Study of Belat Fishing Gear in the Waters of Dumai, Riau Province

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ABSTRACT

Based on data from the Dumai City PPI Office in 2013 and 2019, the number of belat fishing gear in Dumai City has decreased from 20 to 7. It is suspected that there are symptoms of overfishing caused by the non-selectivity of this belat, where the bycatch is greater than the main catch, and supported by belat construction data because it is known that fishermen use a small mesh size of 1 inch. The study's purpose is to find out how the main catch and bycatch which amount of catch is more caught. Data analysis using descriptive analysis and research methods with survey methods. The main catch of belat weighing 1.914.9 kg is composed of white shrimp *(Penaeus indicus)*, kelong shrimp *(Penaeus merguiensis)*, Malaysian prawn *(Macrobranchium rosenbergii),* smallhead catfish *(Euristhmus microceps),* bluespot mullet *(Crenimugil seheli)*, gulamah *(Panna microdon)*, and the bycatch weighs 710 kg is composed of Fourfinger threadfin *(Eleutheronema tetradactylum)*, sagor catfish *(Hexanematichthys sagor)*, milk shark *(Rhizoprionodon acutus),* stingray *(Dasyatis sephen),* silver sillago *(Sillago sihama),* white snapper *(Lates calcarifer),* spotted scat *(Scatophagus argus)*, crab *(Portunus pelagicus),* pomfret *(Pampus argenteus)*, and saddle grunt *(Pomadasis maculates)*.

Keywords: Fishing Gear Study, Belat, Catch Composition

1. INTRODUCTION

According to the Law of the Republic of Indonesia No. 45 the Year 2009 on fisheries, it is stated that the definition of fisheries is all activities related to the management and utilisation of fish resources and the environment from pre-production, production, processing to marketing carried out in a fisheries business system.

Fishing is one of the fisheries activities that has existed for hundreds of years. Catching is done to fulfil the needs of human life, using simple equipment and with the development of the era, fishing equipment is modified and has many types so that it is easier and more efficient to use. Fishing gear is an important factor that must be owned to carry out fishing activities. The type of fishing gear will determine the amount and type of catch. Fishing gear is divided into 2 types, namely active fishing gear and passive fishing gear (Agustina et al., 2014).

Fishermen activities around the Fish Landing Base (PPI) of Dumai City generally use several fishing gears such as longline, surface gillnet, bottom drift gillnet, belat and sondong (Sari, 2010). Belats are passive fish and shrimp fishing gear made from materials such as stakes, branches, nets, bamboo, and so on. Usually built in tidal areas with a sloping bottom. In operation, this belat fishing gear does not move and only relies on the tidal currents of the waters. The fishing area of this belat fishing gear is the bay areas, where the fish in its migration through the place (Aditya et al., 2016).

Fishing gear as the main means in the capture fisheries business is regulated in such a way that it does not hurt users of fisheries resources and the aquatic environment as well as other users of aquatic services. The use of fishing gear must pay attention to balance and minimise negative impacts on other biota. This is important to consider considering the loss of biota in the ecosystem structure will affect the entire ecosystem. Radarwati et al. (2010) explained that mistakes in anticipating the dynamics of fishing gear have also led to the extinction of fish resources.

2. RESEARCH METHODS
Time and Place

This research was conducted from July to August 2022 in the waters of Dumai, Riau

Methods

The method used in this research is the survey method. Research data were obtained in two ways, namely primary data collection and secondary data. Primary data is data obtained from interviews with mullet fishermen and observations, while secondary data is conducted through interviews with the UPT Dumai manager and LANAL Dumai Commander, as well as literature.

The selection of respondents or sources was carried out by saturated sampling. According to Sugiyono (2015), saturated sampling is a sampling technique in which all members of the population are used as samples. This is often done when the population is relatively small, less than 30 people, or

research that wants to make generalisations with very small errors.

Data Analysis

Catch analysis was done descriptively, by classifying, tabulating, and interpreting data and presenting it in tables and graphs (Djunaidi et al., 2022).

