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Studying the Composition of Types and Productivity of Trap Net Fishing Equipment in the Coastal Waters of Pangkep Regency, South Sulawesi Indonesian

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ABSTRACT

Catch productivity is the ability of a fishing gear to get a number of catches in each unit of fishing effort. This study aimed to determine the productivity of trap net fishing gear for fish migration to coastal waters. The research was conducted in October-November 2020 along the coastal area, Pangkep Regency, South Sulawesi, Indonesia. For data collection, a survey method was used by following fishing operations carried out with the data collected covering the production of fish each trip during the study. The composition of the obtained catch recorded 13 species of fish including white snapper (*Lates calcarifer*), milkfish (*Chanos chanos*), goalkeeper fish (*Scatophagus argus*), gulamah fish (*Johnius trachycephalus*) and cotton fish (*Gerres punctatus*). The productivity of trap net catches is more effective in September during which the catch increases, and the longer the duration of each trip, the less productive this tool becomes in terms of time use. Although the economic value of the trap net fishing business provides a better economic contribution, adding to being profitable for fishermen operating this fishing gear, the economic value of the trap net fishing business is feasible to be developed.

INTRODUCTION

The existence of capture fisheries in an area contributes to the development of the area. Capture fisheries activities support employment, increase community income, especially fishermen, fulfill animal protein needs for the community and increase exports of fishery products. **Ihsan and Tajuddin (2020)** reported that, Pangkajene and Islands Regency (Pangkep), geographically located between longitude of 110º- 113º E and latitude of 4º40'- 8º00', located on the west coast of South Sulawesi, has a total area of 12,362.73km^2, with a marine area of 11,464.4 km^2. They added that, this water body

provides abundant and diverse biological natural resources including capture fisheries with important economic value for local communities.

The coastal waters of Pangkep Regency have important habitats for several types of fish, both for foraging, spawning and breeding habitats for various types of fish that are sedentary/resident as well as migratory fish species during low tides, foraging for various types of fish outside the mangrove ecosystem, seagrass and coral reefs.

The coastal communities in Pangkep Regency in general are fishermen and cultivators, some of whom are trap net fishermen, seaweed and pond cultivators used by coastal communities and their surroundings. Productivity is usually defined as a profitable result, but the meaning of productivity from the fisheries viewpoint is much more complex, because it has different dimensions.

The trap net is a fishing gear whose operating method is by utilizing the tides of sea water, where the trap net is installed at the front of the mangrove area. The potential of mangroves in Pangkep Regency is important as a place for nurturing, rearing and spawning non-fish fish, thus providing an important role in increasing community income, especially for trap net fishermen. Among the obstacles that often occur during the operation of trap net fishing gear is the determination of the right location, and net removal is carried out if the catch decreases.

This study aimed to determine the type composition and productivity of fish caught by trap net fishing gear in the coastal area of Pangkep Regency, South Sulawesi, Indonesia.

MATERIALS AND METHODS

The research was conducted in October- November on the coastal area of Pangkep Regency. To accomplish this study, some materials were used, viz. a trap net, boat, global position system, digital camera, fish measuring ruler, digital scale with a capacity of 5kg and office stationery.

The data requirements in this study included primary and secondary data. The collection of data was carried out by taking direct measurements following the capture operation of each trip for 24 times. Primary data were collected by following the operation of trap net fishermen and conducting interviews using a list of questionnaires. For the production data of trap net catches collected, the following stages were addressed:

a. Recording data on the type of catch (kg) of the trap net during the study;
b. Weighing the catch (kg) of the trap net during the study, and
c. Recording the types of fish caught with economic value caught by fishermen and identifying the catch considering a fish identification book. The data collection was related to two fishermen who operate trap net fishing gears.

Secondary data were obtained from related agencies; namely, the Pangkep Regency Fisheries Service, Pangkep Regency BPS and published study documents. This research was conducted via a descriptive method. The duration of immersion of the tool for one

descent until the withdrawal of the net is around ± 6 hours, and then the overall net body is withdrawn to the lifting of the net body using wood as a peg at the seabed **(Ihsan & Tajuddin, 2018)**. The secondary data are those refering to the information collected from existing sources, such as company records or documentations, government publications, industry analysis by media, websites, internet and others.

For the trap net catching productivity achieved in this study, survey research methods were used. Data were collected in this study using a questionnaire list via a random sampling method for owner fishermen who operate trap net fishing gear.

