



# Analysis of The Effect of Different Types of Bait on The Catch of Freshwater Lobster (*Cherax Quadricarinatus*) on Umbrella Trap in Rawa Pening Lake, Semarang Regency, Indonesia

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## ABSTRACT

Umbrella trap is a fishing gear used by fishermen in Rawa Pening Lake, Banyubiru Village, Semarang Regency, Central Java, Indonesia to catch freshwater lobster (*Cherax quadricarinatus*). Umbrella trap does not use a sinker but only uses an iron frame so that it can sink. The net material used is nylon which is designed in the shape of a hexagon like an umbrella. The purpose of this study was to analyze the number of catches and effectiveness of different bait. The method used in this study is an experimental method. The data analysis method used is the One Way Anova test. The baits used in this study were discarded fish (as control), gold snails, and salted slipmouth fish (*Leiognathus* sp). The composition of the catch obtained is lobster as the main catch, and by-catch is marble goby fish (*Oxyeleotris marmorata*), goldensnail (*Pomacea canaliculate*), and shrimp. Most lobsters are caught on umbrella trap using salted slipmouth fish bait. The results of the data processing showed that the significance value of the feed difference was 0.363 (>significant value). This shows that Ho is accepted, so there is no significant effect from the difference in the type of bait.

Keywords: Discarded Fish, Gold Snail, Salted Slipmouth Fish, Umbrella Trap.

## 1. Introduction

Rawa Pening Lake is one of the largest public waters in Indonesia that has the potential to produce fish commodities. One of the important fishery commodities in Rawa Pening is freshwater lobster which has a high sales price. A lobster is one of the catches caught with the trap. The manufacture of bubu is very varied, the materials used for the trap include bamboo, wire, paralon, and others. Bubu used by Rawa Pening fishermen is an umbrella trap. This fishing gear uses an iron for the frame and nylon for the net. The trap is a fishing gear that is installed permanently (passively) in the water for a certain period which makes it easier for fish to enter and makes it difficult to get out. According to Efraldo *et al.*, (2014), the trap is a three-dimensional cage, where all sides are covered except for the trap's mouth. The construction of the lobster trap itself consists of a trap body made of iron wire, two trap funnels, and a place to remove catches. Based on the operation of the trap, the main factor needed is bait. The bait to be used in the trap operation research is discarded fish (marble goby fish/*Oxyeleotris marmorata*) as a control bait variable, salted slipmouth fish (*Leiognathus* sp), and gold snails.

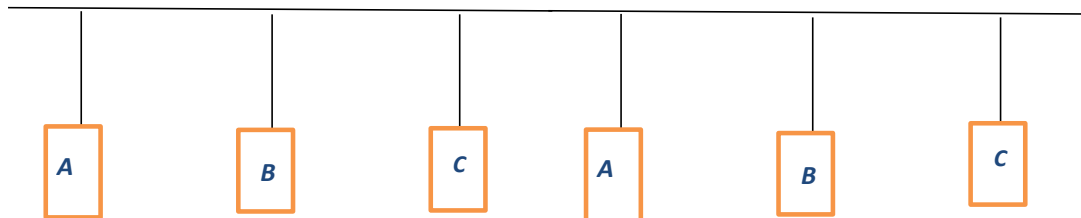
Rawa Pening has great fishery potential. The fishing vessel is dominated by wooden rowed boats, but there are also boats with engines. Fisheries' potential includes types of shrimp, lobster, small pelagic, and demersal fish. Traditional fishermen are closely related to the lack of access to technological developments and small catch productivity. Trap operations are carried out as many as one operation in one trip, with an average immersing time of 24 hours. The bait used by fishermen so far during the operation of the umbrella trap is discarded fish from bycatches, namely marble goby fish (*O. marmorata*) which has little economic value when compared to the main catch. The choice of using salted slipmouth fish (*Leiognathus* sp) and gold snail bait because they are not easily rotten, the stock is widely available, has a high protein content, has a strong smell, and is easy to find.

