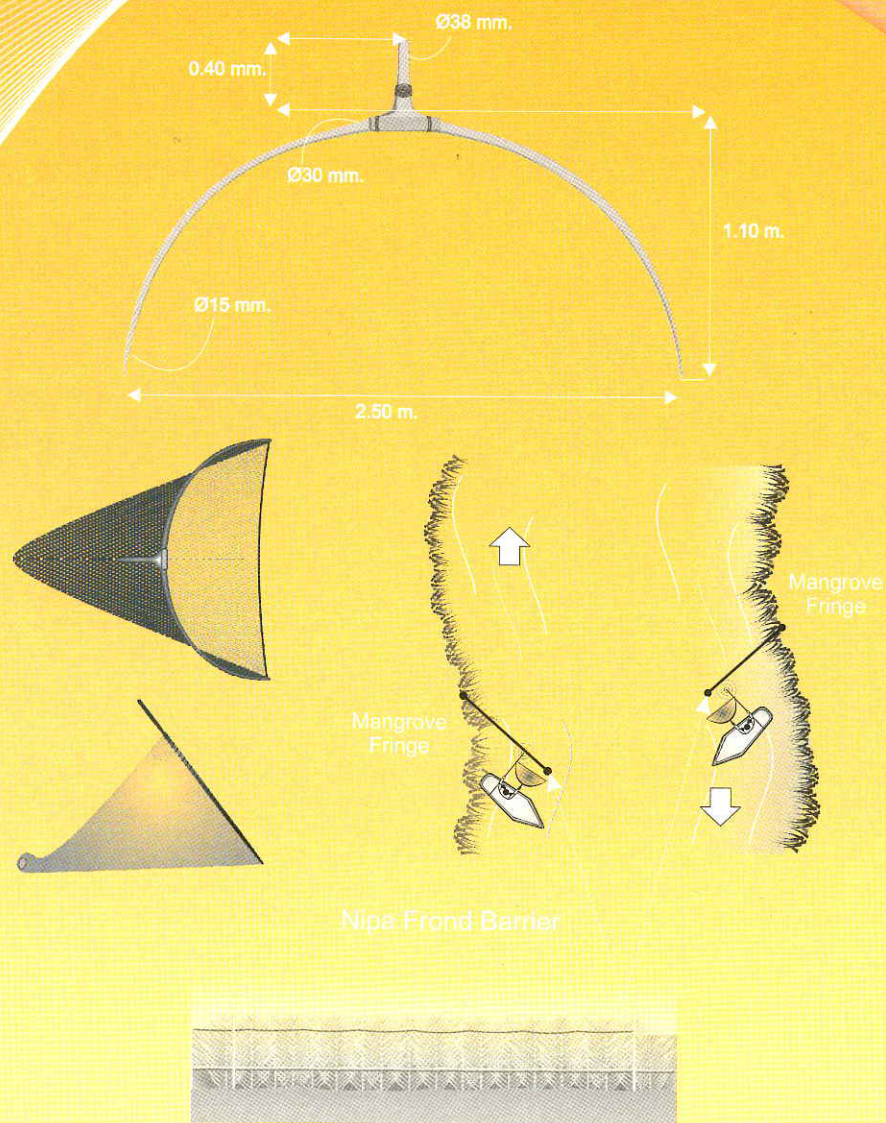


FISHING GEARS AND METHODS IN SOUTHEAST ASIA :

V. BRUNEI DARUSSALAM



DEPARTMENT OF FISHERIES / BRUNEI DARUSSALAM
SEAFDEC / TRAINING DEPARTMENT



What is SEAFDEC?

The Southeast Asian Fisheries Development Center (SEAFDEC) is an autonomous intergovernmental body established as a regional treaty organization in 1967 to promote sustainable fisheries development in Southeast Asia.

Objectives

SEAFDEC aims specifically to develop fishery potential in the region through training, research and information services in order to improve the food supply through rational utilization of fisheries resources in the region.

Functions

To achieve its objectives the Center has the following functions:

1. To offer training courses, and to organize workshops and seminars, in fishing technology, marine engineering, extension methodology, post-harvest technology, and aquaculture.
2. To conduct research and development in fishing gear technology, fishing ground survey, post-harvest technology and aquaculture, to examine problems related to the handling of fish at sea and quality control, and to undertake studies on the fisheries resources in the region; and
3. To arrange for the transfer of technology to the countries in the region and to make available the printed and non-printed media, which include the publication of statistical bulletins for the exchange and dissemination related to fisheries and aquaculture development.

Membership

SEAFDEC members are the ASEAN Member Countries (Brunei Darussalam, Cambodia, Indonesia, Lao PDR., Malaysia, Myanmar, the Philippines, Singapore, Thailand and Vietnam) and Japan.

FISHING GEARS AND METHODS IN SOUTHEAST ASIA:

BRUNEI DARUSSALAM

Edited by

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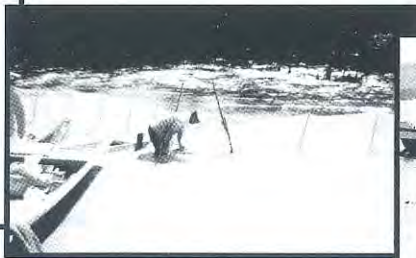
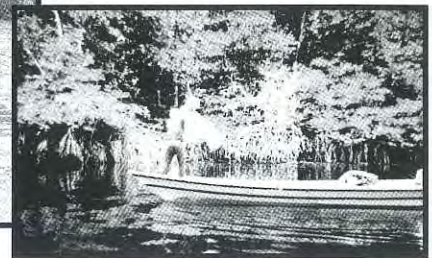
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Fishing Gears and Methods in Southeast Asia :

BRUNEI DARUSSALAM



DEPARTMENT OF FISHERIES / BRUNEI DARUSSALAM
SEAFDEC / TRAINING DEPARTMENT



FISHING GEARS AND METHODS IN SOUTHEAST ASIA:

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FOREWORD



Assalamualaikum Warahmatullah: Taala Wabarakatuh

Bismillahir Rahmanir Rahim

The capture fishery is one of the important industries in Brunei Darussalam which has contributed to more than 70% of the total fish production in the country.

Fishing has been one of the traditional pastimes using small-scale gears such as cast nets, hooks and lines and many more. Now it has evolved to a high technology fishing using trawls, purse seiners and long liners. Being aware that there are limited marine fisheries and fishing areas in Brunei Darussalam, careful fisheries management is a must in order to sustain the capture fisheries industry, and therefore the Department is currently implementing a course of actions such as the adoption of selective fishing gears and the prohibition of destructive fishing methods and gears as well as regulating fishing through licensing according to zones.

The Fishing Gears and Methods in Brunei Darussalam highlights the different types of fishing gears and methods that have been used in both coastal and offshore waters of Brunei Darussalam. It is our sincere hope that this Monograph would serve as a useful reference and guide to those who are interested with the fishing industry in Brunei Darussalam.

Finally, on behalf of the Department, I would like to express and extend our sincere appreciation and heartfelt gratitude to those that have been involved in the preparation of this Monograph, especially the staff of the Training Department, SEAFDEC, who have assisted in putting it all together and the local fishermen who have been cooperative in providing valuable information, thus making it possible for this Monograph to be completed.

Wassalam

HAJAH HASNAH IBRAHIM

Director

Department Of Fisheries

Ministry Of Industry And Primary Resources

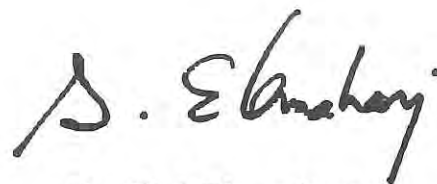
Brunei Darussalam

Preface



This compilation of the most important fishing gears and methods commonly used in Brunei Darussalam is the fifth volume in the Monograph Series, "Fishing Gears and Methods in Southeast Asia" with the initiative of SEAFDEC/Training Department. The aim is for better understanding of the existence structure of marine fishing gears and fishing techniques in Brunei Darussalam. The survey was started in collaboration with the Department of Fisheries of Brunei Darussalam since 2004. The study was a part of ASEAN-SEAFDEC program on "Responsible Fisheries Technology and Practices" funded by Government of JAPAN through the trust fund program in fisheries.

This volume contains description of 48 types of marine fishing gears presently employed in the marine fisheries of Brunei Darussalam. Fishing methods of tenth important groups namely surrounding nets, seine nets, trawls, lift nets, falling gears, gill nets, traps, scoop nets, hook and lines and miscellaneous gears are also described. It is hoped that this book can serve as a useful reference for those who are interested in marine fisheries in Brunei Darussalam.

A handwritten signature in black ink, appearing to read "S. Ekmaharaj". The signature is fluid and cursive, with a large initial 'S' and a period following it.

Dr. Siri Ekmaharaj
Secretary-General
and
Chief of the Training Department

Chapter 1

Introduction

1. INTRODUCTION

Brunei Darussalam is located in the northwestern part of Borneo. It has a land area of 5,765 km² and 130 km long coastline fronting the South China Sea. The total marine territorial area is estimated at about 38,600 km² covering the Brunei Fisheries Limits with the potential yield of about 21,300 mt. The coastal waters of Brunei Darussalam are characterized by narrow continental shelves, having a total area of about 8,600 km². For the purpose of fisheries management, the fishing area is divided into four zones as shown in Figure 1.

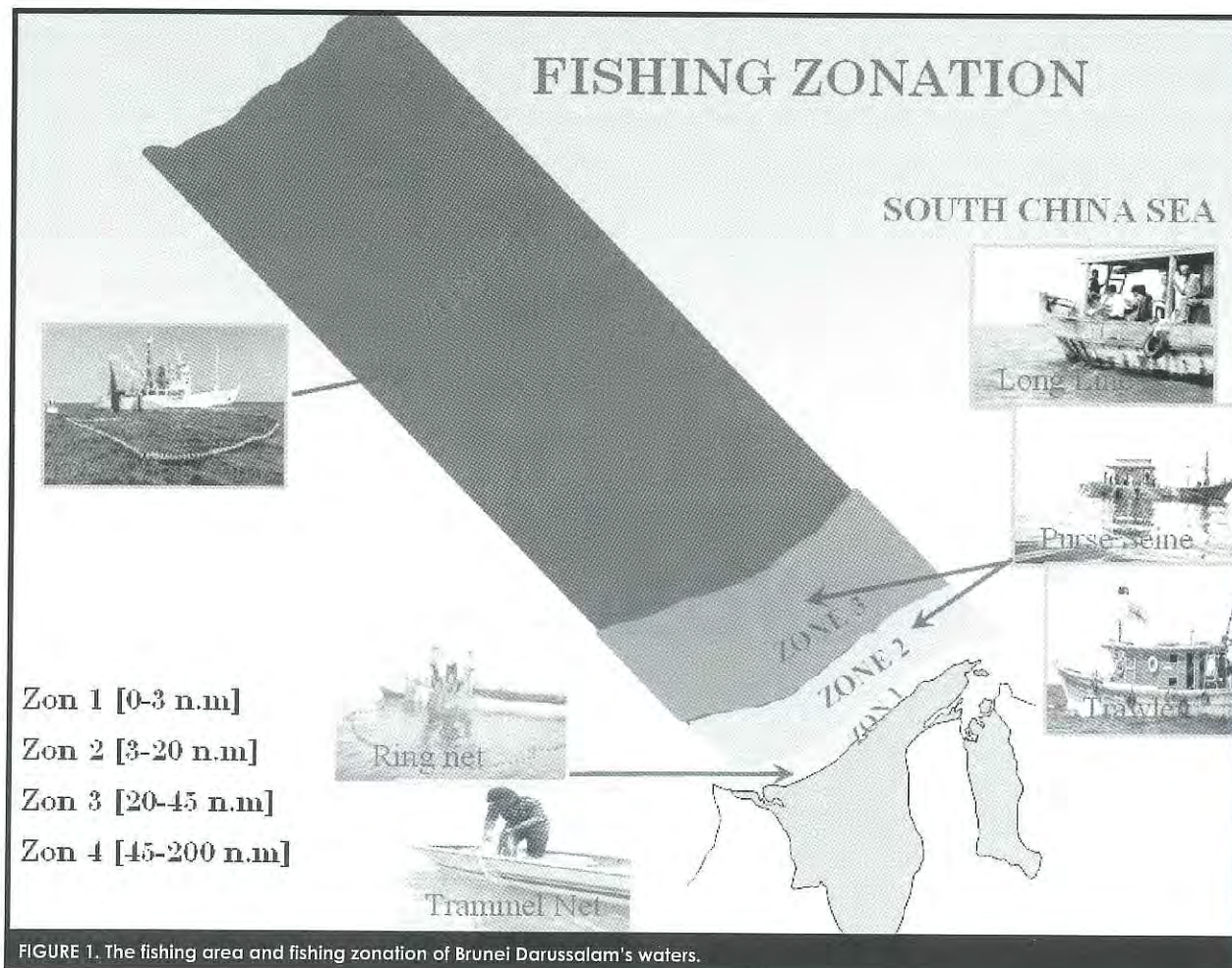


FIGURE 1. The fishing area and fishing zonation of Brunei Darussalam's waters.

The zone 1 extends from 0 to 3 nautical miles offshore and is exclusively for small-scale fishermen with small boats, operated only using traditional fishing gears. (e.g.: set bottom net, trammel net, traps, hook and lines). While zone 2 extends from 3 to 20 nautical miles offshore and is operated by inboards vessels having engine of not more than 350 horsepower with gross tonnage not less than 60 tons. Zone 3 extends 20 to 45 nautical miles offshore and is open for purse seiners having engines with 351 to 600 horsepower and gross tonnage from 60.1 to 150 tons. The zone 4 extends from 45 to 200 nautical miles offshore and is open for larger vessels as follow:

- Purse seiner and Tuna Long Line having engines greater than 600 Horsepower and gross tonnage greater than 150 tons.

In the global development of the capture fisheries, the quality of fishing gears and methods is an important factor especially in the exploitation of the marine fisheries resources and its impact on the marine environment. In Brunei Darussalam, capture fishery is still on its developmental stage but is wary of the experiences of the neighboring Asian countries. Its current posture is learning from the lessons of other countries that are now having problems on overexploitation and depletion of fish stocks that is mainly due to uncontrolled and destructive fishing methods and gears.

The work being described here is a result of a team effort of the staffs of the Department of Fisheries to provide a technical description of the existing fishing gears and methods in use in Brunei Darussalam as well as the technical inputs and assistance from the Training Department of SEAFDEC⁴. It is aimed in improving the catch by modifying the gear and the same time eliminating its destructive effects to the environment. However, before any gear modification is made, a technical assessment of the existing gears and methods must be done and such is the primary objective of this report.

This report also presents a brief overview of the status of the capture fisheries of Brunei Darussalam, covering the resources and its characteristics as well as its management that are necessary towards goal of sustainable development of fisheries.

1.1 Capture Fisheries in Brunei Darussalam

Fisheries Resources and Potential

The fish fauna of Brunei Darussalam is typical of the fish communities in the Southeast Asian seas with high species diversity. About 500 species of fish and invertebrates have been reported from the catch of various fishing gears used in Brunei waters. There are two main resource groups caught during fishing operations namely, demersals and pelagics. Overall, the fisheries resources in Brunei waters are estimated at about 21,300 metric tons in terms of potential yield. This is based on the survey studies conducted by the Department of Fisheries in the recent years. The bulk of the resources comprise the demersal amounting to about 12,500 metric tons while the pelagics was estimated at about 8,800 metric tons

Demersals

The term "demersals" refer to fishes and invertebrates that spend most of their life on or near the sea bottom. The demersals account for the bulk of the catch of various gears in Brunei waters numbering about 400 species (out of 500). About 100 species occur regularly in bottom trawl catches. The species includes slipmouths, goatfishes, breams, croackers, grunts, lizardfishes, sea catfish and mojarras to name a few.

Pelagics

The term "pelagics" on the other hand, refer to fishes that spend most of their adult life living through the water column away from the sea bottom. Considering less diverse than the demersals, the pelagics is still species rich consisting roughly of about 100 species. The pelagics caught by various fishing gears in Brunei waters belong to two major groups namely, the small and large pelagics. The small pelagics include roundscads, mackerels, anchovies, herrings, jacks, butterfishes and cobia to mention some while the large pelagics include yellowfin tuna, bigeye tuna, billfishes, skipjacks, sharks, wolf herrings, barracudas, bonitos, etc.

1.2 Current Exploitation

Fisheries sector plays an important role in the economy of the country. The fisheries of Brunei Darussalam contributes about 1.1% in the GDP as the year 2004 and is targeting a greater contribution by optimizing its annual potential yield of about 21,300 mt with the value of B\$ 112 million. Presently, fish remains the main source of animal protein for the people of Brunei Darussalam. One of the highest worldwide, per capita consumption of fish in 2004 was estimated at about 47 kg/yr. It is estimated that the fish consumption during 2004 is about 16,816 mt of which most are fresh fish.

1.2.1. Capture fish production trend

Figure 2 shows the general trend in the total annual production from both the commercial and small-scale capture fisheries of Brunei Darussalam from 1999 to 2005.

The total production from the capture fisheries industry has increased remarkably by about 67% from 9,620 mt to 16,069 mt in 1999 and 2005, respectively. And on the average, about 70% of the total production is contributed by the small-scale fisheries sector and 30% from the commercial-scale fisheries sector.

⁴ SEAFDEC - Southeast Asian Fisheries Development Center

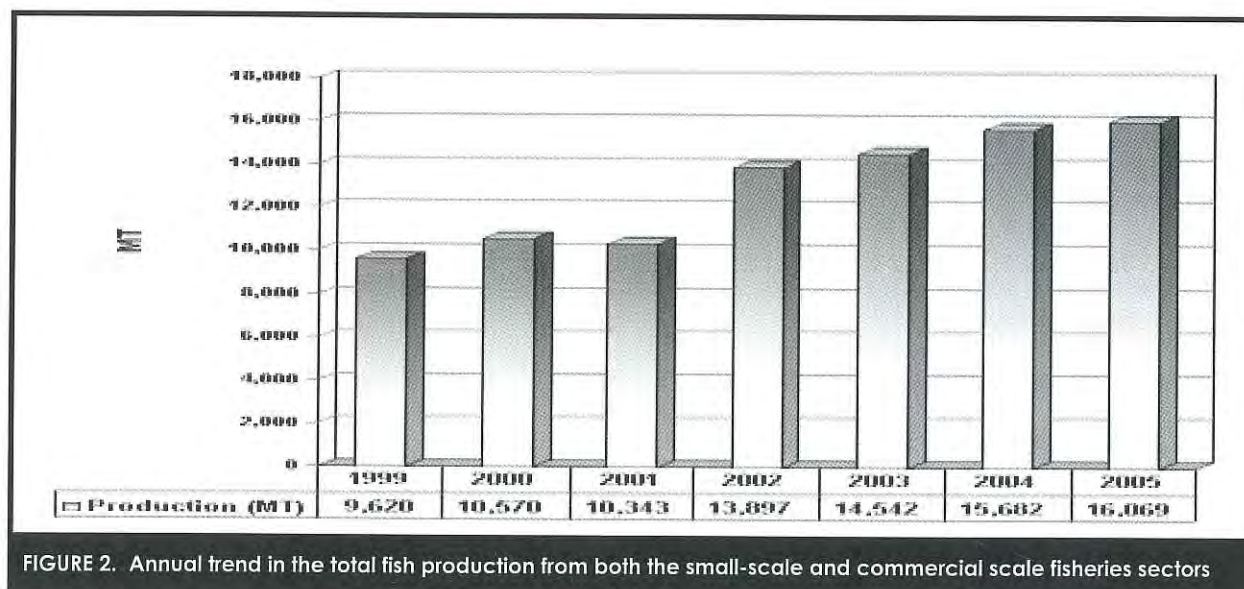


FIGURE 2. Annual trend in the total fish production from both the small-scale and commercial scale fisheries sectors

1.2.2 Capture Fisheries Technology

Commercial-scale fisheries

About 30% share of the total production from commercial fisheries sector is contributed by the bottom trawlers, purse seiners and long liners that operates mainly in zones 2 and 3 of Brunei fishing limits. The scenario of declining productivity among capture commercial fishing venture is clearly influenced by the dwindling production performance of the bottom trawlers from 1990 until 2005. Table 1 below, presents the annual production from the major commercial fishing boats of Brunei Darussalam as well as the annual change in the number of fishing boats and gear units.

The bottom-set longliners and the purse seiners that re-started operating in 1999 and 2001, respectively, has yet to boost up its minimal contribution to the total commercial fisheries production. Conversely, the pelagic fishing using purse seine contributed about 1,235 mt only in 2005 that is way below the expected maximum sustainable yield (MSY) of about 7,000 mt per year. This means that the potential increase in the capture fisheries production relies on the development of the pelagic fishing especially in zones 3 and 4 of Brunei Darussalam.

TABLE 1. Marine fisheries production and number of units from among the commercial sector from 1990 to 2005

YEAR	TRAWL UNITS	TRAWL PRODUCTION (mt)	P SEINE UNITS	P SEINE PRODUCTION (mt)	LONGLINE UNITS	LONGLINE PRODUCTION (mt)	TOTAL
1990	9	1,807	3	563	-	-	2,367
1991	11	3,307	3	663	-	-	3,970
1992	10	3,607	3	371	-	-	3,978
1993	16	2,843	5	382	-	-	3,225
1994	17	2,977	3	56	-	-	3,033
1995	17	3,297	1	115	-	-	3,412
1996	23	3,820	1	75	-	-	3,895
1997	24	4,230	0	0	-	-	4,230
1998	22	4,103	0	0	-	-	4,103
1999	23	3,007	0	0	1	NA	3,007
2000	23	3,367	0	0	2	64	3,431
2001	25	3,500	2	124	4	35	3,747
2002	25	2,720	6	363	14	38	3,135
2003	20	2,788	7	364	9	25	3,177
2004	21	2,730	7	584	9	36	3,348
2005	21	2,933	7	1,235	9	43	4,209

Note; NA : Not Available
- : Not yet operation

Small-scale fisheries

In general, the marine capture fisheries have continuously provided more or less of 50% of the country's supply of fish for over 20 years. And in recent years, a significant chunk in the local fish production amounting to about 70% or 11,911 mt (in 2005) has been contributed by the small-scale fisheries sector. Majority of the fishermen in this sector are operating in zone 1 or fishing areas from the shoreline moving seaward to within 3 nm offshore. They generally use fiberglass fishing boats propelled by one or two units of outboard engines to reach their fishing destinations and operate small-scale fishing gears such as trammel nets, hooks and lines, pots to name a few. Most have modernized their fishing techniques using electronic devices such as the Global Positioning System (GPS) receivers, echo sounder or fish finder and even mobile phones for communication have become very common among the small-scale fishermen.

The demersal fish production level in Brunei Darussalam for both small-scale and commercial sectors has notably increased from 1999 until 2005. The fish production especially from the small-scale fishing sector generally exceeded the targeted Maximum Sustainable Yield (MSY) limit estimated at about 6,400 mt based on the research survey conducted by the Brunei Department of Fisheries in 1999. The level of the fish production among small-scale fishing gears has increased from 5,083 mt to 11,911 mt in 2000 till 2005 as shown in Figure 3 below. The excess in fish production over MSY among major small-scale fishing gears is quite alarming since it might be an indication of biological overfishing.

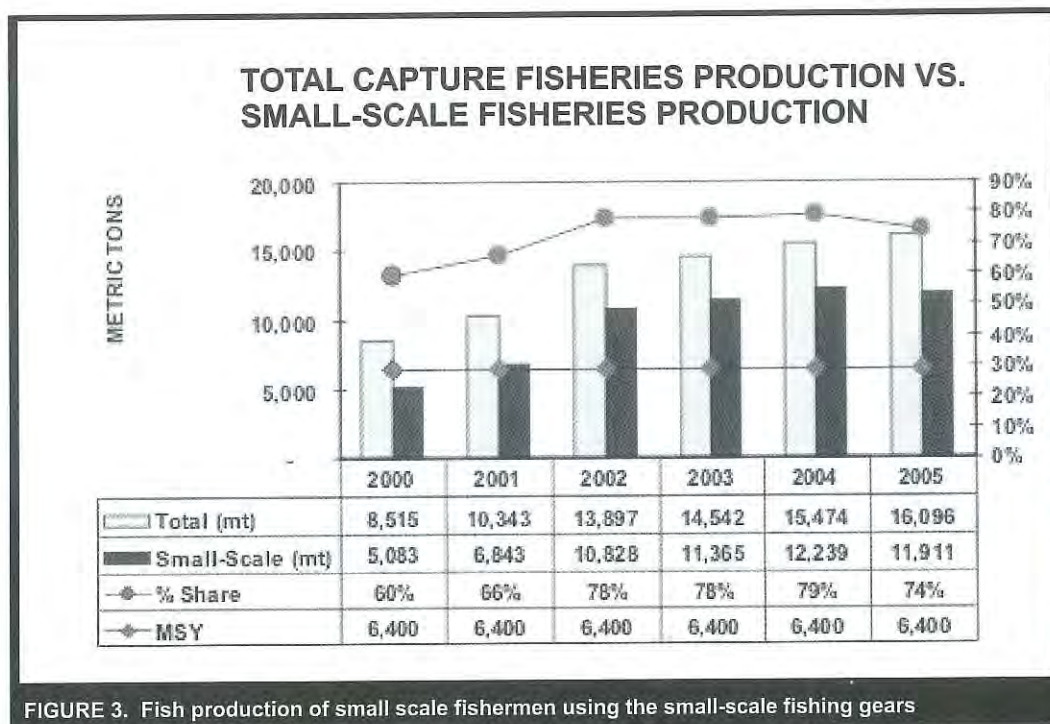


FIGURE 3. Fish production of small scale fishermen using the small-scale fishing gears

The above observation (implied overfishing) was aggravated by the general decline in the aggregate Catch Per Unit Effort (CPUE) among various small-scale fishing gears within the past few years. CPUE is a measure or index of a species relative abundance to explain changes through time. CPUE metrics are calculated from random samples, collected from various fishing gears for many years, which provide an unbiased measure of relative abundance and is expressed as kg/trip or kg/da

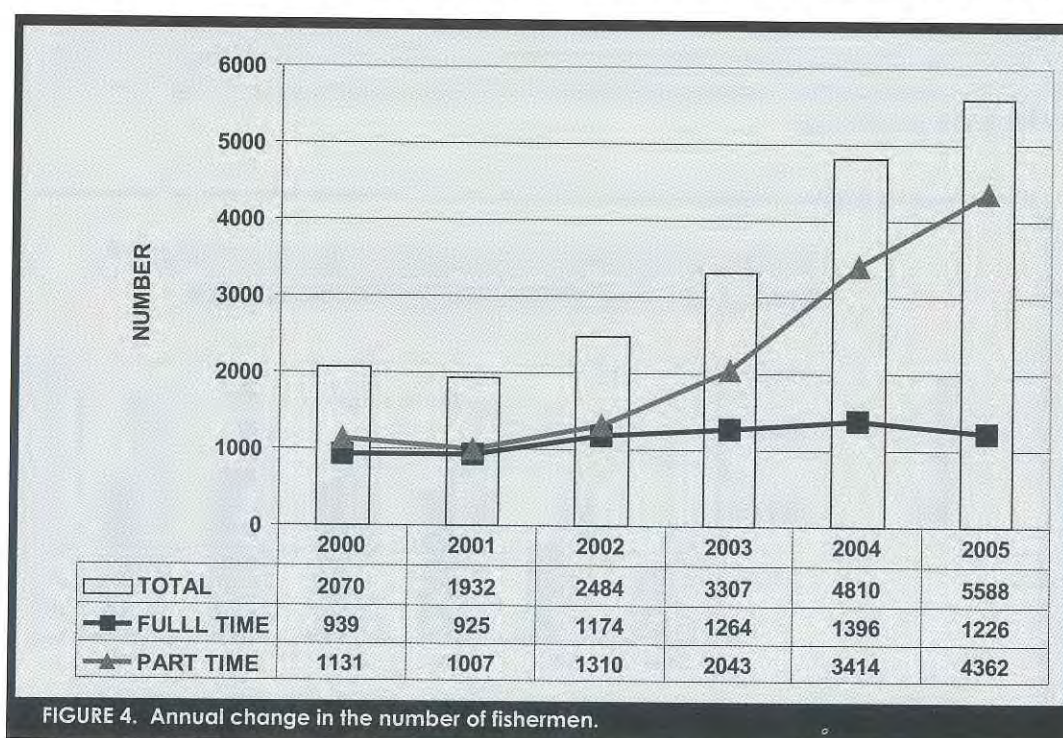
The general decline in the CPUE was noted in some of the major small-scale fishing gears in Brunei Darussalam and this includes ring net, bottom-set gill net, palisade trap and tidal trap. The drop in the CPUE of ring net was reported from 364 kg/day to 262 kg/day in 1998 and 1999, respectively. A slight improvement though was recorded in the next two succeeding years. The most commonly used fishing gear; the bottom-set gill net on the other hand, presented a continuous decline in the CPUE from 87 kg/day to only about 27 kg/day in 1991 and 2001, respectively. The CPUE of the deep-water palisade however, dropped abruptly in 2000 but recovered nearly to the 1998 level in 2001. Likewise, the CPUE of one of the oldest used gear in Brunei Darussalam, the tidal trap follows

the CPUE trend of the bottom-set gill net where a continuous decline was recorded from 117 kg/day in 1984 to only about 14 kg/day in 2001.

If the trend continues to drop, there will come a point that the fishery will collapse as claimed by the Canadian researcher, Boris Worm of Dalhousie University in Halifax, Nova Scotia who says that roughly one-third of seafood species have collapsed so far. That means their catch has declined 90 percent below the historic maximum. Of these sea species, seven percent have become extinct. "If this trend continues, if we don't change the way we are managing ocean ecosystems, this trend projects that 100 percent of species will collapse by the year 2048 or around that," he said.

One of the major factors in the continuous decline in the CPUE in Brunei Darussalam is the increasing and uncontrolled increase in the number of fishermen. The number of small-scale fishermen has increased from 2,070 individuals in 2000 to a staggering 5,588 individuals in 2005 as shown in Figure 4 below. Majority of the small-scale fishermen are part timers that generally operate during weekends.

Based on the CPUE analysis conducted by the Department of Fisheries in 2004, twelve types of small-scale



fishing gears, as listed below, have exceeded the estimated maximum efforts (units). This includes the following types of gears:

- Ancau (ring net)*
- Andang karan (trammel gill net)*
- Andang jarang (bottom-set gill net)*
- Bubu (fish pots)*
- Kabat (tidal weir).*
- Jaul/pancing (hand lines)*
- Pukat kembura (surface gill-net)*
- Kilong (palisade trap for deeper water)*
- Lintau (palisade trap for shallow water)*
- Rambat (cast net)*
- Rantau (drift gill net)*
- Tugu (conical or funnel inter-tidal trap)*

Among the small-scale capture fisheries, *jaul (hand lines)* and *andang jarang (bottom-set gill net)* yields the highest contribution to the total production and MSY share among the small-scale fisheries sector. Overall, the

aggregate MSY contribution of the small-scale fisheries sector is more than 6,400 mt based on the estimates using the surplus production models and catch and effort data from the major types of fishing gears.

1.3 Capture Fisheries Management

The goal of marine capture fisheries in Brunei Darussalam is the sustainable development the marine fisheries and to attain the maximum economic yield. This goal is to be achieved through the formulation and implementation of rational and workable management strategies to increase the productivity, resource sustainability and equality among the fishers. In general, the objectives of the management are as follows:

- ▶▶ To fully exploit the marine resources up to 21,300 mt at sustainable level;
- ▶▶ To protect the nursery and breeding grounds through the establishment of marine protected areas;
- ▶▶ To promote equal sharing of marine resources between the small-scale and the commercial fisheries sectors;
- ▶▶ To promote the usage of selective fishing gears and environmentally friendly gears to minimize the wastage of under-sized fish; and
- ▶▶ To increase the marine resource productivity through resource enhancement programs.

To achieve the above goals, some mitigating measures have been undertaken by the Department of Fisheries to abate the recent decline in the fish capture production and CPUE that leads to operational losses among trawl operators as well as among the small-scale fishermen. These management measures include:

- i. Freezing the number of fishing licenses through the moratorium on the issuance of new fishing licenses for commercial bottom trawlers in zone 2 which have been imposed since 2000. This management move was implemented due to the significant decrease in the demersal resources in the traditional fishing grounds over the years. Likewise, similar moratorium is also being considered among the small-scale fisheries due to the tremendous increase of small-scale fishermen in the near shore fishing areas in the recent years. These also caused the decline in the catch per unit effort among the major small-scale fishing gears.
- ii. The implementation of new mesh size regulations using 51 mm square mesh netting for the trawl cod end, among all commercial trawlers in the country started in 2002. This management move was made due to the growing concern over the rampant high wastage of the unwanted fish resources, wherein about 70% of the catch consisting mainly of juvenile fishes is discarded back dead to the sea due to its low value in the market. The enlargement of the mesh size from 38 mm (diamond mesh) to 51 mm (square mesh) somehow reduced the wastage from the trawlers considerably.
- iii. Creation of fishing zonation for fishing grounds or boundaries to demarcate fishery limits among various fishing gears notably the commercial scale ones. It was also being implemented to avoid overfishing and to allow limited fishing rights to certain fishermen in designated areas depending on the types and fishing capabilities of each fishing gear. Using this fishing zonation as reference, commercial fishing boats including trawlers, purse seiners and longliners for example, are banned from fishing in zone 1 area.
- iv. Construction and deployment of artificial reef in specific areas for the purpose of habitat enrichment which is intended to create fish breeding grounds and to help increase the marine biodiversity.
- v. Further, the law enforcement capabilities of the Department have been revitalized to prevent the overexploitation of the resources specifically from poaching and illegal forms of fishing through the acquisition of additional patrol boats and additional manpower for the enforcement personnel.



(Commercial Fishing Port in Muara)

Chapter 2

Explanatory notes

2. EXPLANATORY NOTES

This report is a result of a joint survey conducted by the Department of Fisheries of Brunei Darussalam and the team from Training Department of SEAFDEC in 2004. The background information and current status of different fishing gears were based on the annual fishery statistics (unpublished) in 2005.

The classification of fishing gear for Brunei Darussalam is presented with the description of each group. This was based on the system presented by FAO entitled "Definition and Classification of Fishing Gear Categories." The classification of fishing gear is presented below.

Illustrations

- 1) The horizontal length of surrounding nets, purse seines and fill nets is drawn according to the length of the float line, and the vertical depth according to the fully stretched netting. In the case of gill nets with sidelines, the depth is drawn according to their length. The width of netting panels or sections of trawl gear is drawn according to half the stretched netting, and the depth or length according to fully stretched netting. Some gears are shown by schematic or partly perspective overall sketches, with dimensions indicated where applicable.
- 2.) The general outline of drawings such as the rig of the complete gear and detailed drawings of components are mostly not to scale, but the main dimensions are given.
- 3) The dimensions are only given in meters (m) and millimeters (mm). The units are not indicated but can easily be recognized, as follows:
 - Meters: Length of footrope, headlines, floatlines, etc., used with one decimal (e.g., 5.2, 98.7)
 - Millimeters: Mesh size (stretched, diameters of ropes, floats, etc., used without a point or with one decimal only (e.g. 12, 525, or 1.2, 38.2)
- 4) The mesh size (in millimeters, mm) is understood to be the distance between the centers of the two opposite knots in the same mesh when fully stretched.
- 5) The number of meshes in a straight row along the edges indicates the width and length or depth of net panels or sections.

