Length-Weight Relation and Growth of Mangrove Crab

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Abstract

This study aims to determine the relation of length-weight and growth of mangrove crabs (Scylla serrata) in the Mootilango Village, Duhiadaa Sub-district, Pohuwato Regency. This research was conducted by observation for ± 6 months starting from September 2015 until February 2016. The sampling area covers all of Duhiadaa Sub-district mangrove forest with random sampling method. The result of the research shows that the relationship between carapace length and weight of mangrove crab (Scylla serrata) has the equation W = 6,026L2,444 with correlation (R2) = 0,850. Crab population consist of three age group (L1 = 61,66666667cm, L2 = 17,81981982, and L3 = 0,176691729 cm). While the maximum carapace length (L∞) reach 17.204 cm with a growth rate coefficient of 0.2133 per year.

Keywords: length; weight; growth; mangrove crab; Scylla serrata

Introduction

Mangrove crab is one of the biota whose natural resources are very wide considering its habitat covers all areas of mangrove forest and estuary area. Indonesia is an archipelago of more than 17,000 islands, with more than 91,000 km long beaches. All are estuaries with mangrove forests covering an area of 4.2 million hectares spread throughout the archipelago archipelago. Mangrove forest is the original habitat of mangrove crab (PPKP, 2011).

Mangrove crabs have high economic value, both in domestic and foreign markets. This is due to the increasing demand of crab customers. Mangrove crab (scylla serrata) is highly favored by consumers. The cause is a sense of good meat and high nutritional content (Komarudin, 2012).

The decline of mangrove crab populations in nature is thought to be caused by degradation of mangrove ecosystem and over exploration (Siahainenia, 2008). According to Sparre and Venema (1999) in Monoarfa (2013), growth, mortality, recruitment and exploitation rates of mangrove crabs can be used to determine the optimum catch rate that is the basis for the management policy of mangrove crab catching.

Pohuwato District consists of 13 districts with an area of 4,244.31 km2 (Kabupaten Pohuwato in figures, 2003). At the beginning of Pohuwato District there were several shelters of mangrove crabs in several sub-districts, but the increasing price of mangrove crabs currently causes some shelters to be unable to buy crabs from fishermen. Currently there is only one mangrove crab shelter left in Pohuwato Regency In Kecamatan Duhiadaa Village Mootilango.

Mootilango village has considerable potential in developing the existing mangrove crab production in Mootilango Village. The catch of mangrove crab captured by fishermen is obtained from several places, namely from the area of mangrove forest and the surrounding river Mootilango.Menurut data obtained from the Mootilango Village (2010), Mootilango Village mangrove crab production in 2010 reached 30 tons / per tahun.Average price In 2010 for the mangrove crab is Rp.20.000 / kg, in 2014 until now Rp.30.000 / kg.

Seeing that mangrove crabs have substantial economic potential both domestically and abroad with high levels of demand, but only in supply with continuous catching in nature, there is concern about the special population condition in Mootilango Village. Given the research on long-weight analysis and weight of mangrove crab growth in Mootilango Village, Duhiadaa Sub-District, Pohuwato Regency has not been done so the writer is interested to conduct research with title of long-weight analysis and growth of mangrove crab in Mootilango Village, Duhiadaa Sub-district, Pohuwato Regency.

Research Methodology

This research was conducted for ± 6 months starting from September 2015 until February 2016 located in Mootilango Village.

The research procedure is done starting with observation at the field in Mootilango Village

DuhiadaaSubdistrictPohuwato.Observation is done to know the location of sampling and sampling technique to be studied. After the observation continued with the capture / sampling in the field. The sampling site covers all areas of Duhiadaa village mangrove forest with random sampling method, while sampling method of mangrove crab to be studied is random sampling method, sampling of mangrove crab done every day for two months.

Data analysis technique used in practice is descriptive method, that is by way of describing especially for qualitative data about state of location where takers of mangrove crab, season, and others. While for quantitative data is analyzed through editing process and tabulation. Quantitative data to be analyzed in this research is data obtained from the measurement of weight and length of crab carapaks

According to Hile (1936) in Asmara (2004), that analysis of growth parameters of carapace length and body weight of crabs was measured.

Long carapace relationship with body weight using linear regression approach.To estimate the growth rate of both parameters.