The traps take advantage of the bait with the smell released to lure lobsters. The bait operated by fishermen is discarded fish bait, namely marble goby fish (*O. marmorata*). Another factor is that the use of marble goby fish (*O. marmorata*) bait cannot be used more than once because the protein content of fresh fish is easily dissolved when immersed in water. The purpose of the study was to analyze the effect of differences in the use of discarded fish bait with gold snail bait and salted slipmouth fish bait on freshwater lobster catches in Rawa Pening Waters, Semarang Regency, and analyze the effectiveness of umbrella trap with salted slipmouth fish (*Leiognathus* sp) and gold snail bait.

## 2. Research method

The method carried out is an experimental fishing method by carrying out direct fishing operations in the field. There are three treatments used in this study, namely discarded fish bait as a control variable used by fishermen, salted slipmouth fish (*Leiognathus* sp) bait which will be used experimentally as first independent variable, and gold snail bait as second independent variable. Each treatment will be repeated 9 times with details of 1 repetition of 1 fishing trip with a 24-hour immersing time. During operation, 6 units of trap fishing gear will be unloaded simultaneously at the same fishing ground and all traps series will be moved to their fishing ground on the next trip. This research was conducted in Rawa Pening Lake, Semarang Regency by finding respondents of local fishermen operating in Banyubiru waters using umbrella trap fishing gear.

Traps are arranged in a line with the following scheme:



**Fig. 1 - Bait Preparation Scheme on Umbrella Trap**

Where:

A: Discarded fish bait from marble goby fish (control variable);

B: Salted slipmouth fish bait (first independent variable);

C: Gold snail bait (second independent variable)

Determining the number of repetitions, Federer's formula (1963) is used:

$$(r-1)(n-1) \geq 15$$

$$n \geq 9$$

Where

n = number of repeats,

r = number of treatments (3 variables)

So, a repeat is done more than or equal to 9 times to avoid errors.

### 2.1 Catch effectiveness method

The effectiveness of the catch is the ability of the trap fishing gear that catches fish by comparing the catch with the number of trap caught from each treatment. Calculation of the effectiveness value of the catch using the Simbolon formula (2020):

$$E_i = (h_i / h_n) \times 100\% \quad (1)$$

Where :

$E_i$  = effectiveness of lobster catch

$h_i$  = Lobster catches obtained based on the type of bait

$h_n$  = Overall catch

### 2.2 Data collection methods

The type of data collected primary data was obtained from the results of research conducted and interviews with umbrella trap fishermen in Banyubiru Village, Semarang Regency. Secondary data was obtained from the Semarang Regency Fisheries Office. The secondary data obtained during the study include number of fishing gear; the number of fishing vessels, number of production and production value data in Rawa Pening.

### 2.3 Data analysis method

The raw data that has been collected needs to be tabled in groups and categorized so that the data has meaning to answer the problem and is useful for testing hypotheses. The data that has been obtained is arranged in the form of tables to facilitate analysis. After tabulating the data, then the data normality test is carried out.

## 3. Result and discussion

### 3.1 State of research location

Rawa Pening Lake is located in Ambarawa District, Bawen District, Banyubiru District, and Tuntang District. The location of Rawa Pening is in the Semarang Regency area which is included in part of the water resources management system managed by the local community. Rawa Pening Lake has an area. Lake Rawa Pening covering an area of 2,670 ha is considered the largest lake in Central Java province. Rawa Pening is a resource that has potential in the fisheries sector.

