Characterizing the Baseline Catch Composition on the North Coast of East Java: A Case Study of Demersal Seine Nets in Tuban District

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Abstract

Fisheries Management Area of the Republic of Indonesia (FMA-RI) 712, which encompasses the Java Sea and surrounding waters, is one of the most productive marine regions in the country, contributing significantly to national fisheries production. However, increasing exploitation pressure, particularly from medium-scale fisheries, demands focused attention on catch composition and its implications for resource sustainability. This study aims to identify and analyze the catch composition from demersal seine-net fishing activities along the northern coastal waters of Tuban District, East Java (part of FMA 712). Data were collected from January to April 2025 as a baseline to understand the structure of the fishery catch. Quantitative catch composition analysis reveals the influence of seasonal patterns and fishing depth on species variation, while qualitative data from observations and interviews explain how fishermen's adaptive practices influence catches. The catch was dominated by demersal fish (90,57%) and pelagic species (9,43%), reflecting a shift from previously recorded proportions. The dominant demersal species were Priacanthus tayenus, Nemipterus virgatus, and Upeneus sundaicus, while the dominant pelagic species were Scolopsis taenioptera, Sphyraena obtusata, and Atropus atropos. Field observations indicated that decision-making in fishing operations remains heavily reliant on local experience, with limited access to scientific information and technical regulations. This study provides an initial overview of the demersal fishery's ecological status in the study area and underscores the importance of ecosystem-based management and locally informed policies to ensure the sustainability of marine living resources in FMA-712.

Keywords: Catch composition, JTB, demersal fish, north coast, fishing trip income.

1. INTRODUCTION

The northern coastal region of East Java is an area with significant fisheries resource potential and plays a strategic role in meeting the protein needs of local communities. This, in turn, supports the regional economy. The fish resources in this area are dominated by demersal and small pelagic species (Lelono et al., 2021). The marine biodiversity of this region provides substantial potential for the development of a sustainable fisheries sector (Holsman et al., 2020). Fishing activities along the northern coast of East Java are relatively intensive, involving both small- and large-scale fishers who employ various types of fishing gear. One of the key coastal areas in this context is Tuban Regency. Tuban Regency, located on the northern coast of East Java, has a strong fishing tradition and highly active capture fisheries. The regency encompasses approximately 11.7 km² of marine waters (Joesidawati & Suntoyo, 2017). The area is also equipped with the Fish Landing Base (Pangkalan Pendaratan Ikan, PPI) located in Palang Village, Tuban Regency, which serves as one of the active fishing ports. The fishing gear commonly used by fishers in Tuban Regency, particularly those in Palang Village, is the bagged seine net (Jaring Tarik Berkantong, JTB). This fishing gear, which falls under the category of seine nets, is operated using a single vessel equipped with a hauling rope to encircle schools of demersal and pelagic fish, which are then hauled aboard the vessel (Munir & Priyantika, 2024). The bagged seine net (Jaring Tarik Berkantong, JTB) is generally operated in sandy-bottom waters that are relatively free of coral structures, with demersal and pelagic fish as its primary targets.

The use of bagged seine nets (Jaring Tarik Berkantong, JTB) has raised concerns about the sustainability of fishery resources due to increasing fishing intensity and the growing economic potential of the fisheries sector. This fishing gear has the potential to capture various non-target organisms, including small-sized fish, low-economic-value species, and organisms that play important ecological roles within the ecosystem. Scientific information regarding this matter is crucial for assessing the ecological impact of JTB operations and for supporting the formulation of sustainable fisheries management strategies. Information on the catch composition of bagged seine nets (Jaring Tarik Berkantong, JTB) in Tuban remains limited. However, such data are crucial for assessing fish stock conditions, identifying species vulnerable to overexploitation, and evaluating the ecological impacts of fishing activities.

Previous studies conducted in other areas, such as Brondong (Lamongan), have examined catch composition and economic aspects. However, similar research in Tuban—particularly in Palang Village, Palang Sub-district, Tuban Regency—remains limited, even though this area has distinctive ecological and socio-economic characteristics, which makes the findings from those studies not directly generalizable. Therefore, there exists a research gap concerning the baseline data on the catch composition of the Jaring Tarik Berkantong (JTB, or bag seine) fishery in Tuban, which could serve as a foundation for developing ecosystem-based fisheries management strategies.

