Mantis Journal of Fisheries
Volume 2, Issue 3, December 2025: 150-159 ISSN: 3063-8887
https://online-journal.unja.ac.id/manthis

Analysis of the Composition and Community Structure of Fish *Trawl* Catches in the Waters of East Muara Sabak, East Tanjung Jabung Regency

Analisis Komposisi dan Struktur Komunitas Hasil Tangkapan *Trawl* Ikan Di Perairan Muara Sabak Timur Kabupaten Tanjung Jabung Timur

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Received: October 6th 2025/Accepted: December 12th 2025
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DOI: 10.22437/mjf.v2i03.48798

ABSTRACT

East Tanjung Jabung Regency is part of Jambi Province and is directly adjacent to the sea. This study aims to determine the composition and structure of the trawl catch community. The research was conducted in Lambur Luar Village, East Muara Sabak District, East Tanjung Jabung Regency, Jambi Province, on March 19-May 25, 2025. The method used in this study is a survey method with purposive sampling technique. The data obtained were analyzed on the composition of the catch, the proportion of the catch, the diversity, evenness, and dominance of the catch. The results of the study showed that there were 53 types of fish caught, the diversity index value was 1.915 (medium), the evenness index value was 0.480 (medium), and the dominance index value was 0.219 (low). From the results of the study, it can be concluded that 53 catches were obtained consisting of 3 main catches, 42 types of by catch, and 8 types of discards. The proportion of catches showed HTU of 3.07%, HTS of 57.14%, and HTB of 39.79%. The value of the diversity index is in the medium category, as well as the value of evenness which is also included in the medium category, while the dominance value is relatively low.

Keywords: composition, main, side, trawl,waste

ABSTRAK

Kabupaten Tanjung Jabung Timur termasuk wilayah Provinsi Jambi dan berbatasan langsung dengan laut. Penelitian ini bertujuan untuk mengetahui komposisi dan struktur komunitas hasil tangkapan *trawl*. Penelitian dilakukan di Desa Lambur Luar, Kecamatan Muara Sabak Timur, Kabupaten Tanjung Jabung Timur, Provinsi Jambi, pada tanggal 19 Maret -25 Mei 2025. Metode yang digunakan dalam penelitian ini adalah metode survei dengan teknik pengambilan sampel *purposive sampling*. Data yang diperoleh dianalisis komposisi hasil tangkapan, proporsi hasil tangkapan, keanekaragaman, keseragaman, dan dominansi hasil tangkapan. Hasil penelitian menunjukkan bahwa jenis ikan yang tertangkap sebanyak 53 jenis, Nilai indeks keanekaragaman adalah sebesar 1,915 (sedang), nilai indeks keseragaman yaitu 0,480 (sedang), dan nilai indeks dominansi yaitu sebesar 0,219 (rendah). Dari hasil penelitian dapat disimpulkan bahwa diperoleh 53 hasil tangkapan yang terdiri dari 3 jenis tangkapan utama, 42 jenis tangkapan sampingan, dan 8 jenis buangan. Proporsi hasil tangkapan menunjukkan HTU sebesar 3,07%, HTS sebesar 57,14%, dan HTB sebesar 39,79%. Nilai indeks keanekaragaman berada pada kategori sedang, demikian pula nilai keseragamannya yang juga termasuk kategori sedang, sedangkan nilai dominansinya tergolong rendah.

Kata Kunci: *trawl*, komposisi, utama, sampingan, buangan

INTRODUCTION

East Tanjung Jabung Regency is one of the regency in Jambi Province that borders directly with the sea. Geographically, this regency is located at coordinates 0°53' - 1°41' south latitude and 103°23' - 104°31' east longitude with a coastline of 191 km. This area has considerable marine and fishery resources. In 2020, the potential production of capture fisheries reached 23,491.54 tons with a water area of approximately 77,752 ha (Investment and One-Stop Integrated Service Agency, 2020). East Muara Sabak Subdistrict is an area with significant fishery potential in East Tanjung Jabung Regency. Lambur Luar Village is one of the centers of fishery activities in the region. Local fishermen use various types of fishing gear, including trawls, belats, gillnets, traps, kelongs, and rawai. According to research by Jarwanto et al., (2014), fishermen in Lambur Luar Village generally use trawls, with a recorded number of 120 trawl units.

