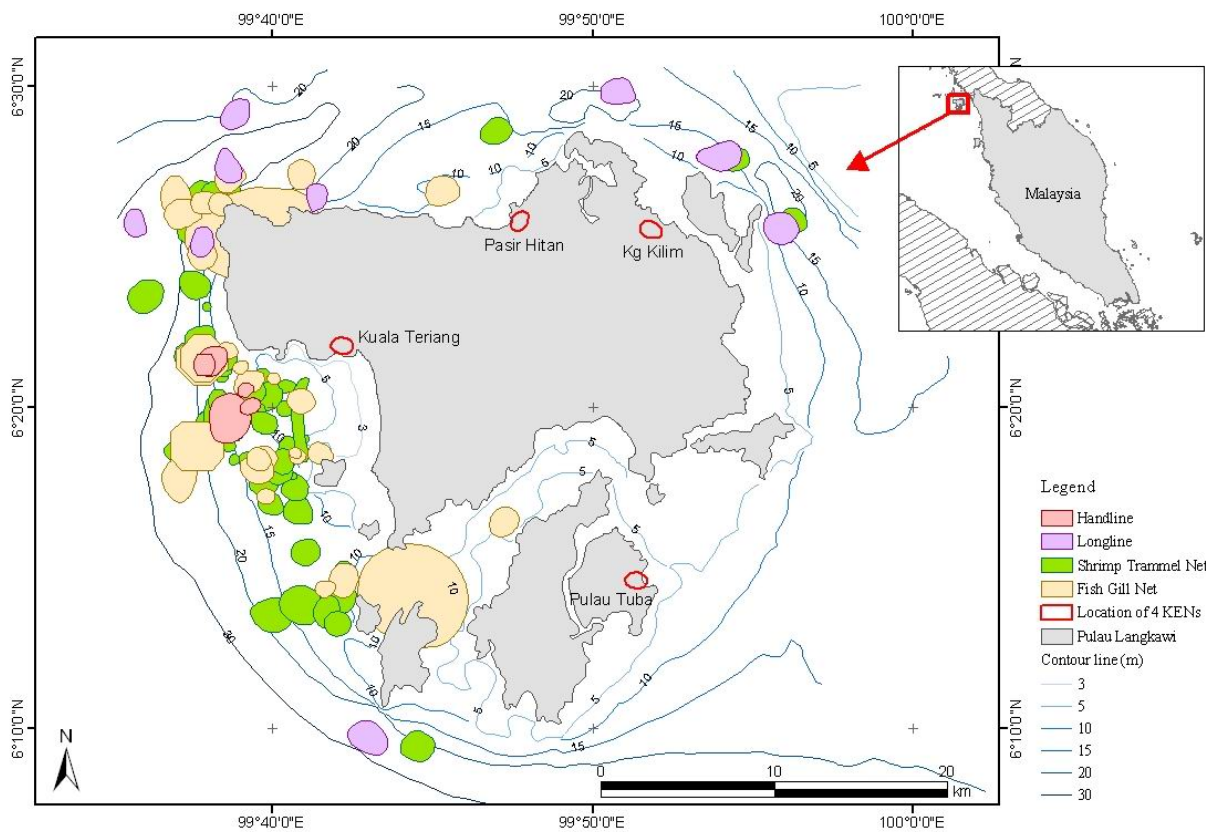


Report of

The Marine Resources Monitoring in Langkawi during 2004-2006



Fishing Ground in Pulau Langkawi



Department of Fisheries, Malaysia

Southeast Asian Fisheries Development Center

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Report on Marine Resources Monitoring in Langkawi during year 2004-2006

Penchan Laongmanee

Fishing Ground and Fishery Oceanography Section, Capture Fisheries Technology Division
SEAFDEC/TD

1. Background

The fisheries resources monitoring survey had conducted since April 2004. The activity first aim to ensure the sustainability of available marine resources, especially around the artificial reefs (ARs) and fish aggregating device (FADs) after introduction of improved fishing gear in the project operational area. However, the improved fishing gear such as crab trap and abalone trap is not widely used in the community yet. Then the activity objective was transformed to be monitoring on fisheries resources utilized by the project community.

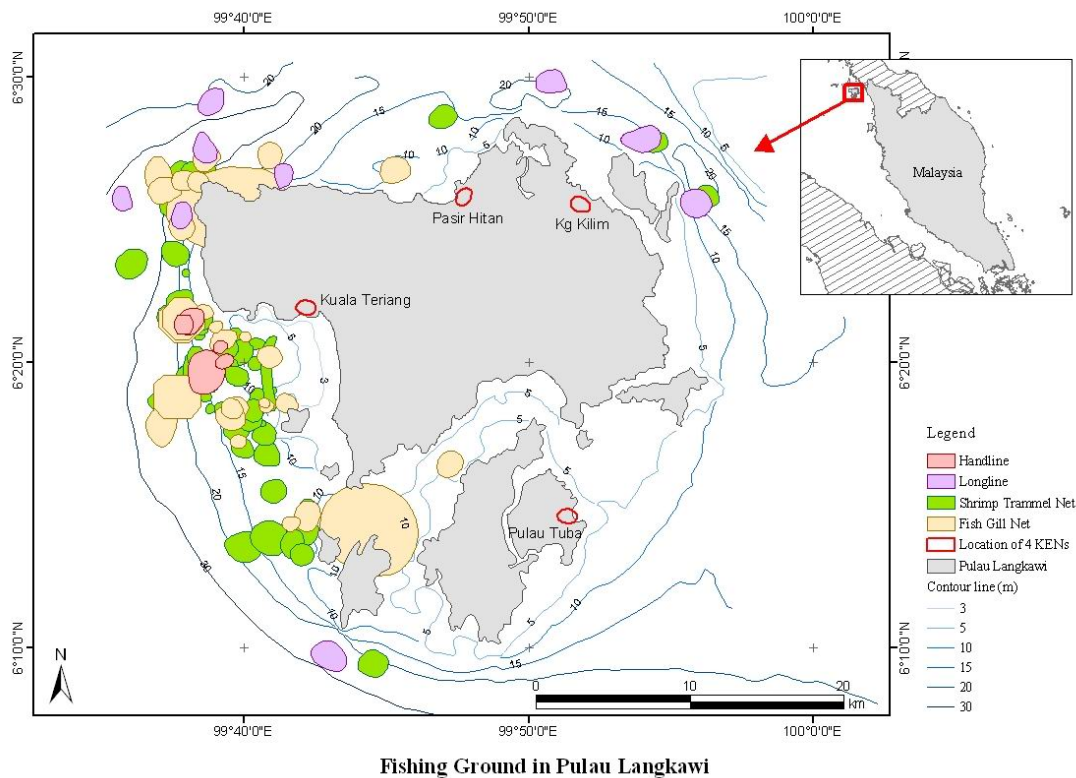


Fig. 1 Study area and fishing ground of fisherman in Kuala Teriang. (after Theparunrat, 2004)

Study area

The Langkawi Island consists of 99 islands totally 204 square miles in size, of which the main island, Pulau Langkawi, is the largest and is the population center of the group. Project site, Kuala Teriang is located on the west coast of Langkawi Island. It is the fishing village of Malaysia that most effected from 26 December 2004 Tsunami.

Langkawi has a tropical monsoon climate with the raining season between April and October and dry season from November to March. Langkawi has mixed tided. Generally, spring tided is good for catching shrimp. Some fishermen tend to rest during neap tide while some change to other type of catch.

Shrimp and crab is main target of most fishermen in Kuala Terieng. It is because of higher price in the market compare to fish and they could be caught all year round. Fisherman only targeted squids and some fish species which seasonally abundance (Chong and Lee, 2006).

It is well-known in Malaysia that the seas off Langkawi teem with squids during late November to early February. The Langkawi Squid Challenge held simultaneously at sea area near project site (Pantai Kok, Teluk Burau and Belikit). It was organized by the Langkawi Tourism Action Council together with the Fisheries Department. Some fisherman can caught more than 100 kg/night using hooks and line with hurricane lamp. (<http://www.nst.com.my/weekly/Travel/artical/FeatureStory/20050427133134>) In this season many fishermen in Kuala Terieng change fishing gear to catch squid.

2. Materials and methods

2.1 Data source

The activity collected data from three sources; fisherman logbook, middle man logbook and fish landing survey. The starting time of each data source collection is different upon the readiness of both staff and fisherman. Fish landing survey was started on April 2004, while middle man logbook and Fisherman logbook activity was started on June and August 2004, respectively. After Asian Tsunami on 26 December 2006 hit the project site, all activity was stop then restarted again on August 2005.

