



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

REPORT

**REPRODUCTIVE BIOLOGY OF THE PRIORITY SPECIES
(GONAD MATURITY AND GSI)
CORON, PALAWAN
(OCTOBER – DECEMBER 2021)**

Prepared by
**NATIONAL FISHERIES RESEARCH AND DEVELOPMENT INSTITUTE
PHILIPPINES**

SOUTHEAST ASIAN FISHERIES DEVELOPMENT CENTER
TRAINING DEPARTMENT



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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>

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I. Introduction

Fish reproductive biology is crucial for fishery management (Jakobsen et al., 2009), where managers rely on size at first maturity and the onset and duration of spawning season for managing fisheries (Dias Neto, 2010a). As part of the baseline data collection for the establishment of fisheries refugia in the 3 sites, the gonad maturity and GSI of the priority species were studied. After a series of consultation in Coron Site and in reference to the results of the Fisheries Landing Survey and the Ichthyoplankton Survey, the committee decided for the conservation of fusilier and scad refugia. Redbelly yellowtail fusilier and Amberstripe scad are among the commercially important fish commodities in Coron, Palawan.

II. Materials and Methods

Data Collection

The identified priority species selected for the proposed fisheries refugia site in Coron, Palawan were *Caesio cuning* (redbelly yellowtail fusilier) and *Decapterus muroadsi* (amberstripe scad) based on the series of consultations from the LGU and the fisherfolk. (Figure 1a-1b).

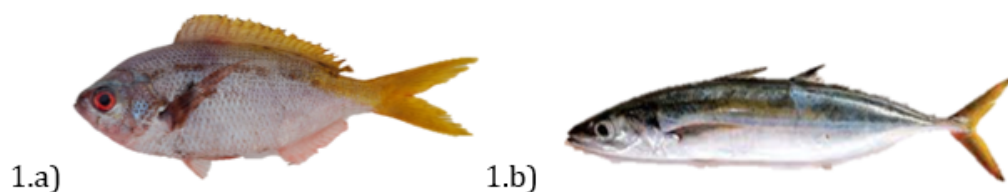


Fig. 1. Fisheries Refugia - Priority Species

Two technical enumerators were collecting the samples for reproductive biology. Ten samples for every species were randomly collected and purchased from the local markets of each site. The samples were dissected on-site daily from April 2021 to March 2022. Total lengths, weight and gonad samples were recorded for each sample. The sex of each fish sample were identified by visual examination (Figure 2a and 2b). The gonads were dissected and weighed by a digital weighing scale.

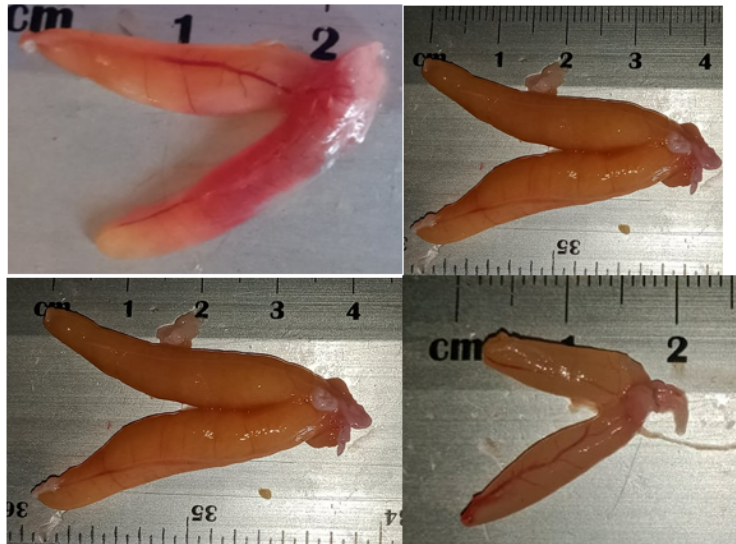


Fig. 2a. Gonads dissected from female C. cuning

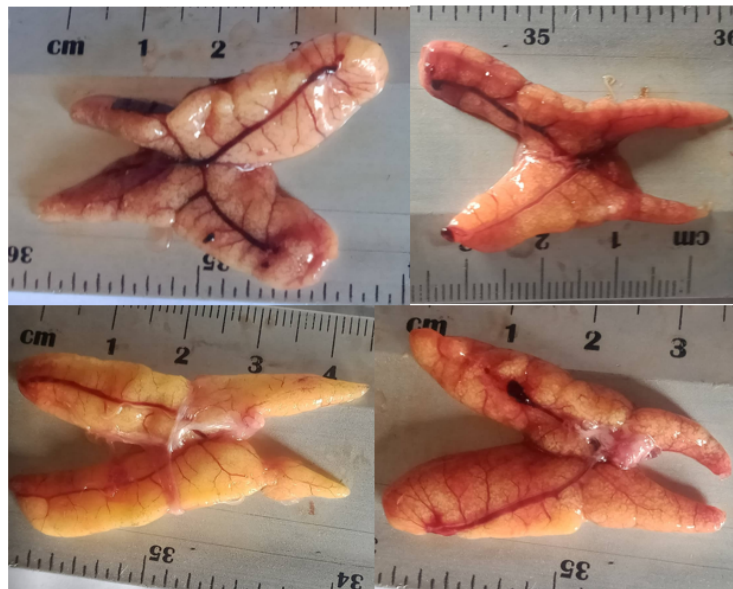


Fig. 2b. Gonads dissected from female D. muroadsi

Data Analyses

The mean Gonado-somatic Index (GSI) was used to determine the spawning season for each species (Figure 3).