Trawl is a bag-shaped fishing gear that is operated by being pulled by a boat moving along the seabed to catch fish and various other types of demersal fish (Ernawati and Sumiono, 2017). The main structure of a trawl consists of a cone-shaped or rectangular bag (cod end) that functions to hold the catch, and two wings connected to a towline (warp). The mechanism works when the net is pulled horizontally in the water, where the pressure of the water current keeps the mouth of the net open so that fish in its path enter and are trapped inside (Sudirman and Mallawa, 2004).

The trawl fishing process involves four main stages, including preparation, setting the net at the fishing location, towing the net in the water, and finally hauling the net to obtain the catch (Wardhani et al., 2012). Fish trawls are capable of producing a more diverse and varied catch. Although the use of trawls has been banned, many fishermen in Lambur Luar Village still operate this equipment in their fishing activities. This practice is illegal, as stipulated in Regulation of the Minister of Marine Affairs and Fisheries No. 2 of 2015 concerning the prohibition of the use of trawls and seine nets in the Fisheries Management Area of the Republic of Indonesia. Although the use of trawls has been banned, fishermen continue to use this fishing gear as the primary choice for most fishermen in the village because it is considered to be highly effective in obtaining abundant and diverse catches compared to other fishing gear. This view is one of the main factors that encourage fishermen to continue using trawls, even though their use has been banned or restricted.

In Lambur Luar Village, fishermen use two types of trawls, namely fish trawls and shrimp trawls. It is known that the main catch of fish trawls consists of white pomfret (*Pampus argenteus*), black pomfret (*Parastromateus niger*), and mackerel (*Scomberomorus guttatus*), while shrimp trawls generally produce catches of shrimp. Fish trawls in this village are mostly operated using boats with a capacity of around 5-7 gross tonnage (GT). The dominant type of trawl used by fishermen in the waters of Muara Sabak is the fish trawl. In addition to catching the target fish, this tool also has the potential to catch other marine organisms that are not the main target because they are also caught in the net bag.

Fish trawl catches show considerable variation, and information on the composition of fish trawl catches in the waters of East Muara Sabak is still very limited. Data related to catch types, structure, diversity levels, and catch dominance are important aspects needed to support the sustainable use of fishery resources. Therefore, this study aims to identify fish trawl catches in the waters of East Muara Sabak.

RESEARCH METHOD

This research was conducted in Lambur Luar Village, East Muara Sabak waters, East Tanjung Jabung Regency, Jambi Province, from March 19 to May 25, 2025. The location of fishing with trawl nets operated shown on the research map (Figure 1).

The research object was the catch from fish trawl fishing gear. The equipment used included a global positioning system (GPS), writing instruments, a camera for documentation, scales, calculators, and baskets for sorting the catch into main, secondary, and discarded categories. The research method applied was a survey method using purposive sampling, which involved selecting fishermen who used fish trawl gear. Data was obtained through observation and direct interviews in the field, then analyzed descriptively. Data collection was carried out by two fishermen

with 30 repeated fishing operations in the waters of East Muara Sabak.

