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# Size Distribution and Growth *Mackerel scad* (*Decapterusmacarellus*) in the Ambon Waters

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***Abstract*—***Mackerel scad (Decapterusmacarellus) is one of the small pelagic fish that has important economic value and caught throughout the year around the waters of Ambon. Utilization of these fish is not only profitable economically but also can have a negative impact if not pay attention to aspects of sustainability. The purpose of this research is to know the distribution of long frequency and growth pattern. This research was conducted for six months (September 2016-February 2017) around Ambon waters. Samples of fish analyzed amounted to 1548 individuals. The average length of the minimum fish caught is 9.5 cm and the average size of the maximum length of fish caught is 31.8 cm. Fish growth patterns obtained are isometric.*

***Keywords: Decapterusmacarellus, size distribution, growth pattern, Ambon Waters.***

## I. INTRODUCTION

Ambon Waters is a one of the waters which has a lot of Fishery Resources in Maluku. The site of ambon waters which is front on the Banda Sea makes this waters also has a lot of variety and kind of pelagic fish and demersal fish. Mackerel Scad (*Decapterusmacarellus*) is a one of pelagic fish which was caught over the year, around Ambon Waters. This kind of fish was caught by using purseseine with a Fish Aggregating Device (FADs). Comparing with any kind of mackerel fish like *Decapturesrusselli* and *Decapturesmacrosoma*, the characteristic of Mackerel Scad is Off-shore. This kind of fish is living as a group with other small pelagic fishes (Chan *et al*, 1997). Tiews*et al*., (2001) A spreading of Mackerel Fish in Indonesia inculdes, Java Sea, Strain of Makassar, Ambon, Ternate (East Indonesia). Besides, became a source of an animal protein to be consumed by local people, this fish also can be a fish bait to the pole and line fishery and has become an export commodity to a making of katsuobushiin Japan. (Widodo, *et al* 1999).

An utilization and an effort of catch which has done straight away toward the source of *Dercapterusspp* should be based on the amount of the available supply in order to make a fish supply can be continued.An utilization of *Decapterusmacarellus* resource in Ambon Waters was indicated that it has experienced a biological overfishing and economic overfishing (Sangadji*et al*,2014; Pattikawa, J.A*et al*, 2018). An information of *Decapterusmacarellus* utilization from biologic aspect still lack of doing for kicking the continuing management. The purpose of this reasearch is to know size distribution and the pattern of growth of *Decapterusmacarellus* in Ambon Waters. An information of *Decapterusmacarellus* should be investigated and done straight away, and also include the fish biological information. The data about length distribution and the growth pattern of mackerel was useful to describe a condition of fish supply, recently and was expected to be able in giving biological information and data base for the importance of the fish management.

## II. MATERIALS AND METHODS

This research was conducted for Six Months (Sept. 2016 to February 2017) represent two seasons of catch, such as; Two Change Season and West Season around Ambon Waters (**Fig 1**).Sample of Mackerel Scad was achieved from the result of pursesein haul which operated around Ambon Waters every month as long as six months. The sample was taken random at the fishing landing and fish landing site around Ambon. Sample collection was done every two weeks during a reserach. Sample analyzing of Mackerel Scad was done at the Biological Laboratory of the Faculty of Fishery and Marine Science, Pattimura University. The sample of fish length was measured by using gauge board with carefulness of 0,1 cm. Type of measuring which has done was the total length of body such as the length from a top of the head or a top of the mouth to the end of the tail. The weight was measured by using digital scales with a carefulness of 0,1 gram.

Length distribution was made based on the class with the interval 0,5 cm on every month of research (Sept. 2016-February 2017). The relation between the length and the weight were analyzed by using Effendie (1979) as follow : $W = a L^b$.

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Which : W = fishWeight (gr) . L = fish length (cm). a and b = Constanta.

