

# Size Composition Of Skipjack Tuna (*Katsuwonus Pelamis*) In Three Region Fisheries Management In Bitung Ocean Fishery Port

Asia, Sudirman, Budimawan, Natsir Nessa

**Abstract:** The aim of research is to know the size composition of length and weight of skipjack tuna (*Katsuwonus pelamis*) caught in three region fisheries management i.e. WPP 714, WPP 715 and WPP 716. Its result indicate that the size composition measure of skipjack tuna were caught in three WPP different each other. In WPP 714 was domination of size measure 38 cm - 44 cm, WPP 715 domination by 32 cm and WPP 716 predominated the size measure 38 cm.. The relationship between length and weight of skipjack tuna are the important information for development and sustainability of fish management.

**Index Terms:** skipjack tuna, Bitung, length, fishery, weight

## 1 INTRODUCTION

Cakalang City (Skipjack tuna City) is the nick name of Bitung, the centre of fishery industries in Indonesia. Bitung is a city on the northern coast of the Sulawesi island in Indonesia. It is in the province of North Sulawesi, faces Lembeh Island and the Lembeh Strait, which is known for its colorful marine life, in particular sea slugs. Bitung has a population of 187,932 at the 2010 Census (Anonim, 2014). This position makes Bitung as the one of centre fisheries industry in Indonesia. Its the opportunity for Bitung to be a centre of regional economic activities in Indonesian eastern area. Beside it, Bitung has potential of natural sources and fisheries amount 587.000 tonnes. Unfortunately, only 147.000 tonnes was used for people prosperity. In 2009, the fisheries production value Bitung was increased from 142.362 to 145.053. The advantages from this activities increasing about 82,47 billion rupiahs in the same year. This is the achievement for Bitung fisheries development because increasing value production not affect the number of fisherman ship. This phenomenon as the indicator need another factor as catchment fish technology and fisherman capability in increasing value fisheries production (BPPS Bitung, 2010). The famous commodities from Bitung is skipjack tuna and give the higher production about 6.132 tonnes with value 398 billion rupiahs in 2009 (Anonymous, 2014). Skipjack tuna (*Katsuwonus pelamis*) around Bitung could be catch everytime. The fish catch season start from January, April, June, July and August. In May, October and December not suitable to fish catcher (Kekenusa, 2006). Relationship between length and weight is great importance in fishery assessments.

The relationship indicates the taxonomic differences and events in the life history and fish species. Based Sala (2009) reported that, size composition of skipjack tuna in Bitung catch by huhate system (pole and line) tend to be stable. Unfortunately, skipjack from ring trawl was dominated by fish size less than 1 kg. For the development and sustainability of the fishery in the Bitung city, need more research on the biological condition of skipjack tuna especially for length and weight relationship.

## 2. METHODS

The research was conducted in three region fisheries management in Bitung Ocean Fisheries Port. The three region namely WPP 714, WPP 715 and WPP 716. The research was conducted in Januari – December 2013. The maps of research location was showed in Fig 1.

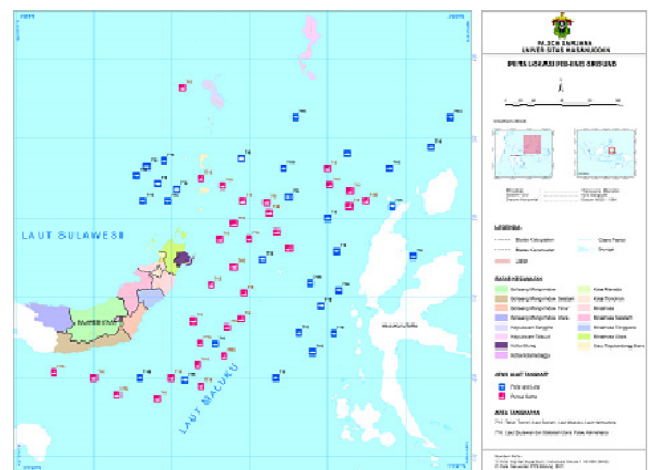


Figure 1. Maps of Research Location in Bitung

- Asia, Polytechnic Marine and Fisheries Bitung, North Sulawesi Indonesia.
- Sudirman, Faculty of Marine and Fishery, Hasanuddin University, Makassar, Indonesia.
- Budimawan, Faculty of Marine and Fishery, Hasanuddin University, Makassar, Indonesia.
- Natsir Nessa, Faculty of Marine and Fishery, Hasanuddin University, Makassar, Indonesia.

