

## 6. THE SPECIES AND SIZE COMPOSITION OF ANCHOVY CAUGHT

### 6.1 Species composition

At present, three major species namely, *E. heteroloba*, *E. devisi* and *E. punctifer*, constitute 80-90% of the anchovy catches (Chaitiumvong, 1999). Each type of fishing gear catches anchovy in a different species composition as shown in Table 13 (composition by weight) and Table 14 (composition by numbers).

**Table 13. Species composition by weight of anchovy caught by different gears in the year 1997 (Chaitiumvong, 1999)**

Gear type	Species composition	Percent by weight	Size range (TL,cm)	Most abundant size	Water depth (m)	Province
FNL	<i>E. devisi</i>	42.5	3.2-7.7	4.0-4.9	6-18	Prachuab Kiri Khan
	<i>E. heteroloba</i>	23.4	3.6-8.4	7.0-7.9		
	<i>E. punctifer</i>	1.2	3.6-5.8	4.0-4.9		
	Saimai(juvenile <i>Encrasicholina</i> )	21.9	1.9-3.7	2.0-2.9		
	Species mix of <i>S. andhraensis</i> <i>S. indicus</i> <i>S. waitei</i>	11.0				
LNL	<i>E. heteroloba</i>	46.0	6.4-8.6	7.0-7.9	30-52	Cholburi
	<i>E. punctifer</i>	54.0	5.8-9.0	6.0-6.9		
APSL	<i>E. heteroloba</i>	78.55	6.9-10.3	7.0-7.9	25-48	Prachuab Kiri Khan
	<i>E. punctifer</i>	21.45	4.1-8.4	5.0-5.9		

**Table 14. The species composition by number of anchovy caught by different gears in the year 1997 (Chaitiumvong, 1999)**

Gear type	Species composition	Percent by number	Size range (TL,cm)	Abundant size	Water depth (m)	Province
FNL	<i>E. devisi</i>	35.2	3.2-7.7	4.0-4.9	6-18	Prachuab Kiri Khan
	<i>E. heteroloba</i>	18.6	3.6-8.4	7.0-7.9		
	<i>E. punctifer</i>	4.3	3.6-5.8	4.0-4.9		
	Saimai(juvenile <i>Encrasicholina</i> )	35.5	1.9-3.7	2.0-2.9		
	<i>S. andhraensis</i>	3.7				
	<i>S. indicus</i>	0.1				
	<i>S. waitei</i>	2.6				
LNL	<i>E. heteroloba</i>	44.5	6.4-8.6	7.0-7.9	30-52	Cholburi
	<i>E. punctifer</i>	55.5	5.8-9.0	6.0-6.9		
APSL	<i>E. heteroloba</i>	91.4	6.9-10.3	7.0-7.9	25-48	Prachuab Kiri Khan
	<i>E. punctifer</i>	8.6	4.1-8.4	5.0-5.9		

## 6.2 Size composition by gear

The size composition of anchovy in the catches is dependent on the location, depth and type of fishing gear used. The size range for all gears and all species is 1.2-10.3cm, while the most frequent sizes are 3.5-8.0 cm.

The anchovy size range caught by APS in the year 1971 was 3.0-9.0cm. The size range caught by bamboo stake traps in 1972 was 3.0–8.5cm (Fig. 19 ). In 1992-1993 and 1997, the LNL caught the size ranges 3.2-9.2cm and 3.5-8.5cm respectively (Fig. 20). In the years 1994-1995 and 1997, the FNL caught size ranges 2.0-9.8cm and 1.5-8.0cm respectively (Fig. 21). At present, it is noticeable that the size range is wider than previously.

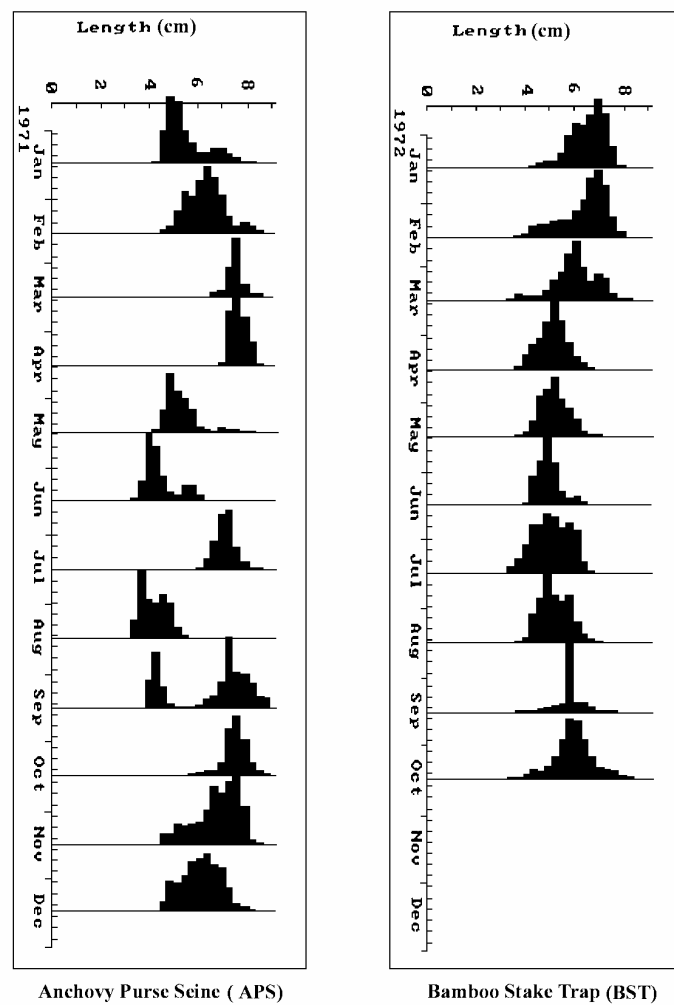
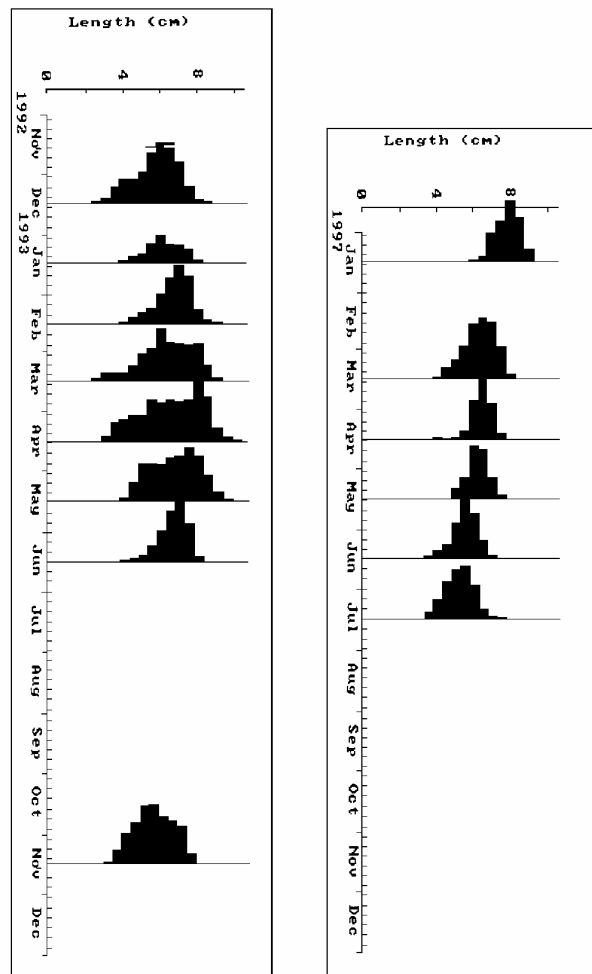


