SEYCHELLES FISHERIES AUTHORITY

Status Report of the Seychelles Fisheries 2025

Seychelles Fisheries Authority

Fisheries Research

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Acronyms

CAS Catch Assessment survey

CPUE Catch Per Unit Effort

CL Carapace Length

DCLF Data and Capacity limited Fisheries

EEZ Exclusive Economic zone

F Fishing Mortality

FL Fork Length

GDP Gross domestic product

IOTC Indian Ocean Tuna Commission

Kg Kilo grams

M Natural mortality

MAC Management Advisory Committee

mm Millimetres

Mt Metric Tonnes

MSY Maximum Sustainable Yield

nm Nautical miles

SFA Seychelles Fisheries Authority

TAC Total Allowable catch

TL Total Length

UN United Nations

WIO Western Indian Ocean

Summary Table

Fishery	Species	Status		Comments	Chapter
		Fishing Mortalit	Biomass		
Demersal Handline Fishery	Emperor red snapper			WoEF indicating maximally sustainably fished. High fishing pressure. High value species	2.1.1.
	Jobfish			WoEF indicating maximally sustainably fished. High fishing pressure. High value species	2.1.2.
	Brown-spotted grouper			Declining catches and fluctuating CPUE. B/B_{MSY} indicating healthy stock	2.1.3.
	Emperors			CPUE indicating fluctuating biomass. B/B_{MSY} low indicating recovery	2.1.4.
	Other snappers			CPUE stable and increasing. B/B_{MSY} indicating recovery	2.1.5.
	Other groupers			CPUE indicating decline for two vessels. Very large uncertainty in B/B_{MSY}	2.1.6.
Semi-Pelagic Handline Fishery	Trevally			CPUE decline for one vessel type but stable for others and B/B_{MSY} indicating stock depletion	2.2.1.
	Bonito			CPUE has been stable for most years. B/B_{MSY} indicating the stock is not overfished	2.2.2
	Barracuda			CPUE declining for one vessel type but stable for others. B/B_{MSY} at a level indicating stock depletion	2.2.3.
Trap Fishery	Rabbitfish			CPUE declining but B/B_{MSY} at a healthy level. High resilience	3.1.
	Other trap fish			CPUE fluctuating. B/B_{MSY} indicating stock depletion. Multiple species included in the estimation	3.2.
Encircling Gillnet	Mackerel			Never been assessed	4.1.
Lobster Fishery	Pronghorn spiny lobster			Stability in both CPUE and mean carapace size. Level of fishing mortality unknown	5.1.
	Long-legged spiny lobster			Stability in both CPUE and mean carapace size. Level of fishing mortality unknown	5.2.
Sea Cucumber Fishery	Flower teatfish			Decline in density and CPUE estimation	6.1.
	White teatfish			Significant decline in density and CPUE estimation since 2004	6.2.
	Prickly redfish			Stable biomass with increase in CPUE	6.3.
Crab Fishery	Spanner crab			Last assessed in 1995	7.
Octopus Fishery	Octopus			Never been assessed	8.
Shark and Rays Fishery	Sharks and Rays			Never been assessed	9.

Fishing mortality	Not subject to overfishing	Uncertain	Subject to overfishing
Biomass	Not overfished	Uncertain	Overfished

1. Introduction

1.1. Country overview

The Republic of Seychelles is a small island state consisting of 115 widely scattered islands between 3° and 10° S and 45° and 56° E in the Western Indian Ocean. Its Exclusive Economic Zone (EEZ) spans 1.3 million km^2, while its total land area is only 455 km^2. The archipelago is divided into two distinct groups of islands; the granitic group which consist of 43 mountainous islands with narrow coastal plains, and 72 low-lying coralline islands. Mahé is the largest island, with a land area of 153 km^2, accounting for one third of the total land area and home to 80% of the Seychelles population. The other islands of importance are Praslin which hosts around 8% of the population and La Digue, with around 3% of the population (Seychelles Nation, 2013).

Seychelles' economy is primarily dependent on tourism, which contributes directly and indirectly to approximately 55% of the Gross domestic product (GDP) and 26.7% of formal employment (Laing, 2021). The fishery sector closely follows, accounting for 20% of the GDP and 17% of formal employment. Additionally, the fishery sector is responsible for about 93% of the country's export (Laing, 2021).

1.2. The Commercial Fisheries of Seychelles

Fisheries play an important role in the Seychelles economy and contributes significantly to food security. The sector is divided into three categories, which are: industrial fisheries, semi-industrial fisheries and artisanal fisheries (Seychelles Fisheries Authority, 2024b).

The industrial fisheries comprise of all foreign purse seiners and longliners that are licenced to operate in the Seychelles EEZ or vessels that are registered to operate under the Seychelles flag. These fisheries primarily target tuna species such as yellowfin, bigeye and skipjack tuna and operates within the Seychelles EEZ (within designated areas), other foreign EEZ (through agreements) and in international waters (Seychelles Fisheries Authority, 2024b).

Commercial industrial purse seining activities started in 1984 with French and Spanish fleets moving to the Western Indian Ocean (WIO). Since then, fishing activities has increased and in 2023, 47 purse seiners hold licenses to fish inside the Seychelles EEZ. The main fishing nations involved in purse seining in the WIO are France and Spain operating under the European Economic Community Agreement (Seychelles Fisheries Authority, 2024b).

The industrial longline fishery comprises of foreign longliners licensed to fish in the Seychelles EEZ. In 2023, 124 vessels were licensed, with the majority originating from the Taiwan province of China (76), followed by the Seychelles fleet (34) and Mauritius (15)(Seychelles Fisheries Authority, 2024b).

The industrial fisheries sector is the largest contributor to the fisheries sector's exports and earnings through activities such as fish landings, transhipments and processing at the canning factory.

The semi-industrial sector comprises of the monofilament longline fishery and the sea cucumber fishery; both operated solely by locally owned vessels. The semi-industrial longline fishery started in 1995 and the fishery has expanded from 2 active vessels at the beginning of the fishery to approximately 60 vessels in 2023 (Seychelles Fisheries Authority, 2024b). It comprises of vessels ranging from 14 – 23 metres in length targeting mainly swordfish, tuna and other large pelagic species. The fishery primarily operates from the edge of the Mahe plateau within the Seychelles EEZ but can also extend into international waters. The majority of the catch is exported, with only a small percentage sold on the local market.

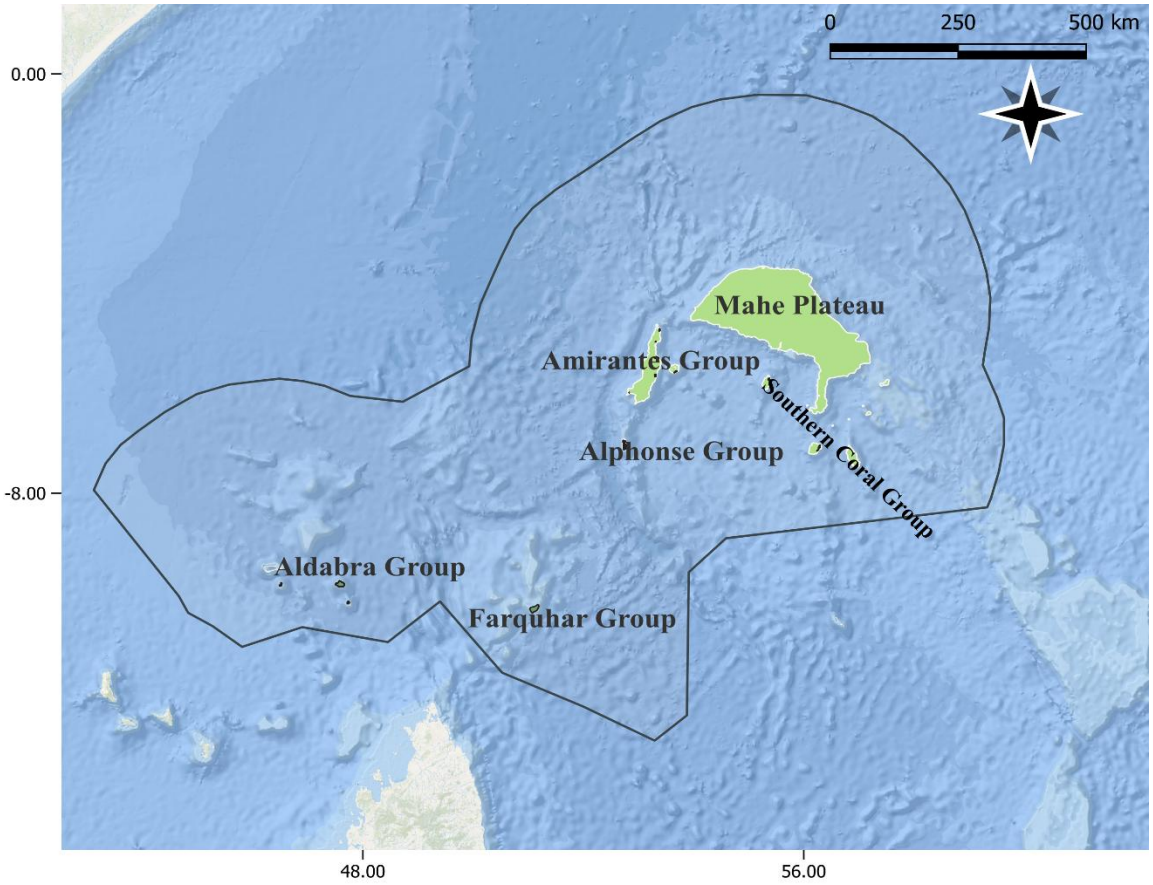
The sea cucumber fishery is currently one of the most regulated fisheries in Seychelles. It is limited to only 25 vessels and three processors targeting three sea cucumber species, primarily on the Mahe and Amirantes plateaus. The vessels may also operate in outer island fishing areas with special authorisation from the Seychelles Fisheries Authority. Majority of the catch is processed into a dried form and exported, mainly to Asian markets(Seychelles Fishing Authority, 2021).

The artisanal fisheries sector is operated solely by Seychellois. It is a multi-species, multi-gear and multi-vessel fishery targeting finfish, crustaceans, and cephalopods (Ministry of Fisheries and Agriculture, 2019). This sector is further divided into the demersal handline fishery, the semi-pelagic handline fishery, the trap fishery, the net fishery, the spanner crab fishery, the lobster fishery, the octopus fishery and the sharks and rays fishery. Vessel operating within this fishery includes outboards vessels such as Mini Mahe and extended Mini Mahe, as well as larger inboard vessels such as lavenir, whalers, lekonomi and schooners (Figure 1). The fisheries operate exclusively within the Seychelles EEZ, with the majority of activities concentrated on the Mahe plateau (Ministry of Fisheries and Agriculture, 2019). In 2023, there were over 800 registered fishers with a fleet of more than 500 fishing vessels although the average number of vessels active per month was around 262 (Seychelles Fisheries Authority, 2024b).

Figure 1: Some vessels styles used within the Seychelles artisanal fisheries

1.3. Fishing Areas

The Mahe plateau is a steep-sided plateau that rises rapidly from depths of around 1,000m. It is encompassed by an incomplete shallow rim at depths of 10-20m, enclosing a central area with depth of about 50-65m. This central area features subsurface granite and coral outcrops that form small banks (Seychelles Fishing Authority, 2020). The majority of the Seychelles population resides on the three main inner granitic islands of Mahe, Praslin and La Digue. Consequently, the majority of the artisanal fishing activities are concentrated within nearshore banks and within the boundaries of the Mahe plateau (MRAG Ltd, 1994). The remaining islands and plateaux lie to the south and west of the Mahe plateau and are coralline in nature. These include the Amirantes plateau, Platte and Coetivy islands in the Southern Coral groups, the Alphonse group, the Aldabra group and the Farquhar group (Map1). Additionally, there are several submerged but shallow banks such as Fortune bank, which lies south of the Mahe plateau (MRAG Ltd, 1994).



Map 1: Seychelles Exclusive Economic Zone (outline in black) with the Mahe plateau and Amirantes plateau in green and the major island groups.

