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Growth characteristic and conditioning factors of mackerel fish (Scomberomorus commersonii) landed at PPI Cikidang Pangandaran West Java

Karakteristik pertumbuhan dan faktor pengkondisi ikan tenggiri (Scomberomorus commersonii) yang didaratkan di PPI Cikidang Pangandaran Jawa Barat

Muhammad Gianaya Adinalda, Dyahruri Sanjayasari*

Fisheries and Marine Science Faculty, Jenderal Soedirman University, Purwokerto, 53123, Indonesia

*Corresponding Author: dyahruri.sanjayasari@unsoed.ac.id

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ABSTRACT

Mackerel fish (*Scomberomorus commersonii*) is one of potential catch in Indonesia. The production of mackerel fish in Indonesia has become the highest in the world exceeding the Philippines, Cingalese, Yemen, and Pakistan. Currently, mackerel fish is used maximumly by considering its sustainability. Present study aimed to understand the growth characteristic and condition factors for mackerel fish which landed at PPI Cikidang, Pangandaran, West Java. The data was collected at PPI Cikidang, Pangandaran, West Java in February 2021. Survey and observation method were used to obtain the growth characteristic of mackerel fish, and it analyzed descriptively. The results of the study revealed that the growth of mackerel fish landed at PPI Cikidang Pangandaran was allometric negative with the b value at 1.71. The growth characteristic based on length-weight relation showed strong relationship with coefficient determination at 93.1%. The condition factor resulted 0.64 with average of relative weight 100.75. The regression relationship between relative weight and condition factors had weak relationship.

Keywords: condition factor, growth characteristic, length-weight relationship, mackerel fish, relative weight.

ABSTRAK

Ikan Tenggiri merupakan salah satu komoditas perikanan unggulan Indonesia. Produksi ikan tenggiri Indonesia pernah menjadi yang tertinggi di dunia melebihi Filipina, Sri Langka, Yaman, dan Pakistan. Saat ini, ikan tenggiri perlu dimanfaatkan secara maksimal dengan memperhatikan kelestariannya agar dapat dimanfaatkan secara berkelanjutan. Kerja praktek ini bertujuan untuk mengetahui hubungan panjang berat dan faktor kondisi ikan Tenggiri. Pengambilan sampel dilakukan di PPI Cikidang Pangandaran Jawa Barat pada bulan Februari 2021. Metode kerja praktek yang digunakan adalah dengan mengambil beberapa sampel ikan yang didaratkan di PPI Cikidang Pangandaran. Parameter yang diukur meliputi panjang dan berat ikan, kemudian data dianalisis secara deskriptif. Hasil penelitian menunjukan bahwa pola pertumbuhan ikan tenggiri yang didaratkan di PPI Cikidang Pangandaran adalah allometrik negatif dengan nilai b = 1,71. Hubungan panjang dan berat ikan tenggiri memiliki koefisien determinasi R^2 sebesar 93.07% menunjukan hubungan panjang dan berat ikan tenggiri yang diperoleh sangat kuat. Hasil nilai faktor kondisi memiliki rata-rata 0,64 dan berat relatif dengan rata-rata 100,75. Hubungan faktor kondisi dan berat relatif memiliki koefisien determinasi R^2 relatif rendah sebesar 21.3%.

***Kata Kunci**: condition factor, length, mackerel, PPI Cikidang Pangandaran, relative weight, weight.*

INTRODUCTION

Mackerel is one of Indonesia's leading fishery commodities. The production of Indonesian mackerel was once the highest in the world, surpassing the Philippines, Sri Lanka, Yemen and Pakistan (FAO, 1989). Mackerel is a pelagic fish that is widely distributed in Indonesia. Mackerel fish are scattered throughout the waters of the northern coast of Java and Madura, south of Central Java, south of Bali, north of Lombok, Sumbawa and north of Flores and the north coast of West Timor (Saragih, 2012).

