

SEYCHELLES FISHING AUTHORITY TECHNICAL REPORT

REPORT ON THE SPINY LOBSTER FISHERY

Summary of Fishing Activity for the 2015-2016 season



P. O. Box 449 - Fishing Port - Mahe - Seychelles
Phone: (248) 670300 - Fax: (248) 224508
Email: management@sfa.sc

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SFA Fisheries Research Section

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1. Introduction

The Seychelles artisanal spiny lobster fishery targets shallow water lobster stocks around the main granitic islands. The main species of lobsters caught are Homard Grosse Tete (*Panulirus penicillatus*), Homard Rouge (*P. longipes*), Homard Vert (*P. versicolor*) and Porcellene (*P. ornatus*). The preferred habitats for these species are fringing carbonate reefs and granite reefs which provide good shelter for the lobsters.

The spiny lobster fishery in Seychelles is a licensed and seasonally-managed fishery with fishers applying for licences prior to the opening of the season, which typically last 3 months in duration. The current management regulations in place for the spiny lobster fishery are:

- i. Restrictions on the number of licenses
- ii. Seasonal restrictions (the fishery is typically opened for a 3 month period)
- iii. Minimum size (75 mm carapace length for all species)
- iv. Prohibition to retain berried females

The fishery was opened from the 1st of December 2015 to the 29th of February 2016. A compliance bond of SCR5000 was maintained to ensure that licence holders submitted their logbooks and sales records at the end of the fishing season. A total of sixteen fishing licences were on offer to fishermen. However, only 12 fishermen applied and was subsequently issued a licence, of which 10 was from Mahe and 2 from Praslin. In comparison, for the 2013/2014 season, only 8 licences were issued to fishermen.

This report presents analyses of fisheries-dependent data collected for the spiny lobster fishery during the 2015/2016 fishing season. It also compares the stock indicators, namely the size structure of lobsters and the harvest rate between the, 2012/2013, 2013/2014 and 2015/2016 fishing season.

2. Sampling methodology and analysis

During the 2015/2016 season data was collected from fishermen operating on Mahé and Praslin through three different sources:

- a) **Catch and Effort log:** Each licensed fishermen was given a logbook to record information on their fishing activities. Information collected included information on catch, effort and fishing location.
- b) **Sampled Catch and Effort log:** SFA technicians sampled the landed catch directly whenever possible. Information on the species caught, weight and length measures were collected. Interviews were also conducted to determine total effort and fishing location.
- c) **Receipt Book:** At the end of the fishing season, receipt books completed by licensed fishermen with sales of lobsters were collected to derive total sales. The fishermen recorded the number and weight of lobsters sold.

The total catch of lobsters caught for the season was derived from the sum of the weight of lobsters from the sampled catch and effort log and the raised calculated weight of lobsters from the catch and effort log for each species. The raised weight was calculated from the average estimated weight multiplied by the number of lobsters caught for each species. The average weight for each species was derived from the total number and weight of lobsters sampled from the sampled catch and effort log recorded by the technicians.

The total effort was based on the total number of fishing trips undertaken. The catch per unit effort (CPUE) was calculated from the total catch in kg and the total effort. The catch, effort and CPUE and species composition was estimated for the main fishing location groupings.

The length frequency distributions of males and females of the different species of lobsters sampled in 2015/2016 was compared with distributions of lobsters sampled in the previous season (2012/2013 and 2013/2014) using univariate analysis of variance (ANOVA) or Kruskal-Wallis non-parametric tests. Assumptions of the ANOVA model were checked by examining the residual plots for normality of error terms and homogeneity of variances. In addition, homogeneity of variances was checked by running the Fligner-Killeen test. A significance level of $\alpha=0.05$ was used throughout the analysis.

3. Results

3.1 Catch, effort and catch per unit effort

The estimated total catch for the 2015/2016 season was 4.99 t. In contrast, the estimated total catch for the 2013/2014 fishing season was only 609 kg (fishery opened for only 1 month), whilst the total catch for the 2012/2013 season was 2.11 t (Figure 1). Compared to the 2012/2013 season, this represents an increase of 136% in the estimated total catch. Similarly, to the 2013/2014 season, the snorkelling technique was the only method used to catch lobsters.

