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Seasonal effects on blue swimming crab catch per unit effort (CPUE) in Tiworo Strait, Southeast Sulawesi, Indonesia

M Cardin* and M Welis

¹ Indonesian Blue Swimming Crab Association (Asosiasi Pengelolaan Rajungan Indonesia-APRI), Surabaya, Indonesia

*Corresponding author: rajunganindonesia@gmail.com

Abstract. Blue swimming crab (BSC) resources are fisheries commodities that have important economic value, so their utilization needs to be carried out sustainably. Understanding crab fishing season patterns is very important in efforts to improve the efficiency and effectiveness of crab fishing industry. This study aimed to analyze the abundance and catch per unit effort (CPUE) of blue swimming crab based on season in the the Tiworo Strait, Southeast Sulawesi, Indonesia. BSC sampling was conducted monthly from October 2022 to March 2023 (west season) and April to September 2023 (east season). . The results showed that the maximum catch occurred during the east to west transition season, amounting to 1,668.50 kg, while the lowest catch was 376.70 kg with a total of 1,032 trips. The maximum catch in the west season was 1,402.10 kg, while the lowest was 666.50 kg with a total of 1,265 trips. The highest CPUE value was observed in July at 7.92 kg/trip, while the lowest CPUE occurred in April at 2.18 kg/trip. Differences in crab catches and number of trips in each season may be influenced by environmental conditions that occur in that season as well the location of the fishing ground.

Keywords: blue swimming crab; CPUE; season pattern; Tiworo strait

1. Introduction

The blue swimming crab (*Portunus pelagicus*) or BSC is an organism that has a fairly wide distribution in the waters of the Tiworo Strait. This organism generally occupies the intertidal zone habitat at depths of up to 5 m - 30 m. In the intertidal zone, the preferred habitat for this organism is one that has a sandy substrate mixed with a little silt near mangrove forests and river mouths, and some are also found in seagrass-covered waters [1]. The BSC is a marine fishery commodity that has important economic value and has a large export market. Currently, crabs are heavily hunted by fishermen and are typically found in both coastal and deep-sea waters. To meet market needs, they still rely on fishing from the sea.

The utilization of BSC resources facing big challenge that requires the right solution, so proper management is needed. One of them is understanding the internal and external factors that influence crab resources. According to Fauzi and Anna, sustainability is a key word in fisheries development, which is expected to improve the condition of resources and the welfare of the fishing community itself [2]. The territorial waters of Indonesia follow the trajectory of the monsoon system, which reverses twice a year. Surface currents in Indonesian waters are strongly influenced by these winds, so the current



pattern that is formed is determined by the ongoing season. From June to August (east season), the east wind blows with the direction of surface currents moving from east to west, while from December to February (west season), the westerly wind blows with the direction of surface currents moving from west to east. From March to May and September to November, there is a transitional season, during which the movement of surface currents is irregular [3]. The season integrates various important pieces of information in resource exploitation for crab fishing. Crab fishing areas and crab season patterns integrate various information that is important in the exploitation of resources, so that fishing areas and seasons can be predicted more precisely [4].

Proper management of BSC resources will increase the profit and sustainability of the small-scale fishery business. One of the main things that needs to be known is the seasonal pattern of participatory crab fishing efforts to support the efficiency and effectiveness of resources. Therefore, it is necessary to conduct research on the influence of seasons on participatory crab fishing efforts by catching crab in the waters of the Tiworo Strait. This research aims to determine the number of crab catches per unit effort (CPUE) during the seasonal cycle catching crabs in the Tiworo Strait Waters.

2. Methods

2.1. Study Area

This research was carried out during the seasonal cycle that occurs in the waters of the Tiworo Strait, Southeast Sulawesi (Figure 1). April–September 2022 is the east season, and October 2022–March 2023 is the west season.

2.2. Data collection

Data collection was carried out using descriptive methods, which can be interpreted as a problem-solving procedure that is investigated by describing the state of the subject or object in the study [5]. Primary data that were obtained directly from the object of research were taken with systematic random sampling at the same place at the same time every day, and samples were obtained from catches while at sea at intervals of the seasonal cycle. Sampling was carried out at the crab landing site (mini plant) because it is a place where fishermen sell their crab catches. To obtain production data, sampling activities are carried out every month during the season cycle.