Fig. 19. Size distribution of anchovy caught by APS and BST in 1971 and 1972



Lift net with light luring (LNL) Lift net with light luring (LNL)

Fig. 20. Size distributions of anchovy caught by LNL in 1992-1993 (left) and 1997 (right)

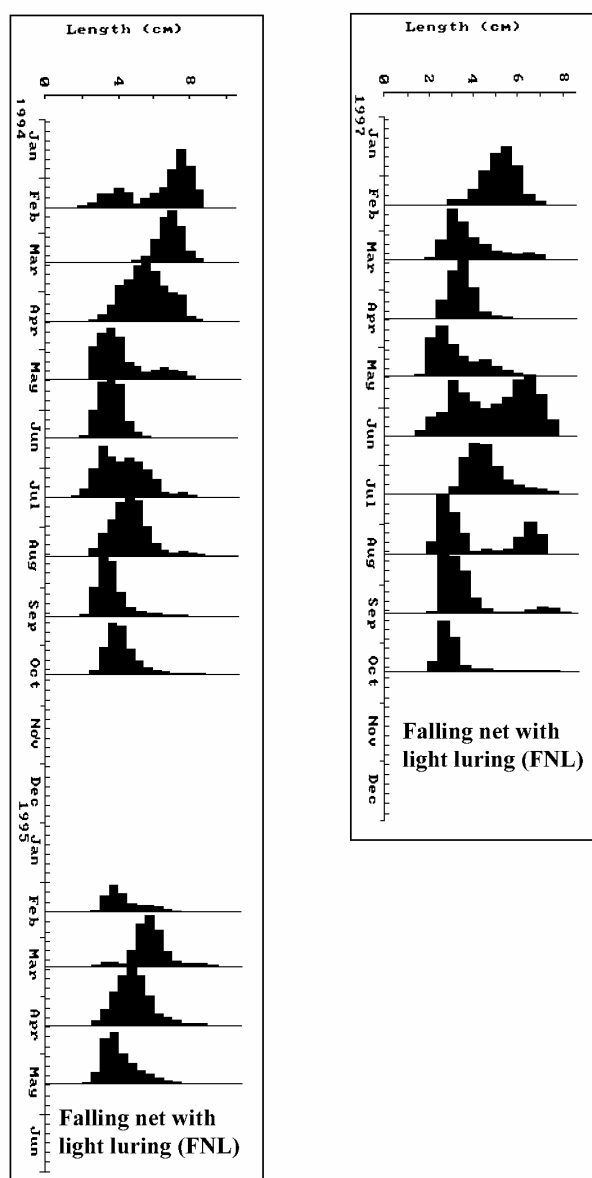


Fig. 21. Size distributions of anchovy caught by FNL in 1994-1995 (left) and 1997 (right)

### 6.3 Catch composition by type of fishing gear and fishing zone

#### 6.3.1 Catch composition of day time anchovy purse seine (APS)

The range of total catches of APS large-sized boat (LOA 18-25m) in Chumphon Province was 1,400-7,700 kg per day per boat with an average catch of 3,130 kg, out of which 88-98%, on average 94% or 2,941 kg/day/boat was anchovy. The lowest percentage of anchovy was found in July due to large catches of *Rastrelliger* and sardine and the highest was found in May. The average annual composition of the other fish caught was *Rastrelliger* spp. 2.2%, sardine 1.6%, trash fish 1.3% and *Caranx* spp., dorab, king mackerel, cephalopods and others together 0.9% (Table 15). The total number of boats where researchers have determined the fish composition on board was 17.

**Table 15. CPUE (Catch per day per boat in kg ) of Anchovy Purse Seine (APS) (day time) in Chumphon Province, January- December 1992**

Month	Anchovy	Rastrelliger	Sardine	Caranx	Dorab	King mackerel	Cephalopods	Other	Trash fish	Total catches
Jan	1,454.2	33.4	19.4	0.3	34.0	0.9	3.1	0.0	1.2	1,546.5
Feb	3,539.9	8.8	7.1	3.8	23.0	0.0	10.0	70.9	167.4	3,830.9
Mar	7,298.5	171.4	170.6	0.0	0.0	0.0	0.0	5.4	74.1	7,720.0
May	1,490.8	12.6	6.2	0.0	0.0	0.0	0.0	1.5	8.8	1,519.9
Jun	2,016.2	5.3	10.9	20.9	0.0	0.0	0.8	12.3	33.6	2,100.0
Jul	3,022.9	290.5	81.0	0.4	0.0	11.5	0.0	10.6	20.1	3,437.0
Aug	1,826.9	24.4	48.8	0.0	0.0	4.6	1.2	0.5	18.6	1,925.0
Sep	4,140.4	24.6	12.9	0.0	0.0	0.0	11.5	0.0	50.6	4,240.0
Nov	3,197.3	19.2	155.4	0.0	0.0	1.2	0.0	7.2	19.8	3,400.1
Dec	1,364.8	43.1	1.7	0.0	0.0	0.0	0.0	0.5	0.0	1,410.1
Wt CPUE	2,941.3	69.4	50.5	3.0	6.7	2.1	2.5	12.4	42.2	3129.9
%	94.0	2.2	1.6	0.1	0.2	0.1	0.1	0.4	1.3	100

Source: Vadhanakul and Boongerd, 1993

Remarks: Researchers collected data and sorted fish composition on board. No data in April and October due to seasonal closure and strong winds, respectively.

