Seychelles Sea Cucumber Fishery Report:

2020/21–2022/23

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1.Background

The sea cucumber fishery in the Seychelles has a long history, with harvesting activities dating back to the 1800s. However, it was not until the late 1990s that exploitation significantly increased, driven by rising global demand and the corresponding spike in prices (Aumeeruddy and Payet, 2002). This surge in interest led to a shift in fishing practices, transitioning from shallow-water collection by foot to deeper-water harvesting using scuba gear. This change resulted in a notable rise in both catch volumes and prices (Aumeeruddy and Payet, 2002). Despite the rapid expansion of the fishery, it initially operated as an open-access system with minimal baseline data on sea cucumber stocks and fishing activities, particularly before 1999 (Aumeeruddy & Conand, 2008).

By 1999, the decline in economically targeted species led the Seychelles Fisheries Authority (SFA) to implement precautionary management measures, such as issuing fishing and processing licenses and limiting the number of divers to four per license. Ultimately, the fishery was temporarily closed in 2001 due to insufficient measures and a lack of data.

1.1. Past Surveys

Between 2001 and 2017, several surveys were conducted to assess the sea cucumber population. In 2004, the first independent stock assessment was carried out by SFA, across 246 sites on the Amirantes and Mahé Plateaus, funded by the FAO. The survey revealed overfishing of Sandfish *(Holothuria scabra)* and Yellow Surfish (*Actinopyga mauritiana)*, while Black Teatfish (*Holothuria nobilis*) remained underexploited (Aumeeruddy, 2007). A follow-up survey from 2011 to 2013 focused on a specific portion of the Mahé Plateau, revealing declines in species like Lollyfish and minimal recruitment of White Teatfish (Skewes & Long, 2022). In 2012, a fisheries dependent stock assessment based on fishers' logbook data recommended the implementation of a Total Allowable Catch (TAC) measure and improvements in data quality. Following this, the 2017 MRAG fisheries dependent assessment confirmed a significant decline in Black Teatfish populations, urging the establishment of a shorter fishing season and restrictions on the species harvested (Govinden et al., 2024).

Most recently, the 2020-2021 independent survey revisited the Mahé and Amirantes Plateaus, comparing data with earlier surveys. This revealed a 91.3% decline in White Teatfish, a 35% drop in Pentard, and a 45% increase in Prickly Redfish, all of which have influenced ongoing management strategies.

1.2. Catch

Since 1999, SFA's catch and effort data highlighted five main target species: Black Teatfish *(Holothuria nobilis*), Pentard *(Holothuria sp*.), Prickly Redfish *(Thelenota ananas)*, White Teatfish *(Holothuria fuscogilva)*, and Sandfish *(Holothuria scabra)* (Aumeeruddy, 2007). The catch data from 2000 to 2023 (Fig.1) shows significant fluctuations in the numbers of various sea cucumber species. Over the years, the total catch has generally increased, with some notable peaks. In the early years, catches were relatively low, with a total of 13,200 in 2000, which gradually rose to 103,740 in 2002. The years following saw even larger increases, particularly in 2006, when the total catch reached 338,792. However, some species experienced more variability.

For example, Black Teatfish catches grew steadily, peaking at 31,434 in 2010, while catches of Sandfish and Prickly Redfish also saw notable rises. White Teatfish and Prickly Redfish experienced large fluctuations, with peaks in certain years like 2002 and 2009, and lower numbers in the subsequent years. In recent years, there has been a decline in total catch, particularly noticeable in 2023, where total catches reached 298,375, following a downward trend from previous years (Fig.1). The decline in total catch may be linked to management measures, such as adjustments in Total Allowable Catch (TAC) and seasonal closures, which were implemented to ensure the sustainability of the sea cucumber fishery. In addition to environmental factors such as habitat degradation and climate change.

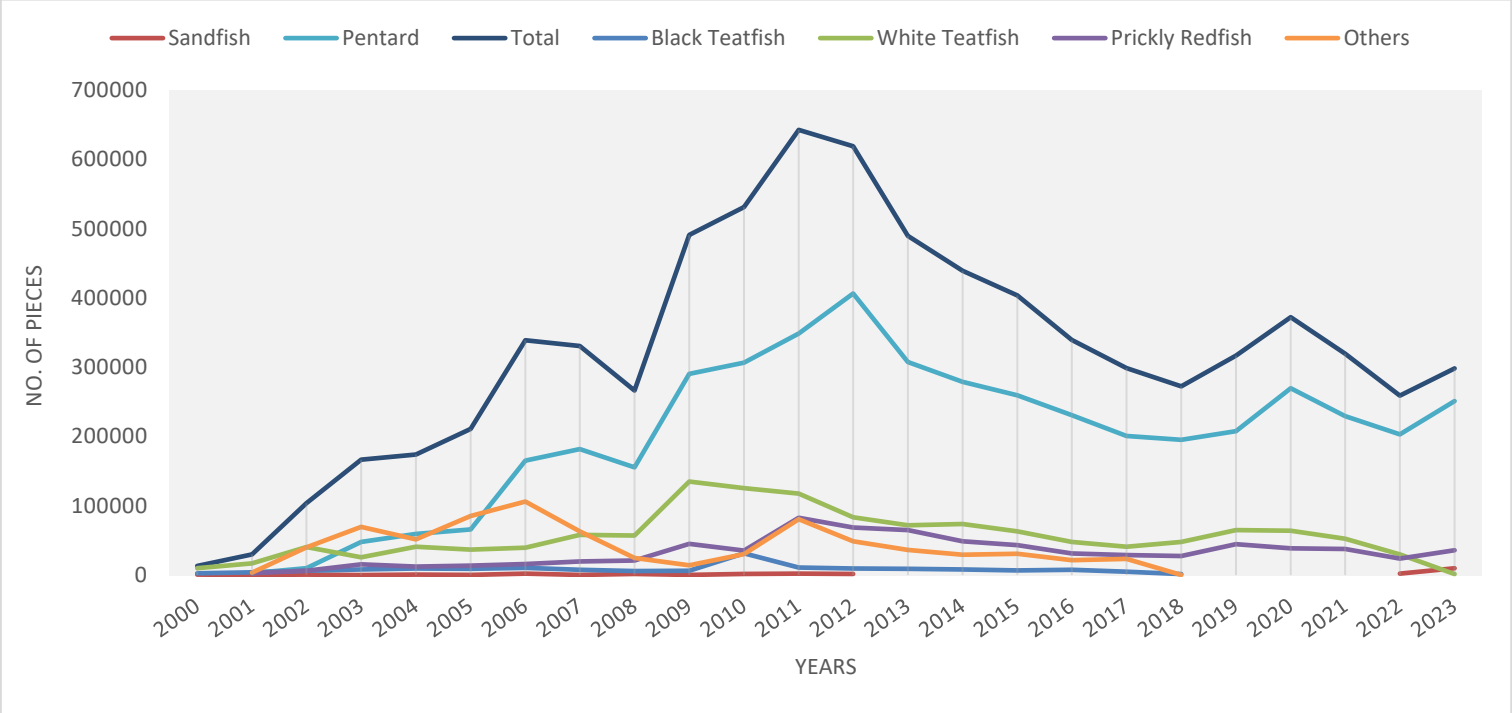

Figure 1: Catch of Sea cucumber (number of pieces) from 2000 to 2023 (based on landings data). ***The recorded catch for White Teatfish after the 2020/2021 season consists of pieces harvested in the outer islands, where the ban was not enforced.***

1.3. Management

Prior to 1999, the sea cucumber fishery was unregulated, with no formal measures in place. However, when the need for regulation became clear, control measures were introduced through the Fisheries (Amendment) Regulations of 1999. These included the requirement for fishing and processing licenses, with an annual fee of SCR 300, a cap of 25 licenses, and a maximum of four divers allowed per license, (Aumeeruddy, 2007). In 2005, Total Allowable Catch (TAC) quotas were established for each commercial species, based on the Maximum Sustainable Yield (MSY) as part of a broader management plan. While these regulations have largely remained in place, the cost of the fishing license has since increased to 7,000 SCR amongst others listed below (Aumeeruddy, 2007).