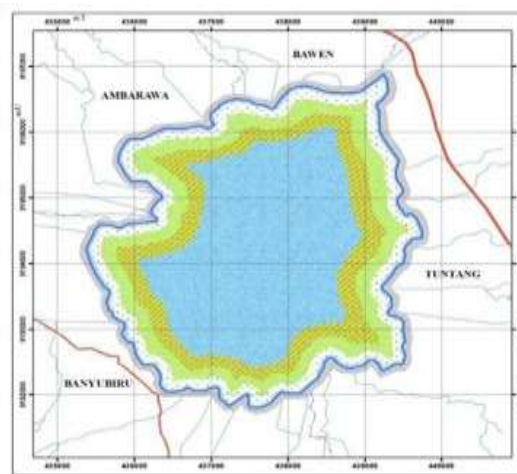


Fig. 2 – Map of Rawa Pening Lake

Many species can be utilized by catching with high economic value such as lobster, shrimp, snakehead fish, and others (Lois *et al.*, 2018). Fishermen in this place catch lobster as a superior commodity. Due to the high selling value price and many lobster enthusiasts who directly visit this village, local fishermen developed fishing gear that is easier to use. The fishing gear that used to be used was bamboo traps, and now some have turned into umbrella traps.

### 3.2 Total production and production value of Rawa Pening Lake

Total production is the number of fish expressed in kg and production value is the amount of production expressed in IDR. The amount of fishery production and production value over the last five years can be seen in Table 1.

Table 1 – Fisheries production and production value

Year	Production (kg)	Production Value (IDR)
2017	1.176.020	2075.725
2018	1.229.496	2157.369
2019	1.234.862	953.575
2020	1.211.854	3019.137
2021	1.263.752	2322.235

Source: Agriculture, Fisheries and Food Office of Semarang Regency, 2023

Based on data obtained from the Agriculture, Fisheries, and Food Office of Semarang Regency (2023), it is known that the number of fish species production fluctuates every year, with the highest amount in 2021 being 1,263,752 kg. Meanwhile, the amount of production value each year has decreased quite drastically in 2019 with a total of Rp 953,575. According to Kisworo *et al.* (2013), fisheries business can be viewed as a combination of production factors, or as an item produced from classical production factors such as capital, labour, or anything included in the implementation of a fishery business. The difference is that fisheries are very dependent on the availability of fish in waters that cannot be predicted absolutely.

### 3.3 Number of fishing gear in Rawa Pening

The fishing gear operated consists of several types that are adapted to the type of main target catch. The number of types of fishing gear in Rawa Pening Lake is presented in the Table 2.

**Table 2 – Number and types of fishing gear in Rawa Pening Lake**

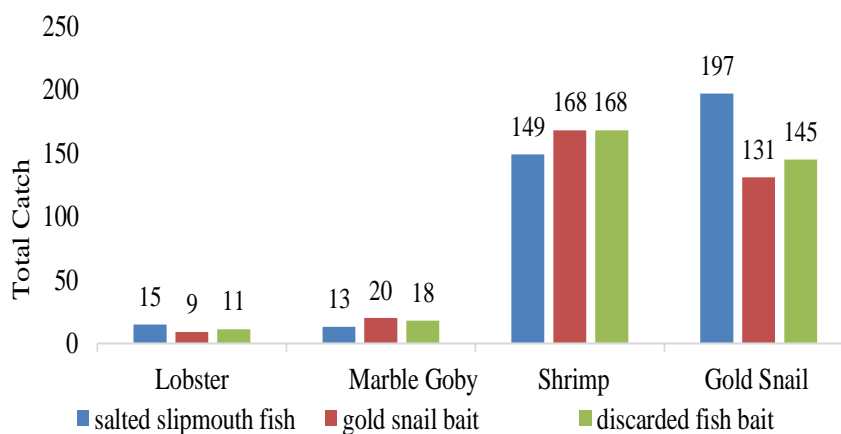
No	Types of Fishing Gear	Year (unit)				
		2017	2018	2019	2020	2021
1	Gill net	1,250	1,250	1,200	1,200	1,200
2	Stationery lift net	400	400	400	465	465
3	Falling gear	180	180	180	180	180
4	Line fishing	320	320	320	320	320
5	Trap	400	400	400	400	400
6	Push net	10	10	10	10	10
7	Other fishing gear	150	150	150	150	150
Total		2,710	2,710	2,710	2,725	2,725

