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Proportion of fish catches types and fishing changes of purse seine in Spermonde water in East season on 2015 and 2019

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Abstract. The proportion of fish type is the percentage of each fish caught. The chances of catching are the percentage of fish types caught from the number of days fishing operations. The purpose of this research is Komposisiand 2019 in Spermonde. Data collection location in Sanane Island and Badi Island, Pangkep regency. This study was a case study on purse seine, where data retrieval was conducted in May until July 2015 and July until August 2019. The number of days of fishing operation on 30 fishing trip. The results showed that there were nine types of fish that had been caught from the Purse Seine in 2015. In 2019 there are 11 types of fish that are caught on the purse seine. In the year 2015, the dominant caught is tembang (*Sardinella fimbriata*) on the first and second hauling. In the year 2019, the dominant caught is the type of selar (*selaroides leptolepis*), on the first and second hauling. The highest percentage of fishing chance in the year 2015, is the type of Tembang fish on the first and second hauling. Likewise, in 2019 the biggest catching chance is a type of selar fish, both on the first and second hauling. The activity of a purse seine in the east season in the waters of Spermonde indicates that there is a difference in the composition of types of fish fishing. Likewise, the fishing chance are in the years 2015 and 2019.

1. Introduction

The composition of a fishing catch is an indication of the chance of catching the capture. In addition, the composition of fish type is an overview of the ecological state in the fishing ground. Fisheries is a business activity to meet the needs of fish as a food source.

Increased fishing activities to meet demand could impact the sustainability of fish resources. One of the most important types of economical fish resources that have production potential is small pelagic fish. Small pelagic fish contributed to the production of the fisheries reached 50% of the world Sea fisheries production, which also has a bearing in food security [1–3].

The waters of Spermonde are located on the western coast of South Sulawesi and surround closely of islands with coral reefs (figure 1). There are four zones based on depth in the water area of Spermonde.



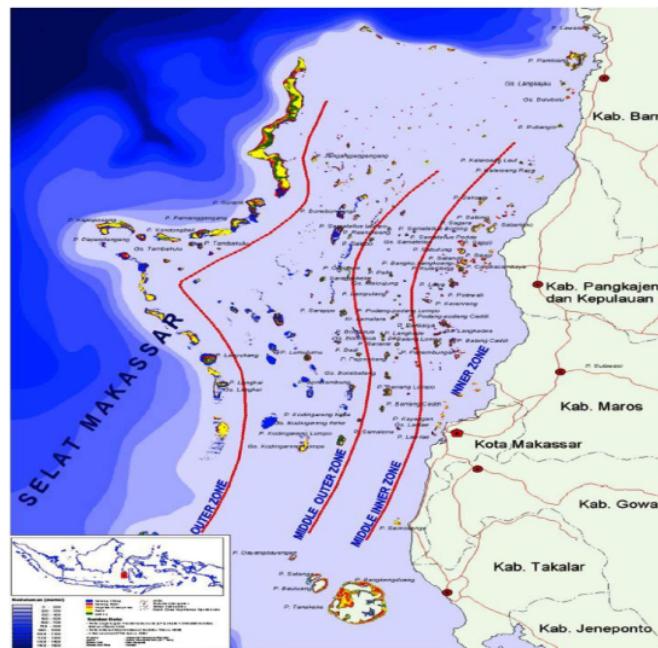


Figure 1. Spermonde archipelago.

(source: <https://www.mongabay.co.id/2013/07/24/ekosistem-laut-kepulauan-spermonde->)

The first zone is a beach near zone that tends to be shallow with an average depth of 10 meters. The second zone, located approximately 5 km from mainland Sulawesi, with an average sea depth of 30 m. The third zone is 12.5 km from the beach, with the depths of the sea between 50 – 100 m—the fourth zone with depths of the sea more than 200m [2].

The waters of Spermonde have a relatively large potential of fish resources, especially small pelagic fish groups and demersal fish groups. Statistical Data of South Sulawesi Province in 2020, showing the total fishing catch of 86,483 tonnes or 23.6% of the total fisheries production of South Sulawesi province.