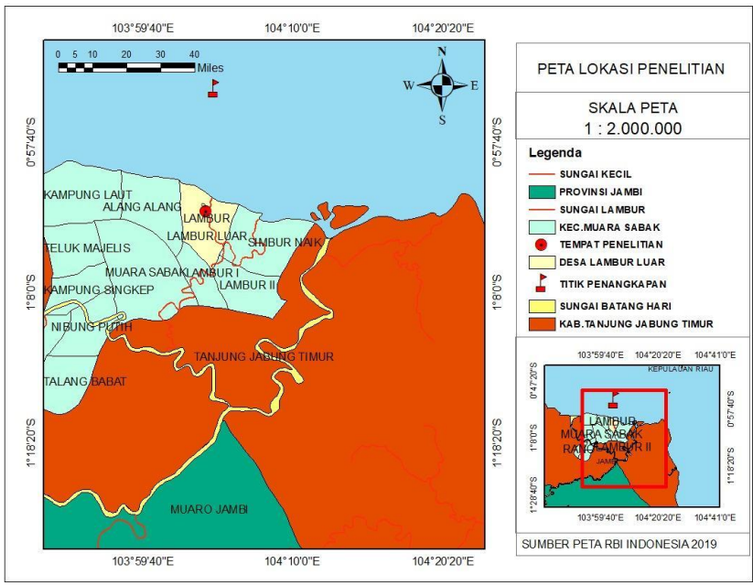

Figure 1. Location of research
Source: Data Processing

The data collected in this study consisted of primary and secondary data. Primary data was obtained directly from field research in the form of the type, quantity, and weight of fish caught by trawl. Meanwhile, secondary data included information on the population, area, number of fishing gear, and types of fishing gear used.

Data Analysis

1. Analysis of catch composition

Analysis of catch composition to identify the types of catch. According to Susaniati et al., (2013), the formula for catch composition is as follows:

$$KJ = \frac{ni}{N}\ x\ 100\%$$

Information:
KJ = Species composition (%)
ni = Number of catches (tails)
N = Total number of fish species caught (tails)

2. Analysis of catch proportions

The data analyzed, namely species composition and catch (main catch, bycatch, discards), was analyzed using descriptive analysis. To determine the percentage of the catch, the following formula was used:

$$Main\ Catch\ (\%) = \frac{Main\ Catch}{Total\ Catch}\ x\ 100\%$$

$$Bycatch\ (\%) = \frac{Bycatch}{Total\ Catch}\ x\ 100\%$$

$$Discard\ (\%) = \frac{Discard}{Total\ Catch}\ x\ 100\%$$

3. Diversity analysis

Diversity index calculations were performed using Microsoft Excel software with the Shannon-Wiener formula (Odum, 1996).

$$H' = \sum \frac{ni}{N}\ x \ln \frac{ni}{N}$$

Information:
H' = Diversity index (Shannon Index)
ni = Number of species caught.
N = Total number of catches

The criteria for the diversity index according to Safe'i et al., 2018), which are grouped into 3 categories, can be seen in Table 1.

Table 1. Diversity Index Values

Diversity Index Values (H')	Diversity Category
<1	Low
1-2	Medium
>2	High

4. Evenness Analysis

Evenness can be defined as balance, namely the composition of individuals of each species found in a community. Evenness index formula (Fachrul, 2007).

$$E = \frac{H'}{H'max}$$

Information:
E = Evenness index
H = Diversity index
H' max = Maximum diversity index
S = Number of species

Index values and evenness categories according to (Nurafni et al., 2020) can be seen in Table 2.

Table 2. Index values and evenness categories

Evenness Index Values (E)	Evenness Category
$0.00 < E \leq 0.50$	Low
$0.50 < E \leq 0.75$	Medium
$0.75 < E \leq 1.00$	High

5. Catch dominance analysis

Dominance analysis was conducted to identify species dominance in catches using trawl gear. The dominance analysis process was carried out using Microsoft Excel software. Dominance was calculated using the Simpson Dominance Index formulated by (Odum, 1993), with the following formula:

$$D = \sum_{i=1}^{n} (\frac{ni}{N})^2$$

Information:
D = Dominance index
N = Number of species
Ni = Number of individuals of species i
N = Total number of individuals

The dominance index values and categories are grouped into three categories, as shown in Table 3.

