Fisheries Resources Sampling Survey by Fishing Gear



Outlines of the Presentation

- Definition of Gillnet
- Classification of Gillnet
- Gillnet Structure and Materials
- Capture mechanisms of Gillnet
- Key design considerations for Gillnets
- Catch Efficiency of a Gillnet: Hanging ratios, mesh size, twine size
- Information Recording : Gillnet fishing log sheet
- Case Study: Assessment of Relative Abundance of Fishes Caught by Gillnet in Vietnamese Waters 1996

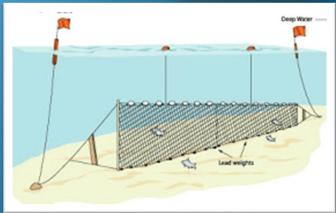
Definition of Gillnet

Ref: Definition and classification of fishing gear categories, FAO Fisheries Technical Paper

No. 222. Rev. 1, 1990)

- A net wall, with its low end weighted by sinkers, upper end suspended by floats
- Set transversely to the path of migrating fish
- ❖ Fish are caught by trying to make their way through the net wall
- Fish are gilled, entangled or enmeshed in the netting





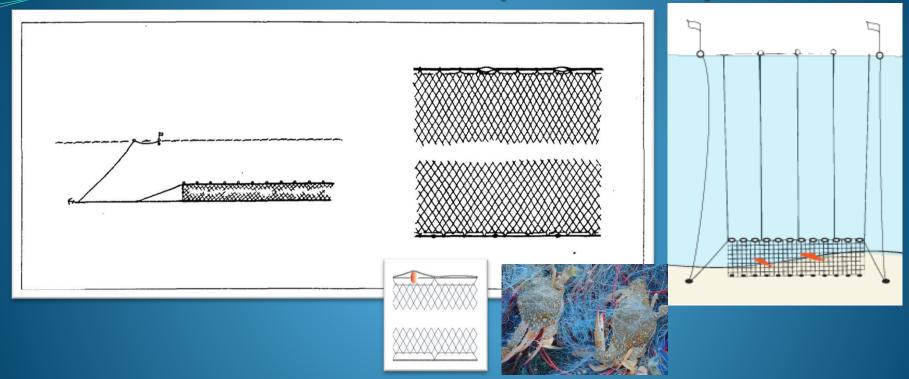
Classification of Gillnet

(Definition and classification of fishing gear categories, FAO Fisheries Technical Paper No. 222. Rev. 1, 1990)

- 1. Set Gillnets (Anchored)
- 2. Drifting Gillnets (Driftnets)
- 3. Encircling gillnets
- 4. Fixed Gillnets (on Stakes)
- 5. Trammel Nets
- 6. Combined Gillnets Trammel Nets

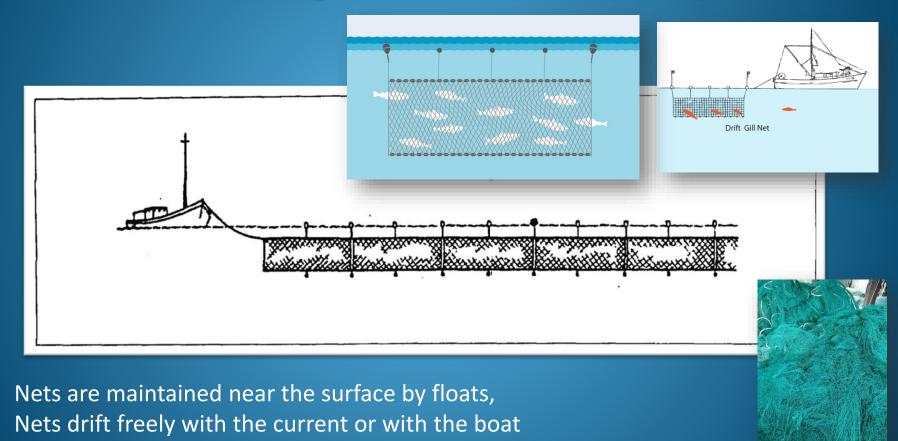
GEAR CATEGORIES	STD ABBREV.	ISSCFG CODE
SEINE NETS		02.0.0
TRAWLS		03.0.0
DREDGES		04.0.0
GILLNETS AND ENTANGLING NETS		07.0.0
Set gillnets (anchored)	GNS	07.1.0
Driftnets	GND	07.2.0
Encircling gillnets	GNC	07.3.0
Fixed gillnets (on stakes)	GNF	07.4.0
Trammel nets	GTR	07.5.0
Combined gillnets-trammel nets	GTN	07.6.0
Gillnets and entangling nets (not specified)	GEN	07.9.0
Gillnets (not specified)	GN	07.9.1
TRAPS		08.0.0
HOOKS AND LINES		09.0.0

