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# Analysis of catch results per effort of catching red snapper (*Lutjanus sp*) in the waters of Lewalu village, Northwest Alor, Alor Regency

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**Abstract**
The purpose of this study was to analyze the catch per fishing effort (CPUE) of Red Snapper (*Lutjanus sp*) resources and analyze the comparison of catches based on the fishing gear used. The results showed that the catch per fishing effort of Red Snapper (*Lutjanus sp*) in the waters of Lewalu Village in the period January – December 2021 fluctuated and tended to decrease with an average CPUE value of 11,499 kg/trip/year. The catch from the Fishing Line and Rawai Fishing Units shows that there is a difference in the average catch.

**Keywords:** Pangasius, hybrid, digestive system, histology

## Introduction
Utilization of fish resources in various areas in Indonesian waters tends to increase. An increase in catch and an increase in fishing effort will lead to a decrease in the size of the fish stock. Red snapper (*Lutjanus sp*) is a type of demersal fish from the Lutjanidae family which has high economic value in Indonesia and is one of the export commodities from the fisheries sub-sector whose demand continues to increase Wahyuningsih, *et al*.,2016 [1], T. It is feared that the increasing market demand for Red Snapper (*Lutjanus sp*) fish resources will lead to higher fishing effort Noija D, 2014[2]; Cowan, J. H *et al*., 2011 [3] In addition, another problem faced by fishermen is that the farther the fishing area can be resulting in increased operational costs and longer fishing trips. Capture fisheries is an economic activity that utilizes fish resources through catching and collecting various types of biota in the waters Sriati, S,2011 [4]; Liu, B., Stokes, *et al*., 2017 [5]. In order to ensure the continuity of the utilization and preservation of fish resources, proper management is necessary. Anas, P *el al*.,2017 [6], A stated that management efforts are increasingly felt with increasing demand, where the increasing intensity of fish resource use has caused a considerable loss of diversity. fish resources and their habitats One form of fisheries management is through stock assessment and control of the fishing season (open or closed season) and the fishing units used. Santoso, D, 2016 [7]; Nurulludin, N *et al*.,2019 [8] stated that stock assessment allows to know the level of utilization of fish resources that have been carried out. Data on capture fisheries as a whole is still very minimal because it is limited to fisheries statistics issued by the Regional Government as is the case in Alor Regency. Fishing activities in Alor Regency are still very simple, especially seen from the specifications of fishing units which still use simple fishing equipment in operation and are still very dependent on the ability of fishermen. The purpose of this study was to analyze the catch per catching effort (CPUE) of Red Snapper (*Lutjanus sp*) and analyze the comparison of catches based on the fishing gear used.

## Material and Methods
This research was carried out in the waters of Lewalu Village, Northwest Alor District, Alor Regency. The object of this research is Red Snapper, Fishing Trip and the catch within 1 (one) year of catching. The method used is a survey and descriptive method. Analysis of the data used in this study is catch per fishing effort (CPUE), and the t test is to see a comparison of

Catches to the fishing gear units used.

*CPUE Analysis*

The CPUE calculation aims to find out the level of utilization of the Red Snapper fishing unit based on the division between catch and effort with the CPUE formula as follows

CPUEi=Ci/Fi

**Information**

CPUEi: Number of catches per unit of i-th fishing effort (Trip)

Ci: Catch to–i (kg)

Fi: The i-th arrest attempt (trip)

Statistical analysis

Comparison of catches for the two fishing gears used (Longline fishing and hand line) then the data analysis used is the T test with the formula

$$t = \frac{\bar{X}_1 - \bar{X}_2}{S\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

**Results and Discussion**

**A. Potential Resources of Red Snapper (*Lutjanus spp*)**

Red Snapper (*Lutjanus spp*) is a type of fish that has a high selling price compared to other types of fish. The fishing gear used by the fishermen of Lewalu Village to catch Red Snapper (*Lutjanus sp*) are hand fishing rods and long line fishing rods. The production of the 2 fishing gear units can be seen in Table 1.

