

**Population Dynamic of Kawakawa (*Euthynnus affinis*)
in Indian Ocean at Western Part of Sumatera Island, Indonesia**

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ABSTRACT

Study on the population dynamic of kawakawa (*E. affinis*) was conducted in Indian Ocean based on data collected during period of survey, February 2013 to November 2013. The purpose of the study was to identify population parameters of kawakawa in this area. The result showed that the growth parameter of kawa-kawa was 0.48/year with fork length maximum (L_{∞}) of 64.1 cm. Instantaneous total mortality (Z) and natural mortality (M) were 2.29/year and 0.92/year, respectively. While fishing mortality (F) and exploitation rate (E) respectively were 1.37/year and 0.65/year. The exploitation rate of kawakawa in Indian Ocean at western part of Sumatera waters was high. It was, therefore, recommended that fishing effort of the kawakawa in that waters is reduce about 30 %.

KEYWORDS : *Population dynamic, kawakawa, Indian Ocean.*

INTRODUCTION

Kawakawa (*Euthynnus affinis*) is one of neritic tuna species which is dominantly caught in Indian Ocean at western part of Sumatera (Hidayat, 2013). Neritic tunas are targetted by several type of fisheries including as a by-catch of fisheries targetted small pelagic spesies, large tuna or other non tuna species (Herera *et al.*, 2009)

Exploitation of the kawakawa in western of Sumatera waters has taken place since long time ago and become more intensive in the recent years due to an increase of local and or foreign market demand. If this situation continues to occur, sustainability of the kawakawa stock will be disturbed in the future. Therefore comprehensive research is needed to reach rational utilization in order to maintain sustainability of the stock for prosperity purpose in the future (Naamin *et al.*, 1992).

This paper discussed population dynamic of the kawakawa fish in Indian Ocean at western part of Sumatera waters. It is hoped that the result can be used as basic and important information for neritic tuna studies and sustainable management of the kawakawa in Indian Ocean waters.

MATERIAL AND PROCEDURE

Samples of the kawakawa were taken from field research in Indian Ocean at western part of Sumater waters from February 2013 to November 2013 (Figure 1). Biometric studies (total length, sex and gonad maturity identifications) were done for 2,141 samples. Growth rate (K) and maximum fork length (L_∞) were analysed by tracing modus of monthly fork length distribution using ELEFAN program (Sparre and Venema, 1992 and Gayanilo *et al.*, 1993). Total mortality (Z) was calculated from catch

curve (Sparre and Venema, 1992 and Gayanilo *et al.*, 1993) and natural mortality (M) was predicted using combination of Pauly empiric equation (Pauly, 1985) and fishing mortality rate (F) = $Z - M$, while exploitation rate (E) = F/Z (Sparre and Venema, 1992).

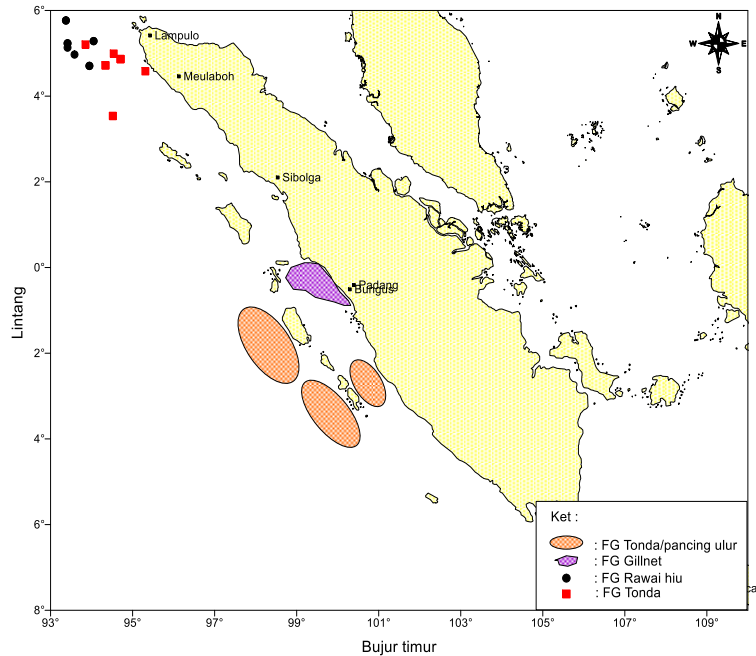


Figure 1. The research area of kawakawa in Indian Ocean at western part of Sumatra.

RESULT AND DISCUSSION

1. Growth Parameter

Basically, ELEFAN program is applied to interpret fork length in time series data adjusted with von Bertalanffy growth curve. Growth pattern is indicated by curve which crosses highest number of modus (Sparre and Venema, 1992). Value of growth rate (K) and maximum carapace length (L_∞) was recorded by identifying monthly fork length frequency namely 0.48/year and 64.1 cm.

Value of K and L_{∞} was lower than 1 showed that growth type of kawakawa in Indian Ocean at western part of Sumatera waters was slow growth (Sparre and Venema, 1992). Therefore care must be taken when planning the amount of effort allowed to be applied each year for exploiting the fish stock in order to obtain rational management of the stock.

2. Mortality Rate and Exploitation Rate

Value of total mortality (Z) represented by value of slope (b) between $\ln N/t$ and relative age was 2.29/year. Meanwhile value of natural mortality (M) and fishing mortality (F) were 0.92/year and 1.37/year, respectively.

Using exploitation rate equation $(E) = F/Z$, it was obtained that E of kawakawa in Indian Ocean at western part of Sumatera waters was 0.65/year. Based on Pauly criterion (1984), it was concluded that it is over-exploited of the kawakawa stock has occurred in western part of Sumatera waters waters, because rational fishing of kawakawa stock can be gained if values of E in that waters equals 0.5. If value of E is more than 0.5, the stock will be endangered thus effort has to be decreased in order to sustain the stock. Phenomenon of the kawakawa stock in Indian Ocean at western part of Sumatera waters suggested that fishing effort of the kawakawa stock should be reduce of present status.

CONCLUSION AND RECOMMENDATION

1. Values of growth rate (K) and maximum fork length (L_{oo}) of the kawakawa (*E. affinis*) in Indian Ocean at western part of Sumatera waters were 0.48/year and 64.1 cm, respectively.
2. Values of total mortality (Z), natural mortality (M), and fishing mortality (F) of the kawakawa (*E. affinis*) respectively were 2.29/year, 0.92/year and 1.37/year.
3. Exploitation rate (E) of the kawakawa in Indian Ocean at western part of Sumatera waters was over-exploited namely 0.65/year.
4. In order to keep sustainability of the kawakawa stock, it was biologically suggested that fishing effort should be reduce of present status.
5. In order to perform sustainability management of the kawakawa stock, comprehensive research in biology, economic, and social aspects was needed.

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