2.1.1 Fisherman logbook

This type of data sources was planed to collect directly from fisherman especially one who joined the experimented fishing in improved fishing methods and subsequent training. However, we found that record in the logbook is too difference from their normal behaves then we could not get any data back in the beginning. Finally, middle man in the village was asked to record catch information of fisherman that he buy fish. Data was recorded at every fishing day.

Fisherman logbook is including fisherman name, fishing date, type of fishing gear, size of fishing gear (length of gill net, no. of hook, etc) and catch species and its weight (Annex II).

Even through, fisherman in the village used several type of fishing gear but main fishing gear are shrimp trammel net and bottom long line. Therefore, the fishing gears that were focusing for this monitoring was shrimp trammel net and bottom long line.

2.1.2 Middle man logbook

In the beginning of the project, information from the pre-survey shown that most of fisherman in the village sell catch to four middle men in the village. Therefore, data of these middle men can present total landing of fisherman in the village.

During Tsunami on 26 December 2004, many fishermen lost their boat and some middle man lost landing site. Since then, two of our contacted middle man changed their job. There are also other new middle men which don't have landing site in the village. From August 2005, we continuous received data from only two middle men. Therefore, the data is not able to assume the total landing and value of catch of fisherman in the project site. However, we would observe trend of catch and its value from data of those two middle men.

Information from middle man logbook composes with fish name, purchasing weight and unit per kilogram (Annex III). Data will be input by middle man on daily basis.

2.1.3 Fish landing survey

Every four month, Southeast Asian Fisheries Development Center (SEAFDEC), Fisheries Research Institute (FRI) and Department of Fisheries (DOF) staffs conducted fish landing survey for 3 days.

Catch from fisherman was sampling for length and weight measurement and species composition from each type of fishing gear.

Shrimp and prawn were measure for total length, Indo-Pacific mackerel for fork length and crab for carapace width. Fisherman also was interviewed for fishing gear and fishing ground information (Annex IV).

2.2 Data Analysis

For monitoring purpose, all source of data were calculated for following parameters

2.2.1 Catch composition

Fisherman logbook is data source of catch composition. It was reported on monthly basis. Target species such as banana prawn, western king prawn, greasy back shrimp, indo-pacific mackerel and Indian mackerel were high in both quantity and value for this survey area therefore they will be reported individually. While many species such as sole, beam, grunt may low in quantity and some fisherman more taken for family consumed than sale to middleman. Therefore, there is few data were recorded in the fisherman logbook. In this paper they will be report as others.

2.2.2 CPUE (catch per unit effort)

CPUE of shrimp trammel net and bottom long line were calculated from catch record and size of fishing gear that record in the fisherman logbook and Landing survey data. CPUE of other gear in Kuala Terieng was reported in Annex I.

Unit of CPUE for shrimp trammel net and bottom long line for this report is kg/net/trip and kg/100 hooks/trip respectively. It was reported on average, minimum and maximum value for each month.

2.2.3 Length distribution

Length distribution was collected during landing survey. Most catch from fisherman that we interview during the survey was measured for length. However some species may very low in number. The species that have enough data to show length distribution of each survey period were greasy back shrimp (*Metapenaeus ensis*), banana prawn (*Penaeus merguensis*), Indo-pacific mackerel (*Rastrelliger brachysoma*) and swimming crab (*Portunus pelagicus*) from shrimp trammel net.

Numbers of sample in each survey trip of each species is also varying. Therefore length distribution was converted to be percentage for comparison purpose.

2.2.4 Total landing and total value

Purchasing weight and value of all species recorded by two contact middlemen in Kuala Terieng were summary for total landing and total value of each month.

2.2.5 Landing weight of commercially important species

Commercially important species in this paper is the species that high in landing weight. The remained species was summary then present as other catch. Purchasing weight of each commercially important species form middleman logbook was summary for monthly report.

3. Results

3.1 Catch composition

Shrimp trammel net

Catch composition of shrimp trammel net is include both pelagic and demersal marine creature such as Indo-pacific mackerel, Indian mackerel, gizzard shad, four finger fish, tripletail fish, croaker, marine catfish, sole, mullet, bream, bay sillago banana prawn, western king prawn, greasy back shrimp, ray, shark, mantis shrimp, swimming crab, Mask crab, etc.

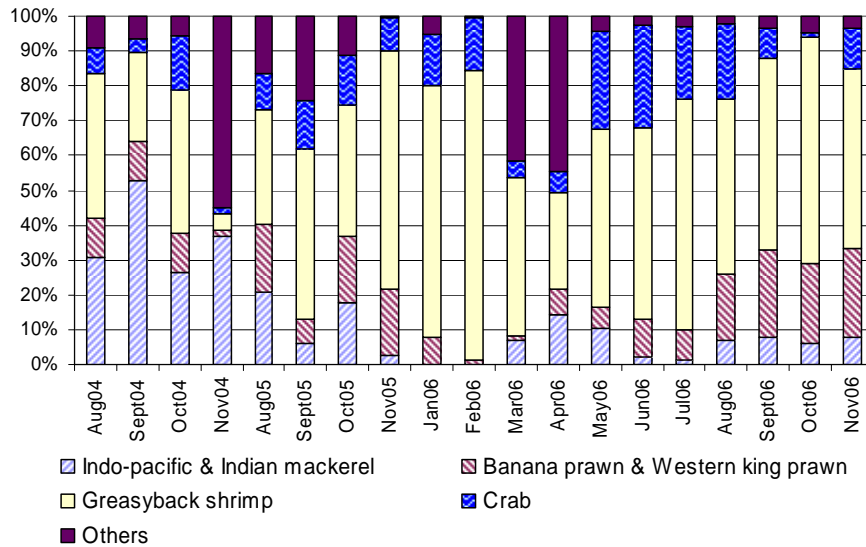


Fig.2 Catch composition of shrimp trammel net in 2004-2006

Shrimp and prawn that is target of shrimp trammel net is abundance all year round in the study area (fig 2). Low percent catch composition of shrimp and prawn was observed in November 2004 and March to April 2006. High percent composition of banana and western king prawn (more than 20% of total catch) was observed in August to November 2006 and of greasy back shrimp (more than 70% of total catch) was November 2005 and January to February 2006.

Percent catch composition of indo-pacific and Indian mackerel in all available data of 2005 and 2006 are less than 25% while in year 2004, there composition in all month are more than 25%.

In November 2004, March 2006 and April 2006, percent catch composition of others was high (more than 40%). The break down percent composition of others in those months shown that high composition are demersal fish such as red sea bream, croaker and sole (fig. 3)

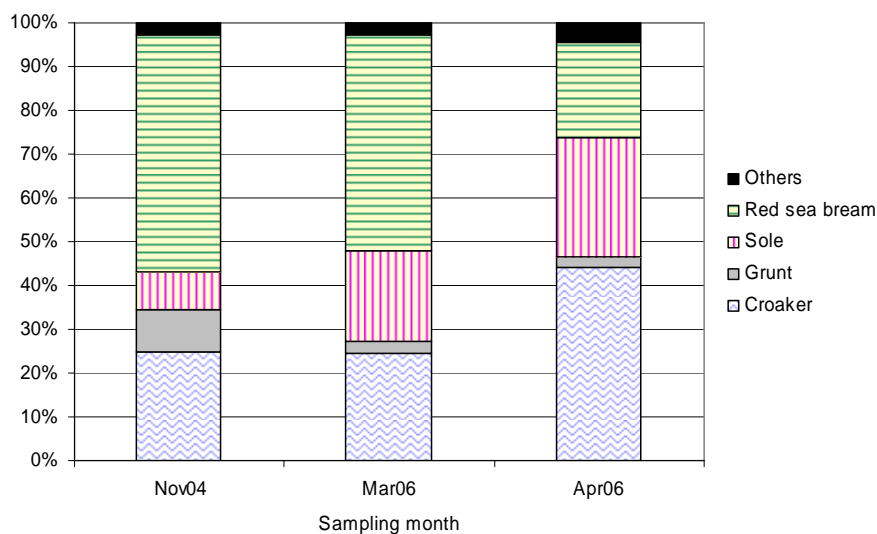


Fig. 3 Percent composition of others in November 2004, March and April 2006

Bottom long line

Catch composition of bottom long line in the study area compose with marine catfish, croaker, shark, grunt, sole, grouper, barracuda, John's snapper, squid, pinjalo, string ray, four finger threadfin, white travelly and others.

