



SEYCHELLES FISHING AUTHORITY TECHNICAL REPORT

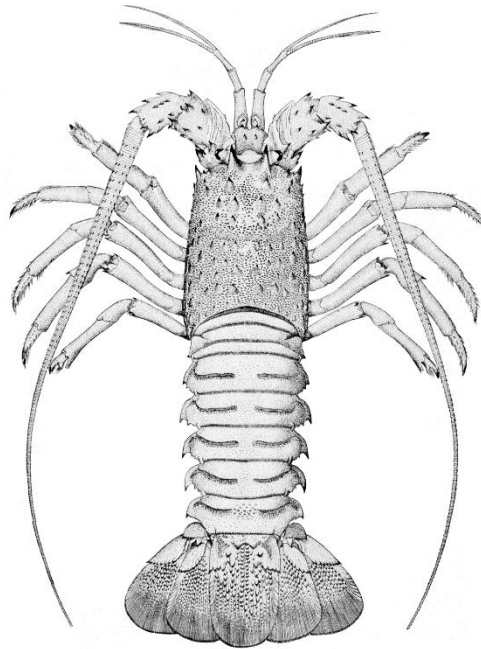
REPORT ON THE SPINY LOBSTER FISHERY

Summary of Fishing Activity for the 2021-2022 season



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SFA Fisheries Research Section

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Abstract

Spiny lobsters (Palinuridae) are amongst many marine species with great commercial importance for small-scale fisherman. In Seychelles, the spiny lobster has traditionally been managed as a seasonal closure and limited access (license-limited) fishery. The lobster fishing season usually opens for 3 months. This report presents analyses of the fisheries-dependent data collected from the spiny lobster fishery during the 2021/2022 fishing season and makes comparison between previous fishing seasons. To achieve this, data collected from fishers and sampled Catch and Effort logbooks were used. Statistical analyses to compare sizes between the previous seasons for *Panulirus longipes* (Long-legged spiny lobster) and *Panulirus penicillatus* (Pronghorn spiny lobster) were performed. Results for 2021/2022 season showed that snorkeling was the predominant fishing method used. A decrease in both the total catch (1.87 MT) and the number of fishing trips (103 trips) was observed compared to the two previous seasons. In terms of fishing sites, Mahé remains the most dominant area for both total catch (1.29 MT) and number of trips (72 trips) amongst the major fishing sites. A decrease in the number of trips (CPUE) was observed. For the 2021/2022 season, female, and male carapace length (CL) size were mostly constant compared to the two previous seasons. Overall, the data analysis for 2021/2022 season indicates that there was a decline in lobster's relative abundance, most probably attributed to lobster fishing season being open for three consecutive fishing seasons. The CPUE has decreased by 27% compared to the previous season. The 2022 fisheries independent survey will be conducted during the last quarter of the year to establish the changes in the relative abundance of lobsters.



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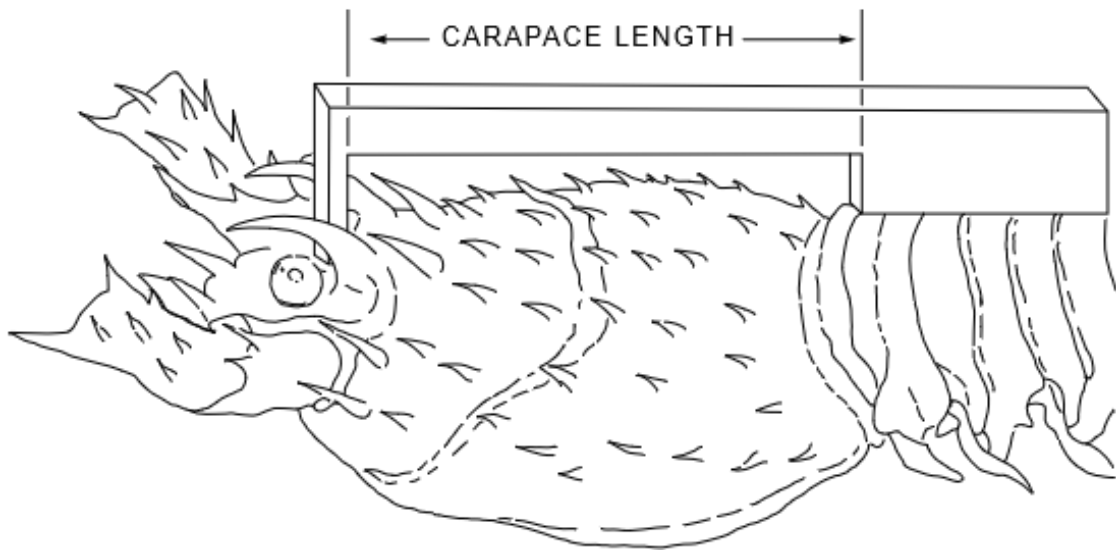
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1. Introduction.

The Seychelles artisanal spiny lobster fishery targets shallow water lobster stocks around the main granitic islands (Seychelles Fishing Authority [SFA], 2019). Locally, there are four species harvested, notably, *Panulirus penicillatus*, the Pronghorn spiny lobster (Oliver, 1791); *Panulirus longipes*, the Long-legged spiny lobster (A. Milne Edwards, 1868); *Panulirus versicolor*, the Painted spiny lobster (Latreille, 1804); and *Panulirus ornatus*, the Ornate spiny lobster (Fabricius, 1798) (SFA, 2017). These reef-dwelling species prefer fringing carbonate reefs and granitic reef habitats, constituting of crevices, burrows, and coral overhangs (Withy-Allen and Hovel, 2013; Hovel and Lowe, 2007; Holthius, 1991), such protective structures provide shelter against multiple ecological factors such as predation, thus maximising survival probabilities (Behringer and Butler, 2010). Since spiny lobsters are nocturnal scavengers, fishing operations are conducted from dusk to dawn (Radhakrishnan et al., 2019; SFA, 2017). Fishers generally utilise small outboard vessels to access various coastal fishing grounds and on average, a fishing trip consists of two to three men fishing for approximately five hours (SFA, 2017). Scuba diving, snorkelling and bamboo traps are the different fishing techniques practiced locally (SFA, 2017). Amongst these, snorkelling or skin diving is the most popular fishing method, whereby fishers use snorkelling gears and underwater flashlight to extract lobsters from crevices. Scuba diving and bamboo traps fishing methods are used on a lesser extent and account for a small percentage of the catch.

In Seychelles, the spiny lobster fishery is licensed and seasonally managed, whereby fishers are required to apply for licences prior to the opening of the fishing season. Currently, the management regulations implemented for the spiny lobster fishery are as follows:

- I. Restrictions on the number of licences**
- 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**

Additionally, the licence conditions also specify that logbooks and sale receipts be maintained and submitted. A copy of the new amended licence conditions is listed in **Appendix 1**. The management measures provide a degree of input control. However, there are no output controls (such as Total Allowable Catches (TACs)) in place to limit the total catches.



Since 1992, a monitoring programme for the spiny lobster fishery was established by the SFA (Mees, 1992). From there onwards, reports have been produced at the end of each season outlining several aspects of the fishery including research and management.

The 2021/2022 lobster fishing season was opened for a period of two months only as from the 17th of December 2021 to the 16th of February 2022. A compliance bond of SCR5000 was maintained to ensure that licence holders submitted their logbooks at the end of the fishing season. A total of sixteen fishing licences were on offer to fishermen. A total of 16 fishermen applied and was subsequently issued a licence, of which 10 was from Mahé, 5 from Praslin and 1 from La Digue. In comparison, for the 2020/2021 season, the number of licensees were, 13 from Mahé, 2 from Praslin and 1 from La Digue. This report presents analyses of fisheries-dependent data collected for the spiny lobster fishery during the 2021/2022 fishing season. It also compares the stock indicators, namely the size structure of lobsters and the harvest rate between the 2019/2020, 2020/2021 and 2021/2022 fishing seasons.



2. Methodology.

2.1 Sampling procedures.

During the 2021/2022 season data was collected from fishermen operating Mahé, Praslin and La Digue through three different sources:

- a) **Fisher Catch and Effort log (FCEL):** Each licenced fisherman was given a logbook to record information on their fishing activities (**Appendix 2**). Information collected included information on catch, effort, and fishing sites.
- b) **Sampled Catch and Effort log (SCEL):** SFA technicians sampled the landed catch directly whenever possible. Information on the species caught, weight and length measures were collected (**Appendix 3**). Interviews were also conducted to determine total effort and fishing sites.
- 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.

