

STUDY ON POPULATION DYNAMIC OF MUDSNAIL
(*Cerithidea cingulata*) IN MANGROVE FOREST AND
INTERTIDAL FLAT AREA OF PENGKALAN GELAP, SETIU

SYAZIELLA BINTI SHAHARIM

FACULTY OF MARITIME STUDIES AND MARINE SCIENCE
UNIVERSITI MALAYSIA TERENGGANU
MALAYSIA

2013

STUDY ON POPULATION DYNAMIC OF MUD SNAIL (*Cerithidea cingulata*)
IN MANGROVE FOREST AND INTERTIDAL FLAT AREA OF
PENGKALAN GELAP, SETIU

By

Syaziella Bt. Shaharim

Research Report submitted in partial of fulfillment of
the requirement for the degree of
Bachelor of Science (Marine Biology)

Department of Marine Science
Faculty of Maritime Studies and Marine Science
UNIVERSITI MALAYSIA TERENGGANU
2013

This project report should be cited as:

Shaharim, S. 2013. Study on Population Dynamic of Mudsnaill (*Cerithidea cingulata*) in Mangrove Forest and Intertidal Flat Area of Pengkalan Gelap, Setiu. Undergraduate Thesis, Bachelor of Science, Universiti Malaysia Terengganu, Terengganu. 70p.

No part of this project report may be reproduced by any mechanical, photographic, or electronic process, or in the form of photographic, recording, nor may it be stored in a retrieval system, transmitted, or otherwise copied for public or private use, without written permission from the author and the supervisor(s) of the project.



DEPARTMENT OF MARINE SCIENCE
FACULTY OF MARITIME STUDIES AND MARINE SCIENCE
UNIVERSITI MALAYSIA TERENGGANU

DECLARATION AND VERIFICATION REPORT
FINAL YEAR RESEARCH PROJECT

It is hereby declared and verified that this research report entitled:

STUDY ON POPULATION DYNAMIC OF MUDSNAIL (*Cerithidea cingulata*) IN MANGROVE FOREST AND INTERTIDAL FLAT AREA OF PENGKALAN GELAP, SETIU by Syaziella Bt. Shaharim, Matric No. UK 22947, have been examined and all errors identified have been corrected. This report is submitted to the Department of Marine Science as partial fulfillment towards obtaining the Degree of Bachelor of Science (Marine Biology) Faculty of Maritime Studies and Marine Science, University Malaysia Terengganu.

Verified by:

Principal Supervisor

Name: **PROF. MADYA DR. ZAINUDIN BIN BACHOK**
Timbalan Pengarah
Institut Oseanografi dan Sekitaran
Universiti Malaysia Terengganu
21030 Kuala Terengganu, Terengganu

Date: **13 JUN 2013**

ACKNOWLEDGEMENTS

The course MMB 4998 and MMB 4999 was a very challenging course I ever had throughout my journey in Marine Biology. It required better time management skill, patience, hard work and cooperation and sharing of knowledge from many people. Fortunately I have carried out my research work and completed it successfully.

Alhamdulillah, I praised to Allah S.W.T for giving me effort and strength to finish and publish this project. Finally, this thesis report was successfully finished. I would like to thanks to all people who always help me so much from early until the end of this work. I would to grateful to my supervisor, Associate Professor Dr. Zainudin B. Bachok that help me and my FYP group so much in giving us advices, facilities, and to us. I also would to thanks to Laboratories Assistants, En. Md.Zan and En. Manaf B. Ahmad for their co-operation in helping me and my group during laboratories work. Besides that, I want to thanks so much to my lecturers, parents, and fellow friends for their caring and advices for my final year project improvement.

Last but not least, my warmest thanks goes to my family members. They had helped me to complete this research work successfully. I strongly believe that their prayers and wishes for me to complete my research project successfully is one of the main causes for me to successfully finish this research work to the end.

Thank you, everyone!

TABLE OF CONTENT

Contents	Page
Acknowledgement	ii
Table of Contents	iii
List of Tables	v
List of Figures	vii
List of Appendixes	ix
Abstract (in English)	x
Abstrak (in Bahasa Malaysia)	xii
INTRODUCTION	
1.1 Mangrove and intertidal flat	1
1.2 Setiu Wetland	2
1.3 Gastropod	2
1.4 Population Dynamic	3
1.5 Objective	4
LITERATURE REVIEW	
2.1 General Review of <i>Cerithidea cingulata</i>	6
2.2 Previous studies	10
2.3 Population Dynamic	11
METHODOLOGY	
3.1 Introduction to the study area	15
3.2 Study of Population Dynamic of <i>Cerithidea cingulata</i>	18
RESULT	
4.1 Length-weight relationship of <i>Cerithidea cingulata</i>	26
4.2 Length-frequency distribution	38
4.3 Growth of <i>Cerithidea cingulata</i>	41
4.4 Mortality and exploitation	43

