

CATCH ANALYSIS AT THE TIME OF FISHING OPERATIONS AND IMMERSING SURFACE GILL NETS IN SEMARANG WATERS, CENTRAL JAVA, INDONESIA

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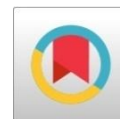
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Abstract: The purpose of this study was to catch analysis at the time of fishing operations and immersing surface gill nets in Semarang Waters, Central Java, Indonesia. The research was carried out in March 2021. The research method was experimental fishing. The treatment variables included the morning operating time with 30 minutes and 60 minutes of immersion time, and the evening operating time with 30 minutes and 60 minutes of soaking. All treatments were repeated 7 times each. Data analysis using the Two Way Anova test.

The composition of the catch obtained was Milkfish (*Chanos Chanos*), Long Jawed Mackerel (*Rastrelliger sp.*), Anchovy Fish (*Mystacoleucus padangensis*), Threadfin (*Eleutheronema tetradactylum*), Queen Fish (*Scomberoides lysan*), Grouper Fish (*Epinephelus sp.*), Pony Fish (*Leiognathus tauvina*), Emperors (*Lethrinus sp.*), Silver Pennah Croaker (*Aspericlavina jubata*), Black Pomfret (*Formio niger*), Torpedo Scad (*Megalaspis cordyla*), Spanish Mackerel Fish (*Scomberomorus sp.*), John's Snapper (*Lutjanidae sp.*), Streaked Spinefoot (*Sinagus sp.*), Tholi Shad (*Tenualosa macrura*), and Tongue fish (*Cynoglossus lingua*). The most catches (biomass) were treated in the morning operating time with 60 minutes of immersion. Data analysis showed that there was a significant effect on the best catch with fishing operation time in the morning (sign 0.05) and immersing time for 60 minutes (sign 0.05). There is no significance between the fishing operation time and the immersing time.

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Keywords: analysis; time; fishing; catch; operations;

I. INTRODUCTION

The potential of fish resources in the waters of Semarang, Central Java, Indonesia is 3,714,385 kg. This potential is exploited by using surface gill nets as the dominant fishing gear used. Surface gill net operation time is one day trip. Fishermen in Semarang waters who belong to the artisanal fisheries group operate surface gill nets during the day with an immersing time of approximately 30 minutes.

The problem faced by fishermen in Semarang waters is that the catch obtained is not optimal. The factors that determine the catch are the time of capture and the length of immersing [1] [2] [3]. Based on these problems, it is necessary to conduct a study on the appropriate catching time and immersing time, so it is hoped that the results of this study can be a reference in solving the problem

This research was conducted to determine the optimal fishing time and immersion time on surface gill net fishing gear. It is hoped that the results of this study can be used as a reference in determining the right time to catch and soaking time so that fishermen get maximum catches.

II. RESEARCH METHODS

A. Method of collecting data

The research method is experimental fishing. The surface gill net design used in this study can be seen in Figure 1.

