Morphology character and length-weight relationship of Goblinfish (*Neovespicula depressifrons*) Tetraogidae in Percut Sei Tuan Coastal, North Sumatera, Indonesia

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Abstract. The research was conducted in Percut Sei Tuan Aquatic with goblinfish (*Neovespicula depressifrons*) as the main object. Goblinfish was caught at a brackish aquatic which is mangroves are grown. This study aimed to analyse the relationship between weight-length, growth pattern, length-frequency distribution, and condition factors of goblin fish. Danish seines with mesh size net of 1 inch, ½ inch, and ¼ inch was used for fishing. After the fish caught, then measured the total length and weighed, measurements were conducted in the laboratory. The total length of fish caught is in the range of 24-65 mm and a weight of 0.2 - 3 g. The resulting group size consisted of 7 groups with class intervals of 42-47 mm is the mode group size. From the analysis of the length-weight relationship, the constant value of b = 0.972 and the value of the condition factor ranges from 0.90 to 1.37 with an average value of CF > 1.

1. Introduction

Goblinfish (*Neovespicula depressifrons*) is one of the potential fish in Percut Aquatic, East Coast North Sumatera. The fishing location is on the river mouth, and near to the mangrove forest as known that the mangrove ecosystem as a habitat for so many types of aquatic organisms, both classified as vertebrates and invertebrates. Those organisms utilized this mangrove ecosystem as a spawning, a nursery, and a feeding ground. Including goblin fish that utilize this mangrove ecosystem as a feeding and nursery ground.

Several types of this species have become an important consumption fish [1]. Almost entirely of the goblin fish has reported had poison glands on its fin spines. However, this poison glands could be discarded first when it is about to be consumed. Apart of being economically beneficial, goblin fish had an ecologically important role, namely in the food web in its habitat. [2] has reported that the other goblin fish (*Vespicula trachinoides*) classified as a carnivorous fish with 86% invertebrates rate in its stomach, consisting of 57% crustaceans (shrimps) and 29% mollusks (bivalvia). As it was known that, food web in a habitat consists of producer, first consumer, second consumer, and predator. If one of these organisms in this food web were disturbed, then there will be an imbalance in its habitat ecology.

Considering how important the existence of goblin fish is in the aquatic, this study about the goblin fish population was conducted. The purpose of this study was to see the conditions of the goblin fish population (*Neovespicula depressifrons*) at Percut Sei Tuan coastal. The conditions are
showed in its morphology, length-frequency distributions, weight-length relation, and conditions factor.

2. Materials and methods

2.1. Study Site
The study was conducted in Percut Sei Tuan coastal, North Sumatera, Indonesia in July 2020 (figure 1). Goblin fish sampling was conducted at the river mouth, near to mangrove forests in Percut coastal. The sample is identified and measured at the Laboratory of Biology and Aquaculture of Agricultural Faculty, Universitas Sumatera Utara.

The materials used in this study are goblin fish (*N. depressifrons*). While the types of equipment used consists of the danish seines with multilevel mesh size, i.e 1 inch, ½ inch, ¼ inch. The size of the danish seines were 5 m in diameter, 8 m long, and 3 m high. Sampling was carried out 3 times a day, namely morning, afternoon and evening.

![Figure 1](image)

**Figure 1.** Location sampling of Goblinfish (*Neovespicula depressifrons*) in Percut Sei Tuan coastal.

2.2. Procedures
Samples that have been caught are identified using a book freshwater-estuarine fish identification [3] and then it was matched with fishbase.org. (accessed September 2020). After that, the total length (TL) measurement and the weight of the goblin fish samples were measured.

2.3. Analysis of data
There are several data analyses used in this study, such as length frequency distribution, weight length relationship, and condition factors. Length frequency distribution analysis was calculated to determine how the size group of goblin fish caught in Percut aquatic, North Sumatra. The frequency distribution of the total length was calculated using the Sturges formula [4].

Analysis of the long relationship of fish weight using a regression test with the following formula [5]:

\[ y = ax + b \]
\[ W = aL^b \]  

Where:
- \( W \) = body weight of fish (g)
- \( L \) = length of fish (mm), \( a \) and \( b \) = constant

The relationship between the total length and the fish weight parameter can be shown from the resulting \( b \) value. The value of \( b \) is an estimator of the close of the relationship between the two parameters, namely:
- If \( b = 3 \), shows an isometric growth pattern (length growth with weight growth)
- If \( b \neq 3 \), shows an allometric growth pattern divided into:
  - If \( b > 3 \), then allometric is positive (weight growth is more dominant)
  - If \( b < 3 \), then allometric is negative (length growth is more dominant)

The closeness of the relationship between fish weight length is indicated by the correlation coefficient \((r)\) obtained from the formula \( \sqrt{(R^2)} \): where \( R \) is the coefficient of determination. Values close to 1 \((r > 0.7)\) represent a close relationship between the two, and values away from 1 \((r < 0.7)\) represent a less close relationship between the two [5].

