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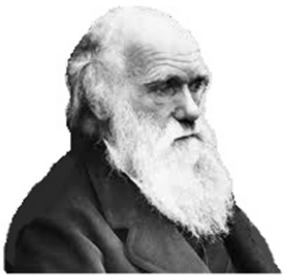

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Size Distribution and Sex Ratio of the Blue Swimming Crab (*Portunus (Portunus) pelagicus* Linnaeus, 1758) Commodities in Gebang Mekar Village, Cirebon Regency, West Java, Indonesia

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ABSTRACT

Blue swimming crab (*Portunus (Portunus) pelagicus* (Linnaeus, 1758)) is included as one of the fishery commodities that has high economic value and becomes one of the primadonnas in the field of fisheries. Besides in the local market, the blue swimming crabs can be one of the high levels and promising export commodities. The purpose of this research is to determine the size distribution and sex ratio from blue swimming crab in Java Sea near Gebang Mekar Village, Cirebon Regency. This research was conducted in Gebang Mekar Village, Cirebon Regency at September 2019 – October 2019 using the case study method with descriptive analysis and quantitative approach. Primary data used are the carapace width of blue swimming crab, amount of male and female blue swimming crab and female blue swimming crab containing egg. The results of the research that blue swimming crab catched by crab gillnet in Java Sea near Gebang Mekar Village, Cirebon Regency have sex ratio 1:1 and the growth of male crabs in these waters was faster than that of female crabs.

***Keywords*:** blue swimming crab, gebang mekar village, sex ratio, carapace width, *Portunus pelagicus*

1. INTRODUCTION

The blue swimming crab, (*Portunus (Portunus) pelagicus* (Linnaeus, 1758)), is widely distributed in the Indo-Pacific, particularly in tropical and subtropical waters, and supports

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important fisheries in many countries within the region. Due to a high demand, unique taste and availability in all seasons, the species is popular and has a high market demand. Blue swimming crab (*Portunus pelagicus*) is included as one of the fishery commodities that has a high economic value and becomes one of the primadonnas in the field of fisheries. Besides in the local market, the blue swimming crabs can be one of the high levels and promising export commodities. The high economic value of blue swimming crab triggers fishermen to massive exploitation caused decrease in natural populations, in both, quantity and quality. To realize sustainable capture fisheries in accordance with the provisions of the implementation of responsible fisheries (FAO Code of Conduct for Responsible Fisheries/CCRF), the exploitation of marine biological resources must be carried out responsibly. Lobster (*Panulirus* sp.), mangrove crab (*Scylla* sp.) and blue swimming crab (*Portunus pelagicus*) in various regions have decreased population in various regions, in order to maintain the existence and availability of stock of these three species, the Minister of Maritime Affairs and Fisheries has stipulated the Minister of Maritime Affairs Regulation and Fisheries number 1/PERMEN-KP/2015 concerning catching lobster (*Panulirus* sp.), mangrove crab (*Scylla* sp.) and blue swimming crab (*Portunus pelagicus*) that for a decent size of catch for small crab commodities with carapace width>10 cm (in carapace width above ten centimeters). The value of blue swimming crab production in West Java Province has decreased from 2016 with a production value of 12,848 tons/year in 2017 decreased to 10,283 tons/year. Sustainability from blue swimming crab export reflected by fishing activities of the blue swimming crab for sustainability resources. The purpose of this research is to determine the size distribution and sex ratio from blue swimming crab in Java Sea near Gebang Mekar Village, Cirebon Regency (**Figure 1**).