1. Set Gillnets (Anchored)

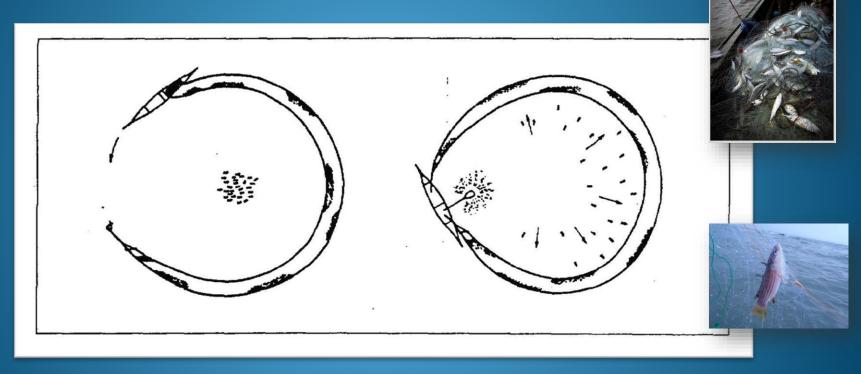


Nets anchored to the bottom or certain distance by anchors/heavy objects

2. Drifting Gillnets (Driftnets)

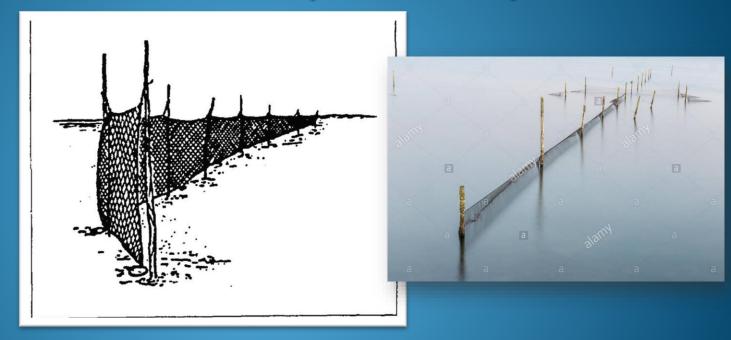


3. Encircling gillnets



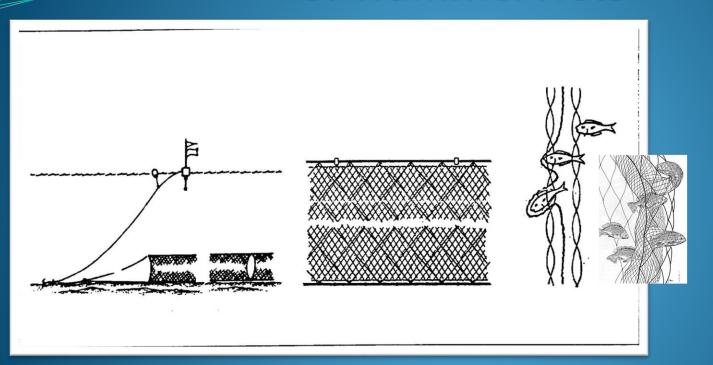
- Generally used in shallow water with float line at the surface
 - Fish are encircled by net, and noise, other means are used to force them to gill/entangle

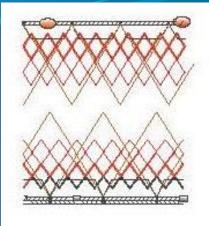
4. Fixed Gillnets (on Stakes)



- Used in tidal and coastal waters
- Nets are mounted on stakes driven into the bottom
- Fish are collected at low tide