Formula above will be equal with using natural logarithm on the two variable as follow :

$$\text{Ln } W = \text{Ln } a + b \text{ Ln } L.$$

In determining the relation between length - weight as long as the research used regression and correlation analyzing. In finding about b mark whether it is equal or not with 3, will be used t test according to Effendi (1979) as :

B = tangent of regression angle.

Sb =Standard deviation of value b.

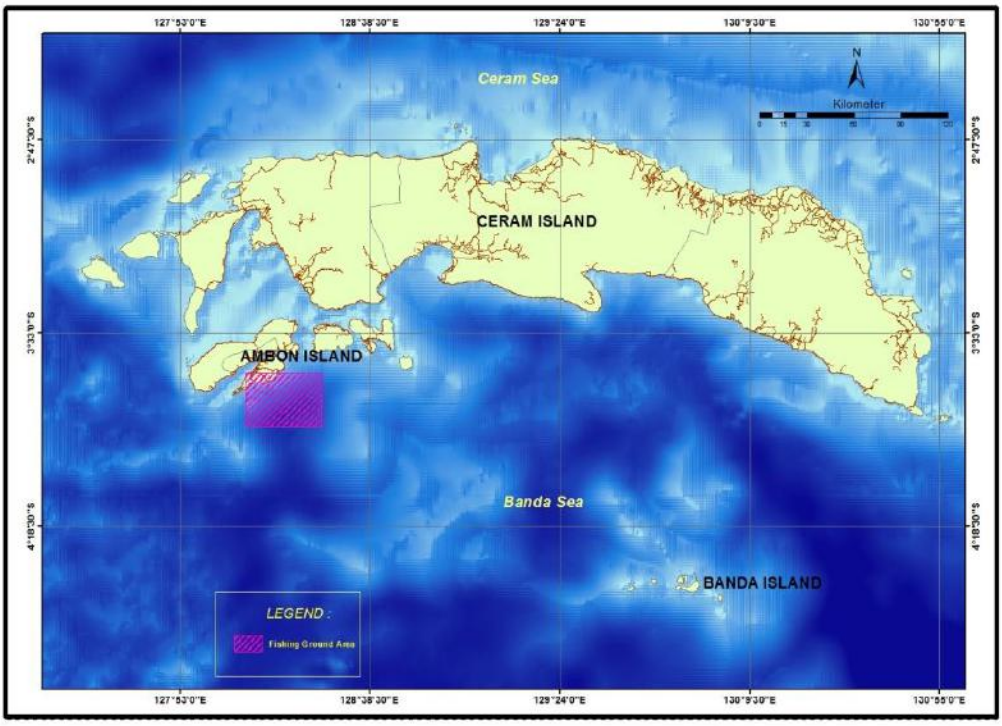


*Fig. 1: Map of Mackerel scad (Decapterusmacarellus) fishing operations in the Ambon Waters.*

## III. RESULTS AND DISCUSSION

### 3.1. Size Distribution

A total sample of 1.548 *Decapterusmacarellus* individuals collected over six months was obtained in a total length range of 9.5-31.8 cm (**Table 1**).The length size every month had a variation, followed by the domination of size presence frequency. For Sept. 27,2 cm, Oct. 19,9 cm, Nov. 17,5 cm, Dec. 19,7 cm, Jan. 22,5 cm, Feb. 21, 35 cm. The size of catch dominant fish was imature except on september in the size of 27,2 cm. Some of research result by Widodo (1999) in Gorontalo Waters, Tilamuta, Tomini Bay, and Maluku Sea shows the size of fish length was 9-30 cm, Hariati (2004) in Banda Aceh Waters, the fork length of 16-32cm., Iksan andIrham (2009) in North Maluku Waters 21,1-31,1 cm, Silooy&Soumokil (2007) in the South of Ambon Waters, the length of the fish 14,0-27,0 cm, Widyastuti andZamroni, (2017) in Tomini Bay 17,25-30,25 cm FL with the ripe condition on August and Pattikawa (2018) in the North Ambon Waters, the length 11,0-24,5 cm. Presence Frequency indicates that *Decapterusmacarellus* was caught over the year in Ambon Waters, it was also revealed by a purseseine fisherman. Widodo (1999), said that the top of this fish season happened twice in a year around April-May and November in Maluku Sea. Yulius (2013) at LombeBay , The season of catch on August - November. Commonly, In Ambon Waters and surroundings, the season of the catch happened on Sept-November (Second Change), this thing was assumed because there was a upwelling proccess in Banda Sea (Gordon and Susanto 2001;Sediadi 2004;Haruna *et al*, 2018).