3. Results and discussion

3.1. Morphology of goblinfish (Neovespicula depressifrons)

Goblin fish (Neovespicula depressifrons) are caught in the aquatic of Percut Sei Tuan, East Coast of North Sumatra, precisely at the estuary of a river which is near mangrove forests [1,6-9]. Goblinfish is classified as euryhaline organisms [10]. Based on the results of the study, goblin fish is included in the order Scorpaeniformes, the family Tetraogidae in fishbase.org (accessed September 2020), or Vespicula depressifrons, family Scorpioniidae [1]. This tribe is mostly red with some coloration pattern, has spines on the dorsal fin, many sharp spines on the head, and a bony disc from the eye across the cheek to the gill cap [1]. The basis for determining the type of depressifrons is that the 3 front spines of the dorsal fin are almost separated from the rest of the fin [1].

![Figure 2. Goblinfish (Neovespicula depressifrons).](image)

The frequency distribution of the total length of the goblin fish studied was 134 individuals with a total length range of 24 - 65 mm and a weight range of 0.2 - 3 g. The structure of the length of the goblin fish spreads in the norm with the size group mode in the 42-47 mm class interval as many as 41
fish. This shows that the goblin fish in Percut consist of a cohort that was pointed at intervals of 42-47 mm. While the group length outside the main cohort was below 30 mm. The length-frequency distribution of goblin fish can be seen in figure 1 below.

![Figure 1](image1.png)

**Figure 1.** Length frequency distribution of goblin fish in Percut Sei Tuan Coastal.

The correlation coefficient (r) of goblinfish is close to 1, which is 0.972. This value shows that the relationship between length and body weight of goblinfish has a very strong correlation, it means that if the length increases, it affects the weight gain. This indicates that the fish caught are in good health. This is by the opinion of [4], where the value close to 1 (r> 0.7) describes a close relationship between the two, and the value away from 1 (r <0.7) describes a not close relationship between the two.

**Figure 3.** Length frequency distribution of goblin fish (*N. depressifrons*) on July 2020 in Percut Sei Tuan Coastal.

The results of the analysis of the relationship between the length-weight of goblinfish obtained a value of b = 2.860. From these results, it can be seen that the growth pattern of the leprosy fish is negative allometric with a value of b <3. This condition explains that fish length growth is more dominant than fish weight growth. The diversity of exponential values (b) in the length and weight relationship between fish species is closely related to ontogenetic development, age differences, gonad maturity, sex, geographical location, and environmental conditions (fishing activity), stomach fullness,
disease, and parasite pressure [11]. Morphologically, goblin fish include fish that have a fusiform body shape (torpedo). According to [12], differences in the value of \( b \) can be caused by differences in external factors, namely microclimate, and internal factors, namely gender and gonad maturity level.

**Table 1.** The factor of the average condition of goblin fish on July 2020 in the Percut Sei Tuan Coastal.

| Class interval | Frequency | CF average |
|----------------|-----------|------------|
| 24-29          | 39        | 1.13       |
| 30-35          | 9         | 1.12       |
| 36-41          | 34        | 0.90       |
| 42-47          | 41        | 1.23       |
| 48-53          | 2         | 1.37       |
| 54-59          | 7         | 1.19       |
| 60-65          | 2         | 1.08       |

The condition factor for goblin fish in Percut Sei Tuan coastal shows the ratio between length and weight. Where the greater the ratio of weight to length of goblin fish, the higher the shedding value of the fish. This is influenced by the environment, both the physicochemical factors of the aquatic and the availability of food in the aquatic. [13] stated that the condition factor is a condition that stated the maturity of fish with numbers and values that are influenced by age, sex, food, and the level of maturity of the gonads.

The value of the goblinfish condition factor based on the length class interval ranges from 0.90 to 1.37 with an average value of CF> 1, namely with a value of 1.15. The value of each class interval FK = 1.13 (class interval 24-29 mm), CF = 1.12 (class interval 30-35 mm), CF = 0.90 (class interval 36-41 mm), CF = 1.23 (class interval 42-47 mm). CF = 1.37 (class hose 48-53 mm), CF = 1.19 (class interval 54-59 mm) and 1.08 (class interval 60-65 mm). This shows that the goblinfish in Percut Sei Tuan coastal are in a good condition.

### 4. Conclusions

The goblin fish caught in the coastal of Percut Sei Tuan belongs to the species *Neovespicula depressifrons* with a fundamental feature of 3 spines in front of the dorsal fin separated from the dorsal fin. The length relationship of goblinfish weight is strong, with a negative allometric growth pattern. In the length-frequency distribution, there is one cohort, and the fish are in a good condition.

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