Table 3. Dominance Index and Categories

Dominance Index Value (D)	Dominance Category
< 0.4	Low
≥ 0.4	Medium
≥ 0.6	High

RESULTS AND DISCUSSION

Composition of Catch

Trawl gear with a mesh size of 1 inch. operated at a depth of 10-25 meters in the waters of Muara Sabak Timur in 30 catches. produced a variety of catches. which can be seen in full in Table 4.

Table 4. Composition of Catch

No	Scientific Name	Number of Fish	Fish (%)	Weight (kg)	Weight (%)	Notes
1	*Scomberomorus guttatus*	649	0.487	383.2	5.620	HTU
2	*Pampus argenteus*	1.040	0.780	255.7	3.753	HTU
3	*Parastromateus niger*	2.398	1.799	588.2	8.632	HTU
4	*Eleutheronema tetradactylum*	192	0.144	266.7	3.914	HTS
5	*Tenualosa toli*	702	0.527	155	2.275	HTS
6	*Crenimugil seheli*	14.838	11.133	1030.5	15.124	HTS
7	*Hemitrygon akajei*	31	0.023	251.5	3.691	HTS
8	*Ilisha megaloptera*	3.378	2.535	259	3.801	HTS
9	*Lates calcarifer*	22	0.017	90.5	1.328	HTS
10	*Labotes surinamensis*	25	0.019	102	1.497	HTS
11	*Trichiurus lepturus*	218	0.164	29	0.426	HTS
12	*Thunnus obesus*	6.424	4.820	295	4.329	HTS
13	*Nibea soldado*	977	0.733	193.5	2.840	HTS
14	*Anadontosoma chacunda*	442	0.332	33	0.484	HTS
15	*Chirocentrus dorab*	72	0.054	46.5	0.682	HTS
16	*Scatophagus argus*	190	0.143	56	0.822	HTS
17	*Johnius carouna*	2.990	2.243	299	4.388	HTS
18	*Psettodes erumeri*	50	0.038	9	0.132	HTS

No	Scientific Name	Number of Fish	Fish (%)	Weight (kg)	Weight (%)	Notes
19	*Muarenesox cinereus*	29	0.022	48	0.704	HTS
20	*Rastrelliger kanagurta*	1.880	1.411	155.5	2.282	HTS
21	*Polydactylus nigripinnis*	19	0.014	111	1.629	HTS
22	*Chorinemus tala*	6	0.005	40	0.587	HTS
23	*Alectis indica*	86	0.065	7	0.103	HTS
24	*Platycephalus indicus*	14	0.011	18	0.264	HTS
25	*Spyraena barracuda*	19	0.014	14.5	0.213	HTS
26	*Carcharodon carcharias*	2	0.002	13	0.191	HTS
27	*Escualosa thoracata*	42.819	32.128	666.5	9.782	HTS
28	*Puntius lateristiga*	41	0.031	8	0.117	HTS
29	*Sepia recurvirostra*	314	0.236	22	0.323	HTS
30	*Octopoda*	26	0.020	3.5	0.051	HTS
31	*Hippocampus bargibanti*	35	0.026	0.075	0.001	HTS
32	*Plicofollis tonggol*	30	0.023	108	1.585	HTS
33	*Harpiosquilla raphidea*	45	0.034	0.98	0.014	HTS
34	*Penaeus merguiensis*	12	0.009	0.69	0.010	HTS
35	*Harpodon neherus*	10	0.008	2	0.029	HTS
36	*Trachurus*	2	0.002	5	0.073	HTS
37	*Portunus pelagicus*	180	0.135	10	0.147	HTS
38	*Plecoglossus altivelis*	4	0.003	0.4	0.006	HTS
39	*Selaroides leptolepis*	13	0.010	1	0.015	HTS
40	*Portunus pelagicus*	4	0.003	0.9	0.013	HTS
41	*Pterois volitans*	5	0.004	0.4	0.006	HTS
42	*Paraplotosus albilabris*	3	0.002	8	0.117	HTS
43	*Hemiramphidae*	1	0.001	1.3	0.019	HTS
44	*Himantura uarnak*	1	0.001	14	0.205	HTS
45	*Hexanematichthys sagor*	4	0.003	16	0.235	HTS
46	*Aratutron nigropunchtatus*	238	0.179	62	0.910	HTB
47	*Chonehinos naritus*	79	0.059	102	1.497	HTB
48	*Hydrophidae sp*	183	0.137	21.2	0.311	HTB
49	*Scyphozoa*	159	0.119	300	4.403	HTB
50	*Thryssa mystax*	40.383	30.300	421	6.179	HTB
51	*Gazza minuta*	11.975	8.985	288	4.227	HTB
52	*Nucella lamellosa*	16	0.012	4	0.059	HTB
53	*Carcinoscorpius rotundicauda*	2	0.002	0.7	0.010	HTB
	Total	133.277		6817.94		

