



**Establishment and Operation of a Regional System of  
Fisheries *Refugia* in the South China Sea and Gulf of Thailand**

**REPORT**

**LOBSTER RESOURCES AND FISHERIES IN SEDILI, JOHOR**

Prepared by

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### Abstract

Spiny lobsters are one of the marine resources that have high commercial value. Due to its important role as income contributor towards our country's economy, the Department of Fisheries Malaysia (DoFM) has taken initiative to ensure the sustainability of lobster's resources in Malaysian waters. To manage the lobster fishery, sufficient data and information are required. Thus, in this study, we aimed to study the current resources status of lobsters in East Johor waters. This study was conducted in Sedili, Johor from July 2017 to October 2018. Information on landing site, fishing gear, weight, sex and species composition were recorded. A total of 2831 lobsters were sampled; only one sample was identified as *Panulirus ornatus* whereas the rest were *Panulirus polyphagus* lobsters. The sex ratio of female to male lobster samples were 0.6:1. The highest landing was recorded in July 2018 with total landing of 505 lobsters whereas the lowest landing was recorded in May 2018 (30 lobsters). Landing of lobsters are higher in July to October compared to another month. Highest average weight of female lobster was in December 2017 ( $375 \pm 23$  g) whereas highest average weight of male lobster was recorded in September 2017 ( $351 \pm 36$  g). The egg-bearing female lobsters was found only in August and September. This study can be used as the baseline data for further management actions such as introducing closed season for ensuring sustainability of lobsters. However, further data collection and survey is needed to confirm the pattern of lobster landing.

### Keywords

Spiny Lobster, *Panulirus polyphagus*, East Johor waters, Sedili

## Introduction

Lobsters (Family: Palinuridae and Scyllaridae) are among the major marine resources that can be found in shallow water (Ibrahim *et al.*, 2000). Spiny lobsters are one of the most expensive commodities in the Malaysia with the current retail price exceeding RM300 per kilogram. In 2004, exportation of lobsters to main exporter; Hong Kong and Singapore reached 1,010 metric tonne, making the lobsters fisheries are very crucial for generating country's income (Food and Agriculture Organization of the United Nations, 2006).

Lobsters landing was recorded in four main fishing grounds in East Coast of Peninsular Malaysia: East Johor, Kelantan, Pahang and Terengganu. According to landing data from 2008 to 2016 by Malaysian Department of Fisheries (2017), the highest landing of spiny lobsters (Palinuridae) was recorded in East Johor with total landing 672 metric tonne, followed by landing in Pahang (363 metric tonne), Kelantan (95 metric tonne) and Terengganu (7 metric tonne). During the 2008-2016 period, landing of Palinuridae in East Johor was the highest in 2014 with 136 metric tonne per year. However, a slight declination of lobster landing in East Johor was recorded in 2015 and 2016 with total landing of 128 and 121 metric tonne, respectively. A decrease of lobster landing was also recorded in Pahang where the landing continuously dropped since 2012 (63 metric tonne) to 2016, where in 2016 no landing of Palinuridae was recorded (Fig. 1).

