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Composition of gillnet catches based on network size at UPT Fishery Port of Riau Province

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Abstract
Gill net catches are one of fishermen's dominant fishing gear at UPT Dumai City Fishing Port. Gill net catches are easy to operate, have a low price, and are durable. This research was conducted in July-August at UPT Port of Fisheries, Riau Province. This study aimed to determine differences in gill net catches based on different mesh sizes. The method used is the survey method. The catch of gill nets by type with a mesh size of 2 inches is 25 fish species. Based on the weight and number of individual fish, it was dominated by lomek (*Harpodon* sp), namely 1,359.5 kg or 21.5% and 16,314 individuals or 27.18%. The catch in the 3-inch mesh size was 23 species of fish. The percentage of catches based on weight dominated by senangin (*Eleutheronema tetradactylum*) was 30.38% (1,353.5 kg), and based on the number of individuals dominated by pomfret of 18.72% (4,534 individuals). The main catches in gill nets at UPT Dumai are lomek (*Harpodon* sp), senangin (*Polynemus* sp), pomfret (Bramidae sp) and machete (*Chirocentrus* sp). The primary and bycatch yields for the 2-inch mesh were 51.58% and 42.42%, while the 3-inch mesh sizes were 57.99% and 42.01%.

1. INTRODUCTION

Dumai is a city in Riau Province and has a significant role in the marine fisheries sector, where these waters face the Malacca Strait. The town of Dumai is situated on the East coast of Sumatra Island between 101°023'37"–101°08'13" East Longitude and 01°023'23"–°024'23" North Latitude. Referring to Law no. 22 of 2005 concerning regional autonomy, the limit of Regency/City management authority is 4 miles because fishermen in Dumai waters usually have limited fishing areas, namely 2 miles from the coast. Gill nets are one of the dominant fishing tools fishermen use at the Dumai City Fisheries Port UPT, namely around 30%. This is because gill net fishing gear is easy to handle and operate, relatively low, easy to repair, and reasonably durable, and the operation of gill net fishing gear does not harm or damage the habitat (Pramesthy et al., 2020)

The composition of the catch from each mesh size has been identified based on the fish's type, weight and length. Pala & Yuksel (2010) explained that the gill net's size significantly influences the catch's efficiency and composition. One of the determining factors for fishing success is the net mesh size. The size of the net mesh varies depending on the fish being caught. Based on the background description above, it is clear that mesh size is a factor that needs to be considered because it can determine the effectiveness of a fishing effort and influence the main catch and bycatch. The research aimed to see the differences in gillnet use based on mesh size at the Riau Province Fisheries Port UPT.

2. RESEARCH METHODS

Time and Place

This research will be carried out from July to August 2022 at the Riau Province Fisheries Port UPT.

Research method

The research was conducted using a survey method. The object of this research is the catch of fishermen using gillnets with net sizes of 2 inches and 3 inches. Sampling was carried out using the purposive sampling method. Purposive sampling is a sampling technique from representatives of the population. The study's respondents were 16 Fisheries Port UPT, Riau Province fishermen. This research uses primary data and secondary data. Preliminary data is data obtained directly in the field through records of situations, events and other data (Bungin, 2007). Secondary data is data obtained from related agencies.

Research Procedure

The research begins with determining the fishing area and setting the gillnet. The hauling process and calculation of catches are based on weight (kg) and number of individuals (fish). Next, data analysis is carried out.

Data Analysis

Analysis of catches is carried out descriptively by classifying, tabulating and interpreting data and presenting it in the form of tables and graphs.

3. RESULTS AND DISCUSSION

General Conditions of the Research Area

The Fishing Port UPT in Dumai City, which was previously known as the Dumai Fish Landing Base, is located in the Batu Bintang area, Pangkalan Sesai Village, Dumai District, is the only fishing port in the city of Dumai. This fishing port, UPT, is a type D fishing port better known by the local community as TPI, and it has significant marine fisheries potential. The city of Dumai is located on the East coast of Sumatra Island between 101°023'37"–101°08'13" East Longitude and 01°023'23"–1°024'23"N, which borders several regions, namely the northern part is Selat Rupat, Bengkalis Regency, the southern part is Pangkalan Sesai Village, the western part is Purnama Village, Dumai City.