Source: Agriculture, Fisheries and Food Office of Semarang Regency (2023)

The fishing fleet used and recorded in Rawa Pening are boats without motors and outboard motorboats. This motorless boat is driven by rowing and made from wood. Fishermen use this boat to assist fishing activities with a maximum capacity of 1 person for small boats and 2 people for medium board boats. Outboard motorboats are only owned by a few fishermen because they are more expensive and require more operational costs to cover longer distances.

### 3.4 Umbrella trap catch

The composition of umbrella trap's catch on the whole treatment can be seen in the following figure:



**Fig. 3 - The composition of umbrella trap's catch**

Main target catch is the main fish stock sought during fishing operations. The number of lobsters (main target catch) obtained is 35. By-catch is fish that are not targets caught in fishing operations. The capture of non-target fish species can be caused by overlapping habitats between target and non-target fish. This is reinforced by Moersid *et al.*, (2019), who stated that marble goby fish (*Oxyeleotris marmorata*) usually live in fresh waters such as rivers, reservoirs, and swamps. marble goby fish (*O. marmorata*) prefer shallow water areas with muddy bottoms, calm currents, hidden places, like waters around 22 – 32.2o C, and often around aquatic plants that appear above the surface of the water to protect themselves. This marble goby fish (*O. marmorata*) eats small shrimp-type crustaceans that are caught in it. Therefore, in this type of fishing gear, fish that are not the target of catch also enter.

Based on the results of the study, the total number of freshwater lobster catches using umbrella trap fishing gear immersing for 24 hours is more caught using salted slipmouth fish bait than with gold snail bait or discarded fish bait. The total number of lobsters caught with salted slipmouth bait with 9 repetitions experienced a slight difference. According to Massimo *et al.* (2014), the difference in catch obtained is caused by different types of bait. This is influenced by the odor factor released by the chemical content of the bait and the odor released by a bait due to the amino acid content that is part of the existing protein series.

Table 3 - Lobster catch by bait type

Repetition	Salted Slipmouth Fish		Gold Snail		Discarded fish	
	Number	Weight (gr)	Number	Weight (gr)	Number	Weight (gr)
1	1	35	0	0	1	25
2	0	0	0	0	0	0
3	3	256	2	87	3	213
4	1	37	1	29	1	58
5	2	87	1	57	2	69
6	2	56	0	0	1	63
7	3	213	1	36	1	57
8	1	38	3	121	0	0
9	2	124	1	26	2	121
<b>Total</b>	<b>15</b>	<b>846</b>	<b>9</b>	<b>356</b>	<b>11</b>	<b>606</b>

