Fisheries Journal, 15 (4), 2187-2194 (2025)
http://doi.org/10.29303/jp.v15i4.1599

ANALYSIS OF THE EFFECT OF FISHING TIME ON TUNA HAND LINE CATCHES IN THE MALUKU SEA

Analisis Pengaruh Waktu Penangkapan Terhadap Hasil Tangkapan Hand Line Tuna di Laut Maluku

Karyanto[1*], Yuli Purwanto[2], Muhammad Zainul Arifin[1], Franky A. Darondo[1], Lidya Katili[1], Ricky Winrison Fuah[3]

[1]Bitung Marine and Fisheries Polytechnic, [2]Jakarta Technical University of Fisheries, [3]Syiah Kuala University, Banda Aceh

Tandurusa Street, Bitung, North Sulawesi

[*]Corresponding Author: aryakaryanto56@gmail.com

(Received May 31th 2025; Accepted August 22th 2025)

ABSTRACT

Girian Bawah Village fishermen use handlines in tuna fishing activities. This study aims to determine the efficiency of fishing time while fishing on the number of tuna handline catches. This study uses catch data with fishing areas in the Maluku Sea during October-November 2022 using the fishing experiment method in a 3-repeat time period, namely morning (05.00 - 09.59), afternoon (10.00 - 14.59) and evening (15.00 - 19.59), then analyzed descriptively quantitatively. Data analysis used statistical tests (Normality Test, Homogeneity Test, ANOVA Test and BNT Test) to see the best time for catching. The results of the normality test obtained normal values, the results of the homogeneity test obtained homogeneous values, the results of the correlation test, have a strong relationship. The results of the ANOVA test show that there is an influence between fishing time and the number and weight of catches. The results of the BNT test, obtained the best time for catching using a tuna handline is the time group 05.00-09.59 WITA or morning time

Keywords: Hand line tuna, Catch, Fishing time

ABSTRAK

Nelayan Kelurahan Girian Bawah menggunakan alat tangkap pancing ulur (handline) dalam aktifitas kegiatan penangkapan ikan tuna. Penelitian ini bertujuan untuk mengetahui efisiensi waktu penangkapan saat memancing terhadap jumlah hasil tangkapan handline tuna. Penelitian ini menggunakan data hasil tangkapan dengan daerah penangkapan di Laut Maluku selama bulan Oktober-November 2022 dengan menggunakan metode percobaan penangkapan ikan pada periode waktu 3 ulangan yaitu pagi (05.00 – 09.59), siang (10.00 – 14.59) dan sore (15.00 – 19.59), kemudian dianalisis secara deskriptif kuantitatif. Analisa data menggunakan uji statistik (Uji Normalitas, Uji Homogenitas, Uji ANOVA dan Uji BNT) untuk melihat waktu terbaik untuk penangkapan. Hasil uji formalities diperoleh nilai normal, hasil uji homogenitas

diperoleh nilai homogen, Hasil uji korelasi, memiliki hubungan yang kuat. Hasil uji ANOVA terdapat pengaruh antara waktu penangkapan dengan jumlah dan berat hasil tangkapan. Hasil uji BNT, diperoleh waktu yang paling baik untuk penangkapan menggunakan handline tuna adalah kelompok waktu 05.00-09.59 WITA atau waktu pagi.

Kata Kunci : Hand line tuna, Hasil tangkapan, Waktu penangkapan

INTRODUCTION

According to Firdaus (2019), tuna, skipjack, and mackerel play a crucial role in Indonesia's global fisheries sector. Tuna is an economically important fish species and the third-largest fishery commodity in Indonesia, after shrimp and bottomfish. Demand continues to rise for tuna, which commands a relatively higher price than other fish commodities (Darondo *et al*. 2014).

Witomo and Wardono (2012) stated that one of the centers of fisheries production in Indonesia is Bitung City, North Sulawesi Province. Two fisheries management areas, namely the Maluku Sea waters (WPP-715) and the Sulawesi Sea waters (WPP-716), flank Bitung City, making its location very strategic. According to Nurhayati, *et al* (2018), yellowfin tuna is mostly caught using tuna longlines and fishing rods. Fishermen in Bitung City and its surrounding areas catch large pelagic fish with small vessels in the Sulawesi Sea and its surroundings using handlines (Karyanto, *et al* 2014). Handlines are environmentally friendly fishing gear commonly used to catch yellowfin tuna (Tomasila, *et al* 2020). The main components consist of the main line, branch lines, hooks, and sinkers, which form one handline unit (Ilhamdi, *et al* 2018).

