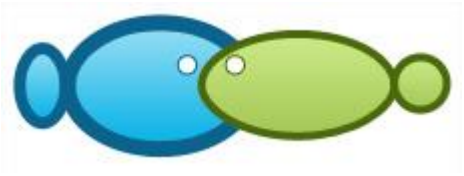

Length-weight relationship and condition factor of *Trichopodus trichopterus* from Ogan Ilir peat swamp, South Sumatra, Indonesia

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Abstract. The study of the length-weight relationship and condition factor is a fundamental component of fisheries management. *Trichopodus trichopterus* (Pallas, 1770) is a native species of Indonesia, used as food and aquarium fish. The purpose of this study was to analyze the length-weight relationship and condition factor of *T. trichopterus* from Ogan Ilir peat swamp, South Sumatra, Indonesia. A total of 85 samples were used in this study. The results showed that the length-weight relationship of the *T. trichopterus*, the predictive model of the weight of the fish from the length of the fish is in the exponential form with the equation $y=0.0207x\ L^{2.8607}$ ($R^2=0.84$, $p<0.01$), with an a coefficient of 0.0207 and a b constant of 2.86. The current study hopes to provide the first baseline data about the length-weight relationship and condition factor of *T. trichopterus* from the Ogan Ilir peat swamp. The data obtained are very useful for the sustainable management of this resource.
Key Words: anabantiformes, fisheries management, floodplain, labyrinth fish, osphronemidae.

Introduction. The three-spot gourami *Trichopodus trichopterus* (Pallas, 1770) is a species of fish native to southeastern Asia but also introduced elsewhere (Low 2019). These fish live in swamps, marshes, lakes, canals, and lowland wetlands. *T. trichopterus* is an omnivore and requires both algae-based and meaty foods. An algae-based flake food, along with freeze-dried bloodworms, *Tubifex* sp. worms, and brine shrimp, provides these fish with the proper nutrition. Live foods such as mosquito larvae and *Daphnia* sp. are also beneficial. In Indonesia, this fish can be found on the islands of Sumatra and Kalimantan. The local people use it as food and ornamental fish.

The fish generally increase in length and weight during development. Factors that affect fish growth are internal and external. Internal factors include health status, life cycle, sexes, and parental inheritance, while external factors include physical, chemical, and biological parameters of the habitat. The length-weight relationship is crucial for ecological assessments and monitoring (Orlov & Binohlan 2009), population stock assessment studies (Augustina et al 2022), determining the growth type of fish (Ricker 1975; Erzini 1994), several biological aspects of the species (Freitas et al 2017), determining the life history (Ferdaushy & Alam 2015), determining the growth and body condition (Zuchi et al 2020), describing geographic and seasonal conditions (Lima et al 2021).

Some previous studies were conducted on the length-weight relationship of Indonesian fish species: *Rasbora tawarensis* and *Poropuntius tawarensis* (Muchlisin et al 2010), *Tor tambra* (Muchlisin et al 2015), *Crassostrea virginica*, *Crassostrea gigas*, *Crassostrea iridescens, Crassostrea angulata,* and *Ostrea edulis* (Octavina et al 2015), *Hemibagrus wyckii* (Aryani et al 2016), *Decapterus macrosoma* (Pattikawa et al 2017), *Barbonymus gonionotus* (Batubara et al 2019), *Channa striata* (Ahmadi 2018), *Anabas testudineus* (Ndobe et al 2019), *Oryzias matanensis* (Rinandha et al 2020; Nugroho et al 2021), *Mystacoleucus padangensis* (Nasution et al 2021), *Pristolepis grootii* (Muslim et al

2022) and others. This study aims to determine the length-weight relationships and condition factor of *T. trichopterus* from Ogan Ilir peat swamp, South Sumatra, Indonesia.

Material and Method. This study was conducted in Ogan Ilir peat swamp, South Sumatra, Indonesia, from September to December 2022 (rainy season). The samples were collected from two sampling stations: station 1 (3°12'21.16"S-104°38'50.25"E) and station 2 (3°12'18.92"S-104°38'49.758"E) (Figure 1).