5. Trammel Nets

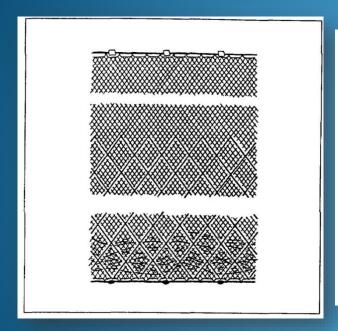


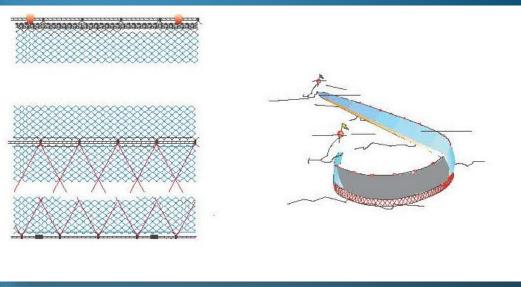




- 3 layers of netting, 2 outer layers being of a larger mesh size, loosely hung inner netting panel
 - Set on the bottom
- Fish entangled in the inner small meshed wall after passing through outer wall

6. Combined Gillnets — Trammel Nets

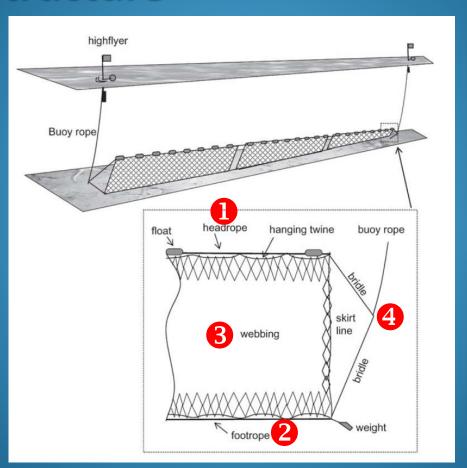


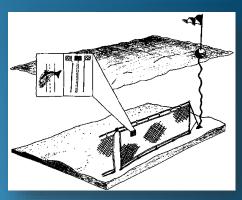


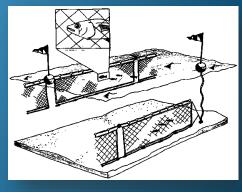
- Set on the bottom
- Lower part: a trammel net, catching demersal fish
- Upper part: a gillnet, catching pelagic fish, semi-demersal fish
- Often used as sampling gear for resource surveys/selectivity of gillnets.

Gillnet Structure

- Headrope
- Pootrope
- O BWebbing
- Bridle, buoylines and markers
- Others

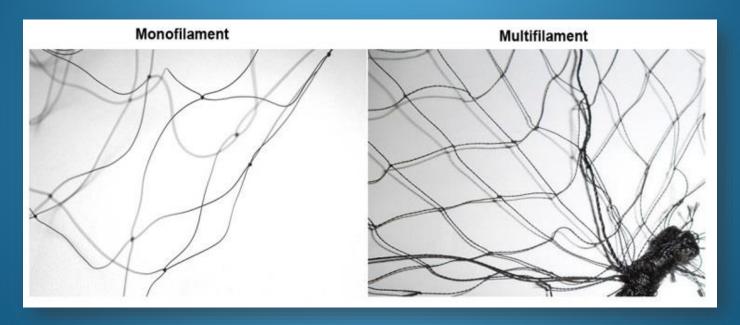






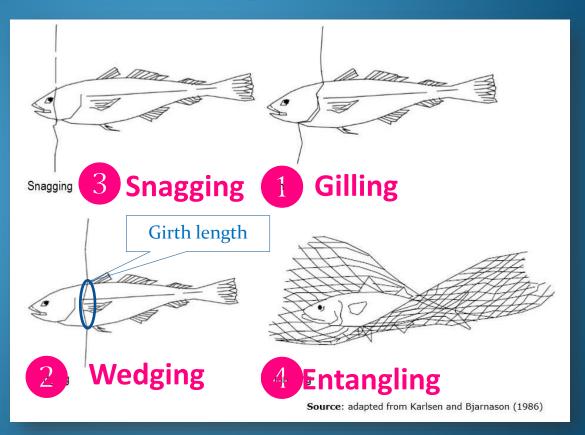
Gillnet netting materials

- Early days: Natural fiber e.g. cotton
- Present: Synthetic fiber mainly 'Nylon'



