



**Establishment and Operation of a Regional System of
Fisheries *Refugia* in the South China Sea and Gulf of Thailand**

REPORT

**MATURATION STAGES OF FEMALE ADULT PENAEUS
MONODON IN KUALA BARAM, MIRI, SARAWAK**

Prepared by

NURRIDAN BINTI ABDUL HAN

FRI Bintawa, 93744, Bintawa, Kuching, Sarawak, MALAYSIA.

**SOUTHEAST ASIAN FISHERIES DEVELOPMENT CENTER
TRAINING DEPARTMENT**



First published in Phrasamutchedi, Samut Prakan, Thailand in December 2020 by the SEAFDEC-UNEP-GEF Fisheries Refugia Project, Training Department of the Southeast Asian Fisheries Development Center

Copyright © 2020, SEAFDEC-UNEP-GEF Fisheries *Refugia* Project

This publication may be reproduced in whole or in part and in any form for educational or non-profit purposes without special permission from the copyright holder provided acknowledgement of the source is made. The SEAFDEC-UNEP-GEF Fisheries *Refugia* Project would appreciate receiving a copy of any publication that uses this publication as a source.

No use of this publication may be made for resale or for any other commercial purpose without prior permission in writing from the SEAFDEC Secretary-General at.

Southeast Asian Fisheries Development Center
Training Department
P.O.Box 97, Phrasamutchedi, Samut Prakan, Thailand
Tel: (66) 2 425 6100
Fax: (66) 2 425 6110
<https://fisheries-refugia.org> and
<https://seafdec.or.th>

DISCLAIMER:

The contents of this report do not necessarily reflect the views and policies of the Southeast Asian Fisheries Development Center, the United Nations Environment Programme, and the Global Environment Facility.

For citation purposes this document may be cited as:

Nurridan binti Abdul Han. 2020. Establishment and Operation of a Regional System of Fisheries Refugia in the South China Sea and Gulf of Thailand, Report on **Maturation Stages of Female Adult Penaeus Monodon In Kuala Baram, Miri, Sarawak, Malaysia**. Southeast Asian Fisheries Development Center, Training Department, Samut Prakan, Thailand; FR/REP/MY26, 13 p.

Report on the maturation stages of female adult *Penaeus monodon* in Kuala Baram,
Miri, Sarawak

Prepared by :

Nurridan binti Abdul Han

FRI Bintawa, 93744, Bintawa, Kuching, Sarawak, MALAYSIA.

Introduction

The tiger prawn, *Penaeus monodon* Fabricius falls under the Family Penaeidae and was identified as one of the largest and the most commercial commodity. *P. monodon*, with body length reaches 270 mm can be considered as one of the largest prawn under Family Penaeidae. The age of first breeding in *P. monodon* is unknown. However, it is apparent that they go through a period of adolescence before passing through puberty and finally becoming sexually mature (Kenway and Hall 1998). Anecdotal evidence supports the conclusion that a combination of age and body size influences the onset of sexual maturity.

The average size of *P. monodon* broodstock varies according to geographic location and may have a genetic as well as an environmental basis. Large males, 80 grams or larger, are preferred by hatcheries for captive matings as they generally produce higher hatch rates compared to those obtained from smaller males typically utilized as broodstock as matings with large males results in higher fertilization rates compared to small males (Pratoomchat *et al.* 1993). In Australia, wild female broodstock are typically within the range of 110 to 160 grams, whereas in the more equatorial regions of Thailand broodstock range from 150 to well over 200 grams. Commercial hatcheries prefer larger females to smaller ones in order to maximize egg production per spawner utilized.

In female penaeid prawns the ovaries are paired, but partially fused in the cephalothorax (head and thorax region), and consist of a number of lateral lobes which continue along the entire length of the tail. The determination of ovarian development by hatchery technicians is made by illuminating the internal body organs of the female by means of a bright underwater torch beam being passed along her side. However, due to the density of the cephalothorax, the only portion of the ovary seen by illumination is that within the tail. This appears as a dark shadow, due to the dense

lipid composition and pigmentation, and can be ranked through a series of developmental stages from I to V.

In order to get the complete information on the spawning season of *P. monodon* in Kuala Baram, Miri, Sarawak, it is necessary that research on ovarian maturation stages conducted, therefore, this report will focused on ovarian maturation of *P.monodon* in Kuala Baram, the earmarked area for refugia.

The objective of this study is to determine the spawning month of *P.monodon* to come up with crucial information, therefore refugia management can prosecute.

