



COMPOSITION OF TYPES OF FISH THAT IS CAPTURED WITH THE GILL NETS IN KUMBE RIVER, MALIND DISTRICT, MERAUKE REGENCY

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ABSTRACT

*The purpose of this study was to determine the composition of the species of fish caught with gill nets on the Kumbe River in Merauke Regency. Fish sampling is carried out in July - September 2017 at three observation stations which are fishing areas by local fishermen, including: station I in the estuary section; station II \pm 1500 meters from the estuary and station III \pm 3000 meters from the mouth of the Kumbe River. The fishing gear used is gill nets with mesh sizes: 3.5, 4 and 7 inches. Fish samples obtained were then calculated according to the number per species and were identified at the Aquatic Resource Management Laboratory of the Faculty of Agriculture, Musamus University. Biological parameters observed were species composition, species richness, diversity index (H'), evenness index (E) and dominance index (D). The results of this research are species composition: *Cinetodus crassilabris* namely 41.48% and the most and the lowest is *Megalops cyprinoides* and *Nibea squamosal* namely 0.25%. There are 22 species of wealth. Moderate diversity and evenness index, dominance index close to 0 indicates that there are no dominant fish on the three research stations.*

Keywords: composition, fish type, gill nets

Cite this Article: Bonny Lantang and Edy H.P. Melmambessy, Composition of Types of Fish That is Captured with the Gill Nets in Kumbe River, Malind District, Merauke Regency, International Journal of Civil Engineering and Technology, 10(03), 2019, pp. 1007–1017

<http://iaeme.com/Home/issue/IJCIET?Volume=10&Issue=3>

1. INTRODUCTION

Merauke Regency in terms of geographical location is in a strategic area which is located in the southern part of the island of Papua and is directly facing the Arafura Sea and is influenced by the pattern of movement of currents moving from the northern part of the Arafura sea in certain seasons. In addition, large land with dense forests and mangrove ecosystems that are

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still well organized and maintained are a potential to supply nutrients to the waters (Lantang, 2015).

Kumbe River, which is one of the rivers in the Merauke Regency region, which belongs to the Einlanden river area - Digul-Bikuma, has a length of 300.42 km with a catchment area of 3,765.90 km² (Directorate General of Water Resources Department of Public Works, 2008). The Kumbe River is located at position 140037 'E and 8000' S in the upper reaches of the river and 140013 'E and 8021' S in the river mouth which borders the Arafura Sea.

Research that is in line with this research has been carried out in Merauke Regency carried out by Yaurbulan (2018), with the research location on the Maro River finding 17 species of the highest type of fish, namely White Bawal fish (*Rhinoprenes Pentanemus*) with the number 140. Furthermore, Melmambessy et. al. (2018) who also conducted research on the Maro River found 17 species of fish. Lantang (2015) who also conducted research in the Maro River found the number of catches as many as 7 species with salinity and pH as well as environmental factors (Hidanah et al., 2016; Mangkoedihardjo and April, 2012) that influence the presence of fish in the waters.

Although the number of previous studies, but the object of study and the sampling point is at one point, this depends on the purpose of the research and development of subsequent research. Whereas this research was carried out at a different location with the distribution of the estuary, headland and the inside of the river.

2. METHODOLOGY

This research has been carried out at Sungai Kumbe, Malind District, Merauke Regency. The study lasted for 3 (three) months, namely July - September 2017. Map of the research location can be seen in (Figure 1).

