Preliminary Results on

Catch Composition and the Length Frequency Distribution of Indian Squid (*Loligo duvauceli*) from Squid Cast Nets in the Coastal Area of Pakklong Sub-District

Southeast Asian Fisheries Development Center

Department of Fisheries, Thailand

TD/RES/76

LBCRM-PD No. 16

January 2003

Preliminary Results on Catch Composition and the Length Frequency Distribution of Indian Squid (*Loligo duvauceli*) from Squid Cast Nets in the Coastal Area of Pakklong Sub-District

By

Pattarajit Kaewnuratchadasorn
Phamornpan Auiprasit
Khunruthai Chaikaew
Boonyarith Charoensombat
Chaiyan Khae-Yai

Collaborative project between
Southeast Asian Fisheries Development Center
and Department of Fisheries, Thailand

TD/RES/76
LBCRM-PD No.16 January 2003

Preliminary Results on Catch Composition and the Length Frequency Distribution of Indian Squid (*Loligo duvauceli*) from Squid Cast Nets in the Coastal Area of Pakklong Sub-District

By

Pattarajit Kaewnuratchadasorn
Phamornpan Auiprasit
Khunruthai Chaikaew
Boonyarith Charoensombat
Chaiyan Khae-Yai

Collaborative project between
Southeast Asian Fisheries Development Center
and Department of Fisheries, Thailand

TD/RES/76

LBCRM-PD No.16 January 2003

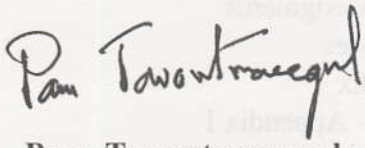
Preliminary Results on Catch Composition and the Length Frequency Distribution of Indian Squid (*Loligo duvauceli*) from Squid Cast Nets in the Coastal Area of Pakklong Sub-District

ISBN : 974-9509-31-5

FOREWORD

Under the Fisheries Consultative Group (FCG) scheme, SEAFDEC/TD and the Department of Fisheries (DOF) has planned and implemented a joint involvement in "Locally Based Coastal Resource Management, Pathew District, Chumporn Province (LBCRM-PD)". This project has the objective of enhancing the people's awareness on the sustainable use of coastal resource management and to develop an effective management framework at the project site.

To lead to the outstanding success of the project activities, the project continues to conduct a base line survey including the distribution and abundance of marine resources aspect. This volume is the result of a part of base line surveys in marine resource study that have been carried out since February 2002. I hope that these survey results will be of great use, not only for Thai coastal fisheries development, but also for other member countries of SEAFDEC-ASEAN.



Panu Tavarutmaneegul
Secretary General

Contents

List of Figures

List of Tables

List of Appendix

Preliminary Results on Catch Composition and the Length Frequency Distrbution of Indian Squid (*Loligo duvauceli*) from Squid Cast Nets in the Coastal Area of Pakklong Sub-District

Pattarajit Kaewnuratchadasorn[1]
Phamornpan Auiprasit[2]
Khunruthai Chaikaew[2]
Boonyarith Charoensombat[2]
Chaiyan Khae-yai[2]

[1]SEAFDEC/Training Department, P.O. Box 97, Phrasamutchedi, Samutprakan 10290
[2]Chumporn Marine Fisheries Development Center, Department of Fisheries, Thailand

Abstract

Indian squid, *Loligo duvauceli,* is an important commercially marine resource commonly found in the Pakklong sub-district coastal area. Squid cast net fishing boats are normally operated all year round. A survey has been conducted every month at the landing sites in the Pakklong sub-district since February 2002. This report presents the preliminary results on catch composition and the length frequency distribution of *Loligo duvauceli* between February and September 2002. The catch composition of the squid cast nets was composed mainly of *Loligo duvauceli* at 96.509 %, followed by pelagic fish at 2.539 %, *L. chinensis* at 0.446 % , *Sepioteuthis lessoniana* at 0.298%, *Sepia* spp. at 0.122 %, demersal fish at 0.084 % and shrimp at 0.002%. The length frequency distribution of *Loligo duvauceli* ranged from 2.5-22.5 cm.

Keywords: Indian squid, squid cast net, catch composition, length frequency distribution

Introduction

Squid is a common marine resource which is popular and in demand in the market and is an important species for commercial fisheries. There is a continued and increasing demand for squid products for both local and export consumption. They are part of the important commercially family of *Loliginidae*, which are often caught by trawling. In past taxonomic work, the squids in Thai waters (both in the Gulf of Thailand and Andaman Sea) consisted of nine species of *loligonid* squid and three other species of squid (Nateewathana, 1992). Between 1996-1998, the trend of squid catch had increased. Based upon fisheries statistics in 1998 (Department of Fisheries, 2001), the total catch of cephalods in the Gulf of Thailand were 130,554 tons, mainly composed of squid 68,788 tons, *Sepia* spp. 44,847 tons, *Octopus* 13,012 tons and cuttlefish 3,907 tons.