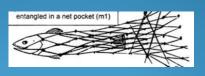
Capture mechanisms of gillnet

- o 🕕 Gilling
- Wedging
- Snagging
- 4 Entangling



Key design considerations for Gillnets

- Visibility
- Mesh size
- Hanging ratio



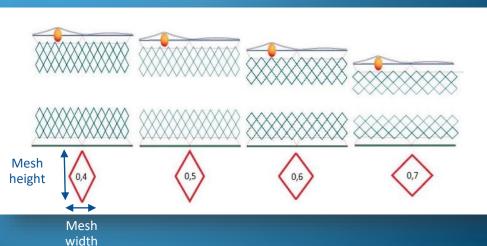




Smaller hanging ratio

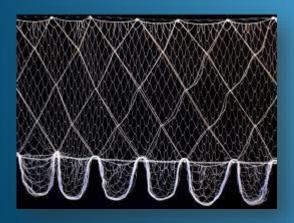
Larger hanging ratio

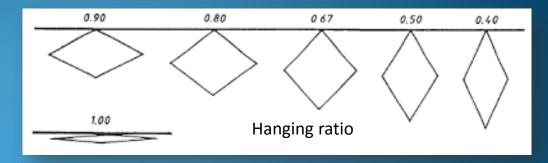


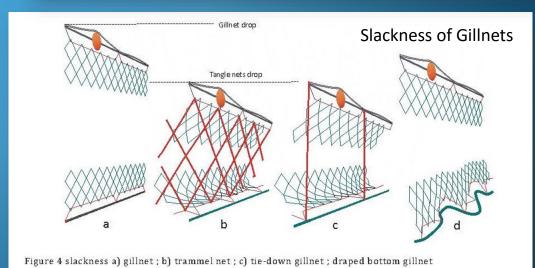


Catch Efficiency of a Gillnet

- Fish Availability and Behavior
- Mesh and Twine Size
- Net Depth
- Webbing Material
- Hanging Ratio







Hanging ratios of Gillnets (SEAFDEC, 2004)

	1141181118	3000
Sub-type	Target species	Hanging ratio
Surface net	Mullet	0.50-0.53
	Threadfin	0.56
	Sardine	0.6
Drifting gillnet	Mullet	0.5
	Indo-Pacific mackerel	0.53-0.54
	Indian mackerel	0.6
	Sardine	0.6
	Trevally, scad, Giant queenfish, Mullet (Mixed)	0.54-0.56
	False trevally	0.54
	Black pomfret	0.40-0.44
	Threadfin, Spanish mackerel (Mixed)	0.64
Fish 0.40-0	Spanish mackerel, Pomfret, Scad, Dorab, Croaker (Mixed)	0.40-0.60
Eish	Whiting	0.52-0.68
T.	Spiny lobster	0.43-0.44
	Red snapper	0.45
	Sea bass	0.52-0.59
	Cavalla (King mackerel)	0.43-0.48
	False trevally	0.42-0.47
	Threadfin	0.57-0.63
	Giant queenfish, scad, trevally	0.51-0.65
	Threadfin, queenfish, snapper, emperor (Mixed)	0.55
	Ray	0.52
	Blue swimming crab	0.42-0.54
	Mangrove crab	0.31
Surface set, encircling	Mullet	0.51
	Indo-Pacific mackerel	0.66
Bottom set, encircling	Indo-Pacific mackerel	0.59-0.63
	Threadfin	0.49-0.57
Encircling	Indian mackerel	0.54

Sub-type	Target species	Hanging ratio
Trammel net	Shrimp	<u>Inner net</u>
		Head rope: 0.47-0.48
		Foot rope: 0.55-0.58
Shrimp		Outer net
Sur		Head rope: 0.64-0.68
		Foot rope: 0.79
	Shrimp	<u>Inner net</u>
		Head rope: 0.46
		Foot rope: 0.57
~ & >		Outer net
rlefts		Head rope: 0.30
Cuttlefish		Foot rope: 0.37
	Cuttlefish	<u>Inner net</u>
		Head rope: 0.49
		Foot rope: 0.58
		Outer net
		Head rope: 0.77
		Foot rope: 0.91