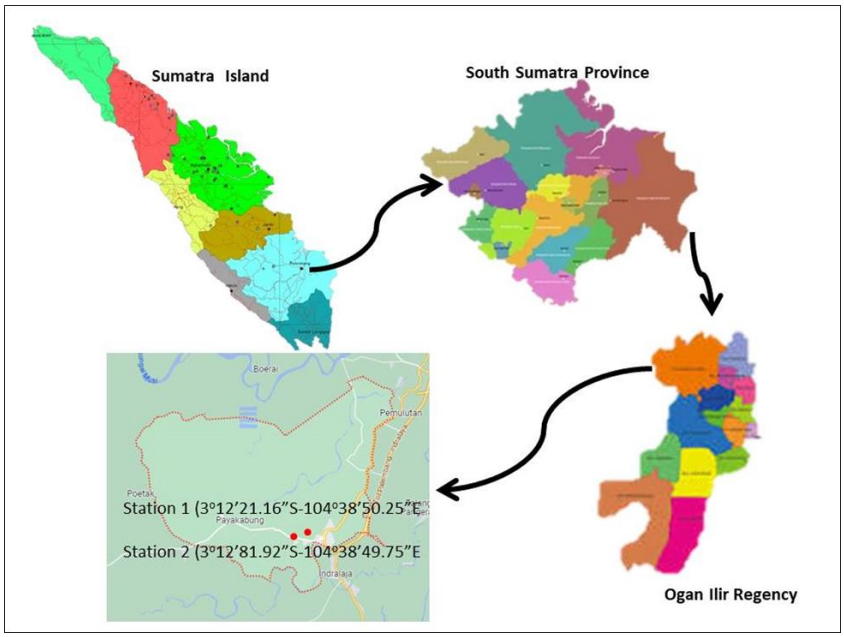

Figure 1. Map of the Ogan Ilir peat swamp, South Sumatra, Indonesia; the red dots mark the location of sampling sites.

The fish were collected using traditional fishing gear, namely traps and gillnets. Sampling was carried out twice in one month. *T. trichopterus* samples were transported to the Batanghari Sembilan Fish Breeding Unit, Ogan Ilir Regency, under live conditions for measurement. The measured sampels were reared as ornamental aquarium fish. A total of 85 *T. trichopterus* were collected at the sampling stations. The total length (TL, cm) and body weight (BW, g) were determined for each individual. The TL of the fish was measured from the tip of the mouth to the tip of the caudal fin. TL was measured using a caliper (0.1 cm accuracy), and the BW of the sample fish was measured using a digital scale (0.01 g accuracy).

The analysis of the length-weight relationship used a linear allometric model for the calculation of parameters 'a' and 'b'. The calculation was done by measuring changes in weight and length. The bias correction that exists in the change in the average weight of the logarithmic unit is used as a weight prediction calculation on the length parameter according to the formula (De Robertis & Williams 2008):

$$BW=aTL^b$$

Where: BW is the body weight of each fish (g); TL is the total length of each fish (cm); a, b are constants.

The fish growth patterns are determined based on the value of b. When it equals 3, then the growth pattern is isometric, or weight gain is equivalent to the length of the fish, and when the value of b not equal to 3, then the growth pattern is allometric. These growth patterns are divided into two categories, namely positive and negative allometric. Whenever the value of b is less than 3, it is called positive allometric (the increase in length is less than the weight gain) (Kirankaya et al 2014). The significance of the length-weight relationship of the specimens was tested among stations by a t-test.

The relative weight (Wr) and condition factor coefficient (C) were used to evaluate the condition factor of each individual. The Wr was determined based on the equation (Rypel & Richter 2008):

$$Wr = \frac{BW}{Ws} \times 100$$

Where: Wr is the relative weight, BW is the body weight of each fish, and Ws is the standard weight predicted from the same sample because it is calculated from the combined length-weight regression through the distance between species.

The Fulton condition factor (K) was determined based on Okgerman (2005) with the following formula:

$$K = BW \times TL^{-3} \times 100$$

Where: K is the condition factor; BW is the body weight (g); TL is the total length (cm).