Indian squid (*Loligo duvauceli*), a neritic, inshore species, are widely distributed along the coasts of the Gulf of Thailand and the Andaman Sea, and are one of the target species of Thai commercial fisheries. Supongpan(1984) reported that *Loligo duvauceli* was abundant in Prachuap Kirikhun, Chumporn and Suratthani. Their spawning season occurs throughout the year and are exploited mainly by artisanal subsistence fisheries. In the Gulf of Thailand, it is one of the target species of the trawl and squid cast nets with luring lights (Carpenter and Niem,1998). Supongpan (1995) reported that the maximum abundance of this species is divided into 2 periods during a year, January-April and June-September. They are distributed along the coast of the Gulf of Thailand. Rungratree (1989) reported that the spawning season of *Loligo duvauceli* in the eastern coast of the Gulf of Thailand is throughout the year, with peaks occurring in March, May, August and October.

The Pakklong sub-district coastal area, Pathew District, is located in the central part of the Gulf of Thailand where mainly traditional fishing gear like squid cast net, anchovy purse seine and gill net are used. The main marine resources are squid, fish, shrimp and crab, etc. The Indian squid, *Loligo duvauceli*, is one of the commercial resource mainly caught by the squid cast net, especially in Moo (village)1 (Thung Maha) and Moo 6 (Bon Rai). The squid cast net can be operated all year round and can catch large amount of squid. Therefore, squid has become an important fish product accruing high value. Previously, Supongpan (1996) reported that the species composition of squid that are caught by squid cast nets with luring lights in Chumporn Province (Lang Suan landing place), are the Indian squid, *Loligo duvauceli* 96.8 %, *S. lessoniana* 2.1 % and *L. sumatrensis* 1.1%. The sizes of *L. duvauceli* range from 3.5-26.1 cm.

Under the Locally Based Coastal Resources Management, Pathew District, Chumporn Province (LBCRM-PD), the project continues to conduct a baseline survey including a marine resources survey. Information on the biology of *Loligo duvauceli* in this area is scanty. A survey of *Loligo duvauceli* will provide the basic data on the biological information in this area allowing management of the resource in the future.

The objective of this report is to present the progress results on catch composition and length frequency distribution of *Loligo duvauceli* from the squid cast nets in Pathew District for further study in the future.

Materials and Methods

A landing survey has been conducted each month covering Pakklong sub-district, Chumporn province. (Fig.1). Data were collected from squid cast net fishing boats (Fig.2) landing their catches at the 6 landing sites at Pakklong sub-district during February to September 2002. Fish samples were measured for length individually and the total weight by each species for catch composition and CPUE study were recorded. The catch composition will be studied by the analysis of varience (ANOVA-single factor) at a level of 0.05 significance. Catch and effort data were collected each month by observing the total catch at each trip. Fishing effort was recorded in the number of operations in each trip. The Catch per Unit Effort was calculated from the available data.

CPUE= Catch in kilograms/Effort in operations.

Simultaneously, data on Indian squid, *Loligo duvauceli*, were recorded for length frequency distribution studies (Fig.3). A total of 1,366 fresh samples of *Loligo duvauceli* were measured. The mantle length was measured in centrimeters and the total weight in kilograms.

Also, an interview form is used for collecting some additional information including fishing vessel, fishing ground and fishing operation.

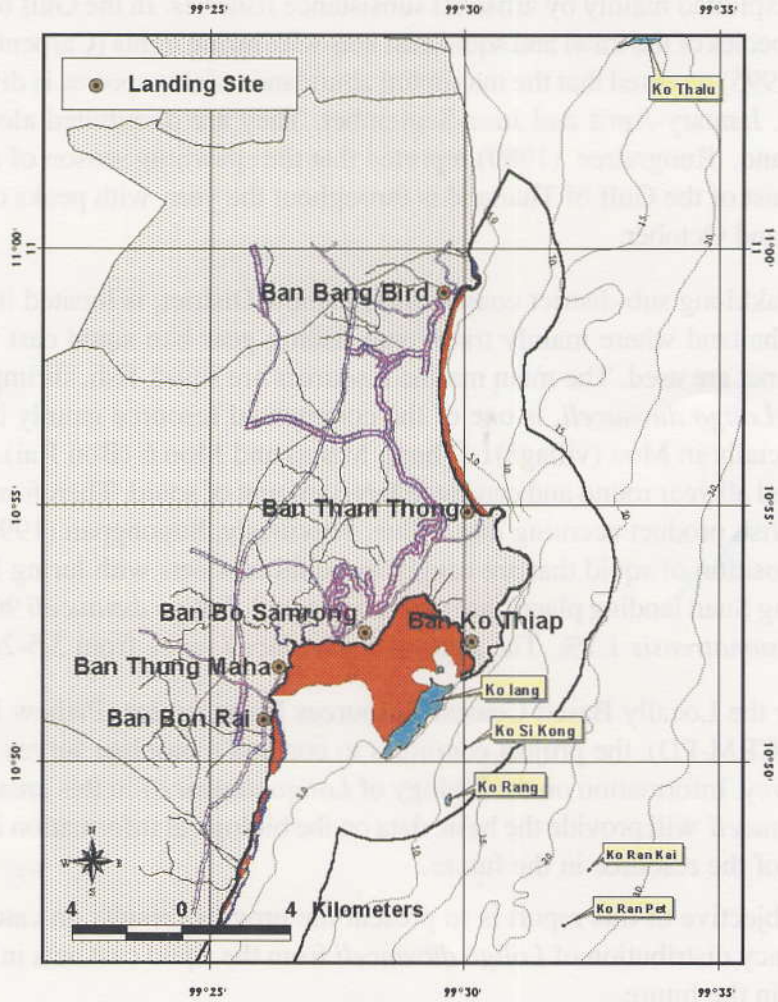


Fig.1 Landing sites in Pakklong sub-district.

