PRELIMINARY STUDY FOR STOCK STATUS OF KAWAKAWA USING DATA-LIMITED APPROACH (*Euthynnus affinis* Cantor, 1849) IN INDONESIA

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ABSTRACT

Kawakawa (*Euthynnus affinis* Cantor, 1849) is the one of the important catch for small-scale fishermen in eastern Indian Ocean waters south of Indonesia. However, the limited data of this species create several obstacles to implement proper management strategies. The objective of this study is to investigate the stock status of kawakawa in Indonesia from spawning potential ratio (SPR) analysis. The SPR analysis is convincing tools as biological reference point and to inform management strategies for data-limited fisheries Analyses were carried out based on a number of 2,115 length frequency data from sampled fish landed in Tanjung Luar Port (West Nusa Tenggara) and Oeba Port (East Nusa Tenggara), Indonesia. Monthly based data were collected from January to December 2016. The length distribution of collected fish ranged from 25 to 71 cm. The methods used to perform stock assessment analysis is length-based spawning potential ratio (LBSPR). The result showed that the estimated SPR was 52% above the target (40%). This indicated that the utilization of kawakawa in Indonesia was under exploited. As a result, local authority can support the fishermen to increase the effort to improve their catch for this species.

Key Words: stock status, length based, spawning potential ratio, kawakawa, Indian Ocean.

INTRODUCTION

Kawakawa (*Euthynnus affinis*) lives in open waters close to the coastline and waters with temperatures range from 18 ° to 29 ° C. This species is included in the neritic tuna group along with longtail tuna (*Thunnus tonngol*), frigate tuna (*Auxis thazard*), bullet tuna (*Auxis rochei*), indo-pacific king mackerel (*Scomberomorus guttatus*) and narrow-barred spanish mackerel (*Scomberomorus commerson*) (Herrera & Pierre, 2016). Kawakawa distributed in Indonesian waters and can be found in all Indonesian Fisheries Management Area (FMA) including in FMA 573 (Indian Ocean, South of Java) (Widodo et al., 2012). One of the kawakawa fish landing in FMA 573 is Tanjung Luar Fishing Port, West Nusa Tenggara. The demand of neritic tuna had been increase in recent year that caused the high effort of fishing operation which can put pressure on the sustainability of the fish stock (Fayetri, 2013).

The production of kawakawa in 2001-2010 in Indonesia from the Indian Ocean is the largest among other types of neritic tuna. Total production of neritic tuna during that period of time reached 1,325,232 tons. The largest composition of the commodity products was kawakawa with 27%, followed by frigate and bullet tuna (25%), longtail tuna (24%), narrow-barred spanish mackerel (18%) and indo-pacific king mackerel (6%) (FAO, 2013).

However, the stock assessment study of this species hasn’t conducted yet in Indonesian water. One way to manage sustainable fisheries is to recommend a spawning potential ratios (SPR) to be applied to fish stocks with very limited data (Brooks *et al.*, 2010). Furthermore, with very limited data, it is advisable to conduct an analysis with a long frequency approach to determine the biological reference point

(Hordyk *et al.*, 2015). This is necessary to preserve the stock of fish in order to survive until the next generation. The objective of this study is to investigate the stock assessment of kawakawa in Indonesian waters. The results from this study be able to provide valuable information to the fisheries authorities to manage the resources for sustainability.

MATERIAL AND METHODS

Data was collected by local officer (enumerator) for 12 consecutive months from January to December 2016 at Tanjung Luar Port, West Nusa Tenggara. The fishing ground of this fisheries is in eastern Indian Ocean south of Java. Length measurements were conducted using calipers with a precision of 1 cm. Collected data then analyzed to determine its length frequency. Biological and population parameters of kawakawa (*E. affinis*) were synthesized from current and previous studies for Spawning Potential Ratio (SPR) analysis. These parameters are length weight relationship *i.e.*: a = 0.00001 and b = 3.114 (Agustina & Jatmiko, 2017), growth parameters *i.e.*: $L\infty$ = 63.5 cm; K = 0.63/yr; t_0 = -0.21 yr and mortality parameters *i.e.*: M = 1.07/yr; F =1.33/yr (Jatmiko et al., 2014).