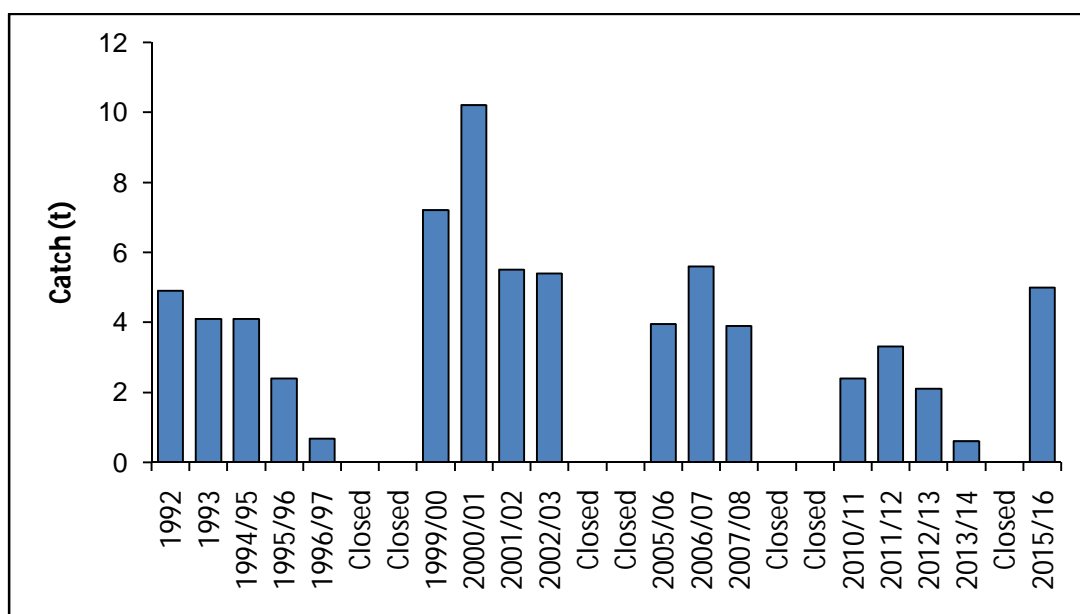


Figure 1. Historical seasonal catch (metric tonnes, t) of spiny lobsters from 1992 to 2016

Similarly to 2013/2014, fishing was concentrated mainly around Mahé, with an estimated landed catch of 3.15t, accounting for 63% of the total catch. This was followed by Fregate/Récif with a total estimated catch of 906 kg and 666 kg from North Island, accounting for 18% and 13% of the total catch respectively. Other minor fishing sites included Praslin and Praslin Ridge where a total of 103 kg and 21 kg of lobsters were caught respectively (Figure 2).

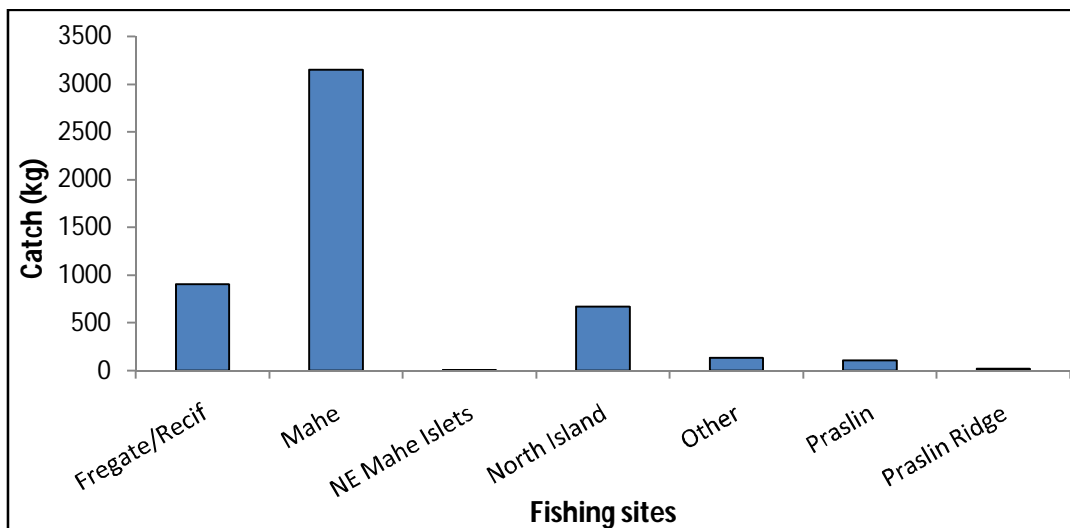


Figure 2. Catches (kg) by major fishing location for the 2015/2016 fishing season

