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ESTIMATION OF THE SUSTAINABLE POTENTIAL OF FOURFINGER THREADFIN (*Eleutheronema tetradactylum*) IN THE WATERS OF TANJUNG JABUNG BARAT, JAMBI

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ABSTRACT

One of the fisheries catches in Tanjung Jabung Barat is Fourfinger threadfin (*Eleutheronema tetradactylum*). Fourfinger threadfin is a commodity with a high economic value and has good taste, so many people catch it. Fourfinger threadfin is carried out continuously without considering the potential of the fish. If this continues to be done, it will cause a decrease in population. This research was conducted in August-October 2024. Secondary data on the results of the capture obtained from this study are data derived from the Tanjung Jabung Barat Fisheries Service from 2018 - 2022, including catches and efforts to catch Fourfinger threadfin. The data that was obtained was analyzed using Microsoft Excel. This research shows that the catch of Fourfinger threadfin in Tanjung Jabung Barat fluctuates every year. The highest CPUE value occurred in 2020, namely 3.688028, and the lowest was in 2021 at 1.28533. CMSY results and Optimum Effort of 727.4554 tons/year with Optimum Effort (Eopt) of 310,280 trips/year. With a Total Allowable Catch of 581.9643244. based on the data analysis that has been done, it can be concluded that the sustainable potential of Fourfinger threadfin in the waters of Tanjung Jabung Barat has not experienced overfishing. However, if there is an increase in fishing effort (trip), then the sustainable potential can be experienced in overfishing.

Keywords: Sustainable Potential, Fourfinger threadfin, CPUE

1. INTRODUCTION

Tanjung Jabung Barat, a regency in Jambi Province, is known for its bustling port city of Kuala Tungkal and is the center of trade in the eastern coastal region of Sumatra. The regency is attractive to researchers because of its rich fisheries resources, which are the center of attention. Tanjung Jabung Barat has great economic potential, especially in the fisheries, plantation, and trade sectors. However, the utilization of this potential has not been optimal, so it has not had a major impact on the welfare of the community. According to Dinas Perikanan Tanjung Jabung Barat[1], the fish production of capture fisheries reached 23,491.54 tons, with 130.86 tons of public waters.

One of the production catches in Kuala Tungkal (PPP) is the Fourfinger threadfin (*Eleutheronema tetradactylum*). The Fourfinger threadfin is a highly prized demersal fish species in Indonesia. Because of its high value and great taste, consumer demand for this fish is on the rise. In addition to its excellent taste, Fourfinger threadfin is full of vitamins that the human body needs. Therefore, the food chain of Fourfinger threadfin is very important. Fishermen derive income from fish populations that

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also play an important role in the marine food chain. Unrestricted fishing of Fourfinger threadfin may threaten the sustainability of their populations and ecosystems. Therefore, the application of the concept of maximum sustainable yield (MSY) becomes very important to maintain the sustainability of the Fourfinger threadfin in Tanjung Jabung Barat district[2].

The process or activity of overfishing in waters with no regard for the sustainability of these fish will result in a decrease in stocks that will be obtained by fishermen every year. Fisheries statistics show that Fourfinger threadfin production in Tanjung Jabung Barat Regency is always changing, namely in 2018, 873.3 tons and in 2019, 803.8 tons, while in 2020, 523.7 tons, 2021 by 525.7 tons and in 2022 by 536, 2 tons. In the last three years (2020, 2021, and 2022), Fourfinger threadfin production decreased from the previous year, indicating a decline in catch.

However, fish resources are resources that can be recovered, but if there is no sustainable management, it will affect fish stocks in the waters. To maintain the availability of fisheries' stocks, there needs to be management that ensures that production activities are carried out properly and that the biodiversity of fisheries' resources is maintained. Maximum sustainable yield (MSY) is one way to support a sustainable fisheries management system. MSY ensures fishery resource stocks remain secure by allowing exploitation without reducing the population[3].

2. RESEARCH METHOD

Time and Place

The research was conducted in the waters of West Tanjung Jabung Regency for three months, from August to October 2024.