Suggested mesh sizes and twine size of gillnets (SEAFDEC 1986&2004)

Target species	Mesh size (mm)	Twine size (mm)
Whiting	25 - 30	PA mono Ø 0.20-0.25 mm
Sardine	28 – 29	PA 210d/2-4 (Green)
Mullet	40 - 85	PA 210d/2-3 (White)
		■ PA mono Ø 0.15 mm
Indo-Pacific/Indian mackerel	45	PA mono Ø 0.2 mm
Threadfin	50 -63	PA mono Ø 0.35-0.43
Giant queenfish	90-95	■ PA mono Ø 0.35-0.42 mm
		■ PA 210d/6 (Green)
Sea bass	170 -185	■ PA mono Ø 1.45 mm
		PA 210d/75 (White)
Snapper	115	PA 210d/9 (Green)
Dorab	60	PA 210d/9 (White)
Spanish mackerel	100	PA 210d/18 (Green)
Pomfret	110-135	■ PA mono Ø 0.3 mm
		■ PA 210d/6 (Green)

Suggested mesh sizes and twine size of Gillnets (SEAFDEC 1986&2004)

Target species	Mesh size (mm)	Twine
Rays	280 - 300	PA 210d/15 (White&Green)
Spiny lobster	90 - 114	PA mono ∅ 0.4 mm
Swimming crab	100 - 120	 PA 210d/4 (Green) PA mono Ø 0.20-0.30 mm
Mud crab	110 - 115	PA mono ∅ 0.30-0.35 mm

Suggested mesh sizes and twine size of Trammel nets (SEAFDEC 1986&2004)

Target species	Inner net		Inner net		Ou	ter net
	Mesh size (mm)	Twine size	Mesh size (mm)	Twine size		
Shrimp	40	PA 210/2 (White)	245-265	PA 210/4 (White)		
Cuttlefish	50-55	PA 210/2 (White)	255-265	PA 210/6 (White)		

Drifting Gillnet Fishing Logsheet

STANDARD OPERATING PROCEDURES FOR M.V.SEAFDEC2 (REVISED EDITION)

DRIFTING GILLNET FISHING LOGSHEET Operation No.



Recorded by Certified by							
Cruise no:		N	ame of Vessel		Air temp:		.C
Survey stat	ion no:				Air press:		mbar
Date:					Humidity :		%
Moon age:		Start shooting	Finish sho	oting		Water	
W	ind	Time	Time		Surface ten	ip:	.C
Speed (kt)	Direction	Latitude	Latitude		Bottom ten	np:	·C
		Longitude	Longitude		Transparen	cy:	m
Weather co	nd:	Start hauling	Finish ha	uling		Current	
Sca conditi	on:	Time	Time		Depth (m)	Speed (kt)	Direction
Fishir	g gear	Latitude	Latitude				
Type of Gi	Inet:	Longitude	Longitude				
Net length		Depth of capture	Bottom type				
No. of net		Memorandum:			Total catch	in number:	
Immersion					Total catch	in weight (k	(g):

No.	Species	Length (cm)	Weight (kg)	Remarks

Drifting Gillnet Fishing Logsheet

DRIFTING GILLNET FISHING LOGSHEET Operation No.



Recorded by Certified by

Cruise no:			Name	of Vessel		Air temp:		.C
Survey stat	ion no:					Air press:		mbar
Date:						Humidity:		%
Moon age:		Start sho	oting	Finish s	hooting		Water	
W	ind	Time		Time		Surface ten	ip:	,C
Speed (kt)	Direction	Latitude		Latitude		Bottom ten	ip;	·C
		Longitude		Longitude		Transparen	cy:	m
Weather co	nd:	Start has	uling	Finish	hauling		Current	
Sea conditi	on:	Time		Time		Depth (m)	Speed (kt)	Direction
Fishir	ng gear	Latitude		Latitude				
Type of Gi	llnet:	Longitude		Longitude				
Net length	CO.0000	Depth of capt	ure	Bottom type	:			
No. of net p		Memorandun	1;		N-	Total catch	in number:	
Immersion						Total catch	in weight (k	(g):

