NOMINAL CPUE, LENGTH DISTRIBUTION AND CONDITION FACTOR OF KAWAKAWA (*Euthynnus affinis*) IN INDIAN OCEAN

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ABSTRACT

Kawakawa (*Euthynnus affinis*) one of the important catch for small-scale fisheries in Indonesia. This species is included in neritic tuna group that mostly utilized by using purse seine and gillnet. The objectives of this research are to investigate the Nominal CPUE, length distribution and condition factor of kawakawa. Data collection was conducted for 11 months from February to December 2019 in Aceh, West Sumatera, and Bengkulu (Indian Ocean). Total of 1,622 specimens were collected, measured (cmFL) and weighted (kg). CPUE analysis shows the fluctuations in each month with the highest CPUE value in August and the lowest in May. Length distribution ranged from 20 – 55 cmFL and weight ranged from 0,13 – 3,06 kg. Analysis of length-weight relationships showed the equation $W = 0{,}0124L^{3{,}1079}$ with determination coefficient (R^2) 0.9665. Growth pattern of kawakawa was positive allometric. The highest relative condition factor (Kn) occurred at upper limit of length class 21 cmFL with 1.25 and the lowest at 57 cmFL with 1.06. The condition factor was relatively stable with the highest value occurred on Desember with 1.265 and the lowest on April with 1.081. This fluctuated for small size group and decrease along with the length increase for the adult fish.

KEYWORDS: Condition Factor; CPUE; kawakawa; length distribution;

INTRODUCTION

Kawakawa (*Euthynnus affinis*) is one of the neritic tuna commodities that represent 10% in the world trade, especialy for marine fisheries (Ahmed *et al*., 2015). Kawakawa is a type of pelagic fish, fast swimmers, live in groups, and distributed both in the coastal and oceanic waters (Blackburn, 1965 *in* Nurhayati, 2001). Furthermore, Indian Ocean Tuna Commision/IOTC (2006), reported that kawakawa inhabits coastal water and has preference staying in relatively warm water 18°- 29°C. This species forms school that appears down to 400 m depth.

Suwarso (2009), reported that purse seine (67%) and gillnet (33%) are the fishing gear used to catch kawakawa in the Indian Ocean. Purse seine fisheries in Indonesia are consisted of two types, which are small pelagic and large pelagic purse seine. The difference between them is on the mesh size and fishing area (Tampubolon *et al*. 2018).

Nominal CPUE can be used to determine the abundance of fish in a waters and the level of utilization that is calculated based on the distribution of the total catch with effort. In the aspect of fisheries biology, length distribution is one of the important things of growth to be able to

determine maturity and size of catch fish. Condition factor or often called index of plumpness, used to compare condones or the relative health condition of fish populations (Everhart&Youngs, 1981).

IOTC (2016), reported that condition of the kawakawa stock in the Indian Ocean was not overfished and not subject to overfishing with F_{2013} / F MSY_{2013} of 0.98 or 98% of the total MSY (Maximum Sustainable Yield). To ensure the sustained use of kawakawa, management of these fish resources must be carried out. One of the information needed and important to learn in relation to fisheries management is by knowing the nominal CPUE, length distribution and condition factor. This information is essential as a basis for neritic tuna management to gain the sustainable fisheries as a whole.

MATERIALS AND METHODS

The data were collected daily by enumerators on the fish landing site, Aceh, West Sumatera, and Bengkulu (Indian Ocean) (Fig. 1) from Februari to Desember 2019. The parameters were taken including, the fishing gear, number of the day at sea, catch, individual weight, and length of kawakawa. Catch per-unit of Effort (CPUE) is calculated using the formula of Sparre & Venema (1999). The condition factor is calculated for each range length every year. The method used for relative condition factor calculations using the formula of King (2007).