A total of 219 fishing trips were recorded compared to 33 trips in 2013/2014 and 208 trips in the 2012/2013 season. Compared to the 2012/2013 fishing effort, this represents a small increase of 5% in the total effort. In terms of location, fishing effort was concentrated around Mahé, with a total of 169 trips, followed by Fregate/Récif with 20 trips, North Island with 14 trips and Praslin with 10 trips (Figure 3).

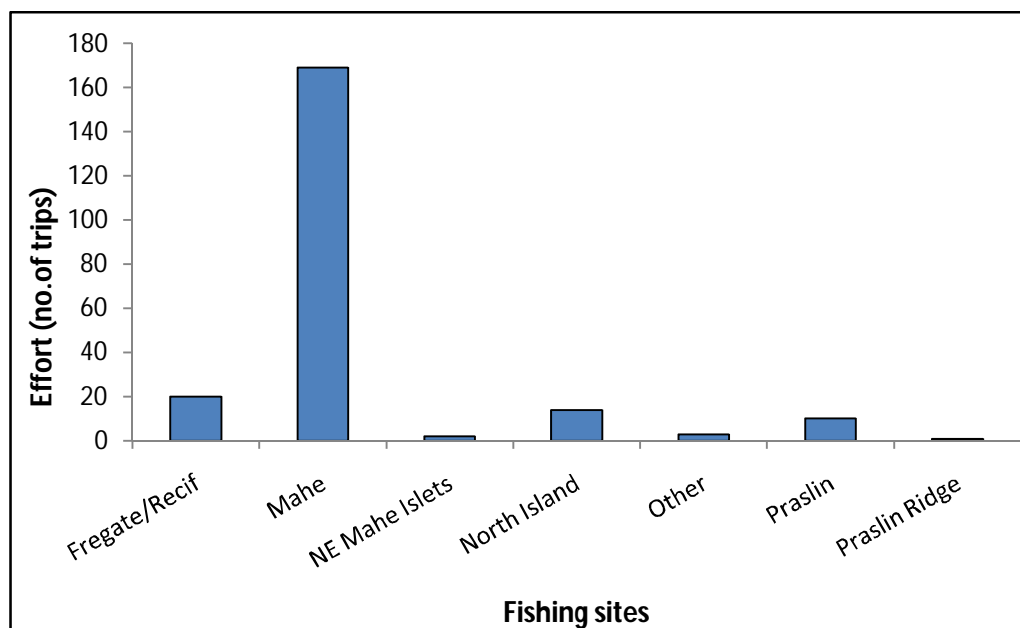


Figure 3. Fishing effort (no. of trips) by major fishing location for the 2015/2016 fishing season

The estimated CPUE for the 2015/2016 season was 22.8 kg/trip. This represents an increase of 124% and 23% in the CPUE compared to the 2012/2013 and 2013/2014 season

respectively. The CPUE for the 2013/2014 season was 18.4 kg/trip, whilst in 2012/2013 it was 10.1 kg/trip (Figure 4).

