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ESTIMATION OF SUSTAINABLE POTENTIAL AND UTILIZATION LEVEL OF PENAEUS MERGUIENSIS IN PANGANDARAN WATERS, WEST JAVA

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ABSTRACT

Banana prawn is one of the penaeid shrimp commodities whose market demand is high in Pangandaran Regency. The high market demand for shrimp will encourage the interest of fishers to catch shrimp as much as possible so that it threatens the sustainability of banana prawn resources. The purpose this research is to know determine the Maximum Sustainable Yield (MSY), the optimum fishing efforrts and the utilization level of banana prawn in Pangandaran Waters. The research was conducted at TPI Minasari Pangandaran and TPI Bojongsalawe in March – June. The method used in this research is a descriptive survey method that is case study of banana prawn fishery in Pangandaran Waters. The data collected was primary data and secondary data related to catching banana prawn. The data were analyzed presented in the form of Catching Per Unit Effort (CPUE), Maximum Sustainable Yield (MSY), optimum fishing efforts and utilization level of banana prawn. The result showed that Maximum Sustainable Yield (MSY) of banan prawn was 74.05 tons per year with an optimum effort of 10,286 trips per year. The utilization level of banana prawn in Pangandaran Waters was 96%, which in a fully exploited status.

1. INTRODUCTION

Pangandaran Waters is one of the locations included in the Fisheries Management Areas (FMAs) 573 covering the Indian Ocean waters south of Java to the south of Nusakambangan Island (Apriliani et al., 2020) . Fisheries resources in Pangandaran Waters have a great contribution to improving the economy of the Pangandaran Regency, one of which is banana prawn. Banana prawn (*Penaeus merguiensis*) is one of the commodities of shrimp penaeid that has high market demand (Sari et al., 2017). Based on the survey in the field, banana prawn sold various sizes with prices ranging from Rp. 70.000 - 250.000,- per kg. The high demand for banana prawn in the market causes production shrimp catches to continue to increase from year to year. Production of banana prawn catches in 2017 amounted to 47.99 tons and continued to increase until 2019 reached 68.29 tons (Dinas Kelautan Perikanan dan Ketahanan Pangan, 2019)

The high demand of the banana prawn market will lead to continuous catching and result in the stock of resources thin out. If stock resources in thinning water will certainly affect the sustainability of the shrimp and cause a decrease in the amount of production of catches. Decrease in the quantity of banana prawn production caused by overfishing (Suman & Prisantoso, 2017). Overfishing can lead to decreased production and in time the old will result in the extinction of resources that have value economical (Irhamsyah & Agustiana, 2018). Therefore, maintaining the stock of a resource must be followed by management efforts to use it more effectively and certainly get optimal and sustainable results. According to (Irhamsyah & Agustiana, 2018) fishing efforts to manage sustainable fishery resources must be done effectively, efficiently and consider the balance environmental support capacity.

Based on this, it is necessary to do this research on estimation potential and level of utilization of banana prawn resources in Pangandaran waters. This research aims to determine the utilization of banana prawn starting from CPUE, Catching Efforts, MSY, and the utilization level of banana prawn. The research must inspect so the banana prawn that are used are still optimal and sustainable without compromising their sustainability.

2. METHODS

2.1 Research Location

The research conduct at two Fish Auction Sites (TPI) in Pangandaran Regency, namely TPI Minasari Pangandaran and TPI Bojongsalawe started from March – June 2021. The time starts from data collection, data processing, and report preparation. The research location map is present in Figure 1.