To determine the productivity of trap net catching, data were collected to cover the number of catches (kg) of each trip and record the price (Rp) of fish caught by trap nets and sold to fish collectors (collectors). The productivity of trap net fishing gears was analyzed to calculate the amount of catch production based on the moon phase, and then qualitative and quantitative analyses were carried out based on the type of catch on the trap net fishing gear.

Ihsan (2015) clarifed that, in order to minimize the error rate in assessing the amount of production, classifying data into groups of peak season, normal season and famine season was followed. The times and conditions occuring in each season are assumed to be identical while varying from one season to another (peak, regular and famine seasons). In the present study, the productivity of the catch was determined depending on the comparison between production and the operating time of the trap net fishing gear. **Wiyono (2010)** reported that, fish productivity is the division of the number of fish (catch) caught by exploratory fishing gear by the number of fishing trips (effort) used. The equation used is as follows:

$$\text{Productivity (d)} = \frac{\text{Total Catch (c)}}{\text{Effective time of fishing operation (t)}}$$

Where,

P: Productivity (kg/Rp/min.); c:Total catch (kg/Rp); t: Effective time of fishing operation. Actual fishing time (minutes) was calculated starting from the looping process until all parts of the alay were raised on ship deck.

The determination of the productivity of the trap net fishing gear is calculated starting when the fishing gear operates at the lowest tide. The total catch of trap net fishing gear (kg) was calculated during the study as well as the effective time in carrying out fishing operations with trap net fishing gear; both the time used for each trip and the total time used in operating the trap net during the study were calculated.

RESULTS

1. Composition of trap net catches

The results of the carried out research revealed that the catch of trap net fishing gear contained 13 species, considering the production of the catch of 24 fishing trips. The production of the catch was 364.221kg. The species individuals of the catch were dominated by cotton-cotton fish (*Gerres punctatus*), gulamah fish (*Johnius trachycephalus*), white snapper (*Lates calcarifer*), milkfish (*Chanos-chanos*), goalkeeper fish (*Scatophagus argus*), white shrimp (*Penaeus merguiensis* de man), sembilang fish (*Plotosus canius*), rejung fish (*Sillago sihama*), kerung-kerung fish (*Therapon* sp.), peperek fish (*Leiognathus bindus*), mullet (*Liza subviridis*), turtle fish (*Polynemus dubius*) and mangrove crab (*Scylla serrata*).

2. Trap net catch productivity

Catch productivity is a measure of the production capability of a type of fishing gear. Catch productivity is expressed in the ratio between production and fishing effort. The productivity of trap net fishing gear in the coastal area of Pangkep Regency during the study was carried out following the moon phase, which was during September-October, using the productivity of trap net fishing gear obtained for 24 trips (Table 1).

The productivity of the trap net fishing gear can be explained as the carried out catch is as many as 24 trips. For each fishing trip, there is the same productivity value as on the 1st, 8th, 13th, 16th, 18th and the 22nd trip, with a productivity value of 0.08kg and others. Different productivity values, and of course, both different and the same productivity values are strongly influenced by time and events taking place at that time (Table 1). The productivity of the trap net fishing gear is strongly influenced by the length of the fishing trip. The distribution of the productivity of the trap net fishing gear based on the fishing trip is presented in Fig. (1).

