

HOW DO FISHERMEN FEEL ABOUT THE MANAGEMENT OF THE PONDOKDADAP COASTAL FISHING PORT (CFP), EAST JAVA, INDONESIA

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Abstract

This study aims to determine the volume and value of fishermen's fish production as well as fishermen's perceptions of the services and facilities available at CFP Pondokdadap. This is because fishermen's opinions are an important point in port development. The study was carried out using mixed methods, which required qualitative and quantitative data. The results show that pelagic fish catches are taken using fishing gear such as purse seines and handlines. The average purse seine harvest is dominated by lemuru with 1,733,231 kg and a production value of IDR 7,482,101,500, whereas the catch with handline harvesting is dominated by Yellowfin tuna (>20 kg) with a production volume of 1,248,944 kg. A total of 44 fishermen who were interviewed and analyzed using a Likert scale, on average said they were satisfied with the services and facilities available at CFP Pondokdadap. Overall fisheries production reached a volume of 5,596,271 kg and a production value of 137,691,524,000 from January 2022 to June 2022. Based on six months of data processing, it was found that the highest S. lemuru catch volume occurred in May 2022, with 812,052 kg. The weather can influence differences in catches, with poor weather or heavy precipitation resulting in low fishing income, which limits fishing processes. Considering the importance of port services, the perspectives of fishermen are necessary for the development of improved fishing ports. In average, fishermen are pleased with CFP Pondokdadap's management. Fishermen believe that all parties involved have contributed maximally.

Keywords: Production Volume Of Fish; Production Value Of Fish; Yellowfin Tuna; Lemuru; Purse Seine; Handline, Qualitative And Quantitative Data.

INTRODUCTION

Coastal regions, such as the Malang Regency, have a very diverse ecosystem, allowing them to be exploited as residential, industrial, port, or conservation areas. This is due to the presence of mangrove, seagrass, and coral reef ecosystems in coastal regions (Isdianto et al., 2020). Sendang Biru Beach is located in Tambakrejo Village, Sumbermanjing Wetan District, Malang Regency, and is host to a variety of activities, including fish auctions, harbors, and tourism (Handartoputra et al., 2015). Sendang Biru, also known as the WPP 573 region, faces the Indian

Ocean, so fishing is very common there. Sendang Biru is a landing site for fish, especially big or small pelagic fish, for those who make their living from fishing. Pondokdadap Coastal Fishing Port (CFP) is one of the main landing ports for fish, especially Tuna, Tongkol (Mackarel Tuna), and Cakalang (Skipjack Tuna) (TTC) in Malang, East Java (Mawarida et al., 2022). It is known as a Coastal Fishing Port because local fishermen travel on 1-2 day fishing expeditions in large powered canoes and 20-meter-long fishing vessels (Marina et al., 2014).

Fishing ports are public service organizations that play a crucial role in the development of fisheries, particularly capture fisheries, by increasing the utilization of fishery raw materials and marine fisheries (Maky et al., 2023). Community services are supported by facilities and infrastructure such as fishing ports in order to support fisheries resource management (Mbay et al., 2014). The Minister of Maritime Affairs and Fisheries Regulation Number PER/08/MEN/2012 defines a fishing port as a location for government activities and a fisheries business system used by fishing vessels to dock, anchor, and discharge fish (Wahyu et al., 2019). The CFP Pondokdadap area is responsible for fish landing, ship departure, and retrieval of untransported catches (Marina et al., 2014).

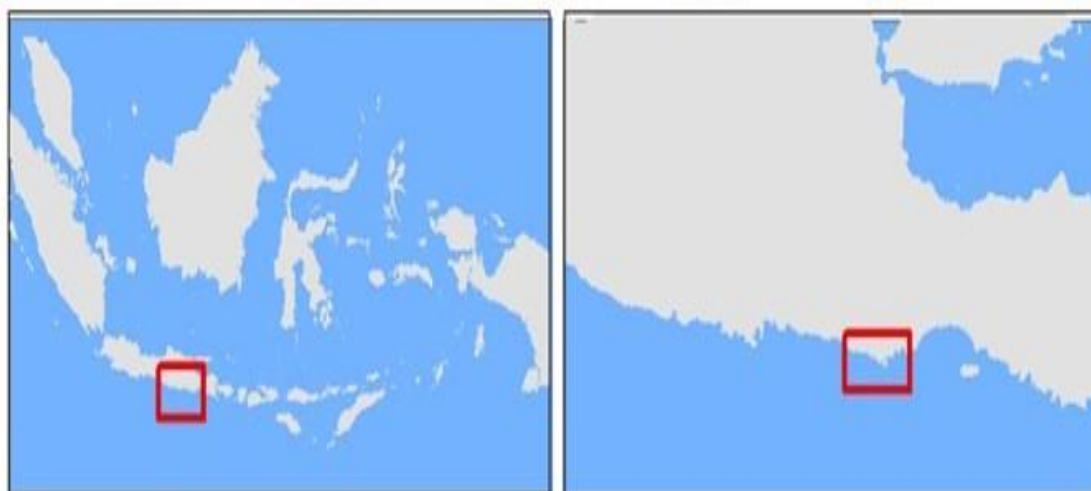
The capture fisheries area of Malang Regency is spread across numerous subdistricts. According to data compiled by the Malang Regency Maritime and Fisheries Service, Sumbermanjing is the district that generates the most capture fisheries in Malang Regency. Sendang Biru Hamlet, which contains a Coastal Fishing Port (CFP) and Fish Auction Place (TPI), is one of the main producers of captured fisheries in Malang. This is because it contains a Fish Auction Place (TPI) that functions as a fish port, loading and unloading for boats captured by fishermen, and a meeting place for sellers and buyers to negotiate price agreement for fish (Pane et al., 2019; Sinaga et al., 2020).