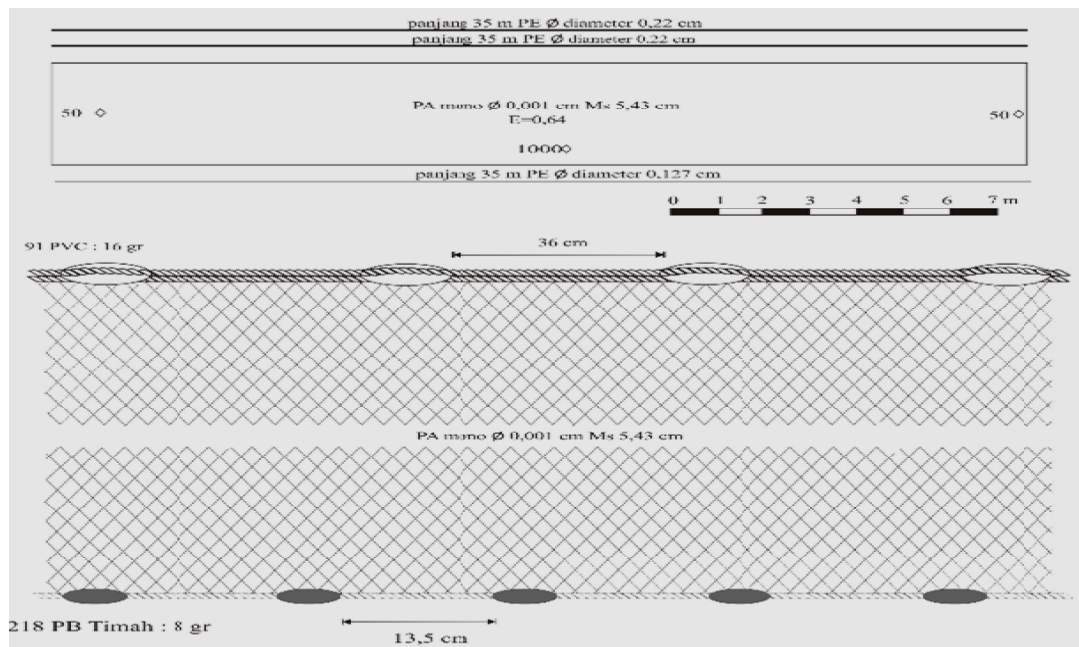


Figure 1. Surface gill net design

The treatment consisted of operating time and immersing time. Operation time is carried out in the morning and evening. The choice of immersion time is 60 minutes because it is more effective and the right time to pull the net [4]. The night time was chosen because the productivity of fish resources and fishermen's income was higher at night and the water conditions were getting darker, making it difficult for target fish to escape from fishing gear [5]. The immersing time was divided into 2 variables, namely the immersion time of 30 minutes and 60 minutes. The immersion time was 30 minutes as a control based on the habits of fishermen in Semarang waters, while the immersion time was 60 minutes as a comparison variable. A total of 4 treatments. The combination of treatments can be seen in table 1.

Table I- EXPERIMENTAL COMBINATIONS

Time	Difference in immersion time	
	30 Minutes	60 Minutes
Morning	30 P	60 P
Night	30 M	60 M

Each treatment was repeated 7 times to minimize errors during data processing. The location of the gillnet setting is done by the random sampling method (Figure 2).

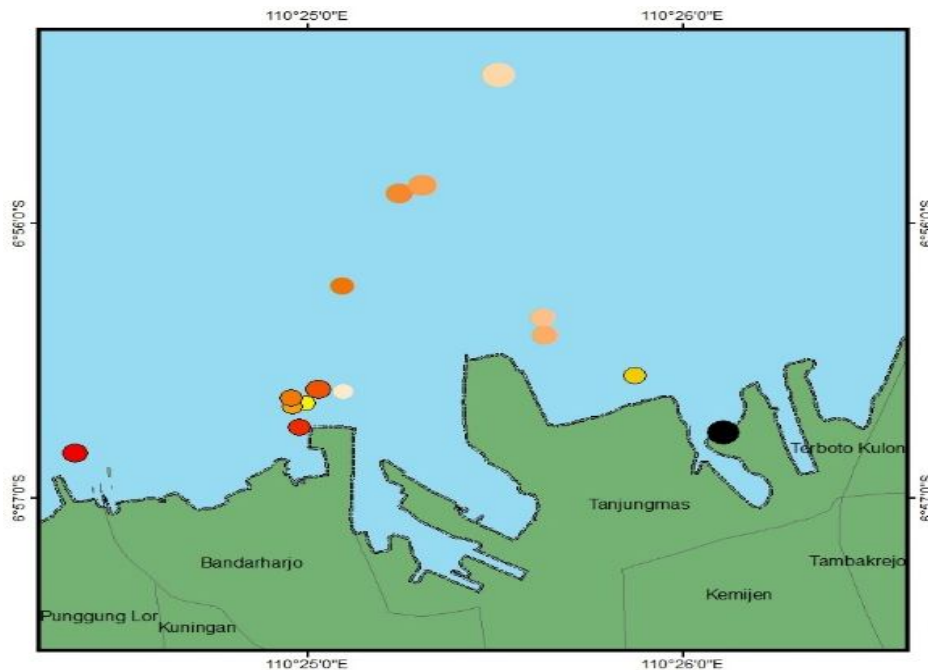


Fig. 2 Fishing area map, Semarang Waters

B. Data Analysis

Two Way Anova

Data analysis was carried out by using the Two Way Anova test with the consideration that the comparison between the 4 treatment variables had a significant value of 0.05.

