

CHAPTER III



RESULTS

During August 1991 to April 1992, four sampling periods were conducted, under the consideration on the impact of Northeast and Southwest monsoons in the Gulf of Thailand. This study was treated into 3 parts : reef fish community; seagrass fish community; migration of fishes between the coral reef and seagrass bed and their feeding habits.

Coral Reef Fish Community

A total of 76 species belonging to 21 families of fishes were identified from the 150 meters transect lines in January and April 1992 (Table 2). Fifteen species of target species from 4 families which included 2 species of Haemulidae, 1 species of Lethrinidae, 4 species of Lutjanidae and 8 species of Serranidae. The indicator species namely Chaetodontidae, 3 species were found, Eight - banded butterflyfish *Chaetodon octofasciatus*, Weiber 's butterflyfish *Chaetodon weibeli* and Beaked butterflyfish *Chelmon rostratus*. The major families composed of 16 families, the major ones were, Apogonidae, Holocentridae, Labridae, Nemipteridae, Pomacentridae, Scaridae, Siganidae, etc. Almost all of fishes observed were of large sizes or adult stage.

Abundance, species richness and species composition

The abundance and species richness of fishes between the 2 sampling periods, January and April 1992, are given in Table 3. Comparing the abundance and species richness of fishes in all categories found to be both higher in April than January (Fig. 4 and 5). There were no differences in the dominant species found in the 2 sampling periods. The target species composed of the snappers (Lutjanidae), Spanishflag snapper *Lutjanus carponotatus* and Moses snapper *L. russelli* respectively,

were the most abundant and followed by the small groupers (Serranidae), Brown-barred grouper *Cephalopholis boenack* and Blue lined grouper *C. formosa*. The indicator species was dominated by Eight-banded butterflyfish, *Chaetodon octofasciatus* and followed by Beaked butterflyfish *Chelmon rostratus*. These chaetodontid fishes were commonly found in both month collections. The Weiber's butterflyfish *Chaetodon weibili* was rare and found only in April. Among the major families or other species, the damselfishes (Pomacentridae) was the most dominant in term of abundance and species richness. The other dominant were wrasses (Labridae), squirrelfishes (Holocentridae), cardinalfishes (Apogonidae), parrotfishes (Scaridae) and rabbitfishes (Siganidae).

Although there was a wide range in species richness of fishes recorded in January (60 species) and April (70 species) but there was no marked different in species composition between the 2 sampling periods since 55 species were commonly found in both months. The quantitative fish similarity index was of 0.84. The diversity index (H') of fish recorded in January and April were 3.0643 and 3.373 (Table 3).

Table 2 Fishes recorded from coral reef at Nai - Wog Bay, Ko Pha - Ngan in January and April, 1992 (number/150 m. transect).

SCIENTIFIC NAME	January	April	Estimated length(cm.) or Life history
TARGET SPECIES			
Serranidae (Groupers)			
<i>Cephalopholis argus</i>	3		15 - 20
<i>Cephalopholis boenack</i>	2	6	10 - 20
<i>Cephalopholis formosa</i>		2	20 - 25
<i>Cephalopholis miniatus</i>	2	2	20
<i>Epinephelus fasciatus</i>	2	2	25 - 30
<i>Epinephelus malabaricus</i>		1	30
<i>Epinephelus quoyanus</i>	3	3	20 - 30
<i>Plectopomus maculatus</i>	1	3	30 - 40
Lutjanidae (Snappers)			
<i>Lutjanus carponotatus</i>	10	62	25 - 30
<i>Lutjanus decussatus</i>	3	7	30
<i>Lutjanus russelli</i>	2	32	30
<i>Lutjanus vitta</i>	10	13	20
Haemulidae (Grunts)			
<i>Plectorhinchus chaetodonoides</i>	2	5	5 - 10
<i>Plectorhinchus pictus</i>		5	30 - 40
Lethrinidae (Emperors)			
<i>Lethrinus lentjan</i>		13	20 - 30
INDICATOR SPECIES			
Chaetodontidae (Butterflyfishes)			
<i>Chaetodon octofasciatus</i>	20	24	J/A
<i>Chaetodon weibeli</i>		3	A
<i>Chelmon rostratus</i>	7	15	A
MAJOR FAMILIES			
Dasyatidae (Stingrays)			
<i>Taeniura lymna</i>		1	A
Holocentridae (Squirrelfishes)			
<i>Myripristes murdjan</i>	2		A
<i>Sargocentron rubrum</i>	5	5	A
Gramistridae (Soapfishes)			
<i>Diploprion bifasciatus</i>	3	3	A
Apogonidae (cardinalfishes)			
<i>Apogon cyanosoma</i>	2	4	A
<i>Apogon guamensis</i>	4	2	A
<i>Apogon fasciatus</i>	2		A
<i>Cheilodipterus quinquelineatus</i>	5	5	A

Table 2 (continued).

SCIENTIFIC NAME	January	April	Estimated length(cm.) or Life history
Caesionidae (Fusiliers)			
<i>Caesio xanthonotus</i>	3	5	A
Nemipteridae (Monocle beams)			
<i>Scolopsis ciliatus</i>	3	4	A
<i>Scolopsis margaritifer</i>	3	3	A
<i>Scolopsis vosmeri</i>	2	3	A
Mullidae (Goatfishes)			
<i>Parupeneus indicus</i>		2	A
<i>Upeneus tragula</i>	3	3	J/A
Pempheridae (Sweepers)			
<i>Pempheris oualensis</i>	3	4	A
Pomacanthidae (Anglefishes)			
<i>Pomacanthus annularis</i>		1	A
Pomacentridae (Damsel-fishes)			
<i>Abudefduf bengalensis</i>	2	3	A
<i>Abudefduf sexfasciatus</i>	2	4	A
<i>Amblyglyphidodon curacao</i>		4	A
<i>Amphrion periderarion</i>	2	3	A
<i>Chromis atripectoralis</i>	5	5	A
<i>Chromis fumeus</i>	2		A
<i>Chromis viridis</i>	2	2	A
<i>Dasyllus reticulatus</i>	3	3	A
<i>Dasyllus trimaculatus</i>		3	A
<i>Hemiglyphidodon plagiometapon</i>	2	2	A
<i>Neoglyphidodon melas</i>	2	3	J/A
<i>Neoglyphidodon nigroris</i>		2	J/A
<i>Neopomacentrus cyanomos</i>	3	3	A
<i>Plectoglyphidodon lacrymatus</i>	3	3	A
<i>Pomacentrus chysurus</i>	4	4	A
<i>Pomacentrus coelestris</i>	3	4	A
<i>Pomacentrus moluccensis</i>	2	3	A
<i>Pomacentrus tripunctatus</i>	4	4	A
<i>Stegetis apicalis</i>	2	3	A
Sphyraenidae (Barracudas)			
<i>Sphyraena obtusata</i>	3	5	A

Table 2 (continued).

SCIENTIFIC NAME	January	April	Estimated length(cm.) or Life history
Labridae (Wrasses)			
<i>Cheilinus chlorourus</i>	1	2	A
<i>Cheilinus fasciatus</i>		2	A
<i>Cherodon anchorago</i>	1	2	A
<i>Epibulus insidiator</i>		2	A
<i>Halichoeres argus</i>	2	3	A
<i>Halichoeres chloropterus</i>	4	4	A
<i>Halichoeres margariticeus</i>	2	2	A
<i>Halichoeres melunurus</i>	2	3	A
<i>Hemigymnus melapterus</i>	2	2	A
<i>Labroides dimidiatus</i>	2		A
<i>Thalassoma lunre</i>	2	2	A
Scaridae (Parrotfishes)			
<i>Scarus frenatus</i>		2	A
<i>Scarus ghobban</i>	2	3	J/A
<i>Scarus rivulatus</i>	5	5	A
Gobiidae (Gobies)			
<i>Pteriotris sp.</i>	4	4	A
<i>Goby species</i>	1	2	A
Siganidae (Rabbitfishes)			
<i>Siganus guttatus</i>	3	4	A
<i>Siganus javus</i>	2	2	A
<i>Siganus virgatus</i>	4	4	A
Didontidae (Percupinefishes)			
<i>Diodon liturosus</i>	1	1	A

Table 3 Species richness, abundance and diversity index (H') of fishes recorded from coral reef at Nai - Wog Bay, Ko Pha-Ngan in January and April, 1992.

	January 1992	April 1992
Species richness (M')		
Target species	11	14
Indicator species	2	3
Major families	47	53
Total	60	70
Abundance (N')		
Target species	40	155
Indicator species	27	58
Major families	274	1685
Total	1041	1871
Diversity index (H')	3.064	3.373

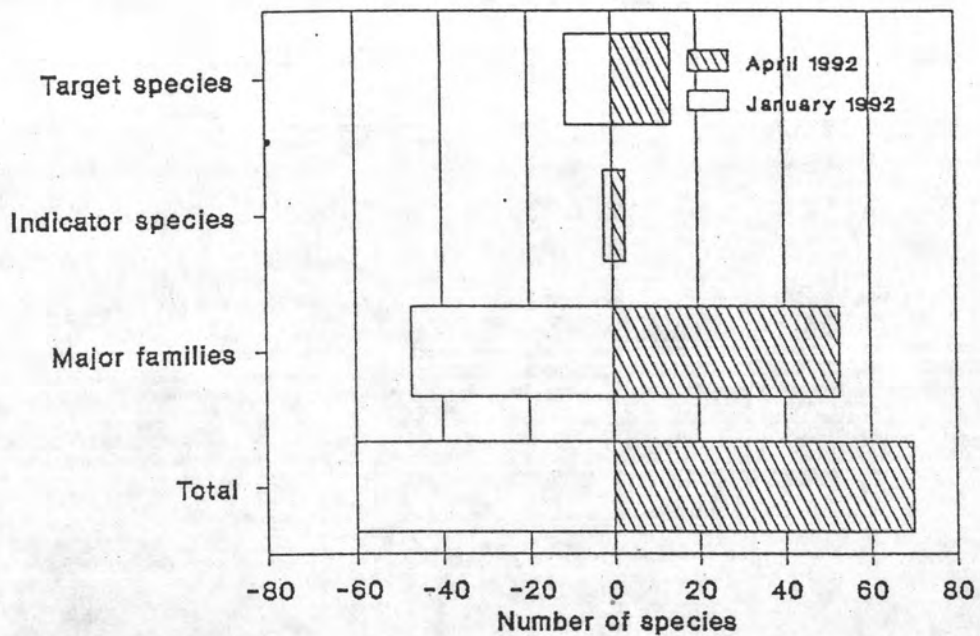


Figure 4. Species richness of fishes recorded from coral reef at Nai - Wog Bay, Koh Pha - Ngan in January and April 1992.

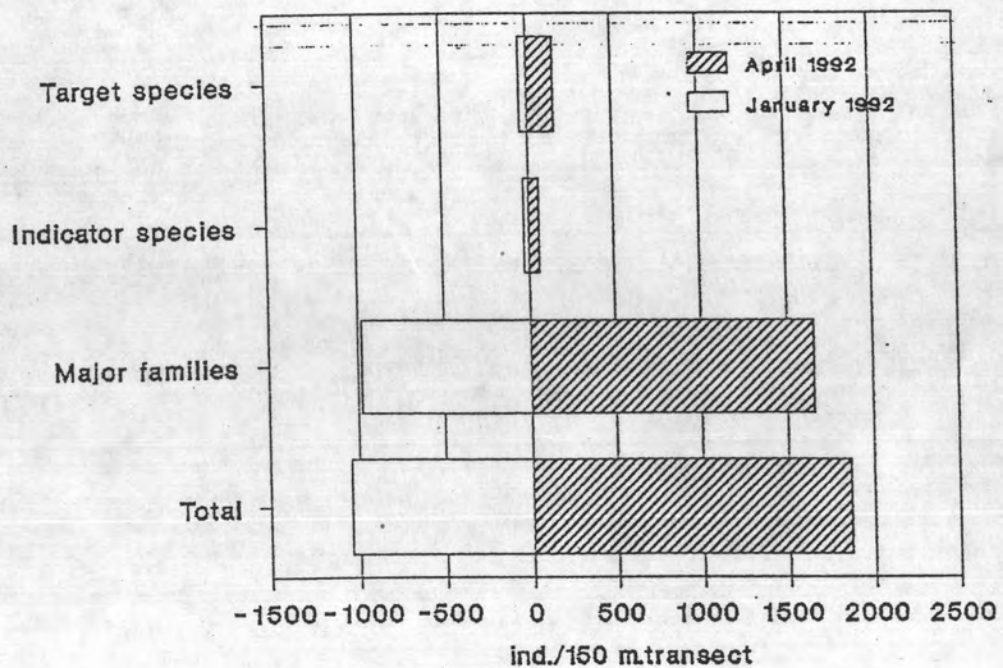


Figure 5. Abundance of fishes recorded from coral reef at Nai - Wog Bay, Koh Pha - Ngan in January and April 1992.

Seagrass Fish Community

Day and night samples were taken from the seagrass bed by beam trawl. A total of 1,448 individuals representing 22 species of fishes from 19 families were identified (Table 4) of which 597 and 851 individuals were the day and night samples collected. Several fish species were found only in day samples, i.e. Pastel - green wrassefish *Halichoeres chloropterus*, Double barred rabbitfish *Siganus virgatus*, Beaked butterflyfish *Chelmon rostratus* and Carpet eel blenny *Congrogadus subuducens*, and some species, Redcoat squirrelfish *Sargocentron rubrum*, Guam cardinalfish *Apogon guamensis* and Sand bass *Psammoperca waigiensis*, were found at night. Many species were found from both day and night samples, i.e. Fourlined terapon *Pelates quadrilineatus*, Oyena mojarras *Gerres oyena*, Seagrass rabbitfish *Siganus canaliculatus*, Emperor *Lethrinus lentjan*, Spanishflag snapper *Lutjanus carponotatus* and Moses snapper *Lutjanus russelli*. The most abundant fish collected was *P. quadrilineatus*, next to that were *G. oyena*, *S. canaliculatus* and *Lethrinus lentjan*. Almost all of the fishes collected were of the small size or juvenile stage (Fig. 6).

Variation in abundance

There were significant differences in abundance of fishes collected between the day and night samples. The night samples were found more abundant than the day samples (Table 5 and Fig. 7). The abundance of fish was higher at the beginning of the year, January and April but lesser toward the end of the year, August and October (Table 5 and Fig. 8).

Table 4 Fishes collected from the seagrass bed during the day and night from August 1991-April 1992 (ind./trawl).