Abbreviations:

FAD	=	fish aggregating device also known locally as <i>lawa-lawa</i>
GPS	=	global positioning system
GT	=	gross tonnage
Hp	=	horsepower (the capacity of the vessel engine)
LOA	=	length overall (length of the vessel from the bow to the stern)
PA	=	polyamide
PE	=	polyethylene
mt	=	metric tons
m	=	meters
mm	=	millimeters
Nm	=	nautical miles

TABLE 2. Fishing gear classification in Brunei Darussalam

Fishing Gear Classification	Local Name
1. Surrounding nets	
1.1 With purse line	
1.2 One-boat purse seine with skiff boat	
1.2.1. Luring purse seine (with light)	<i>Pukat lingkong</i>
1.2.2. Ordinary purse seine	<i>Pukat lingkong</i>
1.3 One boat no skiff boat	
1.3.1. Mini purse seine/ring net	<i>Ancau</i>
1.3.2. Ring net for black pomfret	<i>Panau</i>
2. Seine nets	
2.1 Beach seine	<i>Paguyut</i>
2.2 Small beach seine with no cod-end	<i>Pukat kikis/ambit</i>
3. Trawls	
3.1 Bottom trawl	<i>Pukat tunda</i>
3.2 Beam trawl	<i>Pukat tunda</i>
4. Lift nets	
4.1 Stationary lift net	<i>Selambau</i>
4.2 Crab lift net	<i>Bintur</i>
5. Falling gears	
5.1 Portable cast net	<i>Rambat</i>
5.2 Stick held net	<i>Rambat sotong</i>
6. Gill nets	
6.1 Surface gill net	<i>Andang/Kembura</i>
6.2 Drift gill net	<i>Rantau</i>
6.3 Bottom set gill net	<i>Andang jarang</i>
6.4 Crab gill net	<i>Andang katam</i>
6.5 Trammel net	<i>Andang karan</i>
6.6 Encircling gill net	<i>Andang</i>
7. Traps	
7.1 Stationary traps	
7.1.1. Palisade trap (shallow water)	<i>Lintau</i>
7.1.2. Palisade trap (deep water)	<i>Kilong</i>
7.2 Semi-stationary traps	
7.2.1. Tidal weir	<i>Kabat</i>
7.2.2. Conical or funnel inter-tidal trap	<i>Tugu</i>
7.2.3. Barrier net	<i>Tambak</i>
7.3 Portable traps	
7.3.1. Fish pots	<i>Bubu ikan</i>
7.3.2. Crab pots	<i>Bubu katam</i>
7.3.3. Shrimp pots	<i>Bubu udang</i>
8. Scoop nets	
8.1 Scoop net	<i>Tanggok</i>
8.2 Push net	<i>Satak</i>
9. Hook and line	
9.1 Simple handline	<i>Pancing/Jual/ambor</i>
9.2 Pole and line	<i>Juran</i>
9.3 Multiple handline	<i>Pancing</i>
9.4 Longline	<i>Rawai</i>
9.5 Bottom set longline	<i>Rawai</i>
9.6 Drift longline/Tuna longline	<i>Rawai tuna</i>
9.7 Drop line	<i>Rawai dropline</i>
9.8 Troll line	<i>Jaul Tunda</i>
9.9 Vertical longline	<i>Papar</i>
10. Other fishing method	
10.1 Gleaning	<i>Gurit</i>

2.1. Major Groups of Fishing Gear and General Descriptions

Fishing gears and methods

Various methods to catch fish and other aquatic resources, with or without a gear, have always been practiced in many countries including Brunei Darussalam. Although the fundamental principles, i.e. filtering the water, luring and outwitting the prey and hunting, are the basis for most of the fishing gears and methods used even today, gears and methods have changed significantly over time, especially with the invention of synthetic materials and electronic gadgets, and their capture efficiency is obviously hardly comparable to that of prehistoric times.

A fishing gear is the tool with which aquatic resources are captured, whereas the fishing method is how the gear is used. Gear also includes harvesting organisms when no particular gear (tool) or boat is involved. Furthermore, the same fishing gear can be used in different ways by different fishers. A common way to classify fishing gears and methods is based on the principles of how the fishes or other preys are captured and, to a lesser extent, on the gear construction or gear materials used.

Following FAO's definition and classification, the main categories of fishing gears in Brunei Darussalam are as follows:

(1) SURROUNDING NETS

The net is roughly rectangular in shape without a distinct bag. It is set vertically in water to surround the school of fish, generally of pelagic nature. The nets are subdivided into three categories: one-boat seine, two-boat seine; and surrounding net without purse line. The one-boat purse seine is commonly used in Brunei Darussalam waters.

(2) SEINE NETS

Seine nets are cone-shaped net with two wings wherein the wings are normally larger than those of trawl nets. The net is pulled towards a stationary boat or onto a beach.

(3) TRAWL

A conical bag-shaped net with two or more wings, pulled by one or two boats for a period, to catch mainly demersal fish or other aquatic animals that live directly on, or stay near the seabed. The trawl is subdivided into three major types: bottom trawl, pair trawl and beam trawl.

(4) LIFT NET

A sheet of net, usually square, but may sometimes be conical, is mounted either by several rods and ropes, or on a frame and is either at the bottom or in mid-water for some time and then lifted to trap the fish lying above it.

(5) FALLING GEAR

The gear is usually a cone-shaped net that is dropped to cover aquatic animals and trap them. Generally it is hand-operated in shallow waters but some are operated from a boat like the stick-held cast net for catching squid.

(6) GILL NETS

Gill nets are curtain-like net that are fitted with sinkers on the lower end and floats on the upper end and are set transversely to the path of migrating fish. Fish trying to make their way through the net wall are entangled, gilled or enmeshed in the mesh.

(7) SCOOP NETS

A bag-shaped net with fixed or variable opening and is usually operated in shallow waters. The gear catching mechanism is done by filtering a certain volume of water and trapping the fish into it in a scooping manner.

(8) TRAPS

The gear is set or stationed in the water for a certain period to trap moving fish in the water. Trapping is made with the use of a non-return valve fitted in the entrance of the gear. The gear may or may not include a netting material.

(9) HOOK AND LINE

The gear generally consists of line(s) and hook(s) to which artificial or edible baits are attached to lure and catch fishes or other aquatic animals.

(10) OTHER FISHING GEARS AND METHODS

This group covers a variety of fishing gears and methods not classified with the above groups such as the use of gleaning along the shore for shellfish, seaweed or fish.



(Sorting of fishes caught by Purse Seine at Commercial fishery port in Muara)

Chapter 3

Surrounding nets

3. SURROUNDING NETS

Fishing Gears and methods

- 3.1 *Lingkong* (purse seine). This type of fishing gear is used for catching pelagic fishes like jacks and sardines in the offshore areas of Brunei using fishing boats that are powered by on-board marine engines and aided with power blocks and luring lights (see Figure 5). The purse seine boat is about 20 m LOA with about 60 to 150 GT in size (see Figure 6). It is operated with a small motorized wooden boat (skiff) to hold one end of the net. The main vessel holding the other end of the net encircles the school of fish which congregate around the fish aggregating device (FAD) that was set a few days earlier. The bottom edge of the net is closed (or pursed) to trap the fishes using a purse line rope passing through a series of circular metal rings fixed under the net. The purse line is pulled using a winch on board the boat. Then the net is slowly lifted up until fishes are close enough to the surface to scoop onto the main vessel's fish hold. The skiff is also used as light boat to congregate all the fish grouped around a number of FADs into one FAD. The nets are usually made of polyethylene of 25.4 mm mesh size and of about 400 to 600 m in length with mesh size usually ranging from 2.5 to 3 cm stretched.

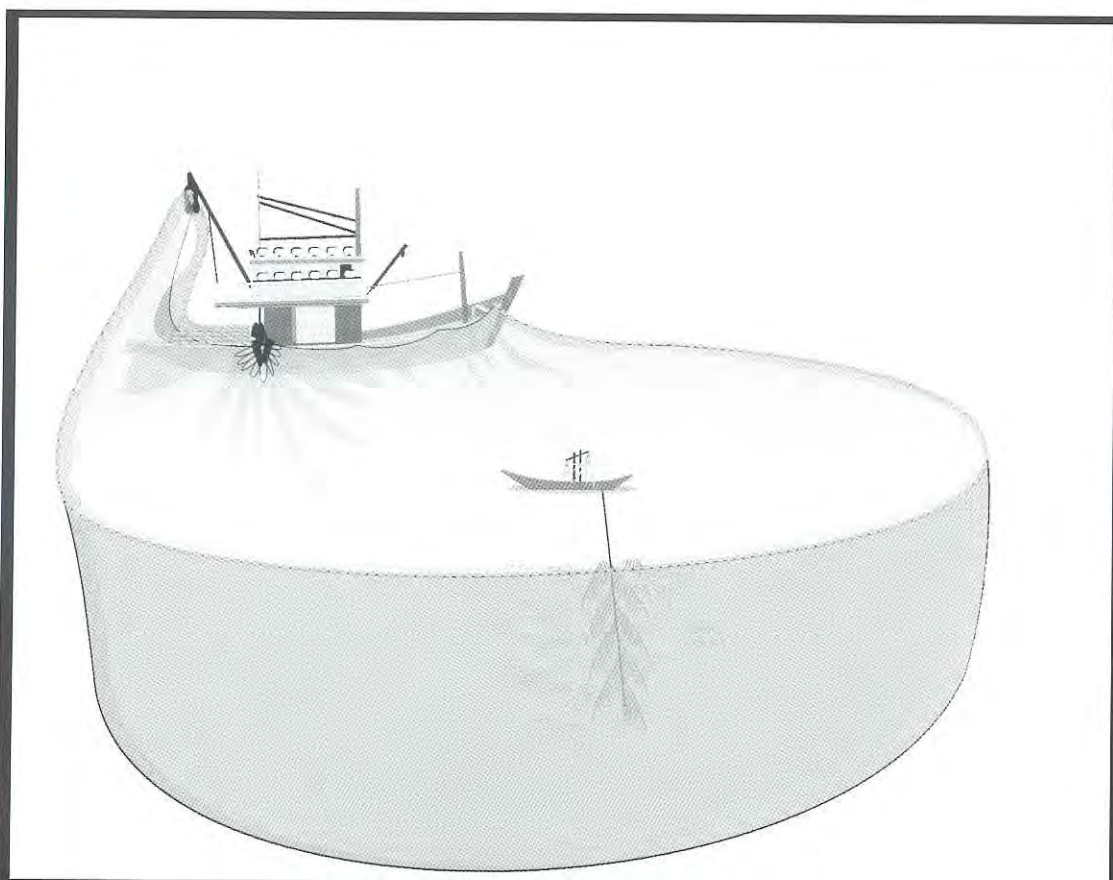


FIGURE 5. A purse seine operation



FIGURE 6. A purse seine boat

SURROUNDING NET

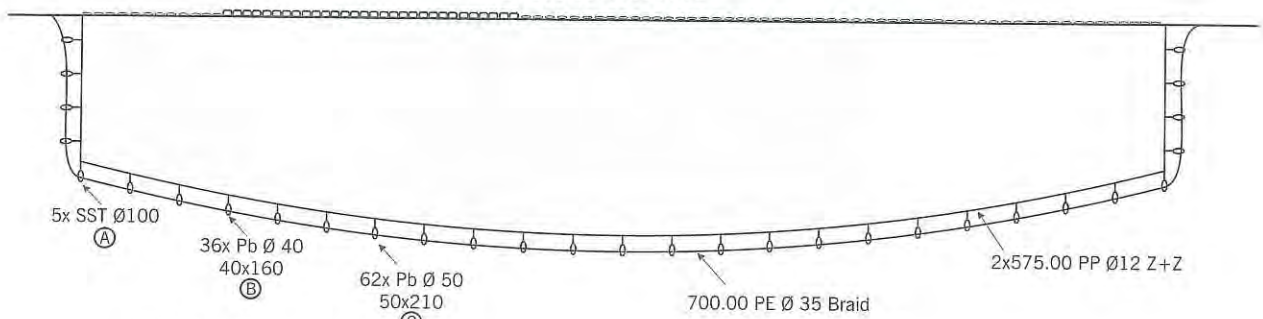
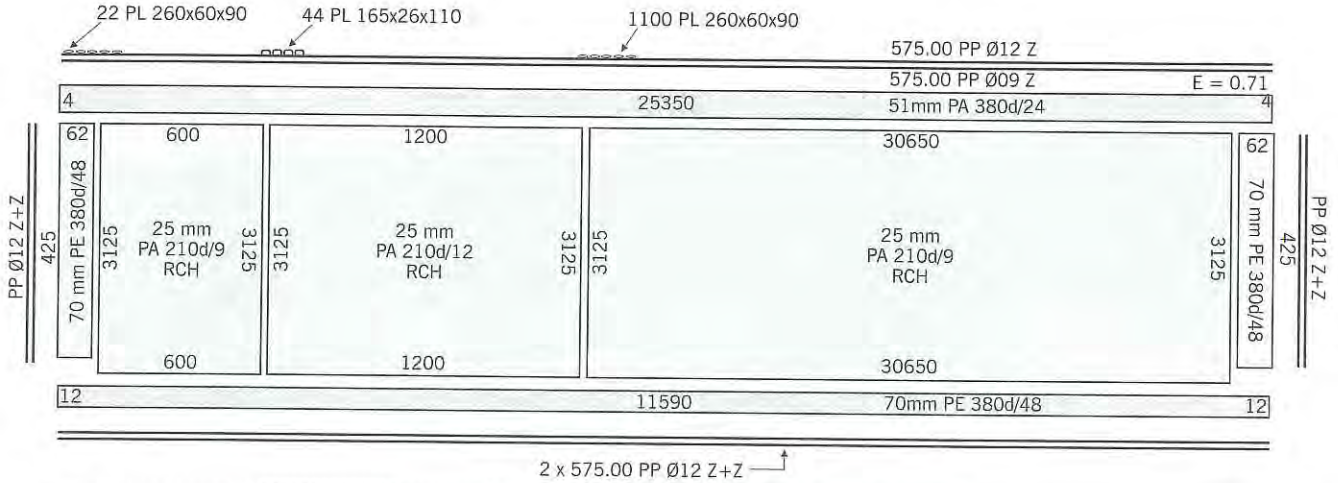
Purse Seine (FADs and Luring light)
Pukat Lingkong
 Chub Mackerel, Scad
 Trevallys and Bonito

VESSEL

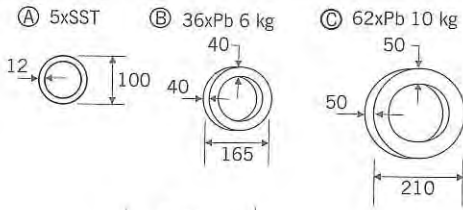
Loa : 20.00 m
 GT : 66
 Hp : 190 + 2 tons Power block

LOCATION

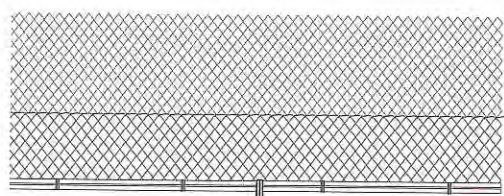
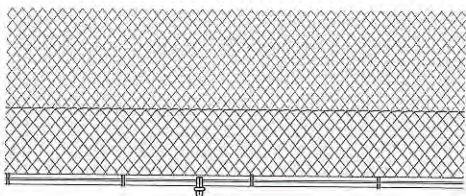
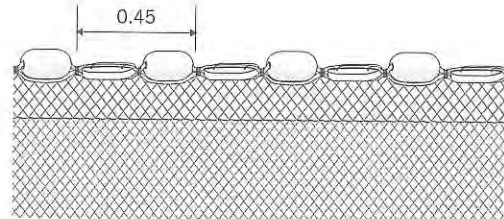
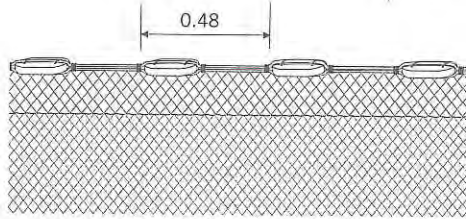
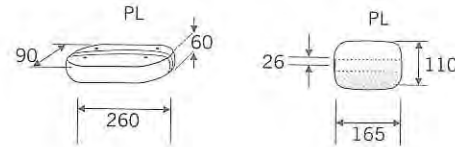
Muara
 Fish landing Complex
 Zone 2



PURSE RING



FLOAT



30.0 PP Ø10 Z

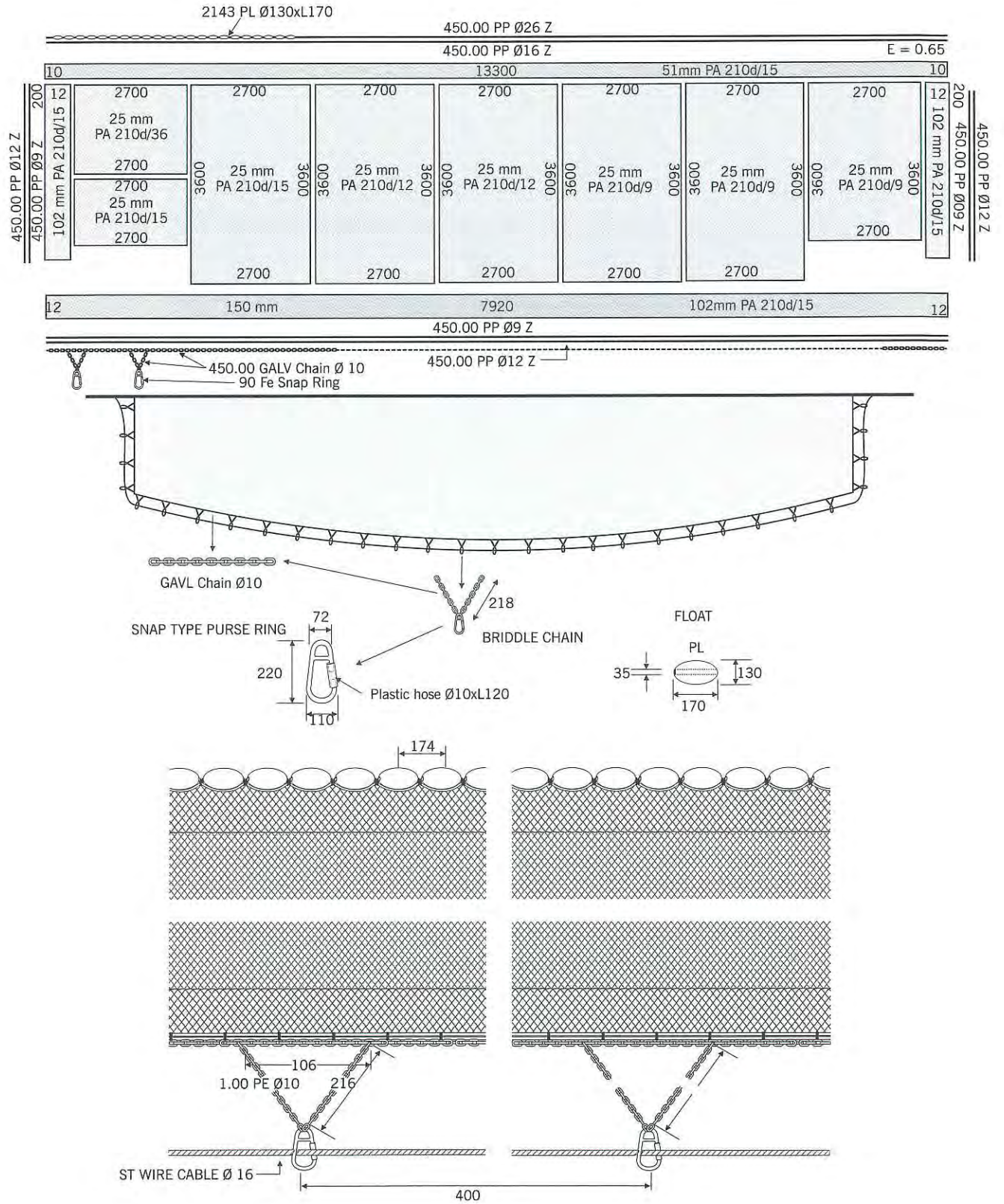
5.0-8.0

PE Ø35 Braid

SURROUNDING NET
 Purse Seine (FADS and Luring Light)
Pukat Lingkong
 Bonito, Chub Mackerel,
 Trevally, Scad and Tuna

VESSEL
 Loa : 19 m
 GT : >60
 Hp : 500 +2 tons power block
 +Purse winch

LOCATION
 Muara
 Fish landing Complex
 Zone 3



- 3.2. *Ancau* (ring net). This surrounding gear is a curtain-like net used for catching sardines and/or sergestid shrimps. It is operated during calm seasons in the bay and coastal areas. The operation starts by scouting schools of fish and then surrounding the school with the net (see Figure 7 and 8). The lower end of the net is then pursed or closed by pulling the purse line attached to the rings at the bottom of the net to trap the fish and the net is pulled into the boat. The rectangular-shaped netting is about 300 m in length by 15 m depth. It is operated manually by 4-6 fishermen in a 9-12 m boat. The netting material is made of PA with 2.5 cm mesh while the float, sinker lines and purse seine lines are made of PE. The *ancau* for sergestid shrimps or *bubuk* is made PA knotless netting and with finer mesh size of about 7 mm stretched mesh.



FIGURE 7. *Ancau* for catching small-pelagics such as mackerels and sardines



FIGURE 8. *Ancau* for catching *bubuk* or sergestid shrimps

SURROUNDING NET

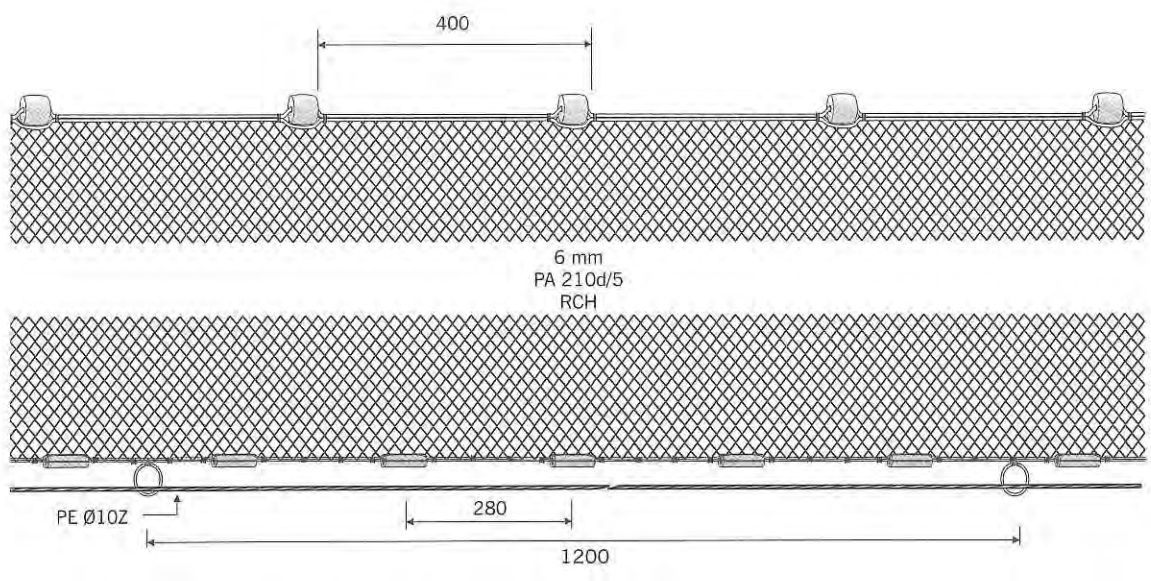
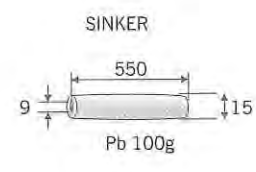
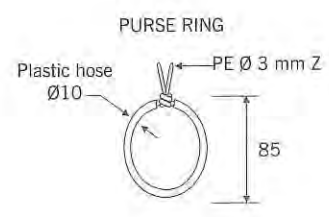
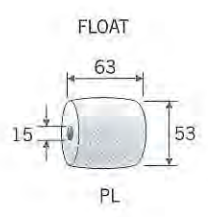
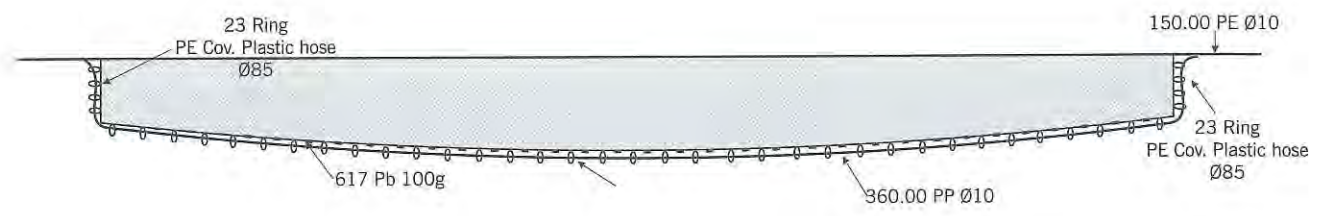
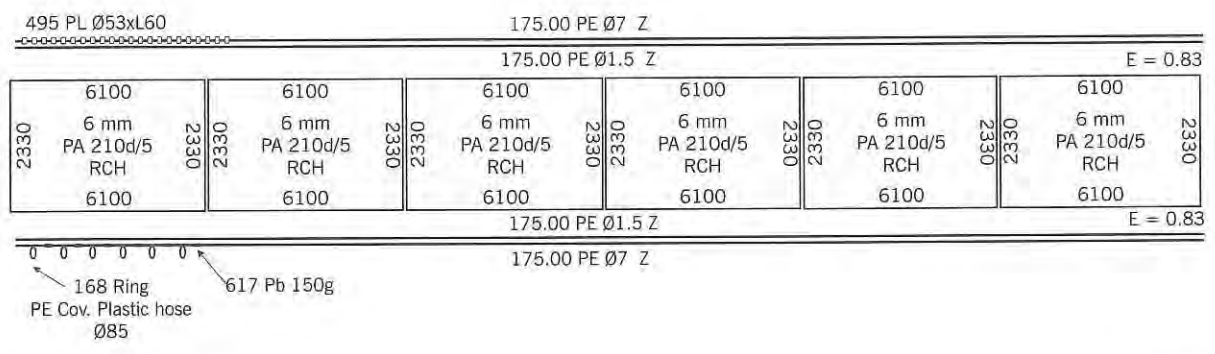
Ring net (FADs and Day- time schooling)
Ancau
 Anchovy, Sergestids shrimp

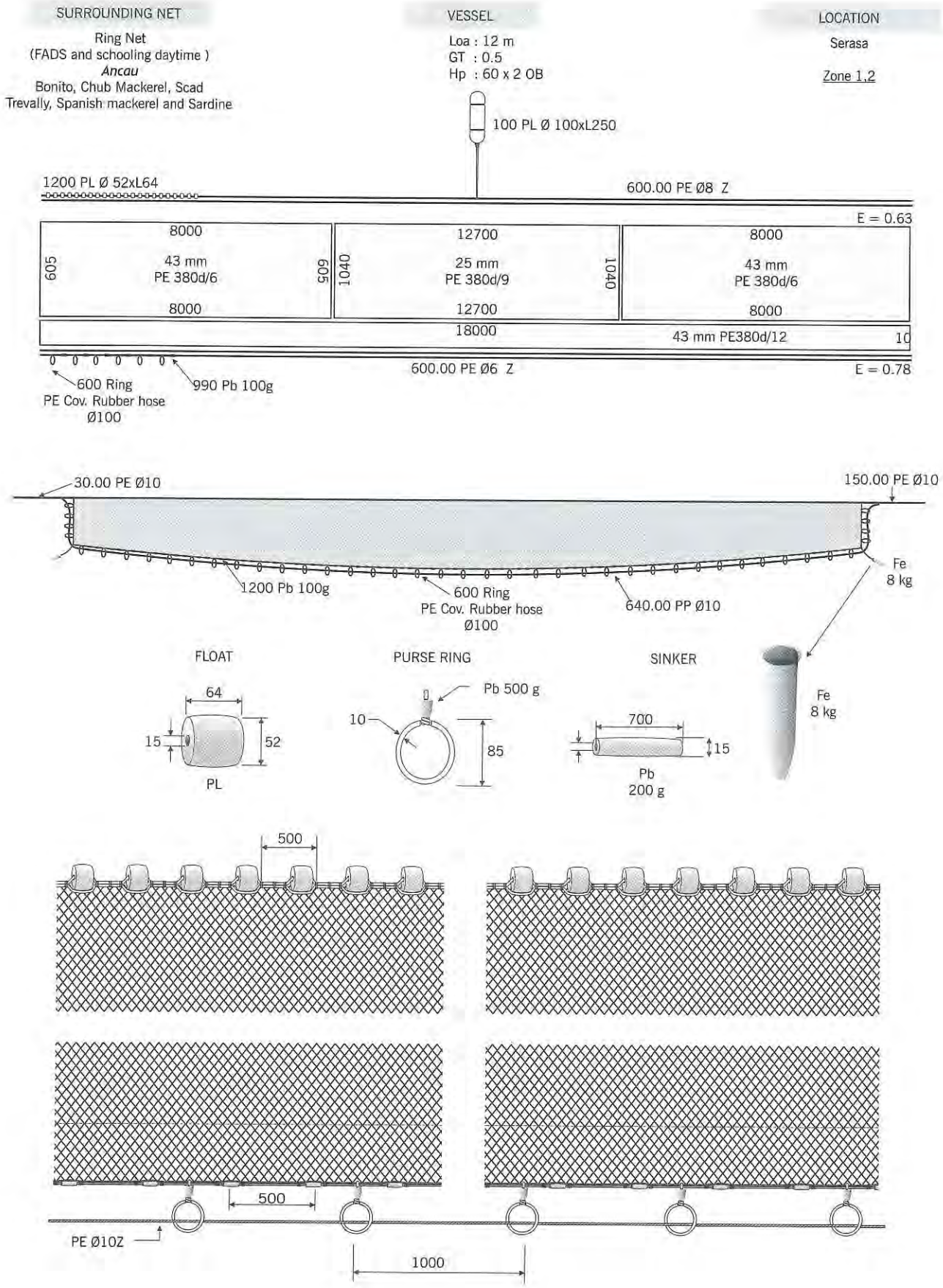
VESSEL

Loa : 16 m
 GT : 0.5
 Hp : 40 x 2 OB

LOCATION

Serasa
 Zone 1

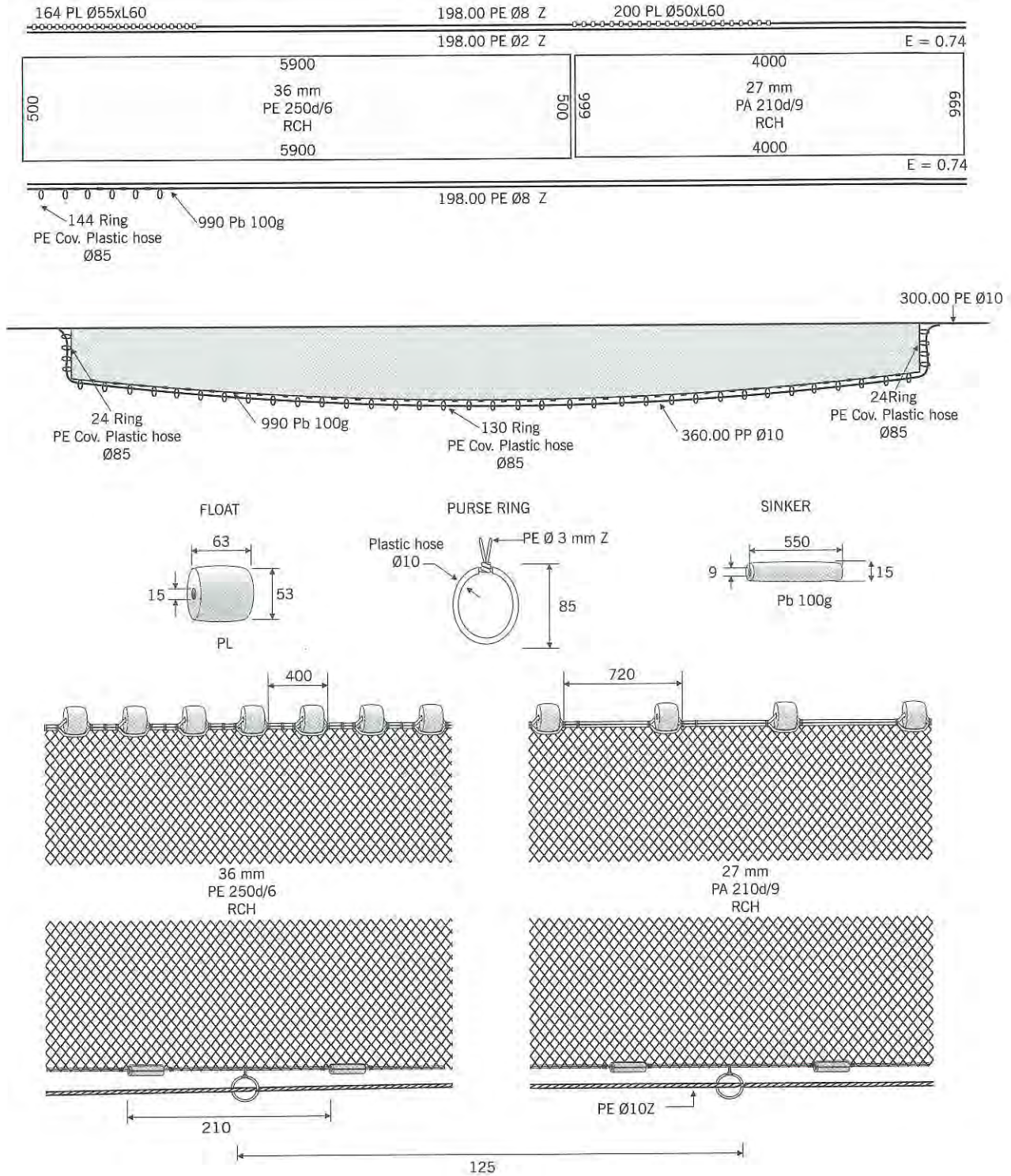




SURROUNDING NET
 Ring net
 (FADs and Day-time schooling)
Ancau
 Bonito, Chub mackerel,
 Spanish mackerel and Carangid

VESSEL
 Loa : 16 m
 GT : 0.5
 Hp : 40 x 2 OB

LOCATION
 Serasa
 Zone 1,2



- 3.3. *Panau (Ring net for black pomfret)*. The gear is commonly used near the coastal areas of Seria, southwest of Brunei. Before *panau* is operated, FADs are installed and soaked for several days in the fishing grounds to aggregate the target fish. Upon launching the net, a diver checks any fish aggregation at the FAD and later poses as a substitute for the FAD as the fishes (black pomfret) swim towards him. The diver then swims and brings the school of fish away from the FAD to commence shooting the net. The gear is launched from the boat to encircle the school of fish and the diver. To enclose and trap the pomfrets, the diver exits the circle after the purse lines are pulled manually on-board the boat through the purse rings attached at the bottom of the net. Then the net is slowly heaved up manually by 3 or 4 fishermen towards the boat to facilitate scooping the pomfrets trapped at the belly of *panau*.