The CFP Pondokdadap has ten types of fish caught, including Lemuru (*Sardinella lemuru*), Layang (*Decapterus* sp.), Lada (*Leiognathidae*), Lemlang (*Coryphaena hippurus*), Yellowfin Tuna (*Thunnus albacares*), Skipjack (*Katsuwonus pelamis*), Tongkol (*Euthynnus affinis*), Bigeye Tuna (*Thunnus obesus*), Marlin (*Istiophoridae*), and Albakora (*Thunnus alalunga*) (Ariefandi et al., 2023). According to Pane et al. (2019), Malang Regency has a potential fish catch of 403,000 tons per year, with tuna being the primary export product from Malang Regency waters. Through the use of hand lines, jukungs, and purse shines, fishermen capture fish for their harvest. The fish production in CFP Pondokdadap was 5,454 tonnes in 2011, 11,318.93 tonnes in 2016 (Malang Central Statistics Agency), and 8,458.2 tonnes in 2017 (Agustina et al., 2019). The fishery has a substantial economic potential that can benefit both seafarers and those whose livelihood depends on the processing of fish products. This study seeks to determine the production output and value of fish landed by fishermen at this port, as well as to measure and analyze fishermen's perceptions of the services they receive from the management and distribution patterns of catches implemented thus far at CFP Pondokdadap.

MATERIAL AND METHODS

The research was conducted on 27 June – 5 August 2022 at Pondokdadap Coastal Fisheries Port (CFP)





Fish Catch Results

The study includes submitting a summary of catch production data to the CFP Pondokdadap website and compiling a summary of fisheries production data collected by the Port Technical Implementation and Management Section of CFP Pondokdadap. Figure 1 shows the input procedures for data on fisheries production.

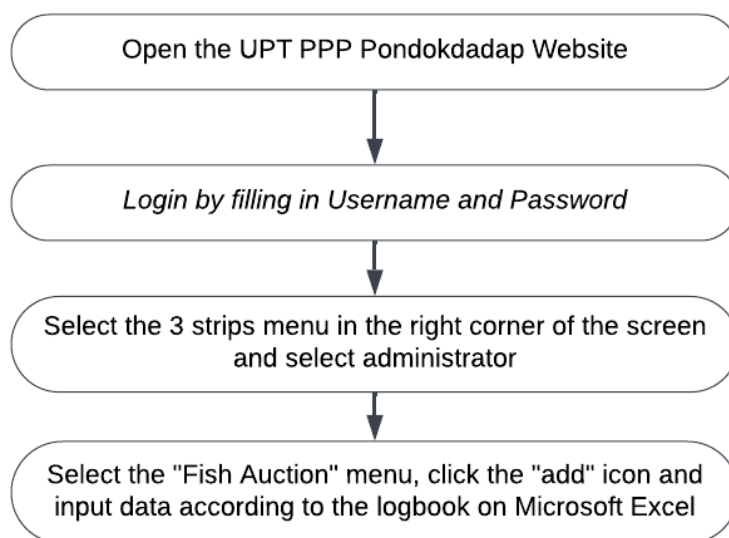


Figure 1: Fisheries Production Data Input Steps

Entering the ship's cargo and unloading logbook into Microsoft Excel and reprocessing it to determine the volume and value of production is the first step in compiling a summary of fisheries production data. This is repeated every day for a month to determine the average fishery production.

Fishermen's Perception

Fishermen's perceptions were taken by conducting surveys to observe and study port management and the role of ports in the fish distribution system. Apart from that, fish auction activities, distribution activities, and distribution systems are also observed and studied. This process produces quantitative data. The sample of informants was taken at simple random using the Slovin Formula to calculate the number of research samples. The sample size (n) using the known population size (N) and the acceptable error value (e) using Equation 1. The information that has been obtained from the sources is then analyzed using a Likert scale to measure a person's attitudes, opinions and perceptions about a topic (Sugiyono, 2016). The Likert scale is calculated using the following formula (Equation 2).

$$n = \frac{N}{1+Ne^2} \quad (1)$$

$$Result = \frac{Total\ score}{(highest\ score\ x\ number\ of\ respondents)} \times 100\% \quad (2)$$

Table 1: Likert Scale Criteria

Value (%)	Criteria
0-19.99	Very dissatisfied
20-39.99	Dissatisfied
40-59.99	Enough/Average
60-79.99	Satisfied
80-100	Very satisfied

RESULTS

Production Volume Production Value

Production volume is the number of fish that can be produced or landed at a fishing port (Ariefandi et al., 2023). The types of fish most often caught by fishermen in Sendang Biru waters include skipjack tuna, tuna, mackerel tuna, sharks, mackerel, stingrays, red tail fish, layur, squid and other economical fish (Atmaja et al., 2021). The types of fish landed are dominated by yellowfin tuna and bigeye tuna. The only fishing gear used is trolling rods (Nurani et al., 2014).

Data for January 2022 (Figure 2A) shows that the highest fishery production volume was for lemuru fish at 135,435 kg and the lowest was for flying fish at 504 kg. Meanwhile, Yellowfin Tuna, red tail, salmon, marlin, layur, albakor, peperek, mackerel, skipjack tuna and bigeye tuna are not found during fishing. Figure 2B shows the highest fishery production value for lemuru fish at Rp. 415,635,700 and the lowest was for flying fish at IDR 3,528,000. The total production value in January 2022 at CFP Pondokdadap is IDR 522,599,900.