Catch type composition

The composition of the type of catch was studied to know the percentage of each type of fish caught from the 4 treatments based on biomass (kg). The calculation of the composition is carried out by equation [7].

$$P = \frac{n_i}{N} \times 100\% \dots\dots\dots (1)$$

P = the species composition (%)

N_i = total weight of each caught species

N = weight of all catch

Catch feasibility analysis

How to calculate the percentage of fish that are worth catching and not worth catching is [8]

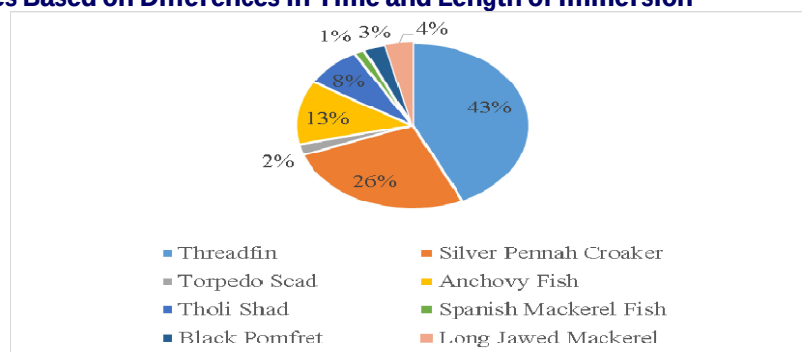
The purpose of the analysis of the size of fish fit for catching as the basis for the study is to find out the four treatment variables that catch fish optimally, not only the amount of fish biomass caught but the number of fish that are worth catching. How to calculate the percentage of fish that are fit to be caught and not worth catching is [8]

$$\text{Presentage (\%)} = \frac{\text{the number of fish is feasible or not worth catching}}{\text{total number of samples}} \dots\dots\dots (2)$$

