SIZE DISTRIBUTION AND GROWTH PATTERN OF GREENBACK MULLET, PLANILIZA SUBVIRIDIS (VALENCIANNES, 1836), IN MAKASSAR STRAITS

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Abstract

Grenback mullet (Planilizasubviridis) is one of several types of fish that live in the waters of Pangkajene&Kepulauan Regency (Pangkep) and Takalar Regency which have high economic value. This research was conducted for 6 months (June 2021 – November 2021), aiming to compare the length-weight relationship and condition factors for mullets caught in Pangkep and Takalar waters (Makassar Straits). Sampling was carried out at the MacciniBaji Fish Auction Site (Pangkep) and at the Beba Fish Landing Base (Takalar). The fishing gear used during the research was gill nets with a mesh size of 1.0-2.5 inches. Overall, there were 349 fish samples caught in Pangkep waters, consisting of 124 male fish and 225 female fish, while in Takalar waters there were 174 fishes, consisting of 93 male fish and 81 female fish. In Pangkep waters, the length-weight relationship for male fish was W = 0.000103 L2.5699 (r = 0.9654) and female fish W = 0.000129 L2.5309 (r = 0.9788) while in Takalar waters for male fish was W = 0.000202 L2.4714 (r = 0.9524) and female fish W = 0.000220 L2.4626 (r = 0.9663). The average value of the condition factor for male mullets in Pangkep waters is greater than the female fish generally. The same thing was found in Takalar waters. The growth pattern of mullets (Planilizasubviridis) in Pangkep and Takalar waters is hypoallometric or negative allometric. The average value of the condition factor is greater than 1 which indicates a good condition of the fish.

Keywords*: Condition Factor, Greenback Mullet, Hypoallometric, Length-Weight Relationship, PangkajeneAndKepulauan, PlanilizaSubviridis, Takalar*

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1. Introduction

The waters of Pangkajene&Kepulauan Regency (Pangkep) and Takalar Regency are in the Makassar Strait waters which have abundant and varied fish resources. This water is relatively more fertile than other waters in Indonesia (Inaku, 2015). One of the fish that can be found in the Makassar Strait is the mullet.

Mullet fish (Planalizasubviridis) is a type of fish that has a wide distribution, found in various extreme ecosystems ranging from river ecosystems, estuaries and coastal waters (Haqie and Haryono, 2019), living in groups of around 20-30 individuals (Sulistiono et al., 2001). This species is categorized as a euryhaline species and belongs to the Mugilidae family (Durand et al., 2012). Greenback mullet has many synonyms, including: Chelonsubviridis, Liza dussumieri, L. macrolepis, L. parmata, L. parsia, L. subviris, L. vaigiensis, Mugil alcocki, M. dussumieri, M. javanicus, M. jerdoni, M. lepidopterus, M. ogilbyi, M. philippinus, M. ruthveni, M. stevensi, M. subviridis, M. sundanensis, and M. tadopsis (Froese and Pauly, 2023). Mullet is a fish with important economic value in Indonesia (White et al., 2013; Indrawan, 2016). This fish is widely consumed by the public due to the high nutritional value with a protein content of 17.6-19.6%, 2.8-3.3% fat, 1.4-1.5% fatty acids, and 0.3-0.5% carbohydrates (Hafiluddin et al., 2012; Ratnaningsih et al., 2022).

The length-weight relationship (LWR) is very important in fisheries assessment (Getso et al., 2018) to determine the biological conditions of fish and fish stocks so that it is easy to carry out fish biodiversity sustainable management (Nurhayati et al., 2016; Olii et al., 2022). The length-weight relationship is an important parameter that has a very large contribution in fisheries because it relates the variables of length and weight of fish mathematically (Rahman et al., 2013). One of the values that can be obtained from the length-weight relationship of fish is the shape or type of growth. If the value of b = 3 then the type of fish growth is isometric which shows the fish does not change its shape and the increase in fish is balanced with the increase in weight. If the value of b <3, then indicates the growth type of the fish is hypo allometric or negative allometric which indicates the condition of the fish is thin and its length increases faster than its weight. If the value of b> 3 then the type of fish growth is hyper allometric or positive allometric which indicates that this fish is plump, its weight gain is faster than its length (Andy-Omar et al., 2016). Based on the length-weight relationship, some researchers have found that the greenback mullet growth type is hypo allometric (Wahyudewantoro and Haryono, 2013; Fitriah et al., 2021; Mohamed and Al-Hassani, 2021).

Fish condition factor is the most important biological parameter that provides information about the fish species condition and the entire community (Muchlisin et al., 2010; Baloch et al., 2015). Fish condition factors can help determine the quality and quantity of existing fish (Andy-Omar, 2013). The condition factor is useful for assessing the physiological status of fish species in their habitat based on the principle that individuals with a certain length have greater body weight in better "conditions" (Awasthi et al., 2015; Falaye et al., 2015; Azevedo et al., 2017) Condition factors can also be used to measure the health of individuals in a population or to determine whether a population is healthier than other populations (Falaye et al., 2015).

