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IMPACT OF MOON PHASES ON PURSE SEINE FISHING YIELDS IN BULUKUMBA WATERS

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ABSTRACT

The activity of small pelagic fish is influenced by light, so changes in the moon phase will impact the distribution of fish, especially small pelagic fish. Therefore, this research aims to determine the concentration of fish based on lunar phases and explain the composition and frequency of fishing based on lunar phases in Bulukumba Regency. This research aims to provide information to fishermen to determine potential fishing areas. Data was collected in Bulukumba from July to September 2020 following 28 fishing trips using purse seines. The data used are primary and secondary. Primary data consists of the type and number of catches grouped based on lunar phases, namely dark, dark-to-light, light, and light-to-dark periods. Secondary data was obtained from interviews and literature studies. The data analysis used calculates the composition and frequency of catches. The results showed that there were eight types of fish caught during the research. The types of fish most commonly seen are trevally (*Decapterus* spp), yellow trevally (*Selaroides* sp.), and mackerel (*Rastrelliger* spp). The highest catch frequency of these three types of fish occurred during the light-dark and light-dark periods.

Keywords: Composition, Frequency, Lunar phases, Purse seine

INTRODUCTION

Bulukumba Regency has a potential in the marine and fisheries sector of 370545.3 tons and Bulukumba Regency contributes 14% of total production (52651.6 tons) (BPS, 2020). Capture fisheries in Bulukumba Regency predominantly use purse seines. Purse seine is a fishing tool used in the fishing process that gathers on the surface of the water and is attracted by light. The principle is to cover schools of fish with nets to create vertical walls and to narrow the bottom of the net to prevent horizontal movement of fish (Sudirman and Mallawa, 2004).

Small pelagic fish species are generally attracted to or lured by light, so fishermen use it to concentrate fish in fishing areas using purse seines. Various research results show that there are differences in the number of catches in each phase of the moon, but catching using light is ineffective when it is in the bright moon phase. According to Jatmiko (2015), there is no significant difference in the relative catch of fish during the dark and semi-dark months, but referring to the average catch, the number of fish based on these two treatments can be said to be quite dominant. Furthermore, Jatmiko

(2015) states that this can occur due to the influence of water conditions where after the full moon (semi-light and dark) the water conditions still experience high tides, so this can result in the emergence of fish in greater numbers. on the surface. This indirectly influences fish behavior and the foraging process, as well as other activities, especially adapting to environmental changes. The influence of lunar phases can change pelagic fish catches. Optomotor reactions refer to the phenomenon of lunar phases.

Efficient, optimal, and sustainable use of marine fisheries resources is an important thing to pay attention to so that it can improve the welfare of fishermen, especially the catch and income received (Jatmiko, 2015). This research examines changes in lunar phases that affect fishing activities based on fishing areas. This is because there are fishing aids in the form of lights and FADs that are installed in fishing areas. FADs are a tool used to assist in the fishing process with the function of attracting the attention of fish to gather and concentrate at only one point in the water so that it can facilitate the fishing process according to the fishing gear, this is because the position of the fishing area has been known or determined from the start. (Hikmah et al., 2016). The problem is how big are the opportunities for fishing are in each lunar phase; therefore, research regarding the opportunities for fishing using purse seines based on the moon phases in Bulukumba Regency needs to be carried out.

MATERIAL AND METHOD

Time and Location of Research

This research was conducted in the waters of the Flores Sea and Bone Bay with a fishing base at Bira Harbor, Bulukumba Regency, South Sulawesi Province, from July to September 2020. The case study method is used in research to collect data. The purse seine vessels used were chosen directly because they have relatively the same specifications. The scope of data included in this research is the type and amount of catch (kg). Data collection was carried out on 28 fishing trips. The purse seine in Bulukumba has a one-day trip operating day pattern.

The phases of the moon are determined according to the lunar calendar. In this study, the age of the month is divided into four quadrants. The first quadrant is the dark month, namely the 26th day to the 3rd day of the following month; the second quadrant is the dark-light transition period starting from the 4th day to the 10th day; and the third quadrant is the light period starting on the 11th day to the 18th day, and the fourth quadrant is the transition period from light to dark on the 19th to the 25th day. Apart from that, determining the moon phase is also done by verifying it on the website http://www.moongiant.com.

