UNIVERSITI PUTRA MALAYSIA

POPULATION PARAMETERS OF TWO COMMON MANTIS SHRIMPS SPECIES OF PANTAI REMIS COASTAL WATERS

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ABSTRACT

The study is an effort to estimate the length-weight relationship, sex ratio and population parameters of two common mantis shrimps collected from the coastal waters of Pantai Remis, Perak between February 2012 and October 2012 using trawl nets. The two common mantis shrimps collected are *Harpiosquilla harpax* and *Miyakea nepa*. A total length and weight of 804 specimens of *H. harpax* and 695 specimens of *M. nepa* were measured and the sex ratio for *H. harpax* is 1:0.83 (males: females) while for *M. nepa*, the sex ratio is 1:1.46 (males: females). Males of *H. harpax* were predominant than the females and females were predominant for *M. nepa* throughout the study period. For the length-weight relationship, both species exhibit negative allometric for males, females and combined sexes as their value is below 3. The value of *b* for *H. harpax* were 2.698 for males and 2.884 for females while for *M. nepa* the value of *b* were 2.480 for males and 2.481 for females. For combined sexes of both species, value of *b* was 2.852 for *H. harpax* and 2.412 for *M. nepa*. FiSAT II software package was used to estimate the growth and mortality parameters such as asymptotic length ($L\infty$), growth co-efficient (K), total mortality (Z) and natural mortality (M), exploitation rate (E) and recruitment pattern. The $L\infty$ and K for *H. harpax* were 18.38 cm and 1.10 y^{-1} for males and 21.53 cm and 0.75 y^{-1} for females while for *M. nepa*, the $L\infty$ and K were found to be 16.28 cm and 1.10 y^{-1} for males and 17.73 cm and 0.75 y^{-1} for females. The growth performance index (φ') for *H. harpax* was 2.57 for males and 2.541 for females while for *M. nepa*, the growth performance index (φ') was 2.465 for males and 2.372 for females. Total mortality (Z), natural mortality and fishing mortality for *H. harpax* was 4.084 y^{-1} for males and 3.259y^{-1} for females, 2.247 y^{-1} for males and 1.674 y^{-1} for females, 1.837 y^{-1} for males and 1.585 y^{-1} for females respectively. Total mortality (Z), natural mortality and fishing mortality for *M. nepa* was 3.648 y^{-1} for males and 3.248 y^{-1} for females, 2.325 y^{-1} for males and 1.767 y^{-1} for females, 1.323 y^{-1} for males and 1.481 y^{-1} for females respectively. The recruitment patterns of both species were continuous throughout the year. The exploitation rate (E) for *H. harpax* were 0.499 for males and 0.486 for females while for *M. nepa*, the rate of exploitation (E) were 0.363 for males and 0.456 for females.