2.2 Data analysis.

Information collected from the FCEL and the SCEL were crosschecked to determine the number of lobsters not sampled for each fishing trip. The average weight for each species was derived from the total weight and total number of lobsters (per species) recorded from the SCEL ^(a). The weight of lobsters not sampled for each fishing trip was estimated by raising the average weight of each species to the total number of that species caught ^(b). The total catch of lobsters ^(c) for the 2020/2021 season was derived from the sum of weights of lobsters from the SCEL and the total sum of the raised weight of lobsters not sampled (SFA, 2017).

$$a) \text{ Average weight} = \sum \text{total} \frac{\text{Weight (kg)}}{\mathcal{N}^0 \text{ of Lobster (per species)}}$$

$$b) \text{ Raised Weight} = \text{average weight} * \mathcal{N}^0 \text{ of lobsters (per species)}$$

$$c) \text{ Catch (kg)} = \sum \text{of weight sampled catch effort log} + \text{raised weight of lobsters not sampled}$$



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^(e). The catch, effort, CPUE and species composition was calculated for the main fishing sites groupings.

$$e) CPUE = \sum total \frac{Catch (kg)}{Fishing Effort (N^o of trips)}$$

The length frequency (carapace length (CL)) distributions of males and females for the different lobster species sampled in 2021/2022 was compared with distributions of lobsters sampled in the previous seasons (2019/2020 and 2020/2021), 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 verified 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.

For the 2021/2022 lobster fishing season, a total catch of 2.05 Metric Tonnes (MT) was recorded, compared to 6.14 MT in 2020/2021 and 5.42 MT in 2019/2020 season, representing a 67% and 62% decrease, respectively. The 2021/2022 catch was 52% lower than the historical mean of 4.24 MT (**Figure 1**). The predominant fishing method used to capture lobster was snorkelling which accounted for 99% of the total catch. **N.B.** The data displayed for the 2020/2021 season, accommodates the 1-month extension period.

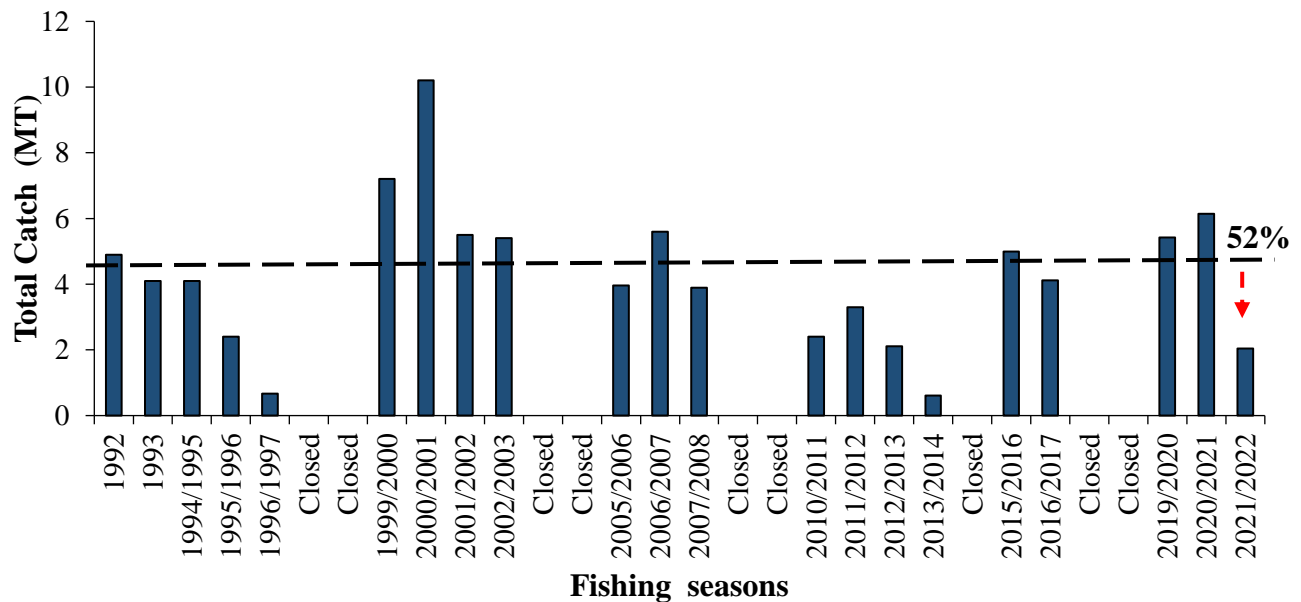


Figure 1: Spiny lobster historical seasonal catch (metric tonnes) from 1992 to 2022. Dashed black line of 4.24 MT indicates mean seasonal catch since the monitoring began in 1992.

Fishing activities were predominantly around the region of Mahé. The landed catch for 2021/2022 was 1294.4 kg (1.29 MT; **Figure 2**), representing 63% of the total catch compared to 48% in 2020/2021 and 75% in 2019/2020 seasons. The second most dominant fishing site was Frigate/Recif with a total catch of 210 kg representing 10%, followed by 185.7 kg from ‘Other’ sites and Praslin accounting for 9% of the total catch each. Minor fishing sites comprised of North

Island (97.5 kg), The Sisters/Felicite (62.1 kg) and Praslin Ridge (16.8 kg) collectively representing 9% of the total catch (**Figure 3**).

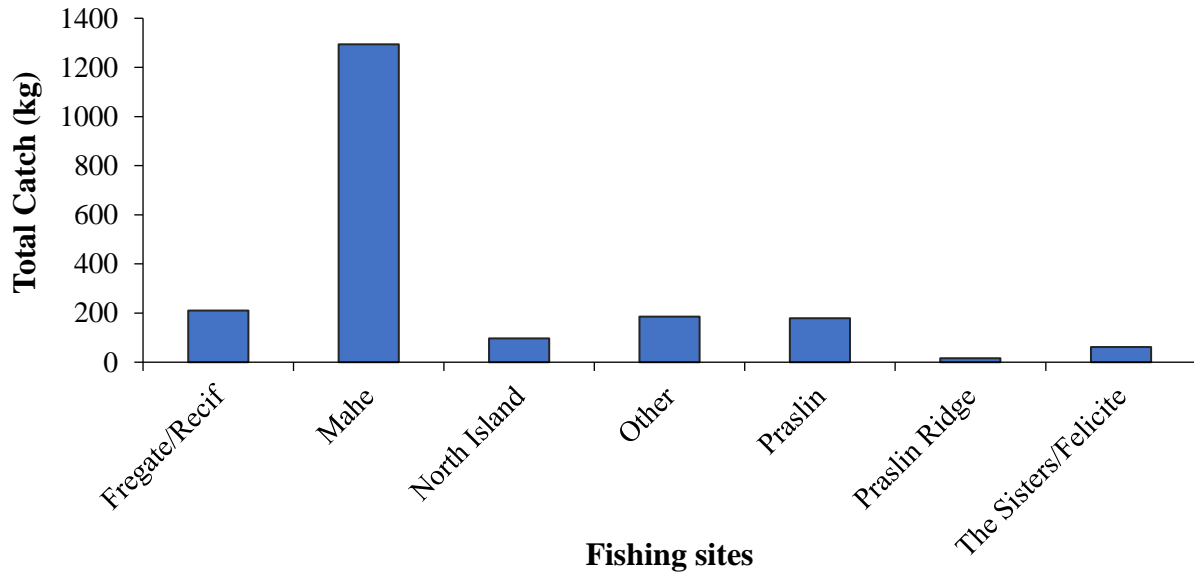


Figure 2: Total Catch (kg) by major fishing sites for the 2021/2022 fishing season.

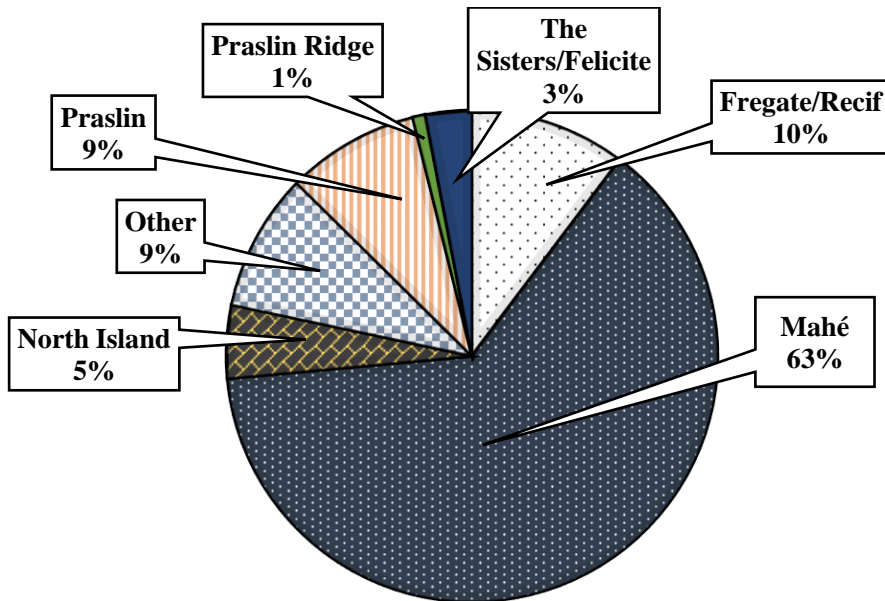


Figure 3: Total catch in percentage by major fishing sites for the 2021/2022 fishing season.

