The Characteristics of Shrimp Caught by Trammel net in The Waters of Lontar, Banten

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Abstract. Shrimp is one of the high commodities caught in Lontar waters. The Fishing gear used is trammel net. The type of trammel net based on slackness partition has been discussed in previous research. The aim of this study is to identify shrimp caught by trammel net, analyze the legal size of shrimp and analyze the relationship between length and weight of shrimp. The study was conducted in November and December 2018 in waters of Lontar, Banten. The trammel net used is divided into 3 types. The first trammel net is trammel net control (TK) which is not insulated and the distribution of slackness is only under the webbing. The second trammel net is divided into 2 parts (TN A) and the third is divided into 3 parts (TN B). The number of settings is 32 times. The result showed that there were two species of shrimp caught, namely white shrimp (Penaeus merguiensis) and mantis shrimp (Squilla mantis). The total catch of white shrimp is 478 shrimp (14 kg) and 235 shrimp of mantis (7 kg). The length of white shrimp caught in TK is 11-18 cm, TN A is 11-20 cm and TN B is 10-20 cm. The shrimp caught in TK have a size between 10-16 cm. In TN A and B, the size of shrimp caught is 10-23 cm. The total of white shrimp which has legal size is 420 shrimp (88%). The number of mantis shrimp has a smaller than white shrimp, which are 49 shrimp (21%) spread on three types of trammel net. The length and weight relationship between two species of shrimp are the same. The relationship is negative allometric.

Key Words: Length, Mantis shrimp, Trammel Net and White Shrimp

1. Introduction
Trammel net is a fishing device designed no capture demersal organism. Example are shrimp (Penaeus sp.), common pony fish (Leiognathus equulus), croaker fish (Nibea albiflora) and groper fish (Epinephelus sp.) [9 and 10]. The catch caught in the webbing will be twisted at the bottom and entangles at the top. The organism that is often entangled are fish that have vertical swimming, such as pepetek and gulamah. Many organism are twisted in the the lower of the webbing, especially shrimp. The reason is the passive behaviour of the shrimp, the way of swimming shrimp that jerking the shrimp body back and the shape of the body shrimp is curved. Trammel net fishermen consider the main catch is shrimp, because a lot of caught and have high economic value.

Shrimp caught by trammel net fishermen consist of several species. The species are white and mantis shrimp. The morphometrics of both are very different. The striking difference is carapase. Mantis shrimp have a harder carapase and have claws. The two body lengths are also different. Adult mantis shrimp can grow up to 20 cm. This difference is the basis of research of the Characteristics of the Shrimp Caught by Trammel Net in The Waters of Trammel Net, Banten. The aim of the study was to identify shrimp caught by trammel net, analyze the size of shrimp suitable for capture and analyse the relationship between the length and weight of shrimp.

2. Material and Method
The study was conducted in November and Desember 2018 in waters of Lontar, Banten. The first type is trammel net which is not partitioned and the distribution of slck is only under the webbing
called trammel net control (TK). The second trammel net has 2 partition (TN A) and the third is a 3 parted net (TN B). Total of settings is 32 times.

This research was conducted using experimental fishing. The way with operating the three types of trammel net using one boat. The operation of fishing gear is carried out between 04.00-14.00 WIB. The data collected is primary and secondary. The primary data of the study included the size and weight of shrimp. Secondary data obtained from a literature. Analysis of trammel net capture using analysis of comparative descriptive. It was carried out on the identification of caught shrimp and analyzed the legal size of main catch. Then an analysis of the relationship of shrimp lengths is done using the following equation [7]:

\[ W = a L^b \]

Where:
- \( W \) = Weight of shrimp (g);
- \( L \) = Length of shrimp (cm);
- \( a \) dan \( b \) = Constant.

If the value of \( b < 3 \), the character is allometric negative, which means that the carapace length increase is more dominant than its weight gain. If the value of \( b > 3 \), the character is positive allometric, which means that shrimp weight gain is more dominant than the increase in carapace length. If the value of \( b = 3 \), the character is isometric, which means the weight gain of the shrimp is balanced by the increase in length [7].

### 3. Result and Discussion

#### 3.1. Identify shrimp caught by trammel net

Shrimp caught are white shrimp (*Penaeus merguiensis*) and mantis (*Squilla mantis*). The total catch of 704 shrimp consist of 478 white shrimp and 216 mantis. Both species of shrimp have the same class, that is malacostraca. Ordo of two species is different. White shrimp included in ordo of decapoda and mantis has stomatopoda [13]. Shrimp classification presented in Table 1.

| No | Klasifikasi | White Shrimp [8] | Mantis Shrimp [15] |
|----|-------------|------------------|--------------------|
| 1. | Kingdom     | Animalia         | Animalia           |
| 2. | Phylum      | Arthropoda       | Arthropoda         |
| 3. | Class       | Malacostraca     | Malacostraca       |
| 4. | Sub Class   | Eumalacostraca   | Hoplocarida        |
| 5. | Ordo        | Decapoda         | Stomatopoda       |
| 6. | Family      | Penaeidae        | Squilidae          |
| 7. | Genus       | Penaeus          | Squilla            |
| 8. | Spesies     | *Penaeus merguiensis* | *Squilla mantis* |

#### 3.2. Length of shrimp

Length of White shrimp. The ranges of caught white shrimp are from 10-20 cm. The smallest size is between 10-11 cm are 8 shrimp. The size most caught is between 14-15 cm were 336 shrimp. Shrimp are spread on TK was 56 shrimp, 163 shrimp on TN A and 117 shrimp on TN B. TN A can capture more and a longer size. The reason is that TN A of construction has been modified in webbing. The center of webbing is given a partition. So that the webbing has more space to entangle the shrimp [5]. The length specification and total of shrimp are presented in Figure 1.
3.3. Weight of shrimp

Length of Mantis Shrimp. The length of mantis ranges from 10-23 cm. The smallest size is between 10-11 cm are 21 shrimp. The size most caught is 12-13 cm, which is 105 shrimp. Mantis is caught a lot in webbing, because mantis lives in sand and muddy habitats. This is in accordance with Lontar waters. The length of mantis has a shorter size than white shrimp. Mantis has longer growth than white shrimp. Mantis can live up to 20 years and spawn up to 20-30 times. At a certain length, mantis will use energy it has for growing claws and shells. The length of mantis is attached in Figure 2.