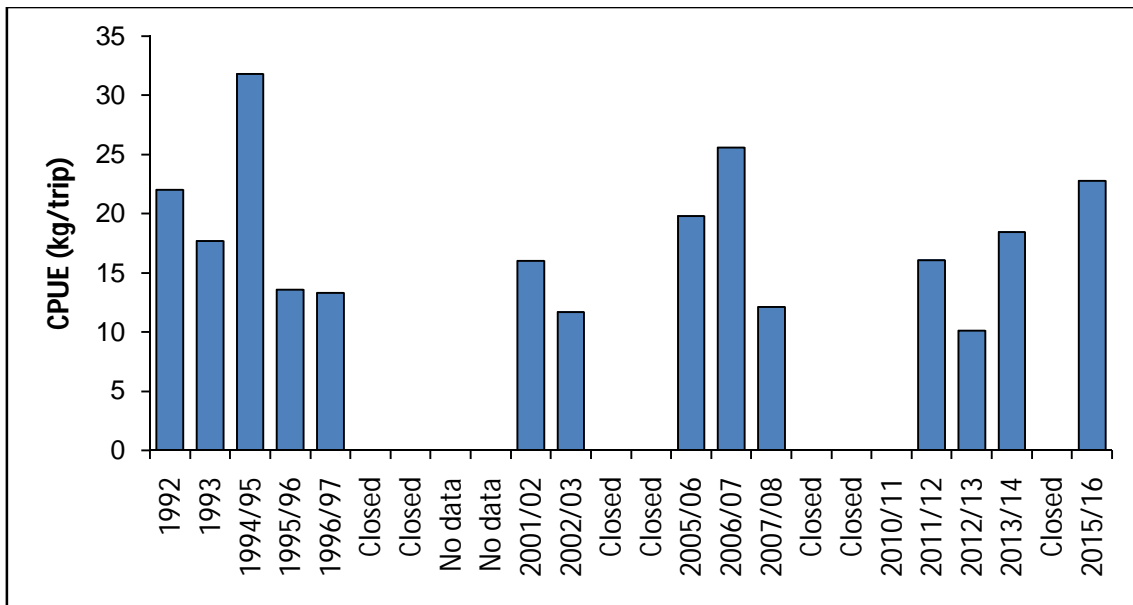


Figure 4. Seasonal CPUE (kg/trip) for open seasons of the lobster fishery between 1992 and 2016.

Due to unavailable data for 2 open seasons and underreporting for 2010/2011 season, the CPUE was not calculated.

In terms of fishing locations, the highest CPUEs were recorded at North Island, Fregate/Récif and Other sites with catch rates of 47.6, 45.3 and 44.8 kg/trip respectively. The Praslin Ridge recorded a catch rate of 21.4 kg. In contrast, the catch rate on Mahé was 18.6 kg/trip, whilst that of Praslin was 10.3 kg/trip (Figure 5).

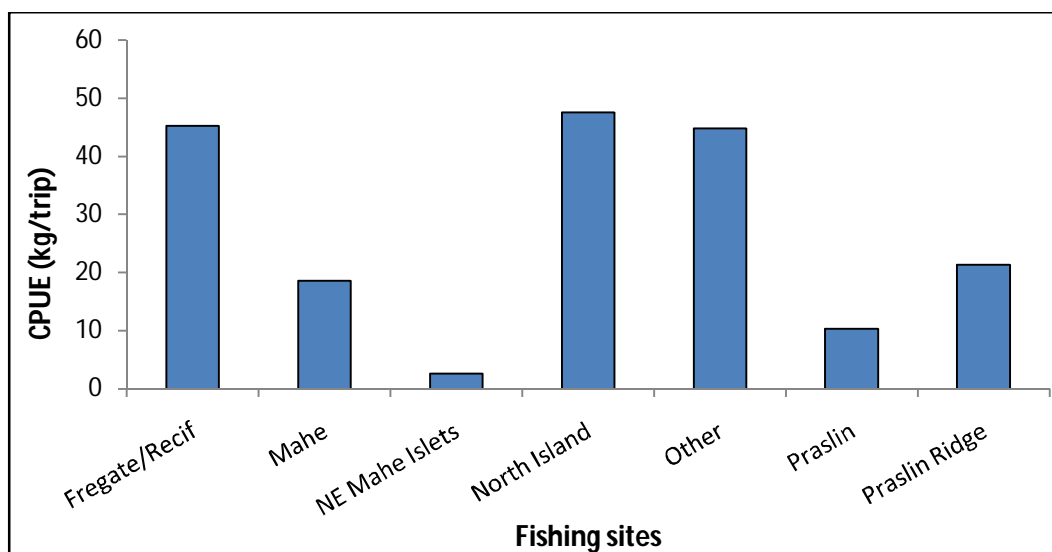


Figure 5. Catch per unit effort (CPUE) (kg/trip) for the 2015/2016 season at the major fishing locations

