# Distribution of fishing grounds of longline sharks based in Ujung Serangga Fishing Base, Southwest Aceh, Aceh

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**Abstract.** The number and size of shark catches at Ujung Serangga Fish Landing Base have declined, while the operational area of shark longlines has expanded since 2015. This research aims to determine the distribution of longline fishing grounds and the composition of the shark catches for longlines based in Ujung Serangga Fish Landing Base. This research was done in 2024, March to April at Ujong Serangga Fish Landing Base, Padang Baru Village, Susoh District, Southwest Aceh Regency. The research method is descriptive. The results showed that shark catches were most common in the Mentawai waters of Siberut Island and Pagai Island. During the research, sharks landed at Ujung Serangga Fish Landing Base totaling 296 individuals with a total of 8 species. The dominant shark during the study was the lanjaman shark (*Carcharhinus falciformis*) with a total of 147 individuals (49.66%) and spotted tail shark species (Carcharhinus sorrah) as many as 82 individuals (27.70%). The least caught shark species were the great hammerhead shark (*Sphyrna mokkaran*) with 1 individual (0.34%), tiger shark (*Galeocerdo cuvier*) with 1 individual (0.34%), and silvertip shark (*Carcharhinus albimarginatus*) with 1 individual (0.34%). The longline sharks based at Ujung Serangga Fish Landing Base have 9 fishing locations consisting of Ujung Batu Island, Gunung Sitoli Island, Asu Island, Siberut Island, Hinako Island, Bangkaru Island, Simuk Island, Pini Island and Pagai Island.

## 1 Introduction

Aceh is a potential region for marine resources and a strategic location facing the Indian Ocean [1]. Among its significant fisheries, shark catches stand out as a valuable potential. Southwest Aceh District is a notable contributor, with a recorded production of two tons of shark landings in 2020 [2]. Southwest Aceh, with its capital in BlangPidie, spans 1,882.05 km² or 188,205.02 hectares [3]. The region's shark landings are primarily concentrated at the

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Ujong Serangga Fish Landing Base, located in Padang Baru Village, Susoh District. The local fishermen utilize shark longlines as their primary fishing gear. According to [4], Ujong Serangga PPI currently operates 10 shark longline vessels ranging from 5 to 13 Gross Tonnage (GT), with fishing gear lengths varying between 2,000 and 4,000 meters. The construction of these longlines aligns with general longline structures, comprising main lines, branch lines, hook, floats, and sinkers.

The availability of scientific data on shark populations in Indonesia remains limited, underscoring the importance of ongoing research and data collection to assess the current status of shark fisheries [5]. Observations from Ujong Serangga PPI reveal a declining trend in both the size and number of sharks caught, suggesting a need for sustainable fishing practices. Additionally, the operational area of shark longlines has expanded since 2015. Several studies have examined shark populations and fishing grounds in Aceh. For example, [6] identified 11 shark species along Aceh's west coast, with a total of 258 individuals. Ten species were landed at Ujung Baroh Fish Landing Base, West Aceh (246 individuals), and five species at Rigaih TPI, Aceh Jaya (12 individuals). The [7] detailed that pelagic thresher shark landed at the Kutaraja Ocean Fishing Port (PPS) had an average total length of 249.40 cm, 252.29 cm, and 250.78 cm, with a male-to-female ratio of 1:2.

Despite these studies, no comprehensive literature review has been conducted on the composition of shark longline catches or fishing ground distribution specific to Southwest Aceh. Continued research is essential to provide updated information on shark fishery status, supporting conservation and management efforts. This study aims to contribute insights into the composition of shark longline catches and the distribution of fishing grounds, focusing on Ujong Serangga PPI in Southwest Aceh.

## 2 Materials and methods

This research was conducted using the survey method. The primary data needed for this study are divided into two, namely data on the distribution of fishing grounds and data of longline catches. Sampling for data on the distribution of fishing grounds was carried out by census of the entire number of shark longline fishing units. The distribution of fishing grounds was obtained based on information from Marine and Fisheries Service of Southwest Aceh, and to verify the data, a survey was conducted by conducting interviews by giving questionnaires to each vessel consisting of 2 respondents/vessel, namely the crew and skipper. Catch data was collected by directly identifying all shark longline catches landed at Ujong Serangga Fish Landing Base. The data of catches were collected using accidental sampling method.