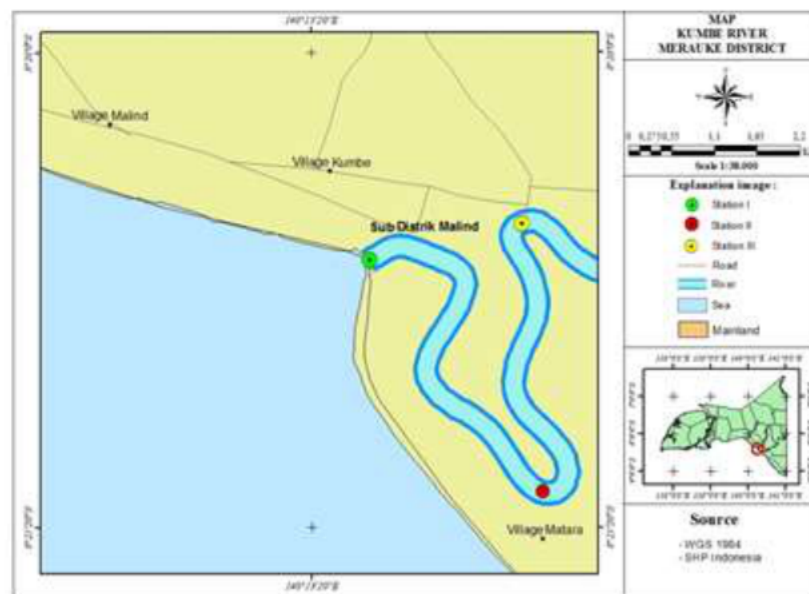


Figure 1. Research location

Sampling is done three times a month, by collecting data directly from fish catches each trip. The catch obtained is separated according to the type and calculates the amount obtained per type.

1. Type Composition

The species composition was obtained from data on the size and number of nekton species obtained from each location with a predetermined station.

2. Relative Abundance

Calculation of the relative abundance of each fish species is carried out by calculating the percentage amount. The equation used is:

$$Kr = \frac{ni}{N} \times 100\%$$

where:

Kr = Relative Abundance

ni = Number of individual species of-i

N = The total number of individuals of all species

2.1. Frequency of density

The frequency of density is used to show the extent of local distribution of certain species. This can be seen from the frequency (%) of fish caught with equations (Misra, 1968):

$$Fi: \frac{ti}{T} \times 100\%$$

where:

Fi = frequency of density of fish of-i caught (%)

ti = The number of stations where the-i species is caught

T = Number of all stations

Species that have a value close to 100% are fish that have a wide local spread. Species that have an F value close to 0% are species that have a narrow local spread.

2.2. Diversity Index

To determine fish diversity, the Shannon-Wiener index is used (Odum, 1971):

$$H' = - \sum_{i=1}^n \left(\frac{ni}{N} \right) \ln \left(\frac{ni}{N} \right)$$

where:

H' = Shannon-Wiener Diversity Index

ni = Number of individual species-i

N = Individual number of all species

Determination of criteria:

The range of diversity index values according to Krieb (1989) are:

$H' < 1$: low diversity, low distribution of individual numbers per species and low community stability.

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$1 < H' < 3$: moderate diversity, the distribution of the number of individuals per medium and the stability of the medium community.

$H' > 3$: high diversity, high distribution of individual species and high community stability.

3. RESULTS AND DISCUSSION

To find out the composition of fish catches in Sungai Kumbe can be seen as follows:

3.1. Type Composition

Based on the results of research conducted in the Kumbe River, Malind District, Merauke Regency, there are 22 species with the number of species composition of the catch can be seen in Table 1 below.

Table 1. Type of fish catch in the Kumbe River

Number	Scientific name	Number	Scientific name
1	<i>Cinetodus crassilabris</i>	12	<i>Paraplagusia bilineata</i>
2	<i>Lates calcarifer</i>	13	<i>Toxotes chatareus</i>
3	<i>Leiognathus ecuulus</i>	14	<i>Eleutheronema tetradactylum</i>
4	<i>Carcharhinus amboinensis</i>	15	<i>Neosilurus sp</i>
5	<i>Argyrosomus amoyensis</i>	16	<i>Marilyna meraukensis</i>
6	<i>Polydactylus plebeius</i>	17	<i>Pastinachus Sephen</i>
7	<i>Mugil cephalus</i>	18	<i>Rhinobatos typus</i>
8	<i>Thryssa scratchleyi</i>	19	<i>Therapon Theraps</i>
9	<i>Cinetodus froggatti</i>	20	<i>Scatophagus argus Linnaeus</i>
10	<i>Kurtus gulliveri</i>	21	<i>Megalops cyprinoides</i>
11	<i>Epinephelus sp</i>	22	<i>Nibea squamosal</i>