1.4. Data Collection

For all the fisheries, data are collected with the objective of ensuring the appropriate management of fishery resources. The primary types of data collected include catch, fishing effort, length frequency, biological values, export statistics and socio-economic data. For the industrial and semi-industrial fishery catch data are collected through logbooks. For the artisanal finfish and octopus fisheries, catch and effort data are collected through the catch assessment survey (CAS) implemented by the Fisheries Statistics Department of the SFA. Additionally, length frequency data for three demersal species and one family within the trap fishery are collected by the Fisheries Research Department. Sea cucumber catch and effort data are obtained through logbooks and port inspection of landings. For the Lobster and Spanner crab fishery, catch and effort data are collected through logbooks, while length and weight data are collected by the Fisheries Research department through landing samplings.

1.5. Purpose of the report

This report presents the status of fish stock within the Seychelles fisheries, focusing specifically on local stocks in the artisanal fishery and the sea cucumber fishery within the semi-industrial sector. Several indicators were used when

determining the status including catch trends, catch per unit effort (both standardized and unstandardized) and length frequency data, where available. Additionally, any stock assessments conducted within the past five years were incorporated to give a more comprehensive understanding of the stock status.

Shared pelagic stocks such as tuna and billfishes, targeted by the Industrial and Semi-industrial fisheries are assessed and managed by the Indian Ocean Tuna Commission (IOTC). Detailed information on the status of these stocks can be found on the IOTC website (https://iotc.org/science/status-summary-species-tuna-and-tuna-species-under-iotc-mandate-well-other-species-impacted-iotc).

Readers should note that some catch and effort figures presented in this report may differ from previously published documents. These differences may be due to updates done on the data through revisions and changes in the database that has been undertaken.

2. Seychelles Artisanal Handline Fisheries

The handline fishery accounts for around 78% of the total landings within the artisanal fishery in 2023 (Seychelles Fisheries Authority, 2024b). This fishery consists of fishers operating monofilament handlines equipped with up to 4-8 hooks per line, each baited with small pelagic fish such as mackerel or bonito(Wakeford, 2000). The fishery operates on the Mahe Plateau and other smaller offshore fishing banks. The main boat types operating in the fishery consists mainly of small outboard vessels including the mini-Mahe, whalers, and schooners. The smaller vessels usually operate within 10nm (nautical mile) of the granitic islands and 'inshore' areas while the larger vessels target offshore banks and outer islands(Seychelles Fisheries Authority, 2024b). In 2023, the fishery recorded a catch of 3340.8 Mt with an effort of 83,058 men-days giving a CPUE of 41.43 kg/mendays. The highest catch recorded within the past 10 years was in 2019, with 4,411.1 Mt, while the highest CPUE was reported in 2013 with 62.7kg/mendays (Seychelles Fisheries Authority, 2024b).

The artisanal hand-line fishery consists of two main fisheries, identified based on the targeted species. These are the demersal handline fishery and the semi-pelagic handline fishery.

2.1. Demersal handline Fishery

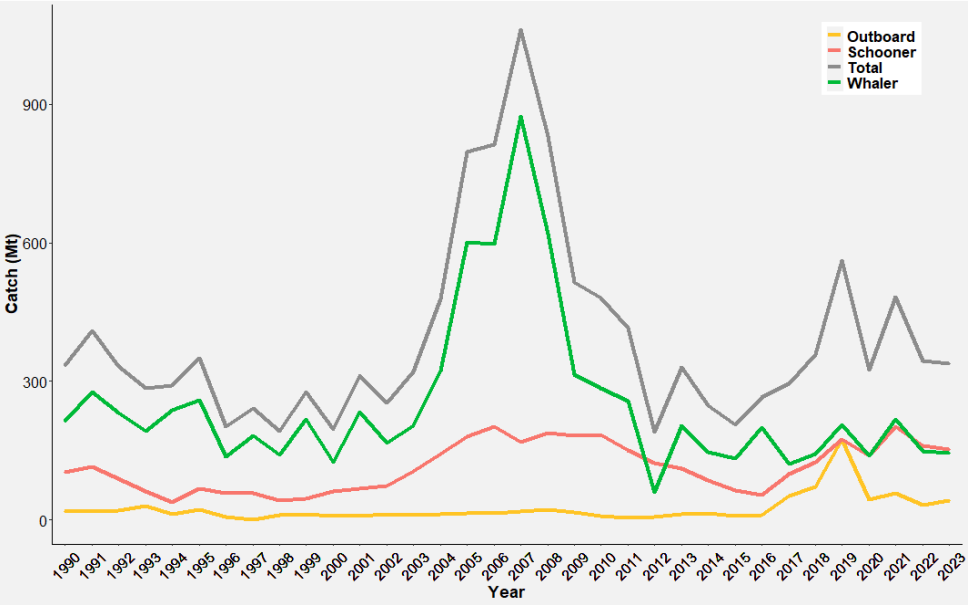
The demersal handline fishery accounts for more than 23% of the total landings for the artisanal fisheries. The fishery catches over 100 different species at depths ranging between 15 – 150m. Key species include demersal species such as snappers (*Lutjanidae*), groupers (*Epinephelinae*), and emperors (*Lethrinidae*). The fishery is currently managed partly under the "Mahe Plateau Trap and Line Fishery Co-management Plan" (Seychelles Fishing Authority, 2020). Some measures currently in place includes, minimum landing size of 32cm (fork length) for *Lutjanus sebae* and *Aprion virescens* and bag limits for other fishery types such as sport and recreational fishery (Seychelles Fishing Authority, 2020). Data for the catch assessment survey are collected for several species and species groups, including *Lutjanus sebae*, jobfish, *Epinephelus chlorostigma*, *Lethrinidae*, other snappers, and other groupers.

2.1.1. Emperor Red Snapper

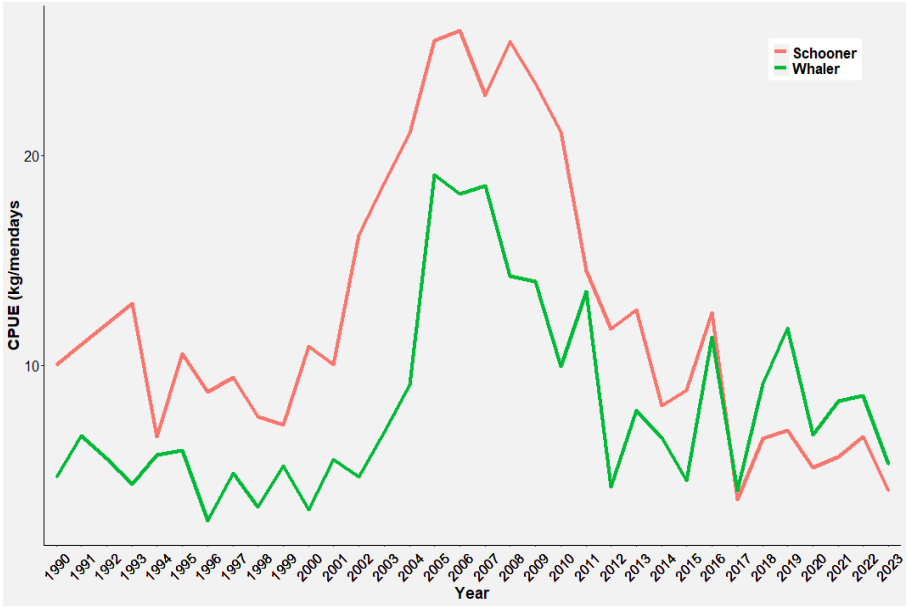
Emperor red snapper *(Lutjanus sebae)*, a species of the Lutjanidae family, is one of the high value species within the artisanal fishery. In the annual SFA statistics report, the catch for this species is reported separately at species level. It is one of the indicator species for the fishery, therefore, length data is routinely collected at landing sites as part of the biological sampling programme.

Catch

Catches for Emperor red snapper increased from 450Mt to over 1000Mt between 2003 and 2007. From 2007 to 2012 catches declined from 1000Mt to about 200Mt. The catch remained stable from 2014 until 2023 (Sebae Figure 1). The catch in 2023 was 339 Mt. The vessel type with the most catch was schooner, landing 152.3Mt in 2023 and 160.1 Mt in 2022. In 2023, the nominal CPUE for whaler was 5.27 kg/mendays, while for schooner it was 4.02 kg/mendays (Sebae Figure 2)