### 2.1 Location and time of research

This research was conducted from March to April 2024 at Ujong Serangga Fish Landing Base, Padang Baru Village, Susoh District, Southwest Aceh Regency.

### 2.2 Data analysis

#### *2.2.1 Catch composition*

Shark species identification will be conducted on the catch before analysis. The aim is to learn the local and Latin names. Identification was based on the identification reference book, “Identification Guide To Sharks, Rays And Skates Of The Southeast Asian Region” to identify the shark species caught.

Fish species from the overall catch were included in the catch composition table to see the proportion of each type of catch using the formula for calculating species composition according to [8] which is as follows:

$$P = \frac{\sum ni}{N} \, x \, 100 \, \% \qquad (1)$$

Description:
P = Percentage of each fish species (%)
$n_i$ = Number of individuals of each fish species (individuals)
N = Number of individual fish in all species (individuals)

### *2.2.2 Distribution of shark fishing grounds*

The distribution of shark fishing grounds begins with the identification of shark fishing grounds. The identification of shark fishing grounds was conducted using the interview method on two indicators, namely the location of fishing operations (distribution of fishing grounds) and catches. To identify the distribution of fishing grounds targeting sharks sourced from questionnaires conducted on each vessel, the available fishing data will be analyzed. The results of this identification will include the composition of shark catch types and the location of fishing operations. Shark fishing ground maps were created using ArcGis 10.3 software.

## 3 Results

### 3.1 Composition of catch

The shark longline gear used by Ujung Serangga Fish Landing Base fishermen amounted to 10 fishing units. The overall total catch obtained during the study was 294 individuals consisting only of main catch. The following is the composition of the types of sharks caught using shark longline fishing gear at Ujung Serangga presented in the form of Table 1 below :

**Table 1.** Composition of shark longline catch.

| No | Latin Name | Number of catch | |
|---|---|---|---|
| | | (individuals) | Percentage (%) |
| 1 | *Sphyrna lewini* | 7 | 2,36 |
| 2 | *Sphyrna mokkaran* | 1 | 0,34 |
| 3 | *Carcharhinus falciformis* | 147 | 49,66 |
| 4 | *Carcharhinus sorrah* | 82 | 27,70 |
| 5 | *Alopias pelagicus* | 39 | 13,18 |
| 6 | *Alopias superciliosus* | 18 | 6,08 |
| 7 | *Galeocerdo cuvier* | 1 | 0,34 |
| 8 | *Carcharhinus albimarginatus* | 1 | 0,34 |
| | Total | 294 | 100 |

Based on Table 1. It is known that during the study month there were 8 species of sharks caught with the most number caught was the species *Carcharhinus falciformis* with 147 individuals (49.66%) and the least caught were the species *Sphyrna mokkaran*, *Galeocerdo cuvier*, *Carcharhinus albimarginatus* with a total of 1 individual (0.34%).

### 3.2 Distribution of shark longline fishing grounds

The results of the research on the distribution of fishing grounds by shark fishing vessels landing at Ujong Serangga Fishing Base can be seen in Table 2 below.

**Table 2.** Fishing grounds of shark longlines based in Ujong Serangga PPI.

| No | Name of Ship | Fishing grounds | Distance (nautical miles) |
|---|---|---|---|
| 1 | KM Doa Adinda 01 | Asu Island and Gunung Sitoli Island | 200 |
| 2 | KM Mutia 02 | Siberut Island and Pagai Island | 480 |
| 3 | KM Selvi 01 | Simuk Island | 260 |
| 4 | KM Marli 02 | Bangkaru Island and Simuk Island | 260 |
| 5 | KM Nadia 04 | Gunung Sitoli Island | 200 |
| 6 | KM Safiatul Jannah 01 | Ujung Batu Island | 130 |
| 7 | KM Putri Ayu 01 | Siberut Island and Pini Island | 450 |
| 8 | KM Cut Putro 02 | Asu Island | 170 |
| 9 | KM Doa Bersama | Hinako Island | 180 |
| 10 | KM Saudara Baru | Bangkaru Island | 150 |

The results show that there were 4 fishing units that traveled to 2 locations during the fishing time, namely KM Doa Adinda 01 (200 miles), KM Mutia 02 (480 miles), KM Marli 02 (260 miles), and KM Putri Ayu 01 (450 miles). From the number of catches recorded per fishing unit, it appears that most of the shark fishing grounds are around the waters of Pagai Island, Siberut Island, and Pini Island.

