Fisheries Journal, 14 (4), 2374-2382 (2024)
http://doi.org/10.29303/jp.v14i4.915

THE EFFECT OF BAIT TYPE ON BOTTOM LONGLINE FISHING CATCH IN EKAS BAY

Pengaruh Jenis Umpan Terhadap Hasil Tangkapan Rawai Dasar Di Teluk Ekas

Lalu Samsul Rizal, Rian Permadi Bohari, Lalu Achmad Tan Tilar Wangsajati Sukmaring Kalih*

[1]Fisheries Resource Utilization Study Program, Faculty of Fisheries, University of 45 Mataram,

Imam Bonjol Street Number 45 Cakranegara, Mataram

*Korespondensi email : tantilar@gmail.com

(Received June 1th 2024; Accepted December 11th 2024)

ABSTRACT

Bottom longlines are operated using different types of bait in Batu Nampar Selatan Village. This research aims to reveal the influence of different types of basic longline bait on catches and economic profits obtained by fishermen in Ekas Bay. The method used in this research is an experimental survey, by comparing the results of 3 different types of bait in-situ. T-test analysis or t-test is used to prove that there are differences in the bait caught. R/C ratio analysis is used to calculate the economic benefits of basic longline catches. The total catch was 185 fish weighing 42.8 kg. The results of the T-test analysis obtained a significant value of 0.924 or a significant value > 0.05, so the hypothesis (H0) was accepted. This means that different types of bait do not have a real influence on bottom longline catches in Ekas Bay. The results of the R/C ratio analysis from the use of 3 types of bait, namely, anchovy bait (Stolephorus indicus) 8.6; squid bait (Loligo sp) 9.5; combination bait of anchovies (S. indicus) and squid (Loligo sp.) 8.84. It can be concluded that the three types of bait are profitable and worth continuing.

Key words: Catch, Fishermen, Bottom longline, Ekas Bay, Bait

ABSTRAK

Rawai dasar dioperasikan dengan menggunakan jenis umpan yang berbeda di Desa Batu Nampar Selatan. Penelitian ini bertujuan mengungkap pengaruh perbedaan jenis umpan rawai dasar terhadap hasil tangkapan dan keuntungan ekonomis yang diperoleh nelayan di Teluk Ekas. Metode yang digunakan dalam penelitian ini adalah survei eksperimental, dengan membandingkan hasil dari 3 jenis umpan berbeda secara in-situ. Analisis Uji-T atau t-test digunakan untuk membuktikan adanya perbedaan umpan hasil tangkapan. Analisis R/C ratio digunakan menghitung keuntungan ekonomis hasil tangkapan rawai dasar. Total hasil tangkapan sebanyak 185 ekor dengan berat 42,8 kg. Hasil analisis T-test diperoleh nilai signifikan sebesar 0,924 atau nilai signifikan > 0,05, sehingga hipotesis (H_0) diterima. Artinya pebedaan jenis umpan tidak memberikan pengaruh yang nyata terhadap hasil tangkapan rawai dasar di Teluk Ekas. Hasil analisis R/C ratio dari penggunaan 3 jenis umpan yaitu, umpan ikan

teri (*Stolephorus indicus*) 8,6; umpan cumi-cumi (*Loligo* sp) 9,5; umpan kombinasi ikan teri (*S. indicus*) dan cumi-cumi (*Loligo* sp.) 8,84. Dapat disimpulkan ketiga jenis umpan menguntungkan dan layak dilanjutkan.
Kata Kunci: Hasil tangkapan, Nelayan, Rawai dasar, Teluk Ekas, Umpan

INTRODUCTION

Ekas Bay, as one of the waters rich in marine biodiversity, has become a major target for fishermen who rely on fishing techniques such as bottom rawai. Bottom longline, or bottom longline, is a commonly used fishing method to target basic fish species such as grouper, snapper, and other types of fish that have high economic value. However, in practice, the success of the catch in the basic swamp depends not only on the skill of the fisherman, but also greatly influenced by the type of bait used.

