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Trophic Structure and Vulnerability of Fish Species Exploited by Bottom Gillnet in the Coastal Waters of Lambur Luar Village, Jambi, Indonesia

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ABSTRACT

Small-scale fisheries in coastal areas utilize various fishing gears, including bottom gillnet, which can catch fish species with different trophic levels. Fishing activities may influence the trophic structure of fish communities and the vulnerability of species to exploitation. This study aimed to analyze the trophic structure, vulnerability level, conservation status based on the IUCN Red List, and Mean Trophic Level (MTL) of fish species caught using bottom gillnet in the coastal waters of Lambur Luar Village, Tanjung Jabung Timur Regency. The study used a survey method with data collected through direct observation of fishermen's catches. Data analysis included catch species composition, trophic level values obtained from the FishBase database, vulnerability analysis of each species, identification of IUCN conservation status, and calculation of Mean Trophic Level (MTL) based on the proportion of catch composition. The results showed that the catches consisted of 20 species, with trophic groups dominated by mesopredators (50%) and top predators (25%), while omnivores and herbivores were found in smaller proportions. Vulnerability analysis indicated that most species were categorized as having low to moderate vulnerability, although several species showed high vulnerability to fishing pressure. Based on the IUCN Red List, most species were classified as Least Concern (LC). The calculated Mean Trophic Level (MTL) was 3.2, indicating that the catches were dominated by mid-level carnivorous fish species.

INTRODUCTION

Indonesia's coastal areas have enormous potential for fishery resources, boasting high levels of biodiversity and supporting both small-scale and industrial capture fisheries. The presence of fish resources in coastal areas is a key economic pillar for coastal communities and provides an important source of protein for the Indonesian population. Fishermen utilize various types of fishing gear, including bottom gillnets, which are widely used due to their simple construction, relatively low operational costs, and ability to catch a variety of demersal and pelagic fish species in coastal waters (Tawari *et al*., 2025).

Gillnet fishing gear is also known to have a fairly high level of efficiency in catching various fish species because it works based on the principle of size selectivity through the mesh, so it is widely used in small-scale fisheries in coastal areas of Indonesia *(Pramesthy et al*., 2020). However, the use of gillnets can produce catches consisting of various fish species with diverse compositions, including target and non-target fish, so that analysis of the community structure and composition of the catch is important to understand the dynamics of the fish resources being utilized (Miradni *et al*., 2024; Nasution *et al*., 2024).

Apart from species composition, studies on trophic levels are also important because trophic levels describe the position of organisms in the food chain and the flow of energy in aquatic ecosystems (Almohdar & Souisa, 2017). An imbalance in the utilization of fish resources at a certain trophic level can cause disruption to the structure of the ecosystem and has the potential to threaten the sustainability of capture fisheries if exploitation is carried out excessively (Aminah & Pratiwi, 2022).

Research on the composition of catches using gillnets in various regions of Indonesia shows that this fishing gear is capable of catching various species with varying levels of dominance and diversity depending on the condition of the aquatic environment and the characteristics of the fishing gear used (Purwanto *et al*., 2021). On the other hand, fishing activities using bottom gillnets also have the potential to put pressure on the bottom of the water ecosystem because the weight of the net comes into direct contact with the bottom of the water, which can affect the benthic habitat and the organisms that live around it (Paransa *et al*., 2017).

Jambi Province, particularly the coastal areas of East Tanjung Jabung Regency and its surrounding areas, is an area with quite intensive capture fisheries activity, utilizing various types of fishing gear, including bottom gillnets. This activity results in a diverse range of fish species being caught, making it important to study their ecology and trophic structure (Khairunissa *et al*., 2025). However, research specifically analyzing the trophic structure and vulnerability of fish species caught by bottom gillnets in Jambi's tropical coastal waters is still very limited. This information is crucial for understanding the role of species in food webs and assessing the potential impact of fishing on the balance of coastal ecosystems. Therefore, research on the trophic structure and vulnerability of fish species exploited by bottom gillnets in Lambur Luar Village, Jambi, is crucial as a basis for supporting sustainable capture fisheries management and maintaining the stability of coastal ecosystems.

METHODS

Time and Location of Research

This research was conducted in February–March 2025 in Lambur Luar village, Jambi Province, specifically in the fishing area of fishermen using bottom gillnets. The research location was chosen because this area is an active fishing area dominated by bottom gillnets.

Research Tools and Materials

The material used in this study is the bottom gillnet catch. The equipment used is a bottom gillnet fishing gear with each size of fishing gear used consisting of 45 pieces × 35m (1.575 m) and each unit has a length of 35 m, a net height of 1.5 m, a width of 1.5 m, and a mesh size of 3.5 inches, a camera, a millimeter block measuring tool, scales and stationery.

Research Methods

The method used during the implementation of this research is a survey method, with direct observation in the field and conducting interviews with fishermen and recording the catch of fish caught by bottom gillnet fishing gear, data collection was carried out at the place where fishermen sorted the catch. A survey is a list of written questions whose answers are recorded by respondents themselves (Sugiyono, 2013). The group of fishermen taken in this study were fishermen who used bottom gillnet fishing gear using stingray and malong fish bait operating in the waters of Lambur Luar Village. The method used for sampling was the purposive sampling method, with the criteria of fishermen who used a mesh size of 3.5 inches on the bottom gillnet fishing gear and then repeated each fishing gear 4 times as many as 10 fishermen.

