Some Biological Aspects of Shark in Indian Ocean at Southern Part of Java Waters.

Ali Suman and Umi Chodrijah *)
e-mail address : alisuman_62@yahoo.com or alis_prpt@indo.net.id

ABSTRACT

The objective of this research is to study the species composition, size distribution and sex ratio of shark in Indian Ocean at the Southern Part of Java waters. This research was carried out based on the data collected from the survey conducted during March to December 2010 in Indian Ocean at southern part of Java waters. The result showed that the species composition of shark in Indian Ocean at southern part of Java waters were consist of 29 species was dominated by *Alopias pelagicus* for about 38 % and *Squalus megalops* for about 18 %. The total length average of *Alopias pelagicus* was 130 -139 cm and Squalus *megalops* was 70 – 79 cm. The equation of length-weight relationship of the dominan species (*Alopias pelagicus*) was $W = 0{,}0071\ L^{3{,}3106}$ for female and $W = 0{,}0367\ L^{2{,}804}$ for male. Sex ratio of shark showed not balance with the number of female more than male.

KEYWORDS : Biological Aspects, Shark, Southern Java, Indian Ocean.

***). Research Institute for Marine Fisheries, Jln. Muara Baru Ujung, Jakarta 14440.**

INTRODUCTION

Shark is pelagic fish species which is incidental caught in Indian Ocean waters (Chodrijah, 2010). Exploitation of the shark in Indian Ocean waters has taken place since long time ago and become more intensive in the recent years due to an increase of local and or foreign market demand. If this situation continues to occur, sustainability of the shark stock will be disturbed in the future. Therefore comprehensive research is needed to reach rational utilization in order to maintain sustainability of the stock for prosperity purpose in the future (Naamin *et al*., 1992).

This paper discussed some biological aspect of the shark in Indian Ocean at southern part of Java waters. It is hoped that the result can be used as basic and important information for sustainable management of the shark in Indian Ocean waters.

MATERIALS AND METHODS

The research was carried out in 2010 in Indian Ocean at southern part of Java (Figure 1). Shark biology observations covered a total body length, sex ratio and length clasper, with direct measurements and visual observations in the field. Clasper measurements were measured from the inner curvature of the stomach up sets includin fin to the tip of clasper. The data analyzed were the result of measurement and direct observation by recording daily data.

Figure 1. Fishing management area 572, the area of survey

RESULT AND DISCUSSION

1. Catch Composition

The results indicated that shark caught in Southern Java waters, consists of 29 species. The catch composition was dominated by *Alopias pelagicus* for about 38 % and *Squalus megalops* for about 18 % (Table 1).

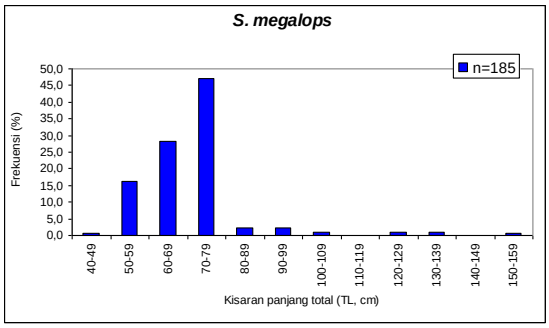
Table 1. Catch composition of shark in Indian Ocean at southern part of Java waters