Sebae Figure 1: Catch (Mt) by fleets between 1990 – 2023 using handlines



Sebae Figure 2: Nominal CPUE (kg/mendays) by fleets between 2003 – 2023

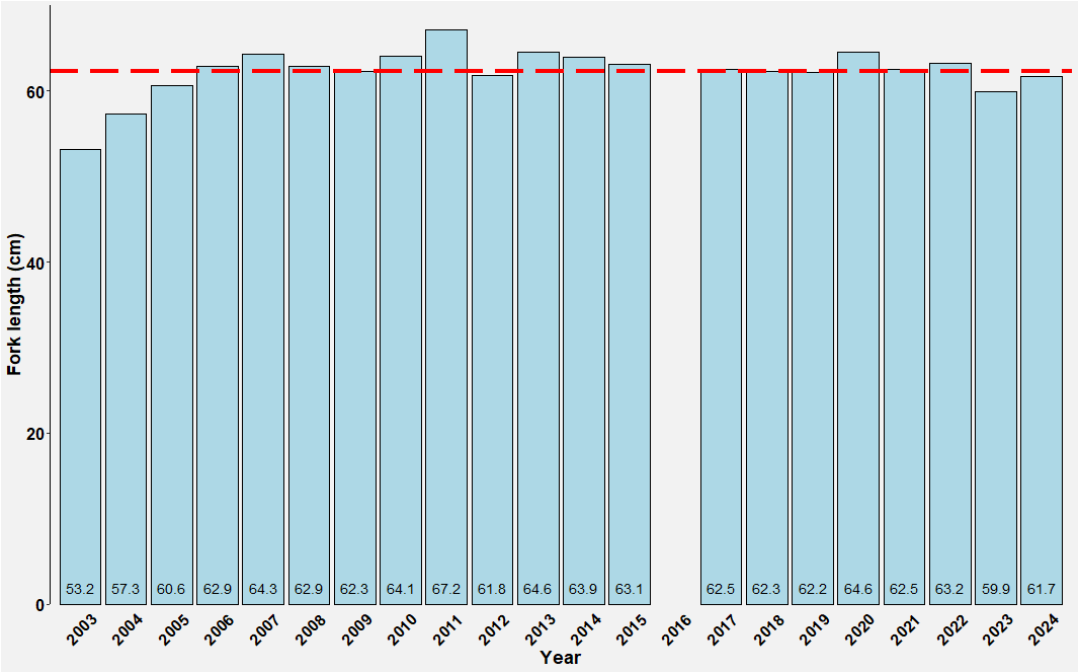
Biology

English name: Emperor Red snapper Local Name*:* Bourzwa

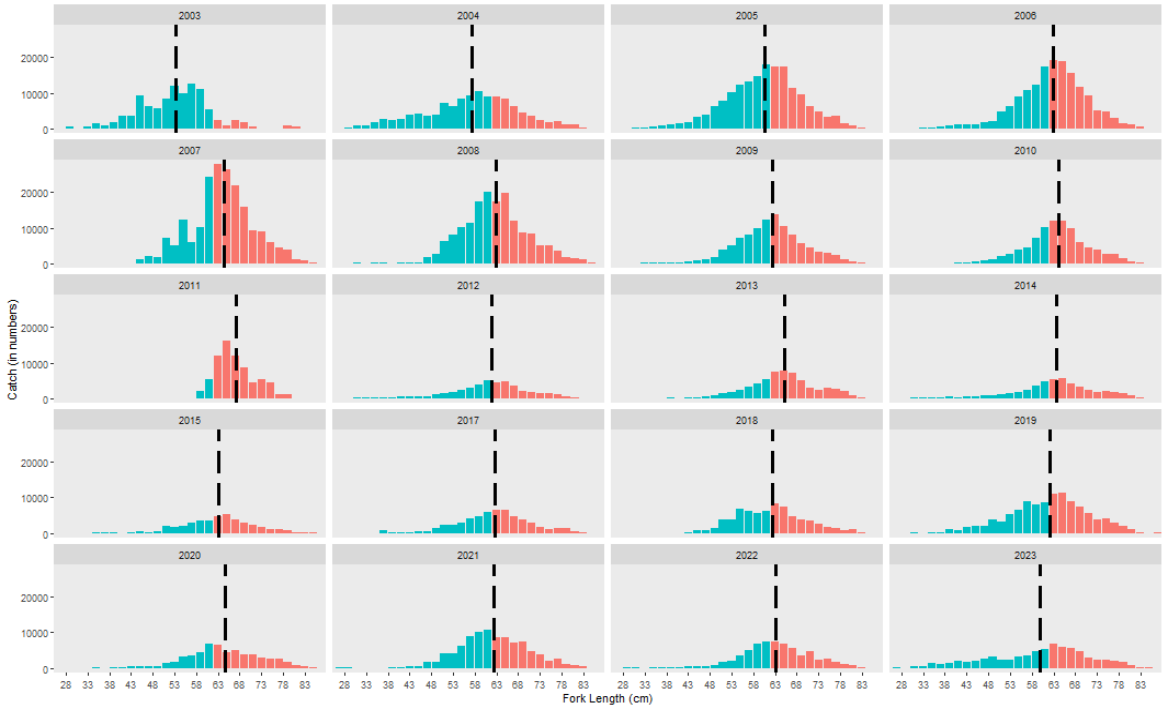
Parameter	Description
General	Form schools of similar-sized individuals or are solitary. Feed on fishes, crabs, stomatopods, other benthic crustaceans, and cephalopods
Range	**Species:** Tropical, 34°N-36°S, 34°E-159°SE **Stock:** Mahe plateau
Depth distribution	5-180 m
Preferred habitats	Occurs near coral or rocky reefs, also adjacent sand flats and gravel patches
Longevity	34 yrs
50% maturity	9 yrs (62 cm)
Spawning season	February-April, September/October
Size	**Maximum:** 116 cm (male/unsexed)

Length Frequency

The mean fork length fluctuated between 53cm - 67cm from 2003 to 2024, with a historical mean of 62.25cm (Sebae Figure 3). A large portion (42%) of fish caught throughout this period were below the size of maturity, with the mean size for most years being below or at 62cm (Sebae Figure 4). Therefore, indicating that large number of juveniles are being caught in the line fishery.



Sebae Figure 3: Mean fork length in cm by year (2003 – 2024). Red line indicating historical average



Sebae Figure 4: Fork length frequency distribution by year (2004 – 2024). Bars in blue indicating fish below the size at maturity (62cm FL). Dash black line indicating mean fork length for the year.

Stock Assessment

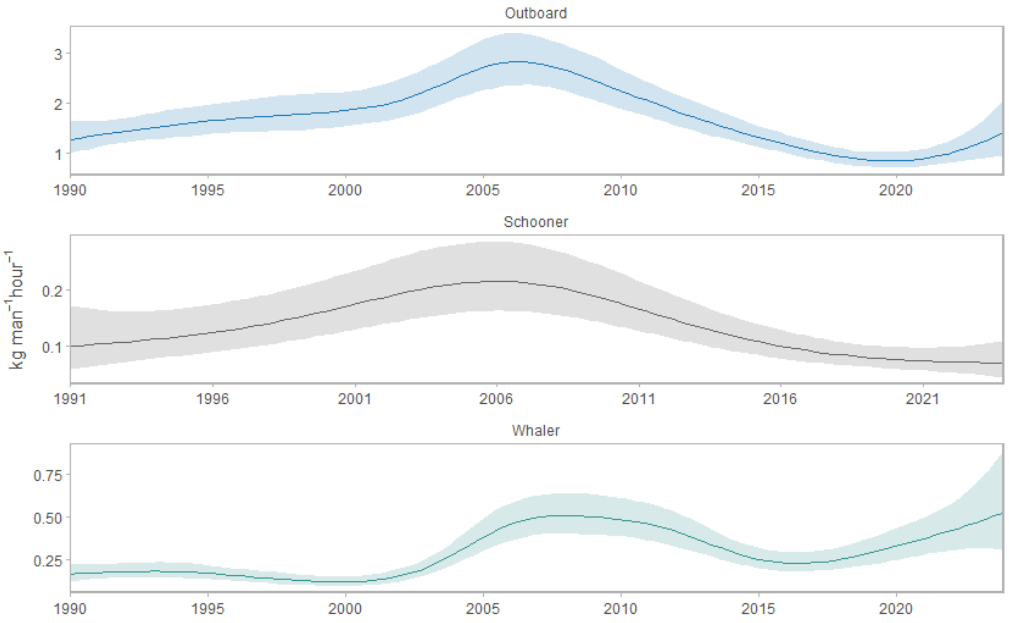
A catch-based stock assessment of Emperor red snapper was conducted using CAS data collected from 1990 to 2019 (Robinson, 2021). In addition, the annual length-based assessment to estimate fishing mortality (F) using length converted catch curves was also undertaken(Seychelles Fisheries Authority, 2024d).

Description of the stock

In the absence of information on the genetic connectivity, mixing and identity of the stock, the population of Emperor red snapper on the Mahe plateau is considered to be a unit stock, due to its remote location.

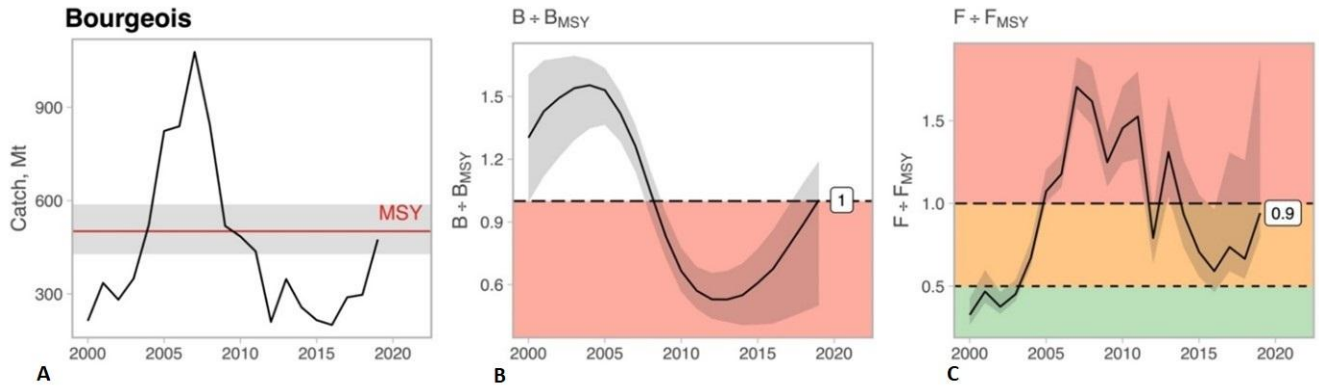
Catch based stock assessment

Standardised CPUE for outboard vessels increased from 1990 until 2007, followed by continuous decline, with the lowest value recorded in 2020 after which it started to increase again. Similarly, CPUE for whalers increased and peaked in 2010, after which it fluctuated in subsequent years. The schooner handline fleet has continuously decline in CPUE since 2007 (Sebae Figure 5).



Sebae Figure 5: Standardized CPUE by fleet determined by Robinson (2021) and updated up to 2023

Between 2005 and 2008 catches were well above the estimated maximum sustainable yield (MSY), following which it declined rapidly. For several years catches remained low and well below the MSY. However, an increase in catches toward the MSY was observed from 2016, indicating signs of stock recovery. The spawning biomass relative to biomass at MSY declined to below 1 during this period, reflecting low biomass. However, recovery in biomass can be observed since 2014. The species experienced high fishing pressure, particularly as from 2004, at levels that risk stock depletion (Robinson, 2021).

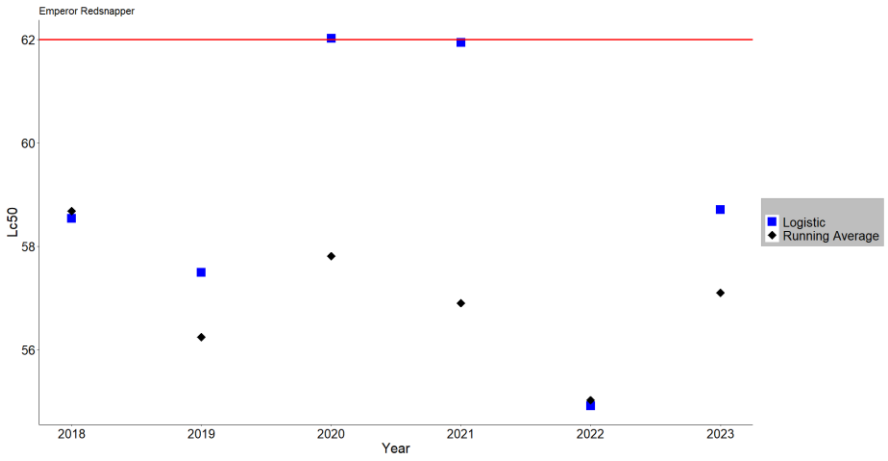


Sebae Figure 6: Indicating catch and estimated MSY (A), spawning biomass relative to biomass at MSY (B) and estimated fishing mortality and fishing mortality at MSY (C) estimated by Robinson (2021)

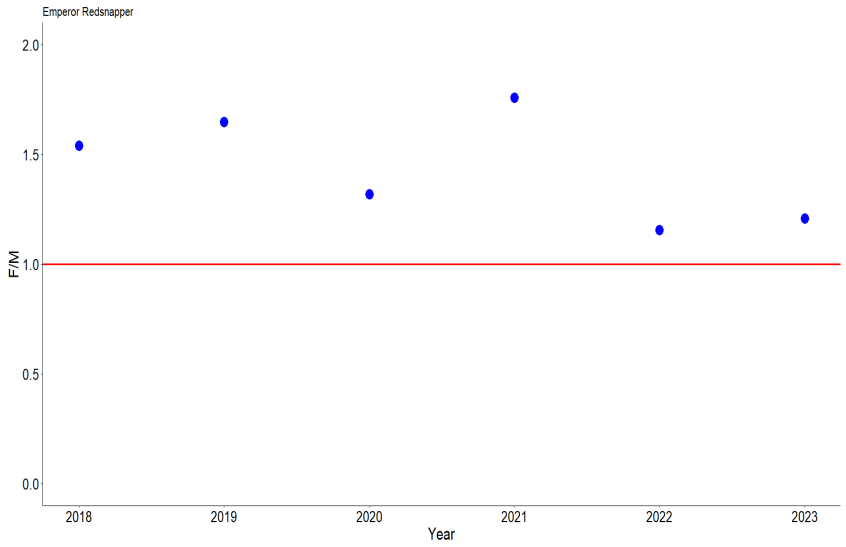
Length-based stock assessment for Lutjanus sebae

An average of two age-based estimates (Grandcourt et al., 2008; Newman et al., 2000)and 2 length-based estimates (Mees, 1992) were used as point estimates of growth parameters where K = 0.163; L_{∞} = 88.6; t_0 = -0.95 in the yield software. An estimate of natural mortality based on an average derived from two methods; M = 1.5K and an age-based estimate derived by Grandcourt et al. (2008)using the Hoenig (1983) empirical equation was used.

In 2023, the estimated logistic length at first capture (L_{c50}) was 58.71cm, while the running average L_{c50} was 57.10cm, both of which was below length at maturity of 62cm (Sebae Figure 7). The F/M ratio which is used an indicator for F_{MSY} was continuously above 1 indicating high fishing pressure. The yield-per-recruit analysis indicated that MSY would occur when fishing mortality (F) is around 0.63 and the Spawning Stock Biomass (SSB) would be reduced to less than 20% (a usual limit reference point) when F = 0.27 (CI= 0.15-0.47). The estimated F was 0.22 (0.058-0.38) which was within the range of the limit reference point, however the upper range of F exceed the upper limit (Seychelles Fisheries Authority, 2024d).



