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SELECTIVITY OF RENGGE HANYUT TOOLS (DRIFT GILL NET) IN THE SUNGAI BATANG VILLAGE OF MARTAPURA (BANJAR DISTRICT, SOUTH KALIMANTAN, INDONESIA)

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ABSTRACT
Drift gill net is a rectangular net. Knowledge of the measure of gear selectivity is very important for fisheries management and ecology. Common water fishing activities in South Kalimantan are generally carried out in rivers, swamps, lakes or reservoirs. Fish that are caught (target). This is due to the increasing intensity of fishing using drift gill nets with various mesh sizes, so that research on the selectivity of the nets is needed. Selectivity is the main factor in determining whether or not a fishing gear is good for the sustainability of fish resources. There are 4 types of fish found in *Sungai Batang* village using gill nets, namely the Cyprinidae family such as 51 *Nilem* fish (*Osteocilus hasselti*), Bagridae families such as *Lundu* (*Mystus gulio*) as many as 20 individuals and *Senggiringan* (*Mystus nigreceps*) as many as 1 tail, in the Nandidae family the fish obtained were 14 *Patung* fish (*Pristolepis grootii*), and the Pangasiidae family such as 1 fish (Pangasius macronema) with a total of 88 fish caught, with details on the mesh size 3 cm as many as 43 tails and mesh size 3.5 cm as many as 45 tails, the highest selectivity value at the 30 mm mesh size is 0.999 S (al) at a length distribution of 106-111 mm and the lowest is 0.212 at a length distribution of 124-129 whereas the value of selection of fishing gears drifting at 35 mm mesh size, the highest selection value is 0.999 S (bl) at 124-129 mm and the lowest is 0.076 S (bl) on the pan distribution, which is 100-105 mm.

KEY WORDS
Selectivity, drift gillnet, Batang River.

Common water fishing activities in South Kalimantan are generally carried out in rivers, swamps, lakes or reservoirs. The fish caught (target species) are local fish. In 2011, the exploitation rate of fish resources in public waters in South Kalimantan reached 62,644.5 tons / year (South Kalimantan Provincial Fisheries and Marine Affairs Office, 2011).

This fishing activity continues because the need for local fish is in the first rank compared to the need for other animal protein. There are 140 species of local fish exploited in South Kalimantan. There are 4 (four) types of local fish which are the main consumption of the people of South Kalimantan. The four fish are *Seluang* fish (Rasbora sp.), *Haruan* Fish (Channa striata), *Papuyu* Fish (Anabas testudineus) and swamp Sepat Fish (Trichogaster trichopterus) (Prasetyo and Asyari, 2003, Sodikin, 2004).

One of the fishing gears used by the Martapura river fishermen is Rem pa (Drift gillnet). Earthquakes are semi-active fishing gear and are very easy to operate by fishermen. The size of the mesh used by fishermen in the Martapura River is from 1.5 cm to 3 cm, the catch of *rempa* is in the form of fish Seluang (*Rasbora sp*.), Puyau (*Osteochilus hasselti*), Tilapia (*Oreochromis niloticus*), Lundu fish (*Mystus wolffii*).

In connection with the exploitation of fish in the Martapura River, research related to the selectivity of the drift gill net fishing gear is necessary. This is due to the increasing intensity of fishing using drift gill nets with various mesh sizes. Several studies have been conducted on gill nets regarding mesh size, hanging ratio, net material and selectivity. Selectivity is the main factor in determining whether or not a fishing gear is good for the sustainability of fish resources. Earthquake is a fishing tool that can be said to be selective, namely the types of fish caught are not too diverse and the catch is quite large.

METHODS OF RESEARCH

The research was conducted in the waters of Sungai *Batang* Martapura Village, Banjar Regency, South Kalimantan. from March - November 2020 starting from the activities of making research proposals and research in the field, processing data, compiling reports.

The method used in this research is to use experimental fishing, namely by conducting field trials on seismic (drift gill net) with 2 different mesh sizes carried out simultaneously at the time and place of operation.

After obtaining data from the experimental results, a statistical analysis of the experiment is carried out, then a conclusion can be drawn from the estimates obtained so that it can be evaluated at the end of the study.