In 2013, a Management Advisory Committee (MAC) was established, comprising representatives from the SFA and industry stakeholders, and it serves as a platform for discussing issues related to the fishery and proposing potential solutions.

The management regulations for the fishery over the past three seasons (2020/21, 2021/22, and 2022/23) were as follows below, except for a change in species in the 2022/23 season, where White Teatfish was replaced by Sandfish:

- A limit of 25 non-transferable fishing licenses and 4 processing licenses
- An 8-month open fishing season
- A maximum of 4 divers per license
- Mandatory logbook reporting of catch and effort data
- Only three species are permitted for exploitation: Flower Teatfish (Pentard, *Holothuria spp.)*, Prickly Redfish (Sanpye, *Thelenota ananas*), and Golden Sandfish (Kokonm, *Holothuria lessoni*)
- The Total Allowable Catch (TAC) per species

All license holders are required to adhere to these regulations as part of their fishing license conditions. These management measures are reviewed seasonally and adjusted as needed. Adjustments may involve changes to TAC quotas and the species allowed for harvest, based on fishery performance analysis, trends in catch and quota usage, and the findings and recommendations from stock assessment surveys.

This summary report presents an overview of the methods used and data processing steps, and a detailed analysis of the catch and effort data for the Sea cucumber fishery during the **2020/2021, 2021/2022**, and **2022/2023 seasons**. It outlines the fluctuations in total catch, fishing effort, variations in Catch Per Unit Effort (CPUE), and percentage

quota utilization, providing insights into the fishery's performance and trends over these periods.

2. Materials and Methods

2.1. Sampling methodology

To determine the status of the fishery, data on the fishery is collected through the following sources:

i) Paper logbooks (Appendix I) are provided to skippers during departure inspections. Skippers fill these logbooks at sea, recording catch and effort data after each dive. Catch is recorded as the number of sea cucumber pieces.

ii) Port Control Officers collect landings data during inspections when the catch is being unloaded. Landings are documented as the total number of sea cucumber pieces and the total weight by species.

Annual logbook training is undertaken before each fishing season and whenever there is a change in skippers, to ensure that they understand the importance of reliable and accurate data collection. Currently, the only fishing method for sea cucumbers is scuba diving. The following details must be entered into the logbook after every dive:

- Diving date
- Fishing site (GPS position or fishing grid provided by SFA (Appendix II)).
- Start and end diving time.
- Number of divers
- Depths
- Dive time for each diver.
- Catch in numbers of individual species; only three species are allowed to be caught.

After each trip, the logbooks are collected and sent to the Research Department for data entry and verification using the SIH-OBSDEB landing fishery data collection tool. Once all the data for the fishing season has been entered and verified, it is downloaded, cleaned, and analysed using Microsoft Excel and R programming software.

2.2. Data analysis

2.2.1. Catch, effort and catch per unit effort.

For each species caught, the total catch in pieces was calculated seasonally using data collected from logbooks. The effort was measured in terms of total number of trips, diver days, and dive minutes. Diver day and dive minutes were calculated using the same method used in the 2012 and 2017 fisheries dependent stock assessments (MRAG, 2012, 2017).

Dive time was calculated by multiplying the recorded dive time by the number of divers. If divers in a pair had differing dive times, only the longest recorded time was considered. In cases where recorded dives included two divers and the total dive time exceeded 70 minutes, the dive time was used as is, without doubling it. However, the recorded dive times varied significantly, ranging from just a few minutes to several hours.

To try to address the problem, the following rules were applied:

- **Dive time > 70 min** was treated as **total dive time** regardless of the number of divers
- **Dive time > 0** but number of divers was 0, dive time was treated as **total dive time.**
- **Total dive time = recorded dive time × number of divers.**
- Dive time less than 10 minutes were not included in the analysis.

Diver days was also calculated as per the equation (MRAG,2012):

$$E_i = d_i \frac{1}{n}$$

Where ***E*** is effort, ***d*** is the recorded number of divers and $\boldsymbol{n}$ is the total number of records on the same day for the same vessel. For example, if the dataset contains three records, each with four divers for a specific vessel and day, the effort for each record was estimated to be $\frac{4}{3}$ diver days. This method assumes equal effort for all records for a specific vessel on any given day.

From the two calculated efforts, CPUE was then determined for each diving operation as per the below equation.

Dive time:

$$CPUE = \frac{Catch\ (pieces)}{Effort\ (dive\ time\ in\ min)}$$

Diver day:

$$CPUE = \frac{Catch\ \ (pieces)}{Effort\ (Diver\ day)}$$

The average CPUE was calculated by summing the CPUEs from all diving operations and then dividing by the total number of diving operations.

Maps were also generated (section 3.3.1) to show fishing effort (dive time per minutes) across the Mahé plateau and the Amirantes bank.

2.2.2. Quota utilization

Quota utilization for the sea cucumber fishery was calculated for each vessel using the landings data, by comparing the recorded landings per species against the vessel's allocated quota for that species. The utilization rate for each vessel and species was determined using the formula:

$$Quota\ utilisation\ (\%) = \frac{Vessel\ landings\ per\ species}{Vessel\ quota\ per\ species}\ \text{x}\ 100$$

Additionally, an overall utilization rate was calculated for each vessel by summing the landings across all species and comparing this total to the combined species quotas allocated to the vessel. This process was repeated for each fishing season, resulting in species-specific and overall quota utilization rates per vessel.

To summarise the data by fishing season, the minimum, maximum, and average quota utilisation rates were calculated across all vessels.

3.Results

3.1. Fishing seasons

The **2020/2021** fishing season started on September 15, 2020, and continued until June 15, 2021, totalling nine months, an extension from the usual eight months. This earlier start was due to requests from industry stakeholders at the pre-season MAC meeting.

Whereas the **2021/2022** season ran from October 8, 2021, to June 7, 2022, maintaining the standard eight-month duration.

The **2022/2023** season also lasted eight months, from October 15, 2022, to June 14, 2023. During the 2020/2021 and 2021/2022 seasons, the authorized species were Flower Teatfish (Pentard, *Holothuria spp*.), White Teatfish (Kokosye Blan, *Holothuria fuscogilva*), and Prickly Redfish (Sanpye, *Thelenota ananas*). However, for the 2022/2023 season White Teatfish was banned from the fishery and was replaced with Golden Sandfish (Kokonm, *Holothuria lessoni*).