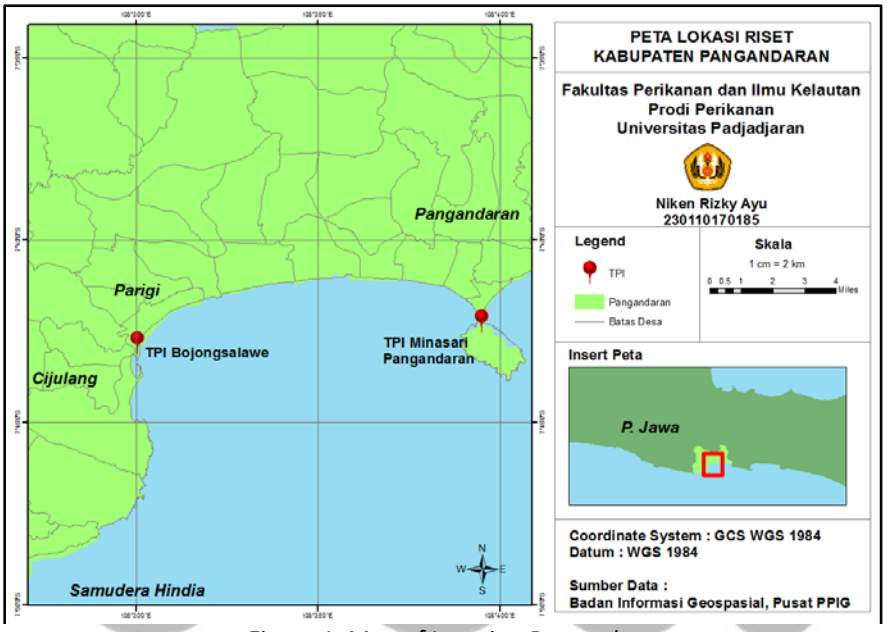

Figure 1. Map of Location Research

2.2 Research Method

The research method used is a combination of methods descriptive surveys with a case study. The case in this research is an estimate of the potential and utilization level of banana prawn in Pangandaran Waters. The descriptive survey method is the method used to collect data on the factors that will support the research (Sobari & Febrianto, 2010). The object to be research is the catch and fishing effort banana prawn landed in two TPI, namely TPI Minasari Pangandaran and TPI Bojongsalawe. Based on the object under the research, the researcher hopes to get the necessary data in the form of the number of catches and the effort to catch banana prawn.

The data obtained are primary data and secondary data. The primary data was obtained directly through interviews with fishermen. the primary data collected is reports of banana prawn catches and fishing efforts in a daily. The secondary data obtained from the relevant agencies, namely the Department of Marine Fisheries and Resilience Food (DKPKP) Pangandaran Regency, PP Cikidang, TPI Minasari Pangandaran, TPI Bojongsalawe, Central Statistics Agency, and other literature studies. Secondary data collected is time-series data from 2016 - 2020 it is a catch production data and fishing efforts data of banana prawn.

2.3 Analysis Data

The data obtained were analyzed to know the estimated sustainable potential and utilization level rate of banana prawn in Pangandaran Waters. Maximum Sustainable Yield (MSY) and optimal fishing efforts were analyzed using the Surplus Production method in the Schaefer model. The data obtained is analyzed based on:

1. Catch Per Unit Effort (CPUE)
   CPUE value calculation is the number of fishermen's catches per unit of capture attempt. According to (Mayu et al., 2018) formula used to calculate the CPUE value is as follows:

$$CPUE = \frac{Catch}{Effort}$$

   Description:
   CPUE = Production Per Unit Effort (ton/trip)
   Catch = Catch (tons)
   Effort = fishing efforts (trip)

2. Maximum Sustainable Yield Analysis
   Maximum Sustainable Potential (MSY) was analyzed using the Schaefer model. The formula is used as follows:
   a. Optimum effort (Fmsy):

$$Fmsy = \frac{a}{2b}$$

   b. Maximum sustainable Yield (MSY):

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

   Description:
   Fmsy = optimum effort (trip)
   MSY = Maximum Sustainable Yield (tons)
   a = intercept
   b = slope

   Values a and b are derived from the simple linear regression equation of the Schaefer model i.e.y = a + bx from CPUE.

3. Utilization level
   Utilization level can be known by calculating the number of catches a given year per Maximum Sustainable (MSY) value. Here is the formula of resource utilization level as follows:

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

   Description:
   T = Utilization level (%)
   Ci = catch of the year (tons)
   MSY = Maximum Sustainable Yield