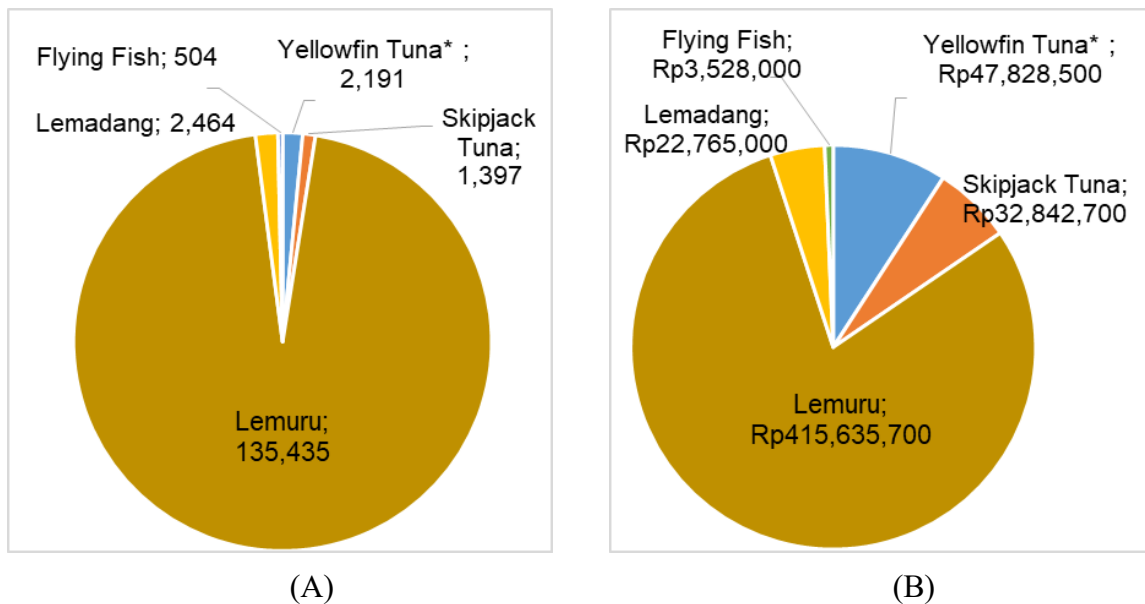


Figure 2: January 2022; (A) Production Volume and (B) Production Value

The highest production volume results for February 2022 (Figure 3) were obtained for lemuru fish weighing 266,954 kg, with a production value from sales of Rp. 1,535,441,200. Meanwhile, the lowest production volume was bigeye tuna weighing 167 kg with a production value of IDR 5,010,000. Fishermen do not obtain red tail fish, Yellowfin Tuna (>20 Kg), albacore, marlin, sea rayur, peperek and mackerel during fishing. The total production value of fishermen in CFP Pondokdadap in February 2022 is IDR 3,663,710,300.

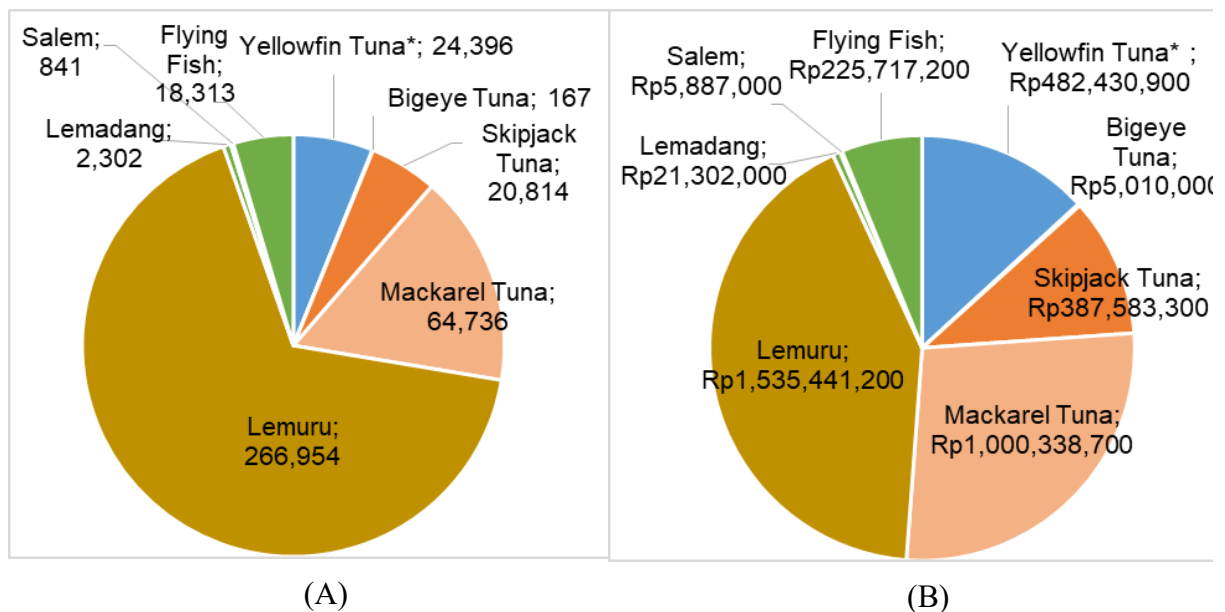


Figure 3: February 2022; (A) Production Volume and (B) Production Value

Data for March 2023 (Figure 4) shows the volume of fishery production and production value. The highest production volume was obtained for skipjack tuna, amounting to 129,990 kg with a production value of Rp. 1,942,581,500. Meanwhile, the lowest volume for albacore fish was 80 kg with a production value of IDR 2,000,000. The total production value in March 2022 at CFP Pondokdadap is IDR 6,381,860,700.