3.2. Catch

The total catch of sea cucumbers exhibited a declining trend over the three seasons (Fig 1). In the **2020/2021** season, the total catch was 313,511 pieces (Flower Teatfish: 225,489; White Teatfish: 49,295; Prickly Redfish: 38,727). This figure decreased by 7.5% in the **2021/2022** season to 289,666 pieces (Flower Teatfish: 209,618; White Teatfish: 49,908; Prickly Redfish: 30,140), driven primarily by reductions in Flower Teatfish and Prickly Redfish, while White Teatfish remained stable.

By the **2022/2023** season, the total catch further declined by 20.4% to 230,248 pieces (Flower Teatfish: 194,390; Prickly Redfish: 26,925; Golden Sandfish: 8,933), with continued decreases in Flower Teatfish and Prickly Redfish. Overall, this data highlights a significant downward trend in sea cucumber catches over the three seasons (Fig. 2). The decline in total catch can be attributed to, as previously mentioned, adjustments in quota allocation per species after each season.

Notably, the quota for Flower Teatfish decreased from 281,250 in 2020/21 to 240,475 in 2022/23. These changes in species quotas likely impacted catch over the seasons. Additionally, environmental factors, such as the ongoing effects of climate change, may have contributed to shifts in the ecosystem, further influencing catch levels.

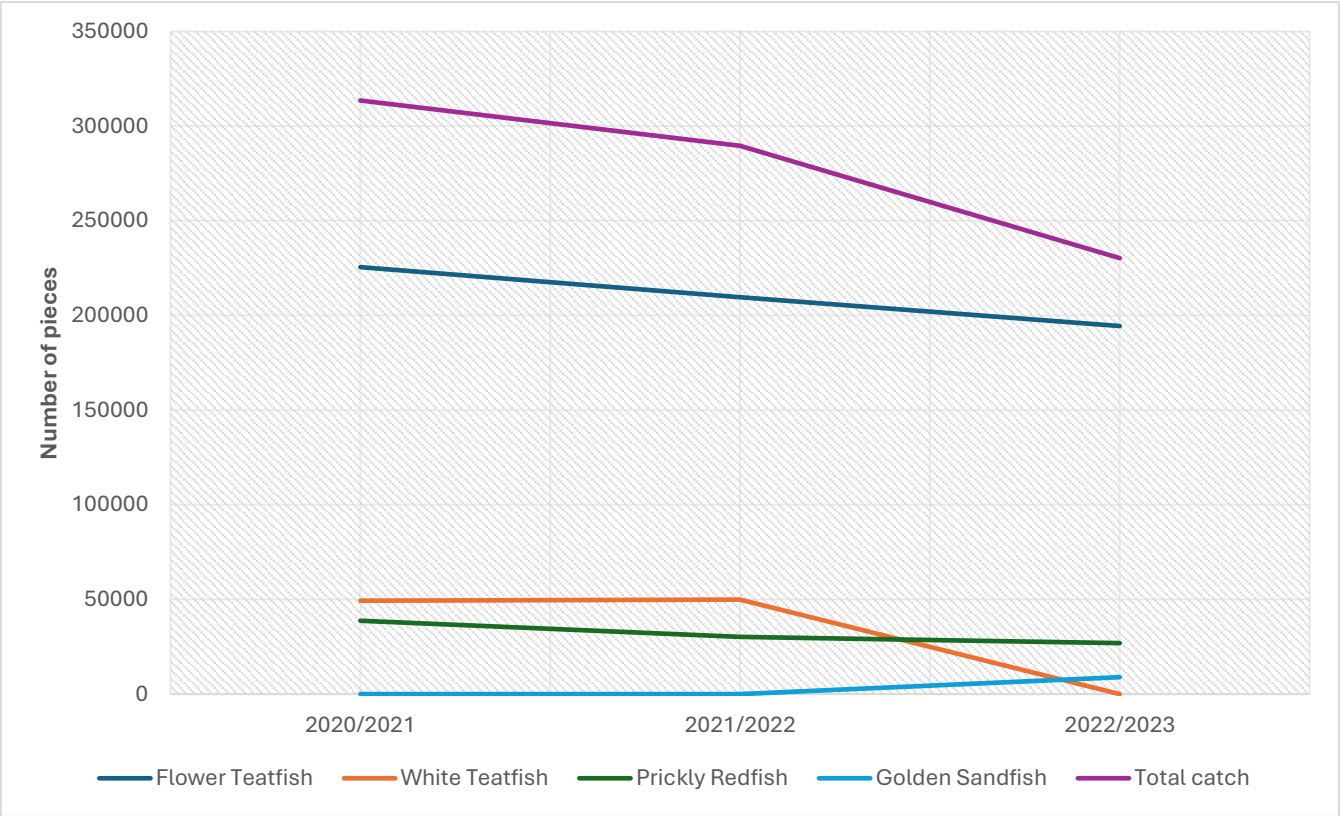

Figure 2:Catches of sea cucumber by species for the 2020/2021, 2021/2022 and 2022/2023 fishing season.

3.2.1. Catch by months

In the fishing seasons of 2020/21, 2021/22, and 2022/23, March consistently recorded the highest catch each year (Fig. 3). In the **2020/21** season, the total catch for March was 54,286 sea cucumbers, with Flower Teatfish (40,717) being the most abundant, followed by White Teatfish (7,737) and Prickly Redfish (5,832). In contrast, September had the lowest catch, totalling 8,669 sea cucumbers, with Flower Teatfish (7,145) leading, followed by White Teatfish (907) and Prickly Redfish (617).

During the **2021/22** season, March remained the peak month, though the total catch decreased from the previous season, with a recorded 50,171 sea cucumbers. Flower Teatfish (38,723) remained the most frequently caught species, followed by White Teatfish (7,863) and Prickly Redfish (3,585). June, on the other hand, saw the lowest catch of the season, with just 4,080 sea cucumbers. Flower Teatfish (2,665) was the dominant species, followed by White Teatfish (968) and Prickly Redfish (447) (Fig. 3).

In the **2022/23** season, March again recorded the highest catch, totalling 45,356 sea cucumbers. Flower Teatfish (41,328) continued to be the most dominant species,

followed by Prickly Redfish (3,993) and Golden Sandfish (35). October had the lowest catch, with just 3,687 sea cucumbers, where Flower Teatfish (2,687) was the most abundant, followed by Sandfish (772) and Prickly Redfish (228) (Fig. 3).

Overall, Flower Teatfish remained the most frequently caught species across all seasons. Overall, the total catch by month continued to decrease across the seasons. In the 2022/23 season, this decline persisted, except for June, where the catch increased compared to the previous seasons.