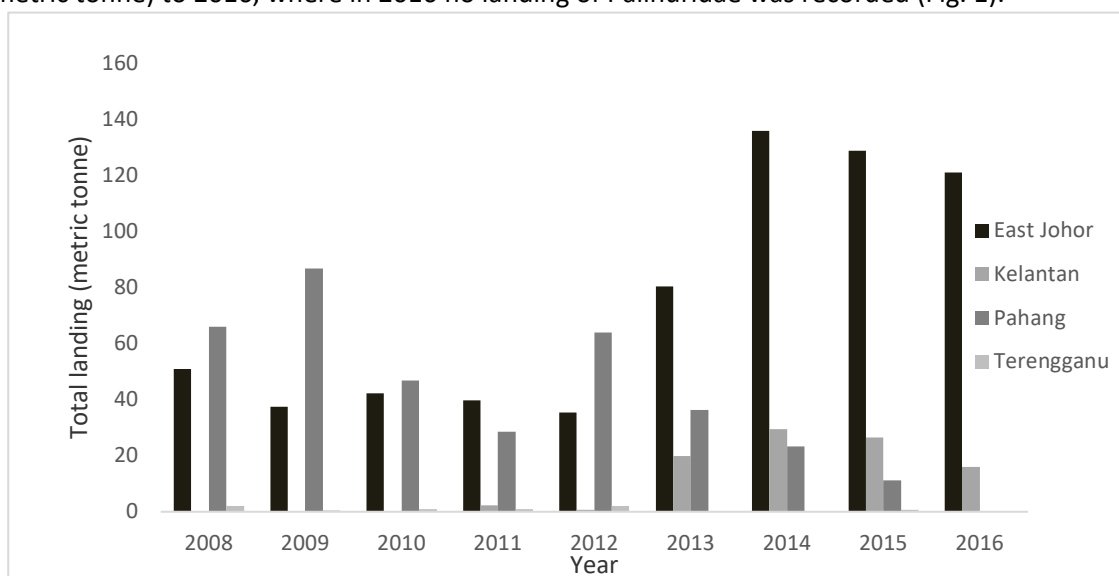


Figure 1: Landing of Spiny lobsters (Palinuridae) in East Coast of Peninsular Malaysia for 2008-2016 (Jabatan Perikanan Malaysia, 2017)

From the landing data, decline in lobster landing was significantly detected in almost all area (Fig. 1). These data revealed that lobsters in Malaysia have been overfishing or overexploited. Despite of declining resources or overfishing of spiny lobsters, the other challenges that are faced by lobster fishery in Malaysia include the paucity of information for fishery management (Biusing and Chio, 2004). This problem can be solved by sufficient data and information gathering on distribution and growth of this species in order to establish fishery management plan to maintain the sustainability of this species (Ikhwanuddin *et al.*, 2014). Hence in this study, we aimed to study the current resources status of lobsters in East Johor waters for the purpose of establishing a special fishery refugium for lobster.

## Materials and Methods

This study was conducted at Sedili, Johor. The data collection was carried out from lobster landing jetties in the study area starting from July 2017 to October 2018 (except for March and

April 2018-data was not collected due to unavoidable circumstance). An enumerator was assigned to collect daily landing data, consisting of information such as date of sampling, landing site, fishing gear, weight, sex and species composition. The data that was obtained from enumerators were then analyzed at the end of each quarter.

## Results

### **Landing Samples**

A total of 2831 lobsters were sampled during the study period. Out of total samples, only one sample was identified as *Panulirus ornatus* whereas the rest were *Panulirus polyphagus* lobsters. From this data, we found that *Panulirus polyphagus* is the most dominant species of spiny lobsters in East Johor water. In Sedili, all the lobsters were landed by using drift nets with mesh size between 4-6 inches.

A total of 1419 lobsters were landed in 2017 whereas another 1412 samples were landed in 2018. The highest landing was recorded in July 2018 with total number of lobster landing of 505 lobsters, followed by August and October 2017 with number of lobster landing of 460 and 457, respectively. February and May 2018 recorded the lowest lobsters landing with only 36 and 30 number of catches. From the result, it was shown that the landing trend of lobsters were higher in August and October for 2017 whereas in 2018 were higher in July and October compared to another month (Fig. 2).