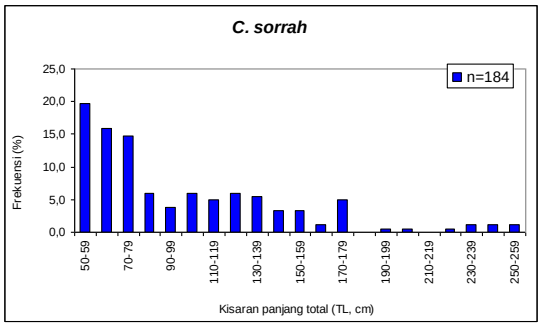
FAMILY	SPECIES	FEMALE	MALE	TOTAL
Alopiidae	*Alopias pelagicus*	76	31	107
	Alopias superciliosus	28	28	56
Total of Alopiidae		104	59	163
Carcharhinidae	*Carcharhinus brevipinna*	37	32	69
	Carcharhinus falciformis	54	59	113
	Carcharhinus leucas	15	7	22
	Carcharhinus longimanus	3	3	6
	Carcharhinus plumbeus	2	1	3
	Carcharhinus sorrah	95	89	184
	Galeocerdo cuvier		1	1
	Prionace glauca		13	13
Carcharhinidae Total		206	205	411
Centrophoridae	*Centrophorus moluccensis*	14	6	20
	Centrophorus squamosus	10	3	13
Centrophoridae Total		24	9	33
Chimaeridae	*Hydrolagus cf lemures*	3		3
Chimaeridae Total		3		3
Hemiscyllidae	*Chiloscyllium punctatum*		3	3
Hemiscyllidae Total			3	3
Hexanchidae	*Heptranchias perlo*	4		4
	Hexanchus griseus	1		1
	Hexanchus nakamurai	7	5	12
Hexanchidae Total		12	5	17
Lamnidae	*Isurus oxyrinchus*	6	10	16
	Isurus paucus	1	3	4
Lamnidae Total		7	13	20
Pseudocarchariidae	*Pseudocarcharias kamoharai*	3	3	6
Pseudocarchariidae Total		3	3	6
Rhinobatidae	*Rhinobatos sp. 1*	3	3	6
	Rhinobatos sp. 2	21		21
Rhinobatidae Total		24	3	27

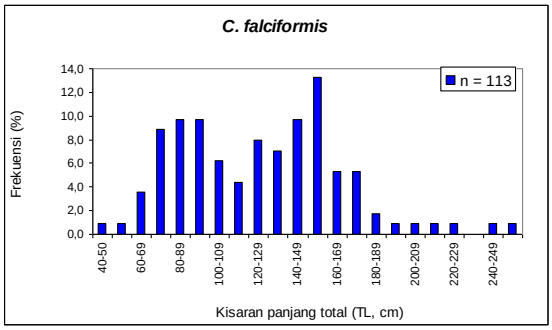
Sphyrnidae	*Sphyrna lewini*	56	15	71
	Sphyrna zygaena	5	3	8
Sphyrnidae Total		61	18	79
Squalidae	*Centroscymnus crepidater*	3	8	11
	Squalus hemipinnis	25	1	26
	Squalus megalops	130	55	185
Squalidae Total		158	64	222
Squatinidae	*Squatina sp.1*	14	23	37
Squatinidae Total		14	23	37
Triakidae	*Mustelus cf manazo*	14	7	21
Triakidae Total		14	7	21
TOTAL		630	412	1042

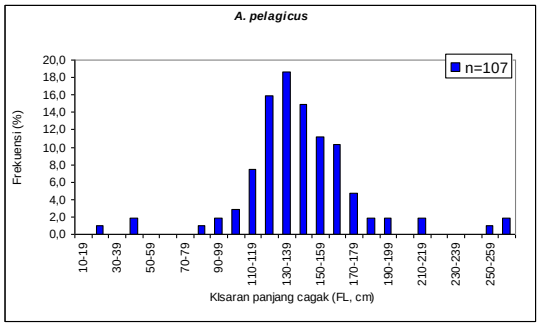
From the composition of the catch in Table 1 also shows that species that dominated in the waters south of Java, which is an economically fish in Indonesia. The compositions of different types were found at southern of Nusa Tenggara waters about 51 species by the discovery of a dominant species namely, *Carcharhinus falciformis, C. limbatus* and *C. sorrah,* (Chodrijah, 2010). The differences between species composition of catches in Southern Java and Southern Nusa Tenggara waters were occurs presumably because of differences of gears and fishing ground.