Based on the results of research involving interviews with shark longline fishers at the Ujung Serangga fishing station, it is known that there are 9 fishing ground locations. The locations were obtained by showing a google map to the fishermen, then showing the location based on the fishing grounds. Detailed information on the distribution of shark longline fishing grounds can be seen in Figure 2 below.

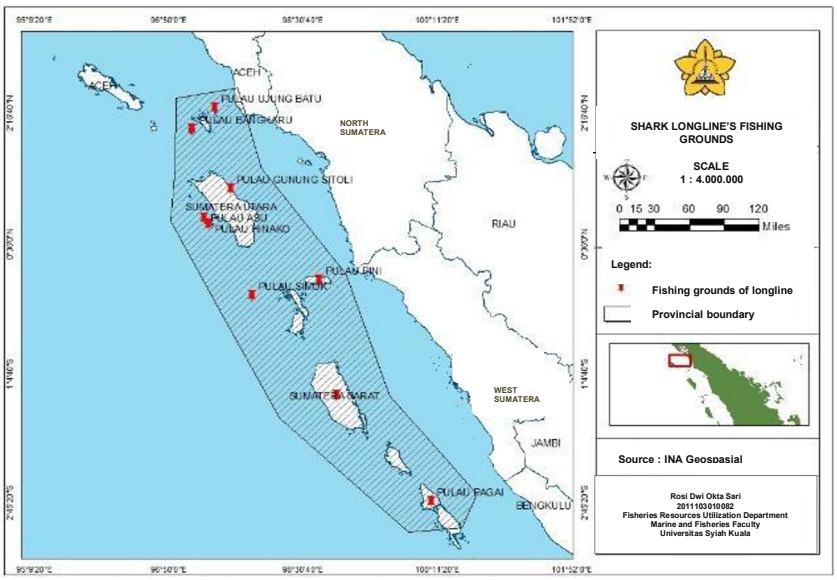


**Fig. 1.** Distribution of shark longline's fishing grounds.

Based on Fig. 1, it can be seen that KM Safiatul jannah 01 traveled the closest shark fishing location with a distance of 130 miles (19 hours) in Ujung Batu Island waters and KM Mutia 02 traveled the farthest shark fishing location with a distance of 480 miles (69 hours) in Siberut Island waters and Pagai Island waters.

## 4 Discussion

The identification carried out is morphological identification using the Identification Guide to Sharks, Rays and Skates of the Southeast Asian Region, 2017. The eight species include rat shark (*Alopias pelagicus*) with a percentage of (13.18%), bigeye thresher shark (*Alopias superciliosus*) with a percentage of (6.08%), longline shark (*Carcharinus falciformis*) with a percentage of (49.66%), tiger shark (*Galeocerdo cuvier*) with a percentage of (0, 34%), serrated hammerhead shark (*Sphyrna lewini*) with a percentage of (2.36%), great hammerhead shark (*Sphyrna mokkaran*) with a percentage of (0.34%), silvertip shark (*Carcharhinus albimarginatus*) with a percentage of (0.34%) and spotted tail shark (*Carcharhinus sorrah*) with a percentage of (27.70%).

Of the eight species landed, the requiem shark family, namely lanjaman shark and spotted tail shark, dominated the catch. The lanjaman shark is a shark species that has a conservation status in the vulnerable category because this species is believed to have a very high risk of extinction in nature. Based on the results of [9] research, lanjaman shark (*Carcharhinus falciformis)* is a dominant species during the research month with a percentage of 61% or 916 individuals in Java sea, namely FMA 712. Lanjaman sharks have smooth skin. In accordance with the identification carried out in the field, it was found that the lanjaman shark has a morphological shape that is almost the same as the spotted tail shark, but what distinguishes these two shark species is located on the fins where the spotted tail shark has a more intense black color. [10] which states that the spotted tail shark (*Carcharhinus sorrah*) has the tip of the dorsal second fin, pectoral fin and lower lobe of the tail fin which is black at the tip, the black dorsal first fin is not clearly visible. This type of shark has a conservation status of near threatened (NT), falling into the category of high risk of extinction in the wild.

