STOCK STUDY AND *KATSUWONUS SP* (Cakalang) FISHING SEASON ANALYSIS OF FISHES LANDED AT PPN PRIGI TRENGGALEK EAST JAVA

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ABSTRACT

The production of Cakalang catches at PPN Prigi, Trenggalek Regency shows a decrease in catches. This is possible because of the increase in fishing efforts in recent times. So that it is necessary to manage the fishing of tuna species to increase the growth capacity of fish stocks. As the first step in this research, an assessment of fish stocks, utilization rates, and analysis of the fishing season will be carried out. The research was carried out in January 2021 - July 2021, at PPN Prigi, Trenggalek Regency. This research uses a descriptive method with case study type. Data collection was carried out using a survey method. The data used are catch data and data on the number of trips for all fishing gear that catch Tongkol for 10 years (2011-2020). The analysis is used in the calculation of production surplus, calculation of utilization rate, and fishing season. Skipjack fishing season occurs in March (115%), April (117%), May (140%), July (194%), August (108%), September (137%), and October (156%). The moderate season occurs in February (92%) and the low season occurs in January, June, November, December. Skipjack tuna has Fopt: 155.55 trips, CMSY: 4646,566 tons, CPUE MSY: 40,212 tons/trip. The utilization rate of Skipjack tuna is 81%.

Keywords: *Fishing Season Index, Stock Assessment, Katsuwonus sp, Prigi, Utilization rate, MSY*

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1. INTRODUCTION

The pattern of fisheries resource management is generally different for each country although countries are likely to use the same approach. This is very likely to happen because the biological conditions of fishery resources and their environment can vary from country to country. This difference will be more pronounced if the management also considers political, traditional, economic, and technological issues. For a developing country such as Indonesia, problems related to the socio-economic conditions of fishermen may even need to be considered in developing a fishery resource management pattern, because at least one of the ultimate goals of finding the right management pattern is to achieve the welfare of the fishermen. Another main goal for developing countries like Indonesia is to provide food and industrial raw materials, to generate foreign exchange, and to find out the optimum portion of the utilization by the national fishing fleet, so that this portion is truly felt to the fullest by the people.

So far, the study of large pelagic fish stocks in Indonesia uses several approaches, namely a surplus production model that uses catch-effort analysis with the assumption that the situation is in a steady-state condition, the second is the analytical model of Beverton and Holt (1957) and the third is the analytical model of Beverton and Holt (1957). simulation using the variation of biomass dynamics from the surplus production model. In this study, the calculation of the assessment of the cob stock and calculating the trend of the fishing season will be carried out to support the sustainability of priority species on a national scale.

2. RESEARCH METHOD

Research activities were carried out from January 2021 to July 2021, at PPN Prigi, Trenggalek Regency, East Java Province. The city of Trenggalek was chosen because it is one of the largest producers of Tuna, Skipjack, and Tongkol in southern Java.

Fig -1: Research Site Map

2.1 Data Collection Method

This study uses a descriptive method with a case study type. Data collection was carried out using a survey method. The data used are catch data and data on the number of trips for all fishing gear that catch Tuna, Skipjack, and Tongkol for 10 years (2011-2020).

2.2 Data Analysis Techniques

a) **Analysis of the Utilization Level of Skipjack**

- CPUE

the calculation is carried out by standardizing fishing gear, the formula used refers to Gulland (1983)

- Calculating productivity on each tool

$$CPUE_i = \frac{ci}{fi}$$

Remarks:
ci: ith catch (tons)
fi: ith fishing gear effort (trip)
CPUEi: ith catch per unit effort (tons/trip)