Based on field studies and studies of several literatures, there are two types of mullets that live in Pangkep and Takalar waters, namely P. subviridis and Ellochelonvaigiensis. Padriana (2017) has conducted a study on the P. subviridis growth and food habits in Pangkep waters, while Annisa (2021) examined the E. vaigensis morphometric and meristic characters in Pangkep and Takalar waters. Until now, studies on the length-weight relationship of mullets originating from Pangkep and Takalar waters have never been investigated. Overall, information on mullets in South Sulawesi is still very limited. This can be seen from the incomplete detailed data on these fish. Information relating to this fish length-weight relationship and the condition factor aspect is urgently needed as a database for future management efforts because until now mullet production has relied solely on fishermen's catches. Therefore, it is necessary to do research in this regard. This research is

expected to provide new information about P. subviridis mullet, so that it can be used by several parties in terms of future management.

2. Materials and Methods

Study Area and Collected Data

Fish sampling is carried out once a month, for 6 months (June-November 2022), at the MacciniBaji Fish Auction Site (TPI), Pangkep, and at the Beba Fish Landing Base (PPI), Takalar (Figure 1). Fish caught by fishermen come from the Makassar Strait. The fishing gear used by fishermen is a gill net with a mesh size of 1.0-2.5 inches. The number of fish caught during the study was 351 fishes. The caught fish were then put into a styrofoam box (length 32.5 cm x width 24 cm x height 25 cm) filled with bulk ice to maintain the freshness of the fish from the sampling site to the laboratory. Fish samples were analyzed at the Fisheries Biology Laboratory, Faculty of Marine and Fisheries Sciences, Hasanuddin University. Each fish sample was measured for its total length and body weight. The total length of the mullets was measured with a digital caliper (Dotziro, accuracy 0.01 mm), while body weight was measured with a digital balance (Fujitsu, accuracy 0.01 g). The total length (L) of the fish is the length measured from the tip of the snout to the tip of the longer lobe of the caudal fin (Andy-Omar, 2013). Fish that have been weighed and then dissected to determine the sex of male and female. Data from measuring body length and weighing body weight were then processed and analyzed.

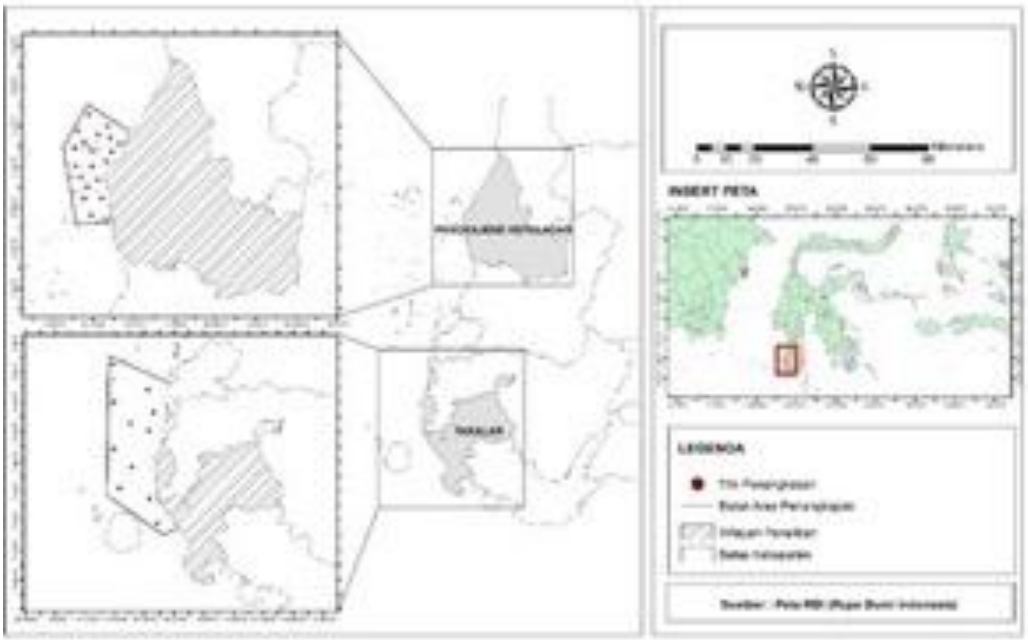


Figure 1. Map of sampling site

Data Analysis

Length and weight research data were analyzed using the Microsoft Excel program. The data is separated by location and gender. The size distribution is differentiated based on the length size group of each fish sampled at each location.

The relationship between fish body length and body weight is analyzed and determined using the following formula (Andy-Omar, 2013):

$$W = a\ L^{b}$$

where: W = body weight (g), L = total length (mm), a = *intercept*, and b = *slope* (growth parameter)

This equation is transformed into logarithmic form to obtain a linear equation (Andy-Omar, 2013):

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

The values of a (intercept), b (regression coefficient), and r (correlation coefficient), were obtained using the least square method. There are two types of growth patterns in fish, namely isometric growth (b = 3) when the

increase in length and weight of fish is balanced and allometric ($b \neq 3$) when the increase in length and weight of fish is not balanced (Andy-Omar, 2013). If $b > 3$, then the growth is positive allometric or hyper allometric, namely the increase in weight is greater than the increase in length, whereas if $b < 3$, then the growth is negative allometric or hypo allometric, namely the increase in length is more dominant than the increase in weight (Andy-Omar *et al.*, 2016).

To find out whether the pattern of the length-weight relationship is isometric or allometric, a test is performed on the value of b using the t-test with the following formula (Andy-Omar, 2013):

$$t_{value} = \left[\frac{3-b}{Sb}\right]$$

where: S_b = standard error of b.

If the t value is greater than t table, then b is different from 3. Conversely, if the t value is less than t table then b is equal to 3.

