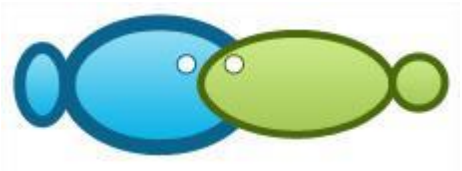

Preliminary study of size distribution, length-weight relationship and condition factor of banded archerfish, *Toxotes jaculatrix* (Pallas, 1767), from Limbangan River, Pangkajene and Islands Regency, South Sulawesi, Indonesia

[1]Mutmainnah, [2]Sharifuddin B. A. Omar, [2]Joeharnani Tresnati, [1]Muhammad R. Perdiansyah

[1] Master Program of Fishery Science, Faculty of Marine Science and Fisheries, Hasanuddin University, Makassar, Indonesia; [2] Aquatic Resources Management Study Program, Faculty of Marine Science and Fisheries, Hasanuddin University, Makassar, Indonesia. Corresponding author: S. B. A. Omar, sharifuddin@unhas.ac.id

Abstract. The banded archerfish (*Toxotes jaculatrix*) has only been reported from a few locations in Indonesia, including the Limbangan River in Pangkajene and Islands Regency, South Sulawesi. Information on the length-weight relationship (LWR) and condition factor (CF) of this species from Indonesian waters is currently unavailable, even though LWR and CF are key components in fisheries studies because they provide insights into fish growth, health, and fatness in their natural habitats. Therefore, this research serves as a preliminary study aimed at assessing the size distribution, LWR, and CF of *T. jaculatrix* in the Limbangan River. A total of 163 specimens (83 females and 80 males) collected between October 2024 and March 2025 were analyzed in the laboratory. The results showed that female fish had a total length ranging from 77.4 to 238.4 mm, body weight between 7.52 and 292.89 g, and exhibited isometric growth (b = 2.9753). Male fish ranged from 55.4 to 185.2 mm in total length, weighed between 2.35 and 116.18 g, and exhibited hyperallometric growth (b = 3.1109). The condition factor values (Fulton's condition factor and relative condition factor) were greater than 1, indicating that both female and male fish were in good condition. This study provides the first baseline information on the LWR and CF of *T. jaculatrix*, which can be used for the sustainable management and conservation of this species.

Key Words: condition factor, growth pattern, length-weight relationship, morphometric characteristics, population dynamics, size variation, *Toxotes jaculatrix*.

Introduction. Archerfish (*Toxotes* spp.) is a type of ornamental fish with high economic value that is highly sought after in both domestic and international markets due to its unique body shape and attractive coloration. The price of an archerfish measuring around 10 cm as an ornamental fish can reach up to IDR 150,000 or approximately USD 9 (Suryati et al 2014). Beyond its aesthetic appeal, this species is also well-known for its distinctive hunting behavior - shooting jets of water to knock down insects from above the water surface (Temple 2007). This shooting ability highly depends on the sharpness and accuracy of its vision (Blaber 2000; Timmermans & Souren 2004). In several regions of Indonesia, archerfish is locally known as *ikan sumpit*.

Archerfish is a euryhaline species capable of adapting to and thriving in various aquatic environments, including freshwater, brackish water, and marine habitats, such as mangrove ecosystems and coral reefs (Simon & Mazlan 2010; Simon et al 2010b). Taxonomically, this species belongs to the family Toxotidae. Most literature classifies archerfish within the order Perciformes (Kottelat 2013; Nelson et al 2016; Simon 2024; Froese & Pauly 2025), although some sources place it under the order Carangiformes (Van der Laan et al 2025).

The number of archerfish species varies depending on the source referenced. Allen (1978, 2004), Nelson et al (2016), and Froese & Pauly (2025) reported that there are

seven archerfish species classified under a single genus, *Toxotes*. In contrast, Fricke et al (2025) documented nine species divided into two genera: *Toxotes* with eight species and *Protoxotes* with one species.

In Indonesia, *Toxotes jaculatrix* (Pallas, 1767) is one of the most commonly encountered archerfish species. Other archerfish species found in Indonesian waters include *T. chatareus* (Warsa et al 2007; Astuti & Warsa 2008; Iqbal et al 2018; Rekapermana 2019), *T. oligolepis* (Kottelat 2013; Kottelat & Tan 2018), *T. microlepis* (Kottelat & Widjanarti 2005; Hidayat 2011; Suryati et al 2014; Iqbal et al 2018; Fekri et al 2024), *T. sundaicus* (Kottelat & Tan 2018), and *Protoxotes lorentzi* (Girard et al 2022).

The banded archerfish, *T. jaculatrix*, is characterized by an elongated, laterally compressed body, a silvery-white coloration with 4 to 6 black bands across its dorsal side, and 4 dorsal fin spines. Its maximum total length is around 30 cm, though it commonly reaches about 20 cm. This species is typically found in estuarine areas and shallow brackish waters, either in groups or as solitary individuals (Allen 2001; Simon 2024). *T. jaculatrix* is distributed across the Indo-West Pacific region, including India, Bangladesh, Myanmar, the Andaman Islands (India), the Philippines, Papua New Guinea, the Solomon Islands, the Ryukyu Islands (Japan), Northern Australia, and Vanuatu (Fricke et al 2025). According to the IUCN, the conservation status of this species is classified as least concern, meaning it is currently at low risk of extinction (Hoese 2012).

Research on *T. jaculatrix* in Indonesia remains very limited. Some studies that have been conducted include investigations on the effect of osmotic pressure on survival (Kadarini et al 2009), sperm motility and viability (Fahmi et al 2009), morphological determination of gonad maturity stages (Permana et al 2009), gonad maturity levels (Fahmi & Permana 2014), and biological aspects in the Bilah River (Hidayah et al 2023). In contrast, various biological aspects of *T. jaculatrix* have been extensively studied in Malaysia, including age (Simon et al 2008, 2010a), length-weight relationship (Simon & Mazlan 2008), population growth (Simon et al 2009), reproductive biology (Simon et al 2009, 2012), trophic position (Simon & Mazlan 2010), daily growth increments (Simon et al 2010b), morphometrics (Simon et al 2010a), and condition factor (Simon et al 2013).

Studies on the length-weight relationship (LWR) are essential for the biological, physiological, and ecological management of fish populations (Kumar et al 2025). Based on the length-weight equation $W = aL^b$, a fish's body weight (W) can be predicted from its body length (L), and vice versa. The LWR is widely used to evaluate growth, survival, maturity, reproduction, and fatness of fish (Ahirwal et al 2023). Sustainable fish population management requires data on stock growth, condition factor, and biomass, all of which can be derived from the LWR (da Silva et al 2020). The condition factor, or ponderal index, which numerically reflects the well-being of fish, is calculated based on the relationship between length and weight (Simon 2024). The condition factor has also been extensively used as an index of growth and feeding intensity. This index tends to decline as fish length increases, which can affect the reproductive cycle (Khanipour et al 2020). Moreover, the condition factor provides insights into the health status of both species and communities and can be used to numerically compare the physiological resilience of fish (Ahirwal et al 2023).

Biological studies on *T. jaculatrix* in Indonesia are still very limited, and to date, no research has been conducted on the LWR and condition factor of this species. Yet, such information is crucial as a fundamental basis for the sustainable management and conservation of fishery resources (Simon 2024). Therefore, this study aims to examine the size distribution, establish the length-weight relationship to predict growth patterns, and assess the condition factor to evaluate habitat suitability for the growth of the banded archerfish (*T. jaculatrix*).