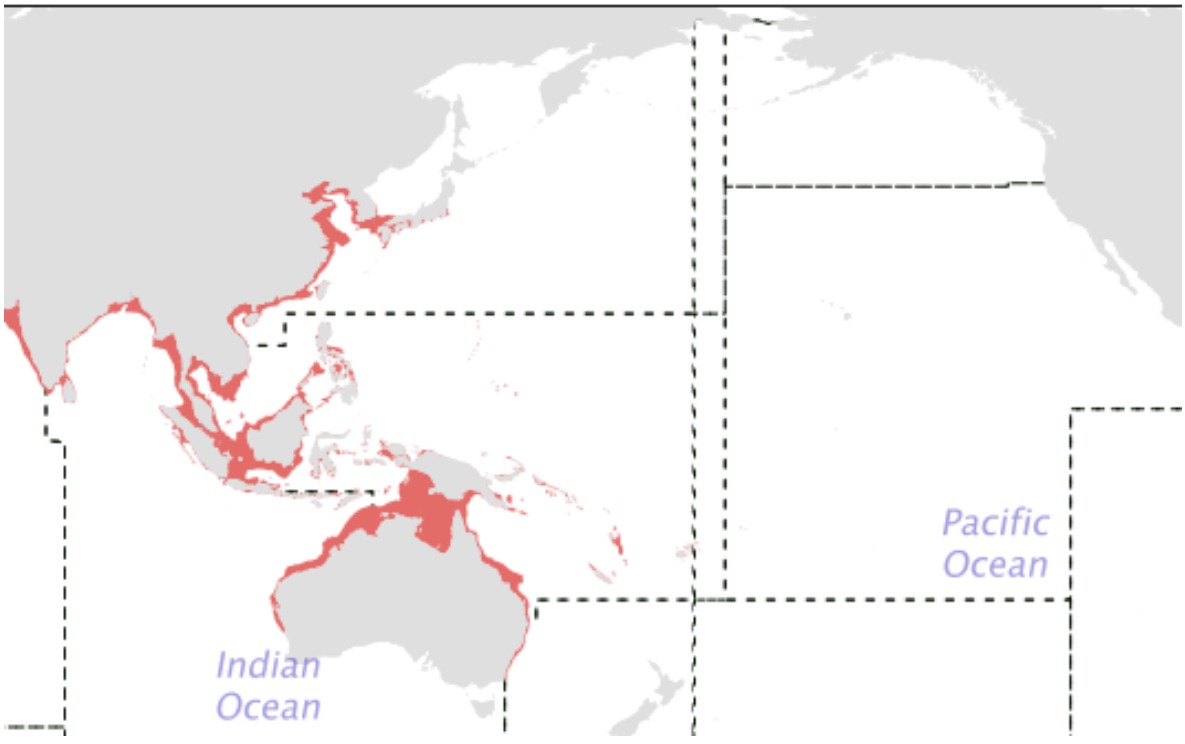


Figure 1. Distribution of *Portunus (Portunus) pelagicus* (Linnaeus, 1758))

2. MATERIALS AND METHODS

This research was conducted in Gebang Mekar Village, Gebang District, Cirebon Regency, West Java (**Figure 2**) with sampling locations in Hamlet 01, RT 19, Gebang Mekar Village in September 2019 until October 2019 with the material used in this research is 3 GT motorized boat, crab gillnet with a 3.5 inches mesh size and collapsible crab trap owned by Gebang Mekar Village fishermen for participate in blue swimming crab fishing trip, meter indicator with an accuracy of 0,1 cm which serves to measure the length and width of blue swimming crab, smartphone camera for document each research activity, stationery used to record primary and secondary data during research, data sheets and blue swimming crab catches that are used as research objects.

