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Catch Per Unit of Effort of Trammel Net in East Coast, Pangandaran, Indonesia

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ABSTRACT

Pangandaran Regency. This research was conducted from September 2019 to January 2020 using trammel net fishing gear located on the East Coast of Pangandaran Regency. The method used is descriptive by analyzing the level of productivity of fishing gear. The productivity value of the fishing gear is calculated using the CPUE (Catch Per Unit Effort) value and the catch rate. The average value of productivity (CPUE) of trammel nets in Pangandaran is 27.52 kg / trip, whereas based on calculations using catch rates the results show trammel net fishing gear produce a catch rate of 9.13 kg / hour.

Keywords: *catch rate, CPUE, Trammel net, Pangandaran*

INTRODUCTION

One of the capture fisheries activities carried out in Pangandaran District is the operation of fishing gear by fishermen. The operation of fishing gear in utilizing fish resources in Pangandaran waters especially shrimp is quite diverse. The fishing gear used by Pangandaran fishermen consists of a trammel net, beach seine and mini bottom trawl (Fauzy 2009).

Based on research conducted by Dewanti et al. (2018) regarding the evaluation of selectivity and environmental friendly of mini bottom trawl fishing gear in Pangandaran Regency, West Java Province, it is known that the assessment of the level of environmental friendly based on selectivity is referred to from three indicators namely the proportion of the main catches on the by catch, the proportion of the size of the catch is more than the size of the use of discard (catches wasted). The results showed the lowest score was in the proportion of size that is 1, while the proportion of main catches was 2 and the utilization value was 4. This shows that in terms of the size of the mini bottom trawl fishing gear is not very selective. The total score is 7 which means in terms of the analysis of the catch has the criteria of "Less Environmental Friendly".

Regarding the results of this research, it is necessary to make efforts to find alternative fishing gear that is environmental friendly as a solution to the diversion of mini bottom trawl fishing gear. Trammel net is one of the environmental friendly shrimp catching equipment with minimal environmental impact. This fishing gear is quite effective and can be operated by small scale fishermen, with lower capital. (WWF 2015)

A trammel net is a type of fishing net because fish or shrimp caught are caused by being caught or trapped in the net. The construction of the net consists of three layers, namely the outer layer has a larger mesh size, while the one in the middle has a smaller mesh opening and is placed more loosely (Subani and Barus 1998). It is important to look at the characteristics of a trammel net that is for the management and development of sustainable fishing in the future by observing the productivity and rate

of catch of a trammel net used by Pangandaran fishermen. However, information about research into trammel net Pangandaran Regency is not yet available. Based on this, then this research needs to be done to provide information on productivity and catch rate of a trammel net in Pangandaran Regency.

MATERIALS AND METHODS

Time and Place

This research was conducted from December 2019 to January 2020 at Pangandaran Fishing Port, Pangandaran Regency, West Java Province.

Materials and Tools

Materials and tools used in this research were trammel net fishing gear, trammel net catches, stationery, ruler, documentation tools, scales, meter roll and interview guide.

Method

Methods used are descriptive. According to Russeffendi (2010) said that descriptive research is research that uses observations, interviews or questionnaires about the current situation, regarding the subject we are studying. Through questionnaires and so on we collect data to test hypotheses or answer questions. Through this descriptive research the researcher will explain what actually happened about the current situation that is being studied.

Analysis Data

During the research were analyzed to find out the productivity and catch rate of trammel net in Pangandaran Regency. The productivity of fishing gear is calculated using CPUE (Catch Per Unit Effort) value. CPUE data is the number of fishermen's catch per unit of effort (trip). According to Sparre et al (1999) in Dewanti 2013 fishing gear productivity is the result of catch value with unit weight per catching effort, then this CPUE value can be used as its productivity value, Trammel net fishing gear is calculated on the number of trips and production and the number of trips, which have been carried out since 2015-2020 uses the following formula:

$$\text{CPUE} = \frac{C}{F}$$

Description:

CPUE = Production Per Unit Effort (kg / trip)
C = Production (kg)
F = Catching Effort (trip)

Besides being counted per catching effort will also be calculated using the value of catching rate. Fishing catch rates are calculated using data series, for a minimum of five (5) years. The longer the time series used the sharper the predictions obtained. The method of calculation is to divide the total catch by using the interpretation of the formulation Spare and Vennema (1999) as follows:

$$c = \frac{C}{t}$$

Description:

c = catch rate
C = Catch (kg)
T = Attempt to catch in units of time (hours)

RESULT AND DISCUSSION

Capture Fisheries in Pangandaran District

Fishermen are the main actors in the fishing process. The welfare of fishermen has progressed, one of which is fishermen who are in Pangandaran. Fishermen in Pangandaran belong to traditional fishermen who only rely on experience without tools in determining fishing areas. The diversity of fishermen resources in the Pangandaran Regency has great potential to be utilized for productive economic interests. Following the number of fishermen and FISHING PORT in Pangandaran Regency can be seen in Table 1.

Table 1. Number of fishermen and FISHING PORT in Pangandaran District

No.	District	Fishing Port (Unit)	Number of Fishermen
1	Cimerak		593
	FISHING PORT Legokjawa	1	
	FISHING PORT Muaragatah	1	
	FISHING PORT Madasari	1	
2	Cijulang		627
	FISHING PORT Nusawiru	1	
	FISHING PORT Batukaras	1	
3	Parigi		764
	FISHING PORT Parigi	1	
4	Cigugur	-	-
5	Langkaplancar	-	-
6	Sidamulih	-	315
7	Pangandaran		2.207
	FISHING PORT Cikidang	1	
	FISHING PORT Jongorbatu	1	
	FISHING PORT Pangandaran	1	
8	Kalipucang	1	562
9	Padaherang	-	14
10	Mangunjaya	-	2
Total		10	5.084

Source: DKPKP Capture Fisheries Sector Pangandaran in 2016

According to Fachrussyah (2011) a fishing unit is a technical unit in a fishing operation, which consists of one fishing vessel and its fishermen and a type of fishing equipment equipped with fishing aids. Fishermen are an important component of a fishing unit, because fishermen are able to operate fishing gear or fishing vessels, if there are no fishermen who are able to operate the fishing gear then the fishing gear will not be able to operate so that it affects the productivity value. The productivity of a fishing gear is also greatly influenced by the skills of fishermen in the operation of a fishing gear, two ways of operating a fishing gear that is very influential on the acquisition of fish catches including the long application for each setting and the amount of setting/ trip (Hakim et al. 2017).

Fishermen in Pangandaran are divided into two namely owner fishermen (skipper) and labor fishermen. Most of the fishermen in Pangandaran are full-time fishermen, but there are also main sideline fishermen whose side jobs are farming. This main part-time fisherman if it is not the season of fish will do farming activities. Fishermen in Pangandaran use various types of fishing gear in fishing operations, one of the fishing gear used is a trammel net.

Trammel fishermen in each fishing gear operation amounted to 2-3 people. The division of tasks for fishermen is one person as a helmsman and the rest is in charge of fishing operations. The helmsman is usually the owner fisherman who joins one or two labor fishermen (crew members). When the fishing gear starts operating, this division of tasks does not function too much, because fishermen work together and complement each other.

Fishing Units

Fishing Units consists of ships, fishing gear and crew (ABK) with the existence of this fishing fleet can help the perpetrators of fishing activities in getting the maximum catch. The fishing fleet operating in Pangandaran Regency is divided into several groups according to size Gross Tonnage (GT). According to data from the Department of Fisheries, Maritime Affairs and Food Security (2016) the size classification of the fishing fleet operating in Pangandaran Regency is presented in Figure 1.

It is known that the fishing fleet in Pangandaran Regency is classified into three types, namely motorized boats, outboard motorboats and motorboats. Until now, the number of fishing fleets operating in Pangandaran waters is dominated by size <5 GT, this is due to limited capital owned by fishermen and fishermen's skills are still lacking.