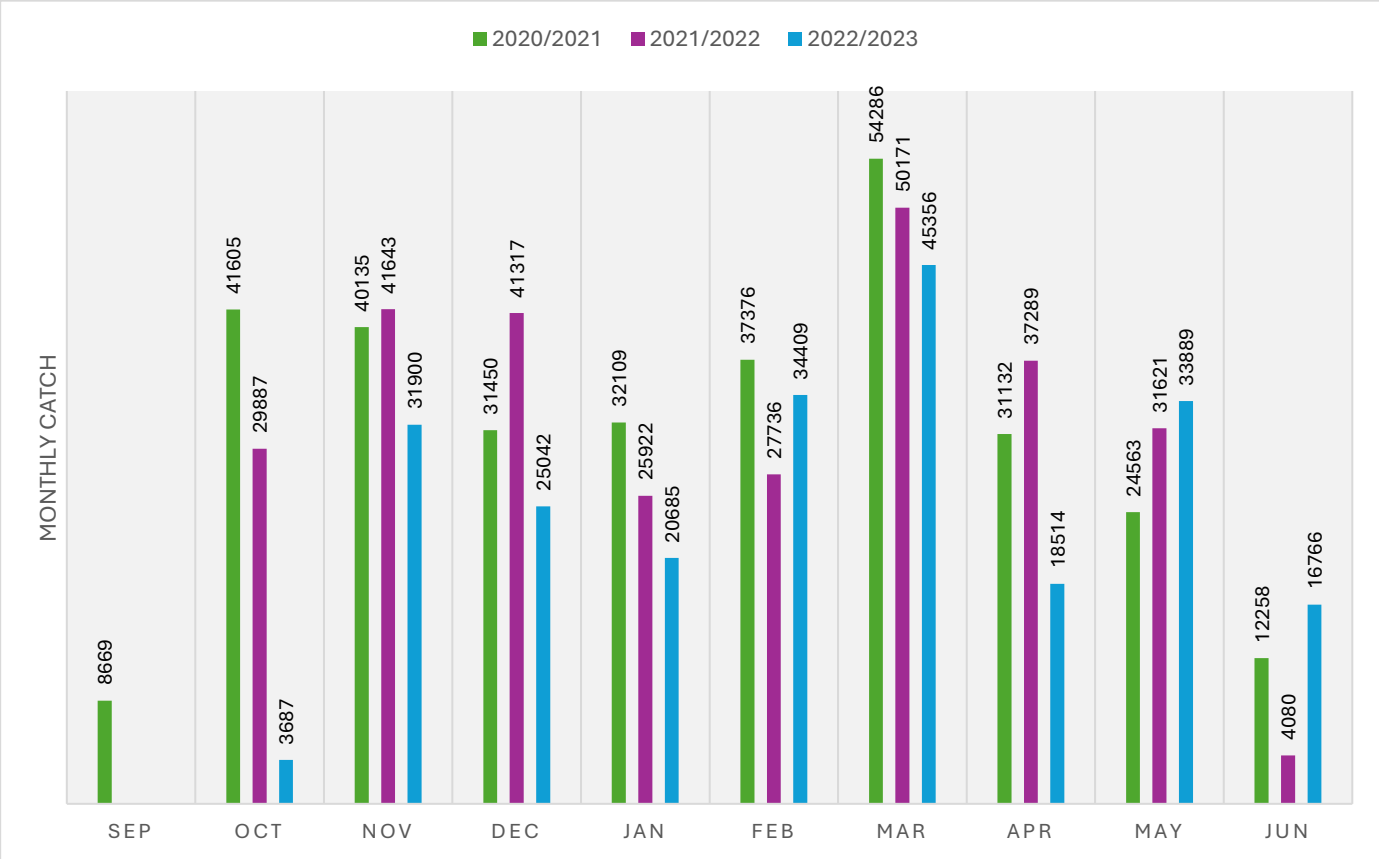

Figure 3: Monthly Sea cucumber catch data for the 2020/2021, 2021/2022, and 2022/2023 fishing seasons. Fishing season 2020/21 started in September, compared to the following seasons.

3.3. Effort

The fishing effort for the sea cucumber fishery, as indicated by the number of trips, total dive minutes, and diver days, exhibited a declining trend over the three seasons (Table 1). In the **2020/2021** season, 153 trips were made, totaling around 1,404,692 dive minutes,

at an average of 96.15 minutes per dive. This season also recorded 7,695 total diver days, with an average of 0.52 diver days per trip.

The **2021/2022** season saw effort reduction with 141 trips, though total dive minutes increased slightly to 1,509,084, resulting in an increased average dive time of 96.84 minutes. However, total diver days decreased to 6,939, with a lower average of 0.44 diver days per trip.

By the **2022/2023** season, the number of trips further decreased to 127, and total dive minutes dropped significantly to 1,100,343, despite an increase in average dive time to 101.15 minutes per dive. Total diver days also declined to 5,813, but the average diver days per trip increased to 0.53.

Table 1: Fishing effort for the 2020/2021, 2021/2022 and 2022/2023 fishing season.

Season	No. of trips	Total dive mins	Avg. dive mins	Total diver days	Avg. diver days
2020/2021	153	1404692	96.15	7695	0.52
2021/2022	141	1509084	96.84	6939	0.44
2022/2023	127	1100343	101.15	5813	0.53

3.3.1. Spatial Distribution of fishing effort

Figure 4 provides a visual representation of the analysis of dive effort for the **2020/2021** fishing season, highlighting notable regional differences across the Mahé Plateau and Amirantes. On the Mahé Plateau, the western and central regions exhibited the highest dive effort, with divers spending considerable time underwater in these areas. In contrast, the eastern and southern regions of the Mahé Plateau showed lower dive effort, with less time spent underwater despite some fishing activity being present.

In the Amirantes, the eastern side was a significant hotspot for dive effort, with divers recording over 3,308 dive minutes. Conversely, the southern part of the Amirantes demonstrated a lower level of dive effort, aligning with the observed pattern of reduced underwater time in this region.