A literature review shows that the selection of bait types has a significant impact on catch in fishing using basic rawai (Emiati et al., 2022; Prastika et al., 2021; Sawi et al., 2022; Tinungki et al., 2022). The use of live bait tends to increase the effectiveness of catching certain target species, while artificial bait is more suitable for catching certain types of fish that are more aggressive (Suratno et al., 2023). It is also known that variations in bait types can affect migration patterns and fish eating behavior, thus affecting the overall catch (Tinungki et al., 2022). Therefore, a deeper understanding of how bait types affect catches in the bottom swamp is essential to improve the efficiency and sustainability of fishing activities in Ekas Bay.

This study aims to explore the influence of different types of bait on the catch and economic benefits of basic rawai practices in Ekas Bay. Thus, this study will not only provide a better understanding of the factors that influence the success of fishing in the bottom swamp, but will also provide useful insights for the management of fishery resources in the region. Through this approach, it is hoped that this research can make a positive contribution in efforts to improve the efficiency and sustainability of fishing practices in Ekas Bay, as well as become a foundation for the development of better policies in the overall management of fishery resources.

METHODS

Place and Time

The research was carried out for 2 months, namely in May and June 2023. The location of the fishing base is in Batunampar Village, Jerowaru District, East Lombok Regency, while the location of the fishing ground is in Ekas Bay, East Lombok Regency, West Nusa Tenggara Province (Figure 1).

Tools and Material

The equipment used during the research consisted of 3 sets of basic fishing gear, boats, buckets, digital scales, thermometers, refractometers, sechi discs, rulers, cameras, and GPS. The main ingredients used include live bait in the form of anchovies (S. indicus) and squid (Loligo sp.) and basic rawai catches.

Research Design

This study is a pre-experimental study with 3 forms of treatment and 3 replicates. Each treatment uses the same fishing gear, namely basic rawai. The form of treatment is applied to the type of bait used in the operation of the basic rawai. The first treatment (P1) used anchovy bait, the second treatment (P2) used squid bait, and the third treatment (P3) used a combination of anchovy and squid bait (Aprilia, 2018; Erfin, 2018; Tinungki et al., 2022). The three treatments were tested simultaneously in 3 different trips as a form of repetition. The primary data in this study are the number and volume of catches, the coordinates of the location of the fishing area, as well as the physical and chemical parameters of seawater consisting of

temperature, brightness, and salinity. The six primary data were extracted directly at the location of the arrest (in-situ).

In this study, the null hypothesis (H0) and the alternative hypothesis (H1) can be formulated based on the latest references that highlight the relationship between bait type and catch in basic rawfish fishing methods. The H0 statement in this study is "there is no significant influence between the types of bait used on the bottom rawfish catch in Ekas Bay", while the H1 statement is "there is a significant influence between the types of bait used on the bottom rawfish catch in Ekas Bay".

