Fisheries Journal, 14(3), 1599-1608 (2024)
http://doi.org/10.29303/jp.v14i3.922

THE INFLUENCE OF OCEANOGRAPHIC FACTORS ON SERO CATCH RESULTS IN KARAMPUANG ISLAND, MAMUJU REGENCY, WEST SULAWESI

Pengaruh Faktor-Faktor Oseanografi Terhadap Hasil Tangkapan Sero di Pulau Karampuang Kab. Mamuju Sulawesi Barat

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(Received June 2th 2024; Accepted September 19th 2024)

ABSTRACT

Sero is a type of fishing gear whose operation is carried out around coastal waters, is permanent, and has the role of trapping fish that have territorial areas around the coast or fish that migrate towards the coast. The oceanographic conditions of a body of water can be used to indicate fishing areas for certain types of fish. This research aims to determine the influence of oceanographic factors (temperature, salinity, currents, and tides) on sero catches on Karampuang Island, Mamuju Regency, West Sulawesi. The research was carried out in June-July 2023 on Karampuang Island, District. Mamuju, West Sulawesi. This method uses a field survey method, namely measuring temperature, salinity, tides, and currents. The results of this study indicate that the influence of oceanographic parameters on the total sero catches yield together with the independent variables (X) does not have a significant impact on the sero catches yield (Y). Individually (partially), the variable with a negative value, the temperature on serocatch but not substantial.

Keywords: Sero, Karampuang Island, Kab. Mamuju

ABSTRAK

Sero adalah jenis alat tangkap yang pengoperasiannya dilakukan di sekitar perairan pantai, bersifat menetap, yang mempunyai peran sebagai perangkap ikan yang memiliki wilayah teritori sekitar pantai atau ikan yang melakukan migrasi ke arah pantai. Kondisi oseanografi suatu perairan dapat dijadikan indikator daerah penangkapan untuk jenis ikan tertentu. Penelitian ini memiliki untuk mengetahui pengaruh faktor-faktor oseanografi (suhu, salinitas, arus, serta pasang surut) terhadap hasil tangkapan sero di Pulau Karampuang Kabupaten Mamuju Sulawesi Barat. Penelitian dilaksanakan pada bulan Juni-Juli 2023 di Pulau Karampuang Kab. Mamuju Sulawesi Barat. Metode ini menggunakan metode survey lapang, yaitu berupa pengukuran suhu, salinitas, pasang surut, dan arus. Hasil penelitian ini menunjukkan bahwa pengaruh parameter oseanografi terhadap total hasil tangkapan sero secara bersama-sama variabel bebas (X) tidak terdapat pengaruh signifikan terhadap hasil tangkapan sero (Y). Secara sendiri-sendiri (parsial) variabel bernilai negatif suhu X3 tidak

berpengaruh nyata terhadap hasil tangkapan sero karena dari hasil analisis produksi didapatkan nilai koefisien regresi bernilai negatif sedangkan variabel lainnya bernilai positif, seperti pasang surut X1, kecepatan arus X2, dan salinitas X4 memiliki pengaruh pada hasil tangkapan sero tetapi tidak signifikan.

Kata Kunci : Sero, Pulau Karampuang, Kab. Mamuju

INTRODUCTION

Indonesian waters have very rich economic resource potential. These resources can make a major contribution to increasing foreign exchange, regional income, and can improve people's welfare, especially those whose work depends on the sea if these resources are managed properly and wisely. Karampuang Island is an island that is still in the category of an area with few settlements and household-scale land use.

Economically, almost all of the people of Karampuang Island still depend on the sea and farming. The most prominent activity in utilizing fishery biological resources is coastal fisheries, with one form of sero fishing business. Sero is a type of fishing gear that is operated in coastal waters, is permanent, and functions as a trap for fish whose territory is on the coast or fish that migrate towards the coast. This fishing gear has many advantages, namely it is economical because the operational costs are relatively cheap. Generally, the types of fish caught vary, people call them mixed fish, but the majority of the types of fish caught are baronang, kuwe fish, mullet, yellowtail fish, sori fish, puffer fish, and squid (Asis, 2019).