Chapter 4

Seine nets

4. SEINE NETS

Fishing Gears and Methods

- 4.1. *Paguyut* (large beach seine with cod-end). This gear is usually operated near the inter-tidal areas along beaches of in Brunei Darussalam. It requires about 6 to 10 people to operate the gear. The operation starts by setting the net off the shore using a small boat. Then the pull rope attached to the net is pulled by fishermen on shore towards the beach when sufficient amount of fish is present along the path of the net. The gear is brought back to the beach some distance away from the first end of the beach. The fishermen standing at strategic positions then pull the net back to the beach, making sure that the fish do not escape and instead enter the cod-end. The gear itself is not necessarily very long (about 273 to 455 m). Only the ropes from the net to the beach need to be quite long. The mesh size is around 76.2 mm on the main body and about 25.4 to 31.7 mm at the cod end. The catches are usually pony fish. The use of this gear is quite an old method and is seldom operated in Brunei Darussalam waters, nowadays.
- 4.2. *Pukat kiki/ambit* (small beach seine with no cod-end). Like the *paguyut*, *kiki/ambit* is operated from the beach; but the latter is made of a smaller size and has no cod-end. *Kiki/ambit* is about 64 to 91 m and thus requires only two or three fishermen in its operation. The mesh size is around 25.4 to 31.7 mm. The same method of operation as the *paguyut* does apply here except that no boat is required. One fisherman holds one end of the gear in a fix location. Another fisherman brings one end of the gear seaward by wading into the water until depth up to his chin and then to wade back some distance away from the first end, making a letter "C". The catches include engraulids (*pusu*), whiting (*usus*), lactarids (*kelapa-kelapa*), and mugillids (*kembura*).
- 4.3. *Pukat jawa* (Danish seine net). This type of gear (see Figure 9) is designed and constructed like a trawl net but differs mainly in the method of operation but catches are almost identical in terms of fish size and species composition. The gear is made of PE netting material. The gear is operated without the use of trawl doors to open the gear horizontally, instead, the gear is equipped with a pair of scare lines that is used to surround and scare fishes towards the net in the middle. The scare device is made of plastic straws inserted on the twisted threads of the rope. The tow rope is hauled into the boat passing trough a 2-ringed tom weight below the boat. This type of gear is currently banned in operate Brunei due to its destructive on juvenile fishes that form by-catches

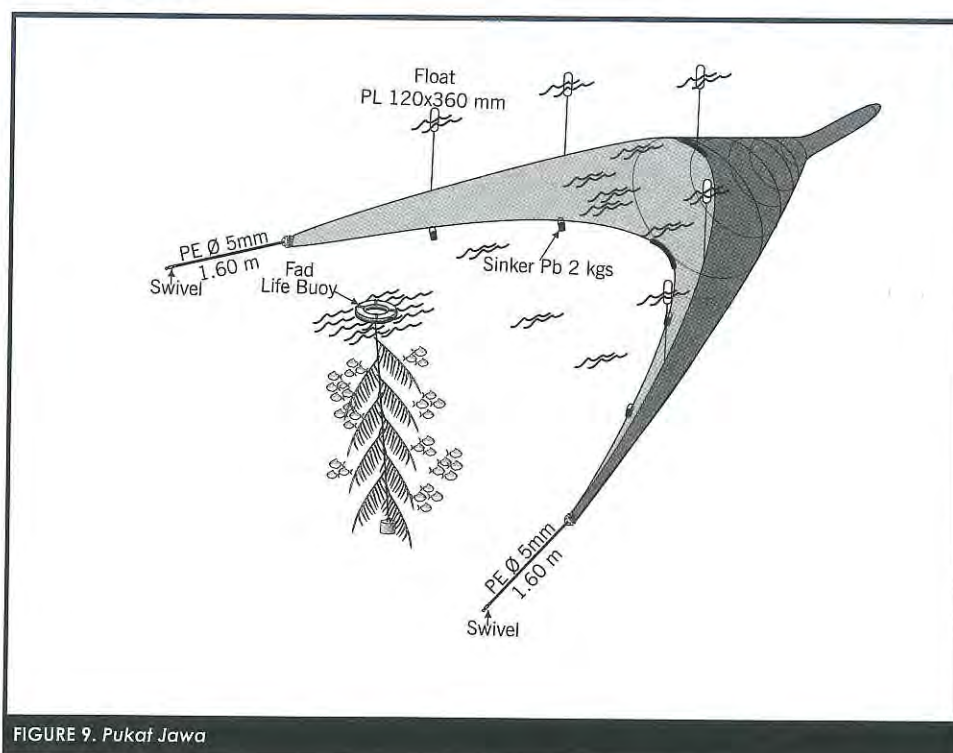
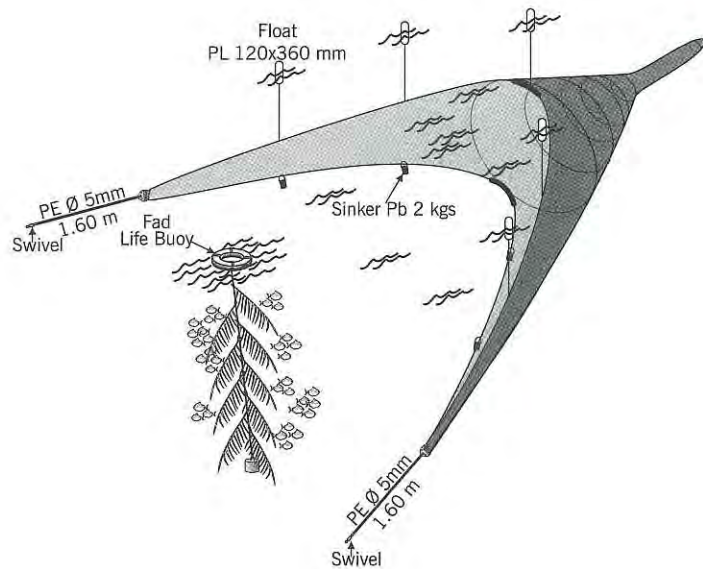
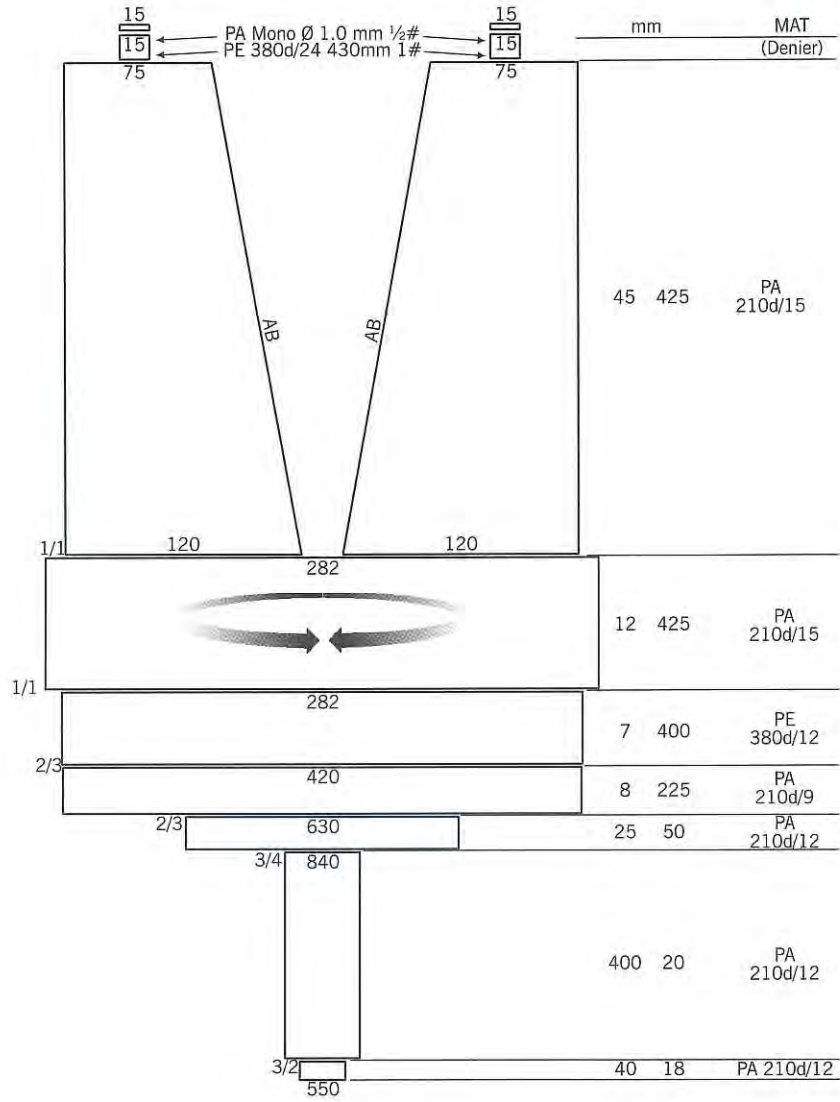


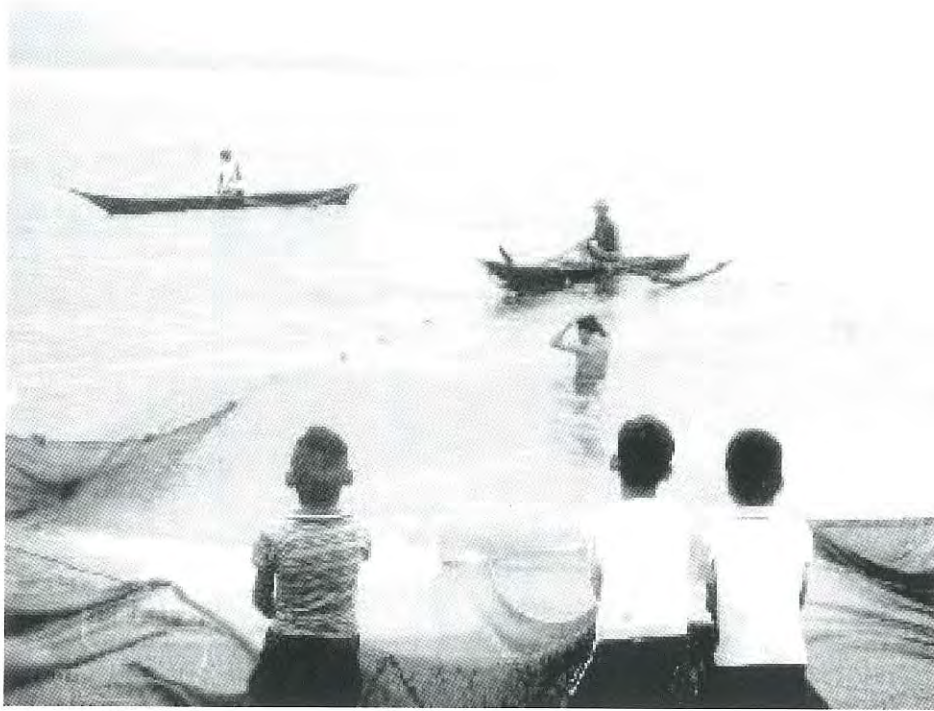
FIGURE 9. *Pukat Jawa*

SEINE NET
 Danish Seine Net
 (Pukat Jawa)
 Black Pomfret

VESSEL
 Loa : 8
 GT : < 2
 Hp : 2 x 60 OB

LOCATION
 Belait
 Zone 2





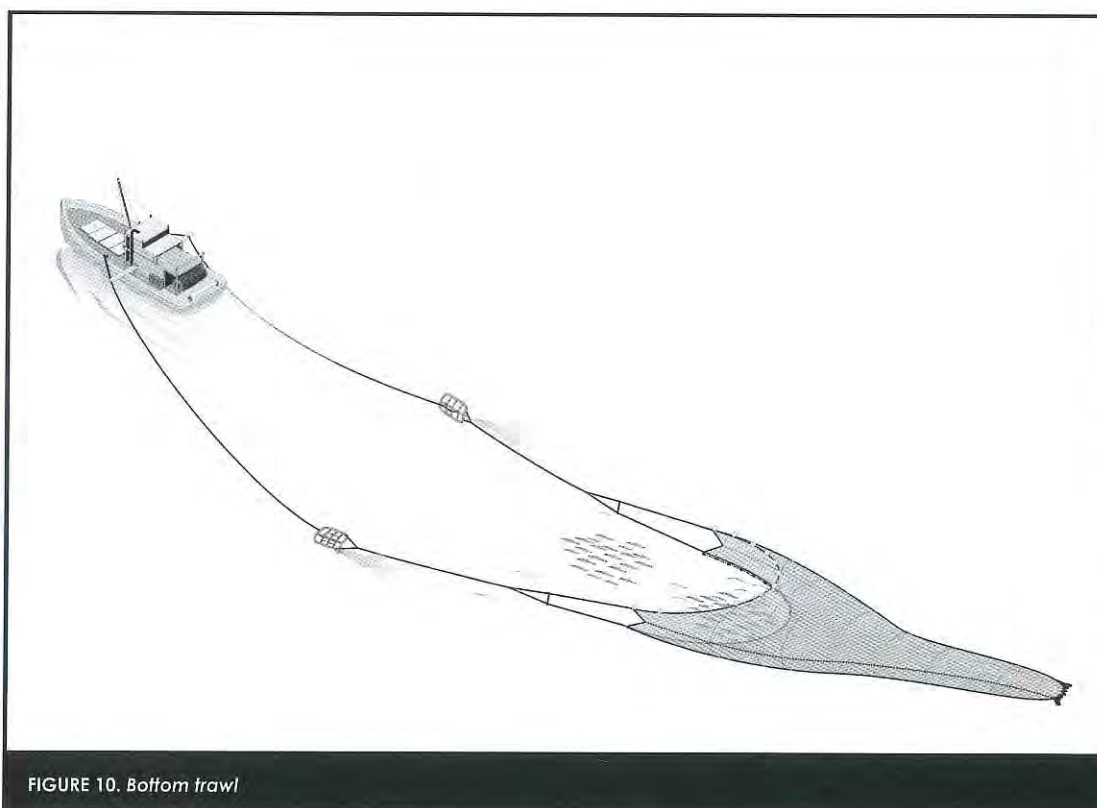
(Operation of Beach seine by local fishermen)

Chapter 5
Trawls

5. TRAWLS

Fishing Gears and Methods

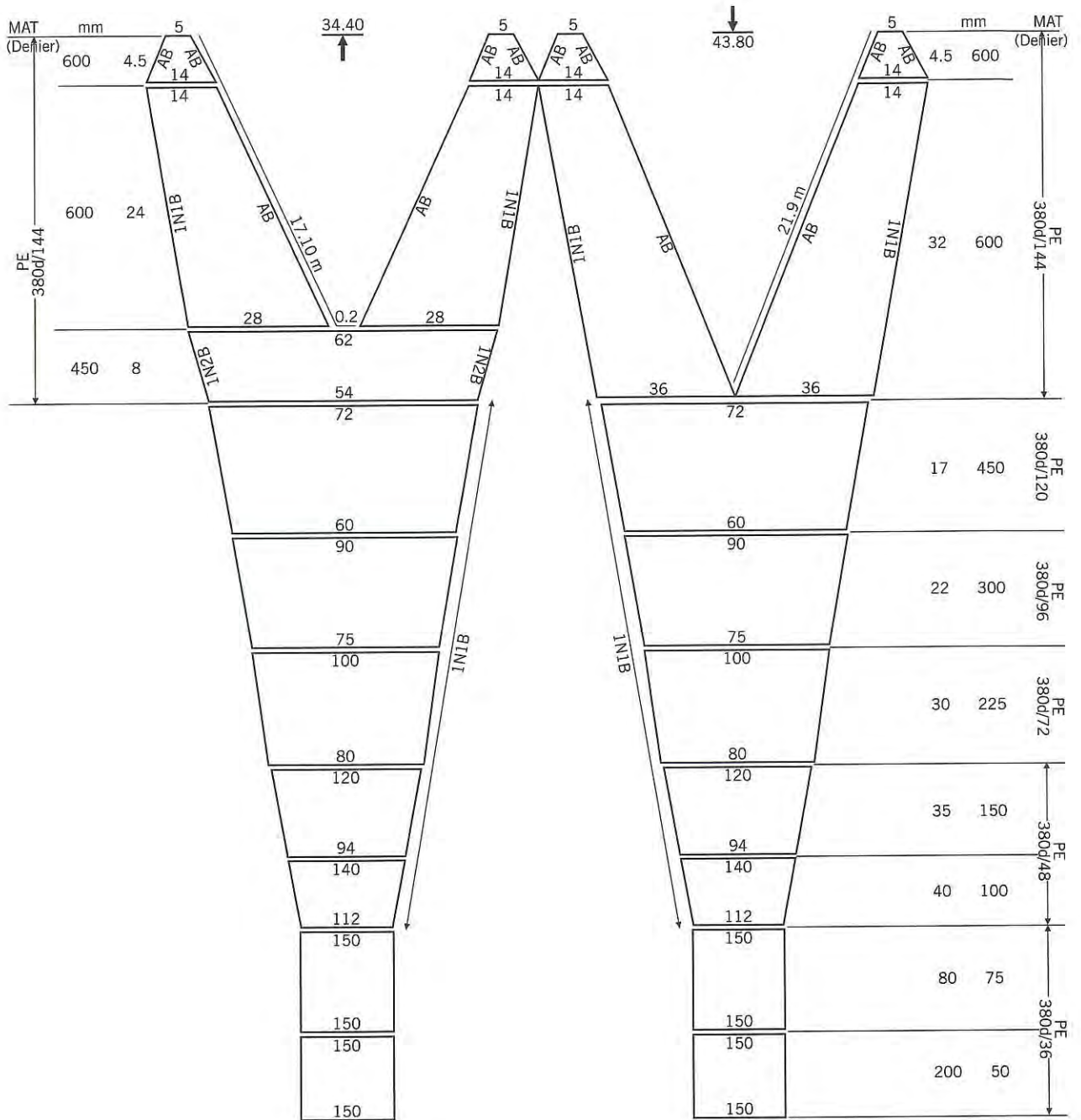
- 5.1 *Pukat tunda* (Bottom trawl). The bottom trawl in Brunei Darussalam has two different types according to the target species, one for catching fish and another for catching shrimp. The main difference is the design and the mesh sizes of the netting used. The fish trawl has a head-a-rope length of about 26 m and a footrope length of about 30 m. The cod-end of the trawl net has a mesh size limited to a minimum of 51 mm of square mesh. The fish trawl net has a higher vertical opening as compared to the shrimp trawl net. Both types are operated using wooden or steel trawl doors to maintain its horizontal spread. The trawling speed normally ranges from about 3 to 3.5 knots. The trawl fishing boats are propelled with marine diesel engines with capacities ranging from 180 to 500 hp. The fishing boats are also equipped with mechanical drums as shown in Figure 10 to facilitate the shooting and hauling of the net. The boat is also equipped with electronic instruments for navigation and for searching for suitable fishing grounds

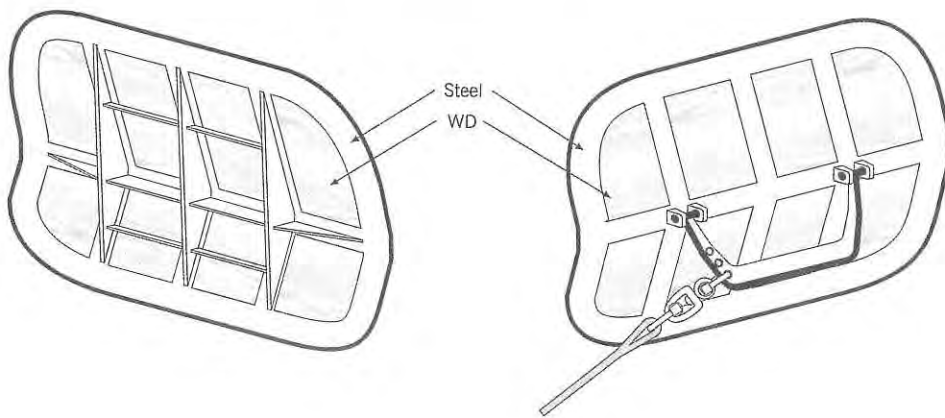
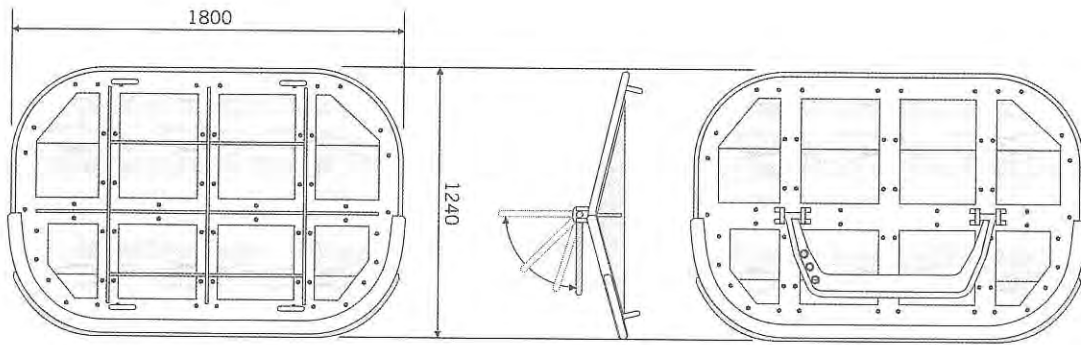


TRAWL NET
 Bottom Otter
 (Pukat Tunda Ikan)
 Demersal fishes

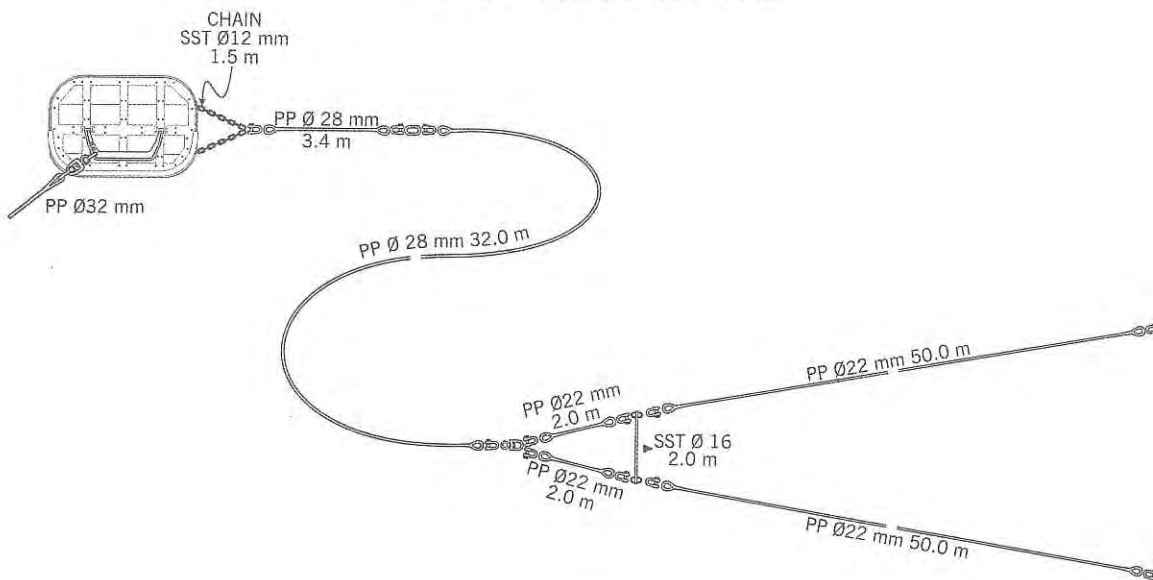
VESSEL
 Loa : 25
 GT : 139
 Hp : 500

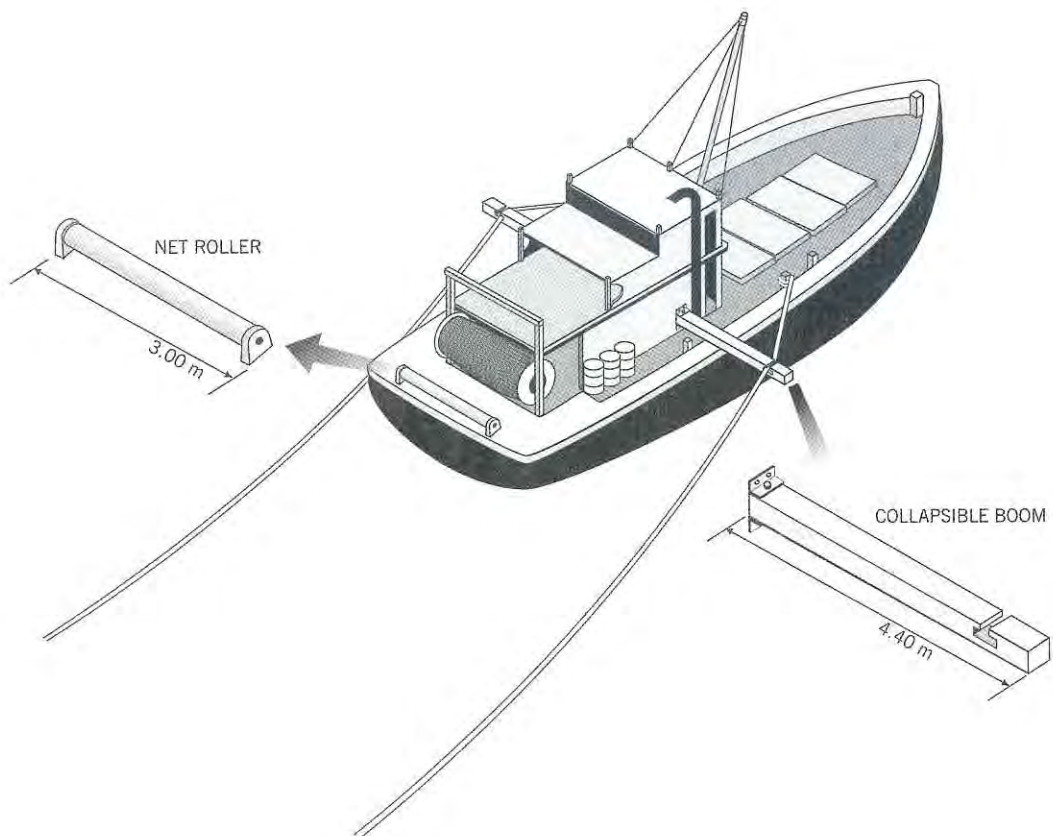
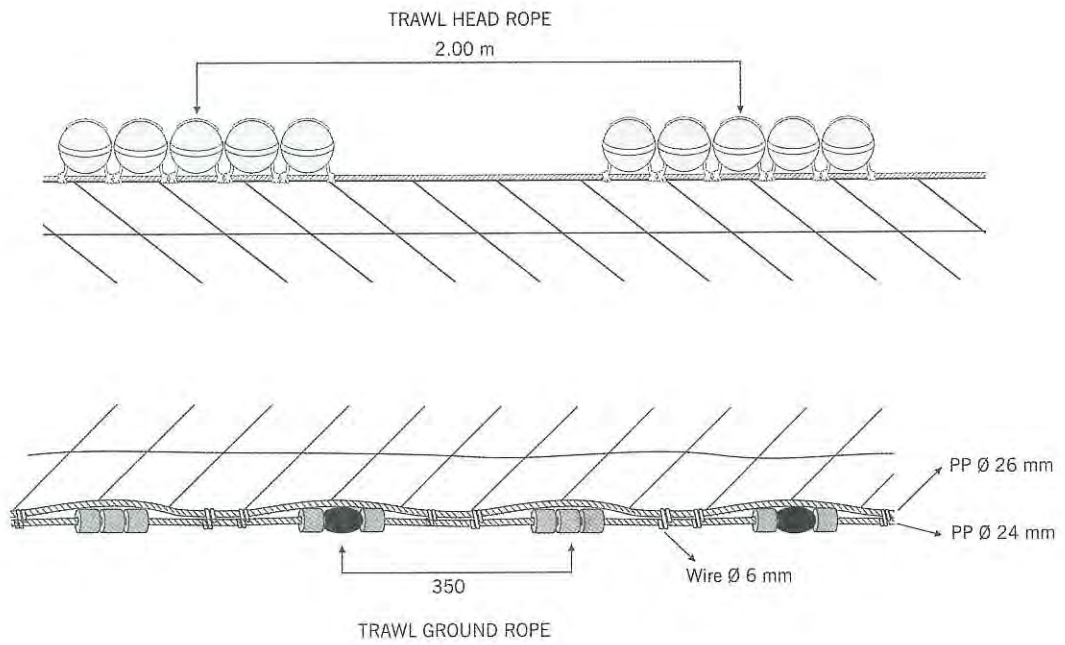
LOCATION
 FLC
 MUARA
 Zone 3





V-Shape Trawl Otter Board and Net Pendant





TRAWL NET

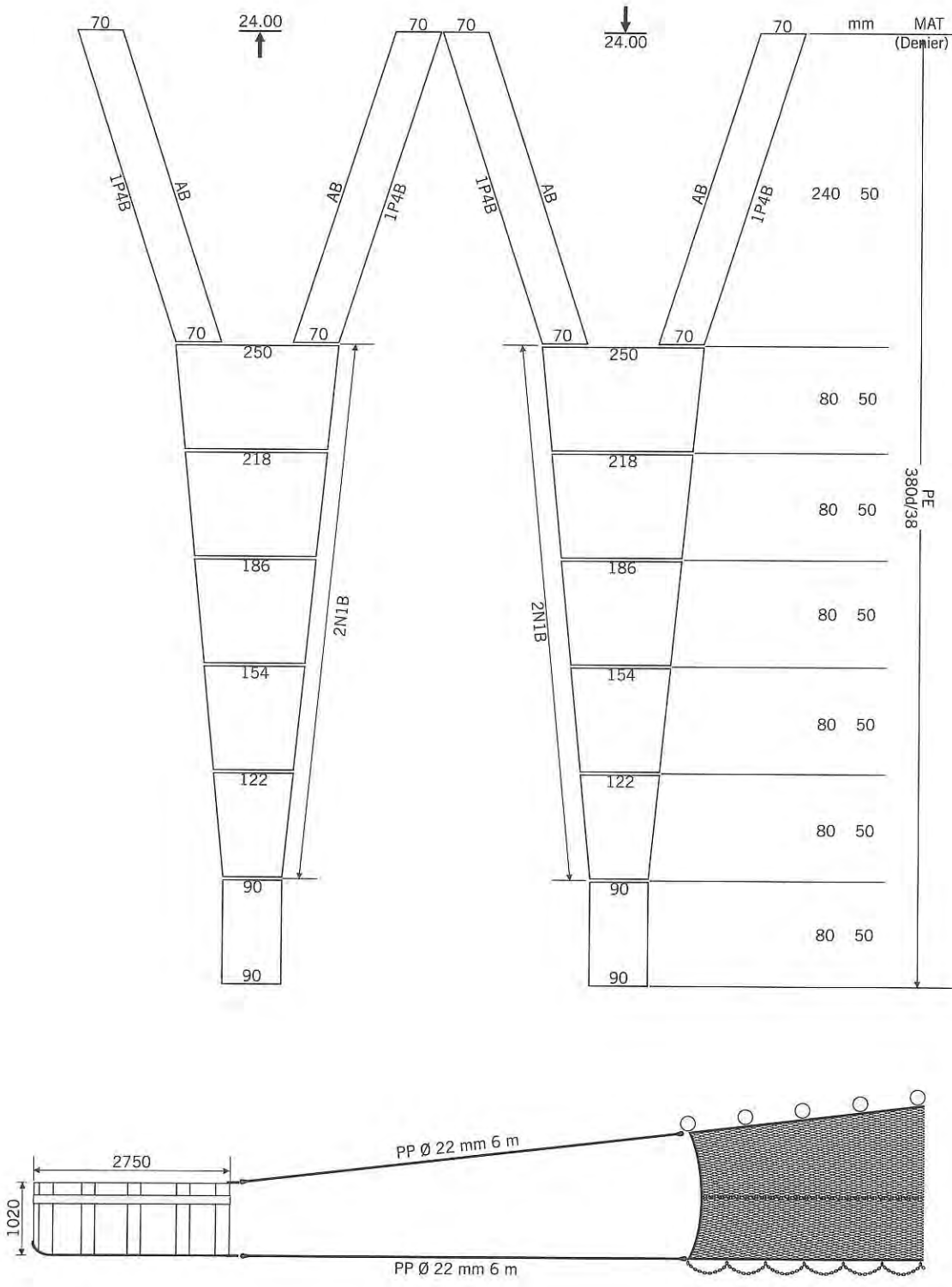
Bottom Otter
(Pukat Tunda Udang)
Shrimp

VESSEL

Loa : 19.2
GT : 48
Hp : 275

LOCATION

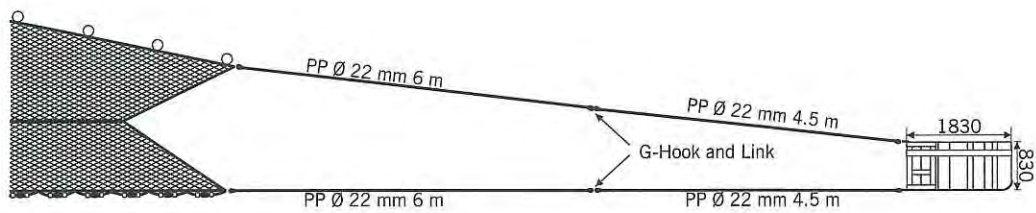
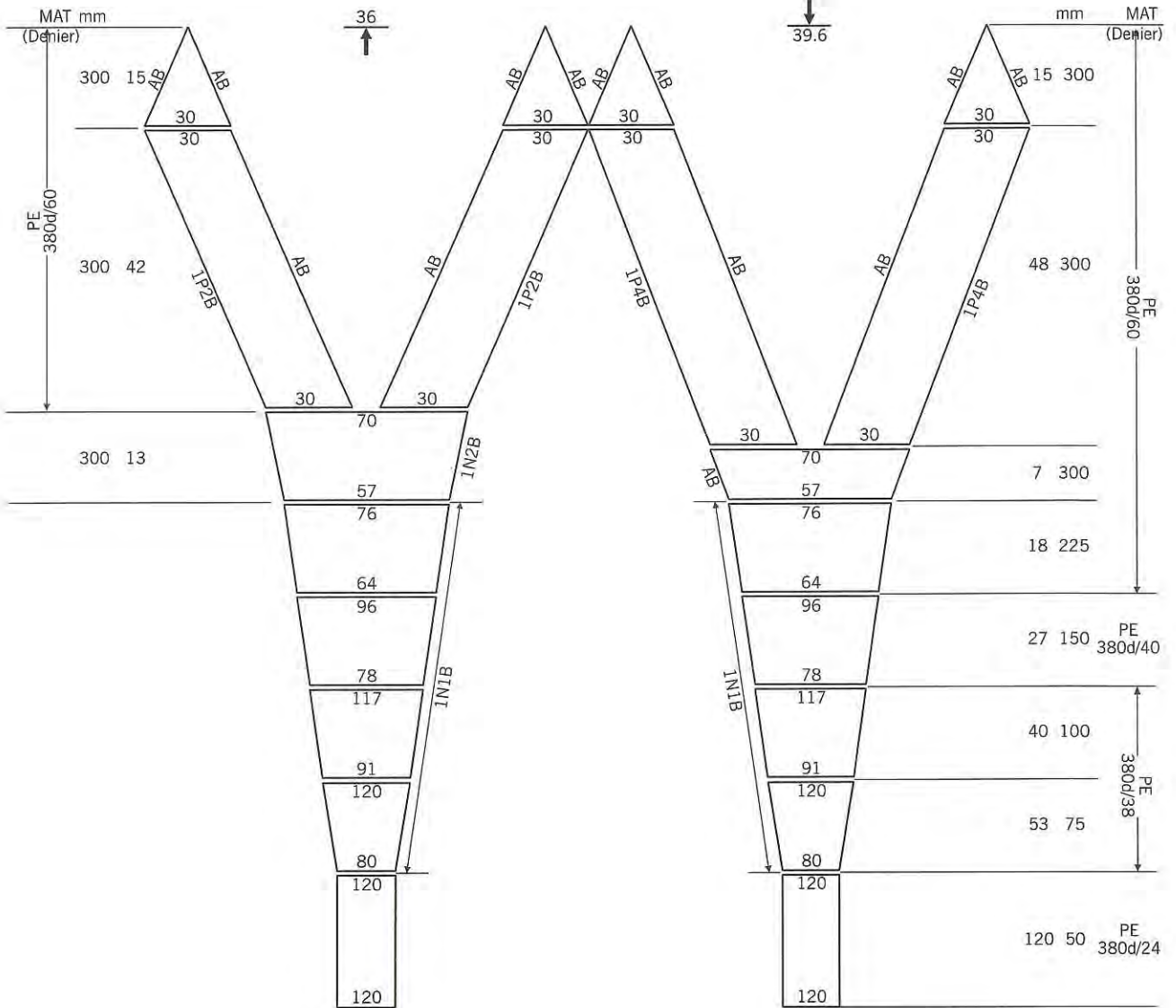
FLC
MUARA
Zone 1



TRAWL NET
 Bottom Otter
 (Pukat Tunda Ikan)
 Demersal fishes

VESSEL
 Loa : 19.2
 GT : 48
 Hp : 275

LOCATION
 FLC
 MUARA
 Zone 1



(a)



(b)



(Foredeck (a) and Stern deck (b) views of trawler in Brunei Darussalam)

Chapter 6
Lift nets

6. LIFT NETS

Fishing Gears and Methods

- 6.1 *Selambau* (Stationary lift net). The gear is made of fine-meshed square netting suspended by ropes in its corner and sides to a wooden frame structure or platform (see Figure 11). The structure is made of a wooden frame base supported by flotation device from empty plastic drums. The middle of the frame is open to soak and heave the net during operation. A rolling drum mechanism that holds the ends of the ropes via pulleys are used to facilitate the operation. Light is also used to attract or lure fishes into the middle of the net

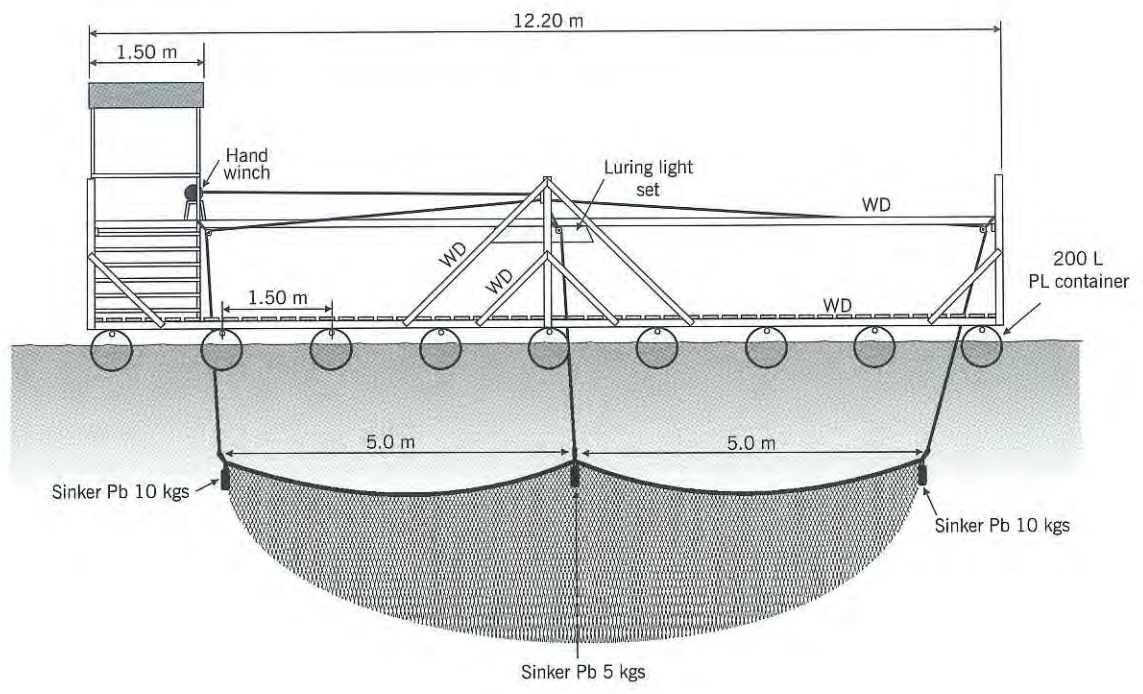
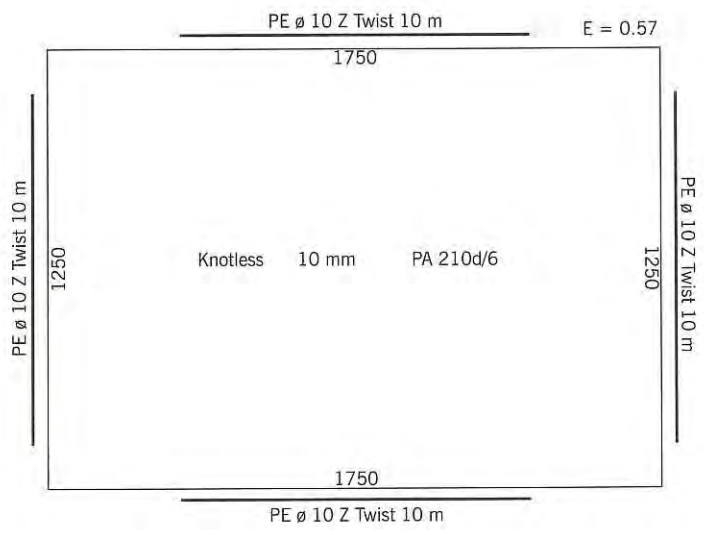


FIGURE 11. *Selambau*

LIFT NET
Anchovy, Sadine

VESSEL
Loa :-
GT :-
Hp :-

LOCATION
Muara
Palumpung



- 6.2 *Bintur* (Crab lift net). This type of lift net is intended for catching crabs in shallow waters and is often baited to lure crabs (see Figure 12). The gear area dimension is about 457 mm x 457 mm in size, for catching river crabs. It is made up usually of two bamboo stick crisscrossed to form the frame with the four ends holding the four corners of the square net with mesh size of about 51 to 76 mm made of PE net. The baits used are usually small chunks of brackish water catfish, rays or sharks that are suspended by a string in the middle of the gear.

