The influence of moon period day to paperek fish (Leiognathus spp) cathed and it’s connection with physical waters of boat live nets at Dodinga Bay, West Halmahera Districs

J Karuwal\textsuperscript{1}\textsuperscript{*} and B Budiman\textsuperscript{2}

\textsuperscript{1}Marine Science and Fisheries of Darussalam University, Ambon
\textsuperscript{2}Graduate Student of North Mollucas Muhammadiyah University

\*E-mail: j_karuwal@yahoo.com

Abstract. The aims of this research are to know the influence of the moon period day on paperek (Leiognathus spp) catches and it’s relation to waters physical factors of the boat liftnets in the Dodinga bay. The oceanographic parameter data are sea surface temperature, waters salinity, brightness, current velocity, wind speed and paperek catches that was in situ collected. Data analysis was done descriptively and statistics to explain the relationship among variables by using multiple linear regression. The result of F test gets the $F_{\text{calc}}$ is 0.974 is greater than $F_{\text{table}}$ value is 0.442. This showing that all physical parameter waters were together to exert an influence upon the presence of paperek fish in waters. The formed of regression equation model are $\hat{y} = 6.675 - 0.22x_1 + 0.70x_2 - 0.126x_3 - 0.58x_4 - 0.806x_5 + e$; where: $\hat{y}$ = total anchovies fish catch; $x_1 =$ temperature ($^\circ$C); $x_2 =$ salinity ($^{\circ}$o/o); $x_3 =$ wind speed (ms$^{-1}$); $x_4 =$ brightness (m); $x_5 =$ current velocity (ms$^{-1}$) and $e =$ standard error. Furthermore the obtained of the paperek (Leiognathus spp) catches were many caught on Dodinga bay waters with boat liftnets at water temperature are 25.00-25.09 $^\circ$C. salinities are 30.0-31.0 ppt. current velocity are 0.05 0.18 m$^{-1}$, brightness value are 8.97-10.0 meters and wind speed are 1.83 3.05 ms$^{-1}$.

1. Introduction

One of the areas in West Halmahera Regency that has the potential resources of small pelagic fish is Dodinga Bay, where fishing activities are well developed and become one of the central production of catch fisheries, especially boat liftnets (Bagan) fisheries [1]. The Fisheries Marine Service Regency found that the potential of boat liftnets in the Dodinga Bay waters with anchovies (Stolephorus spp) as main catches tend to decline [2] and some of the catch boat liftnet are dominated by side catches such as paperek, bloating, squid and others that are not the main catch.

Paperek fish (Leiognathus spp) is one of the side catches in Bagan fishing catches that are also caught using rampus net fishing equipment, stick boat liftnets and raft boat liftnets. Some literature shows that lift nets are the dominant fishing gear used to catch paperek fish. Field observations show that paperek fish is a demersal fish resource that is quite dominant caught on a boat liftnets in the Dodinga Bay waters.

Boat liftnets or Bagan is a type of ship that operates using net fishing equipment with the aim of catching is a type of small pelagic fish that can move from one fishing area to another [3]. Fish that are the target of boat liftnet catching are small pelagic fish that have positive phototaxis properties (attracted by light) such as anchovies (Stolephorus spp), tembang (Sardinella fimiata), bloating (Rastrelliger spp), selar (Salaroides sp), kite (Decapterus spp), pepetak (Leiognathus sp), layur (Trichiurus savala) and squid (Loligo sp) [4, 5, 6]. There are other types of fish but are predators of the above types of fish.

The operation of the boat liftnets is generally carried out at night with the aim of increasing the effectiveness of catching activities. At night the light conditions become minimal so as to minimize the...
level of spread of fish that are positive phototaksis in the water. Usually the period of moon life and oceanic conditions (oceanography) is also a consideration in operating this fishing gear. Some boat liftnets fishermen's experiences are informed that the production rate of anchos follows the period of the age of the moon where there is an increase as the light moon goes to the dark moon and decreases on the way to the full moon.

Some studies have shown that the catch of boat liftnets tends to fluctuate depending on the moon day period. According to [7] found that the number of catches of Seluang fish (*Rasbora argyrotaenia* blkr 1850) in the Barito river of South Kalimantan at the time of the full moon catching operation is more than fishing operations at the time of the dead moon. [8] stated that the catch of anchovies (*Stolephorus commersonii*) on the boat liftnets in the waters of Bacan, South Halmahera was highest caught at the age of the moon in the sky 1-7 days. [9] found that the results of fishing with sero fishing equipment in the waters of Amurang Bay, North Sulawesi get in the phase of the dark moon, early perbani and final perbani give a lot of catches, but at the bright full moon phase gets a little catches.

