PROCEEDING

The 2nd International Seminar of Basic Science

Natural Science For Exploration The Sea-Island Resources

Ambon, May 31st 2016

Organized by

Faculty of Mathematics and Natural Science

Pattimura University

PROCEEDINGS

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"Natural Science for Exploration The Sea-Island Resources"

Poka-Ambon, 31st May 2016

Mathematic and Natural Science Faculty
Universitas Pattimura
Ambon
2016

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Welcoming Address By The Organizing Committee

Today, We have to thank the The Almighty Allah SWT for the implementation of this international seminar. This is the second seminar about Basic Science in The Faculty of MIPA Pattimura University. The seminar under the title “Natural Sciences for Exploration the Sea-Island Resources” will be carried out on May 31st 2016 at Rectorate Building, Pattimura University. There are 200 participants from lecturers, research institute, students, and also there are 34 papers will be presented.

My special thanks refer to the rector of Pattimura University and the Dean of MIPA Faculty, Prof. Dr. Pieter Kakissina, S.Pd., M.Si. I also would like to express my deepest gratitude to Prof. Amanda Reichelt-Brushett, M.Sc., Ph.D. ; Kazuhiko Ishikawa, Ph.D. ; Nicolas Hubert, Ph.D. ; Prof. Dr. Kirbani Sri Brotopuspito ; Prof. Dr. Marjono, M.Phil. ; Gino V. Limon, M.Sc., Ph.D. as the keynote speakers.

The last, We hope this international seminar usefull for all of us, especially Mollucas People and very sorry if any mistake. Thank you very much.

Dr. La Eddy, M.Si.
Chairman of Organizing Committee

Opening Remarks
By Dean of Mathematic and Natural Sciences Faculty

I express my deepest gratitude to The Almighty God for every single blessing He provides us especially in the process of holding the seminar until publishing the proceeding of International Seminar in celebrating the 18th anniversary of MIPA Faculty, Pattimura University. The theme of the anniversary is under the title "Natural Sciences for Exploration the Sea-Island Resources". The reason of choosing this theme is that Maluku is one of five areas in Techno Park Marine in Indonesia. Furthermore, it is expected that this development can be means where the process of innovation, it is the conversion of science and technology into economic value can be worthwhile for public welfare especially coastal communities.

Having the second big variety of biological resources in the world, Indonesia is rich of its marine flora and fauna. These potential resources can be treated as high value products that demand by international market. Basic science of MIPA plays important role in developing the management of sustainable marine biological resources.

The scientific articles in this proceeding are the results of research and they are analyzed scientifically. It is expected that this proceeding can be valuable information in terms of developing science and technology for public welfare, especially people in Maluku.

My special thanks refer to all researchers and reviewers for your brilliant ideas in completing and publishing this proceeding. I also would like to express my gratefulness to the dies committee-anniversary of MIPA Faculty for your creativity and hard working in finishing this proceeding, God Bless you all.

Prof. Dr. Pieter Kakisina, S.Pd., M.Si.
Dean of Mathematic and Natural Sciences Faculty

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RELATIONSHIP OF LENGTH-WEIGHT AND SIZE STRUCTURE OF SKIPJACK (*Katsuwonus pelamis)* IN MARINE WATERS OF MOLUCCAS, INDONESIA

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ABSTRACT

Skipjack (*Katsuwonus pelamis*) commercially important fish scattered in tropical waters covering the Molluccas Sea, Indonesia, the East-West Pacific Ocean Waters, the East-West Atlantic Ocean and the Indian Ocean. Skipjack tuna is one of the fish resources economically valuable. The market demand continues to increase so as to encourage the exploitation intensified, both by small-scale fisheries (local fishermen) and large scale. The purpose of this study was to determine the distribution of size forked long, relationship of length-weights on skipjack. The results are expected to provide information about the parameters intended for the management of skipjack resources. The research was conducted by survey method and direct observations in the field to 10% of the catch of tuna with pool and line method in January until November 2015. The results showed that the distribution of size of the long forked of Skipjack caught by fishing *pole and line* method ranged between 28-65 cm FL and dominated by the size of 43 cm FL. Relationship of length-weight of skipjack were caught from the waters of the Mollucas Sea, is a positive allometric (b> 3) and negative allometric (b <3). The length faster than weight gain. Positive allometric (b> 3) occurred in January and February, negative allometric (b <3) occurred in March and July, while isometric (b = 3) occurred in August and December.

