Seychelles Sea Cucumber Fishery Report: 2024-2025

Fisheries Research Department

Seychelles Fisheries Authority

June 2026

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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 the stocks of high value 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. Management

Prior to 1999, the Seychelles sea cucumber fishery operated with no formal regulations or resource management measures in place. Recognizing the urgent need for oversight, control measures were introduced through the Fisheries (Amendment) Regulations of 1999, which mandated fishing and processing licenses at an annual fee of 300 SCR, capped the total number of fishing licenses at 25, and restricted each license to a maximum of four divers (Aumeeruddy, 2007). In 2005, through a joint technical cooperation program with the Food and Agriculture Organization (FAO), the first comprehensive resource assessment calculated the Maximum Sustainable Yield (MSY) and recommended species-specific Total Allowable Catch (TAC) quotas (Aumeeruddy et al., 2005). Although these catch limits faced heavy initial delays, a strict TAC quota system was officially implemented in 2018 (SFA, 2018). 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 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 3 species are permitted for exploitation in the Authorised zone: Flower Teatfish (Pentard, *Holothuria spp.)*, Prickly Redfish (Sanpye, *Thelenota ananas*), and Golden Sandfish (Kokonm, *Holothuria lessoni*) i.e replacing white teatfish.
- 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 fishery independent 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 **2024-2025 fishing season**. 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 use for sea cucumbers harvesting 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 fishing trip, the logbooks are collected and sent to the Fisheries 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. Fishing Area

The fisheries operate within the Seychelles exclusive economic zone (EEZ) however, it is divided into management zone. The Authorised Zones which are divided into Zone 1 (Mahe Plateau), Zone 2 and Zone 3 (Coetivy/Platte Group), Zone 4 (Amirantes Group) (Figure 1) are the areas where the aforementioned quota and species allowances (3 species) are applicable. The 'Other Zones' are zones within the Seychelles EEZ other than the Authorised Zones where a licensee can conduct fishing activities subject to written permission from SFA.

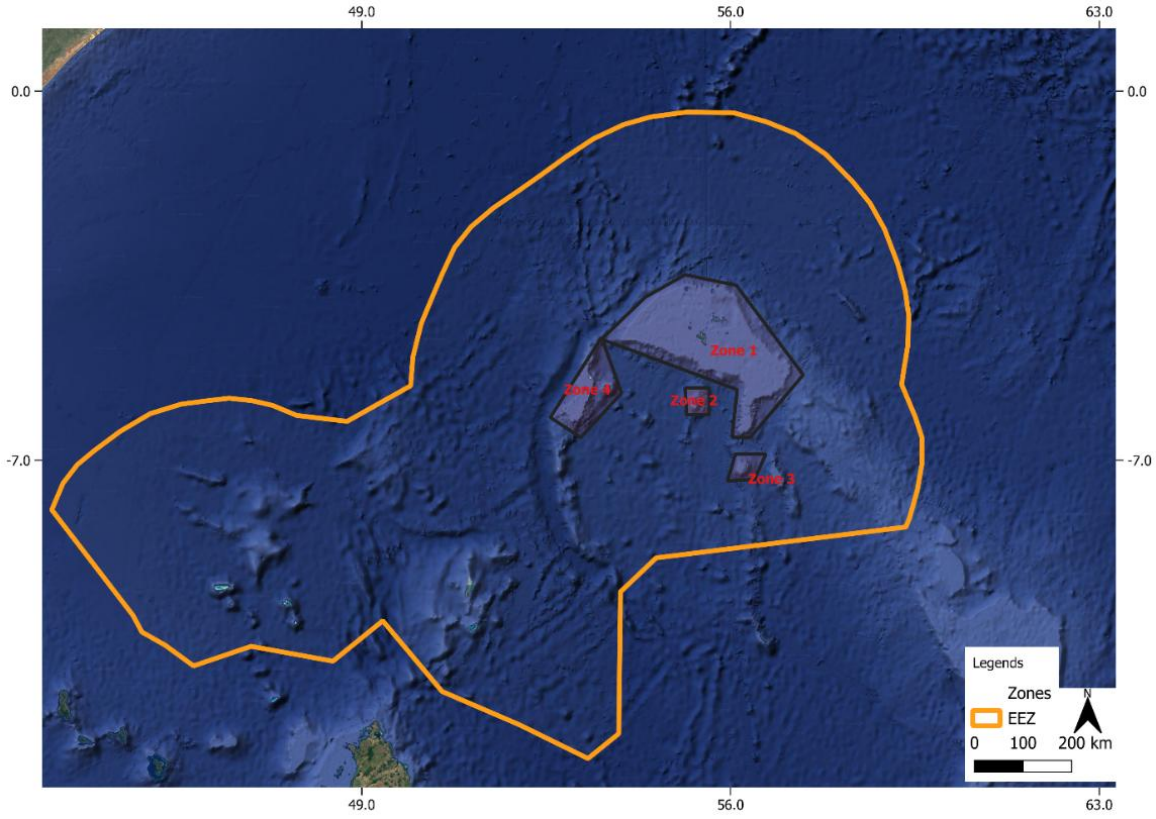

Figure 1: Map indicating all fishing zones that is classified as the Authorised zones

2.3. Data analysis

2.3.1. 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 the 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 $\mathbf{n}$ 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 equation below.

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.

2.3.2. 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 **2024/2025** season lasted eight months, from October 1st, 2024, to June 30th, 2025. The authorized species were Flower Teatfish (Pentard, *Holothuria spp*.), Prickly Redfish (Sanpye, *Thelenota ananas*) and Golden Sandfish (Kokonm, *Holothuria lessoni*). Under current licensing conditions, additional species such as White and black Teatfish, may be harvested from the Other Zones, subjected to a quota but only upon formal request and with official permission granted.

