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SEASONAL FISHING PATTERN OF CORAL TROUT GROUPER (*Plectropomus leopardus*) BASED ON FISH LANDING DATA AT PAOTERE FISH LANDING BASE MAKASSAR CITY, INDONESIA

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ABSTRACT

The fluctuation in coral trout grouper (*Plectropomus leopardus*) production is influenced by fishing season dynamics associated with environmental conditions. This study aims to analyze the seasonal fishing pattern of coral trout grouper in the Makassar Strait based on landing data at the Paotere Fish Landing Base, Makassar City. The data used consisted of primary data obtained through interviews with fishermen and secondary data in the form of catch production from 2019 to 2023. Data analysis was conducted using a time series approach with a moving average method to determine the Fishing Season Index (FSI). The results indicate that the fishing season occurs from February to May, with a peak in March, while the low season occurs in December. This pattern reflects strong seasonal variation in resource availability, influenced by oceanographic conditions, particularly sea surface temperature and chlorophyll-a concentration.

Keywords: *Plectropomus leopardus*, fishing seasonality, CPUE, fishing season index, Makassar Strait

INTRODUCTION

The coral trout grouper (*Plectropomus leopardus*) is a demersal fish species with high economic value and plays an important role in supporting capture fisheries, particularly in coastal areas and coral reef ecosystems (Djamal & Marzuki, 1992). The demand for this commodity tends to be stable and even increasing, especially for export markets. However, the availability of coral trout grouper resources in the wild is fluctuative and influenced by environmental dynamics and seasonal changes, resulting in temporal variability in fish catches.

The Paotere Fish Landing Base Paotereavera is one of the main capture fisheries centers in Makassar City, functioning as a landing, distribution, and marketing site for various fish species, including coral trout grouper

(Suryaningtiyas et al., 2013; Ardandi et al., 2013). Fishing activities for this species occur throughout the year; however, catch yields are not always consistent. This variability indicates the presence of seasonal fishing patterns influenced by oceanographic conditions, such as sea surface temperature and chlorophyll-a concentration. Without accurate information on fishing seasons, fishing activities may occur during less productive periods, thereby reducing fishing efficiency.

The estimation of fishing seasons is an important approach in capture fisheries management. This analysis commonly utilizes the Catch Per Unit Effort (CPUE) as an indicator of the relative abundance of fish resources in relation to fishing effort (Monintja et al., 2001). In addition, the Fishing Season Index (FSI) method is used to identify peak seasons, regular fishing seasons, and low seasons based on time series data (Imron et al., 2020). Such information is essential for determining optimal and sustainable fishing periods.

Previous studies have shown that fishing season patterns for grouper species may vary across regions, depending on environmental characteristics and local oceanographic dynamics (Imron et al., 2020). However, studies on the seasonal fishing pattern of coral trout grouper in the waters around PPI Paotere remain limited and have not extensively utilized long-term time series data. This indicates a research gap that needs to be addressed.

Therefore, this study aims to analyze the seasonal fishing pattern of coral trout grouper (*Plectropomus leopardus*) at PPI Paotere based on CPUE values and the Fishing Season Index (FSI). The results of this study are expected to provide scientific information beneficial for fishermen, fisheries managers, and related stakeholders in supporting more effective and sustainable management of coral trout grouper resources.

MATERIALS AND METHODS

Study Area and Period

This study was conducted from October to December 2024 at the Paotere Fish Landing

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Base, located in Makassar City, South Sulawesi, Indonesia. The study area represents one of the main fish landing centers supporting capture fisheries activities in the Makassar Strait (Figure 1).