$$\text{Gonado-somatic Index (GSI \%)} = \frac{\text{Weight of gonads (g)}}{\text{Weight of fish (g)}} \times 100$$

Fig. 3. Formula for GSI

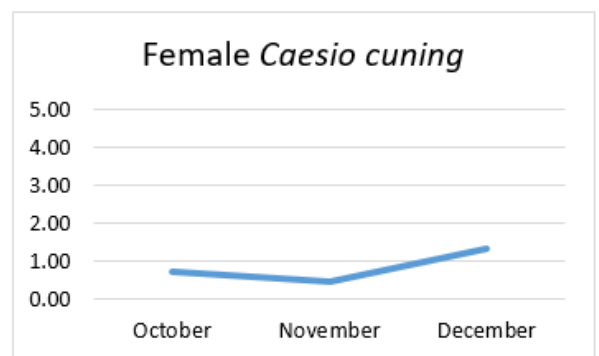
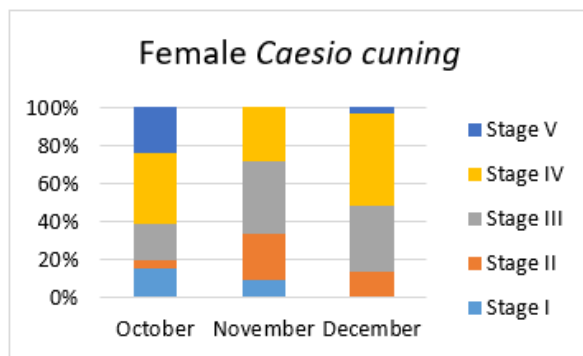
GSI was used to explore peaks of maturity in female gonads per month. After calculating the GSI, the gonads, both male and female, were staged visually. The gonads were identified in stages as: Undifferentiated: J (juvenile). Females: Stage 1

(virgin/immature), Stage 2-3 (mature resting) Stage 4(reproductively developed), Stage 5 (spawning). Males: Stage 1 (virgin), Stage 2 (mature resting), Stage 3 (reproductively developed/ripe), Stage 4 (spawning). The mean GSI values were plotted versus months to search for patterns of reproductive periodicity. The overall sex ratio of males to females was evaluated with χ^2 - test (Sokal and Rohlf, 1995).

III. Results

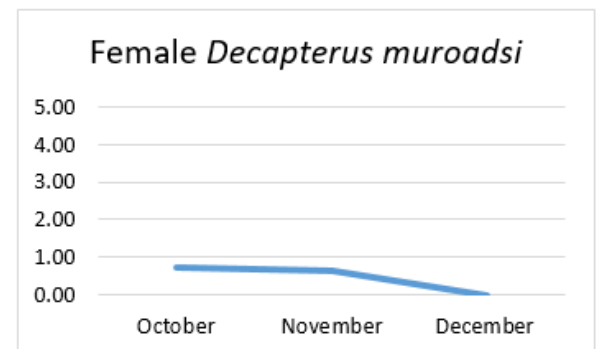
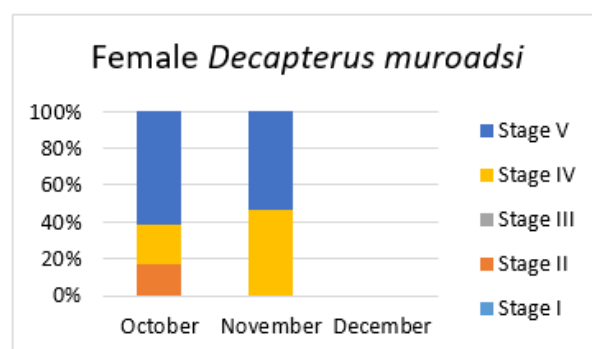
Caesio cuning (redbelly yellowtail fusilier)

Monthly collection of samples gathered 96 females and 144 males. The males slightly dominated females. Stages III and IV gonad were mostly observed in the months consisting of about 19-38% and 28-48% for female *C. cuning*. Monthly GSI value for female ranges from 0.45 (± 0.19) to 1.35 (± 0.27).



Decapterus muroadsi (amberstripe scad)

Third quarter of sampling, data collection recorded a total of 49 females and 31 males. Majority of the gonads observed were Stage V, with a percentage of about 53-61%. Monthly GSI value for female ranges from 0.65 (± 0.07) to 0.72 (± 0.14). The collection was affected by the fishing regulation starting from November until January.



IV. Documentation





V. References

Dias Neto, J. (2010a). Gestão do uso dos Recursos Pesqueiros Marinhos No Brasil. Brasília: Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis.

Jakobsen, T., Fogarty, M. J., Megrey, B. A., and Moksness, E. (2009). Fish Reproductive Biology: Implications for Assessment and Management. Oxford: Blackwell.

Sokal, R.R. and F.J. Rohlf. 1995. Biometry: the principles and practice of statistics in biological research. 3rd edition. W. H. Freeman and Co. New York. 887 pp