Source: Data Processing

Table 4 shows that trawl fishing gear in the waters of East Muara Sabak recorded 53 species with a total of 133.277 fish and a total weight of 6.817.94 kg. The main types of catch consisted of *Scomberomorus guttatus, Pampus argenteus, and Parastromateus niger*. Meanwhile bycatch included various types of fish and marine life including *Eleutheronema tetradactylum, Tenualosa toli, Crenimugil seheli, Hemitrygon akajei, Ilisha megaloptera, Lates calcarifer, Labotes surinamensis, Trichiurus lepturus, Thunnus obesus, Nibea soldado, Anadontosoma chacunda, Chirocentrus dorab. Scatophagus argus, Jhonius carouna, Psettodes erumei, Muarenesox cinereus, Rastrelliger kanagurta, Polydactylus nigripinnis. Chorinemus tala, Alectis indica, Platycephalus indicus, Sphyraena barracuda, Carcharodon carcharias, Escualosa thoracata, Puntius lateristiga, Sepia recurvirosta, Octopoda, Hippocampus bargibanti, Plicofollis tonggol, Harpiosquilla raphidea, Penaeus marquiensis, Harpodon nehereus, Trachurus, Portunus pelagicus, Plecoglossus altivelis, Selaroides leptolepis, Portunus pelagicus, Pterois volitans, Paraplotosus albilabris, Hemiramphidae, Himantura uarnak,* and *Hexanematichthys sagor,* The discarded catch consisted of *Aratoturon nigropunctatus, Chonerhinos naritus, Hydrophidae* sp., *Scyphozoa, Thryssa mystax, Gazza minuta, Nucella lamellosa, and Carcinoscorpius rotundicauda,*

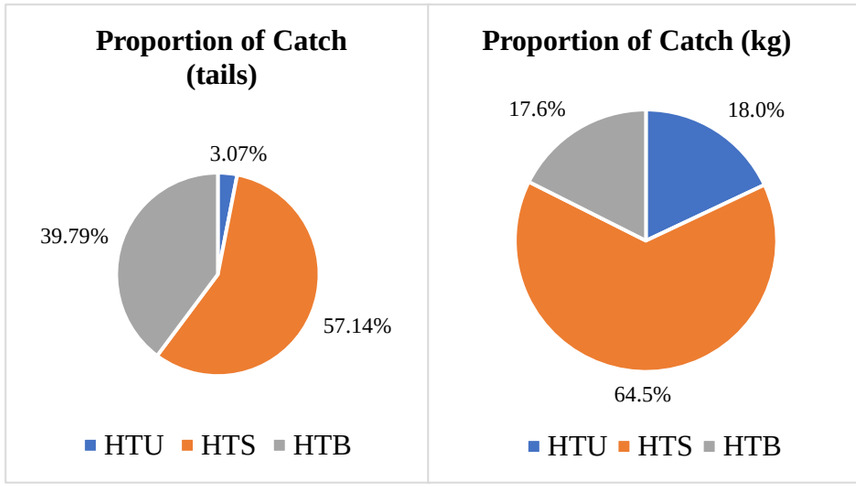

Figure 2. Proportion of Catch
Source: Data Processing

The diversity of species caught is due to the similarity in habitat between target fish and non-target organisms (Sarmintohadi. 2002). This differs from the research conducted by (Saad. 2012) in the waters of Tarakan City. which reported that the use of trawls at a depth of 18–20 meters resulted in a main catch of *Pampus argenteus*, squid, *Harpadon nehereus*, *Croaker*, *cuttlefish*, *and Ilisha elongata*.