Data Analysis

Composition of Types of Catch

In determining the composition of fish species, this research uses the percentage (%) proportion of the specific gravity of the catch. The composition of the fish caught is then calculated based on the following equation:

$$Pi = \frac{ni}{N} \times 100\% \quad (1)$$

Where:

Pi : Proportion of fish species caught (%)

ni : Number of each type of fish caught (kg)

N : Total number of fish species caught (kg).

Frequency of Catch

The frequency of catching was calculated based on the number of fishing trips during the research. Calculation The frequency of capture is calculated using the following equation (Sidiyasa et al., 2006):

$$Fi = \frac{ai}{atot} \times 100\% \quad (2)$$

Where:

Fi : Frequency of catching species i (%)

ai : Number of trips where the ith species was caught

$\mathbf{a_{tot}}$: The total number of fishing trips during data collection

RESULTS AND DISCUSSION

Composition of Types of Catch

The composition of fish catches in each lunar phase can be seen in Figure 1.

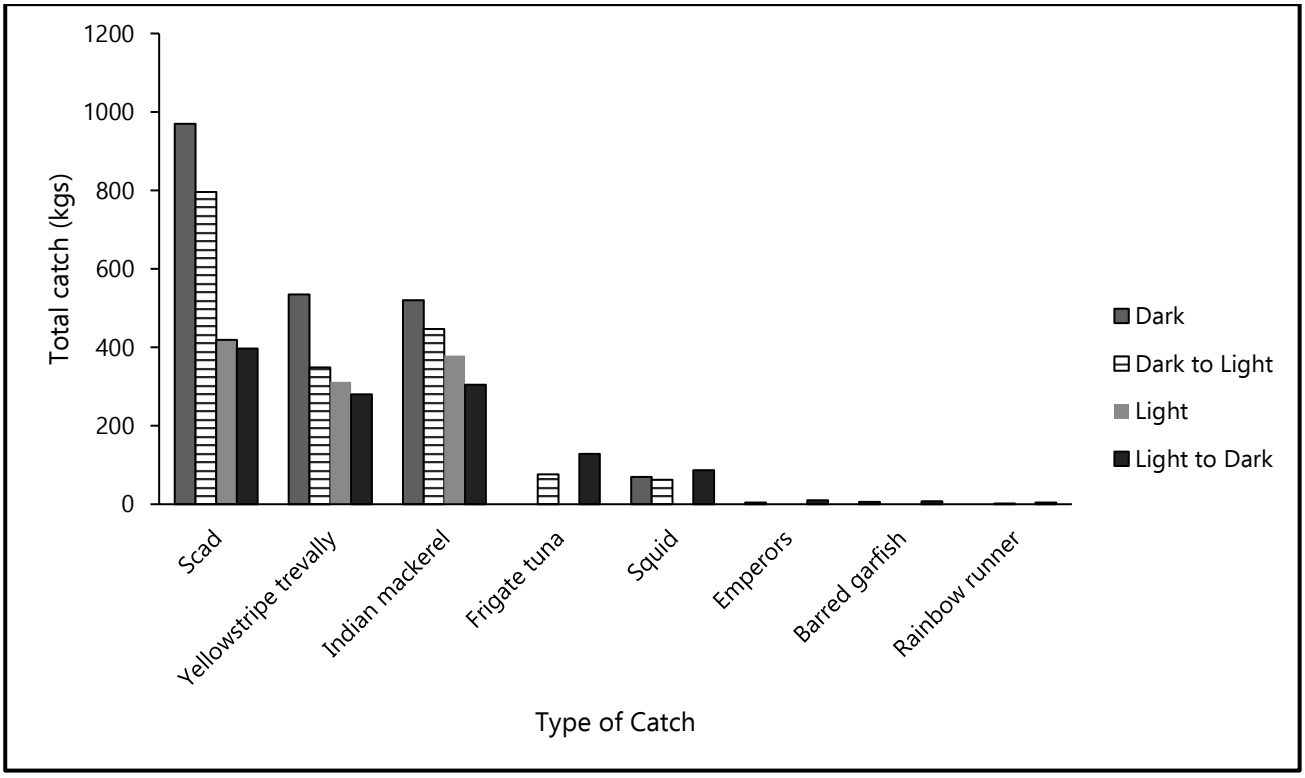

Figure 1. Composition of catches based on moon phases

In Figure 1, the composition of the catch that occupies the highest position in the four phases of the moon is scad (*Decapterus* spp) with 970 kgs (dark period), 796 kgs (dark-light period), 419 kgs (light period), and 397 kgs (light-dark period). The lowest catch composition was rainbow runner (*Elagatis bipinnulata*) with 2 kg (light period) and 4 kg (light-dark period), respectively.

Composition of fish species caught on the purse seine during the dark moon phase there are scad, indian mackerel, yellowstripe trevally, barred garfish, pinkear emperor fish, and squid, during the dark-light moon phase are scad, indian mackerel, yellowstripe trevally, and pinkear emperor fish, the bright moon phase of the types of scad, yellowstripe trevally, and indian mackerel, and the light-dark moon phase of scad, indian mackerel, yellowstripe trevally, barred garfish, and pinkear emperor fish. Fishermen use a combination of fishing aids aimed at increasing catches of small pelagic fish and large pelagic fish. FADs have a role in attracting the attention of fish so that they gather in one place. Many factors