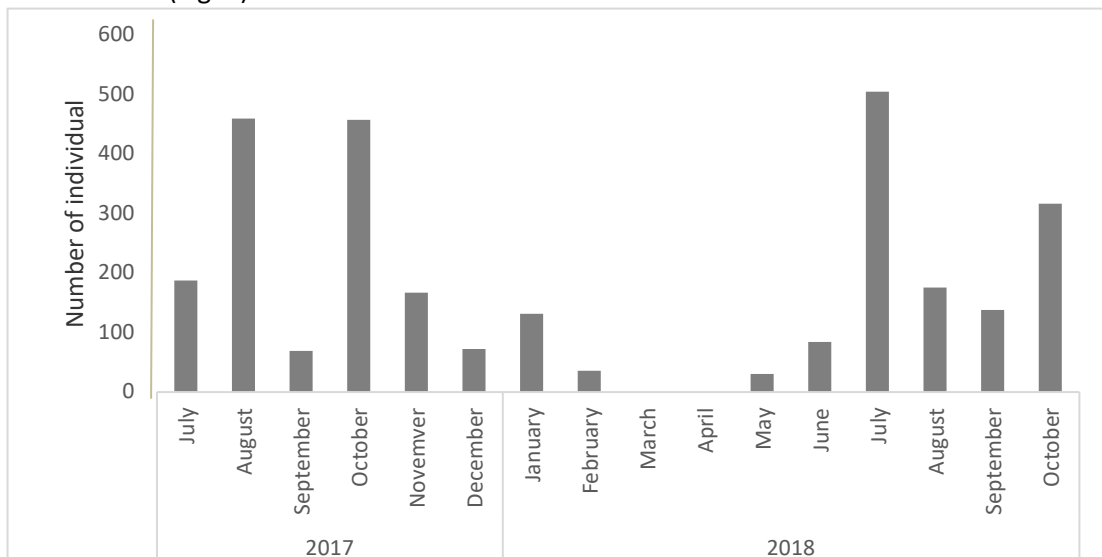


Figure 2: Total landing of spiny lobsters by month in Sedili, Johor starting from July 2017 till October 2018

### **Sex Ratio and Distribution**

Analysis by sex revealed that a total of 1023 female and 1808 male lobsters which contributed to sex ratio (female: male) of 0.6:1 were landed during the study period. For female lobsters, the highest number of lobster landing was recorded in October 2017 with the total catch of 223 lobsters whereas the lowest number of lobster landing was recorded in February 2018 with the total catch of only 6 lobsters. For male lobsters, July 2018 recorded as the highest number of lobster landing month with a total catch of 364 lobsters whereas May 2018 was recorded as the lowest number of lobster landing month with a total catch of 16 lobsters.

In October 2018 showed almost balance number of male and female lobster landing where total number of females was 223 whereas male was 234. This record was followed by August 2018 with total landing of 193 for female and 267 for male. July and October 2018 also recorded among the highest landing of lobsters. However, analysis by sex showed that total of male lobsters landed in these months were twice than the total of female lobsters (Fig. 3).

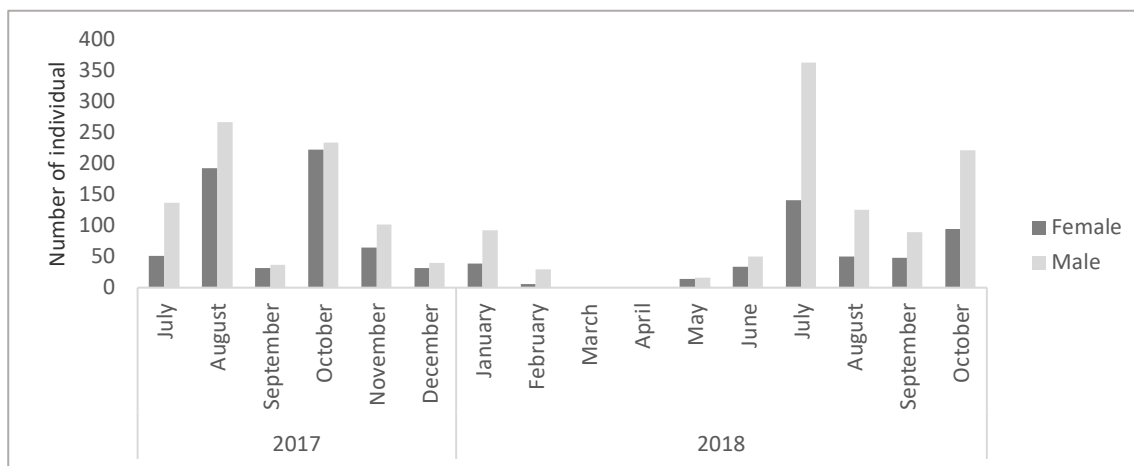


Figure 3: Total landing of spiny lobsters by sex in Sedili, Johor starting from July 2017 to till October 2018

**Body Weight (BW)**

The average weight of male lobsters was  $245.7 \pm 3.6$  g with the weight ranging from 20-940g. For female lobster, the average weight was  $256 \pm 4.8$ g with the weight ranging from 58-960g. This study showed that female lobsters was relatively heavier than the male lobster (Table 1).

Analysis of monthly average weight of total catch showed that the highest average weight was recorded in December 2017 ( $354 \pm 15$ ) g, followed by September 2017 with average weight of  $326 \pm 30$  g. The lowest average weight was recorded in July, May and September 2018 with average weight of  $153 \pm 3$  g,  $174 \pm 15$  g and  $175 \pm 7$  g, respectively (Fig. 4).