Yellowfin tuna fishing is effective around fish aggregating devices (FADs) prepared for fishing. Yellowfin tuna are caught at depths of 200-500 meters in the morning around FADs (Nurdin *et al*. 2019). Kantun and Mallawa (2015) state that FADs are feeding grounds for yellowfin tuna, with peak times in the morning starting at 4:00-8:30 WITA and in the afternoon from 5:00-7:30 PM in the Makassar Strait.

Based on the description above, the success of tuna hand line operations is largely determined by the time of fishing, so to find out the best time for fishing based on the number of catches, it is necessary to conduct a study on the analysis of the influence of fishing time to see the number of catches using tuna hand lines in the Maluku Sea.

RESEARCH METHODS

Data collection

This research was conducted from October to November 2022, with the fishing area located in the Maluku Sea. Data were collected through interviews and practice operating fishing gear by fishermen in Girian Bawah Village, namely by observing 4 (four) vessels. The data collection method was in a period of 3 repetitions: morning (05.00 - 09.59), afternoon (10.00 - 14.59), and evening (15.00 - 19.59). Catch data were recorded and tabulated according to the repetition time. Data analysis used statistical tests (Normality Test, Homogeneity Test, ANOVA Test, and BNT Test) to determine the best time for fishing, which was then analyzed descriptively quantitatively.

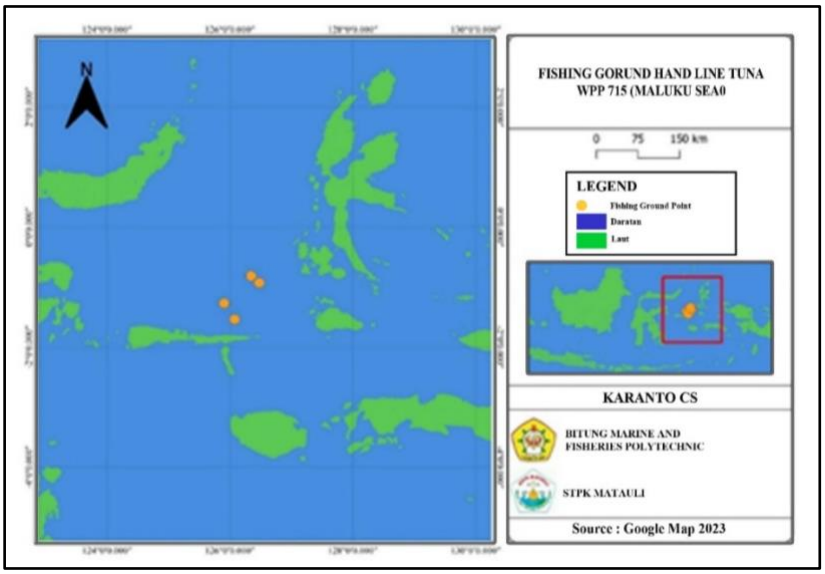

Figure 1. Research Location

RESULTS

Based on the research results, the quantity and weight of tuna catches based on the time of capture are presented in Table 1.

Table 1. Number and weight of tuna catch based on fishing time

Time of Arrest	Number (tail)	Weight (kg)
Morning (05.00-09.59)	63	2.548
Afternoon (10.00-14.59)	31	1.123
Afternoon (15.00-19.59)	4	145
Total	98	3816