There is no distinct trend for percent catch composition of bottom long line which may because of it is characteristic of bottom long line in the study area or from the low number of data recorded (fig.4 and 7).

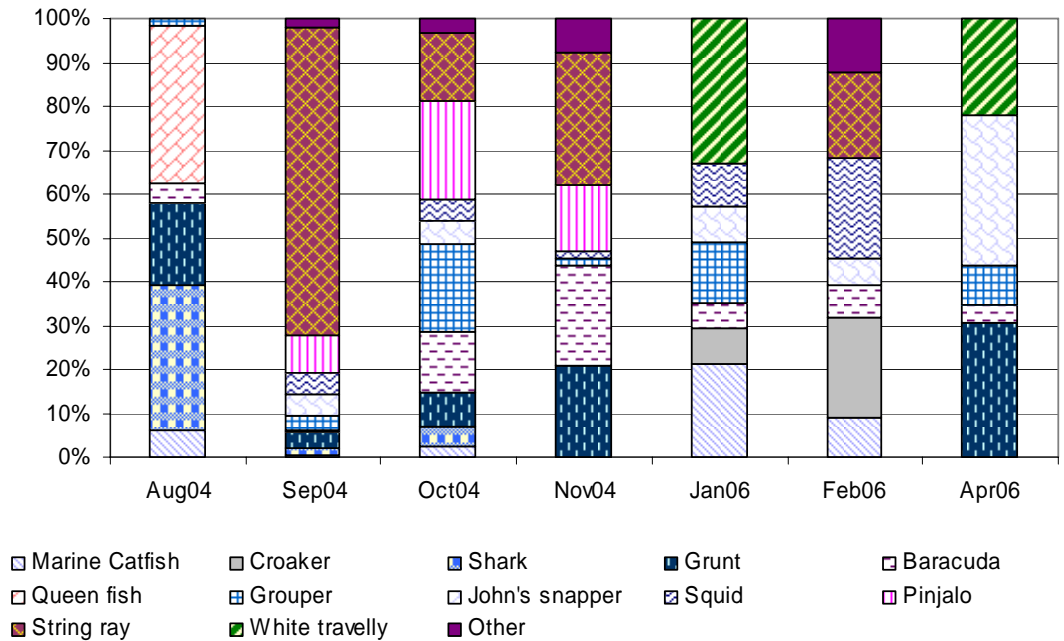


Fig. 4 Catch composition of bottom long line 2004 - 2006

3.2 CPUE

Shrimp trammel net

Fig. 5 shown average, minimum and maximum of total CPUE of shrimp trammels net in Kuala Terieng during June 2004 to November 2006 while fig.6 show only CPUE for shrimp of shrimp trammel net. Data of shrimp trammel net is available all year round except in December of every year which fisherman change fishing gear to catch squid that high abundance at the time. CPUE data shown that shrimp is abundance all year round in this area.

The average total CPUE of shrimp trammel net varied from 0.36 kg/net/trip in August 2006 to 2.47 kg/net/trip in June 2004. If consider on yearly basis of total CPUE of shrimp trammel net, average CPUE of year 2004 is 1.47 kg/net/trip. It is higher than total CPUE in year 2005 and 2007 that are 0.60 and 0.55 kg/net/trip respectively. Considering only target catch which is shrimp, the average CPUE of shrimp trammel net was between 0.11 kg/net/trip in November 2004 to 0.65 kg/net/trip in August 2004.

Bottom long line

Average CPUE of bottom long line in Kuala Terieng between June 2004 and April 2006 was 3.15 – 13.17 kg/100 hooks/trip (fig.7). Data of bottom long line was not available in 2005. It may because of fishing boat and fishing gear of bottom long line was destroyed by tsunami in 26 December 2004. They may temporary change job or fishing gear then start to use bottom long line again in 2006. However some of fisherman that engaged in bottom long line fishing gear is not a full time fisherman. They may go for fishing when the sea in good condition or when they free from other job.

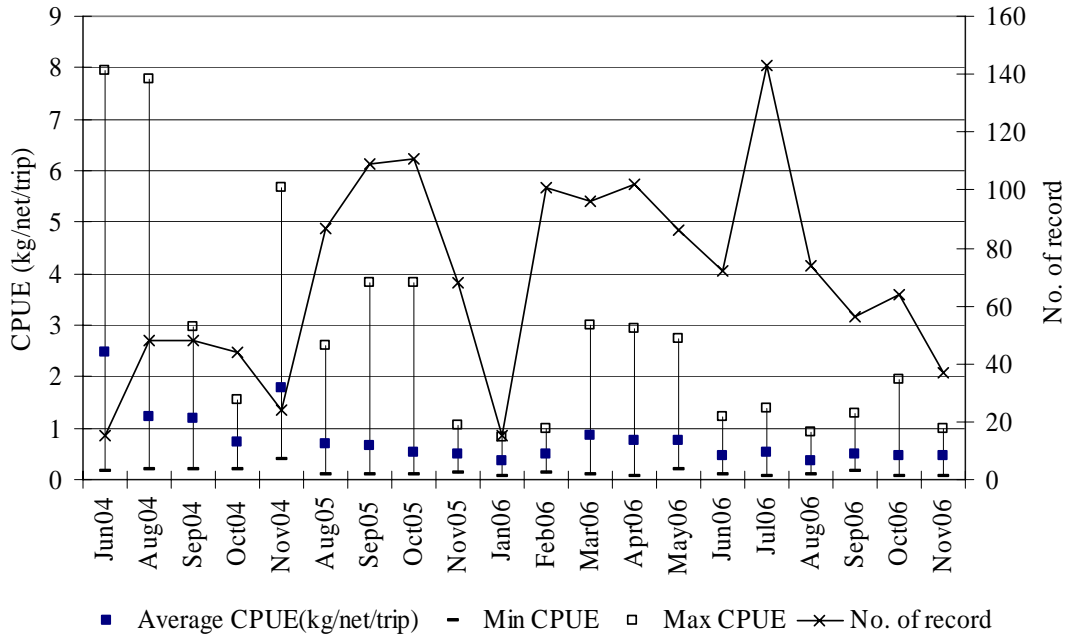


Fig. 5 Total CPUE of shrimp trammels net in Kuala Terieng during June 2004 to November 2006

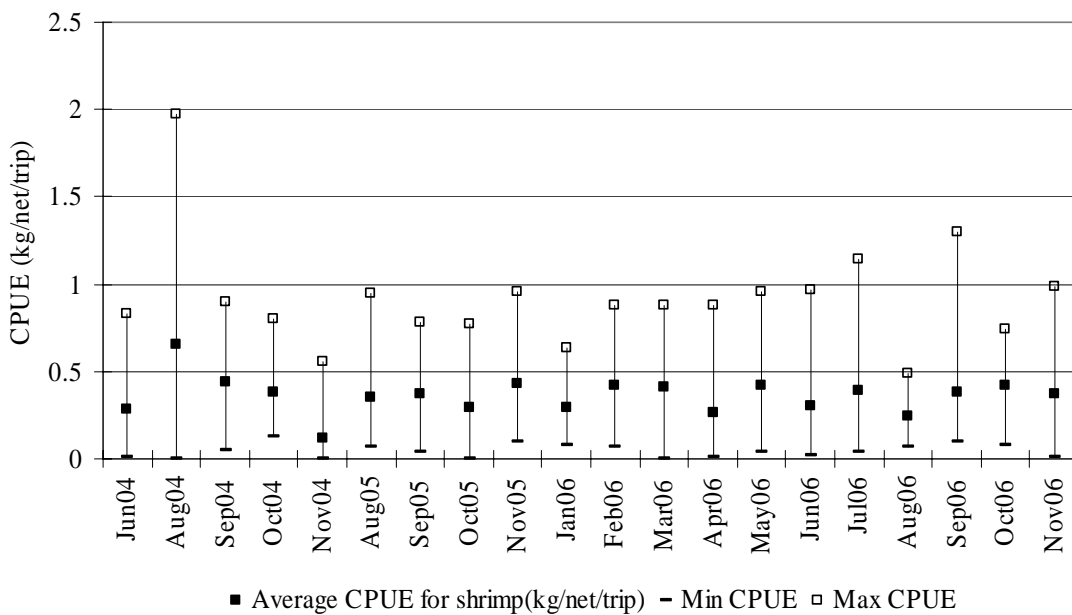


Fig. 6 CPUE for shrimp of shrimp trammels net in Kuala Terieng during June 2004 to November 2006

