ISSN: 1659-7141

SEYCHELLES FISHING AUTHORITY
TECHNICAL REPORT

REPORT ON THE SPINY LOBSTER FISHERY

Lobster Survey Report 2021

P. O. Box 449 - Fishing Port - Mahe - Seychelles
Phone: (248) 4670300 - Fax: (248) 4224508
Email: management@sfa.sc

Lobster Survey Report 2021

©Roger Swainston
Source: anima.net.au/ image ID: IB0418
Species: Panulirus ornatus

SFA Fisheries Research Section

November 2021

Table of Contents

Table of Figures

List of Tables

1. Introduction.

The spiny lobster fishery has been conventionally managed by seasonal closures and limited access (license-limited) regulations implemented by the Seychelles Fishing Authority. These regulations have been in force to limit fishers primarily targeting coastal and shallow water stocks, where abundance is limited and easily accessible. In the past, assessments of fisheries dependent data have shown several significant declines in the coastal stocks when too many licenses are allocated or when the fishery remains open for 3 to 4 consecutive seasons. Consequently, the stock status is determined by assessing both fisheries dependent and independent (surveys) data. Results obtained are provided to managers with advice on whether the fishery should be opened or remain closed.

The 2020-2021 lobster fishing season was opened after opening for the 2019/2020 fishing season (**Figure 1**). In October 2021, as part of the Participatory Lobster Monitoring Programme (PLMP) a fisheries independent survey was carried out to assess stock status at 20 sites around Mahé. The aim of this paper is to present the results of the PLMP survey and to present information on several stock indicators based on the combined data collected from the survey and the 2020-2021 fishing season (**Table 1 & 2**).

Moreover, it provides several recommendations and advice to managers on both fishery and survey to decision making on whether the 2021-2022 fishing season should be opened or remain closed.

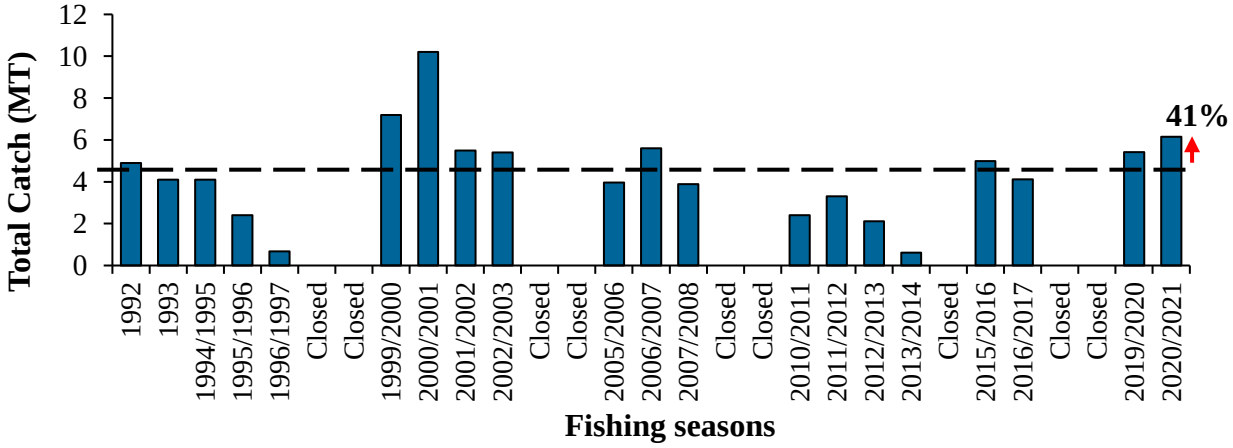

Figure 1: Overview of the catches (Metric Tonnes (MT)) from the lobster fishery from 1992 to 2021. Dashed black line of 4.4 MT indicates mean seasonal catch.

2. Fisheries independent survey (PLMP survey).

2.1. Total catch.

The total catch of lobsters for the 20 sites surveyed is shown in **Figure 2.** In, 2021, 79 kg of lobsters were caught as opposed 90.9 kg in 2020 representing a 13% decrease. The catch composition consisted of three species notably *P. penicillatus*, *Panulirus longipes and P.*

versicolor. *P. penicillatus* remains the dominant species with a total of 39 kg, followed by *P. longipes* 34 kg and *P. versicolor* 6 kg. Compared to 2020, this represents a decline of 18% and 41% for *P. penicillatus* and *P. versicolor* respectively while *Panulirus longipes* increased by 1% (**Figure 2**).