**Table 16. Catch composition and CPUE of Anchovy Purse Seine with light luring (nighttime operation APSL) at Prachuab Kiri Khan Province in May, August and September 1998**

Month	Anchovy	Rastrelliger	Sardine	Caranx	Cephalopods	Others	Trash fish	Total catches	Sampling boats
MAY	7,184.0	2,705.4	5,035.9	1,312.9	104.0	4,632.2	860.7	21,835.1	8
cpue	898.0	338.2	629.5	164.1	13.0	579.0	107.6	2,729.4	
AUG	33,086.8	6,292.3	11,096.1	515.9	792.4	424.7	251.7	52,459.9	10
cpue	3,308.7	629.2	1,109.6	51.6	79.2	42.5	25.2	5,246.0	
SEP	34,822.6	11,948.2	1,988.5	7,763.6	931.7	3,965.9	579.6	62,000.1	13
cpue	2,678.7	919.1	153.0	597.2	71.7	305.1	44.6	4,769.2	
Weighted cpue	2,422.4	675.7	584.5	309.4	59.0	291.1	54.6	4,396.6	
AVG%	55.1	15.4	13.3	7.0	1.3	6.6	1.2	100.0	

CPUE = kg per night per boat

APSL = anchovy purse seine with light luring

Source: Boongerd, 1999.

**Table 17. CPUE (kg per night per boat) of Lift Net with light luring (LNL) in Samae Sarn, Cholburi Province, December 1992-November 1993**

Month	Anchovy	Rastrelliger	Sardine	Caranx	Cephalopods	Others	Trash fish	Total catches
Dec-92	1,056.0	9.7	1.1	3.5	1.5	0.2	2.3	1,074.3
Jan-93	692.1	27.6	17.6	9.7	0.5	1.1	0.2	748.8
Feb	916.0	22.9	32.5	17.7	0.2	0.1	0.6	990.0
Mar	374.5	6.9	6.9	0.0	0.0	2.8	0.1	391.2
Apr	595.4	4.3	19.2	1.8	0.1	1.7	3.0	625.5
May	520.0	7.9	3.9	13.2	0.1	1.1	0.9	547.1
Jun	1,012.4	9.5	49.6	1.3	1.2	0.1	0.0	1,074.1
Nov	571.9	4.7	25.2	0.0	0.8	0.3	1.1	604.0
Weighted CPUE	774.3	13.0	20.2	7.1	0.6	0.8	1.1	817.0
%	94.8	1.6	2.5	0.9	0.1	0.1	0.1	100.0

Source: Boonger, 1995 (calculated from raw data)

**Table 18. CPUE (kg per night per boat) of Lift Net with light luring (LNL) in Samae Sarn, Cholburi Province, January –June 1997**

Month	Anchovy	Rastrelliger	Sardine	Caranx	Cephalopods	Others	Trash fish	Total catches
Jan-97	788.0	11.7	18.9	0.1	4.0	0.3	4.0	827.0
Mar	744.4	7.7	3.9	1.6	0.6	2.8	3.2	764.2
Apr	368.4	2.4	2.3	3.0	1.3	0.0	0.7	378.1
May	799.7	3.0	57.3	7.7	1.5	0.0	0.1	869.3
Jun	2,088.5	7.1	347.3	0.7	0.5	1.3	0.0	2,445.4
Jul	1,150.7	7.8	48.4	1.9	3.1	0.2	2.2	1,214.3
Weighted CPUE	1,043.7	7.3	83.6	2.4	2.2	0.6	1.9	1,141.8
Percent	91.4	0.6	7.3	0.2	0.2	0.1	0.2	100.0

Source: Boonger, 1995 (calculated from raw data)

### 6.3.2 Catch composition of APSL

Annual catch composition of APSL was: anchovy 55.1%, *Rastrelliger* 15.4%, sardine 13.4%, *Caranx* 7%, cephalopods 1.3%, trashfish 1.2% and others 6.6%, with a weighted average of total catches of 2,422.4 kg per night per boat (Table 16).

### 6.3.3 Catch composition of LNL

The average total catch of LNL in Cholburi Province (at Samae Sarn Village) during December 1992 to November 1993, was 817 kg/night/boat. The percentage of anchovy caught was 92-98, on average 94.8% or 774.3 kg/night/boat. The average annual contribution of other species was *Rastrelliger*

spp.1.6%, sardine 2.5%, trash fish 1.1% and *Caranx* 0.9%, cephalopods 0.1% and others 0.9% (Table 15). A total of 169 boats was sampled at the fishing piers of the villages by researchers to determine the fish composition.

Total catches of LNL in Choluteca Province (at Samae Sarn Village) from January to June 1997 were 1,141.8 kg/day/boat. The percentage of anchovy caught ranged from 85-97, with an average of 91% or 1,043.7 kg/day/boat. The highest percentage of anchovy was in March and April, the lowest was in June due to high catches of sardine. The composition of other species was: *Rastrelliger* spp. 0.6%, sardine 7.3%, *Caranx*, 0.2%, trash fish 0.2%, cephalopods 0.2% and others 0.1%. (Table 18 ). The total number of boats where researchers determined the fish composition at the fishing piers of the villages was 67.

The average total catch of LNL in Choluteca Province (at Bangsarai Village) from December 1992 to November 1993, was 778.6 kg/night/boat. The percentage of anchovy range was 92-96, with an average of 96.6% or 752.1 kg/night/boat. The composition of other species was: *Rastrelliger* spp. 8.8%, sardine 9.3%, *Caranx* 3.9%, trash fish 3.5%, cephalopods 0.6% and 0.4% others. (Table 19 ). The total number of boats where researchers determined the fish composition at the fishing piers of the villages was 469.

The average total catch of LNL in Prachuab Kiri Khan Province in August and September 1997, was 1,541.9 kg/night/boat. The percentage of anchovy range was 87-95, with an average of 93.1% or 1,435.1 kg/night/boat. The composition of other species was: *Rastrelliger* spp. 1.3%, sardine 4.6%, trash fish 0.1%, cephalopods 0.1% and 0.7% of others. (Table 20 ). The total number of boats where researchers determined the fish composition at the fishing piers of the villages was 4.