Material and Method

Period and location. Archerfish sampling was conducted over a six-month period, from October 2024 to March 2025, in the Limbangan River, Pangkajene and Islands Regency, South Sulawesi Province, Indonesia (Figure 1). The *T. jaculatrix* specimens were analyzed

at the Fisheries Biology Laboratory, Department of Fisheries, Faculty of Marine Science and Fisheries, Hasanuddin University, Makassar, Indonesia.

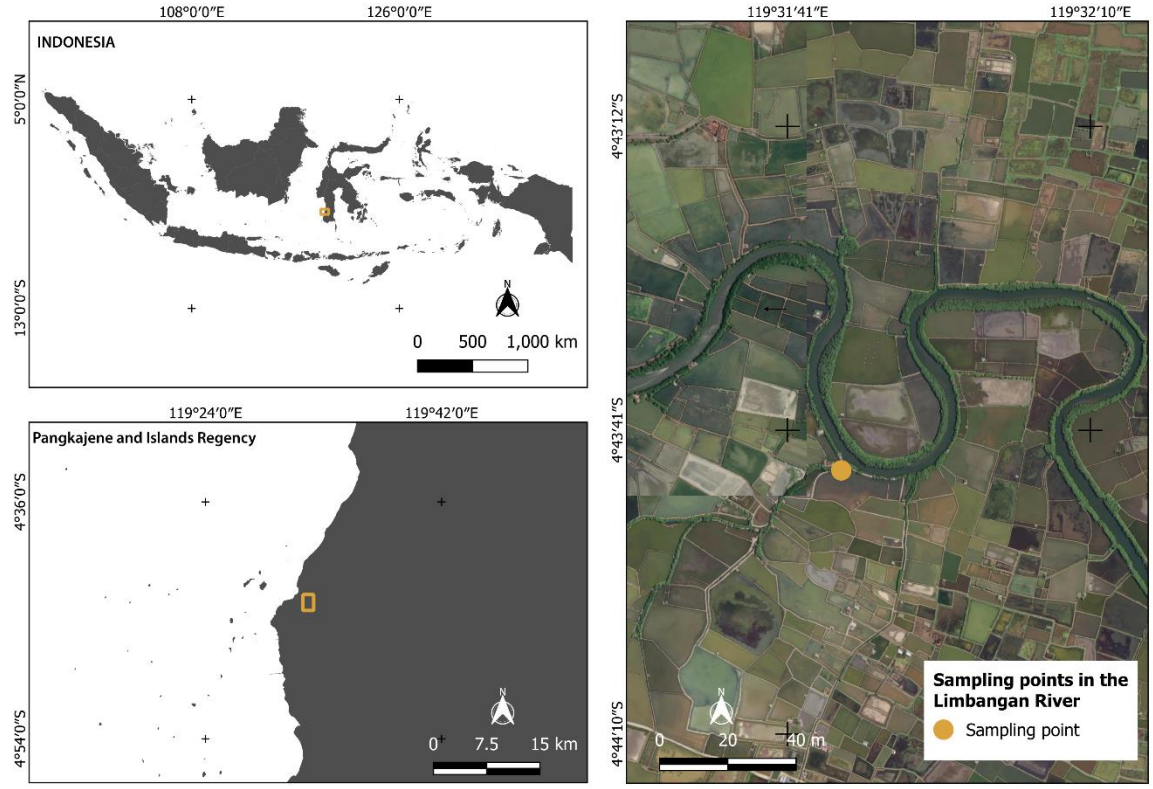

Figure 1. Sampling locations of banded archerfish, *Toxotes jaculatrix*, at Limbangan River, Pangkajene and Islands Regency, South Sulawesi, Indonesia.

Sampling and sample handling. Archerfish sampling was conducted over a six-month period, with collections carried out twice per month. Fish samples were obtained from local fishermen at several sampling points along the Limbangan River, using fishing lines equipped with No. 2 Cham hooks made in Korea. All fish caught at each sampling site were collected without selection and then combined into a single sample group. A total of 163 fish specimens were analyzed, consisting of 83 females and 80 males. The fish were immediately placed in a coolbox filled with crushed ice to maintain freshness until arrival at the Fisheries Biology Laboratory for further measurement and analysis. Upon arrival at the laboratory, the fish were rinsed thoroughly under running water. Subsequently, total length and body weight measurements were taken. Total length was measured from the tip of the snout to the end of the caudal fin using a digital caliper with a precision of 0.01 mm. Body weight was measured using a digital electronic scale with a precision of 0.01 g. Each fish was then dissected to expose the abdominal cavity, allowing for morphological observation of the gonads to determine the sex of the fish.

Data analysis. The LWR of the fish was analyzed based on sex and sampling period. The equation used to determine the relationship between the total length and body weight of the fish is (Ningsih et al 2023; Haslina et al 2024; Huzaimah et al 2024; Tikawati et al 2024): $W = aL^b$. The equation was then transformed into a logarithmic form to obtain a linear equation (Omar et al 2020; Haslina et al 2024): log W = log a + b log L, where: W is the total body weight (g) of fish, L is the total length (mm) of fish, a is intercept (regression constant), and b is slope (regression coefficient). Value b provides information about fish growth. Value a (intercept), b (regression coeffisient), and r (correlation coefficient) were obtained through the least squares method. Fish growth patterns can be categorized into two types: isometric growth (b = 3), which indicates that the increase in length and weight occurs proportionally, and allometric growth (b ≠ 3), which indicates an

imbalance between the increase in length and weight. If the value of b > 3, then the fish exhibits positive allometric growth (hyperallometric), meaning the weight increases more than the length. Conversely, if the value of b < 3, then the fish exhibits negative allometric growth (hypoallometric), meaning that the increase in length is more dominant than the gain in weight (Omar et al 2020).

To determine whether the LWR follows an isometric or allometric growth pattern, a t-test is performed on the b value using the following formula (Omar 2013): $t_{value} = \left[\frac{3-b}{Sb}\right]$ where: S_b = standard error of b. If the value of $t_{value} > t_{table}$ then b is different from 3. Conversely, if $t_{value} < t_{table}$ then b is equal to 3. To compare the growth coefficients between female and male fish, a statistical test is performed using the following formula (Fowler et al 1998; Zar 2014): $t_{value} = \frac{(b_1-b_2)}{SE_{(b1-b2)}}$ and $SE_{(b1-b2)} = \sqrt{(S_{b1})^2 + (S_{b2})^2}$ where b_1 = regression coefficient of female, b_2 = regression coefficient of male, S_{b1} = standard error of regression coefficient of female, S_{b2} = standard error of regression coefficient of male. If $t_{value} < t_{table}$ then it can be concluded that the LWR of female and male fish are not significantly different, so the data for both sexes can be combined. Conversely, if $t_{value} > t_{table}$ then it can be concluded that the LWR of female and male fish are significantly different. All total length and body weight data obtained were analyzed using Microsoft excel software.

The condition factor of archerfish was calculated based on the LWR, both by sex and sampling period. If the fish growth is isometric, the formula used to calculate the condition factor is (Omar et al 2020): $K = \frac{W}{L^3} \times 10^5$ where K is Fulton's condition factor, W is the total body weight (g) of fish specimens, L is the total length (mm) of fish specimens. If the fish growth follows a hypoallometric or hyperallometric pattern, the condition factor is calculated using the following formula (Omar et al 2020): $K_n = \frac{W}{aL^b}$ or $K_n = \frac{W}{W^*}$ where K_n is relative condition factor, W is the observed weight of a fish (g), W* is expected weight of a fish (g). This analysis was performed using Microsoft Excel software.