The analytical method used to estimate the selectivity of drift gill net is the Holt Model (Sparre and Venema, 1999). Supported by a normal curve, with the following calculation steps:

1. Calculate the Logarithm of the Ratio:

Calculate the logarithm of the ratio for each length group. Only lengths with overlapping frequencies are used. The formula used is as follows:

$$Y = 1n\left(\frac{cb}{ca}\right) \textit{ Step 1}$$

Where: Ca: the number of fish caught for a mesh size of 3 cm; Cb: the number of fish caught for a mesh size of 3.5 cm.

2. Determine the values of a and b with the following equation:

Perform a regression analysis of the logarithm of the ratio y to the midpoint of the interval for the length of the fish (x = L) and determine a and b with the following formula:

$$1n\left(\frac{cb}{ca}\right) = a + b * L \textit{ Step 2}$$

Where: L: midpoint interval; a: *intercept*; b: *slope*.

3. Determine the selection factor (selection factor):

The final result can be obtained by entering the values of a, b, ma, and mb in expressions such as the following:

$$SF = \frac{(-2)a}{b*(ma+mb)} \textit{ Step 3}$$

Where: Ma = *mesh size* 3 cm; Mb = *mesh size* 3,5 cm; SF = *Selection Factor*.

Then to determine the standard deviation that applies to both, the variants are determined as follows:

$$S^2 = \frac{(-2)*a*(mb-ma)}{b^2*(ma+mb)} = SF*\frac{mb-ma}{b}$$

4. Determine the points of the selection curve obtained by plugging the values of L into the equation below:

$$Sa(L) = \exp\left[-\frac{n(L-L\,ma)}{2*S^2}\right]^2 \textit{ Step 4}$$

$$Sb(L) = \exp\left[-\frac{n(L-L\,mb)}{2*S^2}\right]^2$$

Where: Lma = optimum length of fish for nets with a mesh size of 3 cm; Lmb = optimum length of fish for nets with a mesh size of 3,5 cm.

5. Determine the number in the population estimated for each mesh:

From this all and the catch Ca) and Cb (L), an index of the numbers in the population is estimated for each eye size length by the following formula:

$$Na(L) = \frac{Ca\ (L)}{Sa\ (L)}\ Step\ 5$$

$$Nb(L) = \frac{Cb\ (L)}{Sb\ (L)}\ Step\ 5$$

RESULTS AND DISCUSSION

The types of fish caught by drift gill net are as follows:

Figure 1 – *Nilem* Fish (Osteocilus hasselti (Kottelat, 1993). Source: Primary data.

Note:
Kingdom: Animalia;
Phylum: Chordata;
Class: Pesscies;
Sub-class: Teleostei;
Order: Cypriniformes;
Family: Cyprinidae;
Genus: Osteocilus;
Species: Osteocilus hasselti (Kottelat, 1993).

Figure 2 – *Patung* Fish (*Pristolepis grootii* (Kottelat, 1993). Source: Primary Data.

Note:
Kingdom: Animalia;
Filum: Chordata;
Kelas: Pesscies;
Sub-class: Teleostei;
Ordo: *Perciformes;*
Family: *Nandidae;*
Genus: *Pristolepis;*
Spesies: *Pristolepis grootii* (Kottelat, 1993).

Figure 3 – *Lundu* Fish (*Mystus gulio* (Kottelat, 1993). Source: Primary Data.

Note for Figure 3:
Kingdom: Animalia;
Phylum: Chordata;
Class: Pesscies;
Sub-class: Teleostei;
Order: Siluriformes;
Family: Bagridae;
Genus: Mystus;
Species: Mystus gulio (Kottelat, 1993).

Figure 4 – *Riu* Fish (*Pangasius macronema* (Kottelat, 1993). Source: Primary Data.

Note:
Kingdom: Animalia;
Phylum: Chordata;
Class: Pesscies;
Sub-class: Teleostei;
Order: Siluriformes;
Family: Pangasiidae;
Genus: Pangasius;
Species: Pangasius macronema (Kottelat, 1993).