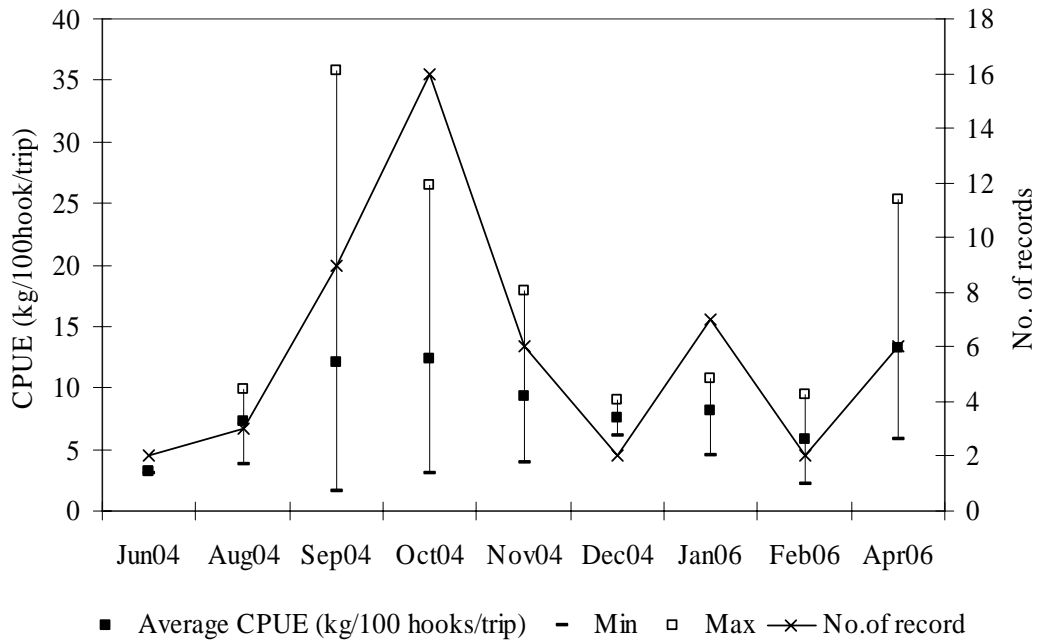


Fig. 7 CPUE of bottom long line in Kuala Terieng during June 2004 to April 2006

3.3 Length distribution

Total length of greasy back shrimp are between 7.50 – 19.00 cm and 11.50 to 23.50 cm for banana prawn. The average total length in June 2004, December 2004, August 2005, November 2005 and April 2006 of greasyback shrimp are 11.85 , 11.38, 11.27, 11.75 and 15.83 cm, respectively while of banana prawn are 14.01, 16.19, 16.17, 15.67 and 17.78 respectively. Percent length distribution of greasy back shrimp and Banana prawn show that size of them in 2006 was bigger than in 2005 and 2004 (fig 8 and 9).

Carapace width of swimming crab was between 9.50 – 18.00 cm. Average width of swimming crab in June 2004, December 2004, August 2005, November 2005 and April 2006 was 13.24, 13.42, 13.18, 13.14 and 14.25, respectively (fig 10).

Total length of Indo-pacific mackerel during year 2005 and 2006 were between 13.00 – 22.00 cm with average length in June 2004, August 2005 and April 2006 was 16.97, 14.62 and 15.32 respectively (fig 11).

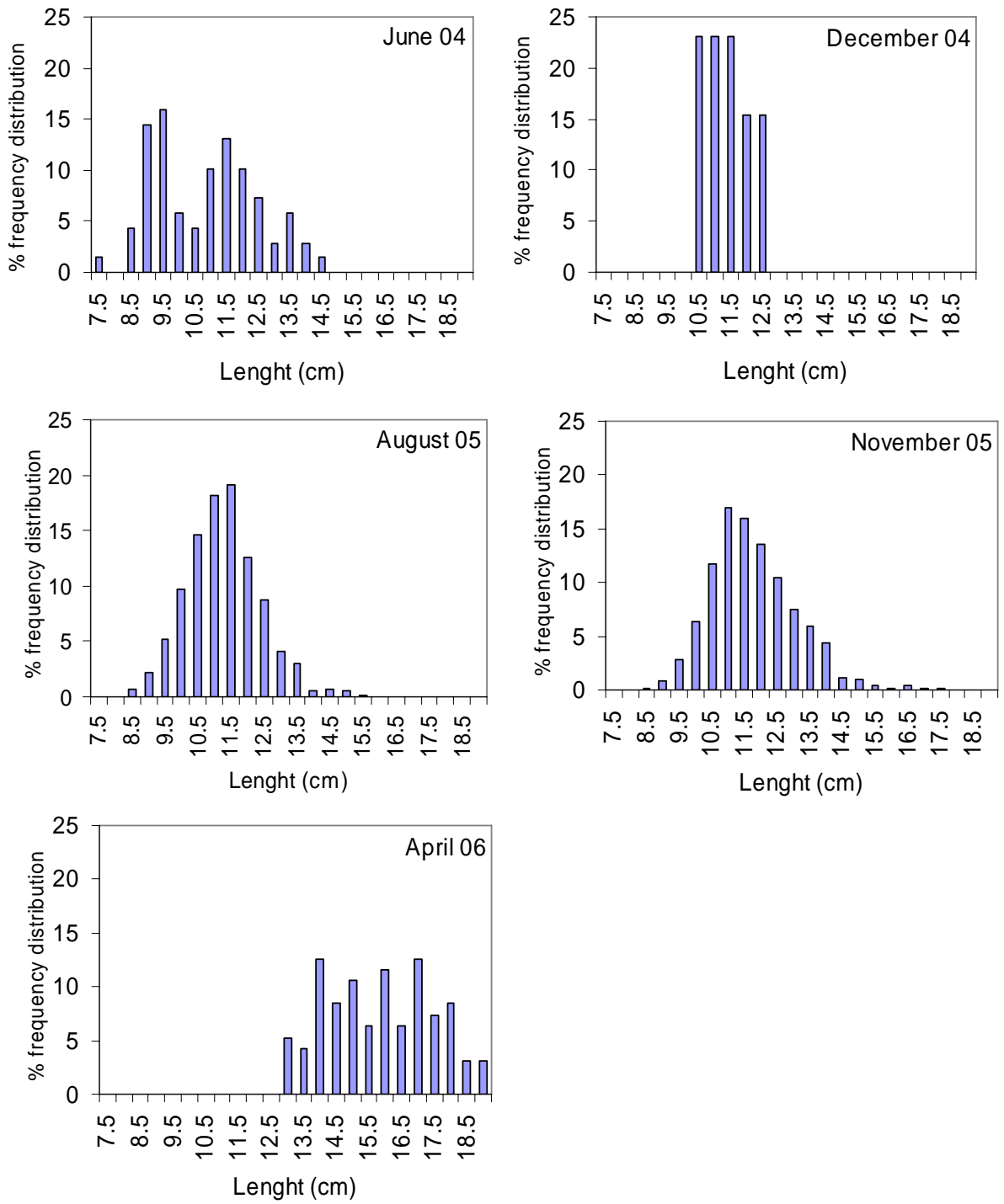


Fig. 8 Percent length frequency distribution of greasy back shrimp (*Metapenaeus ensis*) from shrimp trammel net from 2004-2006