ABSTRAK

Kajian ini merupakan suatu usaha untuk menganggarkan hubungan panjang - berat, nisbah jantina dan parameter populasi untuk dua jenis udang lipan yang disampel daripada perairan Pantai Remis, Perak antara bulan Februari 2012 dan Oktober 2012 menggunakan pukat tunda. Kedua-dua udang lipan yang dikumpul adalah *Harpiosquilla harpax* dan *Miyakea nepa*. Satu jumlah panjang dan berat 804 spesimen *H. harpax* dan 695 spesimen *M. nepa* diukur dan nisbah jantina untuk *H. harpax* adalah 1:0.83 (jantan: betina) manakala bagi *M. nepa*, nisbah jantina adalah 1: 1.46 (jantan: betina). Udang jantan *H. harpax* lebih berpengaruh daripada betina manakala udang lipan betina lebih berpengaruh bagi *M. nepa* sepanjang tempoh kajian. Untuk hubungan panjang-berat, kedua-dua spesies mempamerkan allometrik negatif bagi jantan, betina dan gabungan untuk kedua-dua jantina adalah di bawah 3. Nilai *b* untuk *H. harpax* adalah 2.698 untuk jantan dan 2.884 untuk betina manakala untuk *M. nepa*, nilai *b* adalah 2.480 untuk jantan dan 2.481 untuk betina. Untuk gabungan kedua-dua jantina, nilai *b* adalah 2.852 untuk *H. harpax* dan 2.412 untuk *M. nepa*. FiSAT II pakej perisian telah digunakan untuk menganggar parameter pertumbuhan dan kematian seperti panjang asimptot ($L\infty$), pertumbuhan cekap bersama (K), jumlah kematian (Z) dan kematian semulajadi (M), kadar eksploitasi (E) dan corak pengambilan. Nilai $L\infty$ dan K untuk *H. harpax* adalah 18.38 cm dan 1.10 y^{-1} bagi jantan dan 21.53 cm dan 0.75 y^{-1} untuk betina manakala bagi *M. nepa*, nilai $L\infty$ dan K adalah 16.28 cm dan 1.10 y^{-1} bagi jantan dan 17.73 cm dan 0.75 y^{-1} bagi betina. Indeks prestasi pertumbuhan (φ') untuk *H. harpax* adalah 2.57 bagi jantan dan 2.541 untuk betina manakala bagi *M. nepa*, indeks prestasi pertumbuhan (φ') adalah 2.465 jantan dan 2.372 betina. Jumlah kematian (Z), kematian semulajadi (M) dan kematian memancing (F) untuk *H. harpax* masing-masing adalah 4.084 y^{-1} bagi jantan dan 3.259y^{-1} untuk betina, 2.247 y^{-1} bagi jantan dan 1.674 y^{-1} untuk betina, 1.837 y^{-1} bagi jantan dan 1.585 y^{-1} bagi betina. Jumlah kematian (Z), kematian semulajadi (M) dan kematian memancing (F) untuk *M. nepa* masing-masing ialah 3.648 y^{-1} untuk jantan dan 3.248 y^{-1} untuk betina, 2.325 y^{-1} bagi jantan dan 1.767 y^{-1} untuk betina, 1.323 y^{-1} bagi jantan dan 1.481 y^{-1} bagi betina. Corak pengambilan kedua-dua spesies adalah berterusan sepanjang tahun. Kadar eksploitasi (E) untuk *H. harpax* adalah 0.499 untuk jantan dan 0.486 untuk betina manakala bagi *M. nepa*, kadar pengeksploitasian (E) adalah 0.363 untuk jantan dan 0.456 untuk betina.

TABLE OF CONTENTS

Contents	Page
ACKNOWLEDGEMENT	i
ABSTRACT	ii
ABSTRAK	iii
TABLE OF CONTENTS	iv
LIST OF TABLES	vi
LIST OF FIGURES	vii
LIST OF ABBREVIATIONS AND SYMBOLS	x
1.0 INTRODUCTION	1
2.0 LITERATURE REVIEW	4
2.1 Taxonomy	4
2.2 Morphology of stomatopods	4
2.3 Habitat	7
2.4 Reproduction of stomatopods	8
2.5 Larvae	9
2.6 Behaviour of Stomatpods	10
2.7 Population dynamics	11
2.8 *Harpiosquilla harpax* (De Haan, 1884)	12
2.9 *Miyakea nepa* (Latreille, 1828)	14
3.0 MATERIALS AND METHODS	16
3.1 Specimens	16
3.2 Methods	16