4.5 Recruitment pattern and probability of capture	46
4.6 Relative yield-per-recruit and Biomass-per-recruit	47
4.7 Dry weight analysis	53
DISCUSSION	
5.1 Growth of <i>Cerithidea cingulata</i> based on length frequency data	56
5.2 Mortality and exploitation rate for <i>Cerithidea cingulata</i>	58
5.3 Recruitment pattern and probability of capture	59
CONCLUSION	61
REFERENCES	63
APPENDICES	68
CURRICULUM VITAE	70

LIST OF TABLES

- Table 4.1 Annual length frequency distribution of gastropods species *Cerithidea cingulata* caught randomly at two different sampling areas (a) mangrove forest (b) intertidal flat of Kg. Pengkalan Gelap, Setiu during May 2012 until April 2013
- Table 4.2 Population parameters of *Cerithidea cingulata* sampled from May 2012 until April 2013

LIST OF FIGURES

- Figure 3.0 Picture of *Cerithidea cingulata* on surface of substrate
- Figure 3.1 The map of Terengganu state in Malaysia and sampling area at mangrove forest (S1) and intertidal flat area (S2)
- Figure 3.2 Picture of hand-sieve
- Figure 3.3 Picture of Electronic balance
- Figure 3.4 Picture of Vernier caliper
- Figure 3.5 Specimen of *Cerithidea cingulata* were marked
- Figure 3.6 Scientific oven for dry-weight analysis
- Figure 3.7 Paper tissue used for wipe specimen
- Figure 4.1(a) Graph of Log Length (Log L) and Log Weight (Log W) of *Cerithidea cingulata* from mangrove forest area of Pengkalan Gelap, Setiu in May 2012 until April 2013
- Figure 4.1(a) Graph of Log Length (Log L) and Log Weight (Log W) of *Cerithidea cingulata* from mangrove forest area of Pengkalan Gelap, Setiu in May 2012 until April 2013 (continue)
- Figure 4.1(b) Graph of Log Length (Log L) and Log Weight (Log W) of *Cerithidea cingulata* from intertidal flat area of Pengkalan Gelap, Setiu in May 2012 until April 2013
- Figure 4.1(b) Graph of Log Length (Log L) and Log Weight (Log W) of *Cerithidea cingulata* from intertidal flat area of Pengkalan Gelap, Setiu in May 2012

until April 2013(continue)

Figure 4.2(a) Graph length-weight relationship of *Cerithidea cingulata* from mangrove forest of Pengkalan Gelap, Setiu Wetland in May 2012 until April 2013

Figure 4.2(a) Graph length-weight relationship of *Cerithidea cingulata* from mangrove forest of Pengkalan Gelap, Setiu Wetland in May 2012 until April 2013 (continue)

Figure 4.2(b) Graph length-weight relationship of *Cerithidea cingulata* from intertidal flat area of Pengkalan Gelap, Setiu Wetland in May 2012 until April 2013

Figure 4.2(b) Graph length-weight relationship of *Cerithidea cingulata* in intertidal flat area for twelve month (continue)

Figure 4.3(a) Graph length-frequency distribution (percentage of total number measured, n) of *Cerithidea cingulata* from mangrove forest area of Pengkalan Gelap, Setiu for 12 months

Figure 4.3(b) Graph length-frequency distribution (percentage of total number measured, n) of *Cerithidea cingulata* from intertidal area of Pengkalan Gelap, Setiu for 12 months

Figure 4.4 Growth constant K and growth performance index, (ϕ') for *Cerithidea cingulata* in different habitat (a) mangrove forest area (b) intertidal flat area of Pengkalan Gelap, Setiu

Figure 4.5 The length-frequency of *Cerithidea cingulata* with VBGF growth curves fitted by ELEFAN-1. (a) Mangrove forest area, $L_{\infty} = 2.78$ cm and $K=0.810$ year⁻¹, and (b) Intertidal flat area, ($L_{\infty} = 2.78$ cm and $K= 1.10$ year⁻¹)