The Waters that have the potential of fisheries can increase the fishing pressure. The fishing pressure will affect fish stocks. It also affects ecologically. Further lowering the potential of marine resources, especially fish resources [3,4].

The capture activity on the fishing ground will capture several types of fish, each type of fish has a different biological cycle. Such provisions can affect the intra-species relationship, especially in the Tropic level system. It is because the change grows and develops different fishes. Thus the difference of the fishing opportunity is the relationship between Biological and Environmental conditions [2,5]. Thus the composition of fish-type results of fishing activities is an early indication of the reality of ecosystems in a fishing ground.

One of the fishing gears that are widely used in the waters of Spermonde is the purse seine, it is related to the potential of fish found in the waters of Spermonde is a small pelagic fish [6,7].

The fishing activity will certainly impact the stock and ecosystem conditions. Thus it is necessary to observe in different years to know the impact of the attempt to fishing ground the purse seine on the fish-type composition and the diversity index as an indicator of the ecosystem on the fishing ground of purse seine.

This research aims to describe changes in fish composition and wide of fishing ground, and fishing frequency in the waters of Spermonde, Pangkep district.

2. Material and method

The data retrieval location in 2015 is located at Badi Island and the year 2019 on Sanane Island. The number of data retrieval in Badi Island and Sanane Island is as much as 35 fishing trip. The location of both islands is within Pangkep District administration area (figure 2).

Both islands are the center of the fishing purse seine in the Spermonde Islands, Pangkep District. Data retrieval period July-August 2015 in Badi Island and July-August 2019 on Sanane Island sampling of purse seine using purposive sampling.

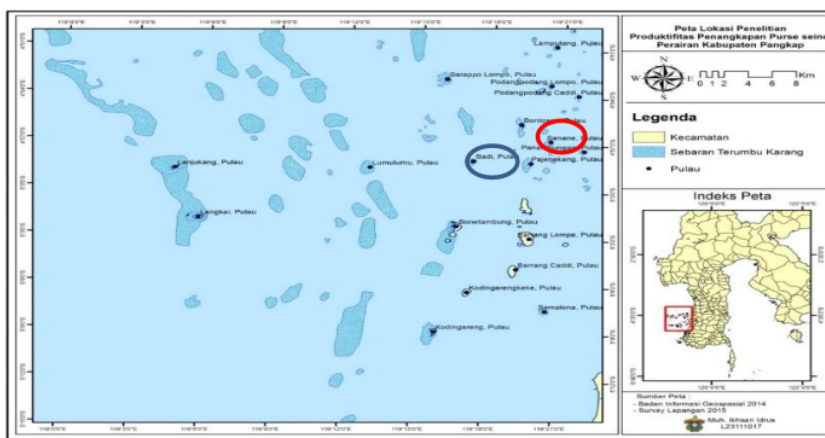


Figure 2. Location of Badi island and Sanane island (the blue circle is Location Badi Island and red circle is location Sanane island).

The following in Table 1, displayed description of the ship and the purse seine nets used as sampling for data retrieval, both on Badi Island, and on Sanane Island.

Table 1. Purse seine construction at Badi island and Sanane Island.

Purse Seine Badi Island (2015)	Purse Seine Sanane Island (2019)
Dimension of Fishing boat: L: 21m; W: 3.5m; D: 1.50m	Dimension of fishing boat: L:18.27 m, W: 3.93 m, D: 1.25 m
Net length 250m; D: 40 m; mesh size 1inch;	Net length: 330 m; D: 54 m; Mesh size: 1 inch;
Net material:polyamide	Net material: Polyamide

3. Data Analysis

1) Fish type composition is calculated by the following equation:

$$KJ = \frac{ni}{N} \times 100\% \tag{1}$$

While,

KJ = fish type composition

n_i = number of species catches to i
 N = Total number of catches

- 2) The number of catches and capture frequencies are displayed descriptively using tables and graphs.
- 3) Calculation of the fishing area is done by utilizing the observation result of the geographical position of the fishing location using GPS. The spatial analyst technique is used to create polygons using the outer point of the capture data. The formed Polygon is then calculated using the Calculate Geometry tools available in ArcGIS software.