Keywords: Skipjack, Length-Weight relationship, Structure size, and Mollucas Sea

INTRODUCTION

Fish populations of Skipjack in the Pacific Ocean in 2013 was 1,729,142 tons with peak spawning from July to September (Davies *et al.,* 2014; Harley *et al.*, 2014; Rice *et al.*, 2014; WCPFC, 2014; Williams and Terawasi, 2014). Total catches in 2013 in the waters of the Mollucas Sea was 51,823,738 kg (51,823 tons) with a sale value of fish per tail was IDR 14,950 and production value amount of IDR 744 billion. Skipjack in the waters around Bitung can be caught throughout the year.

Catching season of Skipjack fish is in January to April, June, July, and September, while in May, August, and October through December is not the catching season (Kekenusa, 2006; Kekenusa, 2014; Saputra *et al.,* 2014; Karman *et al.,* 2014). The impact of the catching season against the size of decent fish caught of skipjack (Wagiyo, 2014; Karman *et al.,* 2014)

that occurred in the Mollucas Sea. The aim of this study was to determine the distribution of size forked long, relationship of length-weights on skipjack fish (*Katsuwonus pelamis*).

MATERIALS AND METHODS

Location of the study (Figure 1), is divided by the migration of skipjack. Maluku Sea is a zone of open sea waters entered relating to the Pacific Ocean, with fishing base in the Ocean Fishing Port (OFP) Bitung (Shamsuddin, 2006).

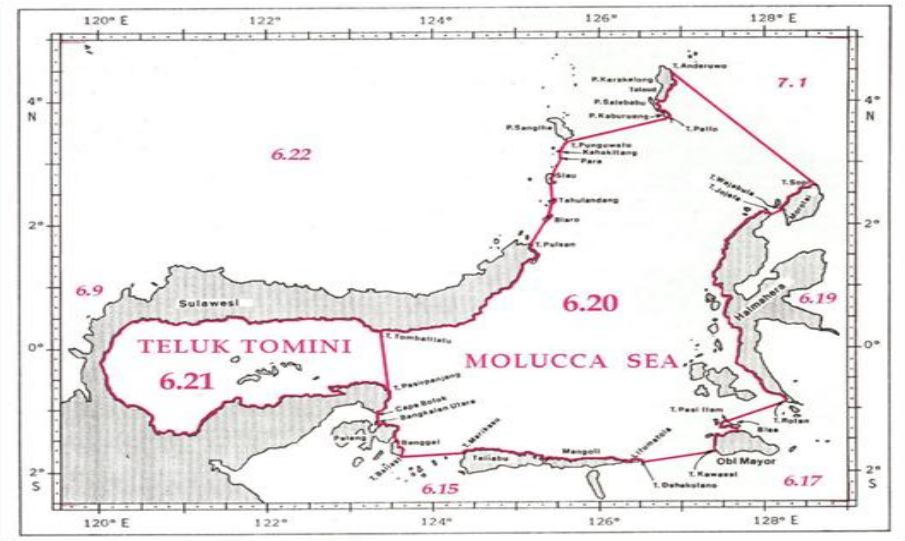


Figure 1. Location of the study in the Molluca Sea

Skipjack samples were taken 10% of the amount of fish on a pole and line that landed daily at the Bitung Ocean Fishery Port. Percentage of influence and the relationship length-weight analyzed by linear regression method using MS Excel application and manually calculated using the formula (Effendie, 2002): $W = a L^b$

Noted :
W=weight of yellow fin of skipjack (g)
L = length of yellow fin skipjack (cm)
a = constant (intercept)
b = regression coefficient (slope)

a) If b = 3, the growth is isometric, i.e. the growth of the same length with a weight growth
b) If b> 3, then allometric growth pattern is positive, the weight gain is faster than the increase in length,
c) If b <3, then allometric growth pattern is negative, i.e. the length faster than weight gain.