The Changes of moon day period are also thought to contribute to the presence of paparek fish on the boat liftnets because the fish is positive phototaksis. The relationship formed between oceanographic factors and paparek fish catches as a by-catch of boat liftnets is felt to be a very important object of study to be researched.

This study aims to find out whether or not the influence of the moon day period on the catch of peperok fish (*Leiognathus equulus*) and its relation to the physical factors of the waters on the boat liftnets Dodinga bay. This research is expected as a source of information for fishermen in Toniku Village, West Halmahera Regency, North Maluku to optimize the main catch of Bagan Perahu fishery and as a scientific study material for the development of fishing science.

2. Research Methods

The research has done for 3 months from November 2017 to January 2017 in the Dodinga Bay waters, West Halmahera Regency. The implementation of the research follows the timing of boat liftnet operations around the Dodinga Bay waters. The research equipment used in this study are 3 boat liftnets, GPS, hand compass, handheld refraktometer, water thermometer, sacchi disc, camera, stationery writing, computer and current kite. The data was taken are paparek catch per trip, coordinates of the capture area, oceanographic parameters (temperature, salinity, brightness, wind speed, and current speed) for only 21 observation trips adjusted to moon age period that is used as a benchmark that is from the new dark moon period to quartil end period.

The analysis used to determine the effect of the moon’s day period on paparek catches used a random group design [10] with 3 repeats. This study used one factor that influenced the experiment, namely the period of the moon day (phase) as a treatment and the time of data retrieval for 3 months used as a repeat. The moon day (phase of the age of the moon) taken in groups of 3 phases namely the dark moon, the initial quartile and the final quartile follow the day of capture of local fishermen.

The model of linear equations is: 

\[ Y_{ij} = \mu + \tau_i + \beta_j + \epsilon_{ij} \]

Where:
- \( Y_{ij} \) = The catches on the period of the day of the moon to \(-i\) dan repetition to \(-j\)
- \( \mu \) = Average production of paparek catches
- \( \tau_i \) = Effect of the period of the day of the moon to \(-i\)
- \( \beta_j \) = Group influence (Repetition time of the receipt of the data) to \(-j\)
- \( \epsilon_{ij} \) = The effect of experiment errors on treating moon period to \(-i\) on the observational replay to \(-j\)

The hypothesis tested for fixed models is:

- \( H_0 \): no influence of factors from the day of the moon on the paparek catches
- \( H_1 \): there is influence of factors from the day of the moon on the paparek catches

Furthermore, to find out the relationship between paparek caught and physical factors (temperature, salinity, brightness, wind speed, and current speed) using stepwise model of Multiple Regression Analysis method. The equation in general is:
\[ Y = a + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + e \]

Where \( Y \) = Total catches of paperek fish; \( a \) = Cut coefficient (Constant); \( b_1 \) = Regression coefficient of temperature parameters; \( b_2 \) = Regression coefficient of salinity; \( b_3 \) = Regression coefficient of current speed; \( b_4 \) = Regression coefficient of water brightness; \( x_1 \) = Temperature (°C); \( x_2 \) = Salinity (°/oo); \( x_3 \) = Current speed (ms\(^{-1}\)); \( x_4 \) = Brightness (m); \( x_5 \) = wind speed (m/s); \( e \) = Standard Error

3. Results and Discussions

3.1. Peperek fish production

The production of peperek fish obtained from 63 fishing operation trips during 3 months of research was 265.93 kg. The highest amount of production was in the 3\(^{rd}\) research month of 112.66 kg and the lowest in the first month was 63.93 kg (Figure 1).

![Figure 1. Total Production of Paperek catches during 3 months of research](image)

Fluctuating of paperek catches every month during the research are thought to be conducted in the eastern season. At that time the waters tend to be bumpy so the fishing activity is somewhat disturbed. Fish tend to descend rather deep layers to avoid wave action. At this time also the rainfall was increases that it affects to salinity and water temperature conditions. This condition is the same with the results of [11] who found that there is a close relationship between rainfall, oceanographic paremater and fish catches in the estuary waters of the Barito River, Central Kalimantan. Paperek fish production during the study was seen in figure 2, while the average production of catches per trip was 4.22 kg/trip.