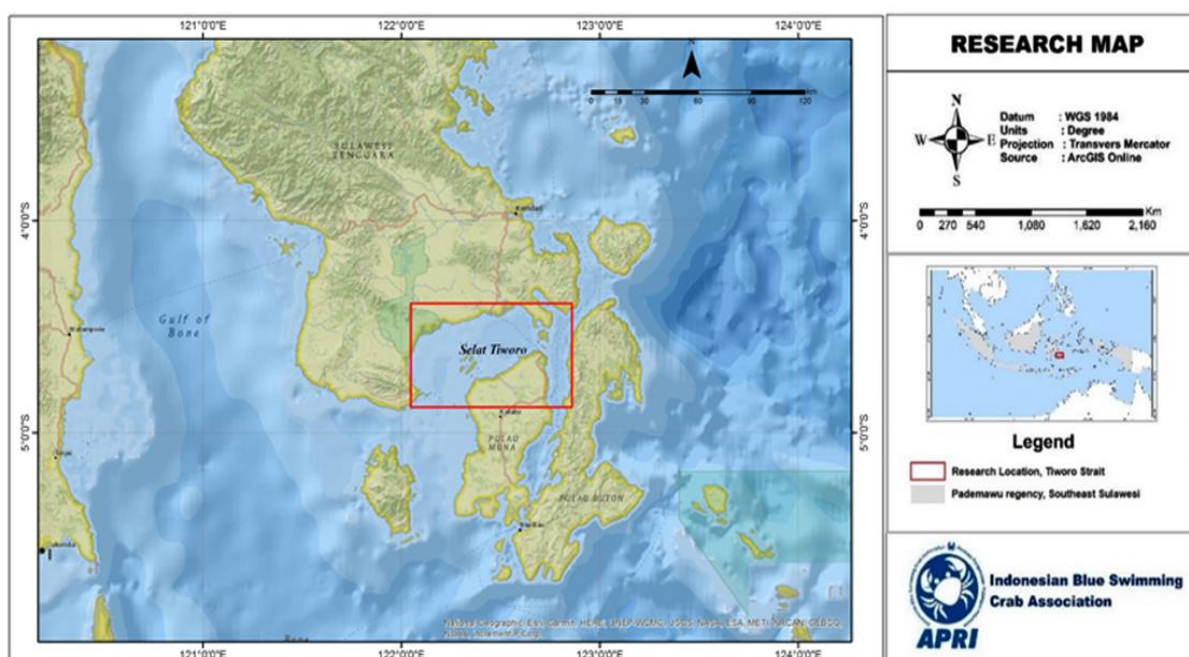


Figure 1. Map of Research Locations in Tiworo Strait Waters.

2.3. Data Analysis

CPUE analysis can describe the number of catches. Productivity per fishing trip from crab fishing gear is calculated by dividing the number of catches, or the average production, by dividing the amount of catch production by the number of fishing gear used. According to Noiija *et al.*, to calculate Catch Per Unit Effort (CPUE) fishing gear, the formula is [6]:

$$CPUE = \frac{Catch}{Effort}$$

3. Results and Discussion

3.1. Results

The crab catch fluctuated each season the catch during the maximum season, namely during the east-to-west transitional season, was 1,668.50 kg, while the lowest catch was 365.70 Kg (Table 1). This is because the eastern season occurs in April-September with the condition of crabs decreasing so that the number of trips from April-September was 1,032 trips. In the west season, the maximum catch is 1,402.10 kg, and the lowest is 666.50 Kg. This condition is due to the west monsoon cycle occurring in the Tiworo Strait region, which is experiencing conditions of increasing crab yields, so that the number of fishing trips increases by 1,265 trips. September is a transition season, where the catch is the highest in that season.

The results of observations of the fishing season in the Tiworo Strait can be seen as the peak of the crab fishing season. Figure 2 showed that in January, the BSC production was 1,402.1 Kg and decreased in February to 749.6 kg; in March, it also decreased by 666.5 kg and decreased again from April to June; In June the activities of some fishermen do not go to sea because that month the miniplant is closed. In July and August, there was an increase in catch from the previous month, then it increased drastically in September to 1,668.5 Kg due to the shift from the east to west season, and then the monthly production increased by 1,256 Kg, 1,056.9 Kg, and 1,383.8 Kg in October, November, and December.

Table 1. Production and CPUE during Research.

No	Season periode	Total Catch (Kg)	Total fishermen (Trip)	CPUE
1	April	495.90	228	2,18
2	May	398.00	152	2,62
3	June	365.70	98	3,73
4	July	903.00	114	7,92
5	August	969.90	172	5,64
6	September	1,668.50	268	6,23
7	October	1,256.00	234	5,37
8	November	1,056.90	211	5,01
9	Desember	1,383.80	226	6,12
10	January	1,402.10	229	6,12
11	February	749.60	183	4,10
12	March	666.50	182	3,66