Fig.2 Squid cast net fishing boats.

Fig.3 Indian squid, *Loligo duvauceli*.

Results and Discussions

Catch Composition

Fish samples have been collected as marine resource data in Pakklong sub-district, starting in February and continuing until September 2002. From the survey, squid cast net fishing in Pakklong sub-district is mainly landed at Moo1 (Thung Maha) and Moo 6 (Bon Rai). There were forty-seven trips using squid cast net. The sampling total catch was 1,693.15 kg, consisting of two types of *Loligo* sp., Bigfin reef squid, three species of cuttlefish and six families of pelagic and demersal fishes. It was found that *Loligo duvauceli* was the main target species for the squid cast nets. A list of fishes is shown in Table 1. The results of the statistical analysis (ANOVA) at the level of 0.05 significance indicated that the indifferent mean of the total squid catch among the trips was the same, but the fish composition differed significantly.

During February to September 2002, the overall catch composition was dominated by *Loligo duvauceli* at 96.509 %, followed by pelagic fish at 2.539 %, *L. chinensis* at 0.446 % , *Sepioteuthis lessoniana* at 0.298%, *Sepia* spp. at 0.122 %, demersal fish at 0.084 % and shrimp at 0.002% (Fig.4, Appendix I). The monthly catch composition of the squid cast nets is shown in Fig. 5. It was observed that *L. duvauceli* was prevalent throughout every month ranging from 69-100 % while other species were in lesser quantity. However, the result of the 100 percentage of *L. duvauceli* in May, August and September it could not be indicated that during those months caught only squids, it might be sorted out onboard before landed.

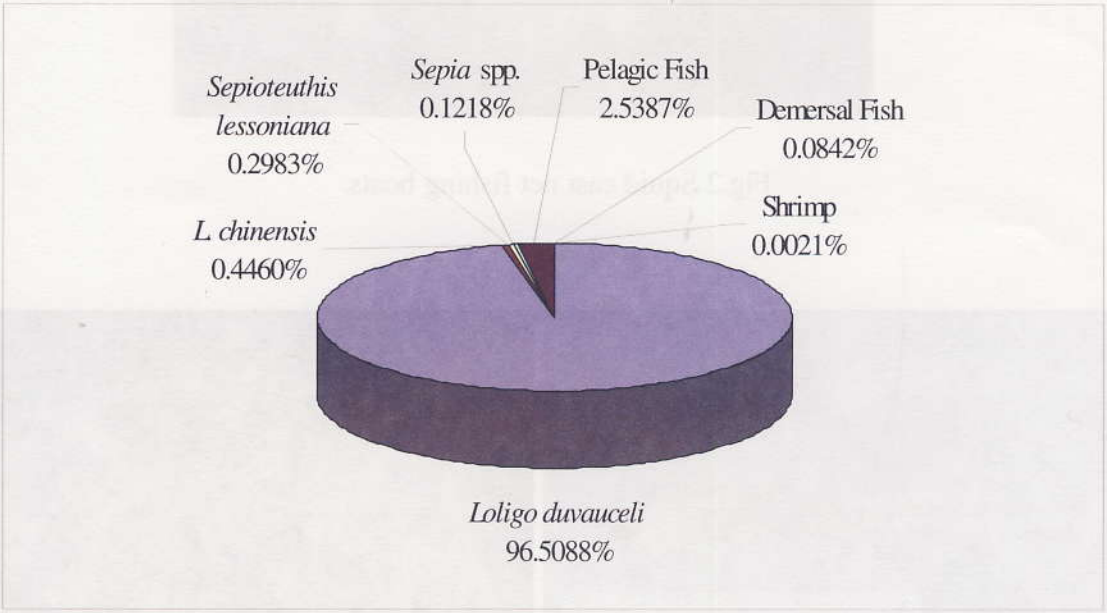


Fig.4 The overall catch composition of squid cast net from February-September 2002.