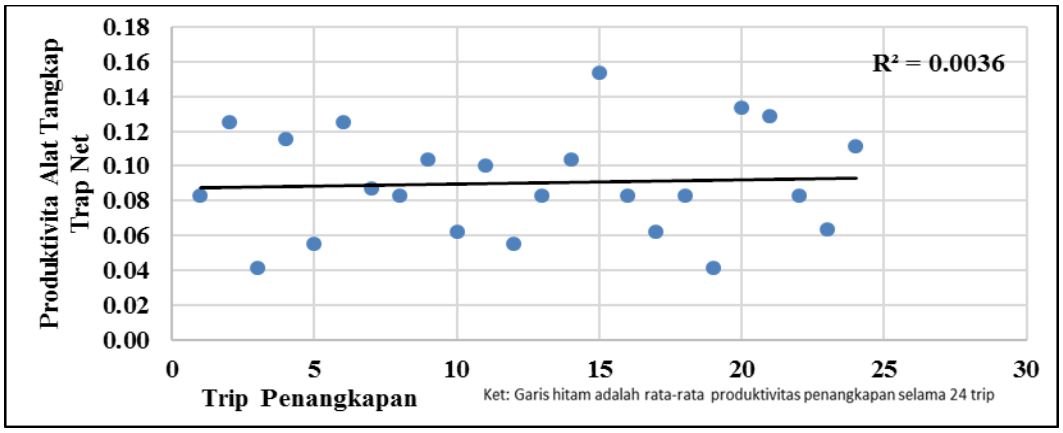

Fig. 1. Productivity of fishing traps

Table 1. Productivity of trap net fishing equipment

No.	Catch (Kg)	Time (min.)	Productivity (kg/min.)
1	15	180	0.08
2	15	120	0.13
3	10	240	0.04
4	15	130	0.12
5	10	180	0.06
6	15	120	0.13
7	20	230	0.09
8	15	180	0.08
9	15	145	0.10
10	15	240	0.06
11	20	200	0.10
12	10	180	0.06
13	15	180	0.08
14	15	145	0.10
15	20	130	0.15
16	15	180	0.08
17	10	160	0.06
18	15	180	0.08
19	10	240	0.04
20	20	150	0.13
21	20	155	0.13
22	15	180	0.08
23	15	235	0.06
24	20	180	0.11
Total	365	4260	2.17
Average	15.21	177.50	0.09

The lowest productivity value of the catch was recorded for the 3rd and 19th trip, with a value of 0.04kg/ minute; while the highest productivity was for the 15th trip, with a value of 0.15kg/ minute (Table 1 & Fig. 1). This is caused by several factors, including different fishing areas, wave currents and uncertain weather in addition to the level of water clearness related to the substrate and the depth of the waters during the hauling process of the trap net fishing gear. The results of catching productivity using trap net fishing gear based on catching time can be seen in Fig. (2).

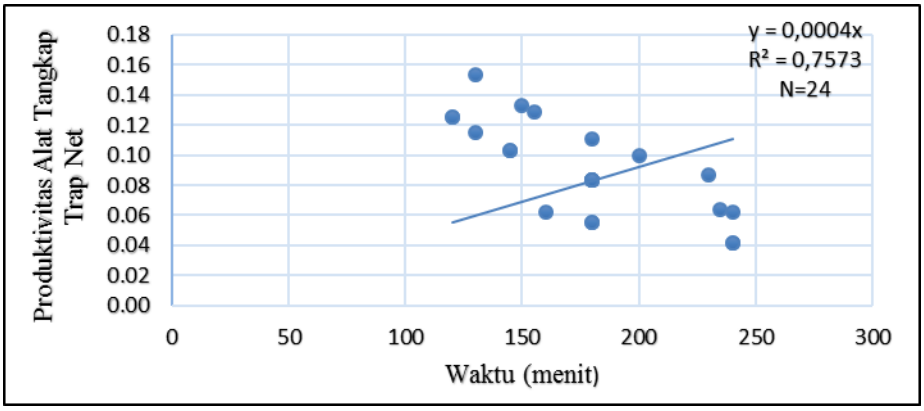

Fig. 2. Productivity of trap net fishing equipment by time arrests for 24 arrest trips

The productivity of catching trap net fishing gear was carried out for 24 fishing trips, with an average fishing time of 177 minutes, and the effective time in catching trap net fishing gear ranged from 130- 240 minutes, which is a fairly long fishing time, compared to the process of hauling other traps. The results of the analysis of the productivity of the catch obtained for a year are presented in Table (2).

Table 2. Monthly productivity of trap net fishing equipment for a year

No	Month	Number of trips (Days)	Number of catches (kg)	Time (minutes)	Productivity (kg/minute)
1	January	10	195	1625	0.12
2	February	12	185	1945	0.10
3	March	10	175	1520	0.12
4	April	12	210	1905	0.11
5	May	21	345	3475	0.10
6	June	21	365	3505	0.10
7	July	20	350	3325	0.11
8	August	19	385	3310	0.12
9	September	24	435	4260	0.10
10	October	18	340	3055	0.11
11	November	17	320	2880	0.11
12	December	11	200	1730	0.12
	Quantity	195	3505	32535	1.31
	Average	163	292.1	2711	0.11

The productivity of trap net fishing gear can be explained as the catch for a year is carried out as many as 195 trips. For trips in January, March, August and December, there was the same productivity value of 0.12 kg. On trips in February, May, June and September, there was the same productivity value of 0.10 kg. In April, July, October and November, there was the same productivity value of 0.11 kg Table 2.

The highest productivity results were recorded in January, March, August and December with a value of 0.12 kg and the lowest productivity results were recorded in February, May, June and September with a value of 0.10 kg.