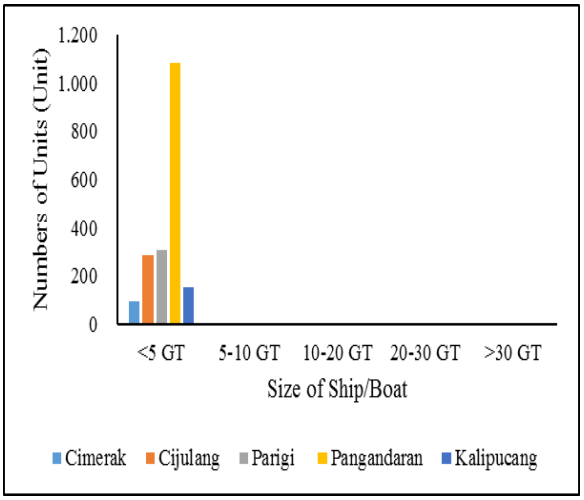

Fig 1. Capture Fleet Fish in Pangandaran Regency
Source: Fisheries Capture Division DKPKP Kab. Pangandaran in 2016

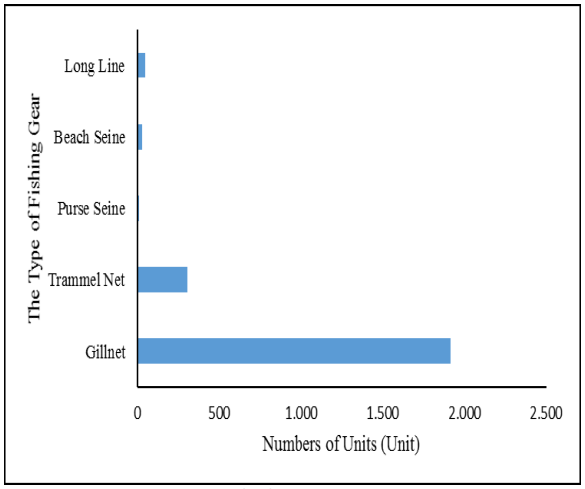

Figure 2. The type of fishing gear that operates in Pangandaran Regency
Source: Fisheries Sector DKPKP Kab. Pangandaran in 2016

Ships of <5 GT size are used by fishermen in Pangandaran with various kinds of fishing gear, one of which is a Trammel net. The boat used by trammel fishermen in carrying out fishing operations is outboard motor boats measuring <5 GT. Outboard motor boats made of fiber glass and wood. Trammel nets are ranging in length from 8.2 to 12.1 meters, widths from 1.05-1.57 meters and deep from 0.78 to 1.05 meters. Ship propulsion in the form of an outboard engine with a power of 15 DK.

The ship is an important component of a fishing unit, the larger the size of the ship, the higher the productivity value of a fishing gear that is operated on the ship. That is because the larger the size of the ship, the more catches it gets. The size of the ship is also in line with the size of the engine, the larger the size of the ship the larger the engine size. According to Kisworo (2013), ships with larger engine power sizes have the ability to get bigger catches of fish compared to ships that have smaller engine power sizes.

Fishing Method

The fishing gear used in Pangandaran Regency is very diverse, the following are the types of fishing gear used by fishermen in Pangandaran Regency are presented in Figure 2.

Gillnet fishing gear is used more by fishermen in Pangandaran Regency compared to other fishing gear. According to Azam (2009) at the time of the Pangandaran tsunami and surrounding areas, all fishing gear around the coast both those that were operating and those that were being stored were damaged and lost. This caused a decrease in the number of fishing gear units in 2006. To stabilize the condition of fishing fisheries in Pangandaran, the local government provided assistance to fishermen in the form of fishing gear gillnet, with this assistance an additional fishing gear occurred. Until now, gillnet fishing gear is the most widely used fishing gear in Pangandaran waters then followed by trammel net or commonly referred to by fishermen in Pangandaran Regency with the name of the trammel net.

