



HANGING RATIO GILLNETS ON DIFFERENT MESH SIZE FOR SILVER POMFRET (*PAMPUS ARGENTEUS*) IN PANGANDARAN, INDONESIA

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KeyWords

Coastal area; Fishing gear; Mesh; Selectivity; Sustainable fisheries.

ABSTRACT

Capture fisheries activities in Pangandaran Regency are one of the potentials of this area in the coastal area. Gillnet is one of the most used fishing gear by fishermen in Pangandaran. There are no specific calculations related to the hanging ratio amount of gillnet used. Hanging ratio affects the number of catches obtained. Therefore, it is necessary to conduct research on the hanging ratio value for gillnet used to catch silver pomfret (*Pampus argenteus*). Research was conducted in August 2018 and January 2019 in Pangandaran Regency, West Java. The research object is gillnet with a different mesh size of 4,5 and 5 inches with main catch is silver pomfret (*Pampus argenteus*). The data obtained were then analyzed descriptively by describing the condition of gillnet for silver pomfret (*Pampus argenteus*) in Pangandaran and analyzing the hanging ratio of the gillnet. Hanging ratio for 4,5 inch gillnet is 0,51 while for mesh size 5 inches 0,54. Based on these results, it can be concluded that the gill nets are selective. The proportion of the catch results shows the number of target fish gill nets with a 4,5 inch mesh size is 74% and bycatch is 26%. The proportion of gillnet catches with a 5 inch mesh size shows a main catch of 44% while the bycatch proportion is 56%.

Introduction

Fishing activities become a source of income for the community, especially in coastal areas [1]. This has become a source of economic growth triggered by the increasing demand for fish as one source of food, the impact is the increasing use of production technology from fishing activities. Fisheries resources have limited carrying capacity to grow and develop, so they need management actions so that fish utilization activities can be sustainable [2].

Capture fisheries activities in Pangandaran Regency are one of the potentials of this area in the coastal area. The area of Pangandaran Regency is directly to the Indian Ocean so that it has generally been developed as a tourism conservation and fisheries area [3]. Pangandaran waters have a vast potential of marine resources. Therefore, marine fish resources in Pangandaran waters should be optimally utilized. Sustainable fishery resources will continue to support fishing activity in Pangandaran waters, increasing fishery production [4].

One of the fisheries resources that has important economic value generated from Indonesian fish is silver pomfret (*Pampus argenteus*). Silver pomfret has a high economic value because this fish is one of the fish that is good for consumption because it contains nutrients [5]. Another factor that increases the value of white pomfret is market demand for white pomfret which continues to increase and rise at a relatively high price compared to other types of fish [6]. Prihatiningsih et al. [7] silver pomfret is marketed locally and exported in frozen form to China, Korea, Japan, Malaysia, Singapore and Thailand.

Fishing gear used in catching white pomfret is gillnet. Gillnet is one of the fishing gear that describes sustainable fisheries management [8]. One form of sustainable fisheries management that is applied to gillnet fishing gear is the value of selectivity. Selectivity can be done through the hanging ratio magnitude approach used by a fishing gear to catch certain species. Gillnet is one of the most used fishing gear by fishermen in Pangandaran which is operated at night or early in the morning [9]. Gillnet fishermen in Pangandaran used to catch silver pomfret using two types of mesh size, at 4,5 inches and 5 inches. There are no specific calculations related to the hanging ratio amount of gillnet used. Determination hanging ratio is only based on the habits of fishermen. Previous researches conducted by Hamley [10]; Duman et al. [11] and Ayaz et al. [12] indicate that hanging ratio affects the number of catches obtained. Therefore, the optimum hanging ratio for catching silver pomfret needs to be known.

Based on the description above, it is clear that the hanging ratio affects the gillnet catches. However, fishermen using gill nets in Pangandaran are not supported by information about the size of the hanging ratio. Therefore, it is necessary to conduct research on the hanging ratio value for gillnet used to catch silver pomfret (*Pampus argenteus*). This study aims to determine the classification and calculate the value of hanging ratio gillnet and the catch of silver pomfret (*Pampus argenteus*) with different mesh sizes.