The productivity value of trap net fishing gear is different every month with varying values. This is thought to be caused by differences in the fishing grounds related to the time and conditions of the aquatic environment that occurred at that time. The average catch productivity for a year is 0.01 kg/minute. The value of fishing productivity on each trip, which averaged 0.01 kg/minute, showed that for ±3 hours of fishing for a year the ability to catch trap net fishing gear on average every minute resulted in a production of 0.01 kg. The lowest productivity occurred in February, May, June and September with a value of 0.10 kg/minute Fig. 3.

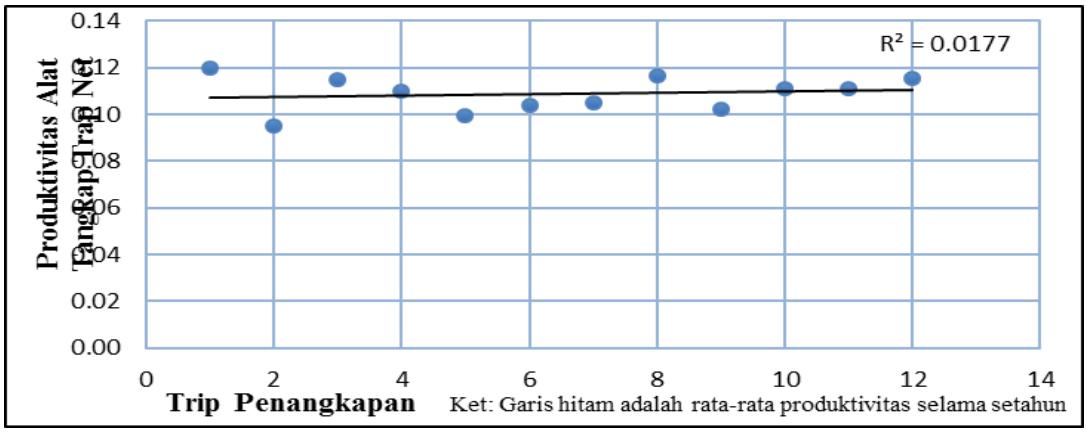

Fig. 3. Productivity of Catching Trap Net for a Year

The results showed that the productivity of catching trap net fishing gear for a year, the average length of fishing is 2,711 minutes and the effective time in catching trap net fishing gear ranges from 130-240 minutes per trip and during the year catching trap net fishing gear is 32,535 min. The annual productivity of trap net gear is highly dependent on the number of trap fishing gear trips, as well as the number of catches per fishing trip. Meanwhile, the number of fishing trips each month is highly dependent on the moon phase and the bathymetry of the coastal waters of the operating area of the trap net fishing gear Fig. 4.

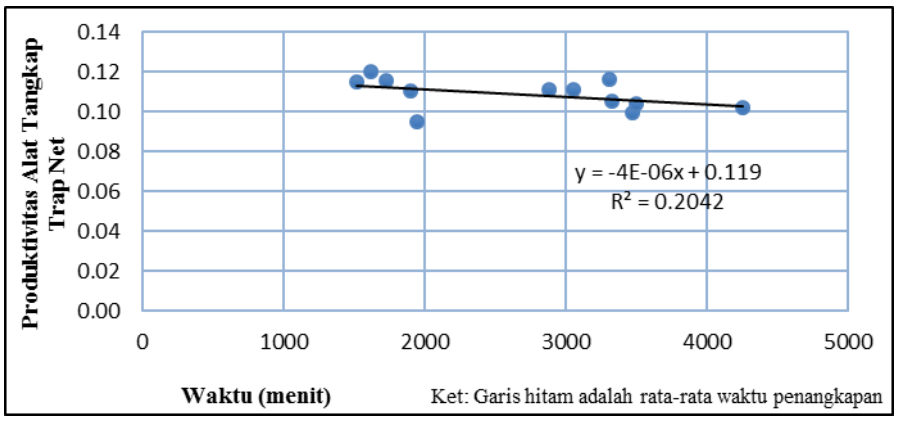

Fig. 4. Time of Catching Trap Net for a Year

DISCUSSION

The effect of the moon phase which is directly related to the tides is one of the factors that is closely related to the behavior of fish both as permanent residents in coastal waters and other fish on the coast whose nature is not permanent, only foraging data and after receding back to their original habitat. The results show that the full moon and dark moon phases are better in the early and late moon phases. The higher the tide, the greater the catch compared to the low tide, and also affects the distribution of species and the number of fish migrating to the coast.