Method

The method used in this research is a descriptive method, which describes the existing problems based on the data. The descriptive method in this research is done directly and in-depth. The analysis carried out in finding the catch per unit of fishing effort (CPUE) in this study uses the formula for the comparison between the catch per year and the fishing effort made per year. The maximum catch of Fourfinger threadfin can be found using the Schaefer model method. Analysis of the value of the Total Allowable Catch is obtained from 80% of the maximum catch value[5].

Procedures

The data collection method is carried out by describing the problem of collecting data on catch trips and catches. Data collection in this study was carried out by survey or going directly to the field. The data source used in this research is secondary data. Secondary data is data obtained from government agencies, such as the Fisheries Service office. Secondary data used in this study are the catch of Fourfinger threadfin and the number of fishing trips made per year in West Tanjung Jabung Regency.

Data Analysis

Catch per Unit Effort

According to Hasrun et al.[6]

$$CPUE_t = \frac{Catch_t}{Effort_t}$$

Description:

$CPUE_t$ = total catch per fishing effort in year t (kg/trip),
$Catch_t$ = total catch in year t (kg),
$Effort_t$ = Fishing effort in year t (trip)

The calculation of CPUE values usually determines the development of fish stocks. It is also used as an indicator of the efficiency of possible and effective fishing operations, which can be achieved without requiring as much data as other methods.

Maximum Sustainable Yield (MSY)

Estimation of Fourfinger threadfin can use maximum sustainable analysis using one of the methods, namely the Schaefer method. Calculate the sustainable potential (CMSY) and optimum effort (EMSY) linear regression equation using the formula[7]:

$$Y = a + bx$$

Description:

a = intercept
b = slope
x = Fishing effort of Fourfinger threadfin in period-i (independent)
y = Catch of Fourfinger threadfin per unit effort in period-i (dependent).

Total Allowable Catch (TAC)

Calculation of the amount of catch obtained (TAC) or allowable catch is the catch by taking into account the stock of fish population so that it can be utilized sustainably in the future. The calculation of the TAC value can be used the following formula:

$$TAC = MSY \times 80\%$$

Description:

TAC = Total allowable catch
MSY = Maximum sustainable yield

As stated by Badiuzzaman et al.[5], a situation where the JTB value is greater than the MSY value indicates that there is overfishing. Conversely, a situation where the JTB value is smaller than the MSY value indicates that the catch of fish resources in that place can still be increased. As a result, the yield obtained will be greater or more abundant but should not exceed the established sustainable potential value (MSY).

Utilization Rate and Enrichment Rate

Fishery resources that are currently exploited must immediately be subjected to sustainable utilization rates. If this is not done immediately, fisheries face the risk of overfishing, which could threaten the sustainability of fish resources in the waters. (overexploited), and even fisheries resources may decline significantly as a result of uncontrolled and poorly managed exploitation rates[2].

Estimation of the percentage level of utilization of fish resources is carried out to assess the level of utilization of fishery resources. The equation of the utilization rate is[6].

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

Description:

TPc = Percentage Utilization of Fourfinger threadfin during the i-th period
Ci = Catch of Fourfinger threadfin during the i-th period
MSY = The sustainable potential of Fourfinger threadfin / maximum sustainable yield

3. RESULT AND DISCUSSION

Fourfinger threadfin Production

The current catch of Fourfinger threadfin in West Tanjung Jabung Regency with a 5-year observation period from the range (2018-2022). The catch of Fourfinger threadfin can be seen in Table 1.

Table 1. Fourfinger threadfin production

Year	Production (Ton)
2018	873.3
2019	803.8
2020	523.7
2021	525.7
2022	536.21
Amount	3262.71
Average	652.542

Based on the catch data obtained in 2018-2022, the highest catch of Fourfinger threadfin in Tanjung Jabung Barat was obtained in 2018, which was 873.3 tons, and the lowest in 2020 was 523.7 tons. The catch of Fourfinger threadfin from 2018-2022 has decreased due to several factors. Climatic variations such as rainfall, water conditions with high waves, and strong winds affect fishermen's activities at sea while fishing[4].

