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Weight-Length Relationship and Factors of Octopus Fishery Resources Conditions in the Waters of North Lombok

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Abstract: *Octopus (Octopus spp.) is an important part of the fisheries sector and has commercial value. For this reason, supervision and maintenance is necessary to maintain and preserve its existence. This study aims to examine the growth patterns of different sources in Lombok, North Lombok. Data collection is conducted from April to November 2018 with survey methods and direct observations in the field. Octopus samples were obtained from the catch of fishermen in the area of North Lombok. The total number of octopus samples is 96. Data analysis by looking at the length of the octopus to find out its growth pattern. The results showed that the weight-length relationship of octopus obtained by the formula y = 2.1279x-2.1197 with the coefficient of determination is R2 = 0.795. This means that 79% of weight gain occurs due to the old growth of the octopus body, while 21% of weight gain is influenced by other factors such as environmental and age factors. This also shows the total amount is not too significant to the total weight of the octopus. For octopus growth patterns obtained b value of 2.1279, which means octopus is a negative allometric (b <3) where long growth is faster than others. This can be caused by conditions that are not possible. Whereas to assess factors between 0.08-0.78 which means that the body of the octopus is less flat.*

Keywords: *Octopus, Long-Weight Relations, Condition Factors, North Lombok*

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I. Introduction

Octopus (*Octopus* spp) is a mollusk animal from the Cephalopod class which has a strong export market share and market demand tends to increase every year. The price of raw octopus material in the international market increased spectacularly from $ 4 to $ 12. This means that prices have increased by 200% over this decade, while for processed products the price of perkilogram reaches $ 40 to $ 50 (Kolkovski et al., 2015). Along with the high demand and the attractive selling price of octopus in the international market will stimulate most fishermen to do the assessment. This is feared to cause excessive levels of exploitation, which in turn will threaten the sustainability of octopus fisheries resources.

Octopus is an important resource for the fisheries sector and has commercial value. The low level of information and publications on octopus fisheries resources in Indonesia cause limitations regarding the existence of potential and resource conditions. For this reason, it is necessary to conduct supervision and management to maintain and preserve their existence. One effort that can be done to maintain the availability of octopus populations in nature, can be done with a preliminary study of the weight-length relationship of octopus. Information about the weight-length relationship of the octopus is important in managing octopus fisheries resources.

The study of the weight-length relationship of octopus is one of the information that needs to be known. This relates to determining the selectivity of fishing gear, so that later caught octopus is only the size that is worth catching. According to Richter (2007) states that the measurement of fish weight aims to determine the specific weight and length variations of individual fish or groups of individuals as an indication of obesity, health, productivity and physiological conditions including gonad development. Therefore, this study aims to examine the pattern of growth and the condition factors of fisheries resources for octopus caught in the waters of North Lombok.

II. Method

Place and Time of Study

The research was carried out for six months starting from April to November 2018. The location of the field research was carried out in the management area of octopus fisheries resource management in North Lombok, and identification of the relationship of weight-length octopus was carried out in the Bioecology Laboratory of Aquaculture Study Program, Mataram University. In detail the research area is presented in the following figure.