Manan *et al*. (2011) explained that tidal patterns that occur in estuary waters greatly determine the distribution and abundance of fish larvae in these waters. Where, the tidal pattern is closely related to the phase of the moon. The spring tide pattern occurs during the new and full moon phases, while the neap tide pattern occurs in the quarter and three quarter moon phases. The tidal strength that occurs in the Spring Tide is greater than the tidal strength that occurs in the Neap Tide so that it is able to bring larger fish larvae into the estuary waters.

The results of the present study identified 13 species of fish from the production of the catch of 24 fishing trips in the catch of the trap net fishing gear with a the catch production of 364.221 Kg. The percentage value of trap net fish catches consisted of cotton-cotton fish (*G. punctatus*) with 21.90%, gulamah fish (*J. trachycephalus*) with 19.05%, white snapper (*L. calcarifer*) with 16.33%, milkfish (*C. chanos*) with 15.58% and goalkeeper fish (*S. argus*) with 13.13%.

Cotton-cotton fish (*G. punctatus*) which was the dominant type of fish caught, the local name especially fish "kalang pute" usually lives in coastal areas, mangroves and rivers, estuaries, lives at a depth of 30 meters, foraging for food until spawning. Dewi *et al*. (2018) recorded that the results of the measurement of aquatic environmental parameters showed a normal range for the growth of cotton-cotton fish. Temperature 28-29 C, current speed 0.0037 - 0.0492 m/s, salinity 29-32‰.

The production of the five types of fish that dominates is gulamah fish (*J. trachycephalus*), living in shallow coastal waters, including demersal fish, distributed in the waters of Thailand, Sumatra and Kalimantan (Sasaki, 2001). Juvenile Gulamah fish in estuaries often reach the bottom of murky rivers (Allen, 1991). The gulamah fish (*J. terachycephalus*) likes cloudy and muddy conditions for spawning because the low temperature makes the population increase. Gulamah fish live in low-temperature, very cloudy and muddy waters (Longhurst & Pauly, 1987). This type of carnivore fish eats small shrimp. Gulamah fish is a type of fish that lives in marine and brackish waters (Robin *et al*., 1991; Sasaki, 1995). Its natural diet is small fish, shrimp, and litter (Kottelat *et al*, 1993).

White snapper (*L. calcarifer*) dominated the heaviest production of the total density of other catches. Snapper is often also found in brackish waters, because it is able to adapt to low salinity. Mangroves are an ideal place for rearing and rearing various types of marine organisms, providing a source of food for snapper. The original habitat of white snapper is salinity 30 - 32‰, and migrating to the sea during spawning. Yeni *et al*. (2014) recorded that the habitat of this white snapper is almost often found living on the beach or sea (1 m to 10 m depth) and in estuaries. Aulia (2018) recorded that this white snapper prefers river mouths, ponds, bays of mangrove forests (mangroves) which have clear and rippling water, coral beaches, shallow to deep sea waters, harbors (water depth less than 8 m), rocky beaches, estuary with certain specific conditions.

Milkfish (*C. chanos*) which has the local name of bolu, is one of the most caught fish in trap nets, it has a habitat in estuary, brackish and sea areas, including fish that are very strong in adapting to changes in salinity and temperature.

According to Yeni *et al*. (2014) that milkfish live in coastal waters, river estuaries, expanses of mangrove forests, lagoons, tidal inundation areas and rivers. Milkfish (*C. chanos*) belongs to the herbivorous fish group that eats phythoplankton, algae, and klekap. In general, adult milkfish are usually in the littoral area and when they want to spawn these fish are usually in clear waters. Aulia (2018) said that in the spawning season, milkfish brood-stock are often found in groups at a distance not too far from the beach with habitat characteristics of clear, sandy, and rocky waters at a depth of 10 - 30 m.

The production of the catch of goalkeeper fish (*S. argus*) is one of the dominant fish caught in the trap net during the study. This flat-bodied fish has a habitat on the beach but, in the area around the mangrove (estuary). It was recorded that the environment of goalkipper fish is in fresh water, in ponds, brackish estuaries and downstream rivers, and in mangrove forests. Titan fish have a pretty good immune system, live with different salinity tolerances, including fish that migrate every day at high tide and return when sea water conditions recede. The daily migration carried out by these fish aims to find food in coastal areas around the mangroves where the mangrove ecosystem has high enough nutrients for the survival of various fish that have different habitats and strengths of

salinity tolerance. Many goalkeeper fish are found in rivers that still have brackish salinity and until now have been able to be cultivated even though their survival is still low (Kottelat *et al*, 1993; Aida *et al*., 2006; Khanh *et al*, 2012).