**Table 19. CPUE (kg per night per boat) of Lift Net with light luring (LNL) in Bangsarai, Choluteca Province, December 1992-November 1993**

Month	Anchovy	Rastrelliger	Sardine	Caranx	Cephalo-pods	Others	Trash fish	Total catches
Dec-92	988.1	3.4	1.8	1.4	0.6	0.2	1.6	997.1
Jan-93	610.5	20.9	13.3	8.8	1.0	1.1	0.3	655.9
Feb	744.6	14.8	10.0	7.1	0.1	0.0	3.5	780.1
Mar	325.1	4.5	3.9	0.2	0.0	1.6	0.4	335.7
Apr	464.6	3.4	14.0	1.3	0.1	1.2	20.6	505.2
May	461.1	6.8	3.5	11.5	0.1	1.0	4.0	488.0
Jun	871.6	8.0	37.5	1.7	5.6	0.1	0.0	924.5
Nov	624.0	4.5	18.0	0.0	0.5	0.5	1.8	649.3
Weighted CPUE	752.1	8.8	9.3	3.9	0.6	0.4	3.5	778.6
AVG%	96.6	1.13	1.19	0.5	0.08	0.05	0.45	100

Source: Boongerd, 1995 (calculated from raw data)

**Table 20. CPUE (kg per boat day) of Lift Net with light luring (LNL) in Prachub Kiri Khan Province, August and September 1997**

Month	Anchovy	Rastrelliger	Sardine	Caranx	Cephalo-pods	Others	Trash fish	Total catches
Aug	1,307.9	17.1	170.6	0.0	4.5	0.0	0.0	1,500.1
Sep	1,477.5	20.8	38.7	1.0	1.0	14.7	2.1	1,555.8
Weighted CPUE	1,435.1	19.9	71.7	0.8	1.9	11.0	1.6	1,541.9
%	93.1	1.3	4.6	0.0	0.1	0.7	0.1	100

Source: Boongerd, 1995

#### 6.3.4 Catch composition of FNL

In Songkhla Province, catches of FNL consisted of anchovy 79.23%, sardines 16.9%, Rastrelliger 0.9%, trashfish 0.3%, cephalopods 0.2% and others 2.4% with a weighted average total catch of 828.2 kg/night/boat (Table 21). In Pattani Province the catch composition was almost the same as in Songkhla, the percentage of anchovy was lower and that of sardine higher (Table 22). The percentage of anchovy in the catches of the year 1996 was higher than in 1995 in Pattani Province (Table 23).

Table 21. Catch per night per boat of Falling Net with light luring (FNL) in Songkhla Province, 1997-1998 (Total number of sampling mobile boats=95)

Month	Anchovy	Rastrelliger	Sardine	Cephalo-pods	Others	Trashfish	Total catches
Jul, 1997	757.5	3.1	92.4	3.6	17.6	2.7	876.9
Aug	1,096.5	0.1	62.0	1.9	13.6	3.0	1,177.1
Sep	358.6	2.6	36.2	1.1	13.5	7.8	419.8
Oct	1,065.6	40.4	384.5	4.8	26.1	0.4	1,521.8
May, 1998	1,022.7	9.7	380.3	0.1	54.1	1.9	1,468.8
Jun	612.0	1.9	93.8	2.9	25.2	4.5	740.3
Weighted CPUE	687.7	4.1	107.5	2.7	22.0	4.1	828.2
AVG%	79.23	0.9	16.9	0.2	2.4	0.3	100

Source: Songkhla Marine Fisheries Development Center, 1998 (calculated from raw data)



**Table 22. CPUE (kg per night per boat ) of Falling Net with light luring (FNL) in Pattani Province, May to October 1995 (Total sampling boats = 52)**

Month	Anchovy	<b>Rastrelliger</b>	Sardine	Caranx	King mackerel	Cephalopods	Others	Trashfish	Total catches
May	254.9	15.5	419.8	0.7	12.2	1.2	3.1	0	707.7
Jun	608.2	2.5	73.8	2.1	0	7.0	13.3	0.3	1,397.1
Jul	492.0	0.6	119.4	5.1	0.1	0	23.1	0.2	640.4
Aug	562.5	11.5	53.0	4.8	0.1	2.1	18.7	1.8	656.0
Sep	1,567.8	8.3	46.6	0.1	1.3	0	61.8	0.3	1,686.3
Oct	1,107.4	76.0	79.1	7.0	0	7.6	4.1	0	1,281.3
Weighted CPUE	718.8	15.8	272.5	11.3	2.6	2.9	20.0	0.4	1,036.7
AVG%	69.3	1.5	26.3	1.1	0.3	0.3	1.9	0.04	100

\* mixed of *S. indicus* about 2.75% in the anchovy catches

**Table 23. CPUE (kg per night per boat) of Falling Net with Light luring (FNL) in Pattani Province, March to September 1996. (Total sampling boats = 53)**

Month	Anchovy	<b>Rastrelliger</b>	Sardine	Caranx	Cephalopods	Others	Trashfish	Total catches
Mar	3,266.1	3.8	420.6	4.0	0	3.6	6.9	3,705.0
Apr	1,827.0	5.5	42.5	3.2	0	5.1	0	1,883.3
May	813.3	10.8	7.5	26.4	0.5	11.9	0	1,393.5
Jun	557.4	7.5	19.6	0.6	0.7	2.1	0	587.0
Jul	1,305.5	5.4	61.0	0.7	2.1	14.4	4.1	1,393.5
Aug	2,515.6	0.2	126.9	0.01	3.5	3.7	0.1	2,650.0
Sep	668.4	2.8	13.4	1.6	1.4	2.4	0.3	690.4
Weighted CPUE	1,662.4	4.7	99.0	3.4	1.4	3.0	1.8	1,779.4
%	93.4	0.3	5.6	0.2	0.1	0.2	0.1	100

- mixed of *S. indicus* about 3.36% in the anchovy catches

**Table 24 . The species composition of catches by FNL in % of total weight landed by zones in Songkhla Province, 1997-1998**

Fish group	Distance from shoreline (nm)				
	0-5	5-10	10-15	15-20	>20
<b>Anchovy</b>	88.4	83.3	83.2	85.3	81.3
<b><i>Rastrelliger</i> spp.</b>	0.04	0.7	0.1	0.3	0.9
<b>sardines</b>	6.2	8.6	12.3	9.5	12.0
<b><i>Caranx</i> spp</b>	1.2	1.6	1.3	2.0	1.2
<b>king mackerel</b>	0.3	0.04	0.02	0.1	0.02
<b>cephalopods</b>	0.1	0.5	0.4	0.3	0.3
<b>other fishes</b>	2.3	3.2	2.5	2.1	4.2
<b>trashfish</b>	1.5	2.1	0.2	0.4	0.1
<b>Total catches (kg/night/boat)</b>	336.4	483.0	1,030.7	708.4	1,251.6
<b>Number of boats sampled</b>	9	23	23	17	23

Source: Songkhla Marine Fisheries Development Center, 1998.

#### **6.4 Catch composition by zones**

The coastal area of the Gulf of Thailand is divided into four zones, using the distance from the shore in nautical miles: 0 – 5; 5 – 10; 10 – 15 and 15 – 20.

The catch composition by zone for FNL in Songkhla Province indicated that the farther offshore the higher the catches of other fish, while the higher total catches were at distances over 10 nm from the shore (Table 24, Songkhla Marine Fisheries Development Center, 1998; Working Group of Resources and Environment of the National Fishery Policy Board, 1999).