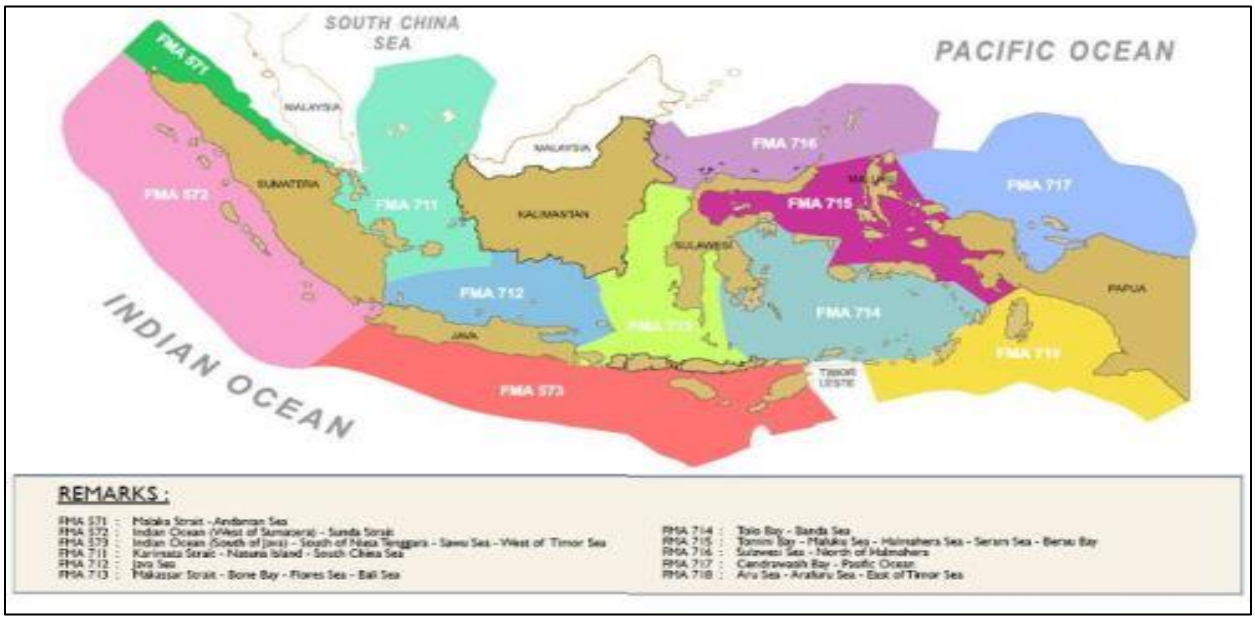

Figure 1. Fisheries Management Areas (FMA) in Indonesia.

RESULTS

The monthly catch of kawakawa fluctuated, with the highest catch occurred in October and the lowest was in March. While the CPUE analysis shows the highest in August and the lowest in May (Fig. 2). According to Sulistyaningsih et al., (2011) the value of CPUE may decrease due to several factors, namely the influence of tuna fishing season, decreased fishing effort (trip), the presence of waves, and large winds. Nugroho et al., (2018) reported that fishing season in western Sumatra usually occurs in March, April, May and October. Whereas January, February, June, July, August, November and December are not categorized as fishing season. CPUE value itself is much influenced by catch behavior and water conditions (Sadiyah et al., 2012).