Table 1: Mean, maximum and minimum body weight (g) of landed lobster in Sedili from July 2017 to October 2018

Parameter	Body weight (g)	
	Male	Female
Average	245.7	256.0
Max	940	960
Min	20	58
SE	3.6	4.8
n	1808	1023

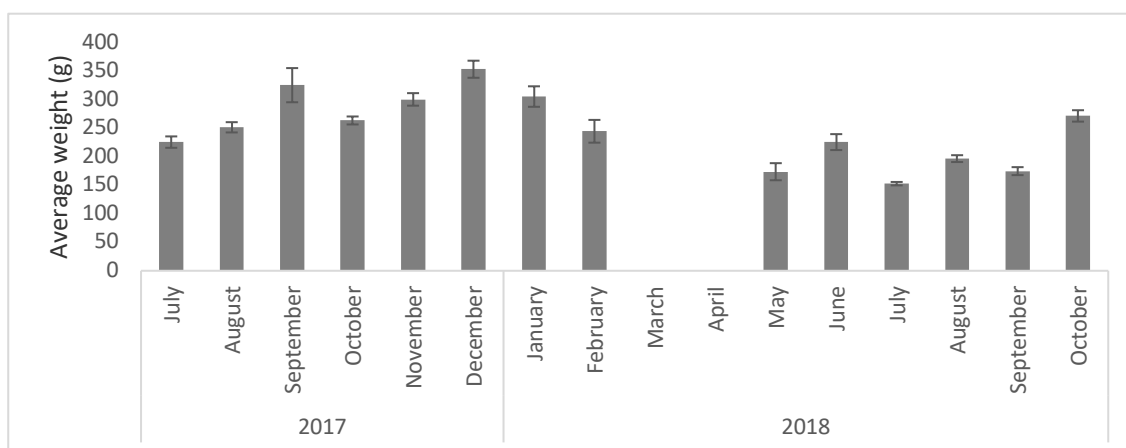


Figure 4: Average weight (gram) of landed lobsters in the Sedili waters from July 2017 to October 2018

Analysis by sex showed that the highest average weight of female lobster was in December 2017 with an average weight of  $375 \pm 23$  g, followed by October 2017 with an average weight of  $357 \pm 71$  g. The lowest average weight of female lobster was recorded in May 2018 with an average weight of  $139 \pm 17$  g. For male lobster, the highest average weight was recorded in September 2017 with an average weight of  $351 \pm 36$  g, followed by  $338 \pm 18$  g that was recorded in December 2017. The lowest average weight for male lobster was recorded in July 2018 with an average weight of  $147 \pm 3$  g. December 2017 recorded almost balance record of weight average between male and female lobster where the average weight of female was  $375 \pm 23$  g whereas male was  $338 \pm 18$  g. (Fig. 5).