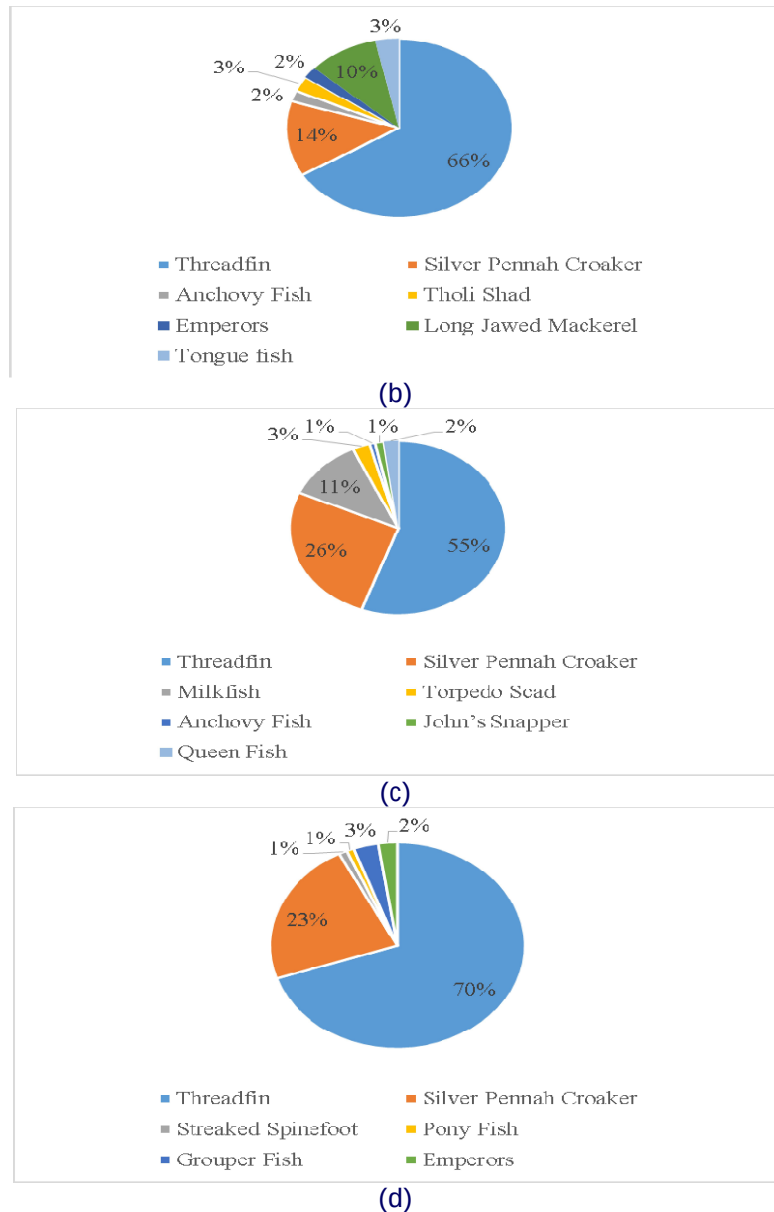
III. RESULTS AND DISCUSSION

A. Catch Results During Research

Composition of Catches Based on Differences in Time and Length of Immersion



(a)



Percentage of catch of surface gill net operating time in the morning and soaking time of 30 minutes; (b) Percentage of surface gill net catches operating at night and soaking time of 30 minutes. ; (c) Percentage of surface gill net catch, operating time in the morning and immersion time of 60 minutes; (d) Percentage of catch of surface gill net operating time at night and immersion

Fig. 3 Composition of Catches Based on Differences in Time and Length of Immersion

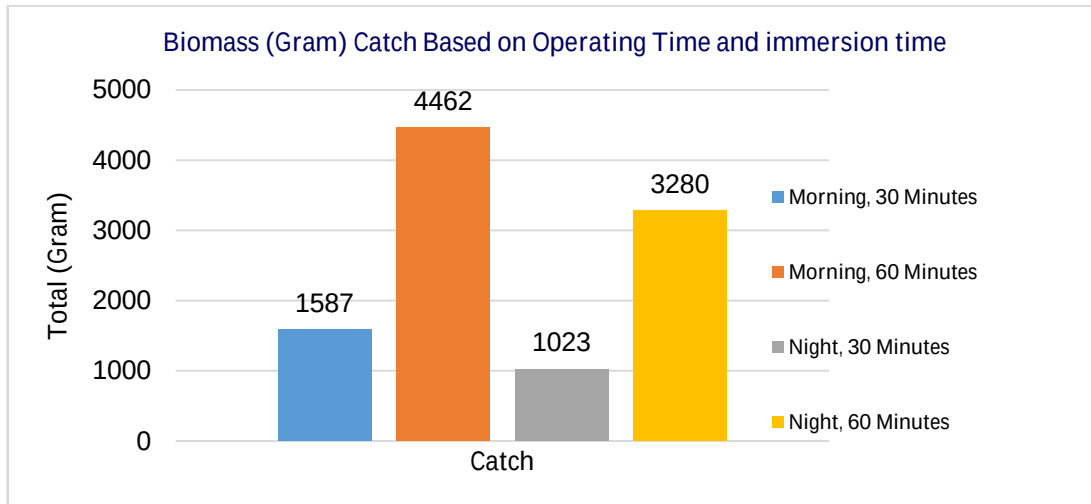
The composition of the catch obtained was Milkfish (*Chanos Chanos*), Long Jawed Mackerel (*Rastrelliger sp.*), Anchovy Fish (*Mystacoleucus padangesis*), Threadfin (*Eleutheronema tetradactylum*), Queen Fish (*Scomberoides lysan*), Grouper Fish (*Epinephelus sp.*), Pony Fish (*Leiognatus tauvina*), Emperors (*Lethrinus sp.*), Silver Pennah Croaker (*Aspericovina jubata*), Black Pomfret (*Formio niger*), Torpedo Scad (*Megalaspis cordyla*), Spanish Mackerel Fish (*Scomberomorus sp.*), John's Snapper (*Lutjanidae sp.*), Streaked Spinefoot (*Sinagus sp.*), Tholi Shad (*Tenualosa macrura*), and Tongue fish (*Cynoglossus lingua*).