Data Collection Technique

The data collection technique in this study was carried out through direct observation of fishing activities using bottom gillnet fishing gear in the coastal waters of Jambi. Data collection was carried out by following the fishing activities of fishermen on several fishing trips. All fish caught were collected and then separated by species for identification using fish identification books and relevant scientific references. The number of individuals for each fish species caught was recorded, then the total length was measured using a fish measuring board and weight was measured using a digital scale. The identified fish species were then matched with scientific databases such as FishBase to obtain information on the trophic level and vulnerability index of each species. This data was then used to analyze the trophic structure and vulnerability level of fish species caught by bottom gillnet fishing gear in the study area.

Data Analysis

1. Species Composition

Fish species composition is calculated to determine the percentage of each species in the total catch. Species composition is calculated using the formula (Khairunissa *et al*., 2025):

$$\mathrm{Ki} = \frac{\mathrm{n_i}}{\mathrm{N}} \mathrm{x}\ 100\%$$

Where:

Ki = species composition (%)
ni = number of individuals of the i-th species
N = total number of individuals of all species

2. Trophic Level Analysis

Trophic level analysis is performed to determine the position of each fish species in the food chain. Trophic level values are obtained from the FishBase database. Based on these values, fish species can be categorized into trophic groups such as herbivores, omnivores, or

carnivores. Trophic structure analysis is essential for understanding aquatic ecosystems and the role of each species in the food web (Malek *et al*., 2016).

Table 1. Tropical Level Category

Trophic Level Range	Trophic Category	Characteristics of Organisms
TL < 2.5	Herbivores / Detritivores	Consuming phytoplankton, algae, or detritus
2.5 – 3.4	Omnivore	Consuming plants and small animals
3.5 – 4.0	Intermediate Carnivore	Consume crustaceans, mollusks, and small fish
> 4.0	High-Level Predator	Consuming fish and other large organisms

3. Species Vulnerability Index Analysis

The vulnerability of fish species to fishing pressure was analyzed using a vulnerability index obtained from the FishBase database. The vulnerability index reflects the sensitivity of a fish species to fishing exploitation. The vulnerability index is widely used as an indicator to assess the risk of exploitation and the conservation status of fish species in fisheries (Coll *et al*., 2016). Species vulnerability categories can generally be grouped as follows:

Table 2. Species Vulnerability Category

Vulnerability Value	Category
< 30	Low
30 – 50	Currently
50 – 70	Tall
> 70	Very high

4. IUCN Conservation Status

The conservation status of fish species was analyzed based on the IUCN Red List. The conservation status of fish species in this study was analyzed based on categories established by the IUCN Red List. These categories are used to assess the level of threat to a species based on population size, geographic distribution, and the rate of population decline in the wild (IUCN, 2024). Conservation status data was used to determine the level of threat to captured fish species. Conservation status categories include:

Table 3. Conservation Status Categories

Category	Abbreviation	Description
Extinct	EX	The species has become extinct and is no longer found in nature or captivity.
Extinct in the Wild	EW	Species found only in captivity or outside their natural habitat.
Critically Endangered	CR	Species facing a very high risk of extinction in nature.
Endangered	EN	The species faces a very high risk of extinction in the near future.
Vulnerable	VU	Species are at high risk of extinction in the wild.
Near Threatened	NT	The species is close to meeting the criteria for threatened with extinction in the near future.

Category	Abbreviation	Description
Least Concern	LC	Species with low risk of extinction and relatively stable populations.
Data Deficient	DD	Information on the species is insufficient to assess its conservation status.
Not Evaluated	NE	The species has not been evaluated for conservation status by the IUCN.

5. Mean Trophic Level (MTL)

Mean Trophic Level (MTL) is used to determine the average trophic level of all fish species caught. The MTL value is calculated using the following formula (Su *et al*., 2021):

$$\mathrm{MTL} = \frac{\sum(\mathrm{TL_i x\ Y_i})}{\sum \mathrm{Y_i}}$$

MTL = Mean Trophic Level
TLi = trophic level of the i-th species
Yi = number of individuals of the i-th species

The MTL value is used to describe the trophic structure of fisheries catches. A high MTL value indicates the dominance of high-trophic-level species (predators), while a low MTL value indicates the dominance of low-trophic-level species.

RESULTS

Fish Species Caught by Bottom Gillnet

Identification of fish species caught by bottom gillnet fishing gear can provide information on species diversity and catch composition. In this study, species identification was carried out on all organisms caught during the fishing process using bottom gillnet fishing gear in the waters of Lambur Luar Village. Each captured species was then analyzed to determine the catch composition and its ecological characteristics, such as trophic level value, vulnerability, and conservation status based on the IUCN Red List. The distribution of caught species is presented in Table 4.

Table 4. Trophic Guild Distribution of Species Caught by Bottom Gillnet

No	Species	Composition (%)	Trophic Level	Trophic Guild	Vulnerability	IUCN Status
1	*Harpiosquilla raphidea*	21.61%	1.32–1.68	Detritivore / Benthos feeder	19	LC
2	*Platycephalus indicus*	10.56%	3.6	Carnivores	37	LC
3	*Parastromateus niger*	3.14%	2.9	Omnivore	35	LC
4	*Pampus argenteus*	1.45%	3.3	Omnivore	31	LC
5	*Ilisha elongata*	1.05%	3.8	Carnivores	34	LC
6	*Pterotolithus maculatus*	1.87%	3.7	Carnivores	42	LC

