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# Growth Pattern and Factors of Fisheries Resources Condition in Serewe Bay, East Lombok District

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***Abstract***
*Octopus is a mollusk from the Cephalopoda class known to have a unique morphology that stimulates behavior that tends to be interesting because of its uniqueness. Octopus has a strong export market share and market demand tends to increase every year. The high demand and attractive selling price of octopus in the international market certainly triggerthe capture, so that in turn will threaten the sustainability of the octopus fisheries resources. For this reason, management is needed to maintain and preserve its existence. This study aims to determine the growth patterns of theoctopus fisheries resources caught in the waters of Serewe Bay, East Lombok District. Data collection was conducted from April to November 2019 using the survey method. The octopus samples analyzed amounted to 120, obtained directly from the catch of fishermen. The results showed that the octopus length-weight relationship obtained the equation y = 2.9815x-3.7315 with a coefficient of determination R2 = 0.95. This means that 95% of body weight gain occurs due to the octopus body length increase, while 5% is caused by other factors such as environmental and age factors. Octopus growth pattern is negative allometric (b = 2.9815), meaning that long growth is more dominant than weight gain, so it is categorized thin. While the octopus condition factor values range between 1.35-2.97, meaning that the physical condition of the octopus is relatively flat. This means that the condition of the infertile waters of the mesotrophic category causes the octopus to get less food intake, besides that, environmental factors such as currents and waves as well as physiological conditions, especially reproductive activity and overfishing by ignoring the size and age of the fish and the reproductive period can cause patterns growth and condition factors are low and include the thin fish category.*
***Keywords:*** *Octopus, Long-Weight Relationship, Condition Factor, Serewe Bay*

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## I. Preliminary

Octopus is a mollusk from the Cephalopoda class known to have a unique morphology that stimulates behavior that tends to be interesting because of its uniqueness. Octopus has a strong export market share and market demand tends to increase every year. During this time each the octopus production depends on the catch of the tool because it has not been successfully cultivated. Octopus catches are still not able to meet the consumption needs of people around the world. The consumption needs of the world's octopus are estimated at 270,000 tons per year.

The amount of market demand thus puts the price of this commodity to be "special". Over the past 10 years the price of raw material for octopus on the international market has risen spectacularly from $ 4 to $ 12. This means that prices have risen by 200% over the past decade. As for processed products per kilograms, prices reach $ 40 to $ 50 (Kolkovski et al, 2015). The high demand and attractive selling price of octopus in the international market certainly triggers the capture, which in turn will threaten the sustainability of octopus fishery resources. If these conditions are not immediately addressed both in management and development, it is expected to experience a decline in population (degradation). Increased exploitation of finfish resources (tuna, snapper, grouper, and others) with decreasing stock of finfish resources, which has been supported by the presence of the modern fisheries industry, thereby fostering attention to marine fisheries resources.

The study of growth patterns and factors in octopus conditions is one of the efforts to optimize capture, use and preservation. This is done to provide biology information on octopus fisheries as a reference for determining the selectivity of fishing gear so that later octopuses that are caught are only decent-sized catches. Richter (2007) states that the measurement of fish length and weight aims to determine the specific weight and length variations of fish individually or groups of individuals as a guide to obesity, health, productivity and physiological conditions including gonadal development. Therefore this study aims to determine the growth patterns and condition factors of octopus fisheries resources caught in the waters of Serewe Bay, East Lombok District.

## II. Materials And Methods

**Time and place**

The study were conducted for six months, from April to November 2019. The location of the field research was carried out in the area of octopus fisheries resource management in Serewe Bay, East Lombok District, and identification of octopus length and weight growth patterns was carried out at the Bioecology Laboratory of Aquaculture Study Program, Mataram University.

**Data collection**

Research data collection using survey methods, namely research methods that take octopus samples from fishermen's catches in the waters of Serewe Bay, East Lombok Regency. Octopus sampling is done once a week for six months. The total sample of octopus as a whole is 120 fish.

**Data analysis**

Patterns of Octopus Growth and Weight

Analysis of the length and weight of the octopus using a regression test aims to determine the pattern of growth. The analysis refers to Effendie (2002), using the following formula:

$$W = a.L^b$$

Info:

W = fish weight (g)

L = fish length (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 wherein the weight gain is more dominant than the length increase. Conversely, if b <3, then 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), whereas (Effendie, 2002).

**Condition Factor**

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

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

Info:

K = Condition factor,

W = Total weight (g),

L = total length (mm)

and -3 is the long coefficient (correction factor) to ensure that the K value tends to be 1.