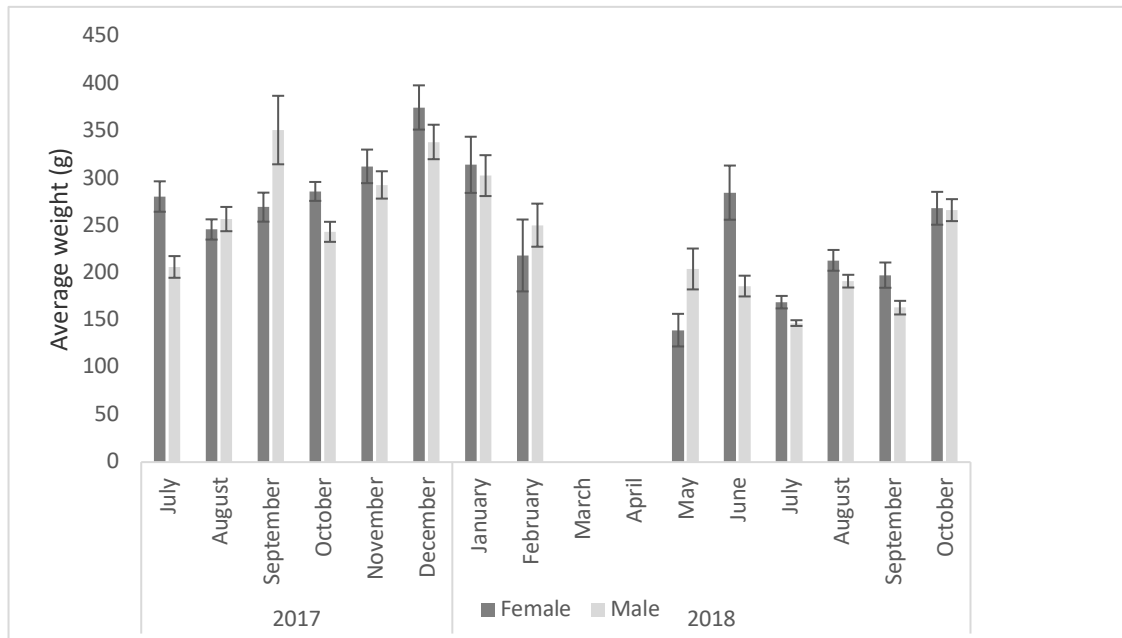


Figure 5: Average weight of landed lobster in Sedili by sex

### Breeding Season

Among a total of 1023 female lobsters landed in Sedili, only two lobsters were found carrying eggs. One egg-bearing lobster was landed in August 2017 with the weight of 320g, whereas another one was landed in September 2017 with the weight of 380g. The average weight of egg-bearing lobsters in Sedili was smaller than other areas such as Endau (*not discussed in this paper*), which were usually more than 600 g. Another study in Endau found that the egg-bearing female lobsters were landed in 4 consecutive months starting from May till August 2018. The average weight of egg-bearing female lobsters in Endau ranges from 600-684g (Table 2).

### Discussion

Our landing data showed that only one out of 2831 sampled lobster was identified as *Panulirus ornatus* whereas the rest were *Panulirus polyphagus*. This data suggests that *Panulirus polyphagus* is the most dominant species of spiny lobsters in Sedili. Our data is consistent with a study that was performed by Alias *et al.*, (2001) where this study revealed that at least five species of Spiny Lobsters can be found in the East Coast of Peninsular Malaysia including *Panulirus ornatus*, *P. Versicolor*, *P. omarus omarus*, *P. longpipes* and *P. polyphagus*, but the most abundant species is *Panulirus polyphagus* that can be found mainly in East Johor water.

Table 2: Average weight of egg-bearing female lobsters in Endau and Sedili

Year	Month	Average weight (g)	
		Endau	Sedili
2017	August	-	320
	September	-	380
2018	May	600	-
	June	607	-
	July	684	-
	August	611	-

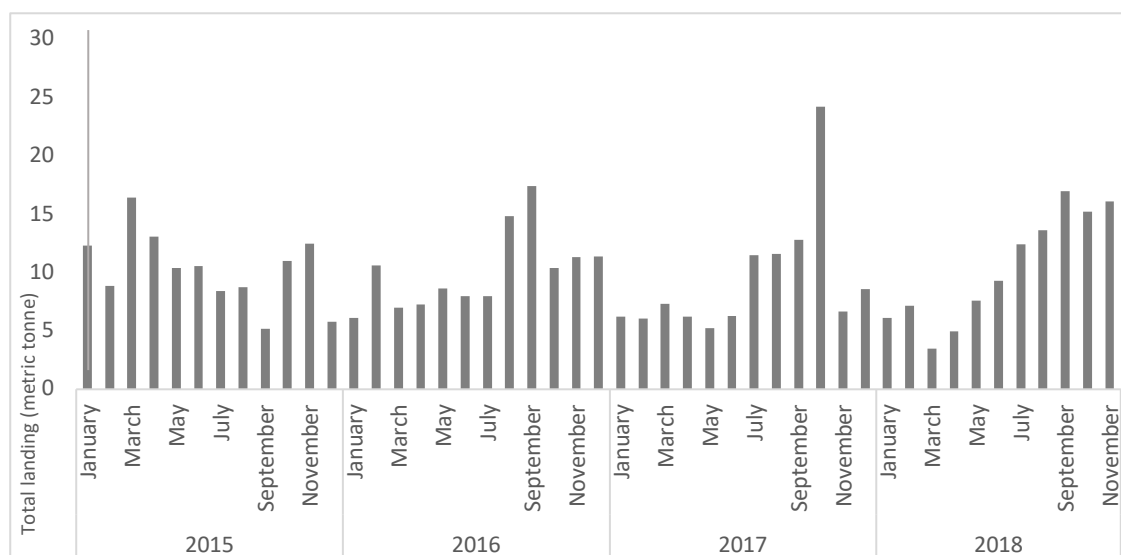


Figure 6: Monthly landing of Spiny lobsters (Palinuridae) in East Johor waters for 2015 till 2018. Source: Fisheries Statistic, Department of Fisheries Malaysia, 2018

Our results showed that during study period, almost similar pattern of lobster landing can be seen in 2017 and 2018 where highest landing was recorded in July, August and October. Data from the fisheries statistics collected by the Department of Fisheries Malaysia also showed similar pattern. However, in 2015 and 2016, unstable pattern can be observed (Fig. 6). Changes in landing pattern of lobster in year by year may be due to several factors including climate change.