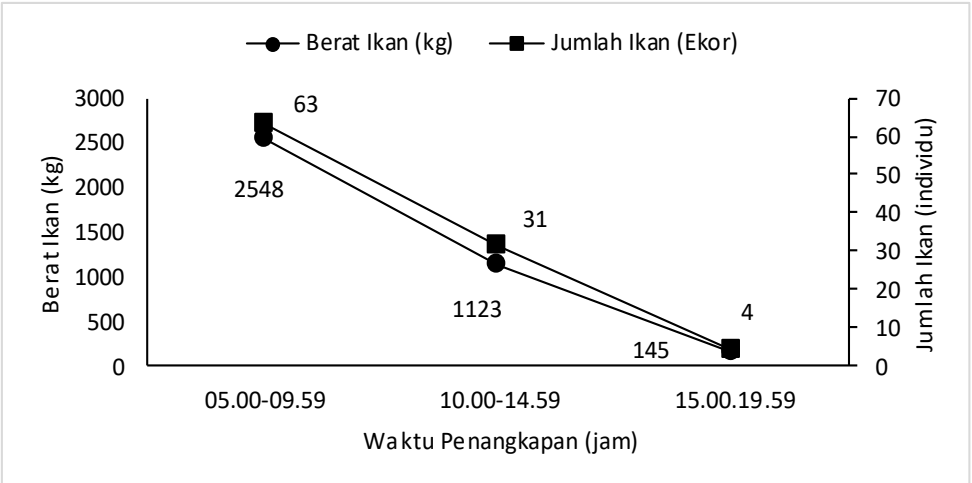

Figure 2. Number and weight of tuna catch based on fishing time

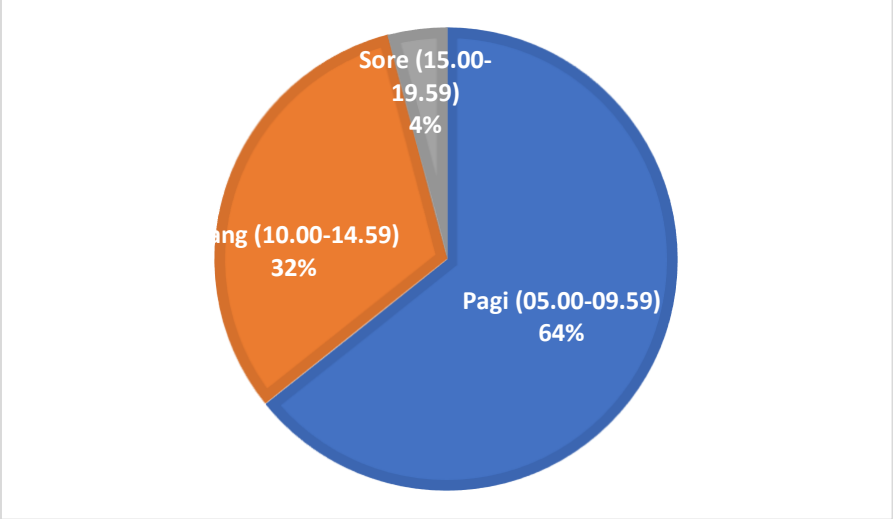

Figure 3. Percentage of catch based on time

DISCUSSION

Fishing Vessel Fleet

The fishing fleet used is a pumpboat type vessel. The vessels used are 4 units, namely KM. Al Aqsa, KM. Cahaya Arafah 02, KM. Cahaya Arafah 99 and KM. Ambar laut. According to Pamikiran (2012) the boats used by Bitung City fishermen in tuna fishing are pelang type katir boats or pumpboats. The engines used are 25-40PK outboard engines. Pumpboats in operating fishing gear are equipped with 6 to 8 katinting boats (Pakura). In line with what was stated by Purwanto, *et al* (2024) that fishermen in catching yellowfin tuna always carry pakura (katinting boats). Siadadi, *et al*. (2012) stated that katir boats or handlines pumpboats measure length = 9.60–17.18 m; width = 0.80–1.95 m; depth = 0.64–1.74 m.

Figure 1. Pumpboat

Hand line construction

Based on the Decree of the Minister of Maritime Affairs and Fisheries No. 6 of 2010, hand line fishing gear is included in hand line fishing gear. The fishing gear used by fishermen in Girian Bawah village in fishing operations is a tuna hand line, which consists of a reel of line, main line, swivel, snap, sinker, leader line and hook. Almost the same as the opinion of Rahmat (2007), that the components of a deep water hand line consist of 1) reel of line; 2)

fishing line; 3) hook; and 4) sinker 5) spool. In tuna fishing operations, hand lines are equipped with additional weights, namely river stones, which function to accelerate the sinking of the fishing line and as a container for placing sliced bait as a scattered bait, in addition to the bait attached to the hook. In addition, the bait is also given squid ink extract (cisabu) which functions to attract tuna.

