

Lobster (*Panulirus* spp) catch in simeulue waters, aceh province: composition and results

Irfannur Irfannur¹, Muliari Muliari², Syifa Saputra^{3,*}, Yusrizal Akmal¹, Agung Setia Batubara⁴, Asmaul Husna¹, Imamshadiqin Imamshadiqin²

¹Department of Aquaculture, Faculty of Agriculture, Almuslim University, Bireuen, Indonesia.

²Department of Marine Science, Faculty of Agriculture, Malikussaleh University, North Aceh, Indonesia

³Department of Forestry, Faculty of Agriculture, Almuslim University, Bireuen, Indonesia

⁴Department of Biology, Faculty of Mathematics and Natural Sciences, Medan State University, North Sumatra, Indonesia

Abstract. Aceh Province's main export is lobster. This commodity commands a high economic price in Simeulue Regency, which boasts exceptional commodities in the fisheries industry, particularly lobster. The purpose of this study is to describe the composition of the catch and the productivity of the catch of six different varieties of lobster in the Simeulue water. The research methods employed include field surveys to collect data directly from fishermen. The study was carried out in Simeulue waters in numerous areas in 2023, including Busung, Kampung Air, Teupah Selatan, and Alafan. The types of samples taken were six species consisting of *Panulirus homarus*, *P. longipes*, *P. penicillatus*, *P. versicolor*, *P. ornatus* and *P. polyphagus*. The research results showed that the catch comprised lobster species such as *Panulirus homarus*, *P. longipes*, *P. penicillatus*, *P. versicolor*, *P. ornatus*, and *P. polyphagus*. The catch composition was dominated by *Panulirus penicillatus* (44%) and *P. versicolor* (23%). The length and weight growth of the six varieties of lobster is allometric, which is vital for sustainable fisheries management. The research findings also show oscillations in the supply of Simeulue lobster shipments, with peak delivery in 2022 (246,157 ind) and a fall in 2023 (57,654 ind). It is critical to underline the need for sustainable management in maintaining a balance between usage and conservation of fishing resources.

1 Introduction

Simeulue waters in Aceh Province are among the places with the greatest potential for marine resources and key products in the local fishing industry is lobster (*Panulirus* spp.). In addition to having a substantial economic impact, lobster fishing has an ecological effect on the equilibrium of the marine ecosystem. Unrestrained lobster fishing practices have been shown to endanger lobster populations' viability and harm maritime environments [1]. The productivity and quantity of lobsters in Simeulue seas can be impacted by elements like climate change, overfishing, and the degradation of natural habitats.

Lobster is a leading commodity in Aceh Province, particularly in Simeulue Regency. This commodity has a considerable economic value, making it a key pillar in the area's fishing sector [2]. According to statistical statistics, the overall production of lobster catches in Simeulue Regency from 2011 to 2016 was 2.4 tons per month, and continued to decline from

* Corresponding author : syifa.mpbiousnyiah@gmail.com

January 2016 to July 2016 [3]. The existence of lobster as a major fisheries item in Simeulue Regency had a substantial impact on the local economy and enhanced the income of fishermen. One of these is a *Panulirus*-genus crayfish found in Aceh province [4]. In addition to offering financial gains, lobstering has social effects and helps to sustain the culture of coastal communities that have long depended on marine resources.

Lobster fisheries resources have a high economic value and are a popular food commodity [5]. This fishery commodity has a high economic value and is intended to be sold and consumed both domestically and internationally [6]. Because the economic value of lobster is quite high, ranging from IDR 200,000 to IDR 400,000 per kg [7], it can be ensured that the economic benefits generated from this superior commodity are balanced with the protection and preservation of marine resources, which are critical for the future of the Simeulue Regency area. *Panulirus penicillatus*, *P. homarus*, *P. versicolor*, *P. longipes*, and *P. ornatus* are among the species caught off Badung Beach in Bali [8]. *Panulirus versicolor* is one of the primary species of lobster that is extremely vulnerable to fishing, as is the case in West Papua [9]. *Panulirus versicolor* is one of the five types of lobster that are dominantly caught in the waters of South Sulawesi [10]. The catch per fishing effort (CPUE) has decreased as a result of the high intensity of *Panulirus homarus* catches in Gunung Kidul waters [11]. Meanwhile, catch intensity dominates the *P penicillatus* species in Aceh Jaya waters, despite its bigger size compared to other species [4].