No	Species	Composition (%)	Trophic Level	Trophic Guild	Vulnerability	IUCN Status
7	*Johnius trachycephalus*	12.30%	3.4	Omnivore	10	LC
8	*Cynoglossus lingua*	7.06%	3.5	Carnivores	35	LC
9	*Lutjanus campechanus*	0.68%	3.9	Carnivores	54	VU
10	*Arius venosus*	0.61%	4.0	Carnivores	20	LC
11	*Chirocentrus dorab*	1.28%	4.4	Predator	73	LC
12	*Telatrygon zugei*	5.43%	3.5	Carnivores	90	VU
13	*Chiloscyllium arabicum*	5.64%	4.1	Predator	56	NT
14	*Pseudorhombus arsius*	6.63%	4.2	Predator	49	LC
15	*Anodontostoma chacunda*	1.33%	2.8	Omnivore	14	LC
16	*Selaroides leptolepis*	0.39%	3.8	Carnivores	14	LC
17	*Megalaspis cordyla*	3.80%	3.9	Carnivores	29	LC
18	*Plotosus canius*	5.91%	3.8	Carnivores	43	LC
19	*Eleutheronema tetradactylum*	9.20%	4.1	Predator	90	LC
20	*Epinephelus malabaricus*	0.06%	4.2	Predator	40	LC

Trophic Structure (Trophic Level) of Caught Fish

In this study, trophic level analysis was conducted on all fish species caught by bottom gillnets in the waters of Lambur Luar Village. The trophic level values for each species were obtained from the fish ecology database available on FishBase and then analyzed to determine the trophic distribution of the captured fish community. The Trophic Level Distribution Graph of Captured Species can be seen in Figure 1.

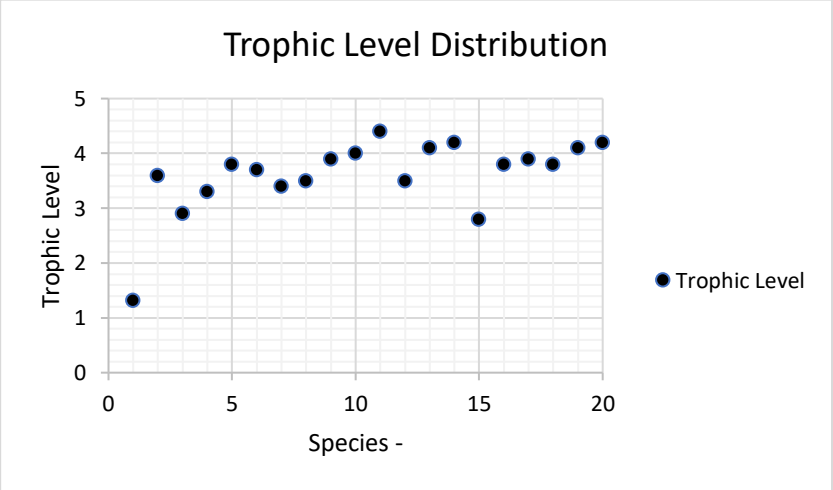

Figure 1. Trophic Level Distribution of Captured Species

The distribution of trophic level values of the fish species caught is presented in graphic form in Figure 2.

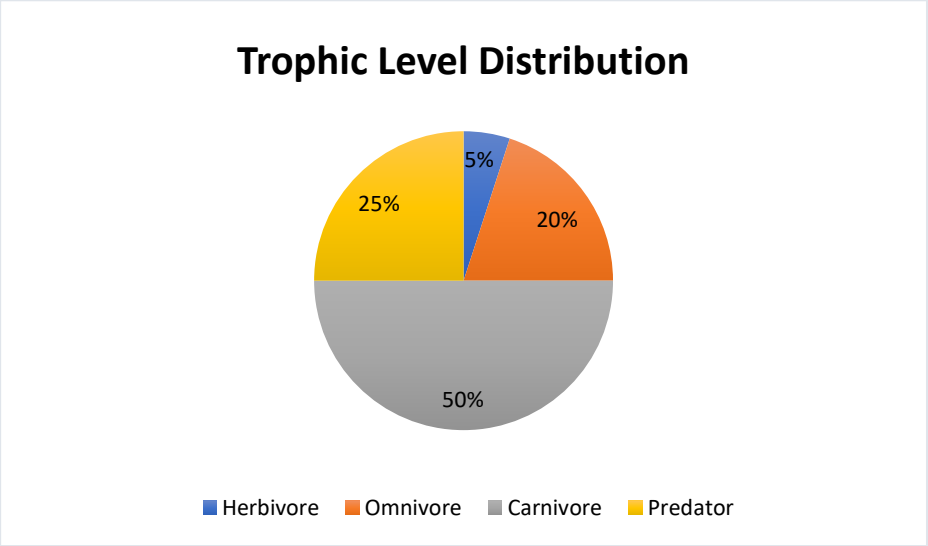

Figure 2. Trophic Level Distribution

Vulnerability Level of Fish Species

The vulnerability index is an indicator used to assess the level of vulnerability of fish species to fishing exploitation. Vulnerability is influenced by various biological characteristics such as growth rate, maximum lifespan, body size, and reproductive rate. The distribution of vulnerability levels can be seen in Figure 3.