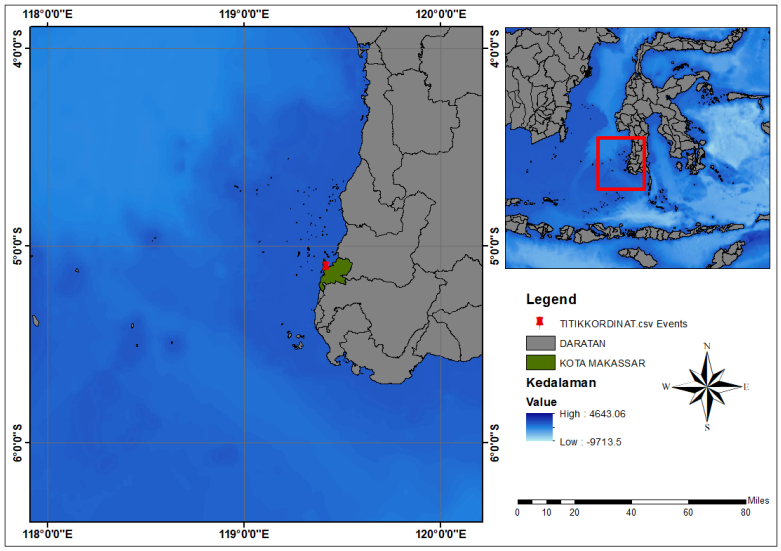

Figure 1 Map of the Study Area

Data Collection Methods

This study was conducted from October to December 2024 at the Paotere Fish Landing Base (PPI Paotere), Makassar City. The data used in this study consisted of both primary and secondary data.

Primary data were obtained through interviews with fishermen, while secondary data included catch production and fishing effort data of coral trout grouper (*Plectropomus leopardus*) over the period 2019–2023. Primary data were collected through field surveys involving interviews with fishermen and staff at PPI Paotere, and were subsequently used as supporting data for the analysis.

Data Analysis

Data analysis in this study was focused on estimating the fishing season of coral trout grouper (*Plectropomus leopardus*). The analytical approach included the use of Catch Per Unit Effort (CPUE) and the Fishing Season Index (FSI).

Fishing Season Estimation

Catch Per Unit Effort (CPUE) analysis was used to represent the relative productivity of fish catches in relation to fishing effort.

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Monthly CPUE values were calculated during the study period based on the ratio between total catch and fishing effort. According to Dajan (1986), CPUE can be calculated using the following equation:

$$CPUE_i = \frac{C_i}{F_i}$$

Where:

$CPUE_i$= catch per unit effort (ton/trip) in month *i*

C_i= total catch of coral trout grouper (*Plectropomus leopardus*) (ton) in month *i*

F_i= fishing effort (trip) in month *i*

The resulting CPUE values were subsequently used as the basis for analyzing the Fishing Season Index (FSI) using a time series approach. A moving average method was applied to identify seasonal fishing patterns by reducing random fluctuations in the data.

Fishing Season Index (FSI) Analysis

The fishing season of coral trout grouper (*Plectropomus leopardus*) was estimated using the Fishing Season Index (FSI) method based on time series analysis. Monthly Catch Per Unit Effort (CPUE) values were processed using a moving average method to obtain a more stable seasonal pattern and to minimize the effect of random fluctuations.

The FSI was calculated for each month by comparing the monthly CPUE values with the centered moving average. The classification criteria were defined based on the index values, where FSI > 100% indicates the fishing season, while FSI < 100% indicates the off-season. The month with the highest FSI value was identified as the peak fishing season.

Supporting Oceanographic Data Analysis

Oceanographic data analysis was conducted descriptively using sea surface temperature (SST) and chlorophyll-a concentration to support the interpretation of seasonal fishing patterns of coral trout grouper (*Plectropomus leopardus*). These parameters were used to explain the relationship between environmental dynamics and the identified fishing and off-season periods based on the Fishing Season Index (FSI).

This analysis was interpretative in nature and was not intended for spatial modeling. Variations in SST and chlorophyll-a are known to influence primary productivity and

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fish distribution in marine ecosystems (Nontji, 2007; Yuan et al., 2018.

RESULTS AND DISCUSSION

CPUE of Pattern of Coral Trout Grouper

Based on the analysis of Catch Per Unit Effort (CPUE) of coral trout grouper (*Plectropomus leopardus*) at the Paotere Fish Landing Base during the period 2019–2023, a clear seasonal fluctuation pattern was observed. CPUE values tended to increase at the beginning of the year, particularly from January to March, with the highest peak occurring in March. Subsequently, CPUE values gradually decreased toward the end of the year. The monthly CPUE fluctuation pattern is presented in Figure 2.