The composition of the sero catch on Karampuang Island produced 7 types of dominant catches, namely Julung-julung fish (Hemiramphus brasiliensis) 60.80% and Squid (*Sepioteuthis lesseoniana*) 20.35%. The productivity of the sero fishing gear increased and more fish were caught in the 15th to 24th minute (Ardiansyah, 2022).

According to Abdullah *et al.*, (2018) in the study conducted, the sero fishing gear used in the Limboto Gorontalo waters had a profit of IDR 9,272,000 per year which was obtained from a total income of IDR 14,412,000 per year minus a total cost of IDR 5,139,000. This condition explains that the sero fishing gear has better benefits than using fishing gear with an annual profit of IDR 7,363,900.

Baeur (2013) stated that the increasing use of resources has resulted in a decline in fishery resources due to environmentally unfriendly fishing activities, resulting in increased bycatch (World Conservation Monitoring Center, 1992). According to Salim & Anggoro (2019), the decline in fish resource populations can be caused by damage to ecosystems such as seagrass, coral reefs, and mangroves. The level of environmental friendliness of sero fishing gear based on Rita's research (2015) states that the level of environmental friendliness of sero fishing gear is 25, so it is included in the group of environmentally friendly fishing gear.

Data availability is a major obstacle in ensuring fish quotas in waters. We are aware that there is still a mismatch in oceanographic data, especially in offshore areas, this condition is caused by the complexity of survey activities of various oceanographic parameters directly, in addition to the active nature of the waters, which requires a high frequency of stages to reach a wide area. Oceanographic standards that are directly related to fish circulation include currents, temperature, and tides, salinity. The application of this factor has benefits in the utilization and management of fish resources, especially in fishing efforts. Observations need to be made because of the various transitions that occur in the ocean, resulting in a transition in adaptation and fish behavior, where each type of fish has a certain temperature tolerance transition in its survival. Therefore, the temperature shift and current patterns that occur can affect fish in their activities, especially in laying eggs, looking for food and migrating (Sahidi *et al.*, 2015). Based on this condition, it is necessary to conduct a study on the Influence of

Oceanographic Factors (current, temperature, salinity, and tides) on Sero Catch Results on Karampuang Island, Mamuju Regency, West Sulawesi.

RESEARCH METHODS

Time and Place

This research was conducted in June-July 2023 on Karampuang Island, Mamuju Regency, West Sulawesi.