Wiyono (2011) conducted research on fish assemblages of basic fish resources on the north coast of Cirebon. Fish caught between different seasons identified 23 species, but there were several types of fish caught in March but not caught in July and November, such as lettuce, pestle, bilis, and aloe. The number of fish species caught in March, July and November respectively were 12, 13 and 9 species. While the fish that are always there in every season are pepetek and Tigawaja. Pepetek fish dominated the catch in all months of the study, namely 85.52% (March), 87.71% (July) and 95.30% (November). While other types of fish make a great contribution.

The productivity of catching trap net fishing gear is calculated based on the comparison of the number of catches with the time needed in the fishing process or the effective time of catching is calculated from the decline in the fishing gear until the catch increases. The productivity of the catch in this study is calculated every time from departure to the fishing area until returning to the fishing base, but in carrying out operations it has a different time. Ihsan *et al*. (2022) recorded that fishing productivity is strongly influenced by the number of fishing trips each month for a year. The number of trip trap nets every month for a year is different; this is because the operation of the trap net fishing gear is very dependent on the low tide of the sea. The technical requirements for the operation of a trap net are the lowest ebb of sea water from the most ideal shoreline, at least ± 70 meters from the shoreline. In May–November, the lowest low tide can reach this distance, so the fishing trips are 17-21 trips/month. Meanwhile, in January, February, March, April and December the number of fishing trips is between 10-12 trips per month, the lowest low tide cannot reach that distance.

Furthermore, Wiyono (2011) conducted a study on fish assemblages of basic fish resources on the north coast of Cirebon, which includes the composition, diversity and productivity of basic fish in different seasons, fish productivity at the study site fluctuates between seasons. The fish that had the highest productivity in each month of the study was pepetek (*Leiognathus sp*.). The highest pepetek productivity occurred in March (17.10 kg/trip), and the lowest occurred in July (7.97 kg/trip). While other species caught in dogol nets had a much lower value than pepetek fish.

In the present study, the productivity of catching trap net fishing gear on catching made as many as 24 trips. For each fishing trip, there is the same productivity value as on the 1st, 8th, 13th, 16th, 18th and 22nd trips with a productivity value of 0.08 kg and others. Likewise, there are different productivity values and of course both different and the same productivity values are strongly influenced by the time and events at that time. The distribution of trap net fishing productivity values based on productivity fishing trips is still low, when referring to the average line of productivity values, both below and above

the average line; the total productivity value is the same, which is caused by differences in fishing areas in all fishing trips.

The average fishing productivity is almost close to 0.09 kg/minute, meaning that the average fishing productivity value on each trip is 0.09 kg/minute, indicating that for ±3 hours the ability to catch trap net fishing gear on average every minute produces production of 0.09 kg. The shorter the time used for each trip, the higher the productivity of trap net fishing gear. The longer the time used for each trip from the trap net, the lower the productivity.

Prayitno *et al*. (2017) recorded that the high productivity of ring seine fishing gear in the February-July period indicated that this period is a good time to catch purse seine fish. The support for water conditions during this period began to calm because it was a transitional season from the west season to the east season (Sprintal *et al*. 1999). The low productivity in June was caused by a temporary weather anomaly, where the weather conditions worsened affecting the success of the fishing process. Setiawan *et al*. (2013) who calculated the productivity of skipjack catching in the waters south of Prigi found the opposite condition, namely the fishing season for skipjack tuna actually occurs in June - November and the period from January - May is actually a famine season.

In the present work, the lowest productivity of the catch was on the 3rd and 19th trips with a value of 0.04 kg/minute while the highest productivity on the 15th trip with a value of 0.15 kg/minute. Influencing factors include different fishing areas, wave currents and unpredictable weather and the level of brightness of the waters related to the substrate and the depth of the waters during the hauling process of trap net fishing gear. The productivity of catching trap net fishing gear for 24 fishing trips with an average length of fishing is 177 minutes and the effective time in catching trap net fishing gear ranging from 130 - 240 minutes is a fairly long fishing time, when compared to the process of other hauling trap fishing gear. The high influence of fishing trip time on the productivity of trap net fishing gear, some solutions that can be done include:

1. Reducing the use of stakes in the operation of trap net fishing gear
2. Using buoys and ballast so that the length of setting the trap net is shorter
3. Using fish scoopnet in the form of fishery blades so that it is faster in the process of hauling or catching fish.
4. Reconstructing the trap net by using several bags, each trap net so that the hauling time is not too long

Ernawati *et al*. (2007) explained that the difference in catches included:

1) The difference in the treatment of cantrang net operating techniques due to the influence of waves, current direction and ship maneuverability.
2) Different number of brawls/settings every day in each trip.
3) Different fishing ground conditions.