Drifting Gillnet Fishing Logsheet

No.	Species	Length (cm)	Weight (kg)	Remarks

Case study:

Assessment of Relative Abundance of Fishes Caught by Gillnet in Vietnamese Waters in 1996 (N-E and S-W monsoons)

By Dr. Chu Tien Vinh

Research Institute of Marine Products
VIET NAM

Introduction

- Over-exploitation of near-shore waters of Viet Nam
- Ministry of Fisheries planned to develop sustainable utilization of coastal and off-shore fisheries
- Identifying species and catch composition, distribution of economically important species, relative abundance and potential fisheries resources
- Research Institute of Marine Product-RIMP conducted offshore fisheries resources research programs under support by Vietnamese Gov., JICA, DANIDA, and SEAFDEC in 1995-1997

Materials and Methods

- Project "Study on the marine resources study in Viet Nam" 1995-1997
- R/V Bien Dong
- Multi-mesh sized gillnet



Construction of Surface Gillnets of 5 mesh-sizes (Total 5,000 m long)

- o 1 #73 mm, 1,000 m
- o 2 # 95 mm, 1,000 m
- o 3 # 123 mm, 1,000 m
- 4 # 150 mm, 1,000 m
- o 5 # 160 mm, 1,000 m

Total length 5,000 m long, 1 Tan is about 50 m long



Fig. 1. Construction of surface gillnets of five mesh-sizes used for study.

Study area

S-W Monsoon

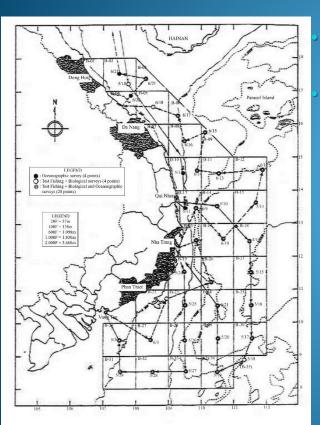


Fig. 2. Sailing track and test fishing stations in S-W monsoon.

Position: Lat: 8° – 18°
N, Lon: 107° – 112° E
Soaking time: Before
sunset until sunrise of
next day

N-E Monsoon

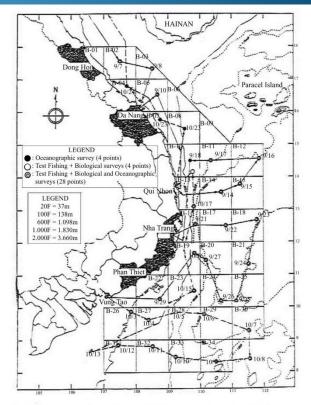


Fig. 3. Sailing track and test fishing stations in N-E monsoon.

Results: Species composition

- 96 fish species (30 families)
- 2 squid species
- 18 sp. of Carangidae



12 sp. of Scombridae



• 10 sp. of Exocoetidae

Results: Catch rate

- 14 major species accounted for 86.80% of the total catch
- Top 3 species caught: Skipjack tuna, Devil ray and Common dolphinfish
- Catch rate of species caught in the N-E was higher than in the S-W monsoon, 92.4 and 84.20% respectively

14 Major species caught

S-W and N-E 1996 Catch rate

Table 3. Catch rate(%) of major species caught by gillnet in off-shore waters of Vietnam in S-W and N-E monsoons 1996.

