Growth of Stingrays (*Hemitrigon longicauda*) in the waters of Kuala Tanjung, Batubara, Sumatera Utara Province

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Abstract. Stingray (*Hemitrigon longicauda*) is a fish commodity that has high economic value, so it become the first target for fisherman. It can impact negatively the population of stingray. So, we need to make a research about the development of stingray in the Kuala Tanjung waters, Batubara Regency in order to get the information for the basic process of stingray. This research is done in Kuala Tanjung waters, Batubara Regency for two months starting from May to June 2019. The purpose of this study is to determine the Growth Pattern of Stingray in Kuala Tanjung waters, Batubara Regency. The study result concluded that the Stingray Growth Pattern stingray is obtained a value of $b = 2.7672$ otherwise $b < 3$ had a negative allometric growth pattern.

1. Introduction

Stingray (*Hemitrigon longicauda*) is Elasmobranchii class and it is known as Batoid Fish, which is cartilaginous fish with long tail such as whips or whips, but it does not look like fin. Usually at the base of the Pari tail there are one to five spines which have a toxin glandular tissue below it [1].

In general, stingray has a very flat body shape, flat flattened (depressed) so it resembles a wide disk added with wide pectoral fin that look like wide wing that connected with head. If it is looked from the top (anterior) and bottom (posterior), stingray’s body looks oval or rounded. The width or large of the disk can reach 1.2 times its length and it is generally thought to be able to see growth patterns and sizes when the gonads mature [2].

Massive fishing in sustainable can reduce the reservation of Stingray in Kuala Tanjung waters, Batubara regency. Because of the increasing of massive fishing to a fish resource, it can be caused a decreasing in the fish population. Therefore, to maintain the availability of stingray resources in Kuala Tanjung waters, a study of growth is needed that includes a lengthy weight structure in order to know the stingray growth patterns in order not to damage the preservation of the stingray population.

The Growth patterns can provide information about the correlation between length and weight of fish condition, the main important step of fishing process resource in the waters. Growth patterns in resource waters processing very useful in determining the selectivity of fishing gear so that only fish that are caught are of proper size [3]. The purpose of this research to know the type of stingray fish and to know the growth pattern of stingray in Kuala Tanjung waters in Batubara regency.
2. Material and methods

2.1. Study area
This research was conducted in the waters of Kuala Tanjung, Batubara Regency from May to June 2019, with a time interval of one week. The method used in this study is the purposive sampling method. Stingray data collection was obtained visually to identify genes using the [4] guidebooks.

2.2. Procedures
Stingray intact obtained from the waters of Kuala Tanjung. This method is expected to represent the population being studied. Samples of fish that have been taken are then measured in total length and weighed in wet weight. Primary data which includes morphological data and secondary fish sex in the form of supporting data.

2.3. Data analysis
Analysis of the data used to determine the growth pattern of stingrays (*Hemitrigon longicauda*) is to use Length Frequency Distribution [5], Length-Weight Relationship [6] and Condition Factor analysis [6].
3. Results and discussion

3.1. Catches of stingrays
The total number of fish caught during the study was 268. The number of fish that was caught the most was on Sunday 2 totalling 71 fishes, while the number of fish that was the least caught was Sunday 5 totalling 7 fish so it can be seen in Figure 2.

![Figure 2. Catches of stingrays](image_url)

3.2. Length frequency of rays
In May, the number of fish caught most at class 1122-1257 mm was 63 fish and at least 1666-1801 mm caught at 1 class can be seen in Figure 3.

![Figure 3. Distribution of length frequency stingrays in May during observation](image_url)

In June, the greatest number of fish caught were at class 1122-1257 mm, and there were 13 fish caught at 1394-1529 mm, 1530-1665 mm, 1666-1801 mm, 1802-1937 mm and 1938-2073 mm. mm of 0 tails can be chosen in Figure 4.

The highest frequency in May was found in clas s 1122-1257 mm at 63 heads. In June the highest frequency in the class interval 1122-1257 mm was 13 tails, so that every month of observation there was a difference in the number of length distributions in each class hose caused by the influence of the size of
the fishing line itself, where the Kuala Tanjung fishermen used a stretching line which generally uses fishing rod measuring 7-9 inches. In accordance with the literature [7] which states that the size of the net and fishing hook significantly affect the composition of the type of catch.

![Figure 4. Distribution of length frequency stingrays in June during observation](image)

The difference in the number of length distributions will experience different growth, because it has internal factors and external factors that affect the growth of fish according to [8] states the factors within are generally difficult to control such as heredity, sex, age, parasites and disease. The main external factors affecting fish growth are temperature and food.

### 3.3 Length-weight relationships

The results of the analysis of the length and weight relationship of all data show that the results of the relationship between length and weight have the equation: \( \log W = 0.00001 + 2.7672 \log L \) or in the form of an escalation is \( W = 1E^{-05} \times L^{2.7672} \) with a value of determination \( (R^2) = 0.6087 \) and the correlation coefficient \( (r) = 0.780 \) can be seen in Figure 5.

![Figure 5. Graph of relationship between stingray length and weigh](image)
The length of the Stingray catches throughout the week is in the range of 850-2070 mm and the range of fish body weight of 1000-13900 gr, the difference in the structure of the length illustrates the characteristics of the waters and high catching pressure, [9] add that the fish who have a large total length tend to live long and have a low growth coefficient.

From the results of the study and the T test, the b value is smaller than 2.7672, which means it is smaller than 3, so it can be assumed that the growth pattern of Stingray (*Hemitrigon longicauda*) in Kuala Tanjung waters is negative Allometric, which according to [8] based on the 95% confidence interval T test, the value of T<sub>count</sub> > T<sub>table</sub>, which means reject H<sub>0</sub>, is that the stingray growth pattern is negative allometry, which is the length increase faster than weight gain.