![Figure 2. Paparek Fish Catch per fishing trip for 3 months research](image)
Generally, it can be described that the peperek catches with boat liftnets are fluctuate throughout the time of the study. The average catch for 3 months research was 88.64 kg. Greater catches in the 3rd month are thought to be due to somewhat stable water conditions compared to the previous two months of research where at that time the environmental conditions of the waters tended to be choppy and rain conditions were closely related to the influence of the turn of the season. At the turn of the season oceanographic factors such as current speed, brightness, temperature and salinity tend to be unstable so the catch tends to change. [12] said that the changing seasons in Indonesia resulted in changes in water hydrological conditions.

3.2. The dynamics of physical parameters waters insitu to paperek catches
As most bay water conditions in generally, the physical parameters of Dodinga bay waters tend to fluctuate. An overview of the dynamics of the physical parameters of the waters for 63 days (3 months) during the study showed that there are dynamics that occur in the in situ parameters of sea surface temperature, salinity, brightness, wind speed and current speed that should be suspected to affect the paparek caught in these waters. The Description of these parameters dynamics in situ to the paparek catches as follows as.

3.2.1. Sea surface temperature. The observations found that the range of sea surface temperatures during the study in Dodinga Bay tended to fluctuate with temperature range values ranging from 23 - 29°C (Figure 3).

![Figure 3. The condition of Sea Surface Temperature at Dodinga Bay for 3 months of research.](image)

Based on the picture above, it can be seen that the sea surface temperature of Dodinga Bay tends to fluctuate during the research months but is still within the range that small pelagic fish can tolerate. The results of [13], stated that small pelagic fish are in the optimum temperature range of 29 – 30°C. The wide temperature range at the research site is suspected to occur because the implementation of research carried out at the turn of the season (pancaroba) when it occurs in the rainy season that results in a large influx of fresh water into the bay of 3 rivers that flow in this bay. Furthermore, [14] stated that the variation in tropical water temperature is fair if the value ranges from 25.6-32.3°C.

Furthermore, description of the condition of temperature dynamics to paperek catches can be seen in figure 4.
Figure 4. Dynamics of Sea Surface Temperatures to Catch

The picture above shows that the most catches were found at a temperature of 25.00 – 25.09°C of 51.32 kg while the lowest in the temperature range of 24.00-24.09°C. But in general there is still at the appropriate temperature condition range suitable for the life of paperek fish. According to [15] research found that peperek (Leiognathus spp) usually live at the bottom of the water with water temperatures between 26-29°C and can be found also in estuary areas such as bays.

3.2.2. Salinity. The observations showed that salinity distribution in the waters of Dodinga Bay at the time of the study ranged from 23 ppt – 31 ppt (Figure 5).

Figure 5 shows that the salinity conditions of the waters of Dodinga bay during the study tend to fluctuate. The ups and downs of salinity values are expected to occur because data collection is carried out at the time of the turn of the season (pancaroba). According to [16] said that seawater salinity is different due to the influence of evaporation and precipitation, run off of rivers, cooling or melting of ice. [17] stated that changes this season can result in changes in the pattern of temperature distribution and salinity in a water way. Furthermore, [18] stated that the value of salinity in its distribution in sea waters is strongly influenced by several factors, among others, the interaction of freshwater entry into seawater through rivers, also influenced by evaporation, water circulation patterns, evaporation and rainfall. The relationship between salinity condition and paperek caught can be shown in figure 6.
Figure 6. The Dynamics of Sea Level Salinity to Catches

Figure 6 shows that the most paperek catches were found in the water salinity range of 30.0 – 31 ppt and the lowest at salinity 25.0 – 26.0 ppt. Like other small pelagic fish, paperek fish are also very sensitive to salinity. [19] suggested that physiologically salinity is closely related to the adjustment of fish pressure osmotics where the tolerance and salinity preferences of marine organisms vary depending on the stage of life, namely eggs, larvae, juvenil, and adult. [20] researched found that salinity exerts a noticeable influence on the juvenile growth of fish.

3.2.3. Current speed. The speed of currents in a water contributes to the operation of tools such as the dispersal or disengaging of net fishing equipment, stability and successful capture operations. Based on the results of the study obtained the speed of water currents at the research site ranging from 0.06 - 0.96 ms$^{-1}$, can be seen in the Figure 7.

Figure 7. Condition of currents speeds in Dodinga bay during 3 months research

Figure 7 shows that the current speed in Dodinga bay during the study tends to fluctuate allegedly because data retrieval occurs at the turn of the season. However, the results of the average current speed obtained showed that the current speed condition is classified as a very slow to fast current speed. [21] stated that the current speed of the waters are grouped into five groups, namely: a) Very fast flow (>100 cm.s$^{-1}$); b) fast-flowing (50-100 cm s$^{-1}$); c) medium current (25-50 cm s$^{-1}$), d) slow current (20 – 25 cm s$^{-1}$); and e) very slow-flowing (< 10 cm s$^{-1}$).