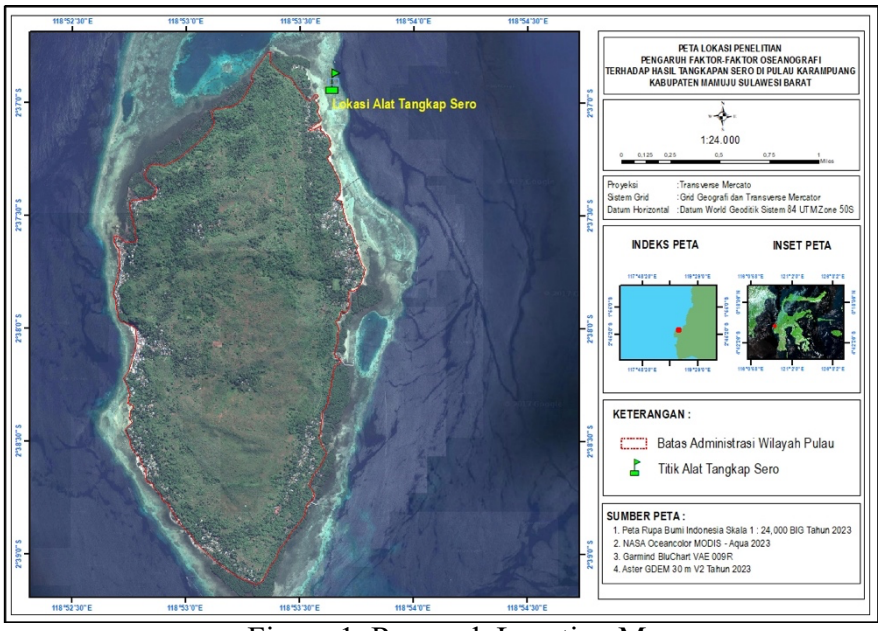

Figure 1. Research Location Map

Tools and materials

The following are the tools and materials used in the research :

Table 1. Tools and Materials Used in Research

No	Description	Unit	Function
1.	Ship/ Boat	Unit	As Transportation to Fishing Areas
2.	Stationery	Set	Writing Research Data
3.	Camera	Unit	Taking pictures during Research
4.	Thermometer	Unit	Evaluate Temperature Sea Level
5.	Refractometer	Unit	Evaluate Sea Water Salinity
6.	Stick tide	Unit	Assessing Sea Tides
7.	Kite Current	Unit	Evaluate Speed Current
8.	Stopwatch	Unit	To Calculate Speed Time Current
9.	Spear	Unit	To Catch Fish Trapped in the Sero

Method of collecting data

This method uses a field survey method, namely measuring temperature, salinity, tides, and currents. Additional primary data required is carried out by direct interviews with fishermen. This research was carried out for two months for 24 trips with data collection intervals carried out every 3 times a week. The data taken include oceanographic data (salinity, temperature, tides, currents) and sero catch data. In order to prevent errors in collecting oceanographic parameter data, it was repeated 2 times.

Data Analysis

The analysis of research data will be processed using software (Excel). So that the data collection process carried out in the field can reduce the deviation of measurement data caused by several factors that are difficult to control, so that in the data study a 90% confidence level is used, which means that the permissible error rate is 10%. The condition of oceanographic data and catch data is analyzed using Multiple Linear Regression Analysis.

Sugiyono (2015) explains that multiple linear regression analysis is a regression that has one dependent variable and two or more independent variables. In determining oceanographic factors on sero catch results, there is a multiple linear regression equation formulated (Sugiyono, 2015):

$$y = a + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + e$$

Where :

y = Total catch Sero (Kg)
a = Coefficient piece (Constant)
b1 = Coefficient tidal parameter regression
b2 = Coefficient regression speed current
b3 = Coefficient regression temperature
b4 = Coefficient regression salinity
x 1 = Ebb and flow (cm)
x 2 = Speed current (m/s)
x 3 = Temperature (°C)
x 4 = Salinity (°/ oo)
e = Standard Error

In order to find out whether the equation is acceptable, an F test is performed, as well as a t test.

Analysis of Variance (F Test)

The test is performed to determine the impact of independent variables together on the dependent variable. From the Anova table, a significant F value is obtained where if the calculated F is smaller than the F table from the test level of 0.05, it means that it has a real effect and if it is greater than 0.05, it means that it does not have a real effect.

Regression Coefficient Analysis (t Test)

This test is performed to test the effect of each independent variable on the dependent variable. From the summary output table, a significant p (probability) value is obtained where if the calculated t value is smaller than the t table value in the 0.05 test, it means that it has a real effect, and if the calculated t value is greater than the t table value at the 0.05 test level, it means that it does not have a real effect.

RESULTS

Description of Catch Results

The catch of the sero fishing gear produced in 24 fishing trips using one sero unit on Karampuang Island which is at a depth of 2.5 meters with the catch of 3 types of fish, namely; Julung-julung (Hemiramphus brasiliensis), Squid (Sepioteuthis lesseoniana), and Kuwe (Caranx ignobilis). The total sero catch was 47.7 kg.

