

## TUNA CAUGHT BY PURSE SEINING IN THE EASTERN INDIAN OCEAN

by

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### ABSTRACT

*Tuna purse seining survey in the Eastern Indian Ocean was conducted during May – June 1998, the survey area covered 03°S - 08°S and 89°E – 96°E. Only 10 hauls of tuna purse seining were operated. The results showed very poor catch with the average catch rate of 2.58 ton / haul. Yellowfin tuna was the most dominant species of the catch consisted of 44.00 % , their length distributed from 27.0 cm to 135.0 cm , with a predominant of big fishes. Skipjack tuna also dominated in the catch consisted of 43.04 % , with the size range from 28.5 to 92.0 cm. Bigeye tuna is not a target species for tuna purse sein catch. The result of analyzed gonad maturity showed that no spawning take place during southwest monsoon in the survey area for yellowfin and bigeye tuna.*

### INTRODUCTION

Due to the developing of oceanic tuna fisheries and increasing tuna production of canning industries in Thailand, the Department of Fisheries has launched two research vessels, “ CHULABHORN ” and “ MAHIDOL ” for tuna resources survey in the Indian Ocean since 1987 and 1994, respectively. In 1998, the R/V MAHIDOL carried out a tuna purse seining survey with the employment of drifting FADs in the Eastern Indian Ocean, with the purpose of collecting data on the abundance of tuna, biological study and oceanographic research. The result of tuna purse seining survey in the Western Indian Ocean by Thai Research Vessel “ CHULABHORN ” was presented in the 5<sup>th</sup> Expert Consultation on Indian Ocean Tunus by Poreeyanond in 1993.

#### Fishing survey

The operations were conducted during May – June 1998 in the Eastern Indian Ocean between latitude of 03°S - 08°S and longitude of 89°E – 96°E. The total of 12 drifting FADs were

set at the area of 03° 30'S and 81° 00'E. All the FADs drifted to the southeast. 10 hauls of tuna purse seining were operated along the southern part of Ninety East Ridge. It takes only 2-3 days in traveling from Phuket, Thailand to this fishing ground.

### RESULTS

#### Catch and species composition.

Tuna caught by purse seining in this area during the southwest monsoon showed very poor catches, it's due to the sea condition and strong wind effective for tuna purse sein operation. An average catch for 10 operations was observed only 2.58 tons/set, decreased from 6.40 tons/set in 1996. To compare, the average species composition based on the data during the year 1995, 1996, and 1998 was presented in Table 1. It can be seen that skipjack tuna was the most dominant species during the period of 1995 – 1996, whilst yellowfin tuna showed predominant of the catch in 1998. However, bigeye tuna is not target species for tuna purse seine catches in this area.

Table 1. The average species composition of tuna caught by purse seining in the Eastern Indian Ocean during May – June.

No.	Species	Composition ( % )		
		1995	1996	1998
	<i>Katsuwonus pelamis</i>	44.49	64.37	43.04
	<i>Thunnus albacares</i>	33.02	16.89	44.00
	<i>T. obesus</i>	9.03	12.20	8.70
	Others	13.46	6.54	3.26

#### Length distribution

The data on length frequency distribution of the survey available for the main species catch are summarized in Table 2. The length distribution of yellowfin tuna catch presents a wide range from 27.0 to 135.0 cm. with three modes at 30.5,

62.5 and 117.0 cm. The size of skipjack tuna in the catch distributed from 28.5 to 92.0 cm, with two modes at 32.0 and 53.0 cm. The size range for bigeye tuna is between 27.5 and 116.0 cm, with a predominant of small fish at the modes of 31.0 and 52.5 cm. ( Fig. 3 )

Table 2. Length distribution of tuna caught by purse seining in the Eastern Indian Ocean during May – June, 1998.