3. RESULT AND DISCUSSION
Belat Fishing Gear

Belat fishing gear is a passive fishing gear operated by entangling fish or traps. The construction of belat fishing gear generally consists of several components, namely nets, stakes, upper risers and lower risers (Hadmojo et al., 2016). The detailed construction of the belat is presented in Figure 1.
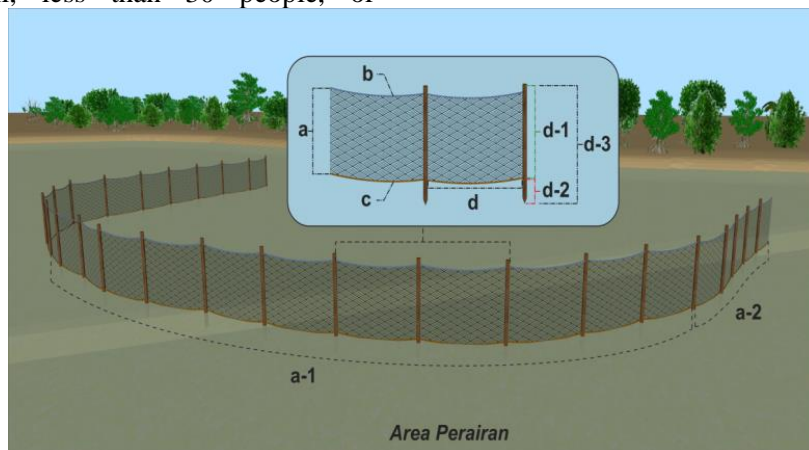
Figure 1. Construction of belat fishing gear in Dumai
Description: a-1= Front net length; a-2= Side mesh length; a. Top ris rope; b. Bottom ris strap; c. Belat stakes; d-1 = The length of the pile after it has been driven into the mud; d-2 = Length of the pile embedded in mud; d-3 = Overall pile length

The fleet used by belat fishermen is motorised boats or often called pompong. The tonnage of motorboats used by belat fishermen is 3-6 Gross Tonnage. Belat motorboats are made of wood using Dong Feng 24 Paarden Kracht engines. In addition, auxiliary boats (kompang) and tungkah are also used. The size of the kompang used is 6.7 m long, 2 m wide, and 70 cm high, while the size of the tungkah used is 180 cm long, 38 cm wide, and 20 cm high.

Belat gear fishers operating in Dumai Waters are permanent fishers where employment status is full-time. Most of the fishers come from Rupat Island, Bengkalis. The number of fishermen operating belat fishing gear in one fleet is 4-6 fishermen.

Mullet fishers usually conduct fishing operations in the areas of Santa Hulu (±22 miles from the harbour, with a travel time of about 4 hours), Tianjung (±35 miles from the harbour, with a travel time of about 5 hours), Teluk Dalam (±45 miles from the harbour, with a travel time of about 7 hours), and Senepis (±40 miles from the harbour, with a travel time of about 6 hours).

The operation of belat fishing gear in Dumai Waters is carried out by 4 to 6 fishermen. The mullet fishing gear is installed on the bottom of muddy waters by going through 3 stages. The stage is carried out by the tides. The first stage is preparation for going to sea, the second stage is the installation of fishing gear (setting), and the third stage is the

removal of fishing gear (hauling).

Composition of Catch

  According to Nofrizal et al. (2018), the composition of the catch can be calculated by the way the total catch from each installation of the belat gear is collected, then separated by type and counted. This is done to determine the percentage of the total catch per type so that the proportion of the main, side and discarded catches can be known.

  During the study, there were 16 species caught using mullet fishing gear, namely, white shrimp *(Penaeus indicus)*, kelong shrimp (*P.merguensis)*, Malaysian prawn (*Macrobranchium rosenbergii)*, small head

catfish (*Euristhmus microceps),* bluespot mullet (*Valamugil seheli)*, gulamah *(Otolithoides microdon)*, fourfinger threadfin (*Eleutheronema tetradactylum)*, sagor catfish (*Hexanematichthys sagor),* milk shark (*Rhizoprionodon acutus),* stingray (*Dasyatis sephen),* silrver sillago (*Sillago sihama),* white snapper (*Lates calcarifer),* spotted scat (*Scatophagus argus)*, crab (*Portunus pelagicus),* pomfret (*Pampus argenteus),* and saddle grunt *(Pomadasis maculates).*

  During the study, the total catch of belat was 2,525 kg or 198,753 fish. Data on the total weight and number of catches during the study can be seen in Table 1.