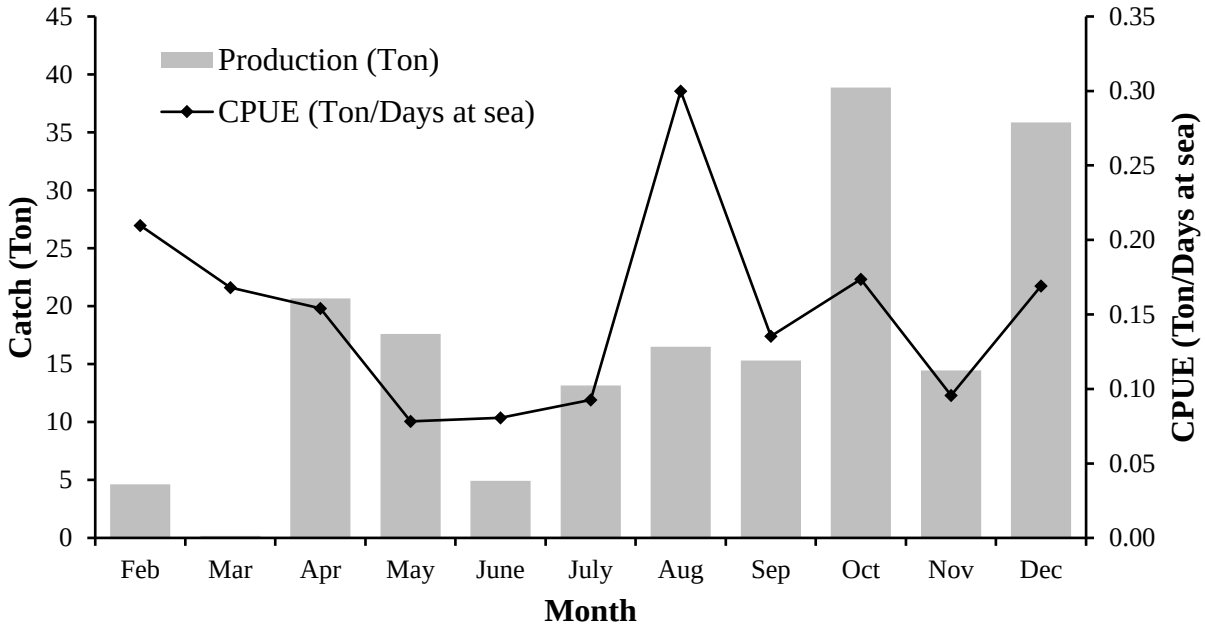

Figure 2. Nominal CPUE and catch of kawakawa landed in Indian Ocean, west of Sumatera

Length measurements were carried out on 1,622 kawakawa landed in the Indian Ocean (FMA 572), ranged between 20 - 55 cm (fork length) and dominated by sizes of 24 - 30 cm (Fig. 3). Chodrijah et al (2013) stated that the length of kawakawa in the Java Sea ranged from 11.7 to 55.4 cm with an average of 34.1 cm. While Kaymaran & Darvishi (2012), the length of kawakawa fish in Iranian waters ranges from 28-88 cm, with an average of 66 cm. Jatmiko et al., (2014) said that in the waters of West Sumatra, the length distribution of kawakawa ranges from 30-60 cm.

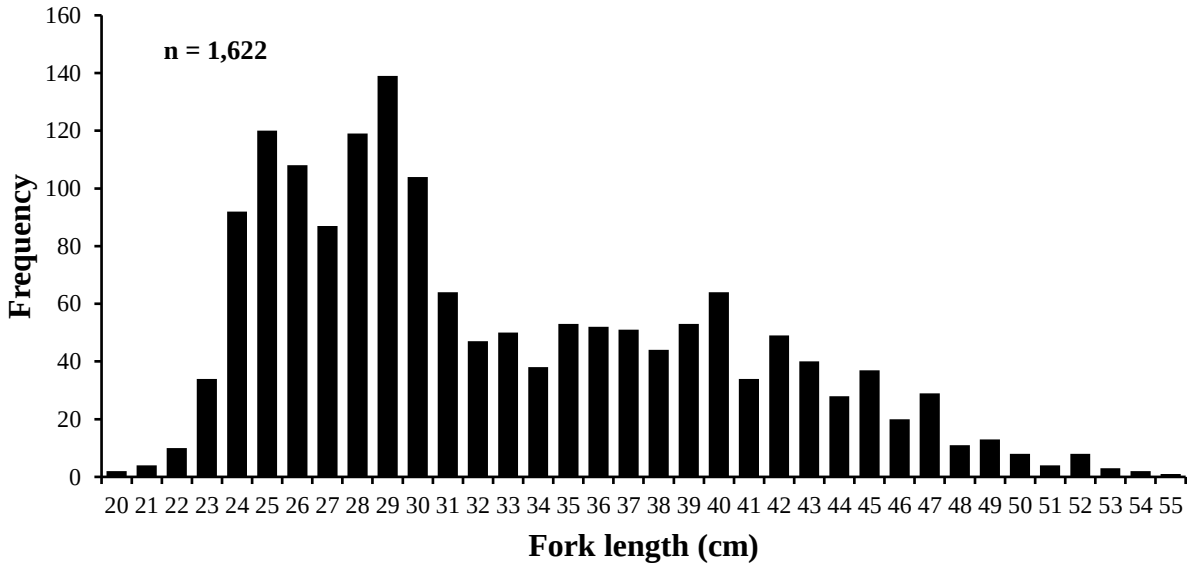

Figure 3. Length measurements of kawakawa landed in Indian Ocean, west of Sumatera