3.2 Species composition by location

Catches of the main targeted species during this season was dominated by *P. penicillatus*. A total of 4.14 t of *P. penicillatus* was caught compared to 1.37 t caught in 2012/2013 and 421 kg in 2013/2014. The second most dominant species in the catch was *P. longipes*. A total of 803 kg of this species was caught compared to 710 kg in 2012/2013 and 185 kg in 2013/2014. *P. versicolor* and *P. ornatus* were the rarest species caught, comprising of only 35 and 5.6 kg of the total catch respectively.

By fishing location, *P. penicillatus* was the main species caught around Mahé, Fregate/Récif North Island and Other sites, comprising of 83%, 89%, 87% and 100% of the total catch respectively at those locations. In contrast, *P. longipes* was the most dominant species caught on Praslin and the Praslin Ridge accounting for 86 % and 71 % of the total catches (Figure 6).

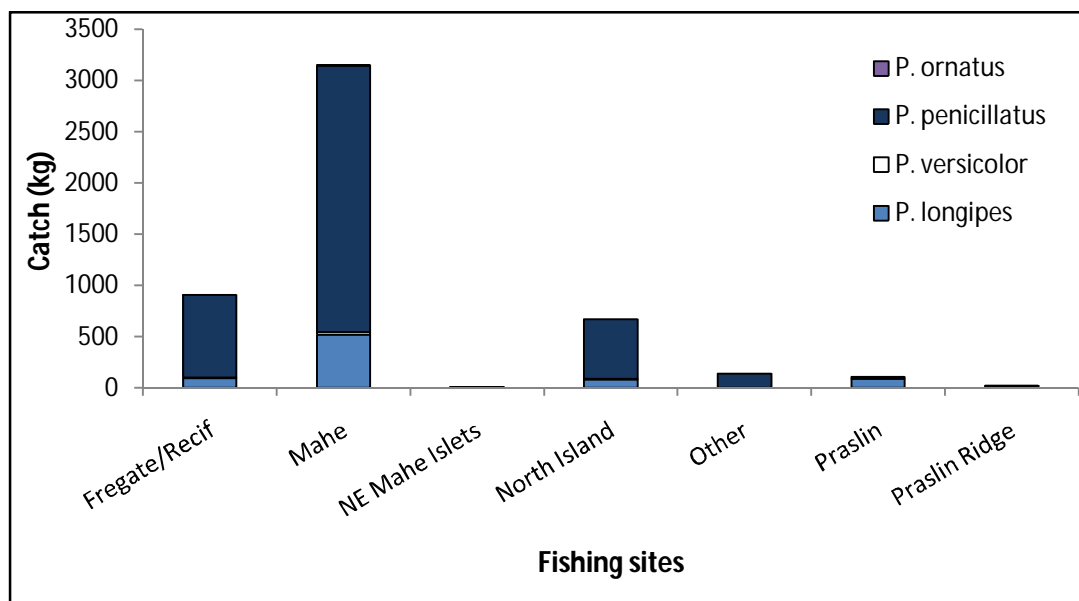


Figure 6. Species compositions of spiny lobster catch from the main fishing locations during the 2015/2016 fishing season.

3.3 Size frequency distributions

A total of 5049 spiny lobsters were sampled for length and sex during the 2015/2016 season compared to 249 in 2013/2014 and 1490 sampled in 2012/2013 (Table 1). This represents a sampling coverage of about 83% of fishing activities for the 2015/2016 season. Similarly to previous seasons, males dominated females in the samples with a ratio of 1.51.