## 1. Relationship Between Length and Weight of Skipjack Tuna

The relationship between length (L) and weight (W) of skipjack tuna refers to the formula by Fafioye and Oluajo (2005) [2] and Kalayci et al., (2007) [4].

$$W = aL^b$$

where, a and b = constanta, W = weight (g), L = length (cm).

**2. The Length Size Composition of Skipjack Tuna**

Measurement of length and weight is to determine the relationship between length and weight of skipjack tuna. The amount of b in relation between length and weight skipjack tuna as important indicator of fish body i.e slim, isometric or fatty. The value of b = 3 meaning that skipjack tuna has isometric growth as the indicator balance between length and weight. In contrast value b>3 or b<3 meaning allometric growth or length development slowly or faster from weight development. If value b<3 meaning negative allometric development (slim) and b>3 positive allometric (fatty). To test value of b was used T test (Matsumoto,1984) with formula:

$$t_{value} = \frac{3 - b}{s / \sqrt{n}}$$

where b is calculated value length and weight ratio of skipjack tuna, s meaning the standard deviation, n is the number of sample. If T value is greater than T table (95% = significant), then the value of b, is not equal to 3 or relationship between length and weight of skipjack tuna is positive allometric (b>3) and negative allometric (b<3). However t value less than T table, the value is equal to 3 or relationship symmetrical skipjack tuna length and weight. The size composition of the skipjack tuna samples were analyzed by T test samples to test whether the sample is interpretation of the population. Then we made class based skipjack tuna length to determine the frequency of measurement. Furthermore we made a graphed using Microsoft Excel 2007 program.

**3. RESULT AND DISCUSSION**

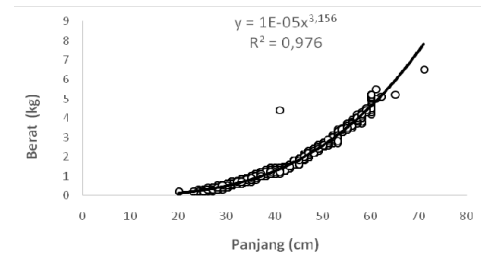
**1. Relationship Between Length and Weight of Skipjack Tuna**

Skipjack tuna living in the deep sea. The results of relationship length and weight skipjack tuna in WPP 714, WPP 715 and WPP 716 was showed in Fig 2, 3 and 4. The number of skipjack tuna, a and b coefficient from three research location was showed in Table 1.

**Table 1.** Analysis of The Number of Skipjack Tuna From Three Research Location.

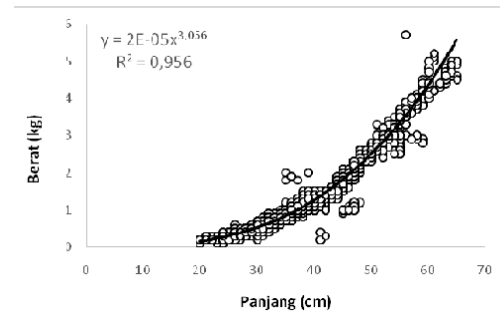
Research Location	Number of skipjack tuna samples	a coefficient	b coefficient	Determinant coefficient (R <sup>2</sup> )
WPP 714	7.200	-4,9489	3.1568	0,99
WPP 715	58.800	-4,7747	3.0462	0,98
WPP 716	8.900	-4,8519	3.0976	0,99

The number of skipjack tuna samples was higher in WPP 715 is 58.800. In WPP 716 is 8.900 and lowest in WPP 714 with the amount 7.200. The coefficient of determination (R<sup>2</sup>) of the length relationship weight on each WPP including WPP 714 is 0.99, WPP 715 is 0.98 and 0.99, respectively. This suggests that 98-99% of the equation can explain precisely the results obtained.