Table 1. Total weight (kg) and number (fish) of belat caught during the study

No.	Date	Weight (kg)	Number (Fish)
1.	30 July 2022	381	35.206
2.	01 August 2022	172	4.129
3.	02 August 2022	61	9.347
4.	06 August 2022	368	10.808
5.	09 August 2022	224	18.893
6.	10 August 2022	296	25.812
7.	11 August 2022	300	25.246
8.	14 August 2022	113	15.815
9.	15 August 2022	239	22.974
10.	22 August 2022	370	30.523
	Total	2.524	198.753

  From Table 1 it can be seen that the most catches were on 30 July 2022, namely 381 kg and the least catches were on 02 August 2022, 61 kg. For the number of catches, the most on 30 July 2022 was 35,206 fish and the least catch on 01 August 2022 was 4,129 fish. The mullet catch consists of shrimp, fish, and crab.

Catches During the Study by Catch Type

  The main catch is a component of the main fish stock or fish that is the main target in fishing operations because it has a high economic value (Paputungan et al., 2023). Bycatch are species that are caught during the operation of fishing gear, usually of low economic value, some of which are utilised by fishers and others are not utilised because they are small or have no economic value (Rizal & Apriliani, 2019).

  The determination of the main and side catch criteria was based on interviews with 8 belat fishermen and literature studies. The 8 fishermen said that the main catch criteria are

seen from the high selling value of the fish and the ease or difficulty of obtaining the fish during the operation, while the bycatch is fish that are not the target of fishing but are always caught during operations and are still sold by fishermen because they still have a selling value, although the selling value is not so high and some are consumed by the fishermen themselves.

  For the main catch of belat, the most dominant species caught during the study were smallhead catfish, white shrimp, kelong shrimp, malaysian prawn, gulamah, and bluespot mullet. Furthermore, for bycatch, the most dominant belat caught during the study were fourfinger threadfin, sagor catfish, milk shark, silver sillago, white snapper, spotted scat, crab, pomfret, and saddle grunt.

  The following catches of target fish during the study by weight (kg) and individuals (fish) are shown in Table 2.

Table 2. Catch of target fish during the study by weight (kg) and individuals (fish).

No.	Type of Fish Target	Weight (kg)	Percentage (%)	Total (Fish)	Percentage (%)
1.	Kelong shrimp	424.4	16.81	31.841	16.02
2.	White prawns	569	22.54	121.355	61.06
3.	Malaysian prawn	139.5	5.53	26.505	13.34
4.	Smallhead catfish	416	16.48	2.706	1.36
5.	Bluespot Mullet	125	4.95	746	0.38
6.	Gulamah	141	5.59	2.253	1.13
	Total	1.814,9	71.89	185.406	93.29

From Table 2 it can be seen that the highest type of catch by weight is white shrimp as much as 569 kg (22.54%) which amounts to 121,355 fish and the lowest type of catch is sembilang as much as 416 kg (16.48%) which amounts to 2,706 fish.

Furthermore, the bycatch of belat during the study by weight (kg) and individuals (tails) is shown in Table 3.

Table 3. Total bycatch during the study by weight (kg) and individuals (fish).

No.	Catch Results	Weight (kg)	Percentage (%)	Number (Fish)	Percentage (%)
1.	Fourfinger threadfin	213	8.43	4.346	2.19
2.	Sagor catfish	50	1.98	90	0.05
3.	Milky shark	102	4.04	1.847	0.93
4.	Stingray	125	4.95	77	0.04
5.	Silrver sillago	94	3.72	5.082	2.56
6.	White snapper	8.8	0.35	2	0.00
7.	Spotted scat	26.4	1.05	317	0.16
8.	Mackerel	18.5	0.73	333	0.17
9.	Pomfret	41	1.62	1.230	0.62
10.	Saddle grunt	30	1.19	23	0.01
	Total	709	28.06	13.346	6.71

Table 4. Total catch by a fishing trip

No.	Date	Arrest Trip	Main Catch		By-Catch	
			Weight (kg)	Ind (fish)	Weight (kg)	Ind (fish)
1.	30 July 2022	1st trip	241,5	33.247	139,5	1.959
2.	01 August 2022	2nd trip	95,6	2.081	76,6	2.048
3	02 August 2022	3rd trip	61	9.347	-	-
4.	06 August 2022	4th Trip	195,4	4.578	171,9	6.230
5.	09 August 2022	5th Trip	186	18.866	37,8	27
6.	10 August 2022	6th trip	217	24.464	79	1.348
7.	11 August 2022	7th trip	224,2	25.104	75,3	142
8.	14 August 2022	8th trip	100	15.777	13	38
9.	15 August 2022	9th trip	165,2	21.491	73,4	1.483
10.	22 August 2022	10th trip	328,3	30.451	42	72
	Total		1.814,9	185.406	709	13.346

Catch During the Study by Catch Trip

The amount of main and bycatch of belat during the study based on fishing trips can be seen in Table 4.