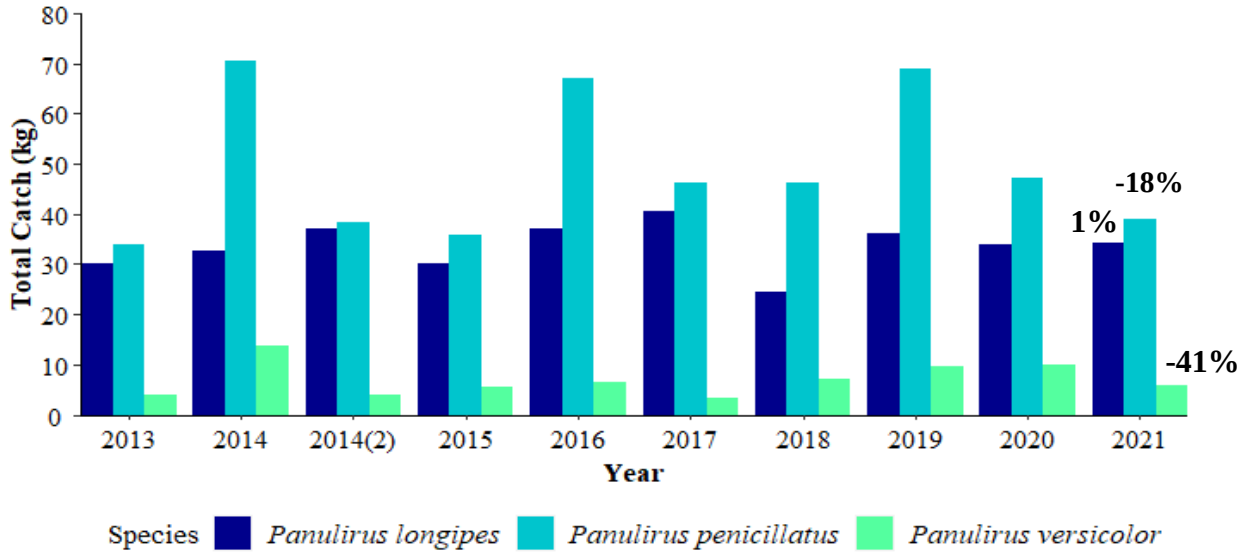

Figure 2: Total catch by species in kilograms for the twenty survey sites from 2013 to 2021.

3. Catch and effort trend indicator.

The average fishing effort and total catch (kg) cis shown in **Figure 3**. From 2020 to 2021, a decline in both the effort and total catch can be observed. An increase of 42% for both indicators was reported in 2019. Compared to 2019, 2020 reported a decline of 28% in fishing effort and 20.8% in total lobster caught. Further decline of 5% and 13% was observed for fishing effort and total catch (kg) in 2021.