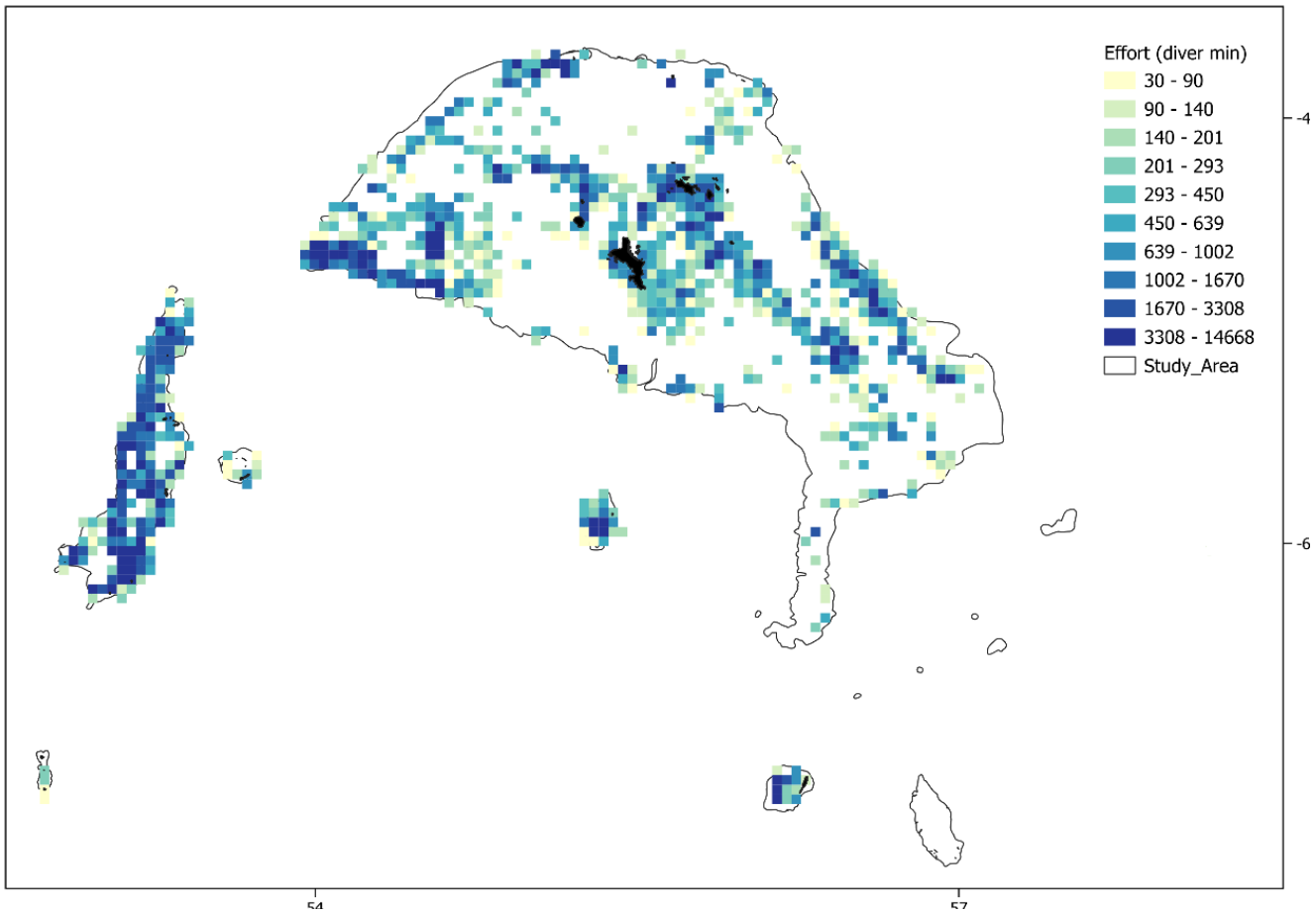

Figure 4: Map illustrating dive effort during the 2020/2021 fishing season across the Mahé Plateau and Amirantes.

For the **2021/2022** fishing season (Fig. 5), dive effort increased and expanded into the central and eastern regions of the Mahé Plateau. This expansion contrasted with the previous season, where most of the diving activity was focused on the western and central areas of the plateau. Despite the overall increase in dive effort across the plateau, the southeastern region continued to show lower dive effort.

In the Amirantes, a rise in dive effort was observed in the northern regions and the Platte area. Conversely, the western region of the Amirantes exhibited lower dive effort.

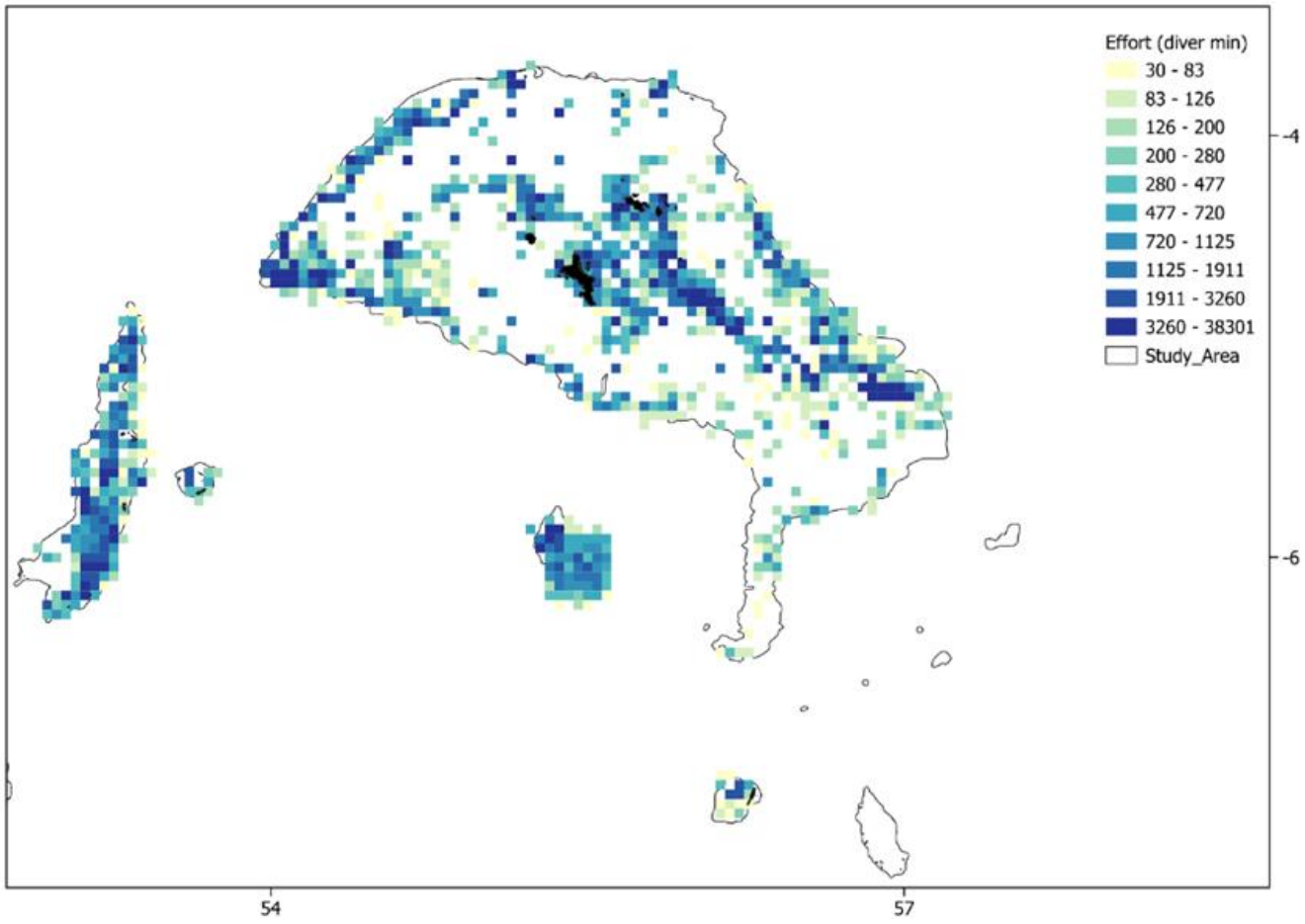

Figure 5: Map illustrating dive effort during the 2021/2022 fishing season across the Mahé Plateau and Amirantes.

In the **2022/2023** fishing season (Fig.6), dive effort was notably lower compared to previous seasons. However, there was consistent fishing activity on the western edge of the Mahé Plateau and at several locations in the Amirantes.