The catch composition of APSL in Prachuab Kiri Khan in different seasons of the years 1993 (June-July) and 1997 (Feb-Sep) was used to determine the percentage of fish caught by zones (Figs. 22 -26).

In the upper part of Prachuab Kiri Khan (Ao Noi), the contribution of anchovy was more than 72.8% (range 72.8– 83.9%, Fig. 22) in every zone for the year 1993, while in the year 1997 it was more than 75.8% (range 75.8–91.9%, Fig. 26) in every zone.

In the central part of Prachuab Kiri Khan (Tabskae), the contribution of anchovy was higher with a range of 82.8–89.9% in 1993 (Fig. 22) and 61.5–79.8% (Fig. 26) in 1997.

The amounts in percentages of *Rastrelliger*, sardine and *Caranx* caught by APSL at Prachuab Kiri Khan are shown in Figs. 23, 24 and 25 respectively for the year 1993 in June-July. For 1997, the percentages of catch composition of *Rastrelliger* and sardine caught by APSL at Prachuab Kiri Khan during February to September are shown in Figs. 27 and 28.

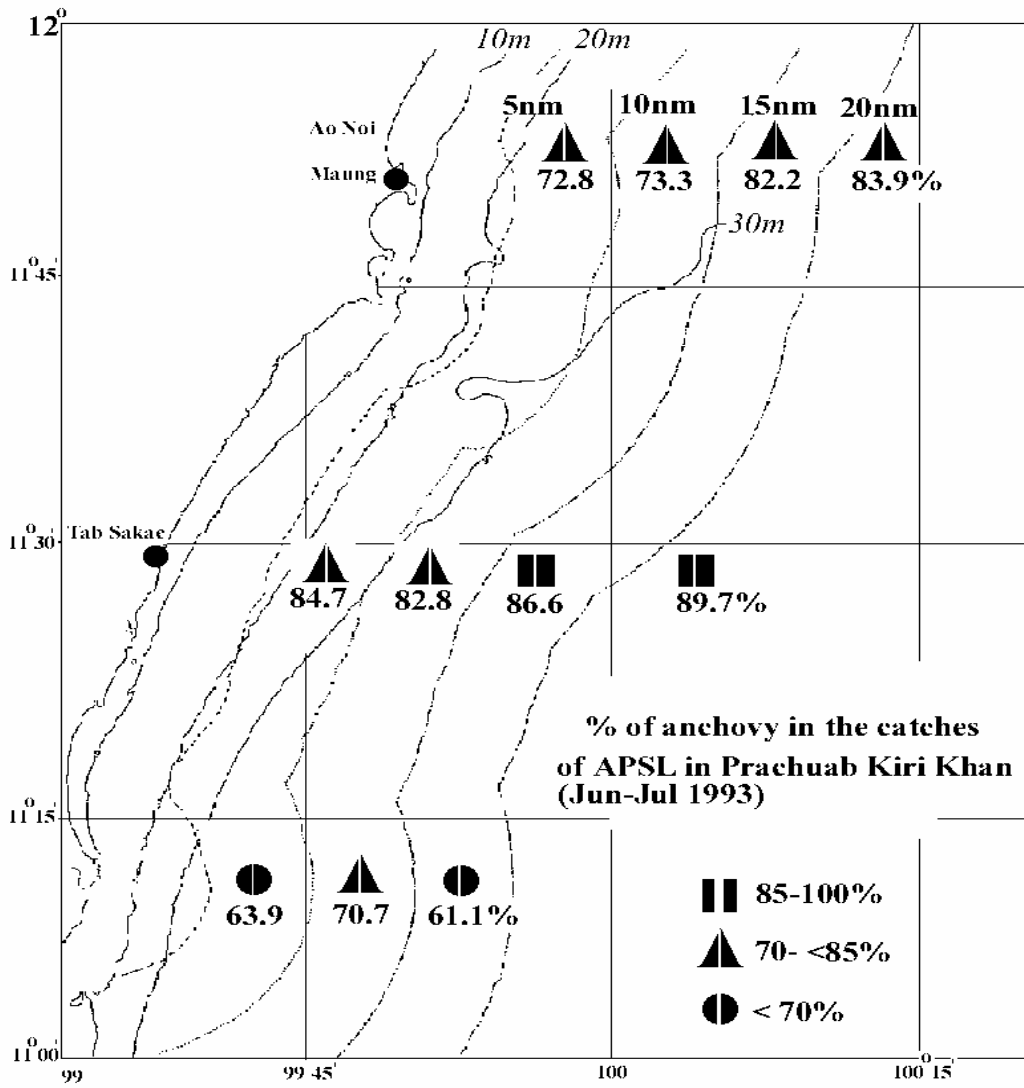
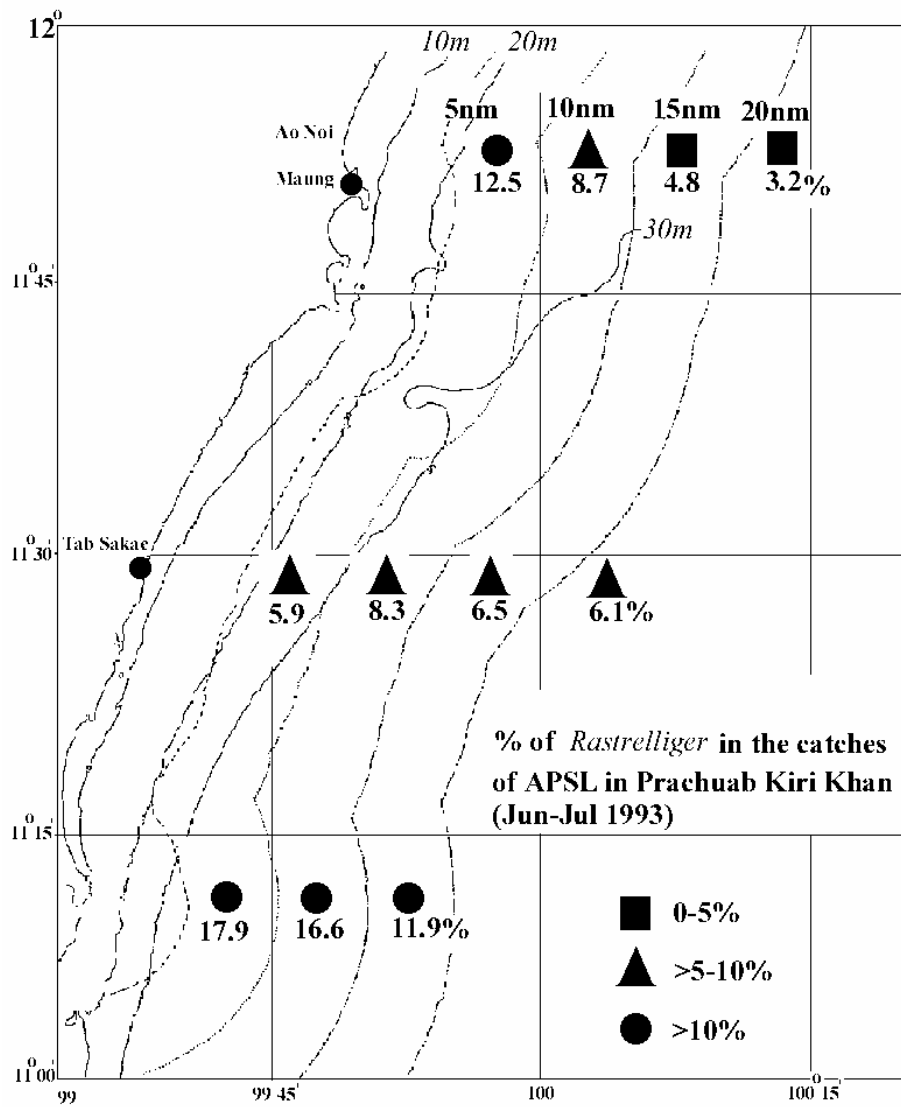
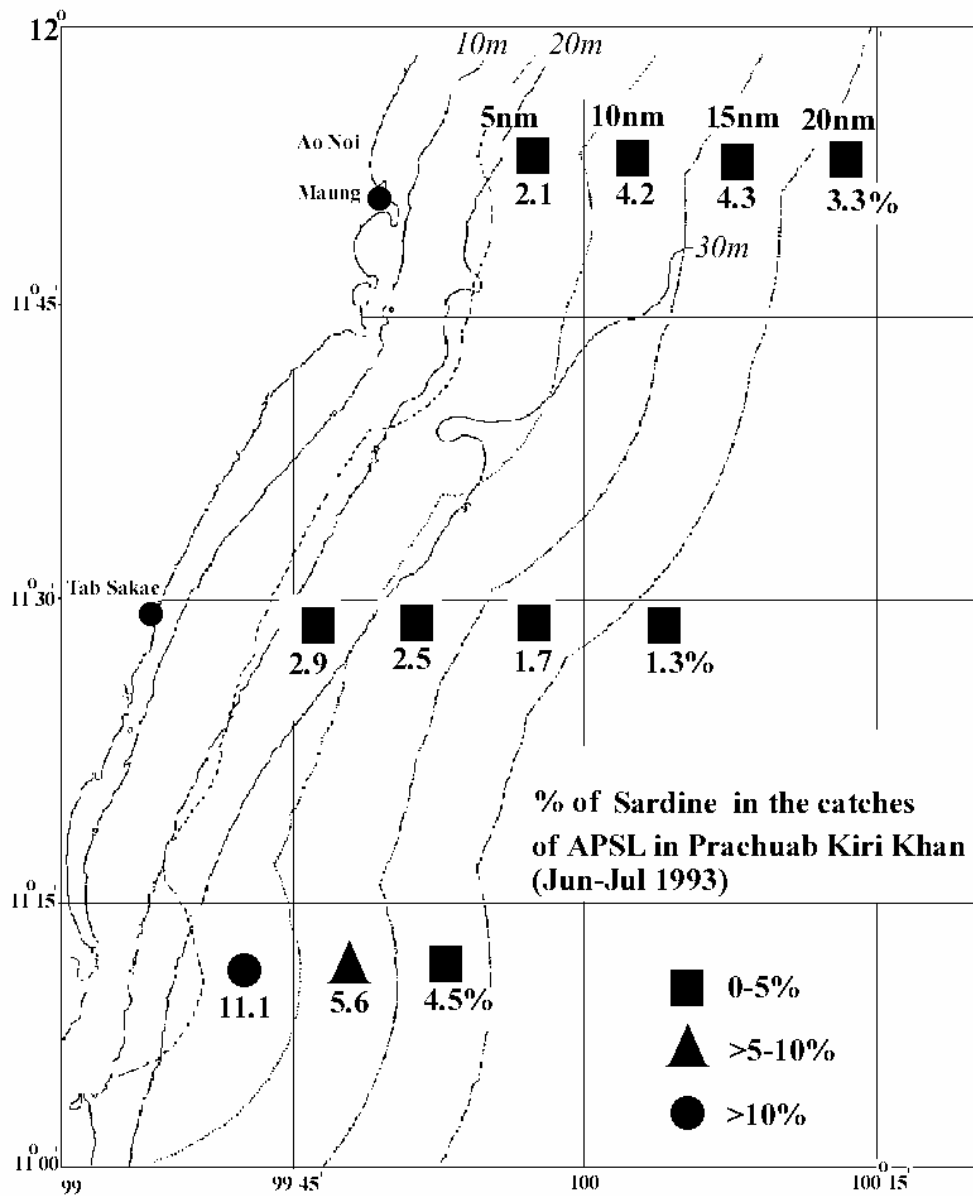