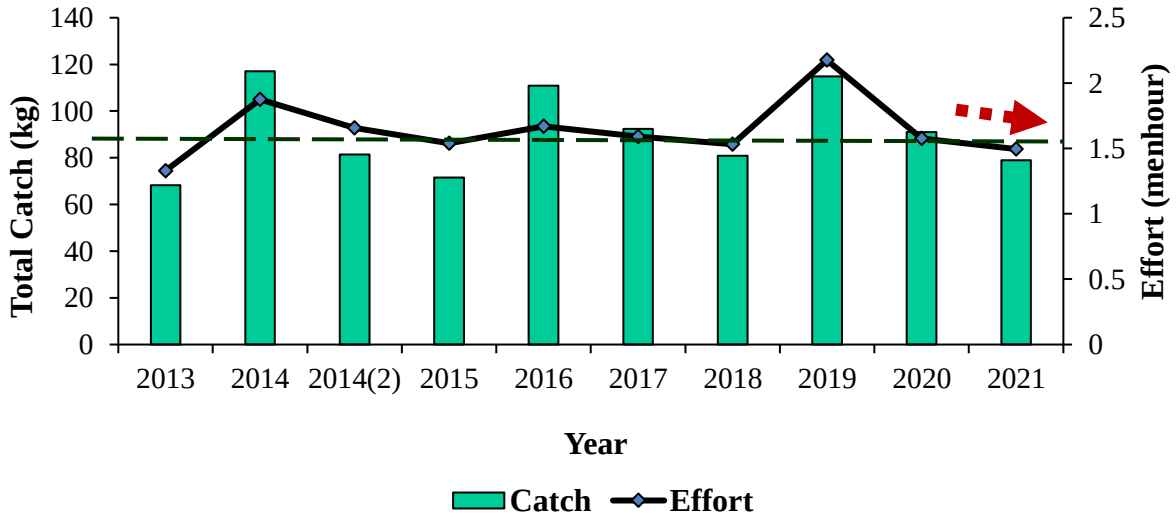

Figure 3: Average fishing effort (menhour) and total catch (kg) from 2013 to 2021. Red arrow highlights decrease in trend. Dark green dotted line of 89kg indicates long-term catch average.

4. Abundance and biomass indicators.

4.1. All lobsters caught.

The average catch per unit effort (CPUE) in kg/menhour and no/menhour* from 2013 to 2021 can be observed in **Figure 4**. In 2016, the CPUE increased by 35% (kg/menhour) and 30% (no/menhour) compared to 2015. A 25% decline was observed in the CPUE in kg/menhour whilst the CPUE in no/menhour remained relatively stable in 2017. Further declines in CPUE were observed in 2018. In 2019 a 13% increase for both measures of CPUE was recorded. Similarly, in 2020, both measures of CPUE showed an increasing trend of 7.6% (kg/menhour) and 14.6% (no/menhour). In 2021, a 10% decline was observed in the CPUE in kg/menhour whilst the CPUE in no/menhour increased by 2%. **Note: all lobster caught consisted of 51% of undersized and 49% legal size individual lobsters.**

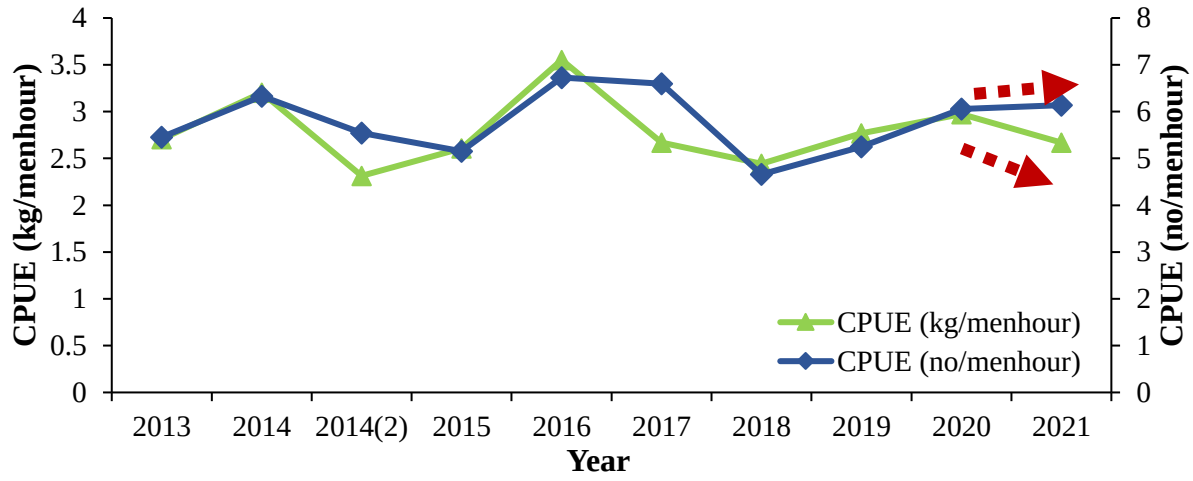

Figure 4: Average catch per unit effort at survey sites in kilogram/menhour and numbers/menhour for all lobsters caught from 2013 to 2021. Red arrow highlights change in trends.