To make a comparison of the growth coefficient between male and female fish, a test was carried out according to Fowler et al. (1998), with the following formula:

$$t_{value} = \frac{(b_1 - b_2)}{SE_{(b1-b2)}}$$

Where: b1 = regression coefficient of female fish, b2 = regression coefficient of male fish, SEb1 = deviation of the regression coefficient error of female fish, SEb2 = deviation of the error of male fish regression coefficient.

If tvalue<ttable, the conclusion is that the weight-length relationship between male and female fish is not significantly different. Conversely, if tvalue>ttable, the conclusion is that the weight-length relationship between male and female fish is significantly different. All data on total length and body weight obtained were analyzed using Microsoft Excel.

The condition factor was calculated based on the length-weight relationship of the sampled fish (Ibrahim *et al.*, 2017). If the growth of the fish obtained is isometric then the formula used to calculate the condition factor is (Andy-Omar *et al.*, 2020):

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

where: PI = condition factor, W = mean body weight (g) of the fish in a given size class, L = mean total length (mm) of the fish in the same size class.

If fish growth follows a hypo allometric or hypo allometric pattern, then the condition factor formula used is (Andy-Omar *et al.*, 2020):

$$PI_n = \frac{Wb}{aL^b} \text{ or } PI_n = \frac{Wb}{W^*}$$

where: PI_n = relative condition factor, Wb = observed mass (g) of an individual, W* = predicted mass, which is obtained from the linear regression of the length-weight relationship of the respective population sample (aL^b).

3. Results and Discussion

Overall, the number of greenback mullets obtained from Pangkep waters was 349 consisting of 124 males and 225 females. The male fish has a total length that ranges from 112-298 mm (187.18 ± 4.25 mm) and a body weight of 21.15-233.34 g (81.80 ± 4.82 g). Female fish ranged from 115-280 mm (172.88±3.33 mm, mean±standard error) with body weights of 20.09-221.39 g (69.85±3.33 g). The number of fish samples obtained in Takalar waters was 174 individuals, consisting of 93 males and 81 females. Male fish have a total length ranging from 123-295 mm (220.20±5.19 mm) and body weight ranging from 22.21-276.09 g (137.66±7.33 g). In contrast, female fish have a total length ranging from 120-305 mm (216.44±6.55 mm) and body weight ranging from 21.42-330.43 g (142.35±9.94 g). According to Kottelat et al. (1993), the length of *P. subviridis* can reach 300 mm, even up to 400 mm (White *et al.*, 2013; Froese and Pauly, 2023).

The total length size distribution of *P. subviridis* caught in Pangkep and Takalar, both male and female, can be seen in Figure 2. Male fish in Pangkep waters were mostly caught in the middle size class of 159.5 – 199.5 mm and 259.5 – 299.5 mm, while female fish are in middle-sized class 119.5 – 139.5 mm and 219.5 – 239.5 mm. In Takalar waters, more male fish were found in the middle size class of 219.5 – 279.5 mm, while most of female fish were caught in the middle size class of 119.5 – 199.5 mm. The largest size of fish caught in Pangkep is a male fish, while in Takalar is a female fish.

The body length of the greenback mullet found during the study was larger than some of the research results that have been reported. Wahyudewantoro and Haryono (2013) reported that the body length of *L. subviridis* ranged from 30.55-150.54 mm. Al-Ghiffary et al. (2018) obtained *C. subviridis* with a length range of 73.34-185.72 mm and a body weight of 8.23-115.50 g. This study finding is also greater than the reports of Padriana (2017) and Fitriah et al. (2021) on the same species. Padriana (2017) obtained that male *P. subviridis* had body lengths ranging from 123-284 mm and females 130-274 mm, with a body weight range of 19.18-204.08 g and 23.37-212.33, for male and female fish respectively. Fitria et al. (2021) found *P. subviridis* with a body length range of 56-263 mm and a body weight of 2.3-182 g.