RESULTS AND DISCUSSION

Relationship between the length-weight of skipjack

Length forked and weight of skipjack relationship every month shown by the equation as presented at Table 1 and Figure 2.

Table 1. Relationship between the length-weight of Skipjack fish (*Katsuwonus pelamis*) catches *Pole and line* in the Maluku Sea waters in January - December 2015.

Month – Year	Fish Sampel	a Coefficient	Exp (a)	b Coefficient	Determination Coefficient (R^2)
January 2015	123	-6,398	0,001665	2,488	0,928
February 2015	341	-4,662	0,00944755	2,036	0,960
March 2015	63	-13,06	2,1287E-06	3,957	0,993
April 2015	49	-14,21	6,74024E-07	4,242	0,985
May 2015	117	-12,34	4,37327E-06	3,771	0,981
June 2015	183	-10,48	2,80927E-05	3,305	0,985
July 2015	187	-4,414	0,012046273	1,895	0,919
August 2015	177	-6,147	0,00214	2,399	0,907
September 2015	193	-10,28	3,43125E-05	3,255	0,987
October 2015	183	-10,30	3,36331E-05	3,262	0,972
November 2015	196	-9,318	8,97933E-05	3,013	0,977
December 2015	196	-9,281	9,31779E-05	3,004	0,976

Sources : Original data, 2015

The research found that length-weight relationship on the 1st transitional season (March-April) explained that in March 2015 the value of W = 2,1287E-06 $L^{3,957}$ with confidence level of 99% and the April 2015 value 6,74024E-07 $L^{4,242}$ with 95% confidence level, b value greater than 3 indicates a growth pattern in which growth is *Allometric Positive* which the weight growth was faster than that of length growth.