Based on these conditions, this study aims to address the main research question regarding the species composition of catches from the Jaring Tarik Berkantong (JTB, or bag seine) landed at the Palang Fish Landing Base (PPI), Tuban; the levels of species diversity and evenness; as well as the ecological implications and potential long-term impacts of these catches on the sustainability of fishery resources. The findings of this study are expected not only to contribute to a better understanding of the fishery ecology in Tuban but also to serve as a scientific foundation for formulating adaptive and sustainable fisheries management policies.

2. RESEARCH METHODS

This research was conducted from January to April 2025 at the Palang Fish Landing Base (PPI), Tuban Regency, East Java. The site was selected because it is one of the major fish landing centers along the northern coast of Java, where fishing activities using the *Jaring Tarik Berkantong* (JTB, or bag seine) are particularly dominant. The research employed a combination of field observations and structured interviews to obtain both quantitative and qualitative data comprehensively (Creswell, 2014; Yin, 2018).

1. Sampling

The research unit consisted of fishing vessels operating with *Jaring Tarik Berkantong* (JTB, or bag seine) gear. Observations were carried out on fishing activities conducted by the vessel *KM. Mayor,* which was selected using purposive sampling it represents the operational pattern of local medium-sized fleets (20–30 Gross Tons). The use of purposive sampling is consistent with the case study approach commonly applied in capture fisheries research (Marshall & Rossman, 2016). The primary respondent in the interviews was the vessel owner, who also served as the skipper. The selection criteria for respondents followed the *key informant* approach, targeting individuals with extensive experience and in-depth knowledge of fishing operations (Bernard, 2017). Accordingly, the data obtained are considered representative of JTB vessel operations in the study area.

This research employed an exploratory case study design, as it involved only a single fishing unit; thus, the findings emphasize in-depth understanding rather than broad generalization. The case study approach can serve as a foundation for more comprehensive fisheries research in the future (Yin, 2018).

2. Data Collection

Catch data were collected during each landing event. The recorded parameters included: identification of both target and bycatch species, which was conducted based on morphological characteristics referring to the *Identification Key of Marine Fishes of Indonesia*; the number and biomass of each species (kg/trip); and the catch frequency of each species per trip. In addition, interview data covered the average catch per trip, fishing operation duration, and economic aspects such as the selling price of each fish species.

3. Data Analysis

The data were analyzed using descriptive statistical methods as described by Nasution and Rosanti (2020). The catch composition was calculated in percentage form

(Susaniati et al., 2013). The species composition of the catch was estimated using the following formula:

$$P = \frac{ni}{N} \times 100\%$$

Annotation:
P = Species composition (%)
n_i = Number of individuals of each fish species
N = Total number of individuals of all fish species

Fishermen's income analysis was conducted by calculating the total income, net income, and the Revenue–Cost Ratio (R/C) analysis. According to Darsono (2008) in Mbato et al. (2020), total revenue (TR) is obtained by multiplying the price of fish by the total catch, as shown below:

$$TR = P \times Q$$

Annotation:
P = Price of fish (Rp/kg)
Q = Quantity of fish caught (kg)

Net income (π) is obtained by subtracting the total cost (TC) from the total revenue (TR) of a fishing operation.

$$\pi = TR - TC$$

annotation:
π = Net income (Rp)
TR = Total revenue (Rp)
TC = Total cost (Rp)

The Revenue–Cost Ratio (R/C) was calculated by dividing the total revenue (TR) by the total cost (TC). The R/C value indicates the profitability of the fishing operation whether it generates a profit, breaks even, or incurs a loss.

$$R/C = \frac{TR}{TC}$$

Criteria:
R/C > 1 : Profitable operation
R/C = 1 : Break-even point
R/C < 1 : Unprofitable operation

3 RESULTS AND DISCUSSION

3.1 Catch Composition

The total catch from a single fishing trip (approximately 15 days) amounted to about 13,103 kg, or 13 tons, consisting of both demersal and pelagic fish species. The demersal fish catch totaled 11,867 kg, or 11.9 tons (90.57%), while the pelagic fish catch amounted to 1,236 kg, or 1.2 tons (9.43%) (Figure 1).