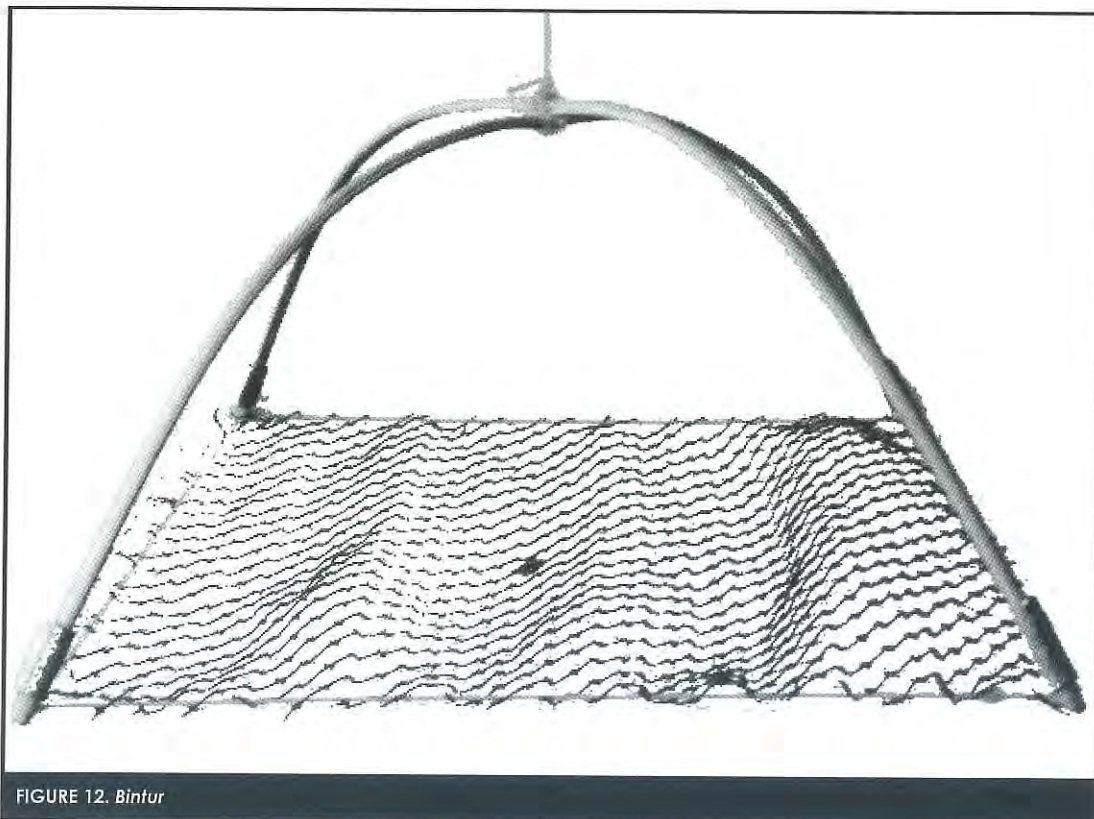


FIGURE 12. *Bintur*

LIFT NET

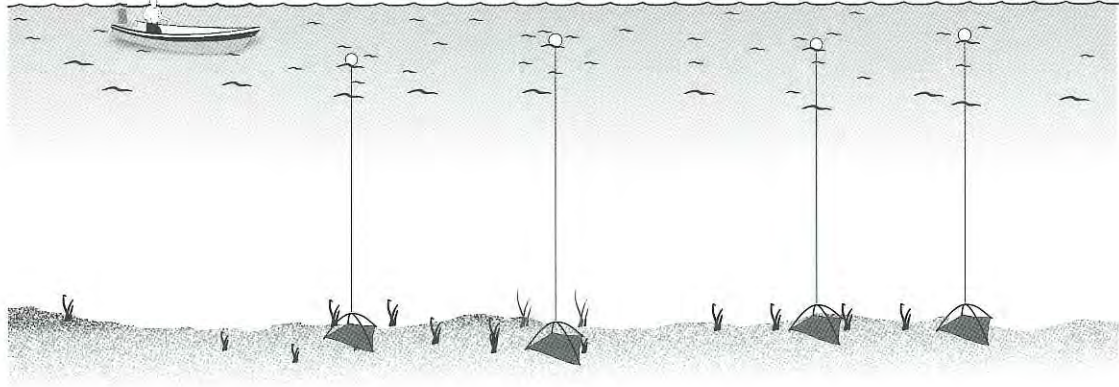
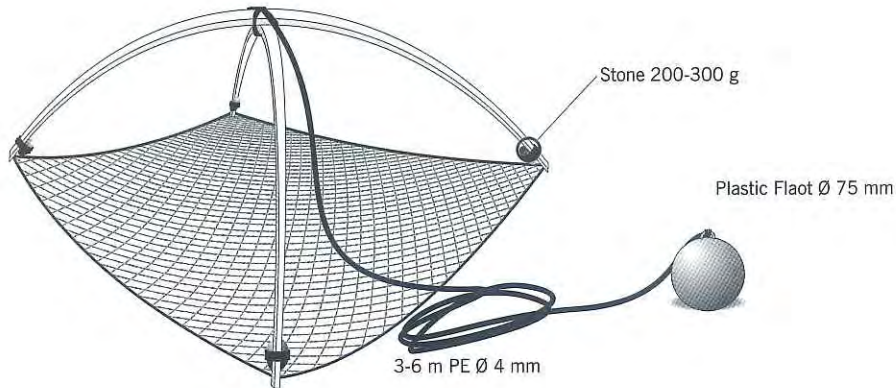
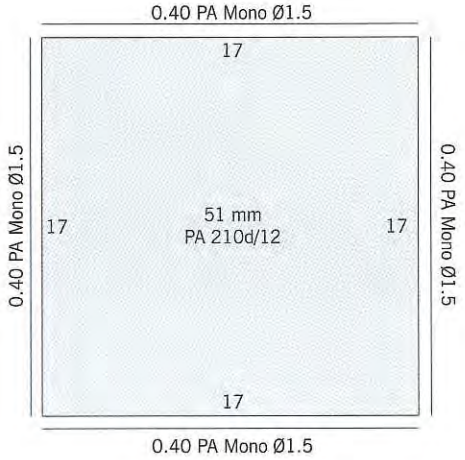
Portable Lift Net
Bintur
Mangrove crab, Blue Swimming Crab

VESSEL

Loa : 3-4 m
GT :
Hp :

LOCATION

Brunei Bay





Chapter 7

Falling Gears

7. FALLING GEARS

Fishing Gears and Methods

- 7.1 *Rambat* (cast net). This is a gear can that be used from small boats (see Figure 13) or even from the shore. The net is usually made of nylon netting and comes in various sizes. The fishermen collect the folds of the net in his arm and cast the net out in a fanning motion into the water to catch the fish.



FIGURE 13. Cast net

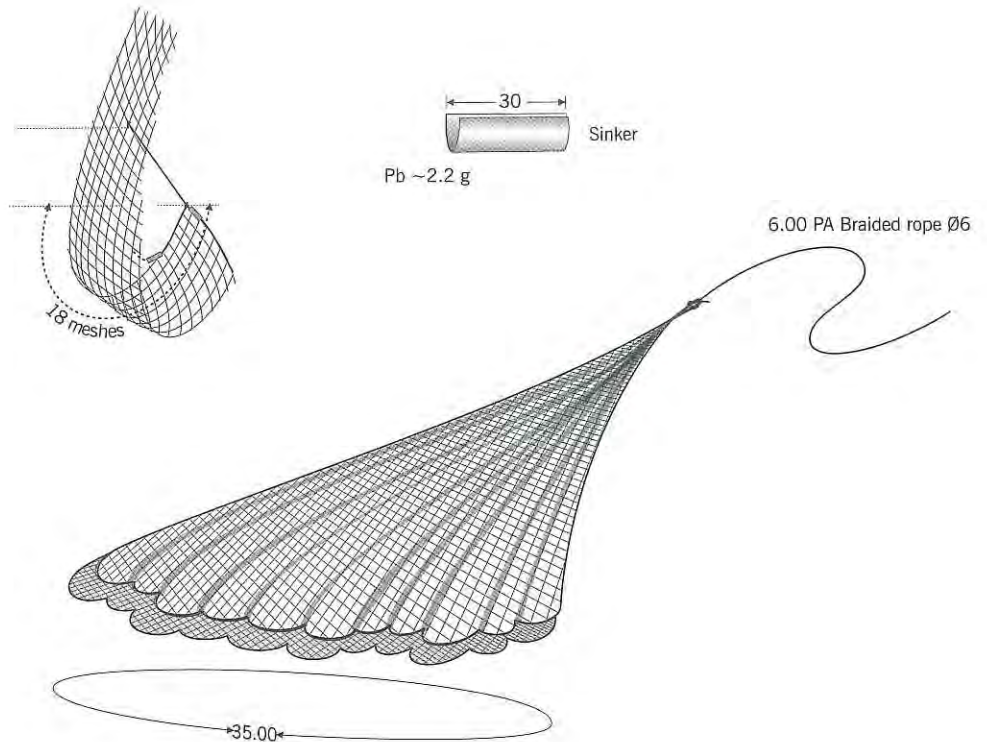
FALLING GEAR
 Cast net
Rambat
 Fresh water Shrimp and Fish

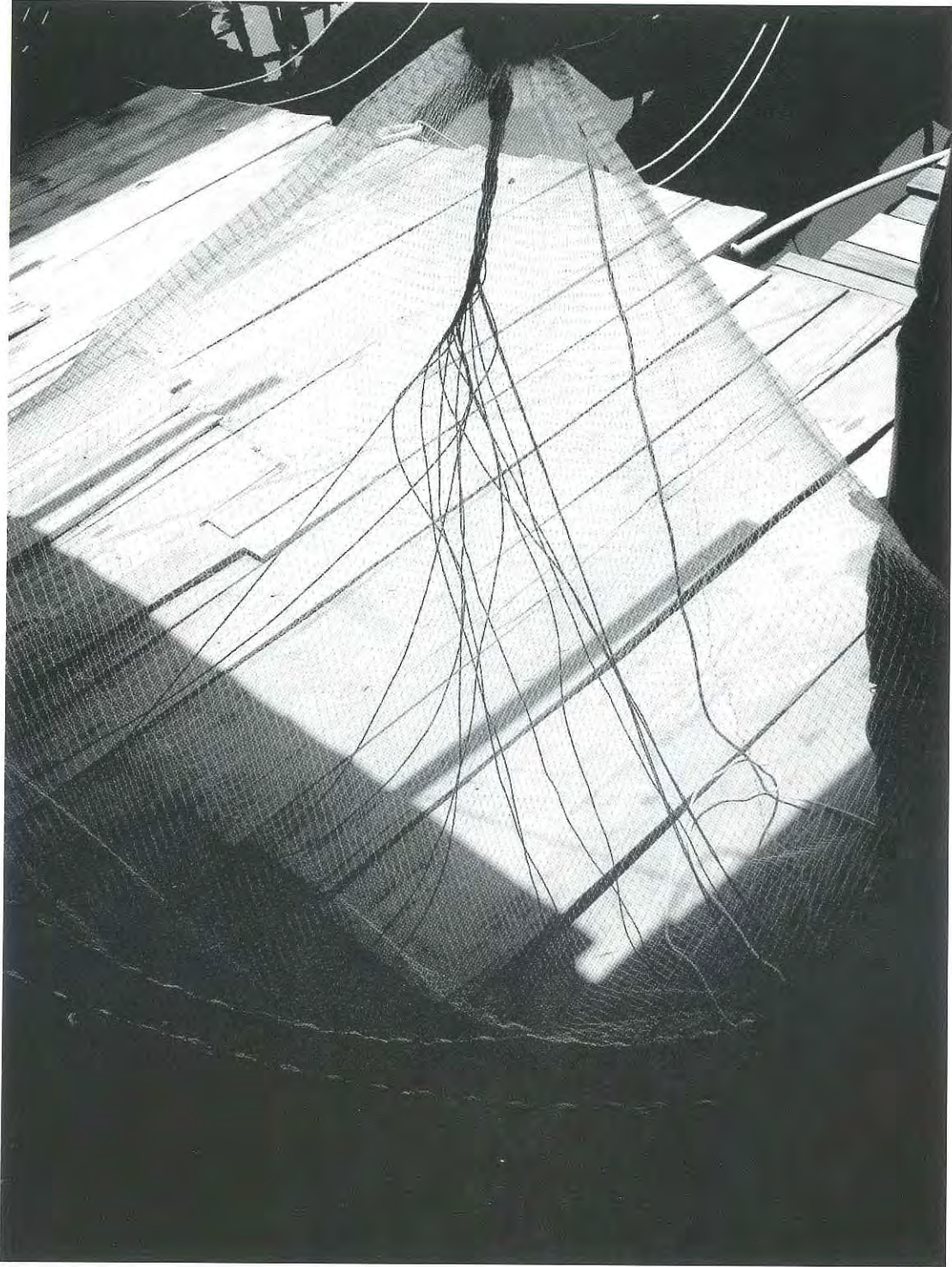
VESSEL
 Loa : 4.00
 GT : <0.2
 Hp : 15-40 OB

LOCATION
 Temburong

Mat Denier	mm	
		3/4 121
		4/5 161
		5/6 201
		6/7 241
		7/8 281
		8/9 321
		9/10 361
		10/11 402
		11/12 442
		12/13 482
		13/14 522
		14/15 562
		15/16 602
		16/17 642
		17/18 682
		18/19 722
		19/20 762
		20/21 802
		21/22 843
		22/23 883
		23/24 923
		24/25 963
		25/26 1003
24		1043
		1043
28		1043
		1043

Nylon Ø 1.5 Z





Chapter 8
Gill Nets

8. GILL NETS

Fishing Gears and Methods

- 8.1 *Andang jarang* (bottom set gill net). The gear is made from monofilament or nylon (PA) material with mesh size ranging from 51 to 76 mm. The gear is also fitted with floats and sinkers to stay vertical at the bottom of the river or sea. It is usually operated by one or two fishers on board an outboard motor boat along the coastal areas (see Figure 14). The soaking time is from six to eight hours. The catch usually consists of pony fish, hard-tail scads, croakers, etc.



FIGURE 14. Bottom set Gill net

- 8.2 *Andang karan* (trammel net). This is an entangling net of measuring about 270 to 460 m in length and 1.5 m depth. The gear is made of three layers of nylon nets that are fused together forming a curtain-like wall (see Figure 15). The outer walls of the net have a stretched mesh size of 270 mm, while the inner wall have mesh sizes varying between 38 mm, 45 mm and 48 mm. Due to the small twine diameter of the net, appendages of shrimps and crabs are easily entangled and are usually difficult to remove and often damage the netting. The *andang karan* is used to catch fish in the open waters off Tutong and Belait districts. The net used for catching shrimps have smaller meshes (2.5 – 4.5 cm). The *andang karan* designed for shrimps is set adrift with the tidal current and traps shrimps around the flexed abdomen. Fishermen operate alone or in pairs during daylight hours using two *andang* units alternately. Each unit is 120 – 150 m long by 3.5 m deep. Fishermen follow shrimp concentrations within the Brunei estuary and during season of Nov-Dec, off the northern coast as far as Berakas and Jerudong (Silvestre, et al.)
- 8.3 *Andang ketam* (gill net for crabs). There is no special gear for catching crabs. The nets usually used are made from old *rantau*, *andang jarang* or *andang karan*. These are modified with floats and sinkers. These gears are set in the evenings and picked up the next morning.
- 8.4 *Rantau* (drift gill net). This gear is made of nylon and is operated at night (Figure 16). One end of the net is attached to the boat while the other is illuminated with a kerosene lamp. The latter serves as a warning light to passing vessels to enable them to keep away from the net.

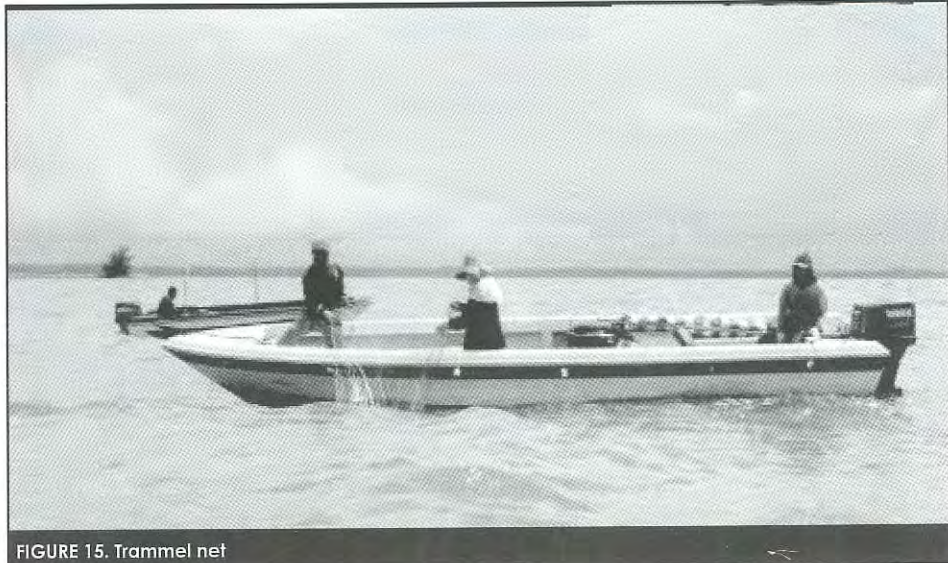


FIGURE 15. Trammel net



FIGURE 16. Drift gill net

GILL NET

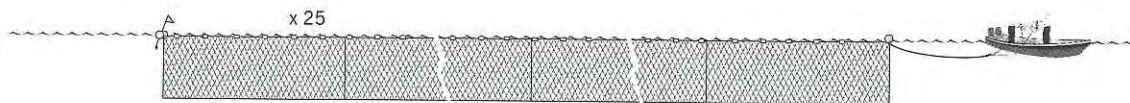
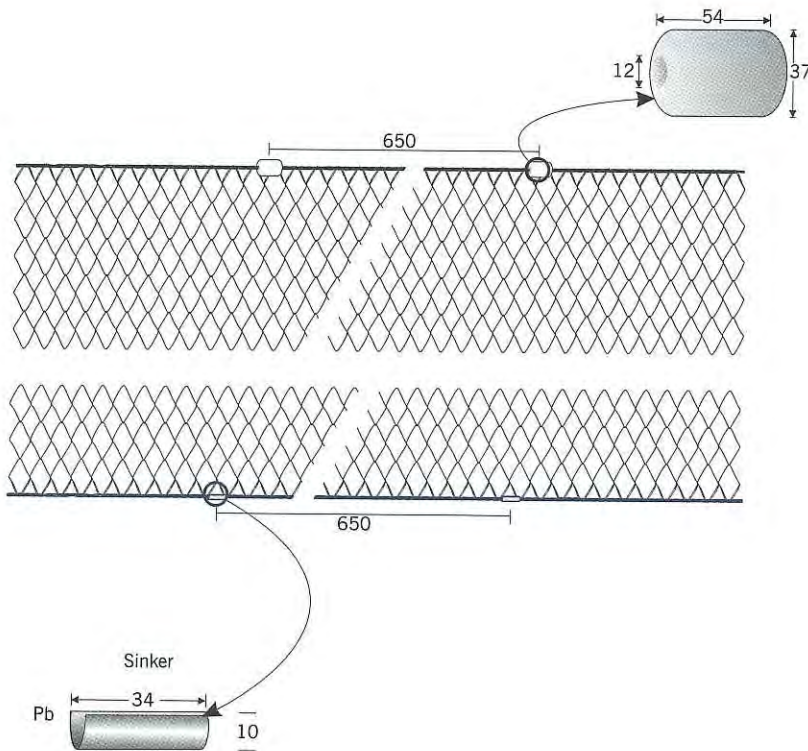
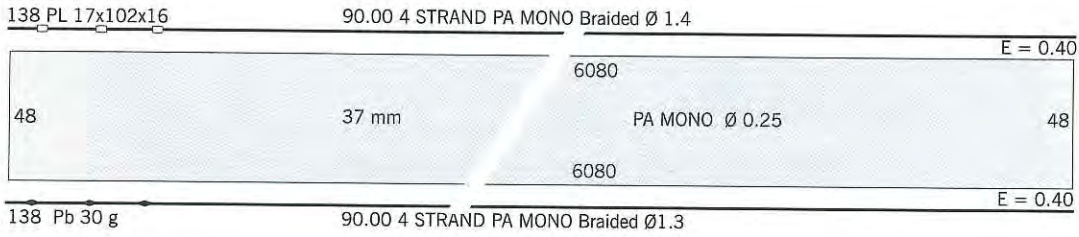
Surface gill net
Pukat Kembura
 Mullet

VESSEL

Loa : 7 m
 GT : < 2
 Hp : 2 x 60 OB

LOCATION

Tutong
Zone 1

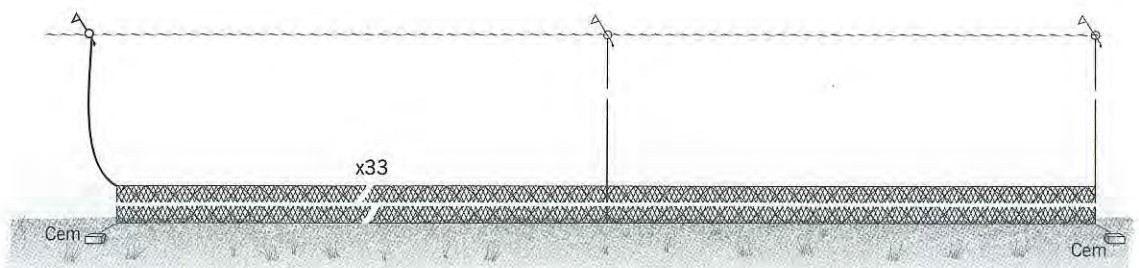
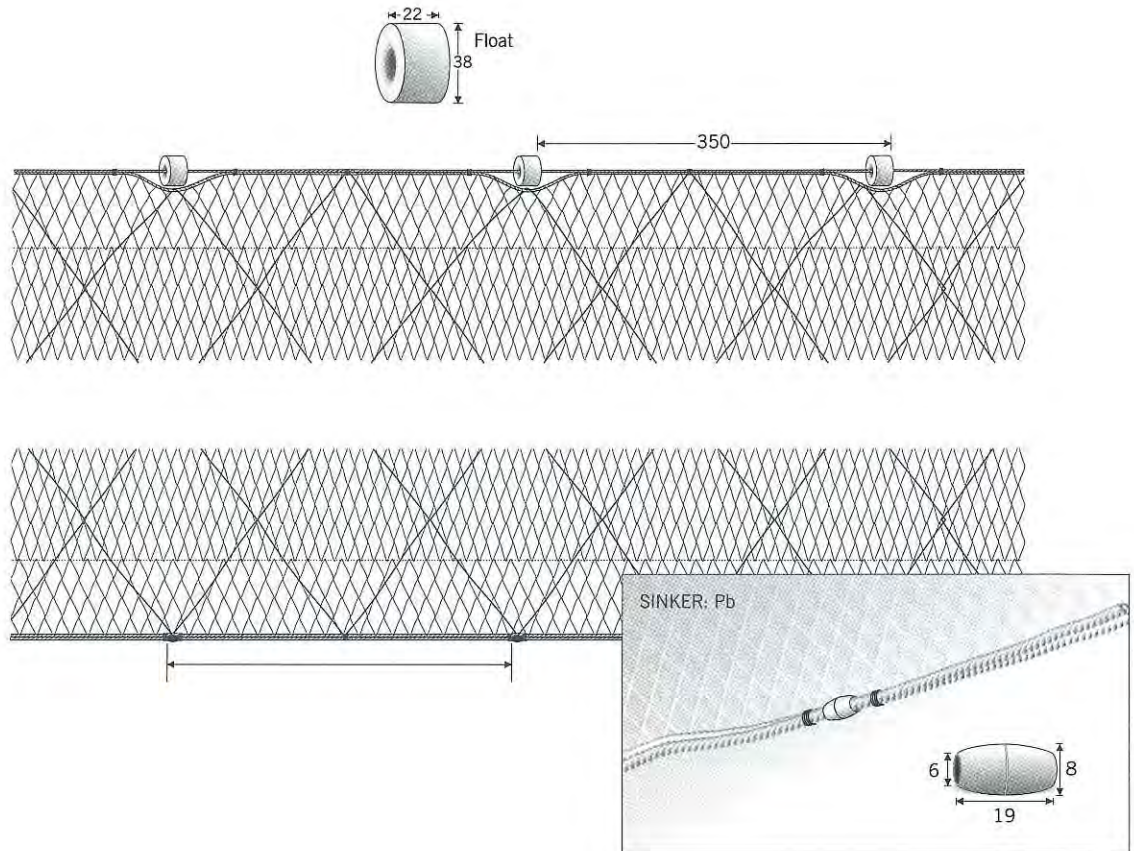


GILL NET
 Trammel, Bottom - Set
 Andang karan
 Shrimp

VESSEL
 Loa : 6 m
 GT : < 2
 Hp : 60 OB

LOCATION
 Brunei Muara, Tutong, Temburong
 Zone 1

9.5	138 mm	PA 210D/3	9.5	E=0.50
100 FR 55x25x25		2 x 150.00 PE Ø 3	E = 0.60	
E = 0.41				
50	35 mm	PA 210 D/2	50	
		2 x 150.00 PE Ø 2.5		
100 Pb 36g				E = 0.60
9.5	138 mm	PA 210D/3	9.5	E = 0.60



GILL NET

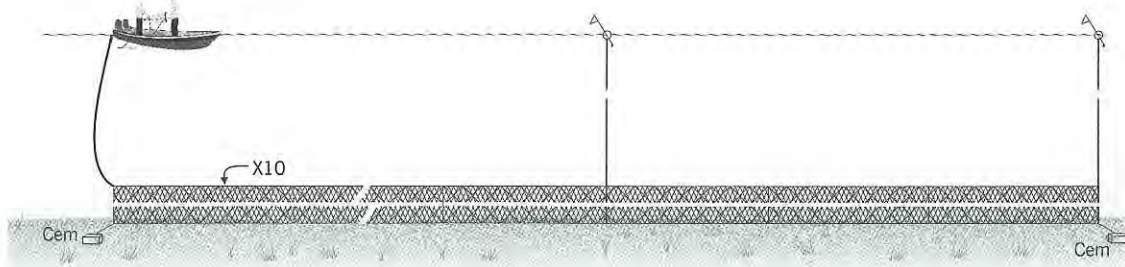
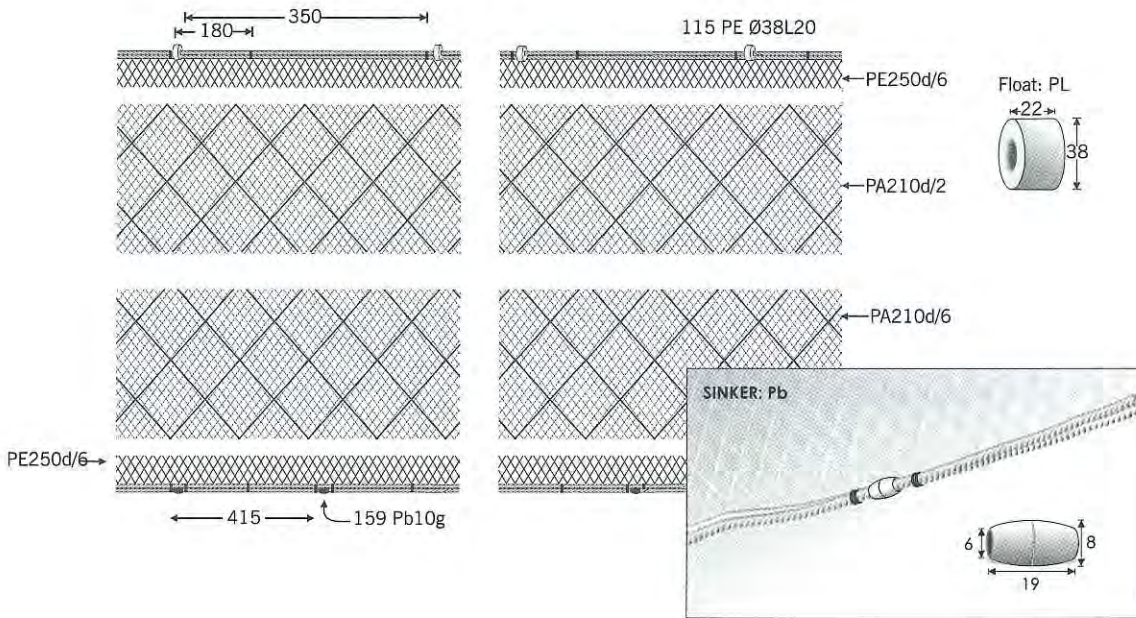
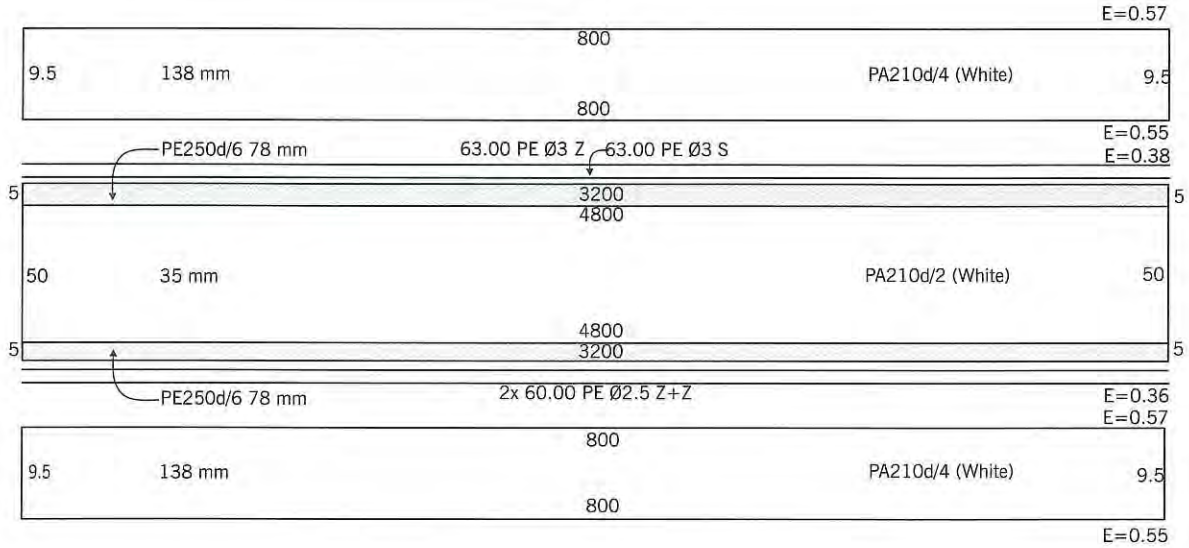
Trammel, Bottom - Set
Andang karan
 Shrimp

VESSEL

Loa : 6 m
 GT : <2
 Hp : 60 OB

LOCATION

Muara, Temburong
 and Tutong
 Zone1

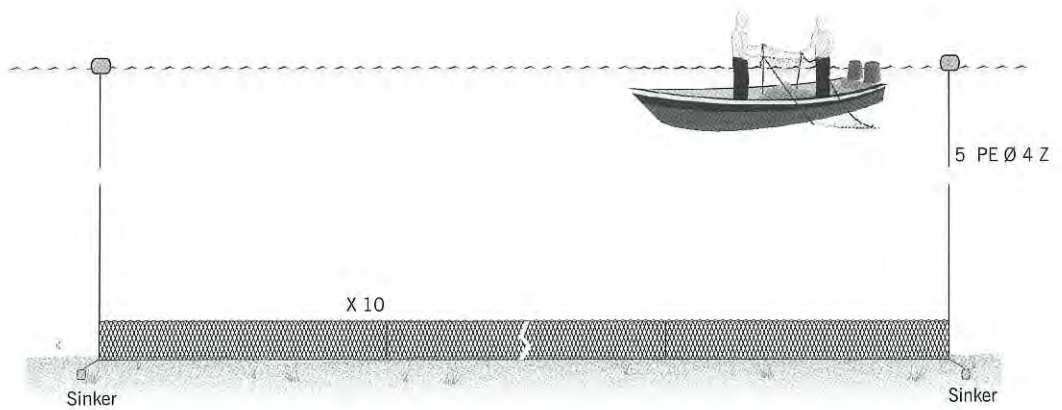
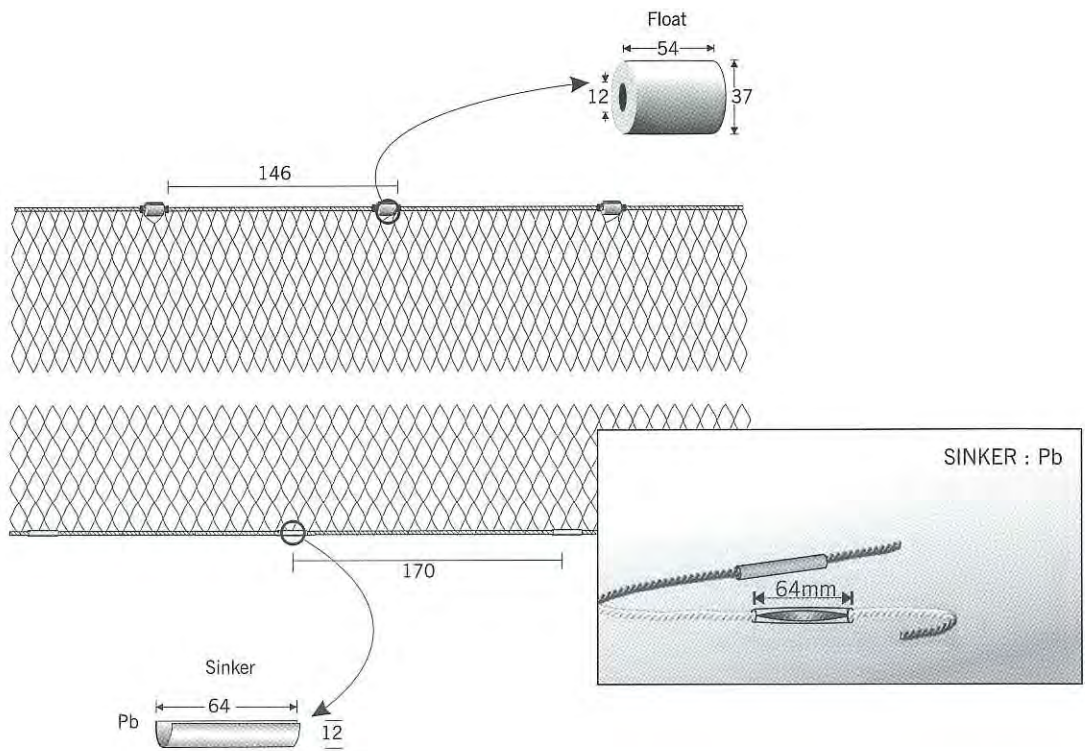