Construction of Gillnet

A gill net is a type of fishing gear made from net material with a rectangular shape where the meshes of the main net are the same size. The number of meshes in the horizontal direction (Mesh Length/ML) is much greater than the number of meshes in the vertical direction or the horizontal direction. Deep (Mesh Depth/MD) (Martasuganda, 2008). Gillnet has the construction and constituent materials described in Table 1.

The boats fishermen use are wooden outboard motor boats or what the public also calls pompous boats with a size of 1-6 GT. The ship's dimensions are 13 m x 3 m x 1.5 m (l x w x d) using a Dong Feng or Yanmar brand ship engine with an engine power of 7 PK to 60 PK powered by diesel fuel. The journey to the fishing ground takes around 3-4 hours, depending on the intended fishing location. The helmsman determines the intended area of the fishing operation. When they arrive at the fishing location, they begin the process of operating fishing gear, such as setting, immersing, and hauling.

Table 1. Gill net fishing equipment specifications measured at the Riau Province Fisheries Port UPT

No	Fishing gear parts	Material	Length (m)/ diameter (mm)
1.	Net body	Polyethylene(PE)	1,500 m /0.6 mm
2.	Top ris strap	Nylon/PE	1,500 m /6 mm
3.	Bottom ris strap	Nylon/PE	1,500 m /3 mm
4.	Life buoy rope	Nylon/PE	1,505 m /6 mm
5.	Life buoy	Plastik/PVC	Length: 0.3 m Diameter: 98.5 mm Total: 91 Distance between buoys: 72 cm
6.	Weight rope	Nylon/PE	1,500m
7.	Ballast	Timah	Weight: 20 g Quantity: 2,500 pieces Distance between weights: 48 cm
8.	Strap	Nylon	50

The operating areas for 2-inch and 3-inch gill nets are almost the same, namely in the areas of Bulu Hala, Santau Hulu, Teluk Dalam, Senepis, Bengkalis, Pulau Babi, Ujung Pasir, and Sinaboi. Judging from the existing fishing season, especially in the waters of the Malacca Strait, it is divided into two seasons, namely the West season (lean season), which occurs in December, January and February. The East Season occurs in June, July and August (Zain et al. 2009).

Catch Reslut based on Type of Caught

Gillnet catches at the Dumai Fishing Port UPT obtained 26 types of fish (Table 2). When seen using a 2-inch net, there were 25 types of fish (96.16%), while when using a 3-inch net, there were 23 types of fish (88.47%).

Table 2. The catch is based on the type of fish caught

No.	Types of fish	2 *inchi*	3 *inchi*
1.	*Eleutheronema tetradactylum*	✓	✓
2.	*Bramidae* sp	✓	✓
3.	*Harpodon* sp	✓	✓
4.	*Setipinna* sp	✓	✓
5.	*Chirocentrus* sp	✓	✓
6.	*Scomberoides lysan*	✓	✓
7.	*Muraenesox cinerus*	✓	✓
8.	*Scomberomurus* sp	✓	✓
9.	*Tenualosa toil*	✓	✓
10.	*Pseudocienna amovensis*	✓	✓
11.	*Decapterus matrosoma*	✓	✓
12.	*Plicofollis argyropleuron*	✓	✓
13.	*Pomadasys andamnensis*	✓	✓
14.	*Selachimorpha*	✓	✓
15.	*Bataidea*	✓	✓
16.	*Hexanematichthys sagor*	✓	✓
17.	*Scomberomus guttatus*	✓	✓
18.	*Pomadasis* sp	✓	✓
19.	*Cynoglossus lida*	✓	✓
20.	*Scinidae* sp	✓	✓

No.	Types of fish	2 *inchi*	3 *inchi*
21.	*Ilisha elongate*	✓	✓
22.	*Lutjanus argentimaculatus*	✓	-
23.	*Sphyrna lewini*	✓	✓
24.	*Nemiperus hexodom*	-	✓
25.	*Lates calcarifer*	✓	-
26.	*Torpedo scad*	✓	-
	Total	25	23

Of the 26 types of fish caught during the study, ridingfish (3.84%) were not detected in the 2-inch gillnet mesh. Meanwhile, 3 types of fish (11.53%) were not caught on the 3-inch gillnet, namely jenak, snapper and caru.