There were 1,609 kawakawa recorded which were weighed (kg). The measurement results show that kawakawa weighs 0.13-3.06 kg. Analysis of the relationship of weight length obtained $W = 0{,}0124L^{3{,}107}$ with a coefficient of determination (R^2) 0.9665, indicating that the fork length can estimate the weight of kawakawa with an accuracy of 96.7% (Fig. 4). The results of the t-test showed that the growth pattern of kawakawa was allometric. In Malacca waters, Wagiyo et al., (2018) reported that the weight of kawakawa is in the range of 0.093-2.58 kg. The difference in the length range of fish can be caused by environmental conditions of the waters. Kaymaram & Daryishi (2012) mentioned that the differences in fishing gear used and water conditions can result in differences in fish length range. Meanwhile, Suruwaky & Gunaisah (2013) studied that the length of the weight of the fish caught can be influenced by overexploitation of fish. The more caught the smaller the size of the fish.

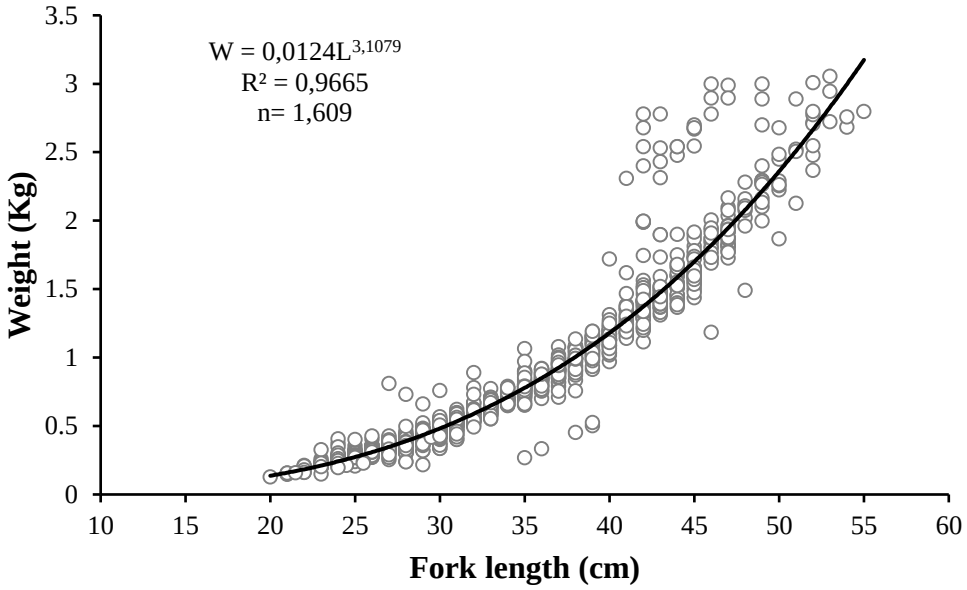

Figure 4. Length-weight relationship of kawakawa landed in Indian Ocean, west of Sumatera

The relative condition factor (Kn) of kawakawa is 1,178 and tends to fluctuate in small-sized fish. Whereas in adult fish it shows a declining trend along with increasing length. The highest relative condition factor occurs at the upper limit of the 21 cm length class at 1.25 and the lowest occurs at the upper limit of the 57 cm length class at 1.06 (Fig. 5). The relative monthly condition factor tends to be stable with the highest value occurring in December at 1.265 and the lowest in April at 1.081 (Fig. 6). Based on this observations, the relative condition of kawakawa conditions tends to fluctuate in small fish. This is presumably because the number of samples in small fish is not sufficient which is indicated by a standard error (standard error) that is quite high. Whereas in adult fish shows a declining trend with increasing length. The relative condition factor of kawakawa shows that high values occur in the range of 21-30 cm in length. The relative monthly condition factor tends to be stable throughout the year. This was assumed that kawakawa in the Indian Ocean have a relatively similar waters conditions and food source. In addition, the condition factor value can also be influenced by population density, gonad maturity level, food, sex, and age of fish (Effendie, 2002). Condition factors could indicate the state of good or not long fish weight expressed in numbers and viewed in terms of physical capacity for survival and reproduction (Effendie, 1997). Kawakawa fish condition factors in Indian ocean waters indicated that they are in good condition and can be consumed with a value of 1.081 - 1.265 every month. According to

Wujdi et al. (2012), more than one condition factor value also indicated that the observed fish samples are in good environmental conditions and can be used for consumption.