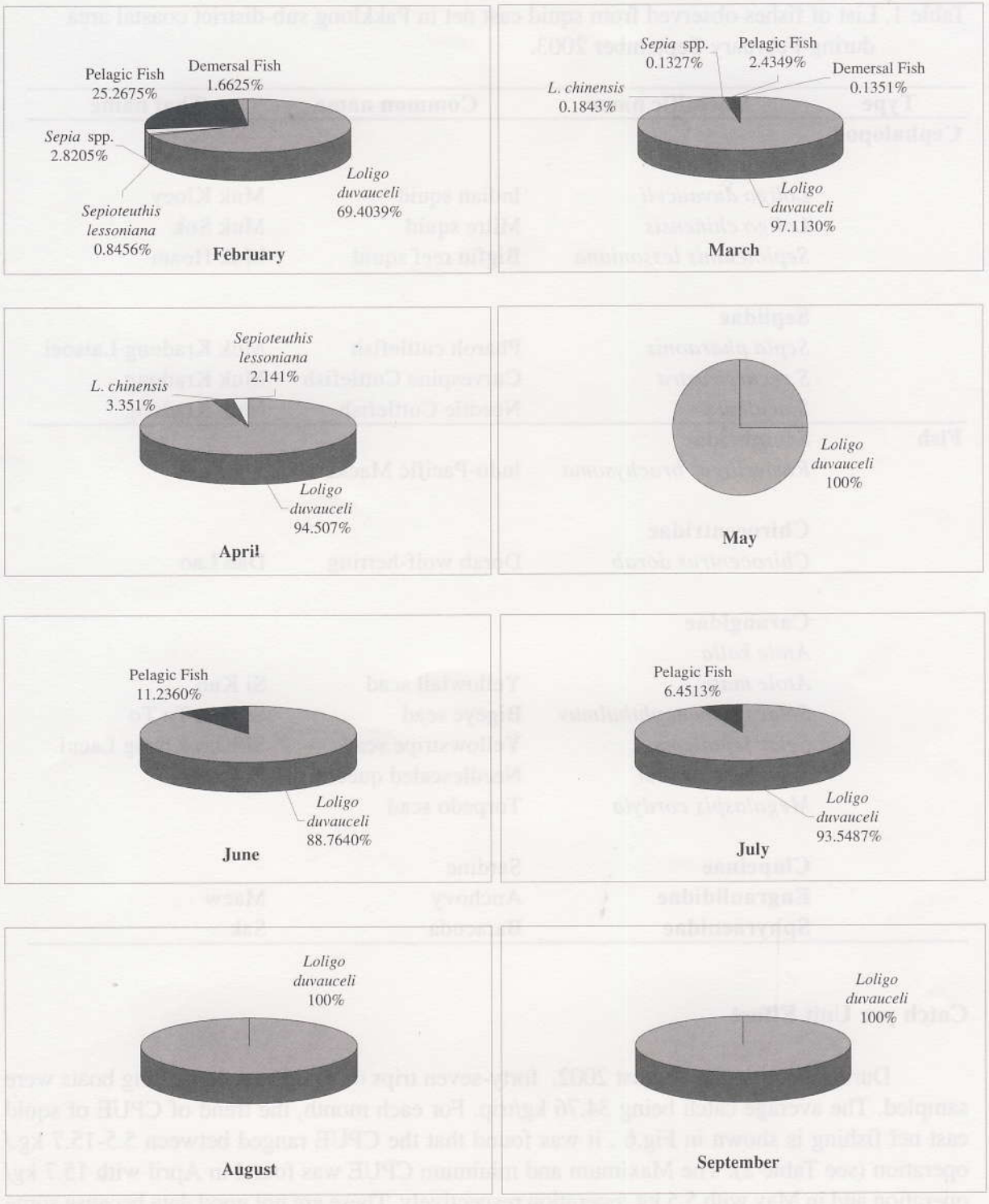


Fig.5 Catch composition of squid cast net by month

Table 1. List of fishes observed from squid cast net in Pakklong sub-district coastal area during February-September 2003.

Type	Scientific name	Common name	Thai name
Cephalopod			
	Loliginidae		
	Loligo duvauceli	Indian squid	Muk Kloey
	Loligo chinensis	Mitre squid	Muk Sok
	Sepioteuthis lessoniana	Bigfin reef squid	Muk Hoam
	Sepiidae		
	Sepia pharaonis	Pharoh cuttlefish	Muk Kradong Laisoei
	S.recurvirostra	Curvespine Cuttlefish	Muk Kradong
	S.aculeata	Needtle Cuttlefish	Muk Kradong
Fish	**Scombridae**		
	Rastrelliger brachysoma	Indo-Pacific Mackerel	Too
	Chirocentridae		
	Chirocentrus dorab	Dorab wolf-herring	Dab Lao
	Carangidae		
	Atole kalla		
	Atole mate	Yellowtail scad	Si Kun
	Selar crumenophthalmus	Bigeye scad	Si Kun Ta To
	Selar leptolepis	Yellowstripe scad	Si Kun Khang Laeui
	Scomberoides tol	Needlescaled queenfish	Si Saed
	Megalaspis cordyla	Torpedo scad	
	Clupeinae	Sardine	
	Engraulididae	Anchovy	Maew
	Sphyraenidae	Baracuda	Sak

Catch per Unit Effort

During February to August 2002, forty-seven trips of squid cast net fishing boats were sampled. The average catch being 34.76 kg/trip. For each month, the trend of CPUE of squid cast net fishing is shown in Fig.6 , it was found that the CPUE ranged between 5.5-15.7 kg./ operation (see Table 2). The Maximum and minimum CPUE was found in April with 15.7 kg/ operation and in May with 5.5 kg./operation respectively. These are not good data because some was lost e.g. the number of operations at each trip during some months. Therefore, the analysis is conducted from the data collected from some trips with completed data.