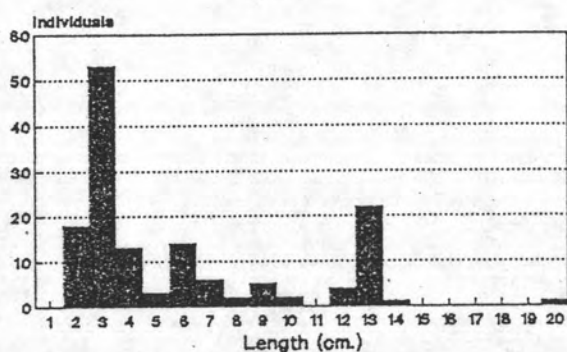
SCIENTIFIC NAME	AUGUST			OCTOBER			JANUARY			APRIL		
	DAY	NIGHT	TOTAL	DAY	NIGHT	TOTAL	DAY	NIGHT	TOTAL	DAY	NIGHT	TOTAL
	No.	No.	No. %	No.	No.	No. %	No.	No.	No. %	No.	No.	No. %
<i>Atherinomoron duodecimalis</i>		2	1.5	3	3	2.3	15	13	28	2	7	9
<i>Sargocentron rubrum</i>		2	1.5	2	2	1.5	1		1		3	
<i>Psammoperca waigiensis</i>		1	0.7								1	
<i>Congrogadus subducens</i>	1	1	0.7	1	1	0.8	1	1	1	1	1	
<i>Pelates quadrilineatus</i>	10	34	32.1	18	29	35.3	40	40	101	71	248	
<i>Apogon guamensis</i>		2	1.5	3	3	2.3	2		2		1	
<i>Lutjanus carponotatus</i>										3	5	
<i>Lutjanus russelli</i>	8	10	13.1	5	13	13.5	110	21	245	18	35	
<i>Gerres oyena</i>									50	22	40	
<i>Lethrinus lentjan</i>									17	2	1	
<i>Scolopsis ciliatus</i>	2	3	3.6	3	4	5.3	7	1	1	6	5	
<i>Upeneus tragula</i>									4	1	1	
<i>Chelmon rostratus</i>	1	1	0.7	1	1	0.8	4	4	4	2	2	
<i>Halichoeres chloropterus</i>									4	2	8	
<i>Sphyræna obtusata</i>	6	18	17.5	3	5	6.0	4	4	8	8	11	
<i>Petroscirtes lupus</i>	2	5	5.1	7	7	10.5	42	18	60	70	139	
<i>Siganus canaliculatus</i>									3	14	14	
<i>Siganus virgatus</i>	2	6	5.8	3	4	5.3	6	4	10	9	20	
<i>Acreichthys tomentosus</i>	1	1	1.5	3	3	4.5	3	5	8	3	8	
<i>Monocanthus chinensis</i>	8	12	14.6	3	6	6.8	5	6	11	5	13	
<i>Chelonodon potoca</i>									1		1	
<i>Diodon liturosus</i>									1		1	
TOTAL	41	96	100.0	54	79	100.0	262	293	555	240	383	623
		137		133			100.0		100.0			100.0

Table 5 Species richness, abundance and diversity index (H') of fishes collected from seagrass bed at Pha-Ngan Island during the day and night, August 1991- April 1992.

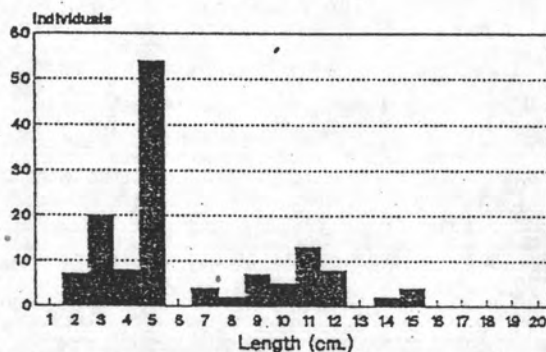
Sampling period	No. of species	Abundance	Diversity Index (H')
August 1991			
Day samples	10	41	1.977
Night samples	12	96	1.950
Total	14	137	2.011
October 1991			
Day samples	11	54	2.067
Night samples	11	79	2.018
Total	14	133	2.139
January 1992			
Day samples	15	262	1.865
Night samples	14	293	1.727
Total	18	555	1.823
April 1992			
Day samples	17	240	2.038
Night samples	17	383	1.786
Total	21	623	1.934



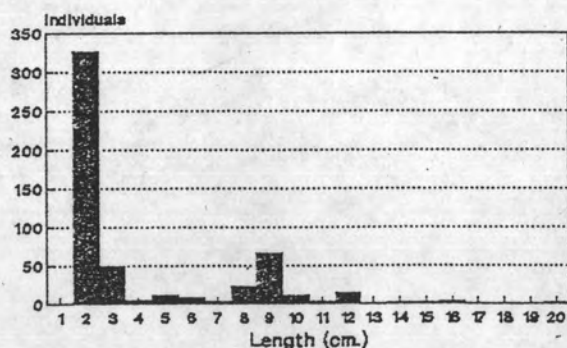
Length frequency distribution
August 1991



Length frequency distribution
October 1991



Length frequency distribution
January 1992



Length frequency distribution
April 1992

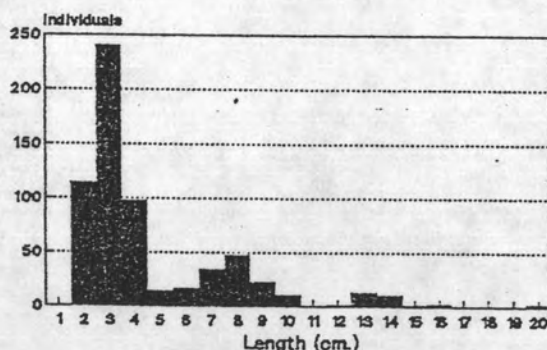


Figure 6. Length frequency distribution of fishes collected from seagrass bed at Nai - Wog Bay, Koh Pha - Ngan from August 1991 - April 1992.

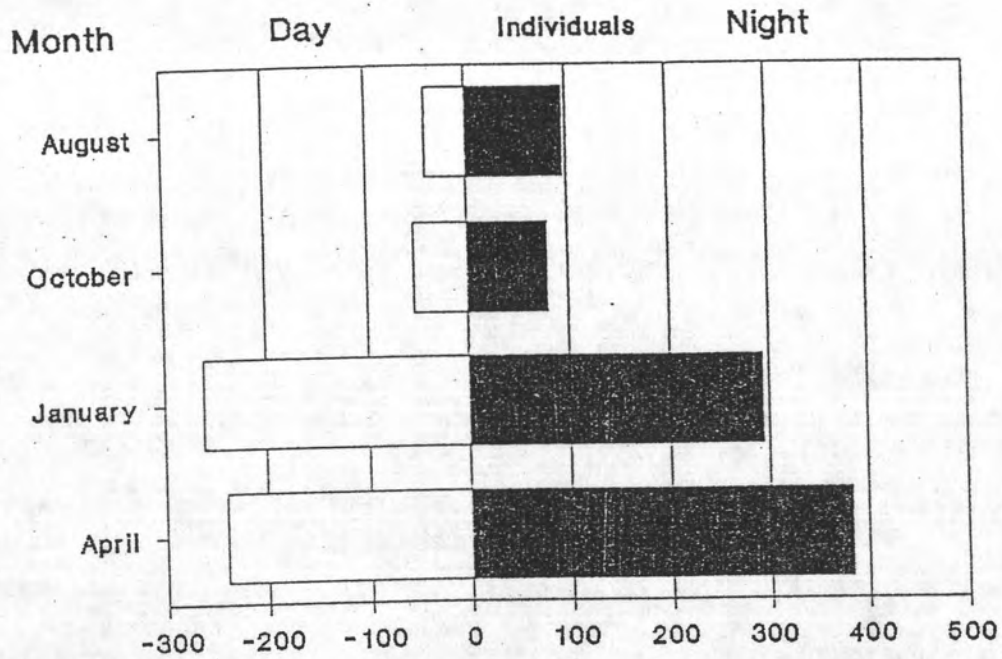


Figure 7. Abundance of fishes collected day and night from seagrass bed at Nai - Wog Bay, Koh Pha - Ngan from August 1991 - April 1992.

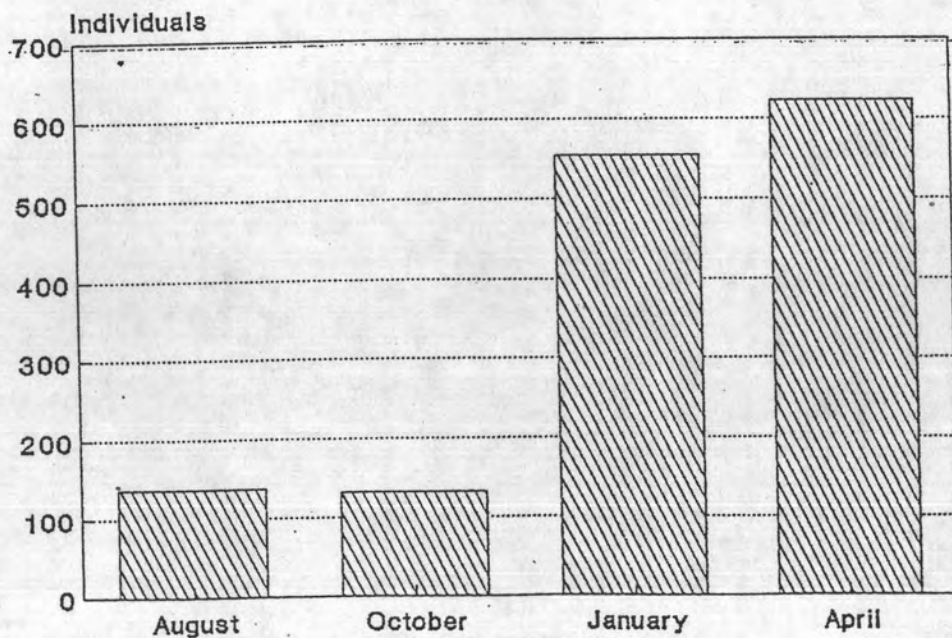


Figure 8. Total abundance of fishes collected from seagrass bed at Nai - Wog Bay, Koh Pha - Ngan from August 1991 - April 1992.

In August 1991, a total of 137 individuals composed of 14 species belonging to 13 families were indentified (Table 4 and 5). The day samples which 41 individuals from 10 species of 9 families were collected, *Pelates quadrilineatus* was the most abundant species, making up to 24 % of the catch, and follwed by *Oyena mojarrs Gerres oyena* (20 %) and Puffers *Chelonodon potoca* (20 %) (Fig. 9). The night sample composed of 96 individuals representing 12 species of 11 families were collected. The most abundant fish was *P. quadrilineatus* (35 %), and followed by *Petroscirtes lupus* (19 %) and *C. potoca* (12 %) (Fig. 9). The diversity index was of 2.011.

In October 1991, a total 133 individuals composed of 14 species belonging to 12 families were indentified (Table 4 and 5). The day sample which 54 individuals from 11 species of 9 families were collected *P. quadrilineatus* was also the most abundant fish (33 %) and followed by *Siganus canaliculatus* (13 %) and *Siganus virgatus* (13 %) (Fig. 10). The night sample composed of 79 individuals from 11 species of 10 families. The most abundant fish was also *P. quadrilineatus* (37 %) and followed by *G. oyena* (16 %) and *S. canaliculatus* (9 %) (Fig. 10). The diversity index was of 2.1390.

In January 1992, a total of 555 individuals representing 19 species representing 16 families were identified (Table 4 and 5). The day sample which 262 individuals from 15 species of 13 families were recored, *G. oyena* was the most abundant species, making up to 42 % of the catch and followed by *S. canaliculatus* (16 %) and *P. quadrilineatus* (15 %) (Fig. 11). The night sample which 293 individuals from 14 species of 13 families were found. The most abundant fish, *G. oyena*, was found to be 48% of the catch, followed by *P. quadrilineatus* (22%) and *Lethrinus lentjan* (10 %) (Fig. 11). The diversity index was of 1.7247.

X 1.823

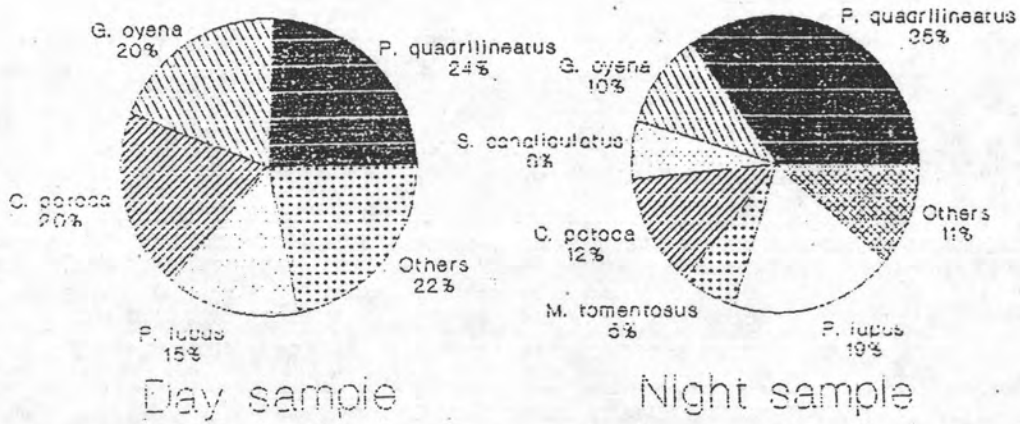


Figure 9. Dominant fishes collected day and night from seagrass at Nai - Wog Bay, Koh Pha - Ngan in August 1991.

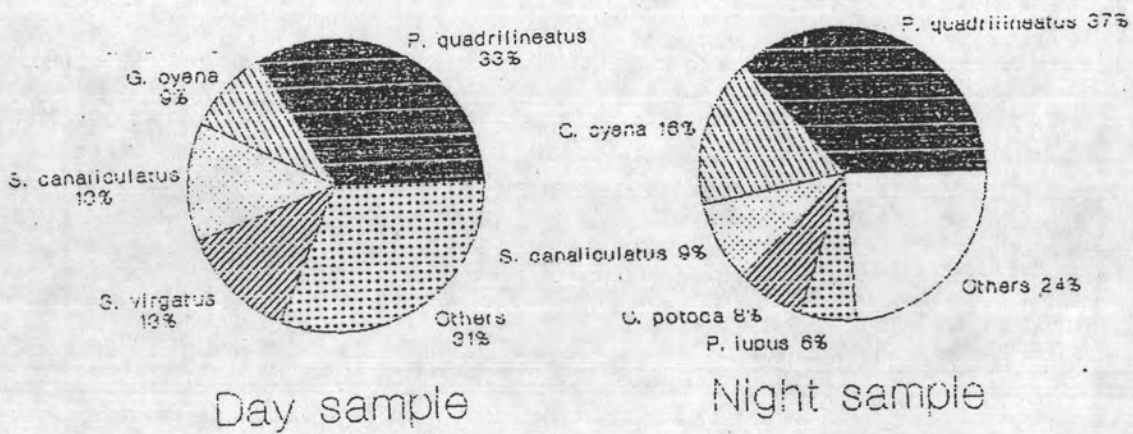


Figure 10. Dominant fishes collected day and night from seagrass at Nai - Wog Bay, Koh Pha - Ngan in October 1991.