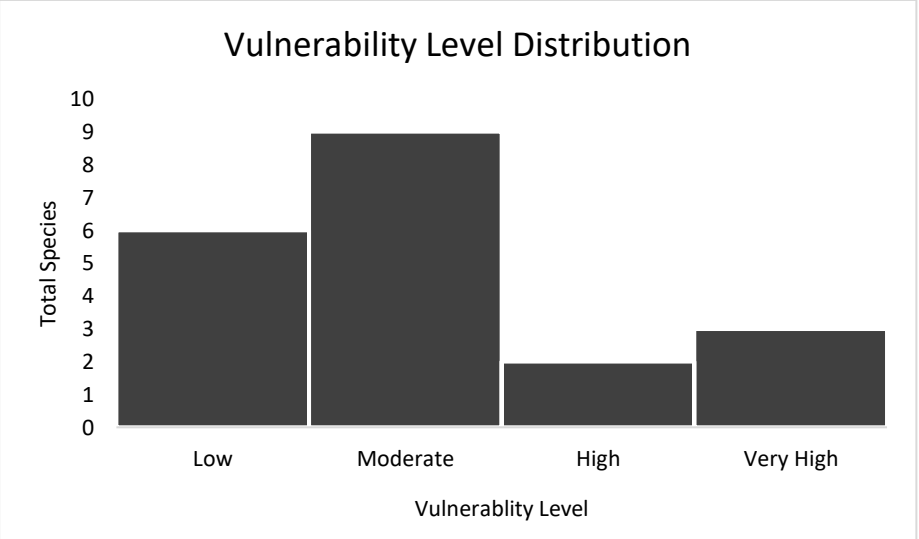

Figure 3. Vulnerability Level Distribution

Species Conservation Status Based on IUCN

The conservation status of captured fish species was analyzed based on data available on the IUCN Red List to determine the species' vulnerability to fisheries exploitation pressures. This analysis aims to provide an overview of the conservation status of captured species and its implications for sustainable fisheries resource management. The distribution of the conservation status of captured fish species by IUCN category is presented in Figure 4.

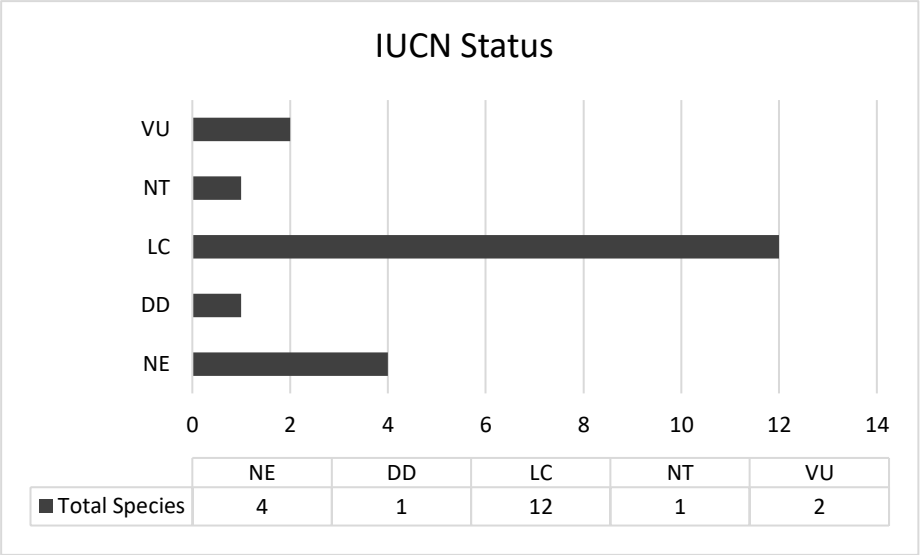

Figure 4. IUCN Capture Status

DISCUSSION

Fish Species Caught by Bottom Gillnet

Based on the results of the study (Table 4) conducted in the waters of Lambur Luar Village, Jambi, 20 species were caught consisting of various families of demersal and pelagic fish and one group of crustaceans. The total weight of the catch during the study reached 80.9 kg. The species with the highest catch composition was *Harpiosquilla raphidea* with a weight of 17.48 kg or 21.61% of the total catch. The next dominant species was the gulama fish *Johnius trachycephalus* at 12.30%, followed by the bai fish *Platycephalus indicus* at 10.56% and the senangin fish *Eleutheronema tetradactylum* at 9.20%.

The dominance of benthic organisms such as mantis shrimp indicates that bottom gillnet fishing gear tends to catch organisms that live or are active near the bottom of the water. This is in accordance with the characteristics of bottom gillnet fishing gear that is installed on the water substrate, making it effective in catching demersal fish and benthic organisms that move around the bottom of the water. The characteristics of gillnet fishing gear that is operated passively by blocking the movement of fish, causing fish that pass through the net to become entangled in the mesh, so this fishing gear is able to catch various types of fish in the fishing area (Nurcholifah *et al*., 2025; Togatorop *et al*., 2025).

Research by Pramesthy *et al*. (2020) shows that gillnet fishing gear has the ability to catch various types of demersal and pelagic fish with a certain level of selectivity depending on the mesh size and the depth of the net installation. In addition, research by Miradni *et al*. (2024) show that the composition of gillnet catches in Indonesian coastal waters is generally dominated by demersal fish that live around the bottom substrate. The dominance of demersal species in this study also indicates that the coastal ecosystem of Lambur Luar has a bottom habitat that supports the presence of benthic organisms and demersal fish.

Trophic Structure (Trophic Level) of Caught Fish

Trophic structure is an important aspect in the study of fisheries ecology because it describes an organism's position in the food chain and the feeding relationships between species in an aquatic ecosystem. Trophic structure describes the feeding relationships between organisms in an ecosystem and shows the flow of energy in the food chain (Almohdar & Souisa, 2017). Trophic level (TL) analysis is used to determine the trophic level of each fish

species based on the type of food consumed, thereby depicting the flow of energy within the aquatic food web. This analysis can determine whether the fish species caught are herbivores, omnivores, carnivores, or high-level predators.

The Trophic Level Distribution Graph of Captured Species (Figure 1) shows the distribution of trophic level values of 20 fish species caught using bottom gillnet fishing gear. Based on the graph, the trophic level values of the captured species range from 1.3 to 4.4. The lowest trophic level value was found in *Harpiosquilla raphidea* with a value of 1.32, while the highest trophic level value was found in *Chirocentrus dorab* with a value of 4.4. Most of the captured fish species belong to the group of mid-level carnivores to high-level predators, with trophic level values between 3.0–4.4. This indicates that the fish community caught by bottom gillnet fishing gear in the study area is dominated by predatory species that utilize benthic organisms and small fish as food sources.