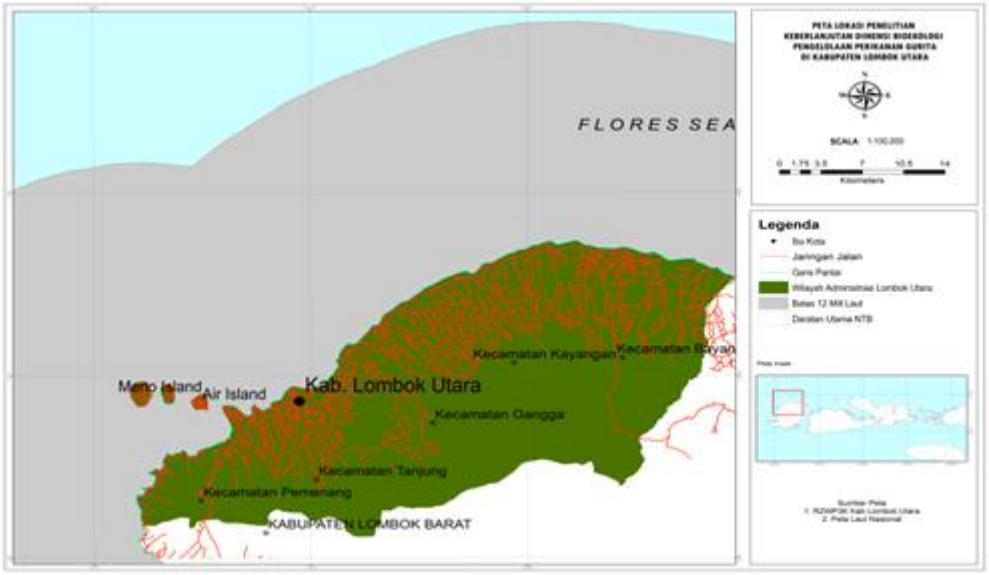

Figure 1.1. Map of Research Location

III. Data collection and Analysis

Collecting research data using survey methods, namely research methods that take octopus samples from the catch of fishermen in the waters of North Lombok. The sampling of octopus is done once a week for six months. The total sample of octopus in total is 96.

Relationship Length and Weight

The relationship between the length and weight of fish was analyzed to determine the pattern of growth. According to Effendie (2002), the length and weight relationship formula for fish is:

$$W = a.L^b$$

Where:

W = fish weight (g)
L = length of fish (cm)
a and b = constants

To find out the pattern of octopus growth can be determined from the constant value b. If b> 3, then the relationship is positive allometric where weight gain is more dominant than the increase in length. Conversely, if b <3, the relationship formed is negative allometric where the length increase is more dominant than the weight gain. While b = 3, the growth is isometric (length increase is proportional to weight gain), while (Effendie, 2002). To find out the growth pattern of octopus can be determined from the constant value b. If b> 3, then the relationship is positive allometric where weight gain is more dominant than the increase in length. Conversely, if b <3, the relationship formed is negative allometric where the length increase is more dominant than the weight gain. While b = 3, the growth is isometric (length increase is proportional to weight gain), while (Effendie, 2002).

Condition Factor

Fulton Condition Factor (K) is calculated based on Okgerman (2005) with the equation:

$$K = W.L^{-3}x100$$

Where:

K = condition factor,

W = total weight (g),
L = total length (mm)
and -3 is a long coefficient (correction factor) to ensure that the K value tends to be 1.

IV. Results and Discussion

Length-Weight of Octopus Relationship

Length-weight measurement aims to determine the growth pattern of fish by using length and weight parameters. Weight can be considered as a function of length. The value obtained from the calculation of this length of weight is to estimate the weight of the length of the fish or vice versa. Besides that, it can also be known the pattern of growth, and the effect of environmental changes on the growth of fish. The number of octopus measured during the study was 96 tails with a length range of 24-138 cm (mean 85.97 ± SD 20.33 cm) and a weight range of 100-4,100 grams (mean 1.737 ± SD 894.91 grams). The results of regression analysis of long-weight relationship of octopus obtained by the equation y = 2.1279x-2.1197 with the coefficient of determination is R2 = 0.795. This means that 79% of body weight gain occurs due to the increase in the length of the octopus body, while 21% of the weight gain of the octopus is caused by other factors such as environmental factors and age. This also shows that the total length of the body does not significantly affect the total weight of the octopus. Graph of the long-weight relationship of octopus is presented in Figure 1.