- Calculate the FPI of other fishing gear by dividing the productivity value (CPUE) on each fishing gear against the fishing gear that has the highest production value. (Standard fishing gear).
- Calculate the FPI for each fishing gear that has been standardized by multiplying the number of existing fishing gear with the FPI of each gear.
- Next, calculate the standard CPUE
- Skipjack Fish Resource Utilization

calculation of the status of skipjack tuna utilization is using the Schaefer Model production surplus analysis. Analysis of the relationship between *effort* (catch effort) and CPUE of skipjack tuna is calculated using least-squares analysis, namely by making the error value very small, with the function:

$$Y = \alpha + \beta x + e$$

Description:
Y : dependent variable (CPUE) (tons/trip)
X : independent variable (*effort*) (Trip)
e : Deviation
, : regression parameter estimating the values of a and b
then estimation with function:

$$Y = a + bx$$

$$b = \frac{n(\sum XY) - (\sum X)(\sum Y)}{n(\sum X^2) - (\sum X)^2}$$

$$a = \frac{(\sum X)(\sum X^2) - (\sum X)(\sum XY)}{n(\sum X^2) - (\sum X)^2}$$

Description:
a: intercept (the point where the regression line intersects with the y axis)
b: slope (slope) of the line regression
The known values of a and b will then be calculated regarding the

- relationship between CPUE and fishing effort (f)
  CPUE = a + bf

- Relationship between catch (c) and fishing effort (f)

  c = CPUE xf

  c = af + bf^2

- Optimum fishing effort (f_{opt})

$$f_{opt} = \frac{-a}{2b}$$

- *Maximum Sustainable Yield* (MSY)

$$MSY = \frac{-(a^2)}{4b}$$

- Utilization Rate

$$TPc = \frac{Ci}{MSY} \times 100\%$$

Remarks:

TPc: Utilization rate in year i (%)
Ci: Catch year i (tons)

According to the national commission for fish stock assessment (1998), the utilization rate is divided into four, namely:

The low stage which is 0-33.3%
The developing stage is 33.4-66.7% Catching
dense stage ie 66.8-100%
catching stage that is > 100%

- analysis *Total Allowable Catch* (TAC) / Allowable Catch (JTB)
  The allowable catch is 80% of the total sustainable potential (Dahuri, 2010). JTB is calculated by the formula:

$$JTB = MSY \times 80\%$$

Description:
MSY: *Maximum Sustainable Yield*

b) **Analysis of the Season of Capture**

Data is processed using simple excel. Calculation of catch per unit effort (CPUE) is calculated using the formula from KKP (2003):

$$CPUE = \frac{Volume\ hasil\ tangkapan\ (kg)}{Jumlah\ trip\ penangkapan}$$

The fishing season is calculated using a time series analysis (*moving average*) which is carried out based on the steps of Dajan (1998):

1. Compiling the CPUE series over a period of 5 years

$$CPUEi = n_i$$

Remarks :
n_i = i-order CPUE
i = 1, 2, 3, …

2. Composes 12-month moving average CPUE (RG)

$$RGi = \frac{1}{12}\left(\frac{1+5}{i=i-6} CPUEi\right)$$

Description:
RG*i* = i-order 12-month moving average
CPUE*i* = i-order CPUE -i
i = 7, 8, … , n-5

3. Compose the CPUE centered moving average (RGP)

$$RGPi = \frac{1}{2}\left[\sum_{i=i}^{t=1} RGi\right]$$

Remarks:
RGP*i* = i-centralized moving average
RG*i* = 12-month moving average i order
i = 7,8, … , n-5

4. Arrange the average value in a matrix of size *ixj* (every month) then calculate the total value of the average ratio each month, followed by calculating the total overall average ratio and the last is calculating the pattern fishing season.

a. i-th month average ratio (RBBi)

$$RBBi = \frac{1}{n}\left[\sum_{j=1}^{n} Rbij\right]$$

Note:
RBB*i* = Average of Rbij for i-month

Rbij = Monthly average ratio in matrix size ixj
i = 1,2,3, … , 12,
j = 1,2,3, … , n

b. Total monthly mean ratio (JRBB)
c. Fishing season index

3. RESULTS AND DISCUSSION

3.1 Fishing Season Index

Large pelagic fish resources that play an important role are skipjack tuna (Katsuwonus pelamis). Cakalang fish production at PPN Prigi is 616 tons with a maximum sustainable yield (MSY) of 949 tons. The average utilization rate is 83% with the utilization status entering the fully exploited category. In 2006 – 2013 the average skipjack tuna production was 792 tons per year. The fishing gear used to catch skipjack tuna in Prigi is a line fishing line, handline, and some are caught using a ring trawl. In this study, the fishing gear used for the analysis was a fishing line and a ring trawl. In 2006 skipjack tuna production exceeded the MSY limit, until 2013 the catch per unit effort (CPU) decreased.