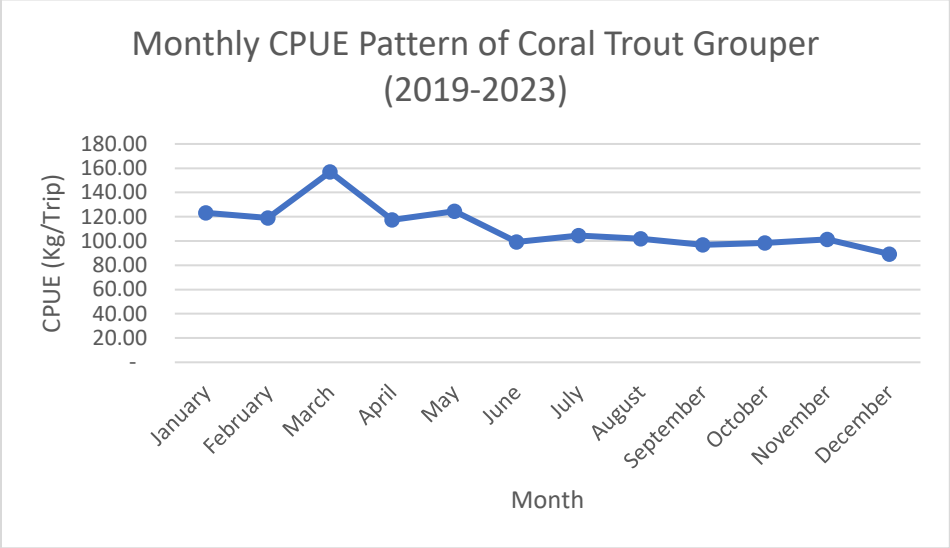

Figure 2 Catch per Unit Effort of Trout Grouper

This pattern indicates the influence of environmental factors on the availability of fish resources. According to King (2007), CPUE values can be used as an indicator of the relative abundance of fish stocks in a given area. The increase in CPUE at the beginning of the year is likely associated with more favorable oceanographic conditions, such as relatively stable sea surface temperatures and higher availability of natural food sources. This finding is consistent with Nontji (2007), who stated that marine productivity is strongly influenced by

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the dynamics of physical and chemical oceanographic conditions.

Fishing Season Index (FSI) of Coral Trout Grouper

Based on the analysis of the Fishing Season Index (FSI), the index values for coral trout grouper (*Plectropomus leopardus*) ranged from 106.06% to 142.71%. These values indicate that the fishing season occurs from February to May, corresponding to the west monsoon and the first transitional season, with the peak season occurring in March. In contrast, the off-season occurs in December, as indicated by the lowest index value.

In general, FSI values greater than 100% indicate the fishing season, while values below 100% represent the off-season or low fishing period (Imron et al., 2020).