The presence of high-trophic level species such as *Chiloscyllium arabicum*, *Epinephelus malabaricus*, and *Chirocentrus dorab* shows that the coastal aquatic ecosystem in the research area still supports the presence of top-level predators in the food chain. Research by Almohdar & Souisa (2017) stated that most tropical demersal fish have a trophic level value between 3 and 4, which indicates that these fish are secondary consumers that utilize benthic organisms such as crustaceans, mollusks, and small fish as food sources.

Predator species such as *Chiloscyllium arabicum, Chirocentrus dorab*, and *Epinephelus malabaricus* demonstrate that the trophic structure of the coastal aquatic ecosystem in the study area still supports the presence of top-level predators. The presence of predators in an ecosystem is crucial because they play a role in maintaining community balance through trophic control mechanisms over organisms at lower trophic levels (Notanubun *et al*., 2022; Yunita *et al*., 2023).

Based on the results of the trophic level analysis (Figure 2) of fish species caught using bottom gillnet fishing gear, the distribution of trophic groups was obtained consisting of herbivores at 5%, omnivores at 20%, medium predators at 50%, and high-level predators at 25%. This distribution indicates that most of the fish species caught were at the middle to high trophic levels in the food chain.

The dominance of the mid-range predator group, at 50%, indicates that the captured fish community is largely comprised of carnivorous fish that utilize benthic organisms, crustaceans, mollusks, and small fish as food sources. Fish in this group are generally secondary consumers in aquatic ecosystems, playing a crucial role in connecting the flow of energy from lower trophic organisms to higher-level predators.

The presence of 25% of high-level predators indicates that the aquatic ecosystem at the study site is still capable of supporting predator species within the fish community. High-level predators typically occupy the top of the food chain and play a role in controlling the populations of organisms at lower trophic levels. The presence of predators in an ecosystem is crucial because it maintains the balance of community structure and prevents excessive dominance by organisms at lower trophic levels (Britten *et al*., 2014).

The omnivorous group in the catch, which accounts for 20%, indicates that some fish species have a more flexible diet, utilizing a variety of food sources, including both plant and small animal organisms. Omnivorous fish generally have a high adaptability to changes in food availability in the ecosystem, making them frequently found in a variety of aquatic habitats (Malek *et al*., 2016).

Meanwhile, herbivorous fish comprised only 5% of the total species caught. The low percentage of herbivorous fish in the catch may be due to the characteristics of bottom

gillnets, which are more effective at catching demersal fish and carnivorous fish that actively forage near the bottom. Furthermore, herbivorous fish are generally more common in specific habitats, such as seagrass beds or coral reefs, where algae and marine plants are readily available (Latuconsina *et al*., 2012).

Based on the trophic level distribution, it can be concluded that the catch is dominated by medium- and high-level predator fish (75%), which indicates that bottom gillnet fishing gear catches more carnivorous fish that actively forage around the bottom of the waters. This condition also indicates that the aquatic ecosystem still has a fairly complete trophic structure with the presence of predators in the food chain. The presence of several species with high trophic levels such as *Chirocentrus dorab, Chiloscyllium arabicum*, and *Epinephelus malabaricus* indicates that the coastal aquatic ecosystem in the study area still supports the presence of high-level predators. Predators play an important role in maintaining ecosystem balance because they are able to control the population of organisms at lower trophic levels. A decrease in the predator population in an ecosystem can cause trophic imbalances that impact the increase in the population of organisms at lower trophic levels (Britten et al., 2014).

Vulnerability Level of Fish Species

The vulnerability distribution graph (Figure 3) shows that most of the fish species caught are in the moderate vulnerability category, with approximately 9 species, followed by the low vulnerability category with 6 species. Meanwhile, species with a high vulnerability category are relatively few, with approximately 2 species, and the very high vulnerability category with approximately 3 species. The dominance of the moderate vulnerability category indicates that most of the fish species caught have a moderate level of sensitivity to fishing pressure. The presence of several species with high to very high vulnerability levels indicates that some species are biologically more vulnerable to fishing exploitation. Species with high vulnerability values generally have biological characteristics such as slow growth, long lifespans, and low reproductive rates, making them more sensitive to fishing pressure. Research Wibisono, (2020) many target species of deep-sea fisheries in Indonesia have slow growth, long lifespan, and slow gonad maturity, making them vulnerable to overexploitation.

The vulnerability values (Table 4) of the captured species ranged from 10 to 90. The species with the highest vulnerability levels were *Telatrygon zugei* and *Eleutheronema tetradactylum* with a value of 90, which is included in the category of very vulnerable to fishing pressure. Other species that have relatively high vulnerability values are *Chirocentrus dorab* with a value of 73 and *Chiloscyllium arabicum* with a value of 56. The high vulnerability values in several species indicate that these species have biological characteristics such as slow growth, long lifespan, or low reproductive rates, making them more vulnerable to fishing exploitation.

The research results show that several species have relatively high vulnerability values, such as *Telatrygon zuge*i and *Eleutheronema tetradactylum*. The high vulnerability values in these species indicate that they are more sensitive to fishing pressure than other species. Species with large body size and slow growth are generally more vulnerable to fishing exploitation. This is because these species take longer to reach reproductive size, making it more difficult for populations to recover after experiencing fishing pressure (Biggs *et al*., 2021; Santos *et al*., 2021). According to Mohamed *et al*. (2021), fish species with large body size and slow growth tend to have a higher level of vulnerability to fishing exploitation than fast-growing species.