Results and Discussion The TL range was between 5.3 and 12.1 cm with an average of 8.56±1.15 cm, and the BW range was between 1.69 and 26.65 g with an average of 10.21±4.28 g (Figure 2). Eight length class intervals were obtained as the result of the TL frequency distribution analysis. The most frequent fish size classes are in the TL of 7–7.99 cm, 8–8.99 cm, and 9–9.99 cm classes. The least frequent fish size is in the 5–5.99 cm and 12–12.99 cm classes. *T. trichopterus* had a larger maximum TL compared to the TL of *T. trichopterus* in other studies (Table 1) and the same maximum TL as the fish reported by Cuadrado et al (2019) in Lake Esperanza, Agusan del Sur, Philippines, which was 12.1 cm. However, its size is smaller compared to *T. trichopterus* data recorded in FishBase, where the maximum length of *T. trichopterus* can reach 15 cm in natural waters (Froese & Pauly 2021).

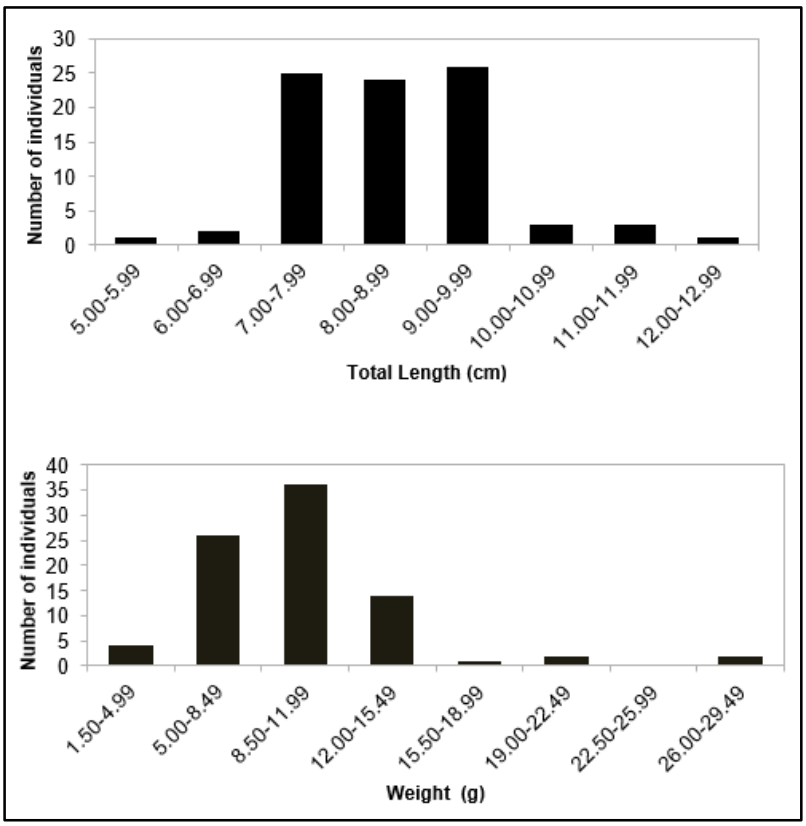

Figure 2. Total length and weight of *Trichopodus trichopterus* (Pallas, 1770) from Ogan Ilir peat swamp, South Sumatra, Indonesia.

Table 1
Length-weight relationships and condition factor of *Trichopodus trichopterus* (Pallas, 1770) in different regions

Location	*Author*	*Length (cm)*	*a*	*b*	*R^2*	*GP*	*K*
Agusan Marsh	Jumawan & Seronay (2017)	4.9-11.5	0.029	3.04	0.96	A+	-
Martapura	Aminah & Ahmadi (2018)	3-11.1	0.0002	1.60	0.70	A-	1.88
Bendungan Lempake	Jusmaldi et al (2021)	3.16-10.35	0.0003	2.86	0.94	A-	1.05
Ciperet River	Wahyudewantoro et al (2021)	3.42-10.75	0.0006	2.40	0.99	A-	1.00
Muara Angke	Wahyudewantoro et al (2021)	3.54-10.33	0.0003	2.62	0.99	A-	1.00
Ogan Ilir, Peat Swamp	Current study	5.3-12.1	0.0207	2.86	0.84	A-	1.01

Note: a and b - constants; R^2 - coefficient of determination; GP - growth pattern; A+ - allometric positive; A- - allometric negative; K - condition factor.