The current speed in the Dodinga Bay waters is still at a safe level for boat liftnets operations. [22] found that the operation of the Rambo boat liftnet in the Makassar Strait waters was in the current range of 0.06 – 0.46 ms$^{-1}$, but the net will only be lowered down when the current speed ranges between 0.315
ms$^{-1}$ at the bottom and 0.339 ms$^{-1}$ for the upper current depending on the direction of arrival and knowledge of the capture location. For the sake of it, [23] research found that the hauling time on the operation of boat liftnets in the Makassar Strait when the current speed of the waters is 1.6-35.7 cm.s$^{-1}$. While [24] also found that the operation of boat liftnets in Belitung waters was carried out at current speed of 0.06-0.83 ms$^{-1}$. Furthermore, an description of the water currents dynamics to paperek catches in the Dodinga bay waters is shown in Figure 8.

![Figure 8. Dynamics of Sea Level Current Speed to Catch](image)

Figure 8 shows that paperek catches during the most research at current speeds of 0.05 to 0.18 ms$^{-1}$. This condition occurs allegedly due to the habit of these fish that live in association near the bottom of the water. In waters near the base, the current speed tends to weaken. As a result of [25] research, live peperek fish clustered at the bottom of shallow waters are at a depth of between 5-60 m with the highest catches obtained at a depth of 10-20 m. Paparek is a fish that is often also caught along with anchovy. So it is also suspected that at the same current speed this fish was also caught. [22] suggests that the relationship of brightness factor and current speed at a certain depth to the catch has a real effect, especially for hauling activities on boat liftnets activities.

3.2.4. Water Brightness. The brightness around the Dodinga Bay waters during the study ranged from 7 -13 m (Figure 9)

![Figure 9. The Sea brightness conditions of Doding Bay for 3 months research](image)

Figure 9 shows that, the brightness conditions of the Dodinga Bay waters during the study tend to fluctuate. This is thought to be due to changes in oceanographic factors and lighting conditions as the moon ages in space. However, the brightness of these waters is still considered good for catching
activities using boat lift nets. [26] said that the brightness of the waters is affected by the absorption of light by water, wavelengths of light, suspended solids and the reflecting of light by sea level. The results of [27] researched obtained that the brightness of the waters in the operation of the boat lift nets in the Lekok Pasuruan Regency waters of East Java obtained a water brightness of 1.86–2.075 m. According to [28] states that brightness is also affects fish attracted to light sources, when low brightness will make fish not interested in gathering around the lamp because of the lack of light lamps due to exhausted absorbed by substances/particles that spread in the water. Furthermore, the picture of the dynamics of the relationship between paparek catches and water brightness factor can be seen in Figure 10.

![Figure 10. Dynamics of Sea Level Brightness to Catches](image)

Based Figure 10, it is known that paparek are most caught at the brightness of the water 8.97 - 10 meters by 127.33 kg. This is thought to be due to the habit of live fish living near the bottom of the water on water columns which are rather low lighting and grazing feeder. According to [29], paparek fish from the Leiognathidae family live in coastal waters up to a depth of 30 m, near the surface (benthopelagic). Patek fish are found around the mouth of rivers and muddy coastal areas, often in mangrove areas. In adulthood it is found in the territory at the base of the beach usually at a depth of between 10-70 m. Juvenils are often found in estuary areas and sometimes enter river areas during high tides and swarm and actively move daily. Petek fish are amphydromous, which is not to colonize but to foraging [30 and 28].

3.2.5. Wind speed. Wind is one of the climatic elements that has an important role in the interaction between the sea and atmosphere so that it gets attention not only in meteorological research but also in marine research. For the dynamics of marine waters, especially in the surface layer of wind is the main source of energy. The transfer of energy from surface wind to sea will cause ocean waves and sea level currents. Wind speed conditions in Dodinga Bay during the study can be seen in Figure 11.
Figure 11 shows that wind exhaustion during the study tended to fluctuate at 0.61 – 8.6 ms\(^{-1}\). This condition is thought to have occurred due to the presence of eastern monsoon. [18] stated that the wind pattern that plays a role in Indonesia is the season wind (munson) where the season wind blows steadily in a certain direction at one period while in the other period the wind blows steadily in different directions. This is because Indonesia’s position between the two Continents of Asia and Australia makes the region most ideal for the development of the season winds. [31] stated that in Indonesia the average global wind speed is about 30 - 40 km.h\(^{-1}\). Meanwhile, based on the research of [32] obtained that the cycle of monsoon wind blowing in the territory of Indonesia is closely related to the main parameters of oceanography that is characteristic of Sea Surface Temperature cycle by currents in Indonesian territorial waters. The direction of surface currents has a close relationship with the wind.