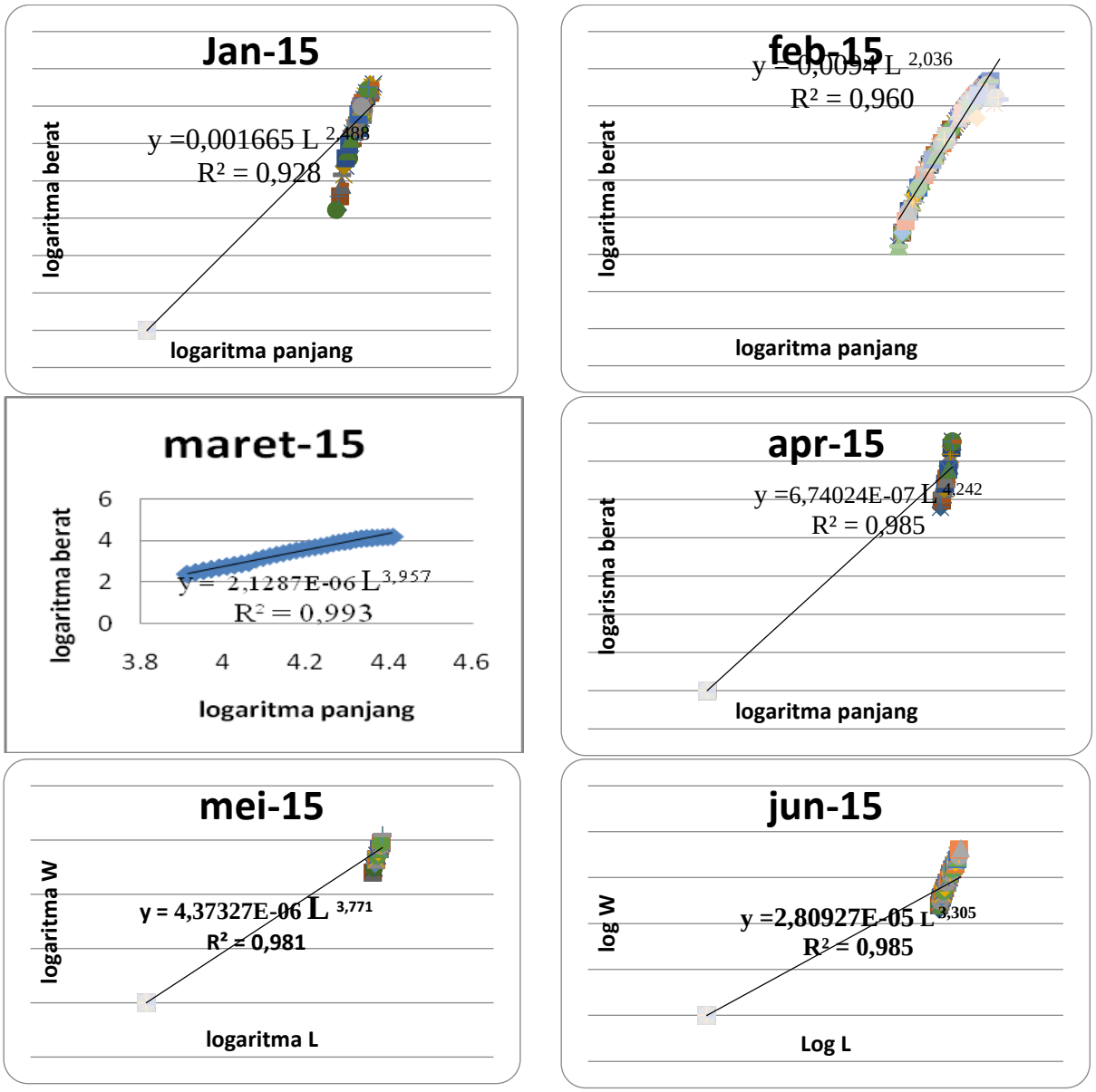
East season in May 2015 W = 4,37327E-06 $L^{3,771}$ with 98% confidence level (*allometric positive*), June 2015 W = 0.012 $L^{1,895}$ (*allometric negative*) confidence level of 98%, in July 2015 W = 0.012 $L^{2,399}$ (*allometric negative*) confidence level of 90%, in August 2015 W = 0.0021 $L^{2,399}$ (*allometric negative*) 91% confidence level.

Research results of the 2nd Transition Season in October 2015 the value of W = 3,36331E-05 $L^{3,255}$ confidence level of 98%, September 2015 W = 3,43125E-05 $L^{3,262}$ confidence level of 97% in October to September 2015 b value greater than 3 indicates Isometric pattern of growth where the growth weight is balanced to the long growth.

The 1st transition season in November 2015 W= 8,97933E $L^{3,013}$ R^2 = 97%, in December 2015 W = 9,31779E $L^{3,004}$ R^2 = 97%, in January 2015 W= 0.001665 $L^{2,488}$ R^2 = 92%, the value of b is greater than 3 indicates a growth pattern which is *Isometric* weight growth balanced to the long growth, and in February 2015 the value of b is greater than 3 indicates a growth pattern *Isometric* where weight growth is slower than that of a long growth. W = 0.0094 $L^{2,036}$ R^2 = 96%.

Length-weight relationship of skipjack in the area of FADs is *negative allometric* while in areas without FADs experiencing *negative allometric* growth pattern. It concludes that eleven and twelve point arrests were found in the area using FADs and without using FADs, respectively.