A total of 103 (mostly dominated on Mahé (72 trips)) fishing trips were recorded during the 2021/2022 season (**Figure 4**), compared to 242 trips in 2020/2021 and 196 trips in 2019/2020, representing a decrease of 57% and 47% respectively (**Figure 5**).

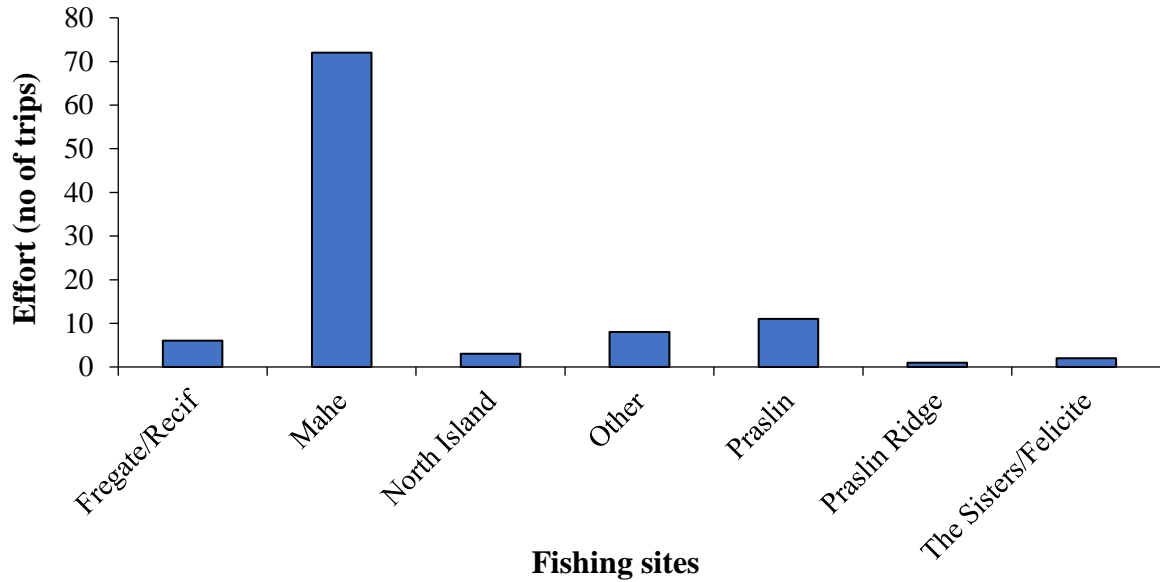


Figure 4: Fishing effort (no. of trips) by major fishing sites for the 2021/2022 fishing season.

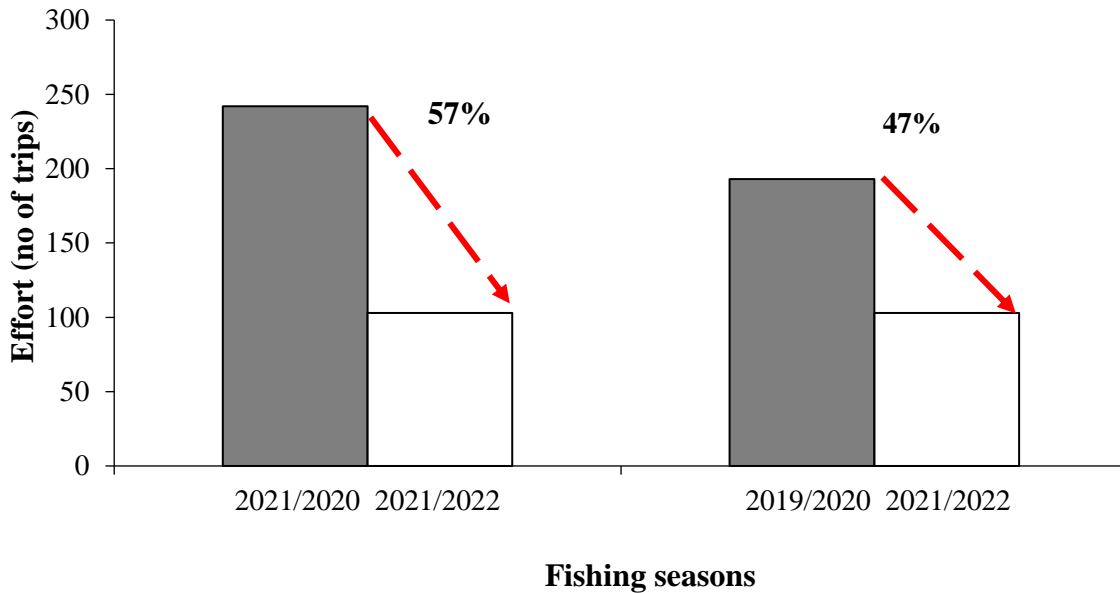


Figure 5: Comparisons of fishing efforts (no. of trips) between the recent and previous fishing seasons. Red dashed arrow highlights the increase in number of efforts.

The overall CPUE for the 2021/2022 season was 19.9 kg/trip compared to 25 and 28 kg/trip in the 2020/2021 and 2019/2020 seasons respectively (**Figure 6**). This represents a decline of 22% and 28% in 2020/2021 and 2019/2020 season, respectively. In 2020/2021 season the CPUE was 5% above the historical mean of 18.9 MT.

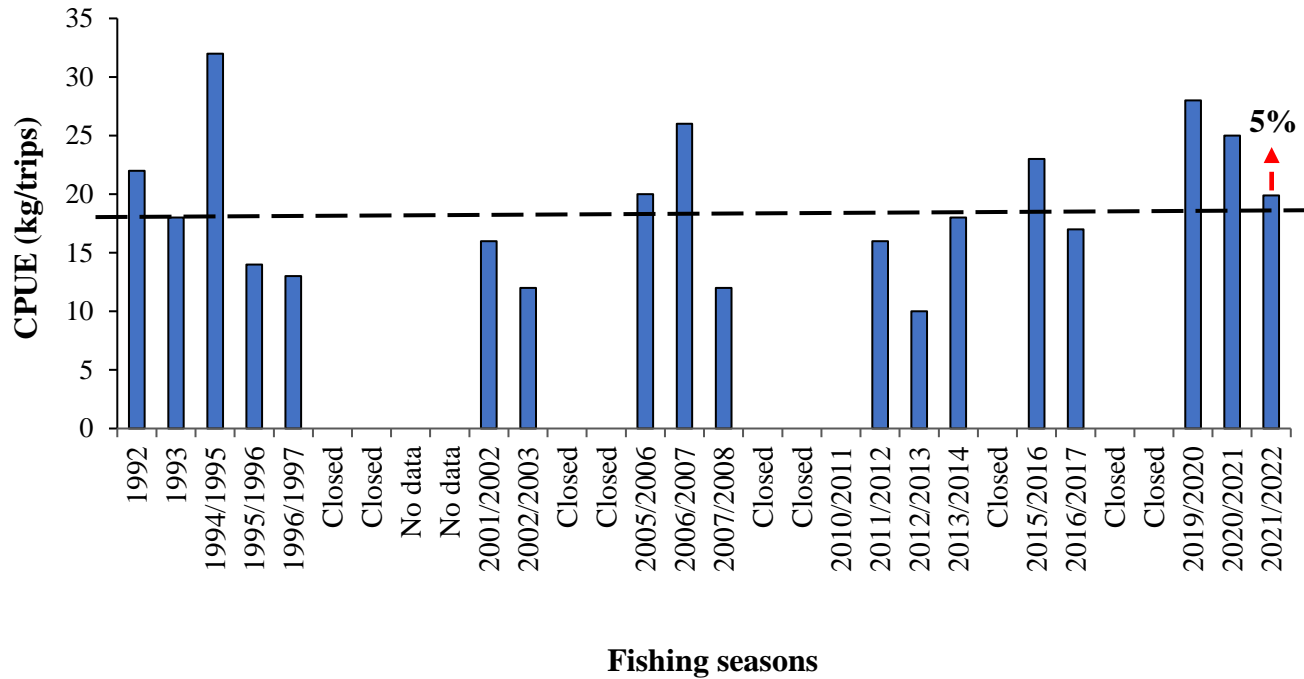


Figure 6: Seasonal CPUE (kg/trip) for open seasons of the lobster fishery between 1992 and 2022. The red dashed line highlights the CPUE increase from the historical mean of 18.9 MT represented by the dashed black line. N.B. Due to unavailable data for two open seasons and underreporting for 2010/2011 season, the CPUE was not calculated.