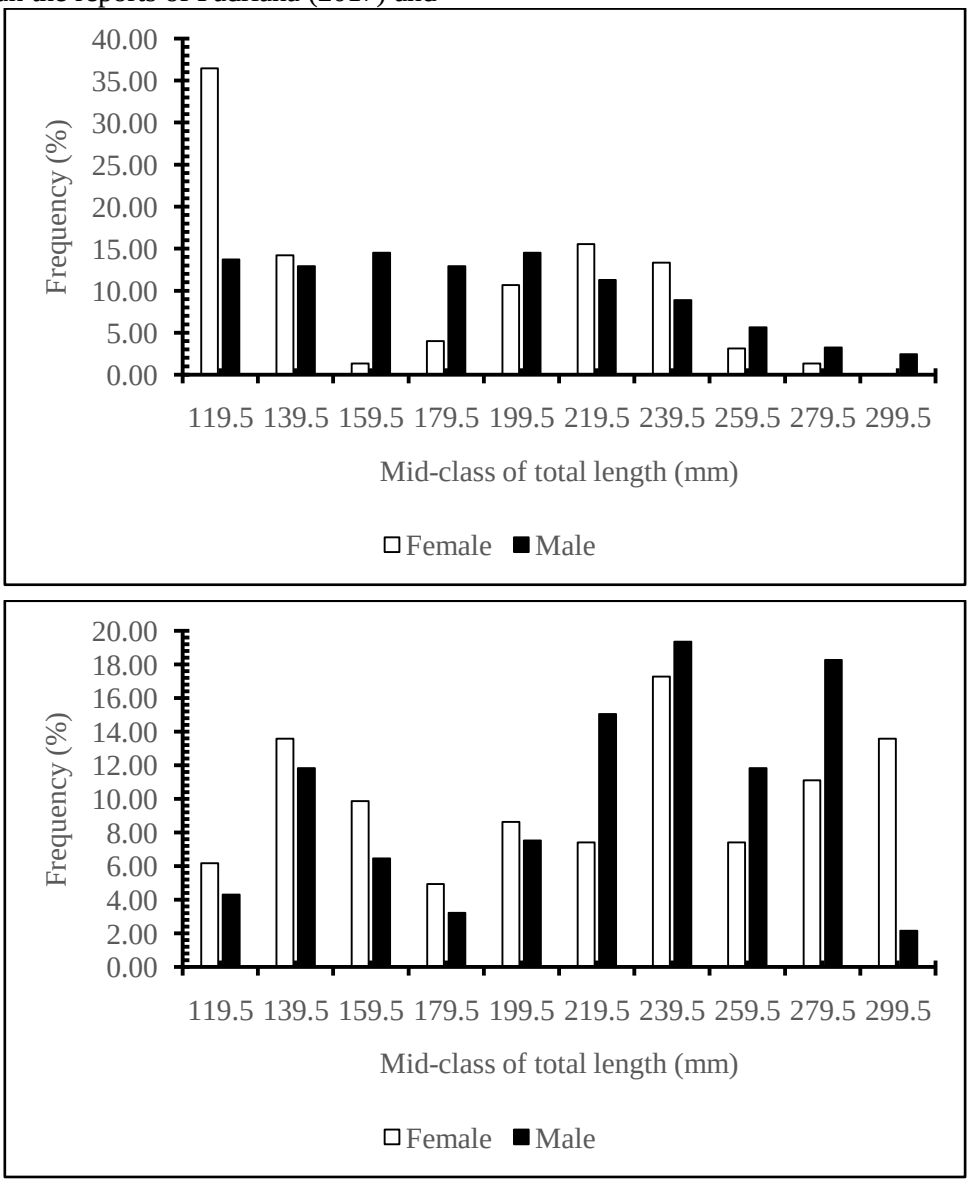


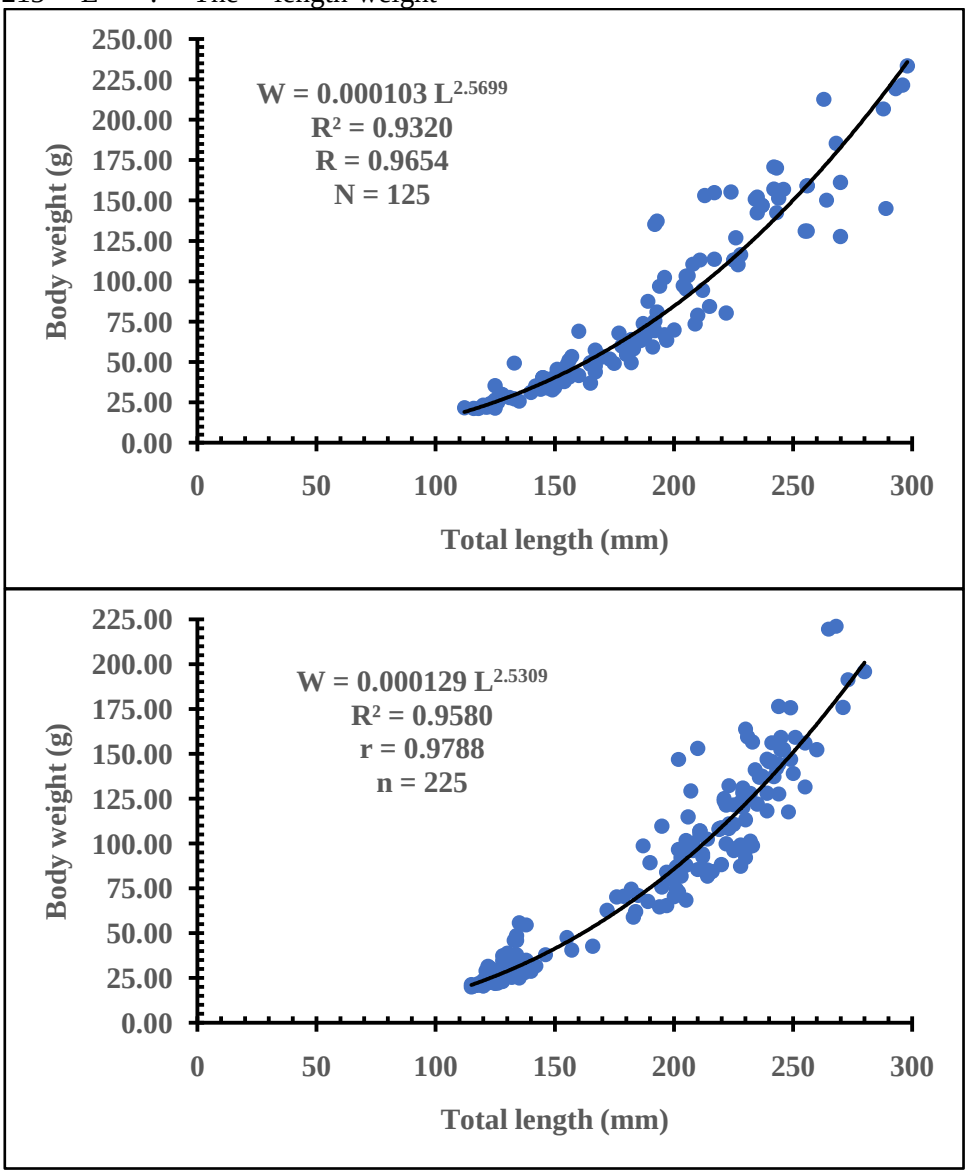
Figure 2. Total length distribution of greenback mullet, *Planilizasubviridis* in Pangkep waters (above) and Takalar waters (below)