Materials and Method

The ovarian maturation stages of gravid/adult female surveys in 2020 were conducted at 2 different sites, namely Hock Hai Kim Cold Storage jetty and Krokop market in Miri, Sarawak. Hock Hai Kim Cold Storage jetty was privately owned by trawl operators whereas, samples from Krokop market originated from trawl operators from 'Lembaga Kemajuan Ikan Malaysia (LKIM) jetty.

Samples were bought from the operators and fish monger, with price ranging from RM85 to RM100 per kilogram. Around 100-150 tails of adult *P.monodon* were bought, measured length and weight. Approximately 30-70 tails of gravid female were dissected to get/collect the gonad. Thereupon, Gonadosomatic Index, abbreviated as GSI was calculated. GSI is the calculation of the gonad mass as a proportion of the total body mass. It is represented by the formula:

$$\text{GSI} = [\text{gonad weight} / \text{total tissue weight}] \times 100$$

It is a tool for measuring the sexual maturity of animals in correlation to ovary development and testes development (in this study, ovary development).

Beside the GSI to estimate the sexual maturity, the visualization technique to observe stages of ovary maturation were also explicitly used. The determination of ovarian development is made by illuminating the internal body organs of the female by means of a torch light being passed along her side. The maturation of the ovary has been categorised into five stages, the classification of which is based on ovum size, gonad expansion and coloration (Motoh, 1981).

Results

A total of 290 tail of gravid female *P.monodon* were weighted and GSI were calculated from June until November 2020.

The maturity stage of tiger prawn in Kuala Baram were presented in Figure 1. With a total of 290 individuals (Table 1) caught within the six months of sampling, stage 4 has recorded as the most prominent catch, followed by stage 3, 2, 5 and 1 respectively. Stage 4 classified as ripe stage (mature), It is diamond in shape, expanding through the exoskeleton of the first abdominal segment. The isolated ovary appears dark olive green, filling up all the available space in the body cavity (Primavera 1980).

From the observation (Figure 1), stage 4 started to increase from July to Nov 2020, and August experienced the peak of increase in stage 4.

Table 1: The maturity stage of tiger prawn prawn caught in Kuala Baram

Month	Stage				
	1	2	3	4	5
June	4	10	11	8	13
July	3	7	9	13	10
Aug	15	15	11	16	7
Sept	8	11	15	14	12
Oct	6	7	9	15	3
Nov	6	9	6	15	2
Total	42	59	61	81	47

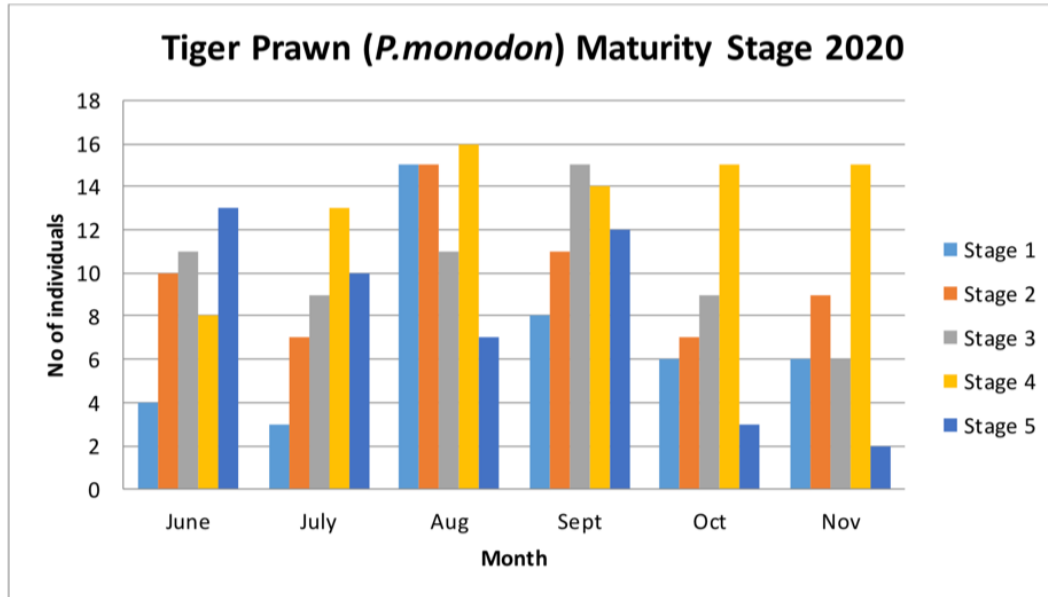


Figure 1: Bar graph of maturity stage of tiger prawn caught in Kuala Baram

Discussion

The results of these survey indicated that starting from July until November yearly, the gravid female of stage 4 dominated with August as the peak month. This observation is equivalent to previous findings (Hadil, 2018), where stage 4 of ovary maturation peak in the month of August.