The results of the analysis of the length-weight relationship are expressed in the regression equation $BW=0.0207xTL^{2.8607}$ (Figure 3). The TL and BW of *T. trichopterus* show a positive association with a correlation coefficient (r) of 0.92 and a coefficient of determination (R^2) of 0.84, indicating that TL influences 84% of the change in BW of *T. trichopterus*. The results of the t-test show that the regression coefficient (b) is significantly different from 3 ($p>0.05$). *T. trichopterus* has a b value of 2.86, meaning a negative allometric growth pattern (the increase in length is not followed by an increase in weight).

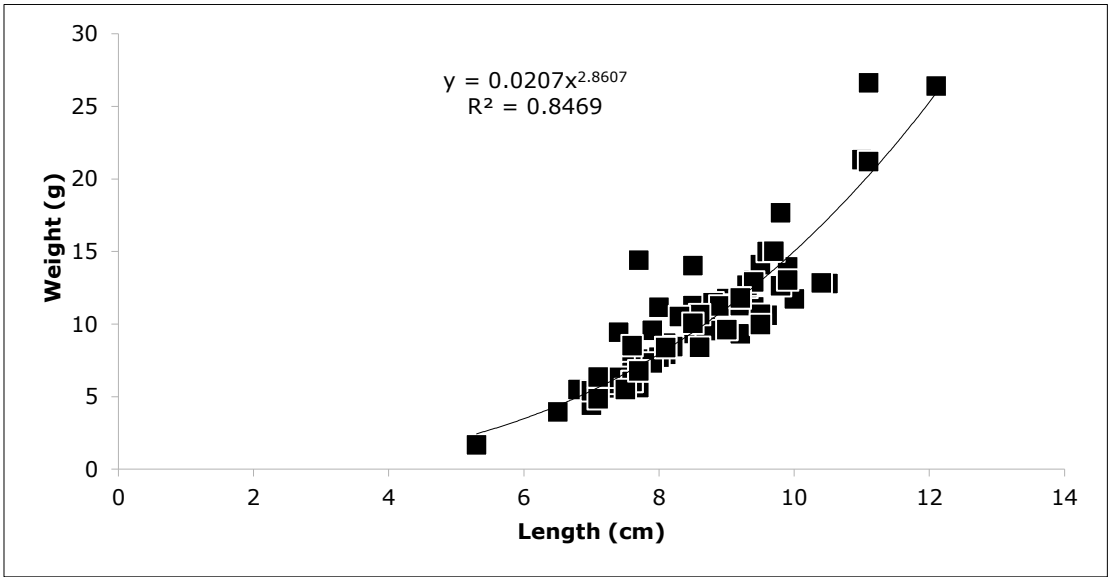

Figure 3. The length-weight relationship of *Trichopodus trichopterus* (Pallas, 1770) from Ogan Ilir peat swamp, *So*uth Sumatra, Indonesia.

In this study, the growth of *T. trichopterus* was negative allometric. Negative allometric *T. trichopterus* growth was also found in Martapura (Aminah & Ahmadi 2018), at the Lempake Dam (Jusmaldi et al 2021), in the Ciperet River, and in Muara Angke (Wahyudewantoro et al 2021). According to Mazumder et al (2016), factors that may cause allometric negative growth patterns in *T. trichopterus* are habitat conditions that are not suitable for growth. Mon et al (2020) explained that fish growth with $b<3$ indicates an aquatic environment that is not good for fish growth. Meanwhile, $b>3$ (positive allometric) indicates good

environmental factors. The cause of the difference in the value of b in fish is thought to be due to ecological differences such as temperature and food supply.

The K value is used to assess the health condition of fish (Ahmadi 2018; Basak & Hadiuzzaman 2019). The Fulton condition factor is generally used to assess the health of the fish, indicating the nutritional and physiological status of the fish (Muchlisin et al 2017; Oktaviani et al 2020). According to Fafioye & Ayodele (2018), a K value less than 1 indicates that the fish habitat is not fully suitable for fish health. The mean value of the condition factor of the *T. trichopterus* in the study was 1.01, which indicated the fish were in good condition.

Conclusions. The relationship between the length and weight of the *T. trichopterus* has a positive correlation, and the fish present a negative allometric growth pattern. The condition factor value of 1.01 indicated that the *T. trichopterus* population in the Ogan Ilir peat swamp was in good condition.

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Conflict of Interest. The authors declare that there is no conflict of interest.

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