



# Monitoring the Biological Aspects of Banded Archer Fish (*Toxotes jaculatrix* Pallas, 1767) in Bilah River, Labuhanbatu Regency, Indonesia

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**Abstract:** Banded archer fish (*Toxotes jaculatrix* Pallas, 1767) is one of the leading commodities of Indonesian ornamental fish. Its production so far is still from the catch of nature. Banded archer fish based on IUCN data has been included in the red list with the Least Concern (LC) category. Currently one of its habitats is found in the Bilah River, Labuhanbatu Regency. The purpose of the study was to information the condition of biological factors related to the relationship of weight length, sex ratio and factors of banded archer fish conditions in the Bilah River. Determination of observation station points by purposive sampling method, where in this study there are 3 stations. Fish sampling in January-March 2022. Fish are caught using splint nets. The entire number of fish caught was measured using a ruler with a length of 30 cm and weight using a digital balance sheet with a precision of 0.01 g. Next the data is tabulated and analyzed using the Microsoft Excel 2013 application. The data of the results of the study is displayed based on each month of observation. The results of the analysis of banded archer fish research data for the long weight relationship from January-March 2022 are negative allometric. The sex ratio of banded archer fish in January 2022 (0.69:1), February 2022 (0.47:1), and March 2022 (0.5:1). The value of the banded archer fish condition factor in January 2022 (1.0304), February 2020 (1.0338), and March 2022 (0.0954). It was concluded that the biological aspects of banded archer fish in the Bilah River still their growth and reproduction.

**Keywords:** Bilah River; Biological Aspects; *Toxotes jaculatrix*

## Introduction

Bilah River is the longest river in Labuhanbatu Regency (Dimenta et al., 2020). The river has long been a source of clean water, transportation routes, agriculture, and capture fisheries areas. (Harahap, 2019). Fish resources that have a high selling value in the Bilah River such as the hilsa shad (*Tenualosa ilisha*) (Machrizal et al., 2019) dan seluang fish (*Rasbora argyrotaenia*) (Bleeker, 1850; Siregar & Khairul, 2022). Another species of fish that can be found in the Bilah River is banded archer fish (*Toxotes jaculatrix*) (Pallas, 1767). This fish is generally used as an ornamental fish Shih et al. (2017),

and has a high economic value because it is an export commodity (Kadarini, 2015). In Palembang the price reaches IRD 150.000 or \$ 10 per individual (Suryati & Makmur, 2014). Banded archer fish production so far is still obtained from the result of fishing in nature. The exploitation that has been carried out can threaten the preservation of banded archer fish in nature. Based on IUCN data, banded archer fish (*Toxotes jaculatrix* Pallas, 1767) entered the redlist status with the Least Concern category (Hoese, 2012). Decrease in banded archer fish population is thought to be due to the impact of habitat degradation and water pollution (Suryati & Makmur, 2014).

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Several studies on banded archer fish in Indonesia have been conducted Rohmy et al. (2010) related to the identification of banded archer fish in Pangkalan Susu; Suryati & Makmur (2014) on aspects of its reproductive biology in the Musi River; Fahmi (2014) on gonad maturity level *Toxotes jaculatrix* on different salinity maintenance; Kadarini (2015) about the support on sustainability of diversity through banded archer fish feed types and maintained at salinity 8 ‰. Abroad research has been conducted Simon et al. (2013) on the condition factors of two species banded archer fish in Johor Coastal Water, Malaysia. Shih et al. (2017) about kinetic and hydrodynamic tests for water spray power on banded archer fish; Zhu et al. (2021) about its genetic variation and phylogenetic.