In our study, landing in 2017 showed high landing in August with sudden significant declination in September before it increased in October. Almost similar pattern can be seen in 2018 where the lobster landing was recorded high in July, then drop significantly in August and September before it increased again in October (Fig. 2). This situation occurred due to several possible factors including festive season (Hari Raya Aidilfitri and Hari Raya Aidiladha) and south-west monsoon wind that occur from April to September (Ku Kassim *et al.*, 2007). The number of operated vessels reduced due to Hari Raya celebration, which was celebrated on June to August and this may affect the quantity of landed fish (Lembaga Kemajuan Ikan Malaysia, 2017). Besides, the south-west monsoon wind also hindered the fishermen especially small fiber boat operators from going out to the sea. Fig. 7 showed the wind movement pattern in July, August and September, where the wind gust affects our area of study.



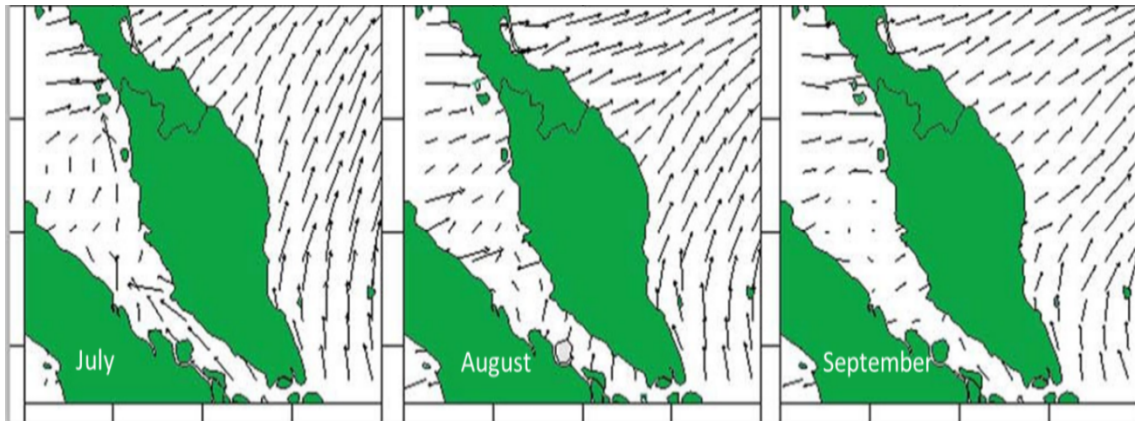


Figure 7: Wind Movement Pattern of Peninsular Malaysia in July, August and September. Source: Ku Kassim *et al.*, (2007)

Female lobsters' weight was usually higher compared to males in 9 out of 14 months of study period. This is due to several factors including female grew larger in size for carrying the eggs during breeding season (Ikhwanuddin *et al.*, 2014). According to Alias *et al.*, (2001), the mature lobster has body weight between 370g to 1170g. Our study showed that only 15% of female and 9% of male of sampled lobsters already reach mature body weight. The highest number of matured female lobsters were found in October 2017 with total of 43 lobsters, whereas for male was in August 2017 with total of 38 lobsters (Table 3). From the data obtained, it showed that most of sampling lobsters were not yet reach mature size.

Table 3: Total number of mature lobsters that reach mature body weight, 370g

Year	Month	Female	Male
2017	July	13	12
	August	22	38
	September	5	6
	October	43	6
	November	18	20
	December	16	18
2018	January	12	24
	February	0	4
	March		
	April		
	May	0	0
	June	11	1
	July	8	4
	August	2	4
	September	2	0
	October	9	32

## Conclusion

The number of lobster landing was high in July and October for 2017 whereas in 2018 the lobster's landing was high in August and October. The landing of lobsters was decline in certain months due to several factors including festive season and monsoon season. However, further data collection and survey is needed to confirm the pattern of lobster landing and also to study the spawning season of this species.

## Acknowledgement

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