

ENVIRONMENT AND DIVERSITY OF FISH FAUNA
OF THE SUNGAI BERING, MALAYSIA

SITI AINUL BAKHTIAR

FACULTY OF MARINE STUDIES AND MARINE SCIENCE
UNIVERSITI MALAYSIA TERENGGANU

2007

LP
49
FMSM
1
2007

**ABUNDANCE AND DIVERSITY OF FISH LARVAE
AROUND PULAU REDANG, MALAYSIA**

By

Siti Ariza Binti Aripin

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

**Department of Marine Science
Faculty of Maritime and Marine Sciences
Universiti Malaysia Terengganu
2007**

1100058053

Siti Ariza, A. 2007. Abundance and Diversity of Fish Larvae around Pulau Redang, Malaysia. Undergraduate thesis, Bachelor of Science (Marine Biology), Universiti Malaysia Terengganu, Terengganu, Malaysia. 74p.

No part of this project may be produced by any mechanical, photographic or electronic processes, or in the form of phonographic recording, nor may it be stored in retrieval system, transmitted, or otherwise copied for public or private use, without written permission from the author and the supervisors of this project.



**JABATAN SAINS MARIN
FAKULTI PENGAJIAN MARITIM DAN SAINS MARIN
UNIVERSITI MALAYSIA TERENGGANU**

**PENGAKUAN DAN PENGESAHAN
LAPORAN PROJEK PENYELIDIKAN I DAN II**

Adalah ini diakui dan disahkan bahawa laporan penyelidikan bertajuk: **ABUNDANCE AND DIVERSITY OF FISH LARVAE AROUND PULAU REDANG, MALAYSIA** oleh Siti Ariza binti Aripin, No. Matrik UK10740 telah diperiksa dan semua pembetulan yang disarankan telah dilakukan. Laporan ini dikemukakan kepada Jabatan Sains Marin sebagai memenuhi sebahagian daripada keperluan memperoleh ijazah Sarjana Muda Sains (Biologi Marin) Fakulti Pengajian Maritim dan Sains Marin, Universiti Malaysia Terengganu.

Disahkan oleh:

Penyelia Utama **PROF. MADYA LIEW HOCK GHARK**
Nama: **Pensyarah**
Institut Oseanografi
Cop Rasmi: **Universiti Malaysia Terengganu (UMT)**
21030 Kuala Terengganu, Terengganu.

Tarikh: 24 April 2007

Penyelia Kedua **AMIRRUDIN AHMAD**
Nama: **Pensyarah**
Jabatan Sains Biologi
Fakulti Sains dan Teknologi
Cop Rasmi: **Universiti Malaysia Terengganu**
21030 Kuala Terengganu.

Tarikh: 24 APR 2007

ACKNOWLEDGEMENTS

I was first introduced to fish larvae when I did my internship in Southeast Asia Fisheries Development Centre (SEAFDEC) Chendering, Terengganu. From that exposure I gained experience for my research project. This research project was based on specimens collected by SEAFDEC on several research cruises. Therefore, I would like to express my appreciation to SEAFDEC personnel especially to YM Raja Mohammad Noordin Raja Omar, for allowing me to examine the samples at SEAFDEC. I thank Dr. Hjh. Mahyam Isa, Dr. Yoshinobu Konishi, Mr. Zulkifli Talib, Mr. Rosdi Mohd. Nor, Mr. Nazmeer Nazri and Mr. Mad Akhir Arshad in helping me to complete this study.

I thank my supervisors Assoc. Prof. Liew Hock Chark and Mr. Amirrudin Ahmad for their guidance and help throughout this research. I am indebted to Mr. Yusri Yusuf for his constructive comments and contribution of references to complete this research. I also would like to acknowledge The Institute of Oceanography (INOS), Universiti Malaysia Terengganu for authorizing me to use the facilities at Biodiversity Laboratory to analyze the specimens.

Lastly, but most importantly, I wish to acknowledge the love, care, devotion and support of my family and friends.

MuaX!!