Figure 12. Dynamics of Sea Level Wind Speed to Catch

In figure 12, it can be seen that paperek fish are generally caught at wind speeds of 1.83 to 3.05 ms\(^{-1}\). In such wind speed conditions allow the formation of sea level currents that are good for the process of operating a boat chart in a water. According to [33], in the tropics monsoon variations and rainfall are more influential on marine ecosistence, where monsoon variations will affect the availability of amounts and types of food that have a direct impact on the presence of fish in tropical marine ecosistence. According to [34], the monsoon wind also affects current patterns in Indonesian waters. The direction of the surface current has a close relationship with the wind. Indonesian waters are heavily affected by
the monsoon wind system which experiences a reversal of direction twice a year, related to high and low pressures between the Asian continent and Australia.

3.3. The effect of moon day period on peperek catches
The results of statistical analysis of the variety of fingerprints to find out the effect of treating the moon day period to peperek catches got a $F_{count}$ value of 17.53 more than $F_{table}$ at the level of $\alpha = 0.05$ of 6.94 (Table 1).

| Source of Variation | Degrees of freedom | Sum of Squares | Mean Square | F Count | F table |
|---------------------|--------------------|----------------|-------------|---------|---------|
| Groups              | 2                  | 117.32         | 58.66       | 5.22    | 6.94    |
| Treatment           | 2                  | 396.09         | 198.04      | 17.63   | 18.00   |
| Error               | 4                  | 44.92          | 11.23       |         |         |
| Total               | 8                  | 558.33         |             |         |         |

These results showed that in real terms the moon day period had a significant influence on paperek catches at the research site. Further testing found that between the period treatments tested found that the average catch of the final and dark period was the best treatment for paperek fishing activities at this location. Research of [34] found that Paperek fish were caught abundantly on the dark and light moon day to dark (final Quartil). Paparek fish is also a fish that is often caught with anchovies and is often a by-catch. This happens because paperek fish groups are often associated with anchovies groups in a fishing area. This fish is also a phototaksis type so often caught on fishing gear that uses light as a lure.

Some research like [35] researched stated that the total catch and catch of pelagic fish in Serang waters is influenced by the difference in the day of the month, the time of capture, the interaction between the two and the most influential factor is the difference in the day of the month.

3.4. The relationship between catches and physical parameters
The influence between the five physical parameters of the water on paperek catches can be known by conducting anova tests in line with regression analysis. The simultaneous influence of physical factors of the water on the catch is carried out F test while partially the influence of parameters is carried out t test. Test result of F found that the value of $F_{count}$ was 0.974 greater than the significant level of 0.442. This indicates that all physical parameters of the waters together influence the presence of paperek fish in the waters. The model of regression equations formed is $y = 6.675 - 0.122x_1 + 0.070x_2 - 0.126x_3 - 0.058x_4 - 0.806x_5 + e$; where $y = \text{Total catches of paperek}; x_1 = \text{Temperature (°C)}; x_2 = \text{Salinity(°/oo)}; x_3 = \text{Wind speed(ms)}; x_4 = \text{Brightness (m)}; x_5 = \text{current speed (ms)}$ dan $e$ = Standar Error.

Research of [36] shows that for all small pelagic fish resources that have important economic value such as anchovies, tembang and bloating, live in the range of Sea surface Temperature are 29 - 32°C. The optimum Sea surface Temperature value is between 29.6 – 30°C. While the relationship with chlorophyll-a density, small pelagic fishing areas tend to be at chlorophyll-a levels between 0.30 - 1.13 mg.m$^{-3}$. But specifically, it appears that the small pelagic fish has optimum chlorophyll-a between 0.7-0.9 mg.m$^{-3}$ and the relationship between depth and catch indicates that all species of small pelagic fish tend to be caught at a maximum depth of 100 m. [37] found that oceanographic parameters of sea surface temperature, chlorophyll concentration a, depth, salinity and current speed have a real influence simultaneously on the variation of boat lift net catches in Pemalang, Central Java waters.