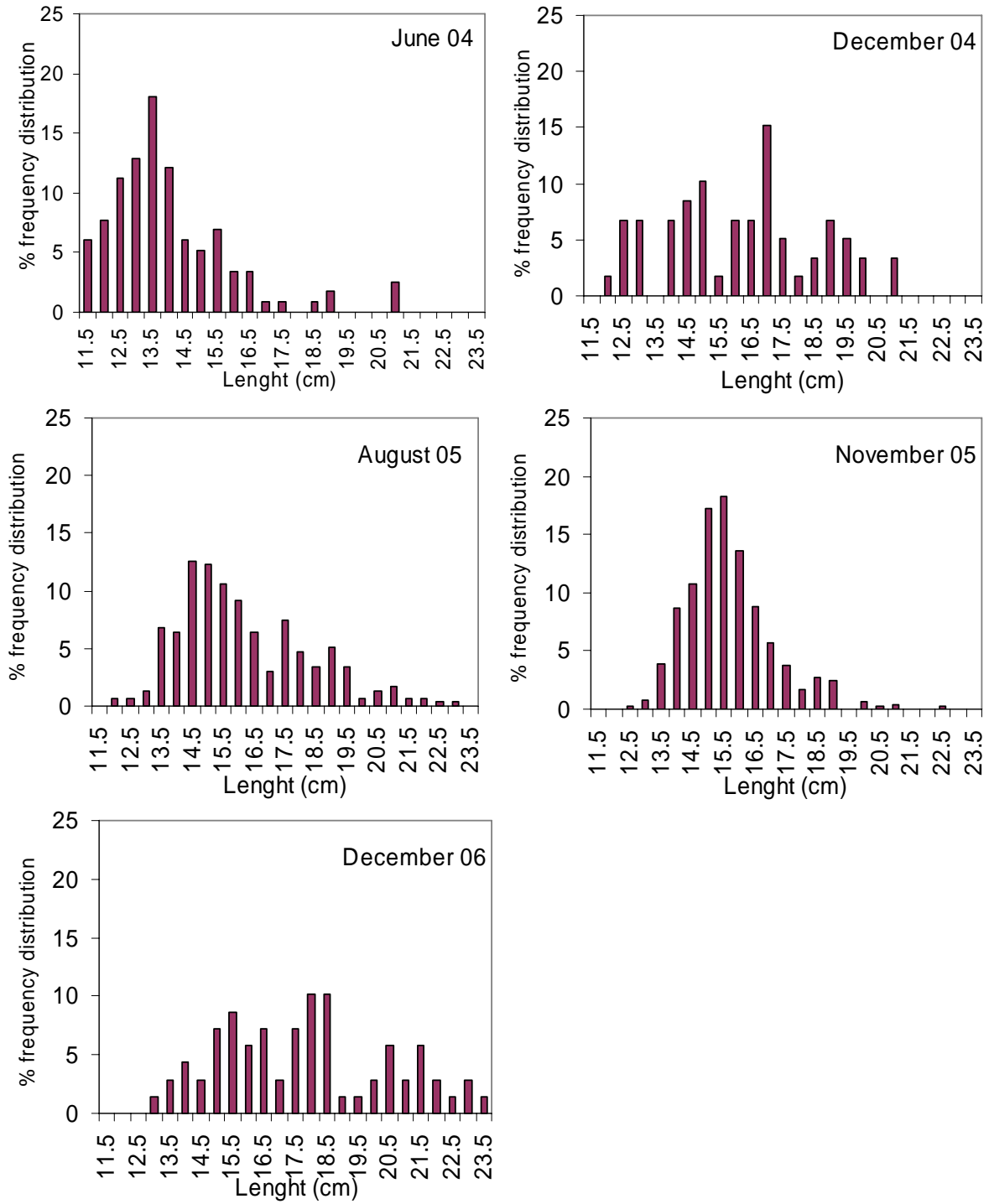


Fig. 9 Percent length frequency distribution of Banana prawn (*Penaeus merguensis*) from shrimp trammel net from 2004-2006

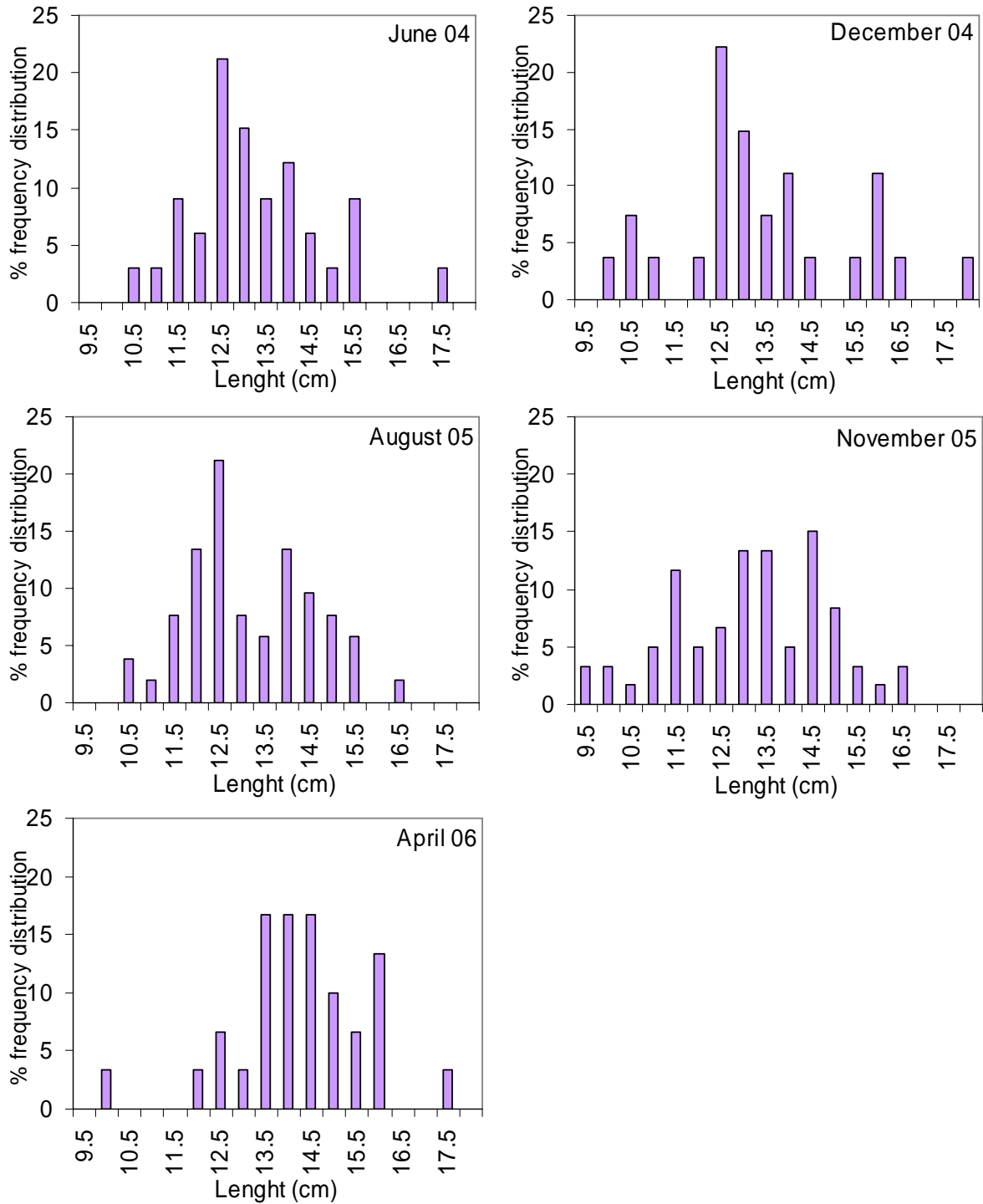


Fig. 10 Percent width frequency distribution of swimming crab from shrimp trammel net.