Catch Result according to Total Weight (kg)

According to Harlyan et al. (2021), the larger the mesh size, the larger the mesh opening, so the size of the fish caught will be more significant. The catch is based on the type of fish caught.

Table 3. Catch and percentage based on fish weight (kg)

Types of fish	Catch (kg)		%	
	X1	X2	X1	X2
Eleutheronema tetradactylum	298,8	1.353,5	4,78	30,38
Bramidae sp	311,8	522,1	4,99	11,71
Harpodon sp	1.359,5	8	21,75	0,17
Setipinna sp	1.227	63,8	19,63	1,43
Chirocentrus sp	26,8	636,5	0,43	14,28
Scomberoides lysan	37	196,5	0,54	4,41
Muraenesox cinerus	611	54	9,78	1,21
Scomberomurus sp	15,5	409,2	0,25	9,18
Tenualosa toil	8,5	61	0,14	1,37
Pseudocienna amovensis	56	240	0,89	5,39
Decapterus matrosoma	232	6,5	3,60	0,15
Plicofollis argyropleuron	7,5	60,5	0,12	1,36
Pomadasys andamnensis	98,9	18	1,58	0,40
Selachimorpha	556,5	39	8,9	0,87
Bataidea	435	116	6,96	2,60
Hexanematichthys sagor	278	155	4,45	3,48
Scimberomus guttatus	29	136	0,46	3,05
Pomadasis sp	23,9	92	0,38	2,06
Cynoglossus lida	45	77	0,72	1,72
Scinidaesp	6,8	16,5	0,11	0,37
Ilisha elongate	388,9	118,5	6,22	2,66
Lutjanus argentimaculatus	17	0	0,27	0
Sphyrna lewini	114	40	1,82	0,89
Nemiperus hexodom	0	29	0	0,65
Lates calcarifer	35,4	0	0,57	0
Torpedo scad	15	0	0,24	0
Amount	6.249.8	4.455,1	100	100

Based on Table 3, the fish catch using a 2-inch mesh (X1) was 6,249.8 kg. The catch of fish using a 3-inch (X2) mesh was 4,455.1 kg after conducting interviews with fishermen and direct

observation of the main catches in gill nets, namely *Setipinna* sp*, Harpodon* sp*, Polynemus* sp*, Bramidae* sp*,* and *Chirocentrus* sp*.* The catch obtained by gill nets with a mesh size of 2 inches during the research was dominated by lomek, amounting to 1,359.5 (21.5%) of the catch. This is because Lomek live in sea waters and brackish water and inhabit muddy, offshore, or sandy areas (Coheny, 2018). The smallest amount of catch obtained was 6.8 kg of longan, or the equivalent of 0.11% of the catch.

Senangin dominated the total weight of the gillnet catch using a 3-inch mesh at 1,353.5 kg (30.38% of the catch). This follows White's (2013) statement that the singing fish inhabit areas with mud substrates. The smallest number of catches obtained was 8 kg longan (0.17%) (Figure 1). The main catch uses a 2-inch mesh, which is 3,223.9 kg (51.58%), compared to a bycatch worth 3,025.1 kg (48.40%). Meanwhile, the main catch uses a 3-inch mesh, namely 2,583.9 kg (57.99%), compared to a bycatch worth 1,871.2 kg (42.01%).

(1) (2)

Figure 1. Percentage comparison of main catch and bycatch results in net mesh sizes (1) 2 inches and (2) 3 inches

Catch Results According to the Number of Individuals

The catch of fish using a 2-inch mesh (X1) was 60,030 fish (Table 4). The most significant number of individual fish caught was the lomek, with 16,314 fish (27.18%), while the lowest number of individual fish caught was the Ajjah, with 2 fish (0.003%). The catch of fish using a 3-inch (X2) mesh was 24,212 fish. The most significant number of individual fish caught was the pomfret, 4,534 (18.72%), while the lowest number of fish caught was the Senunggang, 6 (0.024%).