Results and Discussion

Sample number and fish size. During the study period from October 2024 to March 2025, a total of 163 banded archerfish specimens were collected, comprising 83 females and 80 males. The total length and body weight of the female fish ranged from 77.4 to 238.4 mm (with the mean±SE of 147.3±4.4 mm) and from 7.52 to 292.89 g (with the mean±SE of 74.91±6.65 g), respectively. For the males, total length ranged from 55.4 to 185.2 mm (with the mean±SE of 114.1±3.7 mm) and body weight from 2.35 to 116.18 g (with the mean±SE of 33.98±3.17 g) (Table 1). The smallest female recorded had a total length of 77.4 mm and a body weight of 7.52 g, captured in January 2025, while the largest measured 238.4 mm in length and weighed 292.89 g, caught in October 2024. Conversely, the smallest male, also captured in January 2025, had a total length of 55.4 mm and a body weight of 2.35 g, whereas the largest male, caught in March 2025, measured 185.2 mm and weighed 116.18 g. The lowest average total length and body weight for both female and male fish were recorded in January 2025, while the highest averages for both sexes were observed in March 2025.

The size of female banded archerfish found during this study in the Limbangan River was relatively larger than those reported in the southern waters of Johor, Malaysia, while the males were relatively smaller. Simon et al (2009) reported that female *T. jaculatrix* in Johor waters had total lengths ranging from 87 to 230 mm and body weights between 13.4 and 275.0 g, whereas the males ranged from 85 to 190 mm in total length and 12.0 to 142.8 g in body weight. Lodang et al (2018) recorded banded archerfish in the Jeneberang River estuary, Makassar, South Sulawesi, with a total length of 185 mm. Ardila (2025) reported that *T. jaculatrix* in the Pute River, Maros Regency, South Sulawesi, had total lengths ranging from 6.3 to 76.9 mm (with the mean±SE of 48.4±1.7 mm, n = 73 individuals). Based on these latter two studies, it is evident that *T. jaculatrix* from the Limbangan River have larger body sizes compared to those captured in the Jeneberang River and Pute River.

Table 1

Distribution of total length (mm) and body weight (g) of banded archerfish, *Toxotes jaculatrix*, by sex and sampling period at Limbangan River, Pangkajene and Islands Regency, South Sulawesi, Indonesia

Months	*Sex*	*n (ind.)*	*Total length (mm)*		*Body weight (g)*	
			Range	*Mean±SE*	*Range*	*Mean±SE*
Oct '24	F	17	88.7-238.4	171.7±11.7	11.18-292.89	111.44±19.89
	M	15	59.9-156.9	112.3±8.1	3.87-77.20	31.42±5.43
Nov '24	F	43	78.4-197.5	135.7±4.8	7.99-157.45	54.96±6.09
	M	22	55.6-171.1	102.0±6.2	2.38-89.98	23.21±4.89
Dec '24	F	2	154.2-172.4	163.3±9.1	70.05-96.70	83.38±13.33
	M	17	82.9-171.8	132.7±5.9	11.16-106.23	46.68±5.85
Jan '25	F	7	77.4-130.4	109.4±7.7	7.52-36.41	25.48±4.30
	M	16	55.4-125.9	90.6±5.5	2.35-33.75	14.93±2.54
Feb '25	F	4	111.5-202.6	161.3±18.8	18.82-204.28	99.64±38.57
	M	5	103.8-149.4	128.0±8.5	18.28-71.97	42.55±9.38
Mar '25	F	10	102.3-210.1	173.4±11.7	20.79-201.58	121.67±17.09
	M	5	157.6-185.2	171.3±4.6	71.26-116.18	98.21±8.67
Total	F	83	77.4-238.4	147.3±4.4	7.52-292.89	74.91±6.65
	M	80	55.4-185.2	114.1±3.7	2.35-116.18	33.98±3.17

F = female fish, M = male fish, n = number of sampled fish.

Figure 2 presents the size distribution of female and male *T. jaculatrix* based on total length and body weight. The figure shows that the highest frequency for total length was found in the size class interval of 101.2-124.0 mm, while the highest frequency for body weight was observed in the class interval of 2.35-38.66 g for both females and males. The number of females captured within the 101.2-124.0 mm length class was 22 individuals, while males totaled 20 individuals. For the 2.35-38.66 g body weight class, 35 females and 54 males were recorded. Both in terms of total length and body weight, female banded archerfish were more frequently found in the larger size classes. Similar results were reported by Simon et al (2012) for *T. chatareus* and *T. jaculatrix* caught in Johor waters, Malaysia, where males were more abundant in the smaller size classes compared to females. The difference in size distribution between females and males may be attributed to several factors, such as males reaching gonadal maturity faster than females, males tending to grow more slowly than females, and males having higher mortality rates than females. The higher abundance of smaller-sized males might also be attributed to the greater ability of larger females to evade the fishing gear used during the study (Simon et al 2012). Simon & Mazlan (2010) categorized *T. jaculatrix* into three groups based on total body length: juvenile (< 100 mm), sub-adult (100-150 mm), and adult (> 150 mm). The *T. jaculatrix* captured in the Limbangan River consisted of 10.84% juveniles, 43.37% sub-adults, and 45.78% adults among females, while the males comprised 36.25% juveniles, 50.00% sub-adults, and 13.75% adults, respectively. Minor discrepancies in the total percentages are due to rounding of decimal values.

Geographical differences in fishing locations and the types of fishing gear used are also believed to contribute to the variation in the body size of captured fish. In the Limbangan River, *T. jaculatrix* fish are typically caught using hook and line gear equipped with No. 2 Cham hooks. This gear is size-selective based on the fish's mouth size, yet it still allows the capture of individuals across a wide size range. Additionally, fishing activities in this river are conducted irregularly and without standardized management, resulting in uncontrolled exploitation patterns. This condition contributes to the unstable size distribution of the captured fish, leading to a mixture of individuals from various size classes, ranging from juveniles to adults. The lack of regulated exploitation potentially affects the population structure and growth dynamics of the fish in this habitat. In contrast, Simon & Mazlan (2008) employed trammel nets, cast nets, scoop nets, and traps to collect archerfish samples.

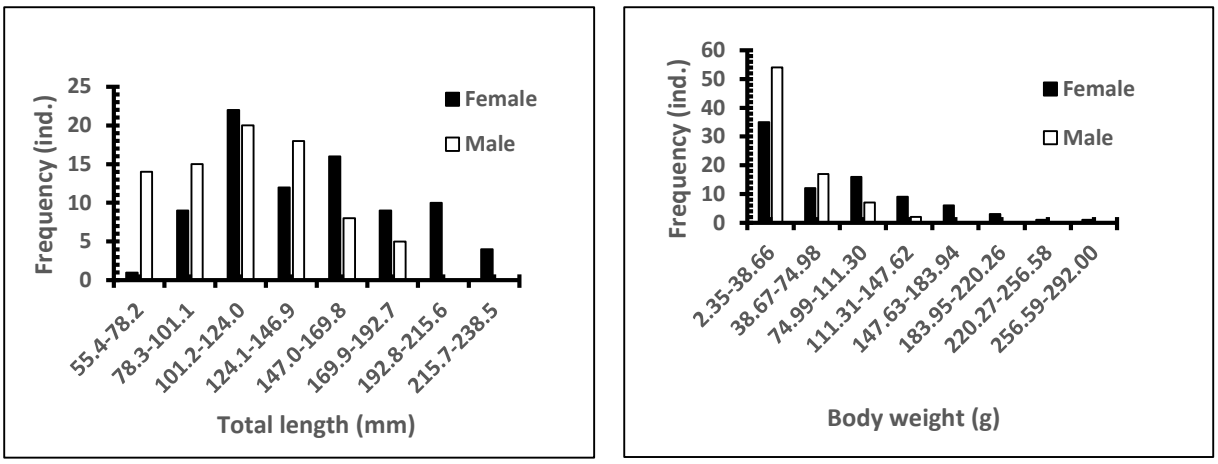

Figure 2. Frequency distribution of total length (mm) and body weight (g) of banded archerfish, *Toxotes jaculatrix,* at Limbangan River, Pangkajene and Islands Regency, South Sulawesi, Indonesia.