Mackerel is the catch of superior large pelagic fish WPP 573 which was also landed in the waters of Pangandaran Regency. This fish species is the leading large pelagic fish commodity in Pangandaran Regency because it is available throughout the year and has high economic value. Based on statistical data from the Department of Marine Affairs and Fisheries of West Java Province from 2005-2014, mackerel in Pangandaran Regency has a total production of 861.24 tons with a production value of more than 19 million rupiah. Therefore, mackerel fish needs to be utilized optimally and consider to its sustainability hence, it can be used sustainably (Savetri et al., 2020).

One of the fish auction places in Pangandaran district is the Cikidang Fish Auction Place located in Babakan Village, Pangandaran District. There were 108 fisherman Joint Business Groups (KUB) based at PPI Cikidang. The number of fishermen who carry out fishing operations and anchor at PPI Cikidang, makes PPI Cikidang the center of capture fisheries activities in Pangandaran District (Syauqi et al., 2020). PPI Cikidang has five types of fishing business units, namely drift gillnets, long buns, basic longlines, trammel nets, and vessel seines. Drift gillnet is the largest fishing business with 450 units compared to other fishing businesses which only amount to 8-16 units. The number of drift gillnet fishing units is suspected to be due to the support of facilities from the PPI Cikidang and technical aspects of the gillnet drift fishing business such as boats, fishing gear, fishing methods, fishing areas and fishing seasons (Syauqi et al., 2020)

Growth can be interpreted as an increase in body length or weight in a certain period. Growth is a good indicator to see the health condition of individuals, populations, and the environment. Growth is influenced by internal factors and external factors. External factors that affect growth are the amount of available food and water quality. While the internal factors that affect growth are heredity, gender, age, and disease. The fast growth rate indicates an abundance of food and suitable environmental conditions in which to live (Tutupoho et al., 2008). Poor aquatic environment conditions will affect the size range of fish caught in relation to the availability of food needed for fish growth. The food eaten by fish is not only used for growth, but the energy is also used for metabolism, activity, osmoregulation, and reproduction (Fujaya, 2004).

The condition factor is a number that indicates the fatness of the fish. From a nutritional point of view, the conditional factors are fat accumulation and gonadal development (Cren, 1951). Condition factors indirectly indicate the physiological condition of fish that receive the influence of intrinsic factors

(gonad development and fat reserves) and extrinsic factors (availability of food resources and environmental stress) (Nikolsky, 1969). Hossain & Lettenmaier (2006) reported that in addition to show the condition of the fish, the condition factor provides information on when the fish spawn. André Gubiani *et al*. (2020) proved that the condition factor is useful in evaluating the importance of various fish spawning areas. In short, it can be said that the condition factor shows as an efficient instrument and shows changes in fish conditions throughout the year.

The purpose of this scientific article is to determine the growth pattern of mackerel, as well as to determine the factors of the condition of mackerel in PPI Cikidang Pangandaran. The benefit of this scientific article is that it provides scientific information about the growth pattern of mackerel and the condition factors of mackerel and can be used as a reference and further research and establish a cooperative relationship with the PPI Cikidang and local communities/fishers, making this report the basis for managing fisheries resources in the district Pangandaran.

The research carried out certainly has a purpose. Specifically, this study aimed to determine the growth pattern of mackerel fish and the condition factors of mackerel in PPI Cikidang Pangandaran.

MATERIALS AND METHODS

The research materials used in the research are tools and materials. For the tools needed, namely: digital scales, rulers, measuring instruments, stationery, and millimeter block laminating paper and for materials, namely mackerel (*Scomberomorus Commersonii*) from the catch of fishermen.

The research method used in this study is a field survey method. The survey was conducted by taking samples of mackerel obtained from fish caught by fishermen at PPI Cikidang Pangandaran. Systematic measurements were carried out by following standard sampling and measurement procedures. Primary data collection was carried out by measuring random sample fish as much as 20% of the mackerel catches from the ship in one day.

The data analysis was carried out by random sampling method. The total length of the fish was measured with a measuring instrument and weighed with a scale. The total length was measured from the leading end of the head to the last end of the tail. The length-weight relationship was calculated using the DeRobertis and William (2008) equation with the equation

$$W = aL^b$$

Information:
W = Weight of fish (grams)
L = total length of fish (cm)

To simplify the calculation, the above equation is converted into logarithmic form so that it becomes a linear equation as follows (Jennings et al., 2001):

$$\log W = \log a + b(\log L)$$

To determine the growth pattern of mackerel, it can be determined from the value of the constant b relationship between the length and weight of the fish. If b value is 3, then the growth is isometric (length gain is proportional to weight gain). If b value is more than 3, then the relationship is positive allometric where the increase in weight is more dominant than the increase in length, whereas if b value less than 3, means the growth is allometric negative (Effendie, 2002).