4. Result and discussion

4.1 Types and number of fishing catch in 2015 and 2019

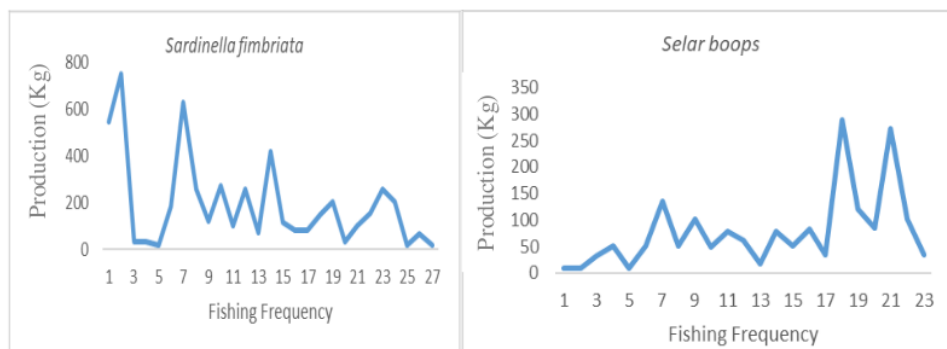
The types of fish that are caught by the Purses seine in 2015 and 2019 in the Spermonde District, Pangkep Regency, as shown in table 2.

Table 2. Types of fishes caught in the Purse Seine 2015 and 2019.

No	Tahun 2015	Tahun 2019
1	Alu-Alu (<i>Sphyraena jello</i>)	Ikan Kuwe (<i>Africano Pompano</i>)
2	Kembung lelaki (<i>Rastrelliger kanagurta</i>)	Kembung Lelaki (<i>Rastrelliger kanagurta</i>)
3	Peperék (<i>Leiognathus sp</i>)	Peperék (<i>Leiognathus sp</i>)
4	Tenggiri (<i>Scomberomorus commerson</i>)	Layang (<i>Decapterus ruselli</i>)
5	Layang (<i>Decapterus ruselli</i>)	Ikan Barakuda (<i>Sphyraena flavacauda</i>)
6	Cendro (<i>Tylosurus crocodilus</i>)	Selar Bentong (<i>Selar boops</i>)
7	Lemuru (<i>Sardinella lemuru</i>)	Tembang (<i>Sardinella fimbriata</i>)
8	Selar Bentong (<i>Selar boops</i>)	Tongkol (<i>Euthynnus affinis</i>)
9	Tembang (<i>Sardinella fimbriata</i>)	Cumi-cumi (<i>Loligo sp.</i>)
10		Sarden (<i>Sardinella pilchardus</i>)

There are nine types of fishes that caught the purse seine in the year 2015 and ten types of fish in the year 2019. There are 5 types of same fish caught in 2015 and 2019 (bold print). As seen in table 2.

The fishing fluctuations in the 2015 and 2019 of the purse seine on waters of Spermonde as shown in Figure 3 in 2015 and Figure 4 in 2019. The fishing fluctuations were described using the relationship graph between production and fishing frequency. The fishing frequency is an opportunity fish caught during the data retrieval as much as 32 fishing trip.