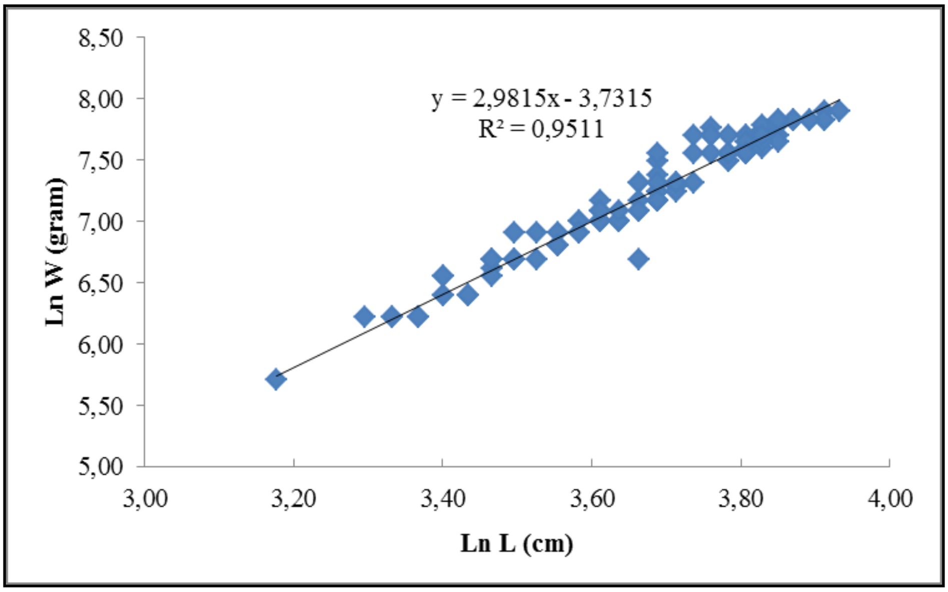
## III. Results And Discussion

**Analysis of Octopus Weighing Relationships**

Analysis of the length-weight relationship was carried out on the octopus caught by fishermen with a total sample of 120 fish. This number is expected to provide information about the growth patterns of octopus in the waters of East Lombok. Besides the analysis of the length-weight relationship of fish is one of the complementary information that needs to be known in terms of fisheries resource management, for example in determining the selectivity of fishing gear so that the fish caught are only of decent-sized catches.

Measurement of fish weight length is done to determine the variation of fish weight and length individually or groups of individuals, so that it can be used as a clue about the level of fatness, health, productivity, gonadal developmental physiological conditions (Blackweer, 2000; Richter, 2007). Effendie (1979) stated that growth can be determined using two models, namely the model related to weight and the model related to length, where weight can be considered as a function of length. According to Said (2007) analysis of the relationship of the length of the weight of a fish population has several uses, namely predicting the weight of a type of fish from the length of the fish that is useful to determine the biomass of the fish population. Meanwhile, according to Effendie (1997) from the calculation of the length of this weight can be assumed to be the weight of the length of the fish or vice versa, information about the fish regarding growth, plumping, and changes from the environment.

Based on the measurement of octopus length and weight, the range of length is 24-51 cm (mean 39.81 ± SD 5.95 cm), while the weight range is 300-2700 grams (mean 1.510 ± SD 631.98 grams). The results of the analysis of octopus length and weight obtained by the equation model y = 2.9815x-3.7315 with the coefficient of determination is R2 = 0.95. This means that 95% of body weight gain occurs due to octopus body length increase, while 5% of octopus weight gain is caused by other factors such as environmental and age factors. This also shows that the total body length does not significantly affect the total weight of the octopus. The graph of octopus length and weight is presented in Figure 1.




Based on the analysis of the octopus length-weight relationship (Figure 1), a b value of 2.9815 means that the octopus growth pattern is negative allometric (b <3) where the long growth is faster than weight gain or indicates the thin octopus's state. According to Effendie (2002) if b = 3, the growth is isometric (length increase is proportional to weight gain). If b> 3, then the relationship is positive allometric where the weight gain is more dominant than the length increase, whereas if b <3, then the relationship formed is negative allometric where the length increase is more dominant than the weight gain.

Allometric growth patterns that are negative (b <3) can be caused by several factors, such as sex factors, the possibility of gonadal maturity being first likely to affect growth. Growth will be slow because some of the food is focused on the development of the gonad. For the age factor, rapid growth occurs in young fish, whereas older fish generally lack food especially for growth, because most are used for body maintenance and movement. Fish growth can also be influenced by temperature, water quality, size, age and type of fish itself, and the number of other fish that use the same source. According to Royce (1973) growth is a gradual change in the size of life units in a matter of time that can apply to the organism's part or population scale. Each part has a difference in growth and some are even negative. Likewise, in terms of quality and quantity of food and temperature are also the things that most influence growth, the combination of these two factors is usually very influential in winter. This is because when the temperature approaches 0oC, metabolic activity and growth are minimal.