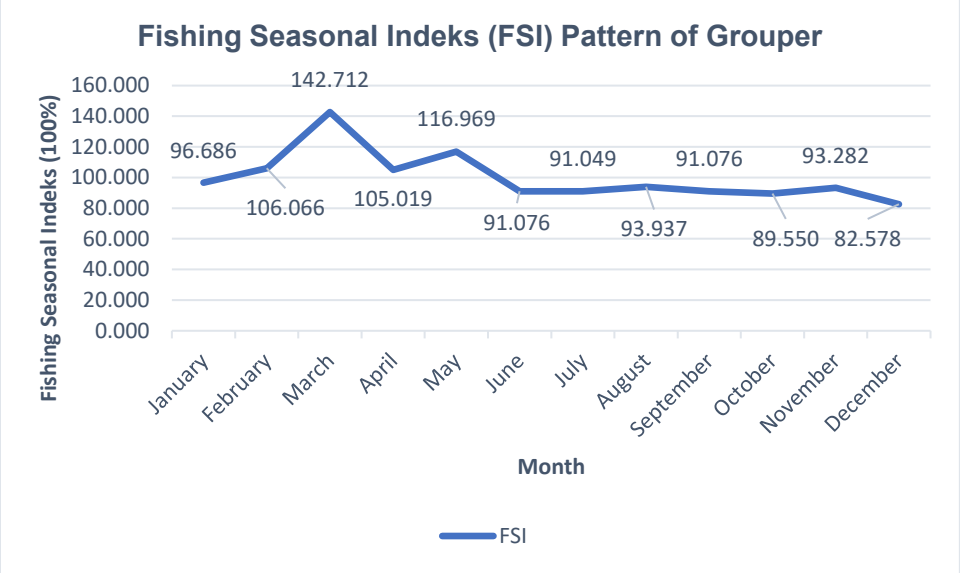

Figure 3 Fishing Seasonal Indeks

The Fishing Season Index (FSI) pattern shows a clear seasonal fluctuation throughout the year. The index values were below or close to 100% in January (96.69) and increased in February (106.07), reaching a peak in March (142.71), which indicates the most optimal fishing conditions. The index values then decreased in April (105.02), although still remaining above 100%, and increased again in May (116.97). Subsequently, the index values declined and remained relatively stable below 100% from June to October, ranging between 89% and 94%. A slight increase occurred in November (93.28), followed by a further decline in December

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(82.58), representing the lowest value of the year.

This pattern indicates that the fishing season of coral trout grouper (*Plectropomus leopardus*) at the Paotere Fish Landing Base is strongly seasonal, with high productivity occurring from early to mid-year, particularly between March and May. This suggests that fish resource availability is not evenly distributed throughout the year but is influenced by environmental dynamics that determine fish distribution and abundance. Seasonal variations are generally associated with changes in oceanographic conditions, such as sea surface temperature and marine productivity, which affect fish migration patterns and habitat availability (Nontji, 2007; Parsons et al., 1984).

These findings are consistent with previous studies indicating that environmental variability, including sea surface temperature and primary productivity, plays a significant role in shaping the spatial and temporal distribution of reef fish in tropical waters (Asch & Erisman, 2018; Froese et al., 2019). Therefore, understanding seasonal fishing patterns is essential for supporting adaptive and sustainable fisheries management.

Furthermore, the relationship between CPUE and FSI values indicates that periods with higher index values are associated with increased catch yields. This suggests that the distribution of coral trout grouper is not homogeneous throughout the year but follows seasonal patterns influenced by environmental conditions.

Seasonal variations in sea surface temperature and chlorophyll-a concentration play a crucial role in determining marine productivity and the availability of natural food sources. According to Parsons et al. (1984), higher chlorophyll-a concentrations, as an indicator of primary productivity, enhance trophic interactions that support fish abundance.

In conclusion, the identified fishing season pattern reflects the biological response of coral trout grouper to oceanographic dynamics. This information is important for supporting ecosystem-based fisheries management, particularly in determining optimal and sustainable fishing periods.

Oceanographic Conditions

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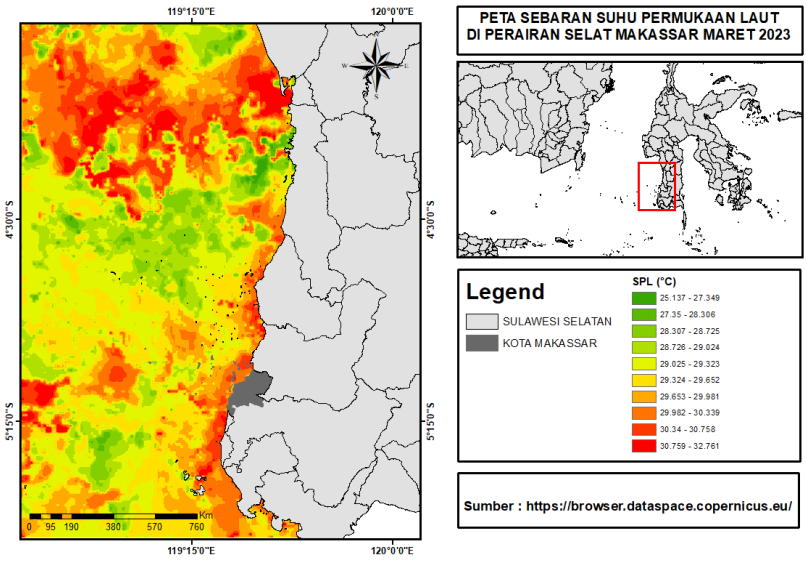

Figure 4. Sea Surface Temperature During Peak Fishing Season (2023)

The distribution of sea surface temperature (SST) in the Makassar Strait during March 2023 exhibited considerable variation, ranging from approximately 25.1°C to 32.7°C. The study area was predominantly characterized by warm to high temperatures (around 29–32°C), which were widely distributed, particularly in the western and southern parts of the waters. In contrast, lower temperatures were observed only in limited areas.