Cath Per Unit Effort (CPUE)

Catch per unit effort is the term for the value of catch per unit effort. The CPUE value indicates how productive the company is. Fishing gear used by fishermen has unique capabilities, including the ability to catch fish, so standardization is needed. One way to measure the level of efficiency of effort techniques is to look at the CPUE

measure, which stands for the number of units of vessel. The higher the CPUE value, the more efficient the use of effort[8].

Table 2 shows the results of the catch-per-unit effort comparison.

Table 2. Production, catch effort, and CPUE

Years	Catch (Unit)	Production (Ton)	CPUE
2018	308	873.3	2.83539
2019	275	803.8	2.922909
2020	142	523.7	3.688028
2021	409	525.7	1.28533
2022	209	536.21	2.565598
Amount	1343	3262.71	13.29726
Average	268.6	652.542	2.659451

CPUE value resulting from the ratio between catch and trip value. The highest CPUE value occurred in 2020, namely 3.688028, and the lowest was in 2021 at 1.28533. The relationship between CPUE and effort can show a downward trend or development of CPUE values. This trend can indicate the status of fish resource utilization in a body of water[9].

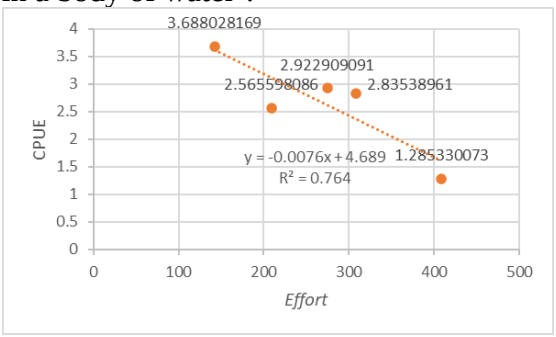

Figure 1. Relationship between CPUE and effort

This decline in CPUE values indicates that the Fourfinger threadfin resource in the waters of Tanjung Jabung Barat is being overexploited. A decrease in CPUE values may also indicate that fishing operations are becoming worse. This happens because greater effort results in less catch. Therefore, further analysis is required to determine the optimum amount[9].

Figure 1 shows a positive relationship between catch and fishing effort, with a coefficient of determination (R2) of 0.764, or 76.4%. This shows that fishing effort affects catch. However, other variables were responsible for the remaining 23.6% of the catch. While the negative relationship between production and fishing effort is indicated by the regression coefficient (b) of -0.0076, the CPUE value will increase by 0.0076 tons per effort for every reduction of 1 fishing effort but will decrease by 1.5189 tons per effort if there is an addition of 1 fishing effort. The decrease in catch production is caused by natural factors, available fish stocks, fishing season, and additional components not discussed in this study[10].

Maximum Sustainable Yield (MSY)

The results of the Maximum Sustainable Yield (MSY) data processing for Fourfinger threadfin in Tanjung Jabung Barat district are shown in Figure 2. The Maximum Sustainable Yield (MSY) value was determined using a linear regression between fishing effort and CPUE.

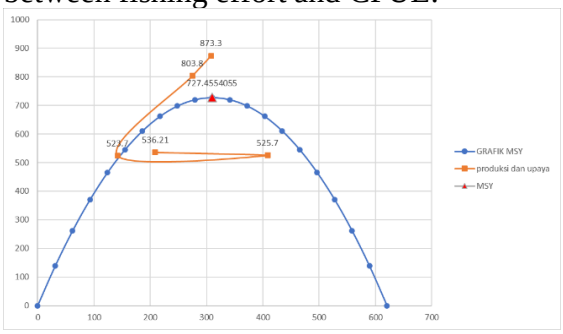

Figure 2. MSY

Based on the Schaefer model of the potential of sustainable Fourfinger threadfin in the Tanjung Jabung Barat District shows the value of Maximum sustainable yield

(MSY) of 727.4554 tons/year with Optimum effort (Eopt) of 310,280 trips/year. Decrease in catch production due to effort, natural factors, and biological factors. In other words, changes in the value of CPUE are caused by effort natural.