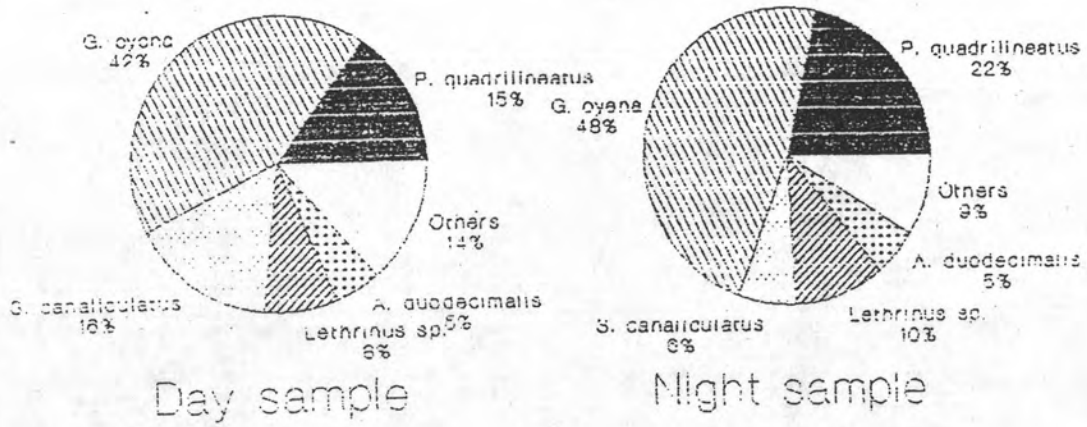


Figure 11. Dominant fishes collected day and night from seagrass at Nai - Wog Bay, Koh Pha - Ngan in January 1992.

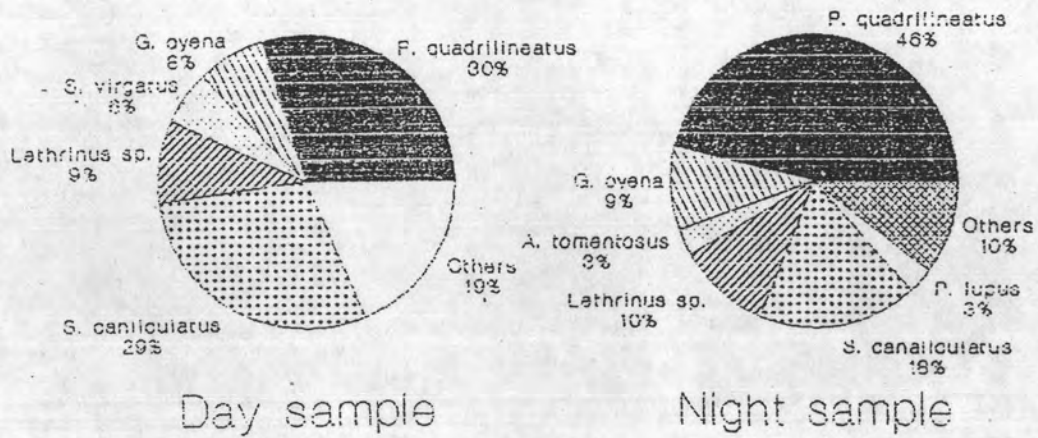


Figure 12. Dominant fishes collected day and night from seagrass at Nai - Wog Bay, Koh Pha - Ngan in April 1992.

In April 1992, a total of 623 individuals from 21 species representing 18 families were identified (Table 4 and 5). The day sample which 240 individuals from 17 of 14 families species were collected, the most abundant fish was *P. quadrilineatus* which making up to 30 % of the catch followed by *S. canaliculatus* (29 %) and *Lethrinus lentjan* (9 %) (Fig. 12). The night sample composed of 383 individuals from 17 species of 15 families. *P. quadrilineatus* was the most abundant fish (46 %), followed by *Siganus canaliculatus* (18 %) and *L. lentjan* (10 %) (Fig. 12). The diversity index was of 1.9340.

Variation in species richness and species composition

From Table 5, there was no marked differences in species richness of fishes collected between the day and night samples, which ranged from 11 to 17 species. Species richness remained the same in August and October, and then increased in January and more in April. The trend was very similar in the increased in abundance.

The comparison in species composition of fishes collected between day and night samples during the entire sampling period are given in Table 6. During January and April, there were high similarity index of ~~fish species composition between day and night samples.~~ For the day samples and night samples comparison, high fish similarity index were found between August and October. From the dendrogram of dissimilarity as showed in Figure 13, clearly differences in species composition of fishes collected between August - October and January - April. There were no differences in species composition between day and night samples in January and April while in August and October, there were remarkably found.

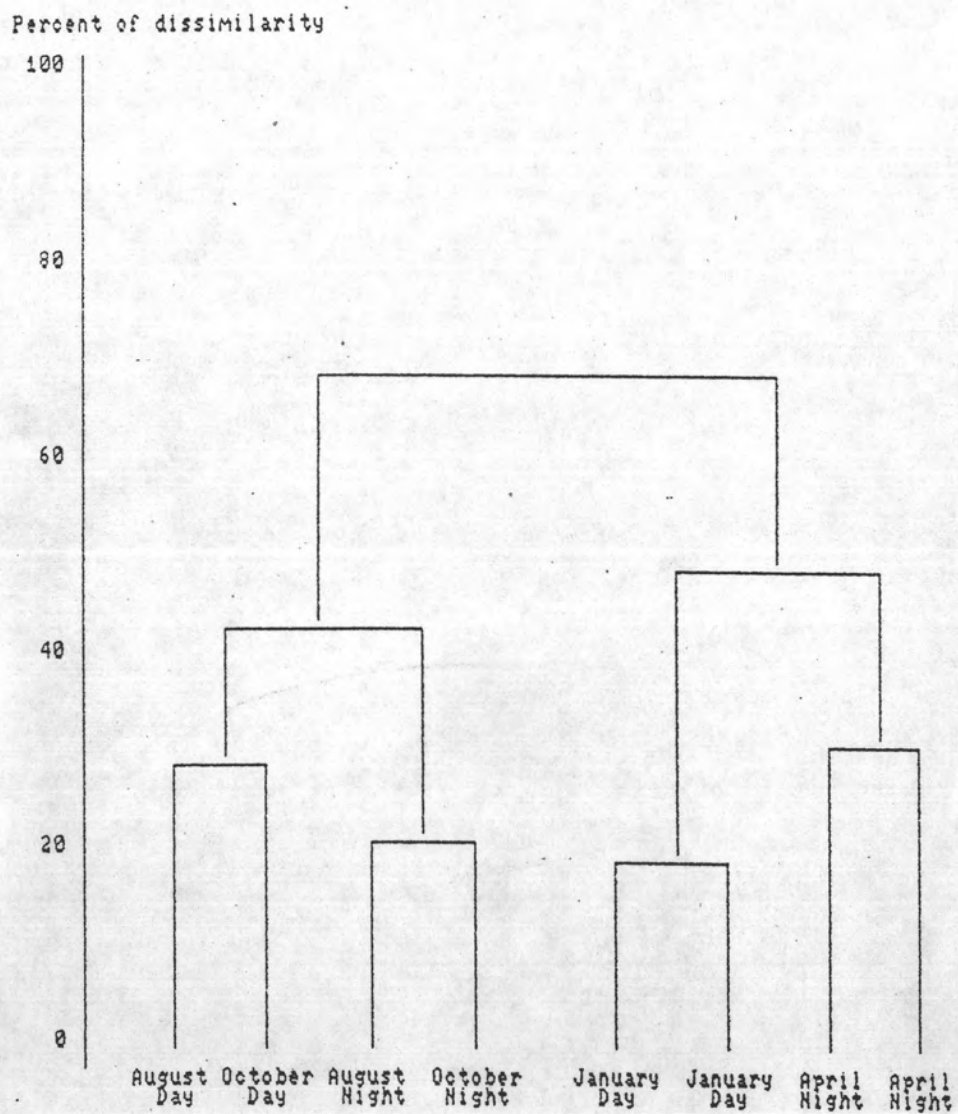


Figure 13. Dendrogram of percent of dissimilarity coefficient of fishes collected from seagrass bed between day and night at Nai - Wog Bay, Koh Pha - Ngan from August 1991 - April 1992.

Migration of Fishes Between the Coral Reef and Seagrass Bed

Gillnets were staked at the edge of seagrass bed in the adjacent area of the coral reef for collecting the fishes migrated between these habitats during the different time of the day through out the year. A total of 1,421 individuals of 49 species belonging to 30 families of fishes were identified (Table 7,8,9,10). The day sampling period, 06.00 - 18.00, collected many families of fishes were collected, i.e. Labridae, Pomacentridae, Chaetodontidae, Serranidae and Siganidae. For the night sampling period, 18.00 - 06.00, collected several other families, i.e. Holocentridae, Apogonidae, Atherinidae, Lutjanidae and Lethrinidae etc. However, few families were found during both the day and night sampling periods, i.e. Gerreidae, Mullidae and Nemipteridae. The Pastel - green wrassefish *Halichoeres chloropterus* and Threespot damselfish *Pomacentrus tripunctatus* of the families Labridae and Pomacentridae were the most abundant species of the day samples, while Redcoat squirrelfish *Sargocentron rubrum* of the family Holocentridae was the most abundant fish of the night samples and followed by Guam cardinalfish *Apogon guamensis* and Tropical silverside, *Atherinomorus duodecimalis* of the families Apogonidae and Atherinidae.

Variation in abundance and species richness

The difference in species richness of fishes collected between day and night time were found no consistency, but the night samples usually found with higher species richness than the day samples (Table 11). In whole species richness, there were no significant peak during the sampling period. The range was about 32 - 33 species with exception in October, when 26 species were only collected (Fig. 14).

The day samples were mostly found more abundant than the night samples. The total abundance were higher in January and April and lower in August and October (Fig. 14). During the day and night sampling

Table 7 Fishes collected from the edge of seagrass bed adjacent to the coral reef at Nai - Wog Bay, using gillnets among the various time in August 1991 (ind./270sq.m.net/ 6hrs).

SCIENTIFIC NAME	DAY SAMPLING PERIOD							NIGHT SAMPLING PERIOD							TOTAL		
	1200		1800		TOTAL			2400		0600		TOTAL			No.	(%)	
	I	X	I	X	I	X	Total	I	X	I	X	I	X	Total			
<i>Taeniura lymna</i>																	
<i>Plotosus canius</i>																	
<i>Halophryne diemensis</i>																	
<i>Hemirhamphus far</i>																	
<i>Hyporhamphus quoyi</i>								4	2	1	3	5	5	10	10	3.4	
<i>Tylosaurus crocodilus</i>									1					1	1	0.3	
<i>Atherinomorus duodecimalis</i>								2	1	1	4	3	5	8	8	2.7	
<i>Sargocentron rubrum</i>								30	16		20	30	36	66	66	22.3	
<i>Scorpaenopsis oxycephala</i>	2	1	1	1	3	2	5								5	1.7	
<i>Synanceia horrida</i>	1	1			1	1	2								2	0.7	
<i>Psammoperca waigiensis</i>								4			4	4	4	8	8	2.7	
<i>Epinephelus quoyanus</i>	1			2	1	2	3								3	1.0	
<i>Diploprion bifasciatus</i>																	
<i>Congrogadus subducens</i>	1				1		1								1	0.3	
<i>Pelates quadrilineatus</i>																	
<i>Apogon guamensis</i>								12	6	1	9	13	15	28	28	9.5	
<i>Apogon cyanosoma</i>																	
<i>Cheilodipterus quinquelineatus</i>																	
<i>Lutjanus carponotatus</i>								5	1	1	1	6	2	8	8	2.7	
<i>Lutjanus russelli</i>								1				1		1	1	0.3	
<i>Gerres abbreviatus</i>											1			1	1	0.3	
<i>Gerres oyena</i>	5	2		2	5	4	9	1	2	5	3	6	5	11	20	6.8	
<i>Sillago sihama</i>										1				1	1	0.3	
<i>Lethinus lentjan</i>								2	1	1	2	3	3	6	6	2.0	
<i>Scolopsis ciliatus</i>			2		2		2	1		1		2		2	4	1.4	
<i>Scolopsis margaritifer</i>																	
<i>Upeneus tragula</i>	5	1	3	2	8	3	11	3	6	1	1	4	7	11	22	7.4	
<i>Pempheris ovalensis</i>												1		1	1	0.3	
<i>Chelmon rostratus</i>	4			3	4	3	7								7	2.4	
<i>Abudefduf bengalensis</i>																	
<i>Pomacentrus tripunctatus</i>	6	2		13	6	15	21								21	7.1	
<i>Cheilinus chlorourus</i>			1		1		1								1	0.3	
<i>Halichoeres argus</i>		2	2	6	2	8	10								10	3.4	
<i>Halichoeres chloropterus</i>	8	4	3	19	11	23	34								34	11.5	
<i>Halichoeres margaritaceus</i>																	
<i>Halichoeres poecilopterus</i>				1		1	1								1	0.3	
<i>Sphyaena obtusata</i>																	
<i>Valenciana sp.</i>																	
<i>Siganus canaliculatus</i>			2	2	2	2	4								4	1.4	
<i>Siganus guttatus</i>			1	1	1	1	2								2	0.7	
<i>Siganus javus</i>	1			1	1	1	2								2	0.7	
<i>Siganus punctatus</i>																	
<i>Siganus virgatus</i>	2			2	2	2	4								4	1.4	
<i>Paradachirus pavoninus</i>		1				1	1								1	0.3	
<i>Acreichthys tomentosus</i>																	
<i>Monocanthus chinensis</i>	5	2	1	4	6	6	12								12	4.1	
<i>Diodon liturosus</i>										1				1	1	0.3	
TOTAL	41	16	16	59	57	75	132	66	38	12	48	78	86	164	296	100.0	

REMARK I = No. of fishes entering the seagrass bed
X = No. of fishes leaving the seagrass bed



Table 8 Fishes collected from the edge of the seagrass bed adjacent to the coral reef at Bai - Wog Bay, using gillnets among the various time in October 1991 (ind./270 sq.m.net/6 hrs.).