In Table 1 above, the number of species found is quite large with 22 species. Yaurbulan (2018), with the research location on the Maro River found 17 species of fish with the highest species, namely White Bawal fish (*Rhinoprenes Pentanemus*) with the number 140. Next, Melmambessy at al. (2018) who also conducted research on the Maro River found 17 species of fish. Ulukyana (2019), reported that the number of fish species obtained in February - March 2019 was 11 types, lower than the 2018 study, allegedly caused by different seasons and different data collection times. The high number of fish found in the Kumbe river is suspected by the fulfillment of ideal conditions that support the presence of fish in waters such as environmental factors both physics, chemistry and biology. In addition, the research area is a river estuary which is an outlet for fish inputs from coastal waters into the river bodies. Hendra, et.al. (2007), high catches due to the condition of the waters on the Kumbe River are still stable providing abundant food.

3.2. The density of fish species per station

To find out the availability of fish in the waters of the Kumbe river can be seen in Table 2 below.

Table 2. Amount of Catch at the Research Location in the Kumbe River

Number	Species	Amount of Catch at the Research Location			Amount
		Station I	Station II	Station III	
1	<i>Cinetodus crassilabris</i>	106	14	43	163
2	<i>Lates calcarifer</i>	24	14	9	47
3	<i>Leiognathus ecuulus</i>	32	-	-	32
4	<i>Carcharhinus amboinensis</i>	24	-	-	24
5	<i>Argyrosomus amoyensis</i>	6	12	5	23
6	<i>Polydactylus plebeius</i>	11	8	3	22
7	<i>Mugil cephalus</i>	10	5	-	15
8	<i>Thryssa scratchleyi</i>	13	1	-	14
9	<i>Cinetodus froggatti</i>	6	-	4	10
10	<i>Kurtus gulliveri</i>	-	6	-	6
11	<i>Epinephelus sp.</i>	1	-	4	5
12	<i>Paraplagusia bilineata</i>	5	-	-	5
13	<i>Toxotes chatareus</i>	-	1	4	5
14	<i>Eleutheronema tetradactylum</i>	3	1	-	4
15	<i>Neosilurus sp.</i>	-	4	-	4
16	<i>Marilyna meraukensis</i>	3	-	-	3
17	<i>Pastinachus Sephen</i>	3	-	-	3
18	<i>Rhinobatos typus</i>	2	-	-	2
19	<i>Therapon Theraps</i>	2	-	-	2
20	<i>Scatophagus argus Linnaeus</i>	-	2	-	2
21	<i>Megalops cyprinoides</i>	1	-	-	1
22	<i>Nibea squamosal</i>	1	-	-	1
Amount		253	68	72	393

Based on the results in Table 2, it shows that the number of fish catches for 3 months (July - September) 2017 in the Kumbe River in the Malind District of Merauke Regency is as many as 393 birds from 22 species spread over three research locations or stations. Where I (Muara) is the location with the first largest number of fish catches with 253 animals and Station III (Tanjung) is the location with the second largest number of catches 72 and Station II (Tanjung) is the location with the third highest number of fish catches 68 tail. *Cinetodus crassilabris* is the type of the largest catches spread across the three stations with a total of 163 birds. Judging from the number of fish obtained, the number obtained in this study was higher, which was 393. Yaurbulan (2018) who conducted research on the Maro River in Merauke District, obtained catches with a total of 286 and Melmambessy at al. (2018), which conducted research on the Maro River in Merauke Regency with the number of fish obtained as many as 1,043 tails. Ridho (2017) in the Banyuasin River Estuary obtained as many as 438 catches with 32 species of fish obtained. The increase in catch is thought to be caused by the optimum variety of environmental factors in river waters so that it fits the needs of organisms in the region. In addition, season and fishing time greatly affect the productivity of the catch. Yaurbulan (2018), changes in fishing time and unbalanced weather in certain months greatly affect the catch. This research was conducted with 3 different observation stations from one