Species Conservation Status Based on IUCN

The conservation status of a species is an important indicator in assessing the level of threat to the sustainability of a fish population in the wild. Conservation status assessments are usually carried out based on criteria established by the International Union for Conservation of Nature (IUCN) through the IUCN Red List, which classifies species into several categories based on their level of extinction risk. These categories include Least Concern (LC), Near Threatened (NT), Vulnerable (VU), Data Deficient (DD), and Not Evaluated (NE), each of which describes the population condition and level of threat faced by a species. Determining conservation status categories such as Least Concern, Vulnerable, or Endangered is used to describe the level of vulnerability of a species to various environmental pressures and serves as the basis for planning conservation strategies and biodiversity management (Makkatenni *et al*., 2020; Siregar *et al*., 2025; Yapenang *et al*., 2022).

The conservation status graph (Figure 4) based on the IUCN Red List shows that most of the captured fish species are categorized as Least Concern (LC), with a total of 12 species. This indicates that the majority of captured species still have a relatively low risk of extinction and their populations are considered stable in the wild. Furthermore, there are 4 species that have not been evaluated (Not Evaluated/NE) and 1 species in the Data Deficient (DD) category, indicating that scientific information regarding the population status of these species is still limited, so further research is needed to determine the level of threat to these species.

Several species fall into higher conservation categories, namely 1 species categorized as Near Threatened (NT) and 2 species classified as Vulnerable (VU). The presence of these species indicates that some of the fish species caught are at greater risk of fisheries exploitation pressure. Several species have higher conservation status, namely *Lutjanus campechanus* and *Telatrygon zugei*, which are categorized as Vulnerable (VU). Furthermore, the species *Chiloscyllium arabicum* has Near Threatened (NT) status. The presence of these species indicates that bottom gillnet fishing activities have the potential to catch species with a certain level of threat, so this needs to be considered in sustainable fisheries management. Study from Dulvy *et al.* (2014) shows that cartilaginous fish groups such as sharks and rays are the fish groups most vulnerable to fishing exploitation because they have low reproductive rates and long lifespans.

Conservation status analysis based on the IUCN Red List shows that most of the species caught in this study are classified as Least Concern. This indicates that these species still have relatively stable populations in the wild. However, some species, such as *Telatrygon zuge*i, have a higher conservation status and therefore require attention in fisheries management. The conservation status of a species provides an overview of the level of threats faced by that species in the wild and is an important indicator in assessing extinction risk and population conditions in its natural habitat (Pattiselanno *et al*., 2022; Rambe *et al*., 2023).

Mean Trophic Level (MTL) Catch Results

Mean Trophic Level (MTL) is an ecological indicator used to describe the average trophic position of fish species caught in a fishery. The MTL value provides information on the trophic level of the exploited fish community and can be used to evaluate the impact of fishing activities on the trophic structure of aquatic ecosystems. This analysis is important because changes in the MTL value of the catch can reflect changes in the composition of the captured species, particularly the shift from high-level predator species to species with lower trophic levels. Mean Trophic Level (MTL) is an ecological indicator used to describe the average trophic position of fish species caught in a fishery and to understand the trophic structure of fish communities in aquatic ecosystems (Hutubessy *et al*., 2020; Lavin et al., 2023).

The Mean Trophic Level (MTL) value is calculated based on the trophic level value of each fish species caught, taking into account the proportion of the catch composition. The MTL analysis aims to determine the average trophic position of the fish community caught and to identify the possibility of the fishing down the food web phenomenon in fisheries in the study area. The MTL value obtained from this study was 3.2. This value indicates that the catch is dominated by mid-level carnivorous fish that act as secondary consumers in the food chain. Mean Trophic Level (MTL) is an ecological indicator often used to evaluate the impact of fishing activities on the trophic structure of fish communities. This indicator is widely used in fisheries studies to evaluate changes in the trophic structure of fish catches and to detect overfishing phenomena such as fishing down the food web, which can change the species composition in marine ecosystems (Fogliarini *et al*., 2021; Li *et al*., 2021; Su *et al*., 2021).

The relatively stable MTL value at around 3 indicates that the catch is still dominated by fish at the middle trophic level and has not shown a strong indication of the Fishing Down the Food Web phenomenon. This phenomenon usually occurs when fishing activities cause a decrease in the MTL value over time due to a decrease in the population of high-level predators and an increase in the catch of species with low trophic levels. The fishing down the food web phenomenon occurs when fisheries begin to catch more species with low trophic levels after high-trophic predators experience a decline due to exploitation (Gough *et al*., 2022; Lavin *et al*., 2023). However, the dominance of low-trophic-level organisms such as mantis shrimp can influence the overall MTL value. Therefore, monitoring changes in MTL values over time is crucial for understanding the dynamics of trophic structure within a fishery.

CONCLUSION

The results of the study indicate that the fish community caught using bottom gillnet fishing gear in the waters of Lambur Luar is dominated by species with medium to high trophic levels, especially the middle predator group (50%) and high-level predators (25%). Analysis of vulnerability levels shows that most species have low to moderate vulnerability, although some species have high vulnerability values indicating sensitivity to fishing pressure. Based on the IUCN conservation status, the majority of species are included in the Least Concern (LC) category, with a small number in the Near Threatened (NT) and Vulnerable (VU) categories. The Mean Trophic Level (MTL) value of 3.2 indicates that the catch is dominated by mid-level carnivorous species and does not show a strong indication of the occurrence of the fishing down the food web phenomenon in fisheries in the study area.

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REFERENCES

Almohdar, E., & Souisa, F. N. J. (2017). Species Composition and Trophic Level of Lift Net Catch in Ohoililir Village. *Jurnal Sumberdaya Akuatik Indopasifik*, *1*(2), 165–174.

Aminah, S., & Pratiwi, T. (2022). Trofik Level dan Status Sumberdaya Ikan yang Tertangkap dengan Gillnet Millenium di Perairan Laut Kabupaten Banjar. *Fish Scientiae*, *12*, 50–59.