Based on the length-weight relationship showed that of skipjack caught in the area without FADs has a size larger than that the size of the fish caught in the area FADs, productivity catches on FADs area higher than that without using FADs (Husair *et al.*, 2014). Kekenusa (2006) reported that skipjack in the waters around Bitung can be caught throughout the year. Fishing season of skipjack is January to April, June, July, and September, while in May, August, and October through December is not the season to catch. Skipjack length – weight equation for Zone A was: W = 0.016 $L^{3,035}$ and for WW=0,014 $L^{3,079}$, where both had isometric growth (Karman *et al.,* 2014).



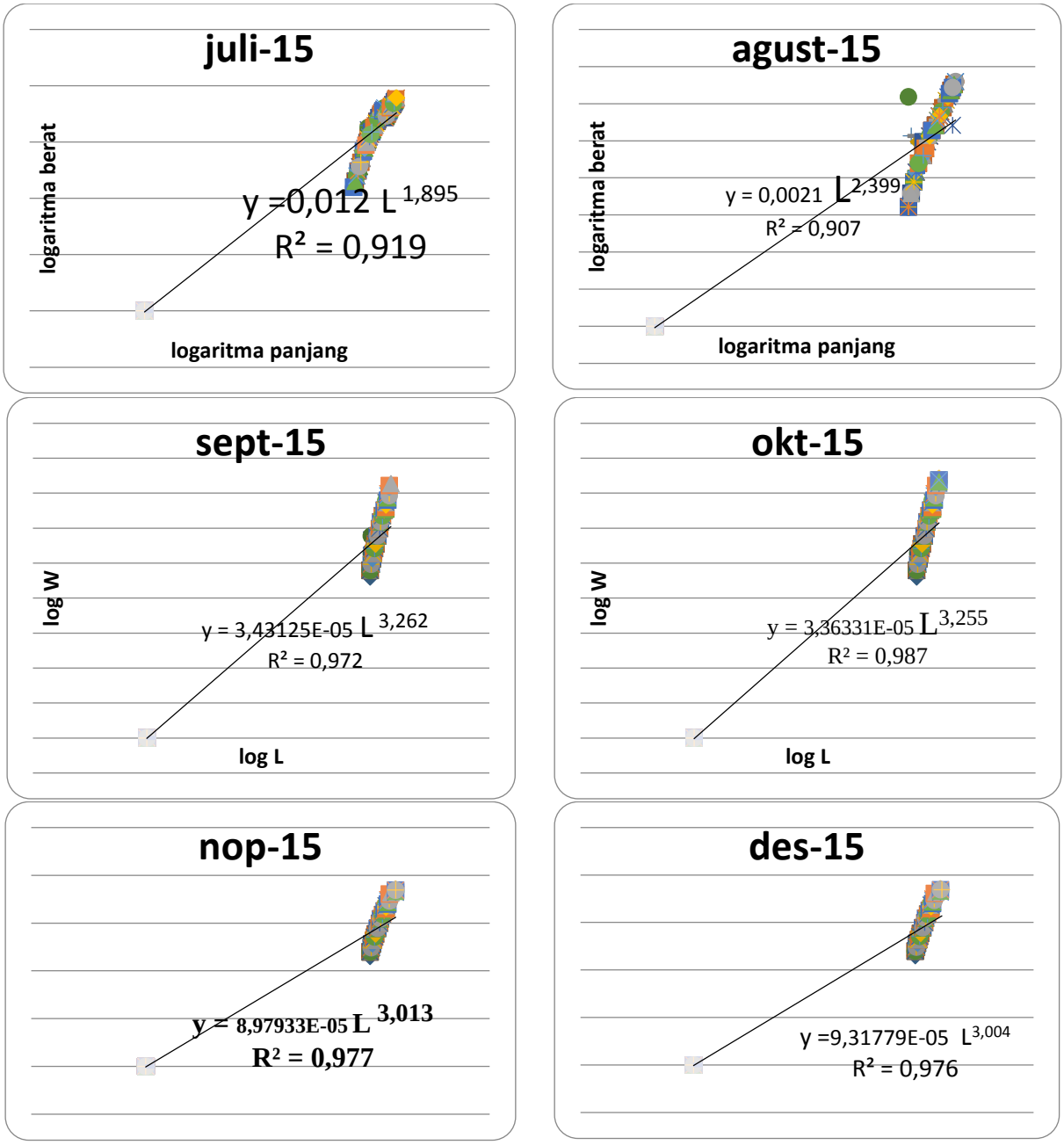


Figure 2. Correlation length-weight of fish Skipjack (*Katsuwonus pelamis*) catches *Pole and line* in the Maluku Sea waters in January - December 2015.

Structure Size

During the study found that many of skipjack size caught in the waters of the Maluku Sea in January and February 2015 was dominated by the size of 42 cm and 52 cm, respectively. Meanwhile in March, April, and May 2015 was dominated by size of 57 cm, in June sizes was dominated by the size of 51 cm, in July 2015 the size was dominated by the size of 49 cm; in August 2015 the size was dominated by the size of 35 cm, September to December 2015 the size was dominated by the size of 51 cm.

Haruna and Septianingshi (2011) found that the total catch of skipjack in the Seram Sea, Mollucas, decent sized skipjack catch in the range of 45.1 to 50.0 cm (27.32%) and the size of 50.1 to 60.0 cm (17.43%). Waileruny *et al.* (2012), found that a decent sized of skipjack fishing in the Banda Sea and its surroundings was more than 58 cm. Domination decent of skipjack fishing throughout the year was vary from one season to another. The highest catch a decent size during east monsoon (June to August) was 52.99%, followed by the 2nd transition season (September-November) was 30.63%, west season (December-February) was 24.22%, and the lowest at the 1st transition season (March to May) was 21.48%. Syahailatua *et al.* (2011) found that period of June to August, the tendency of skipjack that caught was longer than that of 45 cm.