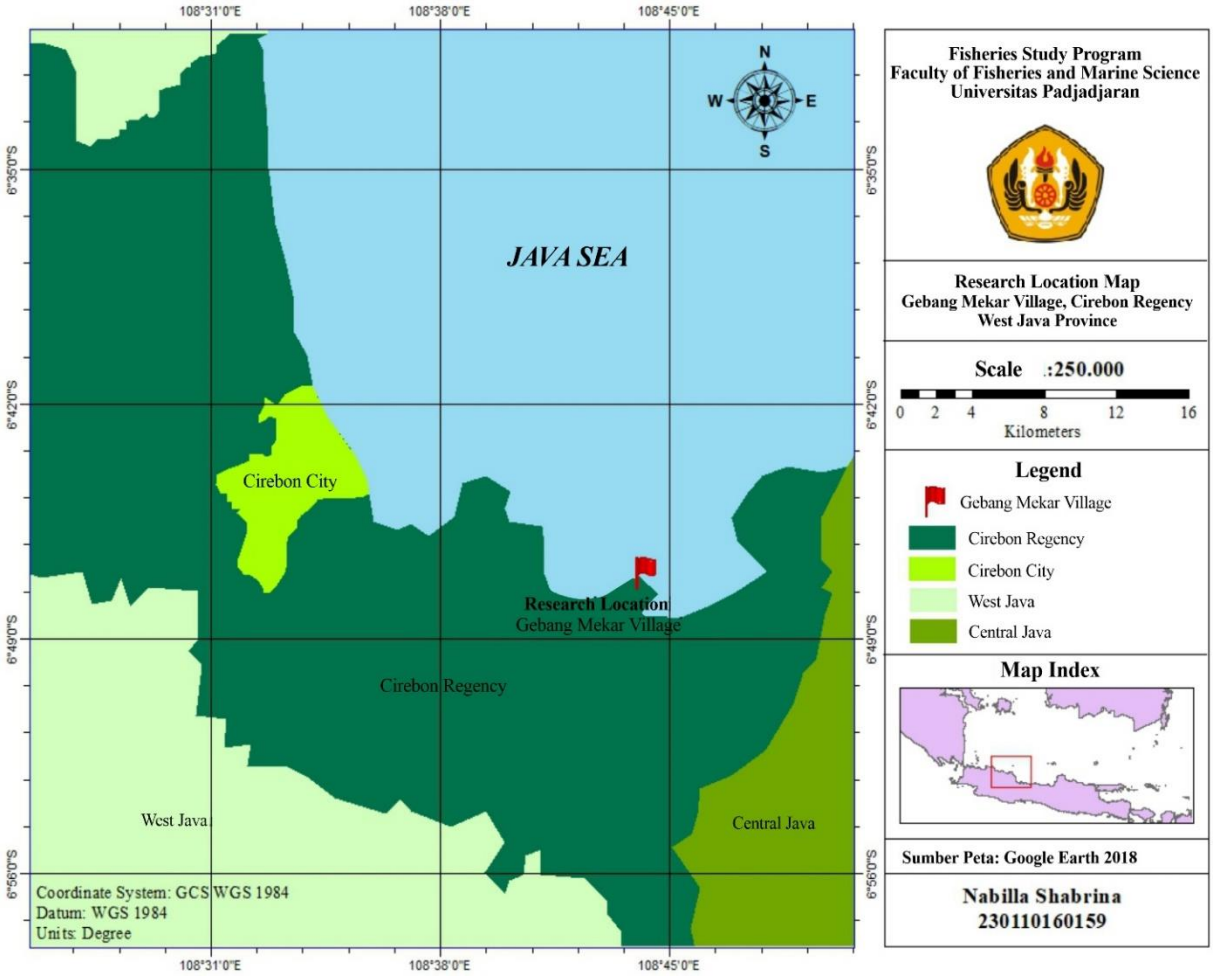


Figure 2. Location of Research

The method for this research used case study with quantitive descriptive analysis and quantitative approach. As a research method, using case study method with focuses intensively on one object certain level from selectivity of fishing gear in Gebang Mekar Village by studying as a case, and then quantitive descriptive analysis and quantitative approach for describe

systematically and factually about facts and the correlation between variables investigated by collecting data, processing, analyzing and interpreting data in statistical hypotheses testing. The sampling method used in this research is the simple random sampling which allows each sampling unit as an element of the population to get the same opportunity to be sample, while the method for collecting data uses the observation, interviews and documentation.

The type of data used is primary data and secondary data, primary data is collected directly during the observations includes measure off carapace width and carapace length of the blue swimming crab from trip results using crab gillnet and collapsible crab trap conducted by Gebang Mekar Village fisherman, separated the male and female blue swimming crabs catches and separated the female blue swimming crab containing eggs. While secondary data used to complete information about the research was conducted, covering the general state of the research area, catch units, production data and some literature obtained from journals, books, dissertations, official agencies, etc.

2. 1. Carapace Length and Width Measurements of Blue Swimming Crab

Carapace length and width of the blue swimming crab catched are measure off based on the section can be seen in **Figure 3**.