Table 4. The catch is based on the number of individual fish on size 2-inch and 3-inch mesh

Types of fish	Number of individual fish (%)			
	X1	X2	X1	X2
Eleutheronema tetradactylum	1.469	3.856	2,44	18,11
Bramidae sp	5.233	4.534	8,7	21,29
Harpodon sp	16.314	96	2717	0,45
Setipinna sp	11.271	296	18,77	1,39
Chirocentrus sp	74	526	0,12	2,47
Scomberoides lysan	8	293	0,013	1,38
Muraenesox cinerus	486	31	0,81	0,05
Scomberomurus sp	60	2.639	0,1	4,39
Tenualosa toil	17	347	0,02	1,63
Pseudocienna amovensis	292	2.969	0,49	13,94
Decapterus matrosoma	12.528	351	20,87	1,65
Plicofollis argyropleuron	2	15	0,003	0,07
Pomadasys andamnensis	78	20	0,13	0,09
Selachimorpha	3.339	252	5,56	1,18
Bataidea	836	212	1,39	0,99

Types of fish	Number of individual fish (%)			
	X1	X2	X1	X2
Hexanematichthys sagor	2.025	1.010	3,37	4,74
Scimberomus guttatus	45	161	0,075	0,76
Pomadasis sp	5	21	0,008	0,09
Cynoglossus lida	855	1.173	1,42	5,51
Scinidae sp	5	12	0,008	0,05
Ilisha elongate	3.315	922	5,52	4,32
Lutjanus argentimaculatus	54	0	0,089	0
Sphyrna lewini	1.680	1.203	2,8	5,65
Nemiperus hexodom	0	6	0	0,03
Lates calcarifer	33	0	0,055	0
Torpedo scad	3	0	0,005	0
Amount	60.030	21.296	100	100

Main catch uses a net size of 2 inches more, namely 34,321 fish or the equivalent of 57.17%, compared to bycatch worth 25,709 fish (42.83%). Main catch results using a 3-inch mesh were 9,308 fish (43.71%), and bycatch results were 11,988 fish (56.29%).

Figure 3. **Percentage comparison of main catch and bycatch results in net mesh sizes 2 inches (1) and 3 inches (2)**

More fish are caught using a 2-inch mesh size compared to a 3-inch mesh size. Fish caught in a 3-inch mesh size is more significant according to the width of the mesh opening than fish caught in a 1.5-inch mesh. Mesh size also influences the number of catches, based on the explanation of Iskandar et al. (2016), who stated that differences in mesh size in gill nets can result in differences in catch results. According to Fajar et al. (2018), mesh size on a gill net affects the catch's size and the number of catches using a gillnet with a 2-inch mesh. The heaviest type of fish and the most significant number of individuals is the lomek, 1,359.5 kg and 16,314 ind. In the gillnet with a 3-inch mesh, the heaviest type of fish was senangin, 1,353.5 kg, and the most significant number of individual fish was pomfret, 4,534 individuals. The larger the mesh size, the larger the fish caught, but the relatively more minor number of catches (Syamsuddin et al., 2021).

4. CONCLUSIONS

The catch at the Riau Province Fisheries Port UPT using gill nets with 2-inch and 3-inch mesh nets was worth 10,823.4 kg or 84,357 fish. The catch using a 2-inch mesh size is more significant than a 3-inch mesh size based on weight (kg) and number of individual fish. There were 25 types of fish caught in a 2-inch mesh, while 23 kinds of fish were caught in a 3-inch mesh. Senunggang fish are only caught on a 3-inch mesh, and jenak, snapper and caru fish are only caught on a 2-inch mesh. The number of catches caught using a 2-inch mesh size was the heaviest type of fish and the most

significant number of individuals, namely lomek, 1,359.5 kg and 16,314. Meanwhile, at 3 inches, the most severe kind of fish is senangin, namely 1,353.5 kg, and the most significant number of individual fish is pomfret, namely 4,534.

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