3.2. Catch

A total of 173,873 sea cucumbers were harvested during the 2024/2025 fishing season, representing a substantial decrease of 25.4% compared to the 233,285 recorded in 2023/2024. The dominant species remained Flower Teatfish, with 141,627 individuals harvested; however, this reflects a 29.1% decline from the 199,611 recorded in the previous season. Prickly Redfish catches increased slightly by 1.9%, rising from 24,401 to 24,874 individuals (Figure 2).

Golden Sandfish the total catch recorded was 3,620 individuals in 2023/2024 to 3,308 individuals in 2024/2025, representing a slight decrease of 8.6%. Additionally, 3,350 White Teatfish and 667 Black Teatfish were harvested under special permissions in the Other Zones. Compared to the previous season, White Teatfish declined sharply by 33.5% (from 5,038), while Black Teatfish increased by 33.5% (from 615) (Figure 2). Furthermore, there were 2,587 Flower Teatfish and 2,033 Prickly Redfish harvested under special permissions in the Other Zones. Excluding White Teatfish, Black Teatfish, Flower Teatfish, and Prickly Redfish harvested in the Other Zones, the total catch from the Authorised Zones stood at 165,236 individuals during the 2024/2025 fishing season.

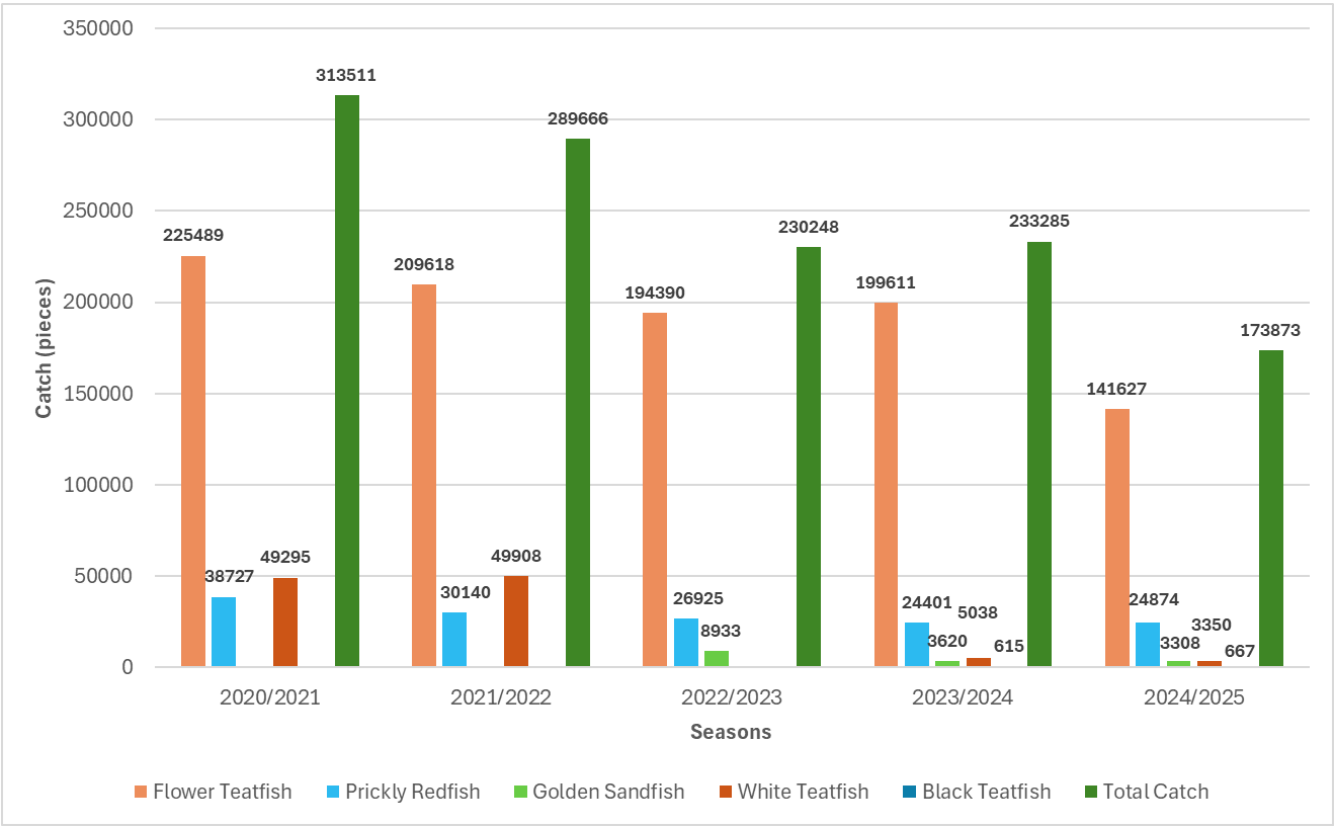

Figure 2: Catches of sea cucumbers by species for the past five fishing season

3.2.1. Catch by months

During the 2024/2025 fishing season, the highest catch was recorded in December, with a total of 35,420 individuals across all species. In contrast, the lowest catch occurred in July, with only 7,210 individuals landed. Catch levels declined in January (25,100 individuals) and this downward trend became more evident in March (22,450 individuals). An increase was recorded in April (30,600 individuals), before catches dropped again toward the end of the season, falling to 19,350 individuals in May (Figure 3).