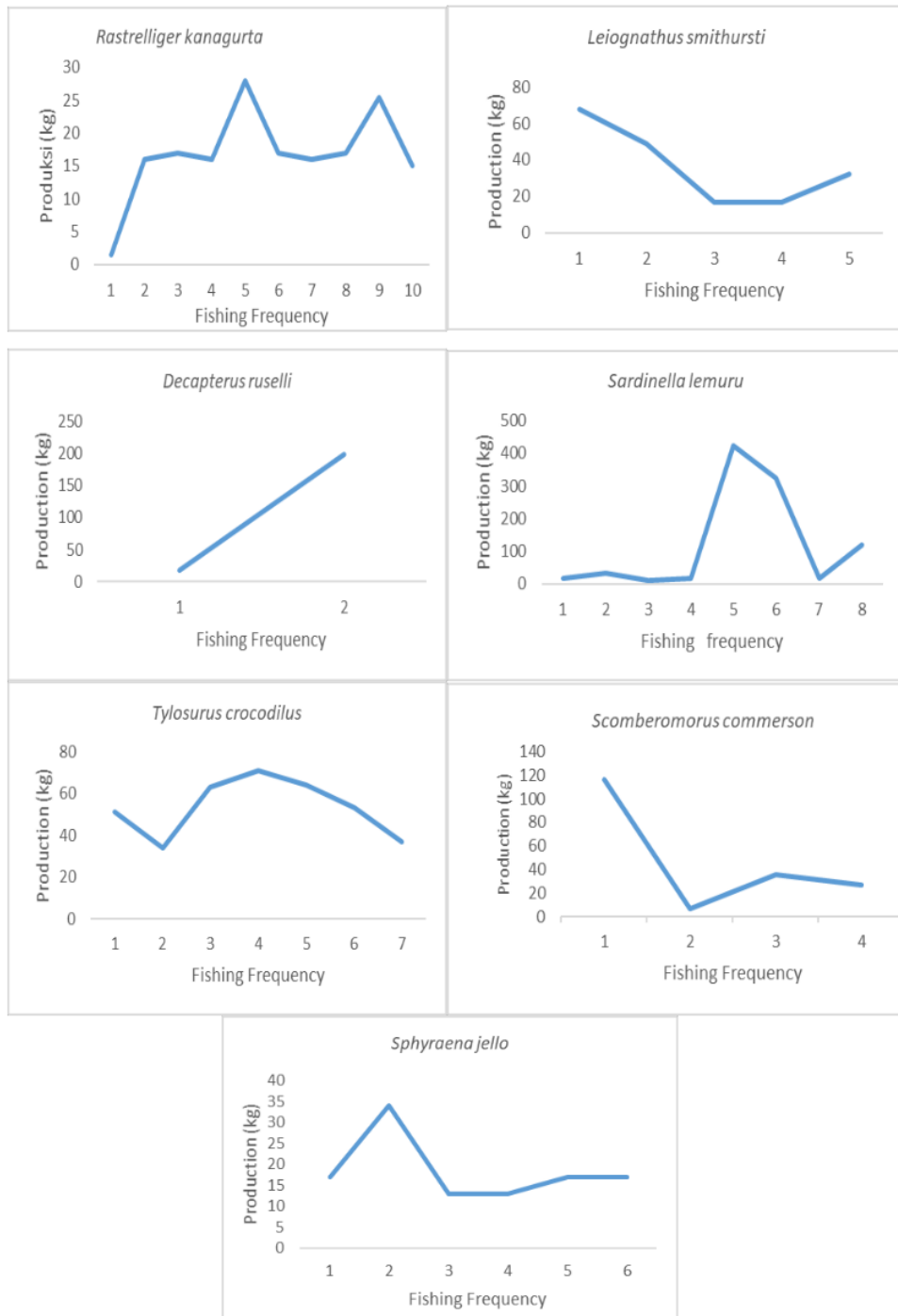


Figure 3. Fishing fluctuations purse seine in 2015.

Noticing figure 3, nine types of fish that caught the purse seine in the year 2019 shows the type of Tembang fish (*Sardinella fimbriata*) shows the highest fishing frequency of nine types of fish reaching 27 times. The condition indicates greater fishing opportunities than other types of fish. The high low frequency of catching a type of fish in the fishing area is determined by various factors. The main factors are the conformity of water conditions and food availability [2,5]. Although the Indonesian water is tropical, that has multi-species characteristics. High capture frequency is indicative of availability and presence of fish in an area of fishing ground.

As the type of layang (*Decapterus, sp*), indicating the lowest fishing frequency in the year 2015. The low chance of catching up on multispecies fisheries is thought to result from the ecological structure between the types of associated fish forming the food chain [6].



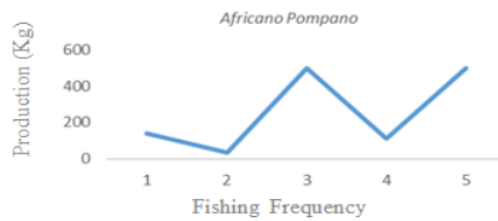


Figure 4. Fishing fluctuations of purse seine in 2019.