Sebae Figure 7: Estimated length at capture (Lc_{50}) estimated using a natural mortality (M) of 0.182 using a logistic and running average. Red line is indicating size at maturity (Lm_{50})



Sebae Figure 8: Ratio of fishing mortality to natural mortality used as an indicator of fishing mortality that will achieve MSY (F_{MSY})

FAO Weight of Evidence Framework (WoEF)

The Weight of evidence framework is a tool developed by the Food and Agriculture Organisation an agency of the United Nations (UN). The framework is a tool to guide and support participatory evidence-based fisheries assessment and decision-making advice for Data and Capacity limited Fisheries (DCLF). The process entails gathering, compiling and analysing all evidence that can be used to determine the status of a stock. The use of the framework enhances transparency and accountability by proving a clear and documented rational on how a conclusion was reached.
The weight of evidence has been applied to several stock of the Seychelles fisheries including the Emperor red snapper. The process concluded that the Emperor red snapper stock is Maximally Sustainably fished.

Stock status determination

Based on the conclusion from the WoEF which has compiled all the previously mentioned information for the stock status it can be concluded that the stock is not overfished. However, the high levels of fishing effort also indicates that the stock is subject to overfishing.

	Fishing mortality	**Biomass**
Emperor red snapper		

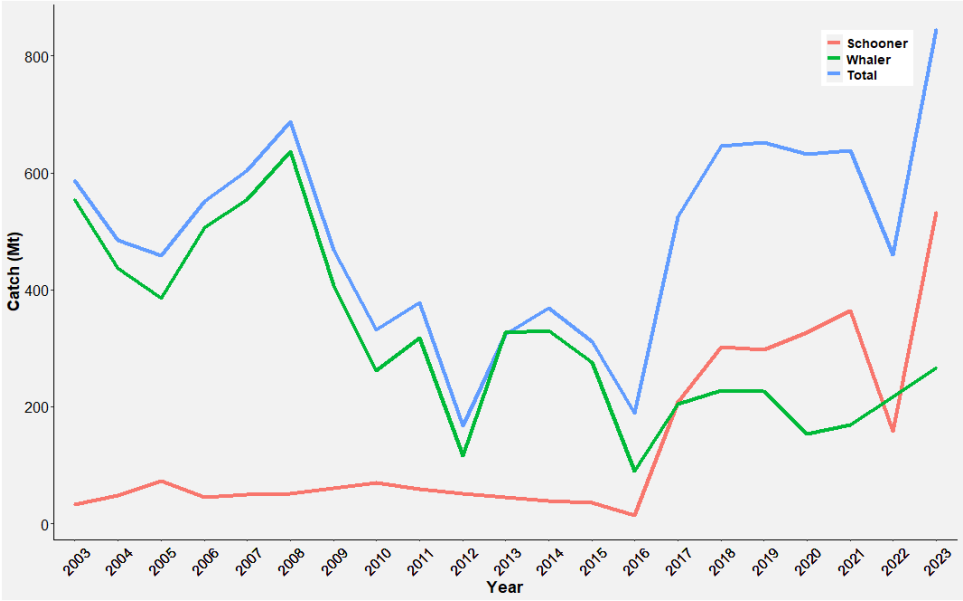
Fishing mortality	Not subject to overfishing	Subject to overfishing	Uncertain
Biomass	Not overfished	Overfished	Uncertain

2.1.2. Jobfish

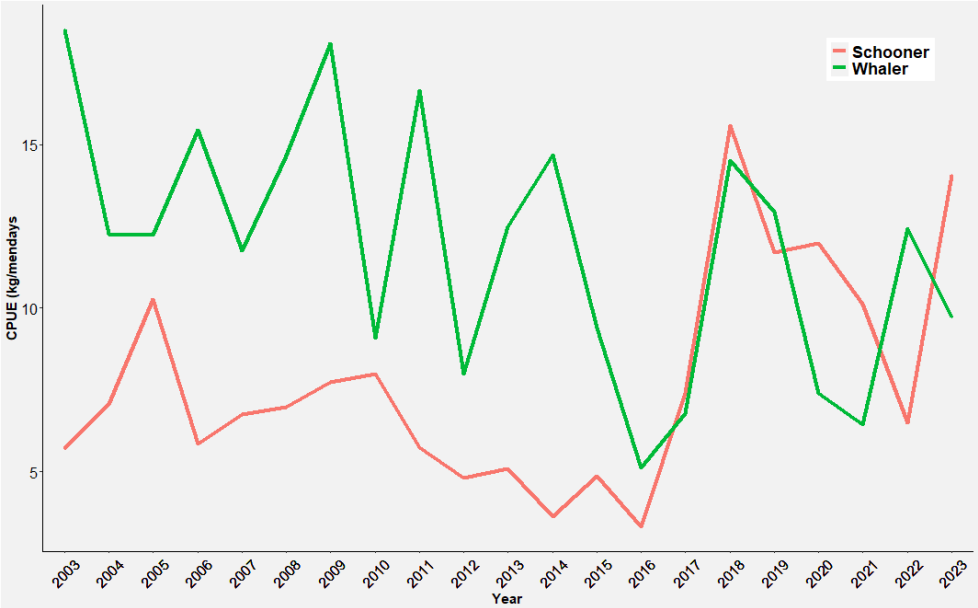
Jobfish (Etelinae) is a subfamily within the snapper family (Lutjanidae), comprising five genera which includes *Aphareus*, *Aprion*, *Etelis* and *Pristipomoides* (Nelson et al., 2016). Catch data classified collectively as "jobfish", consists of mainly three species, *Aprion virescens* (Green jobfish, Zob gri), *Pristipomoides filamentosus* (Crimson jobfish, batrikan) and *Aphareus rutilans* (Rusty jobfish, zob zonn). Historically Green jobfish makes up around 75% of the jobfish catch. Green jobfish is one of the indicator species for the artisanal demersal fisheries, therefore, length data is routinely collected for this species at landing sites as part of the biological sampling programme.

Catch

The total jobfish catch for whaler and schooner using handlines was 845.7 Mt in 2023 which was historically the maximum catch recorded (Jobfish Figure 1). A decline in catch was observed from 2009 to 2012 with the lowest catch of 167.3 Mt observed in 2012. After 2012, fluctuations in catch were observed however it remained low until 2016 when it started to increase again. For both whaler and schooner, nominal CPUE declined until 2016, after which it started to increase and fluctuate (Jobfish Figure 2).



Jobfish Figure 1: Catch (Mt) by fleets between 2003 – 2023 using handlines



Jobfish Figure 2: Nominal CPUE (kg/mendays) by fleets between 2003 - 2023

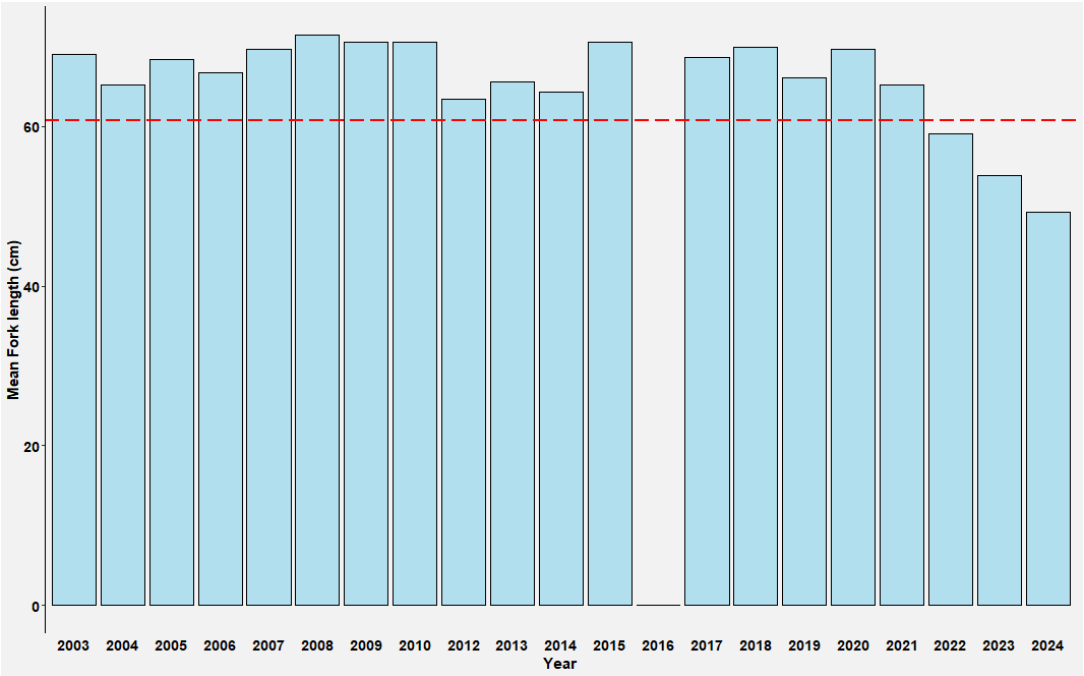
Biology

English name: Jobfish Local Name*: Zob*

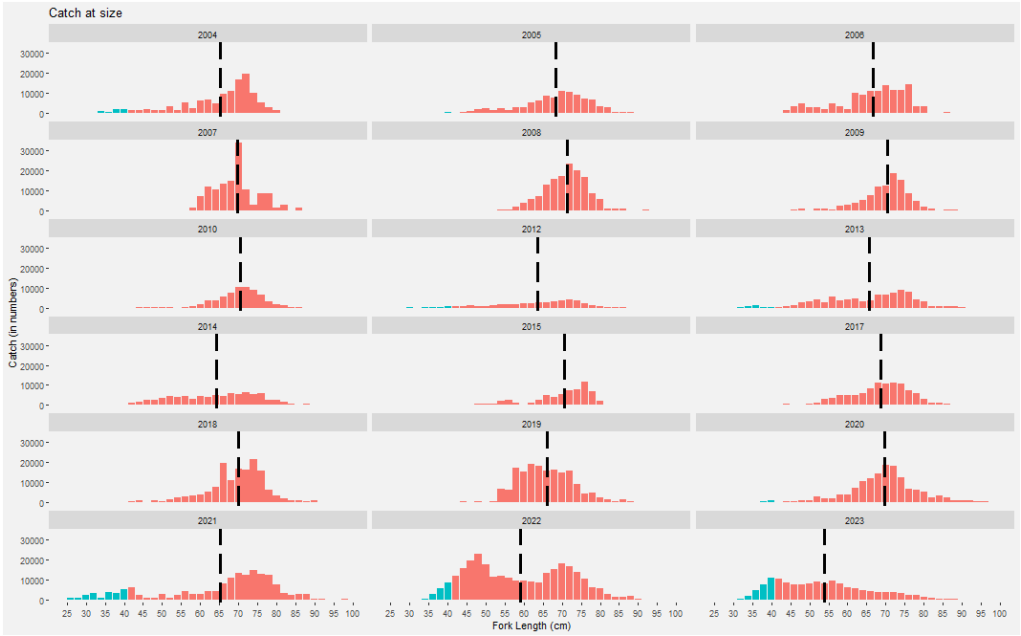
Parameter	Description
General	Found in benthopelagic marine waters. Usually, solitary but can sometimes be found in groups. Feed mainly on fishes, but also on shrimps, crabs, cephalopods and planktonic organisms.
Range	**Species:** Tropical, 35°N - 31°S, 33°E - 134°W **Stock:** Mahe plateau
Depth distribution	0 – 180m
Preferred habitats	Adults inhabit open waters of deep lagoons, channels, or seaward reefs
Longevity	32 yrs
50% maturity	4 – 5 yrs, 40.2cm FL
Spawning season	December – March, potential spawning March - May
Size	**Maximum:** 112cm TL male

Length frequency

The mean fork length has fluctuated between 49cm and 71cm for the past years, with a historical mean of 60.79cm (Jobfish Figure 3). On average, approximately 8% of the sampled catch of Green jobfish were under the length of maturity of 40.2cmFL (Jobfish Figure 4).