**Table 1:** Production of Red Snapper (*Lutjanus sp*) in Fishing Equipment Unit

| No | Months | Fishing Equipmen | | Production quantity (Kg) |
|---|---|---|---|---|
| | | Hand Line | Long Line | |
| 1 | Januari | 96.4 | 78.3 | 174.7 |
| 2 | Februari | 98.2 | 57.4 | 155.6 |
| 3 | Maret | 112.1 | 102.4 | 214.5 |
| 4 | April | 195.2 | 144.5 | 339.7 |
| 5 | Mei | 135.2 | 118.7 | 253.9 |
| 6 | Juni | 174.2 | 154.2 | 328.4 |
| 7 | Juli | 213.3 | 215.4 | 428.7 |
| 8 | Agustus | 325.4 | 222.1 | 547.5 |
| 9 | September | 221.1 | 155.9 | 377 |
| 10 | Oktober | 154.2 | 124.2 | 278.4 |
| 11 | November | 89.3 | 130 | 219.3 |
| 12 | Desember | 89.5 | 55.4 | 144.9 |
| TOTAL | | 1904.1 | 1558.5 | 3462.6 |

Table 1 shows that the production of the highest catch was in the hand line fishing gear unit with a total catch of 1904.1 Kg and long line fishing gear with a total catch of 1558.5 Kg. The total catch overall for 1 (one) year of catching is 3462.6 Kg/Year. The types and fishing gear used by fishermen in Lewalu Village are generally still very simple so that it affects the fishing area which is of course adapted to the experience of fishermen and sea and wind conditions that occur. This condition causes fishermen in Lewalu Village to catch fish to fishing areas that are far away. Dafiq, A. H *et al*.,2019 [9] stated that fishermen are trying to find new fishing areas that are more productive because of the tendency for Red Snapper to migrate to deeper areas to find food and do fishing. Spawning, so that the deeper a fishing area will result in differences in the number and weight of the catch. The proportion of catches based on the fishing gear used can be seen in Figure 1.

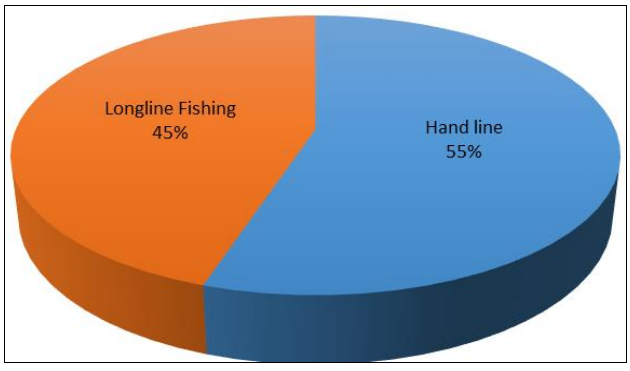


**Fig 1:** Proportion of fishing gear to catch

Based on Figure 1, it is explained that there are differences in the proportion of catches obtained for the 2 units of fishing gear used. Handlines get the most catches, which is 55%, while long lines get 45%. Hand line is one type of fishing gear used by traditional fishermen to catch fish in the sea. Hand line is the simplest type of fishing line. This fishing gear consists of a fishing rod, fishing line and ballast or bait. The fishing ground (fishing ground) for operating hand lines is quite open and varied so that hand lines can be operated around the surface to the bottom of the waters, around coastal waters and in the deep sea Pattiasina, S *et al*.,2020 [10]. The number of catches by fishing season can be seen in Figure 2

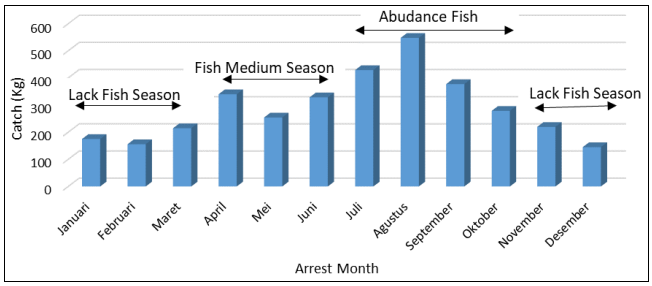


**Fig 2:** Number of Catches by Fishing Season

Figure 2 describes the number of catches of Red Snapper (*Lutjanus sp*) obtained by fishermen during a 12-month period which is very different for certain months, this is adjusted to the fishing season and available resources. The peak season for catching Red Snapper (*Lutjanus sp*) occurs for 4 months, namely from July to October, the moderate season occurs for

3 months, namely April to June, while the famine season occurs for 5 months, namely January, February, March, November and December. The catch in the peak season was 1631.6 kg or as much as 47% of the total catch of Red Snapper (*Lutjanus sp*), in the medium season the catch was 922 kg or 27%, and the lean season the catch was 902 kg or by 26%. Oceanographic conditions of waters in Indonesia are influenced by two seasons, namely the west and east monsoons as a result of changes in the air pressure system in mainland Asia and Australia Usman, A *et al*., 2014 [11]The changing oceanographic conditions of the waters – change according to the season will directly or indirectly affect the productivity of the waters which in turn will affect the behavior of fish grouping, the change of season is very influential on fishing activities and fishing efforts Sumiono, B *et al*.,2017[12] The production of Red Snapper caught for 1 (one) year is obtained with different fishing efforts/ fishing trips in each fishing gear. The average fishing trip for 2 (two) units of fishing gear used can be seen in Figure 3.