3.2.1 Study area and sampling 16

3.2.2 Species identification 18

3.2.3 Data analysis 18

4.0 RESULTS 21

4.1 Length-Weight relationships 21

4.2 Condition factor of *Harpiosquilla harpax* and *Miyakea nepa* 25

4.3 Sex ratio of *Harpiosquilla harpax* and *Miyakea nepa* 27

4.4 Population parameters of Harpiosquilla harpax 29

4.4.1 Growth parameters 29

4.4.2 Mortality and exploitation 31

4.4.3 Recruitment pattern 32

4.5 Population parameters of *Miyakea nepa* 33

4.5.1 Growth parameters 33

4.5.2 Mortality and exploitation 35

4.5.3 Recruitment pattern 36

5.0 DISCUSSION 38

5.1 Length-Weight relationship 38

5.2 Condition factor of *Harpiosquilla harpax* and *Miyakea nepa* 40

5.3 Sex ratio of *Harpiosquilla harpax* and *Miyakea nepa* 41

5.4 Population parameters of *Harpiosquilla harpax* and *Miyakea nepa* 42

6.0 CONCLUSION 45

REFERENCES 46

LIST OF TABLES

Tables		Page
Table 1	Length weight relationship parameters of *Harpiosquilla harpax* and *Miyakea nepa* in the coastal area waters of Pantai Remis during February 2012 to October 2012	25
Table 2	Estimated population parameters of *Harpiosquilla harpax* in the coastal water of Pantai Remis, Perak.	29
Table 3	Estimated population parameters of *Miyakea nepa* in the coastal water of Pantai Remis, Perak.	36
Table 4	Growth parameters (L∞ and K) and computed growth parameter index (φ') of mantis shrimp from different countries	43

LIST OF FIGURES

Figure		Page
Figure 1	Sample of *Harpiosquilla harpax* (De Haan, 1884) collected fron coastal water of Pantai Remis, Perak	12
Figure 2	Sample of *Miyakea nepa* collected from coastal waters of Pantai Remis, Perak	14
Figure 3	Map of district region of Perak Darul Ridzuan	17
Figure 4	Map of Pantai Remis, Perak where the samples were taken	17
Figure 5	Length weight relationship of male *Harpiosquilla harpax* in the coastal area waters of Pantai Remis during February 2012 to October 2012	21
Figure 6	Length weight relationship of female *Harpiosquilla harpax* in the coastal area waters of Pantai Remis during February 2012 to October 2012	22
Figure 7	Length weight relationship of *Harpiosquilla harpax* in the coastal area waters of Pantai Remis during February 2012 to October 2012	22
Figure 8	Length weight relationship of male *Miyakea nepa* in the coastal area waters of Pantai Remis during February 2012 to October 2012	23
Figure 9	Length weight relationship of female *Miyakea nepa* in the coastal area waters of Pantai Remis during February 2012 to October 2012	23
Figure 10	Length weight relationship parameters of *Miyakea nepa* in the coastal area waters of Pantai Remis during February 2012 to October 2012	24
Figure 11	Condition factors of *Harpiosquilla harpax* from coastal area waters of Pantai Remis during February 2012 to October 2012	26

Figure 12	Condition factors of *Miyakea nepa* from coastal area waters of Pantai Remis during February 2012 to October 2012	27
Figure 13	Temporal variation of sex ratio (female/female + male) of *Harpiosquilla harpax* collected from the coastal waters of Pantai Remis, Perak.	28
Figure 14	Temporal variation of sex ratio (female/female + male) of *Miyakea nepa* collected from the coastal waters of Pantai Remis, Perak.	28
Figure 15	K-scan routine for best value of von Bertalanffy growth function (VBGF), asymptotic length (L∞) and growth coefficient (K) of (a) male and (b) female of *Harpiosquilla harpax* using the ELEFAN-I	30
Figure 16	von Bertalanffy growth curves of *Harpiosquilla harpax* for (a) male and (b) female superimposed on the restructured length-frequency histograms	30
Figure 17	Predicted maximum length for (a) male and (b) female *of Harpiosquilla harpax* based on extreme value theory	31
Figure 18	Jones and van Zalinge Plot of (a) male and (b) female *Harpiosquilla harpax* in the coastral water of Pantai Remis, Perak	31
Figure 19	Recruitment pattern of (a) males and (b) females *Harpiosquilla harpax* in the coastal area of Pantai Remis, Perak	33
Figure 20	K-scan routine for best value of von Bertalanffy growth function (VBGF), asymptotic length (L∞) and growth coefficient (K) of (a) male and (b) female of *Miyakea nepa* using the ELEFAN-I	34
Figure 21	von Bertalanffy growth curves of *Miyakea nepa* for (a) male and (b) female superimposed on the restructured length-frequency histograms	34
Figure 22	Predicted maximum length for (a) male and (b) female of *Miyakea nepa* based on extreme value theory	35