influence the gathering of fish around FADs, one of which is the organisms attached to the FAD attractor (Hikmah et al., 2016). According to interviews, the light was intended to attract fish that were around the FAD to concentrate under the light boat. This is in line with the opinion of Wiyono (2006) who states that the use of light in fishing methods is to attract fish as well as concentrate and keep the fish concentrated and easy to catch. Light fishing is a common method that has existed for centuries throughout the world (Sahrhage and Lundbeck, 1967; Solomon and Ahmed, 2016; Nguyen and Winger, 2019), and has been proven to be effective in catching small pelagics at night (Yami, 1976; Solomon and Ahmed, 2016). The combination of lights and FADs is carried out because the FAD construction is installed permanently in the waters. Apart from that, small pelagic fish are often caught on moonless nights using light (Kolding et al., 2019; Mbabazi et al., 2019; NELSAP, 2021). Marchesan et al. (2005) stated that light attracts small aquatic organisms such as zooplankton which are small pelagic prey. Small organisms that are attracted will cause small pelagics to gather to feed. Large species that prey on small pelagics is also attracted to following their prey. During the fishing process, both small pelagics and their predators (bycatch) are trapped in the fishing gear.

This is directly proportional to the opinion of Febriani (2014) who said that the appearance of small fish in the waters around FADs is related to the fish food network pattern. In this case, FADs act as a food area and begin with the growth of bacteria and microgage that occur on coconut leaf midribs or the presence of attractors originating from synthetic materials when installing FADs. In the next step, the tiny

creatures and small animals in the FAD will attract the presence of larger-sized fish, this is because in essence large fish will prey on smaller-sized fish. Apart from food factors, the presence of tembang fish, yellowstripe trevally fish, scad, yellowstripe trevally fish and indian mackerel fish is thought to be for protection (Hikmah et al., 2016).

Frequency of Catch

The frequency of captures in the four lunar phases can be seen in Figure 2 below.