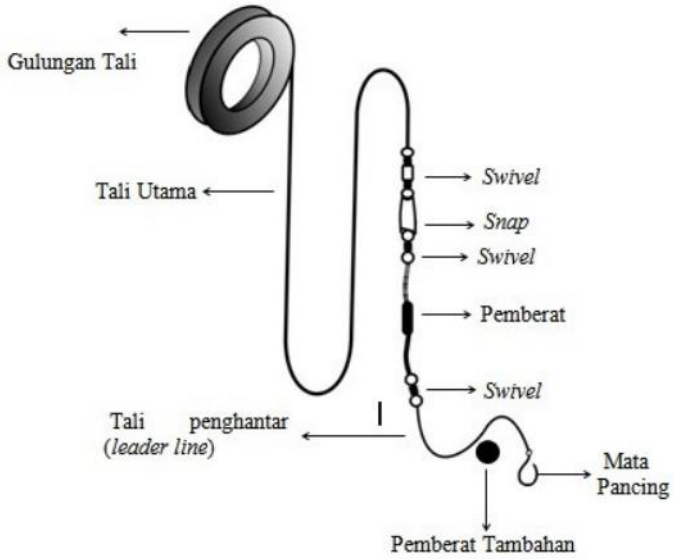

Figure 2. Fishing gear (Hand Line tuna)
(Karyanto *et al, 2014)*

Fishing Gear Operation Techniques

Freshly caught tuna, skipjack tuna, and small tuna are used as bait. The baitfish are thinly sliced or cut into small pieces, and one of the pieces is tied to the hook so that the hook is invisible, along with a bag of squid oil solution. Several more pieces are placed on a rock, then tied together with the bait already attached to the hook. Cisabu (squid oil) is inserted into the bag to entice the tuna to approach. According to Darondo *et al*. (2020), the baited hook is looped around the rock along with cisabu (squid oil) and other pieces of fish.

Hand-line tuna fishing operations are equipped with additional weights, made of stone, to place the bait as a scatter bait, in addition to the bait attached to the hook. The stone weights also help speed up the sinking of the line.

The baited fishing rod is slowly lowered into the sea at a depth of about 50–150 m. When the fishing line has been stretched to the specified depth and feels taut, the fishing line is jerked as hard as possible so that the rock and the hook are released, at that time the bait tied to the rock will scatter and the squid oil bag will spread the squid oil extract solution, thus attracting the attention of fish to eat it, including the bait slices attached to the hook. According to (Karyanto, *et al* (2021) squid oil extract that spreads in the sea will attract the attention of tuna to eat it. The use of squid oil solution affects the catch (Reppie 2010).

The location of the homogeneous fishing ground is in WPP 715 Maluku Sea with coordinates 010 03 789 N-1250 46’ 508” E, 010 18’ 852” N-1260 01’ 217” E, 000 49’ 409” N-1260 19’ 586” E, and 000 48’ 049” N-1260 19’ 106” E. According to Da’i, *et al* (2012) that the most popular hand line tuna fishing areas according to the recognition of several ship captains

at PPS Bitung are the Maluku Sea and Halmahera Sea. Yellowfin tuna fishing is carried out around the prepared fish aggregating devices (FADs) for more effective and efficient fishing. Yellowfin tuna is caught around the FADs at a depth of 200-500 meters in the morning (Nurdin *et al*. 2019)

Catch

Based on the research results, it was found that of the three tuna fishing times, namely morning, afternoon, and evening, the most fish were caught in the morning with the number of tuna caught being 63 with a total weight of 2,548 kg. While the least was caught in the afternoon, which only caught 4 fish with a total weight of 145 kg. Meanwhile, fishing during the day resulted in 31 fish with a total weight of 1,123 kg (Table 1). The number and weight of tuna caught based on the detailed fishing time are shown in Figure 3.

The highest number of fish caught in the morning can be indicated that generally pelagic fish, both large and small, look for food in the morning or around the time the dawn begins to appear in the morning, therefore, it will be easier to catch the fish, if caught in the morning. According to Fuah *et al* (2019), pelagic fish look for food in the morning because of suitable environmental conditions, namely the water temperature tends to be cool and does not have high waves, so the fish will be easier to find food. Meanwhile, research conducted (Kantun and Mallawa 2015) that Yellowfin Tuna began to actively look for food around fish aggregating devices (FADs) in the morning starting at 04.00-08.30 WITA.