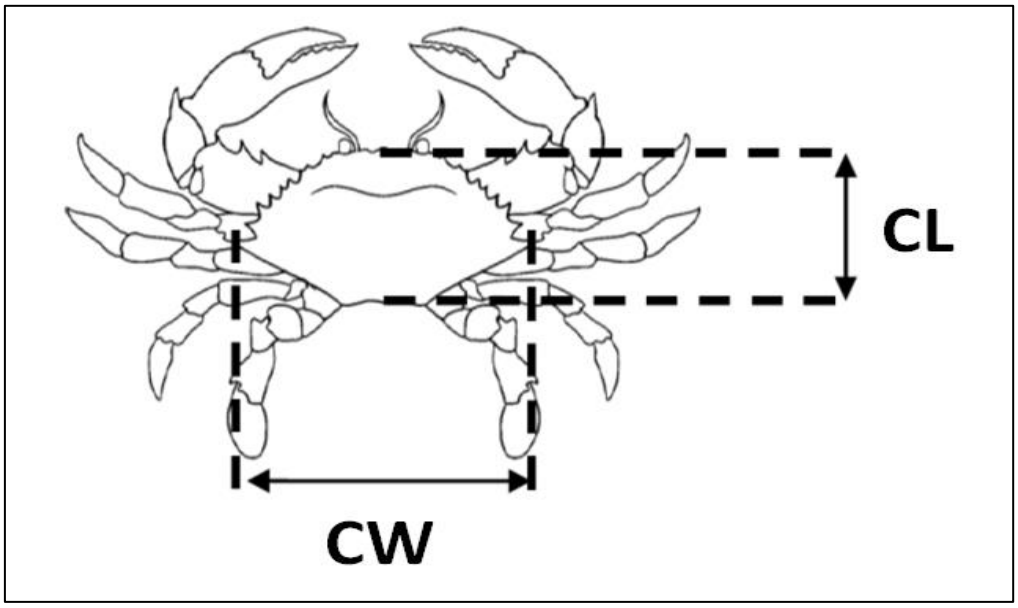


Figure 3. Carapace width (CW)), Carapace length (CL)

2. 2. Data Analysis

2. 2. 1. Sex Ratio Blue Swimming Crab

The blue swimming crab catched from the sampling are separated by sex, then the amount of male and female is counted and recorded. The sex ratio aims to find out how to compare the amount of male blue swimming crab with the amount of female blue swimming crab from samples taken during the research using chi-square test.

$$X^2 = \sum \frac{(Oi-Ei)^2}{Ei}$$

where:
Oi: observed frequency of male and female blue swimming crab
Ei: expectation frequency, that is frequency of the male plus female blue swimming crab divided by two
X^2: a value for the random variable X^2 whose distribution is drawn, for example, approaches the X^2 distribution

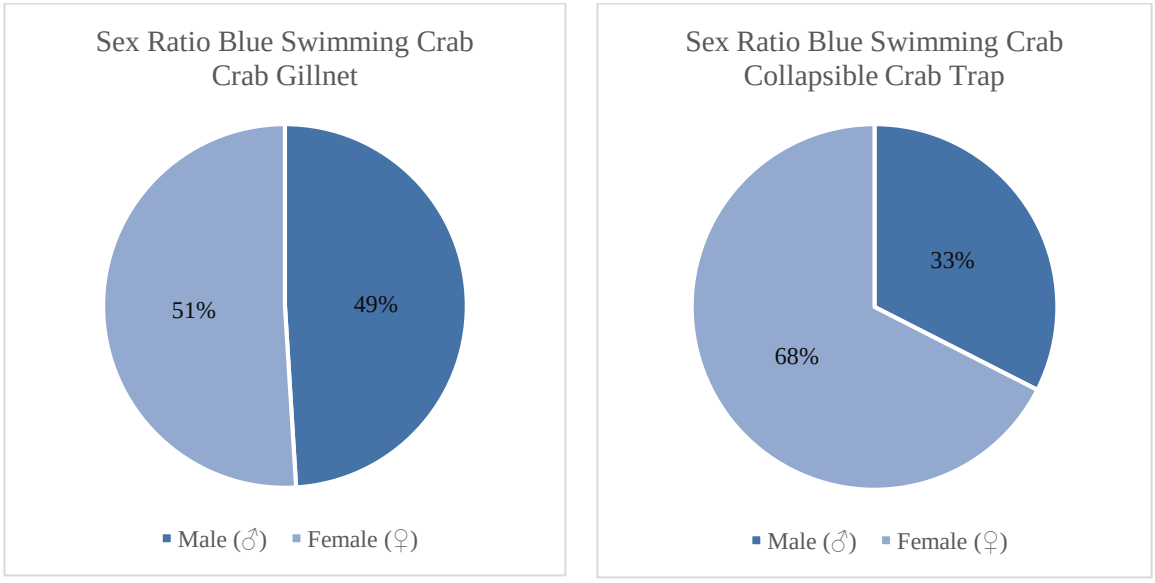
Decision:
H_0: Male and female blue swimming crab genital ratio is 1:1 balanced
H_1: Male and female blue swimming crab genital ratio is unbalanced
Requirements:
H_0 received -> x value < x table
H_1 accepted -> x value > x table