T test results found that partial salinity parameters that affect paperek fish catch with thitung value of 1,238 at a significant level of 0.221 when compared to four other physical parameters of water.
Salinity is an important factor for the life of paparek fish because it is euryhaline (able to adapt to the salinity of wide waters). According to [38], the distribution of *E. splendens* which includes paparek fish species is influenced by hydrology (freshwater and tidal inputs), seasons, and ocean currents. The highest abundance is generally influenced by low salinity, high dissolved oxygen, surface water temperature, and brightness. Furthermore, *S. ruconius* is more euryhaline or able to adapt to salinity than *E. splendens* according to [39]. Similarly, kepok fish of *S. ruconius* can still be caught in river areas and estuaries, such as in the estuary of Digul River, Papua [40]. This condition also occurs in Dodinga bay where there are 3 rivers that flow in this bay. In general, it is also known that the salinity of the waters is also influenced by the low-quality freshwater entering of the land that will sink when met with high-birthion saltwater.

3.5. *Relationship between moon day period and aquatic physical parameters*

The period of the day of the moon and the physical parameters in the waters are quite closely related. Some physical parameters in the ocean tend to change as the moon ages in space usually most noticeable in current speed conditions in the waters. Descriptively the relationship between the moon day period and the physical parameters of the waters of the bay of Dodinga bay can be described in Table 2.

| Physical Water Parameters | Moon day period | Parametres Values | Max   | Min   |
|---------------------------|-----------------|-------------------|-------|-------|
|                           | BG/BB           | 29                | 23    |       |
| Temperature               | Q1              | 29                | 23    |       |
|                           | Q2              | 29                | 23    |       |
| Salinity                  | Q1              | 31                | 24    |       |
|                           | Q2              | 31                | 24    |       |
| Wind Speed                | BG/BB           | 8.60              | 0.61  |       |
| Brightness                | Q1              | 3.9               | 1.2   |       |
|                           | Q2              | 4.9               | 1.0   |       |
|                           | BG/BB           | 11.4              | 1.15  |       |
| Current Speed             | Q1              | 0.709             | 0.063 |       |
|                           | Q2              | 0.893             | 0.085 |       |

Note: BB/BG = New moon or dark moon; Q1 = Early Quartil; Q2 = Last Quartil

Table 2 describes that generally moon day periods does not imply to temperature, salinity, wind speed and brightness parameters, but has an impact on current speed in the Dodinga bay waters. This is thought to be formation because the four other factors outside the current are not related to the age of the moon in space. While in the parameters of sea currents water formed due to the influence of the gravitational force of the moon that has an impact on the strong weak current speed in a water. In the Dodinga Bay waters, it was discovered that the highest current speed occurred in the new moon day period. This was also found in [41] who studied in the waters of Benoa Bay, Bali, when the full moon conditions at current speeds were higher than when the position of the moon was halfway (first or third quarter).
4. Conclusions

The production of peperek fish obtained from 63 fishing operation trips during 3 months of research is 265.93 kg. The highest amount of production was in the 3rd research month of 112.66 kg and the lowest in the first month was 63.93 kg. Paperek Fish (Leiognathus spp) is caught in the Dodinga bay with boat liftnets at conditions of sea surface temperature ranges are 25.00 – 25.09°C, water salinity of 30.0 - 31 ppt, current speed of 0.05 - 0.18 ms⁻¹, the brightness of the waters are 8.97 - 10 m, wind speeds of 1.83 to 3.05 ms⁻¹. The Moon day period has a very noticeable influence on the peperek catches in Dodinga bay. The relationship between oceanographic parameters and paperek catches can be explained by linear regression model, namely \( y = 6.675 - 0.122x_1 + 0.070x_2 - 0.126x_3 - 0.058x_4 - 0.806x_5 + e; \)

where \( y \) = Total catches of paperek; \( x_1 = \) Temperature (°C); \( x_2 = \) Salinity(‰); \( x_3 = \) Wind speed(ms⁻¹); \( x_4 = \) Brightness (m); \( x_5 = \) current speed (ms⁻¹) dan e = Standar Error

References

[1] Muhammad S 2010 Kajian Perikananan Tangkap Bagan Perahu di Perairan Dodinga Kabupaten Halmahera Barat. Unpublished Thesis. Samratulangi University Manado.

[2] DPK Halmahera Barat 2011 Halmahera Barat dalam Angka. Biro Pusat Statistik Kabupaten Halmahera Barat.

[3] Baskoro M S 1999 Capture Process of The Floated Bamboo-Platform Lif net With Ligth Attraction (Bagan) Dissertation. (Tokyo: Fisheries of Tokyo University of Fisheries)

[4] Notanubun J and Patty W 2010 Perbedaan penggunaan intensitas cahaya lampu terhadap hasil tangkapan bagan angung pada perairan selat Rosenberg Kabupaten Maluku Tenggara Kepulauan Kei. Jurnal Perikan dan Nelayan 6(3):134-40.