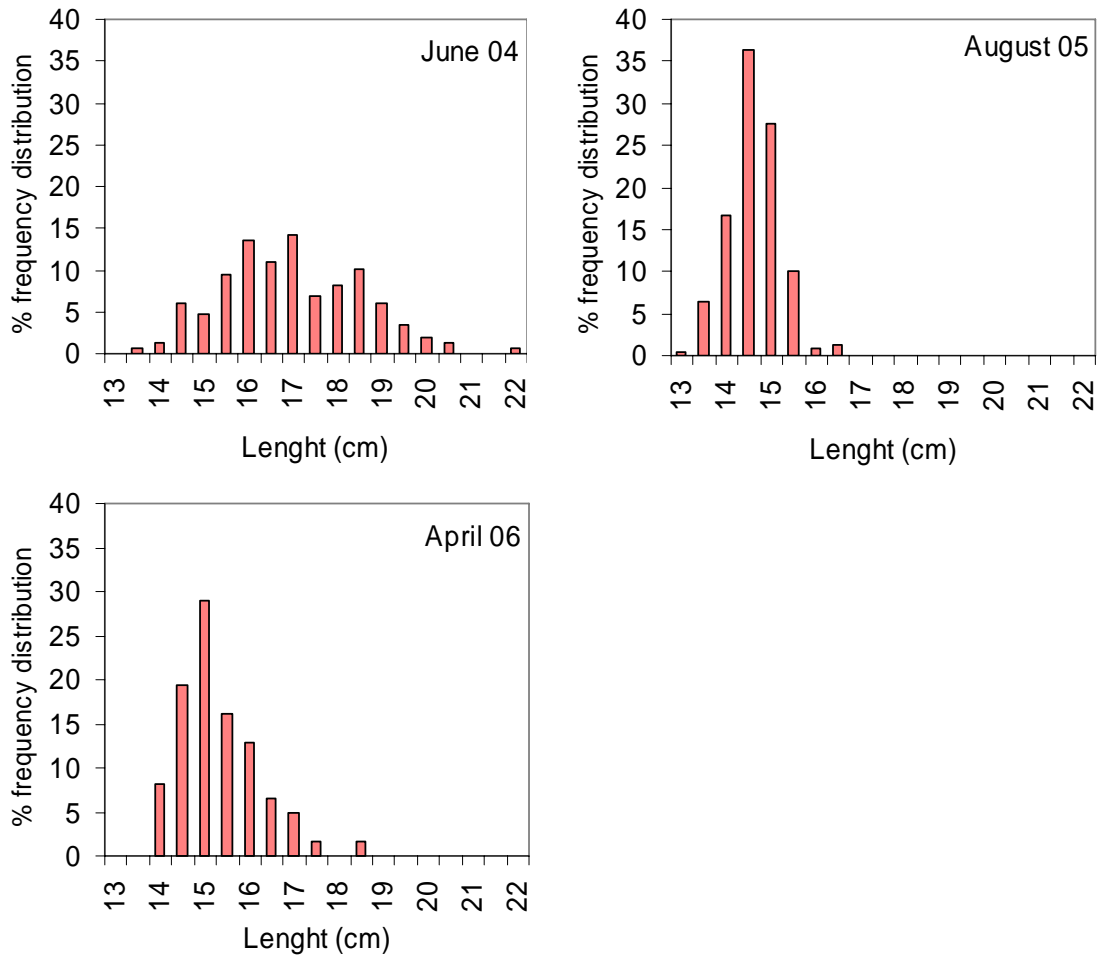


Fig. 11 Percent length frequency distributions of Indo-Pacific mackerel from shrimp trammel net

3.4 Total landing and value in Kuala Terieng

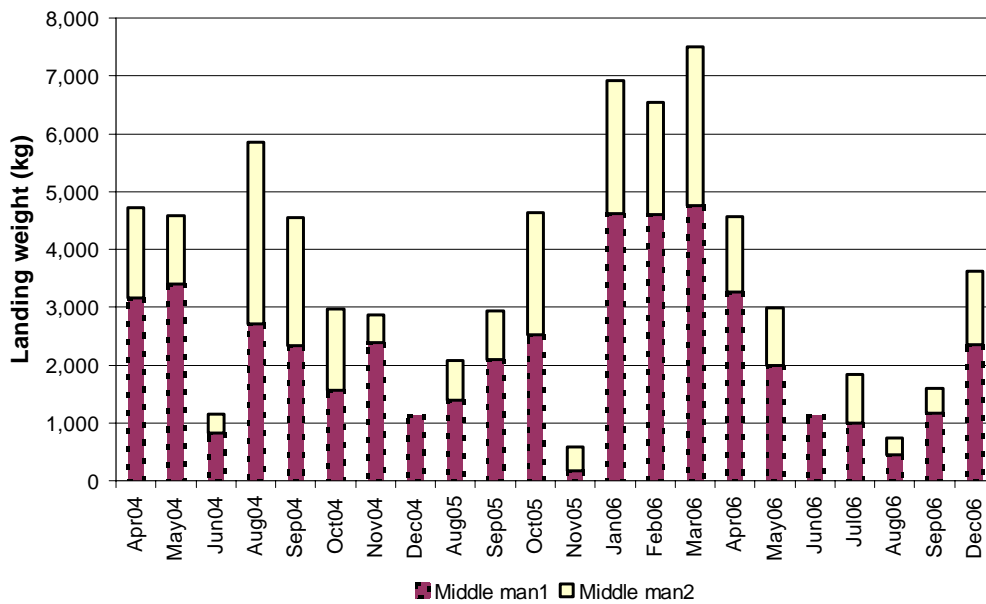


Fig. 12 Landing weight of Kuala Terieng from year 2004 to 2006 , data from two middle man

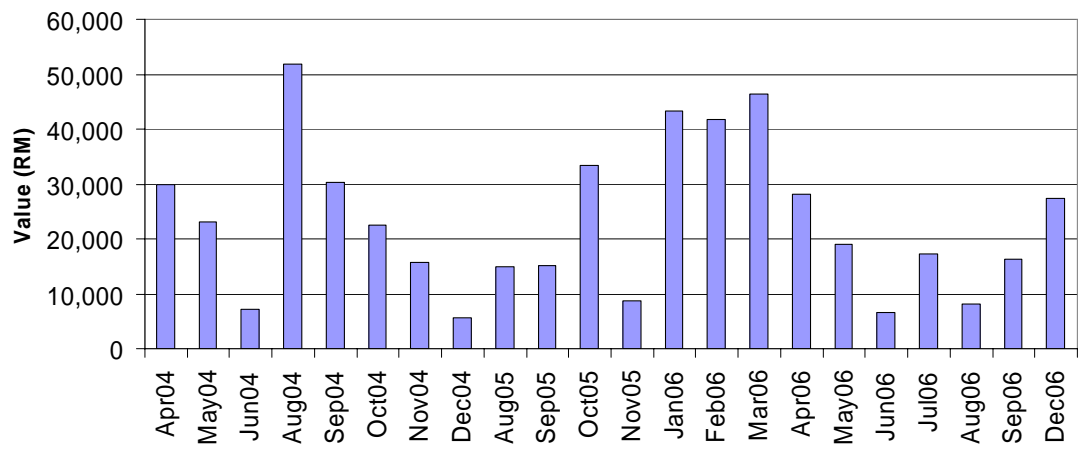


Fig. 13 Landing value from two middle men in Kuala Terieng

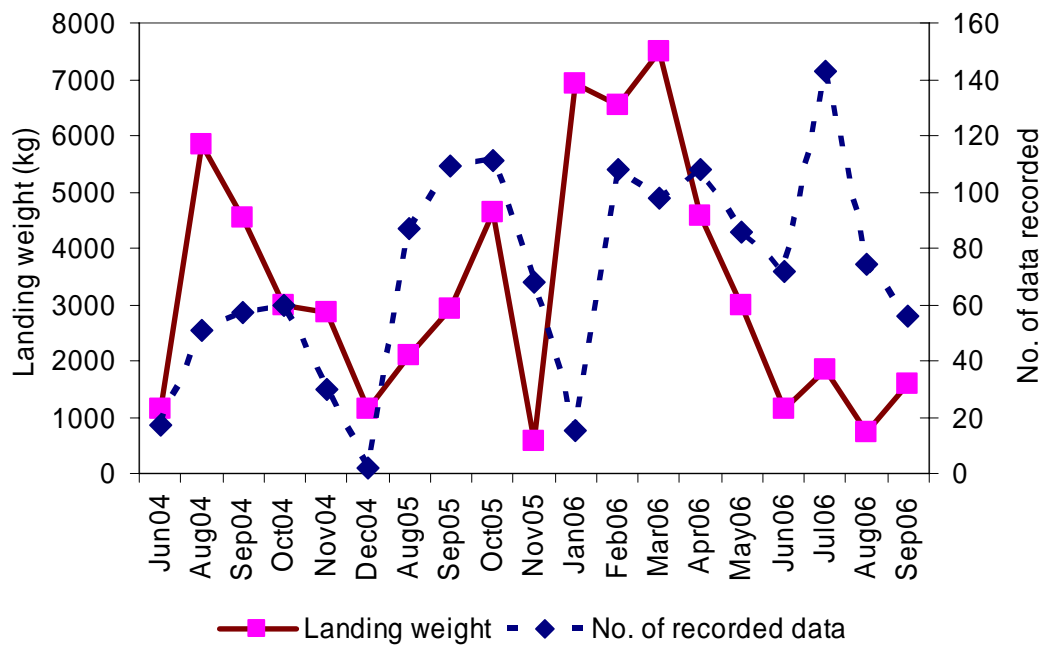


Fig.14 Landing weight of two middle men in Kuala Terieng and number of record in each month of fisherman logbook

