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Abundance and Growth Parameter of Mangrove Crab (*Scylla serrata*) in Estuary Water of Karang Gading, District Deli Serdang

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Abstract. Research about the abundance and growth parameter of mangrove crab *Scylla serrata* in the estuary water of Karang Gading, District Deli Serdang has been done. The aims of this research are to analyze the abundance, frequency distribution of carapace, and growth parameter of mangrove crab. This research use purposive sampling methods. Sampling of mangrove crab use bubu, and data analysis use the equation according to Bengen and Fish Stock Assessment Tool (FISAT II). The study obtained 146 individual male crabs and 192 individual female crabs. The abundance of male mangrove crabs is 88 ind m⁻³⁻¹ and female crabs 116 ind m⁻³⁻¹. The highest value of mangrove crab abundance was found at station 4 of 68 ind m⁻³⁻¹ consisting of 17 male crabs and 51 female crabs, and the lowest in station 1 was 37 ind m⁻³⁻¹ consisting of 23 male crabs and 14 female crabs. Distribution of mud crab is included in the group distribution pattern. The male crabs takes 4 month to reach maximum carapace width, and female crab takes 5 month.

1. Introduction
Mangrove crab (*S. serrata*) are one of the key species found in mangrove ecosystems because they have a major influence on various processes, such as changing nutrients, increasing mineralization, increasing the distribution of oxygen in the soil, helping the carbon cycle, and helping to provide natural food for various types of aquatic biota [1]. Mangrove crab is one of fishery commodities with high economic value and export-oriented. This type of mangrove crab is very popular in the community, because it has a delicious meat taste and high nutrition [2]. Paul *et al* [3] stated that male mangrove crab meat contained 11.60% protein and 2.4% fat, while female crab were 19.92% and 2.3%. Mangrove crabs are found at the mangrove ecosystem of Karang Gading. Karim [4] stated that demand for mangrove crabs, apart from being caused by taste good meat, also the nutritional content high, because crabs contain 47.31% protein and fat 11.20%.

Regulation of the Minister of Maritime Affairs and Fisheries of the Republik Indonesia Number 1 [5], regarding the capture of lobsters (*Panulirus* spp), mangrove crabs (*Scylla* spp), and rajungan (*Portunus pelagicus*), it was stated that the existence and availability of populations for lobsters, crabs and rajungan had diminished, so restrictions were needed to catch them. Everyone is prohibited from catching lobsters, mangrove crabs and crabs in their laying conditions. The condition that can be
caught is lobster with carapace length > 8 cm, crab with carapace width > 15 cm, and crab with carapace width > 10 m.

Mangrove ecosystem of Karang Gading located on the east coast of Sumatera Utara with an area of 15,765 Ha [6]. The market demand for mangrove crab was still sourced from nature. Intensification of fishing is done by adding fishing gear and extending fishing time. This condition will affect the number of mangrove crab and disrupt the growth of this biota in nature. Data on the distribution and growth pattern of mangrove crabs in the mangrove ecosystem of Karang Gading until now has not been obtained, so it is necessary to conduct research.

2. Materials and Methods
The location of sampling was conducted at mangrove ecosystem of Karang Gading Sumatera Utara (Figure 1). Sampling was done using a bubu, which has a diameter of 42 cm and a length of 20 cm. Mangrove crab abundance is analyzed using equation according to Brower & Zar [7]. Distribution of mangrove crab was analyzed using equation according to Krebs [8], and growth parameters using Electronic Length Frequency Assessment within computer programme FAO-ICLARM Fish Stock Assessment Tool [9].

![Figure 1. Map of research site](image)

3. Results and Discussion

3.1. Abundance of Mangrove Crab
The results of the study showed that the abundance of mangrove crab values on each station, as shown in Figure 2. The results showed that the highest value of mangrove crab abundance was found at station 4 of 68 ind m⁻² consisting of 17 male crabs and 51 female crabs, and the lowest in station 1 was 37 ind m⁻² consisting of 23 male crabs and 14 female crabs. The high abundance of mangrove crab at station 4 due to the condition of the water environment in this station is quite supportive of mangrove crab life. The results also show that female mangrove crabs are often found in stations 3 and 4, because these two stations are close to the sea.
Figure 2. Abundance of mangrove crab (ind/m²) at each station

The results showed that the highest value of mangrove crab abundance was found at station 4 of 68 ind/m² consisting of 17 male and 51 female crabs, and the lowest in station 1 was 37 ind/m² consisting of 23 male crabs and 14 female crabs. The high abundance of mangrove crab at station 4 due to the condition of the water environment in this station is quite supportive of mangrove crab life. The results also show that female mangrove crabs are often found in stations 3 and 4, because these two stations are close to the sea.

3.2. Distribution

The distribution of male mangrove crabs at each station can be seen in Figure 3 and for female crabs in figure 4. Based on figures 3 and 4, the distribution of mangrove crab at each station is included in the group distribution pattern, with a distribution index value greater than 3. This is evidenced by the number of mangrove crab found in each station generally have a size that is not much different and is always found in groups. The pattern of group distribution is the most common pattern in populations in nature, because mangrove crabs tend to find suitable habitats for foraging to support their lives.
3.3. The Growth Parameter

The parameter values of male and female mangrove crab growth can be seen in Table 1. The results showed that Von Bertalanffy's equation for male mangrove crab was $L_t = 13.44(1-e^{(0.54(t + 0.033641))}$ and female mangrove crab $L_t = 15.23(1-e^{(0.62(t + 0.02831))}$.

| Sexes       | $L_\infty$ (mm) | $K$ ($t^{-1}$) | $t_0$ (year) | $L_t$ (mm) |
|-------------|-----------------|----------------|--------------|-------------|
| Male        | 13.44           | 0.54           | 0.033641     | 13.44       |
| Female      | 15.23           | 0.62           | 0.02831      | 15.23       |

The maximum carapace width of male mangrove crabs is 13.2 cm with a growth coefficient of 0.54 per year, while for female mangrove crabs is 14.8 cm with a growth coefficient of 0.62 per year. Based on the growth coefficient value obtained, it can be said theoretically that to reach a maximum carapace width of 13.2 cm male mangrove crabs takes 5 months, while female mangrove crabs to reach a maximum carapace width of 14.8 cm takes 6 months.

Based on the $L_\infty$ and $K$ values obtained, it can be said that the higher the growth coefficient value, the longer the raw crab reaches the maximum carapace width ($L_\infty$), on the contrary the smaller the growth coefficient value, the faster the mangrove crab needs to approach the maximum carapace width.

4. Conclusion

- The highest value of mangrove crab abundance is found at station 4 (68 ind/m²) and the lowest is at station 1 (37 ind/m²)
- Distribution of mangrove crab in each station is a group
- Based on the growth coefficient value obtained, it can be said theoretically that to reach a maximum carapace width of 13.2 cm male mangrove crabs takes 5 months, while female mangrove crabs to reach a maximum carapace width of 14.8 cm takes 6 months.
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