The results of the time measurement during the study obtained data showed that the fishing process was quite long, because it followed the tidal trend which was ±6 hours

past 10 minutes, making the trap net unproductive in terms of the use of fishing time, because The coverage area of trap net fishing gear that must be shifted by fishermen during hauling is quite wide, so it is difficult for fishermen to catch fish in a faster time, this also happens because the number of crew members is limited, which is between 2-3 people. The trend of productivity when fishing can be done faster by increasing the number of crew members to 5 people will still affect the income of trap net fishermen.

According to Shadiqin *et al*. (2018), fishing productivity is related to the length of fishing time which tends to increase with increasing fishing time. Fishing effort based on the length of time the fishing gear operates shows a tendency to increase fishing productivity.

The productivity of catching trap net fishing gear for a year was carried out as many as 195 trips. On trips in January, March, August and December there was the same productivity value of 0.12 kg. On trips in February, May, June and September there was the same productivity value of 0.10 kg. In April, July, October and November there was the same productivity value of 0.11 kg.

The productivity of trap net fishing gear, the highest value in January, March, August and December with a value of 0.12 kg and the lowest productivity results were in February, May, June and September with a value of 0.10 kg. The productivity value of trap net fishing gear is different every month with varying values. This is thought to be caused by differences in fishing grounds related to the time and environmental conditions of the waters that occurred at that time. The average catch productivity for a year is 0.01 kg/minute. The value of fishing productivity on each trip, which averaged 0.01 kg/minute, showed that during ±3 hours of fishing for a year the ability to catch trap net fishing gear on average every minute resulted in a production of 0.01 kg. The lowest productivity occurred in February, May, June and September with a value of 0.10 kg/minute. This is due to differences in fishing areas and the lack of fishermen operating trap net fishing gear due to bad weather that occurs in certain months which causes fishermen to rarely operate. The average length of fishing for a year is 2,711 minutes and the effective time for catching trap net fishing gear ranges from 130 - 240 minutes per trip and during a year catching trap net fishing gear is 32,535 minutes.

Efforts to minimize the length of time catching, especially the hauling process, can be done by looking for an ideal fishing location, especially the depth of the waters at low tide, meaning that the shallower the waters the faster the fishing process will be, increasing the number of crew members and modifying trap net fishing gear.

CONCLUSION

Based on the results of the discussion carried out, the following conclusions are formulated:

1. Composition of trap net catches identified 13 species of fish, dominated by cotton-cotton fish (*Gerres punctatus*), gulamah fish (*Johnius trachycephalus*), white snapper

(*Lates calcarifer*), milkfish (*Chanos-chanos*), goalkeeper fish (*Scatophagus argus*), white shrimp (*Penaeus merguiensis* de man), Sembilang fish (*Plotosus canius*), Rejung fish (*Sillago Sihama*), kerung-kerung fish (*Therapon sp*), Peperek fish (*Leiognathus bindus*), mullet (*Liza subviridis*), fish turtle (*Polynemus dubius*) and mud crab (*Scylla serrata*), and the composition of fish changes according to the fishing season.

2. The productivity of trap net catches is more effective in September where the catch increases in that month and the longer duration of fishing time for each trip makes this tool unproductive in terms of time use. Productivity is also affected by fishing grounds related to time and conditions of the aquatic environment.

REFERENCES

Aida, S.N.; Prianto, E.; Husnah; Makri and Nurhayati, E. (2006). Ornamental fish resources in the lower Musi River, South Sumatra. Ornamental Fish Nusanlara 2006. Aquaculture Research Center-Marine and Fisheries Research Agency, DKP. hlm.: 125-136.

Allen, N.J. and Meyer, J.P. (1991). The Measurement and Antecedents of Affective, Continuance and Normative Commitment to the Organizational. Journal of Occupational Psychology, 63(1):1-18.

Aulia, Q. (2018). Species Composition and Daily Migration of Trap Net Catches in Segeri District, Pangkep Regency (thesis). Not published. FPIK Indonesian Muslim University.

Dewi, I. A.; Halili, I.A. and Arami, H. (2018). The Relationship between Length and Weight and Condition Factors of Cotton-Cotton Fish (*Gerres filamentosus*) Caught in Sero Traps in Tondonggeu Waters, Abeli District, Kendari City. Journal of Aquatic Resources Management, 3(4): 263-271.