The analysis results of greenback mullet length-weight relationship (P. subviridis) in Pangkep waters obtained the regression equation for male fish $W = 0.000103\ L^{2.5699}$ and female fish $W = 0.000129\ L^{2.5309}$. Further statistical analysis of the regression coefficients between male and female fish showed no significant difference ($p>0.05$), which indicated that in general male and female fish had similarities in length and weight gain. Therefore, data was combined between male and female fish, which gave the equation $W = 0.000124\ L^{2.5376}$. The graph of the length-weight relationship of P. subviridis

in Pangkep waters is shown in Figure 3. Based on testing the b value using the t-test, both male fish, female fish, and a combination of male and female fish, the growth type of greenback mullet in Pangkep waters is hypo allometric or negative allometric (b<3), namely the increase in body length faster than the increase in body weight.

Furthermore, the length-weight equation for male greenback mullet in Takalar waters is $W = 0.000202\ L^{2.4714}$ and female fish $W = 0.000220\ L^{2.4626}$. The results of statistical analysis on the regression coefficient values of male and female fish in Takalar waters were not significantly different ($p>0.05$), which indicated that in general male and female fish had similarities in length and weight gain so that the data of male and female fish were combined, it gives the regression equation $W = 0.000215\ L^{2.4628}$. The length-weight relationship graph of *P. subviridis* in Takalar waters is shown in Figure 4. Based on the t-test on b values for both male fish, female fish, and a combination of male and female fish, all of them show the growth type of greenback mullet in Takalar waters is hypo allometric or negative allometric.

Based on the b coefficient values obtained during the study, male *P. subvaridis* tended to have higher scores than female fish, both in Pangkep and Takalar. This indicates that the male fish's body weight gain is faster in relation to its length. Furthermore, the value of the regression coefficient of the greenback mullet in Pangkep is higher than that in Takalar. This is presumably because Pangkep waters are better able to support the growth of these fish. In this study, ecological factors were not observed.