By fishing location, the highest CPUEs were recorded at Fregate/Recif, North Island and The Sisters/Felicite with a catch rate of 35, 33 and 31 kg/trip, respectively. The lowest catch rates were observed around Mahé (18 kg/trip), Praslin Ridge (17 kg/trip) and Praslin (16 kg/trip) (**Figure 7**).

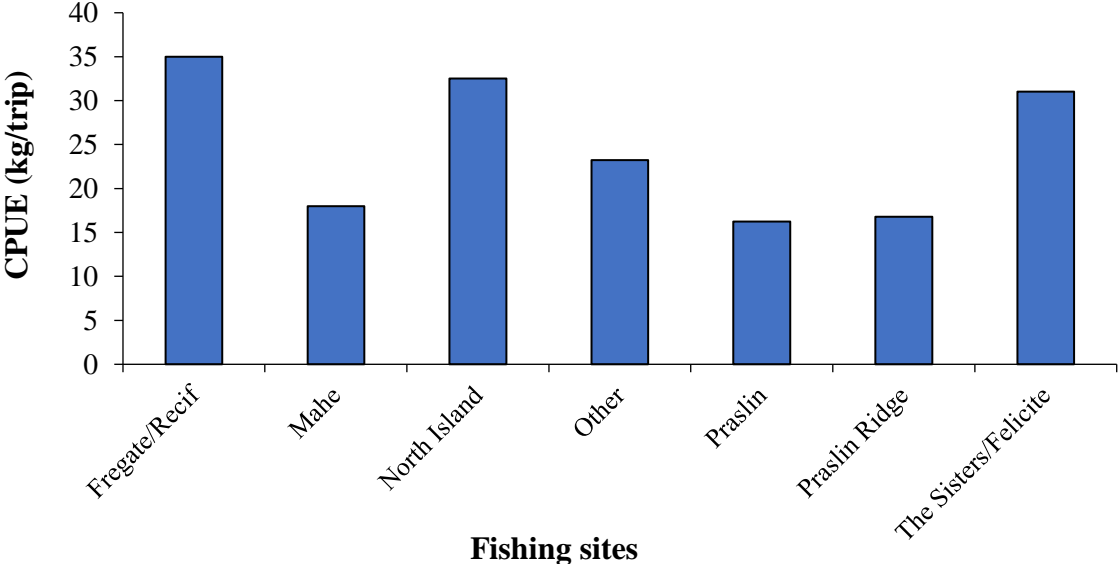


Figure 7: Catch per unit effort (CPUE) (kg/trip) for the 2021/2022 season at the major fishing sites.

3.2. Species catch composition.

The catch composition for the main targeted species was dominated by *P. penicillatus*. A total of 1501.9 kg (1.50 MT) of *P. penicillatus* was caught compared to 4849 kg (4.85 MT) in 2020/2021 and 4535 kg (4.53 MT) in 2019/2020. *P. longipes* remained the second most dominant species, accounting for 505.9 kg of the catch compared to 1031 kg and 806 kg caught in 2020/2021 and 2019/2020 respectively. *P. versicolor* remained the third dominant species comprising of 37.4 kg compared to 253 kg and 78 kg caught in 2020/2021 and 2019/2020. The last season did not record any catch of *P. ornatus* (Figure 8). Species compositions between fishing sites were mostly dominated by *P. penicillatus* except for Praslin where *P. longipes* was more abundant (Figure 9).

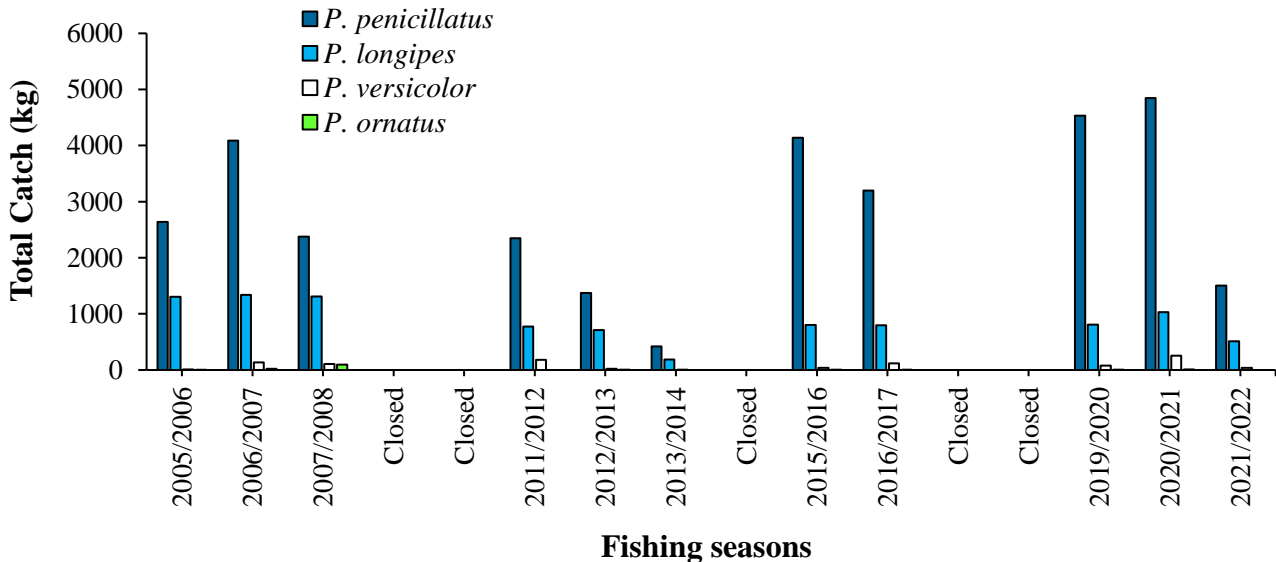


Figure 8: Species catch (kg) composition over the 16-year period from 2005/2006 to 2021/2022.

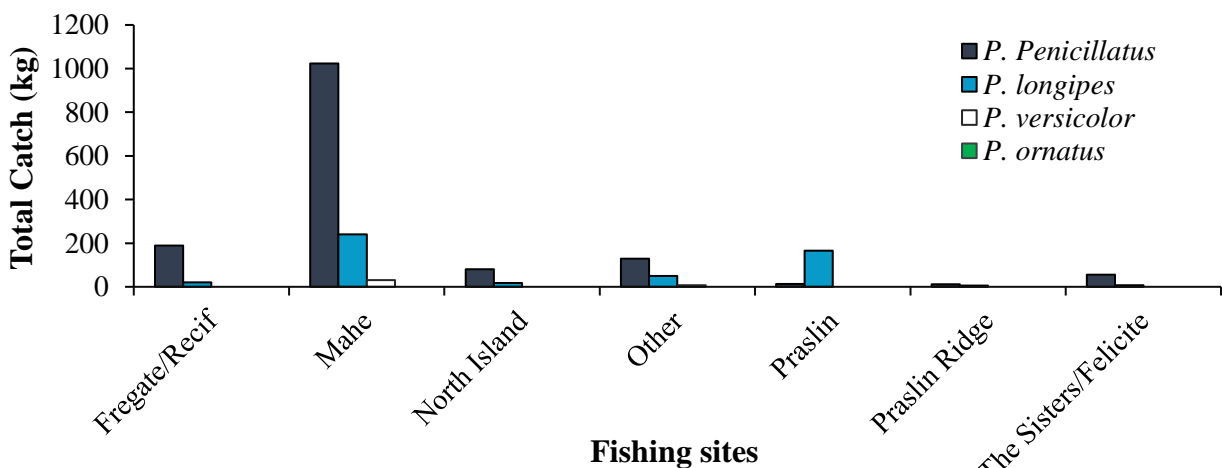


Figure 9: Total catch (kg) by major fishing sites for the 2020/2021 fishing season.

3.3 Size frequency distribution.

A total of 2300 spiny lobsters were sampled for carapace length (CL) and sexed during the 2021/2022 season compared to 6298 in 2020/2021 and 5618 in 2019/2020. This represents a sampling coverage of about 89% of fishing activities for the 2021/2022 season. In comparison, in 2020/2021 and 2019/2020 the sampling coverage was 87% and 94% respectively. Sampling was conducted primarily on Mahé, whilst only one sampling trip was conducted on Praslin and La Digue, due to restrictions imposed on travelling to the inner islands during the Covid 19 pandemic. On average, males dominated females in the samples with a ratio of 1:0.45 (**Table 1**).