Comparing the highest fishing frequency using a purse seine in 2015 and 2019 indicates the same type of fish, *Sardinella fimbriata*, but the number of different fishing frequencies, of which the frequency of the captured was in 2015 compared to 2019. These differences are indicative that the opportunity to catch *Sardinella fimbriata* remains greater in the area of the purse seine catching on the waters of Spermonde, Pangkep District. The difference in fishing frequency is also related to the availability of *Sardinella fimbriata*, but in this study does not study fish stocks, it can not be said there is a change in *Sardinella fimbriata* fish stock. But based on the frequency of fishing can be said there are differences in the years 2015 and 2019 tend to the fishing operating patterns associated with the state of the fish season.

4.2 Type fish composition

The composition of the caught fish is presented in the graph of a proportion. Composition of fish type in the year 2015 as shown in Figure 5 and in the year 2019 as shown in Figure 6.

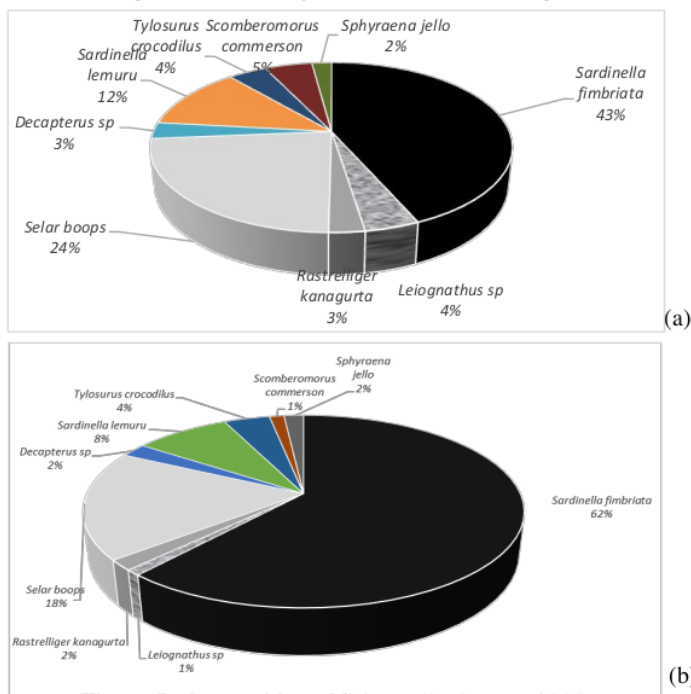


Figure 5. Composition of fish type in the year 2015.
 (a) First hauling; (b) second hauling.