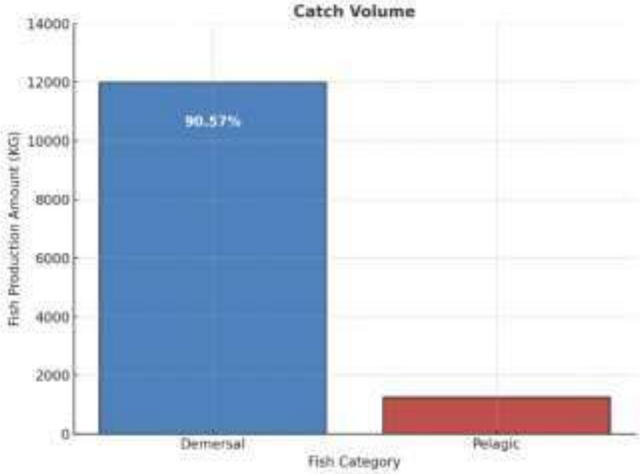

Figure 1. Total Production in a Single Fishing Trip

A total of 19 demersal fish species were identified, dominated by *Priacanthus tayenus* (Swanggi fish) with a total weight of 4,716 kg or 4.7 tons (39.74%); *Nemipterus virgatus* (Kuniran fish) 2,403 kg (20.25%); *Upeneus sundaicus* (Red Goatfish) 1,134 kg (9.56%); *Nemipterus balinensoides* (Kurisi fish) 870 kg (7.33%); *Scolopsis taenioptera* (Moncong Kambing) 552 kg (4.65%); *Pentapodus setosus* (Threadfin Bream) 415 kg (3.5%); *Saurida tumbil* (Lizardfish) 306 kg (2.58%); *Rhynchobatus* sp. (Giant Guitarfish) 300 kg (2.53%); *Neotrygon orientalis* (Stingray) 223 kg (1.88%); *Abalistes stellatus* (Triggerfish) 221 kg (1.86%); *Pentaprion longimanus* (Porcupinefish) 184 kg (1.55%); *Epinephelus sexfasciatus* (Grouper) 149 kg (1.26%); *Gymnocranius griseus* (Tawe-tawe) 106 kg (0.89%); *Psettodes erumei* (Indian Halibut) 91 kg (0.77%); *Diagramma labiosum* (Sweetlips) 89 kg (0.75%); *Lutjanus carponotatus* (Yellowtail Snapper) 58 kg (0.49%); *Parupeneus heptacanthus* (Goatfish) 39 kg (0.33%); *Nemipterus furcosus* (Red Kurisi) 7 kg (0.06%); and *Maculabatis gerrardi* (Ray) 4 kg (0.03%) (Figure 2)

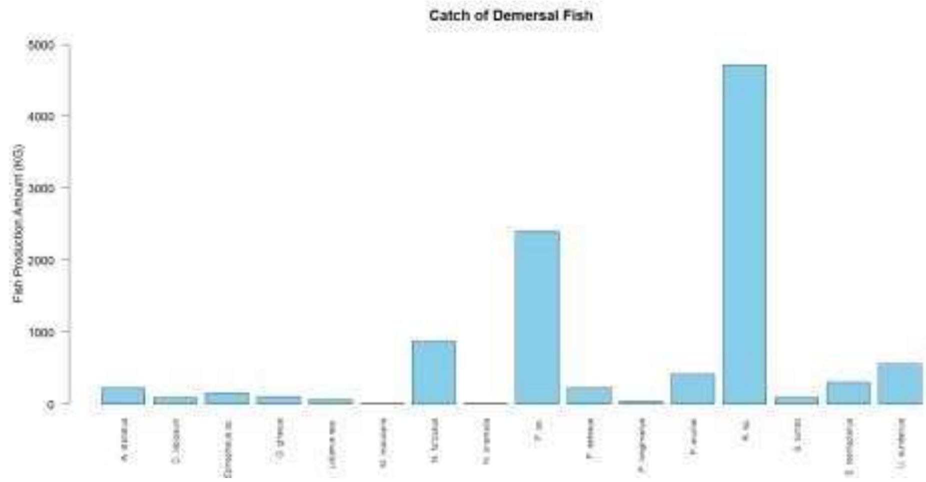

Figure 2. Demersal Fish Catches

The pelagic fish species consisted of four large pelagic species (*Aluterus monoceros*, *Sphyraena jello*, *Sphyraena obtusata*, and *Trichiurus lepturus*), three small pelagic species (*Atropus atropos*, *Selar crumenophthalmus*, and *Selaroides leptolepis*), and one neritic pelagic species (*Loligo* sp.). The pelagic catch was dominated by *Loligo* sp. (squid) with a total weight of 437 kg (35.36%), followed by *Sphyraena obtusata* (barracuda) 330 kg (26.70%), *Selar crumenophthalmus* (selar scad) 171 kg (13.83%), *Atropus atropos* (moonfish) 151 kg (12.22%), *Trichiurus lepturus* (ribbonfish) 64 kg (5.18%), *Sphyraena jello* (yellowtail barracuda) 40 kg (3.24%), *Aluterus monoceros* (unicorn leatherjacket) 30 kg (2.43%), and *Selaroides leptolepis* (yellowstripe scad) 13 kg (1.05%). The total pelagic catch obtained by the vessel amounted to 1,236 kg, or approximately 1.2 tons (Figure 3).