Figure 4 shows that the percentage of catches in the morning was 64%, in the afternoon 32%, and in the evening 47%. Based on the figure above, there are differences in catches that occur according to the time of handline tuna fishing in the Maluku Sea.

In line with the results of statistical tests, to find the effect of fishing time (morning, afternoon, and evening) on tuna catches, it was found that the best time to catch tuna in Maluku is in the morning. However, before analyzing the best time, the data obtained was first analyzed for normality and homogeneity of the data. The test results showed that the data was normally distributed and homogeneous, this can be seen from the Asymp. Sig. (2.tailed) value which is greater than the alpha value (@). (0.684 > 0.05) for the normality value, and (0.104 > 0.05) for the homogeneity value.

Since the data were normally distributed and homogeneous, the next test was the ANOVA test, where this test was to see whether there was an effect of fishing time on tuna catch results, both in terms of fish weight and number of fish. There were three fishing times tested, namely morning, afternoon, and evening. From the analysis results, it was found that there was an effect of fishing time on catch results, where for each value was (0.005 <0.05) for the number of fish, and (0.006 <0.05) for fish weight. Based on the conclusion, if the Sig value <0.05 then it is said that there is an effect, conversely if the Sig value >0.05, then there is no effect.

Dikarenakan Due to the influence of fishing time on the catch, the test needs to be continued using the BNT test, because in the further test it is seen when the fishing time is the most influential, whether morning, afternoon or evening. Based on the further test using the BNT test, it was found that the fishing time in the morning is the best time, when compared to the afternoon and afternoon, it can be seen from the Sig. value. each (fish weight) and (number of fish) is smaller when compared to the Sig. value of afternoon and afternoon. Therefore, in line with the results shown in Figure 3, it can be concluded that the morning is the best time to

catch tuna using fishing rods or tuna handlines. Nurdin, *et al* (2019) that the time when Yellowfin Tuna gathers around FADs occurs in the morning (06.00–08.00 WIB). According to Karyanto *et al* (2020) the catch in the Maluku Sea waters is dominated by Yellowfin Tuna (*Thunnus albacares*) compared to bigeye tuna (*Thunnus obesus*). The handline tuna catch in the Maluku Sea is all Yellowfin tuna (*Thunus albacares*) or Yellowfin tuna (Purwanto, *et al* 2024).

CONCLUSION

1. There is an influence between the time of fishing and the quantity and weight of tuna caught in the Maluku Sea waters.
2. The best time for catching tuna using hand lines in the Maluku Sea waters is the time group 05.00-09.59 WITA or morning time.

ACKNOWLEDGEMENT

The authors would like to thank the Director of the Bitung Marine and Fisheries Polytechnic for granting permission and support so that this research can run well and smoothly. We also would like to thank the Girian Bawah Fishermen of Bitung City, especially the Ambar Laut Fishing Group for granting permission to conduct the research. As well as the captain and crew of the ship who have welcomed us to collect data during the research.

REFERENCES

Da'i, K., Labaro, I. L., & Telleng, A. T. R. (2013). Daerah penangkapan tuna hand liners yang mendaratkan tangkapannya di Pelabuhan Perikanan Samudera Bitung. *Jurnal Ilmu dan Teknologi Perikanan Tangkap, 1*(2), 33–37.

Darondo, F. A., Halim, S., & Reppie, E. (2020). Modifikasi pemberat hand line dengan inovasi menggunakan pemberat batu beton pada penangkapan tuna di Pelabuhan Perikanan Samudera (PPS) Bitung. *Jurnal Ilmu dan Teknologi Perikanan Tangkap, 10*(1), 15–18. https://ejournal.unsrat.ac.id/index.php/JITPT/article/view/28921

Darondo, F. A., Manoppo, L., & Luasunaung, A. (2014). Komposisi tangkapan tuna hand line di Pelabuhan Perikanan Samudera Bitung, Sulawesi Utara. *Jurnal Ilmu dan Teknologi Perikanan Tangkap, 1*(6), 227–232.

