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Stock Identification *Sardinella Lemuru*, Bleeker 1853 In Madura Strait, Bali Strait, and Southern-East Java Water

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ABSTRACT

Balinese Sardinella (*Sardinella lemuru*) is the main commodity in Indonesia. Despite, many researches show that lemuru got the overfishing condition. In East Java region, likely Bali Strait, Southern-East Java water, and Madura Strait are the region which the most production of lemuru catch. So, it needs identification stock of *Sardinella lemuru* on the third fisheries management east java sub-region, as it to be used as a reference to managing the sustainability of the catch *Sardinella lemuru* for the future. Research carried out in January to May 2016 with the methods is the sample of random sampling in three different locations water representing Madura Strait, Bali Strait, and southern-East Java water. Each sample implemented were in four times during a period of months old different. Every sample researchers get as 50-200 tails. Sardinella lemuru is in accordance with the season fish. The sample which has been obtained taken to the laboratory of Marine Science University of Brawijaya to data takes. The analysis used in this research was Truss morphometric and factor analysis of the condition allometric. Based on the results of the analysis in the Madura Strait, Bali Strait, and Southern-East Java water are having a distinction of morphometric character amount 44% with the character being very affected is PAL_FL, DFB_HL, PVL_FL, UPCL_FL, OD_HL, and PPL_FL. Around 64% of the whole morphometric character that is 14 characters. Next, if it is seen from Allometric condition in the third these waters having b value different from each aquatic and after B-test that lemuru in the three the waters might otherwise dissimilar stock so management of Sardinella lemuru in the three waters should have been undertaken in separated.

Keyword: *Sardinella lemuru*, stock identification, and morphometric.

INTRODUCTION

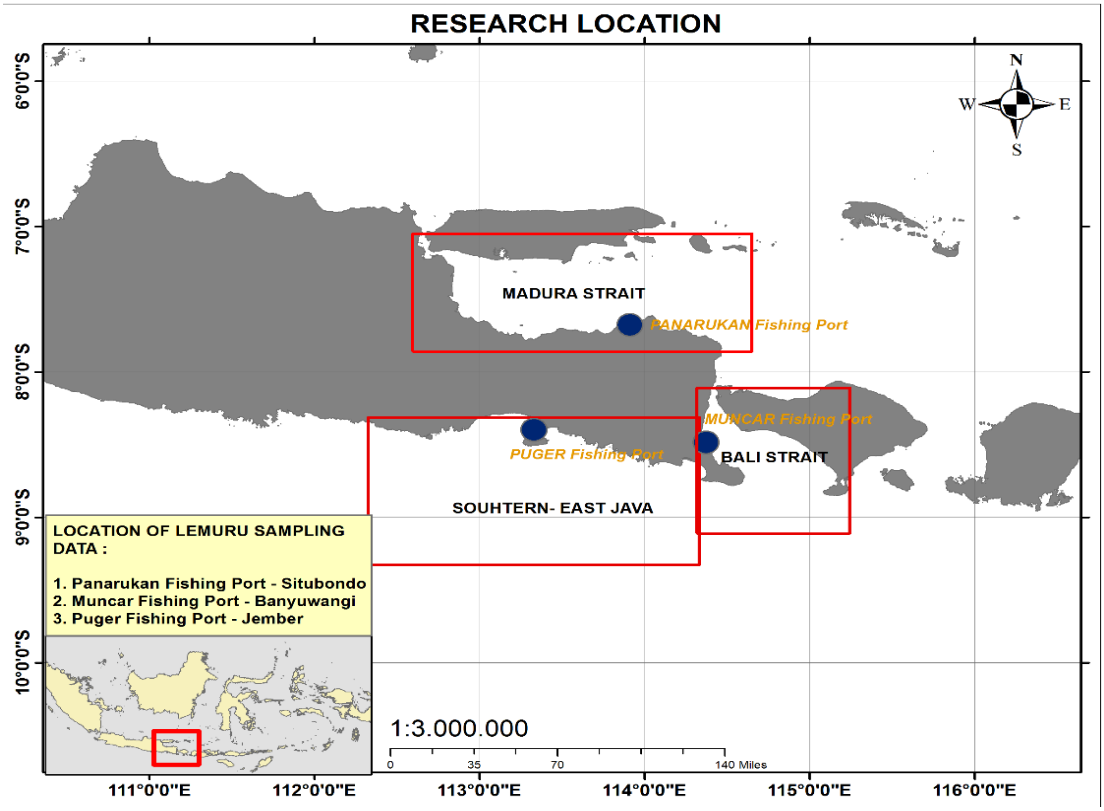
Lemuru (*Sardinella lemuru*) is the main commodity in Indonesia. This species is much cultivated as raw materials can fish or sardines which are exported to various countries, such as the United States, Europe, Japan, China and some other countries (Puji, 2015). Based on Badan Pusat Statistik East Java (2015), in September 2015, lemuru is included on the ten main commodity that has an increasing price index. Based on the discourse, Lemuru (*Sardinella lemuru*) needs to be maintained stock. But, a number of studies said that Lemuru has experienced overfishing. Setyohadi, et al., 2009 stated that Lemuru is a species with the most common to find in Bali Strait water, with a total the production of (in weight) as much as 80% the total number of production in years 1976-2007 in the Bali Strait water. Since fishing gear “Purse Seine” or “kolor” net was known, Fisheries lemuru condition is increased and has a biggest exploited, so that condition makes overfishing for Lemuru stock.