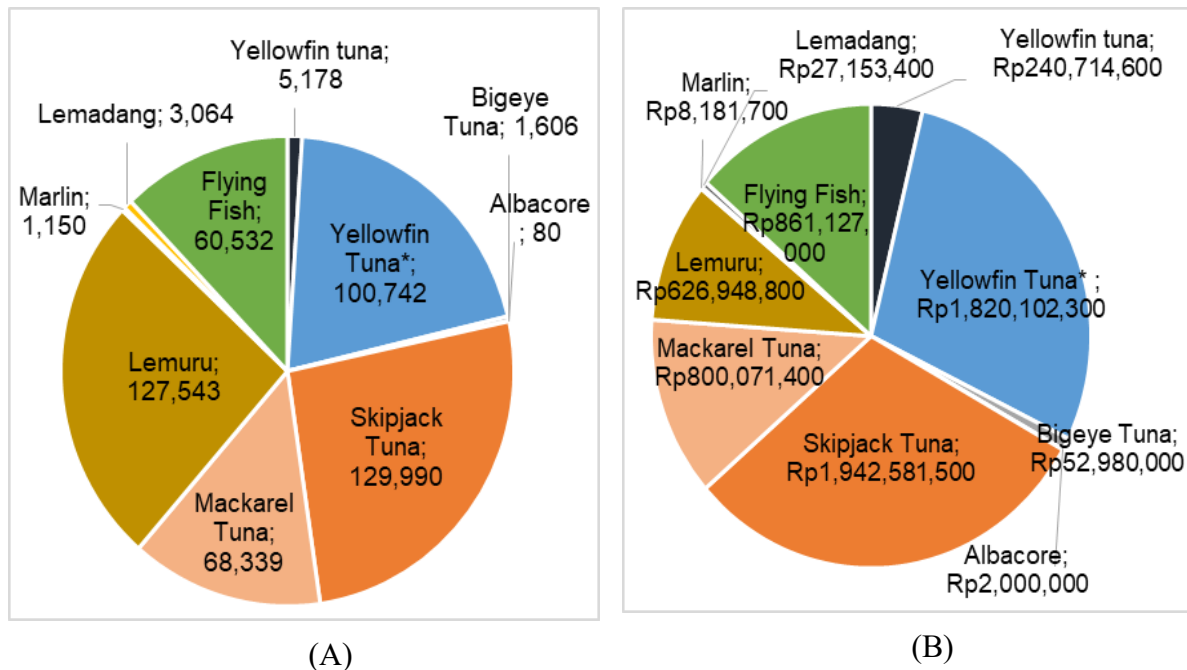
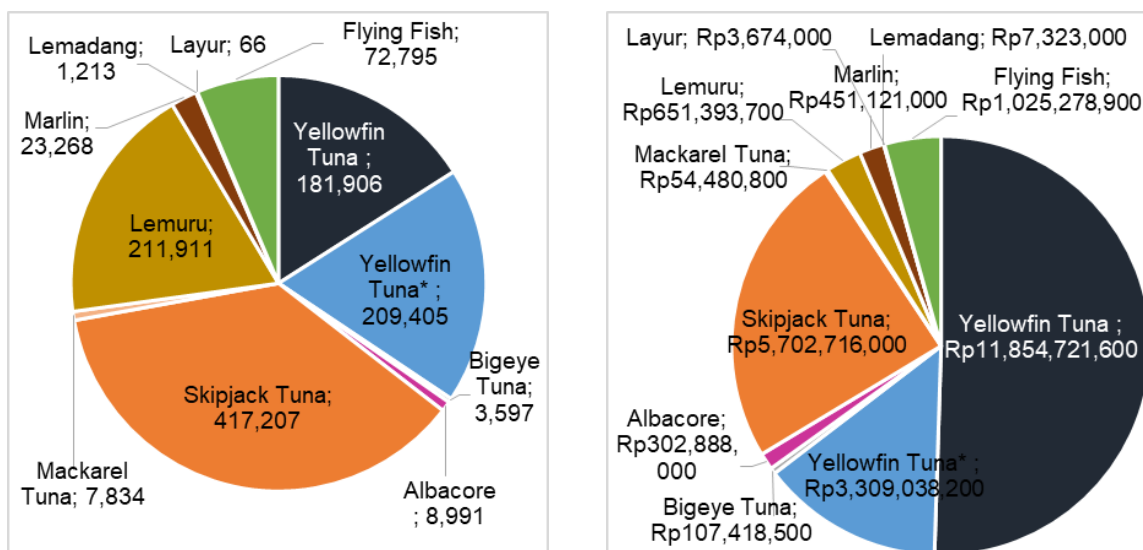


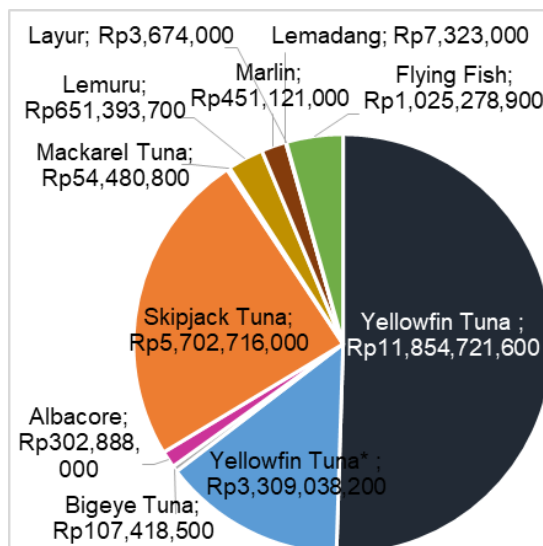
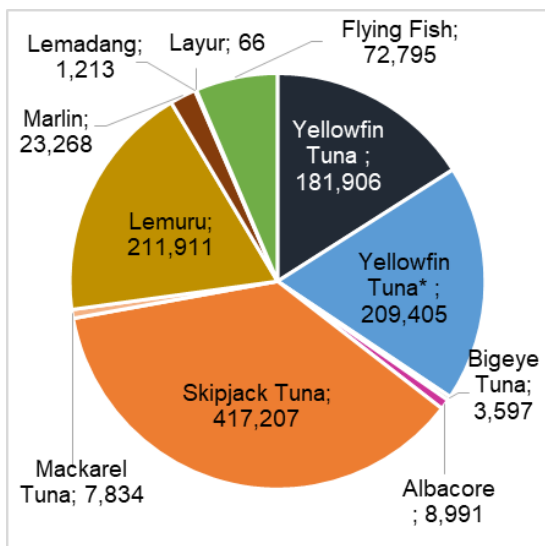
Figure 4: March 2022; (A) Production Volume and (B) Production Value



(A)

(B)

