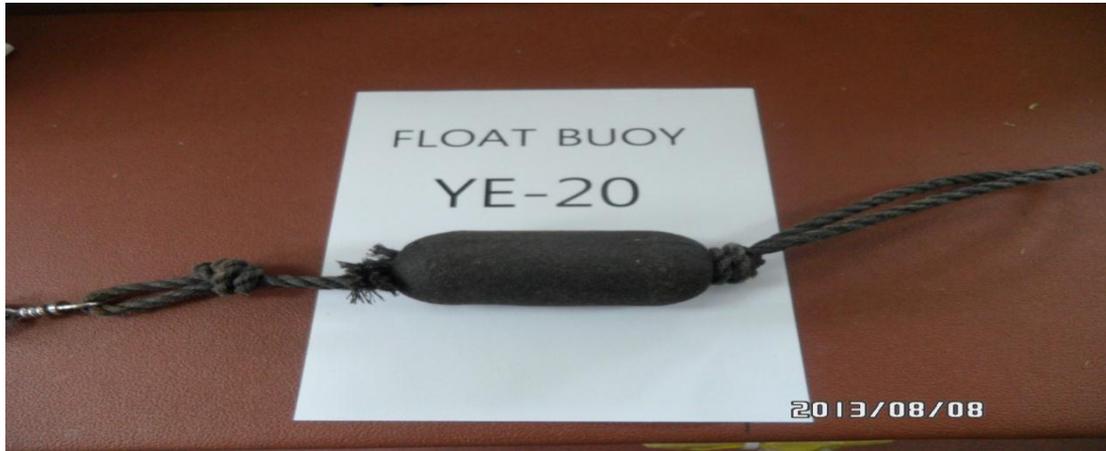


Figure 14 Float Buoy

3.14 APAREJO Box

It consists of 20 hooks and used only for the setting of Spanish long line system



Figure 15 ; APAREJO Box

3.15 Swivel

- Trot line : A coupling device (BL SWIVEL) made of stainless steel which connects the connect line and snap line.
- Spanish line : A coupling device (Swivel 20mm) made of stainless steel which connects the Aparejo line with Snood

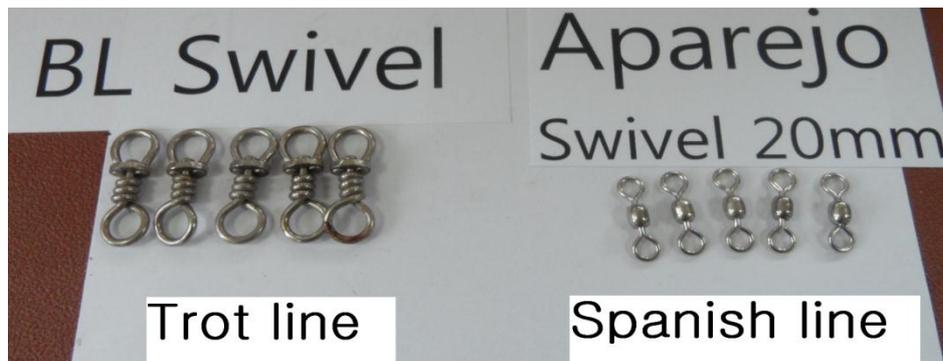


Figure 16 : Swivel

3.16 Line hauler

An automatic winch system which is used to retrieve line on board

- ◆ Hydraulic winch MC-6000 of «*Indunosfer SL* » for hauling of the mainline of a Longline- Trot line and Spanish



- ◆ HALADOR Hauler « *Indunosfer SL* » for hauling of aparejo line of the “spanish longline type”(NAH-637)



III. Method of Setting and Hauling line for Trot line and Spanish (1Set Trot line + Spanish)

Firstly The main considerations before setting are depth of water, wind, and tidal movement as well as local sea bird activity, number of and behaviour

➤ Setting a line

Fishing Gear	TROT LINE	SPANISH LINE
SETTING A LINE	<ol style="list-style-type: none"> 1) Set radio buoy & Norway buoy(3~4ea) 2) Set buoy line The speed of the buoy line setting is 10 knots and when 400m is left, reduce the speed to 6~7 knots. 3) After the setting over, anchor line which is connected to buoy line will be moved with anchor and two 70kg sinkers. 4) After that, lazy line will be moved. 5) While lazy line is moving, connect branch line with two 5kg sinkers and snap line. After lazy line is moved, main line with branch line will be moved. 6) After wanted numbers of branch line are set, the other lazy line with two 70kg sinkers and anchor will be moved forward to the ocean. 7) After the setting of sinker and anchor, set buoy line (increase the speed to 10 knots) 8) Set radio buoy and Norway buoy 9) Depending on the direction of setting, we call it fair tide setting or reversed tide setting. 	<ol style="list-style-type: none"> 1) Set radio buoy & Norway buoy(3~4 ea) 2) Set buoy line. The speed of the buoy line setting is 10 knots and when 400m is left, reduce the speed to 6~7 knots. 3) After the setting over, lazy line which is connected to buoy line will be moved with anchor and two 70kg sinkers. 4) After that, lazy line will be moved. 5) While lazy line is moving, connect hooks with bait at Aparejo line in Aparejo box to 5kg sinkers. After lazy line is moved, Aparejo line, branch line, mainline will be set at the same time. ○Number of hooks in Aparejo box is 20ea and the number of hooks between 1B/K(snap line distance) is 40ea. 5) After wanted numbers of branch line are set, the other lazy line with two 70kg sinkers and anchor will be moved forward to the ocean. 6) After the setting of sinker and anchor, buoy line will be set (increase the speed to 10 knot) 7) Set Radio buoy and Norway buoy, and when the setting of those buoys is over, whole setting is finished. 8) Depending on the direction of setting, we call it fair tide setting or reversed tide setting.

➤ **Hauling a line**

Fishing Gear	TROT LINE	SPANISH LINE
Hauling Line	<ol style="list-style-type: none"> 1) Lift radio buoy and Norway buoys, and coil up buoy line (it is take time 30~40 minutes at the depth of 2000m) 2) Lift anchor and two 70kg sinkers with crane and wind up lazy line 3) Then, snap line that connected to main line will be lifted 4) Haul hook line and snap line separately. 5) Separate branch line and 5kg sinkers at operating room. 6) After the hauling of all snap lines, lift the other anchor, two 70kg sinkers, and buoys while coiling up buoy line and lazy line. 	<ol style="list-style-type: none"> 1) Lift radio buoy and Norway buoys, and coil up buoy line (it is take time 30~40 minutes the depth of 2000m) 2) Lift anchor and two 70kg sinkers with crane and coil up lazy line 3) Then, branch line that connected to main line will be lifted. Haul Aparejo line and branch line separately. 4) Haul main line with Hauling machine in the processing room and Aparejo line with HALADOR at the same time 5) Separate hooks and Aparejo line at processing room, and separate 5kg sinkers. 6) Put hooks in Aparejo box for next setting. 7) After the hauling of Aparejo line, lift the other anchor, two 70kg sinkers, and buoys while coiling up other buoy line and lazy line.