According to the Statistics Fisheries get in 2011 until 2013, there is three sub-region fisheries management at East Java occupying produce lemuru, and the highest in the Bali Strait (Banyuwangi district), Southern-East Java (Lumajang, Trenggalek, and Jember district), and Madura Strait (Probolinggo and Situbondo District). Hence the diversity of Lemuru stock (*Sardinella lemuru*) based on a morphometric approach to the third sub-region fisheries management East Java should be reviewed for a reference to the direction of the sustainability of the catchment of lemuru for production the future. So, the aims of this research are first, to know the percentage of similarity and differences of the lemuru stock in the Bali Strait, Madura Strait, and Southern-East Java water. Second, to understand the condition of an allometric factor of Lemuru in the Bali Strait, Madura Strait, and Southern-East Java water. Third, to find out if Lemuru (Sardinella lemuru) in the Bali Strait, Madura Strait, and Southern-East Java water is derived from the same or different stock.

METHODS

The Research was carried out in January to May 2016; the sample was randomly taken at the three various locations in the representing area of the Panarukan fishing base (Madura Strait), Muncar fishing base–Banyuwangi (Bali Strait), and Puger fishing base–Jember (Southern-East Java water) (Appendix 1). The samples were done in four times and for each location were taken 50-200 fishes. The morphometry analysis was done at the University of Brawijaya, according to the character Truss morphometric.

Appendix 1. Research Location Map



The truss morphometry was done based on the 16 morphometric characters. The characters were: TL (Total Length), SL (Standart Length), FL (Fork Length), PDL (Predorsal Length), DFB (Dorsal Fin Base), UPCL (Upper Caudal Peduncle Length), LPCL (Lower Caudal Peduncle Length), AFB (Anal Fin Base), PAL (Preanal Length), PPL (Prepelvic Length), PVL (Prevectoral Length), SNL (Snout Length), OD (Orbital Diameter), HL (Head Length), POL (Post Orbital Length), MBD (Maximum Body Depth) in centimeters unit (cm). While for a factor analysis Allometric condition is using data TL and weight of the fish (gram).

RESULT AND DISCUSSION

The Lemuru from three location has the same character, which is form rounded body elongated, yellow in gill openings followed with yellow stripe with lateral toward the tail and black spots on the gills the back. The blue/dark on their backs, while the belly is silvery, and the tail forked shaped. However, Lemuru in the Southern-East Java has a gauge that greater than other with an average a total length of 18-19 cm, and Lemuru in Madura Strait is smaller compared to the average (14-15 cm).