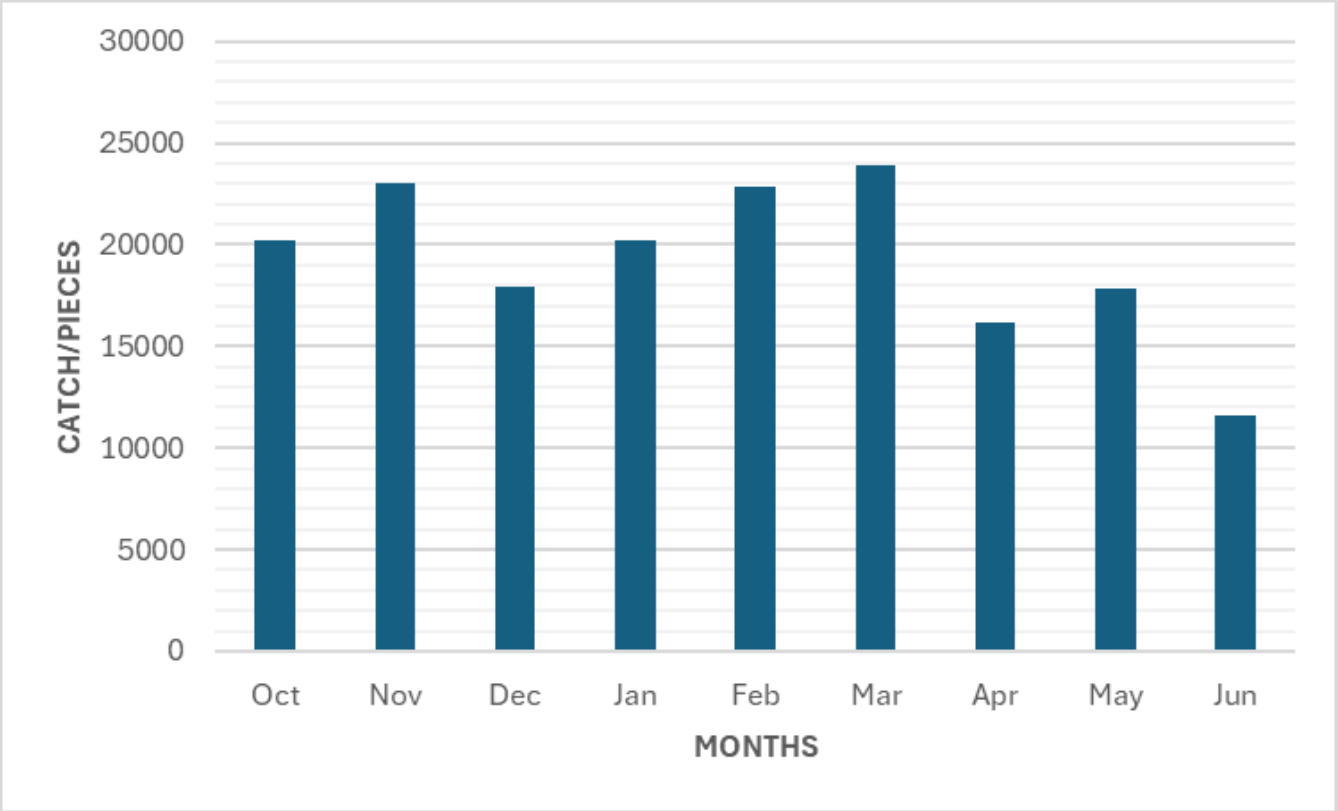

Figure 3:Monthly Sea cucumber catch data for 2024/2025 fishing season.

3.3. Effort

In the 2024/2025 season, 121 trips were made, totalling 1,023,740 dive minutes, with an average of 99.63 minutes per dive. This season also recorded 5,354 total diver days, with an average of 0.52 diver days per trip (Table 1).

Compared to the 2023/2024 season, the total number of trips decreased by 12 trips, from 133 to 121. Total dive minutes declined from 1,193,553 to 1,023,740, representing a 14.2% decrease. Total diver days also decreased by 1,364 days (20.3%), falling from 6,718 to 5,354. In contrast, the average minutes per dive remained relatively stable, showing a slight increase from 99.58 to 99.63 minutes, while the average diver days per trip slightly decreased from 0.56 to 0.52.

Table 1: Fishing effort for the 2020/2021, 2021/2022, 2022/2023 ,2023/2024 and 2024/2025 fishing seasons.

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
2023/2024	133	1193553	99.58	6718	0.56
2024/2025	**121**	**1023740**	**99.63**	**5354**	**0.52**

3.3.1. Spatial Distribution of fishing effort and CPUE

Figure 4 illustrate a spatial distribution of dive effort for the 2024–2025 fishing season across the Mahé Plateau, the Amirantes group and other zones. Dive effort is widely distributed throughout the plateau, with the central and western regions remaining the most dominant hotspots. Notable concentrations are also observed along parts of the

northern and eastern margins of the Mahé Plateau, indicating sustained diving activity across multiple areas. Overall, the pattern suggests that divers spent considerable time underwater across the plateau, with several localized areas of high intensity.

In the Amirantes group, dive effort is also broadly distributed, covering much of the fishing grounds. However, the high dive effort was more concentrated along the western and southern parts of the Amirantes group (Figure 4).

In the Farquhar Group, dive effort appears more clustered with activity concentrated in few discrete areas. Compared to the Farquhar Group, Coetivy and Platte, exhibited higher dive effort, with some areas showing moderate to high intensity effort (Figure 4).