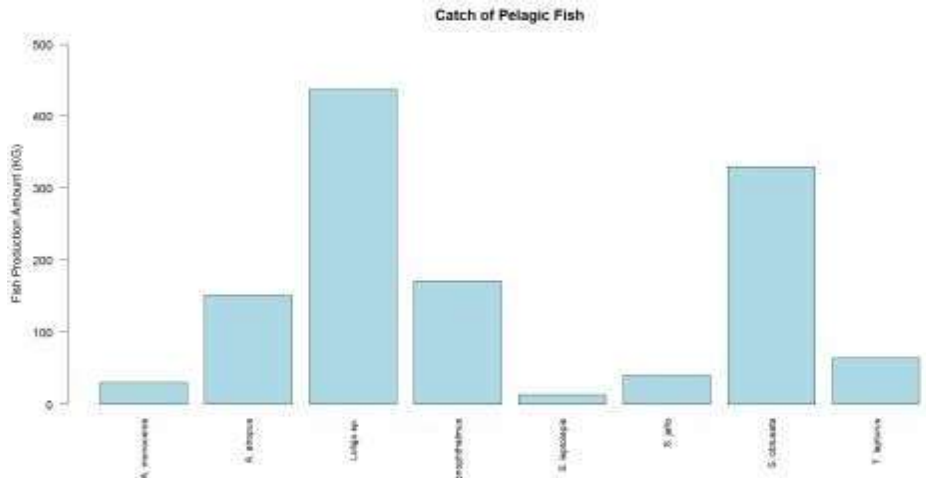

Figure 3. Pelagic Fish Catches

1. 3.2 Fishing Grounds

The fishing grounds were generally located in the Java Sea, specifically in the waters between northern Bawean Island and southern Kalimantan (Figure 4), at a depth of approximately 60 meters. The selection of fishing grounds was influenced by weather conditions, seasonal variations, and coordination with other vessels. The fishing area affects several operational aspects, including setting time, travel duration, and the total cost of supplies required for the fishing trip. The operational expenses for a 15-day fishing trip were estimated at around IDR 90,000,000. Fishing activities were conducted from sunrise to sunset (06:00–17:00 local time), during which net deployment and hauling (*setting–hauling*) were carried out 11 times, each lasting about 1 to 1.15 hours. The fishing crew consisted of approximately 20 members.