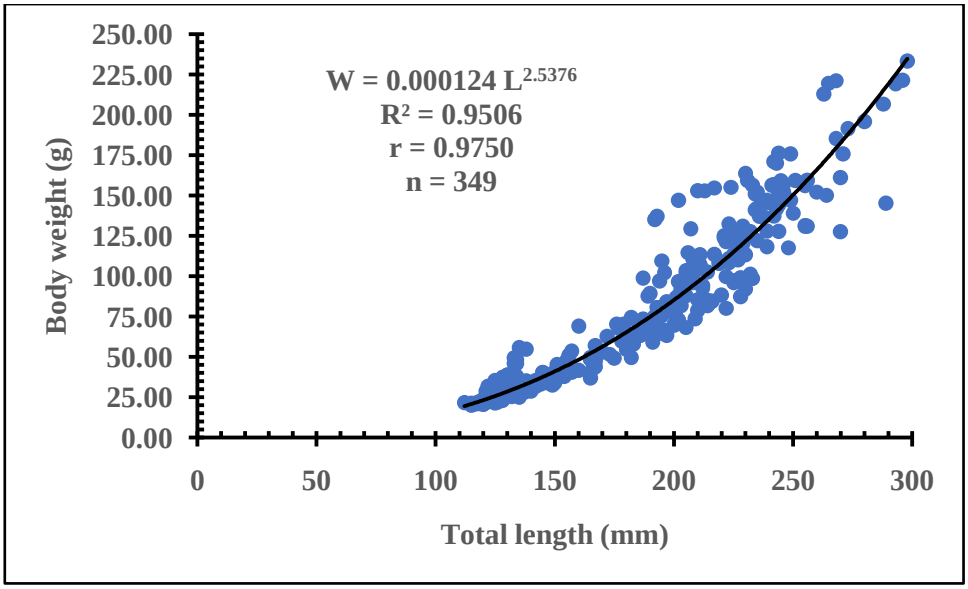
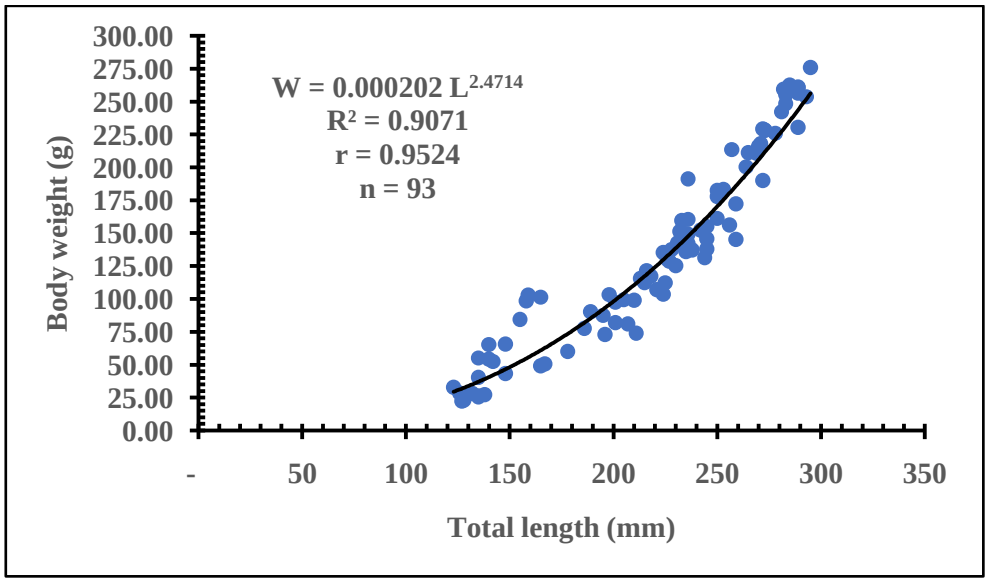
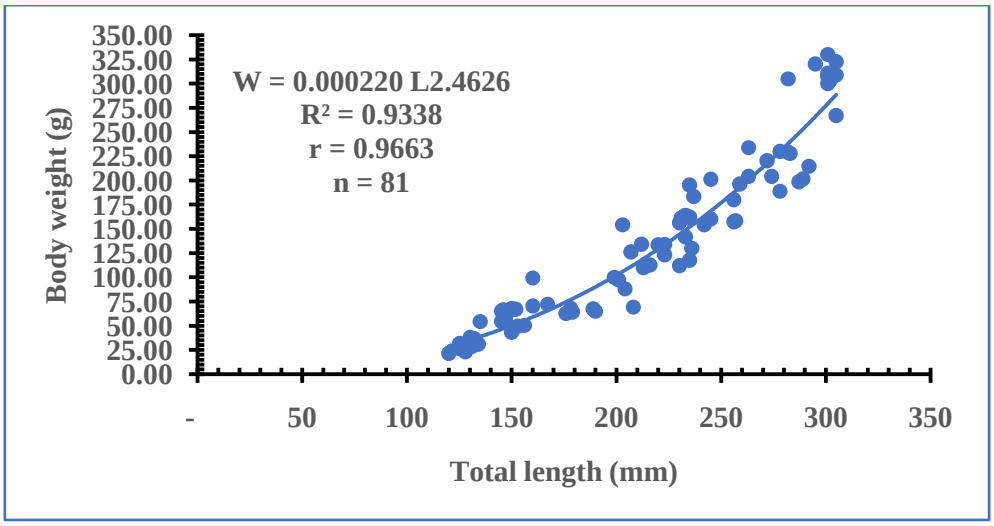


Figure 3. Length-weight curves and equations of greenback mullet *Planilizasubviridis* in Pangkep waters. Above: Males; Middle: Females; Below: All specimens (male + female)





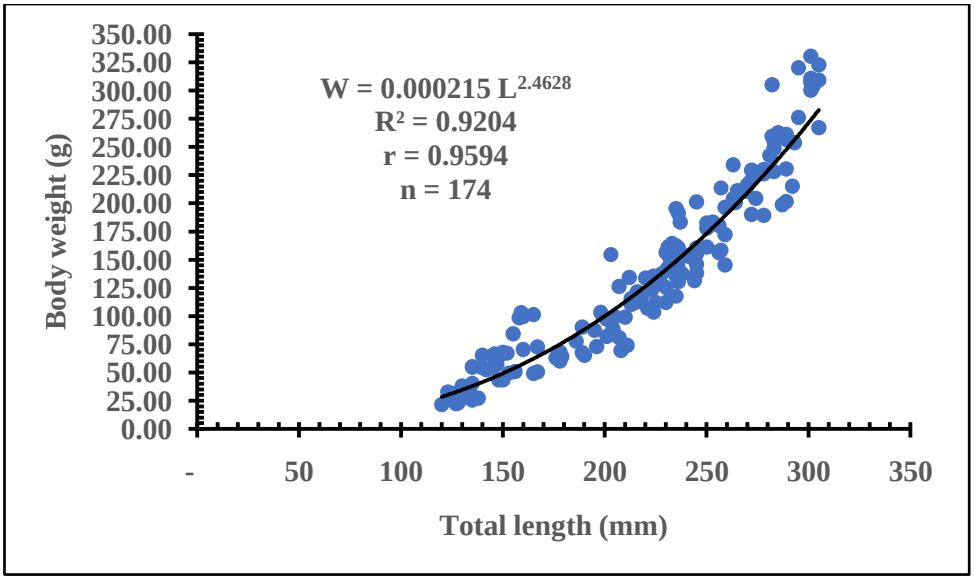


Figure 4. Length-weight curves and equations of greenback mullet *Planilizasubviridis* in Takalar waters. Above: Males; Middle: Females; Below: All specimens (male + female)

The correlation coefficient (r) for the length-weight relationship between male and female fish, both in Pangkep and Takalar waters, was all greater than 0.95 (Figures 3 and 4). This suggests a very strong correlation between total length and body weight of the greenback mullet. Andy-Omar (2013) stated that the correlation coefficient values ranged from 0.90 to 1.00 indicating a very strong correlation, which indicates a close relationship between total length and body weight.