2. 2. 2. Frequency Distribution of Blue Swimming Crab Carapace Width

The results of measurements of blue swimming crab carapace width are grouped by classes of width for analysis.

3. RESULT AND DISCUSSION

3. 1. Carapace width Distribution of Blue Swimming Crab



Crab Trap Collapsible Crab Trap

Figure 4. Blue Swimming Crab Sex Ratio Chart

Figure 4 indicats the blue swimming crab ratios catched by crab gillnet with a 3.5 inches mesh size and collapsible crab trap with a mouth opening height of 2.3 inches and a width of 4.3 inches obtained from two trips in the Java Sea waters around Gebang Mekar Village, Cirebon Regency.

Based on that indicated, the percentage of male blue swimming crabs catched by the crab gillnet is 51% with a total 26 individuals and female blue swimming crabs is 49% with a total of 25 individuals, then from the chi-square test with a confidence level $\alpha = 95\%$, the results show that x^2 value < x^2 then h_1 is accepted, meaning that the sex ratio between male blue swimming crab and female blue swimming crab in the Java Sea around Gebang Mekar Village Cirebon Regency is balanced with the x^2 value 3 and x^2 while in collapsible crab trap the percentage of male blue swimming crab is 34% with a total 15 individuals and female blue swimming crabs by 66% with a total 29 individuals, then from chi-square test with a confidence level $\alpha = 95\%$ obtained that x^2 count > x^2 table then h_0 is accepted, meaning that the sex ratio between male blue swimming crab and female blue swimming crab in Java Sea around Gebang Mekar Village Cirebon Regency is not balanced with the x^2 value 5 and x^2.

The ideal sex ratio between males and females is 1:1, in this research the sex ratio between male blue swimming crabs and female blue swimming crabs catched by crab gillnet has a ratio of 1:1 compared to the sex ratio of blue swimming crab catched by collapsible crab trap which has a ratio of 1:2 more female blue swimming crab, meaning that the crab gillnet is a more selective for catching blue swimming crab commodities so that the blue swimming crab sex ratio catched is evenly balanced. Sex ratio is used as an indicator to assess the ability of the blue swimming crab maintains the running recruitment.

3. 2. Carapace Width Distribution

Figure 4 and Figure 5 that indicated carapace width of blue swimming crabs catched by crab gillnet with 3.5 inches mesh size and collapsible crab trap with a mouth opening height of 2.3 inches and a width of 4.3 inches obtained from two trips in the Java Sea waters around Gebang Mekar Village, Cirebon Regency.