Table 1: Size frequency samples per species for the last 3 open season.

Season	Species	F	M	Total
2019/2020	<i>P. penicillatus</i>	1660	2782	4442
	<i>P. longipes</i>	386	711	1097
	<i>P. versicolor</i>	33	44	77
	<i>P.ornatus</i>	2	0	2
2020/2021	<i>P. penicillatus</i>	2346	2401	4747
	<i>P. longipes</i>	574	774	1348
	<i>P. versicolor</i>	128	73	201
	<i>P.ornatus</i>	0	2	2
2021/2022	<i>P. penicillatus</i>	509	1168	1677
	<i>P. longipes</i>	178	409	587
	<i>P. versicolor</i>	21	15	36
	<i>P.ornatus</i>	0	0	0

3.3.1 *Panulirus penicillatus*.

The relative size frequency distributions of males and females *P. penicillatus* sampled over the last three fishing seasons are shown in **(Figure 10)**. The relative strength of larger size classes (12.5 – 14.0 cm CL) for males decreased in 2021/2022 compared to previous two seasons. Similarly, for females the relative strength of size classes between 8.5-10.0 cm CL decreased.

3.3.1.1 Females.

Females *P. penicillatus* sampled during the 2021/2022 season had CL ranging from 7.4 to 15.3 cm, with a mode of 11 cm and a median of 9.3 cm. For the 2020/2021 season, females CL ranged from 6.8 to 13.8 cm, with a mode of 10.2 cm and a median of 9.3 cm. Whilst in 2019/2020 season, females CL ranged from 6.3 to 13.5 cm, with a mode at 8.6 cm, and a median of 8.9 cm **(Figure 11)**. The CL average size was 9.2 cm in 2021/2022 and 9.4 cm 2020/2021 and 9.1 cm in 2019/2020 **(Figure 12)**. There was significance difference ($p < 0.05$) amongst the females CL average size between the three fishing seasons¹. The females CL in 2021/2022 was significantly larger than in 2019/2022, whereas the CL size remained constant between 2021/2022 and 2020/2021 **(Table 2 Appendix 4)**. During the 2021/2022 season, 2.6 % of females were undersize (< 7.5 cm) whilst in 2020/2021 and 2019/2020, the proportion was 1.2% and 1.4% respectively.

3.3.1.2 Males.

Males *P. Penicillatus* sampled during the 2021/2022 season had CL ranging from 7.12 to 19.35 cm, with a mode at 11.9 cm and a median of 10.4 cm. For the 2020/2021 season, males CL sampled ranged from 6.5 to 17 cm, with a mode at 8.4 cm, and median of 10.9 cm. Whilst in 2019/2020 season, males CL sampled ranged from 7.1 to 16.7 cm, with a mode of 10.6 cm, and a median of 11.8 cm **(Figure 11)**. The CL average size shows a slight declining trend from 2019/2020 (11.6 cm CL) to 2021/2022 (10.7 cm CL) **(Figure 12)**. However, there was a significant difference ($P < 0.05$) amongst the males CL average size between the three fishing seasons². The male CL was significantly smaller compared to the previous fishing season **(Table 3 Appendix 4)**. During the

¹ Kruskal-Wallis test: ($\chi^2_{(2)} = 12540, p < 0.05$)

² Kruskal-Wallis test: ($\chi^2_{(2)} = 23658, p < 0.05$)



2021/2022 season 0.26% of males were undersized (< 7.5 cm) whilst in 2020/2021 and 2019/2020, the proportion was 2.3% and 7% respectively.

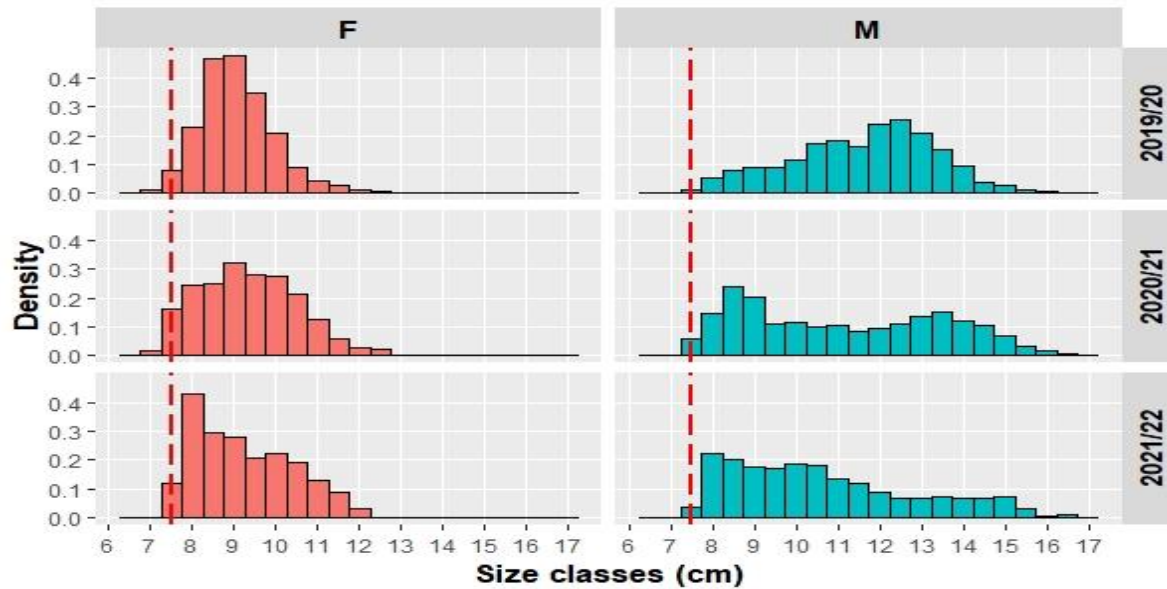


Figure 10: Size frequency distribution of female and male *P. penicillatus* over the last 3 open seasons. Density represents the proportion of counts of each size class. The minimum size limit of 7.5 cm (CL) is highlighted by the dashed redline.

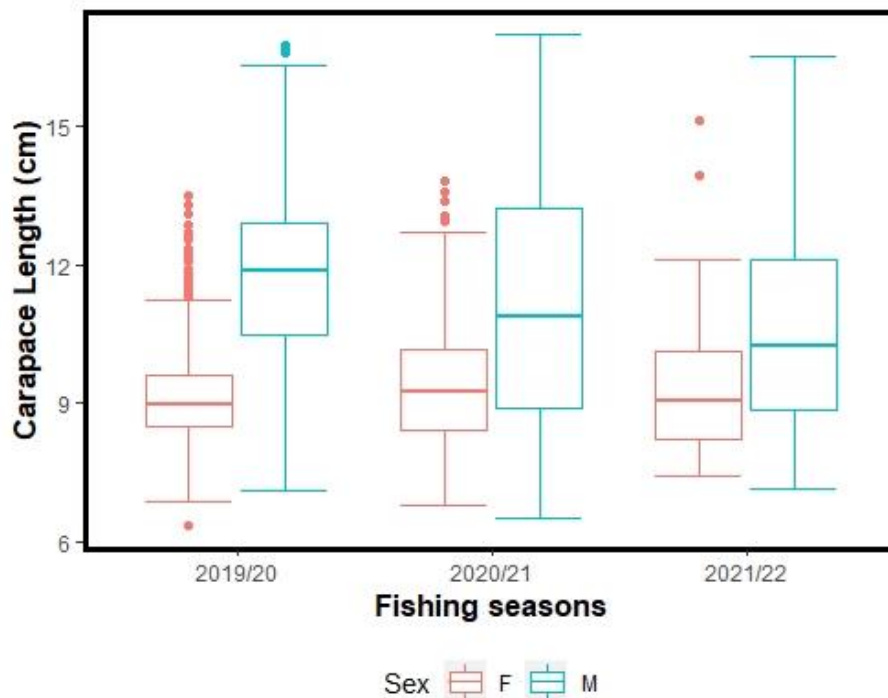


Figure 11: Box plot of the size distribution of female and male *P. penicillatus* for the three fishing seasons.