GILL NET
 Bottom Set
Pukat Kuasi
 Demersal Fishes, Gizzard shad

VESSEL
 Loa : 8 m
 GT : < 5
 Hp : 2 x 60 OB

LOCATION
 Manunggul Laut
 Zone 1

32 FP 54 x Ø 37	48.00 PE Ø 4 Z		E = 0.46
12	200 mm	522 PAMONO Ø 1	12
			E = 0.53
28 Pb 80 g	54.00 PE Ø 4 Z		



GILL NET

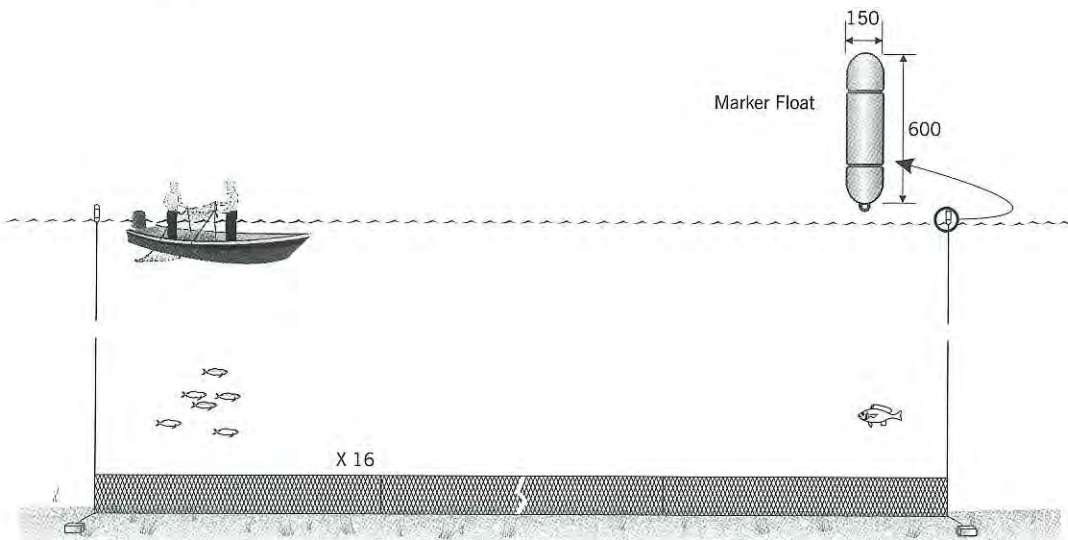
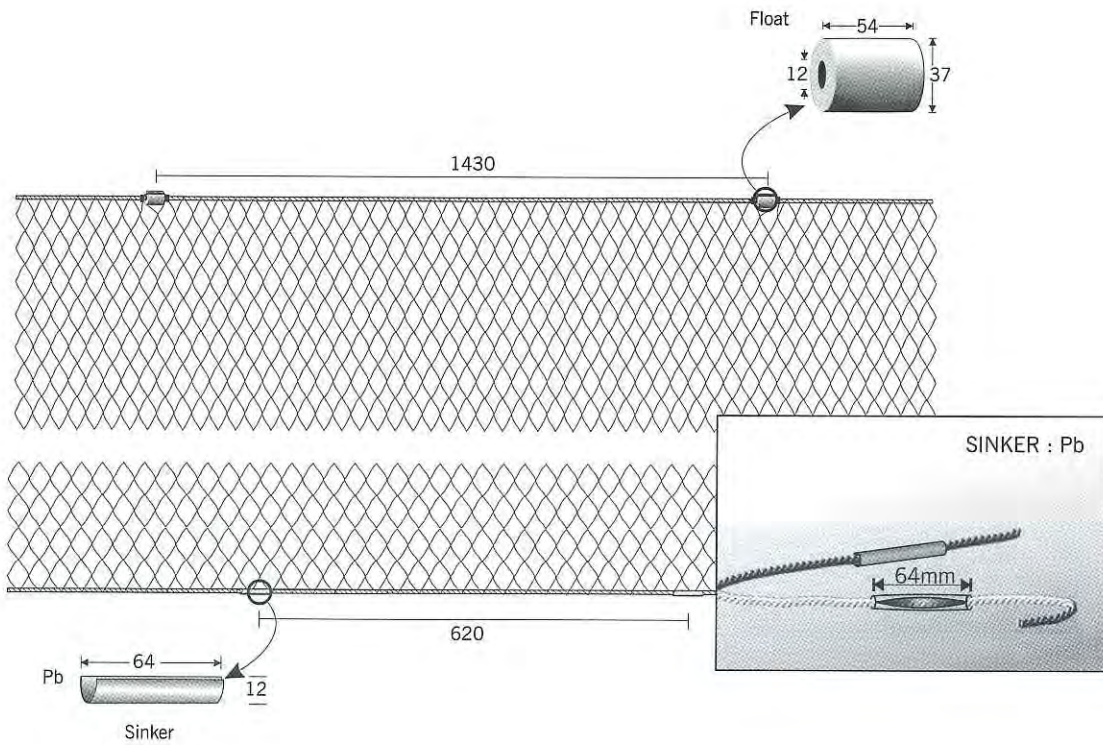
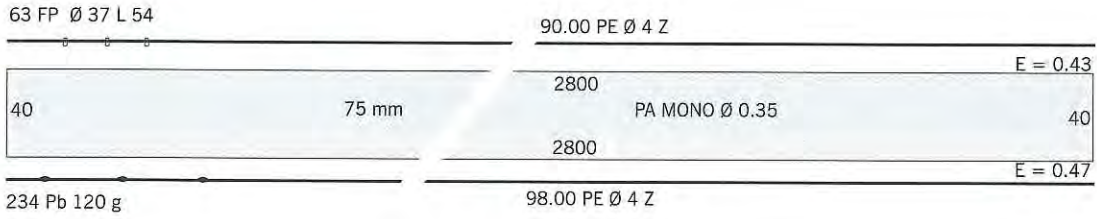
Bottom Set
 Andang Jarang / Andang Lamas
 Demersal Fishes, Small Pelagic

VESSEL

Loa : 6 m
 GT : < 5
 Hp : 60 OB

LOCATION

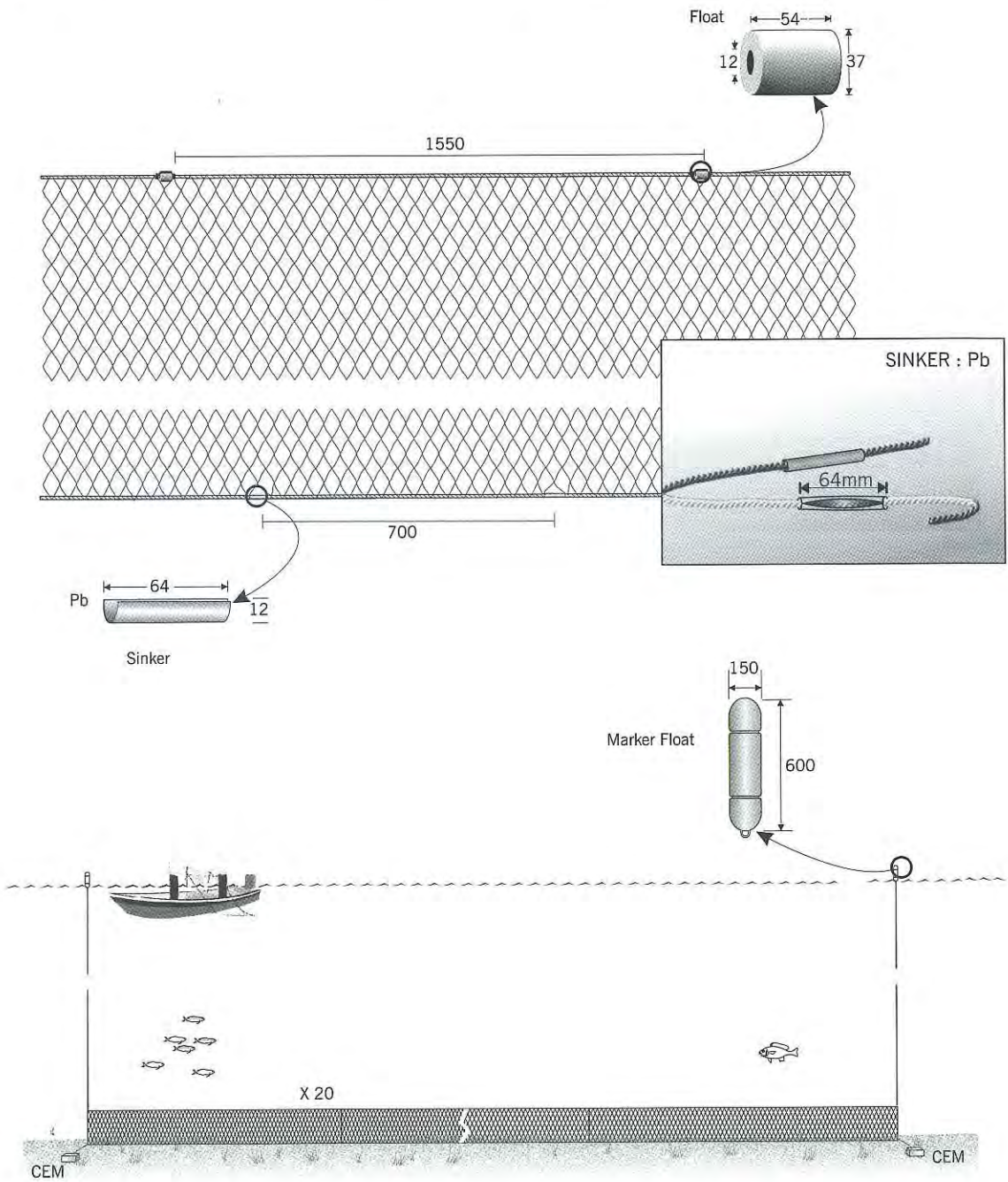
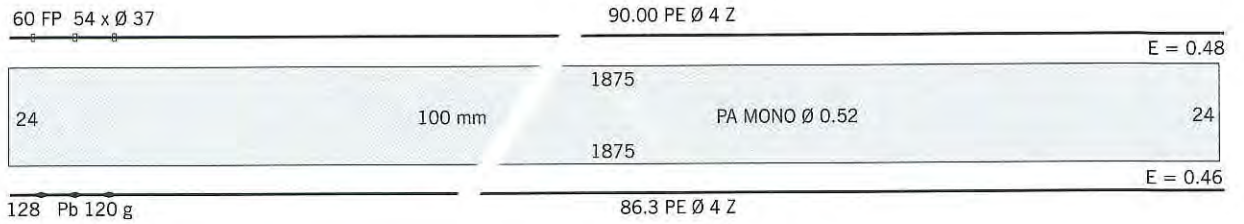
Manunggul Laut
 Zone 1



GILL NET
 Bottom Set
 Andang Lamas / Andang Jarang
 Demersal Fishes

VESSEL
 Loa : 7 m
 GT : < 2
 Hp : 60 OB

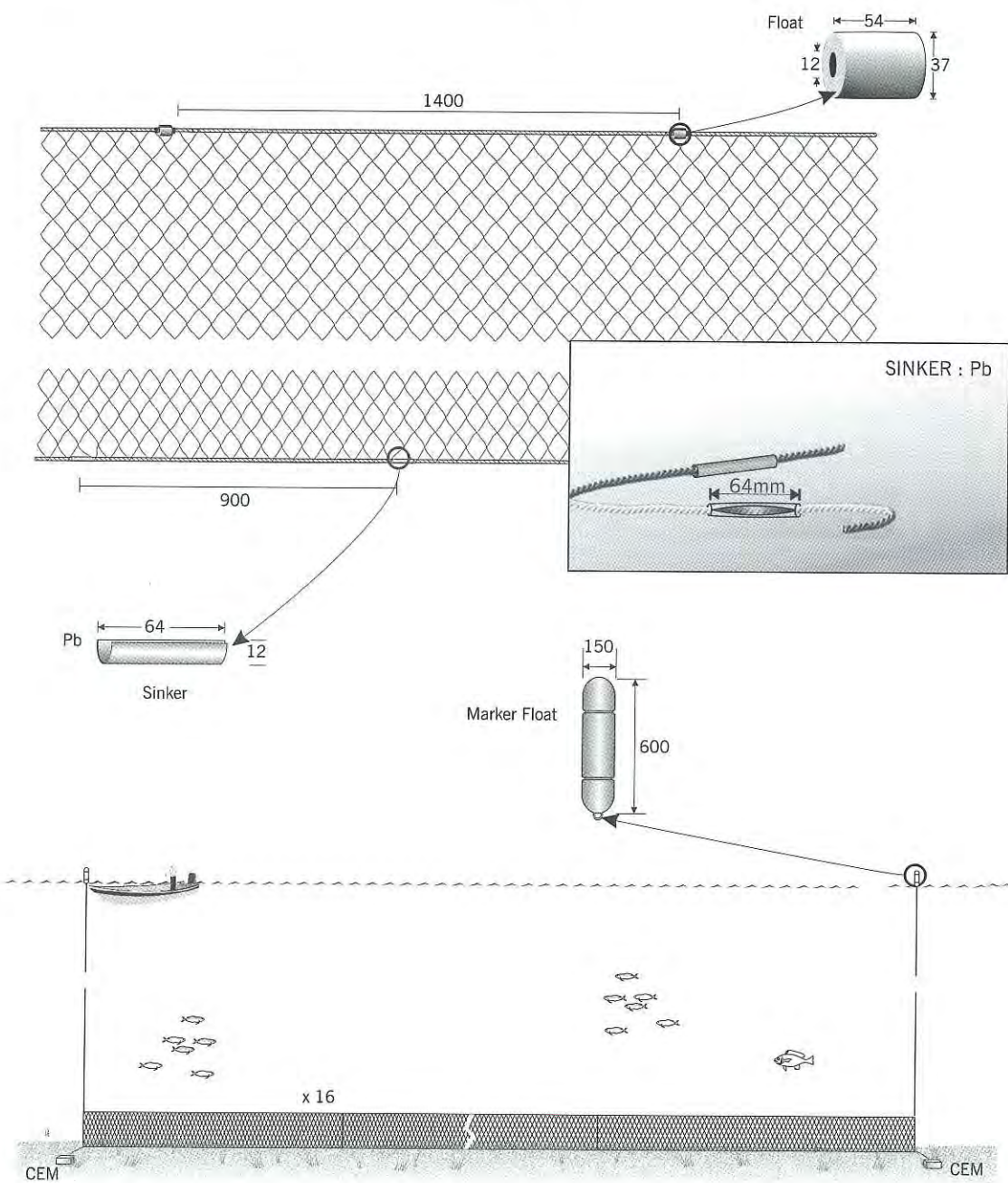
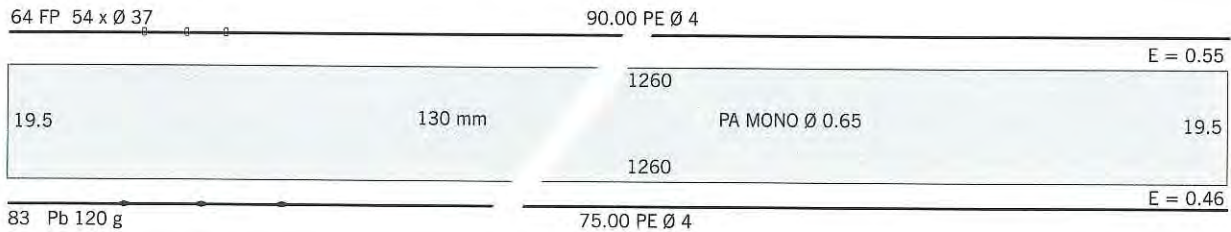
LOCATION
 Manunggul Laut
 Zone 1



GILL NET
 Bottom Set
Andang Jarang / Andang Lamas
 Demersal Fishes, Small Pelagics

VESSEL
 Loa : 7 m
 GT : < 2
 Hp : 60 OB

LOCATION
 Manunggul Laut
Zone 1

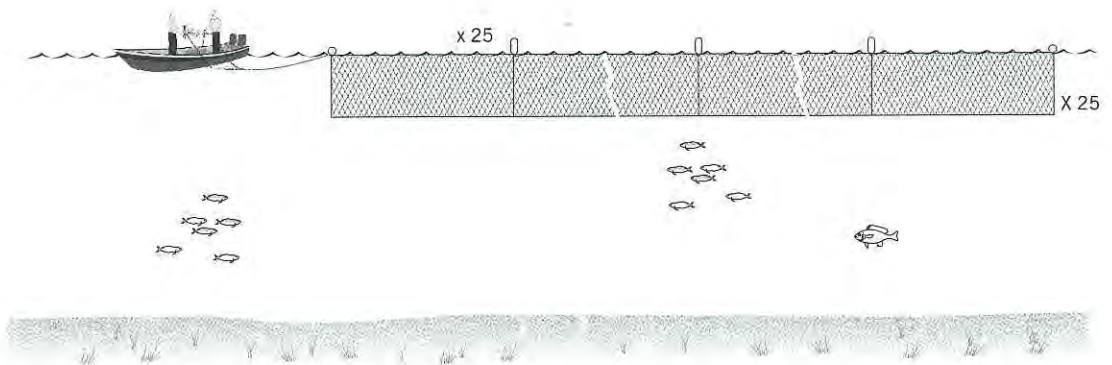
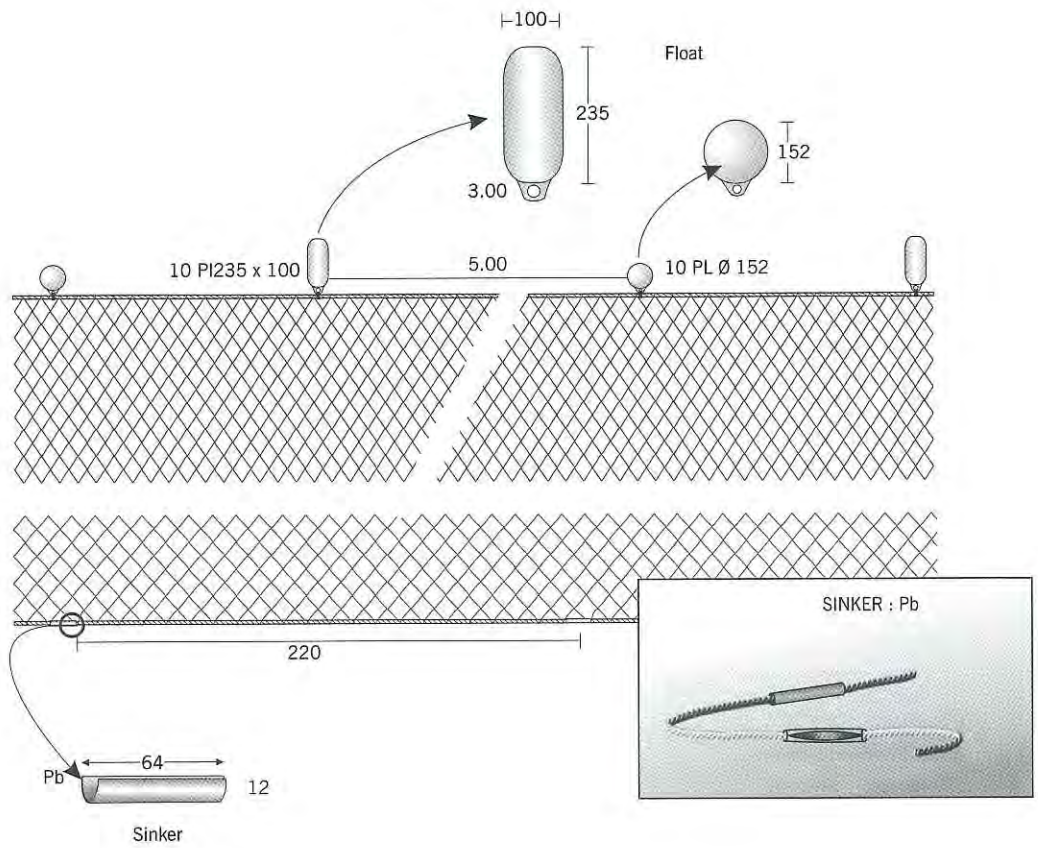


GILL NET
 Drift gill net
Rantau
 Pomfret, Pelagic fishes, Bonito

VESSEL
 Loa : 7 m
 GT : < 2
 Hp : 2x60 OB

LOCATION
 Manunggul Laut
Zone 1

20 PL	90.00 PE Ø 4 Z		E = 0.55
72	150 mm	1090	PA MONO Ø 0.35
		1090	
42 Pb 120 g	108.00 PE Ø 4 Z		E = 0.66



GILL NET

Drift gill net
Rantau
Pelagic fishes

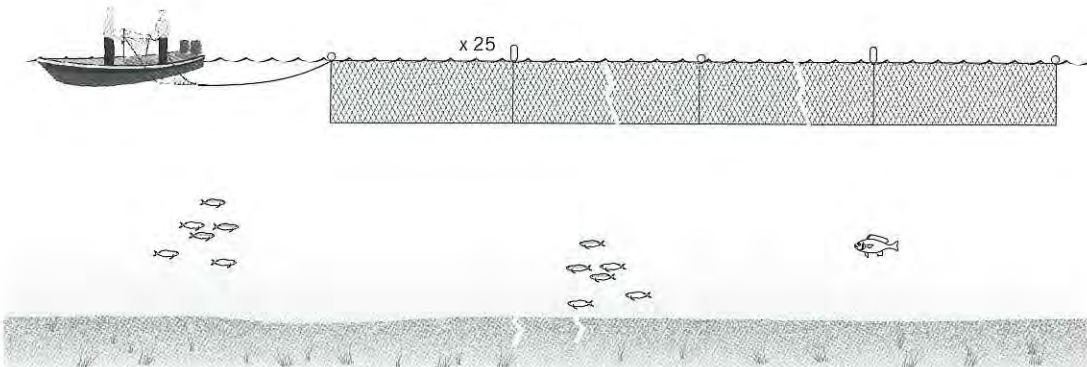
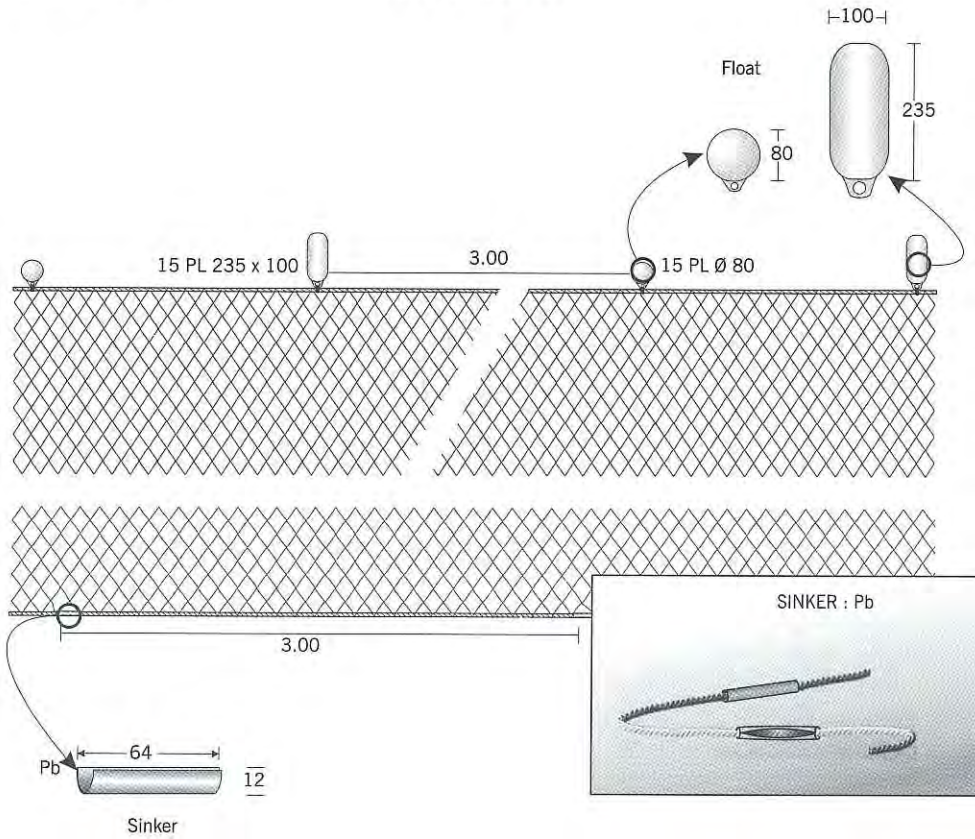
VESSEL

Loa : 7 m
GT : < 2
Hp : 2 x 60 OB

LOCATION

Manungul Laut

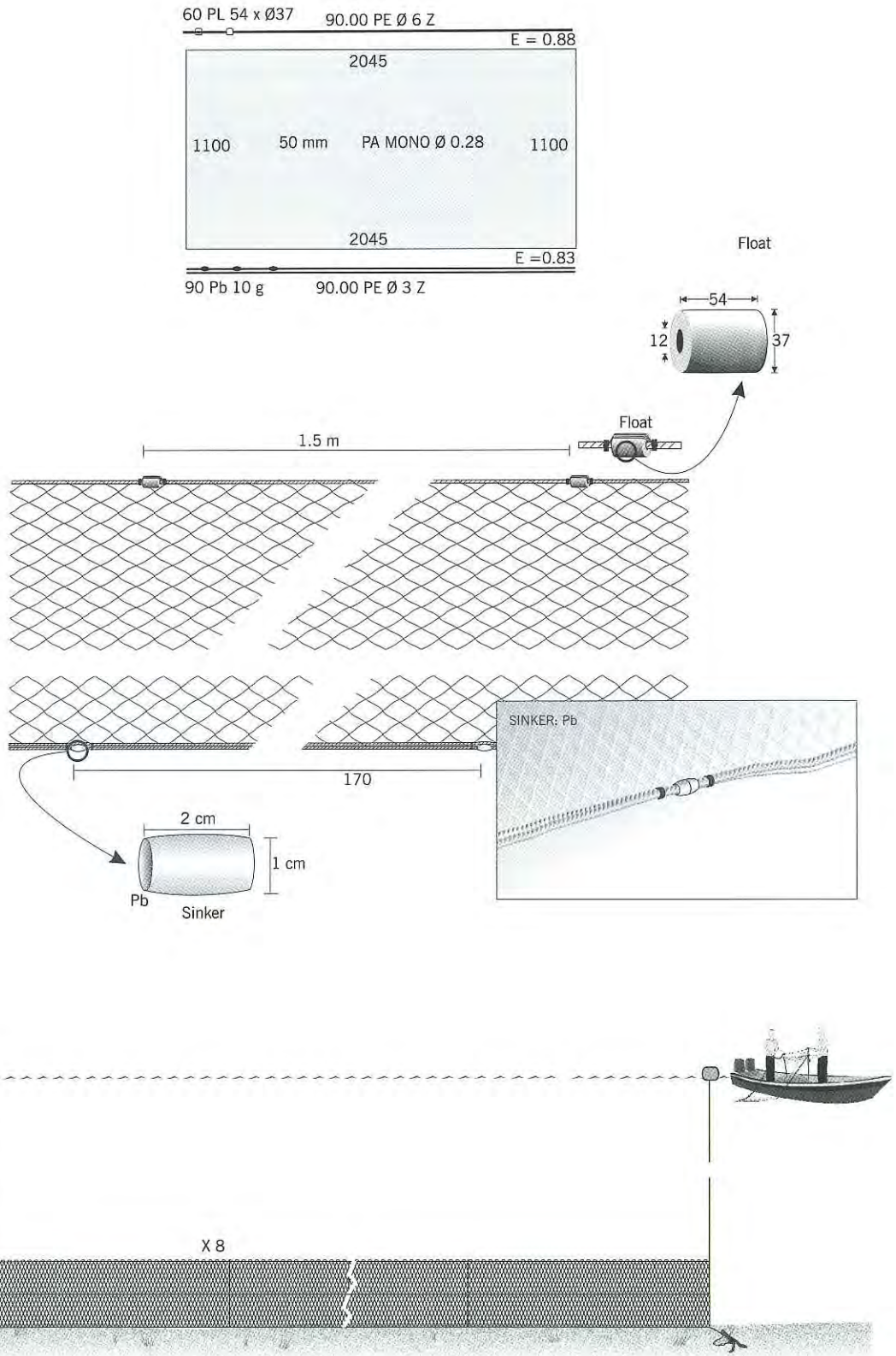
30 PL	2 x 90.00 PE Ø 4 Z			E = 0.44
72	65 mm	3150	PA MONO Ø 0.35	72
		3150		
				E = 0.46
30 Pb 120 g	2 x 94.00 PE Ø 4 Z			



GILL NET
 Bottom Set gill net
Andang Jarang / Andang Lamas
 Demersal Fishes, Grouper,
 Snapper, Small Pelagics

VESSEL
 Loa : 7 m
 GT : < 2
 Hp : 2 x 60 OB

LOCATION
 Pelumpong Muara
Zone 1



GILL NET

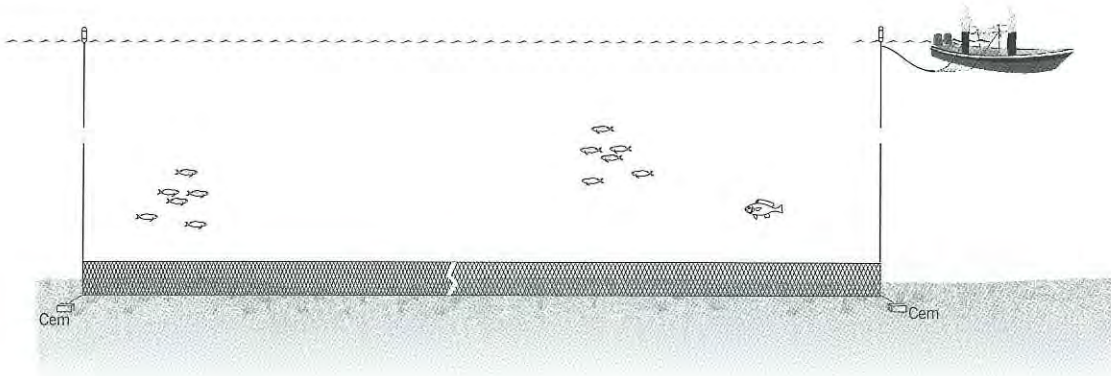
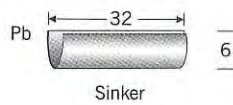
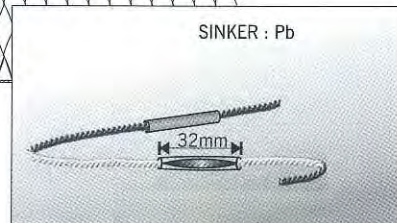
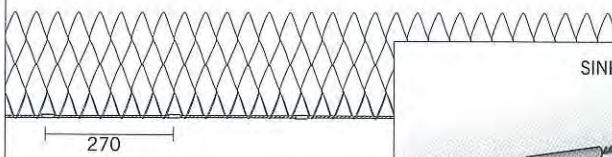
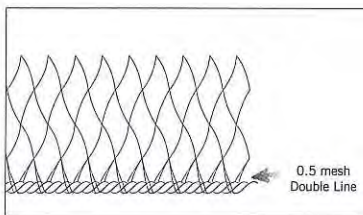
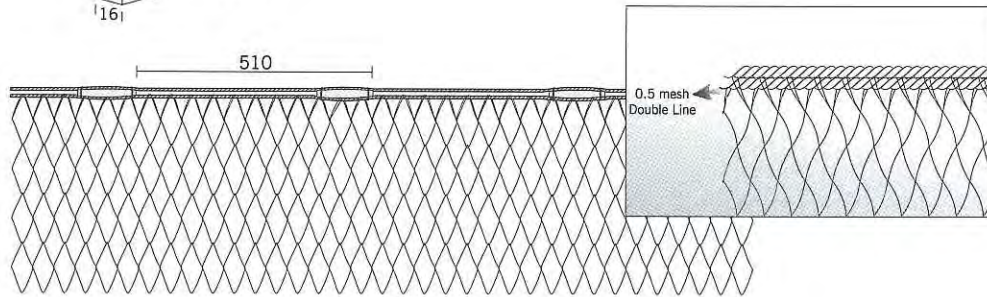
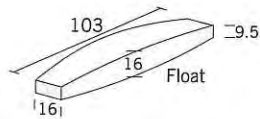
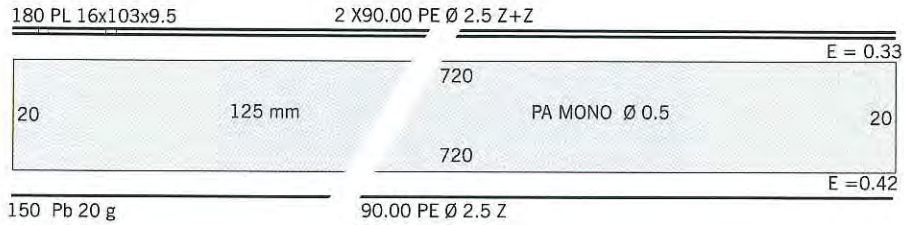
Bottom - Set Gill net
Andang Jarang / Andang Lamas
 Seabass, Grouper and Snapper

VESSEL

Loa : 9 m
 GT : < 2
 Hp : 2 x 60

LOCATION

Temburong
 Zone 1/ Brunei river



GILL NET

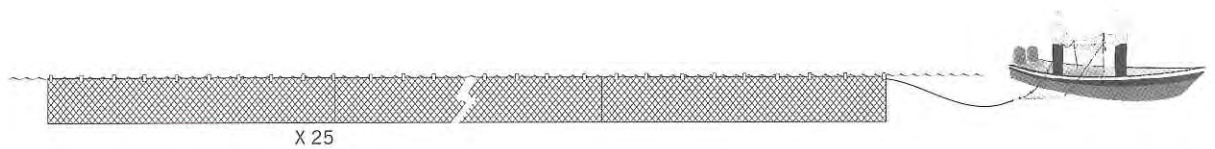
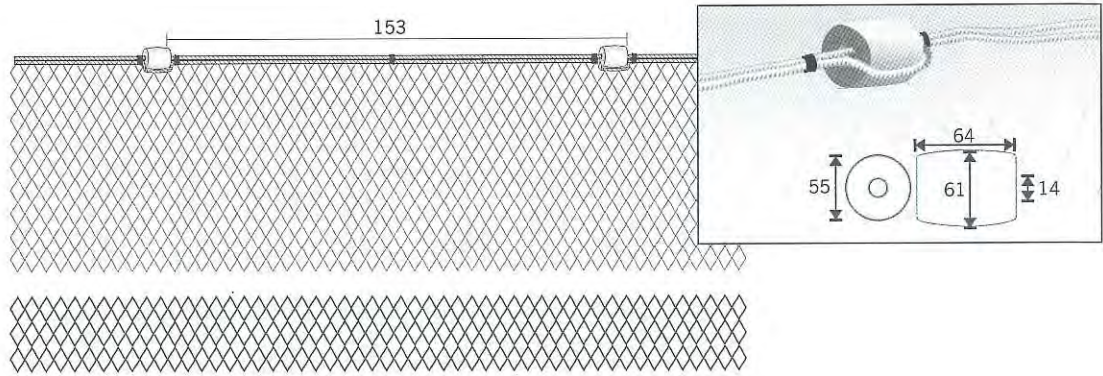
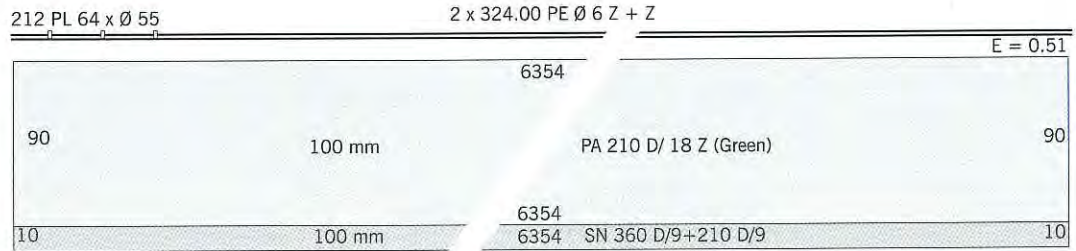
Drift gill net
Rantau
 Pelagic fishes