Length-weight relationship. The LWR by sex and sampling time is presented in Table 2. In this table, the LWR analysis for female fish in December 2024 was not conducted due to the limited number of samples (only 2 individuals). As a result, combined analysis of female and male fish was also not performed for that period.

Table 2

Length-weight relationship regression parameters of banded archerfish, *Toxotes jaculatrix*, by sex and sampling period at Limbangan River, Pangkajene and Islands Regency, South Sulawesi, Indonesia

Month	*Sex*	*N (ind.)*	*Length-weight regression parameter*				*Growth type*
			a	*b*	*R²*	*r*	
Oct ’24	F	17	0.000063	2.7432	0.8599	0.9273	Isometric
	M	15	0.000058	2.7618	0.9651	0.9824	Isometric
	C	32	0.000057	2.7623	0.8599	0.9273	Isometric
Nov ’24	F	43	0.000008	3.1758	0.9930	0.9965	Hyperallometric
	M	22	0.000008	3.1679	0.9945	0.9972	Hyperallometric
	C	65	0.000007	3.1975	0.9950	0.9975	Hyperallometric
Dec ’24	F						
	M	17	0.000017	3.0173	0.9874	0.9937	Isometric
	C						
Jan ’25	F	7	0.000017	3.0110	0.9840	0.9920	Isometric
	M	16	0.000005	3.2773	0.9836	0.9918	Hyperallometric
	C	23	0.000006	3.2411	0.9849	0.9924	Isometric
Feb ’25	F	4	0.0000001	3.9725	0.9963	0.9981	Hyperallometric
	M	5	0.0000013	3.5456	0.9896	0.9948	Isometric
	C	9	0.0000009	3.6073	0.9831	0.9915	Hyperallometric
Mar ’25	F	10	0.004654	1.9550	0.5616	0.7494	Isometric
	M	5	0.000014	3.0562	0.7816	0.8841	Isometric
	C	15	0.004032	1.9756	0.5592	0.7478	Isometric
Total	F	83	0.000021	2.9753	0.8719	0.9338	Isometric
	M	80	0.000011	3.1109	0.9842	0.9921	Hyperallometric
	C	163	0.000013	3.0670	0.9420	0.9706	Isometric

Note: F = female fish, M = male fish, C = combined female and male fish, n = number of sampel fish, *a* = intercept, *b* = regression coefficient, *R²* = coefficient of determination, *r* = correlation coefficient. The total number of female fish samples was 83 individuals; however, only 81 were analyzed. Data processing for December was not conducted due to the small number of samples, which was insufficient for a representative analysis.

Overall, the LWR for female fish is described by the equation $W = 0.000021\ L^{2.9753}$, while for male fish it is $W = 0.000011\ L^{3.1109}$. Based on the t-test analysis against the isometric value of b = 3, the results indicate that female fish exhibit an isometric growth pattern, whereas male fish exhibit a hyperallometric growth pattern. Further statistical analysis comparing the regression coefficients between female and male fish showed no significant difference ($p > 0.05$). Therefore, it can be generally stated that female and male *T. jaculatrix* exhibit similar patterns in total length and body weight increments, allowing for the data from both sexes to be combined. The combined data yielded the regression equation $W = 0.000013\ L^{3.0670}$, indicating an isometric growth pattern. Figure 3 illustrates the LWR of *T. jaculatrix* for females, males, and the combined data of both sexes.

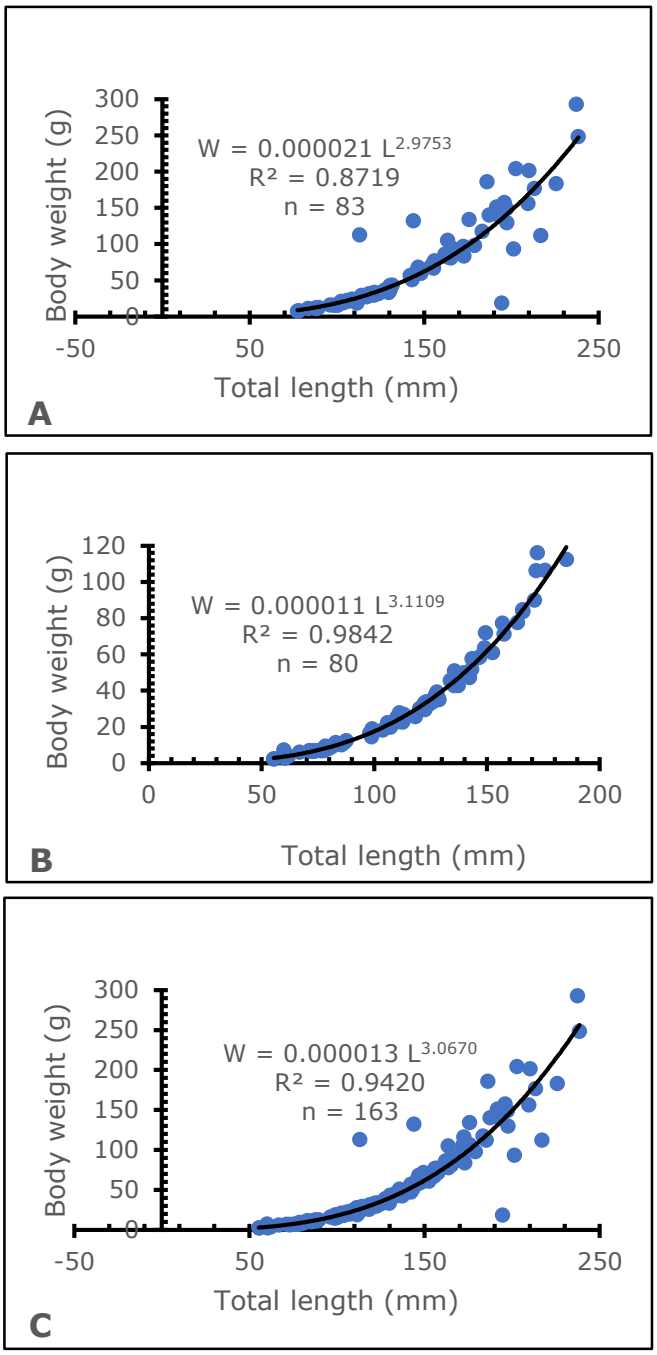

Figure 3. Length-weight relationships of banded archerfish, *Toxotes jaculatrix,* sampled from Limbangan River, Pangkajene and Islands Regency, South Sulawesi, Indonesia. A. female fish, B. male fish, C. both sexes combined.