*Table.1: Size distribution of Decapterusmacarellus during the study*

| Period (month) | Number (indiv) | Length class (cm) | Mid Length (cm) | Minimum (cm) | Maximum (cm) | Mode (cm) |
|---|---|---|---|---|---|---|
| Sept-2016 | 354 | 12-29,5 | 20,8 | 12,3 | 29,3 | 27,2 |
| Oct-2016 | 205 | 15-26,5 | 21 | 15,5 | 26,5 | 18,9 |

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| | | | | | | |
|---|---|---|---|---|---|---|
| Nov-2016 | 360 | 9,5-32,0 | 20,65 | 9,5 | 31,8 | 17,5 |
| Dec-2016 | 202 | 12,0-24,0 | 18 | 12,1 | 23,9 | 19,7 |
| Jan-2017 | 196 | 18,5-26,5 | 22,5 | 18,6 | 26,4 | 19,7 |
| Feb-2017 | 231 | 12,0-31,0 | 21,35 | 12,1 | 30,6 | 20,6 |
| Total | 1.548 | | | | | |

### 3.2. Growth

Based on the result of length-weight relationship of *Decapterusmacarellus*shows that there is a tight relation between length and weight. This relation can be seen from a milling of correlation coefficient mark (r) as much as 0,936-0,984 close to +1 (**Table 2**.) Silooy and Soumokil (2007) also got correlation coefficient mark (r) as much as 0,9168. Ongkers*et al* (2016) got a mark (r) around Latuhalat Waters as much as (r) = 0,942. Pauly (1984) revealed Coefficient of Growth (b) to the relation of length - weight can be used to see the pattern of fish growth. If B = 3 then can be said that the pattern of growth was isometric which means the rate of additional length as same as additional weight. In reverse, if B (not)= then the growth of fish is allometric as Negative Allometric (b<3) which is the growth of length was faster than the growth of weight and Positive Allometric (b>3) which means the growth of weight faster than the growth of length. Based on the result then the growth coefficient mark (b) of Marckerel during the research has a milling about 2,927-3,165. Isometric Growth as the ascension of length had a same level with the ascension of weight happened on September, December, and February, Positive Allometric Growth as ascension of weight was faster than ascension of length on December, meanwhile Negative Allometric Growth as ascension of length was faster than an ascension of weight on October & January. The difference of the b mark of the fish was assumed that there was an effect of food availability, Spawning Time, and the time and pressure of different catch and effecting the living and the growth of fish.

*Table.2: Length-weight relationship of Decapterusmacarellus during the study*

| Periode | n | W= a $L^b$ | Correlation coefficient (r) | Growth Pattern |
|---|---|---|---|---|
| Sept-2016 | 354 | $W = 0{,}0073L^{3{,}0748}$ | 0,984 | Isometric |
| Oct-2016 | 205 | $W = 0{,}0116L^{2{,}9296}$ | 0,951 | Negative allometric |
| Nov-2016 | 360 | $W = 0{,}0058L^{3{,}1685}$ | 0,985 | Positive allometrics |
| Des-2016 | 202 | $W = 0{,}0073L^{3{,}090}$ | 0,936 | Isometric |
| Jan-2017 | 196 | $W = 0{,}0106L^{2{,}9716}$ | 0,940 | Negative allometric |
| Feb-2017 | 231 | $W = 0{,}0086L^{3{,}0403}$ | 0,976 | Isometric |

## IV. CONCLUSION

The avarage of size distribution of Mackerel in Ambon Waters on the size 9,5-31,8 cm. The Variant Growth on the milling of 2,927-3,165, isometric pattern on September, December, and February, negative allometric on October & January, meanwhile positive allometric on November.