Figure 5 – *Senggiringan* Fish (*Mystus nigreceps* (Kottelat, 1993). Source: Primary Data.

Note:
Kingdom: Animalia;
Phylum: Chordata;
Class: Pesscies;
Sub-class: Teleostei;
Order: Siluriformes;
Family: Bagridae;
Genus: Mystus;
Species: Mystus nigreceps (Kottelat, 1993).

The catch of drift gill net with a mesh size of 3 cm and 3.5 cm can be seen in Table 1:

Table 1 – Total Catch Results with mesh sizes 3 and 3.5 cm

No.	Types of Fish	Number	Size	
			3 cm	3,5 cm
1.	*Nilem*	51	25	26
2.	*Lundu*	20	11	9
3.	*Patung*	14	6	8
4.	*Riu*	2	0	2
5.	*Senggiringan*	1	1	0
Amount		88	43	45

Source: Primary Data.

Judging from the data above, there were 88 fish caught at a mesh size of 3 cm, as many as 43 fish and at a size of 3.5 cm as many as 45 fish. The composition of the fish caught in the two mesh sizes, namely 25 Nilem fish at 3 cm size and 26 fish at 3.5 cm size, 11 fish lundu at 3 cm size and 9 fish at 3.5 cm size, 6 statue fish tail at 3 cm size and 8 fish at 3.5 cm size, 2 ryiu fish at 3.5 cm size and 1 senggiringan fish at 3 cm size.

Table 2 – Estimation Curves of Selection for Floating *Rengge* for Nilem Fish (*Osteocilus hasselti*) in Sungai *Batang* Village

Class interval	Midpoint (L) X	Number Caught		CbL/CaL	Ln CbL/CaL	Selection		Estimation	
		ma= 30 mm (CaL)	mb= 35 mm (CbL)		Y	SaL	SbL	NaL	NbL
100 -105	102.5	9	1	0,111	-2,197	0,864	0,076	10,417	13,113
106 – 111	108.5	8	1	0,125	-2,079	0,999	0,238	8,005	4,195
112 – 117	114.5	5	5	1	0	0,830	0,535	6,021	9,344
118 – 123	120.5	2	4	2	0,693	0,496	0,863	4,035	4,636
124 – 129	126.5	1	4	4	1,386	0,212	0,999	4,707	4,002
130 – 135	132.5	0	10	-	-	0,065	0,832	-	12,026
136 – 142	138.5	0	1	-	-	0,014	0,497	-	2,012
Total		25	26						

1n ($\frac{cb}{ca}$) = a + b *L a: -19.,408, b: 0.165660443 ma: 30 cm, mb: 35 cm

SF = $\frac{(-2)a}{b*(ma+mb)} = \frac{-2\ (-19{,}403)}{0.165660443\ *(30+35)} = \frac{38{,}81513135}{10{,}76792882}$ = 3.604697989

Lma: SF*ma = 3.60497989 x 30 = 108,1409397

Lmb: SF*mb = 3.60497989 x 35 = 126,1644296

S^2= SF*$\frac{mb-ma}{b}$ = 3.60497989*$\frac{35-30}{0.165660443}$= 3.60497989* $\frac{5}{0,165660443}$ = 108,7977889

Source: Primary Data.

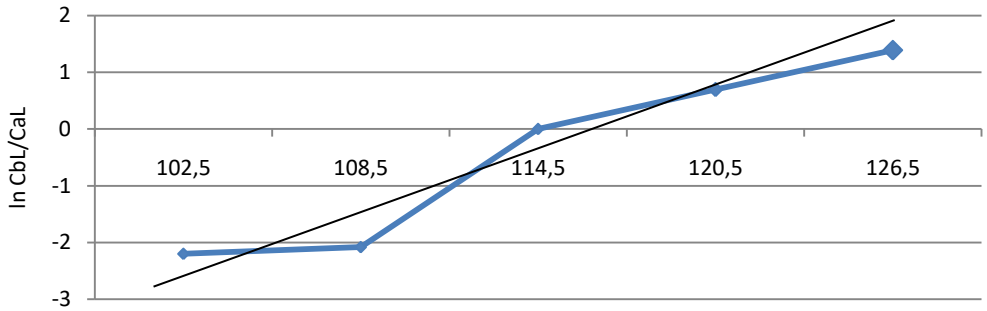

Figure 6 – Regression Curve of Ln (Cbl / Cal) Against Length of Nilem Fish (*Osteocilus hasselti*) in Sungai *Batang* Village (Source: Primary Data)