Intensive fishing is brought on by the increased demand for lobsters [12]. The average size of lobsters caught getting smaller as a result of a lack of control over fishing intensity. The economic worth of lobsters is decreased due to their decreasing size [13]. Fishing intensification that is not based on sustainable resource management principles, such as fishing using explosives, potash, or other chemicals, will harm habitats and ecosystems [14]. According to Junaidi et al. (2010) [15], such use will negatively impact other biological elements such as ratio imbalance, species extinction, and lobster populations. To manage lobsters according to species and distribution areas, a study on distribution based on species is needed due to the availability of lobsters in the Simeulue seas. Therefore, given that fishing is frequently carried out both locally and for export marketing, there is currently little research regarding the identification and catches of lobsters in Aceh Province. Therefore, more research is required to better understand biological elements and sustainable fishing. This study intends to define the composition of the catch and the productivity of the catch in six types of lobster in Simeulue waters.

2 Research Methods

The research methods employed include field surveys to collect data directly from fishermen and analyze population parameters such as weight and spread. The study was carried out in the waters surrounding the Simeulue Islands. The lobster fishing location is around 2 to 4 kilometers from the shoreline. The fishing fleet includes nets (gill nets), as well as Fishing vessel, with the size less than 5 gross tonnage. The sampling locations were determined at several areas, including Busung, Kampung Air, Teupah Selatan, and Alafan, as shown in (Figure 1) below.

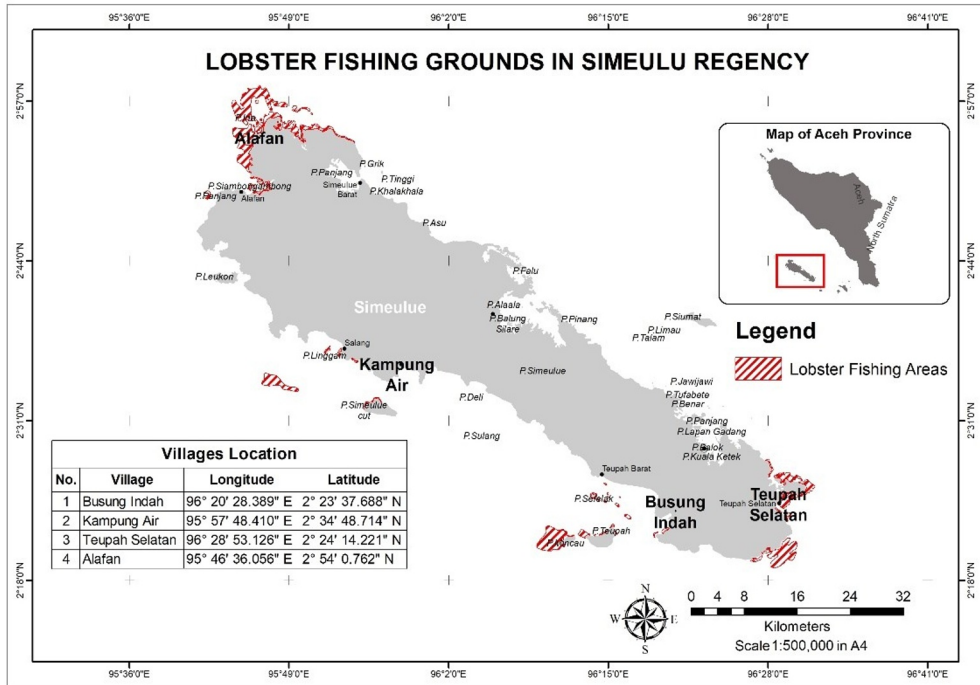


Fig. 1. Map of lobster fishing locations in Simeulue Regency waters

2.1 Composition and Productivity of the Catch

The composition and productivity of lobster catches might differ depending on lobster species, habitat, fishing methods, and other environmental factors. Because of their high economic value, lobsters are a valuable item in the fishing business. The catch composition was examined descriptively and tabulatively. For all lobster catches, the catch composition is displayed in the form of a catch composition graph. referring to Irfannur et al (2017) [4], data on catch composition was collected for 17 days at the research site.

The productivity of lobster fishing is measured using gillnet fishing gear. Catch per Unit Effort (CPUE) is a method for calculating the amount of lobster caught per unit of fishing effort. This analysis was carried out to determine the abundance and level of utilization based on the division between catch (Catch) and fishing effort (Effort) with the equation according to [16]:

$$CPUE = \frac{C}{F} \dots \dots \dots (1)$$

- Information: CPUE = Result catch per Unit (kg/trip)
- Catch (C) = Total catch (kg)
- Effort (F) = Total fishing effort (trip)

By estimating CPUE, we can compare lobster abundance under various situations or observe variations over time. When CPUE rises, either the lobster population or fishing productivity may have increased. On the other hand, a drop in CPUE can be a sign of a population fall or a decline in the efficiency of fishing gear.