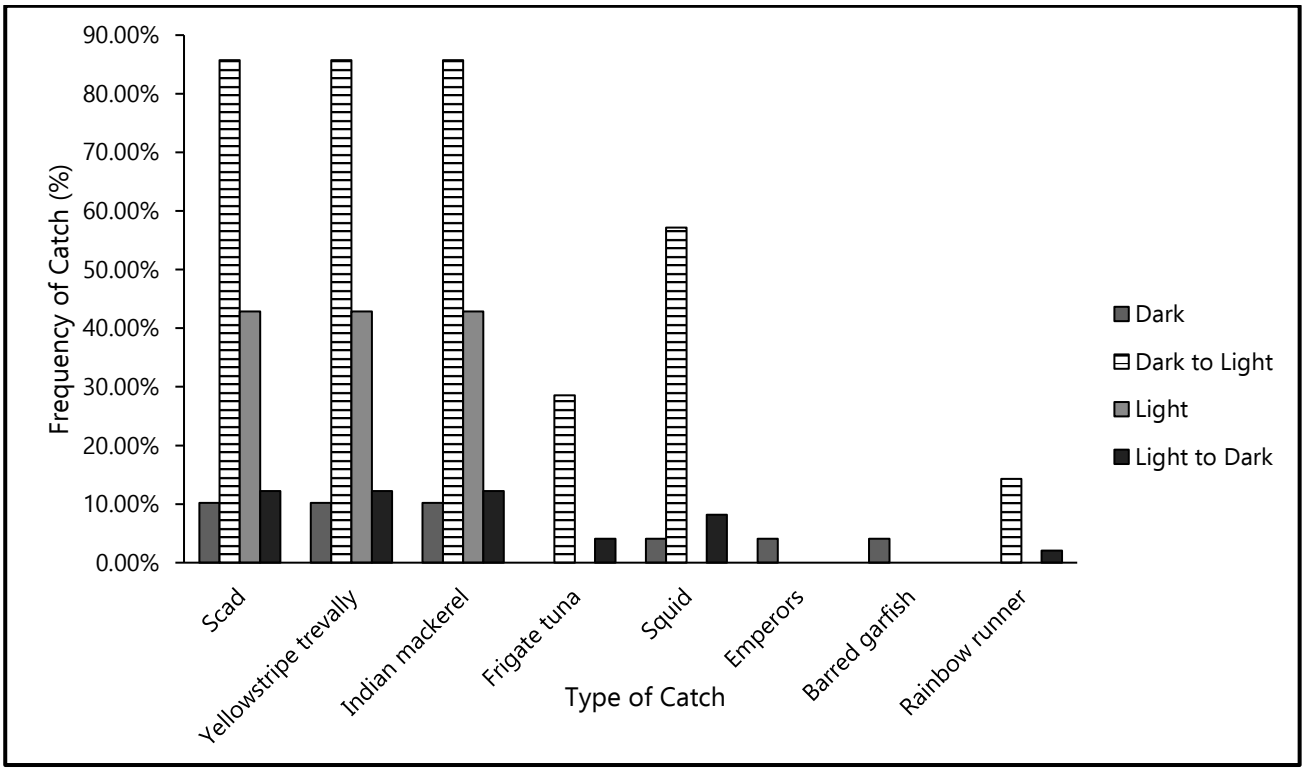

Figure 2. Frequency of catches per haul based on moon phase

Catch frequency is an indicator of whether or not schools of fish exist in fishing areas because fish will always look for an environment that is suitable for themselves and this is in accordance with Nuitja (2010) which states that the highest frequency of occurrence is related to the selection of closely related fish habitats, environmental conditions, and food availability. The results of observations from 28 trips showed varied catch percentages. The highest catch frequencies of scad (*Decapterus* spp), indian mackerel (*Rastrelliger* sp) and yellowstripe trevally (*Selaroides* sp) were in the light-dark and dark-light phases with presentations of 85.7%, respectively. The group with the lowest frequency of catching was the frigate tuna, pinkear emperor fish, and barred garfish.

The high frequency of appearance of scad, yellowstripe trevally, and indian mackerel indicates that the purse seine fishing area in Bulukumba Regency is the habitat of these three fish. The highest catch of flying fish occurs

towards the end of July during the dark moon period and it is thought that this month is the time when scad are abundant. This is in accordance with the research results of Hamka and Rais (2016) which stated that the fishing time for scad occurs from April to October, the most catching of scad occurs in July, yellowstipe trevally has a fishing season throughout the year (Faisol, 2015), and indian mackerel has a year-round fishing season (Prahadina et al., 2015).

CONCLUSION

The catch composition that occupies the highest position in the four lunar phases is the scadspecies and the highest catch frequency is in the dark to light moon phase and the light to dark moon phase.

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