SPR analysis was conducted by online application that developed by Adrian Hordyk, Jeremy Prince and Jason Cope through website http://www.barefootecologist .com.au/ by entering all the input parameters. The results from SPR analysis the compare with reference point from Walters & Martell (2004) and Prince *et al.* (2015). From those study stock status of the fisheries can be classified into three different groups which are under exploited (SPR<40%), moderate (20<SPR<40%) and over exploited (SPR<20%).

RESULTS AND DISCUSSION

Length frequency of 1,298 kawakawa were range from 25-71 cm with average of 52 cm. The most abundance of catch occurred on August and the least occurred on October (Figure 1). From the number of caught fish can be seen that the high fishing season for kawakawa occurred for six months from April to September and the low fishing season also occurred for six months from October to March. Generally, kawakawa caught in south of Java waters is dominated a big mature fish. More than 80% length of the fish are longer than its length at first maturity (*Lm*) with 43 cm (Jamon *et al.*, 2016). This condition is good for the sustainability of the species because the fish had been caught after spawning the eggs (mature condition) at least once during their life time to maintain the stock.

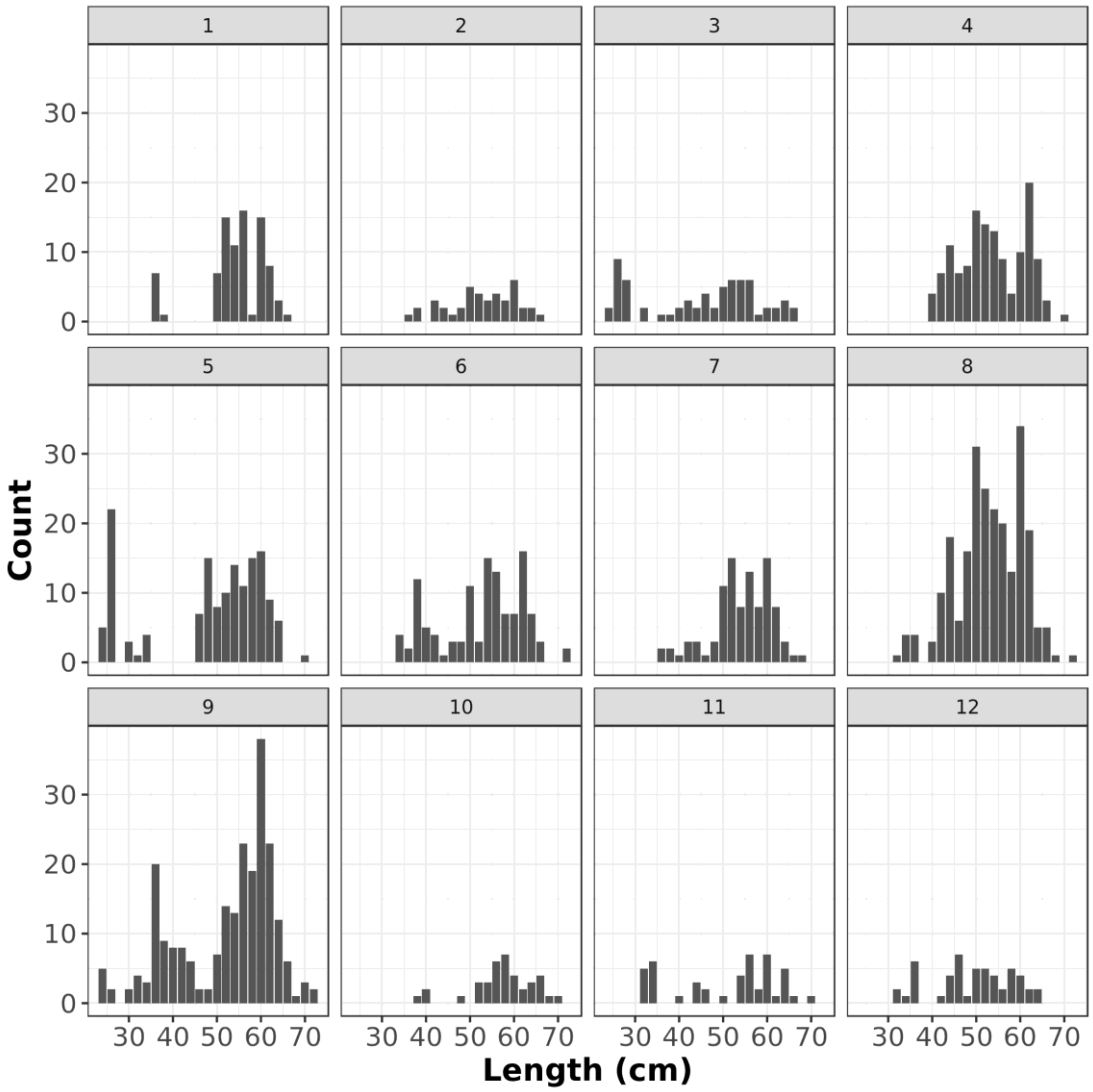

Figure 1. Monthly length frequency of kawakawa (*E. affinis*) landed in Tanjung Luar Port, West Nusa Tenggara.

Length at first capture (*Lc*) of kawakawa in Eastern Indian Ocean south of Java waters was 52 cm (Figure 2). This value is higher than Lc of this species caught in Eastern Indian Ocean west of Sumatra with 37 cm (Jatmiko *et al.*, 2013). The difference of this value possibly caused by the different of fishing gear used on those area. Fishing gear used to catch kawakawa in west of Sumatra waters dominated by purse seine and

in south of Java is hand line and troll line. From management perspective, hand line and troll line are more environmental friendly compare to purse seine because they catch mature fish.

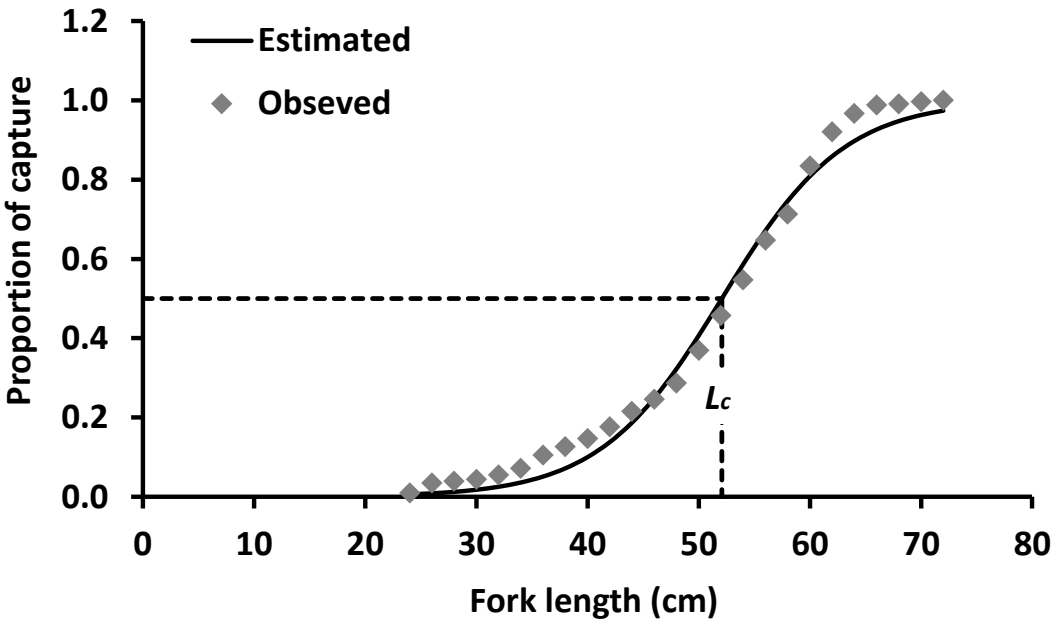

Figure 2. Length at first capture (L_c) of kawakawa (*E. affinis*) landed in Tanjung Luar Port, West Nusa Tenggara.