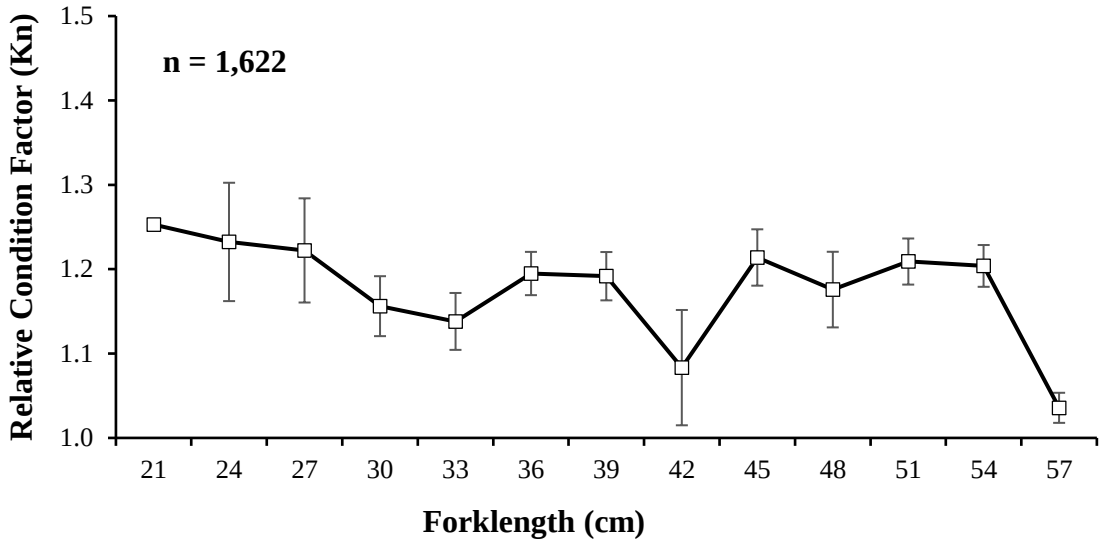

Figure 5. Relative condition factor based on length frequency of kawakawa

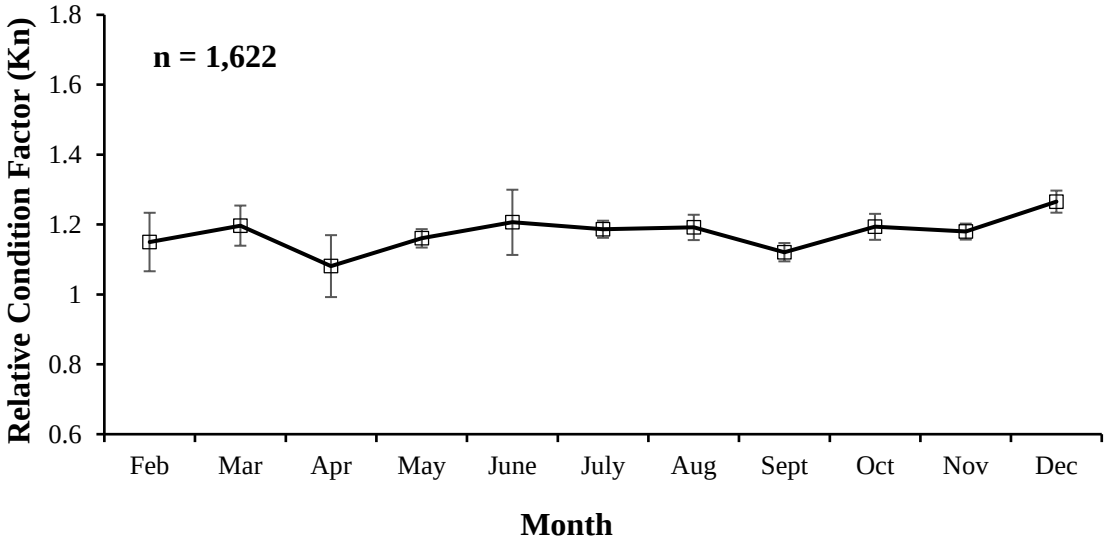

Figure 6. Relative condition factor based on month of kawakawa

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