Overall, this distribution indicates relatively warm water conditions, which may influence oceanographic dynamics and the availability of fish resources in the region.

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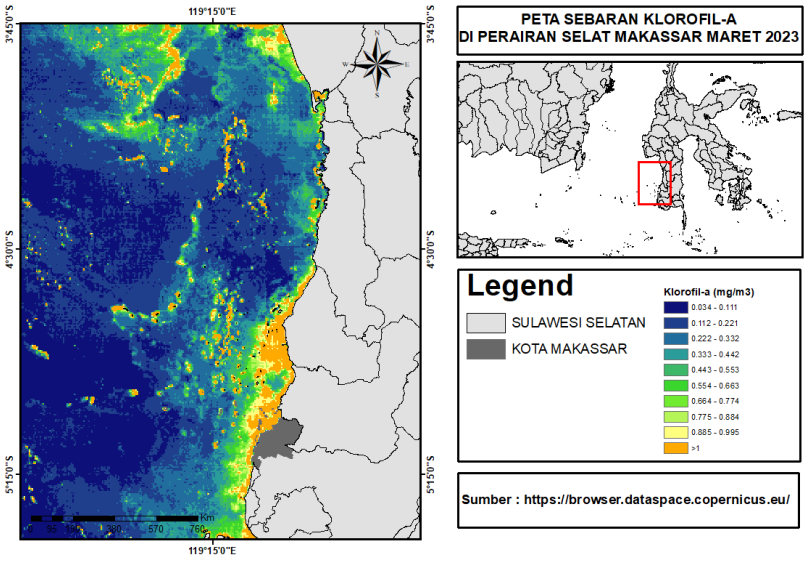

Figure 5. Chlorophyll-a Distribution During Peak Fishing Season (2023)

In addition to temperature, chlorophyll-a concentration in March ranged from low to high values, with relatively higher concentrations observed in coastal areas compared to offshore waters. Chlorophyll-a serves as an indicator of phytoplankton abundance, which represents the primary producers in the marine food web. High chlorophyll-a concentrations reflect elevated marine productivity, which indirectly supports the availability of food resources for higher trophic level organisms, including coral trout grouper (*Plectropomus leopardus*). This condition is consistent with the high CPUE and FSI values observed during this period, indicating an optimal fishing season.

The relationship between oceanographic conditions and the fishing season of coral trout grouper can be interpreted through the association between environmental parameters and fluctuations in CPUE and FSI values. Increased catch rates generally occur during periods when sea surface temperature is within an optimal and relatively stable range and is supported by sufficient chlorophyll-a concentrations. In contrast, when FSI values fall below 100%, CPUE values tend to decrease. This indicates that less favorable oceanographic conditions influence the distribution and abundance of coral trout grouper, thereby affecting fishing productivity.

This phenomenon demonstrates that oceanographic variability plays a significant role in influencing the distribution and abundance of coral trout grouper. Previous studies have also shown that sea surface temperature and primary productivity are key factors controlling fish distribution in tropical marine ecosystems (Nontji, 2007; Yuan et al., 2018). Therefore, the fishing season pattern identified in this study can be understood as a biological response to oceanographic dynamics.

CONCLUSION

The seasonal fishing pattern of coral trout grouper (*Plectropomus leopardus*) at the Paotere Fish Landing Base exhibits a clear seasonal characteristic, with the optimal fishing period occurring from February to May and the peak in March. This variation is closely associated with oceanographic conditions, particularly sea surface temperature and chlorophyll-a concentration, which influence fish distribution and abundance.

These findings provide important information for determining more effective fishing periods and support the implementation of sustainable fisheries management.

Overall, the results of this study indicate that seasonal variations in sea surface temperature (SST) and chlorophyll-a play an important role in shaping the fishing season patterns of coral trout grouper in the Makassar Strait. This information can serve as a basis for determining more optimal and efficient fishing periods, as well as supporting sustainable fisheries management.

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