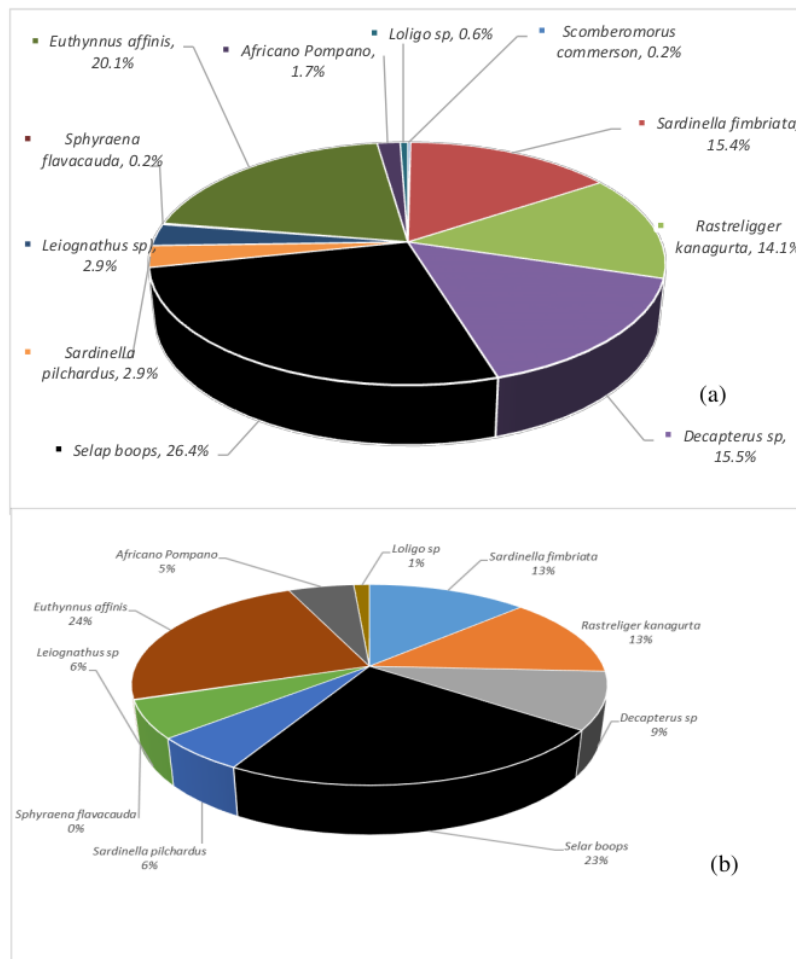


Figure 6. Composition of fish type in the year 2019.
 (a) First hauling; (b) second hauling.

The results of a purse seine both in 2015 and in 2015 show different proportions on each hauling time, in different years. The difference in proportions related to the catching chance. The chance of catching fish in addition to the fish season is also determined by oceanographic conditions. The composition of the caught fish is the proportion of each type of fish that can be caught by the purse seine based on the capture time. The fishing operation using a seine purse in the water Spermonde is generally carried out 2-3 net decay of each fishing trip.

The composition of the type of fish shows, in the year 2015, the type of Tembang fish (*Sardinella fimbriata*) had the largest portion caught. The proportion of *Sardinella fimbriata* ranged from 43% (first hauling) and 63% (second hauling). However, in 2019, the proportion of *Sardinella fimbriata* amounted to 15.4% in the first hauling and 13% on the second hauling and 15.4% on the first hauling. The difference in proportion based on the timing of fishing operations can be suspected based on the response to light intensity, because of the fishing operation of a purse seine using light.

In addition, the difference between the types of fish being caught is an indicator of ecological structures and can also be caused by catching pressure. As seen the type of fish composition in 2019. The highest percentage of caught fish is *Selar boops* which reaches 26.4% in the first hauling and 26% on the second hauling. In addition to the composition of 20.1% in the first hauling and on the second hauling by 24% [5].

The composition of the caught fish is determined by the availability of fish, such as *Sardinella fimbriata* in 2015; the capture frequency reaches 27 times (figure 3). This situation indicates the availability of *Sardinella fimbriata* more, so the chances of arrest is also greater than other fish in the area of fishing. Compare with the type of *Decapterus sp.*, the frequency of catching as much as 2 times. It shows the availability of *Decapterus* less, so the chances of catching low.

Fishing opportunities have caused a variation of the percentage of fish type composition, which also relates to various other factors, including ecological structures and oceanographic conditions that are also directly related to the fish season. However, the catching chance is also seen from the fishing effort, such as the area of fishing ground, as in figures 7 and 8.

4.3 Fishing ground

The fishing ground is a water area, which occurs a meeting between the fish resources and the fishing gear.

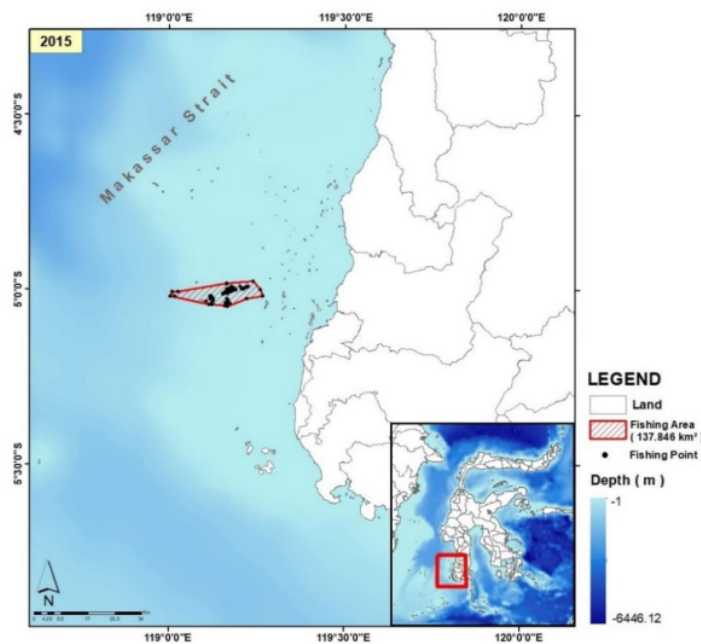


Figure 7. Purse seine fishing ground in 2015.