SCIENTIFIC NAME	DAY SAMPLING PERIOD						NIGHT SAMPLING PERIOD						TOTAL			
	1200		1800		TOTAL		2400		0600		TOTAL		No.	(%)		
	I	X	I	X	I	X	Total	I	X	I	X	Total				
<i>Taeniura lymna</i>							2					2	2	0.7		
<i>Plotosus canius</i>								1				1	1	0.3		
<i>Halophryne diemensis</i>									1		1	1	1	0.3		
<i>Hemirhamphus far</i>									1		1	1	1	0.3		
<i>Hyporhamphus quoyi</i>																
<i>Tylosaurus crocodilus</i>																
<i>Atherinomorus duodecimalis</i>							3	1	1	4	4	5	9	9	3.1	
<i>Sargocentron rubrum</i>							20	13	11	19	31	32	63	63	21.8	
<i>Scorpaenopsis oxycephala</i>	2				2		2						2	0.7		
<i>Synanceia horrida</i>																
<i>Psammoperca waigiensis</i>				1	1	1	2						2	0.7		
<i>Epinephelus quoyanus</i>	1					1	1						1	0.3		
<i>Diploprion bifasciatus</i>						1							1	0.3		
<i>Congrogadus subducens</i>			1		1		1		1	2	1	2	3	4	1.4	
<i>Pelates quadrilineatus</i>																
<i>Apogon guamensis</i>							2			4	2	4	6	6	2.1	
<i>Apogon cyanosoma</i>									2			2	2	2	0.7	
<i>Cheilodipterus quinquelineatus</i>							4	1		2	4	3	7	7	2.4	
<i>Lutjanus carponotatus</i>																
<i>Lutjanus russelli</i>					1		1		4			4	4	5	1.7	
<i>Gerres abbreviatus</i>	1												6	2.1		
<i>Gerres oyena</i>	2	4			2	4	6									
<i>Sillago sihama</i>													5	5	1.7	
<i>Lethinus lentjan</i>							2			3	2	3	5	5	1.7	
<i>Scolopsis ciliatus</i>	2	6	2	4	4	10	14	1	3		2	1	5	6	20	6.9
<i>Scolopsis margaritifera</i>																
<i>Upeneus tragula</i>	3		1	3	4	3	7	2	1	1		3	1	4	11	3.8
<i>Pempheris ovalensis</i>													6	6	2.1	
<i>Chelmon rostratus</i>	3	2		1	3	3	6						1	1	0.3	
<i>Abudefduf bengalensis</i>				1	1	1	1									
<i>Pomacentrus tripunctatus</i>	7	3	2	9	9	12	21						21	7.3		
<i>Cheilinus chlorourus</i>													4	4	1.4	
<i>Halichoeres argus</i>	1		1	2	2	2	4						94	32.5		
<i>Halichoeres chloropterus</i>	18	12	19	45	37	57	94									
<i>Halichoeres margaritaceus</i>																
<i>Halichoeres poecilopterus</i>																
<i>Sphyræna obtusata</i>																
<i>Valenciænna sp.</i>																
<i>Siganus canaliculatus</i>																
<i>Siganus guttatus</i>						1	1						1	0.3		
<i>Siganus javus</i>																
<i>Siganus punctatus</i>													10	3.5		
<i>Siganus virgatus</i>	2	2		6	2	8	10									
<i>Paradachirus pavoninus</i>													2	0.7		
<i>Acreichthys tomentosus</i>	1		1		2		2						2	0.7		
<i>Monocanthus chinensis</i>			1	1	1	1	2									
<i>Diodon liturosus</i>																
TOTAL	43	29	28	75	71	104	175	36	26	16	36	52	62	114	289	100.0

REMARK: I = No. of fishes entering the seagrass bed

Table 9 Fishes collected from the edge of seagrass bed adjacent to the coral reef at Nai - Wog Bay, using gillnets among the various time in January 1992 (ind./270 sq.m.net/6 hrs.).

SCIENTIFIC NAME	DAY SAMPLING PERIOD						DAY SAMPLING PERIOD						TOTAL			
	1200		1800		TOTAL		2400		0600		TOTAL		No.	(%)		
	I	X	I	X	I	X	Total	I	X	I	X	Total				
<i>Taeniura lymna</i>																
<i>Plotosus canius</i>							1				3	1	3	4	4	0.9
<i>Halophryne diemensis</i>							1				1		1	1	1	0.2
<i>Hemirhamphus far</i>																
<i>Hyporhamphus quoyi</i>							3	5	4	2	7	7	14	14	14	3.3
<i>Tylosaurus crocodilus</i>																
<i>Atherinomorus duodecimalis</i>							11	3	3	26	14	29	43	43	43	10.0
<i>Sargocentron rubrum</i>							22	3	3	14	25	17	42	42	42	9.8
<i>Scorpaenopsis oxycephala</i>																
<i>Synanceia horrida</i>									1		1		1	1	1	0.2
<i>Psammoperca waigiensis</i>										1		1	1	1	1	0.2
<i>Epinephelus quoyanus</i>																
<i>Diploprion bifasciatus</i>				1		1	1								1	0.2
<i>Congrogadus subducens</i>	1			1	1	1	2								2	0.5
<i>Pelates quadrilineatus</i>	2		2		4	4	4								4	0.9
<i>Apogon guamensis</i>								14	2	1	13	15	15	30	30	7.0
<i>Apogon cyanosoma</i>										1	1	1	1	2	2	0.5
<i>Cheilodipterus quinquelineatus</i>							4		1	6	5	6	11	11	11	2.6
<i>Lutjanus carponotatus</i>							4	4		5	4	9	13	13	13	3.0
<i>Lutjanus russelli</i>																
<i>Gerres abbreviatus</i>				3		3	3		1				1	1	4	0.9
<i>Gerres oyena</i>	3	1		1	3	2	5	5	2			5	2	7	12	2.8
<i>Sillago sihama</i>																
<i>Lethinus lentjan</i>								6	1		5	6	6	12	12	2.8
<i>Scolopsis ciliatus</i>	1			2	1	2	3								3	0.7
<i>Scolopsis margaritifera</i>	3			4	3	4	7			3		3	3	10	2.3	
<i>Upeneus tragula</i>	5	3	7	8	12	11	23			1	6	1	6	7	30	7.0
<i>Pempheris ovalensis</i>										1		1	1	1	1	0.2
<i>Chelmon rostratus</i>	3			4	3	4	7							7	7	1.6
<i>Abudefduf bengalensis</i>																
<i>Pomacentrus tripunctatus</i>	8	4	1	15	9	19	28								28	6.5
<i>Cheilinus chlorourus</i>																
<i>Halichoeres argus</i>			2	5	2	5	7								7	1.6
<i>Halichoeres chloropterus</i>	34	5	4	43	38	48	86								86	20.1
<i>Halichoeres margaritaceus</i>	1			2	1	2	3								3	0.7
<i>Halichoeres poecilopterus</i>																
<i>Sphyræna obtusata</i>										1	1	1	1	2	2	0.5
<i>Valenciennea sp.</i>																
<i>Siganus canaliculatus</i>																
<i>Siganus guttatus</i>				1		1	1								1	0.2
<i>Siganus javus</i>	1			2	1	2	3								3	0.7
<i>Siganus punctatus</i>																
<i>Siganus virgatus</i>	4	1		1	4	2	6								6	1.4
<i>Paradachirus pavoninus</i>																
<i>Acreichthys tomentosus</i>	5	2	2	3	7	5	12	1		1	2	2	2	4	16	3.7
<i>Monocanthus chinensis</i>	3	3	5	8	8	11	19	2	2	1	2	3	4	7	26	6.1
<i>Diodon liturosus</i>								1	1			1	1	2	2	0.5
TOTAL	74	19	23	104	97	123	220	75	24	18	91	93	115	208	428	100.0

REMARK I = No. of fishes entering the seagrass bed

REMARK X = No. of fishes leaving the seagrass bed

Table 10 Fishes collected from the edge of seagrass bed adjacent to the coral reef at Nai - Wog Bay, using gillnets among the various time in April 1991 (ind./270 sq.m.net/6hrs).

SCIENTIFIC NAME	DAY SAMPLING PERIOD						NIGHT SAMPLING PERIOD						TOTAL			
	1200		1800		TOTAL		2400		0600		TOTAL		No.	(%)		
	I	X	I	X	I	X	Total	I	X	I	X	Total				
<i>Taeniura lymna</i>																
<i>Plotosus canius</i>																
<i>Halophryne diemensis</i>																
<i>Hemirhamphus far</i>																
<i>Hyporhamphus quoyi</i>			1	6	1	6	7						7	1.7		
<i>Tylosaurus crocodilus</i>																
<i>Atherinomorus duodecimalis</i>								14	1	2	19	16	20	36	36	8.8
<i>Sargocentron rubrum</i>								19	4	5	16	24	20	44	44	10.8
<i>Scorpaenopsis oxycephala</i>										1		1		1	1	0.2
<i>Synanceia horrida</i>																
<i>Psammoperca waigiensis</i>																
<i>Epinephelus quoyanus</i>	1			1	1	1	2								2	0.5
<i>Diploprion bifasicatus</i>																
<i>Congrogadus subducens</i>									1	1		1	1	2	2	0.5
<i>Pelates quadrilineatus</i>	6	3	1	1	7	4	11								11	2.7
<i>Apogon cyanosoma</i>																
<i>Apogon guamensis</i>								14	2	3	17	17	19	36	36	8.8
<i>Cheilodipterus quinquelineatus</i>																
<i>Lutjanus carponotatus</i>								3	1	1	4	4	5	9	9	2.2
<i>Lutjanus russelli</i>																
<i>Gerres abbreviatus</i>				1		1	1		1				1	1	2	0.5
<i>Gerres oyena</i>	3	2	1	3	4	5	9								9	2.2
<i>Sillago sihama</i>																
<i>Lethinus lentjan</i>								4	1	2	3	6	4	10	10	2.5
<i>Scolopsis ciliatus</i>	1	2	1	1	2	3	5		1				1	1	6	1.5
<i>Scolopsis margaritifer</i>				1		1	1			1		1		1	2	0.5
<i>Upeneus tragula</i>	3	4	1	4	4	8	12	1	1		2	1	3	4	16	3.9
<i>Pempheris ovalensis</i>																
<i>Chelmon rostratus</i>	2			2	2	2	4								4	1.0
<i>Abudefduf bengalensis</i>		1				1	1								1	0.2
<i>Pomacentrus tripunctatus</i>	14	4	5	18	19	22	41								41	10.0
<i>Halichoeres argus</i>		1	1		1	1	2								2	0.5
<i>Halichoeres chloropterus</i>	36	5	15	49	51	54	105								105	25.7
<i>Halichoeres margaritaceus</i>	1			2	1	2	3								3	0.7
<i>Halichoeres poecilopterus</i>																
<i>Cheilinus chlorourus</i>																
<i>Sphyaena obtusata</i>																
<i>Valenciennea sp.</i>			1	1	1	1	2								2	0.5
<i>Siganus canaliculatus</i>	5	2	2	7	7	9	16								16	3.9
<i>Siganus guttatus</i>	1			2	1	2	3								3	0.7
<i>Siganus javus</i>		2	1	2	1	4	5								5	1.2
<i>Siganus punctatus</i>	2			2	2	2	4								4	1.0
<i>Siganus virgatus</i>	3			3	3	3	6								6	1.5
<i>Paradachirus pavoninus</i>																
<i>Monocanthus chinensis</i>	3	1	2	6	5	7	12								12	2.9
<i>Acreichthys tomentosus</i>	1	3	3	3	4	6	10								10	2.5
<i>Diodon liturosus</i>								1				1		1	1	0.2
TOTAL	82	30	35	115	117	145	262	56	13	16	61	72	74	146	408	100.0

REMARK I = No. of fishes entering the seagrass bed
X = No. of fishes leaving the seagrass bed

periods, the number of fishes entering the seagrass bed at dusk, 18.00 and dawn, 06.00, were lower than the number of fishes leaving the seagrass bed in contrast to fishes migration at noon, 12.00 and mid night; 24.00, when fishes entering the seagrass bed were higher the fishes leaving (Fig. 15).

In August, a total of 296 individuals of 32 species belonging to 23 families were recored (Table 7 and 11). The diversity index (H') of fishes collected was 2.7719. During the day sampling period (06.00 - 18.00), 132 individuals from 16 species of 12 families were collected and dominated by the member of the family Labridae, *Halichoeres chloropterus* which was about 40 % of the catch. Next to that were *Pomacentrus tripunctatus* (Pomacentridae), 15 %, and *Monocanthus chinensis* (Monocanthidae), 9 %, (Fig. 16). The day samples had an the diversity index of 2.4250.

Table 11 Species richness, abundance and diversity index (H') of fishes migrated between coral reef and seagrass bed at Nai - Wog Bay, Ko Pha-Ngan during the day and night, August 1991- April 1992.

Sampling period	No. of species	Abundance	Diversity Index (H')
August 1991			
Day samples	19	132	2.425
Night samples	16	164	2.004
Total	32	296	2.772
October 1991			
Day samples	17	175	1.752
Night samples	14	114	1.726
Total	26	289	2.336
January 1992			
Day samples	18	220	2.148
Night samples	21	208	2.421
Total	33	428	2.840
April 1992			
Day samples	22	262	2.292
Night samples	12	146	1.735
Total	30	408	2.681

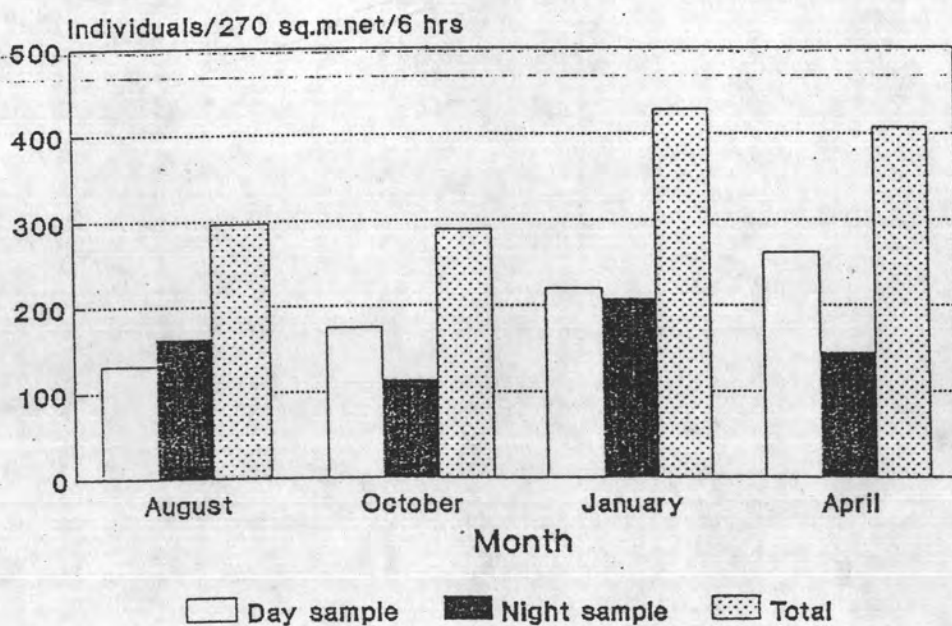
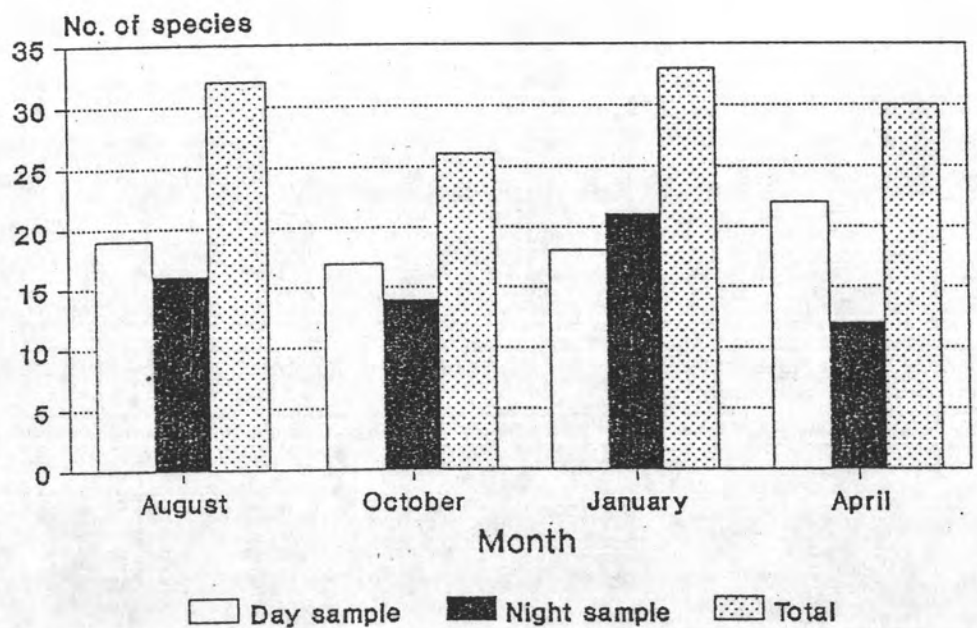


Figure 14. Species richness and abundance of fishes collected from the edge of seagrass bed adjacent to coral reef at Nai - Wog Bay, Koh Pha - Ngan from August 1991 - April 1992.