Ord.	Common English name/ Scientific name	S-Wmonsoon	N-E monsoon
1	Skipjack tuna (Katsuwonus pelamis)	16.21	20.80
2	Devil ray (Mobula japonica)	18.20	13.00
3	Common dolphinfish (Coryphaena hippurus)	6.84	11.29
4	Black marlin (Makaira indica)	5.24	10.38
5	Blue marlin (M. mazara)	8.74	6.90
6	Frigate mackerel (Auxiz thazard)	4.81	8.93
7	Indo-pacific sailfish (Istiophorus platypterus)	7.79	5.10
8	Bigtooth pomfret (Brama orcini)	1.42	5.20
9	Manta ray (Manta biostric)	5.56	0.00
10	Triptail (Lobotes surinamensis)	2.59	2.60
11	Flying squid (Sthenoteuthys ovalsniensis)	1.06	2.57
12	Yellowfin tuna (Thunnus albacares)	0.39	2.60
13	Silky shark (Carcharinus falciformes)	0.50	2.30
14	Bullet tuna (Auxis rochei)	1.83	0.71
	Grand total	81.20	92.40













Relative abundance of major species caught

S-W Monsoon

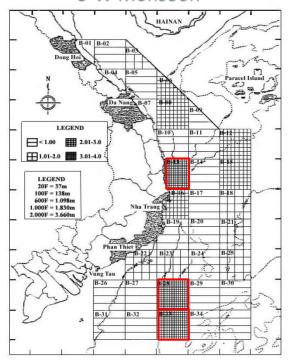


Fig. 5. Distribution of CPUE (kg/tan) in S-W monsoon.

N-E Monsoon

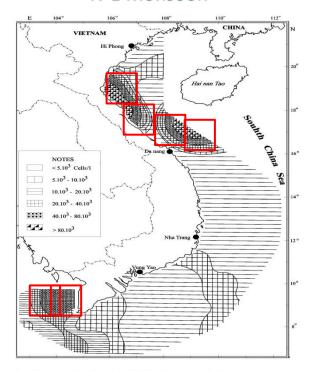
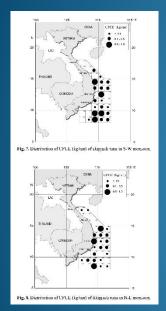


Fig. 6. Distribution of CPUE (kg/tan) in N-E monsoon.

Relative abundance-CPUE of major species by kg/tan



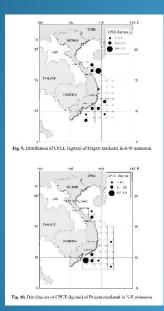
Skipjack tuna

Katsuwonus pelamis

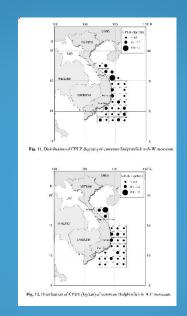
CPUE

0.5-1.0

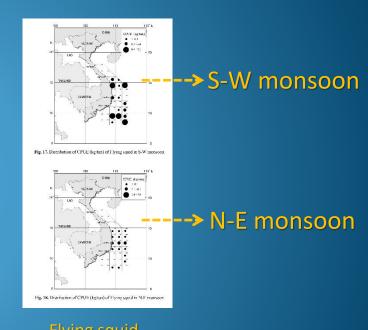
0.5-1.0



Frigate mackere
Auxis thazard
1.0
1.0



Common dolphinfish
Coryphaena hippurus
0.4
0.4-0.5



Sthenoteuthis oualaniensis

0.04-0.1 ----- S-W monsoon

0.1-0.2 ----- N-E monsoon

Discussion

- First time to use different mesh-size gillnets on off-shore pelagic fisheries resources in VN
- 14 major species of commercially important species of VN
- JAMARC's surface gillnets of different mesh size of 73-250 mm in the Pacific Ocean 1978-1990, CPUE in some species ranged from 3.8-20.0 kg/tan
- Lower CPUE (0.84-1.2 kg/tan) due to different season, scattering concentration of pelagic fishes, gillnets' selectivity, fishing method etc.
- Gillnets, purse seines, long line, lift net are considered in the first priority for pelagic fish exploitation in off-shore of VN

References

- Definition and classification of fishing gear categories, FAO Fisheries
 Technical Paper. No. 222. Rev. 1, 1990
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- Assessment of Relative Abundance of Fishes Caught by Gillnet in Vietnamese Waters in 1996 (N-E and S-W monsoons), Dr. Chu Tien Vinh, Research Institute of Marine Products, Viet Nam
- Standard Operating Procedures for M.V. SEAFDEC2, SEAFDEC-TD, 2004.

Thank you very much for your kind attention

For more information, please visit seafdec.org