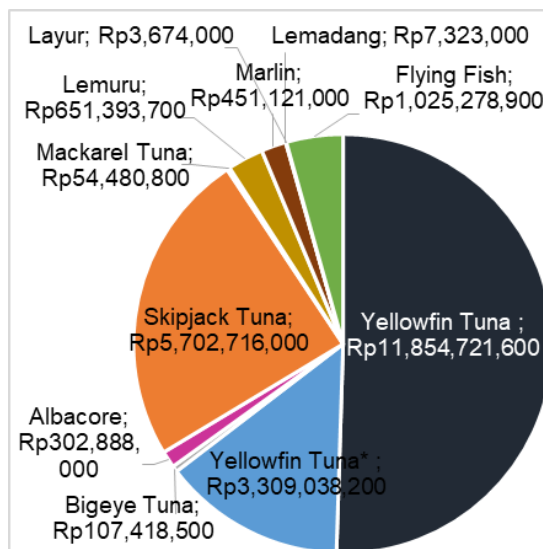
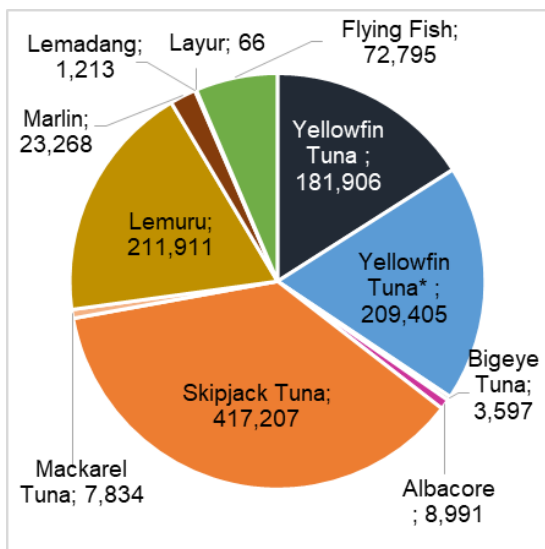
Figure 5A shows that skipjack tuna was the highest fish caught at 417,207 and the lowest was layur fish weighing 66 kg. fishermen do not get red tail fish, peperek, mackerel and salmon when fishing.



(A)

(B)

Figure 5B shows the highest fishery production value for Yellowfin Tuna (>20 Kg) of IDR. 11,854,721,600 and the lowest was layur fish with a production value of IDR 3,674,000. The total production value of fishermen in CFP Pondokdadap in April 2022 is IDR 23,470,053,700.



(A)

(B)

Figure 5: April 2022; (A) Production Volume and (B) Production Value

Data for May 2022 (

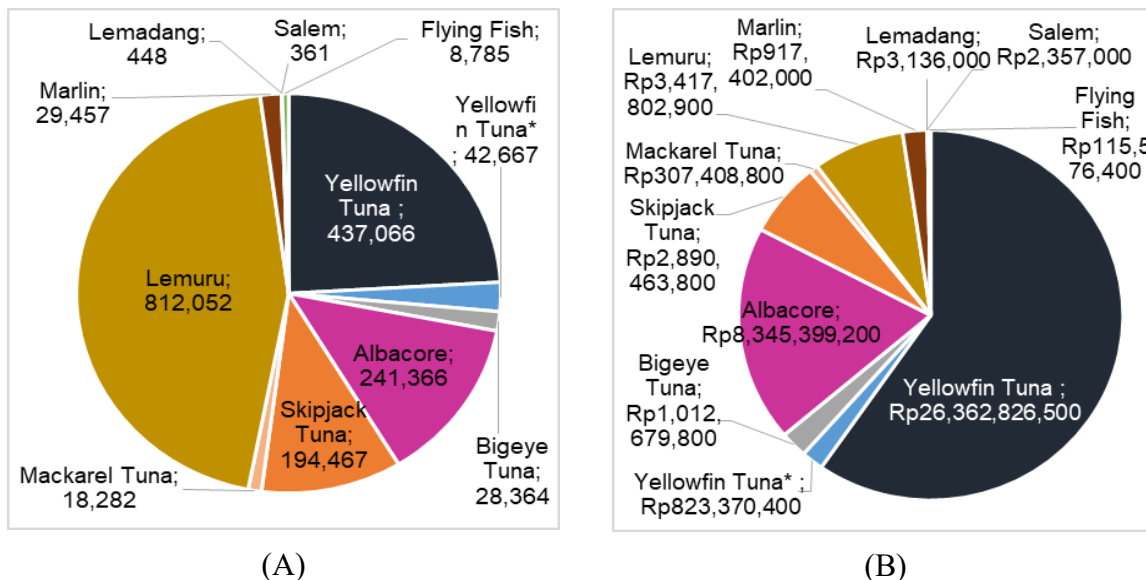


Figure 6A) shows that the highest fishery production volume was lemuru fish at 812,052 kg and the lowest was salmon fish weighing 361 kg. Just like in the previous months, layur, red tail, peperek and mackerel fish were not obtained when fishing by fishermen. Meanwhile,

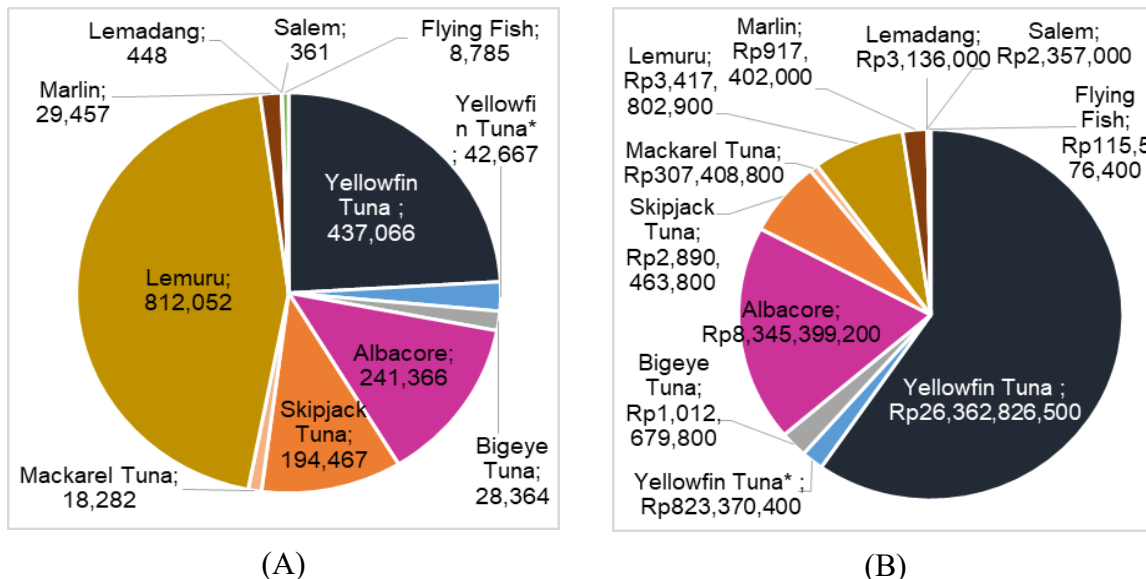


Figure 6B shows the highest fishery production value for Yellowfin Tuna (>20 kg) of IDR. 26,362,826,500 and the lowest is Salem with a value of IDR 2,357,000. The total production value of fishermen in CFP Pondkdadap in May 2022 is IDR 44,198,422,800.