In Table 2 it can be seen that the calculation results obtained a value of a: -19.373 and a value of b: 0.169379503, the value of SF (Selection Factor) is 3.604697989, Lma is 108.1409397 and Lmb 126.1644296, and S2 = 108.7977889.

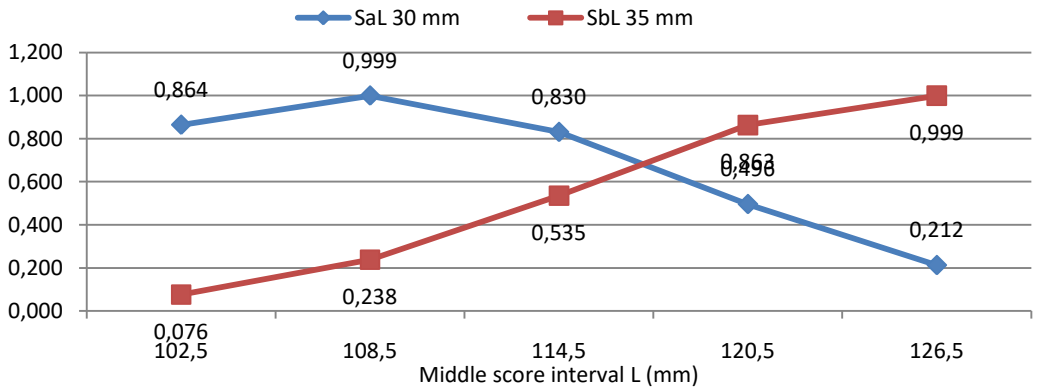

Figure 7 – Selection Curve of Floating Rengge for Nilem Fish (*Osteocilus hasselti*) in *Sungai Batang* Village (Source: Primary data)

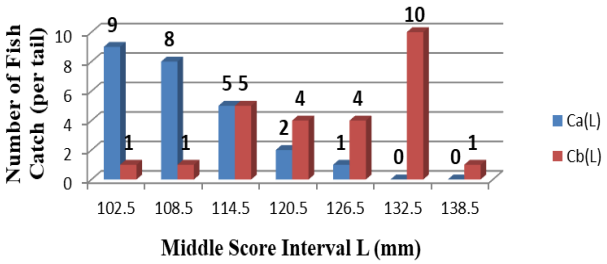

Figure 8 – Curve of Length and Number of Nilem Fish (*Osteocilus hasselti*) in *Sungai Batang* Village (Source: Primary data)

It can be seen that the catches at a mesh size of 30 mm are mostly caught in the class interval of 102.5 mm with 9 fish and the least is in the class interval 126.5 with the number of 1 fish. At the mesh size 35 mm, the most were caught at the class interval of 132.5 mm as many as 10 fish and the least was caught at the class interval 102.5, 108.5 and 138.5 each 1 fish. The fish caught on both fishing gear were at class 114.5 intervals with 5 fish at 30 mm mesh size and 5 fish at 35 mm mesh size.