Biggs, C. R., Heyman, W. D., Farmer, N. A., Kobara, S., Bolser, D. G., Robinson, J., Lowerre-Barbieri, S. K., & Erisman, B. E. (2021). The Importance of Spawning Behavior in Understanding the Vulnerability of Exploited Marine Fi Shes In The U . S . Gulf Of Mexico. *Peerj*, 1–33. Https://Doi.Org/10.7717/Peerj.11814

Coll, M., Shannon, L. J., Kleisner, K. M., F, M. J. J.-J., Bundy, A., Akoglu, A. G., Banaru, D., Boldt, J. L., Borges, M. F., Cook, A., Diallo, I., Fu, C., Fox, C., Gascuel, D., Gurney, L. J., Hattab, T., Heymans, J. J., Jouffre, D., Knight, B. R., Kucukavsar, S., Large, S. I., Lynam, C., Machias, A., Marshall, K. N., Masski, H., Ojaveer, H., Piroddi, C., Tam, J., Thiao, D., Thiaw, M., Torres, M. A., Morgane, T.-T., Tsagarakis, K., Tuck, I., Van Der Meeren, G. I., Yemane, D., Zador, S. G., & Shin, Y.-J. (2016). Ecological Indicators to Capture the Effects of Fishing on Biodiversity and Conservation Status of Marine Ecosystems. *Ecological Indicators*, *60*, 947–962.

Dulvy, N. K., Fowler, S. L., Musick, J. A., Cavanagh, R. D., Kyne, M., Harrison, L. R., Carlson, J. K., Davidson, L. N. K., Fordham, S. V, Francis, M. P., Pollock, C. M., Simpfendorfer, C. A., Burgess, G. H., Carpenter, K. E., Compagno, L. J., Ebert, D. A., Gibson, C., Heupel, M. R., Livingstone, S. R., Sanciangco, J. C., Stevens, J. D., Valenti, S., & White, W. T. (2014). Extinction Risk and Conservation of The World ' S Sharks and Rays. *Elife*, 1–34. Https://Doi.Org/10.7554/Elife.00590

Fogliarini, C. O., Ferreira, C. E. L., Bornholdt, J., Barbosa, M. C., Giglio, V. J., & Bender, M. G. (2021). Telling the Same Story : Fishers and Landing Data Reveal Changes in Fisheries on the Southeastern Brazilian Coast. *Plos One*, *16*(6), 1–21. Https://Doi.Org/10.1371/Journal.Pone.0252391

Gough, C., Ateweberhan, M., Godley, B. J., Harris, A., Manach, F. Le, Zafindranosy, E., & Broderick, A. C. (2022). Temporal Change and Fishing Down Food Webs in Small-Scale Fisheries in Morondava , Madagascar. *Frontiers In Marine Science*, *9*(July), 1–14. Https://Doi.Org/10.3389/Fmars.2022.884083

Hutubessy, B., Mosse, J., Haruna, & Silooy, F. (2020). Evaluation of Traditional Traps : Towards Ecosystem- Based Fisheries Management. *Iop Conf. Series: Earth And Environmental Science*, 517. Https://Doi.Org/10.1088/1755-1315/517/1/012024

Khairunissa, A., Mairizal, Magwa, R. J., Lisna, Ramadan, F., & Wulandari. (2025). Analysis of Bottom Gillnet Catches in Lambur Luar Village, Muara Sabak Timur District, Tanjung Jabung Timur Regency. *Journal Of Fish Health*, *5*(4), 476–488.

Latuconsina, H., Nessa, M. N., & Rappe, R. A. (2012). Komposisi Spesies dan Struktur Komunitas Ikan Padang Lamun di Perairan Tanjung Tiram – Teluk Ambon Dalam. *Jurnal Ilmu Dan Teknologi Kelautan Tropis*, *4*(1), 35–46.

Lavin, C. P., Pauly, D., Dimarchopoulou, D., Liang, C., & Costello, M. J. (2023). Fishery Catch is Affected by Geographic Expansion , Fi Shing Down Food Webs and Climate Change in Aotearoa, New Zealand. *Peerj*, 1–27. Https://Doi.Org/10.7717/Peerj.16070

Li, Y., Ma, S., Fu, C., Tian, Y., Li, J., Sun, P., Ye, Z., & Liu, Y. (2021). Appraising the Status of Fish Community Structure in The Yellow Sea Based on an Indicator-Testing Framework. *Frontiers In Marine Science*, *8*(April). Https://Doi.Org/10.3389/Fmars.2021.646733

Makkatenni, M., Husnaeni, & Amirullah. (2020). Keanekaragaman Jenis Burung Air di Kawasan Ekowisata Hutan Bakau Desa Lakawali Kecamatan Malili Kabupaten Luwu Timur. *Jurnal Biotek*, *8*(2), 189–207.

Miradni, A., Arfiana, B. M., Nelwida, Mairizal, Ramdhani, F., & Heltria, S. (2024). The Composition of Fish Catches Using Gillnet Fishing Gear in The Fishing Village of Tanjung Jabung Barat Regency. *Mantis Journal Of Fisheries*, *1*(2), 97–101. Https://Doi.Org/10.22437/Mjf.V1i02.37885

Mohamed, K. S., Sathianandan, T. V., Vivekanandan, E., Kuriakose, S., Ganga, U., Pillai, S. L., & Nair, R. J. (2021). Application of Biological and Fisheries Attributes to Assess the Vulnerability and Resilience of Tropical Marine Fish Species. *Plos One*, *16*(8), 1–31. Https://Doi.Org/10.1371/Journal.Pone.0255879

Nasution, E. A. S., Alwi, Y., Magwa, R. J., Nurhayati, Ramadan, F., & Hariski, M. (2024). Indeks Keanekragaman Hasil Tangkapan Jaring Insang Hanyut (Drift Gillnet) di Kelurahan Sei Berombang Kecamatan Panai Hilir Kabupaten Labuhan Batu Sumatera Utara. *Jurnal Perikanan*, *14*(3), 1577–1587.