3 Results and Discussion

Based on the data collected, lobster catches in Simeulue waters showed variations during the research period. The number of samples taken to see the composition of the catch during the study was 190 of all types of lobsters measured. The types of samples taken were six species consisting of *Panulirus homarus*, *P. longipes*, *P. penicillatus*, *P. versicolor*, *P. ornatus*, and *P. polyphagus*, as presented in Table 1 below.

Table 1. Composition of types and number and weight of lobsters

| No | Type | Number | Type | Weight | Percentage (%) | |
|-------|--------------------------|--------|------------------------|--------|----------------|--------|
| | | | | | Amount | Weight |
| 1 | <i>Panulirus homarus</i> | 17 | <i>P. homarus</i> | 11.74 | 8.95 | 4.59 |
| 2 | <i>P. longipes</i> | 28 | <i>P. longipes</i> | 37.01 | 14.74 | 14.48 |
| 3 | <i>P. penicillatus</i> | 84 | <i>P. penicillatus</i> | 150.08 | 44.21 | 58.70 |
| 4 | <i>P. versicolor</i> | 45 | <i>P. versicolor</i> | 50.09 | 23.68 | 19.59 |
| 5 | <i>P. ornatus</i> | 9 | <i>P. ornatus</i> | 4.01 | 4.74 | 1.57 |
| 6 | <i>P. polyphagus</i> | 7 | <i>P. polyphagus</i> | 2.74 | 3.68 | 1.07 |
| Total | | 190 | | 255.67 | 100.00 | 100.00 |

The growth trend of the five types of lobster caught in Aceh Jaya waters, namely *P. penicillatus*, *P. homarus*, *P. longipes*, *P. versicolor*, and *P. ornatus*, is negative allometric. This means that some portions of the lobster's body grow more slowly than the rest of its body. Negative allometry in lobsters can have a big impact on fisheries management since it influences how lobster size fluctuates over time and how minimum catch sizes should be regulated to keep populations sustainable.

The composition of the catch collected during the research, with the *Panulirus penicillatus* type accounting for 58,70%, followed by the *P. versicolor* type accounting for 19,59%, *P. homarus* accounting for 4,59%, *P. longipes* accounting for 14,48%, *P. ornatus* accounting for 1,57%, and *P. polyphagus* accounting for 1,07%. According to the catch composition, the species *Panulirus penicillatus*, *P. versicolor*, and *P. longipes* account for the majority of the catch and may be the primary objectives for catching lobsters in Simeulue seas. The catches reported are consistent with previous study from Karimunjawa seas [17] and Canggü Beach, Bali [8], which both recorded the presence of similar types of lobsters. References to lobster biological points from research conducted in diverse locales can provide useful information into fisheries management and conservation activities. Knowing the composition of catches from different areas might help discover trends and compare lobster populations in different regions.

The main source of income for the coastal communities in Simeulue Regency is lobster fishing. Due to Indonesia's high lobster catch rates, lobster is a valuable product for the capture fisheries industry [14]. Simeulue waters are a conservation area, particularly for the conservation of fishery resources, which largely concentrates on the social aspect [18]. The significance of this region for fisheries resource protection is intimately tied to many societal factors that have an impact on the long-term viability of fisheries resource management. Therefore, it's crucial to establish sustainable fishing methods that prevent overfishing, such as catch limits, the use of environmentally friendly fishing equipment, and thorough population monitoring.

According to the research findings (Figure 2), the maximum possible catch occurred in February 2023, totaling 5,982 Kg, while the lowest occurred in May 2023, totaling 2,358 kg.

The results demonstrate that the quantity of lobsters caught varies from month to month. The number of lobsters taken in February 2023 reached 5,982 kg, showing that the season or specific conditions in that month enable active fishing activity and significant catches. The number of species caught could be influenced by variables such as the lobster breeding season or changes in migratory patterns. Meanwhile, the quantity of lobsters collected in May 2023 dropped drastically to 2,358 kg. This reduction could be due to a variety of variables such as seasonality or less favorable environmental conditions for fishing, or it could be due to human factors such as harsher fishing rules during that month. However, special attention must be devoted to the management and sustainability of fisheries resources to ensure that the Simeulue people may continue to rely on fisheries as a source of income. Data show that fluctuations in fish catch numbers can have a significant impact on the economic well-being of Simeulue villages that rely on fishing.

