Relation Between the Distribution of Chlorophyll-A on Catch Skipjack Tuna (*Katsuwonus pelamis*) Landed in PPN Palabuhanratu, Indonesia

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ABSTRACT

This study aims to determine the relationship between the distribution of chlorophyll-a to the yield of skipjack tuna (Katsuwonus pelamis) landed in PPN Palabuhanratu Sukabumi, West Java based on the distribution of chlorophyll-a. The method used is a survey method. Primary spatial data in the northern waters of Palabuhanratu are chlorophyll-a data and skipjack tuna fishing production data. Chlorophyll-a data is obtained from satellite images downloaded from the NASA database, while the fishing production data of skipjack tuna is obtained from PPN Palabuhanratu, West Java. Based on the data obtained, it can be concluded that the highest amount of catch occurred in 2015 with a total of 606,044 kg and the lowest was in 2016 with a total of 134,792 kg. This is due to high market demand in 2015 which resulted in a drastic decline in the following year. the catch of skipjack tuna is only 0.79% influenced by the distribution of chlorophyll-a and 99.21% is influenced by other factors because chlorophyll-a is not the only indicator used to identify potential fishing areas. Apart from chlorophyll-a, other indicators are usually used to determine potential fishing areas, namely sea surface temperature, and currents. The relationship between the distribution of chlorophyll-a and the catch has a very weak relationship with a correlation coefficient of 0.0888.

Keyword: *chlorophyll-a, skipjack tuna, Palabuhanratu*

1. INTRODUCTION

Palabuhanratu is an important location for capture fisheries on the southern coast of West Java [1]. One of the dominant catch and has an an important economic value landed in PPN Palabuhanratu is skipjack tuna (*Katsuwonus pelamis*). Skipjack Tuna (*Katsuwonus pelamis*) is belong to the Scombridae family located in all of tropical and subtropical oceans [2]. Skipjack is one type of fishery resources that play an important role in the export activities in Indonesia and as ingredients of domestic consumption [3]. The statistical data of PPN Palabuhanratu fishery in 2005-2008 shows the amount of skipjack fishing production has decreased every year. Skipjack Tuna distribution are so wide that it lead to the high production of Indonesian capture fisheries. It can be influence the economic growth rate in marine and fisheries sector [4]. Therefore we need an alternative sustainable management so that the skipjack fishery remains sustainable.

Skipjack tuna (*Katsuwonus pelamis*) is a type of pelagic fish that has an important economic value in Indonesian marine waters. As part of the tuna resources, skipjack tuna is a source of animal protein that is beneficial to the community [5]. Skipjack tuna is one of Indonesia's export fishery commodities to countries, such as Korea, Japan, Vietnam, Iran and Australia so that it can contribute to increasing foreign exchange [6]. The distribution area of Skipjack Tuna in Indonesian waters is quite wide and spread out all across Indonesian waters. The area were included Indian Ocean waters (including West Sumatra waters, South Java waters, Bali and Nusa Tenggara), East Indonesia waters (including Cellebes Sea, Mollucas, Arafuru, Banda, Flores and Makassar Straits) and Pasific

Ocean waters (North Irian Jaya waters) with the largest dispersal area around the equator [7]. Skipjack tuna can be found in Palabuhanratu Sukabumi, West Java.

Barnes and Hughes [8] chlorophyll-a is a pigment capable of photosynthesis and is present in all autotrophic organisms. Phytoplankton as primary producers is the base of the food chain and is the basis that supports the life of all other biota. Furthermore, the phytoplankton will be eaten by early eaters (primary consumers) and subsequent eaters. The high concentration of chlorophyll-a indicates many natural food sources for fish. So that fish tend to occupy a lot of areas that are rich in food sources [9].