Species	FL- range (cm )	Mode (cm)	Mean (cm)	SD
Skipjack tuna	28.5 – 92.0	32.0	33.68	± 3.23
		53.0	53.30	± 5.64
Yellowfin tuna	27.0 –135.0	30.5	32.79	± 4.12
		62.5	63.14	± 4.12
		117.0	112.32	± 9.86
Bigeye tuna	27.5 –116.0	31.0	33.41	± 3.76
		52.5	58.13	± 6.16

**Length – weight relationship.**

The two dominant species of tuna obtained from purse seining operations were considered for length – weight relationship studies. Total samples of 321 skipjack tuna and 220 yellowfin tuna were measured and weighed in fresh condition. Fork length was measured in centimeter and weight was recorded in kilogram. Male and female were also separated by each species.

The following formulas defined the relation between length and weight of skipjack and yellowfin tuna in both male and female as:

Skipjack tuna (*Katsuwonus pelamis*)

male :  $W = 0.000005 L^{3.3260}$  , n = 179 , r = 0.9836

female :  $W = 0.000005 L^{3.3234}$  , n = 142 , r = 0.9810

Yellowfin tuna (*Thunnus albacares*)

male :  $W = 0.000014 L^{3.01812}$  , n = 113 , r = 0.9898

female :  $W = 0.000335 L^{2.34104}$  , n = 107 , r = 0.9105

**Gonad maturity stage**

Total of 179 males ( 55.76 % ) and 142 females ( 44.24 % ) of skipjack tuna were sampled during the survey operations. The sex ratio ( males / total ) is significantly higher than 0.5 for this period. Most of the fish samples were found to be in maturity stage III and IV. ( Table 3 ). It can be noted that skipjack tuna have spawning in the Eastern Indian Ocean during southwest monsoon. Yellowfin tuna was found to be in maturity stage II while bigeye tuna showed in maturity stage I. Therefore, it can be deduced that no spawning take place during this period in the survey area for yellowfin and bigeye tuna.

Table 3. Gonad maturity stage of tuna caught by purse seining in the Eastern Indian Ocean during May – June, 1998.

Gonad maturity stage			I	II	III	IV	V	Total
Skipjack tuna	Male	No.	6	5	88	80	-	179
		%	3.35	2.79	49.16	44.70	-	100
	Female	No.	8	12	55	66	1	142
		%	5.64	8.45	38.73	46.48	0.70	100
Yellowfin tuna	Male	No.	11	61	30	11	-	113
		%	9.73	53.99	26.55	9.73	-	100
	Female	No.	1	64	33	9	-	107
		%	0.94	59.81	30.84	8.41	-	100
Bigeye tuna	Male	No.	3	-	-	-	-	3
		%	100	-	-	-	-	100
	Female	No.	8	3	-	-	-	11
		%	72.73	27.27	-	-	-	100

**DISCUSSION AND CONCLUSION**

Tuna purse seining survey in the Eastern Indian Ocean by R/V Mahidol during May – June 1998 showed that the catch was very poor. Similarly to the survey in 1996 which Pokapunt ( 1997 ) reported that tuna caught in the Eastern

Indian Ocean during May – June gave the lowest catch of the year, with the average catch per haul only 6.40 ton.

Pokapunt (1997) also reported that the species composition of tuna caught during this period in 1995 – 1996 indicated that skipjack tuna showed the most dominant species. In 1998, yellowfin tuna became the predominant species of

tuna catch. However, these two species are always the main component in purse seine catch, whilst bigeye tuna showed none significant of the catches. Poreeyanond (1998) noted that the purse seine catch of bigeye tuna in the western was slightly higher than in the Eastern Indian Ocean at the same latitude. Kaosirikul and Tantivala (1996) indicated that skipjack tuna was the most important component of tuna catch in the Western Indian Ocean with more than 73 %.

The length distribution of yellowfin tuna showed a wide range from 27.0 to 135.0 cm. It's interesting to note

that more than 50 % of yellowfin tuna catch in term of weight are the big fish with size range from 82-135 cm. Bigeye tuna distributed between 27.5 and 116.0 cm. with a predominant of small fish at mode of 31.0 cm. Tantivala (1997) studied on length - weight relationship of tunas in the Eastern Indian Ocean in 1996 and found that:-

Skipjack tuna	with	=	$0.000017 L^{3.0140}$
Yellowfin tuna	with	=	$0.000044 L^{2.77084}$
Bigeye tuna	with	=	$0.000027 L^{2.92235}$

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