3. RESULT AND DISCUSSION

Condition of Capture Fisheries in Pangandaran Regency

Pangandaran Regency is one of the regencies in Java Province West has ten sub-districts with an area is adjacent to the sea. Pangandaran Regency is one of the areas included in Fisheries Management Areas (FMAs) 573. FMAs 573 covers the waters of the Indian Ocean south of Java to the south of Nusakambangan Island include Pangandaran Waters (Dewanti et al., 2020). Department of Marine Affairs, Fisheries and Food Security Pangandaran Regency (2017) in (Kusmiati et al., 2020) fishing activities in Pangandaran Regency carried out in several areas such as Teluk Pananjung, Parigi Bay, Karapyak, Nusakambangan, and Cilacap. Resource capture fisheries must optimally and sustainably so that they can continue to support the increase of fishery production in Pangandaran Regency (Dewanti et al., 2018). One of the fisheries resource commodities in Pangandaran Regency that has high economic value is a banana prawn. Banana prawn in Pangandaran Waters caught using only one fishing gear, namely trammel net.

Catching Production of Banana Prawn

Banana prawn is one of the commodities of fishery resources in Pangandaran Regency's main catch target. Based on the results of interviews in the field, a trammel net is a fishing gear used by fishermen to catch banana prawn. Banana prawn caught is utilized by

resale in restaurants and exported to foreign countries. Production of banana prawn catch in Pangandaran Waters presented in Figure 2.

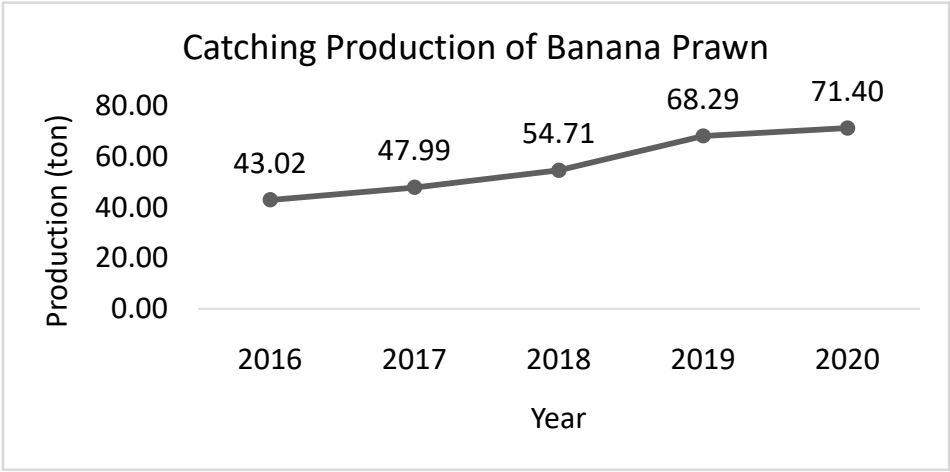

Figure 2. Catching Production of Banana Prawn in Pangandaran Waters (2016 – 2020)
(Source: DKPKP Kab. Pangandaran, PP Cikidang, TPI Minasari Pangandaran, TPI Bojongsalawe)

Production of jerbung shrimp catches in Pangandaran Regency in the last five years, 2016 – 2020, continues to experience increasing every year (Figure 14). The highest catch of jerbung prawns occurred in 2020 at 71.40 tons, while the lowest occurred in 2016 at 43.02 tons. the increase of production catch can be caused by an abundance of jerbung shrimp stocks in nature and the total fishing gear used. (Mayu et al., 2018) the number of result production will be influenced by fishing gear, environmental factors, and oceanographic conditions.

Fishing Efforts of Banana Prawn

The high market demand for banana prawn causes fishing efforts to increase (Nugraha et al., 2012). Efforts to catch banana prawn from 2016 – 2020 in Pangandaran Waters are present in Figure 3.