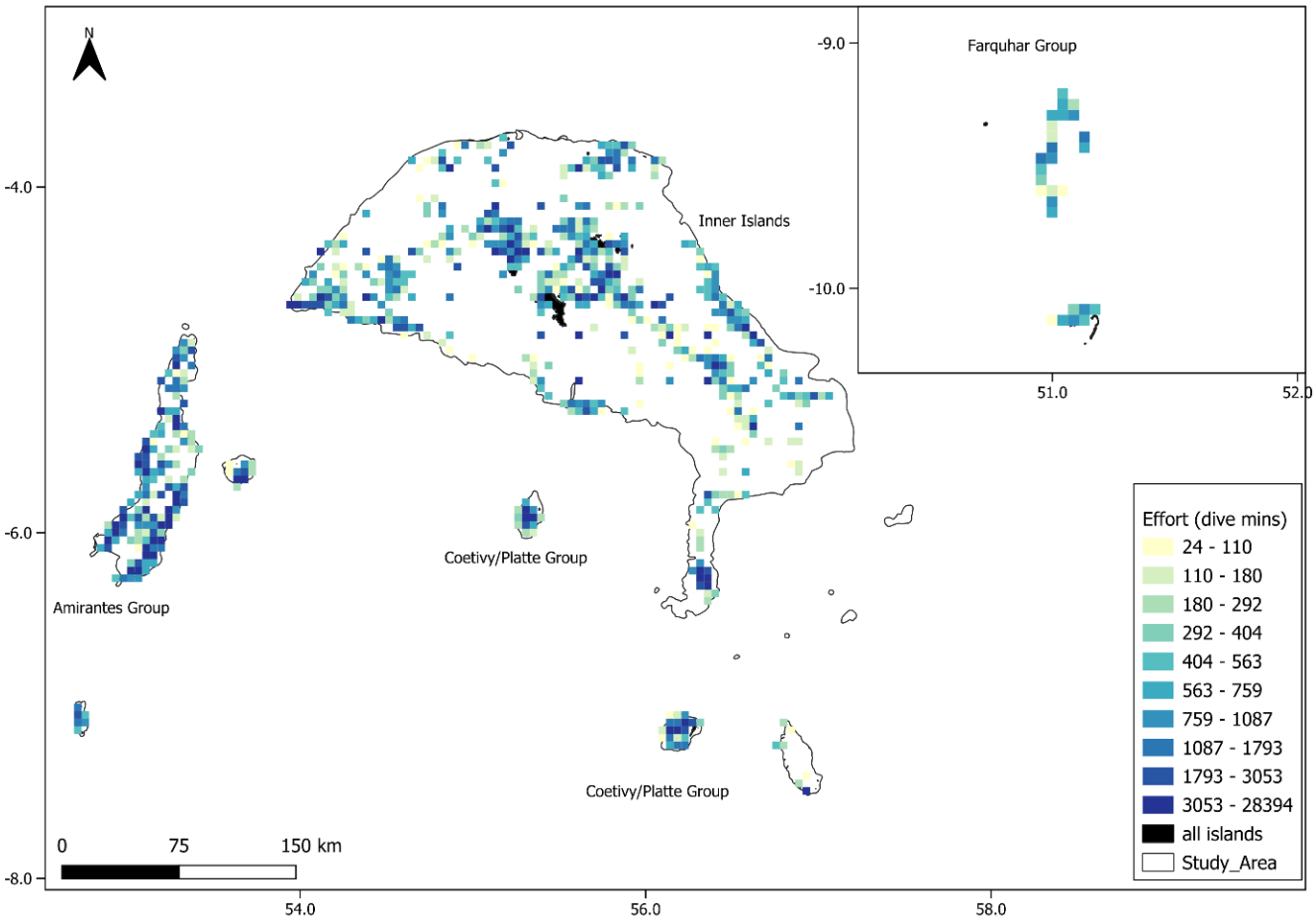

Figure 4:Map illustrating dive effort during the 2024/2025 fishing season across the Mahé Plateau, Amirantes and Farquhar group

Figure 5 illustrates the spatial distribution of CPUE (pieces per dive minute) for the 2024–2025 fishing season across the Mahé Plateau and the outer island areas. The distribution indicates that CPUE is widespread across the Mahé Plateau, with several localized hotspots, particularly in the central and northern regions. Moderate to high CPUE values are also observed along parts of the western and eastern margins of the plateau, although these occur in a patchy and discontinuous pattern.

In the outer island areas, including the Amirantes, Coetivy/Platte, and Farquhar groups, CPUE is more spatially variable, with distinct but localized clusters of elevated values rather than continuous hotspots. Overall, the pattern highlights a heterogeneous and patchy distribution of CPUE rates across the fishing grounds (Figure 5).