VESSEL

Loa : 9 m
 GT : < 2
 Hp : 2 x 60 OB

LOCATION

Tutong
 Zone 1/ Brunei river



GILL NET

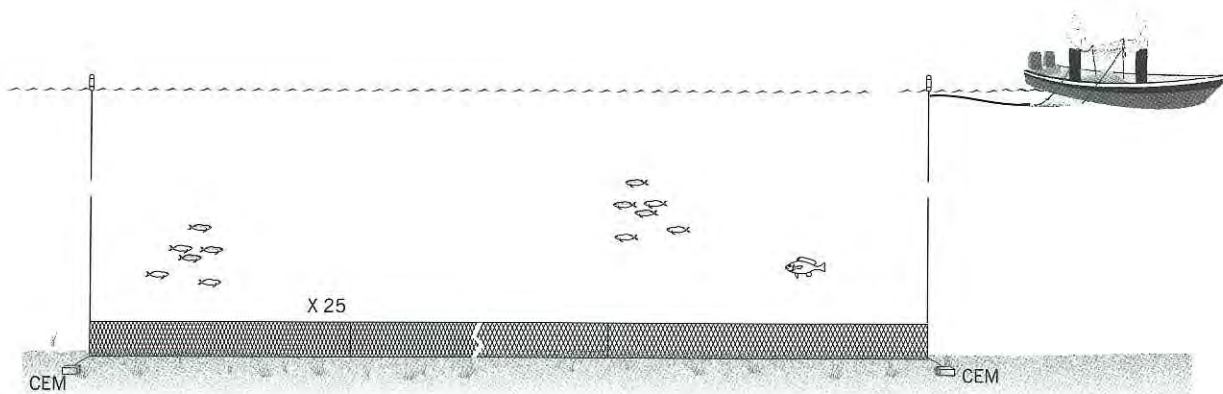
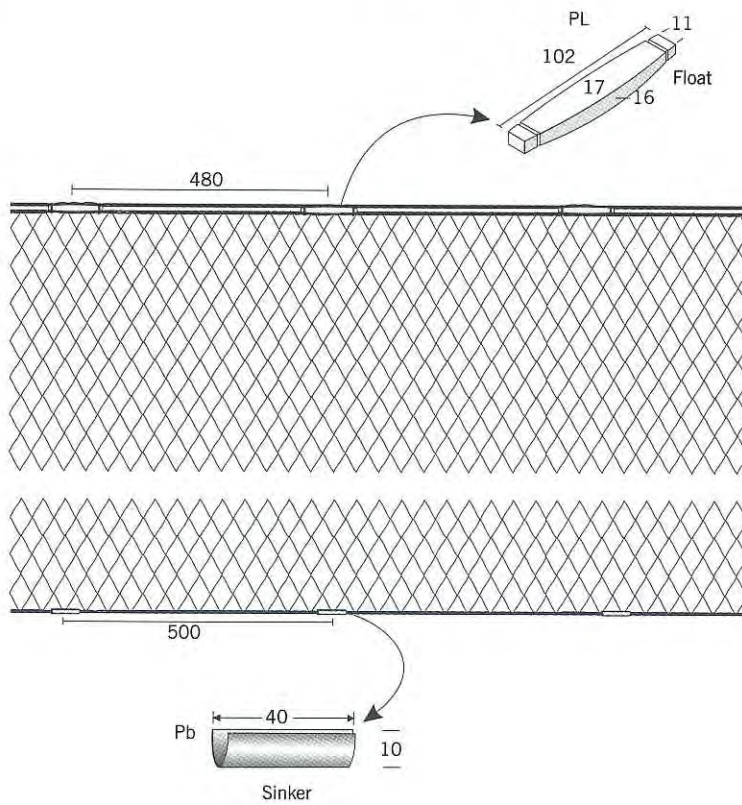
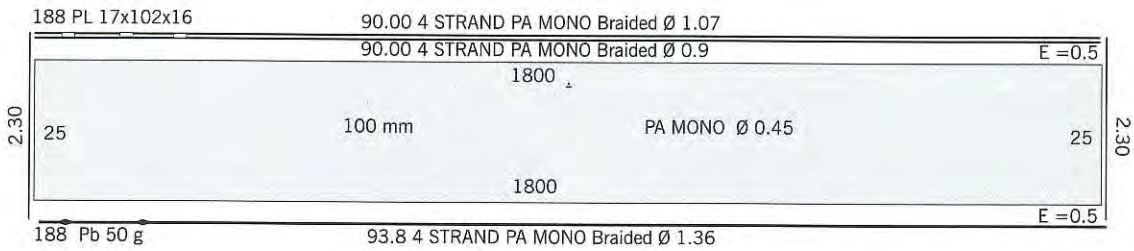
Bottom-Set
Andang Jarang / Andang Lamas
 Demersal fishes

VESSEL

Loa : 9 m
 GT : < 2
 Hp : 2 x 60 OB

LOCATION

Tutong
 Zone 1



Chapter 9
Traps

9. TRAPS

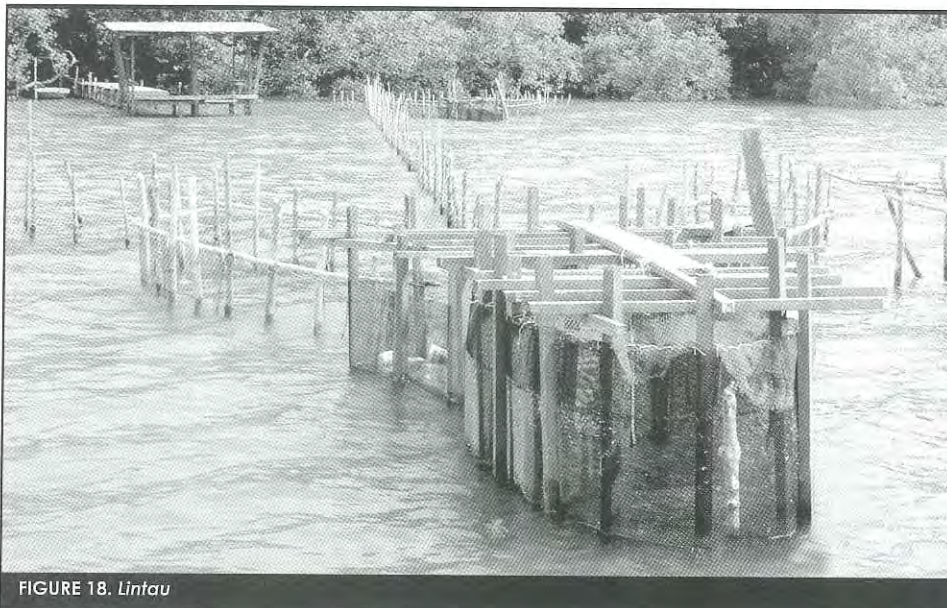
Fishing Gears and Methods

9.1 Stationary traps

- 9.1.1. *Kilong* (Stationary deep-water palisade trap). This gear is shaped like a giant arrowhead (see Figure 17). It is made of poles and chicken wire mesh. The fish are led towards a structure by a leader that is called the *pekarangan* that leads to a playground to the terminal pound or cod end where they are caught.



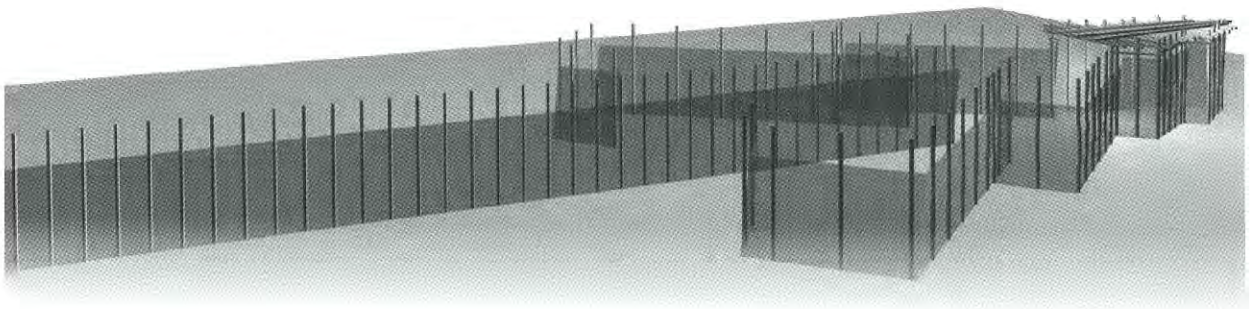
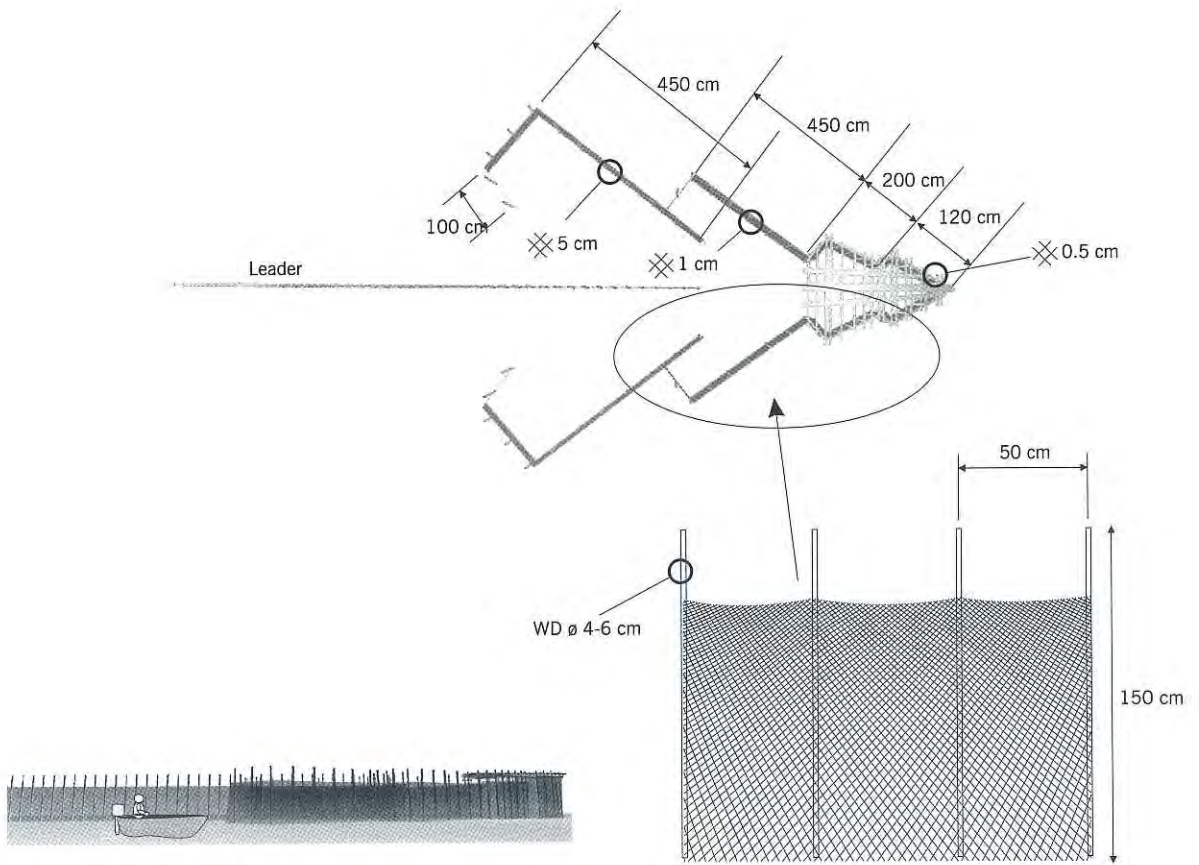
- 9.1.2. *Lintau* (Stationary shallow-water palisade trap). The structure is just like a kilong but is smaller in size (see Figure 18). This is usually set up near the beaches (or mudflats) especially along mangrove fringe areas as opposed to kilong that are set up in the deeper waters of the bay.



TRAP
 Deep Water Stake Palisade Trap
Kilong
 Demersal Fish, Scad, Shrimp

VESSEL
 Loa : 6 m
 GT : <2
 Hp : 60 OB

LOCATION
 Serasa Muara
 Brunei Bay



TRAP

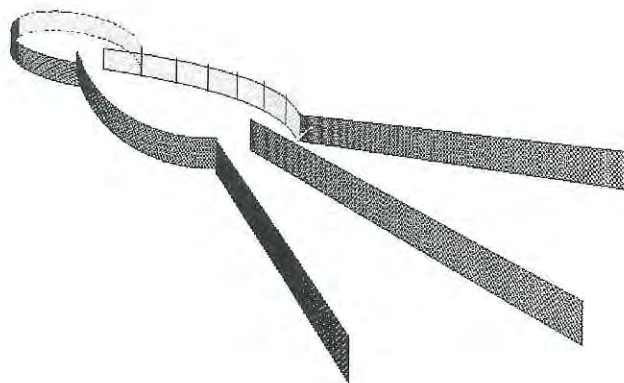
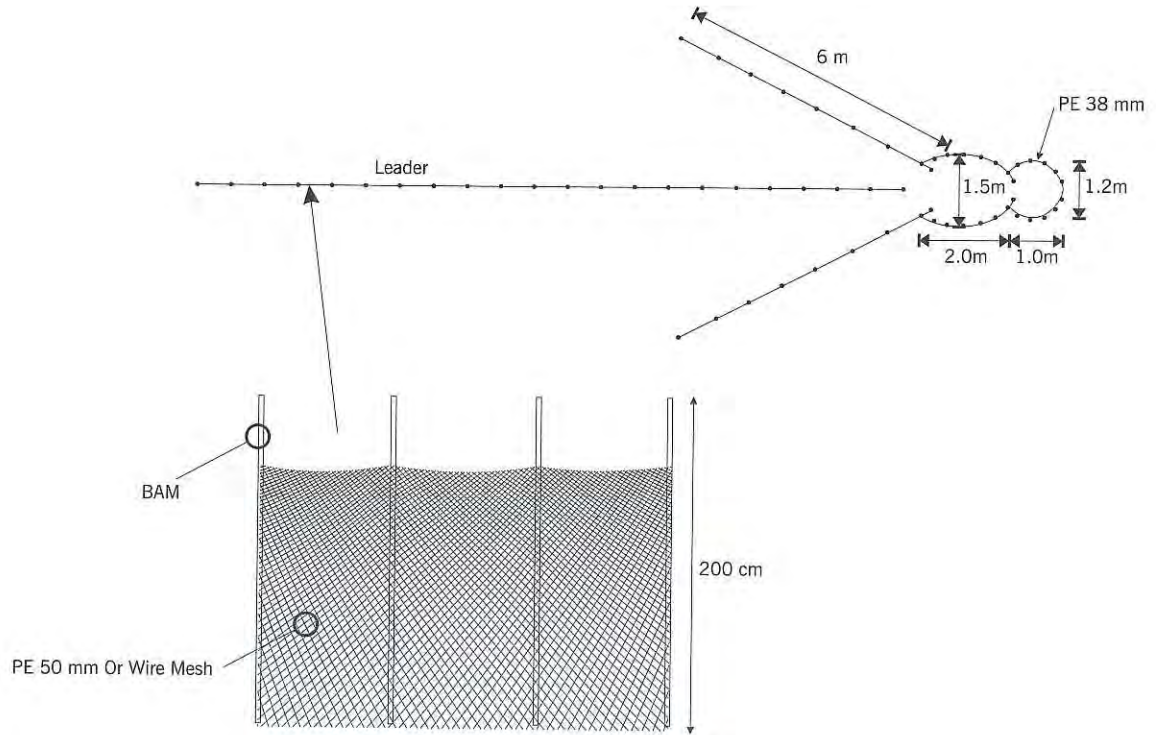
Shallow water Palisade Trap
Lintau
Demersal Fish

VESSEL

Loa : 3-4 m
GT : 0.5
Hp : 30 OB

LOCATION

Brunei Bay



SHORELINE

9.2 Semi-stationary traps

9.2.1. *Kabat* (tidal weir). This gear is used at the mudflats around the mangrove fringe areas (see Figure 19). It is made of polyethylene net some with 25.4 mm mesh size and are usually mounted on wooden poles and set up like a fence forming a letter “C” around a mangrove fringe area during high tide. Formerly the gear is made of woven bamboo but now is replaced by PA monofilament netting material that can sometimes be set to about 400 meters in length covering wider mangrove fringes. The catches usually consist of both shrimp and fish that are picked up on the mudflats during low tide.

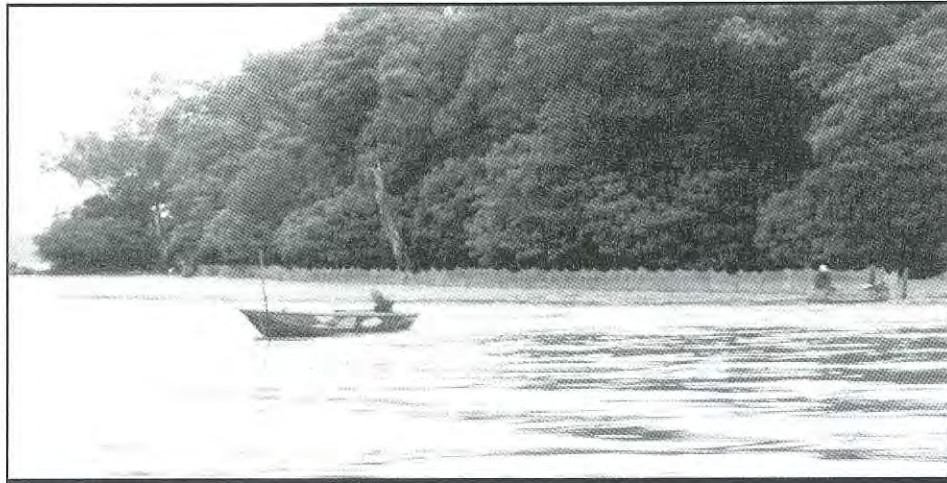
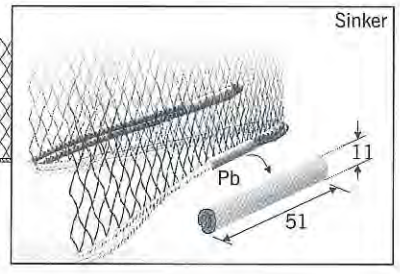
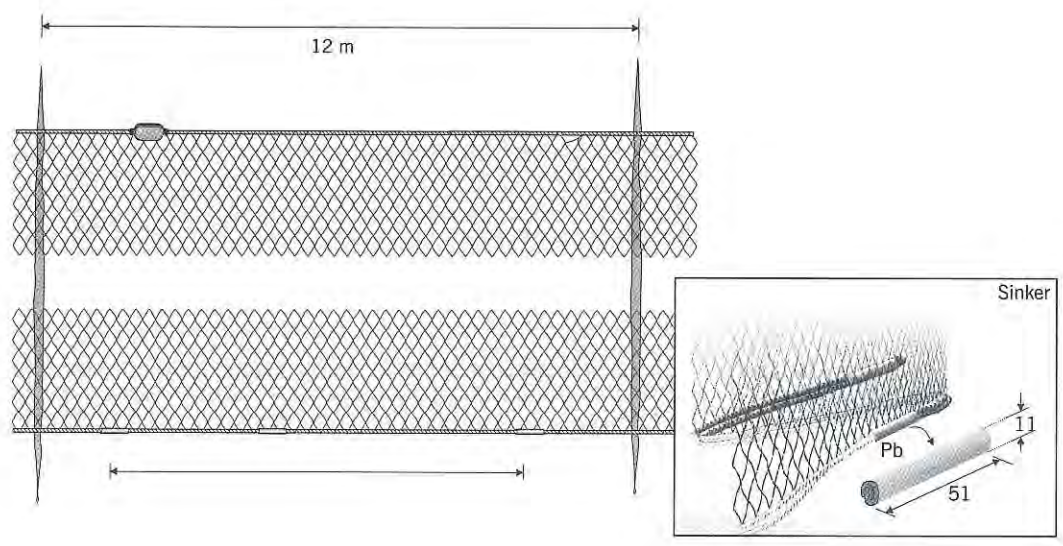
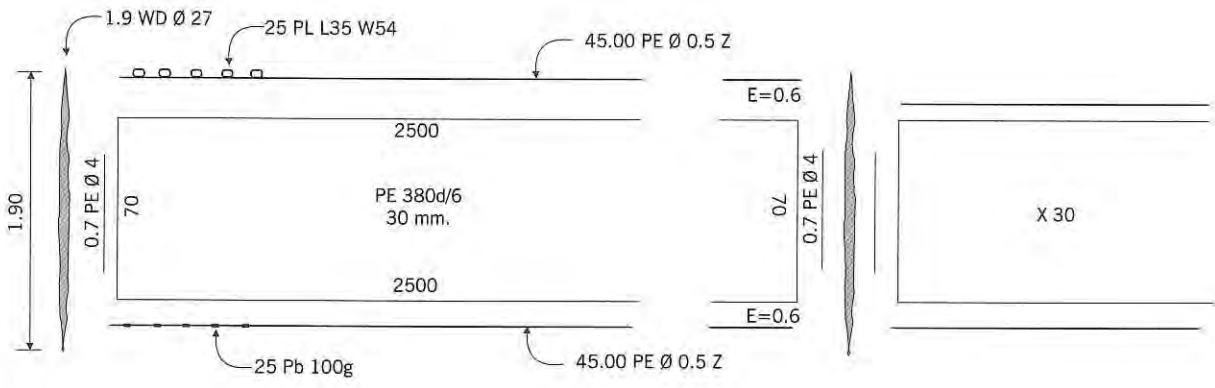


FIGURE 19. *Kabat*



9.2.2. *Tugu* (Conical or funnel intertidal trap). The *tugu* nets are set up side by side in series on wooden stakes driven into the seabed to form the platform to hold the net (see Figure 20). Before the ebbing or flooding of the water or during slack tide, the net is dropped in position to filter the moving water together with the fish to catch. The catch consists mainly of shrimps but may also include fishes such as mullets, ponyfish, etc.



FIGURE 20. *Tugu*

TRAPS

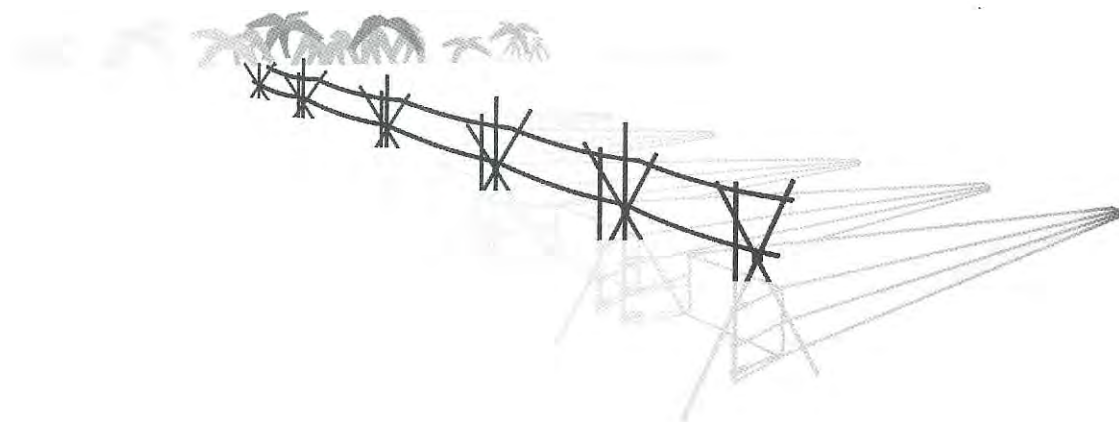
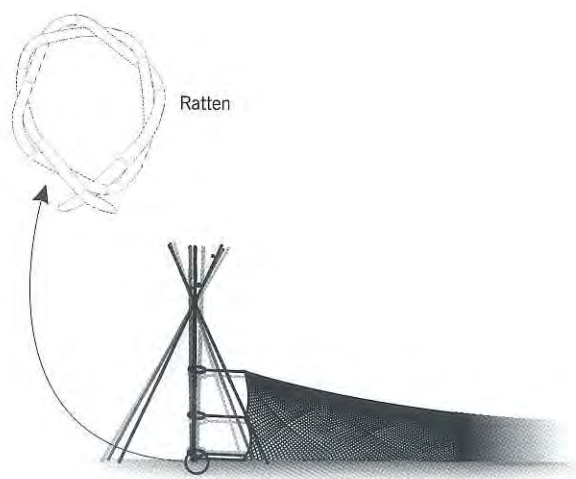
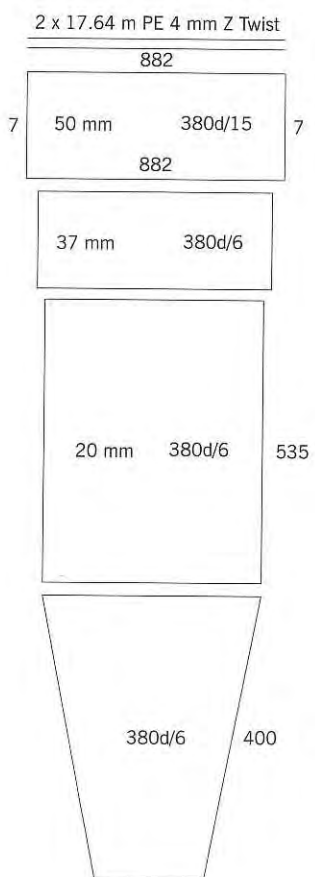
Conical Tidal Trap
Tugu
 Shrimp, Demersal fish

VESSEL

Loa : 6 m
 GT : < 0.5
 Hp : 2x60 OB

LOCATION

Brunei Bay



9.2.3. *Tambak* (Barrier net). This fishing gear is made of synthetic netting material that is mounted on several bamboo stakes (Figure 21 and 22). *Tambak* is usually set like a fence along the river banks of the inner Brunei River. This gear differs from *kabat* in the intended target species that is usually the Sergestid shrimps or *bubuk* during its season. It also differs from *kabat* with the use of fine meshed netting material to trap the shrimps. The operation is done by setting a fence like structure to filter the water during the tidal movement. The fisher usually takes advantage of on the water current created by the tidal change that carries the shrimp that are drifted along with it.



9.3 Portable traps

Fishing Gears and Methods

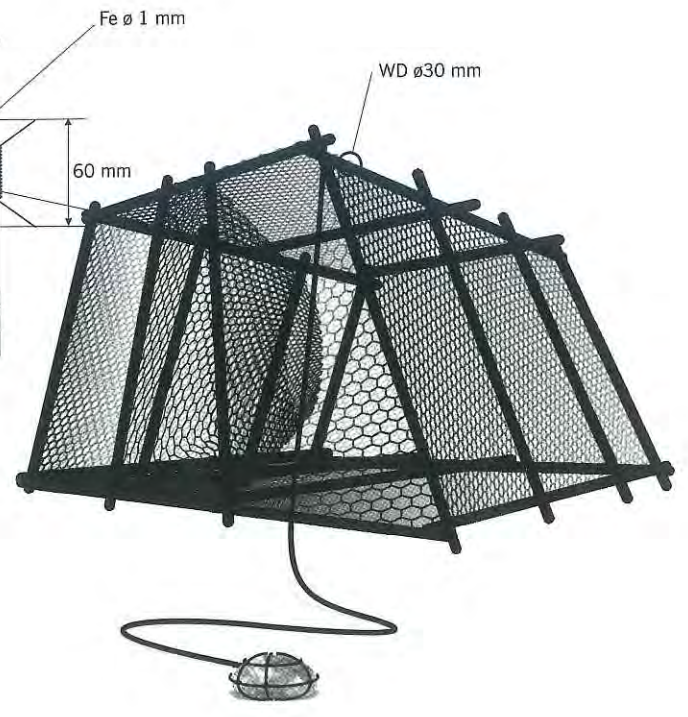
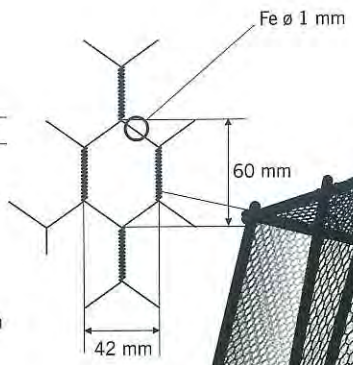
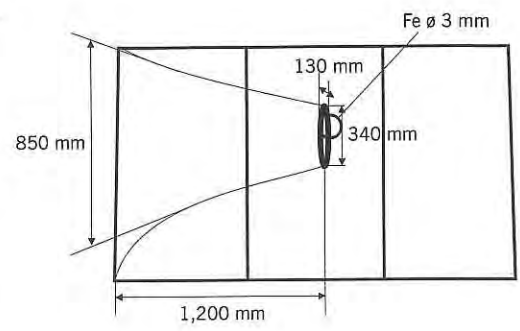
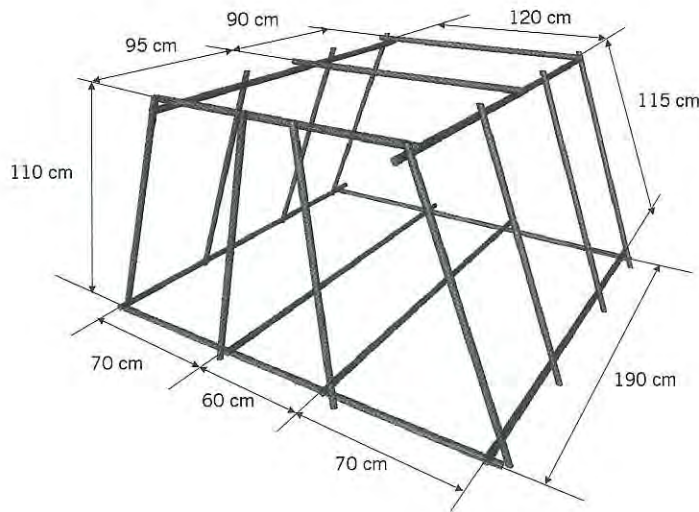
9.3.1. *Bubu* (Fish pot/trap). This gear is usually made of chicken wire mesh and set up near coral reefs in the open sea (see Figure 23). The usual size for pots is 1.8 m x 0.9 m x 0.9 m; and it has a mouth to trap entering fish. Fishermen visit their pots once a week. The catch is usually composed of snappers, groupers, etc. Other versions of pots used in the rivers or streams are usually made of woven bamboo with the mouth facing the oncoming flow of water. The pot opening or mouth is made of a non-return valve shaped like a cone with a big outer opening and smaller inner end to keep the entrap fish from escaping.



TRAP
 Fish Trap
Bubu Ikan
 Demersal fish

VESSEL
 Loa : 6 m
 GT : <2
 Hp : 60 OB

LOCATION
 Muara
 Zone 2,3



TRAP

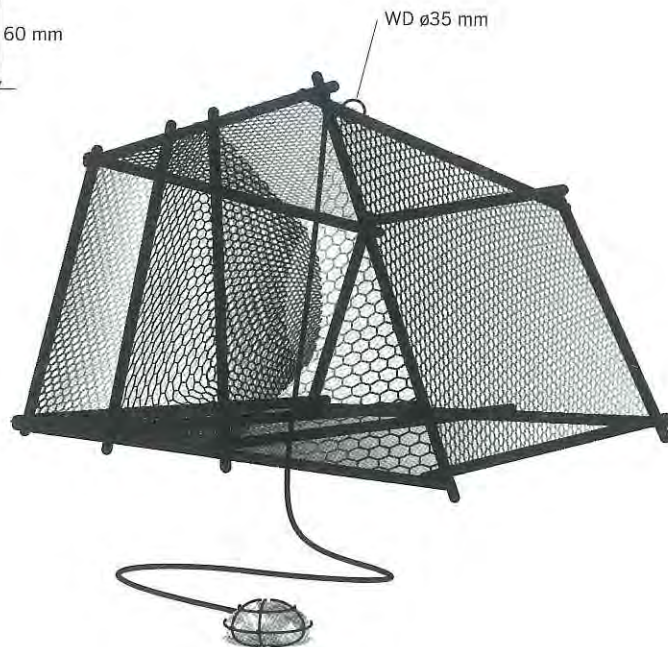
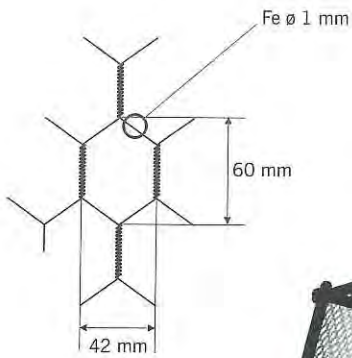
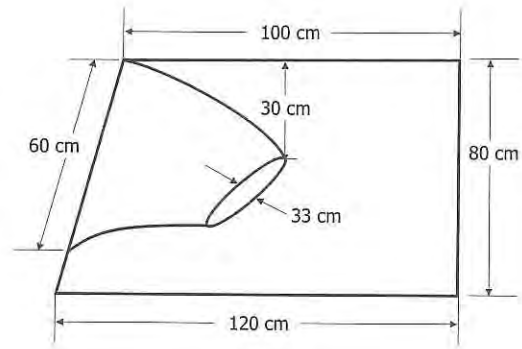
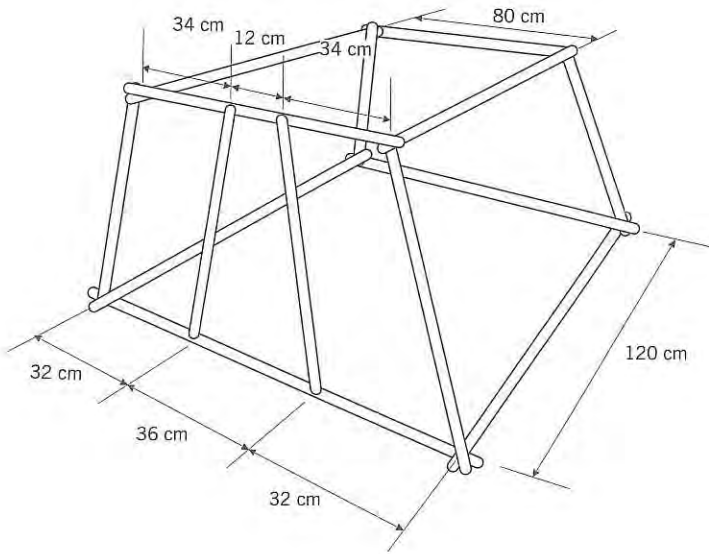
Fish Trap
Bubu Ikan
 Demersal Fish

VESSEL

Loa : 6 m
 GT : <2
 Hp : 60 OB

LOCATION

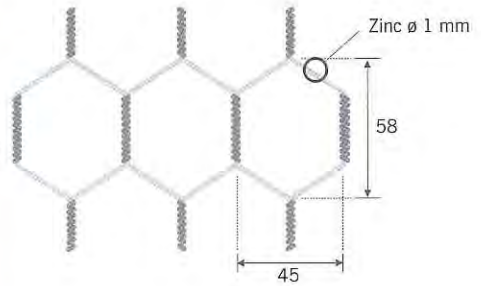
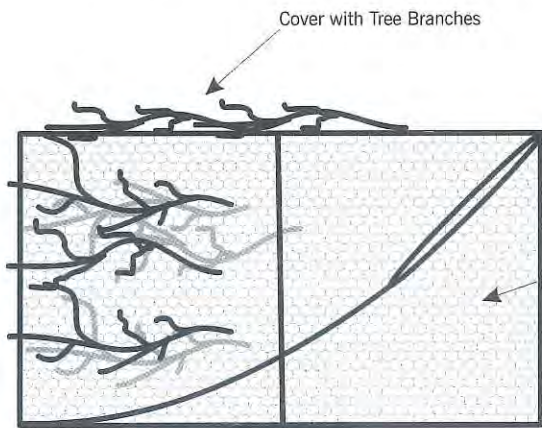
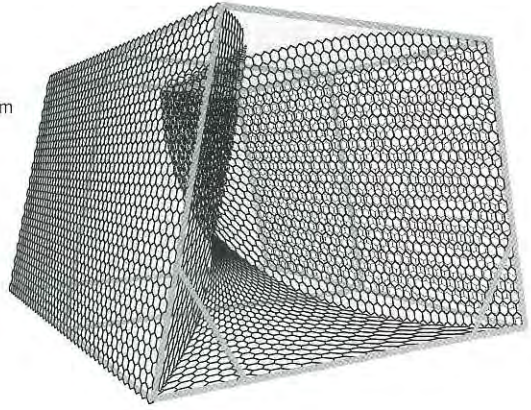
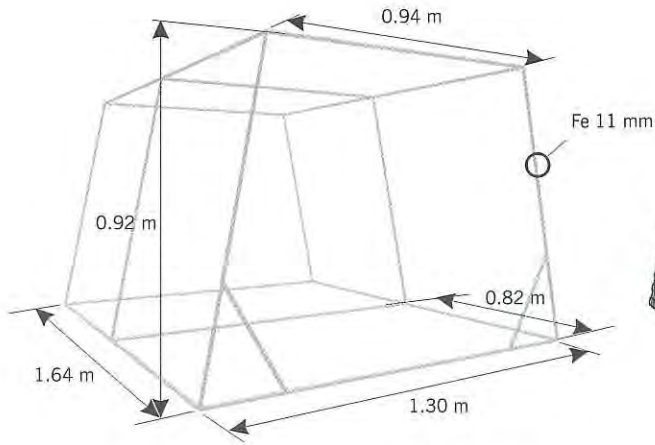
Zone 2, 3



TRAP
 Fish Trap
Bubu Ikan
 Demersal fishes, Red Snapper

VESSEL
 Loa : 6 m
 GT : <2
 Hp : 60 OB

LOCATION
 Muara
Zone 2,3



50-60 m PE ø 5mm

About 70 traps would be deployed and left about 7 days before collection.



9.3.2. *Bubu Ketam* (Crab pot/trap). This type of pot is intended for catching crabs, locally called *ketam*, but is usually catching fishes as well. The gear is made of netting material mounted on a collapsible frame that is aimed to maximize the space on-board a small boat and manage the gear during operation with ease (see Figure 24). It has two cone-shaped entrances in both sides of the gear. The frame is made of a 4 mm diameter wire cable shaped into oval-shaped base and 2 C-shaped upper frame that is swiveled at the center of the base frame, to hold the netting up in place. The net has a mesh size of about 51 mm stretched made of polyethylene material.