Firdaus, M. (2019). Profil perikanan tuna dan cakalang di Indonesia [The profile of tuna and cakalang fishery in Indonesia]. *Buletin Ilmiah Marina Sosial Ekonomi Kelautan dan Perikanan, 5*(2), 23–32. https://doi.org/10.15578/marina.v5i2.7772

Fuah, R. W., & Puspito, G. (2019). The influence of type and color of artificial bait vertical longline on small pelagic fish catches. *Jurnal Airaha, 3*(1), 25–34. https://doi.org/10.15578/airaha.v3i1.7827

Ilhamdi, A. S., & Hari, A. (2018). Karakteristik dan hasil tangkapan pancing ulur di Perairan Teluk Cendrawasih Samudera Pasifik. *Buletin Teknik Litkayasa, 16*(2), 83–86.

Kantun, W., & Mallawa, A. (2015). Response of the yellowfin tuna (*Thunnus albacares*) on bait and depth in handline fishery of Macassar Strait. *Journal of FisheriesSciences.com, 9*(1), 1–9. https://doi.org/10.3153/JFScom.2015001

Karyanto, K., Reppie, E., & Budiman, J. (2014). Perbandingan hasil tangkapan tuna hand line dengan teknik pengoperasian yang berbeda di Laut Maluku. *Jurnal Ilmu dan Teknologi Perikanan Tangkap, 1*(6), 221–226.

Karyanto, K., Arifin, M. Z., & Katili, L. (2020). Teknik pengoperasian hand line tuna dengan metode pemberat batu dan minyak cumi di Perairan Laut Maluku. *Jurnal Bluefin Fisheries, 2*(2), 1–7. https://doi.org/10.53641/jbf.v2i2.99

Nurdin, E., Arifin, M. Z., Katili, L., & Darondo, F. A. (2019). Keberadaan madidihang (*Thunnus albacares*) di sekitar rumpon. *Jurnal Penelitian Perikanan Indonesia, 25*(1), 35–42. https://doi.org/10.15578/jppi.25.1.2019.35-42

Nurhayati, M., Wisudo, S. H., & Purwangka, F. (2018). Produktivitas dan pola musim penangkapan tuna madidihang (*Thunnus albacares*) di Wilayah Pengelolaan Perikanan 573. *Akuatika Indonesia, 3*(2), 127–135. https://doi.org/10.24198/jaki.v3i2.19348

Pamikiran, R. D. (2012). Hubungan ukuran dan kemampuan muat perahu katir di Kota Bitung, Sulawesi Utara. *Jurnal Perikanan dan Kelautan Tropis, 8*(3), 99–102. http://ejournal.unsrat.ac.id/index.php/JPKT/article/view/604

Reppie, E. (2010). Pengaruh minyak cumi pada umpan bubu dasar terhadap hasil tangkapan ikan-ikan karang. *Jurnal Perikanan dan Kelautan Tropis, 6*(3), 141–146. https://doi.org/10.35800/jpkt.6.3.2010.158

Siadadi, A., Pamikiran, R. D., & Pangalila, F. P. T. (2012). Kajian ukuran utama perahu katir (pumpboat) pada perikanan tuna hand line di Kota Bitung, Provinsi Sulawesi Utara. *Jurnal Ilmu dan Teknologi Perikanan Tangkap, 1*(1), 1–5.

Tomasila, L. A., Syamsuddin, M., & Polhaupessy, R. (2020). Proses penangkapan tuna madidihang (*Thunnus albacares*) dengan alat tangkap pancing ulur (hand line) di Pulau Ambon. *Triton: Jurnal Manajemen Sumberdaya Perairan, 16*(2), 97–107. https://doi.org/10.30598/tritonvol16issue2page97-107

Witomo, C. M., & Wardono, B. (2012). Potret perikanan tangkap tuna. *Buletin Riset Sosial Ekonomi Kelautan dan Perikanan, 7*(1), 7–13. https://doi.org/10.15578/brsekp.v7i1.4693

Purwanto, Y., Simau, S., Manengkey, J. I., Arifin, M. Z., Darondo, F. A., Katili, L., Pontoh, P., Karyanto, A., & Lusje, L. D. A. (2024). Pengaruh fase umur bulan terhadap hasil tangkapan dan menghitung jumlah hasil tangkapan. *Airaha, 13*(1), 141–146. https://doi.org/10.15578/airaha.v13i1.1177