The use of advanced technology such as Global Positioning System (GPS) as navigational system through oceanographic imagery satellite are still rare among the Indonesian traditional fishermen [10]. Therefore, the role of scientists and technologies such as the rapidly evolving applications of satellites images are needed. Various literatures have proven the successful application of science and technology in determining fishing ground. Syah [11] summarizes that remote sensing methods for fishing activities may increase the efficiency of fuel, reduced fishing trips and lower cost for ship maintenance. With the reduced fishing operation time, the operational costs will be lower and also better safety for fishermen. Based on this description, it is necessary to know the relationship between chlorophyll-a and the catch of skipjack tuna in Palabuhanratu. This is an effort to use technology in detecting fishing ground.

2. MATERIALS AND METHODS

This research will be carried out in two stages. The first stage is the data collection stage in the waters of Palabuhanratu, West Java with the Palabuhanratu Fishery Port (PPN) fishing base which was held in February 2019. The second stage was carried out in September 2018 by downloading chlorophyll-a satellite image data from the NASA database oceancolor.gsfc.nasa.gov in the 2014 - 2018 period.

The tools used in this research were Microsoft Excel 2016 software, arc GIS 10.3 and seaDAS stationery, to record all important things during the research. Camera, for documentation during research activities. Questionnaire sheet, to obtain data from fishermen and abk. Laptop, to process data. The materials used in this research are production data of skipjack fish catches for 5 years at the PPN Palabuhanratu fishing base, Aqua-MODIS chlorophyll-a satellite image data downloaded from the NASA database,http://oceancolor.gsfc.nasa.gov/cms.

The method used is a survey method. Primary spatial data in the northern waters of Palabuhanratu are chlorophyll-a data, and skipjack tuna fishing production data. Chlorophyll-a data is obtained from satellite images downloaded from the website http://oceancolor.gsfc.nasa.gov/cms, while skipjack fishing production data is obtained from PPN Palabuhanratu, West Java. In addition, to validate the fishing position data obtained, interviews were conducted with several fishermen in the PPN Palabuhanratu area. Furthermore, the data is processed using software that produces a horizontal profile output and spatial analysis descriptively.

Chlorophyll-a data that has been downloaded from the website is then opened using SeaDAS software to carry out the cropping process for the area to be used in research. To change the cropped .nc data so that it can be read by ArcMap software and to remove missing data, further data processing is carried out in Microsoft Excel then the data interpolation process is carried out in ArcMap software to determine the distribution of chlorophyll-a in the Palabuhanratu Waters. .

The visualization of the distribution of chlorophyll-a was done by combining the processed chlorophyll-a image data and the Skipjack tuna fishing location data using ArcGIS 10.3 software. The processed chlorphyll-a distribution map is then overlaid with the coordinates of the location of fishing activities. The results will be known coordinates with the optimum chlorophyll-a value and potential catch.

The relationship between the catch and the chlorophyll-a concentration was known through spatial analysis between chlorophyll-a and catch. To determine the degree of relationship between the catch variable and the chlorifl-a variable, a correlation analysis was performed. The higher the correlation value, the tighter the relationship between the two coefficients. Correlation analysis was performed using Microsoft Excel software. The degree of relationship is expressed by the correlation coefficient (r). The higher the r value indicates a tighter relationship [12].

3. RESULTS AND DISCUSSION

3.1 General Condition of Palabuhanratu

Palabuhanratu District is in Sukabumi Regency which has eight villages or sub-districts including Palabuhanratu, Citarik, Citepus, Cibodas, Pasirsuren, Cikadu, Tonjong, and Buniwangi villages. Administratively Palabuhanratu District is directly adjacent to Cikakak and Cikondang Districts in the north, Cimanggu District in the east, Simpenan District in the south and West Palabuhanratu Bay The length of the Palabuhanratu water beach is 7.9 Km with a sandy beach type. Pelabuhanratu is famous as the main producer of marine fisheries in Sukabumi Regency. Pslabuhanratu waters are located on the southern coast of Java Island which is directly opposite the Indian Ocean.

Fishing business activities in Palabuhanratu are currently open access without clear rules and controls so that all fishermen and fishing gear in the district / city coastal areas are free to access to catch skipjack. Until now, skipjack fishing has been carried out without clear regulations in accordance with the principles of fishery resource management. Fishermen have a tendency whenever and wherever they are free to catch, including fish that are not yet fit to be caught. For the purposes of fish resource management, information on the size composition, growth patterns and size of fish that are fit to catch (legal size) will be very important.