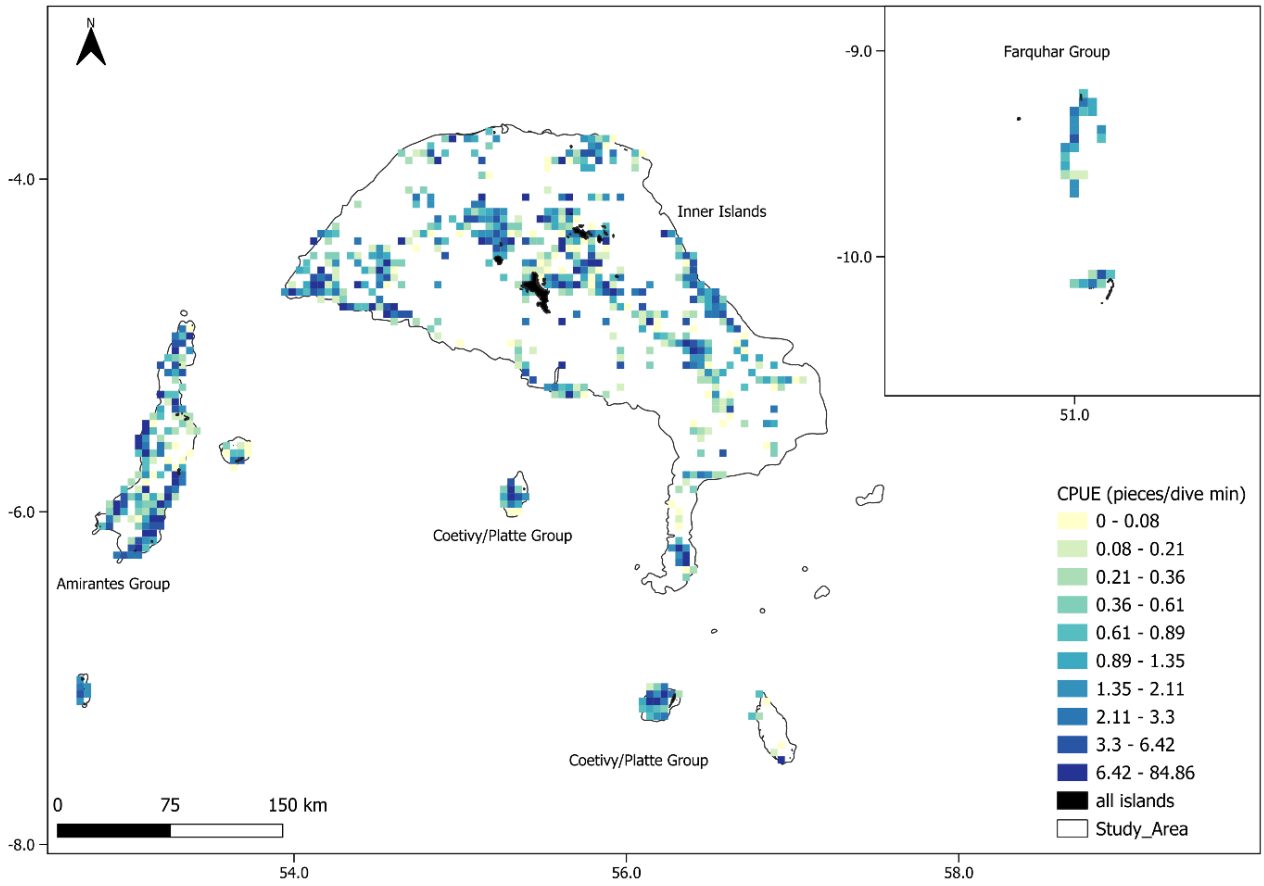

Figure 5: Map illustrating CPUE in pieces per dive minutes during the 2024/2025 fishing season around Mahe plateau, Amirantes banks and the Farquhar group.

3.4. Catch Per Unit Effort (CPUE)

During the 2024/2025 fishing season, the overall CPUE was 39 pieces per diver day. Flower Teatfish recorded the highest CPUE at 30 pieces per diver day, followed by Prickly Redfish (6 pieces), Sandfish (0.62 pieces), White Teatfish (0.59 pieces), and Black Teatfish (0.11 pieces) per diver day. Overall, CPUE has shown a declining trend in recent seasons. However, Prickly Redfish exhibited a slight increase in CPUE, rising by 1.45 pieces per diver day compared to the previous season (Figure 6).

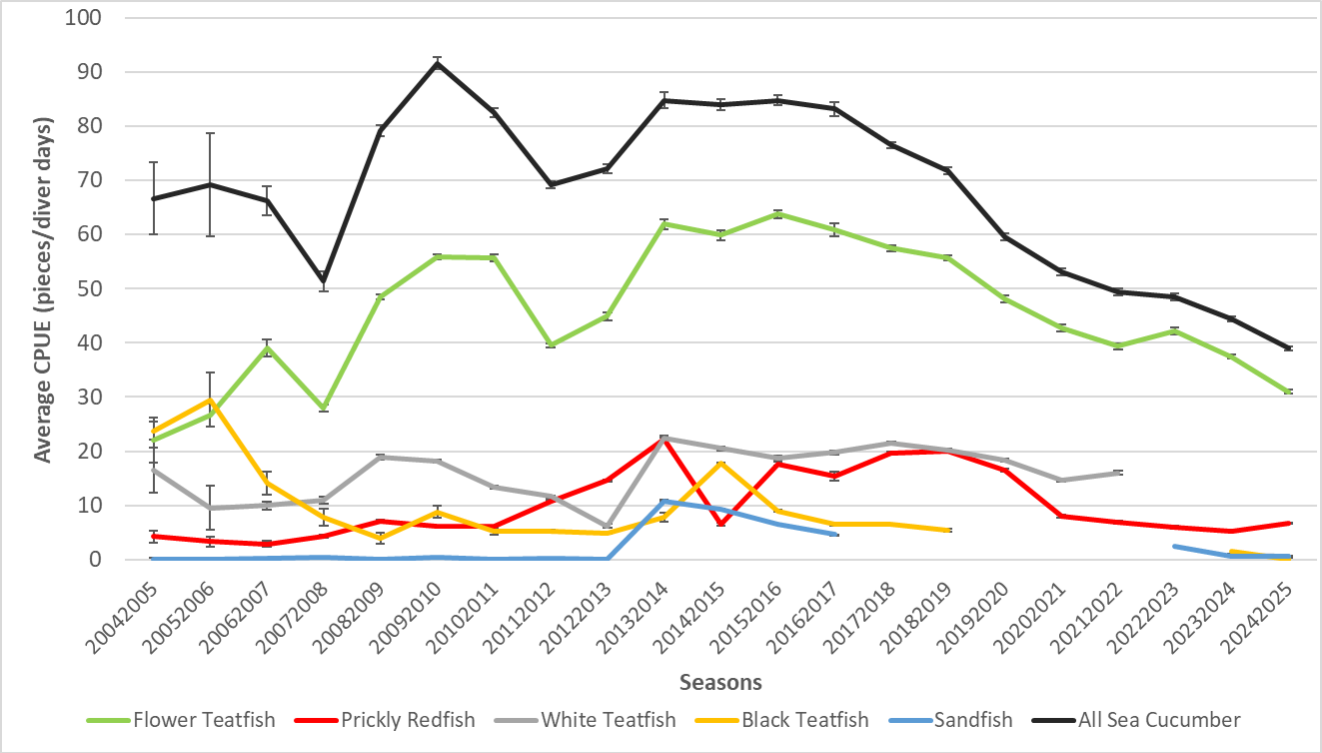

Figure 6: Mean CPUE per diver days by species, and for all species combined for the 2004/2005 to 2024/2025 fishing season.