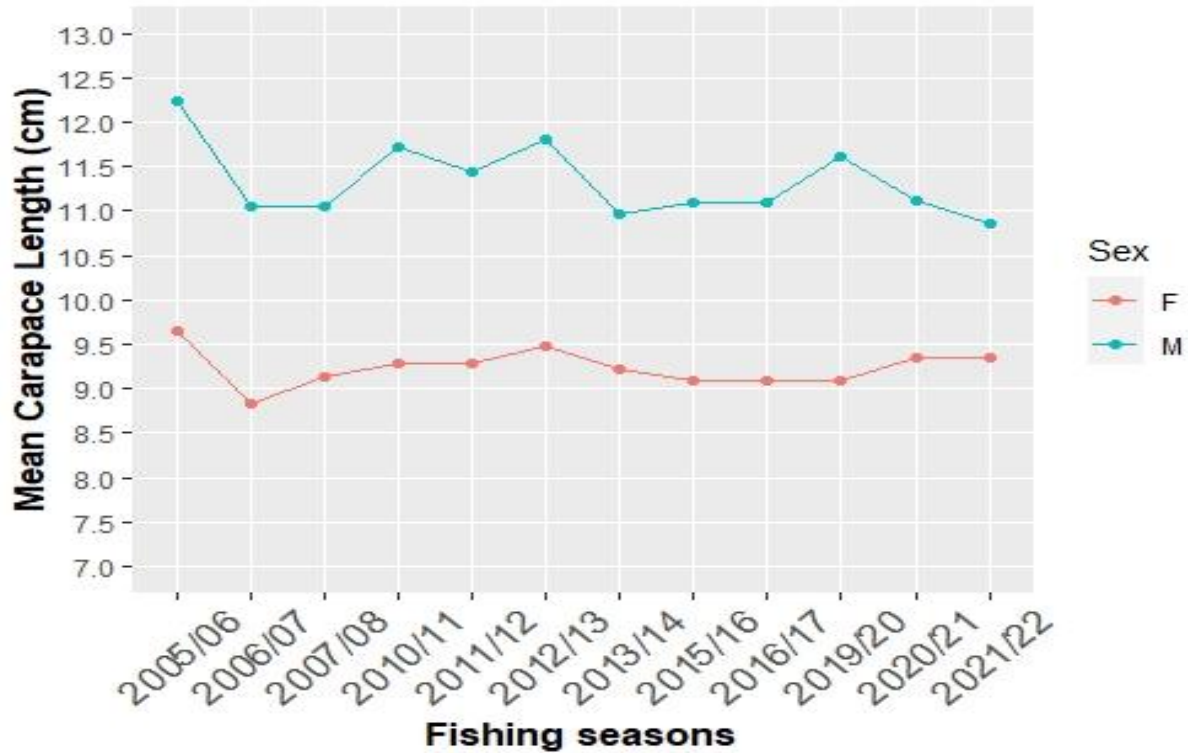


Figure 12: Average sizes of *P. penicillatus* caught during the fishing season between sexes (M= males and F= females) from 2005 to 2022.

3.3.2 *Panulirus longipes*.

The relative size frequency distributions of males and females *P. longipes* sampled over the last three fishing seasons are shown in **(Figure 13)**. The size frequency distribution for both male and females show a similar pattern over the last two fishing season.

3.3.2.1 Females.

Females *P. longipes* sampled during the 2021/2022 season had CL ranging from 7.1 to 9.3 cm CL, with a mode at 7.8 cm CL, and a median of 7.9 cm CL. For the 2020/2021 season, female CL ranging from 6.2 to 9.4 cm CL, with a mode at 7.8 cm CL, and a median of 7.9 cm CL. Whilst in 2019/2020, females CL ranged from 6.0 to 9.9 cm CL, with a mode at 7.7 cm CL, and a median of 7.8 cm CL **(Figure 14)**. The CL average size was relatively similar over the last 3 seasons at 8.1 cm in 2021/2022, 8 cm in 2020/2021 and 7.9 cm in 2019/2020 **(Figure 15)**. There was a significant difference ($p < 0.05$) amongst the females CL average size between the three fishing

seasons³. The female CL in 2021/2022 was significantly larger than in 2019/2020 only (**Table 3 Appendix 4**). During the 2021/2022 season, 3% females were undersized (< 7.5 cm) whilst in 2020/2021 and 2019/2020, the proportion was 8% and 22% respectively.

3.3.2.2 Males.

Males *P. longipes* sampled during the 2021/2022 season had CL ranging from 6.7 cm CL to 11.4 cm CL, with a mode at 8.8 cm CL and a median of 8.7 cm CL. For the 2020/2021 season, males CL sampled ranged from 6.4 to 10.7 cm CL, with a mode 8.8 cm CL and a median of 8.7 cm CL. Whilst in 2019/2020, males CL sampled ranged from 6 to 11.5 cm CL, with a mode 9.6 cm CL, and a median of 8.8 cm CL (Figure 14). The CL average size was 8.7 cm in 2021/2022, similarly to 2020/2021 and 8.8 cm in 2019/2020 (Figure 15). Male sampled in 2021/2022 had no significant differences ($p > 0.05$) compared to 2020/2021 and 2019/2021⁴. The male CL remain constant (Table 5 Appendix 4). During the 2021/2022 season, 1% of males were undersized (< 7.5 cm) whilst 2020/2021 and 2019/2020, the proportion was 2.3% and 7% respectively.

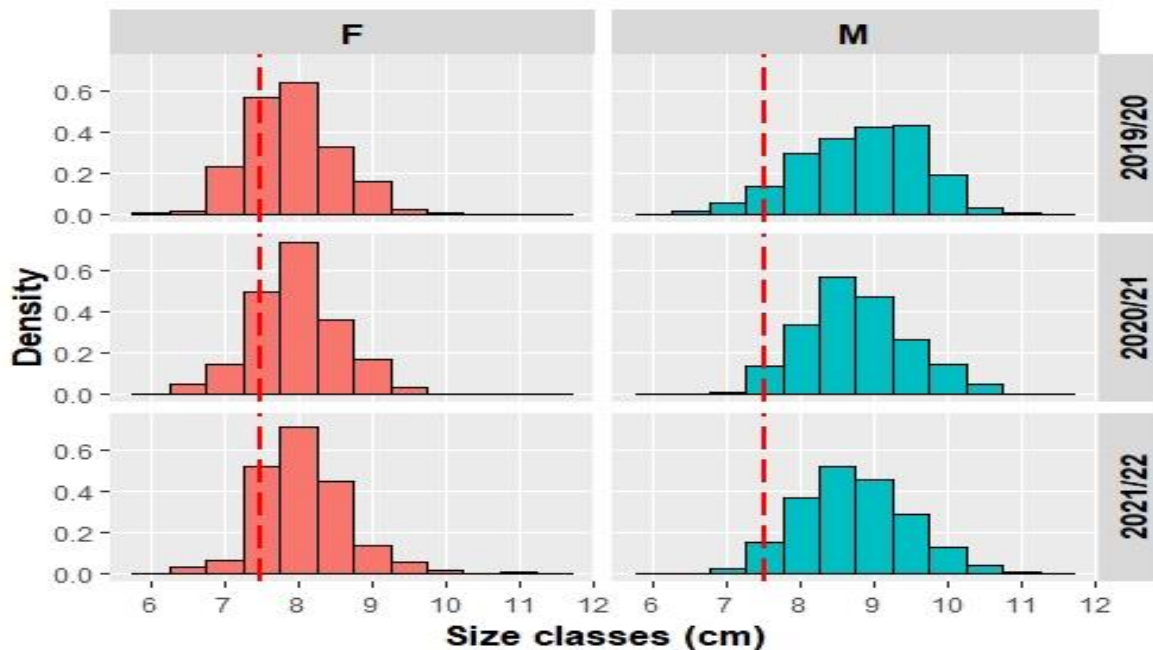


Figure 13: Size frequency distribution of female and male *P. longipes* over the last 3 open seasons. Density represents proportion of counts in each size classes whilst the minimum size limit of 7.5 cm is illustrated by the dashed redline.