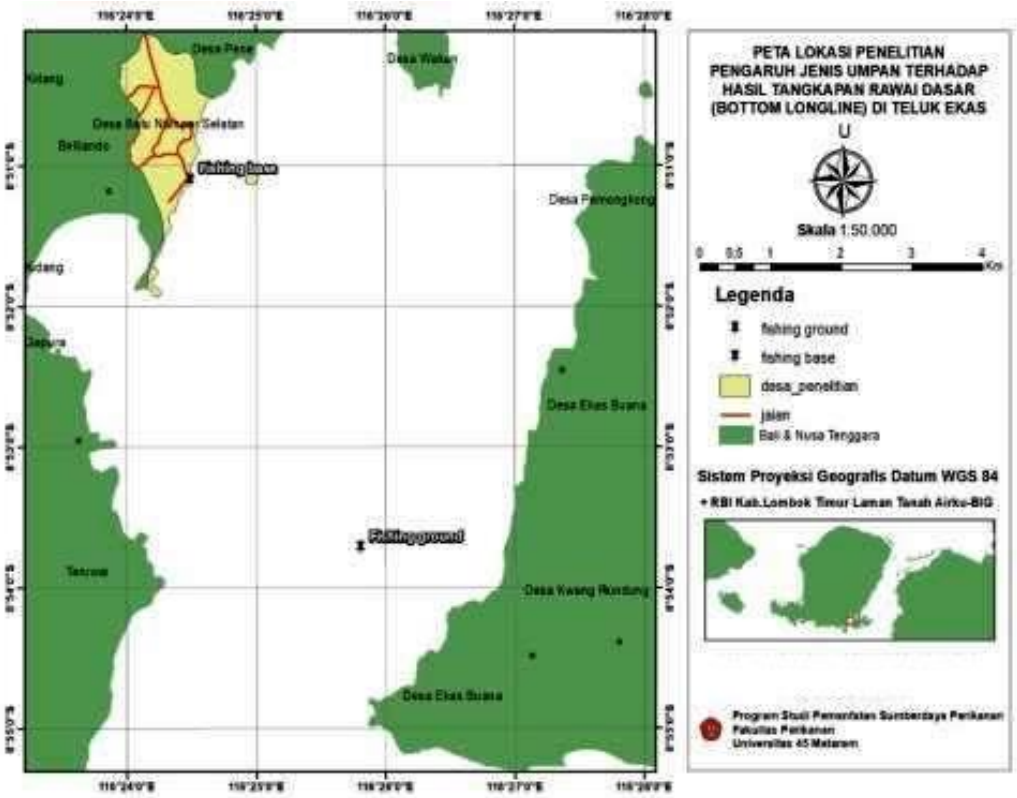

Fig 1. Location MapResearch (Fishing Base and Fishing Ground) of Rawai Bottom in Ekas Bay

Data Analysis

Uji t-*test*

Data analysis to be able to find out the influence of different types of bait on the results of catches statistically, namely the t-test. The t-test or T-test is one of the testing methods of the parametric statistical test that shows how far an independent variable (catch) individually affects in explaining the dependent variable (type of bait). This statistical test of t or t-test was carried out using a significance level of 0.5 (α=5%). Acceptance or rejection of this hypothesis test is carried out with the following criteria: If the significant value > 0.05, then H0 is accepted and H1 is rejected. This means that partially the independent variable does not have a significant influence on the dependent variable. If the significant value < 0.05 then H0 is rejected and H1 is accepted. This means that partially the independent variable has a significant influence on the dependent variable (Simbolon et al., 2023).

The equation of the t-test is as follows:

$$t = \frac{x1 - x2}{\sqrt{\frac{(n1-1)s1^2 + (n2-1)s2^2}{n1+n2^{-2}}\left(\frac{1}{n1} + \frac{1}{n2}\right)}}$$

Information:
x1 = Average sample 1
x2 = Average sample 2
n1 = Number of samples 1
n2 = Number of samples 2
s1 = Standard deviation sample 1
s2 = Standard deviation sample 2

Business Feasibility Analysis (*R/C ratio*)

The R/C ratio functions to determine the extent of benefits obtained from a business activity during a certain period of time whether the business carried out is feasible to be developed or not feasible. The eligibility criteria are if the R/C ratio value > 1 business is said to be feasible and profitable, the R/C ratio value < 1 business is said to be unfeasible and unprofitable and if the R/C ratio value = 1 business is said to break even (not profitable and not loss) (Primyastanto, 2022). To calculate the R/C ratio use the following formula:

$$\text{R/C ratio} = \frac{TR}{Tc}$$

Information:
TR = Total revenue (Rp)
TC = Total Cost (Rp).