Jobfish Figure 3: Mean fork length in cm for Green jobfish by year. Red line indicating historical average.



Jobfish Figure 4*:* Green jobfish fork length frequency distribution by year. Bars in blue indicating fish below the size at maturity (40.2 cm). Dash black line indicating mean FL for the year.

Stock Assessment

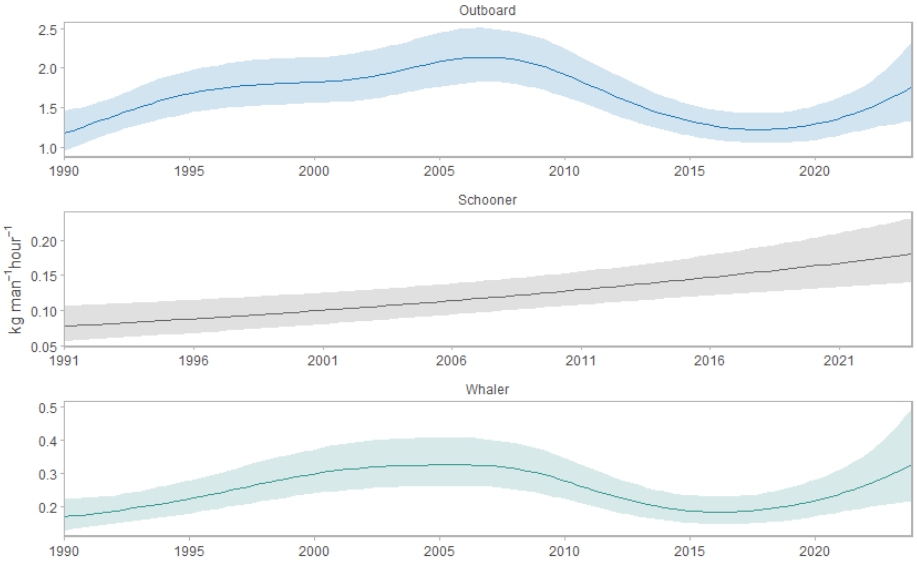
A catch-based stock assessment was conducted on jobfish using CAS data collected from 1990 to 2019 (Robinson, 2021). In addition, the annual length-based assessment to estimate fishing mortality (F) using length converted catch curves was also undertaken on just Green jobfish (Seychelles Fisheries Authority, 2024d).

Description of the stock

In the absence of information on the genetic connectivity, mixing and identity of the stock, the population of Green jobfish and all other jobfish targeted on the Mahe plateau is considered to be a unit stock, due to its remote location.

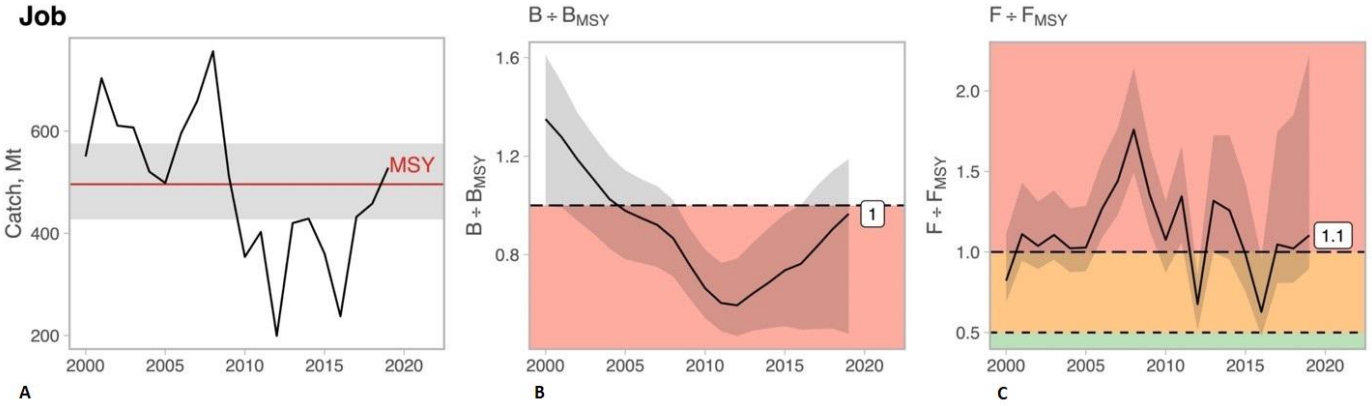
Catch based stock assessment

The standardised CPUE of outboard vessels increased from 1990 to around 2006, before declining, reaching its lowest point in 2020 prior to increasing again. For schooner, standardised CPUE has continuously increased since 1991. For whaler, the CPUE show an increasing trend from 1990 to around 2007, followed by a decline, reaching its lowest point in 2015 after which it started to rise again (Jobfish Figure 5)



Jobfish Figure 5: Standardized CPUE by fleet determined by Robinson (2021) and updated up to 2023

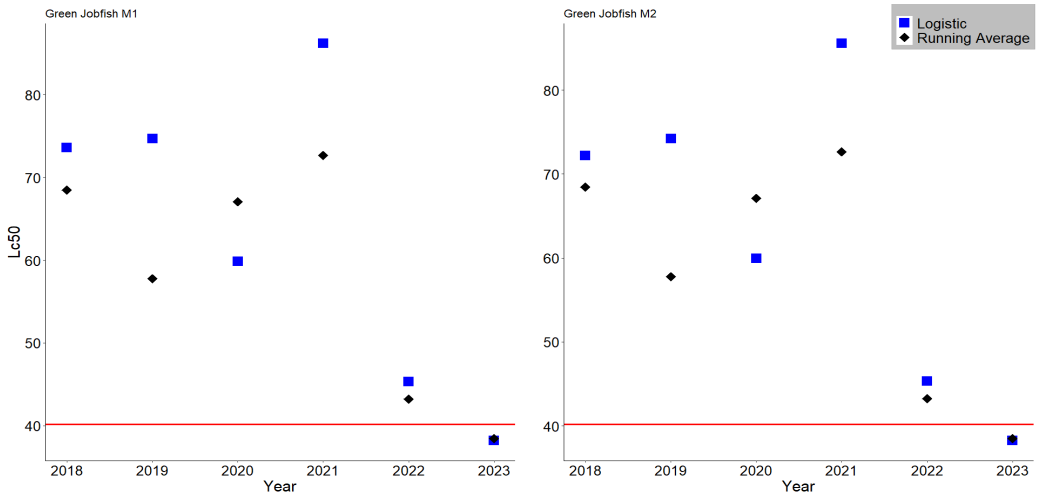
Between 2009 and 2018, the jobfish catch was below the MSY. However, as from 2019 the catch increased above the MSY (Jobfish Figure 6 A). The spawning biomass relative to biomass at MSY was below 1 which indicates stock depletion (Jobfish Figure 6 B). The fishing mortality relative to MSY is above 1 which indicates that fishing pressure is at a level that is causing stock depletion (Jobfish Figure 6 C) (Robinson, 2021).



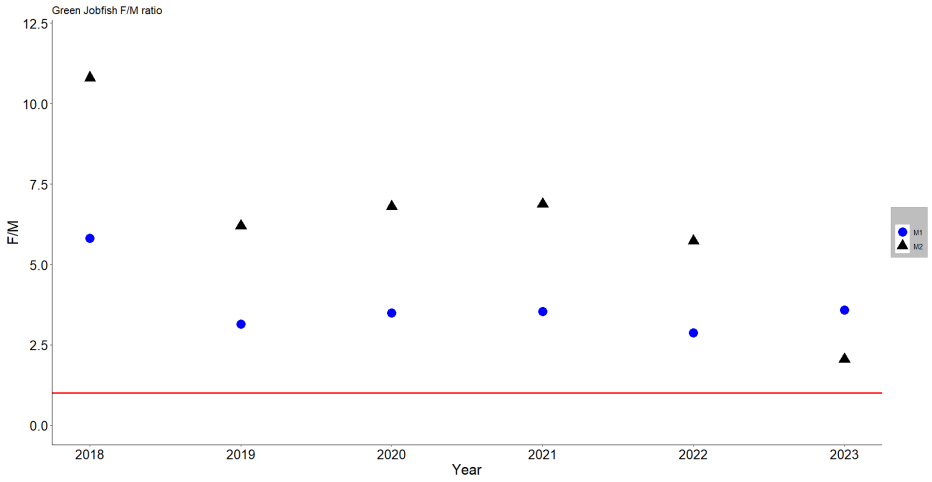
Jobfish Figure 6: Indicating catch and estimated MSY (A), spawning biomass relative to biomass at MSY (B) and estimated fishing mortality and fishing mortality at MSY (C) estimated by Robinson 2017

Length-based stock assessment for Green jobfish

For Green jobfish in 2023, based on both estimate of M, Lc50 was less than Lm50, unlike in previous years where Lc50 was more than Lm50. The F/M ratio was looked at as an indicator of over-exploitation, considering that F=M has been suggested as a proxy for F(MSY). The F/M ratio was 2.88 in 2022 and 3.58 in 2023 with M1 (0.26) and with M2 (0.39) it was 1.59 in 2022 and 2.05 in 2023. With both estimates of M, the ratio is indicating high fishing pressure (Seychelles Fisheries Authority, 2024d).



Jobfish Figure 7: Estimated length at first capture (Lc_{50}) estimated using two natural mortality values (M1 = 0.26; M2 = 0.15) using a logistic and running average model.



Jobfish Figure 8: Ratio of fishing mortality to natural mortality used as an indicator of fishing mortality that will achieve MSY (F_{MSY})

FAO Weight of Evidence Framework (WoEF)

The Weight of evidence framework is a tool developed by the Food and Agriculture Organisation an agency of the United Nations (UN). The framework is a tool to guide and support participatory evidence-based fisheries assessment and decision-making advice for Data and Capacity limited Fisheries (DCLF). The process entails gathering, compiling and analysing all evidence that can be used to determine the status of a stock. The use of the framework enhances transparency and accountability by proving a clear and documented rational on how a conclusion was reached.

The weight of evidence has been applied to several stock of the Seychelles fisheries including the Green jobfish. The process concluded that the Green jobfish stock is Maximally Sustainably fished.

Stock status determination

Based on the conclusion from the WoEF which has compiled all the previously mentioned information for the stock status it can be concluded that the stock is not overfished. Fishing mortality is at a level that either causes stock to be at risk of depletion or at a level that causes depletion. Therefore, the stock for jobfish was determined to be subject to overfishing.

	Fishing mortality	**Biomass**
Jobfish (Etelinae)		

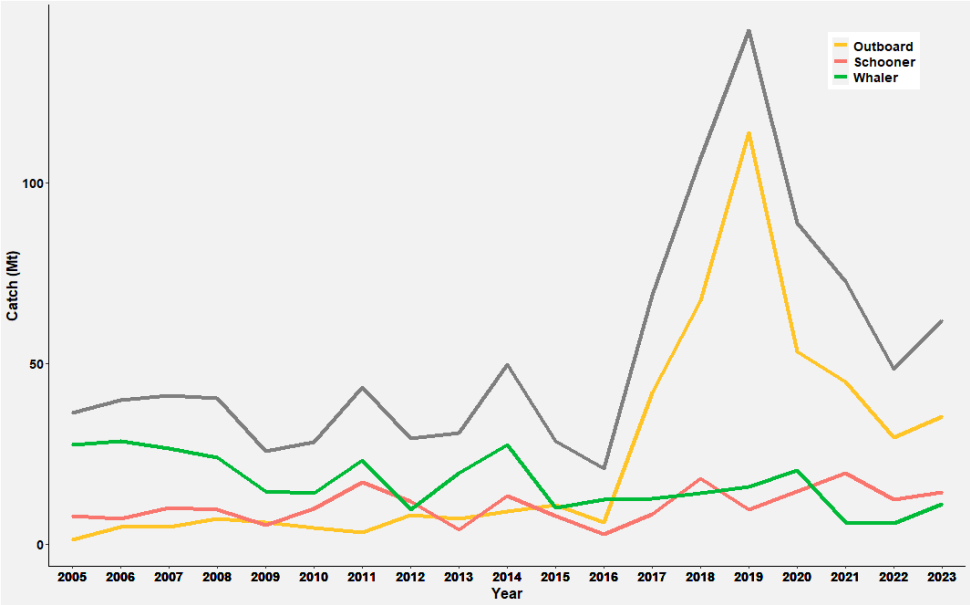
Fishing mortality	Not subject to overfishing	Subject to overfishing	Uncertain
Biomass	Not overfished	Overfished	Uncertain

2.1.3. Brown-spotted Grouper

Brown-spotted grouper *(Epinephelus chlorostigma)* is a species in the sub family Epinephelinae part of the Serranidae family. In the annual SFA statistics report, the catch for Brown-spotted grouper is reported individually. It is one of the indicator species for the artisanal demersal fisheries, therefore, length data is routinely collected for this species at landing sites as part of the biological sampling programme.