Fig. 22. The percentage of anchovy in the catches of APSL in Prachuab Kiri Khan, June-July 1993



**Fig. 23. The percentage of *Rastrelliger* in the catches of APSL in Prachuab Kiri Khan, June-July 1993**



**Fig. 24. The percentage of sardine in the catches of APSSL in Prachuab Kiri Khan, June-July 1993**

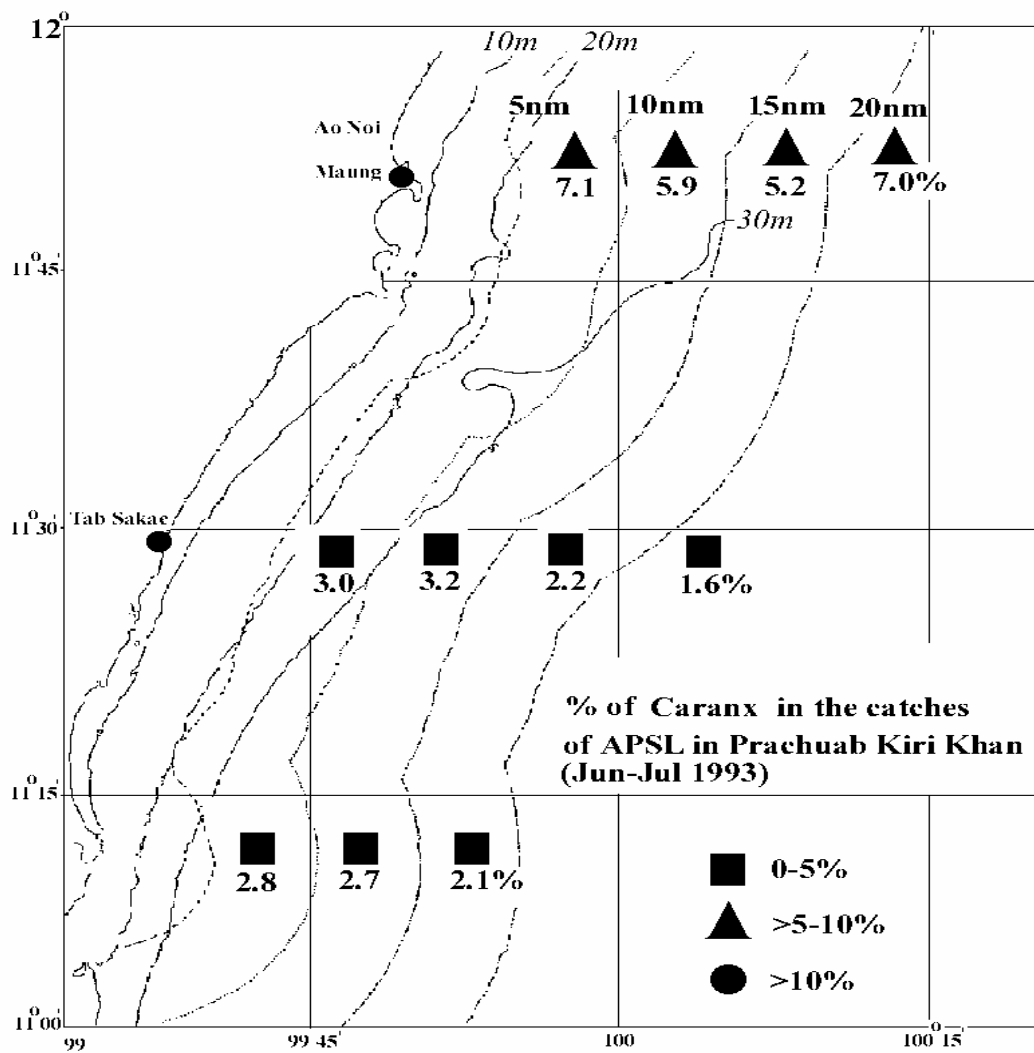


Fig. 25. The percentage of caranx in the catches of APSL in Prachuab Kiri Khan, June-July 1993

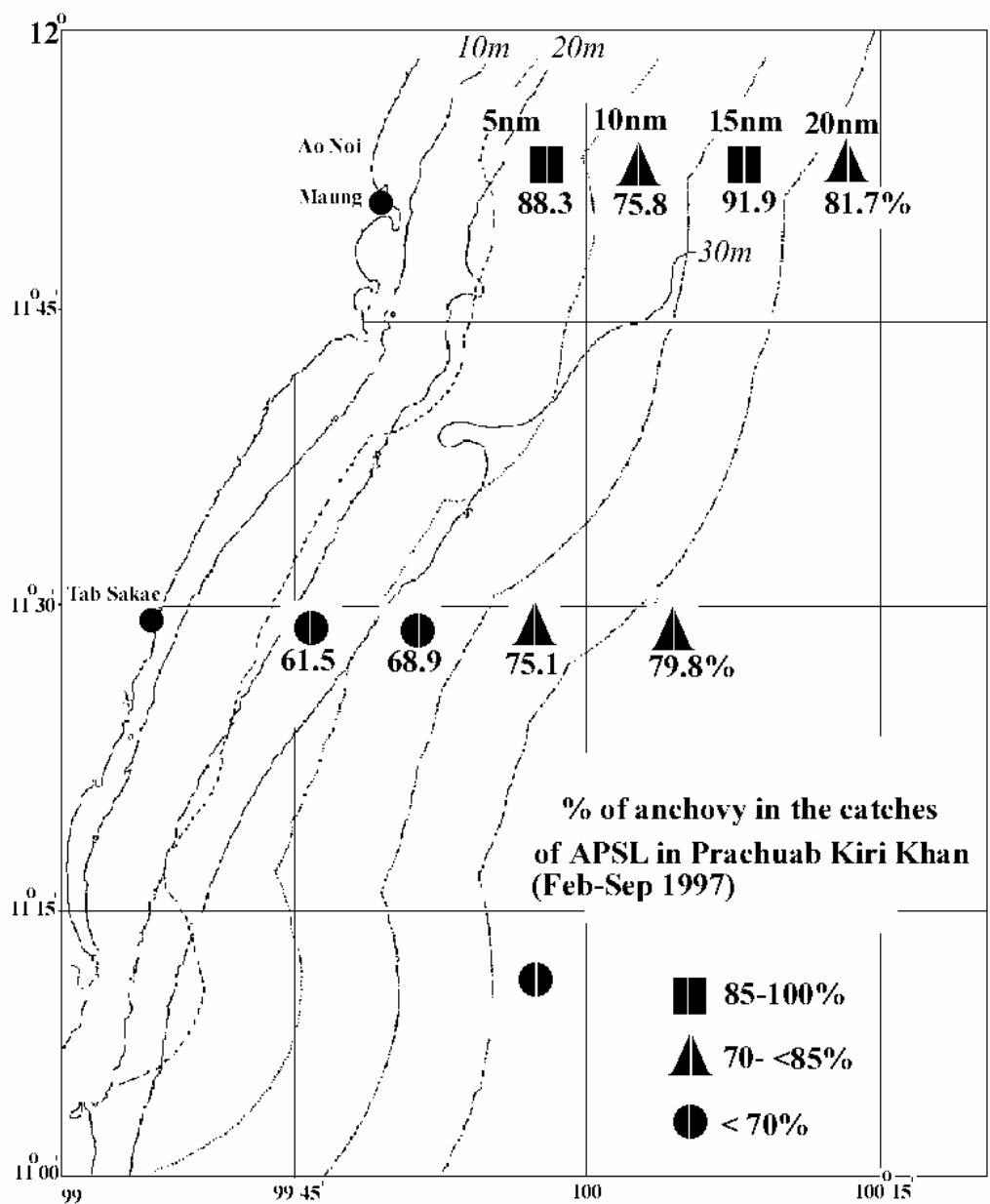


Fig. 26. The percentage of anchovy in the catches of APSSL in Prachuab Kiri Khan, February-September 1997