The least caught during the study were silvertip sharks, great hammerheads and tiger sharks. However, over a period of several years, tiger sharks were very rarely caught. Tiger sharks are one of the largest carnivores in the ocean and have a conservation status in the near threatened category. Based on the results of research tiger sharks caught using shark longline fishing gear amounted to 1 individual with a total length of 228 cm. Research conducted by [11], found tiger sharks in Western Australian waters ranging from 148-407 cm. [12] found that the maximum size of tiger sharks was 380 cm and 450 cm with a few reaching 550 cm. The difference in the size range of tiger sharks caught is thought to be due to differences in the selectivity of fishing gear used, ranges and fishing grounds (*Sentosa* et al., 2016). According to [13] that high fishing pressure and low selectivity of fishing gear will cause the size of the fish caught to be smaller and affect the size of its mature gonads.

Of the 8 species, only 1 species has been included in the Minister of Maritime Affairs and Fisheries Regulation NO 48/2016 regulating national regulations on the release of fish species Sphyrna lewini and Carcharhinus longimanus species as mentioned in article (1) which is prohibited from releasing both species from the territory of the Republic of Indonesia outside the territory of the Republic of Indonesia. As for the Sphyrna species, there are not many of them in the Ujung Serangga PPI so the ideal catch is unknown.

Based on the results of interviews with fishermen obtained information that in April the catch obtained was less, this was influenced by the west season where in the west season there are hydro oceanographic factors such as wind and currents, this is an obstacle in carrying out fishing activities. According to [14], if the current speed is too fast, the fishing gear cannot be spread out perfectly to prevent the movement of fish so that it can affect the

catch. In the western season, the intensity of rainfall is high accompanied by very strong winds, causing large waves. According to [15] the influence of the east and west seasons has a huge impact on catches which are the peak season in Indonesia.

The distribution of shark fishing grounds studied in this study is based on fishing locations obtained from interviews with skippers and crew members per fishing unit. Based on the results obtained, the majority of fishing grounds with the most catches are on the west side of West Sumatra Province. The number of fishing locations is based on the number of gear settings. This fishing gear consists of the main fishing line, branch line, and fishing line attached to each branch. According to [16] longline consists of a series of main ropes, buoy ropes where on the main rope at a certain distance there are several short and smaller diameter branch ropes, and at the end of this branch rope is tied a baited fishing rod.

Based on interviews with shark longline fishermen, the largest shark fishing area is at a distance ranging from 130 miles to 280 miles. This is due to several factors, namely the period of fishing, the amount of fuel used, operational costs and vessel size. [17] state that the amount of fuel is closely related to the location of the fishing area or fishing ground where the farther the fishing area results in a longer trip to the location which has an impact on the use of more fuel. Based on the results of research by [18] that vessels at PPS Lampulo also experienced a development in vessel size ranging from 5-10 GT from the previous size, encouraging fishermen to carry out fishing activities further into the high seas. The shark longline fishing unit which is in the fishing area between 130 miles-280 miles using vessels with a size of 5 GT and 6 GT shows that the distance traveled by the ship is in accordance with the size of the ship used.

During the research month, the majority of shark catches were in the Mentawai islands which have waters with potential fish resources for capture fisheries activities. Several economically important pelagic fish commodities are found in these waters. Lanjaman shark (*Carcharhinus falciformis*) is a type of shark that dominates in Mentawai waters, especially near Pagai Island and Siberut Island. In accordance with the results of research by [19] showed the distribution of SPL in Mentawai waters generally occurs in the West-East transition season in March and the lowest SPL generally occurs in the East-West transition season in September.

## Conclusion

The composition of shark longline catches landed at PPI Ujung Serangga which are mostly caught is the type of longline shark (*Carcharhinus Falciformis*) as many as 147 individuals (49.66%), and spotted tail shark (*Carcharhinus Sorrah*) as many as 82 individuals (27.70%). The least common shark species were great hammerhead shark (*Sphyrna Mokkaran*) with 1 individual (0.34%), tiger shark (*Galeocerdo cuvier*) with 1 individual (0.34%), and silvertip shark (*Carcharhinus Albimarginatus)* with 1 individual (0.34%). The distribution of fishing grounds of longline sharks based in Ujung Serangga Fish Landing Base has 9 locations, consisting of Ujung Batu Island, Gunung Sitoli Island, Asu Island, Siberut Island, Hinako Island, Bangkaru Island, Simuk Island, Pini Island and Pagai Island.

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