To measure the strength of the relationship of length and weight of mangrove crab is used correlation analysis with the formula Omar (2009) in Tilohe (2015).

To provide interpretation of the correlation coefficient obtained big or small, it can be guided by the provisions on Sugiyono (2013: 184) to provide interpretation of the correlation coefficient.

Research and Discussion

Mootilango Village is one of the villages located in KecamatanDuhiadaa of Pohuwato Regency with an area of 112,054 km2, 89 Ha of rice field, 5 ha of plantation, 105 Ha of irrigated rice field, protected forest area 175 Ha. The boundaries of Mootilango Village are as follows (Mootilango Village Profile, 2010).

Potential fishery resources in the village of Mootilango include aquaculture fisheries and capture fisheries. Aquaculture includes milkfish cultivation and shrimp farming vannamei. Mootilango has fishpond with an area reaching 75 Ha. Total of Mootilango production in 2010 fish milk 29 tons / year, shrimp 10 tons / year, crab 30 tons / year. One of the non fish fishery resources that have considerable potential in Mootilango Village is mangrove crab (Scylla serrata) (Village Profile of Mootilango, 2010).

Carapace length-weight relation

The number of mangrove crabs (Scylla serrata) obtained in the study was 801 individuals. Based on the measurements, the long range of mangrove crab carapace in the study was 2.6 cm up to 8.3 cm with an average of 5.204 cm (Appendix 1). Body weight range of mangrove crab (Scylla serrata) studied is 100.99 gr to 1,324.45 gr.

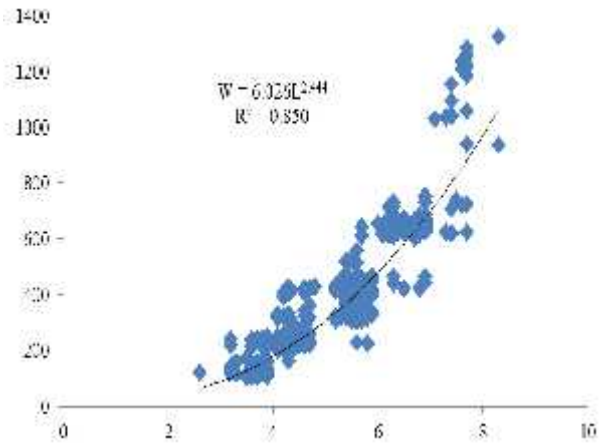

Figure 1 Carapace – Weight relation

According to the graph of FIG. 1, it can be seen that the relationship between carapace length and weight of mangrove crab (Scylla serrata) has the equation W = 6,026L2,444 with correlation (R2) = 0,850. The correlation value shows that the length of karapaks and the weight of mangrove crab in Mootilango Village, Duhiadaa Sub District has a very strong relationship (Based on the correlation coefficient interpretation guideline.

The relationship between carapace length and body weight of mangrove crab in this study is in line with the results of research conducted by Tuhuteru (2003), in Ujung Pangkah waters, Gresik, indicating that the long karapaks relationship with body weight in crab is allometric negative. The weight of the crab shows a strong correlation. This means that carapace length changes have an effect on body weight.

Age structure

The results of class size analysis, total karapaks total, middle class, and value of logarithmic difference of mangrove crab (Scylla serrata) collected during the research in Mootilango Village Duhiadaa Sub-district of Pohuwato Regency based on frequency distribution.

The length of the total karapaks of the mangrove crab (Scylla serrata), can be seen that the mangrove crab mode (Scylla serrata) collected during

the study is dominated by a long carapace range of 5,290 - 5,799 cm, with a total of 154 tails. The least frequencies are carapace length of 7,890 - 8,329 cm with 6 tail.