The lemuru variation from Madura and Bali Strait

The data suggested that the variable UPCL_FL always correlate to the higher, except on second sampling. The variable of PVL_FL has a strong correlation with the first component on the second and third sampling. The variable OD_HL has a high correlation with the second elements; variable PPL_FL has a strong correlation to the three aspects (Table 1).

Table 1. Truss Morphometric from Madura and Bali Strait.

Sampling	Date of Sampling		PCA Result (SPSS PROG)				
			n		% Different		Correlation Variable
	MS	BS	MS	BS	3 Component	All Component	
1	04/02/16	20/01/16	50	50	41,24	67,759	UPCL_FL PDL_FL TL_FL
2	09/03/16	05/03/16	50	55	43,867	69,514	PVL_FL OD_HL MBD_FL
3	10/04/16	12/04/16	50	51	47,895	55,971	PVL_FL UPCL_FL PPL_FL
4	15/05/16	05/05/16	53	51	46,337	70,77	PPL_FL OD_HL UPCL_FL
AVERAGE					44,835	66,004	

Table 2. The factor of Allometric Condition in Madura and Bali Strait.

Sampling	Date of Sampling		Factor of Allometric Condition Test						
			n		b value		b-test		
	MS	BS	MS	BS	MS	BS	Thit	Ttab	Result
1	04/02/16	20/01/16	200	200	2,979	3,177	1,079	1,649	Same
2	09/03/16	05/03/16	200	202	2,389	2,343	5,418	1,649	Different
3	10/04/16	12/04/16	201	204	2,835	2,835	3,866	1,649	Different
4	15/05/16	05/05/16	201	257	2,367	3.102	5,038	1,649	Different
2	09/03/16	05/03/16	200	202	2,389	2,343	5,418	1,649	Different
3	10/04/16	12/04/16	201	204	2,835	2,835	3,866	1,649	Different
4	15/05/16	05/05/16	201	257	2,367	3.102	5,038	1,649	Different

The table 2 showed that once the sampling method of lemuru has same stock and three times the sampling method of different stock. So, Lemuru (*Sardinella lemuru*) in the Madura and Bali Strait has a different stock.

The variation of lemuru from Madura Strait and Southern-East Java Sea.

Table 3. Truss Morphometric from Madura Strait and Southern-East Java Water.

Sampling	Date of Sampling		PCA Result (SPSS prog)				
			n		% different		Correlation Variable
	MS	SJ	MS	SJ	3 component	All component	
1	04/02/16	30/01/16	50	50	45,8	70,2	PAL_FL DFB_HL OD_HL
2	09/03/16	09/03/16	50	50	50,9	58,5	PAL_FL PCL_FL POL_HL
3	10/04/16	13/04/16	50	52	48	63,8	PVL_FL LPCL_FL SNL_HL
4	15/05/16	11/05/16	53	50	52,3	61,2	AFB_HL PAL_FL PPL_FL
AVERAGE					49,3	63,4	

Table (Table 3) above showing variables that have a high correlation. As from all the variable is known that the variable PAL_FL has strong correlate on the sampling method of first and second to the first component and correlated high on the sampling method of fourth to the second component, while other variables only once.

Table 4. The Factor of Allometric Condition in Madura Strait and Southern- East Java Water.

Sampling	Date of Sampling		Factor of Allometric Condition Test						
			n		b value		b-test		
	MS	SJ	MS	SJ	MS	SJ	Thit	Ttab	Result
1	04/02/16	30/01/16	200	58	2,979	2,556	1,477	1,651	Same
2	09/03/16	09/03/16	200	206	2,389	3,052	3,310	1,649	Different
3	10/04/16	13/04/16	201	200	2,835	2,825	2,628	1,649	Different
4	15/05/16	11/05/16	201	154	2,367	3,528	6,833	1,649	Different

The table 4 showed that once the sampling method of lemuru has same stock and three times the sampling method of different stock. So, Lemuru (*Sardinella lemuru*) in the Madura Strait and Southern-East Java Water has a different stock.