Condition factor was calculated by using ponderal index for the isometric growth (Effendie, 1979):

$$K = \frac{W \times 10^5}{L^3}$$

With K as condition factor, W as growth average (g) and L as average of length (mm). If the growth characteristic is allometric, the condition factor calculated with the equation as follow:

$$K_n = \frac{W}{cL^n}$$

With Kn as condition factor, Was growth average (g), L as average of length, C constanta a and n as constanta b (from the weight-length relationship equation).

RESULTS AND DISCUSSION

The growth characteristics of Mackere

The growth characteristics of Mackerel can be seen in Figure 1. The number of mackerel fish that landed was 48 with a weight range of mackerel at 492 - 1550 g with an average of 839.83 g at PPI Cikidang, While the length of the mackerel ranges from 42 to 58.5 cm with an average of 50.14 cm. Sampling carried out in February made the catch low because the number of mackerel caught was influenced by several factors such as season, food availability and biological characteristics. as according to (Mutakin, 2001) The fishing season which is the best time to catch mackerel in Pangandaran waters is the east monsoon period (the wind that blows in April-October in Indonesia.) and reach peak catch in July to August.

Based on the results of practical work that has been done, data on growth patterns are obtained *mackerel* (*Scomberomorus commersonii*) which landed at PPI Cikidang obtained a and b value of 1.71. If the value of b < 3 then the number shows a growth pattern*mackerel*is a negative allometric (minor) i.e. the increase in body length is faster and dominant than the increase in weight. Differences in growth patterns can occur due to differences in food available in the environment (Batubara et al., 2019a). If the food is sufficient for the growth of the fish, the fish will gain weight faster than its length, but if the food is not sufficient, the fish tend to gain body weight more slowly.

From the results of the graphical analysis of the relationship between length and weight of mackerel, the regression equation y = 50.629x - 1708.9 was obtained. with an R^2 value of 0.9307, and a b value of 1.71 so it can be seen that the length of the fish has a close relationship of 93.07% with increasing weight, so if the length of the mackerel increases automatically the weight of the mackerel will also increase. Bidawi et al (2017) stated, the high value of the coefficient of determination obtained from the length-weight relationship stated that there was a very close relationship between total body length and total body weight. if the value of R^2 is close to 1 then there is a strong relationship between the two variables. The value of the coefficient of determination indicates that each addition of fish length will be accompanied by an increase in weight each time of observation.

The length-weight relationship is one of the factors that researchers need to know because it is related to the management of fishery resources. Measurement of fish length-weight also aims to determine the variation in weight

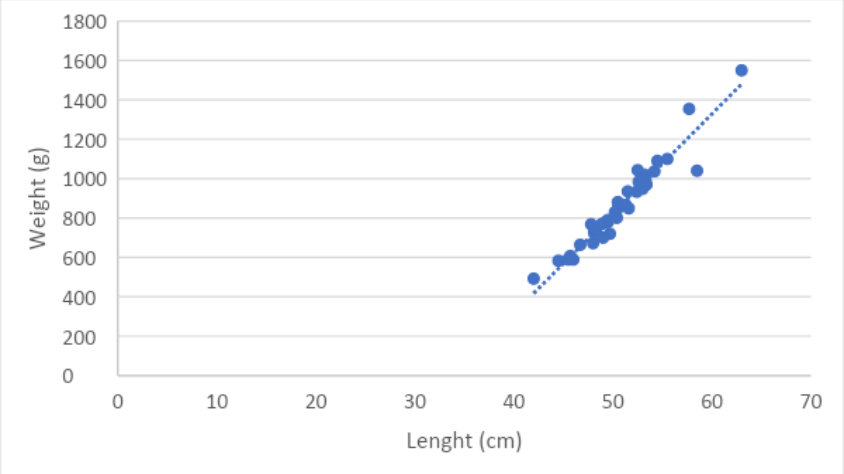

Figure 1. Mackerel fish length and weight relationship

and length of fish individually or in groups of individuals, so that in the future it can be used as a guide for finding out the level of obesity, health, productivity, physiological conditions, and gonadal growth.