3.3. Weight of shrimp

Weight of White shrimp. The total weight of white shrimp during research was 14 kg. Range of weight from 15-86 g. The smallest weight is between 15-22 g which is 70 shrimp. The most weight that caught is 23-30 g of 274 shrimp and more caught on TN A. Adult shrimp have the power to
jump, so they can be caught in the middle of webbing [5]. White shrimp was caught had enough weight. The cause is November and Desember is the time for spawning white shrimp. The size of spawn is more than 13 cm or 16 g [3]. The weight specification and total of shrimp are presented in Figure 3.

![Figure 3](image3.png)

**Figure 3.** The weight specification and total of white shrimp (*Penaeus merguensis*).

Weight of Mantis shrimp. Range of mantis weight from 14-101 g. The smallest weight is between 14-24 g, which is 135 shrimp. Many mantis caught with that range. The largest weight of shrimp range from 91-101 g. That weight caught by TN A. Trammel net A can catch more and larger size of shrimp. The weight of mantis is greatly influenced by the morphology. Mantis body consists of 60% carapase and others are both claws. Clawed mantis like grasshopper claws. The shape will elongate and enlarge [17]. The weight specification and total of mantis are presented in Figure 4.

![Figure 4](image4.png)

**Figure 4.** The weight specification and total of mantis shrimp (*Squilla mantis*).
3.4. The legal size of shrimp

The legal size of white shrimp has a length >14 cm [11]. Total of shrimp caught with legal size as much 420 shrimp (88%) and the number of illegal size is 58 shrimp (22%). Legal size of total white shrimp is higest than illegal size. Factors that influence the legal size catch is fishing season, life cycle and environmental conditions [1]. Shrimp spawning time in June and catching time in October-Desember [7]. Some research in carpentaria show shrimp migration to enlargement area (sea) in rainy season (October-Desember) [18]. This is in accordance with the time of research is November and Desember. Persentage of white shrimp legal size catching presented in Figure 5.

![Figure 5. Percentage of white shrimp legal size.](image)

The legal size of mantis shrimp has a length >15 cm [9]. Total of mantis caught with legal size as much 19 shrimp (92%) and the number of illegal size is 216 shrimp (8%). Legal size shrimp is less than illegal size. The existence of mantis depends on the season. The peak season for spawning mantis was declared in October [12]. When November and Desember are thought to be in a period of growth anad are in transition. Persentage of mantis shrimp legal size catching presented in Figure 6.
Figure 6. Percentage of mantis shrimp legal size.

Mantis is the dominant catch on trammel net capture in Lontar waters. Lontar waters including Banten Bay. It is a distribution of mantis shrimp habitat. Other studies report that mantis are found with the same species in Banten Bay [15]. Mantis distribution areas in Indonesia include the waters of Malacca strait, the east and west coast of Sumatra, the java sea and south java [19].

3.5. The relationship of length and weight shrimp

The relationship between the length and weight of white and mantis shrimp has different $R^2$ values. Determination ($R^2$) of white shrimp is 0.8847. The coefficient of determination of white shrimp is greater, so the analysis of the relationship between carapase length and weight of white shrimp has closer correlation than the correlation of mantis shrimp. The coefficient of b for the relationship between carapase length and weight is 2.6049. That is, the coefficient of b is significantly different from 3. The coefficient of b indicates that the relationship of length and weight has negative allometric, then the addition of length is more dominant than the weight of white shrimp.

Characteristics of white shrimp when researching in lontar water is the same as the characteristic of white shrimp in Segara Anakan is negative allometric [20], Iran Bay [14], mangrove forest of Percut Sei Tuan, North Sumatra [6]. Shrimp with the same characteristic of the relationship between length and weight can have different values of b, because it is relative and can change with time. Variation in value of b is due to various environmental factors such as food, sex, life cycle phase (gonad maturation stage) and habitat conditions [4 and 16].

The relationship of length and weight mantis has different values. Determination of mantis is 0.8722. The coefficient of b for mantis is the same as white shrimp. coefficient of b is significantly different from 3. The coefficient of b indicates that the relationship between length and weight has negative allometric, then the addition of length is more dominant than the weight of mantis. The result of length and weight relationship of white and mantis shrimp are attached to Figure 7 and 8.
4. Conclusions
The identification showed that there were two species of shrimp caught, namely white shrimp \((Penaeus merguiensis)\) and mantis shrimp \((Squilla mantis)\). The total catch of white shrimp is 478 shrimp (14 kg) and 235 shrimp of mantis (7 kg). The length of white shrimp caught in TK is 11-18 cm, TN A is 11-20 cm and TN B is 10-20 cm. The shrimp caught in TK have a size between 10-16 cm. In TN A and B, the size of shrimp caught is 10-23 cm. The total of white shrimp which has legal size is 420 shrimp (88%). The number of mantis shrimp has a smaller than white shrimp, which are 49 shrimp (21%) spread on three types of trammel net. The length and weight relationship between two species of shrimp are the same. The relationship is negative allometric.

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