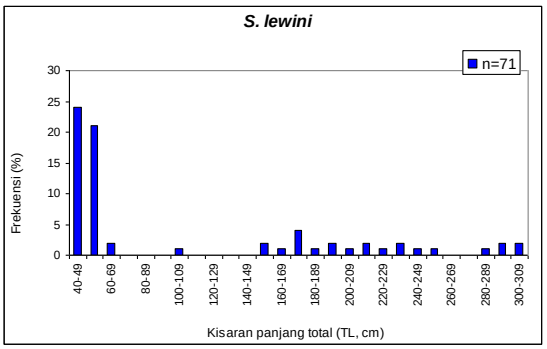
Furthermore, the measurement of length frequency on shark were conducted only on the dominant fish caught in Southern Java waters were as follows: (1) *S. megalops*, length frequency in between 45 to 155 cm (TL) (2) *C. sorrah*, length frequency in between 55 to 255 cm (TL), (3) *C. falciformis*, length frequency in between 45 to 255 cm (TL), (4) *A. pelagicus*, length frequency in between 25 to 275 cm (TL), (5) *S. lewini*, length frequency in between 45 to 305 cm (TL), (6) *C. brevipinna*, length frequency in between 55 to 265 cm (TL), (7) *A. superciliosus*, length frequency in between 85 to 195 cm (TL), (8) *Squatina sp.*, length frequency in between 65 to 145 cm (TL), (9) *S. hemipinnis*, length frequency in between 45 to 175 cm (TL), and (10) *C. leucas*, length frequency in between 85 - 235 cm (TL), (Figure 2).

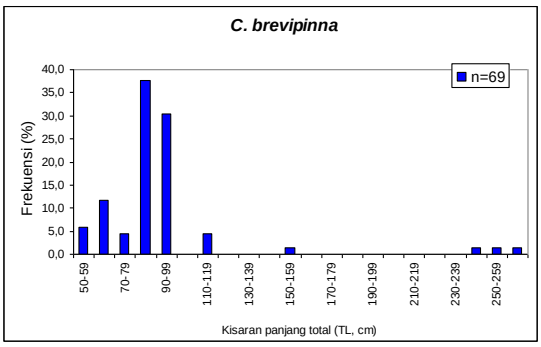

S. megalops
n=185
Frekuensi (%)
Kisaran panjang total (TL, cm)

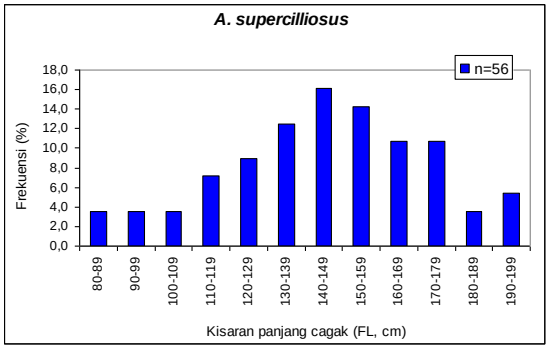

C. sorrah
n=184
Frekuensi (%)
Kisaran panjang total (TL, cm)

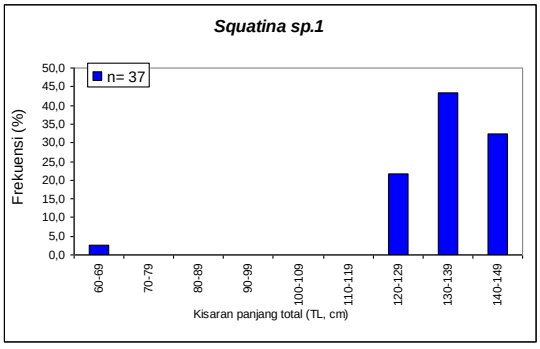

C. falciformis
n = 113
Frekuensi (%)
Kisaran panjang total (TL, cm)


A. pelagicus
n=107
Frekuensi (%)
Klsaran panjang cagak (FL, cm)


S. lewini
n=71
Frekuensi (%)
Kisaran panjang total (TL, cm)


C. brevipinna
n=69
Frekuensi (%)
Kisaran panjang total (TL, cm)


A. supercilliosus
n=56
Frekuensi (%)
Kisaran panjang cagak (FL, cm)


Squatina sp.1
n= 37
Frekuensi (%)
Kisaran panjang total (TL, cm)