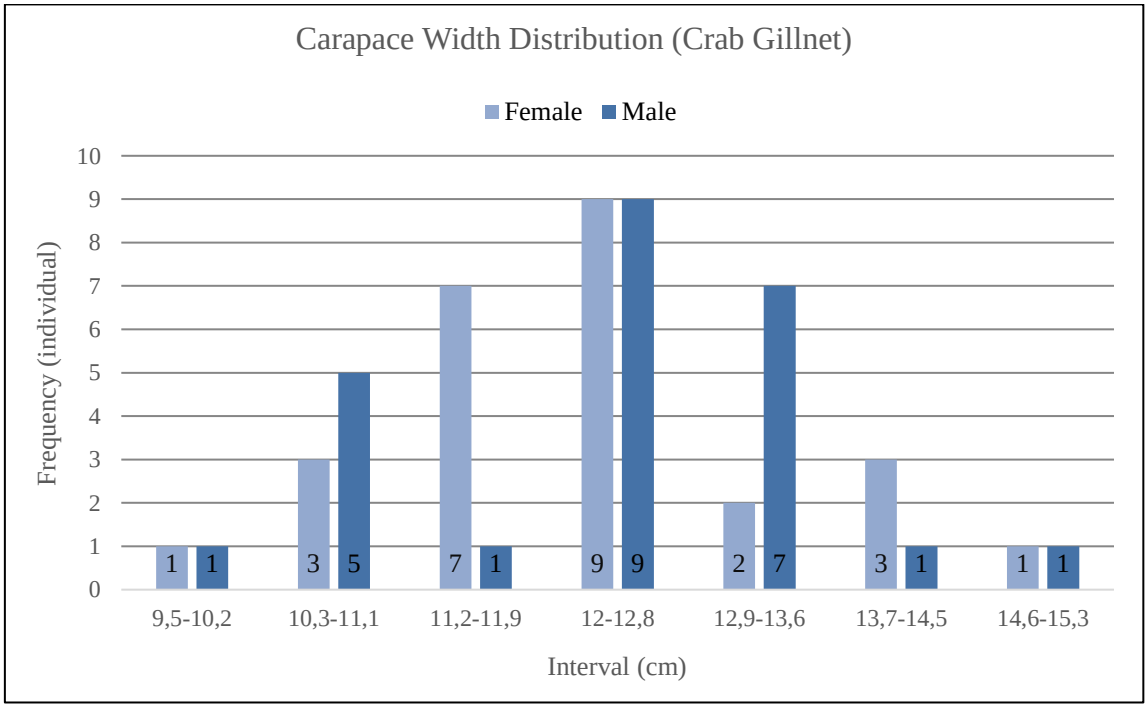


Figure 5. Carapace width Distribution from Crab Gillnet Chart

Based on **Figure** that indicated the lots of male blue swimming crabs catched by crab gillnet with the carapace width ranging from 12 to 12.8 cm by nine individuals and the least with the carapace width ranged from 9.5 to 10.2 cm, 11.2 to 11.9 cm and 14.6 to 15.3 cm by one individual, while for female blue swimming crabs that are lots catched by crab gillnet with the carapace width from 12.5 to 12.8 cm by nine individuals and the least with the carapace width ranged from 9.5 to 10.2 cm and 14.6 to 15.3 cm by one individual.