Ernawati, T. (2007). Distribution And Composition Of Demersal Fish Caught By Trawl In West Season In North Waters Of Central Java [Fish Distribution And Composition Of Demersal Fish Caught By Trawl In West Season In North Waters Of Central Java]. Journal of Iktio/ogi Indonesia, Volume 7, Number 1, June 2007.

Ihsan, I. (2015). The sustainable use of crab (*Portunus pelagicus*) resources in the waters of Pangkep Regency, South Sulawesi Province. Documentation. (Not Published Postgraduate School of Bogor Agricultural University. Bogor.

Ihsan, I. and Tajuddin, M. (2018). Study of Design and Composition of Catches of Trap Net Fishing Equipment in the Waters of Segeri District, Pangkep Regency. Journal of Indonesian Tropical Fisheries, 2(1): 95-108 p

Ihsan, I. and Tajuddin, M. (2020). Production and seasonal patterns of shrimp catching in the waters of Segeri District, Pangkep Regency. Lutjanus Journal, 25 (1): 7-15p

Ihsan, I.; Jamal, M.; Asbar, A. and Kafi, A.T. (2022). Assessment of the economic aspects of trap net fisheries business in the waters of Segeri District, Pangkep Regency. AGRIKAN - Journal of Fisheries Agribusiness, 15 (1): 140-146.

Khanh, L.V.; Hai, T.N.; Huong, D.T. and Phuong, N.T. (2012). Advances in seed production of spotted scat fish (*Scatophagus argus*) in the Mekong Delta, Vietnam. Proceedings of IFS - seed production & aquaculture systems Proceedings of IFS - seed production & aquaculture systems: 70-75 p.

Kottelat, M., A.J. Whitten, S.N. Kartikasari, S. Wirjoatmodjo. 1993. Freshwater fishes of western Indonesia and Sulawesi. Periplus Editions Limited, Jakarta.

Longhurst, A.R. and Pauly, D. (1987). Ecology of Tropical Oceans. Academic Press, Inc. San Diego. 407.p

Manan, A. (2011). The abundance of fish larvae in high and low tide conditions at the mouth of the Pilang Sari River, Pidodo Kulon Village, Kendal. Scientific Journal of Fisheries and Marine, 3 (2): 249 – 254p

Prayitno, M.R.E.; Simbolon, D. and Yusfiandayani, R. (2017). Productivity of fishing equipment operated around deep sea FADs. Journal of Fisheries and Marine Affairs. 8(1): 101-112 p

Robins, C.R.; Bailey, R.M.; Bond, C.E.; Brooker, J.R.; Lachner, E.A.; Lea, R.N. and Scott, W.B. (1991). World fishes important to North Americans. Exclusive of species from the continental waters of the United States and Canada. American Fisheries Society Special Publications, 21. 243 pp.

Sasaki, K. (1995). A. review of the Indo-West Pacific Scaenid genus Panna (Teleostei, Perciformes). Japanese Journal of Ichthyology, 42(1): 27-37.

Sasaki, K. (2001). Menidae to Pomacentridae. The Living Marine Resources Of The Western Central Pacific. FAO. Vol. 5. Rome.

Setiyawan, A.; Haryuni, S.T. and Wijopriono, (2013). Development of catch per effort and seasonal pattern of skipjack (*Katsuwonus pelamis*) fishing in Prigi waters, East Java Province. depik., 2(2): 76 – 81.

Shadiqin, I.; Yusfiandayani, R. and Imron, M. (2018). Productivity of hand line fishing equipment in portable FADs in North Aceh District waters. Journal of Fisheries and Marine Technology, 9(2): 105-113.

Sprintal, J.; Chong, J.; Syamsudin, F.; Morawitz, W.; Hautala, S.; Bray, N. and Wijjfelss, S. (1999). Dynamics of the South Java current in the Indo Australian Basin. Geophysical Research Letters, 26(16): 2493–2496.

Wiyono, E.S. (2010). Composition, Diversity and productivity of basic fish resources in Cirebon coastal waters, West Java. Marine Science, 15 (4): 214-220.

Wiyono, E.S. (2011). Characteristics of fish caught "Illegal" on the North Coast of West Java. Bumi Lestari Journal of Environment, 11 (2); 208 – 2011.

Yeni, T.; Suminto, A. and Sudaryono, (2014). The effect of combination of artificial feed and earthworm (*Lumbricus Rubellus*) on feed utilization efficiency, growth and survival of dumbo catfish (*Clarias Gariepinus*). Journal of Aquaculture Management and Technology, 3(2): 86 - 93.