- Figure 4.6 Length converted catch curve based on average age composition of *Cerithidea cingulata* in different habitat of Pengkalan Gelap, Setiu
- Figure 4.7 Recruitment Pattern for *Cerithidea cingulata* at different habitat (a) mangrove forest (b) intertidal flat area of Pengkalan Gelap, Setiu Wetlands
- Figure 4.8 Probability of capture of *Cerithidea cingulata* (mangrove area) by using the input data from (a) logistic transformation to estimates the probability of length classes
- Figure 4.9 Probability of capture of *Cerithidea cingulata* (intertidal flat area) by using the input data from (a) logistic transformation to estimates the probability of length classes
- Figure 4.10 Yield isopleths for the *Cerithidea cingulata* shows the L_c/L_∞ at certain exploitation ratio(E). (a)mangrove forest area (b) intertidal flat area
- Figure 4.11 Relative yield-per-recruit (Y'/R) and relative biomass-per-recruit (B'/R) for the *Cerithidea cingulata* using the knife-edge procedure for different habitat. (a) Mangrove forest (b) intertidal flat
- Figure 4.12 Graph of Log Length (Log L) and Log Wet Weight (Log W) compared with Log Length (Log L) and Log Dry Weight (Log W) of *Cerithidea cingulata* from mangrove habitat
- Figure 4.13 Graph of Log Length (Log L) and Log Wet Weight (Log W) compared with Log Length (Log L) and Log Dry Weight (Log W) of *Cerithidea cingulata* from intertidal habitat
- Figure 4.14 Graph length-weight relationship of wet-weight compared with dry-weight of *Cerithidea cingulata* from mangrove habitat

Figure 4.15 Graph length-weight relationship of wet-weight compared with dry weight of *Cerithidea cingulata* from intertidal habitat

LIST OF APPENDICES

Appendix 1 The equation Length Weight Relationship of *Cerithidea cingulata* from mangrove forest area of Pengkalan Gelap

Appendix 2 Table 1.2: Table 1.1: The equation Length Weight Relationship of *Cerithidea cingulata* from mangrove forest area of Pengkalan Gelap

ABSTRACT

The study of length-weight relationship of *Cerithidea cingulata* was done in order to assess mud snail that have been founded in different habitats. The relationship of shell length with wet weight of shell of gastropod species *Cerithidea cingulata* from different habitat such as mangrove forest and intertidal flat area of Pengkalan Gelap, Setiu were measured. The sampling was conducted monthly for one year. The relationship of shell length and dry weight also measured in order for comparison with length and wet weight. Growth of the mud snail *Cerithidea cingulata* from different habitat of mangrove forest area and intertidal flat area were measured and compared. The length-frequency data of *Cerithidea cingulata* for the both habitats were applied with Von Bertalanffy growth function. Then, by using electronic analysis (ELEFAN) in FiSAT program the growth parameters were determined. The maximum length of *Cerithidea cingulata* that have been recorded during sampling for habitat of mangrove forest and intertidal flat area were 2.6 cm and 2.7cm. However, asymptotic length, L_{∞} of VBGF estimates that *Cerithidea cingulata* could attain a maximum growth of 2.78 cm even they were living in different habitat. While VBGF growth constant, K of *Cerithidea cingulata* for habitat of mangrove forest were 0.810 year^{-1} while habitat intertidal flat area were 1.10 year^{-1} .

Kajian Populasi Dinamik Gastropod (*Cerithidea cingulata*) Di Paya Bakau Dan Kawasan Tanah Rata Pasang Surut Di Kg. Pengkalan Gelap, Setiu Wetland.

ABSTRAK

Kajian mengenai hubungan antara berat dan panjang bagi *Cerithidea cingulata* yang telah dijumpai dalam habitat berbeza telah dijalankan. Hubungan antara panjang dan berat basah bagi gastropod spesis *Cerithidea cingulata* daripada habitat berbeza seperti hutan paya bakau dan kawasan rata pasang surut di Kg. Pengkalan Gelap, Setiu telah diukur. Persampelan telah dijalankan secara bulanan untuk setahun. Hubungan antara panjang rangka luar dengan berat kering juga diukur untuk perbandingan dengan panjang dan berat basah. Pertumbuhan siput *Cerithidea cingulata* daripada habitat berbeza iaitu hutan bakau dan kawasan rata pasang surut diukur dan dibandingkan. Data kekerapan panjang *Cerithidea cingulata* bagi kedua-dua habitat berbeza telah digunakan bersama dengan Von Bertalanffy growth function. Kemudian, dengan menggunakan analisis elektronik (ELEFAN) yang terdapat dalam FiSAT program parameter pertumbuhan telah ditentukan. Panjang maksimum *Cerithidea cingulata* yang dicatatkan sepanjang persampelan bagi habitat hutan bakau dan kawasan rata pasang surut selama setahun ialah 2.6 cm dan 2.7 cm. walau bagaimanapun, panjang asimptot, L_{∞} oleh VBGF menganggarkan *Cerithidea cingulata* boleh mencapai pertumbuhan maksimum 2.78 cm walaupun hidup dalam habitat yang berbeza. Manakala pertumbuhan malar VBGF, K *Cerithidea cingulata* bagi habitat hutan bakau 0.810 year^{-1} dan kawasan rata pasang surut ialah 1.10 year^{-1} .