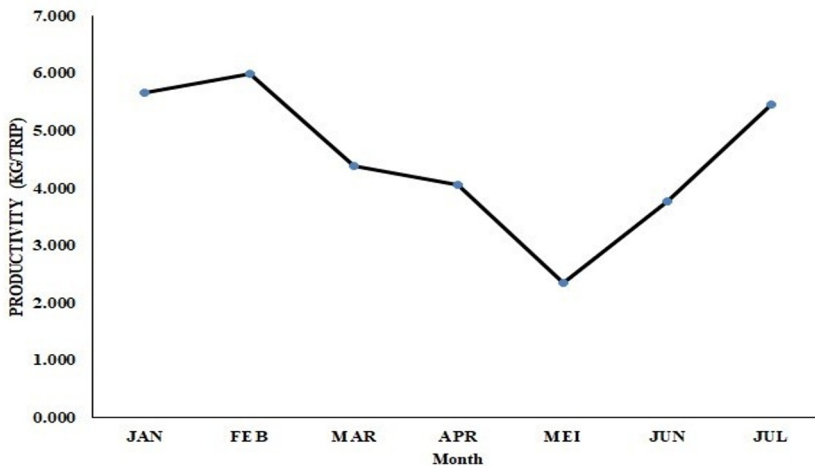


Fig. 2. Productivity of lobster fishing per month in Simeulu waters at four research locations

The catch productivity has decreased significantly when compared to the number of lobsters delivered outside Simeulue Regency (Figure 3). According to data from the Fish Quarantine Agency for Quality and Safety Control of Aceh Fishery Products, KKP Simeulue Regency Working Area, fluctuations in the number of individual lobsters sent show a seasonal pattern, with peak deliveries occurring in 2022 at 246,157 ind, and a decline in 2023 at 57,654 ind. This has a significant impact on the productivity of fishing catches. As a result, the number of lobsters delivered is a crucial indicator of fishing activity, as well as demonstrating the economic importance of the fisheries sector in this region.

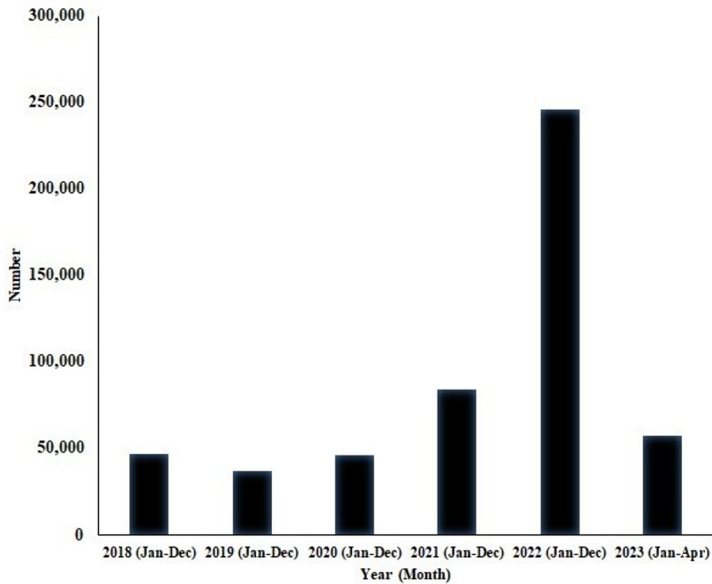


Fig. 3. Number (ind) of lobster shipping supplies per year in Simeulue Regency (Source: Fish quarantine agency for quality control and safety of Aceh fishery products, KKP Simeulue Regency Working Area)

4 Conclusion

Maintaining the sustainability of marine resources and marine ecosystems requires research on the composition and production of lobster catches in the Simeulue water. *Panulirus homarus*, *P. longipes*, *P. penicillatus*, *P. versicolor*, *P. ornatus*, and *P. polyphagus* are some of the lobsters that have been caught in Simeulue waters. The result showed that *Panulirus penicillatus* made up the majority (44%), followed by *P. versicolor* (23%), *P. homarus* (9%), *P. longipes* (15%), *P. ornatus* (5%), and *P. polyphagus* (as much as 4%). The biggest catch output in Simeulue waters was in February 2023, totaling 5,982 Kg, while the lowest occurred in May 2023, totaling 2,358 Kg. Meanwhile, the greatest delivery supply was in 2022, with 246,157 ind, and as much as 57,654 ind in 2023. Sustainable management practices can be applied to maintain a balance between the utilization and conservation of marine resources in the Semeulue Seas with a fuller understanding of lobster species, catch patterns, and impacts.

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