Catch

Total catch was 61.8 Mt in 2023 for all vessels using handlines (Chlorostigma Figure 1). Maximum catch for all vessels was 142.1Mt obtained in 2019. There was a rapid rise in outboard catch from 5.84Mt in 2016 to 41.8Mt in 2017. Catch for both whaler and schooner remained fluctuating below 20Mt. Nominal CPUE for both whaler and schooner fluctuated throughout the years since 2003. Schooner reached a peak of 1.65 kg/mendays in 2011 after which it continued to declined reaching the lowest CPUE of 0.29 kg/mendays in 2017. The CPUE for schooner in 2023 was 0.37 kg/mendays. For whaler CPUE started to increase as of 2018 following a rapid decline in 2015 reaching 0.22 kg/mendays in 2021. The CPUE in 2023 was 0.40 kg/mendays (Chlorostigma Figure 2)

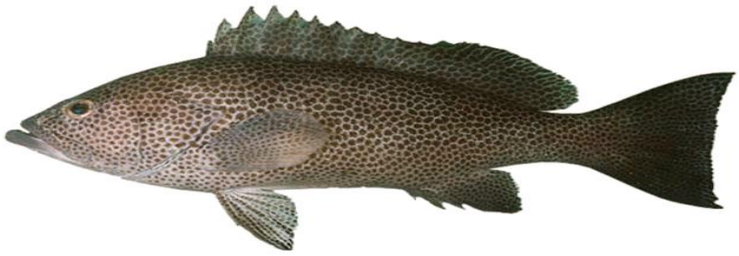


Chlorostigma Figure 1: Catch (Mt) by fleets from 2003 – 2023 using handline

Chlorostigma Figure 2: Nominal CPUE (kg/mendays) by fleets between 2003 – 2023

Biology

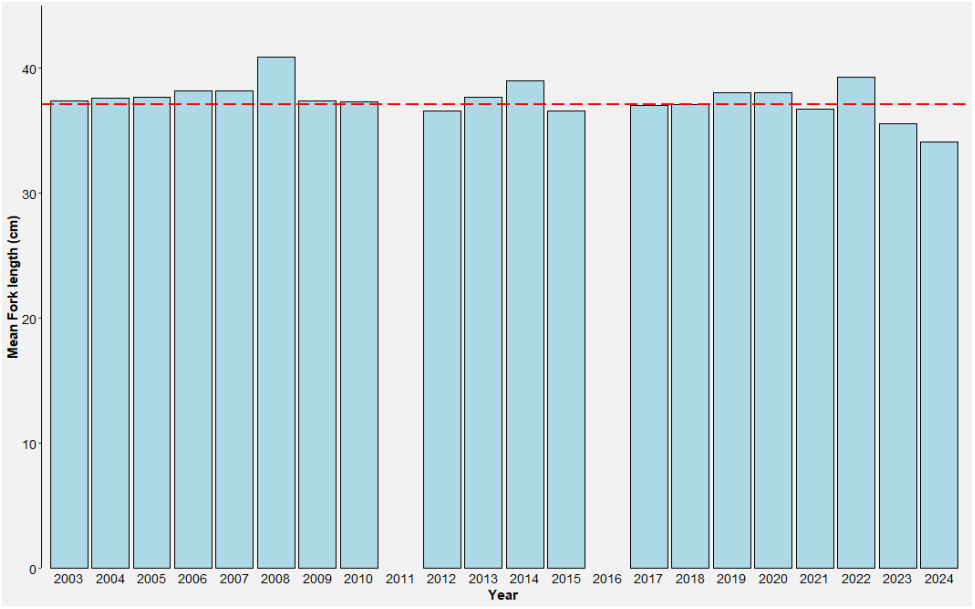
English name: Brown-spotted grouper Local Name*:* Vyey makonde



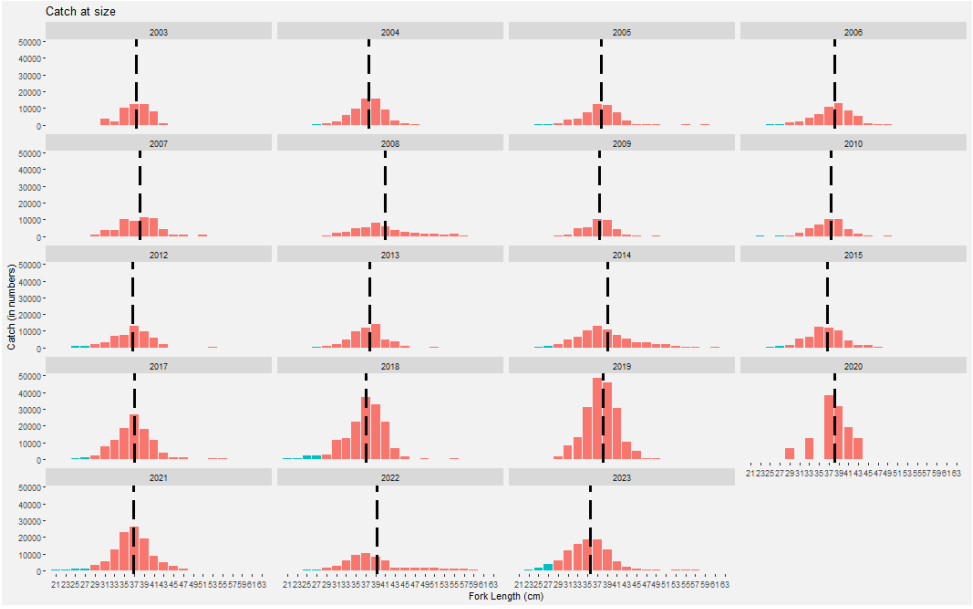
Parameter	Description
General	Found over a wide range of habitats like seagrass beds and outer reef slopes, also on muddy bottoms. Solitary. Feed on small fishes and crustaceans (mainly stomatopods and crabs). Protogynous hermaphrodite with some female transitioning to male upon reaching a certain size
Range	**Species:** Tropical; 37°N - 34°S, 28°E - 169°W **Stock:** Mahe plateau
Depth distribution	4 – 300 m
Preferred habitats	Marine, Reef associated and non-migratory
Longevity	29 years
50% maturity	2.50 – 3 yrs, 26 – 31 cm TL
Spawning season	Year round with reduce activities in April – March and July
Size	**Maximum:** 80cm TL

Length frequency

The mean total length fluctuated between 36cm - 40cm for the past years, with a historical mean of 37.90 cm (Chlorostigma Figure 3). Throughout the past years majority of the fish sampled for length in the handline fishery were above the size of maturity, therefore indicating that the fishery is targeting mainly mature fish (Chlorostigma Figure 4). However, this is not an indicator that juveniles are not being fished in general as the sampling programme does not cover the trap fishery where the chances of catching juveniles are higher



Chlorostigma Figure 3: Mean fork length in cm by year. Red line indicating historical average.



Chlorostigma Figure 4: Total length frequency distribution by year. Bars in blue indicating fish below the size at maturity (26 cm). Dash black line indicating mean total length for the year.

Stock Assessment

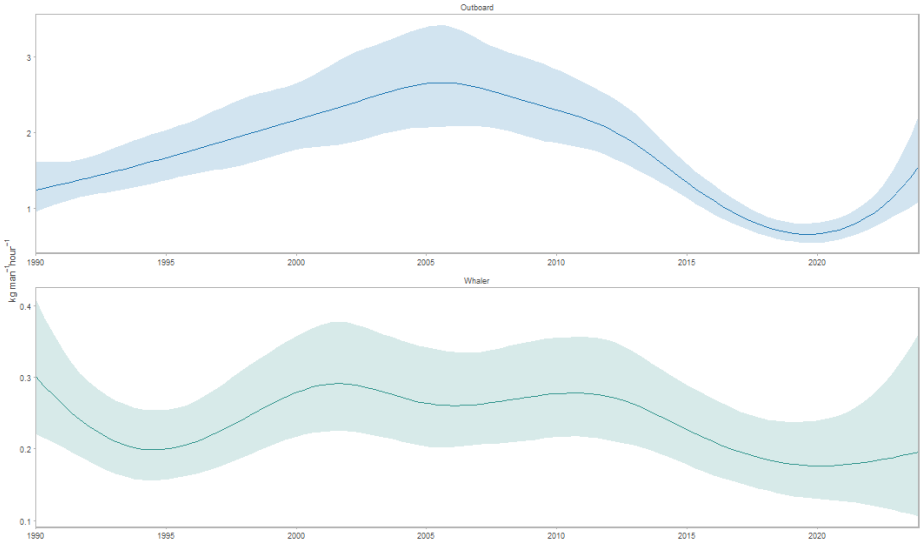
A catch-based stock assessment of Brown-spotted Grouper was conducted using CAS data collected from 1990 to 2019 (Robinson, 2021). In addition, the annual length-based assessment to estimate fishing mortality (F) using length converted catch curves was also undertaken (Seychelles Fisheries Authority, 2024d).

Description of the stock

In the absence of information on the genetic connectivity, mixing and identity of the stock, the population of Brown-spotted Grouper on the Mahe plateau is considered to be a unit stock, due to its remote location.

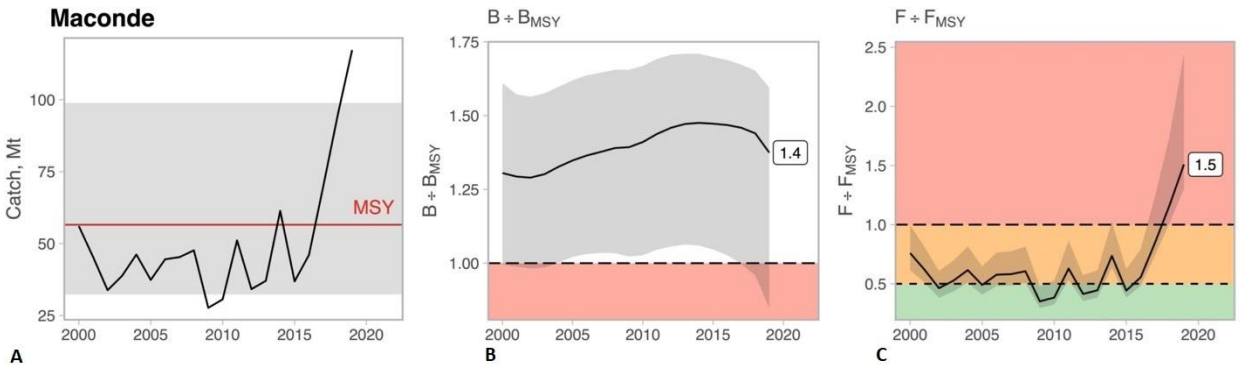
Catch based stock assessment

Standardized CPUE on outboard vessels was increasing until around 2006 after which it declined with the lowest obtained in 2019. From 2020 until 2023 CPUE for outboard vessel has been increasing. For whaler it was fluctuating but fairly stable throughout the years with a slight decline observed from around 2015 until 2019 (Chlorostigma Figure 5).