The overall CPUE for the 2024/2025 season, expressed as the average number of pieces per dive minute, was 0.18, continuing the declining trend observed in recent years. Among species, Flower Teatfish recorded the highest CPUE at (0.15), followed by Prickly Redfish (0.03) and White Teatfish (0.02). Sandfish and Black Teatfish contributed minimally to the overall CPUE, with values of 0.0007 and 0.0005, respectively. Overall, the results indicate a continued decline in CPUE across most species over time. (Figure 7). Both estimates of CPUE are indicating a declining trend (Figure 6 and 7).

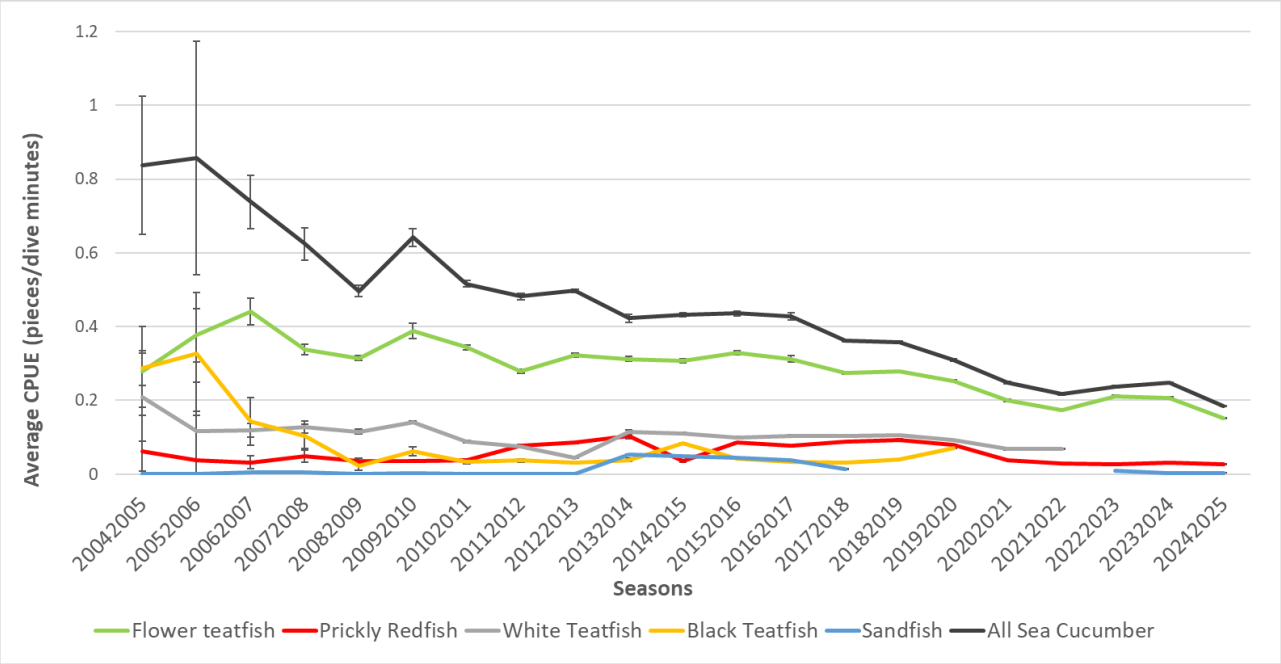

Figure 7: Mean CPUE in pieces per dive minutes by species and for all species combined for the 2004/2005 to 2024/2025 fishing season.

3.5. Quota Utilisation

The box plot illustrates the percentage difference in quota utilisation by fishing vessels since the introduction of quota. Over the four years the mean utilisation for all species has declined, with quotas in the recent years remaining consistently underutilised by most vessels. For the 2024/2025 season 60% of the Flower Teatfish quota was utilised, 56% for Prickly Redfish and only 4% for Golden Sandfish (Table 2).