From Table 4, it is known that the main catch has a larger amount than the bycatch. The total weight of the main catch is 1,814.9 kg, while the bycatch weighs 709 kg, and when viewed from the total individual is also greater. Whereas the main catch was 185,406, the bycatch was 13,346.

Percentage of main catch and bycatch

For the proportion of main and bycatch, the main catch has a higher weight of 1,814.9 kg with a percentage of 71.91% consisting of 5

species, then for the amount of bycatch has a total weight of 709 kg with a percentage of 28.09% consisting of 10 species.

Calculation of the percentage of main catch and bycatch from fishermen's catches uses the formulation of Akiyama, using the main catch and bycatch comparison method. There was no wasted catch because all of the belat catches obtained by the fishermen were sold in the market. The percentages of the main and bycatch of belat are presented in detail in Figure 2.
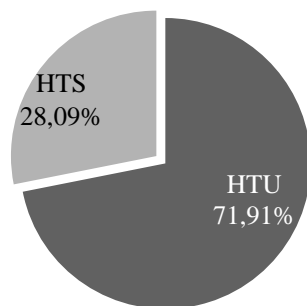
Figure 2. Percentage of main and bycatch of belat

From the percentage value of the main catch and bycatch, it can be seen that this belat fishing gear is still effectively used by fishermen because the composition of the catch obtained is still greater than the main catch than the bycatch.

Aquatic Environment Parameters

Environmental parameters that are closely related to fish distribution include plankton abundance, temperature, current, salinity and others. These parameters are very useful for the utilisation and management of fish resources, especially in fishing. Monitoring is important because various changes in marine waters can cause changes in fish adaptation and behaviour, where each type of fish has a certain temperature tolerance range for its survival. Therefore, the distribution of plankton, temperature and its changes and current patterns that occur will affect fish in their activities, especially in finding food, laying eggs, travelling and migrating (Sahidi et al., 2015). The environmental parameters calculated in this study are the tides because the tides are closely related to the working principle of belat fishing gear.

Tides

The belat is a static fishing gear and is included in the trapping gear, which in its operation utilises tidal currents and fish ranges. This operation is very dependent on tidal currents because it requires tides, the belat is operated in shallow waters around the coast. Tidal currents influence the catch of the belat. Shrimp and fish generally have the behaviour of travelling along the coast to spawn and find food. During these excursions, the current will lead the fish to accidentally enter the fishing gear. The operation of the belat is carried out during high tide and the results are taken during low tide (Ilyas, 2018).

Tides at the research site in one day can occur twice the tide and twice the low tide with almost the same height and tides occur in regular sequence so that it is classified into a type of double daily tide (semi-diurnal tide). This is to the statement of Wyrtki (1961) that for the Malacca Strait region, the tides are included in the mixed tidal type tending to double daily called semidiurnal tide. The tide and ebb results in this study were taken from the Indonesian Islands 2022 tide table issued by the Indonesian Navy Hydro-Oceanographic Centre Jakarta.

The installation of belat by fishermen is done twice a day and night with setting and hauling each done twice. This is because it is influenced by tidal conditions in the research location.

4.   CONCLUSIONS

From the results of the study, it can be seen that the construction of belat fishing gear in Dumai Waters consists of several components, namely nets, stakes, upper ris ropes and lower ris ropes, the fishing fleet used is a motorboat measuring 3-6 GT, usually operated by 4-6 fishermen, the method of operation starts from preparation for sea, setting, hauling and in one day fishermen usually do twice setting and twice hauling because it is influenced by the type of tide in Dumai Waters, for the belat fishing area consists of the Santa Hulu, Tianjung, Teluk Dalam, and Senepis areas.

From the calculation of the composition, it is known that the main catch of belat weighs 1,814.9 kg and the number of individuals is 185,406, while the bycatch weighs 709 kg and the number of individuals is 13,346. For the

percentage of belat catches, the main catch is more dominated by the main catch than the bycatch, with a percentage of the main catch of 71.91% and a percentage of the bycatch of 28.09%.