From the percentage composition of the catch, it can be seen that the dominant catch. In the morning and evening catching, turtle fish became the dominant fish species in this study because the research location in Semarang city waters, Tambak Lorok is relatively shallow waters. While the turtle fish is a type of fish that usually lives in shallow waters with a muddy bottom. At least the catch of Silver Pennah Croaker at night was caused because at the time of catching the weather conditions were not good so that the fishing process obtained less than optimal catches.

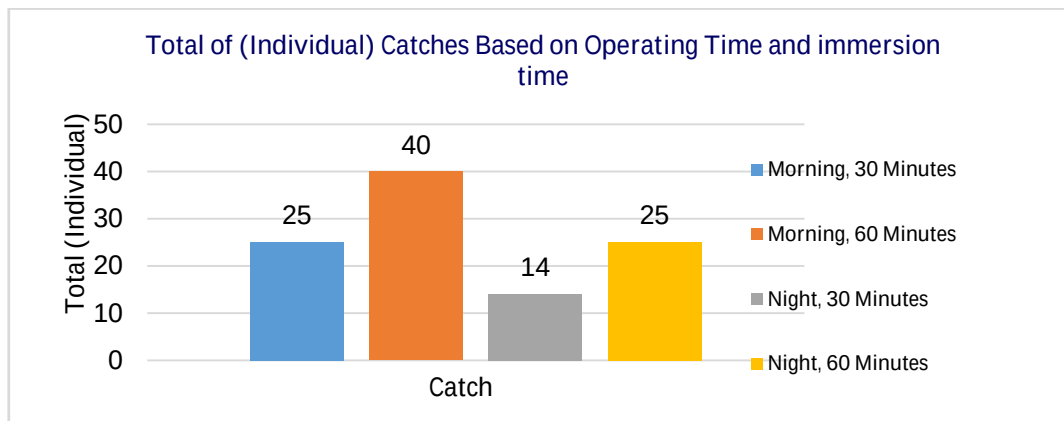
Turtle fish are fish that usually live in shallow coastal waters with muddy bottoms [11]. Factors that affect production results include environmental factors or conditions of fishing areas such as weather, season, and availability of resources [7]

B. Catches on differences in operating time and immersion time

Biomass (grams) and total (individual) catches based on differences in operating time and immersion time presented in the following graph



(a)



(b)

(a) Biomass (Gram) Catch Based on Operating Time and immersion time; (b) Total of (individual) Catches Based on Operating Time and immersion time

Fig. 4 Catches based on differences in operating time and immersion time

In the Figure 4, it can be seen that the catch at 60 minutes of immersion is higher than the 30-minute immersion, this is because the longer the immersion is carried out, the more likely the catch will be increased, but if the immersion time is short, the chances of fish getting entangled will be less. The catch using gill net fishing gear in the morning is greater or the catch is higher than the catch at night. In general, catches in the morning tend to be higher because pelagic fish usually search for food in the morning. After all, sunlight has a big role in the surface waters [12] [2] [13]. The minimum catch at night is because based on the daily vertical migration of pelagic fish in the morning tends to make swimming groups in the morning while at night pelagic fish tend to spread throughout the water column to fill the void of water space below the water surface. Based on the daily (vertical) migration of schooling pelagic fish, small pelagic fish are more abundant during the day than at night, the fish that spread throughout the waters at night is one of the factors for the low catch obtained at night [14][33][34][35].

C. Feasibility of catch

The feasibility of the catch can be seen from the value of the body length of the fish when the gonads first mature and the total body length of the caught fish [36]. Indicator Total body length is a measure of the length of the body at the first of maturity with the abbreviation length of the first maturity/Lm [8][16][17] [18] [19] [20] [21] [5] [22] [23] [24] [25][26] [27] [28] [29].

The percentage of the feasibility of the catch can be seen in table 3.