Table 1 Age structure

No.	UkuranKelas (cm)	Tengah Kelas (cm)	Frekuensi (ekor)	Log F	Δ Log F
1	2,600 - 3,039	3,040	40	16,021	0,169
2	3,040 - 3,479	3,480	59	17,709	0,271
3	3,480 - 3,919	3,920	110	20,414	0,418
4	3,920 - 4,359	4,360	42	16,232	0,258
5	4,360 - 4,799	4,800	76	18,808	0,124
6	4,800 - 5,289	5,290	101	20,043	0,183
7	5,290 - 5,729	5,730	154	21,875	0,243
8	5,730 - 6,169	6,170	88	19,445	0,181
9	6,170 - 6,609	6,610	58	17,634	0,151
10	6,610 - 7,049	7,050	41	16,128	0,358
11	7,050 - 7,489	7,490	18	12,553	0,352
12	7,450 - 7,889	7,890	8	0,9031	0,125
13	7,890 - 8,329		6	0,7782	

Source: Primary Data, 2016. Based on distribution table

The mapping of age grouping can be known by theoretical frequency logarithmic difference analysis against the mean value of mangrove crab class using Bhattacharya (1967) method of analysis in Sparre and Siebern (1999). Mapping the logarithmic difference in the total length of the carapace (Y axis) to the mean middle grade (X axis) of the mangrove crab.

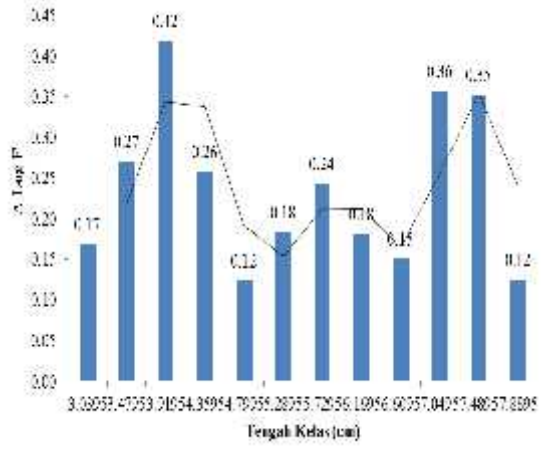

Figure 2 Mapping of the karapaks' long logarithmic difference to the middle grade of the mangrove crab

Based on the results of mapping the total logarithmic length of the total carapace (Y axis) to the mean grade (X axis) of the mangrove crab (Scylla serrata) there are 3 relatively long aggregate carapace age groups (L1, L2, and L3). From the average length of carapaks for the age group 1 (L1) that is 3.717cm with frequency as much as 327 head, age group 2 (L2) is 5,503cm with frequency as many as 477 head, and group age 3 (L3) that is 7,130 cm with frequency As many as 125 tails.

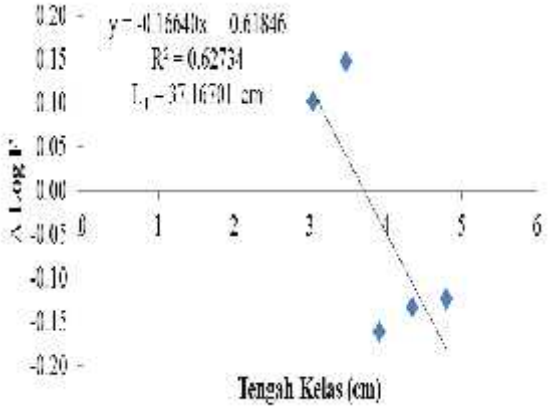

Figure 3 Age group L1

Based on Figure 3 shows that the age group of mangrove crab for the age of one relative (L1) has an average carapace length of 3.716701cm with a correlation value (R2) of 0.62734 with the equation -0.16640 + 0.61846 x. The age group of mangrove crabs for the relative age of one (L1) has a carapace length ranging from 2,600 - 5,289 cm. For distribution, class size, middle class, frequency, logarithmic frequency and crab logarithm difference accumulated during the study for the relative age of one (L1).

Result of mapping of total carapace length logarithm (Y axis) to middle grade value (X axis) for mangrove crab (Scylla serrata) of relative age two (L2) in Mootilango Village Duhiadaa Sub-district of Pohuwato Regency.

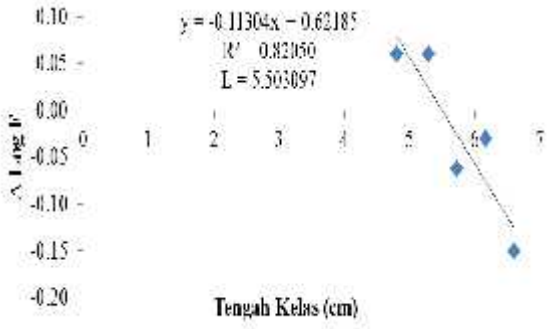

Figure 4 Age group L2

The age group of mangrove crabs for the relative age of two (L2) has an average carapace length of 5,503097cm with a correlation value (R2) of 0.82050 with the equation of -0.11304x + 0.62185. The age group of mangrove crabs for the relative age

of two (L2) has a length of karapaks ranging from 4,800 to 6,609 cm.