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of the stations on the mouth of the river and is the location of the catch with the highest catch. The estuary area of the river has a strategic role in the ecology of the waters including being a habitat in various stages in the life stage of fish.

3.3. Relative Abundance

The relative abundance based on the location of the observation can be seen in Table 3 below.

Table 3. Presentation fish catch at the research location in the Kumbe River

Number	Species	Presentation Fish Catch at the Research Location (%)			Amount (%)
		Station I	Station II	Station III	
1	<i>Cinetodus crassilabris</i>	41,90	20,59	59,72	41,48
2	<i>Lates calcarifer</i>	9,49	20,59	12,50	11,96
3	<i>Leiognathus ecuulus</i>	12,65	0	0	8,14
4	<i>Carcharhinus amboinensis</i>	9,49	0	0	6,11
5	<i>Argyrosomus amoyensis</i>	2,37	17,65	6,94	5,85
6	<i>Polydactylus plebeius</i>	4,35	11,76	4,17	5,6
7	<i>Mugil cephalus</i>	3,95	7,35	0	3,82
8	<i>Thryssa scratchleyi</i>	5,14	1,47	0	3,56
9	<i>Cinetodus froggatti</i>	2,37	0	5,56	2,54
10	<i>Kurtus gulliveri</i>	0	8,82	0	1,53
11	<i>Epinephelus sp.</i>	0,40	0	5,56	1,27
12	<i>Paraplagusia bilineata</i>	1,98	0	0	1,27
13	<i>Toxotes chatareus</i>	0	1,47	5,56	1,27
14	<i>Eleutheronema tetradactylum</i>	1,19	1,47	0	1,02
15	<i>Neosilurus sp.</i>	0	5,88	0	1,02
16	<i>Marilyna meraukensis</i>	1,19	0	0	0,76
17	<i>Pastinachus Sephen</i>	1,19	0	0	0,76
18	<i>Rhinobatos typus</i>	0,79	0	0	0,51
19	<i>Therapon Theraps</i>	0,79	0	0	0,51
20	<i>Scatophagus argus Linnaeus</i>	0	2,94	0	0,51
21	<i>Megalops cyprinoides</i>	0,40	0	0	0,25
22	<i>Nibea squamosal</i>	0,40	0	0	0,25
Amount (%)		100	100	100	100
Amount		253	68	72	393

Based on the results of relative abundance, it shows that in the Kumbe River the type of fish that has the highest relative abundance is species *Cinetodus crassilabris* with a percentage of 41.48% and the smallest relative abundance value, namely by the percentage of 0.25% of the type *Megalops cyprinoides* and *Nibea squamosal*. Yaurbulan (2018) gets a catch on *Cinetodus crassilabris* with a higher percentage of 82.75% compared to other types of fish. Lagler, (1972) explains that a species of fish in nature has a close relationship with the density of its food, these fish can survive if there is a type of food that they like, food availability is a factor that determines the amount and dynamics of population, growth, reproduction, and condition of fish in a waters.