4.2. Legal sized lobsters (>7.5 cm Carapace Length).

The average CPUE for legal sized lobsters caught varied over the survey periods. From the second survey in 2014 to 2016, an increasing trend can be observed in both measures of CPUE (**Figure 5**). In 2017, a decline of 39% (kg/menhour) and 31% (no/menhour) was observed in both measures of CPUE compared to 2016. However, 2018 CPUE data for legal sized lobsters presented an increase of 16% (kg/menhour) and 5% (no/menhour) in comparison to 2017. Further increases in CPUE was observed in 2019. A 13.2% and 8.4% increase for kg/menhour

* **menhour = transect time per site multiply by number of men (2) snorkelling.**

and no/menhour respectively, was recorded in 2020. In contrast, 2021 recorded 21% and 7% decline in both measure of CPUE respectively.

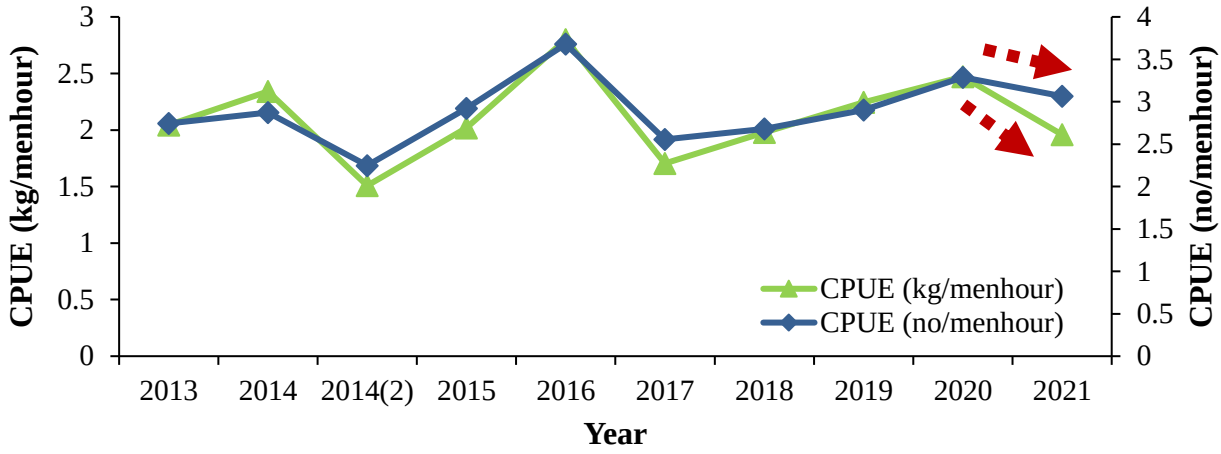

Figure 5: Average catch per unit effort for legal sized lobsters caught from 2013 to 2021. Red arrow highlights decrease in trend.

5. Length based indicators.

5.1. *P. penicillatus.*

The average sizes of *P. penicillatus* caught during the surveys are shown in **Figure 6**. A decrease in the average carapace size, by about 1 cm, can be observed for both males and females between the year 2016 and 2017. However, in 2018 females and males showed an increased average carapace size of 1.3 cm and 1.5 cm respectively. Further increase in the average carapace size of 0.3 cm and 0.8 cm for both females and males were observed respectively in 2019. In 2020, the average carapace size showed a decrease of 0.7 cm in males whilst that of females remains relatively stable. A decrease in average carapace size of 0.6 cm (7%) in females and 1.3 cm (12%) in males was observed in 2021.