Based on the LWR at each sampling period in the Limbangan River, two growth types were identified: isometric and hyperallometric. Similar findings were also reported by Simon & Mazlan (2008) and Simon et al (2009) for *T. jaculatrix* in Malaysia. Simon & Mazlan (2008) reported the combined length-weight regression equation for female and male fish as $W = 0.0078\ L^{3.31}$ (n = 65), indicating a hyperallometric growth type. Furthermore, Simon et al (2009) reported the length-weight regression equations for *T. jaculatrix* as follows: female $W = 0.00782\ L^{3.3105}$ (n = 63), male $W = 0.01542\ L^{3.0766}$ (n = 142), and combined female and male $W = 0.0121\ L^{3.1608}$ (n = 205), with growth types of hyperallometric, isometric, and hyperallometric, respectively. In the Limbangan River, the regression coefficient (b) for the LWR of *T. jaculatrix* ranged from 1.9550 to 3.9725 for females, 2.7618 to 3.5456 for males, and 1.9756 to 3.6073 for combined female and male fish, with a mean±SE of 3.0292±0.1208. According to Le Cren (1951), b values often vary and typically range from 2.5 to 4.5, whereas other researchers (Carlander 1969; Pauly & Gayanilo 1997; Froese 2006; Karna et al 2020) suggest that b values should fall within 2.5 to 3.5. The correlation coefficient (r) for the length-weight relationship was 0.7494-0.9981 for females, 0.8841-0.9972 for males, and 0.7478-0.9975 for combined female and male fish, with a mean±SE of 0.9477±0.0194, indicating a high positive correlation. The coefficient of determination (R^2) ranged from 0.5616 to 0.9963 for females, 0.7816 to 0.9945 for males, and 0.5592 to 0.9950 for combined female and male fish, with a mean±SE of 0.9049±0.0341. According to Hanif et al (2020), in ideal fish growth studies, the R^2 value typically ranges between 0.9 and 1.0.

The b coefficient values presented in Table 2 show variation between sexes as well as between stocks of the same species from the same waters. In general, changes in the b value are primarily influenced by the shape and size of the fish. The regression coefficient can vary seasonally, even daily, and may differ across habitats (Taskavak & Bilecenoglu 2001). Several factors are believed to influence variations in the LWR parameters in fish, including environmental conditions (such as temperature, salinity, and habitat), differences in sample size, geographic location, seasons, ontogenetic differences, age, growth phases, gonadal maturity stages, reproduction, sex, diet (quantity, quality, and size of food), stomach fullness, parasitic pressure, and preservation techniques (Simon et al 2009; Alavi-Yeganeh et al 2011; Azevedo et al 2017; Hanif et al 2020), health and condition of the fish (Moutopoulos & Stergiou 2002; Froese 2006; Hossain et al 2012), food availability, and sampling procedures (Jafari et al 2016; Shalloof & El-Far 2017; Olopade et al 2018; Mitu et al 2019) are also contributing factors. Nazir & Khan (2017) and Blasina et al (2018) stated that the size range of the fish used in the analysis can also affect the b coefficient. Thus, Nazir & Khan (2017) recommended excluding very young or very old fish from length-weight regression analyses. Moreover, differences in b values may not only result from individual factors but also from the combination of several factors mentioned above. Some of these factors, however, were not observed during the fish sampling process.

Information on the LWR of *T. jaculatrix* has not previously been reported from Indonesian waters, or even globally, except for the studies conducted by Simon & Mazlan (2008) and Simon et al (2009) in Malaysia. Understanding the LWR is crucial, as it can support conservation efforts and the sustainable management of *T. jaculatrix* populations.

Condition factor. The range and mean values of the condition factor of *T. jaculatrix* caught in the Limbangan River, based on sampling periods for females, males, and the combined sexes, are presented in Table 3.

The average condition factor (K_n) values for female fish ranged from 1.0014 to 2.5341 (1.6506±0.2930), while for male fish it ranged from 1.0020 to 1.9358 (1.5924±0.1869). Based on the sampling periods, female fish exhibited relatively higher K_n values than males in October 2024, January 2025, and March 2025. Conversely, male fish showed relatively higher K_n values in November 2024 and February 2025. Overall, females displayed higher condition factor values compared to males. Simon et al (2013) reported that *T. jaculatrix* in Johor, Malaysia, had K_n values ranging from 0.98 to 1.83, while *T. chatareus* ranged from 0.95 to 1.79. This indicates that the condition factor values of *T. jaculatrix* in the Limbangan River are higher than those reported from Malaysian waters.

Table 3

Range and mean±se of condition factor of banded archerfish, *Toxotes jaculatrix*, by sex and sampling period at Limbangan River, Pangkajene and Islands Regency, South Sulawesi, Indonesia

Month	*Sex*	*n (ind.)*	*Range*	*Mean±SE*
Oct '24	Female	17	0.2537-4.4432	1.9197±0.2017
	Male	15	1.6145-3.4105	1.9169±0.1147
	Combined sex	32	0.2537-4.4432	1.9184±0.1180
Nov '24	Female	43	0.8286-1.0987	1.0019±0.0094
	Male	22	0.8896-1.1186	1.0020±0.0137
	Combined sex	65	0.8354-1.1054	1.0020±0.0078
Dec '24	Female			
	Male	17	1.6097-2.0950	1.8161±0.0307
	Combined sex			
Jan '25	Female	7	1.6218-1.9613	1.7961±0.0530
	Male	16	0.7926-1.2316	1.0052±0.0264
	Combined sex	23	1.1890-1.9613	1.7136±0.0389
Feb '25	Female	4	0.9152-1.0502	1.0014±0.0297
	Male	5	1.6345-2.1582	1.8784±0.0841
	Combined sex	9	0.8311-1.1274	1.0047±0.0335
Mar '25	Female	10	1.1486-7.8301	2.5341±0.6044
	Male	5	1.7699-2.2674	1.9358±0.0888
	Combined sex	15	1.1486-7.8301	2.3346±0.4037
Total	Female	83	0.2537-7.8301	1.9419±0.0854
	Male	80	0.7169-2.0582	1.0081±0.0165
	Combined sex	163	0.2537-7.8301	1.8653±0.0459

Note: The total number of female fish samples was 83 individuals; however, only 81 were analyzed. Data processing for December was not conducted due to the small number of samples, which was insufficient for a representative analysis.

The average condition factor (K_n) values of *T. jaculatrix* obtained during the study were all greater than 1 for females, males, and the combined sexes. This indicates that the fish samples captured from the Limbangan River were in good condition. A K_n value of ≥ 1 suggests that the fish are in better condition compared to those with $K_n < 1$ in the same waters (Froese 2006; Nash et al 2006; Awasthi et al 2015; Falaye et al 2015; Jisr et al 2018; Lloret-Lloret et al 2022). According to Bagenal & Tesch (1978), condition factor values ranging from 2.9 to 4.8 represent the ideal range for normal growth of fish in freshwater and brackish environments.

Many factors influence the condition factor of fish, including sex, season, habitat and environmental factors, stress, reproductive cycle, food availability, and feeding activity (Zargar et al 2012; Awasthi et al 2015; Jisr et al 2018; Haslina et al 2024). Additionally, age (Anibeze 2000; Falaye et al 2015), climate (Weatherley & Gill 1987), and other water quality parameters can also affect condition factor values (Khallaf et al 2003; Olopade et al 2018). Seasonal variations throughout the year have also been reported by Sarkar et al (2013) as a factor that can cause differences in condition factor values. However, these factors were not observed during the course of this study.