Figure 23	Jones and van Zalinge Plot of (a) male and (b) female *Miyakea nepa* in the coastal water of Pantai Remis, Perak	35
Figure 24	Recruitment pattern of (a) male and (b) female *Miyakea nepa* in the coastal area of Pantai Remis, Perak	37

LIST OF ABBREVIATIONS AND SYMBOLS

E	Exploitation rate
ELEFAN	Electronic Length Frequency Analysis
FiSAT	FAO ICLARM Stock Assessment Tools
F	Fishing mortality
g	Gram
K	Growth co-efficient of VBGF
L_∞	Asymptotic length
M	Natural mortality
mm	Millimeter
ML	Middle length
N	Sample size
Z	Total mortality
φ'	Growth performance index
˚C	Degree celcius
%	Percentage
<	Less than
>	More than

CHAPTER 1

INTRODUCTION

Stomotopoda is a group of crustacean that is widely known as mantis shrimps. According to Ahyong (2004), more than 480 stomatopods species have been recorded worldwide. They are commonly found in a variety of tropical littoral and sublittoral habitats (Dingle and Caldwell, 1978). Approximately 100 species have been recorded in South China Sea (Liu and Wang, 1999; Moosa, 2000). Stomatopod are marine carnivorous crustaceans that stalk or ambush their prey. Their habitats include sandy muddy bottom and coral reef. Stomatopod commonly occupies cavities, crevices and burrows.

Generally, this stomatopods look like lobster with large movable eyes with a very short carapace covering only 1/3 of the body. Stomatopods has three walking legs with a well-developed tail fan called telson and 'raptorial' claws that resembles the praying mantis. Chronin *et al*. (2006) stated that mantis shrimp get their name based on their method capturing prey using a folded, anterior raptorial appendage that look like similar to the foreleg of praying mantis. Stomatopods that live at coral, they are brightly in colour. When they are fighting or courting, they will expose species-specific pink, red, blue, purple, orange or yellow 'eyespot' on their raptorial appendage (Reaka, 1980). Their body colouration also varies among species.

It is found that stomatopods are useful for bioindicators of marine pollution stress on coral reefs (Erdmann and Caldwell, 1997; Erdmann and Sisovann, 1998). According to James and Thirumilu (1993), mantis shrimp are considerable as economic importance since they are used as poultry feed and it is believes that it has medicinal value.

Stomatopods are commercially exploited in several parts of the world. This can be seen through the exploitation of *Squilla* mantis in the Mediterranean and *Oratosquilla oratoria* in Japan. In Japan, *Oratosquilla oratoria* is caught in Tokyo Bay by small trawlers and immediately boiled for meat products (Kodama *et al*., 2006).

Population dynamics of stomatopod has been studied in other country such as in Mekong Delta in South of Viet Nam by Dinh *et al*. (2010), in Kuala Tungkal in Jambi Province Sumatera Island by Wardiatno and Mashar (2011), and in Madras by James and Thirumilu (1993). Many research has been done on the behaviour of mantis shrimp (Manfrin and Piccinetti, 1970), population genetic of stomatopod (Barber *et al.*, 2002) and relationship between body length, processed meat length and seasonal changes in net processed-meat of *Oratosquilla oratoria* (Kodama *et al.*, 2006). However, study regarding population dynamics of stomatopods in Malaysia is still lacking. Therefore, more research needs to be conducted on the population parameters of stomatopods in Malaysia.

Therefore, the objectives for this study were:

1. To investigate the length-weight relationship and relative condition factor of *Harpiosquilla harpax* and *Miyakea Nepa* from the coastal waters of Pantai Remis, Perak.
2. To determine the sex ratio of *Harpiosquilla harpax* and *Miyakea Nepa* populations collected from Pantai Remis, Perak.
3. To estimate the population paramaters of *Harpiosquilla harpax* and *Miyakea Nepa* from the coastal waters of Pantai Remis, Perak.

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