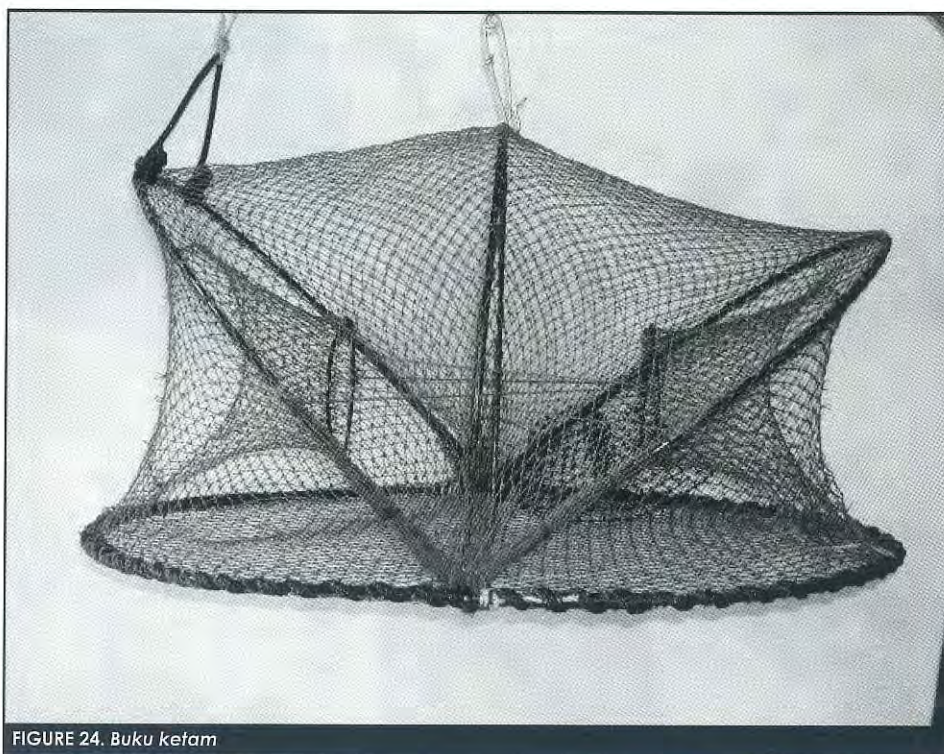


FIGURE 24. *Bubu ketam*

TRAP

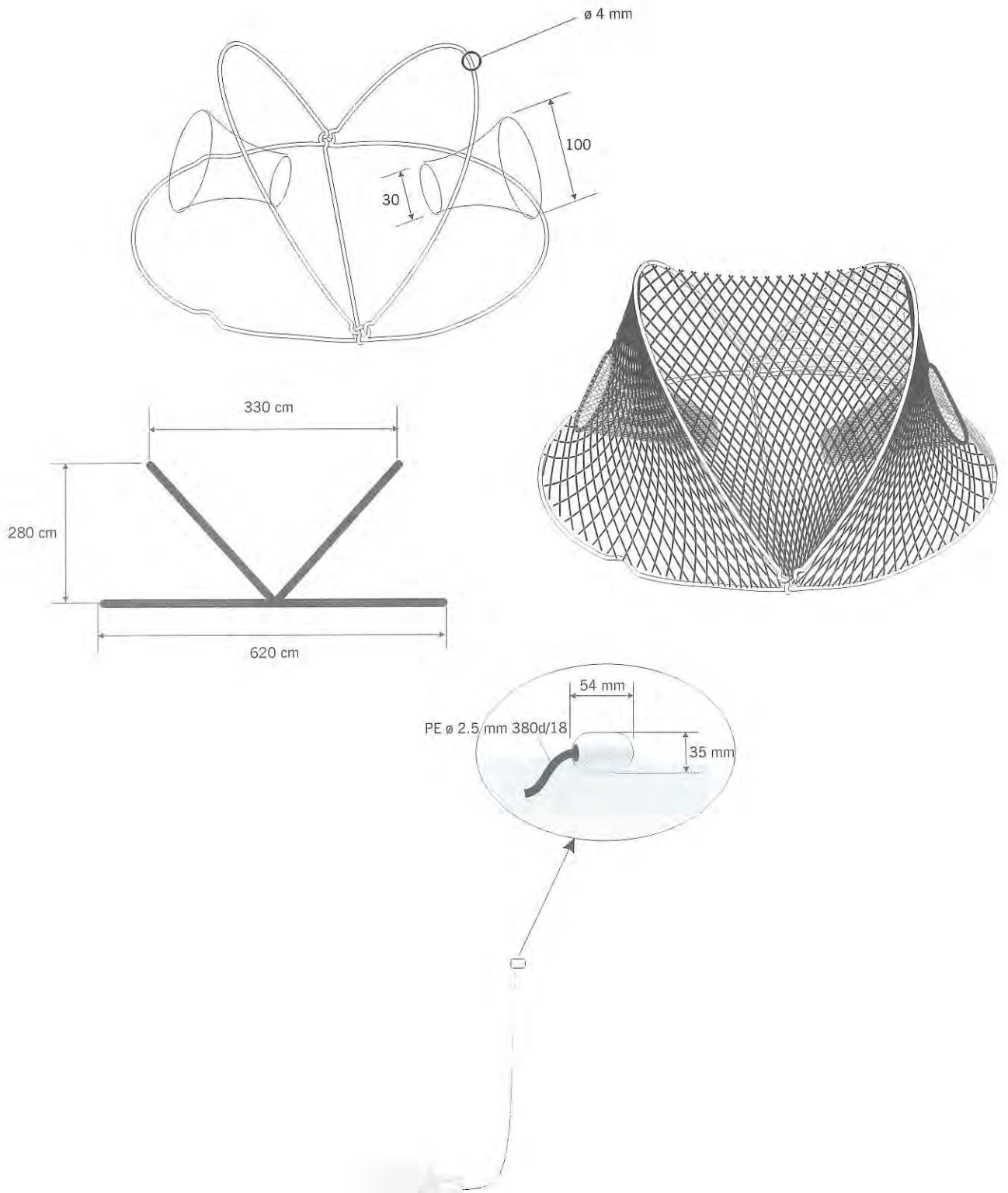
Crab Trap
Bubu Ketam
 Crab

VESSEL

Loa : 6 m
 GT : 0.2
 Hp : 30 OB

LOCATION

Brunei - Muara



9.3.3. *Bubu Udang Galah* (Fresh water shrimp pot/trap). This type of pot is intended for catching freshwater shrimp, locally called *udang galah* (see Figure 25). The gear is made of bamboo strips that is tied together to resemble a torpedo-like frame. The gear is fitted with an entrance at the base forming a cone-shaped non-return valve made of bamboo strips. Another cone-shaped non-return valve is built inside the lower half of the pot to prevent the shrimp from escaping. The entire frame is covered with sock bag to keep the shrimp inside.

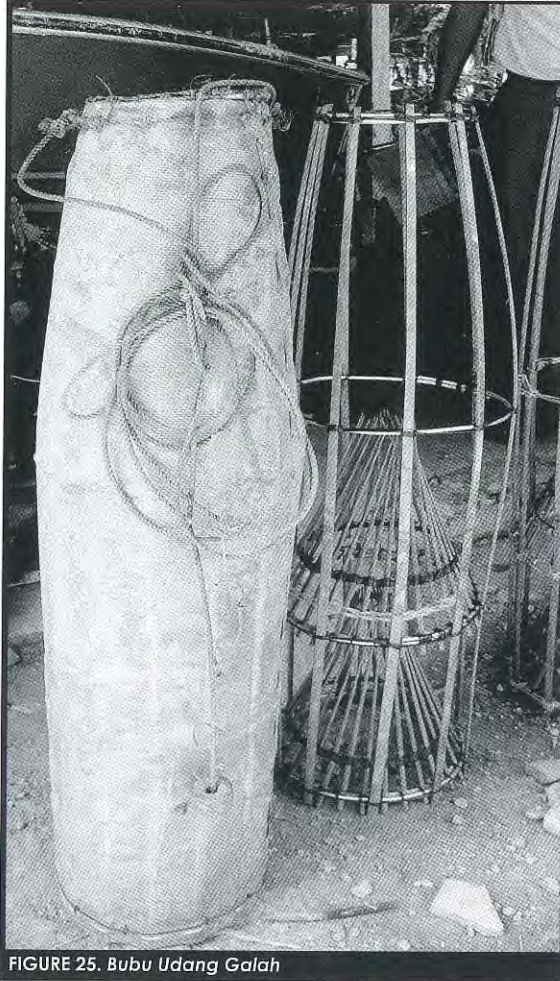
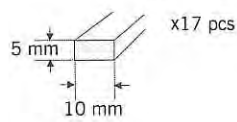
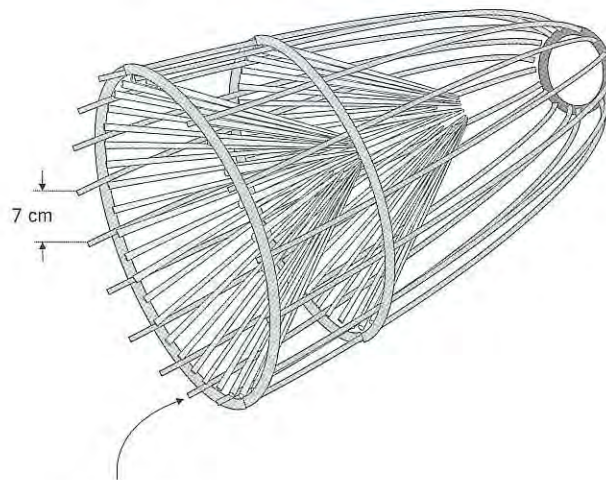
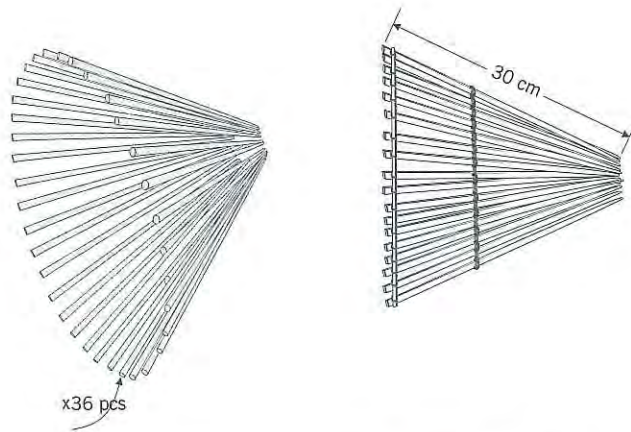
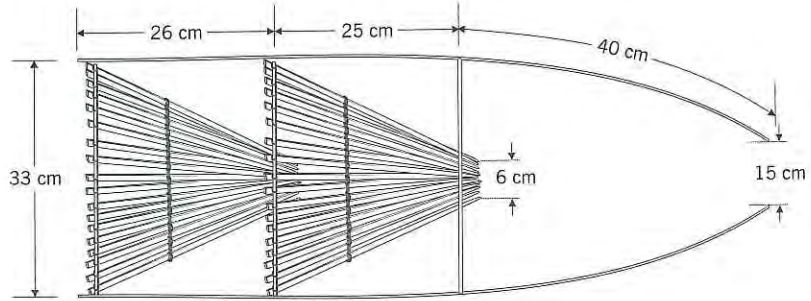


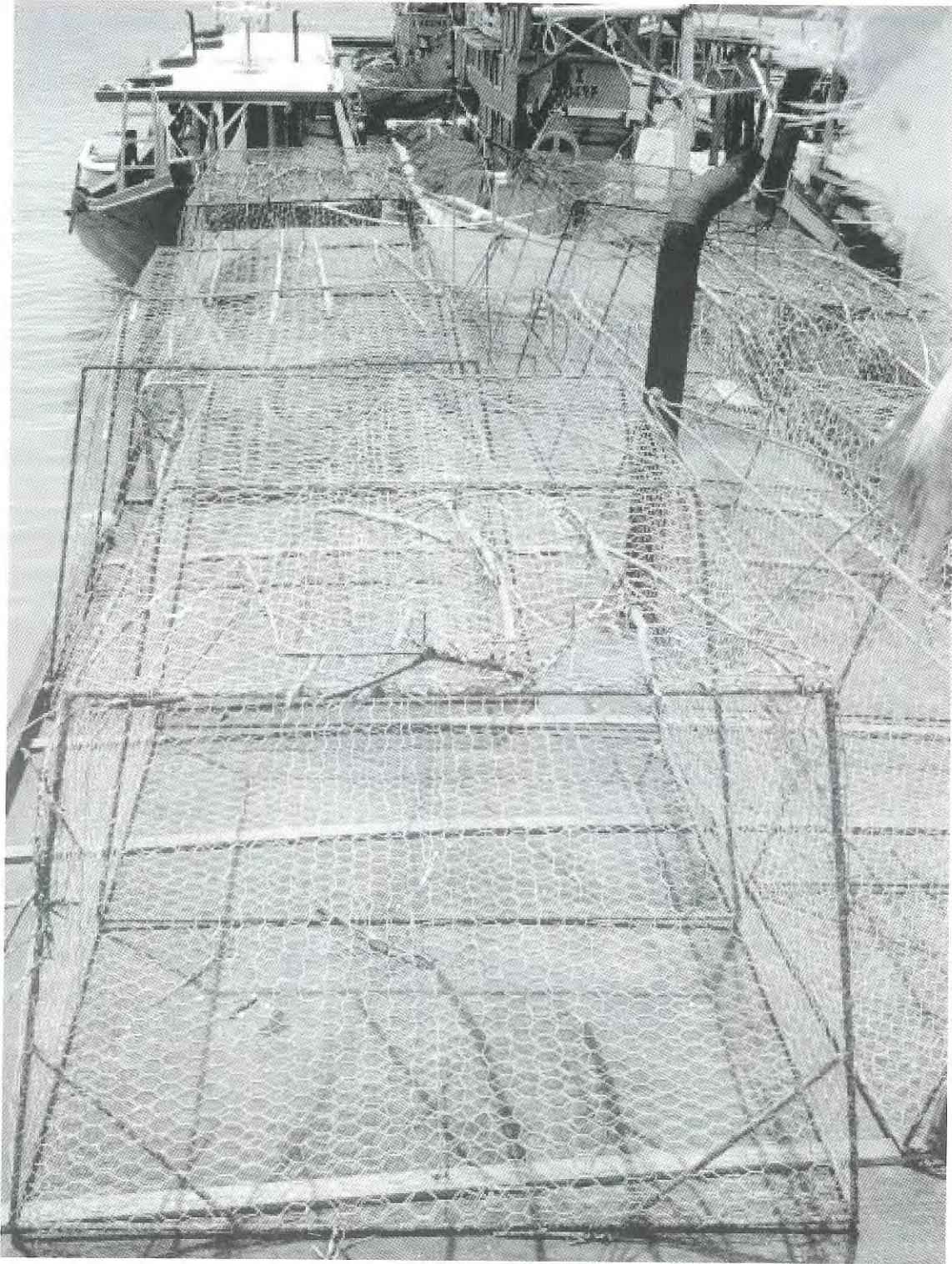
FIGURE 25. *Bubu Udang Galah*

TRAP
 Shrimp Trap
Bubu Udang Galah
 Fresh water Prawn

VESSEL
 Loa : 6 m
 GT : <0.2
 Hp : 30 OB

LOCATION
 Temburong





Chapter 10

Scoop Nets

10. SCOOP NETS

Fishing Gears and Methods

- 10.1 *Tanggok* (Scoop net). This gear is made of fine mesh netting mounted on a C-shaped bamboo frame with a handle in the middle (figure 26). This gear is being used by the Batu Marang fishermen while onboard a boat for catching *Acetes* spp. or sergestid shrimps along mangrove fringes. The species locally called “bubuk”, is popular for preparing belacan or shrimp paste. The gear is operated along a fence like structure or barrier called the *sawar* (Figure 27) that usually blocks the path of the shrimps as they are carried by the water current due to tidal change



FIGURE 26. *Tanggok*



FIGURE 27. Barrier or *sawar*

SCOOP NET

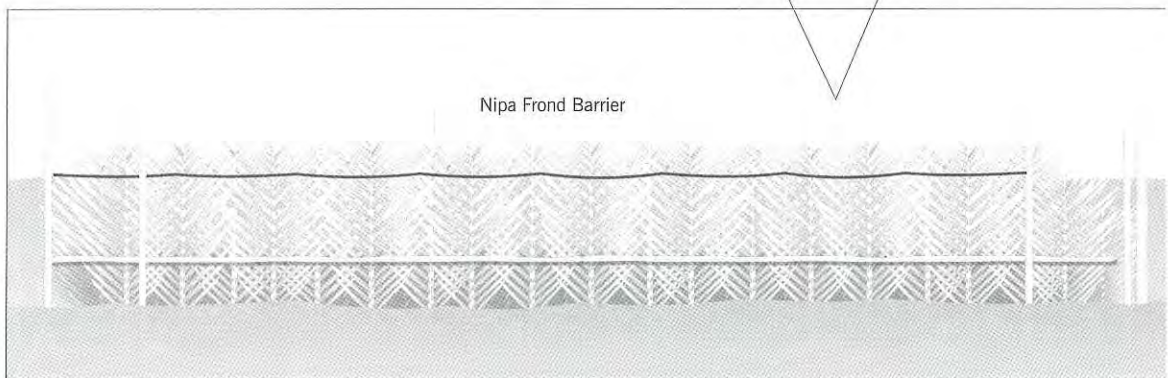
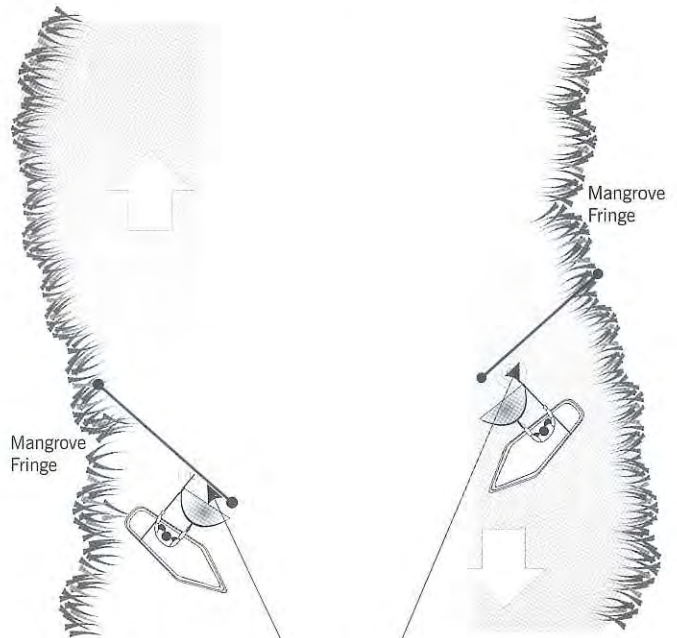
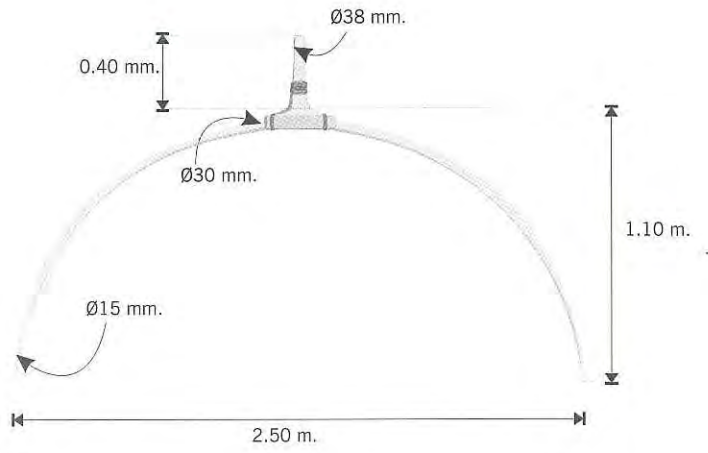
Scoop Net
Tanggok
 Sergistid Shrimp

VESSEL

Loa : 6 m
 GT : <0.2
 Hp : 15 OB

LOCATION

Batu Marang
 Brunei River



- 10.2 *Sadak* (push nets). This gear is a push net that is made of fine mesh netting mounted on two crossed bamboo frames. Each pole is fitted with a wooden shoe at one end to serve as glider at the sea bottom. This gear is being used by the Batu Marang fishermen for catching *Acetes* spp. or sergestid shrimps. The species locally called “bubuk”, is popular for preparing belacan or shrimp paste which is a native delicacy.

Chapter 11

Hook and Line

11. HOOK AND LINE

Fishing Gears and Methods

- 11.1 *Pancing/ambor* (handlines). The handline is one of the simplest *and* oldest methods of fishing in the world (Figure 28). The line is made of monofilament material with a metal hook attached at one end. The gear is operated on selected fishing grounds such as: places with FADs, rocks, coral reefs, offshore oil structures, etc. The catches usually consist of mackerel, snappers, groupers and others.

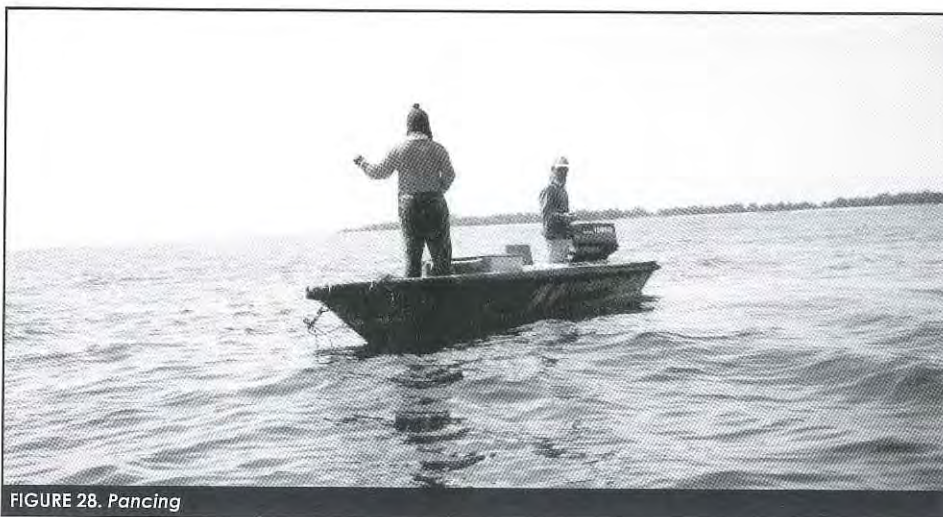


FIGURE 28. *Pancing*

- 11.2 Pole and line (*Juran*). This fishing gear is popular among sports or leisure fishing mainly from the part-time fishers (Figure 29). It is made of commercially made pole and monofilament line, fitted with a mechanical reel for hauling the bait and the catch.

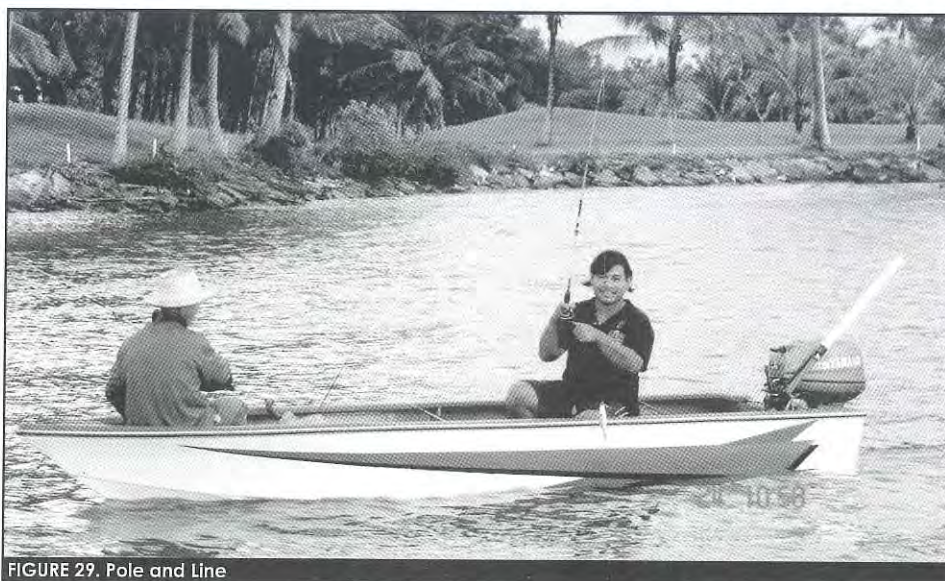


FIGURE 29. Pole and Line

- 11.3 *Tunda* (troll). This gear is made of a thin monofilament line with colored straws as luring device that is attached to the hook (Figure 30). The catches are usually very fast swimming fishes such as mackerels. A boat is used to tow the lines and the gear.



FIGURE 30. *Tunda*

- 11.4 *Papar* or *perampun* (vertical longline). This gear is made of a PA monofilament mainline with about 20 nylon branchlines (see Figure 31) fitted with luring straws attached to it. The fishes caught are usually jacks, round scads and other pelagic species. The gear is most effective with the aid of FADs.

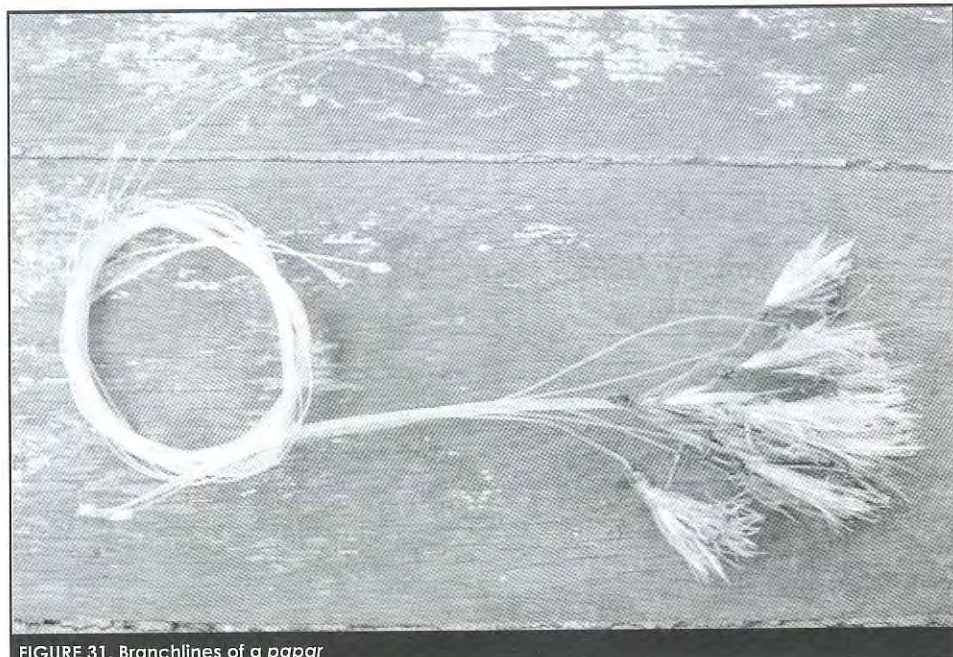


FIGURE 31. Branchlines of a *papar*

- 11.5 *Rawai* (horizontal bottom longline). The gear is made of PA monofilament material with multiple hooks (Figure 32 and 33). It consists of a monofilament mainline and branchlines, where the hooks and baits are attached. The gear is used for catching demersal fishes by setting it horizontally at the sea bottom. The gear is operated both using a boat by the small-scale (Figure 32 and 33) and commercial scale (Figure 34 and 35) fishermen. Soaking time varies from one hour to about 10 hours per operation.



FIGURE 32. Small-scale Longline



FIGURE 33. Small-scale Longline



FIGURE 34. Commercial scale longline



FIGURE 35. A commercial longline fishing boat

HOOK AND LINE

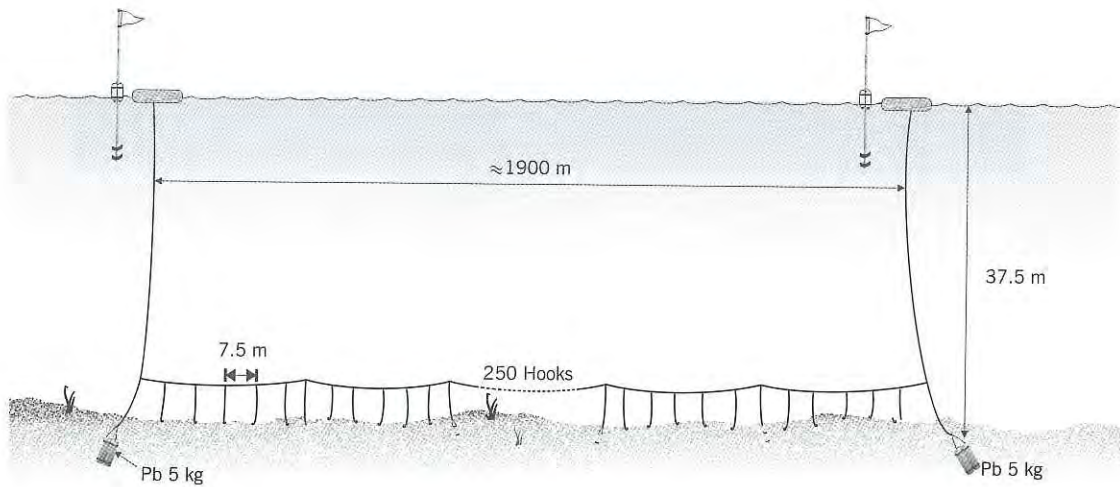
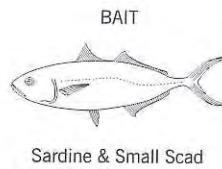
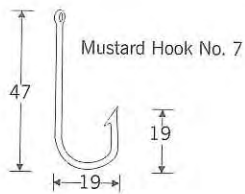
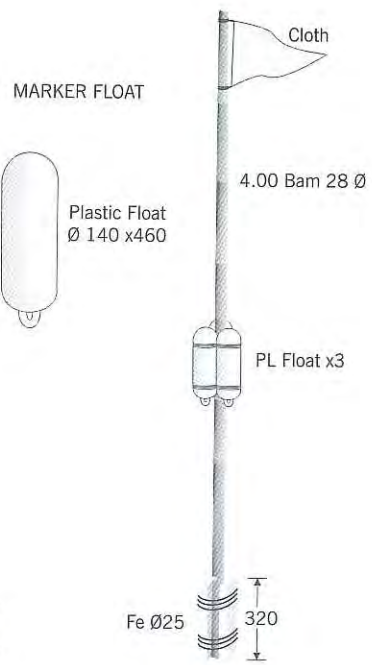
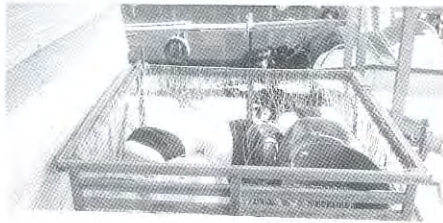
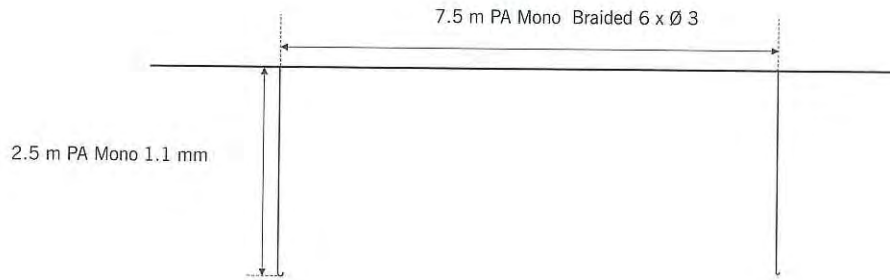
Bottom set long line
Rawai
 Demersal fish

VESSEL

Loa : 9 m
 GT : < 2
 Hp : 85 x 2 OB

LOCATION

Tutong
 Zone 1, 2



HOOK AND LINE

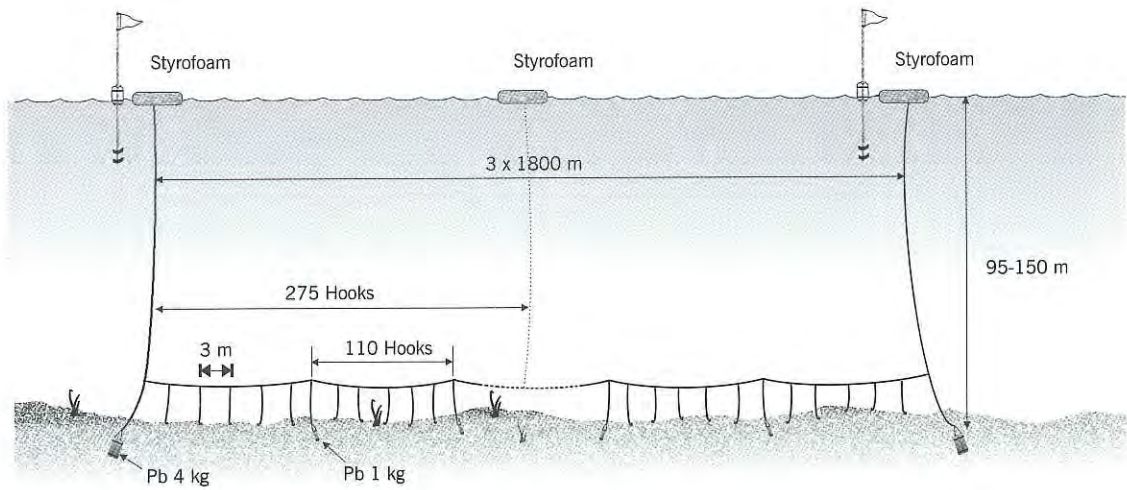
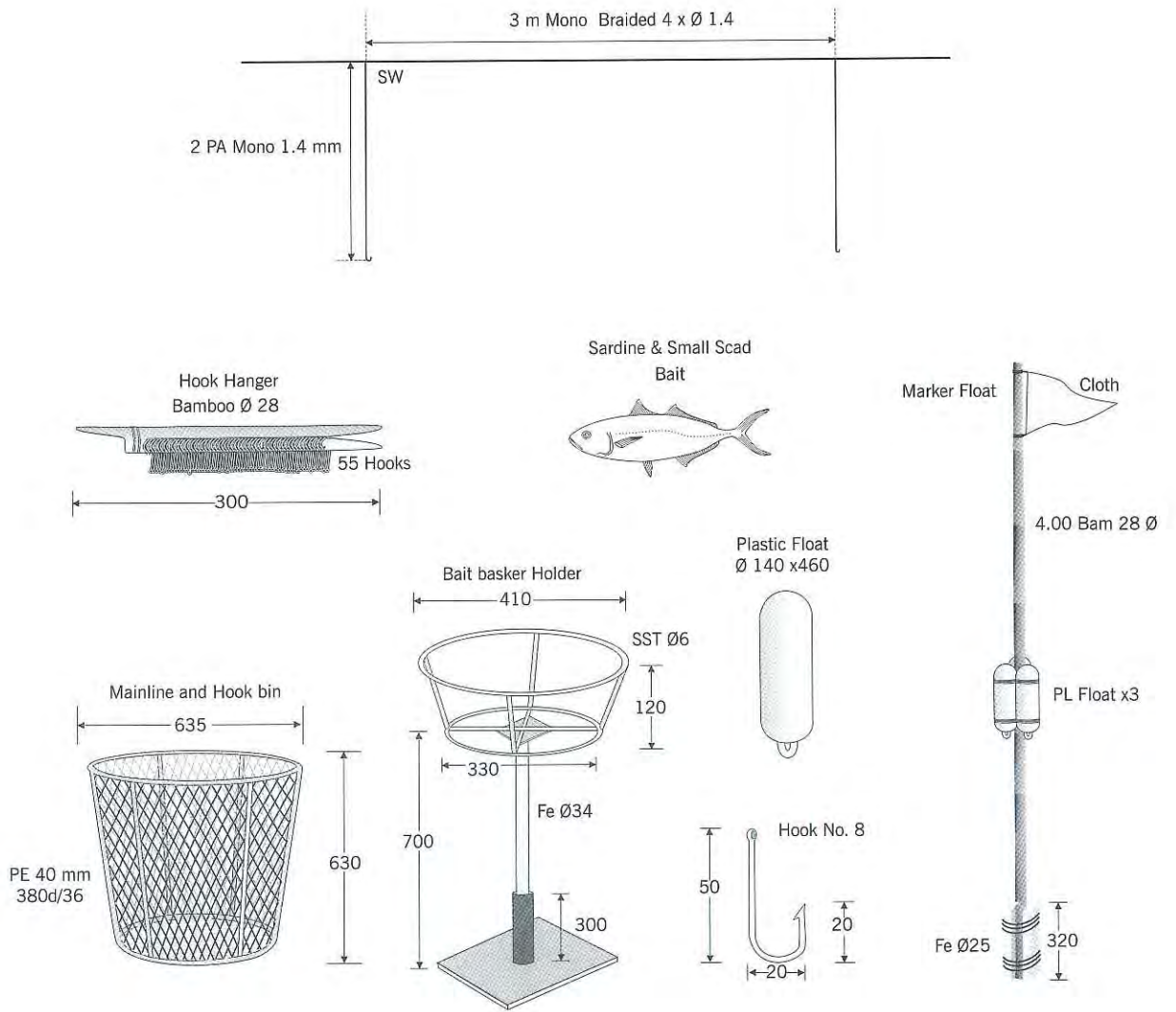
Bottom set long line
Rawai
 Demersal Fishes