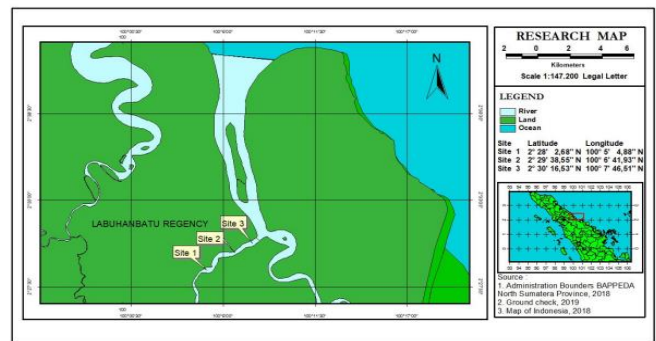
Based on the various literature sources study of the biological aspects of banded archer fish, no researcher has done it, considering that the information is not yet available. This makes the team of writers interested in reviewing the biology of the banded archer fish, as the biology of the fish should be studied essential information and the first step in managing the fish's resources in the water. Studies which examined the biology aspect of banded archer fish in Bilah River have yet to do. The purpose of this study is to inform the results of studies regarding some biological aspects of banded archer fish (*Toxotes jaculatrix*) in the Bilah River. Data and information on the biology of a fish in a body of water can serve as a basis in the fish's resource management efforts to keep it up to sustainable (Faizah & Sadiyah, 2019); (Lindawati et al., 2019).

**Method**

Banded archer fish sampling was carried out in the lower Bilah River, Labuhanbatu Regency, North Sumatra Province. The observation station was determined using the purposive sampling method, based on the information of fishermen using a splint net. There are three banded archer fish sampling station in this studi (Figure 1).

It was caught in a spindle net, with a net 2.5 meters high and 400 meters long. Hoisted nets are placed at high tide and at low tide chopsticks are collected. The entire chopstick fish is collected, then measured in its total length with a standard ruler (30 cm; 12 in.) and the weight of the scale is on a digital scale (0.1 gram of precision). Long and total weight of fish are billed on Microsoft excel 2013 and then data analysis is carried out.

Analysis of data relating to several aspects of the biology of the banded archer fish in the river bed on this study involves: length-weight relationship, sex ratio, and factor condition.



**Figure 1.** Research Location

*Length-Weight Relationship*

Correlation of the length and weight of the fish is calculated in the formula (Ambar, 2006).

$$Y = a+bx \tag{1}$$

Information: Y = total weight of fish (g); X = total length of fish (mm); a and b = Numbers constant

*Sex Ratio*

Sex ratio fish is calculated using the formula (Khairul & Siregar, 2019).

$$\text{Sex Ratio} = (\Sigma \text{Male}) / (\Sigma \text{Female}) \tag{2}$$

*Condition Factor*

Calculating condition factors may use the formula (Sihombing, 2021).

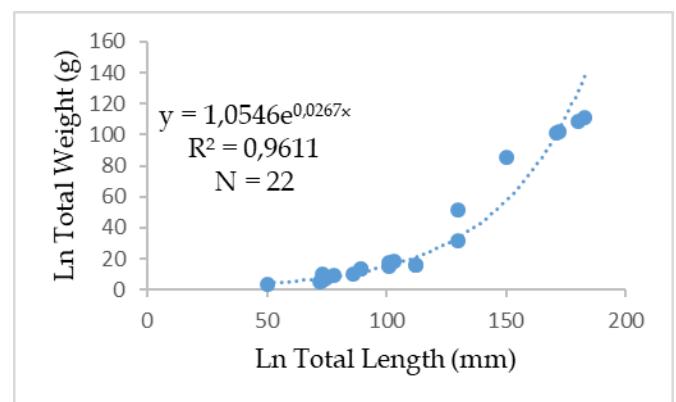
$$fk = W/aL^b \tag{3}$$

Information: fk = condition factor; L = total length of fish (mm); W = weight of fish (g); a and b = value constant.