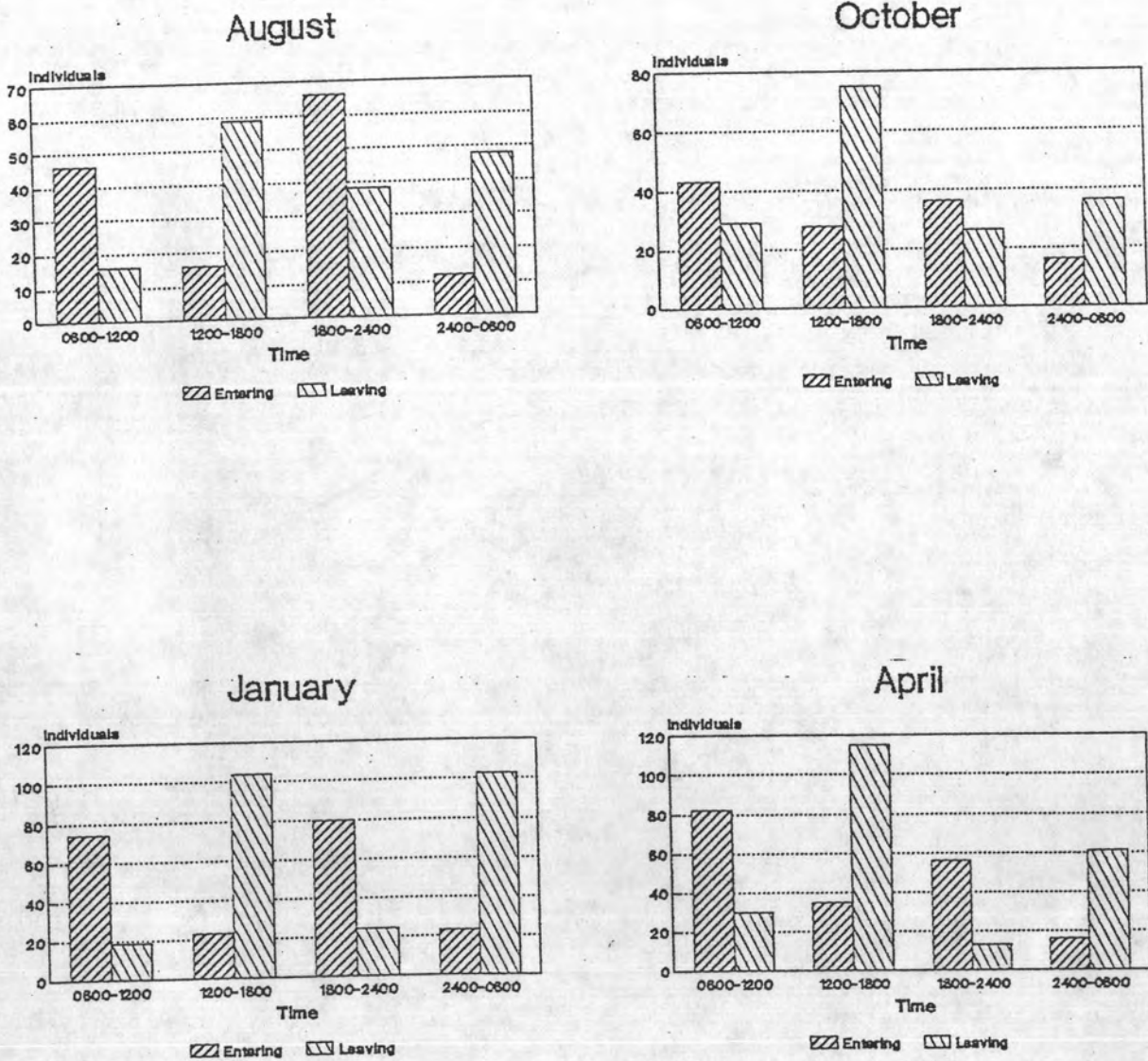


Figure 15. Number of fishes found entering and leaving the seagrass bed among the various time from August 1991 - April 1992.

During the night sampling period (18.00 -06.00), 164 individuals from 19 species of 14 families were collected with *Sargocentron rubrum* (Holocentridae), the most abundant fish, at 44 %, followed by *Apogon guamensis* (Apogonidae), 19 %, and *Gerres oyena* (Gerriidae), 8 %, (Fig. 16). The night sample had the diversity index of 2.0044.

In October, a total of 289 individuals representing 26 species from 19 families were recorded (Table 8 and 11). The diversity index of fishes collected was 2.3306. From the day samples, 175 individuals from 17 species of 12 families were collected, dominated by *H. chloropterus* (Labridae), 56 %, followed by *P. tripunctatus* (Pomacentridae), 13 %, and *Scolopsis ciliatus* (Nemipteridae), 7 % (Fig. 17). The day sample had the diversity index of 1.7523.

From the night samples, 114 individuals from 14 species of 12 families were recorded. The most abundant fish was *S. rubrum* (Holocentridae), 55 %, followed by *A. duodecimalis* (Atherinidae), 8 %, *A. guamensis* (Apogonidae), 7 %, and *Lutjanus* spp. (Lutjanidae), 6 % (Fig. 17). The night sample had the diversity index of 1.7255.

In January, a total of 428 individuals from 33 species of 24 families were collected (Table 9 and 11). The diversity index of fishes collected was 2.8404. From the day samples, 220 individuals from 19 species of 11 families were found with *H. chloropterus* (Labridae), 42 %, was the most abundant fish, followed by *Monocanthus chinensis* (Monocanthidae), 13 %, *P. tripunctatus* (Pomacentridae), 12 %, and *Upeneus tragula* (Mullidae), 10 % (Fig. 18). The day sample had the diversity index of 2.6809.

From the night samples, 208 individuals from 21 species of 17 families were found dominated by *A. duodecimalis* (Atherinidae) and *A. guamensis* (Apogonidae), which were both about 23 %, followed very closely

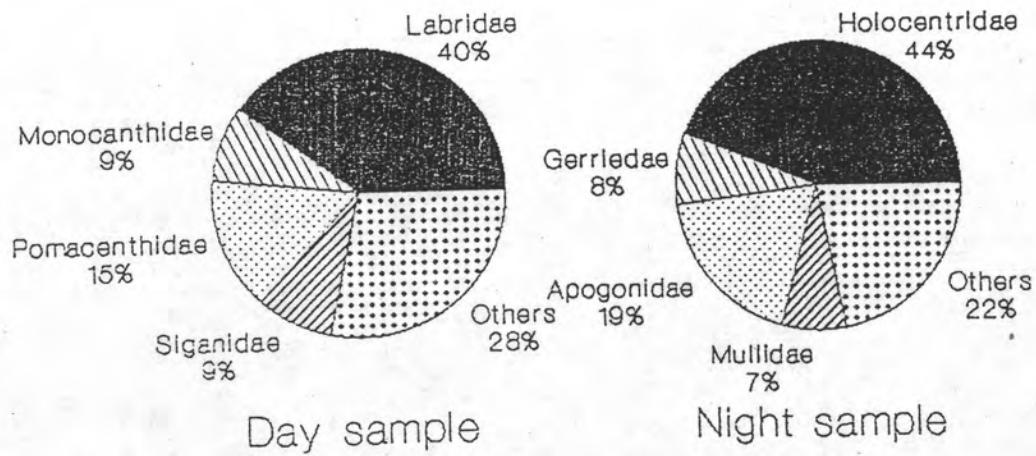


Figure 16. Abundant fishes collected from the edge of seagrass bed adjacent to coral reef between the day and night at Nai - Wog Bay, Koh Pha - Ngan in August 1991.

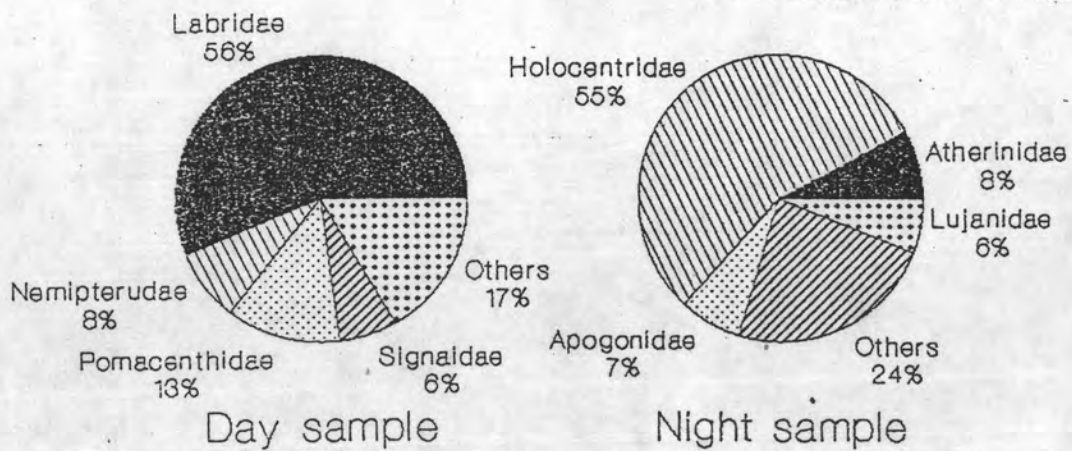


Figure 17. Abundant fishes collected from the edge of seagrass bed adjacent to coral reef between the day and night at Nai - Wog Bay, Koh Pha - Ngan in October 1991.

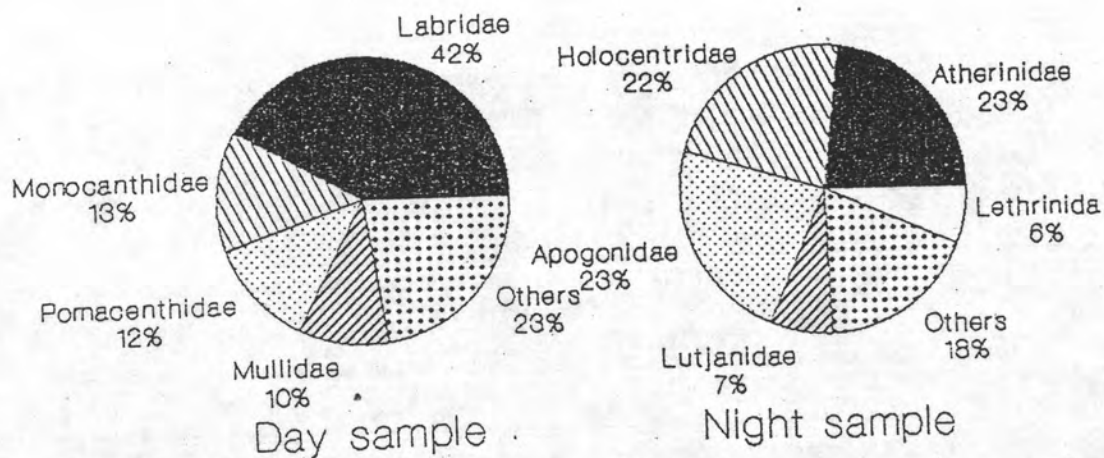


Figure 18. Abundant fishes collected from the edge of seagrass bed adjacent to coral reef between the day and night at Nai - Wog Bay, Koh Pha - Ngan in January 1992.

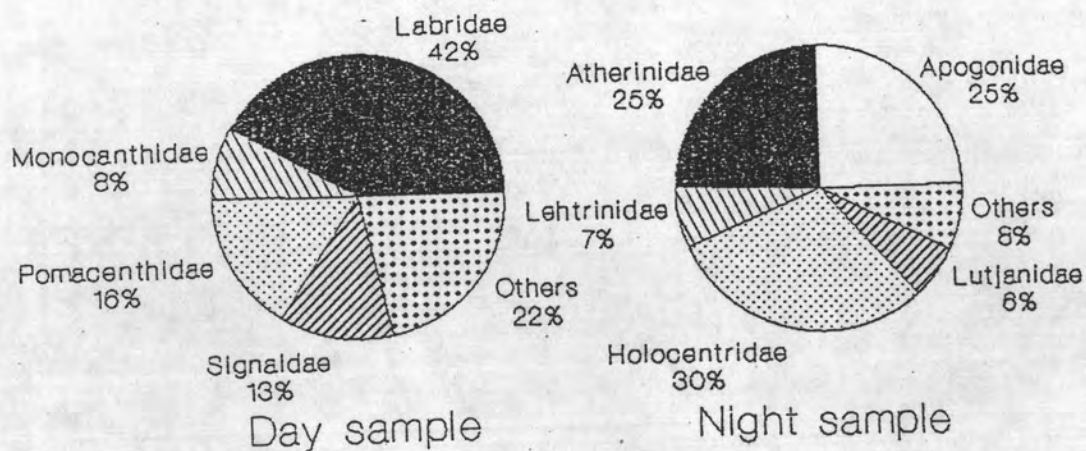


Figure 19. Abundant fishes collected from the edge of seagrass bed adjacent to coral reef between the day and night at Nai - Wog Bay, Koh Pha - Ngan in April 1992.

by *S. rubrum* (Holocentridae), 22 %, (Fig. 18). The night sample had the diversity index of 2.4210.

In April, a total of 408 individuals from 33 species of 20 families were collected (Table 10 and 11). The diversity index of fishes collected was 2.6809. From the day samples, 262 individuals from 20 species of 12 families were found with *H. chloropterus* (Labridae), 42 % as the most abundant species, followed by *P. tripunctatus* (Pomacentridae), 16 % and *Siganus canaliculatus* (Siganidae), 13 % (Fig. 19). The day sample had the diversity index of 2.2915.

From the night samples, 146 individuals from 13 species of 11 families were found, with dominated by *S. rubrum* (Holocentridae), 30 %, followed by *A. guamensis* (Apogonidae), 25 %, and *A. duodecimalis* (Atherinidae), 25 % (Fig. 19). The night sample had the diversity index of 1.7353.