3.5 Landing weight of commercially important species

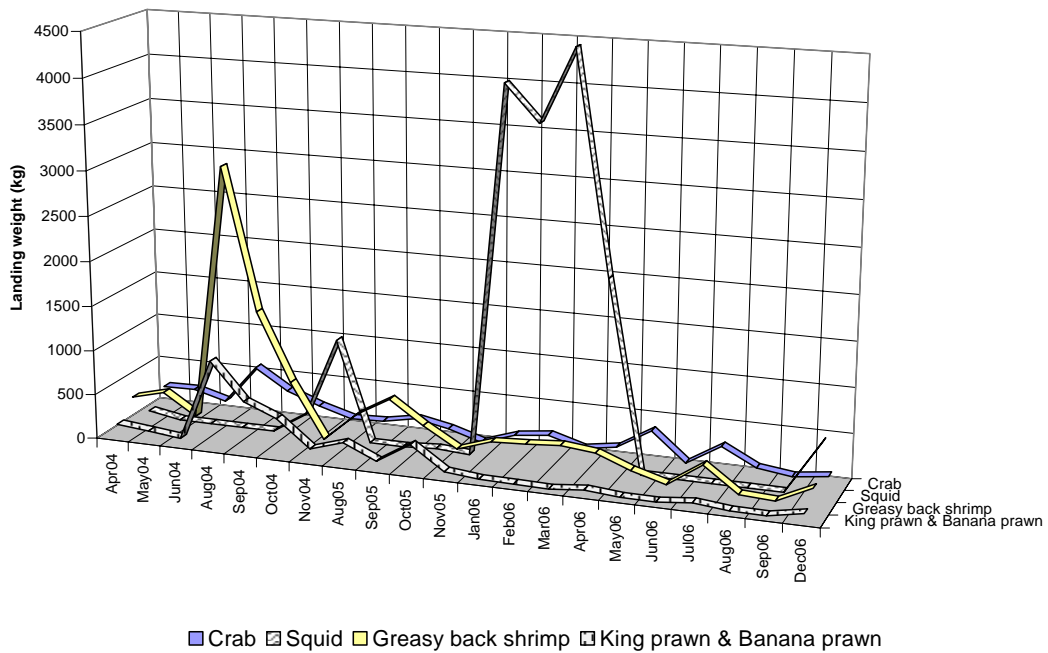


Fig. 15 Landing weight of crab, greasy back shrimp, banana and western king prawn and others from two middle men during April 2004 to December 2006

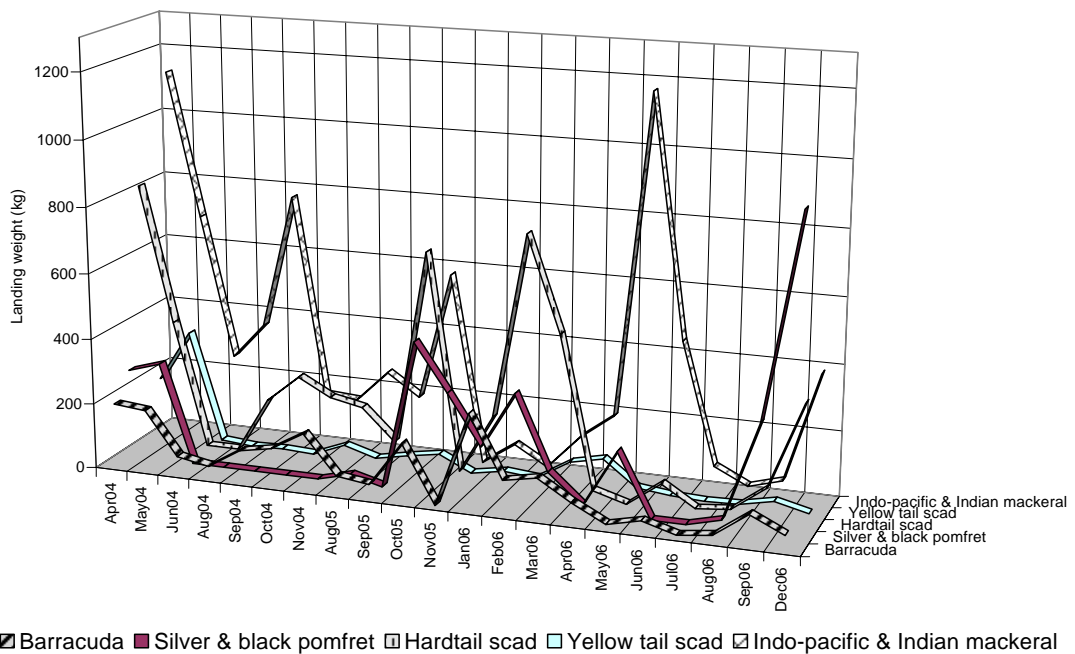


Fig. 16 Landing weight of baracuda, silver and black pomfret, hardtail scad, yellowtail scad and Indo-pacific and Indian mackerel from two middle men during April 2004 to December 2006

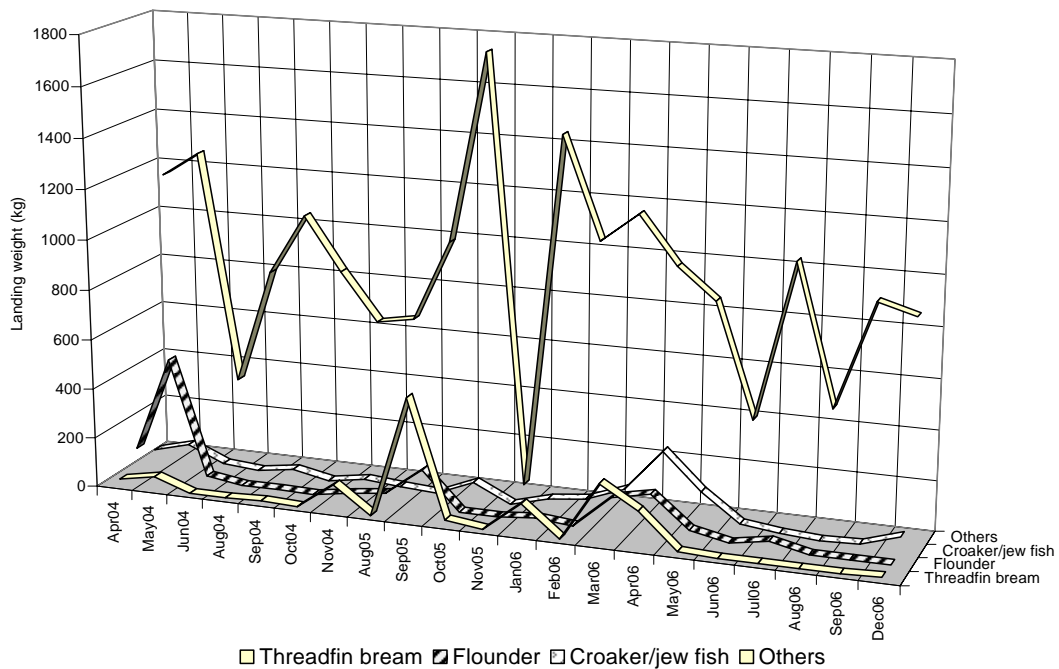


Fig. 17 Landing weight of threadfin bream, flounder (and sole), cracker (Jew fish) and others from two middle men during April 2004 to December 2006

Landing weight of greasy back shrimp was high August, September and October of 2004 and 2005. During the peak period in 2004 and 2005, landing weight of greasy back shrimp was between 1,472 to 3,046 kg and 403 – 654 kg, respectively. In 2006, there is no distinct peak landing season for greasy back shrimp. Good landing of greasy back shrimp in 2006 was only 312 – 363 kg during January to April and 330 kg in July (fig 15).

Banana prawn and western king prawn have similar pattern as greasy back shrimp that high landing was observed during August to October 2004 (427 to 988 kg) and October 2005 (314 kg). In year 2006, landing weight of banana prawn and western king prawn was low the whole year (fig 15).

The highest landing weight of crab was on August 2004 with a weight of 579 kg. The lowest was in November 2005, with the weight of only 15.2 kg (fig. 15).

Landing of squid is clearly showed that they are abundance in some period. If it is not the season, landing weight of squid is almost zero in several months, while in the season such as on November 2004, landing weight is 1123 kg. Or during January to April, landing weight was from 2,102 to 4,502 kg (fig.15).

Among fish, Indo-pacific and Indian mackerel was highest in landing weight. Peak season is in 2004 (1,127 kg) while in 2005 and 2006 is in October (574 kg) and May (1,168 kg), respectively. The peak season is more in transition period from Northeast monsoon to southwest monsoon (fig.16).

High landing weight period of barracuda was similar to squid. The highest was observed in January 2006 with weight of 290 kg (fig. 16).

Landing weight of all pelagic species is varied. It can be none in some season while up to more than 900 kg, 300 kg and 800 kg per month for silver and black pomfret, yellow tail scad and hard tail scad respectively. Landing weight of demersal fish in Kuala Terieng is minor proportion of total landing. Many fisherman take all demersal fish that they catch for family consume (fig.17).