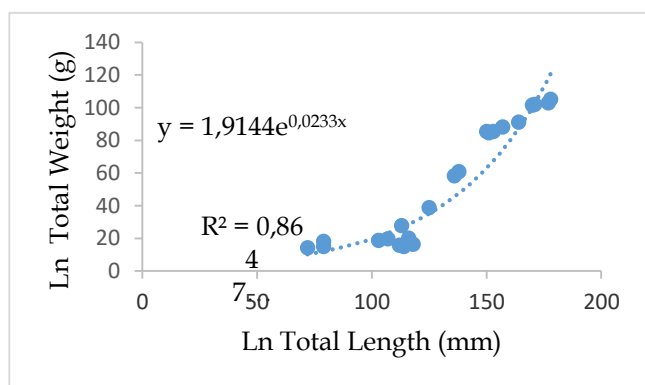
**Result and Discussion**

*Length-Weight Relationship*

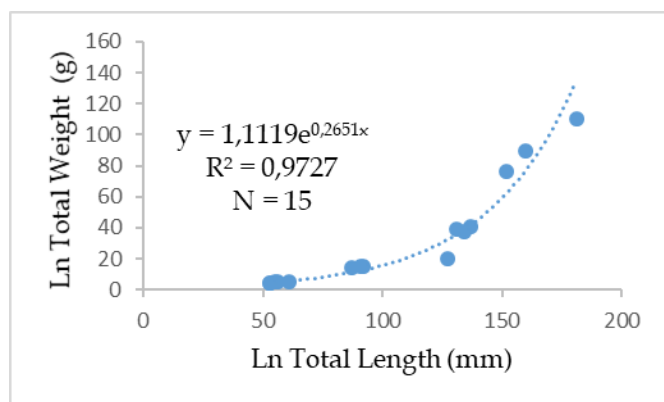
Length-weight relationships of fish based on the catch can be seen in figure 2, figure 3, and figure 4.



**Figure 2.** Catch Result of Banded Archer Fish in January 2022



**Figure 3.** Catch Result of Banded Archer Fish in February 2022



**Figure 4.** Catch Result of Banded Archer Fish in March 2022

Analysis of the relationship between the length and weight of the banded archer fish in the blade river comes from a  $b < 3$  (alometric negative). This condition indicates a faster growth in the fish than the increase in its weight. Sufficient food resources, the conduct of fish, and environmental factors are thought to be essential to the growth of chopstick fish in the river blades. Two factors contribute to the growth of fish, both long and heavy growth. first, internal factors (genetic, sex, parasites, the ability to harness food). Second, external factors (food source and water chemical physics factor) (Afidah et al., 2019; Khairul et al., 2021). Next is Teddy et al. (2020); Maizul et al. (2019). According Manullang & Khairul (2020) adds longevity to fish, gonads, disease, and fish habitat. Factor in food availability and appropriate environmental conditions are known to promote fish growth (Khairul et al., 2019; Shasia et al., 2021).

*Sex Ratio*

Catch was obtained in January 2022 (9 males) and (13 individuals female), February (7 males) and (15 females), and March (5 males) and (10 females). Data analysis is obtained for a total of 0.56:1.81 in male and female sex comparisons. A complete analysis of sex ratio can be seen at Table 1.

**Table 1.** Sex Ratio Banded Archer Fish in Bilah River

Time Monitoring	Sex Fish		Sex Ratio	
	Male	Female	Male	Female
January 2022	9	13	0.69	1.44
February 2022	7	15	0.47	2.14
March 2022	5	10	0.50	1.00
$\Sigma$ Total	21	48	0.56	1.81

Statistically the sex ratio between male and female banded archer fish is less common, more female catching than males. According to Alamsyah (2016) the difference in fish gender rates in different locations of the water may be influenced by a variety of factors, including: the mortality rate, growth rate, fish habits, fish migration, and one of the fish's genders that are vulnerable to capture. The difference in sex ratio, in turn, can also be due to overfishing and depressed environmental conditions (Sarangaa et al., 2018). Sex ratio is important information for assessing the reproductive potential of fish for the assition of their population in nature (Jega et al., 2017).

*Condition Factor*

The condition factor of banded archer fish in the Bilah River based on the result of the analysis range from 0.0954 - 1.0338. The full data can see in Table 2.

**Table 2.** Condition Factor of the Banded Archer Fish in the Bilah River

Observation Time	$\Sigma$ Total	Condition Factor
Januari 2022	22	1.0304
Februari 2022	22	1.0338
Maret 2022	15	0.0954

The condition of banded archer fish in the Bilah River fluctuates based on the the result of fishing for each month. It is suspected that female fish go to freshwater areas to spawning and find food sources. According to Gunadi et al. (2021) if the value of the condition factor getting higher, this indicates the feasibility of the habitat for fish life due to the need for food and environmental limiting factors also support. The value of fluctuations in condition factors is influenced by the development of fish gonads, where fish perform migration for spawning purposes are certain to experience stress (Jusmaldi & Hariani, 2019).

**Conclusion**

It can be concluded that the relationship between l ength and weight, sex ratio, and the condition factor for banded archer fish in the Bilah River is still quite good and in a still tolerable condition.

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