Besides that, the negative allometric growth pattern in octopus shows that the availability of food in the waters of Serewe Bay is small or it can be said that the waters are less fertile. According to Wetzel (1975), infertile waters are usually categorized as mesotrophic with nitrate levels between 1-5 mg/l, oligotrophic have Nitrate levels between 0-1 mg/l, and eutrophic waters have Nitrate levels ranging from 5-50 mg/l . This is an unfavorable condition for the growth of aquatic biota as well as plankton which feeds on young fish. The availability of abundant food can support the survival and growth of fish optimally (Nikolsky, 1963). Besides fish growth 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).

The low value of b (b <3) can also be caused by over-exploitation through fishermen's catch so that it affects the length and weight of the fish. exploitation occurs because of the high demand from exporters, coupled with the high price of octopus, thus spurring the fishing community to over-exploit the existence of the octopus population in nature. Seasonal differences are also one of the factors that can affect fish growth, wherein the rainy season growth is relatively increased and in the dry season will slow down. According to Welcomme (2001) in general, fish growth will increase in the rainy season (rising water) 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. In nature, this long-weight relationship is thought to be influenced by several factors, including water conditions, population density, availability of natural food, and seasons (Sartika et al., 2003).

**Condition Factor**

Condition factors are important derivatives of growth. The condition factor or the Ponderal Index is often called the K factor. This condition factor shows the good condition of fish in terms of physical capacity for survival and reproduction (Effendie, 2002). Condition factors can be used to assess fish health in general, both productivity and physiological conditions of fish populations (Blackwell et al., 2000; Richter, 2007; Muchlisin et al., 2012). These condition factors reflect the body's morphological characteristics, lipid content, and growth rate (Bister et al., 2000; Froese, 2006; Stevenson and Woods, 2006; Rypel and Richter, 2008).

In commercial use, knowledge of the condition of fish can help to determine the quality and quantity of fish meat available to be eaten. The condition factor is the measurement deviation from a certain group of fish from the average weight to the length of a certain group of fish from the average weight of the wavelength, age group or part of the population. The condition factor of a type of fish is not fixed in nature. If in thewaters there is a sudden change in the condition of the fish can affect the fish. If the condition is not good, it might be caused by overcrowded fish populations and vice versa if the conditions are good, then the possibility of population reduction or availability of food in the waters is quite abundant.

Based on the results of the factor analysis of octopus conditions obtained values between 1.35-2.97. The range of values indicates the physical condition of the fish that enter the less flat group. According to Effendie (1997), if the value of the condition factor ranges from 3-4, it shows that the body of the fish is rather flat and if it ranges from 1-2 indicates that the body of the fish is less flat. The condition factor is closely related to the growth pattern, if the bodyweight of the fish is getting bigger, then the condition factor is also getting bigger. Based on the value of the condition factor obtained shows that octopus lacks food intake due to the condition of the waters of the Serewe Bay in the mesotrophic or infertile category. Octopus is a carnivore, which is another marine animal eater, but there are also types of octopus, including cannibal animals that are not reluctant to devour their types, including their children. Its prey is various types of fish, shrimp, crabs, shellfish and snails. The prey will be eaten by the octopus by killing it and then carrying it into the hole. Or instead, the octopus waits and stalks its prey in front of the hole or hiding place. When the prey passes in front of it, the octopus moves its fast puffed arms to catch. After the prey is caught with its jaws the prey is killed and then eaten. According to Olurin and Aderibigbe (2006), gender, season, environmental conditions, stress, and food availability also affect the condition factors of fish.

Environmental factors such as currents and waves are one that can influence the condition of fish. Fish that live in calm waters are dominant have higher K values (> 3), and conversely, fish that live in heavy waters tend to have lower K values (<3). This is related to how active the movement of fish is related to the type of water where the fish live (Muchlisin, 2010). In line with this, it is suspected that the octopus is classified as an active swimmer so that it shows a low condition factor (not flat). Besides being influenced by the environment, the condition factor is also influenced by physiological conditions, especially reproductive activities. The value of the condition factors obtained tends to increase with the high level of gonadal dominance, at the level of maturity the gonad has not yet developed, the gonad will increasingly develop along with the increasing maturity of the gonad. Increased gonad maturity will increase overall body weight, this will cause the condition factor value to increase (Omar, 2002). Besides overfishing by ignoring the size and age of the fish as well as the reproduction or spawning period can cause conditions to below or included in the category of thin fish.