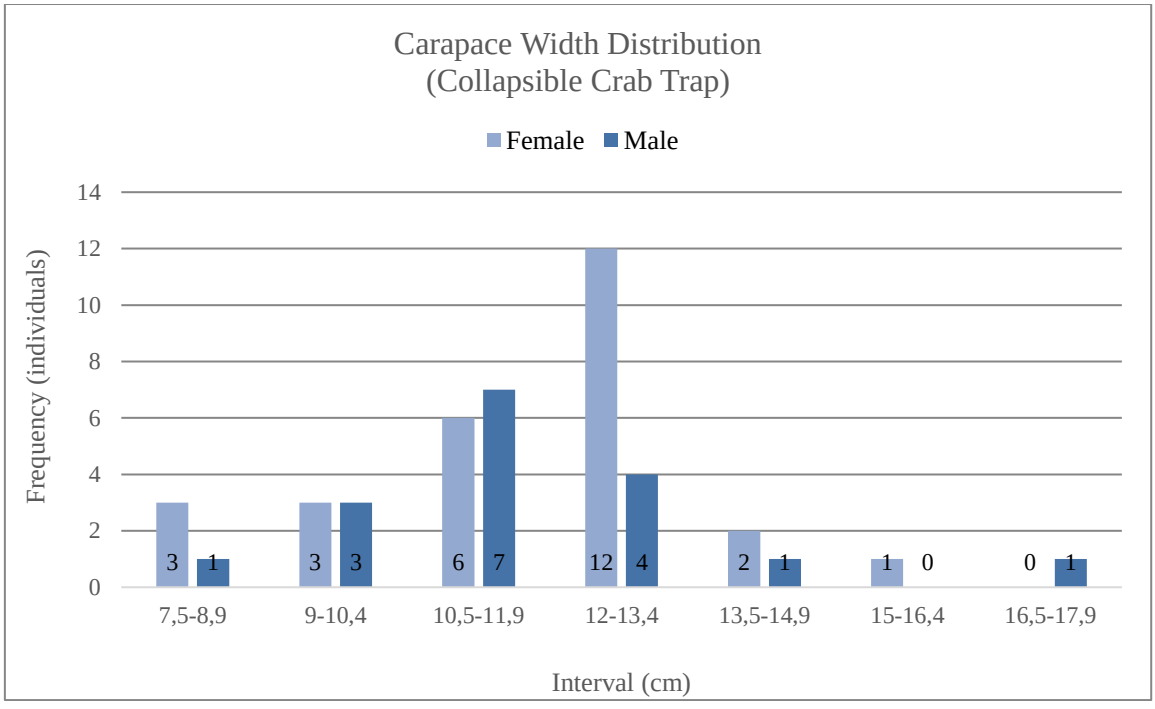


Figure 6. Carapace width Distribution from Collapsible Crab Trap Chart

Based on **Figure 6** one can see the lots of male blue swimming crabs catched by collapsible crab trap with the carapace width ranged from 10.5 to 11.9 cm by nine individuals and the least with the carapace width ranged from 13.5 to 14.9 cm by one individual, while for female blue swimming crabs that are lots catched by collapsible crab trap with the carapace width ranged from 12 to 13.4 cm by 14 individuals and the least with the carapace width ranged from 15 to 16.4 cm and 16.5 to 17.9 cm by one individual.

The results from the research indicated the lots male blue swimming crabs that are catched have a larger carapace width than the female blue swimming crabs. The male blue swimming crabs are larger in size than female blue swimming crabs and male blue swimming crab have a larger body size than female blue swimming crabs. The difference of growth blue swimming crab could be caused by several factors such as age, genetic derivation, and seasons leading to affect water temperature. Sex, level of mature, and disappearance organs. This is what causes blue swimming crab growth is different in each place and time.

In accordance with Regulation of the Minister of Maritime Affairs and Fisheries number 1/PERMEN-KP/2015 concerning Catching lobsters (*Panulirus* sp.), mangrove crabs (*Scylla* sp.) and blue swimming crabs (*Portunus pelagicus*), article three paragraph one point c, where

is catching blue swimming crabs (*Portunus pelagicus*) allowed with carapace width >10 cm (above ten centimeters), from the research carapace width of blue swimming crab catched by crab gillnet and collapsible crab trap have mostly >10 cm (above ten centimeters). In sustainable management of capture fisheries, the size of the individual becomes one of the indicators to determine the age of the individual and biological indicators of reproduction because it is related to how the size is appropriate to caught an individual so as not to interfere with the sustainability of the fish resources. Decent size capture is very important in fisheries resource management activities. In the guidelines for sustainable fisheries governance (code of conduct for responsible fisheries) made FAO requires coastal States to set the size of a decent capture of resources of fisheries.

3. 3. Size Composition of Female Containing Eggs

Figure 7 presents the size composition of female blue swimming crab containing eggs catched by crab gillnet with a 3.5 inches mesh size and collapsible crab trap with a mouth opening height of 2.3 inches and a width of 4.3 inches obtained from two trips in the Java Sea waters around Gebang Mekar Village, Cirebon Regency.