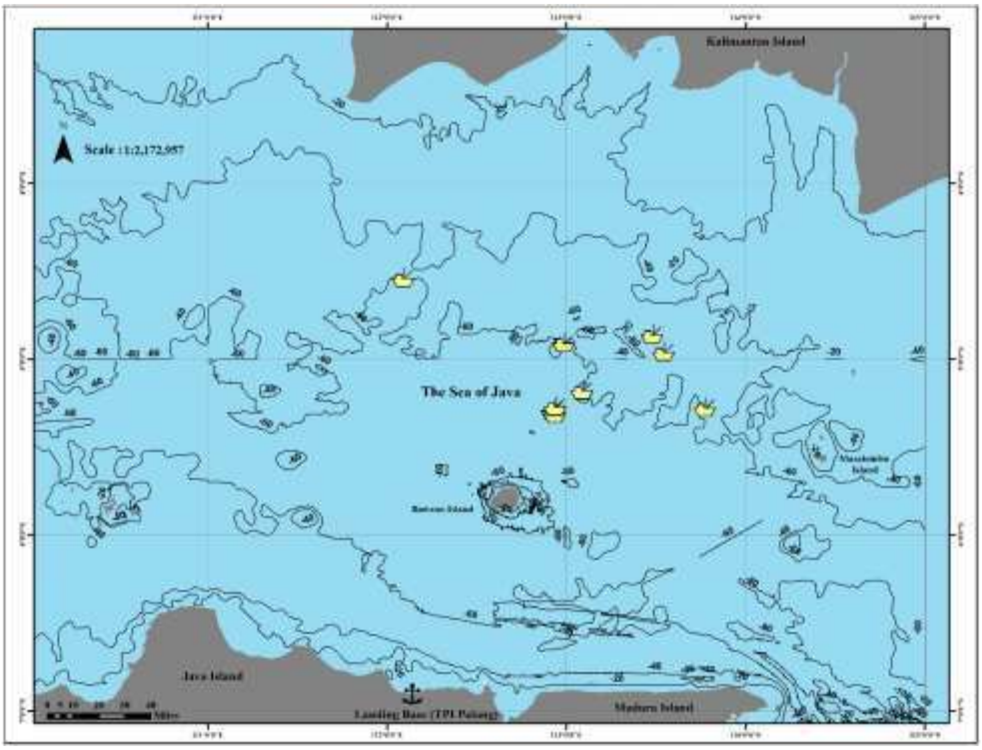

Figure 4. Fishing Area

3.3 Fishing Trip Income

In a single fishing trip, the species *Priacanthus tayenus* (Swanggi) contributed a catch of 4,716 kg, or 4.7 tons, with an economic value of approximately IDR 40,849,000. The species *Loligo* sp. (squid) contributed 437 kg, with a monetary value of around IDR 21,194,000. *Priacanthus tayenus* (Swanggi) and *Loligo* sp. (squid) had relatively higher market prices compared to other species. In contrast, the price of *Rhynchobatus* sp. (guitarfish) was determined by the size of its fins rather than its total body weight. The total income generated from one fishing trip was approximately IDR 157,581,250, with the detailed composition presented in Table 2 and Figure 5.

Table 1. Fishery Revenue Report

No	Species	Quantity (kg)	Total	
1	*Abalistes stellatus*	221	IDR	1,371,000.00
2	*Aluterus monoceros*	30	IDR	1,265,000.00
3	*Atropus atropos*	151	IDR	2,935,000.00
4	*Diagramma labiosum*	89	IDR	1,165,000.00
5	*Epinephelus sexfasciatus*	149	IDR	1,514,000.00
6	*Gymnocranius griseus*	106	IDR	589,000.00
7	*Loligo sp*	437	IDR	21,194,000.00
8	*Lutjanus carponotatus*	58	IDR	522,000.00

9	*Maculabatis gerrardi*	4	IDR	112,000.00
10	*Nemipterus balinensoides*	870	IDR	10,656,000.00
11	*Nemipterus furcosus*	7	IDR	105,000.00
12	*Nemipterus virgatus*	2403	IDR	21,402,250.00
13	*Neotrygon orientalis*	223	IDR	3,554,000.00
14	*Parupeneus heptacanthus*	39	IDR	600,000.00
15	*Pentapodus setosus*	415	IDR	3,561,000.00
16	*Pentaprion longimanus*	184	IDR	1,567,000.00
17	*Priacanthus tayenus*	4716	IDR	40,849,000.00
18	*Psettodes erumei*	91	IDR	2,002,000.00
19	*Rhynchobatus sp*	300	IDR	17,400,000.00
20	*Saurida tumbil*	306	IDR	3,060,000.00
21	*Scolopsis taenioptera*	552	IDR	3,603,000.00
22	*Selar crumenophthalmus*	171	IDR	1,797,000.00
23	*Selaroides leptolepis*	13	IDR	101,000.00
24	*Sphyraena jello*	40	IDR	1,202,000.00
25	*Sphyraena obtusata*	330	IDR	6,793,000.00
26	*Trichiurus lepturus*	64	IDR	831,000.00
27	*Upeneus sundaicus*	1134	IDR	7,831,000.00
	Grand Total	13103	IDR	157,581,250.00