Chlorostigma Figure 5: Standardized CPUE by fleet determined by Robinson (2021) and updated up to 2023

The catch of Brown-spotted grouper since 2018 has been above the estimated MSY of 57 Mt (A). However, the estimated MSY has large confidence interval indicating uncertainty. The estimated biomass is well above 1 indicating a healthy stock (B). Similarly, the confidence interval is quite wide indicating uncertainty in the estimation therefore the results should be interpreted with caution. Fishing mortality has fluctuated throughout the years; in 2015 it was below 0.5 indicating no risk of overfishing. It started to increase in 2016 reaching greater than 1 in 2019 indicating that the stock is at risk of overfishing (C). The result is indicating that the current fishing rate is not sustainable and may eventually lead to stock depletion (Robinson, 2021).

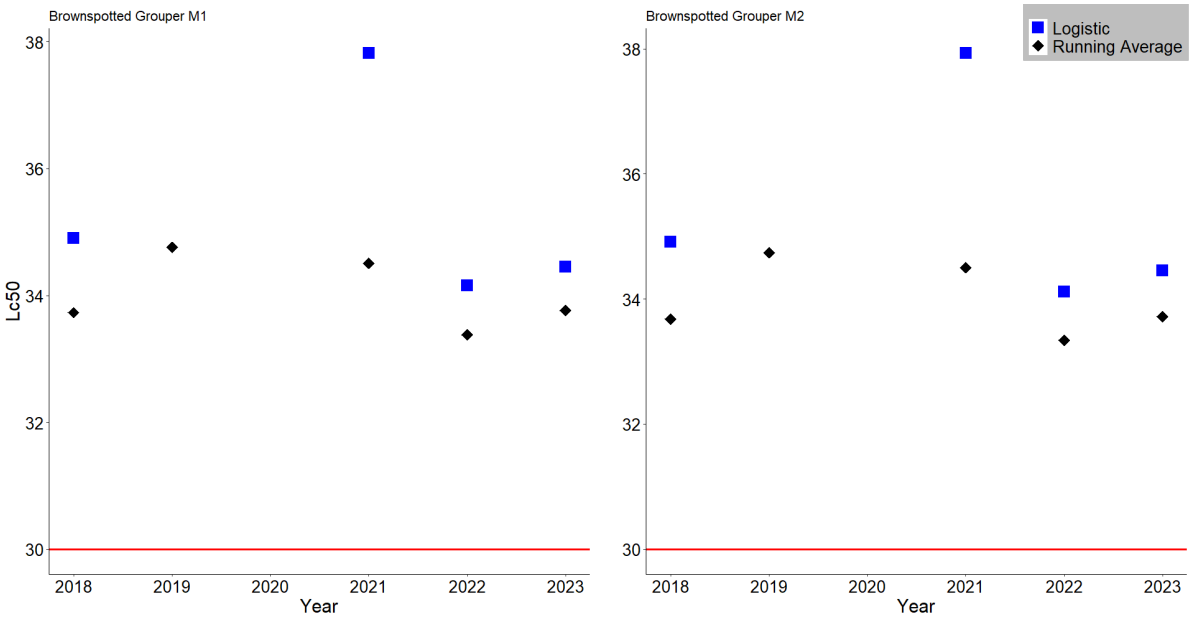


Chlorostigma Figure 6: Indicating catch and estimated MSY (A), estimated biomass against biomass at MSY (B) and estimated fishing mortality and fishing mortality at MSY (C) by Robinson 2021

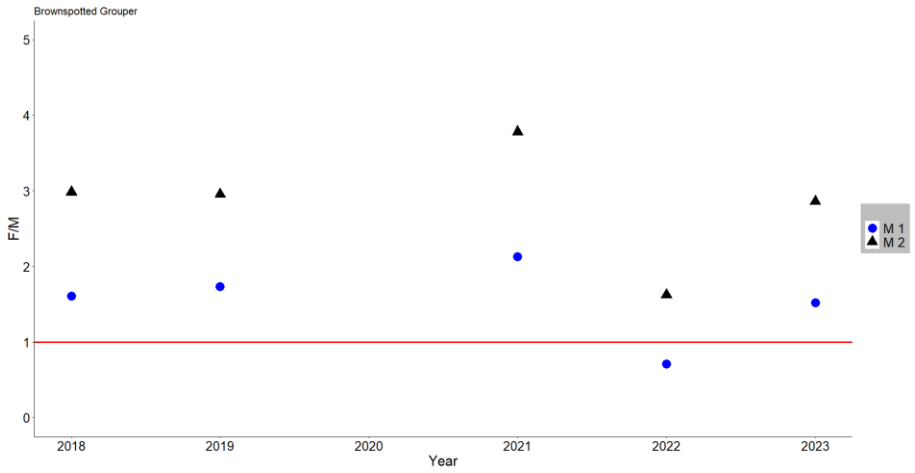
Length-based stock assessment

Average age-based growth parameters were calculated from three estimates obtained from Grandcourt (2002), Mees, (1992) and Sanders et al (1988). Length at capture (L_{c50}) was assessed against a published maturity estimate for females (De Moussac, 1986), rather than for males, since this species is a protogynous hermaphrodite. Maturity was also calculated from $0.5L_{\infty}$. Two estimates of M were used to calculate the ratio F/M.

For both estimates of M, the Lc50 was greater than the Lm50 throughout the years (Chlorostigma Figure 7). The F/M ratio varies depending on the estimate of M used. With M1, the F/M ratio in 2023 is 1.52, whilst with M2, the ratio is 2.86 indicating a high fishing pressure (Chlorostigma Figure 8).



Chlorostigma Figure 7: Estimated length at first capture (Lc_{50}) estimated using two natural mortality values (M1 = 0.48; M2 = 0.315) using a logistic and running average model



Chlorostigma Figure 8: Ratio of fishing mortality to natural mortality used as an indicator of fishing mortality that will achieve MSY

Stock status determination

Estimated fishing mortality is indicating that it is above sustainable level thus leading to the conclusion that the stock may be subjected to overfishing. While the biomass was determined to be uncertain due to high uncertainty in the estimations and conflicting indicators from CPUE and estimated biomass

	Fishing mortality	**Biomass**
Brown-spotted grouper		

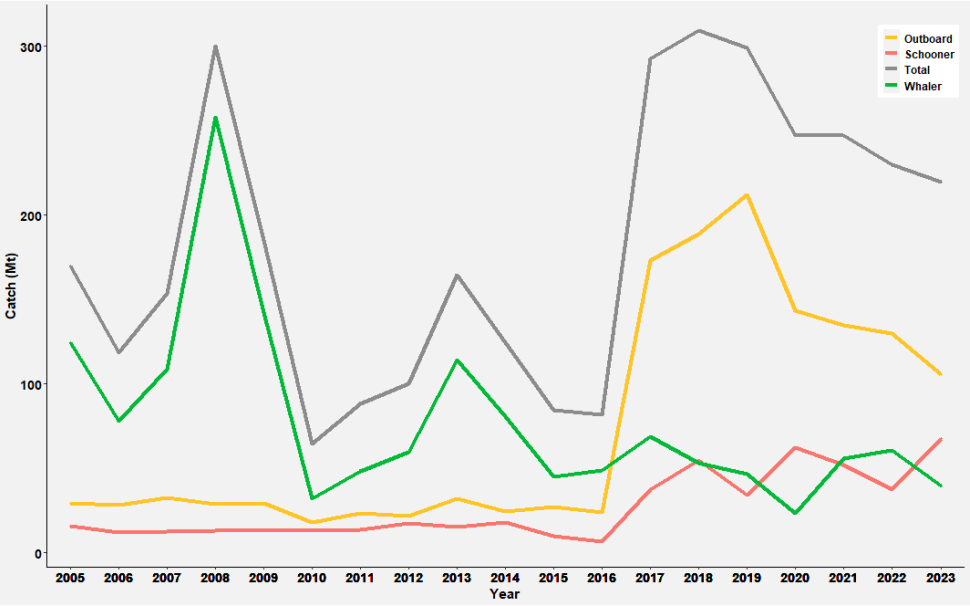
Fishing mortality	Not subject to overfishing	Subject to overfishing	Uncertain
Biomass	Not overfished	Overfished	Uncertain

2.1.4. Emperors

Emperors (lethrinidae) is a family of fishes known locally as kaptenn. Catch data that is classified collectively as emperors consist of several species, these include *Gymnocranius grandoculis* (Blue-lined large eye bream, kaptenn blan), *Lethrinus mahsena* (Sky emperor, madanm beri), *Lethrinus crocineus* (yellowtail emperor, laskar), *Lethrinus nebulosus* (Spangled emperor, kaptenn rouz), *Lethrinus variegatus* (Slender emperor, baksou) and several others.

Catch

Total catch was 219.3 Mt in 2023 for all vessels using handlines (Lethrinidae Figure 1). Highest catch for all vessels was 309.2 Mt obtained in 2018. There was a rapid rise in outboard catch from 24.4Mt in 2016 to 172.8Mt in 2017. Prior to 2016, whalers were catching the most emperors by handline, however as from 2017 this changed to outboard (Lethrinidae Figure 1). Nominal CPUE for whaler peaked in 2009 with 6.32kg/mendays before a rapid decrease in 2010 to 1.12 kg/mendays. The nominal CPUE increased again reaching 4.36 kg/mendays in 2013 before rapidly decreasing and remaining low. Nominal CPUE for schooner also fluctuated throughout the years reaching a maximum of 2.81 kg/mendays in 2018, while in 2023 it was 1.79 kg/mendays. (Lethrinidae Figure 2).



Lethrinidae Figure 1: Catch (Mt) by fleets between 2005 – 2023 using handline

Lethrinidae Figure 2: Nominal CPUE (kg/mendays) by fleets between 2005 – 2023

Biology

English name: Emperors Local Name*:* Kaptenn

Fishdex.org

Parameter	Description
General	Found primarily on or near reefs. Can be solitary or schooling and do not appear to be territorial. They are bottom feeding carnivores, feeding primarily at night on benthic invertebrates or fishes. Protogynous hermaphroditism (sex reversal from female to male) has been demonstrated in several species.
	Species: Tropical and subtropical; 34°N - 34°S, 25°E - 170°W
Range	**Stock:** Mahe plateau
Depth distribution	1 – 150 m
Preferred habitats	Marine, Reef associated and non-migratory
Longevity	15 - 28 years
50% maturity	3 – 9 yrs, 20 – 45 cm FL
Spawning season	
Size	**Maximum:** 20 – 87 cm TL

Stock Assessment

A catch-based stock assessment was carried out on emperors using CAS data collected from 1990 to 2019 (Robinson, 2021).

Description of the stock

In the absence of information on the genetic connectivity, mixing and identity of the stock, the different populations of emperors on the Mahe plateau is considered to be a unit stock, due to its remote location.

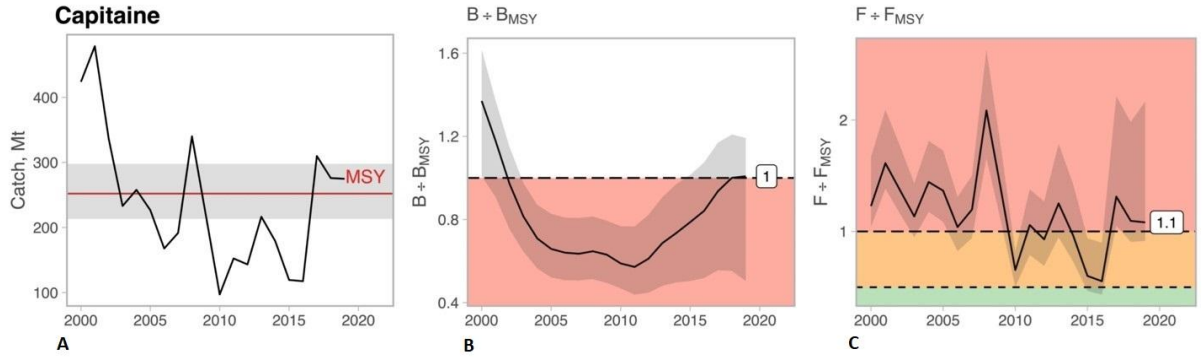
Results of stock assessment

Catch based stock assessment

Standardised CPUE for outboard vessels increased until around 2006 followed by continuous decline with the lowest obtained in 2020 after which it started to increase. For schooner the CPUE was stable until around 2001 before declining and remaining low but stable until present, while for whaler it has been stable throughout all the years with a slight increase starting from 2022 (Lethrinidae Figure 3).