Condition Factor

The condition factors obtained from this study ranged from 0.52 to 0.72 with an average of 0.64. The calculation of the condition factor revealed that the mackerel fish found in current study was in the category flat and long fish, this result was in accordance with (Takeuchi, 1975). If the K (condition factor) value is <1 then the fish body is less plump or flat and long, if the K value is >1 then the fish body is less flat and long or plump. the K value in mackerel is <1 which means the mackerel's body is included in the category of flat and long body. Variations in K values are dependent on diet, age, sex, and gonadal maturity. In order to observed the influence of condition factor to growth performance, hence, current study curved fitting the value of K against the relative weight.

The relative weight obtained in this study ranged from 81.94 – 128.92 with an average of 100.75. The result indicated that the Pangandaran waters where the mackerel live provides sufficient food stocks for the fish population living in that habitat and the predator density is still balanced (Rypel & Richter, 2008). It is in accordance with Anderson, (1996) reported that if the relative weight value is below 100 it indicates a growth problem such as lack of prey availability or high density of predators, and vice versa if it is above 100 it indicates high prey availability or low predator density. The relationship between condition factor and relative weight could observed in Figure 2.

The results of the regression analysis from the graph of the relationship between relative weight and condition factors get a determinant value of 0.213. This shows the relationship between relative weight and the condition factor of mackerel which is included in the low category. This is in accordance with the result study of Ndruru and Situmorang, (2014), the coefficient of determination (R^2) can be used as information about the suitability of a model. If the R^2 interval 0.80 - 1.00 is very strong, the interval 0.60 - 0.799 is strong, the

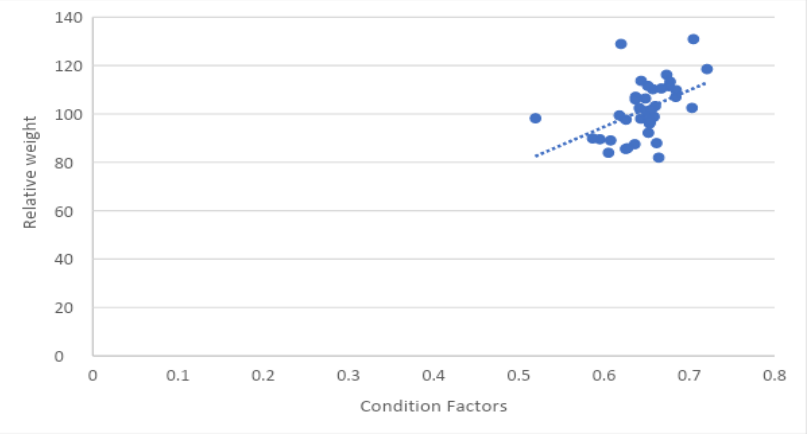

Figure 2. Relationship between relative weight and condition of mackerel fish.

interval 0.40 - 0.599 is quite strong, the interval 0.20 - 0.399 is low, and the interval 0.00 - 0.199 is included very low.

Based on the low value of R^2 in the 2 equations of the relationship between the condition factor and the relative weight, it can be concluded that the condition factor is the ratio of the actual weight to the predictive weight. The condition factor value which is less than 1 indicates that the actual weight is lower than the predictive weight, which can be caused by the large number of young (immature gonads) fish caught which also affects the low R^2 value, but the relative weight value reflects environmental conditions that are support an organism, and vice versa. Therefore, in regards to the value of the condition factor, the waters of Pangandaran Regency are categorized as good habitat for mackerel to grow (Sinaga et al., 2018).

CONCLUSION

In conclusions, the characteristics of the growth pattern of mackerel are negative allometric where the increase in length is more dominant than weight. The condition factor value revealed that the Pangandaran waters are categorized as good habitat and shows a balance between prey and predators in their environment.

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