Table of Contents

<u>Contents</u>	<u>Page</u>
Acknowledgements	iii
Contents table	iv
List of Tables	vii
List of Figures	viii
List of Abbreviations	viii
List of Appendices	xi
Abstrak	xii
Abstract	xiii
Chapter One	
1.0 Introduction	1
1.1 Objective	4
Chapter Two	
2.0 Literature Review	5
2.1 Life history stages of fishes	5
2.2 Pulau Redang Marine Park	6
2.3 The abundance and diversity of marine fishes of Pulau Redang	7

2.4 The commercially important families of marine fishes in South China Sea of Malaysia	7
2.5 The abundance and diversity of marine fish larvae in Malaysia	8
2.6 Distribution of fish larvae by temporal scales	8
2.7 Distribution of fish larvae by spatial patterns	9
2.8 Sampling Techniques of fish larvae	11
2.9 Fish Larvae identification	13

Chapter Three

3.0 Methodologies	15
3.1 Study Site	15
3.2 Sampling method	16
3.3 Sorting and Identification of fish larvae	17
3.4 Data Analysis	18

Chapter Four

4.0 Results	19
4.1 Spatio-temporal composition and abundance of fish larvae	20
4.2 Dominant family of fish larvae	21
4.3 Distribution and abundance of commercially important fish based on fish larvae	32

Chapter five

5.0 Discussion	34
5.1 Spatio-temporal composition and abundance of fish larvae	34
5.2 Dominant family of fish larvae	35
5.3 Distribution and abundance of commercially important fish based on fish larvae	36

Chapter Six

6.0 Conclusion	38
----------------	----

References	39
-------------------	----

Appendices	45
-------------------	----

Curriculum Vitae	61
-------------------------	----

Lists of Tables

Table 3.1: The location for sampling stations	16
Table 4.1: The total orders and families of fish larvae identified in the study	19
Table 4.2: The mean density for day and night catch	20
Table 4.3: The density of fish larvae for day catch on June 2002	22
Table 4.4: The density of fish larvae for night catch on June 2002	23
Table 4.5: The density of fish larvae for day catch on August 2002	24
Table 4.6: The density of fish larvae for night catch on August 2002	25
Table 4.7: The density of fish larvae for day catch on October 2002	26
Table 4.8: The density of fish larvae for night catch on October 2002	27

List of Figures

Figure 3.1: The red dots indicate the sampling station around Pulau Redang. (Modified from Comley, 2004)	16
Figure 3.2: Some of the characteristic of fish larvae which can be used for identification (Adapted from Leis and Carson-Ewart (2000a)	18
Figure 4.1: The total density for every station during sampling period. .	20
Figure 4.2: The dominant families obtained from throughout the sampling period.	28
Figure 4.3: Comparison of total families between months	28
Figure 4.4: The percentage of dominant families for day and night in June 2002.	29
Figure 4.5: The percentage of dominant families for day and night in August 2002	29
Figure 4.6: The percentage of dominant families for day and night in October 2002	29
Figure 4.7: The total families for day and night at station 1	30
Figure 4.8: The total families for day and night at station 2	31
Figure 4.9: The total families for day and night at station 3	31
Figure 4.10: The total families for day and night at station 4	31

Figure 4.11: The total commercial families for month of June, August and October 2002.

33

List of Abbreviations

MPA	:	Marine Protected Area
MOCNESS	:	Multiple Opening/Closing Net and Environment Sampling System
BIONESS	:	Bedford Institute of Oceanography Net and Environmental Sampling System
SEAFDEC	:	Southeast Asia Fisheries Development Centre
ANOVA	:	Analysis of variance
EEZ	:	Exclusive Economic Zone