Proportion of Catch

The proportion of catch in the form of a diagram with tail and weight categories can be seen in Figure 2. Based on the Figure 2. there is a difference in proportion between the main catch (HTU). bycatch (HTS). and discards (HTB) in the use of fish trawls. Of the three categories. HTS shows the most dominant proportion compared to HTU and HTB. The species with the highest catch is anchovy. which was recorded at 42.819 fish. Anchovies are included in the HTS category. as this species generally inhabits coastal areas. Anchovies live at depths of 10–25 meters. which is an area rich in plankton as their main food source (Nasution et al. 2015).

The high percentage of bycatch compared to primary catch is due to trawling not being carried out during the fishing season and the location of operations being in coastal waters about 5 miles from the shore. As an active fishing gear that works by sweeping the seabed and has a low level of selectivity. trawling has the potential to catch various organisms that are not the main target. This condition results in many non-target biota being caught during the fishing process (Luthfiani et al.. 2018).

Maincatch Results

The total catch amounted to 4.087 fish with a total weight of 1.227.1 kg. Commodities included in this category have high economic value. including mackerel (Scomberomorus guttatus). white pomfret (*Pampus argenteus*). and black pomfret (*Parastromateus niger*). These three species are the main targets of fishing activities because they have relatively high selling prices in the market. According to Fauzi and Syahrir (2022). the main catch (HTU) is defined as the group of species that are the main targets of fishing activities. The selection of these species is based on their high economic value. sufficient stock availability. and high market demand.

The main catch consists of species that are specifically targeted by fishermen in their fishing activities. mainly because they have high economic value and significant market demand. In contrast. bycatch is a group of species that are accidentally caught during the operation of fishing gear and are not the main target of fishing (Saputra et al.. 2021). In addition to the main catch. there are also a number of species that fall into the bycatch category but still have economic value. including kuro fish (*Polydactylus nigripinnis*). senangin fish (*Eleutheronema tetradactylum*). mackerel (*Rastrelliger kanagurta*). blue swimmer crab (*Portunus pelagicus*). and white snapper (*Lates calcarifer*).

Bycatch Result

Bycatch (HTS) in trawl fishing refers to species that are not the main target of fishing. Generally. HTS consists of juvenile demersal fish and various other marine organisms that are accidentally

caught during the fishing process (Putri et al., 2024). Bycatch (HTS) is a group of aquatic biota that is caught along with the main catch. but is not included in the target species that is the main focus of fishing activities (Nugraha and Setyadji. 2013). The high proportion of bycatch that is not included in the target species is due to the use of trawls that are not equipped with selection devices. such as fish separation devices (API) or bycatch reduction devices (BRD). This results in non-target organisms being caught along with target species. because the trawls used have low selectivity in terms of both size and type of biota that enter the net bag (Rofiqo et al., 2019).

One of the main causes of bycatch is the accidental capture of organisms during the fishing process. which is generally influenced by the ecological relationship between target species and non-target species in the same aquatic ecosystem (Watson and Kerstetter. 2006). Bycatch with low economic value is generally not fully utilized because fishermen focus more on managing target species that have a high selling price. Non-economic organisms are often thrown back into the sea due to limited storage facilities (Barokah et al., 2017).

Discard Result

Discards from trawl fishing operations generally consist of small fish and species with low economic value or no market value. This occurs because the organisms caught do not provide economic benefits to fishermen. Therefore. discards are usually not utilized and are generally released back into the sea. either alive or dead. This is in line with the opinion of Nugraha et al., (2024). who define discards as organisms that are caught but have no economic value. This group generally consists of very small fish. species that are unfit for consumption. and biota that have been damaged by the fishing gear operation process.