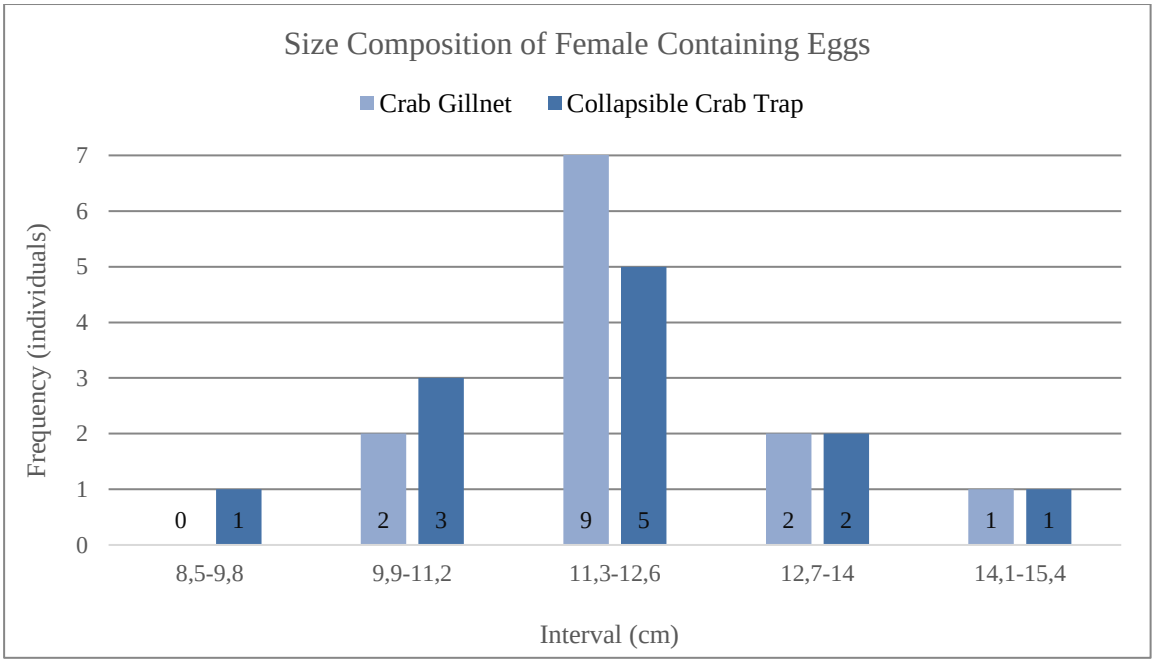


Figure 7. Size Composition of Female Containing Eggs Chart

Based on Figure 7, one can observe the size composition of the female blue swimming crab containing more eggs lots catched by crab gillnet with carapace width ranged from 11.3 to 12.6 cm by nine individuals and the least with carapace width ranged from 14.1 to 15.4 cm by one individual from the total female blue swimming crab contains egg are 14 individuals while the size composition of the female blue swimming crab containing more eggs lots catched by collapsible crab traps with carapace width ranged from 11.3 to 12.6 cm by five individuals and the least with carapace width ranged from 8.5 to 9.8 cm and 14.1 to 15.4 cm by one individual

from the total female blue swimming crab contains egg are 12 individuals. This is in accordance with Regulation of the Minister of Maritime Affairs and Fisheries number 1/PERMEN-KP/2015 concerning Catching lobsters (*Panulirus* sp.), mangrove crabs (*Scylla* sp.) and blue swimming crabs (*Portunus pelagicus*), article three paragraph one point c, where is catching blue swimming crabs (*Portunus pelagicus*) allowed with carapace width >10 cm (above ten centimeters) and female blue swimming crabs have a length at first maturity of 9.5 cm where if some fishing gear catched the catches of a size above the length at first maturity then the fishing gear classified as selective fishing gear.

Blue swimming crab spawning in tropical waters can take place throughout the year, but the triggering factors for the release of eggs into the waters are temperature and strong tidal currents that modulate the movement of planktonic eggs and larvae into deeper waters. To protect the resources of female blue swimming crab containing eggs, the catchment area must also be considered so as not to do catching in the spawning area. In addition, water quality factors should also be considered because the complex life cycle of the blue swimming crab requires a number of special habitats that support the regeneration process of its population for sustainable management of fisheries resources and ecosystem based. Male blue swimming crabs favor waters with low salinity (28 ppt) so that their spread around relatively shallow coastal waters, while female blue swimming crabs favor high salinity (34 ppt) for spawning so that they are spread in deeper waters.

4. CONCLUSION

The carapace width of blue swimming crabs catched by crab gillnet with 3.5 inches mesh size has a bigger size than the carapace width of blue swimming crabs catched by collapsible crab trap. Blue swimming crabs those catched by crab gillnet in Java Sea near Gebang Mekar Village, Cirebon Regency have sex ratio 1:1. The growth of male crabs in these waters was faster than that of female crabs. Crab gillnet is more efficient fishing gear for catch blue swimming crab and good to create a sustainable capture fisheries.

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