Notanubun, J., Ngamel, Y. A., & Bukutubun, S. (2022). Keragaman Jenis Hasil Tangkapan dan Sinkronisasi Waktu Tangkap Jaring Insang Permukaan di Perairan Ohoi Tuburngil Kabupaten Maluku Tenggara. *Jurnal Sumberdaya Akuatik Indopasifik*, *6*(3), 259–270.

Nurcholifah, N., Akmal, Hariski, M., Afriani, H., Idris, N., & Magwa, R. J. (2025). Faktor-Faktor yang Memengaruhi Produksi Hasil Tangkapan Ikan dengan Menggunakan Alat Tangkap Gillnet di Kelurahan Kampung Nelayan. *Mimbar Agribisnis: Jurnal Pemikiran Masyarakat Ilmiah Berwawasan Agribisnis*, *11*(2), 2123–2128.

Paransa, I. J., Gerung, G. S., Sudirman, & Reppie, E. (2017). Bottom Gill Net Modification for Fish Catch Development and Coral Damage Prevention. *Proceedings Of The Pakistan Academy Of Sciences*, *54*(4), 319–324.

Pattiselanno, F., Maturbongs, R. A., Arobaya, A. Y. S., Wanma, A. O., & Rumbiak, W. (2022). Nilai Konservasi Tinggi Kawasan Hutan Bagi Pelestarian Spesies Mamalia di Supiori , Papua. *Jurnal Biologi Papua*, *14*(1), 25–33. Https://Doi.Org/10.31957/Jbp.1796

Pramesthy, T. D., Mardiah, R. S., Shalichaty, S. F., Arkham, M. N., Bayu, R., Haris, K., Kelana, P. P., & Djunaidi. (2020). Analisis Alat Tangkap Jaring Insang (Gill Net) Berdasarkan Kode Etik Tatalaksana Perikanan Bertanggung Jawab di Perairan Kota Dumai. *Aurelia Journal Vol.*, *1*(April), 103–112.

Purwanto, Y., Santoso, H., Manohas, J., Zaini, M., Tumiwa, J. H., & Nugraha, E. (2021). Analysis of the Diversity Index and Dominance of Bottom Gillnet Catches in Kulu Waters , North Minahasa Regency , Indonesia. *Aacl Bioflux, 14*(5), 2639–2649.

Rambe, K., Harahap, M. A. B., Pratiwi, A., Gultom, Y. A., & Sagala, F. A. (2023). Eksplorasi Aspek Bioekologi dan Status Konservasi Ikan Endemik Sumatera Rasbora Spilotaenia Hubbs & Brittan, 1954. *Bioscientist : Jurnal Ilmiah Biologi*, *11*(2), 1111–1122.

Santos, R., Medeiros-Leal, W., Novoa-Pabon, A., Crespo, O., & Pinho, M. (2021). Biological Knowledge of Thornback Ray (*Raja clavata*) from the Azores : Improving Scientific Information for the Effectiveness of Species-Specific Management Measures. *Journal Biology*, *10*, 676.

Siregar, A. F., Adrianto, L., & Zairion, Z. (2025). Nilai Keanekaragaman Hayati Perikanan dengan Mengadopsi Kriteria Oecm : Studi Kasus Paap Teluk Kolono , Sulawesi Tenggara. *Jurnal Kelautan Tropis Juni*, *28*(2), 215–222.

Su, L., Chen, Z., Zhang, K., Xu, S., & Wang, K. (2021). Decadal-Scale Variation in Mean Trophic Level in Beibu Gulf Based on Bottom-Trawl Survey Data. *Marine And Coastal Fisheries: Dynamics, Management, And Ecosystem Science*, *13*, 174–182. Https://Doi.Org/10.1002/Mcf2.10144

Sugiyono. (2013). *Metode Penelitian Kuantitatif,. Kualitatif, Dan R&D*.

Tawari, R. H. S., Tupamahu, A., & Haruna. (2025). Ecological Aspects of Bottom Gill Nets Catches During the Evening and Pre-Dawn Periods in Inner Ambon Bay, Indonesia. *Egyptian Journal Of Aquatic Biology & Fisheries*, *29*(2), 1291–1304.

Togatorop, A. I., Lisna, Magwa, R. J., Mairizal, & Heltria, S. (2025). Keanekaragaman Jenis Hasil Tangkapan pada Alat Tangkap Gillnet di Perairan Hinako Kabupaten Nias Barat Provinsi Sumatra Utara. *Jurnal Pari*, *11*(1), 29–37.

Wibisono, E. (2020). *Characteristics And Potential Management Of Indonesia ' S Deepslope Demersal Fishery*.

Yapsenang, D., Davinsa, D. A., Respati, B., Kurniawan, A., Maryani, & Mustagfirin. (2022). Ecological Index, Status and Challenges of the Bird Conservation Programs (Avifauna) Among Indigenous Peoples of the Moi Lemas Tribe, West Papua. *Indonesian Journal Of Social Responsibility Review (Ijsrr)*, *1*(2), 77–89.

Yunita, L. H., Harjuni, F., Magwa, R. J., & Ramdhani, F. (2023). Analysis of Morpometric Characteristics of Sumera Fish (*Tor tambroides*) in Aek. *Juvenil Jurnal*, *4*(2), 109–116.