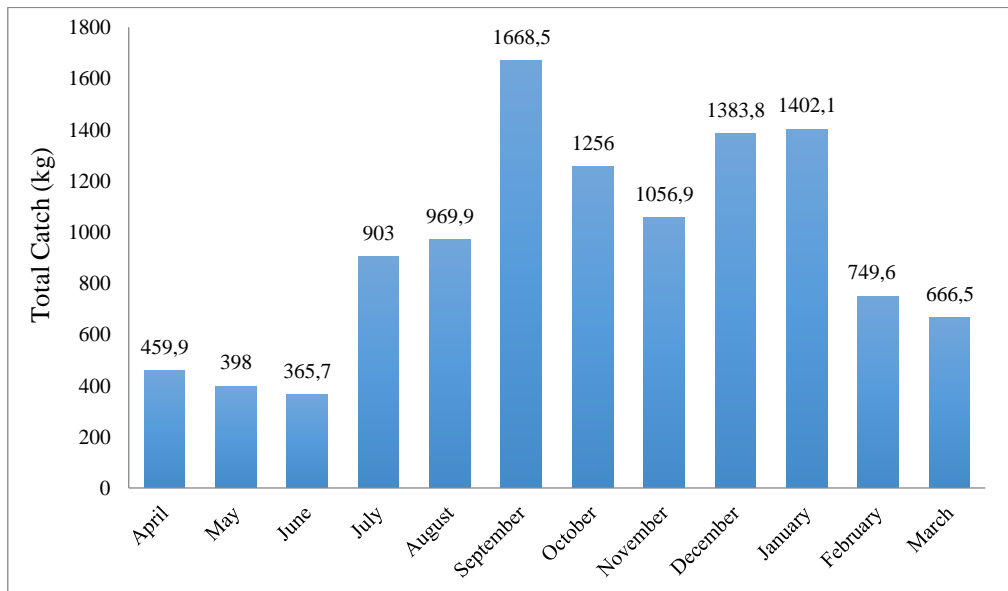


Figure 2. Crab fishing season in the Tiworo Strait Waters.

The production of crab caught from the research results fluctuated every month in the seasonal cycle that occurred, as did the CPUE value every month. The highest CPUE was in July, which was 7.92 kg/trip, with the lowest CPUE occurring in April, which was 2.18 kg/trip (Figure 3). With an average CPUE of 4.89 kg/trip, the influence of environmental conditions and oceanography plays a significant role in changes in CPUE, while wind and rain have a direct effect on activities and catches.

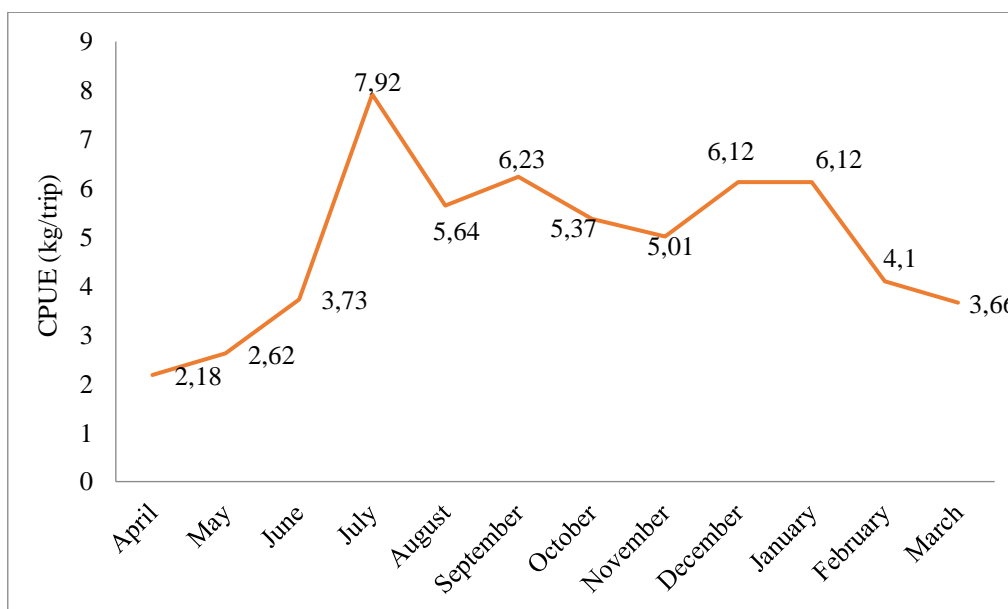


Figure 3. Crab CPUE during April 2022 – March 2023 in Tiworo Strait Waters.

Every month, the CPUE value fluctuates due to the seasonal cycle that occurs. This happened because during that period of the year, there was an increase and decrease in the number of fishing efforts. CPUE is influenced by the amount of effort made throughout the year to generate production.