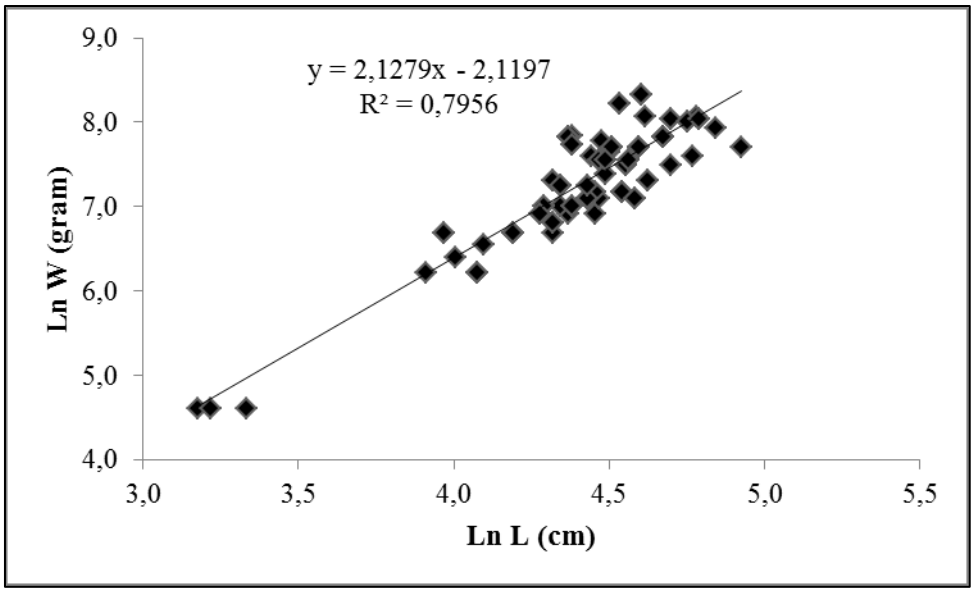

Figure 1.Length-Weight of Octopus Relations

Based on the analysis of the relationship between length-weight octopus (Figure 1) obtained b value of 2.1279 means that the octopus growth pattern is negative allometric (b <3) where long growth is faster than weight gain or shows the condition of the thin octopus. According to Effendie (2002) if b = 3, then the growth is isometric (length increase is proportional to weight gain). If b> 3, then the relationship is a positive allometric where weight gain is more dominant than the increase in length, whereas if b <3, the relationship formed is negative allometric where the length increase is more dominant than the weight gain.

The low value of b (b <3) can be caused by water conditions that do not provide much food. The difference in length and weight of fish indicates the growth that occurs in the fish itself. Growth is strongly influenced by genetic, hormonal and environmental factors (nutrients). These three factors work to influence each other, both in terms of mutual support and hindering each other to control the development of fish. According to Effendie (1997) states that length-term relationships indicate that relative growth means that it is possible to change according to time. If there is a change in the environment and food availability is estimated this value will also change. Further explained that there are several factors that influence growth, including internal factors and external factors that include the amount and size of food available, the amount of food that uses available food sources, temperature, dissolved oxygen, water quality factors, age, and fish size and mature gonads.

Suruwaky and Gunaisah (2013) the low value of b (b <3) can be caused by over-exploitation through fishing catches that affect the length-weight of fish. In addition, the growth of fish is influenced by biological

factors both gonad growth and sex, and the environment in providing adequate food and water conditions (Effendie, 1997; Rosli and Isa, 2012).

Besides that, seasonal differences can also affect the growth of fish, where in the rainy season growth is relatively increased and in the dry season it will slow down. According to Welcomme (2001) fish growth will generally increase during the rainy season (water rises) and will slow down in the dry season. This is because seasonal changes will cause changes in food availability, temperature, food activity, and spawning activities.

Condition Factor

Analysis of important condition factors to be carried out with the aim of knowing the state or contraction of fish expressed in figures based on long and heavy data. Condition factors indicate the state of fish, both in terms of physical capacity for life and reproduction (Effendie, 1997). The condition factor of a type of fish is not fixed. If in a waters there is a sudden change from the condition of the fish can affect the fish. If the conditions are not good, it might be because the fish population is too dense and vice versa if the condition is good, then there is a possibility of population reduction or the availability of food in the waters is quite abundant. This condition factor is a condition of fish, seen in terms of physical capacity for survival and reproduction (Omar, 2009).

Based on the results of the study obtained the value of octopus condition factors between 0.08-0.78. This means that the body of the octopus is less flat. According to Effendie (1997) if the value of the condition factor ranged from 3-4 indicates the body of the fish is rather flat and if it ranges from 1-2 shows the body of the fish is less flat. The value of the condition factor that shows the body of the octopus is less flat can be caused by poor environmental conditions in providing food. The condition factor is closely related to the pattern of growth, if the greater the weight, the greater the factor is the condition. This is related to the availability of food, the level of gonad maturity, environmental conditions and age differences, besides that the condition factors in fish vary according to growth and age (Oymak et al., 2001). Besides that, it can be caused by the predatory density of octopus and also from biotic and abiotic factors and the status of fisheries management will also affect the condition factors. The magnitude of the condition factor depends on many things including the number of organisms that exist, the condition of the organism, the availability of food and the condition of the aquatic environment (Effendie, 1997).

V. Conclusion

The pattern of octopus growth (*Octopus* spp) obtained b value of 2.1279 means that octopus growth pattern is negative allometric (b <3) where length growth is faster than weight gain or shows the condition of the thin octopus. This can be caused by water conditions that do not provide much food. Octopus conditions factor between 0.08-0.78. This means that the body of the octopus is less flat due to poor environmental conditions in providing food. Besides that the condition factor is closely related to its growth pattern, if the greater the weight, the greater the factor is the condition.

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