Conclusions. The size distribution of banded archerfish (*Toxotes jaculatrix*) exhibited a wide range in both total length and body weight, with the highest frequency found in the smaller size classes. The growth pattern of female fish was isometric, meaning that length and weight increased proportionally, while male fish exhibited hyperallometric growth, where body length increased faster than weight. The average condition factor values for both females and males were greater than 1, indicating that the environmental conditions of the Limbangan River support the growth of banded archerfish. This study on size distribution, length-weight relationship and condition factor represents the first report on banded archerfish from Indonesian waters. This valuable information is crucial for fisheries

biologists as a foundation for conservation efforts and the formulation of appropriate fisheries management strategies to ensure the sustainable utilization of *Toxotes jaculatrix*.

Acknowledgements. The author would like to express sincere gratitude to all parties who provided support and assistance throughout the research process, especially the laboratory team and the local fishermen at Limbangan River.

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

References

Ahirwal S. K., Singh J., Sarma K., Kumar T., Bharti V., Kumar A., 2023 Morphometric characteristics, length-weight relationships, and condition factors of five indigenous fish species from the River Ganga in Bihar, India. Hindawi, Journal of Applied Ichthyology 2023:1329222.

Alavi-Yeganeh M. S., Seifabadi S. J., Keivany Y., Kazemi B., Wallis G. P., 2011 Comparison of length-weight relationships in different populations and sexes of Iranian thoothcarps. Journal of Applied Ichthyology 27:1401-1403.

Allen G. R., 1978 A review of the archer fishes (family Toxotidae). Records of Western Australian Museum 6(4):355-378.

Allen G. R., 2001 Toxotidae. Archerfishes. In: FAO species identification guide for fishery purposes. The living marine resources of the Western Central Pacific, Volume 5. Bony fishes part 3 (Menidae to Pomacentridae). Carpenter K. E., Niem V. H., (eds), FAO, Rome, pp. 3212-3215.

Allen G. R., 2004 *Toxotes kimberleyensis*, a new species of archer fish (Pisces: Toxotidae) from freshwaters of Western Australia. Records of the Australian Museum 56:225-230.

Anibeze C. I. P., 2000 Length-weight relationship and relative condition of *Heterobranchus longifilis* (Valenciennes) from Idodo River, Nigeria. Naga, the ICLARM Quarterly 23(2):34-35.

Ardila N. P., 2025 [Ichthyofauna biodiversity in Pute River, Maros Karst Area, South Sulawesi]. Undergraduate thesis, Aquatic Resources Management Study Program, Faculty of Marine Sciences and Fisheries, Hasanuddin University, Makassar, 44 pp. [in Indonesian]

Astuti L. P., Warsa A., 2008 [Inventory of fish resources in the middle Maro River, Merauke Regency]. Proceedings of the National Fish Seminar V, pp. 259-263. [in Indonesian]

Awasthi M., Kashyap A., Serajuddin M., 2015 Length-weight relationship and condition factor of five sub-populations of *Trichogaster lalius* (Osphronemidae) of central and eastern regions of India. Journal of Ichthyology 55(6):849-853.

Azevedo J. W. D. J., Castro A. C. L. D., Silva M. H. L., 2017 Length-weight relation, condition factor and gonadosomatic index of the whitemouth croaker, *Micropogonias furnieri* (Desmarest, 1823) (Actinopterygii: Sciaenidae), caught in Lençóis Bay, state of Maranhão, eastern Amazon, Brazil. Brazilian Journal of Oceanography 65(1):1-8.

Bagenal T. B., Tesch F. W., 1978 Age and growth. In: Methods for assessment of fish production in fresh waters. 3rd edition. Bagenal T. (ed), Blackwell Scientific Publications, London, pp. 101-136.

Blaber S. J. M., 2000 Tropical estuarine fishes: ecology, exploitation and conservation. Blackwell Science Ltd., Bangor, the United Kingdom, 372 pp.

Blasinaa G. E., Izzo L., Figueroa D., 2018 Sexual dimorphism and length-weight relationship of the hairy conger eel *Bassanago albescens* (Anguilliformes: Congridae). Journal of Ichthyology 58(3):396-400.

Carlander K. D., 1969 Handbook of freshwater fishery biology. Vol. 1. The Iowa State University Press, Ames, IA, 752 pp.

da Silva R. S., Virgilio L. R., Corrêa F., Vieira L. J. S., 2020 Length-weight relationships of fish species from oxbow lakes on the floodplain of the middle Purus River in western Brazilian Amazon. Journal of Applied Ichthyology 36(2):256-258.

Fahmi M. R., Permana A., 2014 [Gonad maturity of archerfish (*Toxotes jaculatrix* Pallas 1767) in different salinity]. Jurnal Iktiologi Indonesia 14(3):235-245. [in Indonesian]
Fahmi M. R., Permana A., Ginanjar R., 2009 [Motility and viability of archerfish sperm (*Toxotes* sp.) in several levels of media salinity]. In: Prosiding Forum Innovasi Akuakultur. Sudrajat A., Supriyadi H., Hanafi A., Kristanto A. H., Chumaidi, Mustafa A., Imron, Insan I. (eds), Pusat Peneli-tian Perikanan Budidaya, pp. 251-255. [in Indonesian]
Falaye A. E., Opadokun I. O., Ajani E. K., 2015 Seasonal variation in the length-weight relationships and condition factor of *Gymnarchus niloticus* Cuvier, 1829 in Lekki lagoon, Lagos state, Nigeria. International Journal of Fisheries and Aquatic Studies 2(6):159-162.
Fekri L., Analuddin K., Yusnaini, Adimu H. E., Chadijah A., 2024 Species composition and size distribution of fishes in mangrove ecosystems in Kendari and Staring Bays, Southeast Sulawesi, Indonesia. Biodiversitas 25(10):3683-3692.
Fowler J., Cohen L., Jarvis P., 1998 Practical statistics for field biology. 2nd edition. John Wiley & Sons Ltd, Chichester, England, 272 pp.
Fricke R., Eschmeyer W. N., Van der Laan R. (eds), 2025 Eschmeyer's catalog of fishes: genera, species, references. Available at: http://researcharchive.calacademy.org/research/ichthyology/catalog/fishcatmain.asp. Accessed: July, 2025.
Froese R., 2006 Cube law, condition factor and weight-length relationships: history, meta-analysis and recommendations. Journal of Applied Ichthyology 22(4):241-253.
Froese R., Pauly D. (eds), 2025 FishBase. World Wide Web electronic publication. Available at: http://www.fishbase.org. Accessed: July, 2025.
Girard M. G., Davis M. P., Tan H. H., Wedd D. J., Chakrabarty P., Ludt W. B., Summers A. P., Smith W. L., 2022 Phylogenetics of archerfishes (Toxotidae) and evolution of the toxotid shooting apparatus. Integrative Organismal Biology 4(1):obac013.
Hanif M. A., Siddik S. M., Ali M. M., 2020 Length-weight relationships of seven cyprinid fish species from the Kaptai Lake, Bangladesh. Journal of Applied Ichthyology 36(2):261-264.
Haslina S., Omar S. B. A., Tresnati J., Umar M. T., 2024 Size distribution, growth pattern and condition factor of common ponyfish, *Leiognathus equula*, in Takalar waters, South Sulawesi, Indonesia. AACL Bioflux 17(4):1375-1387.
Hidayah R., Harahap S. K., Lubis R. K., Junita R., Sari L. N., Khairul, 2023 Monitoring the biological aspects of banded archer fish (*Toxotes jaculatrix* Pallas, 1767) in Bilah River, Labuhanbatu Regency, Indonesia. Jurnal Penelitian Pendidikan 9(2):676-680.
Hidayat R., 2011 [Reproductive biology aspects of the archerfish (*Toxotes microlepis* Gunther, 1860) in the Musi River, from Borang to Sungsang]. BSc thesis, Faculty of Mathematics and Natural Sciences, Sriwijaya University, Indralaya, 63 pp. [in Indonesian]
Hoese D., 2012 *Toxotes jaculatrix*. IUCN Red List of Threatened Species. 2012: e.T196451A2458352. doi:10.2305/IUCN.UK.2012.RLTS.T196451A2458352.en. Accessed: July, 2025.
Hossain M. Y., Ahmed Z. F., Leunda P. M., Islam A. K. M. R., Jasmine S., Oscoz J., Miranda R., Ohtomi J., 2006 Length-weight and length-length relationships of some small indigenous fish species from the Mathabhanga River, southwestern Bangladesh. Journal of Applied Ichthyology 22:301-303.
Huzaimah F. N., Omar S. B. A., Tresnati J., 2024 Length-weight relationships and condition factors of the mantis shrimp, *Oratosquillina interrupta* (Kemp 1911), in Bone Bay, South Sulawesi, Indonesia. Egyptian Journal of Aquatic Biology and Fisheries 28(3): 1501-1526.
Iqbal M., Yustian I., Setiawan A., Setiawan D., 2018 [Fishes in the Musi River and the East Coast of South Sumatra]. The Spirit Bird Watching Group of South Sumatra collaborates with the Biology Department of the Faculty of Mathematics and Natural Sciences, Sriwijaya University and Zoological Society for the Conservation of Species and Populations, Palembang, 249 pp. [in Indonesian]
Jafari O., Hedayati A. A., Keivany Y., 2016 Length-weight relationships and condition factors of *Alburnus zagrosensis* (Coad, 2009) from three rivers of Tigris basin in Iran (Teleostei: Cyprinidae). Iranian Journal of Ichthyology 3(4):316-320.