The lemuru variation from Bali Strait and Southern-East Java Sea.

On Table 5 have already been displayed variables which have a high correlation. As from all the variables are known that the variable DFB_HL has a strong correlate on a first sampling of the second component, and fourth sampling of the first element. The variable PVL_FL has a high correlate on the sampling method of these three aspects.

Table 5. Truss Morphometric from Bali Strait and Southern-East Java Sea.

Sampling	Date of Sampling		PCA Result (SPSS prog)				
			n		% different		Correlation
	BS	SJ	BS	SJ	3 component	All component	Variable
1	20/01/16	30/01/16	50	50	45,7	65,2	UPCL_FL DFB_HL SNL_HL
2	05/03/16	09/03/16	55	50	42,8	66,5	PDL_FL OD_HL SL_FL
3	12/04/16	13/04/16	51	52	45	53,3	PVL_FL PPL_FL
4	05/05/16	11/05/16	51	50	53,6	68,6	UPCL_FL DFB_HL MBD_FL PVL_FL
AVERAGE					46,8	63,4	

Table 6. The factor of Allometric Condition in Bali Strait and Southern- East Java Water.

Sampling	Date of Sampling		Factor of Allometric Condition Test						
			n		b value		b-test		
	BS	SJ	BS	SJ	BS	SJ	Thit	Ttab	Result
1	20/01/16	30/01/16	200	58	3,177	2,556	2,886	1,651	Different
2	05/03/16	09/03/16	202	206	2,343	3,052	1,864	1,649	Different
3	12/04/16	13/04/16	204	200	2,835	2,825	6,829	1,649	Different
4	05/05/16	11/05/16	257	154	3.102	3,528	3,658	1,649	Different

The table 6 showed that all b-test result for the fourth sampling had a different stock. So, Lemuru (*Sardinella lemuru*) in the Bali Strait and Southern-East Java Water has a different stock.

DISCUSSION

According to the analysis got that the b factors allometric conditions for every water the sample always get the different b value. The researchers assume this is because the status allometric or value obesity a very depend on food fish. Existence or abundance of food fish is influenced by itself parameter waters. This is consistent with Sulistiono et al., 2001 where relation long heavy increased is relatively meaning can change according to time. When there amendments to the environment and the availability of food estimated trillion is also be changed.

According to the analysis that Lemuru (*Sardinella lemuru*) stock in Madura and Bali Strait were different with the distinction of 44,8%. The morphometric character real effect is UPCL_FL, PVL_FL, OD_HL and PPL_FL. All the variables, 14 variable, that there are differences 66% morphometric character of Lemuru between Madura and Bali Strait.

According to Setijaningsih, 2007 in Kusmini et al., for 2010, that the high the low index value in common is influenced by a genetic shaping so that the percentage a distinction of Truss morphometric characters of fish lemuru can be affected by genetic species between different water.

Overall Lemuru in Madura Strait, Bali strait, and Southern-East Java water have a difference morphometric character about 44% with a character affected PAL_FL, DFB_HL, PVL_FL, UPCL_FL, OD_HL and PPL_FL and around 64% the morphometric character the 14 characters. Furthermore, the three these sea did not have quite mixed if any overfishing on that water between one and then in the other waters cannot recover.

CONCLUSION

Overall Lemuru (*Sardinella lemuru*) in the Madura Strait, Bali strait, and Southern-East Java Sea are having a distinction of character morphometric around 44% with a character very affect PAL_FL, DFB_HL, PVL_FL, UPCL_FL, OD_HL, and PPL_FL so in all the variables there are about 64% differences. Lemuru (*Sardinella lemuru*) from Madura and Bali Strait are different, so also Lemuru from Madura Strait and Southern-East Java Waters and Bali were also differents. Lemuru in the Madura Strait, Bali strait, and Southern-East Java water derived from different stock so that the management of Lemuru in the three distinct area were separate.

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