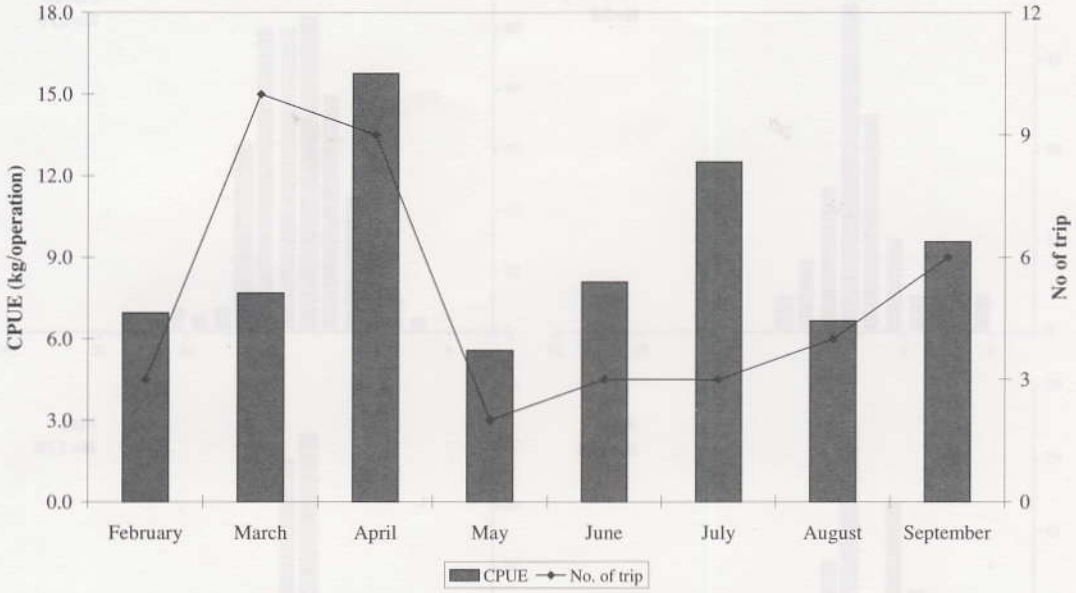


Fig.6 Comparison between catch rate (kg/operation) and number of fishing trips by squid cast net.

Table 2. Catch results of squid cast net in Pakklong sub-district coastal area during February-September 2003.

Month	No. of trip	Total catch (kg)	No. of operation	CPUE (kg/operation)
February	3	55.700	8	6.963
March	10	346.000	45	7.689
April	9	205.000	13	15.769
May	2	33.450	6	5.575
June	3	89.000	11	8.091
July	3	150.000	12	12.500
August	4	160.000	24	6.667
September	6	335.000	35	9.571

Length Frequency Distribution

The length distribution of Indian squid, *Loligo duvauceli*, by month are given in Fig.7 As the results indicate, it was found that the size of indian squid range widely from 2.5-21.5 cm from February to September 2002, but in August, it was found that there were only small sizes of less than 8.0 cm (Appendix II). The average size covered between the overall mantle length distribution of indian squid is shown in Fig.8 , a total of 1,366 specimens recorded indicate that the mantle length ranged between 2.5-21.5 cm with a mean length of 9.88±3.29 cm.