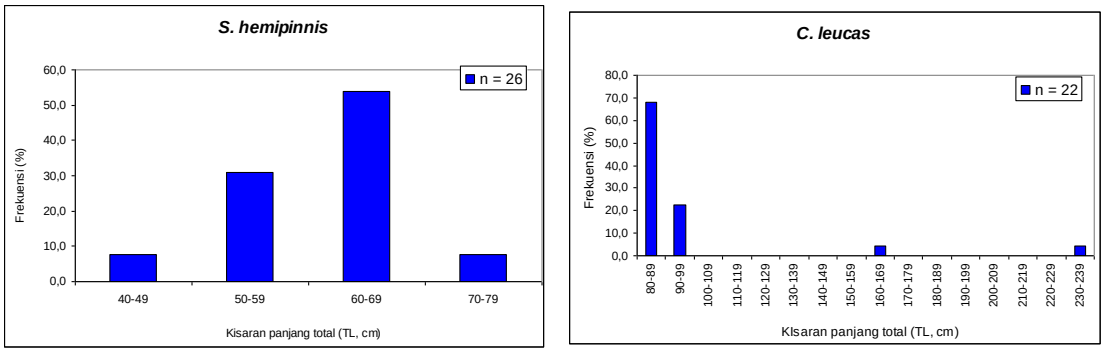
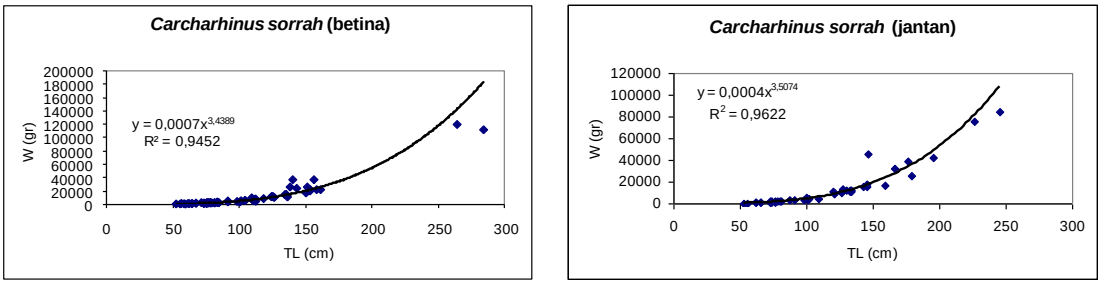


Figure 2. Length composition of dominant species of shark in Southern Java waters, Indian Ocean.

From various lengths of dominant shark caught in Southern Java waters can be seen that sharks caught were varies greatly in size, which means that the population consists of various age groups (Sparre and Venema, 1992).

2. Length-weight relationship and sex ratio

Length-weight relationship of dominan sharks in southern part of Java, Indian Ocean as follows : (1) female of *Carcharhinus sorrah* was $W=0{,}0007L^{3{,}4389}$, (2) male of *Carcharhinus sorrah* was $W = 0{,}0004\ L^{3{,}5074.}$, (3) female of *C. falciformis* was $W = 0{,}005\ L^{3{,}01}$, (3) male of *C. falciformis* was $W = 0{,}003\ L^{3{,}6548.}$,(4) female of *Alopias pelagicus* was $W = 0{,}0071\ L^{3{,}3106}$ and male of *A. pelagicus* was $W = 0{,}0367\ L^{2{,}804.}$ (Figure 3). The relationship was linear with R^2 value more than 0.8. The relationship showed that increasing the total length of the body was followed by an increase in weight.



