STOCK STUDY AND EUTHYNNUS SP (TONGKOL) FISHING SEASON ANALYSIS OF FISHES LANDED AT PPN PRIGI TRENGGALEK EAST JAVA

Nora Akbarsyah[1], Rega Permana[2]

[1] *Lecturer, Department of Fisheries, Faculty Of Fisheries and Marine Science, Universitas Padjadjaran, Indonesia*
[2] *Lecturer, Department of Fisheries, Faculty Of Fisheries and Marine Science, Universitas Padjadjaran, Indonesia*

ABSTRACT

The production of Tongkol 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. The fishing season for Tongkol occurs in March (169%) and April (158%), as well as June (164%) and July (224%). Tongkol has Fopt: 9857 trips, CMSY: 8,670,490 tons, CPUE MSY: 879.59 tons/trip. The utilization rate of tuna is 81%.

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

1. INTRODUCTION

So far, the study of large pelagic fish stocks in Indonesia uses several approaches, namely the surplus production model using *catch-effort analysis* with the assumption that the situation is in *steady-state*, the second is the Beverton and Holt analytical model (1957) and the second one is the Beverton and Holt (1957) analytical model. The third is a simulation model using variations in biomass dynamics from the surplus production model. One of the tasks of fisheries resource managers, especially in the waters of the ZEEI (Indonesian Exclusive Economic Zone) where fish stocks are utilized by more than one country, is to determine the Allowable Catch or TAC (Total Allowable Catch) which will be distributed as a national portion (Domestic Catch). Harvesting Capacity, DHC) and foreign portion (Foreign Harvesting Capacity, FHC). The amount of TAC is usually calculated based on the value of the Maximum Sustainable Yield or MSY (*Maximum Sustainable Yield*) of a fishery resource whose calculations are based on various approaches/methods. In addition, it is also important in evaluating the fishing season because it will relate to the availability of fish resources. The fluctuation of catch production is influenced by the availability of fish resources. Analysis of the fishing season can help to see trends and trends in the abundance of fish resources in the waters. 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 Tuna, Skipjack, and Tongkol**

- 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
- of Skipjack Fish Resource Utilization. The

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

Tuna production in PPN Prigi fluctuated from 2014 to 2018. There was a shift in peak production. In 2014 the peak of production was in October (4230.406 tons), for 2015 the peak of production occurred in November (2614.432 tons), while in 2018 the highest catch occurred in June (3982,033 tons) (Figure 11). The results of the calculation of *catch per unit effort* experienced very sharp fluctuations (Figure 12).

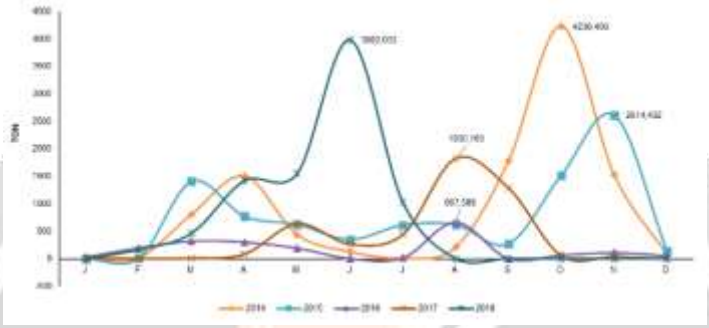

Fig -2: Tuna Production

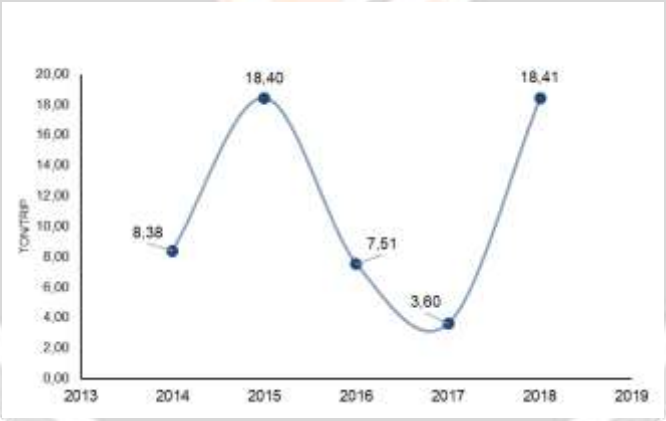

Fig -3: Catch Per Unit Effort

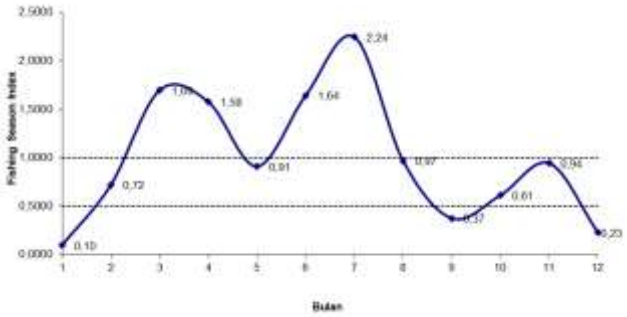

Fig -4: Index of Tongkol Fishing Season The

The season for tuna fishing landed at PPN Prigi occurs in March (169%) and April (158%), as well as June (164%) and July (224%). February (72%), May (91%), August (97%), October (61%), November (94%) were included in the moderate season, while the other months were included in the lean season category.

3.2 Utilization Rate and Maximum Sustainable Yield

The optimum F value for tuna obtained is 9857 trips, the Catch value in MSY is 8670490 tons, while the CPUE value in MSY is 879.59 tons. The utilization rate of skipjack tuna is 81%, which indicates that the utilization of tuna is still in a reasonable stage, but if it is continued and not managed properly, it is feared that it will gradually exceed the limit.

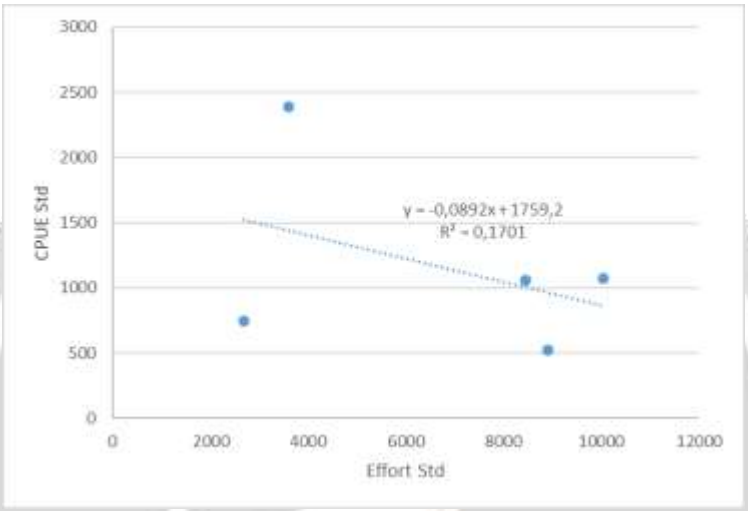

Fig -5: CPUE graph with tuna fish effort

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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. The fishing season for tuna occurs in March (169%) and April (158%), as well as June (164%) and July (224%). Tuna has Fopt: 9857 trips, CMSY: 8,670,490 tons, CPUE MSY: 879.59 tons/trip. The utilization rate of tuna is 81%.

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