The coefficient of determination (R^2) values obtained during the research in Pangkep waters were 0.9320 (male fish) and 0.9580 (female fish), higher than those in Takalar waters, 0.9071 (male fish) and 0.9380 (female fish). This shows that more than 90% of the data on the relationship between total length and body weight can be explained by this equation model. Parawansa et al. (2020) stated that a high coefficient of determination indicates good predictive power and small data dispersion. The ideal fish growth usually has an R^2 coefficient value ranging between 0.9 and 1.0 (Hanif *et al.*, 2020).

The length-weight relationship is very useful in fisheries research because it can be used to compare fish growth (Shalloof and El-Far, 2017). Based on the regression coefficient (b) value obtained, it can be known the type of fish growth (Froese *et al.*, 2011). There are three types of fish growth, namely isometric (b=3) if weight gain and body length are the same fast, hypo allometric (b<3) if body weight gain is slower than length gain, and hyper allometric (b>3) if weight gain is faster than the increase in body length of the fish (Andy-Omar *et al.*, 2016). The growth type obtained on the greenback mullet during the study all showed hypo allometric. Several publications regarding the length-weight relationship in mullet fish show a hypo allometric growth type (Table 1). However, a hyper allometric growth type has been found in *Moolgardaengeli* (Yuliantoet *al.*, 2020) and *Liza vaigiensis* (Ramses *et al.*, 2022). Yulianto et al. (2020) reported *that M. engeli* caught in the waters of Lambada Lhok, Aceh, had a length-weight relationship equation $W = 0.000002\ L^{3.3224}$ (n = 68, r = 0.9448). Furthermore, Ramses et al. (2022) found that *L. vaigiensis* caught on Panjang Island, Batam, had a length-weight relationship equation W = 0.0104 L3.079 (n = 11, r = 0.9899).

Several factors can affect the length-weight relationship in fish. These factors include aquatic environmental factors (temperature, salinity, habitat), differences in the number of samples, geographical location, seasons, ontogenetic differences, age differences, growth phase, gonadal maturity levels, reproduction, sex, food (quantity, quality, and size), degree of gastric fullness, parasite pressure, preservation techniques, fish health and condition, food availability, and sampling procedures (Hossain *et al.*, 2012; Jafari *et al.*, 2016; Azevedo *et al.*, 2017; Shalloof and El-Far, 2017; Olopade *et al.*, 2018; Mitu*et*

al.,2019; Hanif *et al.*, 2020). In addition, the size range used can also affect the value of the regression coefficient b (Blasinaa*et al.*, 2018). Apart from being singly, the difference in the value of the regression coefficient can also be a combination of several factors mentioned above. Some of the factors mentioned above were not observed during fish sampling.

The condition factor shows the biological and physical conditions of the fish and their fluctuations (Yuliantoe*t al.*, 2020). Overall, as shown in Table 2, the results of the calculation of the condition factor values for male greenback mullet *(P. subviridis*) in Pangkep waters ranged from 0.6665-1.7765 (1.0162 ± 0.0174) and for females ranged from 0.7307-1.7579 (1.0122 ± 0.0159). In Takalar waters, male fish had condition factors ranging from 0.6600-1.8493 (1.0208±0.0230) and female fish ranging from 0.6183-1.6904 (1.0183±0.0220). The condition factor values of other mullet species can be seen in Table 2.

Table 1. Regression coefficients and growth patterns of mullet fish from several locations in Indonesia

Species	Location	Sex	n	Regression parameters			Growth type	References
				a	b	r		
Crenimugilcrenilabis	Panjang Island, Batam	C	40	0.0253	2.703	0.9322	HA	Ramses *et al.*, 2022
Liza macrolepis	Lambada Lhok, Aceh	M	172	0.000164	2.4857	0.9247	HA	Yuliantoe*t al.*, 2020
		F	70	0.004897	1.8113	0.8043	HA	Yuliantoe*t al.*, 2020
Liza subviridis	Opak River, Yogyakarta	M	189	0.0141	2.911		HA	Gustiana, 2013
		F	213	0.0198	2.800		HA	Gustiana, 2013
Liza subviridis	Ujung Kulon, Banten	M		0.00005	2.662	0.9925	HA	Wahyudewantoro and Haryono, 2013
		F		0.00006	2.626	0.9889	HA	Wahyudewantoro and Haryono, 2013
Liza tade	Panjang Island, Batam	C	34	0.0147	2.882	0.9466	HA	Ramses *et al.*, 2022
Moolgardaengeli	Mayangan, West Java	M	146	0.001	2.0887	0.8991	HA	Wigati and Syafei, 2013
		F	80	0.0006	2.1949	0.7196	HA	Wigati and Syafei, 2013
		C	226	0.0008	2.1390	0.8469	HA	Wigati and Syafei, 2013
Mugil cephalus	Matang Guru River, Aceh	C	30	0.0348	2.0306	0.9910	HA	Muttaqine*t al.*, 2016
Mugil cephalus	Bali	C	127	0.0011	2.195	0.8672	HA	Putra *et al.*, 2021
Mugil cephalus	Kubu Raya Regency, West Kalimantan	M		0.0306	2.6410	0.9296	HA	Kurniawan *et al.*, 2022
		F		0.1205	2.1458	0.8903	HA	Kurniawan *et al.*, 2022
Mugil dussumieri	Ujung Pangkah, East Java	M	689	0.00003759	2.72	0.9831	HA	Sulistionoe*t al.*, 2001
		F	1050	0.00001465	2.92	0.9835	HA	Sulistionoe*t al.*, 2001
Mugil dussumieri	Muna, Southeast Sulawesi	M	32	0.0004	2.3500	0.9153	HA	Sutrianae*t al.*, 2020
		F	40	0.0001	2.6158	0.9261	HA	Sutrianae*t al.*, 2020
Planilizasubviridis	MacciniBaji, South Sulawesi	M	93	0.00007	2.6448	0.9726	HA	Padriana, 2017
		F	80	0.00003	2.7751	0.9713	HA	Padriana, 2017
		C	173	0.00005	2.6954	0.9723	HA	Padriana, 2017
Planilizasubviridis	Banten Bay	M	113	0.0001	2.6335	0.9401	HA	Fitriahe*t al.*, 2021
		F	110	0.00001	2.9818	0.9757	HA	Fitriahe*t al.*, 2021
Planilizasubviridis	Pangkep, South Sulawesi	M	124	0.000103	2.5699	0.9654	HA	This study
		F	225	0.000129	2.5309	0.9788	HA	This study
		C	349	0.000124	2.5376	0.9750	HA	This study
	Takalar, South Sulawesi	M	93	0.000202	2.4714	0.9524	HA	This study
		F	81	0.000220	2.4626	0.9663	HA	This study
		C	174	0.000215	2.4628	0.9594	HA	This study