Variation in species composition

The diurnal variation in species composition were observed from the day and night samples. Species composition of fishes collected during the day (06.00 - 18.00) and night (18.00 - 06.00) were compared with the different sampling periods. Fish similarity were quantitatively high between the same sampling period, day and day respectively (Table 12). The significant differences in species composition were found between the day and night with more than 90 % of dissimilarity index (Fig. 20).



Percent of dissimilarity index
(%)

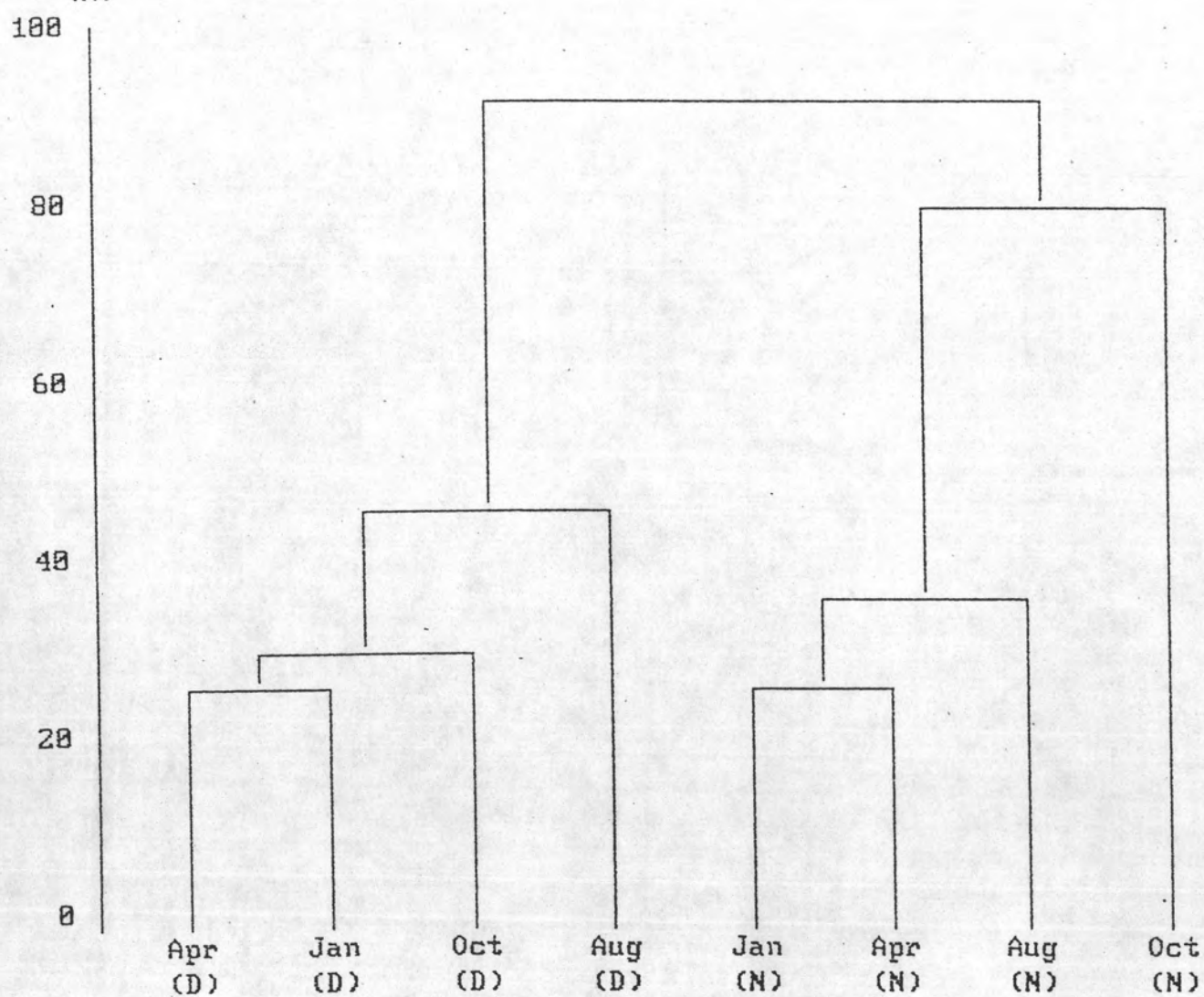


Figure 20. Dendrogram of percent of dissimilarity coefficient of fishes collected from the edge of seagrass bed adjacent to coral reef between day and night at Nai - Wog Bay, Koh Pha - Ngan from August 1991 - April 1992.

Feeding habits of fish migrated between the coral reef and seagrass bed

A total of 1302 individuals from 41 species belonging to 27 families of fishes were having their stomach content analysed. Of this, 598 fishes entering the seagrass bed, 92.64 % of them were found with empty stomach while the rest were found with food in the stomachs. The remaining 704 fishes were those leaving the seagrass bed which 98.86 % were found with food in their stomach and the rest were found with empty stomach (Table 13).

Table 13 Number of fishes entering and leaving the seagrass bed which were found with empty and full stomachs

	Empty stomach	Full stomach
No. of fishes entering the seagrass bed (598 individuals)	554 individuals 92.64 %	44 individuals 7.36 %
No. of fishes leaving the seagrass bed (704 individuals)	8 individuals 1.14 %	696 individuals 98.86

Nine major food items were classified as followed: algae, seagrass, coral, crustaceans, polychaetes, gastropods, bivalvs, sipunculids, and fishes. The crustaceans were composed of copepods, amphipods, isopods, tanaidaceans, crabs, hermit crabs, shrimps, mysidaceans and ostracods. The stomach contents of these fishes are given in Table 14 - 53.

Eel catfishes : Plotosidae

A total of 5 specimens of Lagoon eel catfish *Plotosus canius* were collected during the night. Fishes found entering the seagrass bed, 2

specimens, were with empty stomachs. All of 3 of those fishes leaving the seagrass bed had food in their stomachs containing isopods (84.99 % IRI) as the main food items together with amphipods and shrimps (Table 14).

Halfbeaks : Hemirhamphidae

A total of 32 specimens of Quoy 's halfbeak *Hyporhamphus quoyi* were collected by day. All fishes leaving the seagrass bed, 18 specimens, found with food in their stomachs whereas 14 of fishes entering the seagrass bed, 14 specimens, all stomachs would showed empty. Seagrass fragments were found to be the main food (94.40 % in frequency of occurrence and 74.91 % in weight). The other food items were algae, amphipods, isopods and polychaetes (Table 15).

Needlefishes : Belonidae

Only one specimen of Crocodile needlefish *Tylosaurus crocodilus* leaving the seagrass bed was collected at night in August and only clupeid fishes were found in the stomach content (100 % IRI)(Table 16).

Silversides : Atherinidae

A total of 96 specimens of Tropical silverside *Atherinomorus duodecimalis* were collected only period during the night time. From the total number collected, 46 specimens of atherinid fishes were found entering the seagrass bed and all of them with empty stomachs. The rest, 50 specimens, were found leaving the seagrass bed, and they had food in the stomachs. Crustaceans (amphipod, isopod, mysidacea, ostracod and shrimp) and polychaetes were found in their stomach contents. Changeover of feeding habits in atherinids were found. In August and October, the stomach content was mainly mysidaceans (53.72 % IRI) followed by isopods and amphipods, but the dominant group in the stomach content of fishes during January and April changed to polychaetes (81.10 % IRI), followed by isopods (Table 17).

Table 14 Stomach content analysis of *Plotosus canius*.

Month	January			
No. of fishes	3			
Food items	N (%)	F (%)	Wt (%)	IRI (%)
Amphipod	18.75	100.00	10.22	14.60
Isopod	80.86	100.00	87.93	84.99
Shrimp	0.57	33.30	1.86	0.41

Table 15 Stomach content analysis of *Hyporhamphus quoyi*.

Month	August - April		
No. of fishes	18		
Food items	No.	F(%)	Wt(%)
Algae fragments	-	94.40	74.91
Seagrass fragments	-	66.60	18.73
Amphipod	6	27.60	2.25
Isopod	11	22.20	4.12
Polychaete	7	22.20	2.62

Remark = Eggs were found in January and April

Table 16 Stomach content analysis of *Tylosaurus crocodilus*.

Month	August			
No. of fishes	1			
Food items	N(%)	F(%)	Wt(%)	IRI(%)
Clupeid	100.00	100.00	100.00	100.00

Table 17 Stomach content analysis of *Atherinomorus duodecimalis*.

Month	August - October				January - April			
No. of fishes	7				43			
Food items	N (%)	F (%)	Wt (%)	IRI (%)	N (%)	F (%)	Wt (%)	IRI (%)
Amphipod	17.98	85.71	10.64	14.13	9.21	41.35	2.42	3.05
Isopod	39.33	71.43	38.80	32.15	25.20	72.41	6.62	14.63
Ostracod					0.23	6.90	0.06	0.01
Mysidacea	42.69	100.00	50.55	53.72				
Shrimp					3.80	13.79	9.98	1.21
Polychaete					61.56	89.65	80.91	81.10

Remark = Eggs were found in January.

Table 18 Stomach content analysis of *Sargocentron rubrum*.

Month	August - October				January - April			
No. of fishes	58				37			
Food items	N(%)	F(%)	Wt(%)	IRI(%)	N(%)	F(%)	Wt(%)	IRI(%)
Amphipod	7.45	42.55	3.74	4.55	11.33	54.285	2.25	6.13
Isopod	56.68	72.34	28.46	56.85	29.39	74.285	5.84	21.77
Hermit crab	2.91	17.02	4.39	1.19				
Crab	2.05	38.297	30.95	12.08	4.22	45.714	25.25	11.21
Mysidacea	24.06	40.425	12.08	12.96	3.24	40	0.64	1.29
Shrimp	3.17	34.042	11.13	4.65	3.86	42.857	5.37	3.29
Polychaete	3.68	38.297	9.24	4.73	38.23	77.142	38	48.91
Blenniid					0.87	11.428	5.2	0.58
Gerreid					0.87	14.285	5.2	0.72
Teraponid					7.1	45.714	7.05	5.38

Squirrelfishes : Holocentridae

A total of 215 specimens of Redcoat squirrelfish *Sargocentron rubrum* were all collected at night. From 110 fishes entering the seagrass bed, 8 fishes were found with food in their stomachs content composed low number of amphipods and isopods. For those fishes leaving the seagrass bed, 105 specimens, 95 of these fishes contained food in their stomachs.

Three major food items were found, crustaceans (amphipod, isopod, crab, mysidacea, and shrimp), polychaetes and fishes. In August and October the major food items were isopods (56.85 % IRI) and mysidaceans (12.96 % IRI). In January and April, polychaetes (48.91 % IRI) and isopod were mainly found in fish stomachs. Small size fishes such as teraponid and gerreid were also found in the stomachs of fishes collected in April (Table 18).

Scorpionfishes : Scorpaenidae

Two species of scorpionfishes, Weedy sting scorpionfish *Scorpaenopsis oxycephala* and Estuarine scorpionfish *Synanceia horrida* were collected. A total of 8 of *S. oxycephala* were collected from both day and night time. Fishes entering the seagrass were found with empty stomachs. For those fishes leaving the seagrass bed, 2 specimens contained food their stomachs which crustacean (isopod, crab and shrimp) and blenniid fish were contained. The major food items were crabs (51.05 % IRI) followed by isopods (22.93 % IRI) and blenniid (15.41 % IRI) (Table 19).

A total of 3 of *S. horrida* were collected during both day and night. All 2 fishes entering the seagrass bed were with empty stomachs. The rest, 1 fish leaving the seagrass bed, had food in their stomachs with small size fishes, blenniid and gerreid as the major food items (69.82 % IRI) together with crab (Table 20).



Sand bass : Centropomidae

A total of 9 specimens of sand bass *Psammoperca waigiensis* were collected in August and January at night time. All 5 of fishes leaving the seagrass bed were found with food in their stomachs but the remaining 4 fishes entering the seagrass bed found with empty stomachs. Only crustaceans were found in their stomach content with crabs as the main component (77.03 % IRI) followed by shrimps (14.18 % IRI) together with fishes (Table 21).

Groupers : Serranidae

A total 7 specimens of Longfin grouper *Epinephelus quoyanus* were collected during the day. From the total number collected, 3 fishes entering the seagrass bed were with empty stomachs. The remaining, 4 fishes leaving the seagrass bed had food in their stomachs with the crabs (51.05 % IRI) as the major food items together with shrimps, mysidaceans, isopod and small size fishes, gerreid and teraponid (Table 22).

Soapfishes : Grammistridae

Two specimens of Barred soapfish *Diploprion bifasciatus* were found leaving the seagrass bed and had food found in the stomachs. Only crustaceans was found in the stomach content, dominated by shrimps (73.77 % IRI), followed by the crabs, amphipods and isopods (Table 23).

Eel blenny : Pseudochromidae

Nine specimens of Carpet eel blenny *Congrogadus subducens* were collected during the night. Fishes found entering the seagrass bed, 4 specimens, were found with empty stomachs. The remaining, 4 fishes leaving the seagrass bed, had food in their stomachs with fishes (57.36 % IRI) as the major food items and the other were shrimps (Table 24).

Table 19 Stomach content analysis of *Scorpaenopsis oxycephala*.

Month	August - April			
No. of fishes	2			
Food items	N(%)	F(%)	Wt(%)	IRI(%)
Isopod	38.46	100.00	2.13	22.93
Crab	30.77	100.00	59.57	51.05
Shrimp	15.38	50.00	12.77	10.60
Blenniid	15.38	50.00	25.53	15.41

Remark = Eggs were found in August.

Table 20 Stomach content analysis of *Synanceia horrida*.

Month	January			
No. of fishes	1			
Food items	N(%)	F(%)	Wt(%)	IRI(%)
Crab	33.33	100.00	27.03	30.18
Blenniid	33.33	100.00	33.78	33.56
Gobiid	33.33	100.00	39.19	36.26

Table 21 Stomach content analysis of *Psammoperca waigiensis*.

Month	August			
No. of fishes	5			
Food items	N (%)	F (%)	Wt(%)	IRI (%)
Crab	57.1	80.0	63.66	77.0
Shrimp	28.6	40.0	15.92	14.2
Blenniid	4.8	20.0	12.73	2.8
Clupeid	4.8	20.0	13.79	3.0
Gerried	4.76	20	14.32	3.04

Table 22 Stomach content analysis of *Epinephelus quoyanus*.

Month	August - April			
No. of fishes	4			
Food items	N(%)	F(%)	Wt(%)	IRI(%)
Isopod	9.09	50.00	0.68	2.72
Crab	32.82	100.00	59.73	51.05
Mysidacea	27.27	100.00	2.05	16.35
Shrimp	22.73	100.00	25.60	26.95
Gerreid	4.55	25.00	10.24	2.06
Teraponid	4.55	25.00	1.71	0.87

Table 23 Stomach content analysis of *Diploprion bifasciatus*.

Month	October - January			
No. of fishes	2			
Food items	N(%)	F(%)	Wt(%)	IRI(%)
Isopod	12	100	1.06	6.91
Crab	8	100	17.67	13.57
Mysidacea	20	50	1.77	5.75
Shrimp	60	100	79.51	73.77

~~Remark - Eggs were found in August.~~

Table 24 Stomach content analysis of *Congrogadus subducens*.