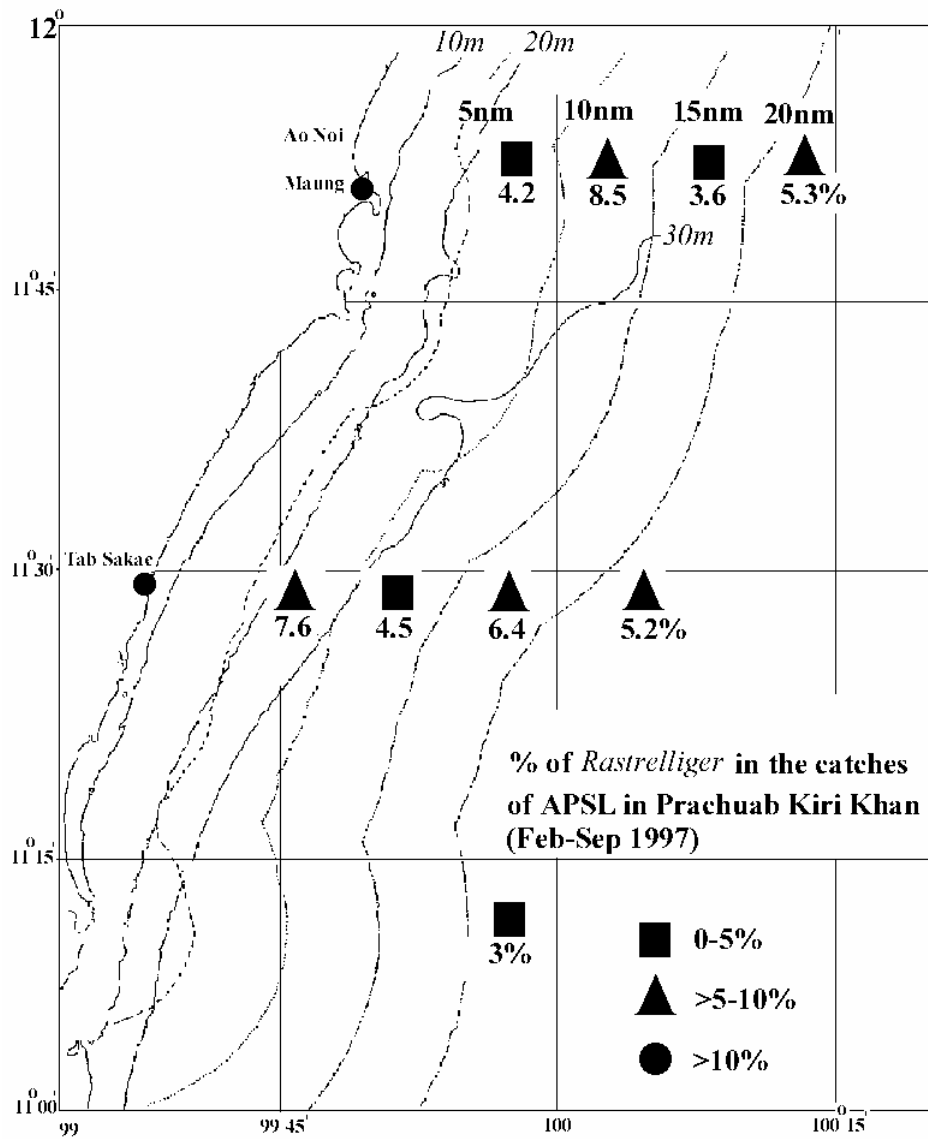


Fig. 27. The percentage of *Rastrelliger* in the catches of APSL in Prachuab Kiri Khan, February-September 1997



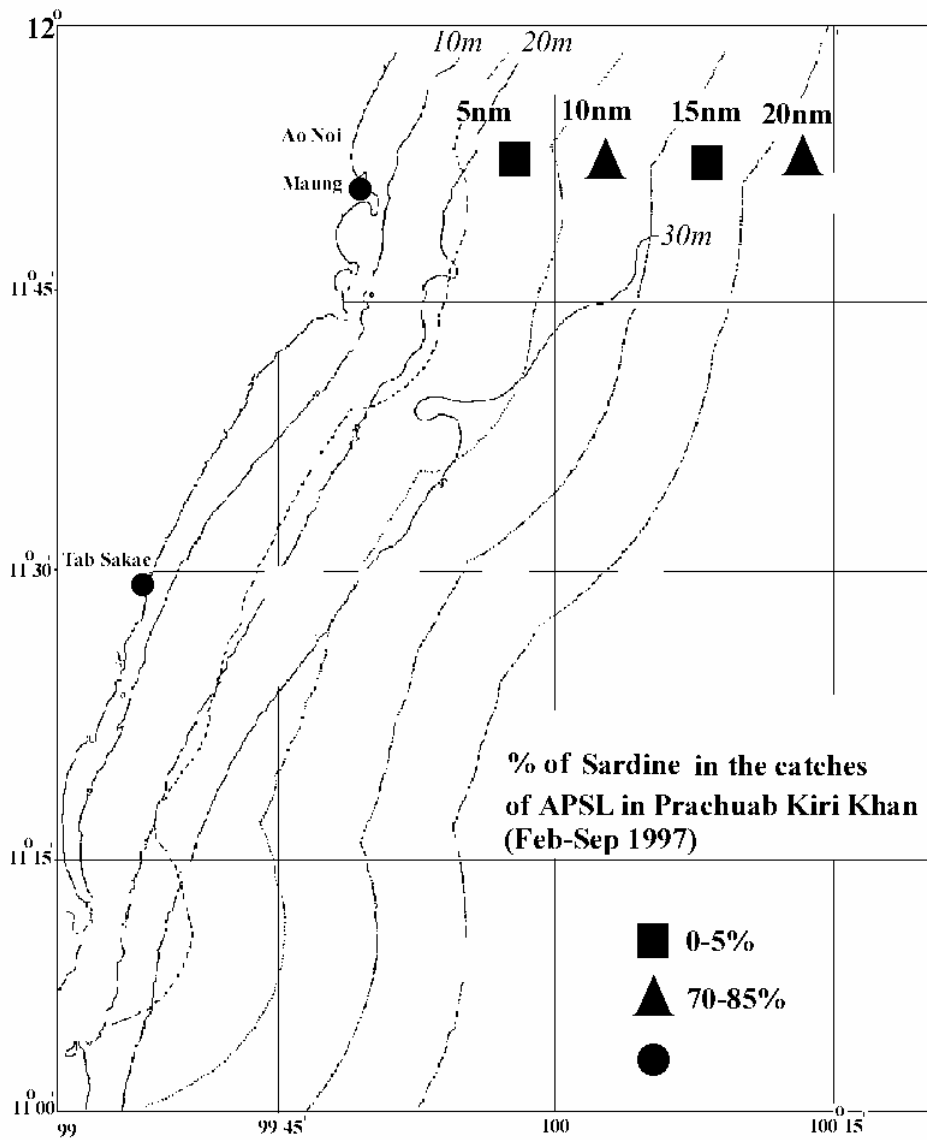


Fig. 28. The percentage of sardine in the catches of APSL in Prachuab Kiri Khan, February-September 1997