### 3.4 Condition factors

The results of the calculation of condition factors (FK) male and female Stingray in Kuala Tanjung waters based on negative allometric growth patterns can be seen in Table 1.

| Gender | Amount (n) | The range | Average |
|--------|------------|-----------|---------|
| Male   | 54         | 1.806 – 0.546 | 1.025   |
| Female | 214        | 0.517 - 0.119  | 0.278   |
| Total  | 268        | 2.339 – 0.467  | 1.158   |

Based on the calculation of the condition factor (FK) Stingray (*Hemitrigon longicauda*) whose long growth pattern is faster than weight (negative Allometrics) ranges from 2.339-0.467. If viewed from the sex of stingray, male and female Stingray condition factors range between 1.806-0.546 and 0.517-0.119 with the average value of male Stingray being smaller than female namely 1.025 and 0.278, it can be said that Stingray (*Hemitrigon longicauda*) has the shape flat body (thin). In accordance [6] If fish growth is obtained allometrically, the condition factor is calculated using the relative condition factor. The relative condition factor is also an allometric condition factor. If the K value of a type of fish = 1-3, then the condition of the fish is flat (thin) [6] adds that the factor conditions influenced by food, age, sex and gonad maturity.

The condition factor values obtained during the study showed an increase along with the increase in the total length of the fish. Increasing the value of factor conditions that follow an increase in the length of the body as well, the stingray (*Hemitrigon longicauda*) males have a condition factor larger than females it is suspected because of the variety of long-range and weight body of the stingray (*Hemitrigon longicauda*) itself. According to [10] states that the differences in these condition factors are indicative of various biological characteristics of fish such as obesity, suitability of the environment or gonadal development.

According to [4] states that the condition factor values often vary and this is influenced by gender. In addition, the condition factor value also depends on the number of organisms that exist in a water, the availability of food in these waters, and the condition of the water environment itself [8].

At the time of the study the catches obtained in June experienced a very drastic decline, it was due to the high waves of sea water so that the fishermen were not allowed to go to sea with a capacity of 1-3 GT vessels, they only caught fish in the area around the Kuala Tanjung course, it greatly influences the catch of stingrays. Can be seen through rainfall data in May in June [11].
4. Conclusions

Stingray Growth Pattern (*Hemitrigon longicauda*) in the waters of Kuala Tanjung in North Sumatra Province obtained a value of \( b = 2.7672 \) otherwise \( b < 3 \) has a negative allometric growth pattern which means the display increase faster than the weight gain.

References

[1] Kinakesti S M and Gema W 2017 Kajian Ikan Pari (Dasyatidae) di Indonesia [Stingray Studies (Dasyatidae) in Indonesia] *Fauna Indonesia* 16 pp 17 – 25

[2] Utami M N S, Redjeki S, Tafiq N S P J 2014 Studi Biologi Ikan Pari (*Dasyatis* sp) di TPI Agung Rembang [Stingray Studies (*Dasyatis* sp) in TPI Agung Rembang] *Journal of Marine Research* 2 pp 79-85

[3] Mulfizar, Zainal A M, Irma D 2012 Hubungan panjang berat dan faktor kondisi tiga jenis ikan yang tertangkap di perairan Kuala Gigieng Aceh Besar Provinsi Aceh [The relationship between the length and weight of the condition of the three species of fish caught in the waters of Kuala Gigieng, Aceh Besar, Aceh Province] *Jurnal DEPIK* 1 pp 1-9

[4] White W T P R, Last J D, Stevens G K, Yearsley F, Dharmadi 2006 *Economically Important Shark and Rays of Indonesia* Australia Australian Center for Internaional Agricultural Research publisher 338 p

[5] Walpole R E 1992 Pengantar Statistik edisi-3 [Introduction of Sattistic third edition] Jakarta PT Gramedia Pustaka Utama pp 340-373

[6] Effendie M I 1979 Metoda Biologi Perikanan [Fisheries Biology Method] Bogor Yayasan Dewi Sri publisher p 112

[7] Alo’s, J, Palmer M, Grau A M, Deudero S 2008 Effects of Hook Size and Barbless Hook on Hooking Injury Catch per unit effort and Fishb Size a Mixed-Species Recreational Fishery in the Western Mediterranean Sea *Journal of Marine Science* 65 pp 899-905

[8] Effendie M I 2002 Biologi Perikanan [Fisheries Biology] Yogyakarta Yayasan Pustaka Nusantara 163 p

[9] Sparre P and Venema S C 1999 Introduksi Pengkajian Stok Ikan Tropis buku manual (Edisi Terjemahan) [Introduction to the book assessment of tropical fish books (Translation Edition)] Jakarta Kerjasama Organisasi Pangan, Perserikatan Bangsa-Bangsa dengan Pusat Penelitian dan Pengembangan Perikanan 438 p

[10] Merta I G S 1993 Hubungan Panjang Bobot dan Faktor Kondisi Ikan Lemuru (*Sardinela lemuru*) Bleeker 1985 Di perairan Selat Bali [Relationship between Weights and Fators Condition of Lemuru (*Sardinela lemuru*) Bleeker 1985 in the waters of the Bali Strait] *Jurnal Perikanan Laut* 73 pp 35-44

[11] World Weather 2019 World Weather Forecast Statistic Analysis Medan,Indonesia Weather [terhubung berkala] http://w-weather.com [Agustus 2019]