If seen, then the highest relative abundance of fish of the species *Cinetodus crassilabris*, this is thought to be caused by optimum environmental factors such as temperature, salinity, pH that support the presence of fish *Cinetodus crassilabris* in the waters of the Kumbe River. The results of the study on the Kumbe River are 28.2 - 31.5 °C, and this is an ideal value for fish. The growth and life of aquatic biota is greatly influenced by water temperature. The optimal temperature range for fish life in tropical waters is between 28.0 - 32.0 °C. At that range oxygen consumption reaches 2.2 mg / 1 body weight / hour, at a temperature of 18.0-25.0 °C, fish still survive, but their appetite begins to decline, water temperature 12-18.0 starts to be dangerous for fish, while at temperatures below 12.0 °C tropical fish die of cold (Gufran et al., 2007). Whereas in salinity with a value of 0.0 - 2.6 ppt and is a salinity that can still be tolerated by fish on the Kumbe River. While at pH with a value of 7.1 - 7.5 which is an ideal value with a normal pH category.

3.4. Frequency of density

Frequency of density based on location of observation can be seen in Table 4 below.

Table 4. Density frequency fish catch at the research location in the Kumbe River

Number	Species	Density Frequency			Fi (%)
		Station I	Station II	Station III	
1	<i>Cinetodus crassilabris</i>	√	√	√	100
2	<i>Lates calcarifer</i>	√	√	√	100
3	<i>Argyrosomus amoyensis</i>	√	√	√	100
4	<i>Polydactylus plebeius</i>	√	√	√	100
5	<i>Mugil cephalus</i>	√	√	-	67
6	<i>Thryssa scratchleyi</i>	√	√	-	67
7	<i>Cinetodus froggatti</i>	√	-	√	67
8	<i>Epinephelus sp.</i>	√	-	√	67
9	<i>Toxotes chatareus</i>	-	√	√	67
10	<i>Eleutheronema tetradactylum</i>	√	√	-	67
11	<i>Leiognathus ecuulus</i>	√	-	-	33
12	<i>Carcharhinus amboinensis</i>	√	-	-	33
13	<i>Kurtus gulliveri</i>	-	√	-	33
14	<i>Paraplagusia bilineata</i>	√	-	-	33
15	<i>Neosilurus sp.</i>	-	√	-	33
16	<i>Marilyna meraukensis</i>	√	-	-	33
17	<i>Pastinachus Sephen</i>	√	-	-	33
18	<i>Rhinobatos typus</i>	√	-	-	33
19	<i>Therapon Theraps</i>	√	-	-	33
20	<i>Scatophagus argus Linnaeus</i>	-	√	-	33
21	<i>Megalops cyprinoides</i>	√	-	-	33
22	<i>Nibeas squamosal</i>	√	-	-	33

Note √ : Shows the Presence of Fish

- : Shows no Fish

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The results of Table 4, show that the frequency of density is related to the distribution area (distribution). The greater the frequency of density means the wider the area of spread. The value of the density of fish species shows that there are 4 species with a percentage of 100% and have a wide spread, namely: *Cinetodus crassilabris*, *Lates calcarifer*, *Argyrosomus amoyensis* and *Polydactylus plebeius*. Whereas 6 species which have a value of 67% show moderate distribution and 12 fish species with a value of 33% showing sparse distribution of regions. The increase in the spread of fish species is one of them *Lates calcarifer* caused by this type of fish has a high tolerance to salt levels (euryhaline) and is a large type of fish in fresh water and mating in sea water and is one type of fish that is found in both fresh, brackish and sea waters in Merauke Regency.

3.5. Diversity Index

Diversity based on the location of observations can be seen in Table 5 below.