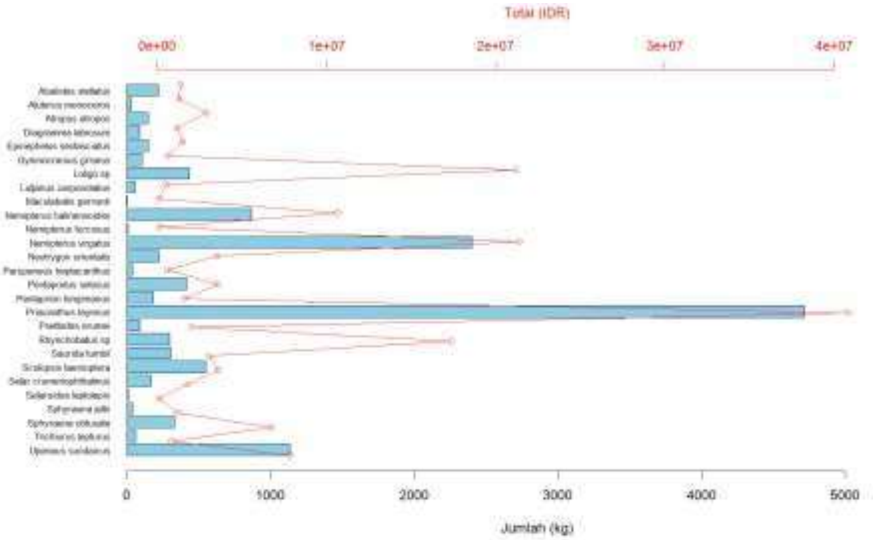

Figure 5. Economic Value per Fishing Trip

The contribution of each species to the total economic income of fishers is presented in Figure 6. Based on catch volume and economic value, the species contributing more than 10% to the total income included *Priacanthus tayenus*, *Nemipterus virgatus*, *Loligo* sp., and *Rhynchobatus* sp.

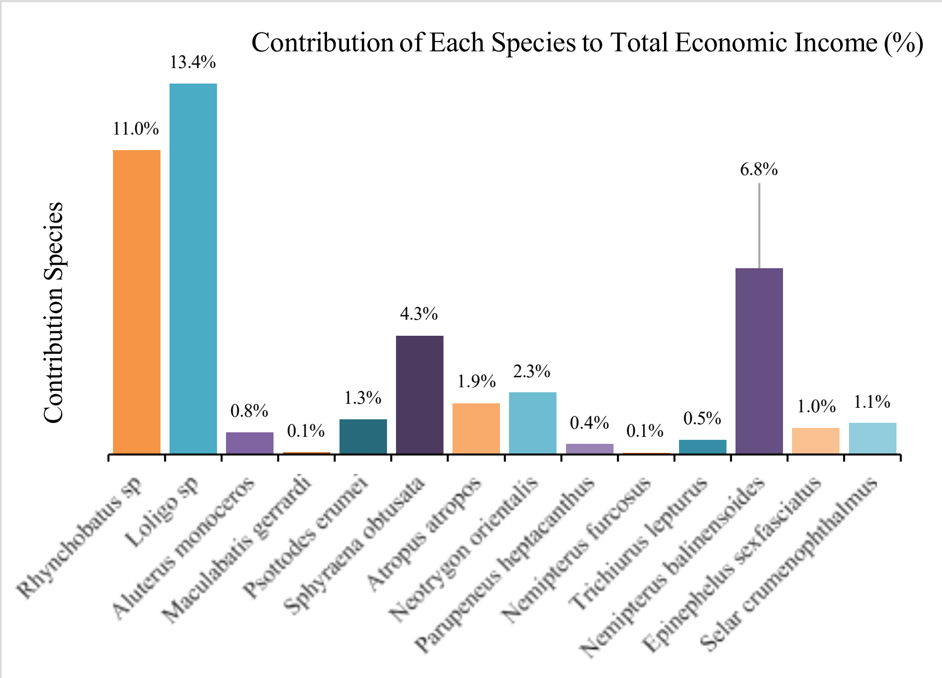

Figure 6. Contribution of Each Species to Total Economic Income (%)

From an economic perspective, *Priacanthus tayenus* and *Nemipterus virgatus* were the most abundant catch species but had relatively low prices per kilogram. In contrast, species such as *Rhynchobatus* sp., *Loligo* sp., and *Aluterus monoceros* were caught in smaller quantities yet had higher prices per kilogram. The profitability analysis of the fishing operations at the Palang Fish Landing Base (PPI Palang) is presented in Table 3. The resulting R/C ratio value was greater than 1, indicating that the fishing activities conducted by fishers per trip were profitable

Table 2. Profitability of the fisheries business at the study location

Revenue (R)	Operating Costs (C)	Net Profit (Per trip)	R/C
IDR 157.601.500,00	IDR 90.000.000,00	IDR 67.601.500,00	1,75

Discussion

The results indicate that the *Jaring Tarik Berkantong* (JTB) fishery at the Palang Fish Landing Base (PPI Palang), Tuban Regency, is dominated by demersal species, contributing more than 90% of the total biomass. This dominance pattern aligns with the findings of Waters et al. (2010) in Brondong and Lelono et al. (2021) in Fisheries