Table 1. Size frequency sample sizes by species for the last 2 open season

Season	Species	F	M	Total
2012/2013	<i>P. penicillatus</i>	335	488	823
	<i>P. longipeds</i>	284	365	649
	<i>P. versicolor</i>	8	10	18
2013/2014	<i>P. penicillatus</i>	77	109	186
	<i>P. longipeds</i>	34	27	61
	<i>P. versicolor</i>	1	1	2
2015/2016	<i>P. penicillatus</i>	1616	2300	3916
	<i>P. longipeds</i>	382	714	1096
	<i>P. versicolor</i>	16	17	33
	<i>P. ornatus</i>	2	1	3

Note: M=males, F=females

The relative size frequency distributions of male and female *P. penicillatus* sampled over the last 3 fishing season are shown in Figure 7. Female *P. penicillatus* sampled during the 2015/2016 season ranged in size from 5.9 to 19.4 cm. The average size was 9.1 cm with a mode at 9.2 cm and a median of 9.0 cm. For the 2013/2014 season, females ranged in size from 6.7 to 12.1 cm. The average size was 9.2 cm with a mode at 8.7 cm and a median of 8.9 cm. In contrast, in 2012/2013, females sampled ranged in size from 6.3 to 19.6 cm. The average size was 9.5 cm and with a mode at 10.1 cm and a median of 9.3 cm. There was a significant difference in the size distribution between the three seasons¹. Females sampled in 2012/2013 were significantly larger than females sampled in 2015/2016.

Males *P. penicillatus* sampled in 2015/2016 ranged in size from 4.4 to 19.5 cm. The average size was 11.1 cm with a mode at 9.5 cm and a median of 10.8 cm. In 2013/2014 males ranged in size from 7.4 to 16.1 cm. The average size was 11.0 cm with a mode at 11.5 cm and a median of 11.2 cm. In contrast, males sampled in 2012/2013 ranged in size from 7.0 to 17.4 cm. The average size was 11.8 cm with a mode at 10.0 cm and a median of 11.6 cm (Figure 7). The average size of male lobsters sampled in 2012/2013 was significantly larger than males sampled in 2013/2014 and 2015/2016².

