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Length–weight relationship and condition factor of *Sygnathoides biaculeatus* (Bloch, 1785) caught from seagrass area of Tanakeke Islands, Takalar District, South Sulawesi, Indonesia

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ABSTRACT

Sygnathoides biaculeatus (Bloch, 1785) is one unique animal among other teleost fish. They have particulary unique mode of reproduction that involve the male carrying developing eggs in their brrood puch during the incubation. Aim of this study is to determine length-weight relationship and condition factors of Alligator pipefish *Sygnathoides biaculeatus* (Bloch, 1785) in Tanakeke Islands. Sampling was taken and observed from June to November 2018 at two sampling points, namely La'botallua and La'bokatoang. The length-weight relationship is analyzed based on the exponential equation formula $W = aL^b$ and the condition factor (K) is calculated based on the length and weight of the sample fish. At Labbotallua location, the regression equations obtained were male $0.2170L^{1.244}$ and female $0.5030L^{0.9400}$. At labbukatoang for the male is $0.8230L^{0.4604}$ and female $0.0430L^{1.7590}$. The results showed that the growth pattern of the male and female *Sygnathoides biaculeatus* (Bloch, 1785) in Labbotallua and Labbokatoang are negative or minor allometric, which means that they grow faster than body weight condition factors of male *Sygnathoides biaculeatus* (Bloch, 1785) is 1.3190 with a range of 0.6369-1.3190. At the Labbukatoang location, the male condition factor was with range 0.7689-1.8219. This value is indicating that the environment of alligator pipefish still in conditions that is suitable for the growth of alligator pipefish.

Key words: *Sygnathoides biaculeatus, Growth pattern, Condition factor, Alligator pipefish*

Introduction

Alligator pipefish is one of the marine biological resources that have a unique body shape, namely because it's head resembles a crocodile and has a flat body shape. Apart from the uniqueness of the morphology, it turns out that alligator pipefish has economic value as ornamental fish, souvenirs and widely known as a raw material for making potent drugs and is believed to increase men's vitality. However, the most extensive use of alligator pipefish is used as raw material for traditional Chinese medicine even though the data on it is inadequate (Barrows *et al.,* 2009). One type of alligator pipefish that is found in Indonesia is *Sygnathoides biaculeatus* (Bloch, 1785). This animal found widely in seagrass areas in marine waters. According to Sanaye *et al.,* (2017) *S. biaculeatus* is very widespread in the Indo

Pacific region in seagrass beds, and generally, there are only one species under the genus *Syngnathoides*.

In Indonesia, information on the existence of these animals through scientific writing or statistical data is insufficiency. The existence of this *Sygnathoides biaculeatus* (Bloch, 1785) has been reported in Pulau Panggang, Kepulauan Seribu (Tishmawati and Ain, 2014). It is also written a little information about the existence of alligator pipefish in Indonesia but is limited to those that found in reef waters (Wisuda, 2018).

IUCN (International Union for Conservation of Nature and Natural Resources) classifies these animals in the Least Concern category in 2017 (Pollom, 2017). In fact, *S. biaculeatus* was traded as popular aquarium fish. The TCM and marine ornamental fish trades coupled with habitat loss are threatening wild populations of *S. biaculeatus* (Sanaye *et al.*, 2016). With these various reasons, it needs an effort to preserve alligator pipefish, mainly because the most prominent use is for traditional medicine. In the next couple of years, probably the use of *Syngnathoides biaculeatus* will increase so that as early as possible, knowledge of the conservation and cultivation techniques of these animals must be known before. Thus, the cultivation of alligator pipefish has excellent potential to integrate conservation and sustainable development goals. This is what lies behind the author want to examine the biological aspects of alligator pipefish, specially their length weight relationship as a primary data to know deep about this species specifically in Indonesia.

Materials and Methods

Study Area

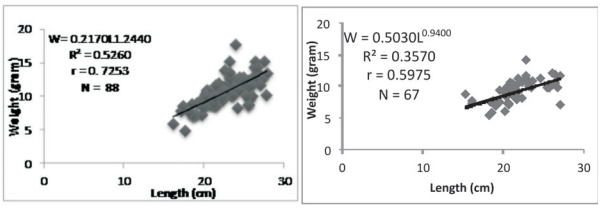
All sample came from the Tanakeke Islands, Takalar District, and originated from two locations (La'boTallua and La'boKatoang). The reason for choosing those locationsis based on information from local fishers that the number of *Syngnathoides biaculoatus* in that area are more abundant than other spot.

Data Collection And Analysis

This study started from June to November 2018. The samples were taken month by month and collected using a push net (3m x 1m) with mesh size 0,5 mm. The catchment area is using a 100m x 100m square area. The push net moves in it and making a zig-zag move to catch the species. All measurement for length-wight relationship was doing in the base camp near the sampling location by using tailors meter with accuracy 0.1 for total length in cm,and portable scales with accuracy 0.01gram for wet weight. Data analysis carried out at the Ecosystem Breeding and Rehabilitation Laboratory, Faculty of Marine and Fisheries, Hasanuddin University, Makassar.