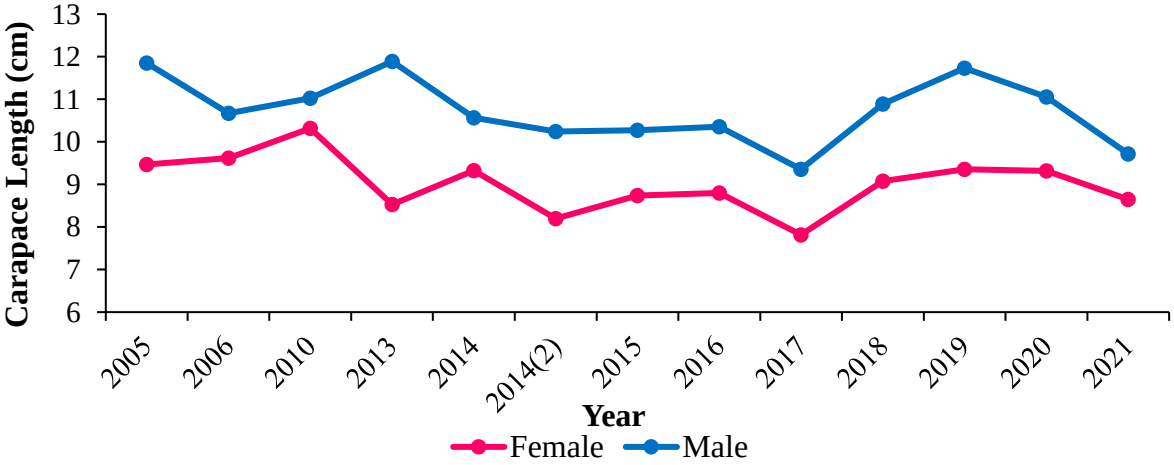

Figure 3: Average carapace sizes of *P. penicillatus* caught during the surveys between sexes from 2013 to 2021.

5.2. *P. longipes.*

Similarly, a decreasing trend was observed in the average carapace size of *P. longipes* surveyed between 2016 and 2017. However, the magnitude of the decline is minute compared to *P. penicillatus.* The average carapace size of males decreased by 0.3 cm and females decreased by 0.5 cm. In 2018, the average carapace size of males remained stable whilst that of females increased by 0.4 cm. The average carapace size increased by 0.2 cm in males and by 0.4 cm in females in 2019. Further increase was observed in average carapace size of in males by 0.3 cm, whilst that of females remains relatively stable. A decrease in average carapace size of 0.3 cm (5%) in females and 0.5 cm (6%) in males was observed in 2021 (**Figure 7**).

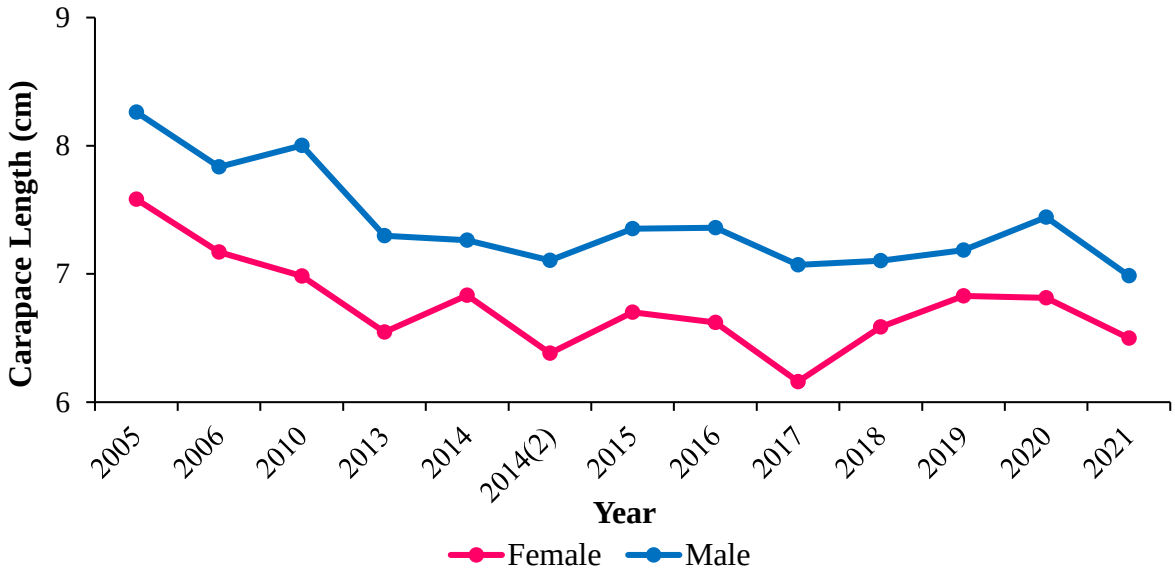

Figure 4: Average carapace sizes of *P. longipes* caught during the surveys between sexes from 2013 to 2021.