3.2 Distribution of Chlorophyll-a in Palabuhanratu Waters

This research was conducted in April 2019 in Palabuhanratu Bay, Sukabumi, West Java. The distribution value of chlorophyll -a is obtained from the Aqua Modis satellite image data. Based on the data obtained in 2014 to 2018, the highest chlorophyll value was 4.7 mg / m3 in December 2018 while the lowest value was 0.0 mg / m3 in November 2016. Overall the chlorophyll data obtained can be projected on the map in Figure 1.

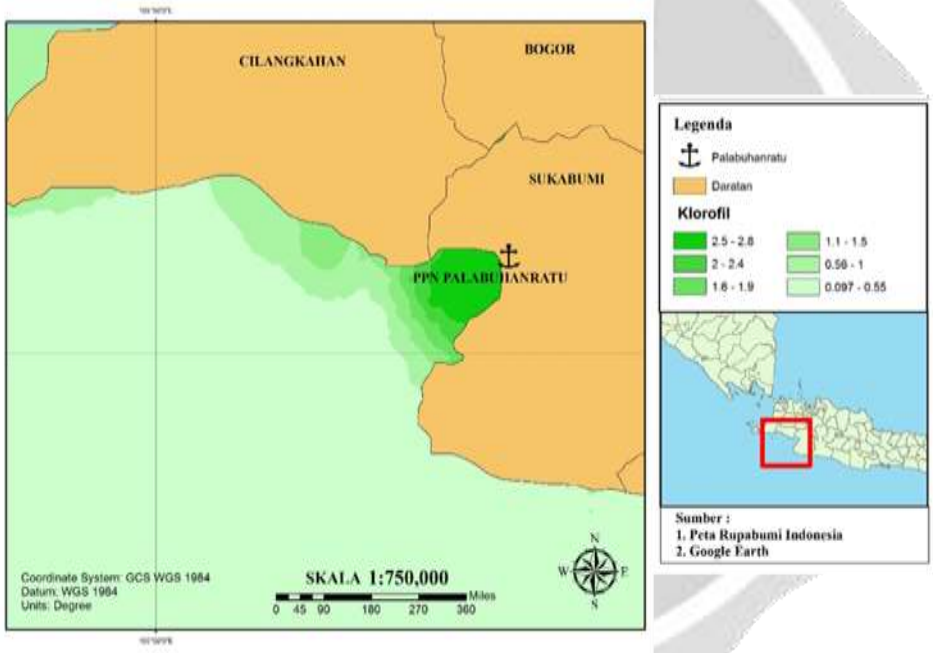

Fig -1 : Map of chlorophyll-a distribution in Palabuhanratu waters

Based on the data obtained, during the last five years (2014-2018) the highest value of chlorophyll distribution occurred in December 2018 and February 2017. The high distribution of chlorophyll-a in December 2018 and February 2017 was thought to be due to the upwelling phenomenon. According to Mujib [13] the value contained in chlorophyll-a in Palabuhanratu waters is influenced or caused by several factors, namely nutrient input from coastal areas and sunlight intensity.

3.3 Skipjack Catchs at PPN Palabuhanratu

The catch of skipjack tuna at PPN Palabuhanratu from 2014 to 2018 fluctuates every month. The fluctuations that occur can be seen in Figure 2.