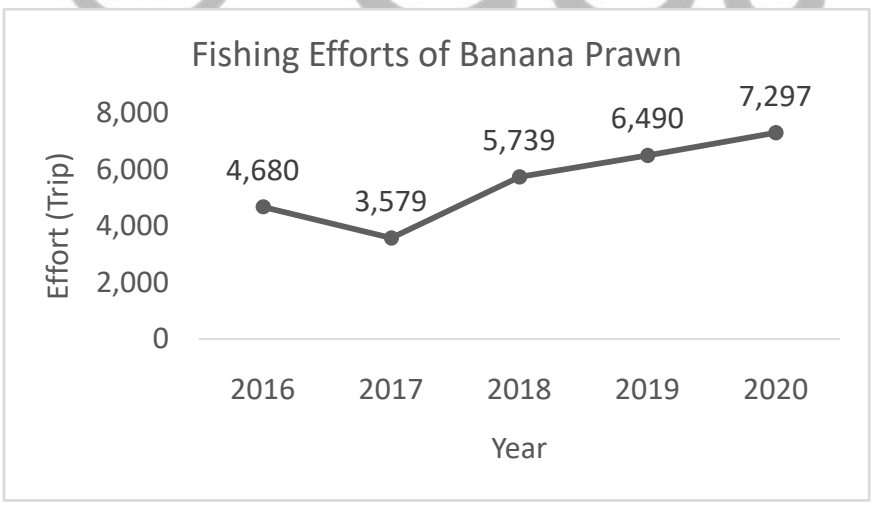

Figure 3. Fishing Efforts of Banana Prawn in Pangandaran Waters (2016 – 2020)
(Source: DKPKP Kab. Pangandaran, PP Cikidang, TPI Minasari Pangandaran, TPI Bojongsalawe)

Fishing efforts of banana prawn in the last five years has fluctuated. Fishing efforts decreased in 2017 and increased again in 2018 to 2020. The lowest fishing efforts occurred in 2017 which was 3,579 trips, while the highest fishing efforts occurred in 2020 which was 7,297 trips. Although the fishing efforts fluctuated, the catch continued to increase. This is in accordance with the statement (Mayu et al., 2018) that the fishing efforts are not the only factor that decreases or increases production catches. According to (Juandi et al., 2016) production of catch will be affected by many factors, namely the fishing grounds, the presence of resource stocks in the waters, the amount of effort put into fishing, and the level of successful capture of a resource.

Catch Per Unit Effort (CPUE)

Catch Per Unit Effort (CPUE) was obtained by comparing the production of the catch and the capture attempt. CPUE is used to determine the catch production of an average source (Listiani et al., 2017). Graph of CPUE value of banana prawn in Pangandaran Regency is present in Figure 4.

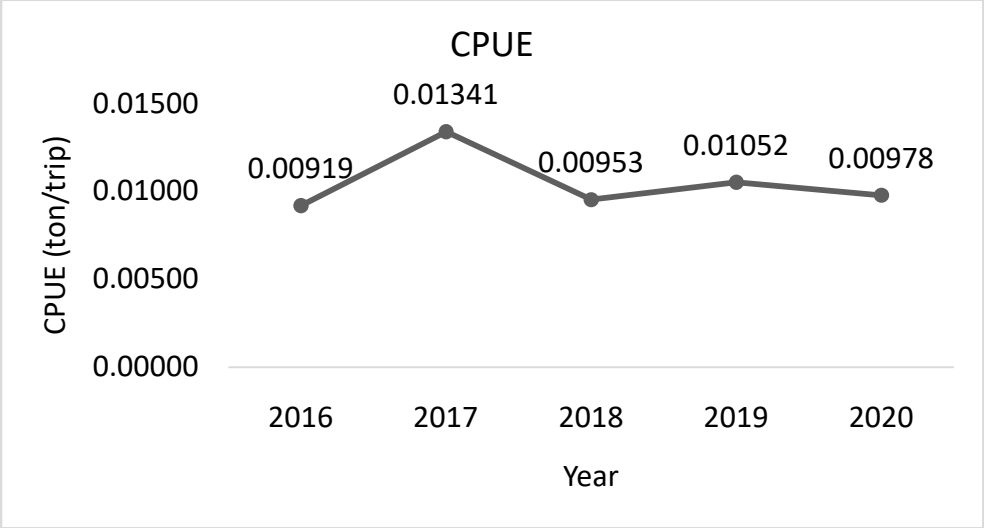

Figure 4. Catch Per Unit Effort of Banana Prawn in Pangandaran Waters (2016 – 2020)
(Source: Primary data)

In addition to the fishing efforts, the CPUE value of banana prawn also fluctuated from 2016 – 2020. The average CPUE value over the last five years was 10.48 ton per trip. The highest CPUE value in 2017 was 0,0134 ton per trip, while the lowest value in 2016 was 0,0091 ton per trip. Calculation of CUE value determines the level of abundance and utilization of fishery resources in water ((Noija et al., 2014) in (Mayu et al., 2018)). According to (Monica et al., 2017), the increase or decrease in fishing efforts affects the productivity of resources. The result of a fluctuating CPUE value causes a need to know the relationship between the CPUE value with the capture attempt and the capture (Aminah, 2011). The relationship between CPUE value and fishing efforts in Pangandaran Regency is present in Figure 5.