## IV. Conclusion

Octopus spp growth pattern obtained b value of 2.9815 means that octopus growth is negative allometric (b <3), where long growth is more dominant than weight gain so it is categorized thin. While the octopus condition factor values range between 1.35-2.97 meaning that the physical condition of the octopus is relatively flat. The low value of b (b <3) and K (1-2) means that the infertile water condition in the mesotrophic category causes the octopus to get less food intake, in addition, environmental factors such as currents and waves affect the condition of fish and physiological conditions, especially activities excessive reproduction and fishing activities regardless of fish size and age and reproduction or spawning periods can cause growth patterns and condition factors to be low in the category of thin fish.

## References

[1]. Bister, T.J., D.W. Willis, M.L. Brown, S.M. Jordan, R.M. Neumann, M.C. Quist, dan C.S. Guy. 2000. Proposed standard weight (Ws) equations and standard length categories for 18 warmwater nongame andriverine fish species. *North American Journal of Fisheries Management*. 20(1): 570-574.

[2]. Blackweel, B.G., M.L. Brown dan D.W. Willis. 2000. Relative weight (Wr) status and current use in fisheries assessment and management. Reviews in fisheries Science, 8: 1-44.

[3]. Effendi, M.I. 2002. Telaahkualitas air bagipengelolaansumbedayadanlingkunganperairan. Kanisius. Yogyakarta. 258 hlm.

[4]. Effendie, M.I. 1997. Metodebiologiperikanan. YayasanDewi Sri. Bogor.112 hlm.

[5]. Froese, R. 2006. Cube law, condition factor and weight length relationship: history, meta-analysis and recommendations. *Journal of Applied Ichthyology*, 22 (1): 241-253.

[6]. Kolkovski S., J. King, N. Watts, M. Natale. A. Mori, R. Cammilleri, dan C. Cammilleri. 2015. Development of octopus aquaculture. Fisheries Research and Development Corporation and Department of Fisheries. Western Australia.

[7]. Muchlisin, Z.A. 2010. Biodeversity of freshwater fishes in Aceh Province, Indonesia with emphasis on several biological aspects of the Depik (*Rasboratawarensis*) an endemic Species in Lake LautTawar. Disertasi, Penang: UniversitiSains Malaysia.

[8]. Muchlisin, Z.A., Mulfizar, dan I. Dewiyanti. (2012). Hubunganpanjangberatdanfaktorkondisitigajenisikan yang tertangkap di perairan Kuala Gigieng, Aceh Besar, Provinsi Aceh. JurnalDepik, 1(1): 1-9.

[9]. Nikolsky, G.V. 1963. The ecology of fishes. Translated by L. Birkett. Academic Press, 352 pp.

[10]. Okgerman, H. 2005. Seasonal variation of the length weight and condition factor of Rudd (*Scardiniuserythrophthalmus L*) in Spanca Lake. *International Journal of Zoological Research*, 1(1): 6-10.

[11]. Omar, A. 2002. Biologireproduksicumi-cumi (Sepioteuthislessoniana Lesson, 1830). Thesis Program Pascasarjana, Bogor: InstitutPertanian Bogor (IPB).

[12]. Oymak, A.S., K. Solak, dan E. Unlu. 2001. Some Biological Characteristics of SilurstriostegusHekel, 1843 from Ataturk

[13]. Richter, T.J. 2007. Devilopment and evaluation of standard weight eqations for bridgelip sucker and largescale sucker. North Amercan, 27 : 936-939.

[14]. Royce, W. F. 1973. Introduction to the Fishery Science. Academic Press . New York. ix + 344 h

[15]. Rypel, A.L., dan T.J. Richter. 2008. Emperical percentile standard weight equation for the Blacktail Redhorse. North American Journal of Fisheries Management, 28:1843-1846.

[16]. Said,A. 2007. Penelitianbeberapaaspekbiologiikanserandang (*Channapleurophthalmus*) di daerahaliranSungaiMusi, Sumatera Selatan. Neptunus 20. 14 (1): 15-23.

[17]. Sartika, D., Widaningroem, R., danSoeparno. 2003. Hubunganpanjang-bobotdanfaktorkondisirelatifbelanak (Liza subviridis) di Laguna LerengKabupatenPurworejo. *JurnalPerikananUniversitasGadjahMada*, Vol 1(2): 24-31.

[18]. Stevenson R.D., W.A. Woods. 2006. Condition indices for conservation: new uses for evolving tools. Integrative and Comparative Biology, 46:1169-1190.

[19]. Welcomme, R.L. 2001. Inland Fisheries: Ecology and Management. Blackwell Science Ltd. London. xvii + 353 hal.

[20]. Wetzel, R. G. 1975. Lymnology. W. B. Saunders Co. Philadelphia. Pennsylvania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