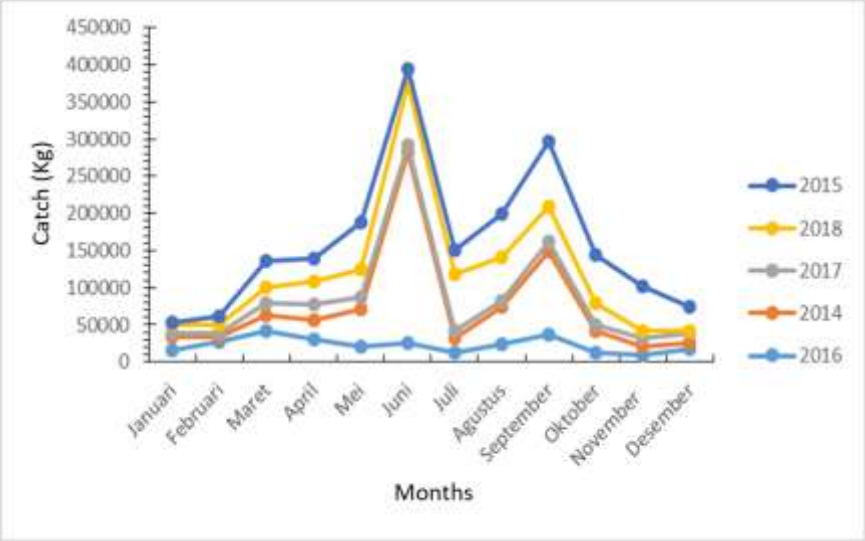

Fig -2 : Fluctuation of skipjack catch on 2014-2018

Based on the data obtained, it can be concluded that the highest amount of catch occurred in 2015 with a total of 606,044 kg and the lowest was in 2016 with a total of 134,792 kg. This is due to high market demand in 2015 which resulted in a drastic decline in the following year. There is a tendency for excessive exploitation in peak production years to be followed by a very sharp decline in production in the following year Zakiah [14]. In June 2015, the highest catch of skipjack tuna was 257,131 kg while the lowest was 3,082 kg in January 2018.

3.4 Relationship between Chlorophyll-a Distribution and Skipjack Catch

The relationship between the distribution of chlorophyll-a and the catch of skipjack tuna was analyzed using correlation analysis which was carried out based on the time series in the 2014 to 2018 timeframe.Based on the analysis results obtained information as in Figure 3.

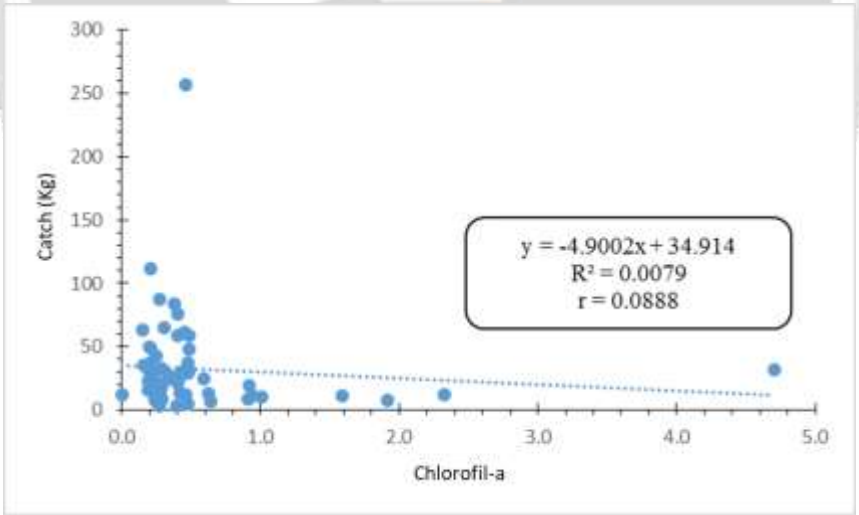

Fig -3 : Chlorophyll-a regression graph with skipjack catch

Information can be obtained from the image above that the tuna catches are only 0.79% affected by the distribution of chlorophyll -a and 99.21% are influenced by other factors. Because chlorophyll-a is not the only indicator used to identify potential fishing areas [15]. Apart from chlorophyll-a, there are other indicators that are usually used to determine potential fishing areas, namely sea surface temperature and currents.

4. CONCLUSIONS

The conclusion that can be drawn from the research results is that the relationship between the distribution of sea surface temperature and the catch has a very weak relationship with a correlation coefficient value of 0.0888. skipjack tuna catches are only 0.79% affected by the distribution of chlorophyll -a and 99.21% influenced by other factors because chlorophyll-a is not the only indicator used to identify potential fishing areas.

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