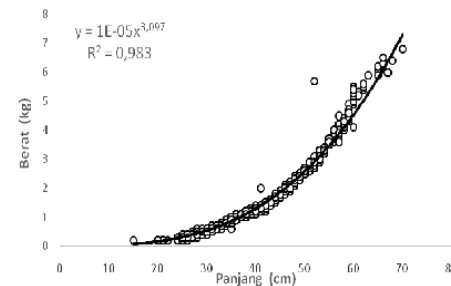
**Figure 2.** Relationship Length and Weight of Skipjack Tuna in WPP 714.

The relationship of length and weight of tuna in WPP 714, WPP 715, and WPP 716 was landed in the ocean Fishing Port Bitung from January to December 2013 can be seen in Figure 2, 3 and 4.



**Figure 3.** Relationship Length and Weight of Skipjack Tuna in WPP 715

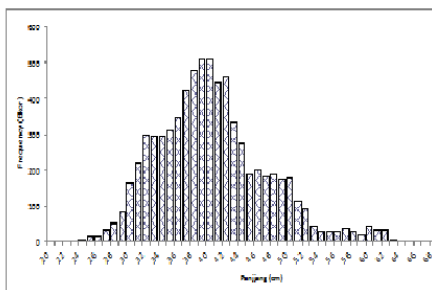
The results of the length analysis of the skipjack tuna were caught was affect by season and catch methods by fisherman. Kekenusa (2006) [5] assumed that the sea with higher biodiversity will attract many skipjack tuna living inside.



**Figure 4.** Relationship Length and Weight of Skipjack Tuna in WPP 716.

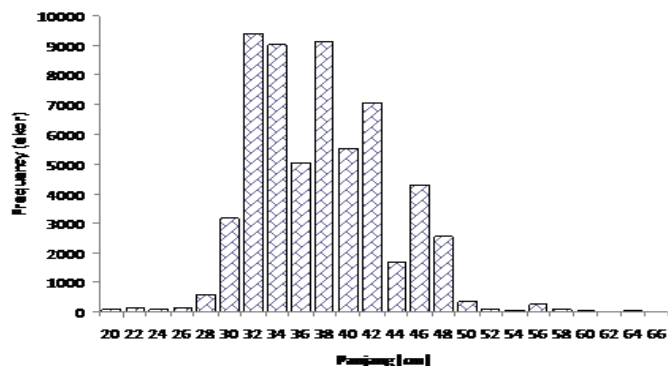
**2. The Length Size Composition of Skipjack Tuna**

The length average of skipjack tuna on WPP 714 from January to December between 20 - 71 cm. The result measurement was showed in Fig 5.



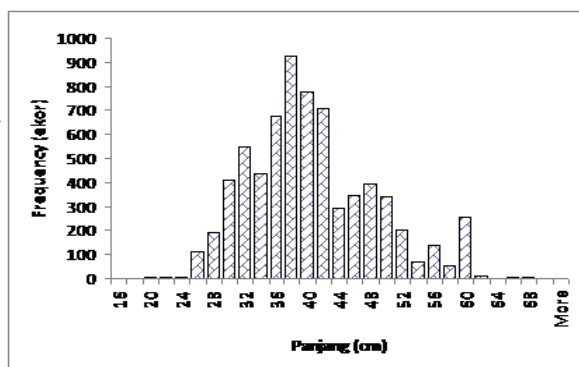
**Figure 5.** Size Composition of Skipjack Tuna in WPP 714

In January, the length average is 28-58 cm, while in February is 26 - 49 cm, March is 23 - 60 cm , April is 24 - 52 cm and May is 25 - 60 cm. In June until August, the length average is 24 – 62 cm, while September to December 20 – 71 cm. Based on Figure 5, the length size of skipjack tuna in WPP 715 were dominant measurement in 38 – 44 cm. The length average of skipjack tuna on WPP 714 from January to December between 20 - 71 cm. The result measurement was showed in Fig 6.