TABLE III- LENGTH OF THE FIRST MATURITY

Species	Lm(cm)
Threadfin	35 – 45
Silver Pennah Croaker	17,5 – 18
Tongue fish	9,4 – 12,2
Anchovy Fish	12,7
Pony Fish	8,8 – 9,5
Tholi Shad	15 – 30
Emperors	39,4 – 55
Long Jawed Mackerel	17,03 – 24,7
Streaked Spinefoot	18
Grouper Fish	45 – 60
Torpedo Scad	19
Tholi Shad	15 – 30
Spanish Mackerel Fish	42,34
Black Pomfret	22,6 – 25,1
Milkfish	70 – 150

The percentage of the feasibility of the catch can be seen in table 4.

TABLE IV- FEASIBILITY OF CATCH

Time	Species	Total (individual)		Total	Presentation (%)	
		Worthy	Unworthy		Worthy	Unworthy
Morning	Threadfin	1	19	20	5%	95%
	Silver Pennah Croaker	10	12	22	45%	55%
	Torpedo Scad	0	6	6		100%
	Anchovy Fish	5	0	5	100%	
	Tholi Shad	3	0	3	100%	
	Queen Fish	0	2	2		100%
	Spanish Mackerel Fish	0	1	1		100%
	Black Pomfret	0	2	2		100%
	Long Jawed Mackerel	0	1	1		100%
	John's Snapper	0	1	1		100%
	Milkfish	0	2	2		100%
Total		19	46	65	29%	71%
Time	Species	Total (individual)		Total	Presentation (%)	
		Worthy	Unworthy		Worthy	Unworthy
Night	Threadfin	0	20	20		100%
	Silver Pennah Croaker	8	1	9	89%	11%
	Anchovy Fish	1	0	1	100%	
	Tholi Shad	0	1	1		100%
	Emperors	0	2	2		100%
	Long Jawed Mackerel	0	2	2		100%
	Tongue fish	1	0	1	100%	
	Streaked Spinefoot	0	1	1		100%
	Pony Fish	1	0	1	100%	
	Grouper Fish	0	1	1		100%
Total		11	28	39	28%	72%

The size of this Lm indicator is used to determine the feasibility of the catch obtained. Fish that have a total length of > Lm, then the fish is classified as a catch fit for catching because these fish have had the opportunity to spawn before being caught. It is recommended that the size of the fish caught is larger than the size of the first maturity of the gonads [15].

Based on the results of the analysis that has been carried out, it is known that in the catch obtained, the majority of the catches are in the category of unfit for catching in the fishing area of Semarang city waters because based on data collection carried out during the west season where Semarang city waters still rain and high waves because the wind coming from the west. In this season the fish that are scattered are juvenile[30]. The decline in production at the beginning of the east season after the west season is thought to be because the number of bodyweight of fish caught at the beginning of the season is juvenile due to the age or condition of the fish being caught that are not properly caught [31].

D. Results Analysis Two Way Aova Test

In the Two Way ANOVA test, the sig corrected model value is 0.015. This value indicates that the sign corrected model is <0.05 , which means that there is a significant effect. The results of the time significance obtained a value of 0.019. This value is smaller than the significance level value, so H_0 is rejected, which means that there is a significant effect of time treatment. The result of the significance of the immersion time is 0.019, which means $0.019 < 0.05$. This shows that H_0 is rejected so that there is a significant effect of the treatment of differences in immersion time on the catch. The significance value of the result of the interaction between length and time obtained a value of 0.701. This value is $0.701 > 0.05$, which means that there is no significant interaction between immersion time and time. There is no interaction between the length and time variables, meaning that the immersion time variable is not correlated with the catch time to the catch if these two independent variables are combined, but the independent variables will affect the catch if they run individually. There is no interaction between the two independent variables, meaning that each will affect the dependent variable individually or individually [32].

IV. CONCLUSIONS

A. Conclusion

1. Catching time in the morning gives more catches than at night (65 individual or 6049 grams)
2. The immersing time of 60 minutes gives more catches than 30 minutes
3. There is no significant interaction between catching time and immersing time.

B. Recommendation

Catching time in the morning with an immersing length of 60 minutes can be recommended by surface fill net fishermen in Semarang waters to optimize catches.

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