Conclusion

A total of 290 gravid female *P. monodon* were recorded from 6 survey trips from June until November, with stage 4 maturation stages began from July until November, with highest score was in the month of August. In conclusion, if refugia is to be implemented, where it will take into account the closure of the area off Kuala Baram during the spawning season, it is suggested that from August to October as a closed season to protect the gravid prawn from being caught and overexploited.



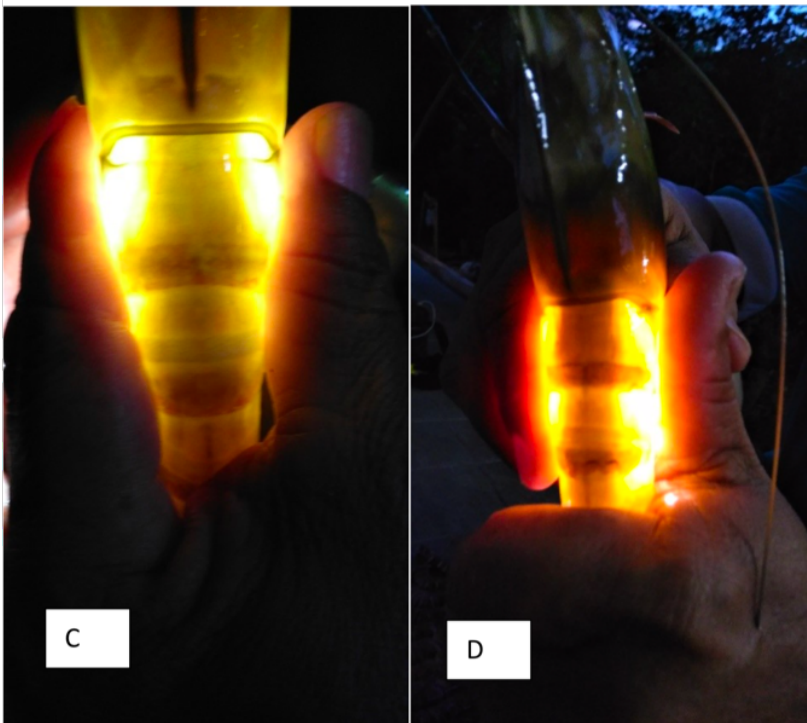
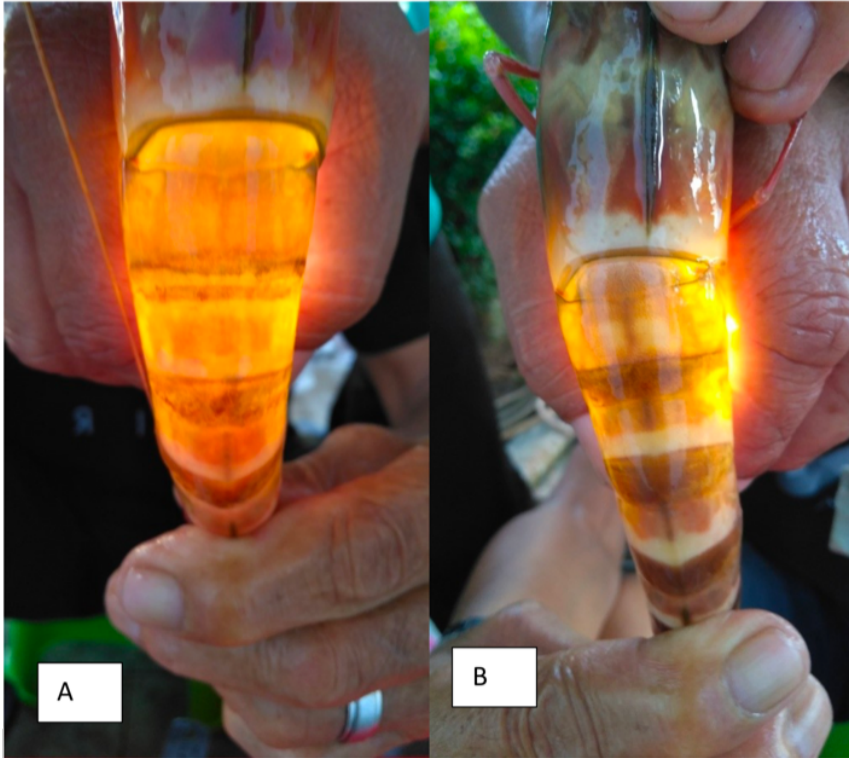
Samples of gravid female *P. monodon* from Krokop Market