Month	October - April			
No. of fishes	4			
Food items	N(%)	F(%)	Wt(%)	IRI(%)
Shrimp	33.33	75	26.39	42.64
Blenniid	22.22	50	30.5	25.09
Gobiid	11.11	25	14.37	6.06
Gerreid	22.22	50	25.18	22.86
Teraponid	11.11	25	2.93	3.34

Terapons : Teraponidae

A total of 15 individuals of four lined terapon *Pelates quadrilineatus* were collected during the day. From the total number, 11 fishes entering the seagrass bed were found with empty stomachs. The remaining, 4 fishes found entering the seagrass bed had food in their stomachs, with amphipods (34.85 % IRI) and shrimps (22.35 % IRI) as the dominant food together with copepods tanaidaceans, isopod and ostracods (Table 25).

Cardinalfishes : Apogonidae

Three species of cardinalfishes namely Yellow striped cardinalfish *Apogon cyanosoma*, Guam cardinalfish *Apogon guamensis* and Fivelined cardinalfish *Cheilodipterus quinquelineatus* were collected. Only one specimen of *A. cyanosoma* leaving the seagrass bed was collected at night in January and found with food in the stomach. Crustaceans and polychaetes were found in the stomach and polychaetes were the principal food (62.18 % IRI); and ther food items were amphipods and isopods (Table 26).

A total of 100 individuals of *A. guamensis* were collected and all the specimens were found at night. Of these, 47 fishes were found entering the seagrass bed while the rest 53 fishes, were found leaving the seagrass. All 47 stomachs of fish entering the seagrass bed were found with empty stomachs while 42 out of 53 specimens of fish leaving the seagrass bed had food in their stomachs. Crustaceans, polychaetes and fishes were found in their stomach. Changing in feeding habit was observed. Mysidaceans were mainly found (88.35 % IRI) in the stomachs of fishes collected in August and October while the rest were amphipods, isopods and ostracods. In contrast, the stomach content of fishes collected in January and April contained mainly of polychaetes (73.86 % IRI) and fishes (14.81 % IRI) together with shrimps, amphipods and isopods. Fishes found in the stomach content of *A. guamensis* collected

Table 25 Stomach content analysis of *Pelates quadrilineatus*.

Month	January - April			
No. of fishes	4			
Food items	N(%)	F(%)	Wt(%)	IRI(%)
Copepod	39.53	50.00	7.56	19.06
Amphipod	26.74	75.00	30.67	34.85
Isopod	6.98	5.00	9.33	6.60
Ostracod	6.98	5.00	6.67	5.52
Tanaidacea	16.28	50.00	12.44	11.62
Shrimp	3.49	75.00	33.33	22.35

Table 26 Stomach content analysis of *Apogon cyanosoma*.

Month	January			
No. of fishes	1			
Food items	N(%)	F(%)	Wt(%)	IRI(%)
Amphipod	9.09	100.00	25.53	17.31
Isopod	9.09	100.00	31.92	20.51
Polychaete	81.82	100.00	42.55	62.18

Table 27 Stomach content analysis of *Apogon guamensis*.

Month	August - October				January - April			
	19				23			
food items	N (%)	F (%)	Wt (%)	IRI (%)	N (%)	F (%)	Wt (%)	IRI (%)
Amphipod	1.75	31.50	12.79	4.72	7.38	52.94	2.75	5.10
Isopod	2.37	31.50	17.31	6.39	6.59	44.42	2.46	3.80
Shrimp	1.44	21.00	1.05	0.54	6.28	29.41	2.34	2.41
Mysidacea	94.43	62.60	68.85	88.35				
Polychaete					73.94	76.47	27.54	73.86
Blenniid					0.31	5.88	3.51	0.21
Gerreid					1.10	8.82	12.28	1.12
Teraponid					4.40	26.47	49.12	13.48

Remark = Eggs were found in January and April

in January was gerrid fish whereas teraponid fish was found in April (Table 27).

A total of 13 specimens of *Cheilodipterus quinquelineatus* were collected at night in October and January. Seven specimens were found entering the seagrass bed with empty stomachs. The remaining 6 specimens were found leaving the seagrass bed and all had food in their stomachs. Their major food items included crustaceans, fishes and polychaetes. Mysidaceans was the main component (96.08 % IRI) and blennid fish were found in the stomach of fish of fishes collected in October, whereas in January, the main food was changed to polychaetes (73.23 % IRI), together with fishes and shrimps (Table 28).

Snappers : Lutjanidae

Two species of snappers, namely Spanishflag snapper *Lutjanus carponotstus* and Moses snapper *Lutjanus russelli*, were collected and only *L. carponotatus* had stomach content. A total of 37 specimens of *L. carponotatus* were collected at night. All 19 fishes leaving the seagrass bed had food in their stomachs while the rest 18 fishes entering the seagrass bed were found with empty stomachs. Three major food items, crustaceans (isopods, crabs, mysidaceans and shrimps), polychaetes and fishes were found in their stomach content. Fishes collected in August and October would have crabs (38.65 % IRI) as main food items followed by mysidaceans and shrimps whereas in January and April, crabs (38.52 % IRI) were found as the main food items followed by shrimps and fishes such as gerreid and teraponid fishes (Table 29).

Mojarras : Gerreidae

Two species of Mojarras, Deepbodied morjarra *Gerres abbreviatus* and Oyena mojarra *Gerres oyena*. A total of 12 specimens of *G. abbreviatus* were collected from both day and night times. From the total number collected, 1 specimen were found entering the seagrass bed with empty stomach. The rest, 10 of 11 specimens, were found leaving the seagrass

Table 28 Stomach content analysis of *Cheilodipterus quinquelineatus*.

Month	October				January			
No. of fishes	2				4			
Food items	N(%)	F(%)	Wt(%)	IRI(%)	N(%)	F(%)	Wt(%)	IRI(%)
Mysidacea	95.24	100.00	76.92	96.08				
Shrimp					2.67	50.00	3.28	1.56
Polychaete					85.33	100.00	52.46	72.23
Blenniid	4.76	100.00	23.08	13.92	2.67	50.00	9.84	3.27
Gerreid					9.33	100.00	34.42	22.94

Table 29 Stomach content analysis of *Lutjanus carponotus*.

Month	August - October				January - April			
No. of fishes	5				14			
Food items	N(%)	F(%)	Wt(%)	IRI(%)	N(%)	F(%)	Wt(%)	IRI(%)
Isopod	10.69	80.00	1.83	5.41	20.83	52.86	1.33	10.53
Mysidacea	61.07	100.00	10.44	20.75				
Crab	6.87	80.00	41.12	38.65	16.67	64.29	37.33	38.52
Shrimp	16.79	100.00	43.08	32.36	28.13	50.00	27.00	30.57
Polychaete					4.17	28.57	1.60	1.83
Blenniid	1.53	40.00	1.57	0.67	1.04	7.14	1.54	0.20
Gerreid					12.50	25.57	24.05	0.24
Teraponid					15.63	25.57	5.01	11.57
Gobiid	3.05	80.00	1.96	2.17	1.04	7.14	2.00	0.24

Remark = Eggs were found in January and April.

and they had food in their stomachs. Crustaceans (amphipods, isopods, hermit crabs and shrimps) and polychaetes were found in the stomachs. From all the stomach content, hermit crabs (52.25 - 78.44 % IRI) were mainly found at all sampling period together with isopods and amphipods.

Shrimps was also found in the stomach content of those fishes collected in August and October while polychaetes were found in those specimens to be in January and August (Table 30).

The small gerreid fish, *G. oyena*, a total of 47 specimens were collected from both day and night times. Fishes leaving the seagrass bed, 20 of 21 specimens, were found food in their stomachs while all 26 of fishes entering the seagrass bed were with empty stomachs. Crustaceans (copepods, amphipods, isopods, tanaidaceans, shrimps and ostracods) and polychaetes were found in their stomach content. The main food items was ostracods (74.44 % IRI) for fishes collected in August and October, but amphipods (45.75 % IRI) together with polychaetes (35.39 % IRI) was for those collected in January and April (Table 31).

Whittings : Sillaginidae

Only one specimen of Common whiting *Sillago sihama* was found leaving the seagrass bed in August during the night. Crabs (53.98 % IRI) was mainly found in the stomach content together with polychaetes (Table 32).

Emperors : Lethrinidae

A total of 33 specimens of Redspot emperor *Lethrinus lentjan* were all collected at night. Fishes entering the seagrass bed, 17 specimens, only 4 of them crab was the only food found in the stomach content. While all 16 fishes leaving the seagrass bed had food in their stomachs. Two major food items, crustaceans (amphipods, isopods, ostracods, crabs and shrimps) and polychaetes were found in their stomach content. The stomachs of fishes collected in August and October were

Table 30 Stomach content analysis of *Gerres abbreviatus*.

Month	August - October				January - April			
No. of fishes	5				5			
Food items	N(%)	F(%)	Wt(%)	IRI(%)	N(%)	F(%)	Wt(%)	IRI(%)
Amphipod	1.97	60.00	0.70	0.88	6.90	80.00	2.09	5.00
Isopod	6.22	80.00	2.91	4.86	4.31	80.00	1.31	3.13
Hermit crab	69.74	100.00	74.00	78.44	65.52	60.00	59.69	52.25
Mysidacea	12.83	80.00	4.53	7.58	2.59	60.00	5.50	3.37
Shrimp	7.24	60.00	17.91	8.24	20.69	100.00	31.41	36.24

Table 31 Stomach content analysis of *Gerres oyena*.

Month	August - October				January - April			
No. of fishes	10				10			
Food items	N(%)	F(%)	Wt(%)	IRI(%)	N(%)	F(%)	Wt(%)	IRI(%)
Copepod	6.40	10.00	5.10	0.73	2.04	10.00	1.19	0.19
Amphipod	13.30	80.00	10.59	12.15	53.47	90.00	31.12	45.75
Isopod	1.48	30.00	1.18	0.51	22.86	80.00	13.30	17.39
Ostracod	72.41	90.00	57.65	74.44				
Tanaidacea					4.08	20.00	2.38	0.78
Shrimp					0.82	20	3.33	0.5
Polychaete	6.40	60.00	25.49	12.17	16.73	90.00	48.69	35.39

Table 32 Stomach content analysis of *Sillago sihima*.

Month	August			
No. of fishes	1			
Food items	N(%)	F(%)	Wt(%)	IRI(%)
Amphipod	50.00	100.00	6.72	28.36
Crab	33.33	100.00	74.63	53.98
Polychaete	16.67	100.00	18.66	17.66

Remark = Eggs were found in August.

Table 33 Stomach content analysis of *Lethrinus lentjan*.

Month	August - October				January - April			
No. of fishes	6				10			
Food items	N(%)	F(%)	Wt(%)	IRI(%)	N(%)	F(%)	Wt(%)	IRI(%)
Amphipod	5.41	16.67	0.34	0.69	2.22	10.00	23.70	3.91
Isopod	8.11	16.67	0.51	1.04	14.44	40.00	0.96	4.71
Ostracod	27.03	16.67	1.71	3.47				
Crab	32.43	83.33	71.79	62.97	13.33	90.00	31.11	27.20
Shrimp	27.03	83.33	25.64	31.82	15.56	70.00	15.56	16.66
Polychaete					37.78	80.00	18.89	34.68
Blenniid					5.56	40.00	11.11	6.34
Gerreid					6.67	40.00	13.33	6.12
Teraponid					4.44	40.00	8.89	4.08

Remark = Eggs were found in January.

Table 34 Stomach content analysis of *Scolopsis ciliatus*.

Month	August - April			
No. of fishes	21			
Food items	N(%)	F(%)	Wt(%)	IRI(%)
Gopepod	4.93	9.52	0.21	0.61
Amphipod	23.15	66.60	5.88	24.23
Isopod	7.88	33.30	2.67	4.40
Ostracod	6.90	14.20	1.46	1.49
Crab	3.45	19.00	21.88	6.04
Mysidacea	3.94	19.00	1.67	1.34
Shrimp	6.90	47.60	20.42	16.29
Polychaete	40.89	42.80	43.23	45.14
Gastropod	1.48	9.52	1.56	0.34
Bivalve	0.49	4.76	1.04	0.09

mainly contained crabs (62.97 % IRI) and shrimp (31.82 % IRI) whereas in January and April, polychaetes (34.68 % IRI) and crab (27.20 % IRI) were mostly found sometimes together with shrimps (Table 33).

Monocle breems : Nemipteridae

Two species of monocle breems namely Sawjawed monocle bream *Scolopsis ciliatus* and Pearly monocle bream *Scolopsis margaritifer* were collected. A total of 33 specimens of *S. ciliatus* were collected from the day and night times. From 12 fishes entering the seagrass bed, only one fish was found with food in the stomachs and crab was contained in its stomach. For those fishes leaving the seagrass bed, all 21 fishes contained food in their stomachs. Four major food items included crustaceans (copepod, amphipod, isopod, ostracod, crab, mysidacea and shrimp), polychaetes, gastropods and bivalves were found in the stomach content. Polychaetes (45.14 % IRI) was the main food items of these fishes (Table 34).

A total of 12 specimens of *S. margaritifer* were collected during both the day and night. Of these total number, 4 fishes entering the seagrass bed were found with empty stomachs. The rest, all of 8 fishes leaving the seagrass bed had food in their stomachs which included crustaceans (amphipods, isopods, ostracods, crabs and shrimps) and polychaetes. The major food items were polychaetes (70.06 % IRI) (Table 35).

Goatfishes : Mullidae

One species of goatfishes, Blackstriped *Upeneus tragula* was found. A total of 78 specimens were collected from both day and night times which included 37 and 41 specimens of fishes entering and leaving the seagrass bed. From 3 fishes entering and all leaving the seagrass bed, their stomachs contained food included crustaceans (amphipods, isopods, ostracods, crabs, mysidaceans and shrimps), polychaetes, gastropods and fishes. Ostracods (42.08 % IRI) and crabs (30.37 % IRI)

were the main food items in stomachs of fishes collected in August and October while in January and April, isopods (28.76 % IRI) and crabs (25.03 % IRI) were mainly found, together with small fishes such as callionymid, gerreid and teraponid (Table 36).

Sweepers : Pempheridae

Two specimens of Copper sweeper *Pempheris ovalensis* were collected during the night. One fish found entering the seagrass bed were with empty stomach and the rest, 1 fish found leaving the seagrass bed and its stomach content contained shrimps (53.82 % IRI) as the major component food and followed by polychaetes (37.53 % IRI) together with amphipods and isopods (Table 37).

Butterflyfishes : Chaetodontidae

A total of 23 specimens of Beaked butterflyfish *Chelmon rostratus* were all collected during the day time. Of the total number, 11 specimens were found entering the seagrass bed and the rest, 12 specimens, were found leaving the seagrass bed. All specimens had food in their stomachs and all with coral fragments as the main components (40.11 - 55.98 % IRI). Crustaceans (amphipods and shrimps) and polychaetes were found in the stomach of chaetodontid fishes leaving the seagrass bed. Amphipods and shrimps were found from the specimens collected in August and October whereas shrimps and polychaetes were found in January and April (Table 38).