³ Kruskal-Wallis test: ($\chi^2_{(2)} = 3265, p < 0.05$)

⁴ Kruskal-Wallis test: ($\chi^2_{(2)} = 4505.8, p < 0.05$)

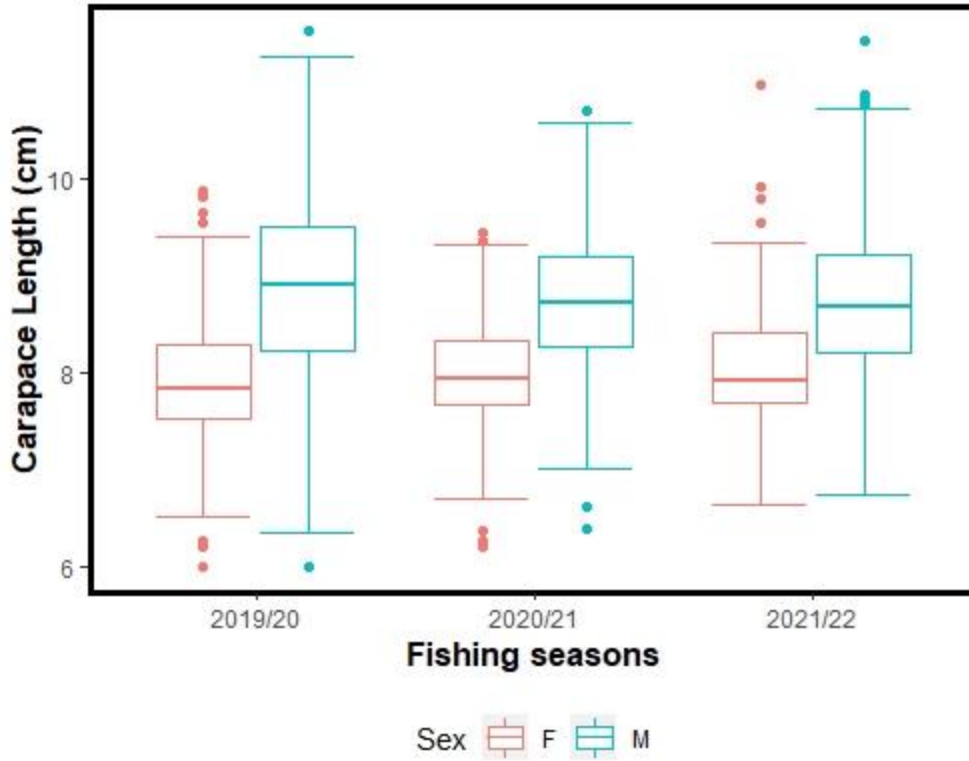


Figure 14: Box plot of the size distribution of female and male *P. longipes* for the three fishing seasons.

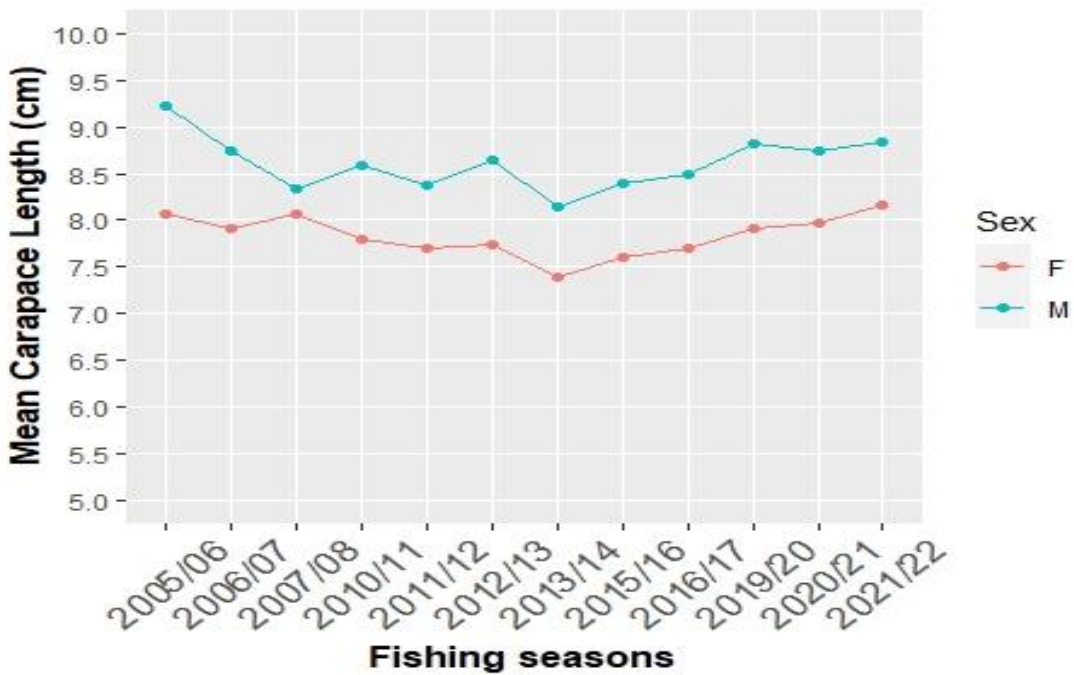


Figure 15: Average sizes of *P. longipes* caught during the fishing season between sexes (M=males and F=females) from 2005 to 2022.

4. Discussion

The 2021/2022 lobster fishing season was opened for a period of only two months compared to the typical three-month duration. The shorter season duration was recommended as a measure to reduce the fishing pressure on the stocks, as the 2021 fisheries independent surveys had showed a decline in various stock indicators. A total of 16 licenses were issued, however, five fishers failed to utilise their license.

A decrease in both fishing trips and total catch was observed compared to the previous fishing seasons. The total catch in 2021/2022 was the third lowest catch recorded since 1992. A decline of 67% and 62% in catches was observed in comparison to the 2020/2021 and 2019/2020 seasons, respectively. However, it is important to note that the duration of the 2020/2021 season was four months (following a one-month extension) and that of the 2019/2020 season was three months compared to the two-month duration of the most recent season. The season length may be a contributing factor to the decline in both total catch and number of fishing trips.

The CPUE, which is a measure of the relative abundance of lobsters, declined by 22% and 28% compared to the 2020/2021 and 2019/2020 fishing season, respectively. The decline may potentially be because of the continued fishing pressure, considering that the lobster fishery has been opened for three consecutive years. It is probable the stock is incapable to replenish in time to replace individuals being taken out by the fishery. In the past, a noticeable rise in CPUE was observed following a 2-year closure of the fishery to allow the stock to replenish.

A slight decrease of average size for male *P. penicillatus* compared to the previous season was observed, however female *P. penicillatus* remained constant throughout both seasons. On the other hand, a slight increase was observed in both female and male *P. longipes* mean size this season compared to 2020/2021. Species composition remained constant over the recent seasons with *P. penicillatus* dominating majority of the fishing sites except for Praslin, *P. longipes* was far more common compared to other sites.

In general, a noticeable decrease in number of undersize lobsters was observed, only 39 undersized lobsters were recorded, representing 1.7% of the total lobsters sampled. Similarly, to previous seasons, *P. longipes* dominated the undersize representing 99% of undersized lobsters. The

decline is due to the increased awareness of fishers on the need to respect the regulations in place and the improved monitoring, control, and surveillance (MCS) efforts this season.

Although efforts were made to improve monitoring, control, and surveillance, reports of illegal fishing were brought forth on multiple occasions by licensed fishers. More monitoring patrol should be conducted regularly, especially around Praslin and La Digue to ensure that fishers are complying with the current regulations. It is imperative that an extensive and effective monitoring plan is enforced. This will ensure compliance from licensed and unlicensed lobster fishers during open and closed season and mitigate stock exhaustion. Unregulated fishing poses a significant menace to the lobster stock as it deprives smaller individuals the chance to replenish the population.

The Research Section implemented an effective sampling programme during the lobster season, however, the sampling coverage on Praslin and La Digue was quite poor given the limited staff and the restrictions imposed on travel to the inner islands due to the Covid 19 pandemic.

Similarly, to most fishing seasons, many fishers complained about unfavourable weather conditions which affected their fishing activities during this period. However, a few fishers often take the risks to go out fishing during the bad weather. Such risks often lead to low catches which contributes to the decline in CPUE.

The accuracy of the data presented in this report is highly dependent on the reliability and cooperation received from the licensed fishers. Generally, despite logbooks being submitted, several issues regarding data reporting were identified. These included inconsistency in recording (1) fishing date, (2) effort number and (3) under reporting of total catch per trip.

Overall, data collected during the 2021/2022 season indicates that there was a decrease in the relative abundance of lobsters (CPUE), most probably attributed to lobster fishery being open for three consecutive seasons. The reported CPUE is considerably lower compared to the previous season, thus showing signs that the lobster abundance is reducing. This will be confirmed following the upcoming 2022 fisheries independent survey (PLMP) which will be compared with historical data ranging from 2013 to 2022. This process will effectively allow us to determine the status of the lobster stocks, and relay appropriate feedback to Fisheries Management. Fisheries Management will then make decision to either open or halt the 2022/2023 fishing season.

6. References

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SFA, (2021). Report on the spiny lobster fishery: Summary of Fishing activity for the 2016-2017 season. Seychelles: Seychelles Fishing Authority, pp. 1-10. SFA/R&D/080.

7. Appendices

Appendix 1

Lobster fishery license terms and condition during open season.