On the Mahé Plateau, the number of fishing sites decreased, yet the effort per dive minute remained significantly high at the sites that were active. A similar trend was observed in the Amirantes, where fewer fishing areas were noted compared to the previous years, but the dive effort within these sites was markedly high.

Overall, dive effort varied across regions, with the western and central Mahé Plateau consistently showing the highest effort, while areas like the southeastern Mahé Plateau and parts of the Amirantes had lower effort. Over time, dive effort spread to new regions, although certain areas continued to receive less attention. The higher dive effort in specific regions suggests that fishing activity concentrated where resources were more abundant or where fishing practices were more effective.

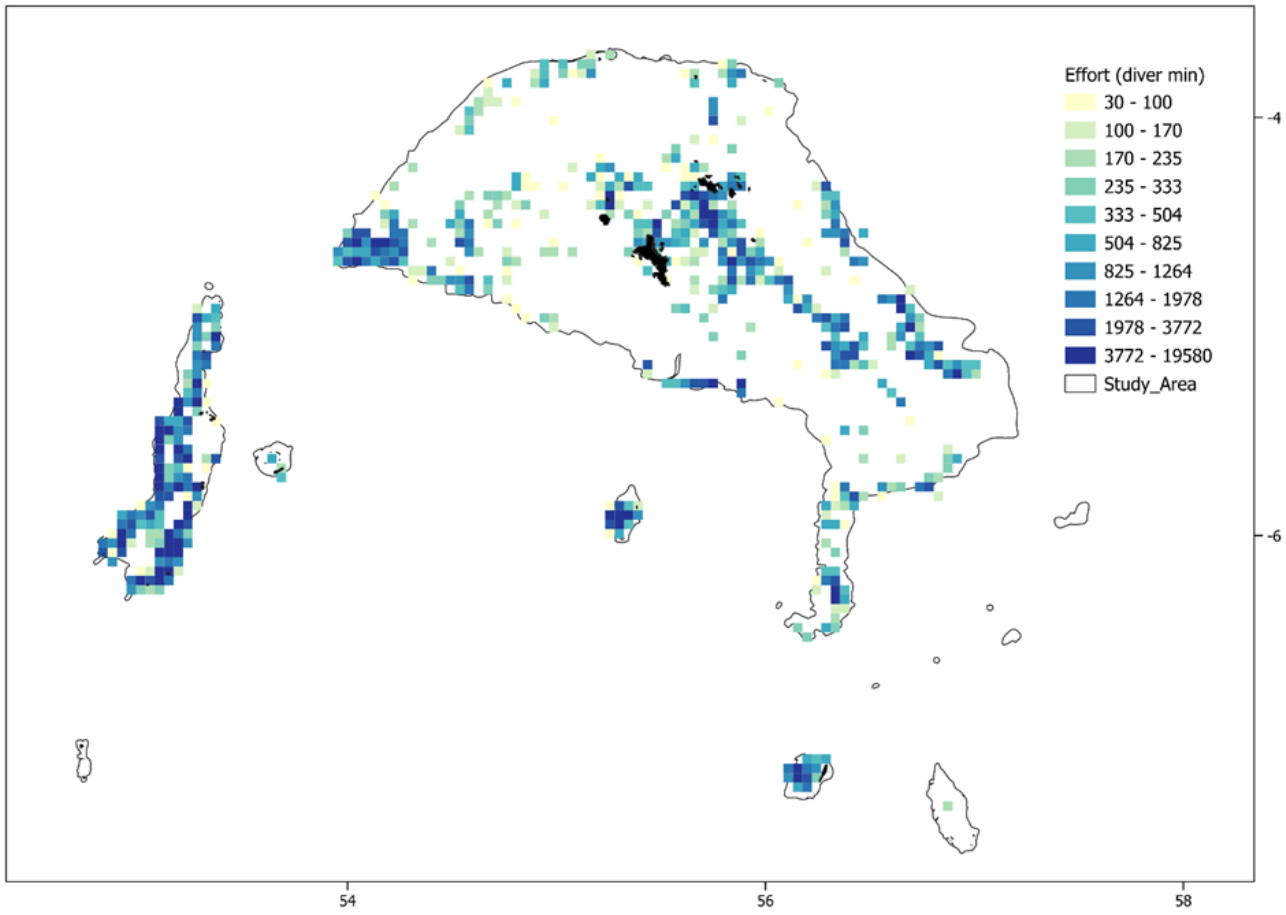

Figure 6:Map illustrating dive effort during the 2022/2023 fishing season across the Mahé Plateau and Amirantes.

3.4. Catch Per Unit Effort (CPUE)

The CPUE, measured as the average number of pieces per diver day, showed a slight decline across the three fishing seasons (Fig 7).

In the **2020/2021** season, the overall CPUE was 54 pieces per diver day, with Flower Teatfish contributing the highest at 39 pieces, followed by White Teatfish (9 pieces), and Prickly Redfish (6 pieces).

By the **2021/2022** season, the overall CPUE rose to 57 pieces per diver per day. There was a slight increase in Flower Teatfish (41 pieces), White Teatfish (10 pieces), and Prickly Redfish (6 pieces).

In the **2022/2023** season, following the ban on White Teatfish, the overall CPUE decreased to 49 pieces per diver per day, with Flower Teatfish falling to 40 pieces. In contrast, Golden Sandfish, which was introduced this season, recorded a CPUE of 3

pieces per diver per day. Meanwhile, Prickly Redfish remained consistent at 6 pieces per diver day.