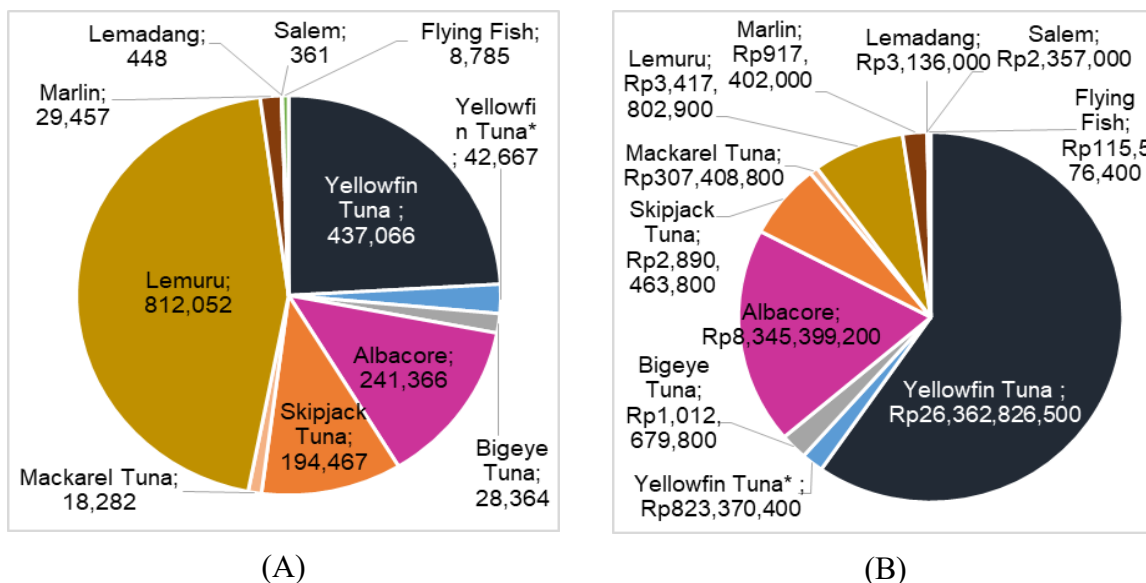


Figure 6: May 2022; (A) Production Volume and (B) Production Value

Data for June 2022 (Figure 7) shows that the highest fishery production volume is Yellowfin Tuna (>20 kg) 625,790 with a production value of IDR 36,218,746,450. Meanwhile, the lowest production volume was layur fish with a volume of 38 kg with a value of IDR 2,090,000. Redtail and mackerel are not obtained when fishing by fishermen. The total production value of fishermen in CFP Pondokdadap in June 2022 is IDR 59,454,876,600.

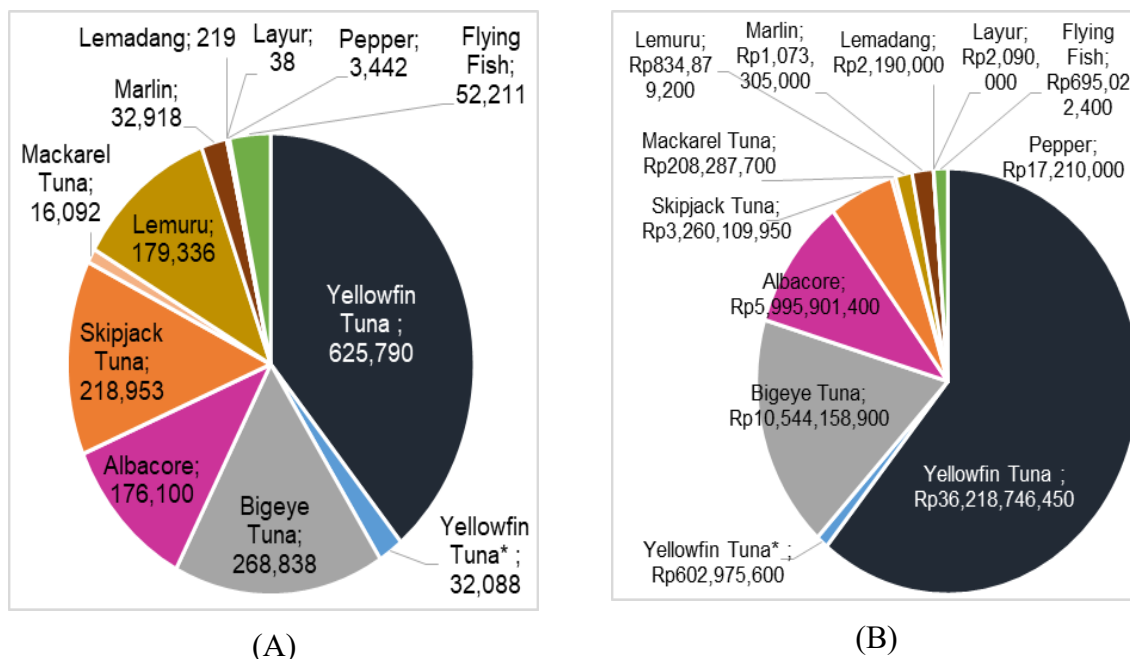


Figure 7: June 2022; (A) Production Volume and (B) Production Value

Based on processing results, the production volume from January 1, 2022 to June 30, 2022 was 5,596,271 kilograms with a value of Rp 137,691,524,000. The fishing gear used by fishermen consists of purse seines and handlines. In general, lemuru fish and layur fish dominate the catch of purse seine fishing gear. Purse seines are used to capture Lemuru (*Sardinella longiceps*), Layur (*Trichiurus lepturus*), Tuna (*Auxis thazard*), and Kites (*Decapterus* sp.) (Hadi et al., 2020; Pratama et al., 2016). Lemuru production reached 1,733,231 kilograms with a production value of IDR 7,482,101,500, while layur fish production reached 104 kilograms with a production value of IDR 5,764,000.