Table 5. Diversity Index of Fish Catch in the Kumbe River

Number	Species	Diversity Index			Total (H')
		Station I	Station II	Station III	
1	<i>Cinetodus crassilabris</i>	0,36	0,33	0,31	0,37
2	<i>Lates calcarifer</i>	0,22	0,33	0,26	0,25
3	<i>Leiognathus ecuulus</i>	0,26	0	0	0,20
4	<i>Carcharhinus amboinensis</i>	0,22	0	0	0,17
5	<i>Argyrosomus amoyensis</i>	0,09	0,31	0,19	0,17
6	<i>Polydactylus plebeius</i>	0,14	0,25	0,13	0,16
7	<i>Mugil cephalus</i>	0,13	0,19	0	0,12
8	<i>Thryssa scratchleyi</i>	0,15	0,06	0	0,12
9	<i>Cinetodus froggatti</i>	0,09	0	0,16	0,09
10	<i>Kurtus gulliveri</i>	0	0,21	0	0,06
11	<i>Epinephelus sp.</i>	0,02	0	0,16	0,06
12	<i>Paraplagusia bilineata</i>	0,08	0	0	0,06
13	<i>Toxotes chatareus</i>	0	0,06	0,16	0,06
14	<i>Eleutheronema tetradactylum</i>	0,05	0,06	0	0,05
15	<i>Neosilurus sp.</i>	0	0,17	0	0,05
16	<i>Marilyna meraukensis</i>	0,05	0	0	0,04
17	<i>Pastinachus Sephen</i>	0,05	0	0	0,04
18	<i>Rhinobatos typus</i>	0,04	0	0	0,03
19	<i>Therapon Theraps</i>	0,04	0	0	0,03
20	<i>Scatophagus argus Linnaeus</i>	0	0,10	0	0,03
21	<i>Megalops cyprinoides</i>	0,02	0	0	0,02
22	<i>Nibeas squamosal</i>	0,02	0	0	0,02
Amount (H')		2,04	2,07	1,37	2,17

The diversity index value (Table 5) the type of fish caught for three months on the Kumbe River in the Malind District is 2.17, indicating moderate diversity. The results of this study are in line with Yaurbulan (2018), with moderate diversity, the distribution of individual species is moderate and the stability of each community is being. Ulukyanan (2019) states that the results of research on the Kumbe River with a diversity index are 1.6960 which indicates that moderate diversity, number distribution, individual species are moderate. Next, Melmambessy at al. (2018), that the diversity index is being suspected because the fish that dominate each area are caught a little. The diversity index of high fish species dominates in each fishing area is large. Odum, (1971) says there are two important things in the scope of diversity, namely the number of species that exist in a community and the abundance of each species. The smaller the number of species and the variation in the number of individuals per species or there are several individuals whose numbers dominate the diversity of an ecosystem will shrink.

3.6. Dominance Index

Dominance index based on location of observation can be seen in Table 6 below.

Table 6. Dominance Index of fish catch in the Kumbe River

Number	Species	Dominance Index			Total
		Station I	Station II	Station III	
1	<i>Cinetodus crassilabris</i>	0,17554	0,04239	0,35667	0,17202
2	<i>Lates calcarifer</i>	0,00900	0,04239	0,01563	0,01430
3	<i>Leiognathus ecuulus</i>	0,01600	0	0	0,00663
4	<i>Carcharhinus amboinensis</i>	0,00900	0	0	0,00373
5	<i>Argyrosomus amoyensis</i>	0,00056	0,03114	0,00482	0,00343
6	<i>Polydactylus plebeius</i>	0,00189	0,01384	0,00174	0,00313
7	<i>Mugil cephalus</i>	0,00156	0,00541	0	0,00146
8	<i>Thryssa scratchleyi</i>	0,00264	0,00022	0	0,00127
9	<i>Cinetodus froggatti</i>	0,00056	0	0,00309	0,00065
10	<i>Kurtus gulliveri</i>	0	0,00779	0	0,00023
11	<i>Epinephelus sp.</i>	0,00002	0	0,00309	0,00016
12	<i>Paraplagusia bilineata</i>	0,00039	0	0	0,00016
13	<i>Toxotes chatareus</i>	0	0,00022	0,00309	0,00016
14	<i>Eleutheronema tetradactylum</i>	0,00014	0,00022	0	0,00010
15	<i>Neosilurus sp.</i>	0	0,00346	0	0,00010
16	<i>Marilyna meraukensis</i>	0,00014	0	0	0,00006
17	<i>Pastinachus Sephen</i>	0,00014	0	0	0,00006
18	<i>Rhinobatos typus</i>	0,00006	0	0	0,00003
19	<i>Therapon Theraps</i>	0,00006	0	0	0,00003
20	<i>Scatophagus argus Linnaeus</i>	0	0,00087	0	0,00003
21	<i>Megalops cyprinoides</i>	0,00002	0	0	0,00001
22	<i>Nibea squamosal</i>	0,00002	0	0	0,00001
Amount		0,21774	0,14792	0,38812	0,20775