Note: M = male, F = female, C = combined (M + F), n = number of fishes, a = intercept, b = slope, r = correlation coefficient, HA = hypoallometric

Table 2. Condition factors of mullet fish from several locations in Indonesia

Species	Location	Sex	n	Total length (mm)	Body weight (g)	Condition factor		References
						Range	Mean	
Liza macrolepis	Lambada Lhok, Aceh	M	172	141.4-202.1	34.7-89.6		1.19	Yuliantoe*t al.*, 2020
		F	70	129.2-185.4	28.8-75.13		1.19	Yuliantoe*t al.*, 2020
Liza subviridis	Opak River, Yogyakarta	M	189	79-290	5-325	0.96-1.04		Gustiana, 2013
		F	213	72-359	3-492	0.88-1.06		Gustiana, 2013
Moolgardaengeli	Lambada Lhok, Aceh	M	68	109.9-188.5	13.6-108.5		1.05	Yuliantoe*t al.*, 2020
		F	41	116.5-182.3	14.2-75.1		1.06	Yuliantoe*t al.*, 2020
Mugil dussumieri	Muna, Southeast Sulawesi	M	32	107-221	23-194	0.65-1.54	1.0226	Sutrianae*t al.*, 2020
		F	40	122-270	27-231	0.72-1.50	1.1300	Sutrianae*t al.*, 2020

Planilizasubviridis	MacciniBaji, South Sulawesi	M	93	123-284	19.18-204.08	0.2595-2.7612	1.0014	Padriana, 2017
		F	80	130-274	23.37-212.33	0.2896-2.6311	0.9979	Padriana, 2017
		C	173	123-284	19.18-212.33	0.2502-2.7694	1.0046	Padriana, 2017
Planilizasubviridis	Banten Bay	M	113	56-263	2.3-182	0.99-1.02		Fitriah*et al*., 2021
		F	110			0.96-1.03		Fitriah*et al*., 2021
Planilizasubviridis	Pangkep, South Sulawesi	M	124	112-298	21.15-233.34	0.6665-1.7765	1.0162	This study
		F	225	115-280	20.09-221.39	0.7307-1.7579	1.0122	This study
		C	349	112-298	20.09-233.34	0.6687-1.7718	1.0137	This study
	Takalar, South Sulawesi	M	93	123-295	22.21-276.09	0.6600-1.8493	1.0208	This study
		F	81	120-305	21.42-330.43	0.6183-1.6904	1.0183	This study
		C	174	120-305	21.42-330.43	0.6315-1.8109	1.0198	This study

Note: M = male, F = female, C = combined (M + F), n = number of fishes.

The average value of the condition factor for male P. viridis obtained during the study was greater than that of female fish, both in Pangkep and Takalar waters. The same thing was found by Padriana (2017) on the same species in MacciniBaji waters (Table 2). Sutriana et al. (2020) obtained an average condition factor value for female M. dussumieri fish compared to male fish. The same thing was found by Yulianto et al. (2020) on M. engeli fish. Large variations in condition factor values can occur among members of the same population due to differences in body length, even though sampling is done at the same time.

Condition factors can be used to evaluate the physiological status of fish where they live based on the principle that individuals of a given length who weigh more are in better 'condition'. Fish that have a condition factor of more than 1 indicates that the fish is consider good quality and said to be in better condition than fish whose condition factor value is less than 1 in the same waters (Awasthi et al., 2015; Falaye et al., 2015; Azevedo et al., 2017). The condition factor value of fish is influenced by many factors, including sex, season, environmental factors, stress, gonadal development, availability of food ingredients, feeding activity, age, climate, and other water quality parameters (Zargar et al., 2012; Awasthi et al., 2015; Falaye et al., 2015; Olopade et al., 2018).

4. Conclusion

Based on the results of this study, the male and female greenback mullet (P. subviridis) caught in Pangkep and Takalar waters had a hypoallometric growth type, meaning that body weight gain was slower than length gain. The fish condition factor value in Pangkep waters is greater than in Takalar waters.

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