4. Discussion

Data of bottom long line is too low to see any trend. However, it may be a reference for further monitoring study. For the monitoring purpose of this study, only shrimp trammel net that data is enough to be monitor.

During the transition period from Northeast monsoon season to Southwest monsoon season (March to May) percent composition of shrimp and prawn lower than other month (fig 2). The average CPUE of shrimp and prawn from the shrimp trammel net in March to May 2006 are between 0.27 – 0.42 kg/net/trip which it is not difference from average CPUE of all data that are 0.36 kg/net/trip. Therefore, shrimp and prawn are abundance in the area for all year round. But percent composition of catch from shrimp trammel net is varied more on abundance variation of other catch than on abundance of itself (fig.6).

In dry season, most of fishermen in Kuala Terieng change fishing gear to be squid cast net using luring lamp, because squid is high abundant in that season (fig.15). However some fisherman continues using shrimp trammel net.

Average CPUE of shrimp trammel net in 2005 and 2006 was lower than in 2004 (fig 6). The total landing of shrimp and prawn that are target species of shrimp trammel net in 2005 and 2006 also lower than in 2004. Considering on recorded number shrimp trammel net (fig.5), it show that after Asian Tsunami in December 2004, fisherman in Kuala Terieng put more effort for shrimp trammel net which can be effect to the decreasing of CPUE. However, the recorded number in this study is need to be clarify that the increasing of recorded is come from the increasing of fisherman and effort of the village or more fisherman sale catch to our contact middle man because some of middle man stop their business after Tsunami.

Even through the decreasing of CPUE and total landing is indicated that the fishing ground of the village is in over fishing condition but the length distribution of greasy back shrimp and banana prawn show us opposite direction. Please note that the available length frequency data is not in monthly basic therefore, it is still in doubt that the length distribution is seasonally pattern or not. However, data that average length of target catch is not decrease yearly show that fishing ground of fisherman in Kuala Terieng is not over fishing yet.

5. Conclusions

Status of marine resource in the fishing ground of Kuala Terieng fisherman was monitoring through catch composition and catch per unit effort of shrimp trammel net , length frequency of shrimp trammel net target catch: greasy back shrimp, banana prawn, swimming crab and Indo-Pacific mackerel and total landing of fisherman in the village.

Three parameter of this study: CPUE, total landing and length frequency distribution of target catch of shrimp trammel net indicate different condition. CPUE and total landing indicated this resource is in over fishing condition while length distribution indicated opposite. Therefore, the resource is needed to be monitor continuously and good management of these resources is needed. The increasing of effort in should be more consider on it effect.

6. References

Chong, C.K. and Lee, Y.L.2006. Socioeconomic Assessment for Kubang Badak, Pulau Langkawi, Malaysia.

<http://www.nst.com.my/weekly/Travel/artical/FeatureStory/20050427133134>.

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7. Acknowledgement

Author would like to thank Mr. Azman Chepa, our contact middle man and enumerator for fisherman logbook and middle man logbook activity. We would also like to thank all fisherman in the village and Mr. Tan Bek Yeow, middle man for their kind cooperation during landing survey. Specially thank also goes to Mrs. Sabena Binti Saleh (Fisheries extension officer, Langkawi), this activity could not finish without her fully support.

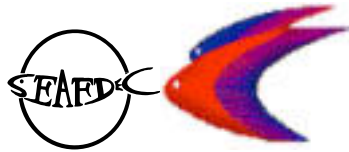
ANNEX I

CPUE of fishing gear in Kuala Terieng

Fishing gear	Month	CPUE			No. of records	Source of data
		Min	Max	Average		
Shrimp trammel net (kg/net/trip)	Jun04	0.18	7.96	2.47	15	landing
	Aug04	0.20	7.78	1.23	48	Logbook
	Sep04	0.20	2.96	1.19	48	Logbook
	Oct04	0.21	1.54	0.71	44	Logbook
	Nov04	0.40	5.67	1.77	24	Logbook
	Aug05	0.11	2.61	0.70	87	Logbook+landing
	Sep05	0.11	3.83	0.66	109	Logbook
	Oct05	0.10	3.83	0.52	111	Logbook
	Nov05	0.14	1.05	0.50	68	Logbook+landing
	Jan06	0.08	0.83	0.37	15	Logbook
	Feb06	0.12	0.98	0.50	101	Logbook
	Mar06	0.10	3.01	0.87	96	Logbook
	Apr06	0.08	2.93	0.76	102	Logbook
	May06	0.20	2.72	0.74	86	Logbook
	Jun06	0.09	1.22	0.46	72	Logbook
	Jul06	0.05	1.39	0.53	143	Logbook
	Aug06	0.10	0.92	0.36	74	Logbook
	Sep06	0.16	1.30	0.48	56	Logbook
	Oct06	0.08	1.96	0.48	64	Logbook
	Nov06	0.07	0.99	0.48	37	Logbook
Bottom vertical longline (kg/100 hooks/trip)	Jun04	3.07	3.24	3.15	2	landing
	Aug04	3.78	9.91	7.25	3	logbook
	Sep04	1.65	35.83	12.07	9	logbook
	Oct04	3.04	26.52	12.36	16	logbook
	Nov04	3.87	17.83	9.33	6	logbook
	Dec04	6.10	9.02	7.56	2	landing
	Jan06	4.50	10.83	8.19	7	logbook
	Feb06	2.17	9.41	5.79	2	logbook
	Apr06	5.78	25.27	13.17	6	logbook
	Pomfret gill net (kg/net/trip)	Apr06	-	-	0.60	1
May06		0.08	1.57	0.57	14	logbook
Feb06		0.24	0.46	0.35	2	logbook
Jan06		-	-	0.20	1	logbook
Fish gill net (kg/net/trip)	Jun04	2.86	6.58	4.44	3	Landing
	Nov06	1.11	14.38	5.87	4	logbook
	Apr06	0.84	4.13	2.23	6	logbook
	May06	0.40	18.38	7.80	21	logbook
	Jun06	2.64	12.22	6.00	10	logbook
	Jan06	-	-	2.75	1	logbook
Squid cast net (kg/trip)	Nov04	2.20	14.00	7.02	9	landing
	Dec04	12.50	25.00	18.11	10	logbook
Crab gill net (kg/net/trip)	Jun04	0.27	2.59	1.13	3	landing

Local name	Common name	Size	Purchased(kg)	Unit price(RM)	Paid(RM)
Alu/Kacang	Baracuda				
Ayu/Kayu/Tongkol	Kawakawa				
Bawal hitam	Black pomfret	Large			
		Small			
Bawal putin	Siver pomfret	Large			
		Small			
Belanak/Kedera	Siver mullet				
Cincaru	Hardtail scad				
Daun Baharu	Grouper				
Kerapu	Grouper				
Duri/Pulutan/Utik	Cat fish				
Gelama/Tangkerong	Croaker/Jew fish				
Kebashi/selangat	Gizzard shad				
	Indo-pacific				
Kembong Tammanu	mackerel				
Kembong Borek	Indian mackerel				
Kerishi	Treadfin bream				
Pelar/Selar	Yellow scad				
Puput/B.mata/Tirok	Slender shad(Ilisha)				
Sebelah	Flounder				
Senanging	Fourfinger Treadfin				
Siakap Merah	Red snapper				
	Leather				
Talang	skin(Needle scales queenfish)				
Tanggiri	Spanish mackeral				
Gerpuh	white travelly				
Gerut	Grunt				
Tanda/Tuat	Yellow streaked snapper				
Loban	Squairetail mullet				
Jayes	mullet				
Putung Damar	Silago				
Kapas	Silver biddy				
yu	shark				
Pari	Ray				
Ikan ampur	Misc. small fish				

ANNEX IV



Questionnaire for Marine resources Monitoring Survey in Langkawi

Date.....

1. Fishing port.....
2. Owner' name.....
 Size of fishing boat: length.....meters
 Fishing engine brand.....
 Horse power..... Inboard Outboard
3. Type of Fishing gear Shrimp trammel net Fish gillnet crab gill net
 Other.....
4. Number of fishing gear.....pcs. Length/each.....m total net
 length.....m
 How long it used..... mesh
 size.....mm/cm/inch
5. Fishing ground..... Distance from shore.....m.
 Sea water depth.....m
 Start shooting..... hrs. Finish shooting.....hrs.,
 Start hauling.....hrs. Finish hauling.....hrs.
6. Total catch.....kg.

Fish	Weight (kg)	Shrimp	Weight (kg)	Other	Weight (kg)

7. Selling to.....
8. Notes:.....