RESULT

The basic rawai fishing gear operated during the research period in Ekas Bay showed catches in the form of 6 types of fish and 1 type of reptile. From these results, it is known that the treatment of squid bait (P2) and combination bait (P3) gave more diverse results (P2 = 5 types; P3 = 5 types) and more abundant (P2 = 14.6 kg; P3 = 14.3 kg) compared to anchovy bait (Table 1). Curisi fish (Nemipterus japonicus) and bandih grouper (Cephalopholis boenak) are the most caught species, with a total volume of 72 kg and 67 kg respectively.

Table 1. Basic Wire Catches with Different Bait Treatments

No	Treatment	Catch	Sum (Tail)	Volume (Kg)
1	(P1) Anchovy bait (Stolephorus indicus) 3 repetitions	Kurisi Fish (*Nemipterus japonicus*)	26	13.9
		Bandih Grouper Fish (*Cephalopholis boenak*)	20	
		Baronang Fish (*Siganus sp*)	8	
		Remora Fish (*Echeneidae*)	4	
2	(P2) Squid bait (Loligo sp) 3 repetitions	Bandih Grouper Fish (*Cephalopholis boenak*)	25	14,6
		Kurisi Fish (*Nemipterus japonicus*)	22	
		Remora Fish (*Echeneidae*)	10	
		Baronang Fish (*Siganus sp*)	7	

No	Treatment	Catch	Sum (Tail)	Volume (Kg)
		Sea Snake (*Hydrophiinae*)	1	
3	(P3) Combination bait Anchovies and squid 3 repetitions	Kurisi Fish (*Nemipterus japonicus*)	24	
		Bandih Grouper Fish (*Cephalopholis boenak*)	22	
		Remora Fish (*Echeneidae*)	11	14,3
		Cantang Grouper Fish (*Caranx Sexfasciatus*)	3	
		Puffer Fish	1	

The average catch of each trip ranged from 4.6 – 4.9 kg/trip with a total of 19 – 21 fish/trip (Table 2). From these data, squid bait is the most effective treatment to provide volume and number of catches for bottom rawfish in Ekas Bay.

Table 2. Volume and Number of Basic Wire Catches with Treatment per Trip

Deuteronomy (*trip*)	Perlakuan					
	(P1) Anchovies (*S. indicus*)		(P2) Squid (*Loligo sp*)		(P3) Combination Anchovies and squid	
	Volume (kg)	Sum (ekor)	Volume (kg)	Sum (ekor)	Volume (kg)	Sum (ekor)
I	5,3	23	5,8	25	4,6	19
II	3,9	14	4,8	23	5,3	24
III	4,7	21	4	17	4,4	18
Total	13,9	58	14,6	65	14,3	61
Average	4,6	19,3	4,9	21,6	4,8	20,3

The results of the oneway analysis of the one-lane anova variety t-test on the number of basic rawai catches with bait treatment in Ekas Bay during the study obtained a probability value (P value) of 0.924 (Table 3). This value is greater than the significance value ( ) of 0.05, so H0 is accepted and H1 is rejected. This means that statistically different bait types do not have a real effect on the bottom rawfish catch in Ekas Bay.

Table 3. Results of Variance Analysis (t-test) Effect of Bait on Bottom Rope Catches in Ekas Bay

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0,082222	2	0,041111	0,08061	0,923535	5,143253
Within Groups	3,06	6	0,51			
Total	3,142222	8				

Operational fishing activities with basic rawai in Ekas Bay use 2 cost components. These costs consist of fixed cost components (Table 4) and non-fixed cost components (Table 5). Fixed cost components are investment vehicles such as boats, engines and fishing gear. Meanwhile, the fixed cost component consists of fuel oil (BBM) and consumption. The fixed cost component is lowered to depreciation costs per day because the capture activity is carried out in 1 day. Based on the results of the interviews, the economic age of each means of

investment varies. The boat has an economic life of 15 years (5475 days), an engine of 20 years (7300 days) and fishing gear of 3 years (1095 days).