Conditions of this license

1. A COMPLIANCE BOND OF SR5000 WILL BE PAID TO SFA AS A DEPOSIT PRIOR TO ISSUANCE OF THE LICENCE. THE SFA SHALL WITHHOLD THE COMPLIANCE BOND IN THE EVENT OF SUSPECTED NON-COMPLIANCE TO THESE CONDITIONS, THE FISHERIES REGULATIONS AND THE FISHERIES ACT.
2. THE LICENSEE SHOULD FILL IN THE LOGBOOK CORRECTLY, WITH A MARGIN OF ERROR OF +/-10 UNITS AND SHALL SUBMIT TO THE SFA FORTNIGHTLY, FOR THE LENGTH OF THE FISHING SEASON. ALL COMPLETED LOGBOOKS SHALL BE SUBMITTED TO THE SFA WITHIN ONE WEEK AFTER CLOSURE OF THE LOBSTER FISHING SEASON.
3. THE HOLDER OF THE LICENCE SHALL NOT AT ANY TIME FISH FOR, CATCH, OR KILL HOMARD IN A PROTECTED AREA.
4. THE HOLDER OF THE LICENCE SHALL NOT FISH FOR, CATCH OR KILL HOMARD WHICH IS LESS THAN 7.5 CM IN LENGTH MEASURED FROM THE EYE SOCKET ALONG A LINE PARALEL TO THE CENTRE LINE OF THE BODY SHELL (CARAPACE) OF THE HOMARD.
5. THE HOLDER OF THE LICENCE SHALL NOT FISH, CATCH, KILL, SELL OR BE IN POSSESSION OF A HOMARD IN THE BERRIED STATE.
6. THE HOLDER OF THE LICENCE SHALL PROVIDE ACCESS TO THE SFA FISHERIES RESEARCH TECHNICIANS TO ALL CATCHES, AND PROVIDE ALL REASONABLE ASSISTANCE IN THE COLLECTION OF ALL FISHERIES RELATED DATA (i.e. INFORMATION RELATING TO FISHING LOCATION etc..)
7. THE HOLDER OF THE LICENSE SHALL COMPLETE AND PROVIDE A SALES RECEIPT FOR ALL SALE OF LOBSTERS. THE HOLDER OF THE LICENSE SHALL PROVIDE THE SFA WITH A COPY OF THE RECEIPT BOOK AT THE CLOSURE OF THE LOBSTER SEASON.
8. THE HOLDER OF THE LICENSE SHALL NOTIFY THE SFA OF THE NAME OF THE VESSEL(IF APPLICABLE) THAT IS BEING USED FOR THE PURPOSES OF LOBSTER FISHING, AS WELL AS THE FOLLOWING DETAILS OF THE CREW ONBOARD
 - a. NAME AND SURNAME
 - b. NATIONAL IDENTIFICATION NUMBER
9. IT SHALL BE THE RESPONSIBILITY OF THE LICENSE HOLDER TO INFORM THE SFA ON ANY CHANGES THEREOF.
10. THE LICENSE HOLDER SHALL SUBMIT A COLOR PICTURE OF FISHING VESSEL BEING NOTIFIED FOR THIS PURPOSE.
11. THE HOLDER OF THE LICENSE SHALL NOTIFY THE SFA PRIOR TO THE COMENCEMENT OF ANY FISHING TRIP, ON 2811280.
12. ALL CREW MEMBERS SHALL CARRY THEIR NATIONAL IDENTIFICATION CARD DURING FISHING TRIPS. THE NATIONAL IDENTIFICATION CARD MUST BE PRODUCED AT THE REQUEST OF AN AUTHORIZED FISHERY OFFICER, OR ANY MEMBER OF A LAW ENFORCEMENT AGENCY.

Appendix 2

Fishers Catch and Effort Logbook (FCEL).

Lobster Catch and Effort Logbook									
SFA No. :									
Date:			Name:				Landing Sites:		
Scuba & Snorkeling									
Fishing Site		Fishing Site		Fishing Site		Fishing Site		Fishing Site	
Scuba <input type="checkbox"/>	Snorkeling <input type="checkbox"/>	Scuba <input type="checkbox"/>	Snorkeling <input type="checkbox"/>	Scuba <input type="checkbox"/>	Snorkeling <input type="checkbox"/>	Scuba <input type="checkbox"/>	Snorkeling <input type="checkbox"/>	Scuba <input type="checkbox"/>	Snorkeling <input type="checkbox"/>
Time in		Time in		Time in		Time in		Time in	
Time out		Time out		Time out		Time out		Time out	
No. fishers		No. fishers		No. fishers		No. fishers		No. fishers	
Bottom Type		Bottom Type		Bottom Type		Bottom Type		Bottom Type	
Oumar Rouz	No: Kg:	Oumar Rouz	No: Kg:	Oumar Rouz	No: Kg:	Oumar Rouz	No: Kg:	Oumar Rouz	No: Kg:
Oumar Ver	No: Kg:	Oumar Ver	No: Kg:	Oumar Ver	No: Kg:	Oumar Ver	No: Kg:	Oumar Ver	No: Kg:
Grosse Tete	No: Kg:	Grosse Tete	No: Kg:	Grosse Tete	No: Kg:	Grosse Tete	No: Kg:	Grosse Tete	No: Kg:
Porcelaine	No: Kg:	Porcelaine	No: Kg:	Porcelaine	No: Kg:	Porcelaine	No: Kg:	Porcelaine	No: Kg:
Trap									
Fishing Site		Fishing Site		Fishing Site		Fishing Site		Fishing Site	
Time set		Time set		Time set		Time set		Time set	
Time Haul		Time Haul		Time Haul		Time Haul		Time Haul	
No. Traps		No. Traps		No. Traps		No. Traps		No. Traps	
Bottom Type		Bottom Type		Bottom Type		Bottom Type		Bottom Type	
Oumar Rouz	No: Kg:	Oumar Rouz	No: Kg:	Oumar Rouz	No: Kg:	Oumar Rouz	No: Kg:	Oumar Rouz	No: Kg:
Oumar Ver	No: Kg:	Oumar Ver	No: Kg:	Oumar Ver	No: Kg:	Oumar Ver	No: Kg:	Oumar Ver	No: Kg:
Grosse Tete	No: Kg:	Grosse Tete	No: Kg:	Grosse Tete	No: Kg:	Grosse Tete	No: Kg:	Grosse Tete	No: Kg:
Porcelaine	No: Kg:	Porcelaine	No: Kg:	Porcelaine	No: Kg:	Porcelaine	No: Kg:	Porcelaine	No: Kg:
Remark:									



Appendix 3

Sampling Catch and Effort Logbook (SCEL).

Lobster data collection form

Date..... Licensee Name License No.....

Landing site..... Fishing Location

Fishing Method No. Men/Trap

Time in..... Time out..... Substrate type

	Species	Sex	CL (mm)	Weight (g)	Eggs	Tar spot	Setae hair	Tag no.
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								

Comments

Measurer..... Recorder.....



Appendix 4

Pairwise comparison between fishing seasons.

Table 2: Pairwise comparisons between average carapace length of *Panulirus penicillatus* females caught in, 2021/2022, 2020/2021 and 2019/2020 fishing seasons. P values adjusted with the Bonferroni method.

Comparison Groups	P value	Significance level
2019/2020 – 2020/2021	4e-16	p < 0.05
2019/2020 - 2021/2022	0.0063	p < 0.05
2020/2021- 2021/2022	0.0716	ns

Significance level at 0.05. ns; nonsignificant difference.

Table 3: Pairwise comparisons between average carapace length of *Panulirus penicillatus* males caught in 2021/2022, 2020/2021 and 2019/2020 fishing seasons.

Comparison Groups	P value	Significance level
2019/2020 – 2020/2021	< 2.2e-16	P < 0.05
2019/2020 - 2021/2022	< 2.2e-16	P < 0.05
2020/2021- 2021/2022	< 4e-16	P < 0.05

Significance level at 0.05. ns; nonsignificant difference.

Table 4: Pairwise comparisons between average carapace length of *Panulirus longipes* females caught in 2021/2022, 2020/2021 and 2019/2020 fishing seasons.

Comparison Groups	P value	Significance level
2019/2020 - 2020/2021	0.2457	ns
2019/2020 – 2021/2022	0.0053	p < 0.05
2020/2021- 2021/2022	0.0894	ns

Significance level at 0.05. ns; nonsignificant difference.

Table 5: Pairwise comparisons between average carapace length of *Panulirus longipes* males caught in 2021/2022, 2020/2021 and 2019/2020 fishing seasons.

Comparison Groups	P value	Significance level
2019/2020 - 2020/2021	0.13	ns
2019/2020 -2021/2022	0.13	ns
2020/2021 -2021/2022	0.72	ns

Significance level at 0.05. ns; nonsignificant different.