VESSEL

Loa : 15 m
 GT : < 60
 Hp : < 350

LOCATION

Muara
Zone 2



HOOK AND LINE

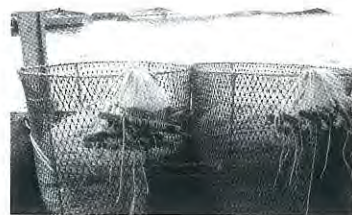
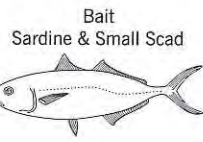
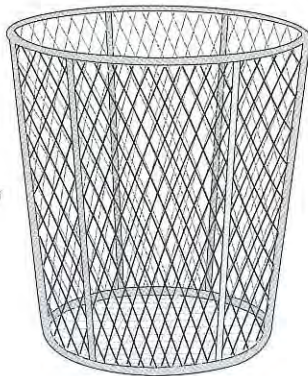
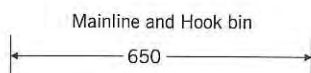
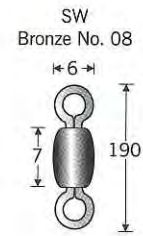
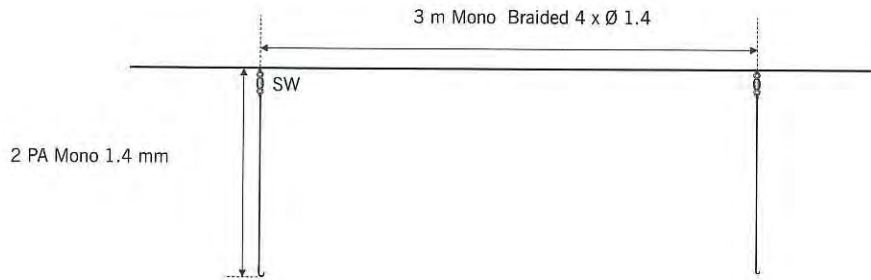
Bottom Longline
Rawai
 Red snapper

VESSEL

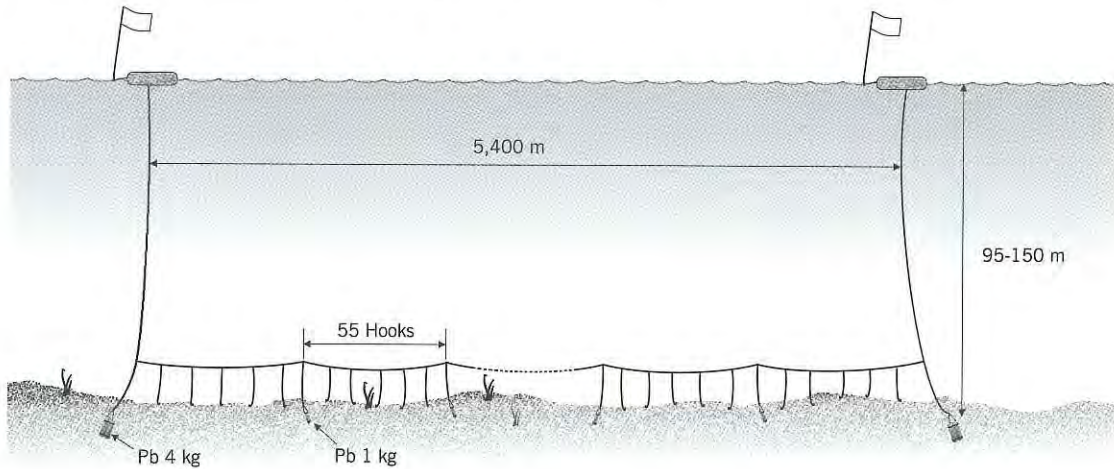
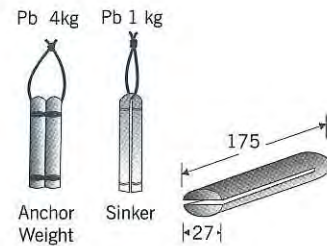
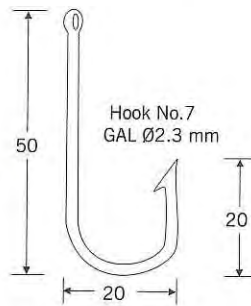
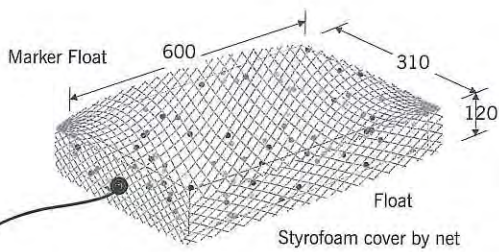
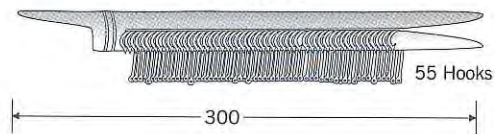
Loa : 7 m
 GT : < 2
 Hp : 60 OB

LOCATION

Batu Marang
 Zone 1, 2



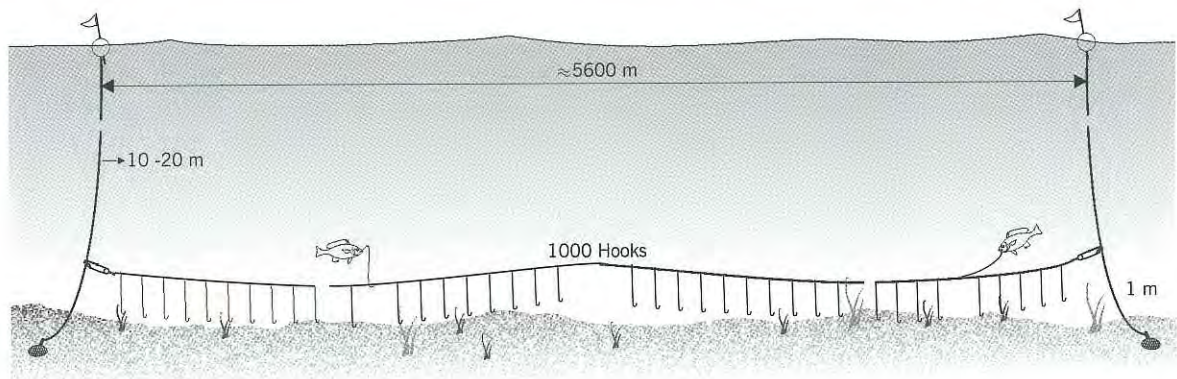
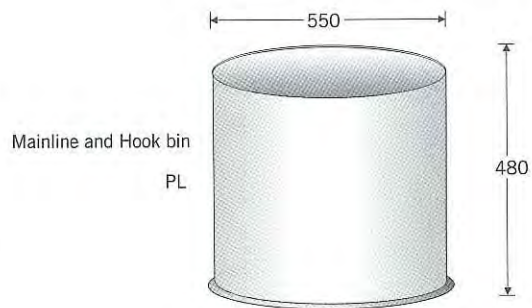
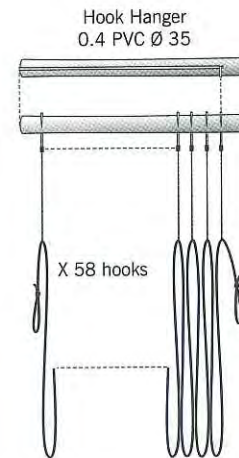
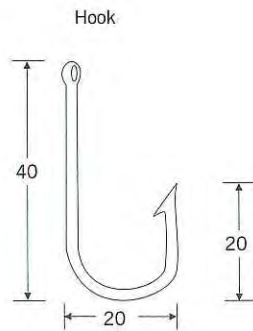
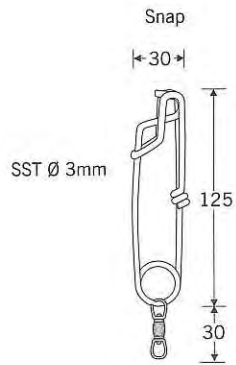
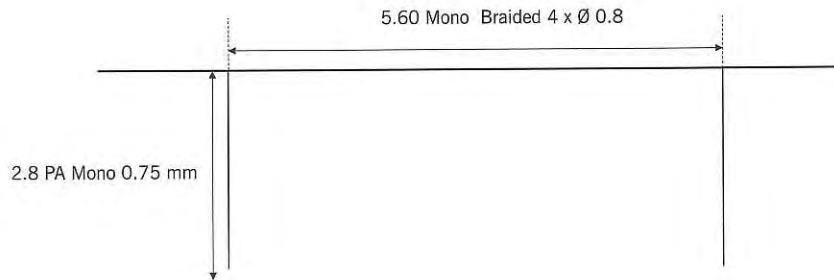
Hook Hanger
 Bamboo Ø 28



HOOK AND LINE
 Bottom Longline
Rawai
 Grouper, Red snapper

VESSEL
 Loa : 9.5 m
 GT : <2
 Hp : 60 x 2 OB

LOCATION
 Batu Marang
 Zone 1, 2



HOOK AND LINE

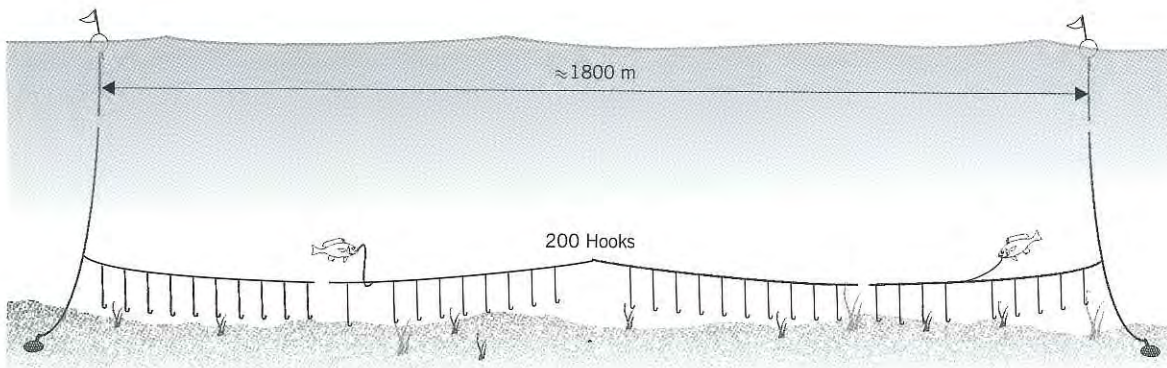
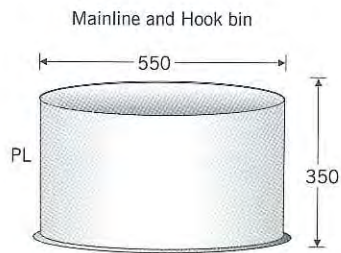
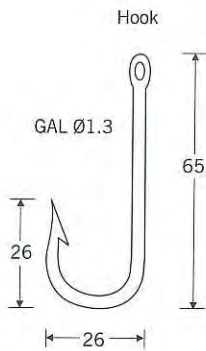
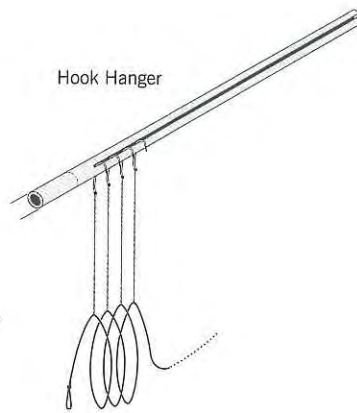
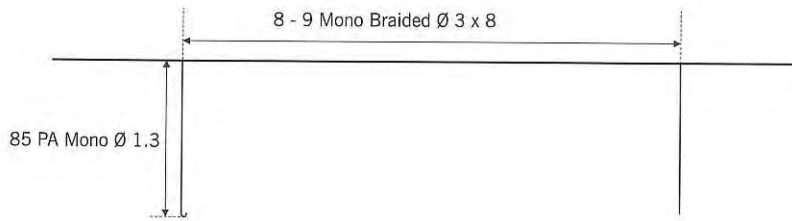
Bottom Longline
Rawai
 Grouper, Shark

VESSEL

Loa : 4.0 m
 GT : < 2
 Hp : 40 OB

LOCATION

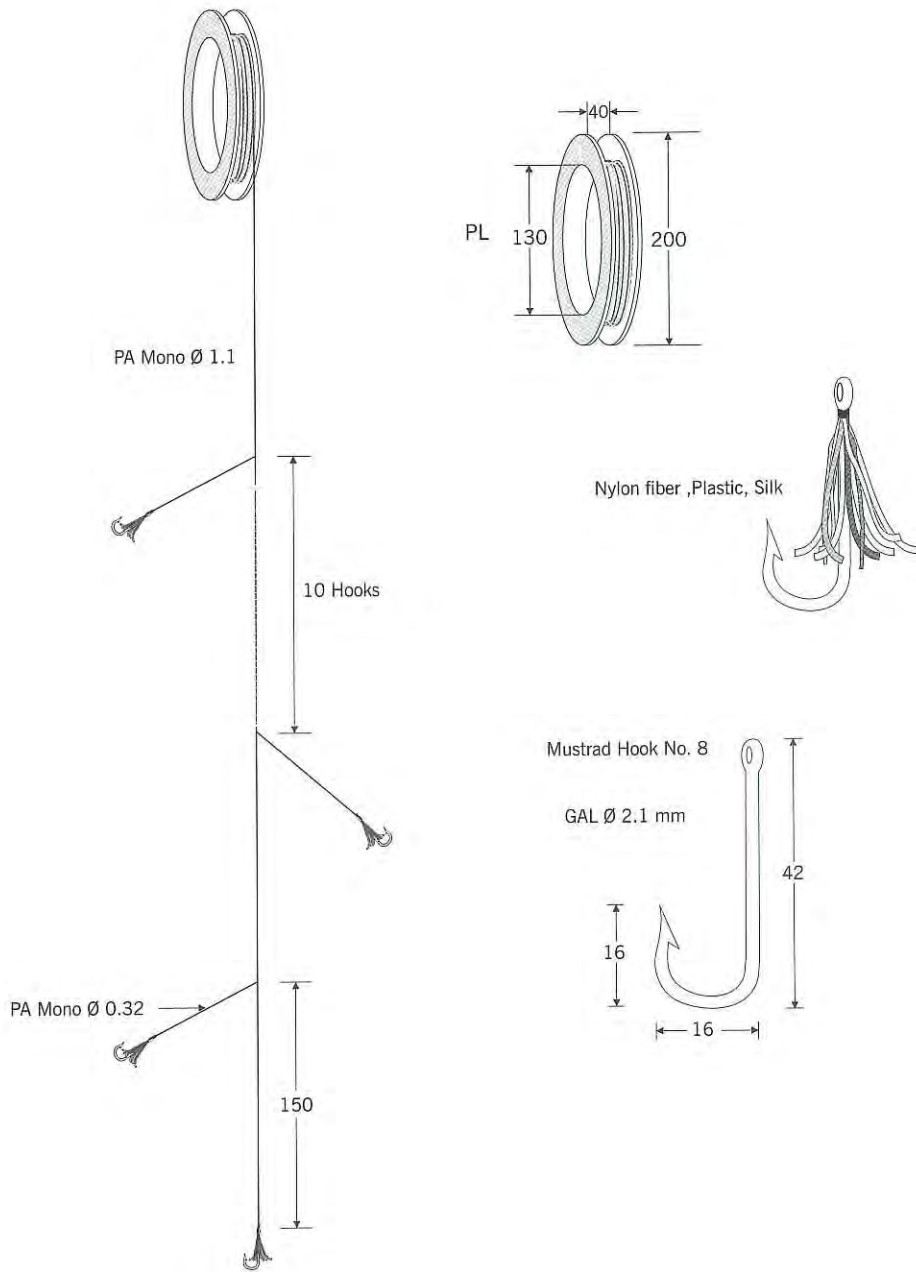
Manunggul Laut
 Zone 1, 2



HOOK AND LINE
 Multiple Hooks Troll Line
Jaul tunda/Papar
 Skipjack, Hard tail scad

VESSEL
 Loa : 7 m
 GT : < 2
 Hp : 60 x 2 OB

LOCATION
 Muara
Zone 1,2



HOOK AND LINE

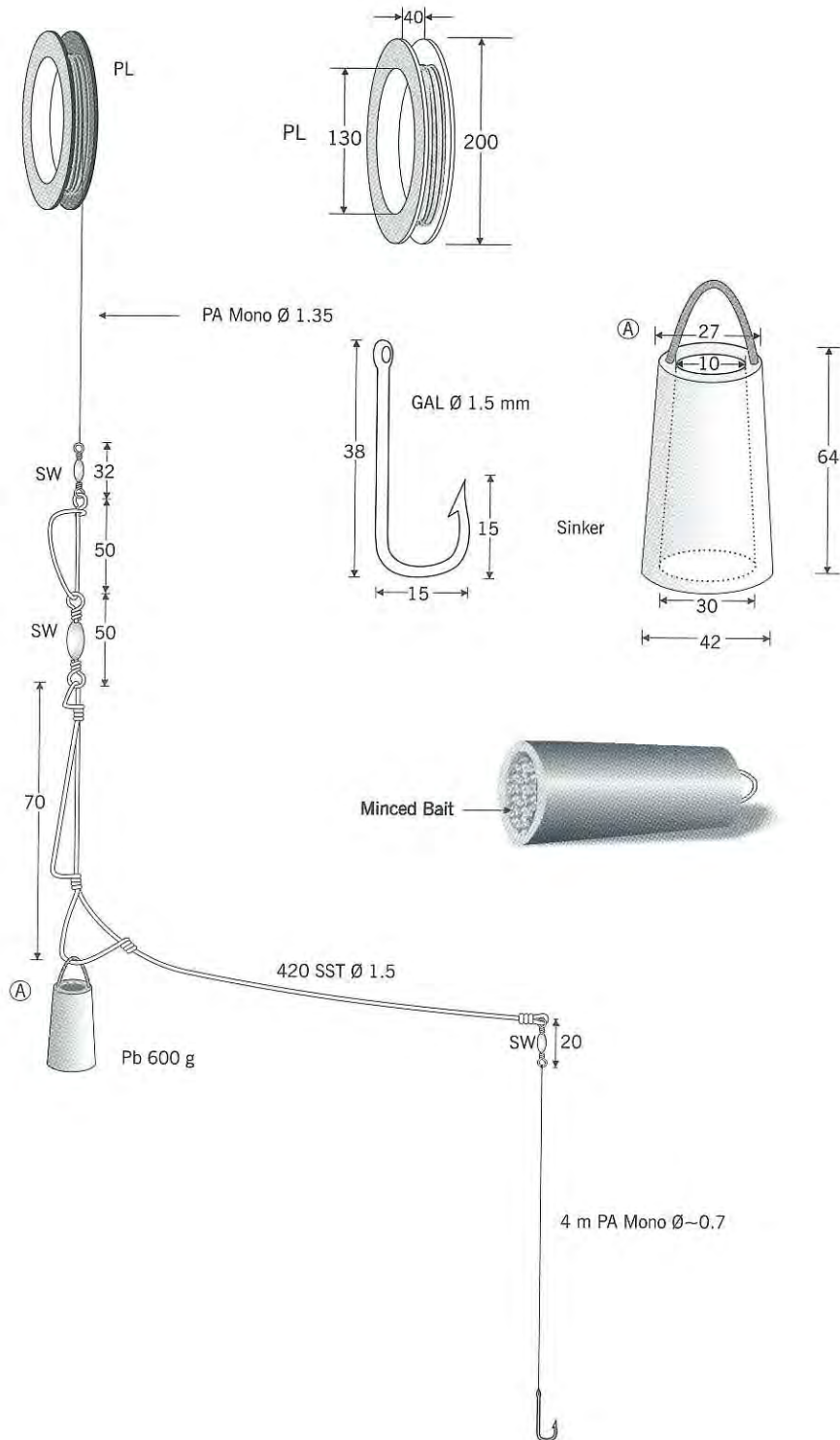
Handline
Jaul tabur
 Grouper , Snapper

VESSEL

Loa : 7 m
 GT : < 2
 Hp : 60 x 2 OB

LOCATION

Tutong
Zone 1



HOOK AND LINE

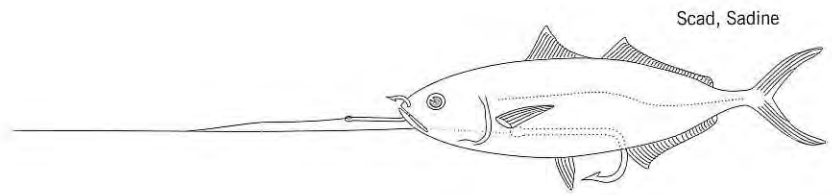
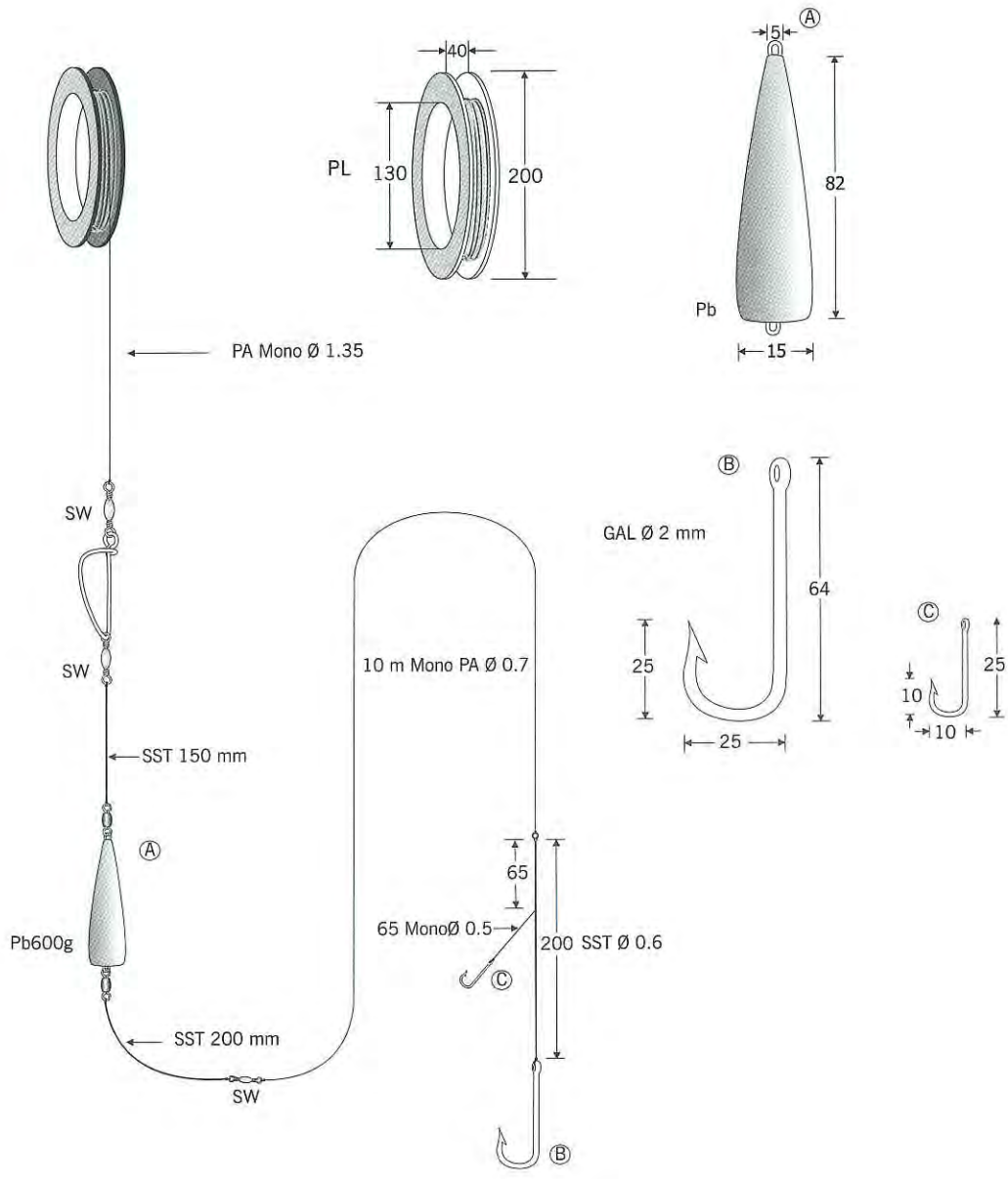
Troll line
Jaul Tunda
 Spanish Mackerel

VESSEL

Loa : 7 m
 GT : < 2
 Hp : 60 x 2 OB

LOCATION

Tutong
Zone 1



HOOK AND LINE

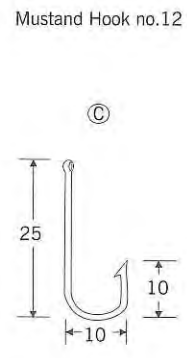
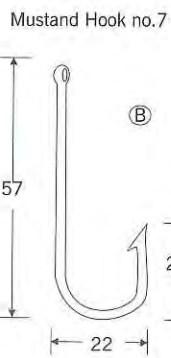
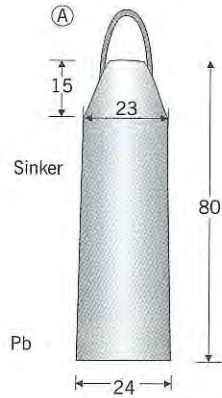
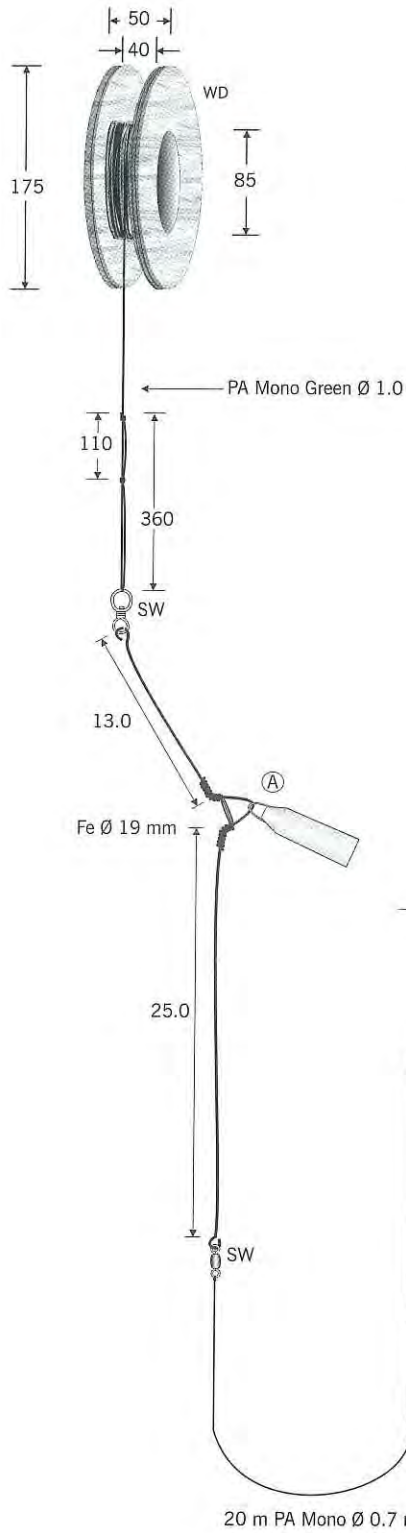
Troll Line
Jaul Tunda
 Spanish mackerel

VESSEL

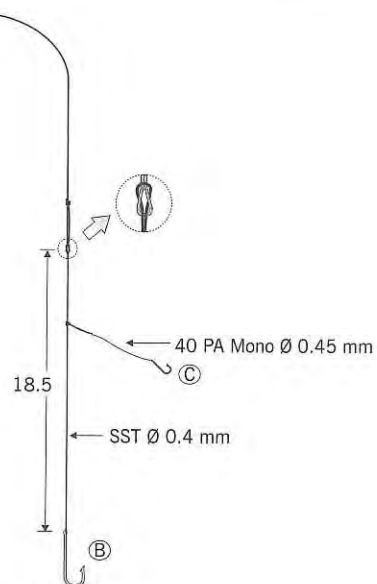
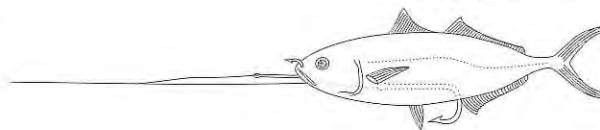
Loa : 7 m
 GT : <2
 Hp : 60 OB

LOCATION

Batumarang
Zone 1



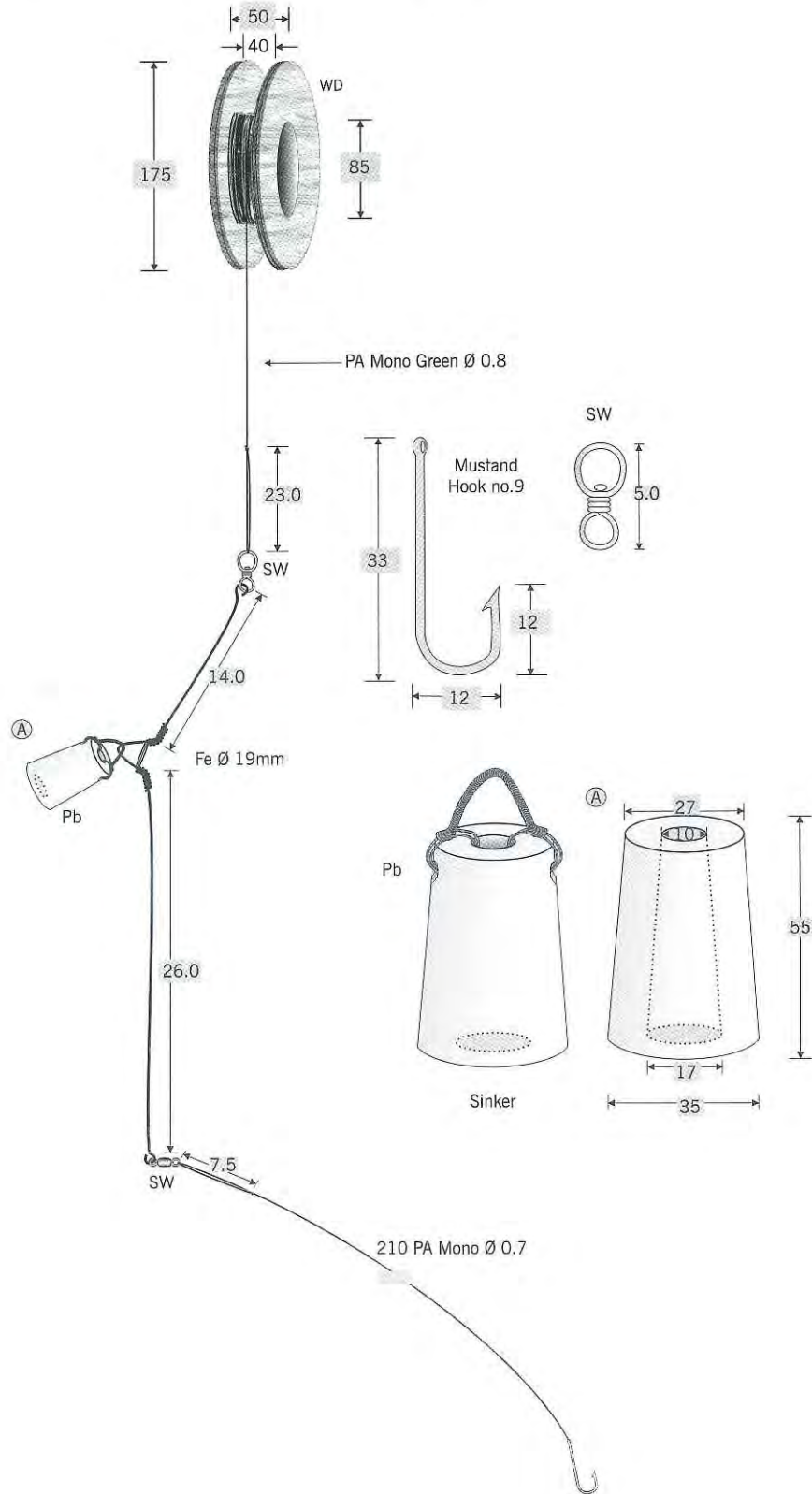
Scad, Sadine



HOOK AND LINE
 Handline
Jaul Tabur
 Grouper ,Red seabream

VESSEL
 Loa : 7 m
 GT : < 2
 Hp : 60 OB

LOCATION
 Batumarang
Zone 1



HOOK AND LINE

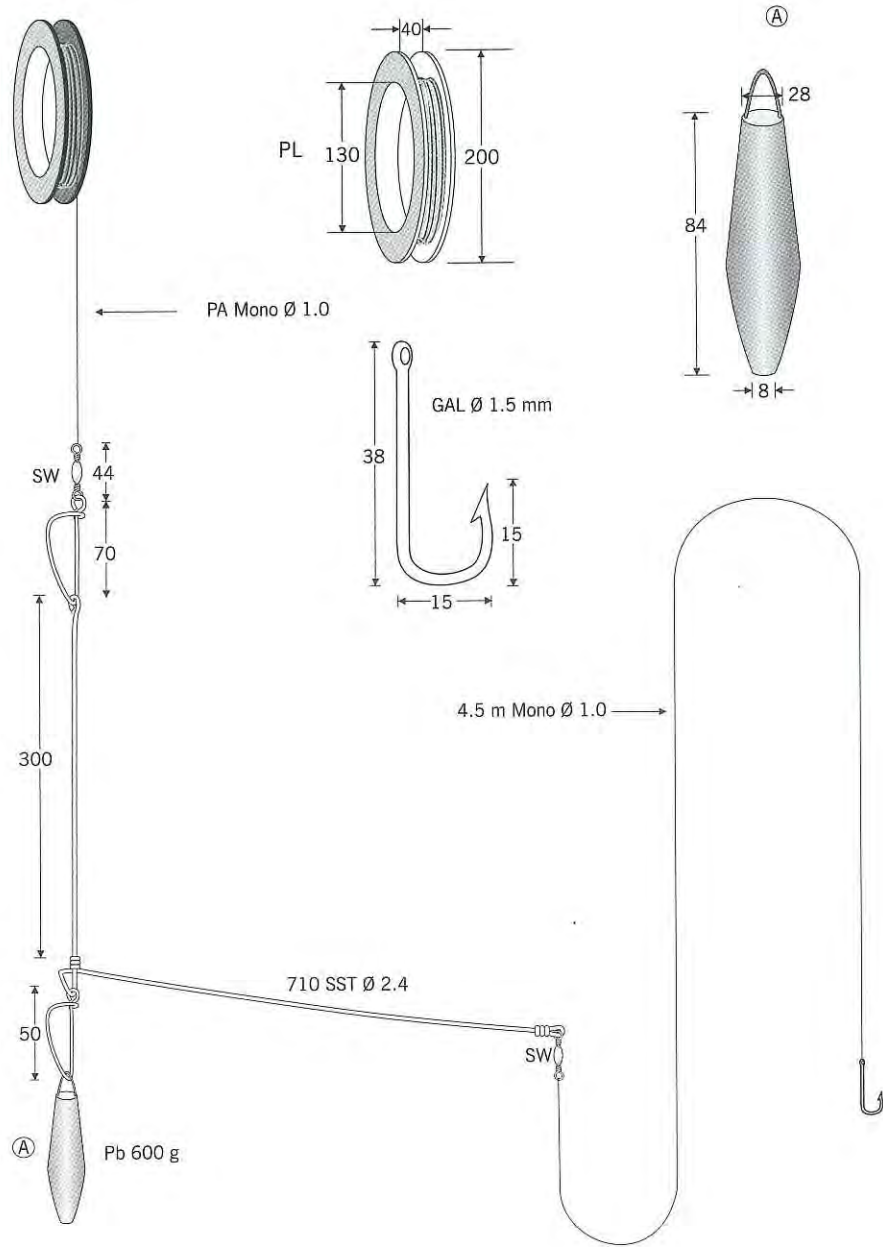
Jig Line
Jaul anjun
 Jacks and Travellies

VESSEL

Loa : 7 m
 GT : < 2
 Hp : 60 OB

LOCATION

Belait
Zone 1 - 3



Chapter 12

Miscellaneous

12. MISCELLANEOUS GEARS AND METHODS

Fishing Gears and Methods

- 12.1 *Gurit*. (Gleaning gear) This instrument is used for finding and gathering clams or shellfish along the beach especially during low tide. This tool is made of a wooden frame with a metal shoe. The frame is fitted with a wooden pole as handle. The tool is dragged along the exposed tidal flats to expose the hard-shelled clams. This technique provides ease in locating clams to harvest. Modern garit is made of steel from pole to the shoe.



FIGURE 36. *Gurit* shoe



FIGURE 37. *Gurit* with the handle.

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