3.2. Discussion

The peak of the crab fishing season in the Tiworo Strait occurs during the west monsoon and the transitional season from east to west, according to the amount of production in that season. There are two fishing seasons because January and September are the west seasons and the transitional period, where conditions of strong winds and high rainfall occur, but in this season the crab population is abundant. This is in line with the statement from Ihsan, that after the transition season, crab production increased again and reached its peak in September, and it is estimated that the caught crabs were spawned in September the previous year [7].

The life cycle of all crabs occurs in these waters since the crabs mate and release their eggs in deep waters (spawning ground), the eggs hatch and develop into larvae (zoea), then grow into juveniles towards shallow waters (the intertidal zone) (nursery ground), reach juvenile and adult sizes (fishing ground) [8]. By looking at the conditions of the BSC life cycle and the experience of fishermen when the west and east seasons are in progress and the weather conditions in these seasons in the Tiworo Strait waters, the fishermen's fishing ground is at a distance of 1-4 miles. According to Arios A. H *et al* [9], fluctuations in the production value of catches are influenced by the location of the fishing grounds. The fishermen usually determine the location of the fishing grounds using their feelings and experiences at sea. The fishing gear for small crab fishermen is meant to be a type of fishing gear that can be used all year round. However, in the east season, there are waves and wind, so the number of crab fishermen who catch them will decrease because fishermen prefer not to go to sea during the east season.

In terms of crab catches, there are fluctuations in the catch per unit effort (CPUE) value due to the many efforts made by fishermen to catch crabs in the Tiworo Strait waters so that fishing activity will be fullstop, this is in line with the results of Jafar Analysis, that additional capture attempts can no longer increase CPUE [10]. If additional efforts continue, it will be biologically dangerous to the population and cause economic losses. For this reason, it is necessary to regulate and control fishing efforts in accordance with optimum effort standards to maintain biological balance and prevent losses in the small crab fishing business.

4. Conclusion

The Tiworo Strait Waters have the highest crab catch between September and January during the east-to-west transition period, primarily the west season. On the other hand, the lowest catches are recorded during the east season in June. The seasonal impact on the catch of small crab fishermen causes the fluctuation in the CPUE value. Understanding the differences in catches during the crab season cycle is crucial in controlling fishing intensity and providing opportunities for crabs to recover. Thus, this information is essential for managing and ensuring sustainable crab fishing in the Tiworo Strait waters.

Author statement

All authors had equal contributions to this study and agreed to the published version of the manuscript.

Credit authorship contribution statement

Muhamad Cardin: Conceptualization, Methodology, Data curation, Formal analysis, Investigation, Visualization, Writing – original draft. **Muhamad Welis:** Investigation, Supervision, Writing – review & editing.

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References

- [1] La Sara, Halili, Ahmad Mustafa and Bahtiar, 2016 *Journal of Fisheries and Aquatic Sciences* **11** 402 – 410 DOI: [10.3923/jfas.2016.402.410](https://doi.org/10.3923/jfas.2016.402.410).

- [2] Fauzi A, Anna S 2002 *Coastal and Ocean Journal Bogor Agricultural University* **4**(2) 36 – 49 <http://repository.ipb.ac.id/handle/123456789/24215>.
- [3] Wyrski, K.A 1961 *Physical Oceanography of the Southeast Asean Waters Vol. 2* University of California Scripps Institution of Oceanography 195p.
- [4] Wiyono, E. S., Wisudo, S. H., & Haluan, J. 2014 *Marine Fisheries: Journal of Marine Fisheries Technology and Management* **5**(2) 193-200.
- [5] Sugiyono 2009 *Quantitative, Qualitative and R&D Research Methods* Bandung: Alfabeta.
- [6] Noija, D., Martasuganda, S., & Murdiyanto, B 2014 *Journal of Fisheries and Marine Technology* **5**(1) 55-64.
- [7] Ihsan, I. 2015 *Marine Fisheries: Journal of Marine Fisheries Technology and Management* **5**(2) 194 – 200 DOI: <https://doi.org/10.29244/jmf.5.2.193-200>
- [8] Astuti, O., Sara, L., & Safilu, S. 2019 *Proceedings of the National Marine and Fisheries Symposium* **6**. Retrieved from <https://journal.unhas.ac.id/index.php/proceedingsimnaskp/article/view/7772>
- [9] A. H. Arios, S. W. Saputra, and A. Solichin 2013 *Management of Aquatic Resources Journal (MAQUARES)* **2**(3) 243-248 DOI : <https://doi.org/10.14710/marj.v2i3.4221>
- [10] Jafar, L 2011 *Crab Fishery in Mattiro Bombang Village (Salemo, Sabangko and Sagara Islands) Pangkep Regency [Thesis] Aquatic Resources Management Study Program Fisheries Department Faculty of Marine and Fisheries Sciences Hasanuddin University.*