6. Lobster stock status indicators

Table 1. Summary output for lobster survey 2021.

Fishery independent indicators	2020 Survey	2021 Survey	Comments
Catch (compared to long-term average)	**90.9 kg**	**79 kg**	Catch for 2021 was lower than the long-term average of 87 kg compared to the two previous years (**Figure 3**).
Catch (compared to previous survey)	**20.8% decrease**	**13% decrease**	Catch further decreased in 2021 survey (**Figure 2**).
Effort (compared to previous season)	**28% decrease**	**5% decrease**	Effort (menhour) decreased by 82% between 2021 and 2020 survey (**Figure 3**).
CPUE kg/menhour (all lobsters compared to previous survey)	**7.6% increase**	**10% decrease**	CPUE decreased for all lobster caught in 2021 compared to the 2020 survey. However, the decrease was not statistically significant (**Figure 4**).
CPUE kg/menhour (legal size lobsters compared to previous survey)	**10% increase**	**21% decrease**	CPUE decreased for legal size lobster caught in 2021 compared to the 2020 survey. However, the decrease was not statistically significant (**Figure 5**).
CPUE no/menhour (all lobsters compared to previous survey)	**14.6% increase**	**2% increase**	CPUE increased slightly for all lobster caught between 2020 and 2021 surveys. However, the increase was not statistically significant (**Figure 4**).
CPUE no/menhour (legal size lobsters compared to previous survey)	**13.2% increase**	**7% decrease**	CPUE decreased for legal size lobster caught in 2021 survey. However, the decrease was not statistically significant (**Figure 5**).
Mean size *P. penicillatus* M (compared to previous season)	**5.7% decrease**	**12% decrease**	Male decreased in size between 2020 and 2021 surveys. However, the decrease was not statistically significant (**Figure 6**).
Mean size *P. penicillatus* F (compared to previous season)	**0.4% decrease**	**7% decrease**	Female decreased in size between 2020 and 2021 surveys. However, the decrease was not statistically significant (**Figure 6**).
Mean size *P. longipes* M (compared to previous season)	**3.6% increase**	**6% decrease**	Male decreased in size for the 2021 survey compared to the 2020 survey. However, the decrease was not statistically significant (**Figure 7**)**.**
Mean size *P. longipes* F (compared to previous season)	**0.2% decrease**	**5% decrease**	Female decreased in size between 2021 and 2020 surveys. However, the decrease was not statistically significant (**Figure 7**).

key		Indicator shows negative trend or comparison		Indicator shows positive trend or comparison		Indicator shows a stable trend

Table 2. Summary output for lobster fishing season 2020/2021.

Fishery dependent indicators	2019/2020 Season	2020/2021 Season*	Comments
Catch (compared to long-term average)	**5421 kg**	**6140 kg**	Catch was higher in 2020/2021 fishing seasons compared to the long-term average (4.4 MT) (SFA, 2021†; **Figure 4)**.
Catch (compared to previous season)	**31.6% increase**	**13% increase**	Catch increase was observed between 2020/2021 and 2019/2020 fishing seasons (SFA, 2021; **Figure 4**).
Effort (compared to previous season)	**14% decrease**	**23% increase**	Effort (no. of fishing trips) increased by 55% between 2020/2021 and 2019/2020 fishing season (SFA, 2021; **Figure 8**).
CPUE (all gears compared to long-term average)	**49.5% increase**	**35% increase**	CPUE for all gears increased significantly from the long-term mean = 18.9 kg/trip (SFA, 2021; **Figure 10**).
CPUE (all gears compared to previous season)	**59.9% increase**	**8% decrease**	CPUE for all gears decreased significantly during the 2020/2021 compared to the 2019/2020 fishing season (SFA, 2021; **Figure 10**)
CPUE (snorkelling) (compared to previous season)	**69.7% increase**	**10% decrease**	CPUE for snorkelling fishing technique decreased in 2020/2021 compared to the 2019/2020 fishing season.
CPUE (scuba‡§) (compared to previous season)			CPUE for scuba fishing technique increased significantly in 2020/2021 compared to the 2019/2020 fishing season.
Mean size *P. penicillatus* M (compared to previous season)	**4.6% increase**	**4.3% decrease**	Male size decreased with males caught in the 2020/2021 significantly smaller than in 2019/2020 fishing season (SFA, 2021; **Figure 15**).
Mean size *P. penicillatus* F (compared to previous season)	**0.02% decrease**	**3% increase**	Female size increased with female caught in 2020/2021 significantly larger than in 2019/2020 fishing season (SFA, 2021; **Figure 15**)
Mean size *P. longipes* M (compared to previous season)	**3.7% increase**	**0.9% decrease**	Male size decreased in the 2020/2021 compared to the 2019/2020 fishing season SFA, 2021; **Figure 15**).
Mean size *P. longipes* F (compared to previous season)	**2.9% increase**	**0.7% increase**	Female size increased with female caught in 2020/2021 significantly larger than in 2019/2020 fishing season (SFA, 2021; **Figure 15**).