[5] Fauziyah, Supriyadi F, Saleh K and Hadi 2013 Perbedaan waktu hauling bagan tancap terhadap hasil tangkapan di perairan sungsang, Sumatera Selatan. Jurnal Lahan Sub optimal 2(1): 50-57.

[6] Silitonga M F, Pramonowibowo and Hartoko A 2014 Analisa sebaran bagan tancap dan hasil tangkapan di Perairan Bandengan, Jepara, Jawa Tengah. Journal of Fisheries Resources Utilization Management and Technology 3(2):77-84

[7] Rosadi E 2014 Hasil tangkapan ikan seluas batang (rasbora argyrotaenia blkr 1850) berdasarkan umur bulan (moon age) Di Sungai Barito Kalimantan Selatan. Fish Scientiae Jurnal Ilmu-Ilmu Perikanan dan Kelautan 4(7):

[8] Kumajas H J 2015. Pengaruh warna lampu dalam air terhadap hasil tangkapan bagan perahu di perairan Bacan Kabupaten Halmahera Selatan. Jurnal LPPM Bidang Sains dan Teknologi 2 (1): 44-61

[9] Mambrasar A, Labaro I. L dan Sompie M S 2014 Perbandingan fase umur bulan terhadap hasil tangkapan sero di perairan Teluk Amurang Provinsi Sulawesi Utara. Jurnal Ilmu dan Teknologi Perikanan Tangkap, Edisi Khusus 14-19

[10] Steel R G D and Torrie J H 1993 Prinsip dan Prosedur Statistika. Suatu Pendekatan Biometrik.. (Jakarta: Gramedia Pustaka Utama)

[11] Rupawan and. Rais A H 2016 Karakteristik penangkapan dan produksi ikan di Kabupaten Barito Selatan, Kalimantan Tengah. Jurnal Penelitian Perikanan Indonesia 22 (4):

[12] Schalk P H 1987 Monsoon – related changes in zooplankton biomass in the Eastern Banda Sea and Aru Basin. Biol. Oceanogr 5: 1 – 12.

[13] Rasyid A J 2010 Distribusi suhu permukaan pada musim peralihan barat-timur terkait dengan fishing ground ikan pelagis kecil di perairan Spermonde. Torani, Jurnal Ilmu Kelautan dan Perikanan 20 (1):

[14] Ilahude A G and Liasaputra 1980 Sebaran normal parameter hidrologi di Teluk Jakarta. Teluk Jakarta. Penyajian fisika, Kimia, Biologi dan Geologi (Jakarta: LON-LIPI) pp 1-40.
[15] Pratwi E 2011 Kajian stok dan analisis ketidakpastian hasil tangkapan sumberdaya ikan pepetek 
(Leiognathus equulus Forskal, 1874) di perairan Teluk Jakarta. Skripsi. (Bogor: Institut Pertanian Bogor)

[16] Yulianda F and Zamani N V 2014. Biologi Kelautan (Jakarta: Perpustakaan Digital Universitas Indonesia)

[17] Wyrtki K 1961 Physical Oceanography of the South East Asian Waters. Naga Report, 2: p 196

[18] Nontji A 2002 Laut Nusantara (Jakarta: Djambatan)

[19] Reddy M P M 1993 Influence of the Various Oceanographic Parameters on the Abundance of Fish Catch. Proceeding of International on workshop on Apllication of Satellite Remote Sensing for Identifying and Forecasting Potential Fishing Zones in Developing Countries. India.

[20] Lisboa V, Barcarolli I F, Sampaio L A and Bianchini A 2015 Effect of salinity on survival, growth and biochemical parameters in juvenile Lebranch mullet Mugil liza (Perciformes: Mugilidae). Neotropical Ichthyology, 13(2): 447-452.