Sample selection of gravid female *P. monodon* in Krokop market



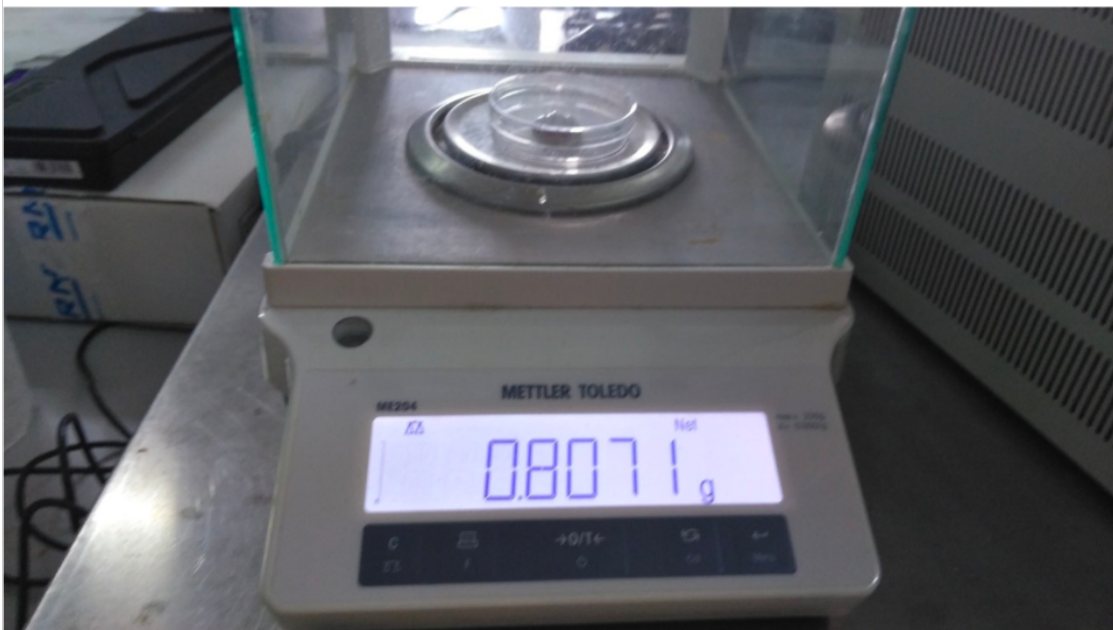
The determination of ovarian development in gravid female *P. monodon* is made by illuminating the internal body organs of the female by means of a torch light being passed along her side.



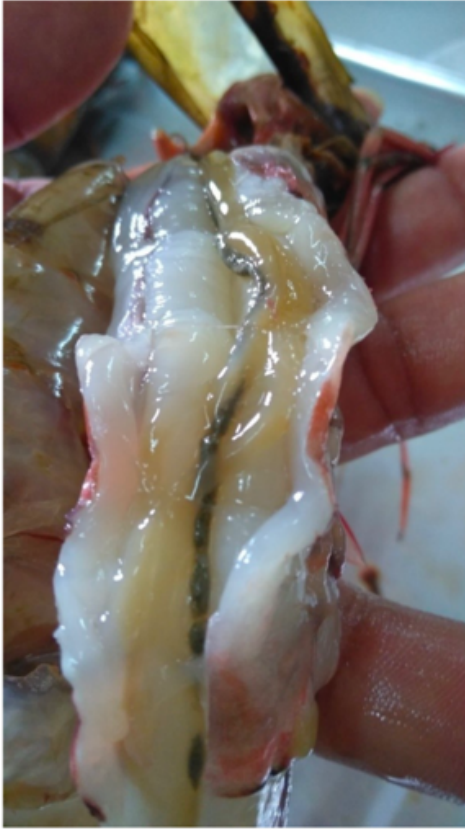
A few stages of gravid female *P. monodon*, A:stage 5, B:stage 1, C:stage 3, D: stage 2



Gravid females of *P. monodon* were dissected to get/collect the gonad.



Weighing gonad using weighing machine, Toledo.



A gravid female *P.monodon*, already dissecting, disposing its gonad and intestine



Stage 4 gravid female *P.monodon*



Gonad, stage 2



Intestine of *P.monodon*



Showing, right: male, left: female of *P.monodon*



Gonad and intestine of gravid female *P.monodon* being separated



Female spawners weighing 231 gram from Krokop market



Different size of gravid female *P. monodon*