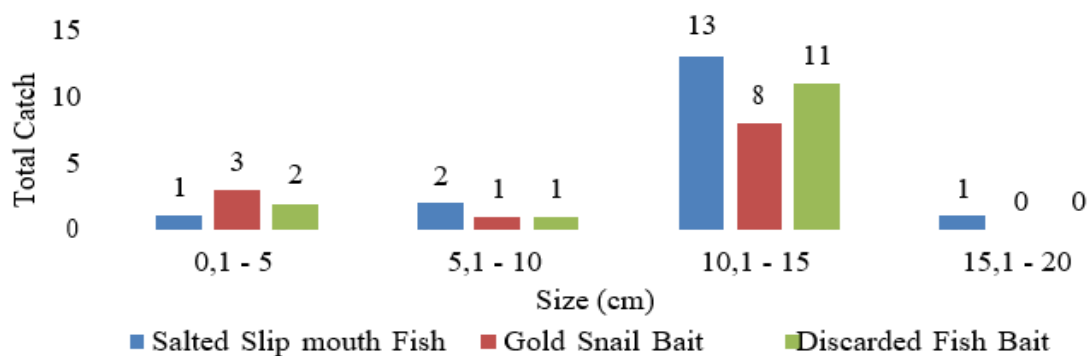


Fig. 4 - Lobster Length Comparison Chart

The size of lobsters was most found when the study was in the range of 10.1 cm to 15 cm with salted slipmouth fish bait. Lobster sizes above 15 cm are only obtained on salted slipmouth fish bait. This size is the size of a lobster that has matured gonads. According to Kurniawan *et al.* (2016), the size of a lobster's first mature gonads is 93.7 mm (9.3 cm). Based on this, it can be interpreted that lobsters with a size of 10 cm and above are declared worthy of being caught.

### 3.5 Effectiveness catch

Lobster catches using salted slipmouth fish bait have a percentage value of 43%, using gold snail bait has a percentage value of 26%, and using discarded fish has a percentage value of 31%. According to Syari *et al.*, (2014), the effectiveness value indicator is divided into three criteria effectiveness is more than 60% then effectiveness is very effective. When the effectiveness is 30-60% then the effectiveness is said to be effective, if the effectiveness value is less than 30% it is said to be less effective. Based on this, it can be said that lobster catches with salted slipmouth fish bait and discarded fish are included in the effective value.

### 3.6 Analysis of results

This study used the Anova one-way test, because it only used one factor or variable tested. The analysis stage that needs to be done before the one way anova test is the normality and homogeneity test first. Based on the normality test that has been carried out, the results are presented in the Table 4.

Table 4 – Normality test results

Result	Bait	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
	Salted Slipmouth Fish	.192	9	.200*	.917	9	.364
	Gold Snail	.278	9	.044	.853	9	.081
	Discarded Fish	.257	9	.088	.903	9	.273

\*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Based on the table, normality tests using Shapiro-Wilk were obtained because the amount of data used was less than 30. Based on the normality test that has been done, it can be seen that the sig value obtained with salted slipmouth fish bait is 0.364 ( $> 0.05$ ), the gold snail bait gets a sig value of 0.081 ( $> 0.05$ ), and the discarded fish bait (control) with a sig value of 0.273 ( $> 0.05$ ) so all the data is normally distributed. The next step is to perform a homogeneity test on the data. This homogeneity test is carried out to determine the uniformity of data. The homogeneity test results are presented in the Table 5.

**Table 5 – Homogeneity test results**

*Tests of Homogeneity of Variances*

Levene Statistic		df1	df2	Sig.	
Result	Based on Mean	.137	2	24	.873
	Based on Median	.077	2	24	.926
	Based on Median and with adjusted df	.077	2	23.929	.926
	Based on trimmed mean	.105	2	24	.901

Based on Mean on the result variable of 0.873 ( $> 0.05$ ), it is concluded that the data variance is homogeneous so that it can be analyzed in the one way annova test. The results of One way annova can be seen in the Table 6.

**Table 6 – One Way ANOVA results**

ANOVA					
Result	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.074	2	1.037	1.057	.363
Within Groups	23.556	24	.981		
Total	25.630	26			

Based on the results of the one-way anova test above, it can be seen that the sig value obtained is 0.363. This value shows that the sig value is 0.363  $> 0.05$  which means that the test variable does not have a significant influence on a result. The value of 0.363  $> 0.05$  then  $H_0$  is accepted, that is, the difference in feed has no effect on the average catch of umbrella trap. Tests that have been carried out on the catch of umbrella trap using One Way Anova obtained the results that umbrella trap installed with bait for salted slipmouth fish and gold snails has no influence on the catch of umbrella trap which shows that fishermen's bait still has a significant influence on the number of umbrella trap catches.

#### 4. Conclusion

The conclusions obtained from this study are the salted slipmouth fish can get the most freshwater lobster (main target catch) compared to other baits. Freshwater lobster caught using different baits (salted slipmouth fish, gold snail, and discarded fish) did not differ significantly.

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