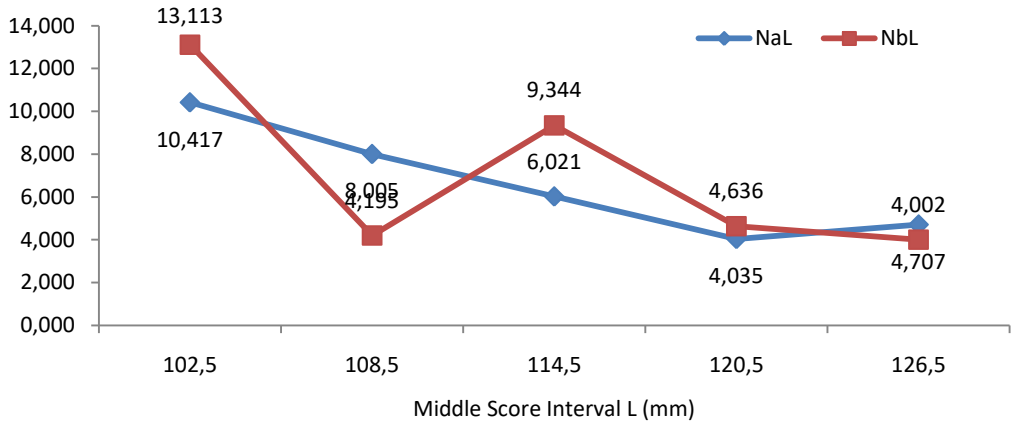

Figure 9 – Population Curve Estimation of Nilem Fish (*Osteochilus hasselti*) in *Sungai Batang* Village

The dominant Nilem fish population (*Osteocilus hasselti*) caught in drift gill net with a mesh size of 30 mm has the highest estimated number of 10,417 Nal at a class interval length of 102.5, 9 tails and the lowest estimated number of 4,035 Nal at a class interval of 120.5 with total 2 tails. Whereas at mesh size 35 mm the highest estimate is 13,113 Nbl at the class interval length of 102.5 mm as many as 1 head and the lowest estimated number is 4,002 mm Nbl at the class interval 108.5 mm with the number of 4 birds.

Research on the selectivity of drift gill nets on the catch of Nilem (*Osteocilus hasselti*) was carried out using two drift gill nets with different mesh sizes. The dominant number of fish samples caught in the drift gill net tool with a mesh size of 30 mm was 25, while the mesh size of 35 mm was 26 with a total of 51 fish. The results of calculations on several parameters related to the estimation of the selectivity curve for Nilem (*Osteocilus hasselti*) in the Martapura River, *Sungai Batang* Village, can be seen in Table 2.

The selectivity of Nilem (*Osteocilus hasselti*) against drift fishing gear with a mesh size of 30 mm and 35 mm, such selectivity value of 30 mm is not much different from that of 35 mm. The highest selectivity value at a mesh size of 30 mm is 0.999 S (al) at a class interval of 108.5 mm with a length distribution of 106-111 mm, the number of catches is 8 fish and the lowest selection value is 0.212 S (al) at a class interval of 126.5 mm with a length distribution of 124 -129 with the number of catches of 1 fish while the value of selection of fishing gears drifted at 35 mm mesh size, the highest selection value was 0.999 S (bl) at the class interval of 126.5 mm with a spread of 124-129 mm with a total of 4 fish and the lowest selection value was 0.076 S (bl) at class intervals of 102.5 mm with a distribution of 100-105 mm with the number of 1 head.

This shows that the length of the fish affects the catch on the mesh size of the net. Where the lower the sal value for the length of the fish, the less catch is because at that length the fish can no longer be caught with a mesh size of 30 mm. in other words, the higher the sbl value for the length of the fish, the more catch is because the fish with a length of over 114.5 mm are caught in the 35 mm mesh size.

CONCLUSION

There were 4 types of fish found in Sungai *Batang* village using gill nets, namely the Cyprinidae family such as 51 Nilem fish (*Osteocilus hasselti*), Bagridae families such as Lundu (*Mystus gulio*) as many as 20 individuals and Senggiringan (*Mystus nigreceps*) as many as 1 fish, in the Nandidae family, the fish obtained were 14 Patung fish (*Pristolepis grootii*), and 1 fish from the Pangasiidae family such as Riu fish (*Pangasius macronema*) with a total of 88 individuals. The fish caught were as many as 88 fish, with details on the mesh size of 3 cm as many as 43 fish and mesh size of 3.5 cm as many as 45 fish. The highest selectivity value is at a mesh size of 30 mm of 0.999 S (al) at a length of 106-111 mm and the lowest is 0.212 in a length distribution of 124-129, while the value of selection for fishing gears drifts at a mesh size of 35 mm, the highest selection value is 0.999 S. (bl) at 124-129 mm and the lowest 0.076 S (bl) at a length of 100-105 mm.

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