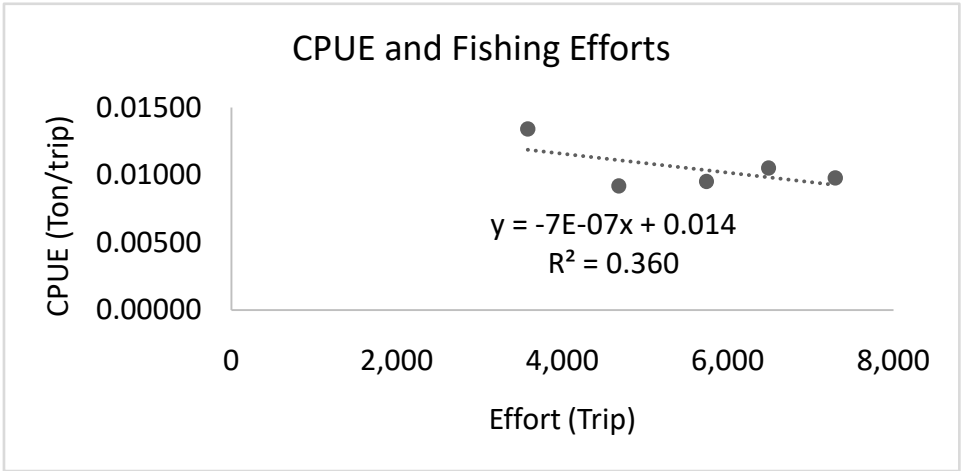

Figure 5. CPUE and Fishing Efforts of Banana Prawn in Pangandaran Waters (2016 – 2020)
(Source: Primary data)

Calculation of CPUE value relationship with a handler attempt generates decreasing trendline. Based on linear regression analysis, the Schaefer model obtained equation y = -7E-07x + 0.0144 with coefficient a of 0.0144 and coefficient b of -0.0000007. The coefficient of value state the potential resource in nature is still available 14.4 kg/trip if there no fishing efforts. The coefficient of value b states that each reduction in one capture trip causes a CPUE value increase of 0.0007 kg/trip. The resulting coefficient determination (R2) of 0.3605 or 36% means the up or down CPUE value is affected by 36% fishing effort and the remaining 64% is influenced by

other factors. Some factors that are suspected to affect CPUE values are the condition of the fishing ground and the oceanography of the waters (Mayu et al., 2018)

Maximum Sustainable Yield (MSY) of Banana Prawn

Maximum Sustainable Yield (MSY) use as a reference for fishery resource management that allows it to exploit to keep resource stocks safe (Listiani et al., 2017). The data used in MSY calculations are data on catches and fishing effort banana prawn that are time series from 2016 - 2020. The calculation curve of MSY banana prawn is present in Figure 6.