¹ ANOVA test: $F(2,2025)=15.21$ $p<0.001$

² ANOVA test: $F(2,2894)=22.04$ $p<0.001$

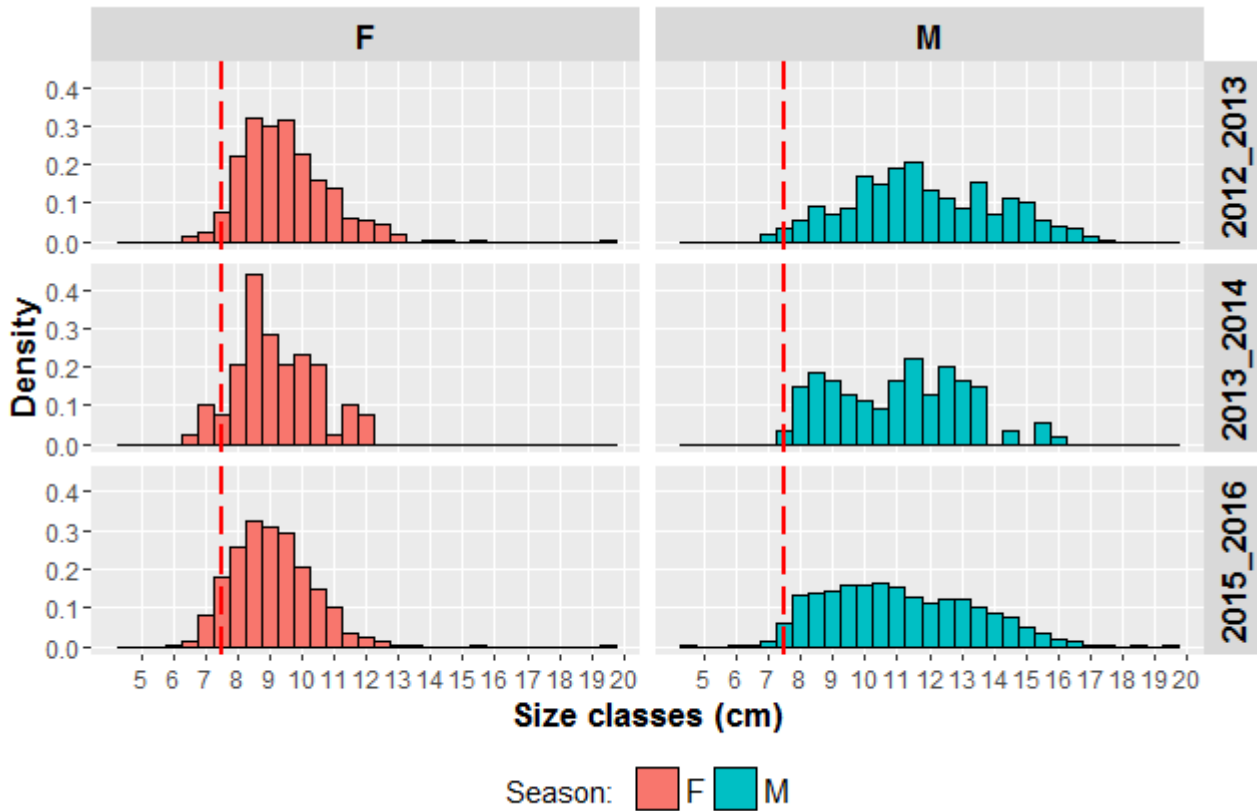


Figure 7. Size frequency distribution of male and female *P. penicillatus* over the last 3 open seasons

The relative size frequency distributions of male and female *P. longipes* sampled are shown in Figure 8. Female *P. longipes* sampled during the 2015/2016 season ranged in size from 4.8 to 10.1 cm. The average size was 7.6 cm with a mode at 7.8 cm and a median of 7.6 cm. In 2013/2014, females ranged in size from 5.6 to 9.8 cm. The average size was 7.4 cm with a mode at 7.2 cm and a median of 7.4 cm. In contrast, in 2012/2013, females sampled ranged in size from 5.9 to 11.1 cm. The average size was 7.7 cm and with a mode at 7.0 cm and a median of 7.6 cm. The average size of females sampled in 2015/2016 was significantly smaller than females sampled in 2012/2013³. The size frequency distribution of females shows a similar pattern between the three seasons, with the median lying around the legal minimum size limit of 7.5 cm. Similarly to previous seasons, a high proportion of females sampled were below the minimum size limit. During the 2015/2016 season, 44% of females were undersized whilst in 2013/2014 and 2012/2013, the proportion was 50% and 41% respectively.