**Figure 6.** Size Composition of Skipjack Tuna in WPP 715

In January to December, the length average minimum in WPP 715 is 20 cm and maximum is 65 cm. The length average maximum 45 cm find in March, August, October and November. The length average maximum in January, February and March is 58 cm. In June and December, the length maximum is 58 and 61 cm, respectively. The length average of skipjack tuna on WPP 716 has a high variation (Fig 7).



**Figure 7.** Size Composition of Skipjack Tuna in WPP 716

While the skipjack tuna were caught on WPP 716, the variety of length was higher than in WPP 714 and 715. The minimal length average is 20 cm find in February, July, October, November and December. In January, April and September, the minimum length average 28 cm. The maximum length average find in October is 70 cm. The length-weight variation in WPP 716 more than in WPP 714 and WPP 715. We assumed, the food richness in WPP 716 support fish living. Micro habitat more suitable in WPP 716 for development of skipjack tuna. Actually, the variation for a same species could be attributed to differences in sampling, sample size or length ranges. In addition, growth increment, food, environmental conditions, such as temperature, salinity, seasonality, as well as differences in age and stage of maturity (Fafioye and Oluajo, 2005)[2].

#### 4. CONCLUSION

Based on the research, the skipjack tuna length-weight in WPP 716 more fatty than WPP 714 and 715. While the composition of the size in three WPP 714 dominated size 38 cm - 44 cm , at WPP 715 in dominance size 32 cm , and in WP 716 dominated the size of 38 cm .

#### 5. REFERENCES

- [1] Anonim, 2014. Bitung. <http://www.wikipedia.org/> (access date 20 November 2014).
- [2] Fafioye O,O and Oluajo O,A (2005). Length-Weight Relationship of Five Fish Species in Epe Lagoon, Nigeria. African Journal Of Biotechnology 4(7):749-751.
- [3] Jamal, M (2011). Analisis Perikanan Cakalang (Katsuwonus pelamis) di Teluk Bone: Hubungan Aspek Biologi dan Faktor Lingkungan. Disertasi. Pascasarjana IPB. Bogor. 252 hlm. .
- [4] Kalayci F, Samsun N. Bilgin S, and Samsun O. (2007). Length-Weight Relationship of Ten Caught by Bottom Trawl and Midwater Trawl From The Middle Black Sea, Turkey. Turkish Journal of Fisheries and Aquatic Science 7:33-36 (access date 20 November 2014).
- [5] Kekenusa, S. J. (2006). Analisis Penentuan Musim Penangkapan Ikan Cakalang (Katsuwonus pelamis) Di Perairan Sekitar Bitung Sulawesi Utara. Jurnal. Vol.13 No.1.Th.2006
- [6] Manik.N. (2007). Beberapa Aspek Biologi Ikan Cakalang (Katsuwonus pelamis) di Perairan Sekitar Pulau Seram Selatan dan Pulau Nusa Laut. Jurnal Oseanologi dan Limnologi 33: 17–25. ISSN 0125 – 9830.
- [7] Matsumoto WM, (1984). Synopsis of biological data on skipjack Tuna (Katsuwonus pelamis). NOAA Technical Report NMFS Circular No. 451 dan FAO Fisheries Synopsis No 136. Diterjemahkan oleh Fedi A. Sondita, 1999. Jurusan Pemanfaatan Sumberdaya Perikanan, IPB. Bogor.
- [8] Sala.R (2009).Composition of Skipjack Tuna (Katsuwonus pelamis L) Taken by Commercial Fishery From The Northeastern Waters of Indonesia. Vol 14 (4) : 46-53. Departemen of Marine Science, The State University of Papua.