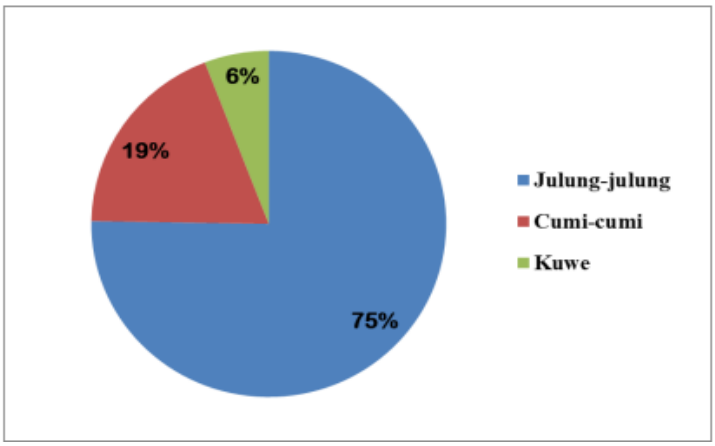

Figure 2. Composition Catch Species

The graph shows percentage size of catch sero throughout research namely 75% of Julung-julung caught was 35.9 kg, 19% of squid were caught with a total of 9 kg, 6% of Kuwe were caught with a total of 2.8 kg.

Oceanographic Parameters

1. Tide

The tidal values showed significant variations between observation periods and between observation locations. The highest tidal value of 99 cm occurred on July 15 and the lowest tidal value of 56 cm occurred on June 17th and July 03 th.

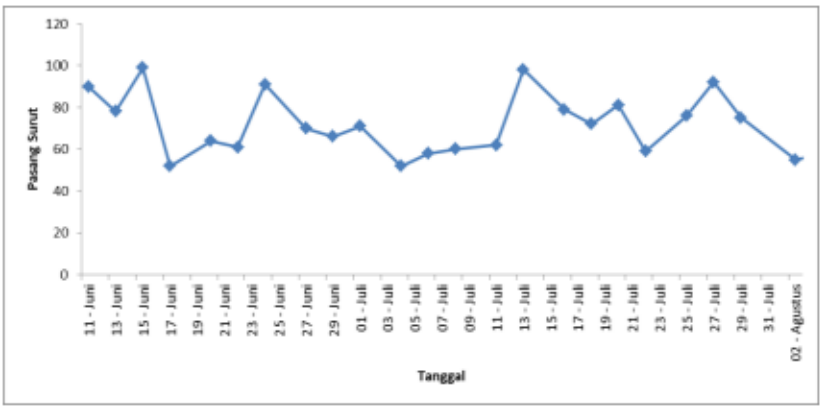

Figure 3. Ebb and flow of Karampuang Island waters

2. Speed Current

The water current velocity values showed significant variations between observation periods and between observation locations. The highest current velocity of 0.27 m/s occurred on June 11 and the lowest current velocity of 0.10 m/s occurred on June 13th, 15 th, 17 th, 23 th, 29 th and July 1st, 11 st, 13th, 22nd and August 2 nd.

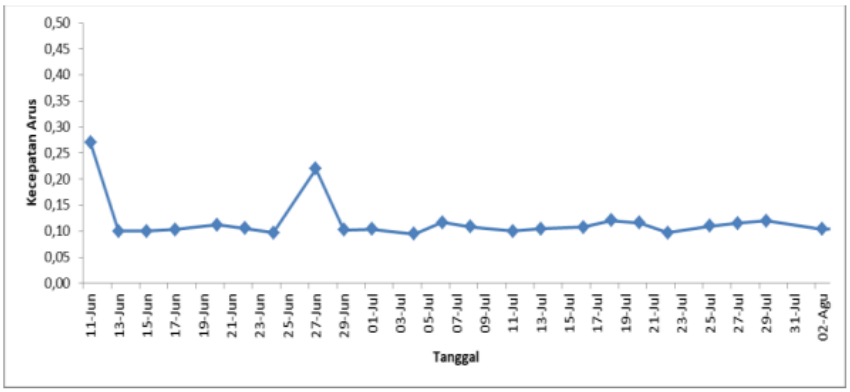

Figure 4. Speed Karampuang Island Current

3. Temperature

Water temperature values showed significant variations between observation periods and between observation locations. The highest water temperature of 34 °C occurred on June 17th, July 1st, July 11st, July 20th, July 22nd, and July 27th and the lowest water temperature of 32 °C occurred on June 11st, 13th, 22nd, 24th, 27th, 29th, and 29th July.