Female **Male**

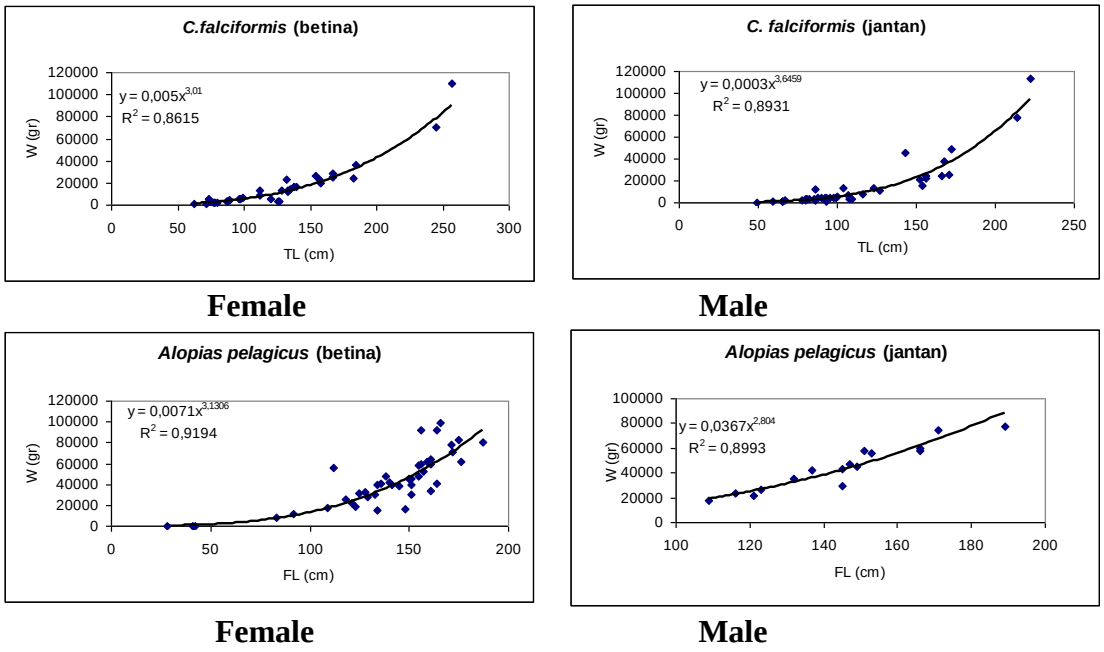


Figure 3. Length-weight relationship of dominan species of shark in Indian Ocean at southern part of Java waters

Sex ratio is a number that indicates the ratio of individual male to female in a population. According to Ball and Rao (1984), naturally in a normal waters estimated comparison female and male is 1:1. During the study, the number of female shark is more than male shark (Table 2).

Table 2. Sex ratio of sharks in Indian Ocean at southern part of Java waters

FAMILY	SPECIES	FEMALE	MALE	TOTAL
Alopiidae	*Alopias pelagicus*	76	31	107
	Alopias superciliosus	28	28	56
Alopiidae Total		104	59	163
Carcharhinidae	*Carcharhinus brevipinna*	37	32	69
	Carcharhinus falciformis	54	59	113
	Carcharhinus leucas	15	7	22
	Carcharhinus longimanus	3	3	6
	Carcharhinus plumbeus	2	1	3
	Carcharhinus sorrah	95	89	184
	Galeocerdo cuvier		1	1
	Prionace glauca		13	13
Carcharhinidae Total		206	205	411
Centrophoridae	*Centrophorus moluccensis*	14	6	20