Table 4. Fixed Cost (Investment) Component of Fishing Activities with Basic Rope in Ekas Bay

No	Component	Price (Rp)	Economical Life (Day)	Depreciation Fee/Day (Rp)
1	Boat	7.000.000	5475	1.278
2	Tinting machine	4.500.000	7300	616
3	Fishing gear	400.000	1095	365
	Total	11.900.000		2.260

Table 5. Component of Non-Fixed Costs for Fishing Activities with Basic Rope in Ekas Bay

No	Component	Price (Rp)	Amount used	Price Total (Rp)
1	BBM	12.000	1 liter	12.000
2	Consumption	10.000	1 paket	10.000
	Total			22.000

Table 6. Results of Business Analysis (R/C ratio) of Fishing Using Basic Ropes with Different Baits

Treatment	Catch (Kg)	Operational Costs (Rp)	Selling Price (Rp)	*R/C ratio*
P1 Terry Pass	13,9	24.260	208.500	8,6
P2 Squid Bait	14,6	24.260	219.000	9,5
P3 Anchovy + Squid Combination	14,3	24.260	214.500	8,84

Based on Table 6, which details the fishing effort using the bottom longline, it can be seen that the use of squid bait (P2) provides the highest catch of 14.6 kg with a selling price of Rp 219,000 and an R/C (Revenue to Cost) ratio of 9.5, which is the highest ratio among the three treatments. Meanwhile, anchovy bait (P1) produced a catch of 13.9 kg with a selling price of IDR 208,500 and an R/C ratio of 8.6. The combination of anchovy and squid bait (P3) resulted in a catch of 14.3 kg with a selling price of IDR 214,500 and an R/C ratio of 8.84. All treatments have the same operational cost of Rp 24,260. From this data, it can be concluded that squid bait is the most economically and productively effective compared to anchovy bait and a combination of both.

Table 7. Results of Measurement and Comparison of Water Quality Parameters at Fishing Locations

Parameters	Measurement Results per trip			Quality Standards (Decree of the Minister of Environment Number 51 of 2004 concerning Seawater Quality Standards, 2004)
	I	II	III	
Temperature (°C)	28	30	28	28 - 32
Brightness (meter)	1,30	1,25	1,25	>5
Salinity (ppt)	35	35	35	33 – 34

Based on the table of the results of the measurement of environmental parameters per trip compared to the quality standards set by the Ministry of Environment No. 51 of 2004, it can be seen that the water temperature during the three measurement trips (28°C, 30°C, and 28°C) is within the set quality standard range (28 - 32°C). However, the level of water brightness with measurements of 1.30 meters, 1.25 meters, and 1.25 meters on each trip did not meet the quality standards that required a brightness of more than 5 meters. Meanwhile, the measured water salinity was consistent at 35 ppt on each trip, exceeding the permissible quality standard limit (33 - 34 ppt). Thus, even though the water temperature meets the standard, the brightness and salinity parameters do not meet the predetermined quality standards.

DISCUSSION

The results showed that the use of squid bait (P2) and a combination of squid-anchovy bait (P3) was more effective in increasing the number and diversity of catches compared to the use of anchovy bait alone (P1). The squid bait (P2) produced the largest total catch volume of 72 kg, while the combination bait (P3) produced 67 kg, higher than the anchovy bait (P1) which only produced 13.9 kg. These findings are consistent with previous research that states that the use of squid bait is preferred by various species of predatory fish due to its attractive aroma and texture (Agustina et al., 2019; Senewe et al., 2019). In addition, bandih grouper (C. boenak) and kurisi fish (N. japonicus) are the most commonly caught species, suggesting that both species have a high preference for the bait used (Baldwin & Johnson, 1994).