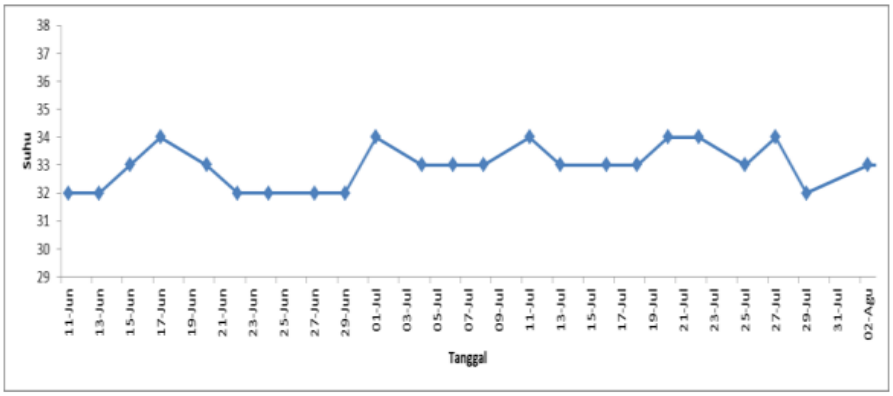

Figure 5. Temperature Sea Surface of Karampuang Island

4. Salinity

The water salinity values showed significant variations between observation periods and between observation locations. The highest water salinity of 36‰ occurred on June 13th, June 24 th, June 29 th, July 8 th, July 11st, July 22nd, July 25th, August 2nd and the lowest water salinity of 33‰ occurred on June 20th, June 22nd and July 6th.

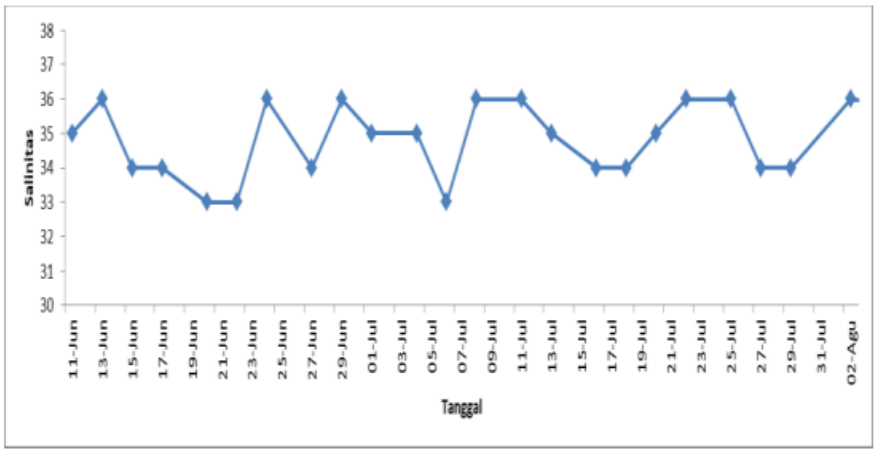

Figure 6. Salinity of Karampuang Island Waters

Analysis Influence of Oceanographic Factors Regarding the Sero Catch Results on Karampuang Island

1. Normality Test

The results of the analysis show that the data obtained during the research have met the normality test standards. The normality test graph or normal probability plot (Figure 7) shows the distribution points around the normality line which shows that the existing data has been normally distributed. Data has been normally distributed if the distribution points are around the normal line or straight line.