³ ANOVA test: $F(2,697)=5.079$ $p<0.05$

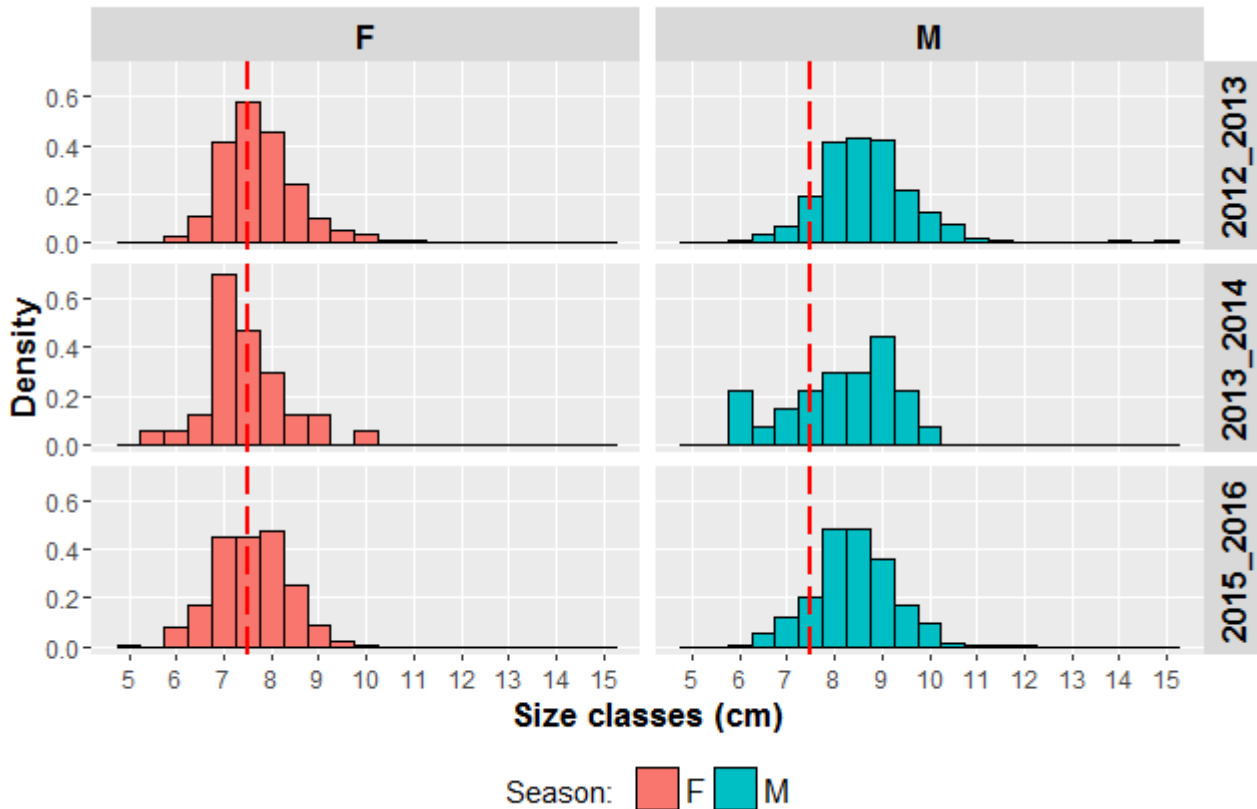


Figure 8. Size frequency distribution of male and female *P. longipes* over the last 2 open seasons

Males *P. longipes* sampled in 2015/2016 ranged in size from 5.9 to 19.7 cm. The average size was 8.4 cm with a mode at 8.8 cm and a median of 8.4 cm. In 2013/2014, males ranged in size from 6.0 to 9.8 cm. The average size was 8.1 cm with a mode at 7.9 cm and a median of 8.3 cm. In contrast, males sampled in 2012/2013 ranged in size from 5.9 to 15.0 cm. The average size was 8.6 cm which was significantly larger than males sampled in 2015/2016⁴. The mode was 9.0 cm and the median was 8.6 cm (Figure. 8).

4. Discussion

Following the closure of the fishery in 2014/2015, the 2015/2016 lobster fishing season was opened for a period of three months. The Research Section of the SFA managed to carry out an effective sampling programme whereby 83% of fishing activities were covered. As a result, the total catch was estimated with greater accuracy. The total catch of 4.99 t during this season was significantly higher than catches recorded over the past five opened seasons. In addition, the CPUE, which is a measure of the relative abundance of lobsters, increased by 124% and 23% compared to the 2012/2013 and 2013/2014 fishing season respectively.

⁴ Kruskal-Wallis test: $p < 0.05$

Changes in the average size of lobsters were observed over the last three fishing seasons. Male and female *P. longipes* and female *P. penicillatus* were significantly smaller during the 2015/2016 season compared to the 2012/2013. Similarly, males *P. penicillatus* were significantly smaller in 2013/2014 and 2015/2016 compared to 2012/2013. However, the differences in size were quite small. A very important point of concern in the size composition of the catch is the high proportions of undersize female *P. longipes* lobsters recorded in the catch sampled over the last three fishing seasons (2012/2013= 41%, 2013/2014= 50% and 2015/2016= 44%). This clearly indicates that the current minimum size of 7.5 cm is not being respected with regards to this species, in particular for females. The minimum size of capture is an important regulation since it allows smaller individuals the chance to reproduce before being recruited into the fishery. The extraction of large proportions of undersize lobsters can potentially have negative impacts on the reproductive potential of this species in the future. Monitoring, control and surveillance efforts should increase in order to ensure that fishers are complying with the current regulation.

Overall, data collected during the 2015/2016 season indicates that there was an increase in the relative abundance of lobsters. The data collected in conjunction with information collected from fisheries independent surveys carried out in 2014, 2015 and 2016 will be used to further assess the status of the lobster stocks and determine the status of the fishery. Such information and assessments will be useful for managers to decide whether the fishery should be open/remain close for the 2016/2017 season.

5. References

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