Management Area (WPP) 712, both of which also reported a high proportion of demersal fish in bottom trawl fisheries. This phenomenon reflects the ecological characteristics of the northern coastal waters of East Java, which are predominantly composed of muddy-sand substrates at moderate depths (20–60 m) — the primary habitat for demersal species (Mardhotillah et al., 2024). However, the strong dominance of demersal species may also indicate a decline in pelagic stocks, which were historically more abundant, as described by Sibert et al. (2021) through the concept of *shifting baselines*. In other words, the sustainability of the JTB fishery in Tuban needs to be critically evaluated to prevent further imbalance in the fish community structure of the Java Sea.

One of the most evident indications of this situation is the capture of *Rhynchobatus sp.*, a wedgefish species classified as Critically Endangered by the IUCN (Kyne et al., 2020). Although the catch volume of *Rhynchobatus sp.* is relatively small compared to other demersal species, its market value is considerable, particularly due to the high price of certain body parts, such as fins. Its total economic value reached over IDR 17 million from approximately 300 kg of catch. This condition illustrates a tangible conflict between short-term economic incentives and long-term conservation needs. A similar pattern was observed by White et al. (2013), who reported that the exploitation of vulnerable species often persists due to strong market demand, even in the presence of legal restrictions or prohibitions. If such practices continue, local extinction of wedgefish populations is highly probable, considering their low reproductive rate and long life cycle, which makes recovery particularly slow.

From a socio-economic perspective, the income generated by the vessel *KM. MAYOR 2*, amounting to approximately IDR 157.5 million per fishing trip, indicates that the Jaring Tarik Berkantong (JTB) fishery remains a major economic backbone for coastal fishers in Tuban. However, the heavy dependence on a few key species—such as *Priacanthus tayenus*, *Loligo sp.*, and *Rhynchobatus sp.*—renders this economic system highly vulnerable. Any decline in the stocks of these high-value species would have a direct and significant impact on fishers' income. A similar pattern was identified by Nur et al. (2014), who noted that small-scale fishing fleets in Indonesia often operate with limited target species diversity, making them particularly susceptible to stock fluctuations.

The management implications of these findings are evident. First, it is essential to designate restricted fishing zones in benthic areas that serve as key habitats for demersal species, particularly in regions vulnerable to degradation. These zones could be established based on depth criteria (e.g., >40 m) or on specific locations identified as spawning grounds. Second, the implementation of minimum catch size regulations, especially for target species such as *Nemipterus* and *Priacanthus,* is necessary to ensure the sustainability of recruitment stocks. Third, modifications to the JTB gear are crucial, for instance, through the installation of Bycatch Reduction Devices (BRDs) or escape panels to reduce the capture of non-target and juvenile fish. Fourth, a seasonal fishing regulation based on the reproductive cycles of key demersal species should be developed to protect spawning periods and enhance long-term stock resilience.

Thus, this discussion emphasizes that the JTB fishery in Tuban stands at a crossroads between economic interests and conservation priorities. The findings of this study reinforce the urgency of implementing an Ecosystem-Based Fisheries Management (EBFM) approach that integrates ecological, socio-economic, and species conservation dimensions to ensure the long-term sustainability of coastal fisheries in the region.

CONCLUSION

Fishing activities, generally conducted over 15 days in the Java Sea (WPP 712), yielded a total production of 13 tons, dominated by demersal species, particularly *Priacanthus tayenus* (Swanggi fish) as the main catch. This finding indicates that small-scale fishing operations are highly dependent on demersal fish stocks, which serve as a critical foundation for the sustainability of local fisheries. Economically, the total sales value of the catch exceeded IDR 157 million, highlighting the significant contribution of fishing activities to fishermen's income and their livelihoods. However, the dominance of certain species in the catch also reflects potential pressure on key stocks that must be continuously monitored. To support sustainable management, it is necessary to strengthen resource utilization control in the Java Sea, including regulating fishing efforts and protecting demersal fish habitats. Furthermore, future research should focus on long-term evaluations of target fish stocks, socio-economic assessments involving a larger number of fishing vessels, and the potential integration of ecosystem-based fisheries management policies within WPP 712.