Diversity, Evenness and Dominance

The diversity. Evenness. and dominance index values can be seen in Table 5.

Table 5, Diversity Index (H'), Evenness Index (E), Dominance Index (D)

Index	Value	Category
Diversity (H’)	1.915	Medium
Evenness (E)	0.480	Medium
Dominance (D)	0.219	Low

Source: Data Processing

The diversity index (H) value obtained was 1.915, indicating that the level of species diversity in the waters of East Muara Sabak was in the moderate category. The evenness index (E) of 0.480 also indicated that the evenness of the fish community was in the moderate category. Meanwhile, the dominance index (D) was 0.219, which is classified as low. This is due to the relatively even distribution of species, so that no particular species dominates significantly.

A diversity index in the moderate category describes the relatively even distribution of organism populations within a community, reflecting a fairly stable ecosystem. According to Tambunan et al., (2013) and Pakpahan et al., (2024) the diversity index is a mathematical representation used as an analytical tool to assess community structure, particularly in examining the number of species and abundance of individuals in a region. The value of this index provides an indication of the level of biota diversity in an ecosystem, which also reflects community balance and environmental stability.

The evenness index reflects the level of ecological balance in a community. The higher the value of this index, the better the quality of the environment and the more suitable it is for organisms to live in. Evenness can be defined as a balanced distribution, namely the ratio of individuals between species that make up a community (Kharisma et al., 2012).

The calculation results show that the evenness index value is 0.48, which is in the moderate category. This condition indicates that the distribution of the number of individuals between species is relatively even so that no species dominates significantly. This is in line with the research by Arfiati et al., (2019), which used the evenness index as a parameter to evaluate the distribution pattern of individuals between species in an ecosystem community. If the E value is < 0.4, the ecosystem is categorized as being under stress with a low level of evenness,

which indicates a high dominance of certain species. An E value in the range of 0.4–0.6 indicates that the ecosystem is in an unstable condition with moderate evenness. where the distribution of individuals between species is not yet even. Conversely, an E value > 0.6 to close to 1 reflects a stable ecosystem with high evenness. characterized by a relatively even distribution of individuals from various species, thus describing a balanced community structure and good ecological conditions.

A low dominance index indicates that no single species significantly dominates the community. This condition reflects that the distribution of species within the community is fairly even. resulting in a balanced level of competition between populations. Low dominance indicates that no particular species extremely dominates the aquatic community, resulting in a relatively stable ecosystem structure. This situation also indicates that ecological pressures, whether in the form of habitat change, pollution. or anthropogenic activities, are at a low level or have no significant effect. Therefore, the aquatic environment can be categorized as healthy and supportive of the sustainable existence of various types of biota (Supriadi et al., 2015).

The waters of East Tanjung Jabung are in good condition for fishing activities. Ibadillah et al. (2024) stated in their research that these waters are in good condition. as indicated by a pH value in the range of 7–8 with an average of 7.5 and a stable water temperature between 27.5–30°C with an average of 28.7°C.

CONCLUSION

From the results of the study. it can be concluded that 53 catches were obtained. consisting of 3 main types of catches. 42 types of by-catches. and 8 types of discards. The proportion of catches showed HTU at 3.07%. HTS at 57.14%. and HTB at 39.79%. The diversity index value was in the moderate category. as was the evenness value. which was also in the moderate category. while the dominance value was classified as low.

RECOMMENDATIONS

Based on the results of the study. it is recommended that trawling activities in the waters of Muara Sabak Timur prioritize sustainability by increasing the selectivity of fishing gear to reduce bycatch and discards. regulating fishing seasons or zones during certain periods. and increasing awareness and training for fishermen on the use of more environmentally friendly gear. In addition. regular monitoring of catch composition and fish stock conditions is necessary. Conservation efforts for important habitats such as spawning grounds need to be considered in order to maintain ecosystem sustainability.

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