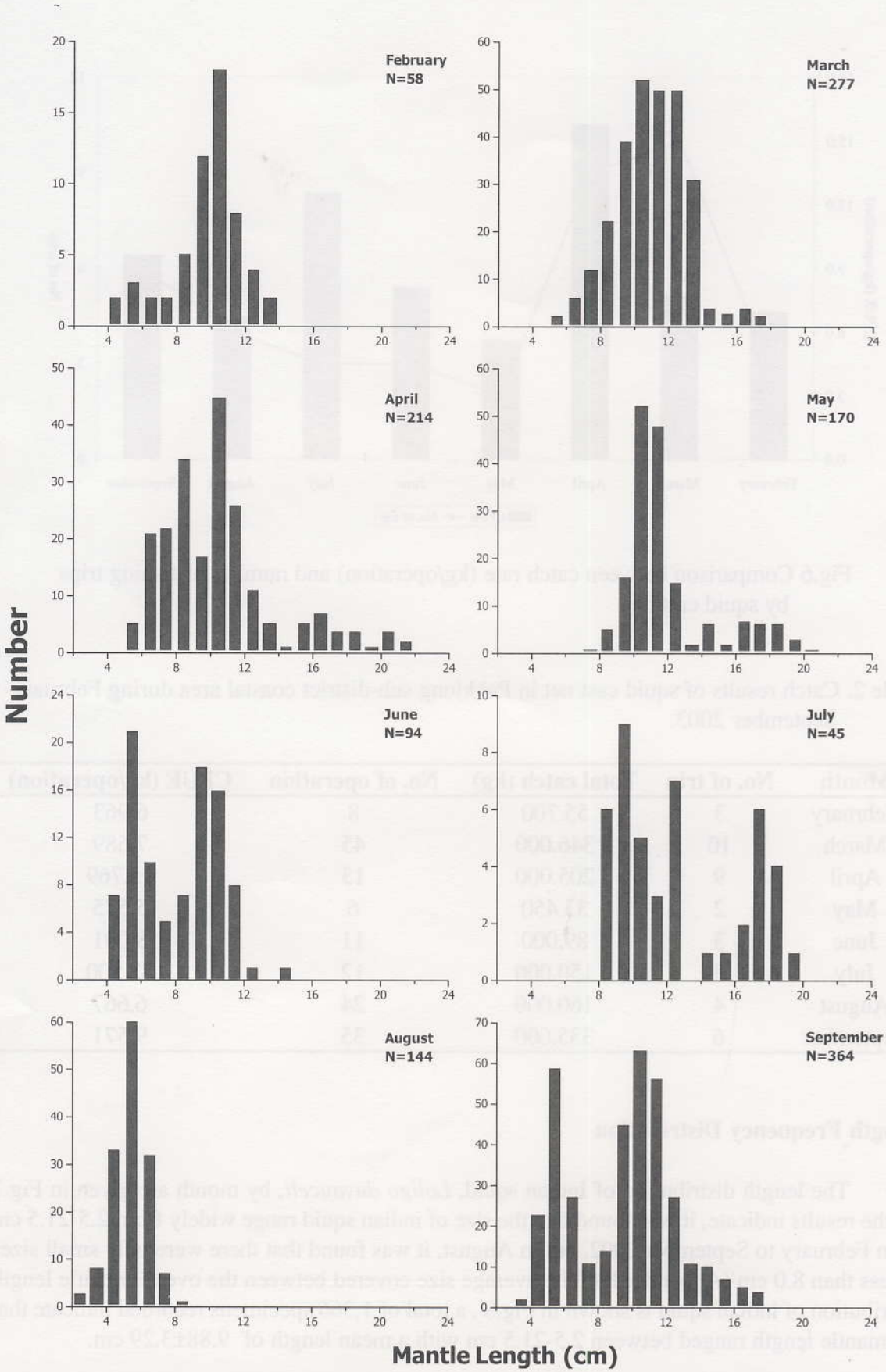


Fig.7 Mantle Length distribution of *Loligo duvauceli* from February-September 2002 in Pakklong sub-district.

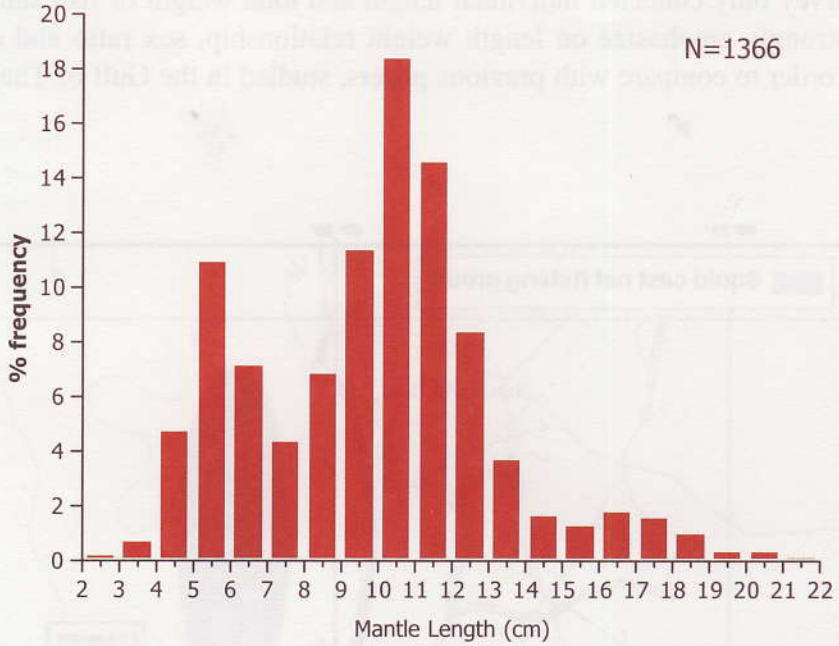


Fig.8 Overall mantle length distribution of Indian squid, *Loligo duvauceli* from February-September 2002.

Fishing ground

It was found that most of fishing boats in this area are traditional fishing boats and that the fishing grounds for squid cast net are at Ko Wiang , Ko Rang Nok, Ko Si Kong, Ao Thung Maha and Bang Bird at a depth of 10-20 meters (see Fig.9). The operational period is at night time during the period of the waning phase of the moon, about 20- 24 days in each month and could be conducted throughout the year.

Conclusions

The Indian squid, *Loligo duvauceli* were dominantly presented by squid cast net in Pakklong sub-district coastal area, espectially in Moo 1 (Thung Maha) and Moo 6 (Bon Rai). Squid can be used as fresh squid and dried squid. It was found frequently that after back from the sea, squid was processed as dried squid in order to increase the value of squid, most of fishermen process squid before selling (Laowapong and Yamao,2002) (Fig.10). Moreover, dried squid plays an important fish product in this area. The great quantity of dried squid has been found in Moo 1 (Thung Maha) and Moo 6 (Bon Rai).Therefore, indian squids are very interesting marine resource and high utilization in this area.

From February-September 2002, the catch composition of the squid cast nets in this area was composed mainly of *Loligo duvauceli* at 96.509 %, followed by pelagic fish at 2.539 %, *L. chinensis* at 0.446 % , *Sepioteuthis lessoniana* at 0.298%, *Sepia* spp. at 0.122 %, demersal fish at 0.084 % and shrimp at 0.002%. The length frequency distribution of *Loligo duvauceli* ranged from 2.5-22.5 cm. The dominant size of this species is 10-11 cm.

This survey only collected individual length and total weight of fish samples. Future study should strongly emphasize on length weight relationship, sex ratio and other biology information in order to compare with previous papers, studied in the Gulf of Thailand.