Materials and Methods

Research was conducted in August 2018 and January 2019 in Pangandaran Regency, West Java. The method used is the survey method using a sample of research objects observed. The data needed in this research are primary and secondary data. Primary data is in the form of direct data collected when conducting research in the field. Secondary data is data sourced from the Fisheries and Marine Service of Pangandaran Regency and literature studies. The research object is gillnet with a different mesh size of 4,5 and 5 inches with main catch is silver pomfret (*Pampus argenteus*).

The method used in this research is the survey method, in its implementation the research method uses samples of research objects caught on the observed fishing gear [13]. This research is assisted by interviews conducted with fishermen by using questionnaires to explore and gather the information needed. The second is useful documentation to visualize the situation or process that occurs during research in the field and the results obtained related to research. Fishermen selection is done to determine the sample size to be selected using sampling methods to determine accuracy. Samples were taken at 10% of the total individual population studied. If a sample of 10% of the population is considered large (more than 30) then the alternative used is to take a sample of 30 individuals / units [14].

Data collection was carried out by participating in capture activities for 6 trips. The vessels used are 2-3 GT with a total of 2 vessels. One trip is one day fishing with operating activities 2 times setting and hauling. The data in this research include weight, number of fish, fork length, girth and how fish are caught using gillnet. The data obtained were then analyzed descriptively by describing the condition of gillnet for silver pomfret (*Pampus argenteus*) in Pangandaran and analyzing the hanging ratio of the gillnet. Calculation of hanging ratio fishing gear uses the following formulations [15] :

$$E = L/(L_0)$$

Information:

E = Hanging ratio

L = Length after the nets installed

L₀ = Length before the net installed

Results and Discussion

Gillnet Fishing Gear

The gillnet is a type of fishing gear made of monofilament or multifilament net material which is formed like a rectangle, and is equipped with floats on the top and the ballast (sinkers) which makes the gill nets can be installed in the catching area in an upright position blocking aquatic biota because there are two opposing styles [16]. This is in line with the gill nets used in Pangandaran waters. This fishing gear unit is rectangular in shape with a certain mesh size. The gill nets used in Pangandaran waters consist of a net with a ballast attached to the lower ris rope and a float on the upper ris rope, a float mark as a marker of both ends of the net, and a sheet string to pull the net.

Buoys used in gill nets are usually made of various materials such as plastic, while the weights use cement molds. According to Umriani [17] buoys and ballast can affect the good or bad of the catches obtained, this is influenced by buoyancy and sinking power caused by buoys and weights that work in opposite directions while in the submerged water used. The gill net fishing gear in Pangandaran usually has about 45 buoys, depending on how long the fishing gear is from the fishing gear. Gill net fishing gear has a buoy mark at the end of each gear. Sign buoys can be made of cork and bamboo marked (flags / cloth) that are useful to identify where they are during the capture process.

Gill net is a fishing gear that can catch various types of fish commodities that can be adjusted to the size of the mesh size depending on the season of the fish to be caught. One of the fish commodities that become the main catch of gill nets is silver pomfret. Silver pomfret is one type of fish that has high economic value. This is in accordance with Islami [18] which states that the main catch of gillnet in Pangandaran is white pomfret. Prihatiningsih et al. [7] stated that the high price of silver pomfret because the interest in these fish is very high so that market prices will remain high, white pomfret also intensively meets the needs of the export market. According to Pangandaran production data [19] for 2016-2018, white pomfret is included in the category of the ten highest capture commodities with a total of 1,503,094 kg in 2016-2018.

Gillnet Catches

Catches are classified into two types, namely main catches and bycatches [20]. The main catch is all species that are the main target in capture and have high economic value. Whereas bycatch is all species outside the main catch that can be utilized. The economic value of the bycatch is lower than the economic value of the main catch. Silver pomfret (Fig. 1) is a type of demersal fish that affects the gillnets used, in this research the gillnets used are bottom gillnets. The gillnets used to catch white pomfret have 2 kinds of mesh sizes, which are 4.5 and 5 inches in length with a net length of approximately 50 sets with 1 set length reaching 4-5 meters.