Fishing gear is an important component of a fishing unit. The number of fishing gear that operates will affect the number of fishermen who operate it. However, increasing the number of fishing gear operations will not necessarily increase the productivity value of the fishing gear if it is not balanced with high production volumes.

Capture Production in Pangandaran Regency Capture

Produced by fishing gear operating in Pangandaran waters in the last five years

has fluctuated, it can be seen from the catch production in 2015-2019 in Figure 3.

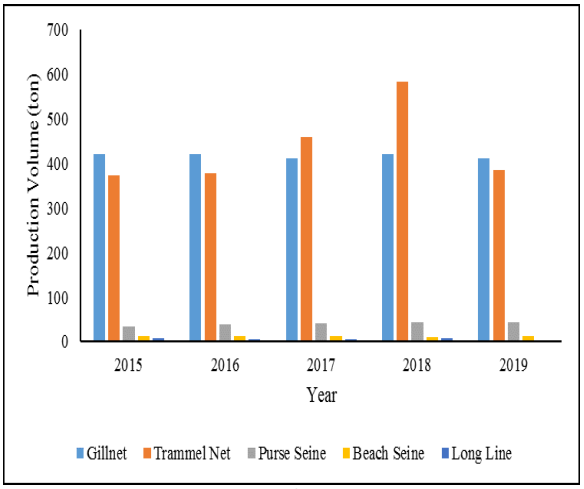

Figure 3. Production volume of catches per Fishing Gear in Pangandaran
Source: Fisheries Sector DKPKP District. Pangandaran in 2019

Based on the picture above, it can be seen that in 2015-2019 the highest production volume of fishing gear was the gill net (liong bun) and then followed by the trammel net. The greater production volume is not necessarily in line with the high productivity value of a fishing gear that is operated, because there are several factors that can affect the value of productivity other than production volume such as the number of fishing gear operated and the number of trips made by fishermen using the fishing gear.

Catches Per Unit of Effort (CPUE)

Fishing gear productivity is catches with a unit weight per catching effort, where the catching effort here can be either a fishing gear or a trip. According to Dewanti (2013) a high amount of production is of course the main objective of capture besides having to consider environmental aspects for the creation of responsible capture fisheries. The following is the productivity value of trammel net fishing gear in Pangandaran Regency from 2015-2019 can be seen in Table 2.

Table 2. Number of Production and Number of Fishing from 2015-2019

Year	Production (kg)	Number of Fishing Gear	Effort (trip)	Productivity (kg/trip)
2015	372520,9	303	15804	23,57
2016	378523,35	305	15804	23,95
2017	459844,49	305	15821	29,07
2018	581830,78	305	15892	36,61
2019	384729,63	305	15759	24,41
Average	435489,83	304,4	15816	27,52

Table 2 shows that the catch and attempts of catching trammel net fishing gear in Pangandaran Regency have fluctuated. The highest catch occurred in 2018, amounting to 581.83 tons while the lowest catch was in 2015 with a catch of 372.52 tons and the highest and lowest catch attempts were in 2018 amounting to 15892 trips and 2019 amounted to 15759 trips.

Catching effort of trammel net fishing gear by Pangandaran fishermen from 2015 to 2019 generally increased but in 2019 efforts to catch trammel net fishing gear decreased to 15759 trips. From table 2 it can be seen that the catch of the trammel net has fluctuated. Fluctuation in trammel net catches is influenced by several factors such as the number of fishing units operating, shrimp catching season which is the main catch of Trammel nets, fishing techniques used and the availability of the main catch trammel nets to be captured. The effort to catch each year is different because of the fishing season, in the peak season where fishermen are easier to get fish in that season compared to other seasons. Fishermen will catch a lot of fish (Nuralimah et al. 2018).