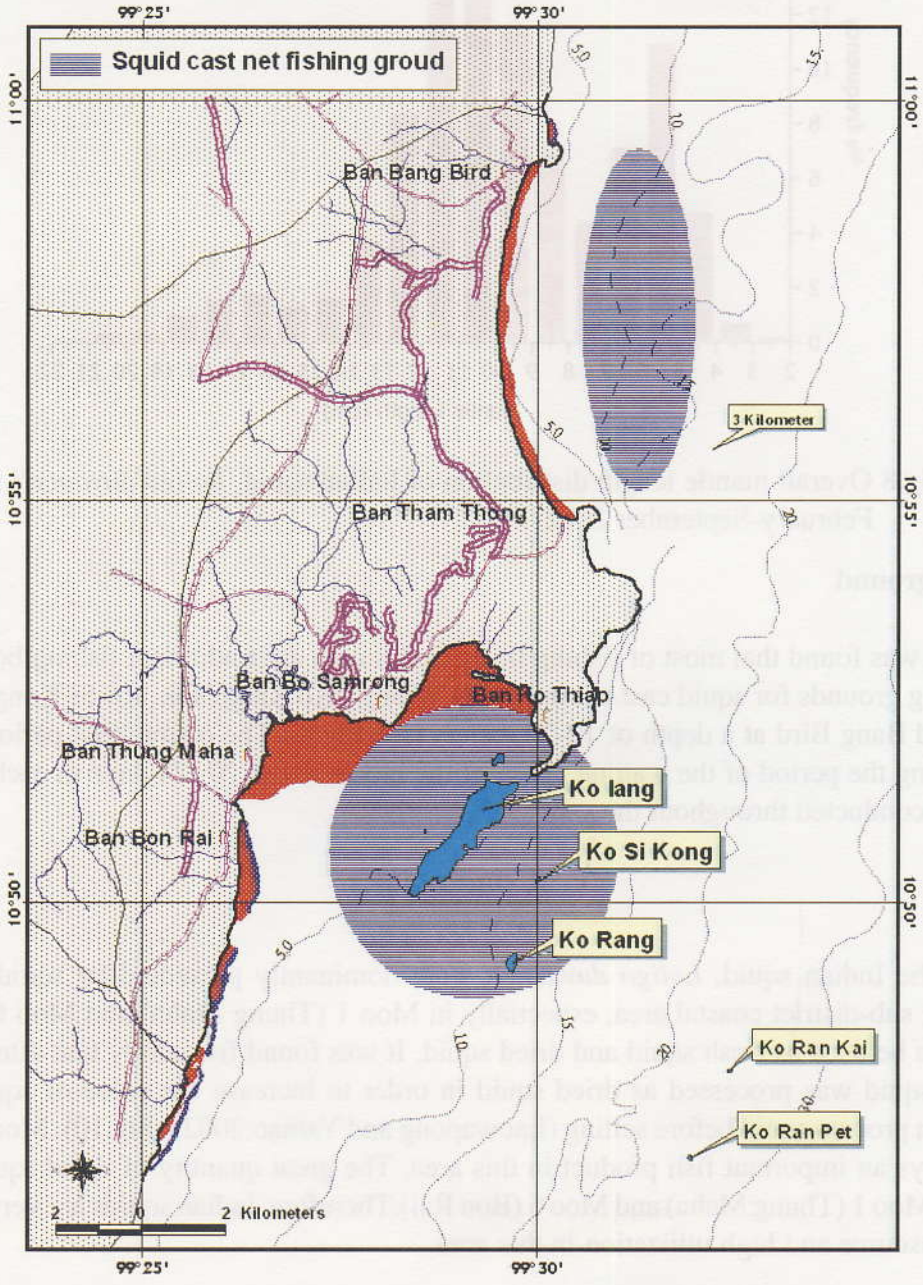


Fig.9 Squid cast net fishing ground in Pakklong coastal area from February-September 2002.

Fig.10 (a),(b) *Loligo duvauceli* samplings from squid cast net fishing boats at Pakklong sub-district from February-September 2002. (c)-(f) Dried squid processing .

Acknowledgments

The authers would like to thank the Secretary General of SEAFDEC and Dr. Somboon Siriraksophon for supporting the research. We wish to thank Mr. Aussanee Munprasit, Ms. Penchan Laongmanee and Ms. Anyanee Yamrungreung for their advice and comments. We are grateful to Mr. Suriyo Nhukrin for his kindly assist. Also thanks to Mr. Apiwat Thummakasorn and Mr. W.R.B. Elstow for critically editing the manuscript.

References

Carpenter E. K. and Niem H. V. 1998. FAO Species identification guide for fishery purposes. The living marine resources of the Western Central Pacific Vol.2 Cephalopods, crustaceans, holothurians and sharks. 1396 pp.

Laowapong A. and Masahiro Yamao.2002.Marketing and utilization of Fish products in Tambol Pakklong, Pathew district, Chumporn province. Southeast Asian Fisheries Development Center (TD/RES/58). 41 pp.

Department of Fisheries.2001. Marine Fisheries Statistics. Fishieres Economics Divsion, Department of Fisheries.

Nateewathana, A. 1992. Taxonomic studies on loligonid squids (Cephalopa: Loligonidae) from the Andaman Sea coast of Thailand. Phuket Mar. Biol. Center Res. Bull. 57:1-40.

Rungratree, M. 1989. Study on spawning seasons and some biological aspects of *Loligo duvauceli* Orbigny and *Loligo chinensis* Gray along the Eastern Coast of the Gulf of Thailand. Tech. paper no. 20, Marine Fisheries Division, Department of Fisheries.15 pp.

Supongpan, M. 1984. The Cephalopods Fisheries and resources in the Gulf of Thailand. Marine Fisheries Division, Department of Fisheries. Seminar paper 4-7 September. 8 pp. (Thai version)

Supongpan, M. 1995. Cephalopods resource in the Gulf of Thailand. Coastal Aquaculture Division, Department of Fisheries. Contribution No.17. 30 pp.