CONCLUSION

1. The 1st transition season (March-April) explained that in March 2015 the value of W = 2,1287E-06 $L^{3,957}$ with confidence level of 99% and the April 2015 value of W = 6,74024E-07 $L^{4.242}$ of the 95% confidence level, the value of b is greater than 3 shows the pattern of growth is positive *allometric*.
2. East season in May 2015 W = 4,37327E-06 $L^{3.771}$ 98% confidence level (*positive allometric*), June 2015 W = 0.012 $L^{1.895}$ (*negative allometric*) confidence level of 98%, in July 2015 W = 0.012 $L^{2,399}$ (*negative allometric*) confidence level of 90%, in August 2015 W = 0.0021 $L^{2,399}$ (*negative allometric*) 91% confidence level.
3. The 2nd Transition Season in October 2015 the value of W = 3,36331E-05 $L^{3,255}$ confidence level of 98%, September 2015 W = 3,43125E-05 $L^{3.262}$ confidence level of 97% in October to Sept 2015 b value greater than 3 indicates Isometric pattern of growth where the growth of weight was balanced of the long growth.
4. The 1st Transition Season November 2015 I-05 W = 8,97933E $L^{3,013}$ R^2 = 97%, December 2015-05 W = 9,31779E $L^{3,004}$ R^2 = 97%, in January 2015 0.001665 $L^{2.488}$ R^2 = 92%, the value of b was greater than 3 indicates a growth pattern which was Isometric weight balanced to the long growth and in February 2015 the value of b was greater than 3 indicates a growth pattern Isometric where weight growth was slower than that of the a long growth.
5. The size of skipjack fish that caught in the Maluku Sea waters in January and February 2015 were dominated by the size of 42 cm and 52 cm, repectively. Meanwhile in March, April, May 2015 was dominated by the size of 57 cm, in June the sizes was dominated by the size of 51 cm, in July 2015 the size was dominated by the size of 49 cm; August 2015 the size was dominated by the size of 35 cm, September to December 2015 the size was dominated by the size of 51 cm.

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