key		Indicator shows negative trend or comparison		Indicator shows positive trend or comparison		Indicator shows a stable trend

* **The 2020/2021 fishing season was extended for another 1 month thus contributed to the increase in total catch (SFA, 2021).**

† **Seychelles Fishing Authority [SFA]., 2021. Report on the spiny lobster fishery: Summary of Fishing activity for the 2020-2021 season. Seychelles: Seychelles Fishing Authority, pp. 1-14.**

‡ **Scuba alongside snorkelling was the other method used in 2020/2021 however no comparison was made with previous fishing season (2019/2020) because snorkelling and scuba was done separately.**

§ **Scuba diving comparison was not made for 2019/2020 with previous fishing season (2016/2017) because snorkelling was the only fishing method used.**

7. Conclusion.

The overall catch of lobsters and the CPUE data for the 2021 PLMP survey indicates that the relative abundance and biomass of all lobsters caught has decreased.

In addition, a decreasing trend was also observed in the relative abundance and biomass of legal-size lobsters (more than 7.5 cm carapace length). However, one noticeable indicator during the 2021 survey was undersized lobsters sampled were slightly more compared to legal size lobsters. This suggest if enough recovery time is given for the undersized lobsters to reach legal size required, it will be beneficial for the next fishing season (2022/2023) depending on results after the 2022 PLMP survey. Similarly, despite the total catch remaining above the historical mean for the 2020/2021 fishing season, the CPUE data indicates a decrease in the relative abundance of lobsters. It is worth mentioning that the fishery was extended for 1 more month due to low catch and effort analysis conducted 15 days prior to fishery closure.

In terms of fishing effort measured in menhour, further indicate a decrease which may suggest the stock could potentially be under pressure and has not had time to recover since the catch is lower than the previous survey.

As for the size indicators, a slight decrease was observed in the average size of males *P. penicillatus*, however this decrease is not statistically significant when compared with lobster average size in 2019 PLMP survey. The average size of females *P. penicillatus* and *P. longipes* (F and M) were relatively stable. The size indicators from the fishery indicates significant increases in the average size of *P. penicillatus* (M) and *P. longipes* (F and M).

The decline observed across all indicators could mostly be attributed to the lobster fishery being opened for two consecutive fishing seasons coupled with suspected illegal fishing. As a result, it is likely that the stock is unable to reproduce or mature faster to replenish individuals taken by both the fishery and illegal fishing.

8. Recommendations.

Based on the analysis of the fisheries dependent and independent information collected, the Research Section proposes the following recommendations with regards to the lobster fishery:

- **It is recommended that the fishery remained closed for 2021-2022 season for a three-month period to allow juvenile to attend the legal size.**

- **It is recommended that the annual PLMP survey is carried out in 2022 to continuously evaluate and monitor the status of lobster stock.**
- **It is recommended that monitoring, control and surveillance is strengthened to discourage illegal fishing activities during opened and closed fishing season.**
- **It is recommended that an education and awareness campaign is set up to educate the public on the regulations of this fishery.**

9. Reference list.

Seychelles Fishing Authority [SFA]., 2021. Report on the spiny lobster fishery: Summary of Fishing activity for the 2020-2021 season. Seychelles: Seychelles Fishing Authority, pp. 1-14.