Supongpan, M. 1996. The fisheries biology of Indian squid (*Loligo duvauceli*) in West Coast of the Gulf of Thailand (Thesis). Nagasaki University, Japan. 132 pp.

Appendix

Appendix I.The Catch (kg) in each trip from squid cast net fishing boats in Pakklong sub-district.

Date-survey	No. of operation	Total Catch	Cephalod weight	*L. duvauceli*	*L. chinensis*	*S. lessoniana*	*Sepia spp.*	Pelagic Fish	Demersal Fish	Shrimp
7 Feb 02	1	9.9	9.9	9.429	0	0.471	0	0	0	0
7 Feb 02	3	25	25	25	0	0	0	0	0	0
7 Feb 02	4	20.8	5.8	4.229	0	0	1.571	14.074	0.926	0
27 Mar 02	10	50	50	50	0	0	0	0	0	0
27 Mar 02	8	30	30	30	0	0	0	0	0	0
27 Mar 02	3	35	25.491	25	0	0	0.491	9.009	0.5	0
27 Mar 02	4	31	31	31	0	0	0	0	0	0
27 Mar 02	8	40	40	39.318	0.682	0	0	0	0	0
27 Mar 02	4	20	20	20	0	0	0	0	0	0
27 Mar 02	4	20	20	20	0	0	0	0	0	0
27 Mar 02	8	120	120	120	0	0	0	0	0	0
28 Mar 02	4	8	8	8	0	0	0	0	0	0
28 Mar 02	4	16	16	16	0	0	0	0	0	0
24 Apr 02	6	25	25	25	0	0	0	0	0	0
24 Apr 02	6	25	25	19.915	5.085	0	0	0	0	0
25 Apr 02	6	30	30	30	0	0	0	0	0	0
25 Apr 02	6	30	30	30	0	0	0	0	0	0
25 Apr 02	1	5	5	5	0	0	0	0	0	0
25 Apr 02	6	20	20	18.215	1.785	0	0	0	0	0
25 Apr 02	6	20	20	20	0	0	0	0	0	0
25 Apr 02	6	30	30	30	0	0	0	0	0	0
25 Apr 02	6	20	20	15.61	0	4.39	0	0	0	0
30 May 02	-	80	80	80	0	0	0	0	0	0
30 May 02	-	31	31	31	0	0	0	0	0	0
30 May 02	-	80	80	80	0	0	0	0	0	0
30 May 02	4	15.45	15.19	15	0	0.19	0	0.224	0	0.036
30 May 02	2	18	18	18	0	0	0	0	0	0
30 May 02	-	16	16	16	0	0	0	0	0	0
31 May 02	-	20	20	20	0	0	0	0	0	0
31 May 02	-	30	30	30	0	0	0	0	0	0

Appendix I. (cont") The Catch (kg) in each trip from squid cast net fishing boats in Pakklong sub-district.

Date-survey	No. of operation	Total Catch	Cephalod weight	*L. duvauceli*	*L. chinensis*	*S. lessoniana*	*Sepia spp.*	Pelagic Fish	Demersal Fish	Shrimp
31 May 02	-	38	38	38	0	0	0	0	0	0
29 Jun 02	5	40	30	30	0	0	0	10	0	0
29 Jun 02	1	19	19	19	0	0	0	0	0	0
29 Jun 02	5	30	30	30	0	0	0	0	0	0
1 Aug 02	4	50	40.323	40.323	0	0	0	9.677	0	0
1 Aug 02	4	30	30	30	0	0	0	0	0	0
1 Aug 02	4	70	70	70	0	0	0	0	0	0
28 Aug 02	6	40	40	40	0	0	0	0	0	0
28 Aug 02	6	30	30	30	0	0	0	0	0	0
28 Aug 02	6	50	50	50	0	0	0	0	0	0
28 Aug 02	6	40	40	40	0	0	0	0	0	0
17 Sep 02	5	50	50	50	0	0	0	0	0	0
17 Sep 02	5	50	50	50	0	0	0	0	0	0
18 Sep 02	10	100	100	100	0	0	0	0	0	0
19 Sep 02	2	15	15	15	0	0	0	0	0	0
19 Sep 02	5	50	50	50	0	0	0	0	0	0
19 Sep 02	8	70	70	70	0	0	0	0	0	0

Appendix II. Number of indian squid samples, *Loligo duvauceli* from squid cast net fishing boats at Pakklong sub-district from February-September 2002.

MP (cm)	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
2.5							3		3
3.5							8	2	10
4.5	2				7		33	23	65
5.5	3	2	5		21		60	59	150
6.5	2	6	21		10		32	27	98
7.5	2	12	22	1	5		7	11	60
8.5	5	22	34	5	7	6	1	14	94
9.5	12	39	17	16	18	9		45	156
10.5	18	52	45	52	16	5		63	251
11.5	8	50	26	48	8	3		56	199
12.5	4	50	11	15	1	7		27	115
13.5	2	31	5	2	0	0		11	51
14.5		4	1	6	1	1		10	23
15.5		3	5	2		1		7	18
16.5		4	7	7		2		5	25
17.5		2	4	6		6		4	22
18.5			4	6		4			14
19.5			1	3		1			5
20.5			4	1					5
21.5			2						2
									1366