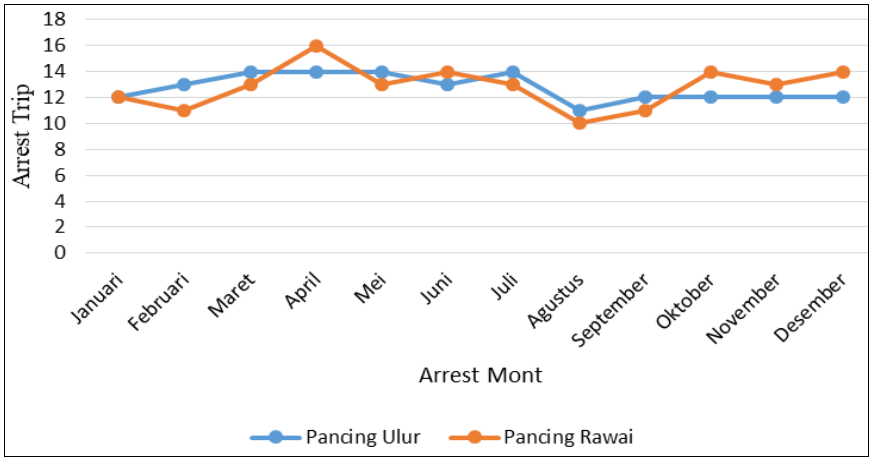


**Fig 3:** Graph of the Relationship of Arrest Trips in Each Month

Figure 3 describes the fluctuation in the number of fishing trips each month for each fishing gear. The lowest fishing trip on long line fishing gear occurred in August with a total of 10 fishing trips and the highest fishing trip occurred in April with 16 fishing trips. The lowest fishing trip was in August with 11 fishing trips, while the highest fishing trip occurred in March, April, May and July with 14 fishing trips. This shows that efforts to increase production can also increase the value of production which means it will also have an impact on increasing income from fishermen, but on the other hand an increase in production means that there will be increased pressure on resource utilization Pralamnita, W. A., & Putra, I. E.2017 [13] Fluctuations in catches What happens on each fishing trip is not only influenced by the presence of fish but also by the number of fishing efforts, the success rate of fishing operations, environmental, economic and fishing factors Prisantoso, B. I., & Badrudin, B 2017[14].

**B. CPUE**

Production per Unit Effort (CPUE) is basically the result of the division between the combined production of Longline and Handline Fishing rods and the effort (Effort) of these two fishing gears. CPUE calculation can be seen in Table 2.

**Table 2:** CPUE of Red Snapper

| No | Month | Production (kg) | Standar Effort (Trip) | Standar CPUE (Kg/Trip) |
|---|---|---|---|---|
| 1 | Januari | 174.7 | 24 | 7.279 |
| 2 | Februari | 155.6 | 24 | 6.483 |
| 3 | Maret | 214.5 | 27 | 7.944 |
| 4 | April | 339.7 | 30 | 11.323 |
| 5 | Mei | 253.9 | 27 | 9.404 |
| 6 | Juni | 328.4 | 27 | 12.163 |
| 7 | Juli | 428.7 | 27 | 15.878 |
| 8 | Agustus | 547.5 | 21 | 26.071 |
| 9 | September | 377 | 23 | 16.391 |
| 10 | Oktober | 278.4 | 26 | 10.708 |
| 11 | November | 219.3 | 25 | 8.772 |
| 12 | Desember | 144.9 | 26 | 5.573 |
| | Amount | 3462.6 | 307 | 137.990 |
| | Average | 288.550 | 26 | 11.499 |

Table 2 explains that the highest CPUE value was obtained in August, which was 26,071 kg/trip and the lowest was in December, which was 5,573 kg/trip. The highest CPUE value occurred in August due to a decrease in fishing effort from the previous month, from 27 fishing trips to 21 fishing trips. The lowest CPUE value was obtained in December due to an increase in the number of fishing trips from the previous month from 25 fishing trips to 26 trips. The value of CPUE within 1 year has fluctuated and tends to decrease. Azkia, L. I *et al*., 2015[15], said that one of the characteristics of a fishery condition that has led to an overfishing condition is the decrease in CPUE. The relationship between CPUE value and effort can be seen in Figure 4.