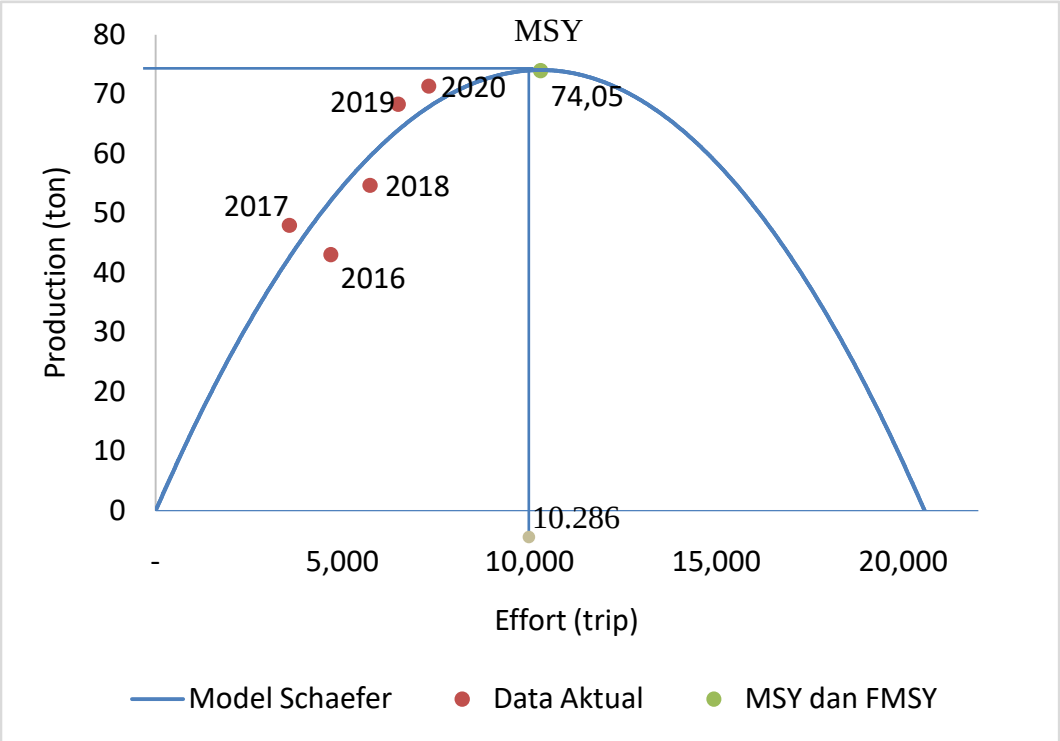

Figure 6. Maximum Sustainable Yield of Banana Prawn in Pangandaran Waters (2016 – 2020)
(Source: Primary data)

Based on the results, optimum fishing efforts can be done by 10,286 trips per year and the production value of Maximum Sustainable Yield (MSY) of 74.05 tons per year. Fishing efforts made have not exceeded the optimum fishing efforts of banana prawns. The same thing occurs in the production of catches that have not reached the Maximum Sustainable Yield point. Other factors that can affect the production of banana prawns that fishermen only use one type of fishing gear it is a trammel net that the fishing effort is not excessive. The conditions suggest that the management of banana prawn resources still allows for continued exploitation on a limited scale. The evidenced by the actual data on catch production of banana prawn resources in 2020 of 71.40 tons. The result is almost close to the MSY value of 74.05 tons.

Utilization level of Banana Prawn

Utilization level to determine the amount or percentage that indicates the use of fishery resources that have been utilized. The utilization level of banana prawn in 2016 – 2020 in the Pangandaran Regency is present in Table 1.

Table 1. Banana prawn Utilization Rate from 2016 - 2020

Year	Catch (ton)	Sustainable Production (MSY) (tons)	TAC (80% MSY) (tons)	Utilization Rate (%)
2016	43,02	74,05	59,24	58
2017	47,99	74,05	59,24	65

2018	54,71	74,05	59,24	74
2019	68,29	74,05	59,24	92
2020	71,40	74,05	59,24	96

Based on Table 1. concluded that in the last five years the utilization level of banana prawn has almost reached the optimum level. The highest banana prawn utilization level occurred in 2020 at 96%, while the lowest occurred in 2016 at 58%. The utilization level of potential resources of banana prawn in 2020 according to the Regulation of the Minister of Marine Affairs and Fisheries of the Republic of Indonesia Number Per.29/MEN/2012 is at fully exploited status. So, catching that banana prawns still can be done but must be effective and efficient that the stock of resources is maintained sustainability

Resources of banana prawn in Pangandaran Waters must be managed and utilized on a limited scale so that the sustainability of the shrimp is maintained. If the stock of banana prawn resources continues to decline will certainly harm all parties such as fishermen, the fisheries service, the fishing industry, especially shrimp, and consumers who take advantage of those resources.

4. CONCLUSIONS

Based on the analysis of the results, the estimation potential and utilization level of banana prawns in Pangandaran Waters can be concluded that the Maximum Sustainable Yield (MSY) of banana prawns is 74.05 tons with an optimum fishing effort is 10,286 trips per year. The utilization level of banana prawns in 2020 is 96% which is in a fully exploited status.

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