The dominance index of fish species caught for three months at the Kumbe River in the Malind District was 0.20775. Diversity index and evenness indicate that no fish dominates at station I, station II and station III. The results of this study are in line with Ulukyanan (2019), with a dominance index value of 0.2938 which indicates that none of the types of fish caught on the River Kumbe dominates. Likewise Yaurbulan (2018) with a dominance index value of 0.37 there is no type of fish dominating the Maro River in Merauke District. Legendre (1983), species dominance often occurs because competition for natural food by certain types is accompanied by changes in environmental quality, imbalance between predators and prey, resulting in competition between species.

4. CONCLUSIONS AND RECOMMENDATIONS

1. The composition of the types of fish caught in the Kumbe River in the Malind District of Merauke Regency are 22 types spread over three research locations or stations, namely: *Cinetodus crassilabris*, *Lates calcarifer*, *Leiognathus ecuulus*, *Carcharhinus amboinensis*, *Argyrosomus amoyensis*, *Polydactylus plebeius*, *Mugil cephalus*, *Thryssa scratchleyi*, *Cinetodus froggatti*, *Kurtus gulliveri*, *Epinephelus sp*, *Paraplagusia bilineata*, *Toxotes chatareus*, *Eleutheronema tetradactylum*, *Neosilurus sp*, *Marilyna meraukensis*, *Pastinachus Sephen*, *Rhinobatos typus*, *Therapon Theraps*, *Scatophagus argus Linnaeus*, *Megalops cyprinoides* and *Nibea squamosal*.
2. The relative abundance of fish catches in the Kumbe River, Malind District, Merauke Regency, from July to September 2017, namely: *Cinetodus crassilabris* 41,48%, *Lates calcarifer* 11,96%, *Leiognathus ecuulus* 8,14%, *Carcharhinus amboinensis* 6,11%, *Argyrosomus amoyensis* 5,85%, *Polydactylus plebeius* 5,60%, *Mugil cephalus* 3,83%, *Thryssa scratchleyi* 3,56%, *Cinetodus froggatti* 2,54%, *Kurtus gulliveri* 1,53%, *Epinephelus sp* 1,27%, *Paraplagusia bilineata* 1,27%, *Toxotes chatareus* 1,27%, *Eleutheronema tetradactylum* 1,02%, *Neosilurus sp* 1,02%, *Marilyna meraukensis* 0,76%, *Pastinachus Sephen* 0,76%, *Rhinobatos typus* 0,51%, *Therapon Theraps* 0,51%, *Scatophagus argus Linnaeus* 0,51%, *Megalops cyprinoides* 0,25% and *Nibea squamosal* 0,25%.
3. The highest frequency of catch of fish species obtained is that there are 4 species with a percentage of 100%, having a wide spread. Furthermore, there are 6 species that have a value of 67%, have a distribution of moderate areas and there are 12 species with a value of 33%, which have a sparse distribution of regions.
4. The diversity index of fish species caught for three months in the Kumbe River, Malind District is 2.17. These results indicate moderate diversity, distribution of numbers, individuals of each medium species.
5. The dominance index value obtained at each time of observation is close to 0, which indicates that there are no dominant species of fish from other types of fish.

Based on the results of this study, the researcher can suggest that the composition of species and the largest number of fish catches is obtained in the river estuary area which is an area of fish entry and is a potential area for fishing areas..

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