	Centrophorus squamosus	10	3	13
Centrophoridae Total		24	9	33
Chimaeridae	*Hydrolagus cf lemures*	3		3
Chimaeridae Total		3		3
Hemiscyllidae	*Chiloscyllium punctatum*		3	3
Hemiscyllidae Total			3	3
Hexanchidae	*Heptranchias perlo*	4		4
	Hexanchus griseus	1		1
	Hexanchus nakamurai	7	5	12
Hexanchidae Total		12	5	17
Lamnidae	*Isurus oxyrinchus*	6	10	16
	Isurus paucus	1	3	4
Lamnidae Total		7	13	20
Pseudocarchariidae	*Pseudocarcharias kamoharai*	3	3	6
Pseudocarchariidae Total		3	3	6
Rhinobatidae	*Rhinobatos sp. 1*	3	3	6
	Rhinobatos sp. 2	21		21
Rhinobatidae Total		24	3	27
Sphyrnidae	*Sphyrna lewini*	56	15	71
	Sphyrna zygaena	5	3	8
Sphyrnidae Total		61	18	79
Squalidae	*Centroscymnus crepidater*	3	8	11
	Squalus hemipinnis	25	1	26
	Squalus megalops	130	55	185
Squalidae Total		158	64	222
Squatinidae	*Squatina sp.1*	14	23	37
Squatinidae Total		14	23	37
Triakidae	*Mustelus cf manazo*	14	7	21
Triakidae Total		14	7	21
TOTAL		630	412	1042

Based on chi-square test, the ratio between female and male significantly different from the ideal ratio of 1: 1. The ratio showed that the number of shark in Indian Ocean was more females than male. The situation could be caused by a comparison of male and female sex ratio at birth. Comparison of male and female at birth may have been an important indicator of the reproductive process of a fish population (Anonymous, 2005). Furthermore, according to Brykov *et al*. (2008) the sex ratio was related to the amount of fish produced in the next generation and as a population control measure. Effendie (2002)

stated that with the imbalance ratio between male and female, the likelihood of fertilization of an egg by sperm increased.

CONCLUSSION

1. The species composition of sharks in Indian Ocean at southern part of Java consisted of 29 species and dominated by *Alopias pelagicus* for about 38 %.
2. Legth-weight relationship of sharks in Indian Ocean at southern part of Java showed the strong correlation between length and weight with r value more than 0,8
3. Sex ratio of shark in Indian Ocean at southern part of Java was not balance with the number of female more than male.

REFRENCES

Anonymous, 2005. Preclude to intersex in fish. Identifying sensitive period for feminization. Environmental Health Perspective. Vol. 113. No. 10. October 2005. Ehp. Niehs.nih.gov/docs/2005/113-10/EHP113pa686PDF.PDF.A686.

Bal, D. V. and K.V. Rao. 1984. Marine Fisheries. Ata Mc Graw-Hill Publ. Co. Ltd. , New Delhi. 470 p.

Brykov, A. , D. Kukhlevsky, E.A. Shevlyakov, N. M. Kinas &L.O. Zavarnia. 2008. Sex ratio control in pink Salmon (*Oncorhynchus gorbuscha* and Chum Salmon (O.keta) populations the possible causes and mechanisms of changes in the sex ratio. Russian Journal of Genetics. Vol. 44. No. 7. High Beam. com/journal_Research..www.sprngerlinkcom/index/y71t62764q10661k.pdf.p.786 -792.

Chodrijah, U. *et al.*, 2010. Riset sumber daya ikan cucut di Samudera Hindia Selatan Jawa WPP 573. Balai Riset Perikanan Laut, Pusat Penelitian Pengelolaan Perikanan dan Konservasi Sumber Daya Ikan, Badan Litbang Kelautan dan Perikanan, Jakarta.

Effendie, I.M. 2002. *Fisheries Biology*. Yayasan Pustaka Nusantara. Yogyakarta. 163 p.

Naamin, N., B. Sumiono, S. Ilyas, D. Nugroho, B. Iskandar PS, H.R. Barus, M. Badrudin, A. Suman dan E.M. Amin, 1992. Pedoman teknis pemanfaatan dan pengelolaan sumber daya udang penaeid bagi pembangunan perikanan. Seri Pengembangan Penelitian Perikanan No. PHP/KAN/PT/22/1992. Badan Penelitian dan Pengembangan Pertanian : 86 hal.

Sparre, P. and S.C. Venema, 1992. Introduction to tropical fish stock assesment. Part I. Manual. FAO Fish Tech. Pap. No. 306/1.