Jisr N., Younes G., Sukhn C., El-Dakdouki M. H., 2018 Length-weight relationships and relative condition factor of fish inhabiting the marine area of the Eastern Mediterranean city, Tripoli-Lebanon. Egyptian Journal of Aquatic Research 44(4):299-305.
Kadarini T., Subamia I. W., Subandiyah S., Ginanjar R., 2009 [Effect of osmotic pressure of media on survival of archerfish (*Toxotes* spp.)]. Proceedings of the Aquaculture Technology Innovation Forum 2009, pp. 275-281. [in Indonesian]
Karna S. K., Mukherjee M., Ali Y., Manna R. K., Suresh V. R., 2020 Length-weight relations of fishes (Actinopterygii) from Chilika Lagoon, India. Acta Ichthyologica et Piscatoria 50(1):93-96.
Khallaf E. A., Galal M., Authman M., 2003 The biology of *Oreochromis niloticus* in a polluted canal. Ecotoxicology 12:405-416.
Khanipour A. A., Noori A., Amini M., Kamrani E., 2020 Length-weight relationship and Fulton's condition factor of *Macrobrachium nipponense* (De Haan, 1849) in Anzali lagoon of Iran. Iranian Journal of Fisheries Sciences 19(1):496-500.
Kottelat M., 2013 The fishes of the inland waters of Southeast Asia: a catalogue and core bibliography of the fishes known to occur in freshwaters, mangroves and estuaries. The Raffles Bulletin of Zoology 27:1-663.
Kottelat M., Widjanarti E., 2005 The fishes of Danau Sentarum National Park and the Kapuas Lakes area, Kalimantan Barat, Indonesia. Raffles Bulletin of Zoology Supplement 13:139-173.
Kottelat M., Tan H. H., 2018 Three new species of archerfishes from the freshwaters of Southeast Asia (Teleostei: Toxotidae) and notes on Henri Mouhot's fish collections. Ichthyological Exploration of Freshwaters/IEF-952, pp. 1-19.
Kumar M. M., Santhosh B., Surya S., Anzeer F. M., Joseph S., 2025 Exploring the length-weight relationship, relative condition factor and sexual dimorphism of crimson jobfish (*Pristipomoides filamentosus*) landed along the southern coast of India. Indian Journal of Animal Research 59(1):1-9.
Le Cren C. D., 1951 Length-weight relationship and seasonal cycle in gonad weight and condition in the perch (*Perca fluviatilis*). Journal of Animal Ecology 20(2):201-219.
Lloret-Lloret E., Albo-Puigserver M., Giménez J., Navarro J., Pennino M. G., Steenbeek J., Belido J. M., Coll M., 2022 Small pelagic fish fitness relates to local environmental conditions and trophic variables. Progress in Oceanography 202:102745.
Lodang H., Anggraeni D., Kurnia N., Azis A. A., 2018 [Preliminary study inventory of fish species in the river estuary of Jeneberang Makassar]. Proceedings of the National Seminar on Biology and Its Learning. Natural Potential-Based Biology Learning and Research Innovations. Biology Education Studies Program, Graduate Program of Makassar State University. Makassar, 5 May 2018, pp. 607-616. [in Indonesian]
Mitu N. R., Alam M. M., Hussain M. A., Hasan M. R., Chandra Singha A., 2019 Length-weight and length-length relationships, sex ratio and condition factors of the Asian striped dwarf catfish *Mystus tengara* (Hamilton, 1822) (Siluriformes: Bagridae) in the Ganges River, Northwestern Bangladesh. Iranian Journal of Ichthyology 6(1):21-30.
Moutopoulos D. K., Stergiou K. I., 2002 Length-weight and length-length relationships of fish species from the Aegean Sea (Greece). Journal of Applied Ichthyology 18(3): 200-203.
Nash R. D. M., Valencia A. H., Geffen A. J., 2006 The origin of Fulton's condition factor setting the record straight. Fisheries 31(5):236-238.
Nazir A., Khan M. A., 2017 Length-weight and length-length relationships of *Cirrhinus mrigala* (Cyprinidae) and *Xenentodon cancila* (Belonidae) from the river Ganga. Journal of Ichthyology 57(5):787-790.
Nelson J. S., Grande T. C., Wilson M. V. H., 2016 Fishes of the world. 5th edition. John Wiley and Sons, Hoboken, New Jersey, 752 pp.
Ningsih N. R., Omar S. B. A., Larasati R. F., Haris A., Nur M., 2023 Length-weight relationship and condition factors of endemic fish, *Lagusia micracanthus* Bleeker, 1860 (Pisces: Terapontidae) in Gilireng River, Wajo Regency, Indonesia. Jurnal Ilmiah Perikanan dan Kelautan 15(2):290-302.