Handline fishing gear produces yellowfin tuna, skipjack tuna, bigeye tuna, little tuna, and marlin (Hargiyatno et al., 2021). This is shown by the production volume of Yellowfin tuna (>20 kg) reaching 1,249,940 kg and Yellowfin tuna* (<10 kg) reaching 411,489 kg. FAD-based tuna fisheries in Sendangbiru, East Java, appear to be impacted by two primary factors: the number of tuna that can be captured and the amount of time that can be spent at sea (Wiadnya et al., 2018).

Wallet fish, red tail fish, and lemuru fish were among the captures made at CFP Pondokdadap by vessels employing purse seine gear. Lemuru fish is the most abundant harvest at CFP Pondokdadap, with a total yield of 1,733,231 kilograms. East Java is one of the greatest capture fisheries producers in Indonesia, with lemuru being the primary catch (Pratama et al., 2016). Productivity, migration patterns, and distribution of *S. lemuru* are affected by concentrations of chlorophyll-a (chl-a), sea surface temperature (SST), salinity, currents, and thermocline depth. On the basis of six months of data processing, it was determined that the highest capture volume of *S. lemuru* occurred in May 2022, specifically 812,052 kg; this was influenced by the Southeast Season, which occurred in the waters south of Java. During the southeast season (April to October), winds from Australia's southeast cause upwelling, delivering cooler water to the southern coasts of Java (including Bali) and Sumatra.

High chl-a concentrations and low SST have an effect on *S. lemuru* captures as a result of this condition (Syah et al., 2019). *S. lemuru* spawns during the southeast monsoon season, which occurs during the southeast season (Rahadian et al., 2019). *S. lemuru* is regarded a seasonal fish because emergence is influenced by environmental conditions and seasons (Sartimbul et al., 2021; Simbolon et al., 2017).

The number of purse seine fishing gear, the size of the vessel's GT, the length of the net, and the number of crew members influence the catch on each vessel differently and contribute to the rise and decline in production numbers. According to Ningsih et al. (2022), the fluctuating fish production is caused by numerous factors, including the number of fishing vessels, the duration of fishing trips, the fishing gear used, the fishing season, and the number of ships landing fish. Aside from this, rainfall with high waves also impacts the number of purse seine fishing excursions (Firdaus et al., 2020). In the meantime, hand-line fishing is conducted in the Indian Ocean near FADs that serve as fishing aides. Lifeboats are the vessels used to operate hand-line fishing apparatus. Handline construction in Sendang Biru targets tuna such as Yellowfin Tuna and Bigeye Tuna as the primary catch (Firdaus & Witomo, 2014).

Fishermen's Perception

Using the results of the Slovin Formula (Equation 2), it was determined that the sample included 44 fishermen. Fishermen's perceptions in the context of fishing port management and fisheries distribution assumes that fishermen's perceptions of fishing port management and market demand influence their decisions in choosing fishing ports and the type of fish to be landed. In addition, according to this theory, port management and fisheries distribution must take fishermen's perspectives into account for optimal results. Liao et al. (2019), state that the perceptions and attitudes of fishermen will help policymakers in comprehending the effectiveness of fisheries management, including various fisheries policies and fisheries conflicts. Fisheries policies include assistance in providing fishing equipment and processing fish catches, as well as training policies to enhance the quality of the community (F. S. Ningsih et al., 2017).

Table 2: Results of Likert Scale Analysis of Fishermen's Perceptions

Likert Scale Analysis Results		
Statement	Percentage	Criteria
Smooth distribution of fish from fishermen to entrepreneurs/traders	68%	Satisfied
Fish distribution system from fishermen to entrepreneurs/traders,	65%	Satisfied
Regarding communication between fishermen/fishermen and entrepreneurs,	95%	Very satisfied
Exchange of information between fishermen/fishermen and entrepreneurs,	90%	Very satisfied
Exchange of information with the management/port,	64%	Satisfied
A price agreement is formed	81%	Very satisfied
The level of trust of fishermen towards entrepreneurs/middlemen	82%	Very satisfied
Infrastructure and facilities	64%	Satisfied
Smooth transactions/payments by traders/middlemen	70%	Satisfied
Transaction/payment system by traders/middlemen,	86%	Very satisfied
Agreements formed with entrepreneurs/middlemen	85%	Very satisfied
Regarding the implementation of existing government policies at ports	86%	Very satisfied
The performance of officers in arranging the arrival and departure of ships	65%	Satisfied
The attitude and performance of officers in technical inspections, ship navigation,	58%	Enough/Average
The attitude and performance of officers in managing ship traffic	73%	Satisfied
Performance of officers in supervising the filling of raw materials	63%	Satisfied
Regarding the attitude of officers in supervising maritime environmental protection,	79%	Satisfied
The attitude of officers in checking the fulfillment of ship manning requirements,	93%	Very satisfied

Likert Scale Analysis Results		
Statement	Percentage	Criteria
Performance of administrative service officers,	85%	Very satisfied
Speed of officers in administrative services,	84%	Very satisfied
Port facilities and infrastructure	75%	Satisfied
Comfort and safety when loading and unloading ships	72%	Satisfied
Officer services when going to sea,	65%	Satisfied
Speed of handling the catch,	70%	Satisfied
There is a dock at the port for loading and unloading fuel	66%	Satisfied
Fuel loading and unloading service times	71%	Satisfied
Performance of fuel loading and unloading service officers,	69%	Satisfied
There is a port pier which is used for landing the catch	58%	Enough
Control of the quality of the catch by the port	61%	Satisfied
The marketing system implemented at the port	92%	Very satisfied

DISCUSSION

Maintaining the sustainability of marine resources and allowing fishermen to make a stable living depends on the distribution of fishing and the accessibility of fishing ports. To resolve these intricate conflicts, however, the participation of fishermen is essential (Mussadun et al., 2016). Diverse perceptions exist among fishermen surrounding the distribution of fisheries, including reasonable prices, access to fair markets, and a more equitable distribution of catches. In addition to policies, regulations, and their participation in port management decision-making, fishermen's perceptions of fishing port management can include a variety of other factors.

