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

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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. Tuna fishing season occurs in February (151%), March (181%), April (123%), May (198%), June (113%), July (134%). Tuna fish has Fopt: 806 trips, CMSY: 156.058 tons, CPUE MSY: 193.57 tons/trip. The utilization rate of tuna is 128%.

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

1. INTRODUCTION

The production of Tuna, Skipjack, and Tongkol catches at PPN Prigi, Trenggalek Regency shows a decrease in catches. This is possible because of the increased fishing effort in recent times. So it is necessary to manage the catch of Tuna, Skipjack, and Tongkol to increase the capacity of fish stock growth. 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 acquisition of this data is expected to be the basis for the management of Tuna, Skipjack, and Tongkol fisheries in Trenggalek Regency. 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

In fisheries statistics, especially in Indonesia, the types of tuna and long beak caught are grouped into three major groups, namely tuna, skipjack, and tuna. Several types of tuna caught in the Indian Ocean are yellowfin tuna (Thunnus albacares, Yellowfin Tuna), Big Eye Tuna (Thunnus obesus, Big Eye Tuna), Southern bluefin tuna (Thunnus maccoyii, Bluefin tuna), Albacore (Thunnus alalunga), Albacore), gray cob (Thunnus tonggol, Longtail tuna). Fisheries statistics Indonesian fishing port (PPN) Prigi, the group of tuna recorded in it is of the yellowfin tuna (Thunnus albacares, Yellowfin tuna) and bigeye tuna (Thunnus obesus, Big eye tuna). There are three fishing gears used to catch tuna that landed at PPN Prigi, namely trolling rods, ring trawlers, and gill nets. During 2005 – 2013 the three fishing gears each contributed to the catch of 27.17% for the tug line, 57.67% for the ring trawl, and 15.16% for the gillnet fishing gear.

In this study, it was found that the two fishing gears that produced the largest numbers of tuna fish were ring trawls and tug lines. To find out whether there is a decrease in productivity in the 2014 – 2018 period, an analysis of the catch per effort (Catch Per Unit Effort = CPUE) is one alternative to see this trend. This analysis was carried out by standardizing the purse seine fishing gear on the trolling line. The amount of CPUE value from an economic perspective can be an indicator of the efficiency level of the fishing effort (effort). The cpue value for 2014 and 2015 was 3.09 tons/trip and 3.35 tons/trip decreased to 1.15 tons per trip in 2016, fell again to 0.31 tons/trip in 2017, and 0.16 tons per trip. tons/trip in 2018. The fluctuating production of tuna shows more catches in the early months of the year, namely January – May, and then decreases until the end of the year. This happened in 2014 – 2015. Meanwhile, in 2016 – 2018 the most catches were produced from June to September.

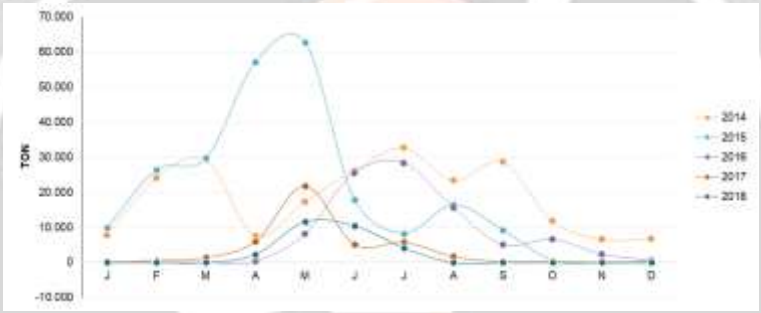

Fig -2: Tuna Production

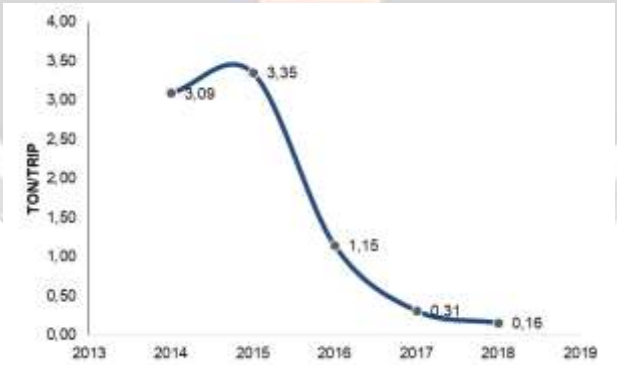

Fig -3: Catch Per Unit Effort

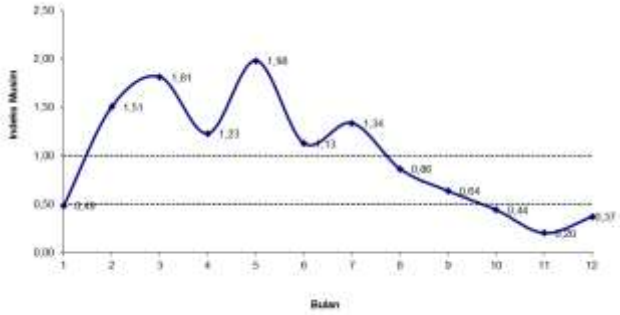

Fig -4: Fishing Season Index of Tuna

The fishing area of ring seine is in the area of 8o – 9o South Latitude and 111o – 113o East Longitude, starting from the coast of Prigi coast to the Indian Ocean. While the trolling line is usually in the 8o – 10o latitude and 111o – 113o east longitude. The catch of tuna fluctuated from 2005 – to 2013, as well as the catch in 2014 - 2018. The catch will be abundant in certain months, this fluctuating pattern can be grouped and analyzed so that the fishing season index (IMP) appears. Tuna fish has a trend of high catch rates in the early months of the year. This is closely related to the results of the analysis that the tuna fishing season occurs in February (151%), March (181%), April (123%), May (198%), June (113%), July (134%), and vice versa for the following months the catch showed a decrease. From the results above, it can be concluded that the effective time of catching tuna is in February, March, April, May, June, and July.

3.2 Utilization Rate and Maximum Sustainable Yield

The optimum F value for Tuna obtained was 806 trips, the Catch value in the MSY state was 156.058 tons, while the CPUE value in the MSY state was 193.57 tons.

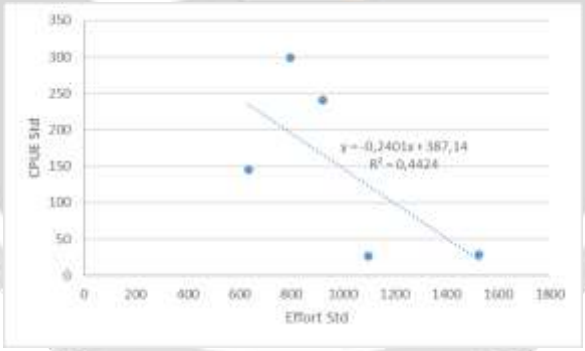

Fig -5: Catch Per Unit Effort

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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. Tuna fishing season occurs in February (151%), March (181%), April (123%), May (198%), June (113%), July (134%). Tuna fish has Fopt: 806 trips, CMSY: 156.058 tons, CPUE MSY: 193.57 tons/trip. The utilization rate of tuna is 128%.

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