REFERENCE

Ardiyani, W.J., Iskandar, B.H., Wisudo, W.H. (2019). Estimasi Jumlah Kapal Penangkap Ikan Optimal di WPP 712 berdasarkan Potensi Sumber Daya Ikan. *Albacore*. 3(1):95-104.

Baihaqi, M. R. (2023). Kerangka Konseptual Pelabuhan Perikanan Hijau Berkelanjutan Menuju Pembangunan Maritim Berkelanjutan. Institut Teknologi Sepuluh Nopember.

Joesidawati, M. I., & Suntoyo, S. (2017). Shoreline Changes in Tuban District in East Java Caused by Sea Level Rise Using Bruun Rule and Hennecke Methods. *Applied Mechanics and Materials*, *862*, 34–40.

Kyne, P. M., et al. (2020). The thin edge of the wedge: Extremely high extinction risk in wedgefishes and giant guitarfishes. bioRxiv. https://doi.org/10.1101/534859

Lelono, T. D., Rahman, M. A., Bintoro, G., Setyowati, N. H., & Wulandari, N. N. (2021). Kondisi Unggulan Sumberdaya Pelagis Kecil Berdasarkan Data Di Wilayah

Pengelolaan Perikanan Negara Republik Indonesia (Wppnri) 712 Dan 573 Tahun 1990–2017 Provinsi Jawa Timur Dalam Rangka Pengelolaan Yang Berkelanjutan Leading Condition Of Small Pelagic R. *Journal of Aquaculture Science*, *6*, 61–76.

Mardhotillah, A. F,, Hartoko A,, Fitri A.D.P. (2024). Management and protection of the Rhinidae family in the Java Sea, Indonesia. AACL Bioflux. 17(1):315-330.

Mbato, I., Nurdiana., Riani, I. 2020. Analisis Usaha Nelayan Bagan Apung Di Desa Kaleroang Kecamatan Bungku Selatan Provinsi Sulawesi Tengah. *Sosial Ekonomi Perikanan*. 5(4), 265-276.

Munir, M., & Priyantika, D. B. (2024). Persepsi Nelayan Jaring Tarik Berkantong terhadap Peraturan Pemerintah Nomor 11 Tahun 2023 di Pelabuhan Perikanan Nusantara Brondong Lamongan: Pocket Drag Net Fishermens Perception of PP Number 11 of 2023 at Brondong Lamongan Fishing port. *Journal Miyang: Ronggolawe Fisheries and Marine Science Journal*, *4*(2), 38–45.

Nasution, I., & Rosanti, R. (2020). Pengaruh Bekerja Dari Rumah (Work From Home) Terhadap Kinerja Karyawan BPKP. *Journal Budgeting*, *1*(1), 9–14.

Nur, A.I., Boer, M., Bengen, D.G., Subandar, A. (2014). Analisis Performa Ekonomi Perikanan Cakalang Skala Sedang di ZEE Samudera Hindia. *Jurnal Bisnis Perikanan*. 1(1):1-16.

Purwaningsih, S. T. (2018). Analisis Keberlanjutan Pengelolaan Sumberdaya Ikan Swanggi (Priacanthus Sp) Di Pelabuhan Perikanan Nusantara (Ppn) Brondong Lamongan Jawa Timur. Universitas Brawijaya.

Rachmawati, N., Haryono, E., & Syaifuddin, M. (2020). Karakteristik Habitat Ikan Demersal di Laut Jawa Berdasarkan Data Penangkapan. Jurnal Ilmu dan Teknologi Kelautan Tropis, 12(1), 63–74.

Sibert, J., Senina, I., Lehodey, P., & Hampton, J. (2021). Shifting ecological baselines and the resilience of tropical demersal fisheries. Fisheries Research, 235, 105825.

Susaniati, W., Nelwan, A. F. P., & Kurnia, M. (2013). Produktivitas daerah penangkapan ikan bagan tancap yang berbeda jarak dari pantai di perairan Kabupaten Jeneponto. *Jurnal Akuatika Indonesia*, *4*(1), 245428.

Waters, L. R., Riyanto, M., Purbayanto, A., Mawardi, W., & Suheri, N. (2010). Kajian Teknis Pengoperasian Cantrang di Perairan Brondong, Kabupaten Lamongan, Jawa Timur.

White, W. T., Last, P. R., & Pogonoski, J. J. (2013). Demersal ichthyofauna of the Eastern Indian Ocean. Zootaxa, 3712(1), 1–40.

Yin, R. K. (2018). Case Study Research and Applications : Design and Methods. SAGE.