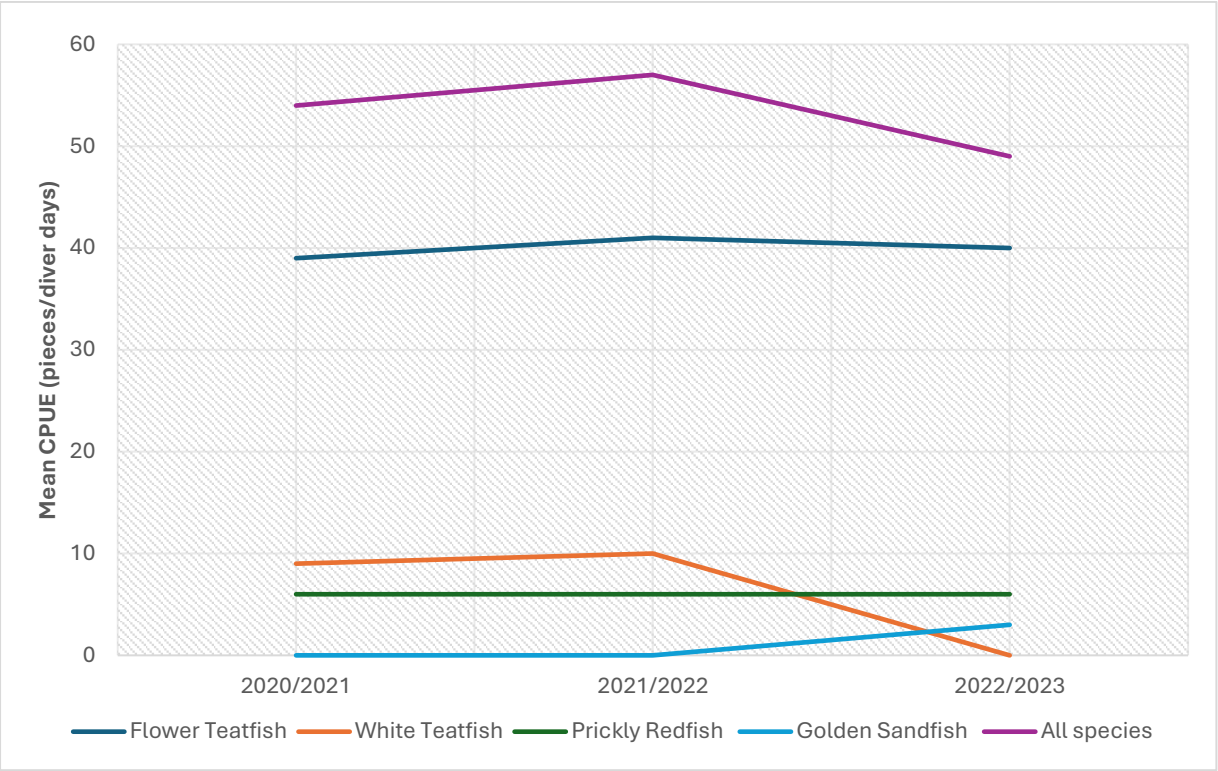

Figure 7: Mean CPUE in pieces per diver days by species and for all species combined for the 2020/2021, 2021/2022 and 2022/2023 fishing season.

The CPUE, expressed as the average number of pieces per dive minute, exhibited varying trends across species and seasons (Fig. 8). In the **2020/2021** season, the overall CPUE for all species was 0.22 pieces per dive minute. Specifically, Flower Teatfish had a CPUE of 0.16, White Teatfish 0.038, and Prickly Redfish 0.022.

In the following season, **2021/2022**, the overall CPUE slightly increased to 0.23, with Flower Teatfish remaining at 0.16, White Teatfish rising to 0.039, and Prickly Redfish reaching 0.024.

During the **2022/2023** season, the overall CPUE remained stable at 0.23 pieces per dive minute. Flower Teatfish improved to 0.19, while Prickly Redfish increased to 0.027. The CPUE for Golden Sandfish was recorded at 0.010. Overall, the CPUE trend has remained stable across the past three seasons.

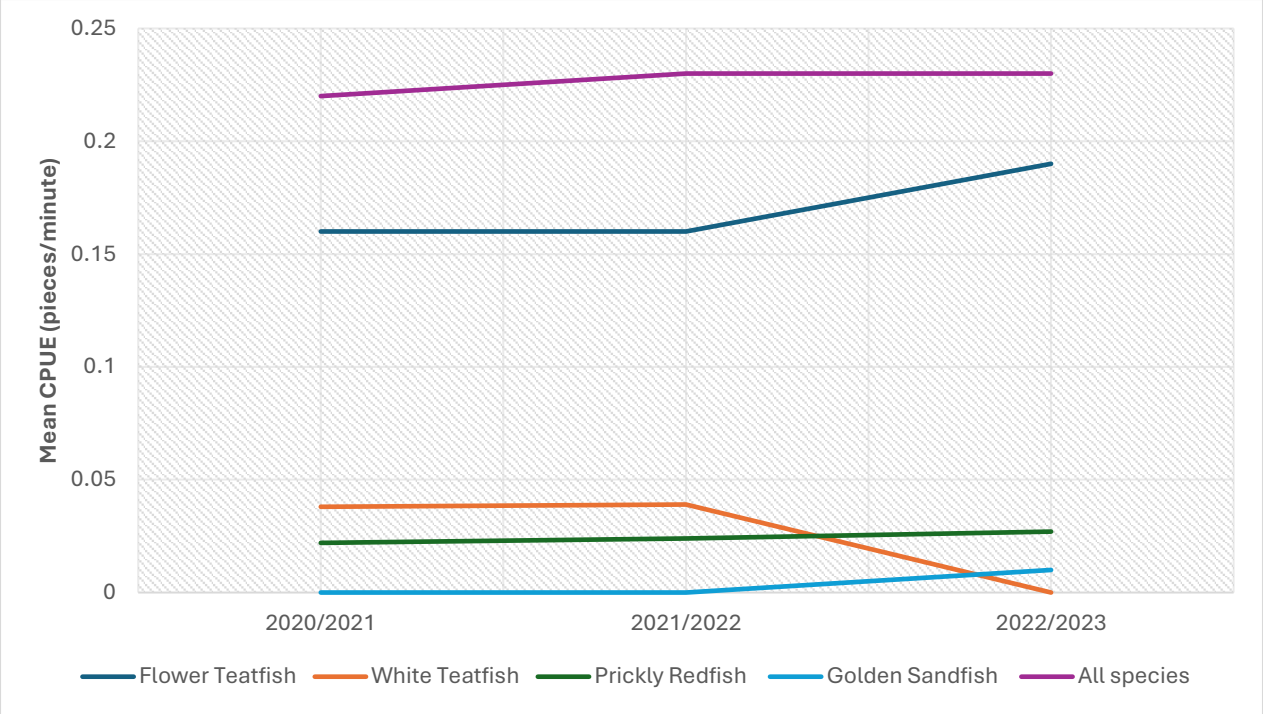

Figure 8: Mean CPUE in pieces per dive minute by species and for all species combined for the 2020/2021, 2021/2022 and 2022/2023 fishing season.

3.5. Quota Utilization

The SFA has implemented a structured quota system to manage the sea cucumber fishery, aiming to ensure sustainability and prevent overexploitation. Introduced in the 2017/2018 fishing season, the Total Allowable Catch (TAC) was initially set at 375,000 pieces, distributed among three primary species:

- Flower Teatfish: 281,250 pieces
- Prickly Redfish: 37,500 pieces
- White Teatfish: 56,250 pieces

This allocation equated to 15,000 pieces per vessel, with each of the 25 licensed vessels receiving specific quotas for each species (SFA, 2024).

In 2021, following a review, the SFA recommended a 10% reduction in the Flower Teatfish quota, adjusting the allocation to:

- Flower Teatfish: 253,125 pieces

- Prickly Redfish: 37,500 pieces
- White Teatfish: 56,250 pieces

This adjustment aimed to address concerns about overexploitation of certain species. Further assessments in 2022 led to additional changes:

- Flower Teatfish: 240,475 pieces
- Prickly Redfish: 45,000 pieces
- Golden Sandfish: 100,000 pieces

Notably, the quota for White Teatfish was set to zero, effectively suspending its harvest for the 2022/2023 season (SFA, 2024).

This section provides a brief overview of the quota performance for the sea cucumber fishery, including the quota utilization across different species and seasons (Fig. 9, Table 2). Although the **2023/2024** season is not fully covered in the report, its quota utilization is included here for comparison.