Olopade O. A., Dienye H. E., Eyekpegha A., 2018 Length frequency distribution, length-weight relationship and condition factor of cichlid fishes (Teleostei: Cichlidae) from the New Calabar River, Nigeria. Iranian Journal of Ichthyology 5(1):74-80.
Omar S. B. A., 2013 [Fishery biology]. Faculty of Marine Sciences and Fisheries, Hasanuddin University, Makassar, 153 pp. [in Indonesian]
Omar S. B. A., Kariyanti K., Yanuarita D., Umar M. T., Lawi Y. S. A., 2020 Length-weight relationship and condition factor of the Celebes rainbowfish *Marosatherina ladigesi*, endemic to the Maros karst region, South Sulawesi, Indonesia. AACL Bioflux 13(6): 3384-3396.
Pauly D., Gayanilo Jr. F. C., 1997 An alternative approach to estimating the parameters of a length-weight relationship from length-frequency samples and their bulk weights. ICLARM, Manila, Philippines, volume 22, pp. 15-26.
Permana A., Ginanjar R., Fahmi M. R., 2009 [Sex determination and gonad maturity assessment of archerfish (*Toxotes jaculatrix*) using a morphological approach]. Prosiding Forum Inovasi Teknologi Akuakultur, pp. 527-532.
Rekapermana M., 2019 [Freshwater fish of Lake Sentarum. Betung Kerihun National Park and Lake Sentarum Center, South Putussibau, Kapuas Hulu, West Kalimantan]. 108 pp. [in Indonesian]
Sarkar U. K., Khan G. E., Dabas A., Pathak A. K., Mir J. I., Rebello S. C., Pal A., Singh S. P., 2013 Length weight relationship and condition factor of selected freshwater fish species found in River Ganga, Gomti and Rapti, India. Journal of Environmental Biology 34(5):951-956.
Shalloof K. A. S., El-Far A. M., 2017 Length-weight relationship and condition factor of some fishes from the River Nile in Egypt with special reference to four *Tilapia* species. Egyptian Journal of Aquatic Biology and Fisheries 21(2):33-46.
Simon K. D., 2024 Archer fish biology. CRC Press, Boca Raton, Florida, 156 pp.
Simon K. D., Mazlan A. G., 2008 Length-weight and length-length relationship of archer and puffer fish species. Open Fish Science Journal 1(1):19-22.
Simon K. D., Mazlan A. G., 2010 Trophic position of archerfish species (*Toxotes chatareus* and *Toxotes jaculatrix*) in the Malaysian estuaries. Journal of Applied Ichthyology 26(1):84-88.
Simon K. D., Mazlan A. G., Cob Z. C., Samat A., Arshad A., 2008 Age determination of archer fishes (*Toxotes jaculatrix* and *Toxotes chatareus*) inhabiting Malaysian estuaries. Journal of Biological Sciences 8(6):1096-1099.
Simon K. D., Bakar Y., Samat A., Zaidi C. C., Aziz A., Mazlan A. G., 2009 Population growth, trophic level, and reproductive biology of two congeneric archer fishes (*Toxotes chatareus* Hamilton, 1822 and *Toxotes jaculatrix* Pallas, 1767) inhabiting Malaysian coastal waters. Journal of Zhejiang University Science B 10(12):902-911.
Simon K. D., Bakar Y., Temple S. E., Mazlan A. G., 2010a Morphometric and meristic variation in two congeneric archer fishes *Toxotes chatareus* (Hamilton 1822) and *Toxotes jaculatrix* (Pallas 1767) inhabiting Malaysian coastal waters. Journal of Zhejiang University Science B (Biomed & Biotechnol) 11(11):871-879.
Simon K. D., Mazlan A. G., Samat A., Zaidi C. C., Aziz A., 2010b Size, growth and age of two congeneric archer fishes (*Toxotes jaculatrix* Pallas, 1767 and *Toxotes chatareus* Hamilton, 1822) inhabiting Malaysian coastal waters. Sains Malaysiana 39(5):697-704.
Simon K. D., Bakar Y., Mazlan A. G., Zaidi C. C., Samat A., Arshad A., Temple S. E., Brown-Peterson N. J., 2012 Aspects of the reproductive biology of two archer fishes *Toxotes chatareus* (Hamilton 1822) and *Toxotes jaculatrix* (Pallas 1767). Environmental Biology of Fishes 93(4):491-503.
Simon K. D., Mazlan A. G., Cob Z. C., 2013 Condition factors of two archerfish species from Johor coastal waters, Malaysia. Sains Malaysiana 42(8):1115-1119.
Suryati N. K., Makmur S., Nurdawati S., 2014 [Biology of reproduction of small scale archer fish (*Toxotes microlepis* Gunther, 1860) in downstream of Musi River, South Sumatera]. Bawal 6(3):119-126. [in Indonesian]

Taskavak E., Bilecenoglu M., 2001 Length-weight relationships for 18 Lessepsian (Red Sea) immigrant fish species from the eastern Mediterranean coast of Turkey. Journal of the Marine Biological Association of the United Kingdom 81:895-896.
Temple S. E., 2007 Effect of salinity on the refractive index of water: considerations for archer fish aerial vision. Journal of Fish Biology 70(5):1626-1629.
Tikawati, Omar S. B. A., Nur M., 2024 Length-weight relationship and condition factor of threadfin goby *Sicyopterus longifilis* de Beauford, 1912 (Teleostei: Sicydiinae) at Ummiding and Matama Rivers, West Sulawesi, Indonesia. Biodiversitas 25(5):2074-2085.
Timmermans P. J. A., Souren P. M., 2004 Prey catching in archer fish: the role of posture and morphology in aiming behavior. Physiology and Behavior 81(1):101-110.
Van der Laan R., Fricke R., Eschmeyer W. N. (eds), 2025 Eschmeyer's catalog of fishes: classification. Available at: http://www.calacademy.org/scientists/catalog-of-fishes-classification/. Accessed: July, 2025.
Warsa A., Astuti L. P., Satria H., 2007 [Maro River: one of the sources of germplasm for native Papuan fish species]. Bawal 1(5):183-189. [in Indonesian]
Weatherley A. H., Gill H. S., 1987 The biology of fish growth. Academic Press, London, 443 pp.
Zar J. H., 2014 Biostatistical analysis. 5th edition. Pearson education limited, Edinburgh Gate, Harlow, Essex, 950 pp.
Zargar U. R., Yousuf A. R., Mushtaq B., Jan D., 2012 Length-weight relationship of the crucian carp, *Carassius carassius* in relation to water quality, sex and season in some lentic water bodies of Kashmir Himalayas. Turkish Journal of Fisheries and Aquatic Sciences 12(2):683-689.

Received: 26 July 2025. Accepted: 12 September 2025. Published online: 21 December 2025.
Authors:
Mutmainnah, Master's Program in Fishery Science, Faculty of Marine Science and Fisheries, Hasanuddin University, Perintis Kemerdekaan street, Km. 10, Tamalanrea Indah, Tamalanrea District, Makassar City, South Sulawesi Province, 90245, Indonesia, e-mail: mutmainnahabdillahh@gmail.com
Sharifuddin Bin Andy Omar, Aquatic Resources Management Study Program, Faculty of Marine Science and Fisheries, Hasanuddin University, Perintis Kemerdekaan street, Km. 10, Tamalanrea Indah, Tamalanrea District, Makassar City, South Sulawesi Province, 90245, Indonesia, e-mail: sharifuddin@unhas.ac.id
Joeharnani Tresnati, Aquatic Resources Management Study Program, Faculty of Marine Science and Fisheries, Hasanuddin University, Perintis Kemerdekaan street, Km. 10, Tamalanrea Indah, Tamalanrea District, Makassar City, South Sulawesi Province, 90245, Indonesia, e-mail: jtresnati@unhas.ac.id
Muhammad Reza Perdiansyah, Master's Program in Fishery Science, Faculty of Marine Science and Fisheries, Hasanuddin University, Perintis Kemerdekaan street, Km. 10, Tamalanrea Indah, Tamalanrea District, Makassar City, South Sulawesi Province, 90245, Indonesia, e-mail: muhammadrezaperdiansyah19@gmail.com

How to cite this article:
Mutmainnah, Omar S. B. A., Tresnati J., Perdiansyah M. R., 2025 Preliminary study of size distribution, length-weight relationship and condition factor of banded archerfish, *Toxotes jaculatrix* (Pallas, 1767), from Limbangan River, Pangkajene and Islands Regency, South Sulawesi, Indonesia. AACL Bioflux 18(6):2832-2845.