## REFERENCES

[1] Chan, W., Talbot, and P. Sukhavisidhi.,1997.FAO Species Identification Sheet forFisheryPurpose Rome I.

[2] Effendie,M. I.,1978.Biology of fisheries. (Part 1. Study Natural History) Faculty of Fisheries, Bogor Agricultural Institute

[3] Effendie,M. I.,1997. Biology of fisheries. PustakaNusantara Foundation. Yogyakarta. 163 p

[4] Gordon A. L., Susanto R. D., 2001 Banda Sea surface layer divergence. Ocean Dynamics 52:2-10

[5] Hariati, T., 2004. Mackerel Scad (*Decapterus macarellus*), One of the Small Deep Sea Pelagic Fish Species in Indonesia. Indonesian Fisheries Research Report. Resource and Arrest Edition: 11 (5): 15-18

[6] Haruna, Mallawa A., Musbir, Zainuddin M., 2018 Population dynamic indicator of the yellowfintuna *Thunnusalbacares* and its stock condition in the Banda Sea, Indonesia. AACL Bioflux 11(4):1323-1333.

[7] Iksan, H. I. danIrham., 2009. Growth and Reproduction of Mackerel Scad (*Decapterusmacarellus*) in the Waters of North Maluku. Indonesian Ikhtiologi Journal, 9 (2): 163-174

[8] Ongkers, O,T,S. Pattikawa, J.A, Rijoly, F., 2016. Biological Aspects of IndianScad (*Decapterusrusselli*) in Latuhalat Waters, Nusaniwe District, Ambon Island. Omni-Akuatika Journal 12 (3): 79-87

[9] Pauly, D., 1984. Fish Population Dynamics in Tropical Waters: A Manual For Use

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Programmable Calculators. Iclarms, Manila, 323pp

[10] Sangadji, J, Kusumatanto, T, Simanjuntak, S M H., 2014. Depreciation Analysis and Policy for *Decapterussp* Resources Management in the Waters Region of Ambon City. Jaree (Journal of Agricultural Economics, Resources and Environment). Page 43 -60

[11] Sediadi S., 2004.Upwelling effects on the abundance and distribution of phytoplankton in the Banda Sea waters and its surroundings]. Journal MakaraSain 8(2):43-51.

[12] Silooy. F,D. dan Soumokil, A., 2007. Analysis of Population Structure of Mackerel Scad (*Decapterus macarellus*) Around the Waters of the Southern Ambon Island Series. TRITON, ISSN Aquatic Resources management journal: 1693-6493. Vol 4, No. 2, April 2007

[13] Tiews,K.I.A.RoquilloandP.CasesBorja.,2001. ontheBiology ofRoundscad(*Decapterus)* Bleeker in the Filiphines Water. Proct. IPEC.13(2):82-106.

[14] Weber, M.L.F. dan de Beaufort, D., 1931. *The Fishes of The Indo-Australian Archipelago*. E.J. Brill. Leiden, 6: 194-201.

[15] Widiyastuti Hand Zamroni A., 2017. Reproduction Biology Of Mackerel Scad (Decapterus macarellus Cuvier, 1833) in Tomini Bay. BAWAL. 9 (1) April 2017: 63-71

[16] Widodo, J. Dharmadi dan Suwarso., 1999. Distribution, abundance and population structure of Mackerel Scad, Decapterus macarellus, (CARANGIDAE) in the waters of North Sulawesi. Seminar on Management Plan for Tuna and Cakalang fisheries in Sulawesi and its surrounding waters. Pp. 9-12

[17] Yulius, L.G, Sara, L, Mustafa, A., 2013. Composition of Kinds and Size of *Decapterus spp* in Lombe Bay Waters, District of Buton Regency, Southeast Sulawesi Province. Mina Laut Indonesia Journal. Vol. 02. 129-141