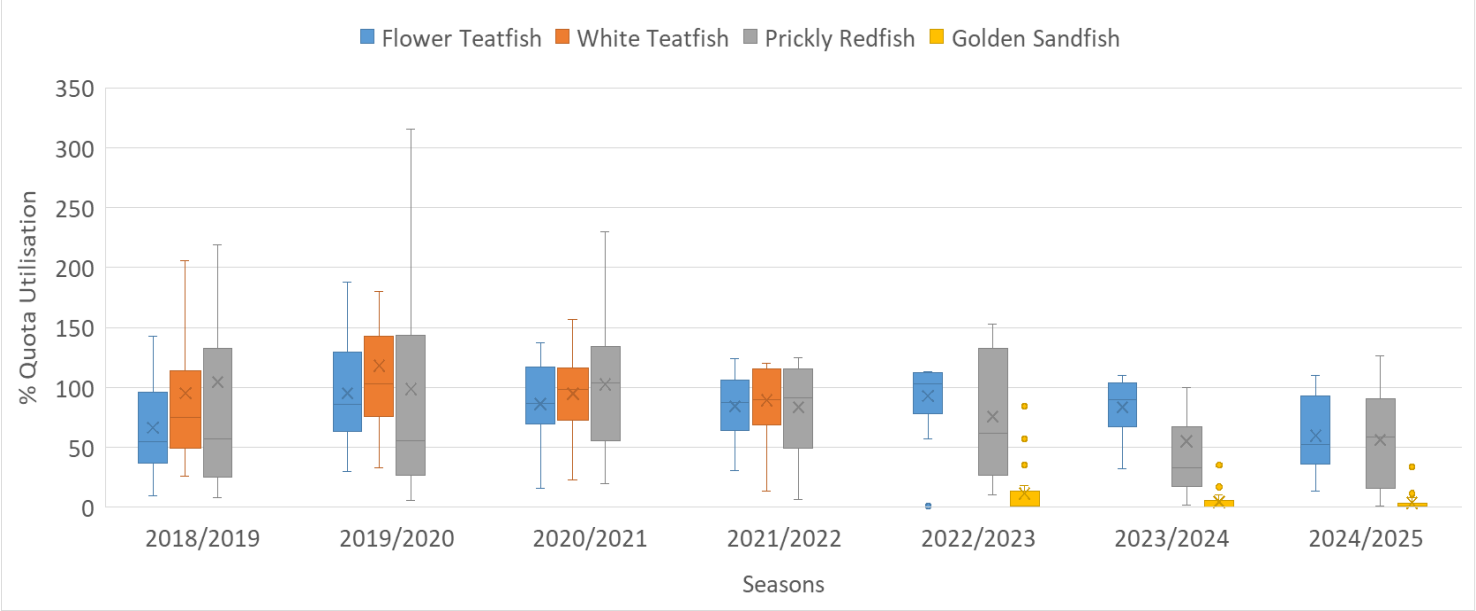

Figure 8: Percentage quota utilisation by species and by fishing season

Table 2: Summary statistics for the percentage quota utilisation amongst fishing vessels by species for 2024/2025 fishing season.

	Flower Teatfish			Prickly Redfish			Golden Sandfish			All species		
Season	**Min**	**Avg.**	**Max**	**Min**	**Avg.**	**Max**	**Min**	**Avg.**	**Max**	**Min**	**Avg.**	**Max**
2024/2025	13	60	110	1	56	126	0	4	34	9	45	82

4.Conclusion

Overall, the 2024/2025 fishing season recorded a significant reduction in fishing effort compared to the previous year, as reflected by fewer trips, substantially lower total dive minutes, and a decline in total diver days. While six out of the 25 licensed vessels participated in the Joint Management Area (JMA) exploratory fishing activities, this alone does not fully explain the magnitude of the observed decline. The decline in catch was much greater than the decline in effort, suggesting that potential changes in resource availability rather than just proportionally less catch due to an effort decline.

Spatial analysis of dive effort and CPUE indicates that fishing activity and catch rates are both widely distributed across the Mahé Plateau, with clear concentrations in the central and northern regions. Dive effort is particularly intense in these areas, suggesting targeted fishing in historically productive grounds. Similarly, CPUE shows localized hotspots within these regions; however, its patchy and heterogeneous distribution across both the plateau and outer island groups.

Catch and CPUE results continue to show that Flower Teatfish remains the dominant contributor to the fishery, while other species contribute relatively little to overall catch rates. Despite this, the continued decline in CPUE across recent seasons is a cause for concern, as it may indicate a reduction in stock abundance. Quota utilisation also declined further during the 2024/2025 season, reaching an average of 45%, the lowest level recorded over the past five seasons.

This persistent under-utilisation of the fishing quota may suggest that the current quota levels do not accurately reflect the present status of the resource. One possible explanation is that the quotas implemented in 2018 relied heavily on population estimates from the 2004 fishery-independent survey, supplemented by information from the 2012 fishery-dependent stock assessment based on logbook catch and effort data. Given the considerable time lag between these assessments and the implementation of the quota system, the underlying estimates may no longer have been fully representative of stock conditions in 2018.

Therefore, If the quota levels were appropriately estimated and effectively maintained stock productivity, abundance indices would be expected to remain relatively stable over time. The continued decline in CPUE may therefore indicate that the current quota levels are not fully aligned with the productive capacity of the stock.

In summary, the combination of declining CPUE trends, reduced fishing effort, lower-than-expected catch volumes, and continued under-utilisation of quotas indicates that some stocks, notably the Flower Teatfish, may be under pressure. Furthermore, as highlighted in previous fishery reports, external factors such as socio-economic conditions and environmental changes should be incorporated into monitoring and

management strategies, as these can significantly influence fishing behaviour, catch efficiency, and stock productivity.

Additionally, further investigation is required to determine the underlying causes of the persistent under-utilisation of quotas. In particular, it is important to assess whether this trend reflects changes in stock abundance and availability, operational and economic constraints affecting fishing activity, or whether the quota levels were established using population estimates that no longer accurately reflected stock status at the time of implementation due to the considerable time lag between the 2004 fishery-independent survey and the introduction of the quota system in 2018.

5.References

Aumeeruddy, R., & Conand, C. (2008). Seychelles: a hotspot of sea cucumber fisheries in Africa and the Indian Ocean region. Sea cucumbers. A global review of fisheries and trade. FAO Fisheries and Aquaculture Technical Paper, 516, 195-209.

Aumeeruddy, R. (2007). Sea cucumbers in Seychelles. In C. Conand & N. A. Muthiga (Eds.), Commercial Sea cucumbers: A review for the Western Indian Ocean (pp. 93–116). Western Indian Ocean Marine Science Association (WIOMSA).