Spawning Potential Ratio (SPR) calculation showed that SPR value was 53% above SPR limit 20% as biological reference point and SPR target 40% as sustainable reference point (Figure 3). This result indicated that kawakawa stock in Indian Ocean south of Java waters are in under fishing condition. Moreover, this result also similar with report from Indian Ocean Tuna Commission that the stock status of kawakawa is in the secure condition. Kawakawa stock is not overfished ($SB_{year}/SB_{MSY}>=1$) and not subject to overfishing (F_{year}/F_{MSY}) (IOTC, 2016). Therefore, the utilization of this

species in south of Java can be improved with adding the fishing effort. It can be applied with increasing the number of boats and days at sea.

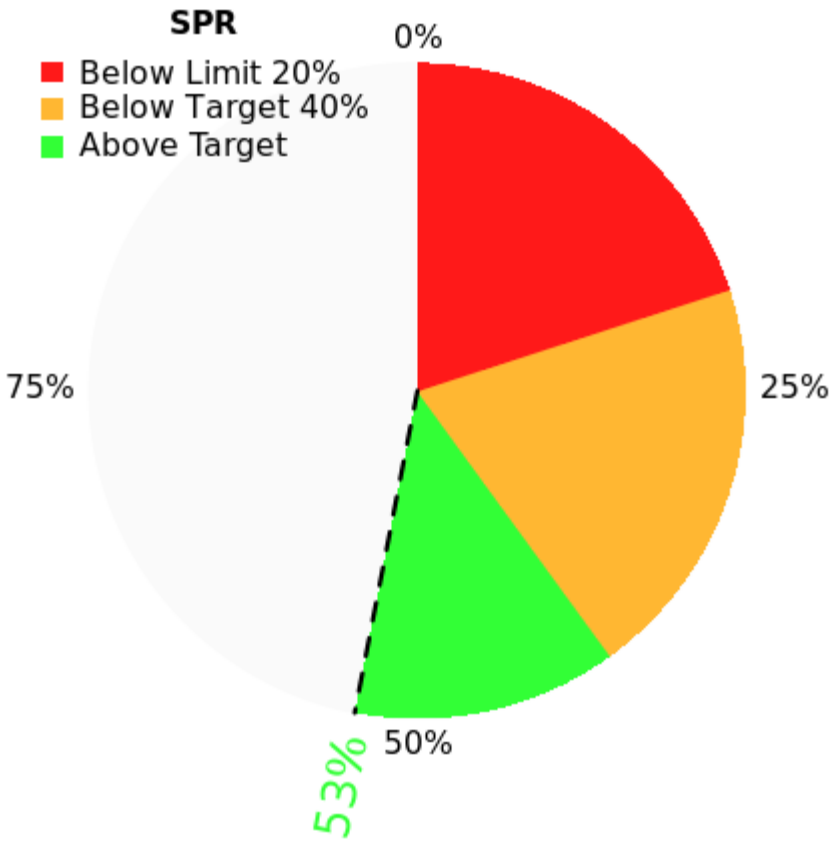

Figure 3. Spawning Potential Ratio (SPR) of kawakawa (*E. affinis*) landed in Tanjung Luar Port, West Nusa Tenggara.

CONCLUSION

Stock status of kawakawa (*E. affinis*) in eastern Indian Ocean, south of Java is under fishing (under exploited). The utilization of this species can be increase with respect to healthy stock status to maintain their sustainability.

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