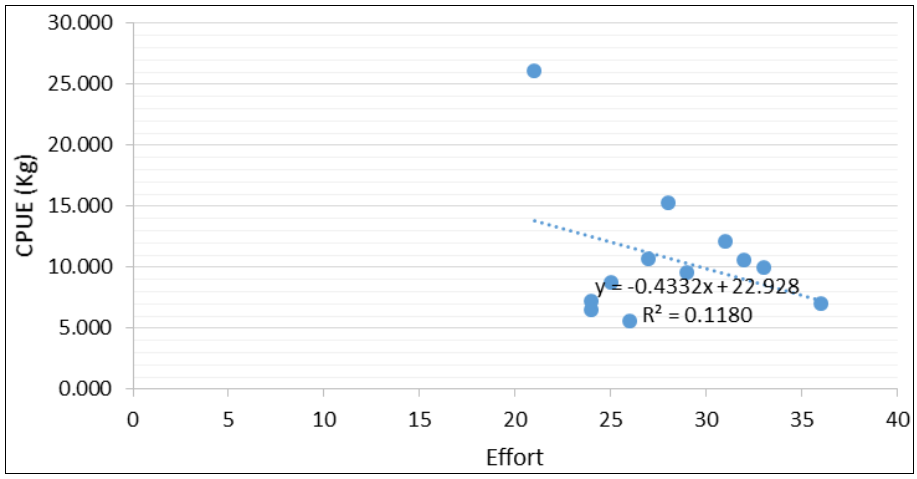


**Fig 4:** Graph of CPUE Relationship with Arrest Efforts

Based on Figure 3, it explains the relationship between CPUE value and catching effort. Coefficients a and b were obtained from simple linear regression with effort level as independent variable (x) and CPUE as dependent variable (y). The equation CPUE = 22.928-0.4332x, explains that every increase in the number of fishing efforts per x units in each quarter will result in a decrease in the number of Red Snapper fish production by 0.4332 kg/trip. The coefficient of determination or R2 is obtained at 0.118 or 11.80% which indicates a good match between the variables and the model used. Nurhaeda, N *et al*., 2019 [16]; Telussa, R. F., & Ernaningsih, D, 2019[17]. Stated that efforts to increase production from one side can increase the production value and income of fishermen but on the other hand these efforts result in pressure on resource utilization which will have an impact on overfishing.) and will even threaten the sustainability of the resource itself.

### C. T Test

Analysis of the catch of Red Snapper (Lutjanus. sp) from the 2 fishing gears (Rawai Fishing Line and Ulur Fishing Line) operated in Lewalu waters, can be seen in Table 3.

**Table 3:** T Tes

| Test Value = 0 | | | | | | |
|---|---|---|---|---|---|---|
| | t | df | Sig.(2 tailed) | Mean Difference | 95% Confidence interval of the difference | |
| | | | | | Lower | Upper |
| Catch | 11.129 | 23 | .000 | 144.275 | 117.46 | 171.09 |
| Catching tool | 14.387 | 23 | .000 | 1.500 | 1.28 | 1.72 |

Based on Table 3, it is explained that there is a significant difference in the catch that occurred during 12 months of fishing in kg ($\acute{\alpha}$ = 0.05). This shows that H0 is rejected because there is a difference in the average catch of each fishing gear (Land line and Rawai fishing line) operated to catch Red Snapper (*Lutjanus sp*). The catch from the fishing line fishing line and line fishing line shows that there is a difference in the average catch, this shows that the ability of each fishing unit is different. The difference was due to differences in fishing effort such as fishing area, number of fishing gear settings, fishing trips and different fishing seasons Oktafiani, R., Pi, A. M., & Pi, P. M, 2013[18]; Rikza, C *et al*.,2013[19]

## Conclusion

Based on this research, it can be concluded that the catch per fishing effort of Red Snapper (*Lutjanus sp*) in the waters of Lewalu Village in the period January – December 2021 has fluctuated and tends to decrease with an average CPUE value of 11,499 kg/trip. The catch from the Fishing Line and Rawai Fishing Units shows that there is a difference in the average catch

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