For Flower Teatfish, the average quota utilization remained fairly consistent across the four seasons, ranging from 93% in the **2022/2023** season to 83% in the **2023/2024** season. White Teatfish showed consistently high utilization, with 95% in **2020/2021** and 89% in **2021/2022**. In contrast, Prickly Redfish exhibited more variability, with average utilization decreasing from 103% in **2020/2021** to 55% in **2023/2024**. Golden Sandfish had a much lower average utilization, starting at 12% in **2022/2023** and dropping further to just 5% in **2023/2024.**

Overall, the combined average quota utilization for all species has declined over the past four seasons. It was 89% in **2020/2021**, then slightly decreased to 85% in **2021/2022,** before dropping further to 70% in **2022/2023**, and reaching 60% in the **2023/2024** season.

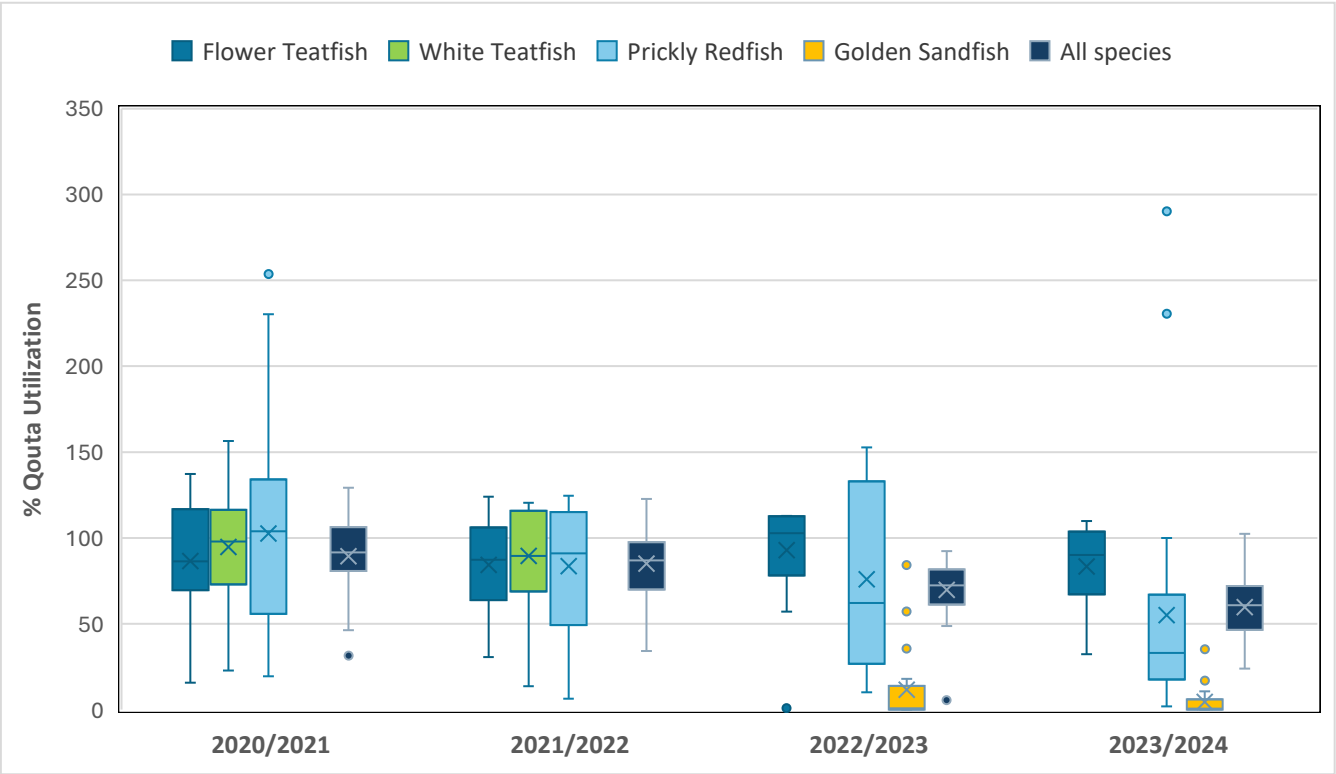

Figure 9: Boxplot showing variations in quota utilization (in percentage) amongst fishing vessels by species and for all species combined for the 2020/2021, 2021/2022, 2022/2023 and 2023/2024 fishing season. Average percentage quota utilization is indicated by the X.

Table 2**:** Summary statistics for the percentage quota utilization amongst fishing vessels by species and for all species combined for the 2020/2021, 2021/2022, 2022/2023 and 2023/2024 fishing season.

	Flower Teatfish			White Teatfish			Prickly Redfish			Golden Sandfish			All species		
Season	**Min**	**Avg.**	**Max**	**Min**	**Avg.**	**Max**	**Min**	**Avg.**	**Max**	**Min**	**Avg.**	**Max**	**Min**	**Avg.**	**Max**
2020/2021	16	86	137	23	95	156	19	103	254				31	89	129
2021/2022	31	84	124	14	89	120	6	84	125				34	85	123
2022/2023	1	93	113				10	76	153	0	12	84	6	70	92
2023/2024	32	83	110				2	55	290	0	5	35	24	60	102

4.Conclusion

From the 2020/2021 to 2022/2023 seasons, the CPUE for the sea cucumber fishery remained stable, with slight fluctuations. The stable CPUE for both flower teatfish and prickly redfish over the past three years may indicate that their population is stable. However, further considerations are required prior to making definite conclusions, including historical CPUE, standardised CPUE and additionally fisheries dependent assessments. Additionally, other factors that may lead to the observe trend in the CPUE can be considered such as fishers adjusting their practices, in response to regulatory measures designed to support the sustainability of the fishery. These adjustments may cause catch rates to remain stable.

However, despite the stable CPUE, there was a steady decline in total catch. Total catch decreased by 26.6%, from 313,511 pieces in 2020/2021 to 230,248 in 2022/2023. This decline was not due to reduced fishing effort, as the number of trips, dive minutes, and diver days remained fairly consistent. Instead, the reduced catch can likely be attributed to other factors, such as changes in quota allocations, regulatory measures (e.g., the White Teatfish ban), and the introduction of new species like Golden Sandfish, which contributed only a small portion to the overall catch. Adjusted regulatory measures, may have also impacted quota utilization efficiency.

In summary, although the CPUE has remained stable, this does not necessarily mean the population is also stable. If the species is remaining steady at a low level, additional management strategies may be needed to support population recovery or improve catch rates in the future. While the fishery appears to be sustainable in the short term, ongoing monitoring will be important to ensure its long-term health. Furthermore, external factors such as socio-economic conditions and environmental changes, must be incorporated into monitoring and management strategies, as they can also impact long-term catch efficiency and quota utilization.

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6. Appendices

6.1. Appendix I: Paper Logbook

Sea Cucumber Catch and Effort Logbook

Licence No:									Species									
No	Date	Fishing Site	Fishing Time		No. Divers	Depth (m)		Dive Time per Diver (minutes)	Flower Teat Fish Pentard	White Teat Fish kokosye Blan	Black Teat Fish Kokosye Nwar	Prickly Red Fish Sanpye	Black Fish Spork	Red Surf Fish Vent Blan	Yellow Surf Brizan	Sand Fish Kokom	Total
			Start	End													
1							1 2 3 4 5										
2							1 2 3 4 5										
3							1 2 3 4 5										
4							1 2 3 4 5										
Remark:																	
Sz No:			Master Name:									Master Signature					

6.2. Appendix II: SFA Grid Map