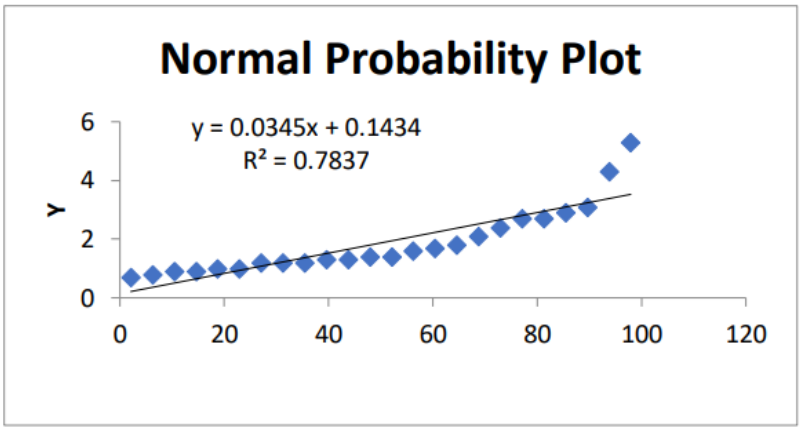

Figure 7. Normality Test Graph or Normal Probability Plot

Analysis Regression

Based on the results of the research data analysis using the Excel program in determining the influence of oceanographic factors (salinity, tides, temperature, and current speed) on sero catch results, calculated using multiple linear regression equations, including:

$$Y = -0.356 + 0.037\ X1 + 0.263\ X2 - 0.067\ X3 + 0.048$$

Testing of the four abiotic factors of waters (tides, current speed, temperature, salinity) has an insignificant correlation in influencing the number of sero catches. This is indicated by the value of the multiple correlation coefficient (R) between the catch and the four abiotic factors of waters, which is 0.49 or 49.31%, which means that the relationship is not too strong. Changes in tides, current speed, temperature, and salinity have an effect of 0.2431 or 24.31% of the total changes that occur in the number of sero catches. Based on calculations regarding the effect of changes in tides, current speed, temperature, and salinity on the number of catches with a correlation coefficient value (r) obtained of 0.083 or 8.39%, it can be concluded that there are still 91.7% other factors that influence changes in the number of sero catches.

Testing Hypothesis

1. Simultaneous Hypothesis Testing

The simultaneous hypothesis experiment produced an F-count value of 1.526 with a significance level of F = 0.23. If the significance value> level of significance ($\alpha = 0.05$) so that in Variables X1, X2, X3, X4, each did not find a significant effect on the sero catch results.

2. Partial Hypothesis Test

Partial hypothesis testing is used to see whether there is an individual (alone) influence of each oceanographic factor on the sero catch in Karampuang Island. The test standard states that if the probability value is > the significant value of F, it is known that there is no significant

partial impact of each production factor contained in the model on the sero catch in Karampuang Island. Based on the results of the t-test analysis, it was found that the factors that have a relevant influence are tides and the factors that do not have a significant influence are current speed, temperature and salinity.

DISCUSSION

Sero Operation Method

The sero fishing gear is operated in the morning or afternoon when the sea water is receding. Based on the results of interviews with fishermen at the research location, the catch obtained was small. One of the points of view that triggered the sero fishing gear to still be widely operated on the coast until now is because it is relatively easy, cheap, and simple to operate. Based on direct observations during 24 lifting trips, fishermen generally leave in the morning at around 09.00 WITA and finish at 10.00 WITA. From the fishing base to the fishing ground with a distance of approximately 80 meters from the coast, it takes 4-5 minutes. Research by Pebrian, *et al.* (2023), conducted in Bambanipa village, the catch is usually taken in the morning at around 07.00 - 07.30 WITA.