This study provides important insights into the factors that affect fish catches using bottom swamps in Ekas Bay. Although statistical analysis shows that bait types do not exert a significant influence on catch, other factors such as economic efficiency and environmental conditions remain key considerations in selecting the most effective bait types. Previous research by (Fadillah, 2023) also suggests that variations in bait types may not always have a significant impact on catches in various aquatic conditions, but economic efficiency and the preferences of certain species can influence bait use decisions.

In the context of fishing operations, fixed and non-fixed cost analysis shows the importance of understanding the cost structure to improve economic efficiency. Fixed cost components, such as boats and engines, have a long economic life and affect the calculation of daily depreciation costs. This is in line with research by (Waileruny et al., 2022), which emphasizes the importance of cost management in fishing operations to ensure the continuity of fishermen's businesses. Meanwhile, non-fixed costs such as fuel and consumption must be managed effectively to optimize catches.

Higher catches with the use of squid bait show the potential for greater economic benefits although there is no statistically significant difference. This shows that economic considerations remain important in choosing the type of bait. Research by (Masilan & Neethiselvan, 2018) supports these findings by showing that squid-based baits are often more effective in attracting different species of fish, thereby increasing the overall catch.

Environmental parameters such as temperature, brightness, and salinity also play an important role in fish catches. Although water temperatures are within the standard range, substandard brightness and salinity can affect aquatic ecosystems and, in turn, catches. Research (Takarina et al., 2018) highlights that optimal environmental conditions are critical to the success of fishing, and attention to these environmental parameters should be part of a sustainable fisheries management strategy in Ekas Bay.

CONCLUSSION

This study shows that the difference in bait type does not have a statistically significant effect on the number of bottom rawfish catches in Ekas Bay. However, the use of squid bait has proven to be more economically effective and productive than anchovy bait and a

combination of anchovy bait. Although all types of bait have the same operational costs, squid bait generates higher economic profits because the selling price of the catch is greater. In addition, the importance of cost management and understanding of environmental conditions has also been identified as important factors that support the efficiency and sustainability of fishing practices in the region.

ACKNOWLEDGEMENT

We would like to express our deepest gratitude to the Rector of the University of 45 Mataram for the financial support provided, which allowed us to publish the results of this research. We also thank Mr. Siraudin and the Fishermen Group of Batu Nampar Village, Jerowaru District, East Lombok Regency for the information and manpower assistance they provided during the implementation of research in the field. The support and cooperation from these parties played a very important role in the success of this research. Without their contribution, this research would not have been able to be carried out properly and provide useful results.

REFERENCES

Agustina, M., Jatmiko, I., & Sulistyaningsih, R. K. (2019). Komposisi Hasil Tangkapan dan Daerah Penangkapan Pancing Ulur Tuna di Perairan Sendang Biru. *Jurnal Penelitian Perikanan Indonesia*, *25*(4), 241. https://doi.org/10.15578/jppi.25.4.2019.241-251

Aprilia, R. G. (2018). Pengaruh Perbedaan Umpan Alat Tangkap Pancing Ulur (*Handline*) Di Pelabuhan Perikanan Nusantara (PPN) Brondong. *Universitas Brawijaya*.

Baldwin, C. C., & Johnson, G. D. (1994). FAO Species Catalogue. Groupers of the World (Family Serranidae, Subfamily Epinephelinae). An Annotated and Illustrated Catalogue of the Grouper, Rockcod, Hind, Coral Grouper, and Lyretail Species Known to Date, 1(6), 1058-1061.

Emiati, E., Nasution, P., & Brown, A. (2022). The Effect of Bait Types on the Catch of Bottom Long Line in Bantan Sari Village Bantan District Bengkalis Regency. *Journal of Coastal and Ocean Sciences*, *3*(3), 171–175. https://doi.org/10.31258/jocos.3.3.171-175

Erfin, E. (2018). Pengaruh Umpan Asli dan Umpan Buatan dengan Waktu Penangkapan yang Berbeda pada Alat Tangkap Pancing Tangan (*Hand line*) terhadap Jumlah dan Jenis Ikan di Perairan Teluk Maumere. *Gema Wiralodra*, *9*(2), 128–136.