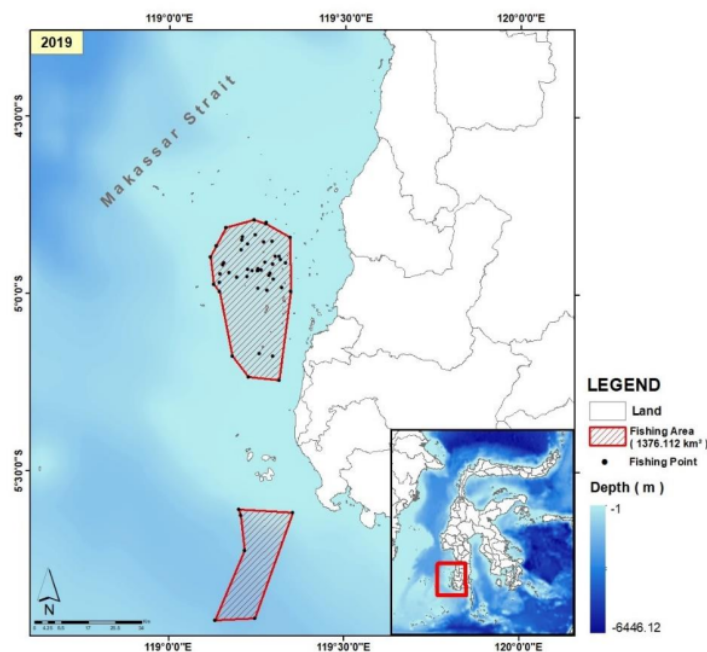


Figure 8. Purse seine fishing ground in 2019.

Figures 7 and 8 show the location of fishing being in zone 1 of Spermonde waters, which is the most deep-water depth of about 35 meters. Thus the fishing area of the purse seine is on the beach area, both in 2015, and in the year 2019.

The area of the fishing ground showed a difference. In 2015 the fishing area was 137,846 km², while in 2019 the fishing area reached 1,376,112 km². The area difference is an indication that fishermen are expanding the fishing areas to achieve a greater economic production advantage [1,4].

But the expansion of fishing ground does not increase the fishing productivity. In 2015 with an area of 137,846 km², it resulted in total production of 6,202 kg. Thus the fishing productivity amounted to 44.9 kg/km². In 2019 with an area of 1,376,112 km², a total of 2,500 kg was shot. Fishing productivity amounted to 1.8 kg/km².

In addition to achieving economic gains, the fishermen expand the fishing area, but on the other hand the expansion of fishing areas is an indication that in the coastal area, there has been a decrease in fish stocks. It can be seen based on the fishing ground location in 2015 and also a comparison of the total number of catches between the year 2015 and the year 2019. The changing population structure will have an impact on the ecological structure. The impact is that the fish resources community is shifting to a location farther away from the beach. Such circumstances are alleged to require further research studies.

Coastal water is a fishing area when formed a community structure of fish resources in water. The fish community structure will be formed if ecological functions are formed. If the ecological function is not in a community not well-established, the community structure of the fish resources will move in a place that allows the formation of ecological functions that can support the continuity or sustainability of fish resources [3,6].

The types of fish caught in the years 2015 and 2019 indicate the difference, which in the year 2019 caught a large type of pelagic fish, because of the fishing activity in the south of the waters of Spermonde which is the sea of Flores with a depth of water more than 100 meters, the water that became the trajectory of big pelagic fish migration.

5. Conclusion

The composition of the fish-type the purse seine catches the difference between the years 2015 and 2019, *Sardinella Fimbriata* dominant in 2015, and *Selar boops* dominant in 2019. The fishing ground in 2019 was more widespread than the year 2015. The fishing ground of 2015 was small, but the fishing frequency tended to be higher than in 2019, where the fishing ground was wider.

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