In 2018 and 2019, the catch of Fourfinger threadfin exceeded the Maximum Sustainable Yield value. In other words, in 2018 and 2019, it has experienced overfishing. Factors and biological factors. But in 2020-2022, the catch of Fourfinger threadfin decreased. This is in accordance with the results of research conducted by Wati[11], which argues that overfishing has an impact on reducing the catch of fishermen so that the fishing area will be further away and will have an impact on the cost of fishermen's expenses when fishing. This shows that aquatic resources are decreasing, so efforts must be reduced to allow resources to grow again.

Total Allowable Catch

Total Allowable Catch is the most that can be taken from a species' stock in an indefinite period. The amount of catch allowed to be utilized is only around 80% of the maximum potential value or MSY. The MSY value of Fourfinger threadfin in Tanjung Jabung Barat is known to be 727.4554 tons/year. Therefore, the TAC allowed the catch of Fourfinger threadfin in Tanjung Jabung Barat, which is 581.9643244 tons/year.

Table 3. Total Allowable Catch (TAC) of Fourfinger threadfin

Value MSY (Ton/year)	Formula		TAC
727.4554	80% MSY	x	581.9643244

The TAC value must be below the Maximum Sustainable Yield (MSY) to maintain the sustainability of fish resources. If JTB is greater than MSY, then it indicates overfishing. However, if TAC is lower than MSY, fishing can still be increased to obtain greater yields but not exceed the predetermined MSY limit[12].

Level of Effort and Utilization Rate

In Tanjung Jabung Barat waters, the level of Fourfinger threadfin effort in the last 5 years has an average percentage of 87%. This shows that the level of enrichment that occurs in these waters has approached overfishing and has not occurred in the waters of Tanjung Jabung Barat, where there is an opportunity to catch Fourfinger threadfin fish in the best conditions, but if the fishing effort is added, it will be very dangerous for the potential of Fourfinger threadfin. This is in accordance with the opinion of Saputra et al.[13,] which states that the addition of effort if carried out, will threaten the existing fisheries resources.

Table 4. Level of Fourfinger threadfin maturation in 2018-2022

Years	Effort	Eopt	Level of Effort	Description
2018	308	310.280	99%	Approaching overfishing
2019	275		89%	Approaching overfishing
2020	142		46%	Not overfishing
2021	409		132%	Overfishing
2022	209		67%	Not overfishing
Average	268.6		87%	Approaching overfishing
Amount	1343		519%	

Table 5 shows that the percentage of utilization of Fourfinger threadfin resources in Tanjung Jabung Barat Waters over the last 5 years has averaged 90%. This indicates that the resources of Fourfinger threadfin in the waters of Tanjung Jabung Barat have been optimized and have not been overexploited. However, if fishing effort increases, the utilization rate of Mantis shrimp stocks becomes threatened. The

highest utilization rate occurred in 2018 at 120%, and the lowest occurred in 2020 and 2021 at 72%. Listiani et al.[14] argue that overfishing or exploitation that exceeds the Maximum Sustainable Yield (MSY) will threaten the sustainability of fish resources in the waters.

Table 5. The utilization rate of Fourfinger threadfin in 2018-2022 in waters

years	Production(ton)	Cmsy	Ultilization Rate	Descriotion
2018	873.3		120%	Overfishing
2019	803.8		110%	Overfishing
2020	523.7	727.4554055	72%	Approaching Overfishing
2021	525.7		72%	Approaching Overfishing
2022	536.21		74%	Approaching Overfishing
Average	652.542		90%	Approaching Overfishing
Amounth	3262.71		538%	

4. CONCLUSION

Based on the analysis that has been done, the catch of Fourfinger threadfin in Tanjung Jabung Barat District has an ideal catch of 727.4554 tons/year with an optimum fishing effort of 310,280 trips/year. The catch of Fourfinger threadfin in Tanjung Jabung Barat district in 2018 and 2019 has exceeded the Total Allowable Catch of 581.9643244 Tons / Year. From 2019 until 2022, there was a decrease in catch production due to effort, natural factors, and biological factors that were not examined in this study. Fourfinger threadfin fishery resources in the waters of Tanjung Jabung Barat will be threatened if the catch effort is added, even though the utilization of Fourfinger threadfin has reached the optimal level and overfishing has not occurred.

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