[21] Sudirmat M S, Baskoro A, Purbayanto D R Monintja and Arimoto T 2001 Review on bagan rambo (large-typed lift net) with electrical lamp in South Sulawesi Indonesia. (In Fishing Technology Manual Series 1. Light Fishing in Japan and Indonesia. The JSPS-DGHE International Workshop (Tokyo: TUF JSPS International)

[22] Sudirmat M S, Baskoro A, Purbayanto, Safruddin A, Latif and Surahman 2006 Hubungan antara kecerahan perairan dan kecepatan arus dengan hasil tangkapan dan pengoperasian bagan rambo di Selat Makassar. Jurnal Ilmiah Sorih 1(5):

[23] Kurnia M., Sudirmat dan A. Nelwan, 2016. Penerapan teknologi akustik pada perikanan bagan perahu. Jurnal Perikanan 18 (1): 7-13

[24] Sani A R, Pramonoiwitowa and Triarso I 2016 Analisis sebaran daerah penangkapan ikan pelagis kecil dengan alat Tanggal bagan perahu di perairan kabupaten Belitung. Journal of Fisheries Resources Utilization Management and Technology 5(4):

[25] Beck U and Sudarajat A 1978 Variationing and size and composition of demersal trawl catches from The North Coast of Java with estimated growth parameters for three importance foodfish species. Special Report No.4 Contrib.of The Demersal Fish. Proj. (Jakarta: a MFRI-GRZ)

[26] Nybakken J W 1992 Biologi Laut Suatu Pendekatan Biologis (Jakarta: PT Gramedia)

[27] Guntur, Fuad and Muntaha A 2015 pengaruh intensitas lampu bawah air terhadap hasil tangkapan pada bagan tancap. Marine Fisheries 6 (2):

[28] Genisa A S 1998 Beberapa catatan tentang alat tangkap ikan pelagik kecil. Jurnal Oseana, 13(3,4):19-34

[29] Simanjuntak R J 2010 Keterkaitan Laju Eksploitasi Dengan Keragaman Pertumbuhan dan Reproduksi Ikan Petek Leiognathus equulus (Forsskal, 1775) Famili Leiognathidae. Skripsi. (Bogor: Fakultas Perikanan dan Kelautan IPB)

[30] Nontji A 1987 Laut Nusantara. (Jakarta: Penerbit Djambatan)

[31] Sudarto 2011 Pemanfaatan dan pengembangan energi angin untuk proses produksi garam di kawasan Timur Indonesia. Jurnal Triton 7 (2):61-70

[32] Habibie M N and. Nuraini T A 2015 Karakteristik dan tren perubahan suhu permukaan laut Di Indonesia periode 1982-2009. Jurnal Meteorologi dan Geofisika 15 (1):

[33] Rasyid A J, Nurjannah N A, Iqbal and Hatta M 2014 Kajian Daerah Penangkapan Ikan Pelagis Kecil Terdah dengan Kondisi Oseanografi Di Perairan Kota Makassar Pada Musim Barat. Prosiding Simposium Nasional I Kelautan dan Perikanan. Universitas Hass anudin Makassar. [in Indonesia].

[34] Nurlindah A, Kurnia M and Nelwan P F A 2017 Perbedaan produksi bagan perahu berdasarkan periode bulan di perairan Kabupaten Barru. Jurnal IPTEKS PSP 4(8): 120-7

[35] Lee J W 2010 Pengaruh Periode Hari Bulan Terhadap Hasil Tangkapan Dan Nelayan Bagan Tancap Di Kabupaten Serang. Thesis. (Bogor: Sekolah Pasca Sarjana IPB)

[36] Safruddin, Hidayat H and Zainuddin M 2018 Kondisi oseanografi pada perikanan pelagis kecil di perairan Teluk Bone. Jurnal Torani 1 (2): 48-58
[37] Saifudin, Fitri. A D P and Sardiyatmo 2014 Aplikasi Sistem Informasi Geografis (GIS) dalam penentuan daerah penangkapan ikan teri (Stolephorus Spp) di perairan Pemalang Jawa Tengah. *Journal of Fisheries Resources Utilization Management and Technology*, 3 (4);

[38] Chen P H 2004. *Distribution, growth and reproduction of splendid ponyfish, Leiognathus splendens* (Cuvier 1829) *in the coastal waters off Southwest Taiwan*. Thesis. (Taiwan: Marine Resources Department, Haiyangziyuan Institute)

[39] Islam M M, Haque M M and Hossain M A 2002 Early developmental stages of two Secutor species (Family: Leiognathidae) collected from the Bak-khali river estuary of the Bay of Bengal, Bangladesh. *Bangladesh J. Fish. Res.*, 6(1): 19-28.

[40] Genisa A S 2003 Sebaran dan struktur komunitas ikan di sekitar estuaria Digul, Irian Jaya. *Torani*, 13(1): 1-9

[41] Tanto T A, Wisha UJ, Kusumah G, Pranowo W S, Husrin S, Ilham and Putra A 2017 Karakteristik arus laut perairan Teluk Benoa – Bali. *Jurnal Ilmiah Geomatika* 23 (1):37-48