The catch of belat landed at the UPT Pelabuhan Perikanan Dumai varies with the most caught species being shrimp, but until now there has been no study on the availability of shrimp stocks in Dumai Waters. Therefore, it is hoped that future researchers will be able to conduct further research on the sustainability status of these shrimp in Dumai Waters so that they can continue to be well utilised and it is also hoped that the local government and also related parties can provide policies and more attention to the sustainability of this belat fishing gear.

REFERENCES

Aditya, R., Taru, P., Adnan. (2016). Studi hasil tangkapan belat *(set net)* dan ketahanan belat *(set net)* terhadap pengaruh arus dan gelombang di Perairan Tanjung Limau Kota Bontang. *Jurnal Ilmu Perikanan Tropis,* 21 (2).

Agustina, D., Taru, P., Adnan. (2014). Studi jenis alat tangkap dan hasil tangkapan oleh nelayan Kelurahan Tanjung Laut Indah Kecamatan Bontang Selatan Kota Bontang. *Jurnal Ilmu Perikanan Tropis*, 20(1).

Djunaidi., Sarianto, D., Zalmirosano. (2022). Analisis hasil tangkapan dan laju tangkap sondong di Kota Dumai Provinsi Riau. *Jurnal Pena Akuatika*, 21(1): 43-52.

Hadmojo, E.S., Rengi, P., Zain, J. (2016). The composition of catches belat during the day and night in the Village of Bunga Siak Regency of Riau, Indonesia. *Jurnal Online Mahasiswa Fakultas Perikanan dan Ilmu Kelautan Universitas Riau*, 3(2).

Ilyas, G.N. (2018). Studi hasil tangkapan sampingan *(bycatch* dan *discard)* usaha penangkapan belat di Desa Kuala Merbau Kecamatan Pulau Merbau Kabupaten Kepulauan Meranti. *Jurnal Online Mahasiswa Fakultas Perikanan dan Ilmu Kelautan,* 5(2):1-13.

Nofrizal., Jhonnerie, R., Yani, A.H., Alvin. (2018). Hasil tangkapan sampingan *(bycatch* dan *discard)* pada alat tangkap gombang *(filter net)* sebagai ancaman bagi kelestarian sumberdaya perikanan. *Marine Fisheries*, 9(2): 221-233.

Paputungan. E., Luasunaung, A., Silooy, F., Budiman, J., Mandagi, I.F., Patty, W. (2023). Komposisi dan Tingkat Keramahan Lingkungan Alat Tangkap Bagan. *Jurnal Ilmu dan Teknologi Perikanan Tangkap,* 8(1): 1-10.

Radarwati, S., Baskoro, M.S., Monintja, D.R., Purbayanto. (2010). Alokasi optimum dan wilayah pengembangan berbasis alat tangkap potensial Teluk Jakarta. *Marine Fisheries*, 1(2): 77-86.

Rizal, A., Apriliani, I.M. (2019). Proporsi Hasil Tangkapan *Trammel Net* pada Kedalaman yang Berbeda di Perairan Indramayu. *Jurnal Albacore,* 3(3): 249-261.

Sahidi, S., Sapsuha, G.D., Laitupa, A.F., Tangke, U. (2015). Hubungan faktor *oseanografi* dengan hasil tangkapan pelagis besar di Perairan Batang Dua Provinsi Maluku Utara. *Jurnal Ilmiah Agribisnis dan Perikanan (Agrikan UMMU-Ternate)*, 8(2).

Sari, I.T. (2010). *Peran pangkalan pendaratan ikan (PPI) Kota Dumai dalam mendukung aktivitas penangkapan ikan.* Mayor Teknologi dan Manajemen Perikanan Tangkap. Departemen Pemanfaatan Sumberdaya Perikanan. Fakultas Perikanan dan Ilmu Kelautan. Institut Pertanian Bogor.

Sugiyono. (2015). *Metode penelitian kuantitatif, kualitatif, dan R&D*. Bandung. PT Alfabeta. p 85.

Undang-Undang Republik Indonesia Nomor 45 Tahun 2009 Tentang Perubahan Atas Undang-Undang Nomor 31 Tahun 2004 Tentang Perikanan. Lembaran RI Tahun 2009. No 5073. Jakarta.

Wyrtki, K. (1961). *Physical oceanography of the Southeast Asian Waters*. The University of California.