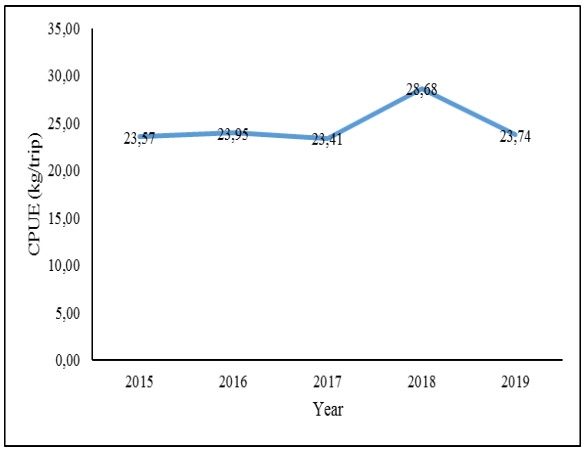

Figure 4. Catching Results Per Capture Catchment (CPUE) in Pangandaran Waters

Data from trammel net catching efforts can be analyzed by calculating trammel net catch value per trammel net catching effort (CPUE). CPUE calculation is used to determine the level of productivity of the trammel net fishing gear. The catches per trammel net catching effort are presented in Figure 4.

Figure 4 shows that the catches per capture catcher were highest in 2018 and the lowest in 2015. CPUE experienced fluctuations that tended to increase. Increased CPUE of shrimp resources occur due to reduced activity of the fishing units (effort) (Hamada 2016).

Catch Rate

Catching rate describes the catching ability of a fishing gear per catching effort. Capability of a fishing gear represents the catch in grams / kilograms / tons. The catching effort that is part of the catch rate analysis is the capture effort such as the length of the pull (duration of submersion), duration of removal and duration of harvest converted in units of time (minutes/hours/day). Based on the results ofresearch and data analysis of three fishing gear, there are unit differences in describing the catch rate of trammel net fishing gear (Table 3).

Table 3. Catching Rate Value of Trammel Net

Catch (kg)		*Setting*	*Catching Rate (cr)*	Description
Main Catch	Bycatch			
22.62	9.82	3.5	9.13	*average towing*: 1 hour/trip

The results of data analysis on the catch rate on the trammel net fishing gear produced a catch rate of 9.13 kg / hour (6.28 kg / hour as main catch and 2.85 kg / hour as bycatch), with an average duration of time towing of 60 minutes / trip. Based on observations during the study, that the operation of the trammel net fishing gear was carried out as many as 3-5 times the period of decline and lifting of the fishing gear with the duration of the fishing gear withdrawal time towing which ranged for approximately 60 minutes. The value of the catch rate target on the trammel net fishing gear means describing the trammel net fishing gear has a greater ability in capturing shrimp as main catch compared to capturing other aquatic biota as bycatch.

Table 4 shows the results of the catch rate calculation from a study conducted by Dewanti et al. (2018), there are five fishing gears which are representatives of the fishing group, gill net group, trawland netlift net. The lowest catch rate is indicated by longline fishing gear with a catch rate of 2.73 kg / hr while the fishing gear with the highest catch rate is mini bottom trawl with a catch rate of 40.85 kg/hr.

Table 4. Catch Rate for fishing gear that landed fish in Fishing Port Pangandaran

No	Fishing Gear	Catch Rate (Kg/Hour)
1.	Longline	2,73
2.	Gill Net	5,56
3.	Beach Seine	8,01
4.	Lift Net	8,18
5.	Mini Bottom Trawl	40,85

Source: Dewanti et al. (2018)

Mini bottom trawl have a high catch rate due to their low selectivity. Mini bottom trawl have a mesh size a small that is an active method of operation so that the catch is high. In terms of increased production this shows a positive indication but if viewed from the dimensions of resource sustainability this condition can indicate that fishing gear is not environmentally friendly because it dredges fish resources in the waters without selection of type or size (Dewanti et al., 2018). Compared to trammel nets which have a catch rate of 9.13 kg / hour with a large enough difference to the catch rate of mini bottom trawl, it indicates that trammel nets are far more selective in the type and size of their catch and this is supported by the fact that trammel net catches are dominated by the main catches that have reached a catchable size.

CONCLUSION

Productivity of Trammel nets in Pangandaran 27.52 kg / trip, and catch rate of 9.13 kg / hour.

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