Relationship of Tidal to Sero Catch Results

The results of the analysis of the relationship between tides and the number of catches obtained from the t-value of 2.30 with a significance of 0.03 <0.23 at a 5% error rate mean that the tidal factor statistically has a real effect on the number of catches. The analysis is in accordance with the results of observations during the study, that tidal changes ranging from 52 cm - 99 cm / sec, provide significant conditions for the number of catches. The research results show that the highest catch was obtained at a tide height of 93 cm and the lowest at a tide height of 52 cm. Yunita & Zainuri (2021) study concluded that the highest tide indicates a positive interaction with the size of individuals and the weight of the species caught, but shows a negative interaction with the quality of the catch. Conditions like this are estimated that the types and total individuals trapped have a relatively small weight standard and the probability of the juvenile phase being accidentally trapped by the sero. The research results of Subiyanto, *et al*. (2009), stated that fish larvae during the pro-larvae stage generally migrate to estuary areas by following the tidal currents and settling in suitable areas or environments.

Relationship of Current Speed to Catch Results

In the analysis results between current speed and total catch results, the t-value obtained was 0.04 with a significance of 0.96> 0.23 at a 5% error level, meaning that the current speed statistically had no significant effect on the total catch results. The results of observations showed that the fluctuation of the water current speed ranged from 0.09 m/sec - 0.27 m/sec. This fluctuation provides a significant change in the amount of catch. A water current speed of 0.16 m/sec can obtain the most catch results and low catch results are obtained at a current speed of 0.10 m/sec. Based on research conducted by Hamriani *et al.* (2021), in the waters of the Makassar Strait, Kab. Barru got the highest catch at a current speed of 0.016-0.018 m/s and a small catch was obtained at a current speed of 0.011-0.015 m/s, so it can be concluded that a small current speed results in a reduced catch and a high current speed can produce a high catch.

Relationship of Temperature to Catch

Based on the results of the calculation of the relationship between temperature and the total catch obtained, the t-value is -0.20 with a significance of = 0.84> 0.23 at an error level of 5%, meaning that temperature statistically has no real effect on the size of the catch. The results

of observations show that the fluctuations in water temperature that occur are relatively narrow, ranging from 32 °C - 34 °C. This fluctuation does not provide significant changes to the total catch. The highest catch was obtained with a water temperature of 33 °C and the lowest at 34 °C. In the study of Hamriani *et al.* (2021), in the waters of the Makassar Strait, Kab. Barru concluded that a temperature of 30°C produced a high catch while a temperature of 31°C produced a low catch.

Relationship of Salinity to Catch Results

The relationship of salinity to the amount of catch obtained from the calculated t value is 0.22 with a significance of 0.82, > 0.23 at an error level of 5%, meaning that the salinity factor based on the data does not have a real effect on the amount of catch. The analysis above can be explained through the results of observations during the study, where there was a narrow change in salinity with a range of 33 ppt - 36 ppt. Changes in salinity provide significant conditions for the amount of catch. The highest catch was obtained at a salinity of 35 ppt and the lowest at a salinity of 34 ppt. Based on research by Hamriani *et al*. (2021), in the waters of the Makassar Strait, Kab. Barru said that if the salinity is too low, the catch will also decrease, as well as if the salinity is high, according to the data obtained where the highest catch was found at a salinity of 37 ppt and the lowest catch was found at a salinity of 40 ppt.

CONCLUSION

The impact of oceanographic parameters on the magnitude of the sero catch simultaneously independent variables (X) do not have a significant effect on the sero catch (Y). Individually (partially) the negative variable temperature X3 does not have a significant effect on the sero catch because the results of the production analysis have a negative regression coefficient value while other variables have positive values, such as tide X1, current speed X2, and salinity X4 have an effect on the sero catch but are not significant.

ACKNOWLEDGMENT

Appreciation to all friends who have provided assistance in the research and all Lecturers of the Aquatic Resources Management Study Program, Faculty of Fisheries and Marine, Muhammadiyah University of Mamuju.

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