Result of mapping of total logarithm of total carapace length (Y axis) to middle grade value (X axis) for mangrove crab (Scylla serrata) of relative age three (L3) in Mootilango Village Duhiadaa Sub-district of Pohuwato Regency.

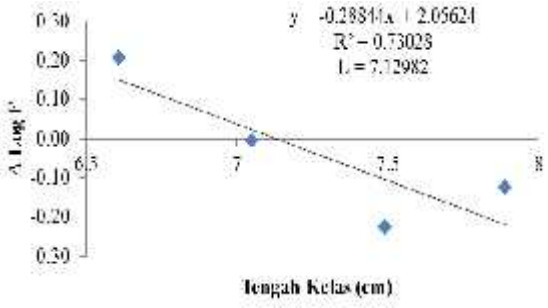

Figure 5 Age group L3

The age group of mangrove crabs for the relative age of three (L3) has an average carapace length of 7.12982cm with a correlation value (R2) of 0.70973 with the equation of 2.05624 + 0.02884x. The age group of mangrove crabs for the relative age of three (L3) has a carapace length ranging from 6.170 - 8.329 cm.

Growth

Based on the values of L ∞, K, and to that obtained by using the Von Bertalanffy equation, the equation of growth of mangrove crab (Scylla serrata) in Mootilango village of Duhiadaa Regency of Pohuwato Regency is as follows:

$$Lt = 1{,}46395\ (1 - e^{0{,}06418\ (t-0{,}353)})$$

From the equation obtained growth curve of mangrove crab (Scylla serrata),

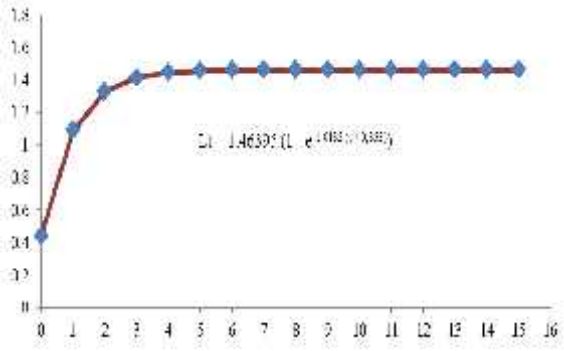

Figure 6 Growth curve of mangrove crab

The growth of the mangrove crab seen in Figure 10 shows that the growth of the relative one moth crab (L1) and and the relative age of two (L2) develops faster than the relative crabs of the relative age of three (L3), and at the relative age of three (L3) will Continues to progress until it reaches the maximum carapace length.

Ellefan analysis results show that maximum karapaks maximum of mangrove crab (Scylla serrata) that can be reached ranged between 14,3 - 15,5 cm with growth rate ranged from 0.45 - 1.5. In Subang, the growth rate (K) of mangrove crabs from 4 Scylla species ranged from 1.10-1.50 / year. It is further stated that the growth rate of Scylla serrata located in MuaraSangatta is higher than other locations, with L∞ being also larger. MuaraSangatta condition which is a big river estuary, making the area become fertile estuary and high productivity. Generally the crabs captured in MuaraSangatta are below adult size with a carapace length less than 11.0 cm (Siahainenia, 2008 in Wijaya, 2011).

Conclusion

Based on the results of research on the analysis of long-weight relationship and growth of mangrove crab (Scylla serrata) in Mootilango village, Duhiadaa sub-district of Pohuwato regency, it can be concluded that the relationship between carapace length and weight of mangrove crab has the equation W = 6,026L2,444 with correlation (R2) = 0,850. Crab population consists of three age groups (L1 = 3.716707cm, L2 = 5,503097, and L3 = 7,12982 cm). Maximum length (L∞) of mangrove crab carapace reach 15,86594cm with coefficient of growth rate 0,276 per year.

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