Fadillah, R. R. (2023). Analisis Pengaruh Perbedaan Umpan dan Ukuran Pancing terhadap Hasil Tangkapan Tenggiri pada Alat Tangkap Pancing Ulur di Perairan Karimunjawa [*Skripsi*]. Universitas Diponegoro.

Keputusan Menteri Lingkungan Hidup Nomor 51 Tahun 2004. Tentang Baku Mutu Air Laut, Kementerian Lingkungan Hidup RI. 1489.

Masilan, K., & Neethiselvan, N. (2018). A review on natural and artificial fish bait. *International Journal of Fisheries and Aquatic Studies*, *6*(2), 198–201.

Prastika, Y., Fahrul., Alfa, F. P., Nelwan., Kurnia, M., Baharuddin, D. G., Nompo., & Abduh I. H. (2021). Penentuan Hasil Tangkapan Rawai Dasar Berdasarkan Perbedaan Jenis Umpan (Pari, Buntal dan Hiu) di Perairan Bulukumba, Sulawesi Selatan. *Prosiding Simposium Nasional Kelautan dan Perikanan*, *8*.

Primyastanto, M. (2022). *Manajemen Operasi Usaha Perikanan*. Media Nusa Creative (MNC Publishing).

Sawi, O. J., Manoppo, L., Pangalila, F. P. T., & Thamin, A. (2022). Pengaruh Jenis Umpan terhadap Hasil Tangkapan Rawai Dasar di Desa Wamesa Kabupaten Kaimana Provinsi Papua Barat. *Jurnal Ilmu dan Teknologi Perikanan Tangkap*, *7*(1), 33. https://doi.org/10.35800/jitpt.v7i1.37713

Senewe, G. S., Kumajas, H. J., & Pamikiran, R. C. (2019). Pengaruh Jenis Umpan terhadap Hasil Tangkapan Pancing Dasar di Pantai Desa Poopoh. *Jurnal Ilmu dan Teknologi Perikanan Tangkap*, *4*(1), 16–21.

Simbolon, I. S. K. M. S. N. P. D. N. E. D., Limbong, D. A., Evelyn H., Tambunan, S. K. M. S. N. P. D. N. E. D., Rantung, G. A., Simanjuntak, S. M., & Indonesia, C. V. G. P. (2023). *Biostatistik*. CV. Green Publisher Indonesia.

Suratno, M., Kusyairi, A., & Noor, M. T. (2023). Respon Penggunaan Umpan Buatan dan Umpan Hidup pada Pancing Ulur terhadap Hasil Tangkapan di Perairan Madura Pagagan Pademawu Pamekasan. *Soetomo Jurnal Pertanian Agropro*, *1*(3), 196–202.

Takarina, N. D., Sutiana, A., & Nurhudah, M. (2018). Study of Water Parameter Related to Catches of Small Pelagic Fishes at Pandeglang Waters, Banten. *AIP Conference Proceedings*, *2023*. https://doi.org/10.1063/1.5064170

Tinungki, G., Labaro, I. L., Kayadoe, M. E., Sitanggang, E. P., & Luasunaung, A. (2022). Pengaruh Jenis Umpan dan Fase Bulan terhadap Hasil Tangkapan Rawai Dasar di Teluk Manado. *Jurnal Ilmu dan Teknologi Perikanan Tangkap*, *7*(2), 80-85. https://doi.org/10.35800/jitpt.7.2.2022.39799

Waileruny, W., Kesaulya, T., & Yuli, M. (2022). Analisis Usaha Perikanan Pancing Tuna di Kecamatan Amahai Kabupaten Maluku Tengah. *TRITON: Jurnal Manajemen Sumberdaya Perairan*, *18*(1). https://doi.org/10.30598/TRITONvol18issue1page38-46