Figure 1 Silver pomfret (*Pampus argenteus*)

Table 1 Gillnet catches Mesh Size 4,5 inch

No.	Main catch	Proporsi		
		Total (fish)	Weight (kg)	Proportion
1	Silver pomfret (<i>P. argenteus</i>)	126	28,5	74,5 %
No.	Bycatch			
1	Hair tail (<i>Trichiurus lepturus</i>)	3	0,3	1,8 %
2	Mixed unidentified (discard)	40	3,8	23,7 %

Table 2 Gillnet catches Mesh Size 5 inch

No.	Main catch	Proporsi		
		Total (fish)	Weight (kg)	Proportion
1	Silver pomfret (<i>P. argenteus</i>)	127	25	44,4 %
No.	Bycatch			
1	Black pomfret (<i>Parastromateus niger</i>)	6	1,5	2,1 %
2	Hair tail (<i>Trichiurus lepturus</i>)	16	0,5	5,6 %
3	<i>Atrobuca brevis</i>	7	1,2	2,5 %
4	<i>Portunidae</i>	3	2	1,1 %
5	<i>S. commerson</i>	1	0,1	0,3 %
6	Shrimp	1	0,2	0,3 %
7	Mixed unidentified (discard)	125	13,93	43,7 %

Main catch fish are 126 silver pomfret with a weight of 28,5 kg for catch gillnet with 4,5 inch mesh size and 127 tail with 25 kg weight for gillnet catch with 5 inch mesh size. The bycatch obtained in this research were seven species, namely black pomfret (*Parastromateus niger*), hair tail (*Trichiurus lepturus*), crab (*Portunidae*), *Atrobuca brevis*, mackerel (*S. commerson*), shrimp and mixed fish (which consists of *Leiognatus* sp, Schneider, goatfish, *Nemipterus* sp., etc.). Bycatch is generally a fish that is accidentally caught together with the main catch and usually has an economical price although not as high as the main catch. The diversity of species caught can be caused by the location of the fishing area which is a habitat for both target and non-target fish [21].

Hanging Ratio

Hanging ratio is the percentage of the length of the net attached to the rope ris divided by the length of the net that is stretched completely (length of the net before fishing gear is made) [22]. The hanging ratio is closely related to the shape of the net opening to the side [23] which causes that the greater the hanging ratio, the more the net eye is open to the side (Figure 1). Hanging Ratio is calculated by means of the length of the net attached divided by the length of the net that is stretched out completely before a fishing gear is made.

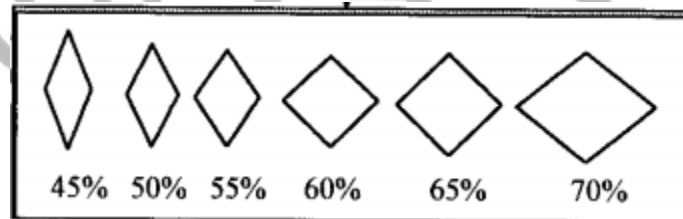


Figure 2 Illustration of Hanging Ratio Gillnet
(Source: Rengi 2002)

According to Razak et al. [24] the hanging ratio of the gill nets that are usually used ranges from 0,40 to 0,60. The results showed that gill nets used by fishermen with a mesh net size of 4,5 had a hanging ratio value of 0,51 while a 5 inch mesh net had a hanging ratio of 0,54. Based on these results it can be concluded that the gill nets with a mesh size of 4,5 and 5 inches including a selective fishing gear to catch white pomfret based on a hanging ratio. This is supported by the statement of Anggreini et al.[22] that the gill-net hanging ratio generally has a value of 0,5. Rengi [23] states that the determination of selectivity can be influenced by parameters such as mesh size, hanging ratio, visibility, elongation, net yarn, body shape and behavior of the main catch fish.

A smaller hanging ratio will result in lower net openings with higher slack levels. The higher the hanging ratio, the wider the opening of the mesh [11]. The use of a high hanging ratio makes the net will catch fish by tipping because the slack will increase [25].

Conclusion

Hanging ratio for 4,5 inch gillnet is 0,51 while for mesh size 5 inch is 0,54. Based on these results, it can be concluded that the gill nets are selective. The proportion of the catch results shows the number of target fish gill nets with a 4,5 inch mesh size is 74% and by-catch is 26%. The proportion of gillnet catches with a 5 inch mesh size shows a main catch of 44% while the bycatch proportion is 56%.

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