Damselfishes : Pomacentridae

Two species of damselfishes, namely Bengal sergeant *Abudefduf bengalensis* and Three spot damselfish *Pomacentrus tripunctatus*, were collected. Two specimens of *A. bengalensis* were collected from the day time. All fishes found leaving the seagrass bed and their stomachs were found to contain mainly with algae fragments (65.22% weight and 100 %

Table 35 Stomach content analysis of *Scolopsis margaritifer*.

Month	January – April			
No. of fishes	8			
Food items	N(%)	F(%)	Wt(%)	IRI(%)
Amphipod	14.29	75.00	3.60	9.01
Isopod	10.20	62.50	3.43	5.72
Ostracod	9.18	25.00	1.93	1.87
Crab	3.06	37.50	12.85	4.01
Shrimp	5.10	62.50	17.14	9.34
Polychaete	58.16	87.50	61.05	70.06

Table 36 Stomach content analysis of *Upeneus tragula*.

No. of fishes	17				24			
Month	August – October				January – April			
Food items	N (%)	F (%)	Wt (%)	IRI (%)	N (%)	F (%)	Wt (%)	IRI (%)
Amphipod	2.28	29.40	0.86	0.77	14.35	32.10	3.79	11.71
Isopod	4.89	23.50	2.16	1.37	29.67	35.70	10.45	28.76
Ostracod	59.61	64.70	18.82	42.08	21.05	17.80	4.64	9.21
Crab	7.17	76.40	40.72	30.37	10.05	25.00	39.82	25.03
Mysidacea	20.85	52.90	13.16	14.93	14.35	25.00	6.32	10.37
Shrimp	4.89	47.00	21.60	10.33	9.57	17.80	29.50	14.00
Blenniid	0.33	5.88	2.67	0.15				
Teraponid					0.96	7.14	5.48	0.92

Table 37 Stomach content analysis of *Pempheris oualensis*.

Month	January			
No. of fishes	1			
Food items	N(%)	F(%)	Wt(%)	IRI(%)
Amphipod	11.54	100.00	1.32	6.43
Isopod	3.85	100.00	0.58	2.22
Shrimp	46.15	100.00	61.49	53.82
Polychaete	38.46	100.00	36.60	37.53

Remark = Eggs were found in January.

Table 38 Stomach content analysis of *Chelmon rostratus*.

Month	August - October				January - April			
No. of fishes	8				9			
Food items	N(%)	F(%)	Wt(%)	IRI(%)	N(%)	F(%)	Wt(%)	IRI(%)
Coral fragments	47.92	100	48.52	55.98	55.22	44.40	52.63	40.11
Shrimp	2.08	12.5	0.84	0.21	12.77	22.20	17.01	9.67
Polychaete	50	75	50.63	43.81	31.91	22.20	30.36	20.22

Table 39 Stomach content analysis of *Abudefduf bengalensis*.

Month	October		
No. of fishes	1		
Food items	No.	F(%)	Wt(%)
Algae fragments	-	100	65.22
Amphipod	2	100	13.04
Polychaete	2	100	21.74

Table 40 Stomach content analysis of *Pomacentrus tripunctatus*.

Month	August - April		
No. of fishes	18		
Food items	No.	F(%)	Wt(%)
Algae fragments	-	66.10	59.93
Seagrass fragmen	-	58.80	26.22
Copepod	23	25	6.37
Amphipod	39	29.40	7.49
Polychaete	27	26.40	14.16

frequency of occurrence) together with polychaetes and amphipods (Table 39).

A total of 111 individuals of *P. tripunctatus* were collected during the day. Of these total number, 43 fishes found entering the seagrass bed, only 6 fishes had food in their stomachs. The rest, 68 fishes leaving the seagrass bed, most of these were found with food in their stomachs. The stomachs contents content composed of algae fragments (66.10 % frequency of occurrence and 59.93 % weight) as the main food, followed by seagrass fragments (58.80 % frequency of occurrence and 26.22 % weight) together with polychaetes, amphipods and copepods (Table 40).

Wrasses : Labridae

Five species of wrasses namely, Peacock wrasse *Halichoeres argus*, Pastel green wrasse *Halichoeres chloropterus*, Pink belly wrasse *Halichoeres margaritaceus*, *Halichoeres poecilopterus* and Floral maori wrasse *Cheilinus chlorourus*, were found which 3 species had stomach content.

A total of 23 specimens of *H. argus* were all collected at the day times. All 7 fishes were found entering the seagrass bed with empty stomachs. The remaining 16 of fishes leaving the seagrass bed were found with food in their stomachs and only the crustaceans were found in the stomach content. Amphipods were mainly found in the fishes stomachs (74.80 -79.93 % IRI) and the other food items were isopods, tanaidacens, shrimps and copepods. Crustaceans (composed of copepods, amphipods, isopods, tanaidaceans, ostracods, hermit crabs, crabs and shrimps), polychaetes, gastropods and bivalves were found Table 41).

A total of 329 specimens of *H. chloropterus* were collected at the day times. Almost all of fishes found entering the seagrass bed, 183 specimens, were found with empty stomachs. Fishes leaving the seagrass bed, 182 of 102 specimens, were found with food in their stomachs and only the crustaceans were found in the stomach content. All of four major food

Table 41 Stomach content analysis of *Halichoeres argus*.

Month	August - October				January			
No. of fishes	7				5			
Food items	N(%)	F(%)	Wt(%)	IRI(%)	N(%)	F(%)	Wt(%)	IRI(%)
Copepod					9.30	40.00	7.27	3.99
Amphipod	70.49	100.00	50.59	79.83	68.77	100.00	54.55	74.80
Isopod	16.39	57.14	11.76	10.62	16.28	80.00	12.73	13.96
Shrimp	6.56	28.58	32.94	7.44	4.65	40.00	25.45	7.25
Tanaidacea	6.56	28.58	4.71	2.12				

Table 42 Stomach content analysis of *Halichoeres chloropterus*.

Month	August - October				January - April			
No. of fishes	90				102			
Food items	N(%)	F(%)	Wt(%)	IRI(%)	N(%)	F(%)	Wt(%)	IRI(%)
Copepod	10.03	12.50	4.53	1.80	3.37	4.90	1.49	0.25
Amphipod	50.28	91.25	22.70	65.91	25.29	51.90	11.14	19.54
Isopod	18.25	61.25	8.24	16.05	44.49	91.18	19.60	60.30
Ostracod	0.56	2.50	0.25	0.02	4.67	5.88	2.06	0.41
Tanaidacea	1.11	3.75	0.50	0.06				
Hermit crab	0.97	6.25	1.32	0.14				
Crab	1.11	10.00	15.09	1.60	2.72	20.59	18.00	4.40
Shrimp	4.74	30.00	14.97	5.85	2.59	13.73	8.00	1.50
Polychaete	3.76	20.00	8.49	2.52	3.89	25.55	8.57	2.90
Gastropod	7.80	22.50	17.61	5.66	11.80	26.47	26.00	10.33
Bivalve	1.39	6.25	6.29	0.48	1.17	5.88	5.14	0.38

Remark = Eggs were found in August, October and January.

Table 43 Stomach content analysis of *Halichoeres margaritaceus*.

Month	January - April			
No. of fishes	4			
Food items	N(%)	F(%)	Wt(%)	IRI(%)
Amphipod	33.33	100.00	17.53	30.92
Isopod	47.06	100.00	24.74	42.66
Ostracod	9.80	25.00	5.15	2.27
Crab	3.93	50.00	30.93	10.59
Shrimp	5.88	75.00	21.65	12.55

items were found in the stomach of with amphipods (19.54 - 65.91 % IRI) and isopods (16.05 - 60.30 % IRI) were the most dominant food. The other, shrimps, copepods, polychaetes and gastropods were frequently found (Table 42).

A total of 6 specimens of *H. margaritaceus* were collected. Crustaceans were found in the stomachs which isopods (42.66 %) was the most dominant food, the others were amphipods, shrimps, crabs and ostracods (Table 43).

Barracudas : Sphyraenidae

Two individuals of Striped barracuda *Sphyraena obtusata* were collected in January from the night which one entering and one leaving the seagrass bed. Only the stomach of the fish leaving the seagrass bed were found with small size fishes in the stomach content (Table 44).

Goby : Gobiidae

Two specimens of gobiid fish, *Valenciennea* sp. were collected in April at the day time. Of those, only one of the fish found leaving the seagrass bed with food in its stomach. Polychaetes were found as the major component (85.45 % IRI) of the stomach content followed by bivalves (Table 45).

Rabbitfishes : Siganidae

A total of 5 species of rabbitfishes were collected, Seagrass rabbitfish *Siganus canaliculatus*, Golden rabbitfish *Siganus guttatus*, Java rabbitfish *Siganus javus*, Goldspot rabbitfish *Siganus punctatus* and Double barred rabbitfish *Siganus virgatus*.

A total of 20 specimens of *S. canaliculatus* were collected during the day. From the total number collected, 9 fishes entering the seagrass bed were with empty stomachs. The remaining, 10 of 11 fishes leaving the seagrass bed had food in their stomachs which seagrass fragments (56.34 %

Table 44 Stomach content analysis of *Sphyraena obtusata*

Month	January			
No. of fishes	1			
Food items	N(%)	F(%)	Wt(%)	IRI(%)
Clupeid	66.67	100.00	74.07	70.37
Gerreid	33.33	100.00	25.93	29.63

Remark = Eggs were found in January.

Table 45 Stomach content analysis of *Valencienna* sp.

Month	April			
No. of fishes	1			
Food-items-	N(%)	F(%)	Wt(%)	iRI(%)
Polychaete	80.00	100.00	90.91	85.45
Bivalve	20.00	100.00	9.09	14.55

weight) were the main food items followed by algae fragments (33.80 % weight) and shrimps (9.86 % weight) (Table 46).

A total of 6 specimens of *S. guttatus* were collected during the day. From the total number collected, 2 fishes entering the seagrass bed were with empty stomachs. The remaining, all 4 fishes leaving the seagrass bed had food in their stomachs which seagrass fragments (91.30 % weight) were the main food items followed by algae fragments (8.70 % weight) (Table 47).

A total of 11 specimens of *S. javus* were collected during the day. From the total number collected, 3 fishes entering the seagrass bed were with empty stomachs. The remaining, all 8 fishes leaving the seagrass bed had food in their stomachs which algae fragments (66.04 % weight) were the main food items followed by seagrass fragments (33.96 % weight) (Table 48).

A total of 4 specimens of *S. punctatus* were collected during the day. From the total number collected, 2 fishes entering the seagrass bed were with empty stomachs. The remaining, all 2 fishes leaving the seagrass bed had food in their stomachs which algae fragments (62.50 % weight) were the main food items followed by seagrass fragments (37.50 % weight) (Table 49).

~~A total of 26 specimens of *S. virgatus* were collected during the~~
day. From the total number collected, 11 fishes entering the seagrass bed were with empty stomachs. The remaining, all 15 fishes leaving the seagrass bed had food in their stomachs which algae fragments (71.43 % weight) were the main food items followed by seagrass fragments (28.57 % weight) (Table 50).

Filefishes : Monacanthidae

Two species, Seagrass filefish *Acreichthys tomentosus* and Fanbellied filefish *Monacanthus chinensis* were collected. A total of 28 specimens of *A. tomentosus* were collected during both the day night times.

Table 46 Stomach content analysis of
Siganus canaliculatus.

Month	August – April		
No. of fishes	10		
Food items	No.	F(%)	Wt(%)
Algae fragments		100.00	33.80
Seagrass fragments		100.00	56.34
Shrimp	7	50.00	9.86

Table 47 Stomach content analysis of
Siganus guttatus.

Month	August – April	
No. of fishes	4	
Food items	F(%)	Wt(%)
Algae fragments	100.00	8.70
Seagrass fragments	100.00	91.30

Table 48 Stomach content analysis of
Siganus javus.

Month	August – April	
No. of fishes	8	
Food items	F(%)	Wt(%)
Algae fragments	100.00	66.04
Seagrass fragments	100.00	33.96

Table 49 Stomach content analysis of
Siganus punctatus.

Month	April	
No. of fishes	2	
Food items	F(%)	Wt(%)
Algae fragments	100.00	62.50
Seagrass fragments	100.00	37.50

Table 50 Stomach content analysis of
Siganus virgatus.

Month	August– April	
No. of fishes	15	
Food items	F(%)	Wt(%)
Algae fragments	100.00	71.43
Seagrass fragments	93.30	28.57

Of these total number, 15 of fishes entering the seagrass bed were with empty stomachs. The remaining 13 fishes leaving the seagrass bed had food in their stomachs which included seagrass (35.21 % weight) and algae (30.81 % weight) fragments were the major food items. The other food items were isopods, shrimps, amphipods, polychaetes, sipunculids, gastropods and ophiuroids (Table 51).

A total of 52 specimens of *M. chinensis* were collected from both day and night times. Fishes entering the seagrass bed, 23 specimens, were found with empty stomachs whereas those leaving the seagrass bed, 29 specimens, contained food in their stomachs which included algae (73.3 % in frequency of occurrence and 22.65 % in weight) and seagrass fragment (68.9 % in frequency of occurrence and 23.98 % in weight) as the main food items in their stomach. Other food items found together were crustaceans (amphipods, isopods, tanaidaceans, ostracods and shrimps), polychaetes sipunculids, gastropods and bivalves (Table 52).

Porcupine : Diodontidae

Four specimens of Blackblotched porcupine *Diodon liturosus* were collected which included two entering and other two leaving the seagrass bed. Fishes entering the seagrass bed were found with empty stomachs but the other two fishes leaving the seagrass bed were found with food in their stomachs. Bivalve was the main component of their food (74.77 % IRI) together with crabs (Table 53).

Table 51 Stomach content analysis of *Acreichthys tomentosus*.

Month	August - April		
No. of fishes	13		
Food items	No.	F(%)	Wt(%)
Algae fragments	-	84.60	30.81
Seagrass fragments	-	76.90	35.21
Amphipod	70	61.50	7.04
Isopod	99	53.80	9.96
Shrimp	19	61.50	9.56
Polychaete	10	38.30	3.40
Gastropod	4	30.70	2.01
Bivalve	2	15.30	2.01

Table 52 Stomach content analysis of *Monocanthus chinensis*.

Month	August - April		
No. of fishes	29		
Food items	No.	F(%)	Wt(%)
Algae fragments		79.3	22.65
Seagrass fragments		68.9	23.98
Copepod	40	51.7	2.03
Amphipod	130	65.5	11.45
Isopod	102	58.6	10.27
Ostracod	38	34.4	2.39
Shrimp	9	27.5	5.66
Polychaete	10	31	6.29
Sipunculid	4	6.89	1.51
Gastropod	2	6.89	0.76

Table 53 Stomach content analysis of *Diodon liturosus*.

Month	August - January			
No. of fishes	2			
Food items	N(%)	F(%)	Wt(%)	IRI(%)
Crab	30	100	20.45	25.23
Bivalve	70	100	79.55	74.77