The high fish production of CFP Pondokdadap fishermen must be connected to the port facilities that serve as the distribution hub for fishermen's products. According to Gumilang & Susilawati (2019), fishing ports are economic hubs from the time fish are landed until they are sold at the port, so they play a crucial role in the supply chain of fishery products. The majority of fishermen are satisfied with CFP Pondokdadap's marketing system, distribution system, seamless distribution, price agreements, transactions, and facilities, according to the

Table 2. Considerations for fish distribution at fishing terminals must include market accessibility, infrastructure, and fish processing. The following are the three channels of the structure of the fish supply chain at CFP Pondokdadap, Kab. Malang (Figure 8).

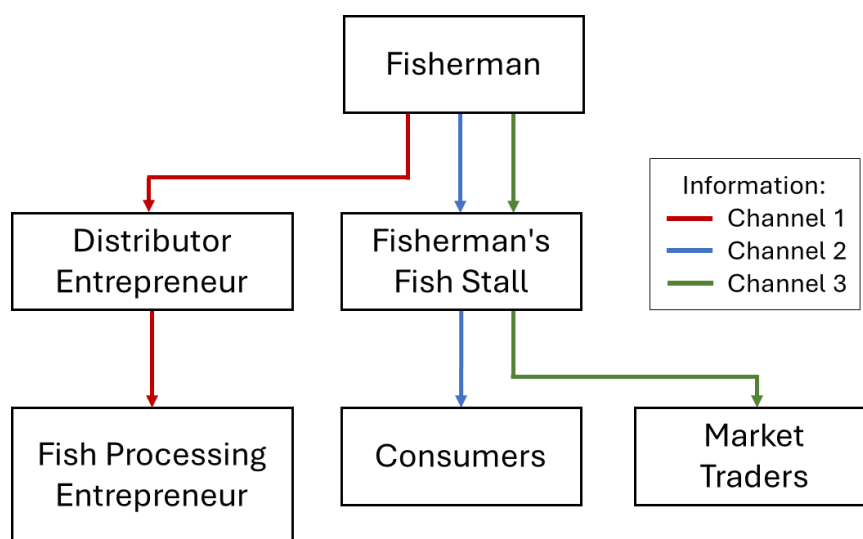


Figure 8: Fish Supply Chain Channels at CFP Pondokdadap

According to Setiawan et al. (2018), the fish supply chain at the port includes the collection of fish from fishermen, processing and storage at the processing factory, transport to the port, inspection and packaging at the port, and distribution to local and export markets. There are three aspects that will affect the efficient distribution of fishermen's catches at CFP Pondokdadap. At first, product flow is associated with ensuring product quality is maintained throughout the transportation and storage procedures. Second, financial flows refer to the certainty and safety of transactions conducted by each participant. Last, the information flows associated with the development of an exchange and transfer process are market demand, fish stocks, and delivery periods between the involved parties.

Fishermen are unsatisfied with the attitude and performance of officers during technical and nautical inspections of ships, plus the lack of a port pier for landing their produce. Individual and group skills can be developed by improving the character of human resources through courses and training programs (Ningsih et al., 2022). According to Buchari & Basri (2015), the development of human resources in ports is highly dependent on maritime education. Therefore, if you want excellent port management, you must also have competent human resources. The aspect of quality control and the quality of the catch is considered by fishermen to be satisfactory, but it is still a relatively low value, namely 61%. According to a study published by Ningsih et al. (2022), the Integrated Cold Storage (ICS) at CFP Pondok Dadap is not operational; therefore, it is necessary to optimize existing facilities such as ICS and KIN Hygienist in order to improve fish quality.

The Likert analysis reveals that, on average, fishermen are satisfied with the administration of CFP Pondokdadap (Table 2). The perspective of fishermen is that all parties involved have made their greatest contribution. Several things that are of concern to CFP Pondokdadap management include:

1. Fishermen have equal and non-discriminatory access to anchor, repair vessels, and transport

and unload catches. The use of port land must be carried out in an orderly and coordinated manner to prevent fishing conflicts.

2. Availability of Sufficient Infrastructure: The CFP Pondokdadap management policy ensures that fishermen anchoring at the port have access to sufficient docks, parking, electricity, pure water, and sanitation.
3. The policy implemented by CFP Pondokdadap protects fishermen from monopolistic practices carried out by collectors or middlemen, ensuring that the selling price of fishermen's catch is equitable and is not detrimental to them.
4. Participation of fisherman in decision-making: CFP Pondokdadap fishermen participate in port management decision-making. This involvement of fishermen must be conducted in an organized and structured manner so that fishermen can provide valuable suggestions and input during the formulation of fishing port management policies.
5. Serious law enforcement: Good port management policies must be supported by severe law enforcement to prevent violations and misuse by irresponsible parties.

RECOMMENDATIONS

There are recommendations to be given to CFP Pondokdadap:

- Annual optimization and maintenance of CFP Pondokdadap's current facilities.
- Improving the quality of human resources, including officers, staff, and fishermen, through counseling, training, and mentoring in order to enhance the attitudes and performance of officers in service during operational activities.
- The need for enhanced government oversight and assistance in expanding CFP Pondokdadap's human resources
- Establishing and improving a clean and hygienic port environment

According to Buchari & Basri (2015), increasing human resource competency must align with advancements in operational technology in order to meet productivity goals.

CONCLUSION

Based on the results of processing data on production volume and fishery production value, as well as fishermen's perceptions of fisheries port management and fisheries distribution at CFP Pondokdadap, it can be concluded as follows:

1. The results of fisheries production data processing from production volume from January 2022 - June 2022 reached 5,596,271 kg with a production value reaching Rp. 137,691,524,000. This catch was obtained using handline and purse seine. Based on data processing for 6 months, it was found that the highest catch volume of *S. lemuru* was in May 2022, namely 812,052 kg.

2. Fishermen on average are satisfied with CFP Pondokdadap management with several management focuses such as access and land use; availability of adequate infrastructure; fair selling price policy; involvement of fishermen in decision making and law enforcement.

Acknowledgements

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Declaration of Interest Statement

The authors declare that there is no conflict of interest.

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