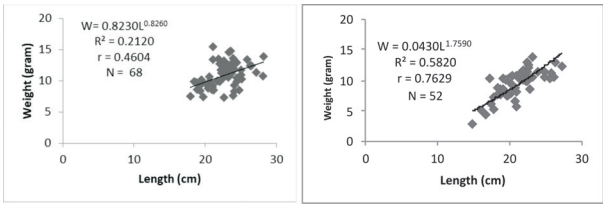
The estimation of length-weight relationships parameters ($W = a \times L^b$) was made using linear regression analysis after the logarithm transformation of the data ($\log W = \log a + b \times \log L$), where W is body weight in grams, TL is the total length in centimeter, a is the intercept and b is the regression coefficient.

The condition factor (K) is calculated based on the length and weight of the alligator. If the growth of isometric fish (b = 3), then the condition factor uses the formula (Effendie, 1997): $K = \frac{10^5}{L^3} W$ where K is a factor of the condition, W is the average weight of fish in one class (gram), L is the average length of fish in one class (mm) of fish that has allometric growth if b '" 3, then the equation used is K



(a) (b)

Fig. 1. Relationship between the length and weight of Alligator Pipefish *Syngnathoides biaculeatus (Bloch, 1785)* at the Labbotallua sampling location. The picture above (a): male; (b): female.



(a) (b)

Fig. 2. Relationship between the length and weight of Alligator Pipefish *Syngnathoides biaculeatus (Bloch, 1785)* at the Labukatoang sampling location. The picture above (a): male; figure below (b): female.

$= \frac{W}{aL^b}$ where K is a factor of the condition, W is the average weight of fish in one class (gram), and L is the average length of fish in one class (cm), a and b are constants of regression.

Results

The number of *Syngnathoides biaculeatus* (Bloch, 1785) captured during the study was 275 individuals consist of 88 male and 67 female at Labbutallua and 68 male and 52 female at Labbokatoang.

Table 1. Conditions Factor of Alligator Pipefish *Syngnathoides biaculeatus* (Bloch, 1785) Male and Female, based on Body Length (cm) at the sampling location of Labbotallua and Labukatoang.

Location	Condition Factor	
	Male	Female
Labotallua	0.782–1.005	0.874–1.189
Labokatoang	0.819–1.086	0.601–1.295

Discussion

Length –weight relationship

The present study shows that the regression analysis of "b" to 3 showed that was "b" significantly different which meant that the growth of Alligator pipefish *Syngnathoides biaculeatus* (Bloch, 1785) in these two locations (Labbutallua and Labbukatoang) are negative allometric, or allometric minor with "b" range value from 1.0605–1.7494. For this species in Indonesian waters, there are no insufficient data to compare this study. The research conducted by (Sanaye *et al.*, 2017) obtained the same growth pattern of *Syngnathoides biaculeatus* with "b" values smaller than 3 in male and female individuals slope range values "b" from 1,31 – 1,75. In the contrary results from (Barrows *et al*, 2009) which obtained that *S. biaculeatus* growth pattern with a slope value "b" (4.07) for *S.biaculeatus*.

From the comparison above, it's seen that the "b" value from all study may have the difference. It means that even the same species can be different in growth pattern. One reason probably because the species that caught most is large or adult species. It is assumed that the absence of the juvenile and small size could effect in "b" value. Other things probably because their habitat (seagrass) provide an excellent healthy environment and abundance of food so they can grow well, Several studies said that small specimens have a significantly different weight–length relationship than larger specimens. It also said that if b < 3, the large specimens have changed their body shape to become more elongated or small specimens were in better nutritional condition at the time of sampling (Froese *et al.*, 2011; Gurkan and Ta°kavak, 2007). This might be related to the unique morphology of *S. Biaculeatus,* which has an elongated body.

Condition Factor

From the values of the condition factors in Tables 2 and 3 it can be seen that the condition factor for males is an average of 0.9221 for males and 1.0393 for females *Syngnathoides biaculeatus* (Bloch, 1785). This range of values is the same as that obtained by Sanaye *et al.* (2017) where the range of K values is from 0.65-1.35 from the sampling location of Palk Bay and 0.68-1.27 at the location where Gulf of Mannar is taken on the Southeast Coast of India.

From the condition factor values, it can be seen that the condition factor value for males is lower than that of females. This is presumably that more energy is used by male pipefish alligators than females because it is well known that males from alligator pipefish take care seed in their egg sacs located in the outer ventral. This is suitable with (Barrows *et al.*, 2009) states that male alligator pipefish are generally known about their parental care of broods which are incubated in a specially developed open-type brood pouch at their ventral surface Energy used for developing brood pouch and nutrition of young ones might also affect the growth pattern of male alligator pipefish Sanaye *et al.* (2017). Based on the condition factor value can be stated that water condition in the sampling location is in good condition for alligator pipefish development.

Conclusion

The growth pattern of alligator pipefish found in both locations study has a value of "b" below 3 which shows a minor allometric growth pattern which means that length is faster than growth. The value of condition factors indicating that the environment of alligator pipefish *Syngnathoides biaculeatus* (Bloch, 1785) still in conditions that are suitable for the growth.

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