List of Appendices

Appendix 1: The schematic diagrams of fish larvae families obtained during sampling period.	45
Appendix 2: The 2-way ANOVA for comparison at monthly sampling between day and night	52
Appendix 3: The 2-way ANOVA for comparison at stations between day and night	53
Appendix 4: Fish larvae density for day catch on June 2002	54
Appendix 5: Fish larvae density for night catch on June 2002	55
Appendix 6: Fish larvae density for day catch on August 2002	56
Appendix 7: Fish larvae density for night catch on August 2002	57
Appendix 8: Fish larvae density for day catch on October 2002	59
Appendix 9: Fish larvae density for night catch on October 2002	60

KEPADATAN DAN KEPELBAGAIAN LARVAL IKAN PADA TERUMBU KARANG DI SEKITAR PULAU REDANG

ABSTRAK

Satu kajian mengenai jumlah kepadatan dan kepelbagaian larva ikan di Taman Laut Pulau Redang, Terengganu dijalankan daripada 10^{hb} Jun hingga 2^{hb} Oktober 2002. Sebanyak 4824 larva ikan telah dikenalpasti merangkumi 43 famili yang telah ditangkap sepanjang persampelan menggunakan larval net. Min kepadatan bagi tangkapan siang adalah masing-masing 18.61 ± 9.81 per 100m^3 , 41.27 ± 53.36 per 100m^3 dan 14.93 ± 5.03 per 100m^3 bagi Jun, Ogos dan Oktober. Min kepadatan bagi tangkapan malam adalah masing-masing 40.99 ± 28.21 per 100m^3 , 46.24 ± 43.72 per 100m^3 dan 40.53 ± 10.05 per 100m^3 bagi Jun, Ogos dan Oktober. Didapati tiada corak yang jelas sewaktu bulan dan stesyen bagi kepadatan larva ikan. Tetapi, terdapat corak yang jelas bagi keseluruhan kepadatan larva ikan diantara siang dan malam kecuali stesyen 4. Kepadatan larva ikan ini menunjukkan kemungkinan bahawa ia mempunyai corak migrasi kompleks dan kajian perlu dilakukan lagi untuk memahami corak migrasi larval ikan. Tiga famili dominan telah diperhatikan sepanjang penyempelan iaitu Terapontidae, Gobiidae dan Engraulidae. Terdapat 21 famili larval ikan yang penting dari segi nilai komersial dikenalpasti seperti Serranidae, Bothidae, Carangidae, Clupeidae, Engraulidae, Cynoglossidae, Hemiramphidae, Scrombridae, Labridae, dan Nemipteridae. Kehadiran larva ikan terutama famili yang penting dari segi nilai komersial di Taman Laut Pulau Redang menunjukkan bahawa peranannya sebagai taman laut adalah penting dalam melindungi dan memulihara ekosistem terumbu karang sebagai tempat pembiakan bagi ikan.

ABSTRACT

A study on the abundance and diversity of fish larvae at Pulau Redang Marine Park, Terengganu was conducted from 10th June to 2nd October 2002. A total of 4824 fish larvae were identified, representing 43 families that were captured using larval net. Mean density for day catch was 18.61 ± 9.81 per 100m^3 , 41.27 ± 53.36 per 100m^3 and 14.93 ± 5.03 per 100m^3 for June, August and October, respectively. Mean density for night catch was 40.99 ± 28.21 per 100m^3 , 46.24 ± 43.72 per 100m^3 and 40.53 ± 10.05 per 100m^3 for June, August and October, respectively. There was no clear pattern between sampling dates at any months and stations for abundance of fish larvae during sampling period. There was clear pattern of overall fish larval density between day and night obtained from this study except for station 4. The abundance of fish larvae indicates that it probably has a complex migration behavior and research should be done to understand more about fish larvae behavior. Three dominant families were observed throughout the sampling period namely Terapontidae, Gobiidae and Engraulidae. There were 21 commercially important families of fish larvae identified such as Serranidae, Bothidae, Carangidae, Clupeidae, Engraulidae, Cynoglossidae, Hemiramphidae, Scrombridae, Labridae, and Nemipteridae. The presence of fish larvae especially the commercially important families in Pulau Redang Marine Park indicates that the role of this island as a marine park is essential in protecting and conserving coral reef ecosystem as a breeding ground for fish.