Aumeeruddy,R., Skewes,T., Dorizo, J., Carocci,F., Coeur de Lion,F., Henritte,C., & Cedras,M. (2005). Resource assessment and management of the Seychelles sea
Aumeeruddy, R., & Payet, R. (2004). Management of the Seychelles sea cucumber fishery: status and prospects.

MRAG. (2012). Stock Assessment for the Sea Cucumber Fishery of the Seychelles. Page 75. MRAG Ltd, London.

MRAG. (2017). Assessment of Seychelles' Sea Cucumber Fishery. Page 58. MRAG Ltd, London.

Govinden, R., Ebrahim, A., & Léopold, M. (2024, October). The Seychelles sea cucumber fishery. Regional Thematic School on the Vulnerability of Reef Heritage (DIDEM Program), University of Seychelles, Anse Royale, Seychelles. https://hal.science/hal-04740737

Seychelles Fishing Authority [SFA]. (2018). New management measures and licensing conditions for the commercial sea cucumber fishery.

Seychelles Fishing Authority. (n.d.). Sea cucumber fishery regulations. Seychelles Fishing Authority. Retrieved February 12, 2025, from https://sfa.sc.

6. Appendices

6.1. Appendix I: Paper Logbook

Sea Cucumber Catch and Effort Logbook

Licence No:

No	Date	Fishing Site	Fishing Time		No. Divers	Depth (m)		Dive Time per Diver (minutes)	Species								Total
			Start	End					Flower Teat Fish	White Teat Fish	Black Teat Fish	Prickly Red Fish	Black Fish	Red Surf Fish	Yellow Surf	Sand Fish	
									Pentard	kokosye Blan	Kokosye Nwar	Sanpye	Spork	Vent Blan	Brizan	Kokom	
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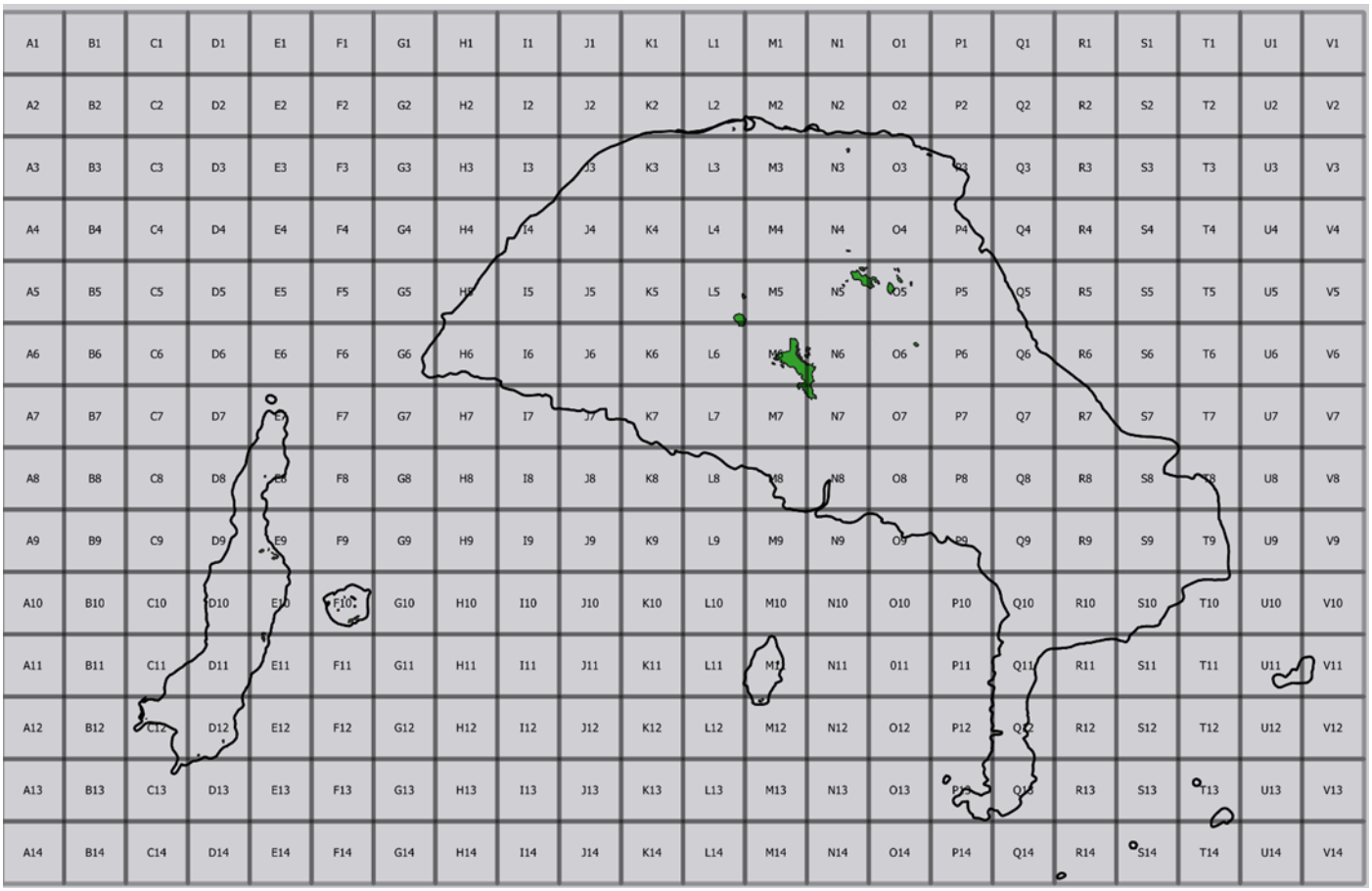
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