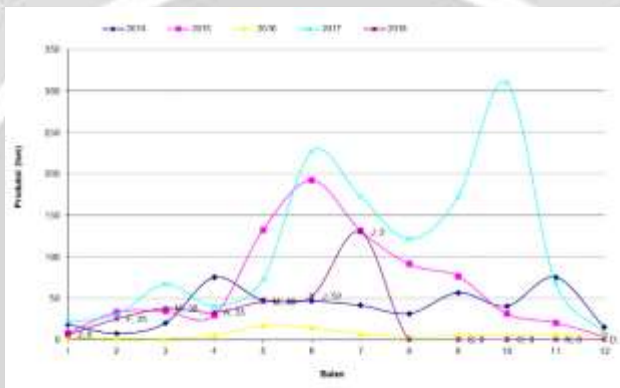

Fig -2: Production Graph

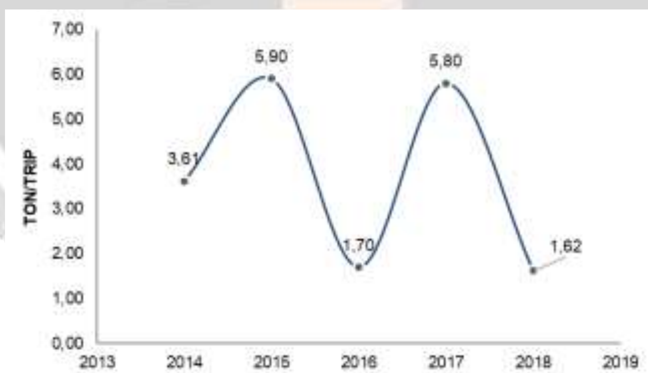

Fig -3: Catch Per Unit Effort

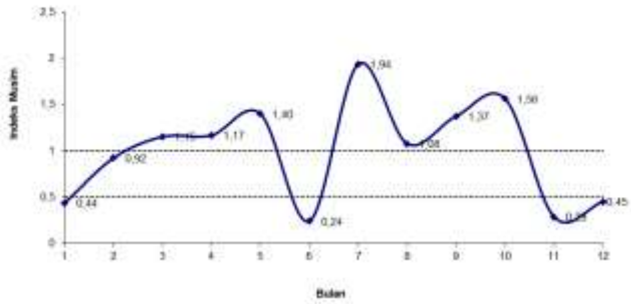

Fig -4: Fishing Season Index of Tuna

Skipjack fishing season occurs in March (115%), April (117%), May (140%), July (194%), August (108%), September (137%), and October (156%). The moderate season occurs in February (92%) and the low season occurs in January, June, November, December.

3.2 Utilization Rate and Maximum Sustainable Yield

The optimum F value for skipjack tuna obtained was 115.55, the Catch value in MSY was 4646,566 tons, while the CPUE value in MSY was 40,212 tons.

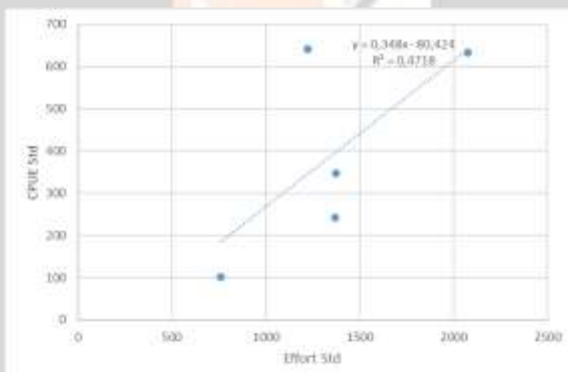

Fig -5: CPUE graph with Cakalang fish effort

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4. CONCLUSIONS

There are two conclusions from this study, namely the fishing season index, and the level of use of tuna that landed at PPN Prigi, Trenggalek. Skipjack fishing season occurs in March (115%), April (117%), May (140%), July (194%), August (108%), September (137%), and October (156%). Skipjack tuna has Fopt: 155.55 trips, CMSY: 4646,566 tons, CPUE MSY: 40,212 tons/trip. The utilization rate of skipjack tuna is 81%.

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