Lethrinidae Figure 3: Standardized CPUE by fleet determined by Robinson (2021) and updated up to 2023

Catch declined from 479Mt in 2001 to the lowest catch of 97Mt in 2010, followed by recovery, up to 270Mt in 2018. Current catch level is above the estimated MSY but within the estimated confidence interval (Lethrinidae Figure 4). Estimation of biomass and fishing pressure is within the level that cause stock depletion. However, for both estimates of biomass and fishing pressure the uncertainty is high therefore the results need to be taken with caution (Robinson, 2021).



Lethrinidae Figure 4: Indicating catch and estimated MSY (A), estimated biomass against biomass at MSY (B) and estimated fishing mortality and fishing mortality at MSY (C) estimated by Robinson 2021

Stock status determination

Estimated fishing mortality is indicating that it is at an unsustainable level thus leading to the conclusion that the stock may be subject to overfishing. Standardised CPUE is indicating decline slight in biomass for some vessel types while the estimated biomass is showing that the biomass was low but is recovering. Therefore, the biomass is determined to be overfished.

	Fishing mortality	**Biomass**
Emperors		

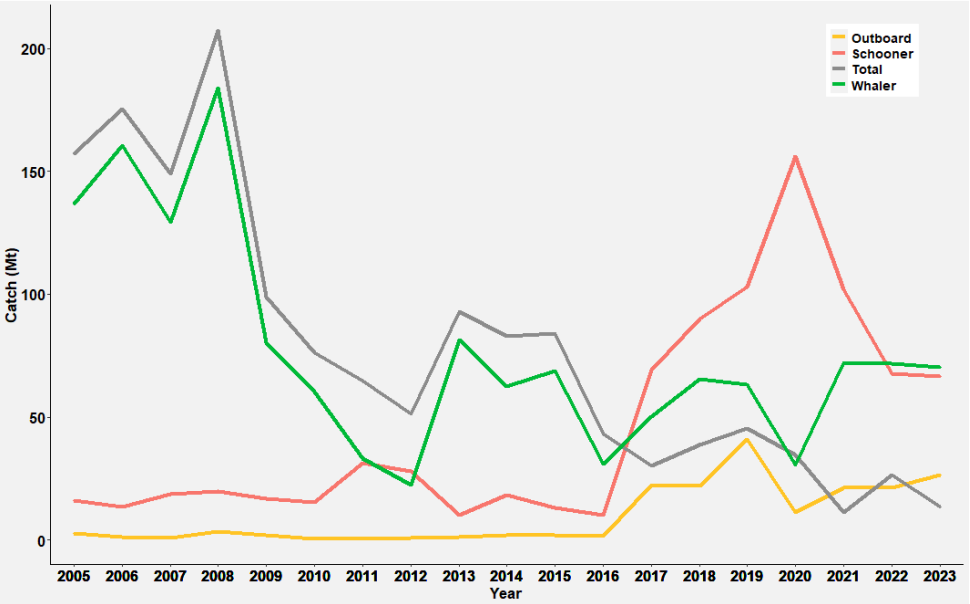
Fishing mortality		Not subject to overfishing		Subject to overfishing		Uncertain
Biomass		Not overfished		Overfished		Uncertain

2.1.5. Other snappers

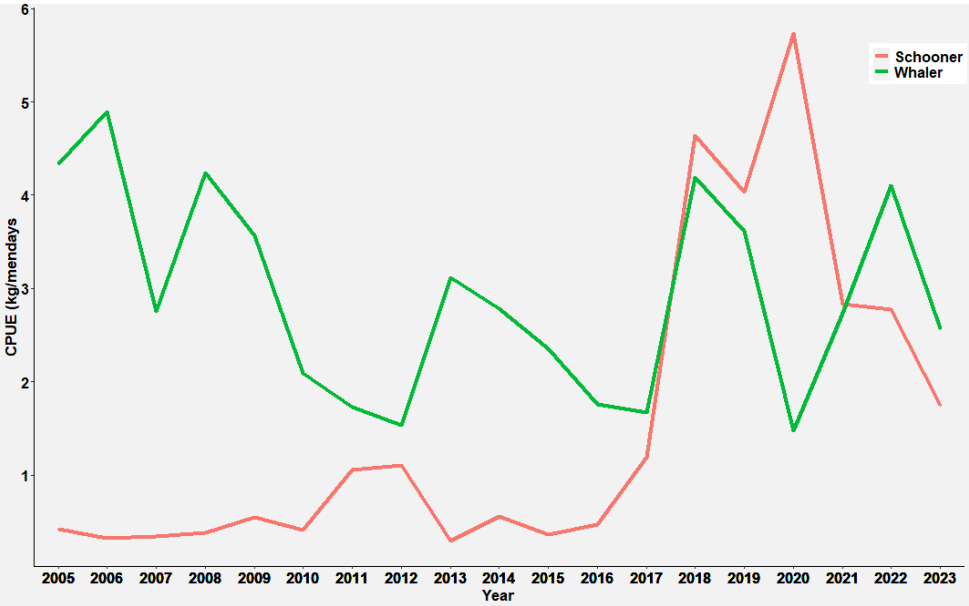
Other snappers are a collective group in the catch assessment survey that consists of all snappers (Lutjanidae) caught in the artisanal fisheries except for the *L.sebae*. Catch data that is classified as other snappers consists mainly of *Lutjanus bohar* (Two-spot red snapper, Varvara), *Lutjanus sanguineus* (Humphead snapper, Bordmar), *Lutjanus gibbus* (Humpback red snapper, Terez) as well as deep water snappers such as *Etelis carbunculus* (Deep-water red snapper, Etelis) and *Etelis coruscans* (Deep-water longtail red snapper, Zob laflanm)

Catch

The highest catch obtained was from whaler with 184Mt obtained in 2008, however this was followed by a rapid decline to reach the lowest catch of 22.4 Mt in 2012 (Other snappers Figure 1). Following the decline, whaler catch increased but remained low compared to previous year. In 2023 whalers caught 73.6 Mt. For both schooner and outboard catch remained low but stable in the early years until 2016. After 2016 schooner catch increased rapidly reaching 155.9 Mt in 2020 before decline to 66.5 Mt in 2023. Outboard catch increased slowly reaching 41.1 Mt in 2019. Nominal CPUE for whaler has been fluctuating since 2006, the lowest CPUE was 1.53 kg/mendays obtained in 2012, while the highest was 4.88 kg/mendays in 2006. For schooners, nominal CPUE remained low and started to rise from 2016 reaching maximum CPUE of 5.73 kg/mendays in 2020 (Other snappers Figure 2).



Other Snappers Figure 1: Catch (Mt) by fleets between 2005 – 2023 using handline



Other Snappers Figure 2: Nominal CPUE (kg/mendays) by fleets between 2003 - 2023

Biology

English name: others snappers Local name: lezot snappers

Parameter	Description
General	Marine. Reef associated. Some form schools or can be solitary. Feed mainly on fishes, crabs, stomatopods, other benthic crustaceans, and cephalopods **Species:** Tropical, 35°N-33°S, 31°E-134°W
Range	**Stock:** Seychelles Bank
Depth distribution	1-180 m
Preferred habitats	Adults inhabit coral reefs. Generally demersal
Longevity	13 - 18 yrs, 55yrs
50% maturity	40 – 50 cm TL
Spawning season	
Size	**Maximum:** 50 -100 cm TL

Stock Assessment

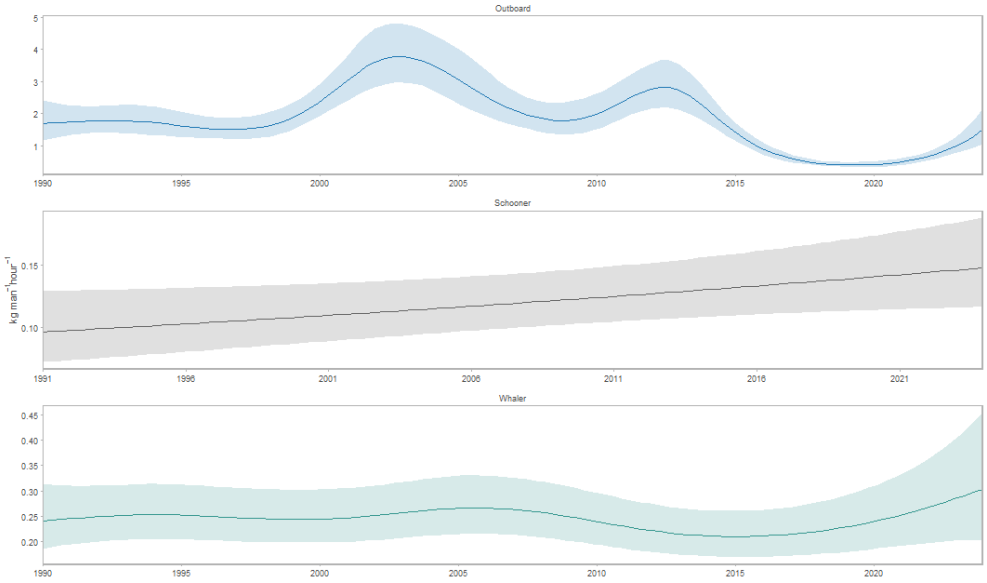
A catch base stock assessment was carried out on other red snappers using CAS data collected from 1991 to 2019 (Robinson, 2021).

Description of the stock

In the absence of individual information for each of the different species within the group, the different populations within the other red snappers' group on the Mahe plateau is considered to be a unit stock.

Catch based stock assessment

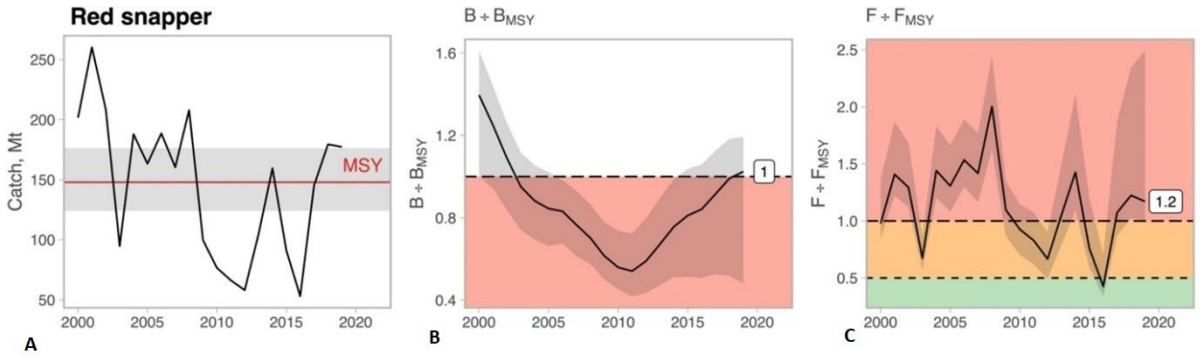
Standardised CPUE for schooner has remained stable since 1991 until present while for whaler it was stable until 2015 when it started to increase. The current estimation in 2023 was the highest CPUE obtained. For outboard vessels it was fluctuating in the early year before declining and reaching the lowest in 2020. (Other snappers Figure 3).



Other Snappers Figure 3: Standardized CPUE by fleet determined by Robinson (2021) and updated up to 2023

Catch was above estimated MSY between 2004 and 2009 before falling below until 2017 when it rose again indicating recovery (Red snappers Figure 4 A). Since 2003 estimated biomass was indicating stock depletion with some indication of

recovery around 2019(B). Similarly fishing pressure has been indicating overfishing for most years with the exception of 2017 (C). However, there is high uncertainty in the estimations and therefore the interpretation of these results should be taken with caution (Robinson, 2021).



Other Snappers Figure 4: Indicating catch and estimated MSY (A), estimated biomass against biomass at MSY (B) and estimated fishing mortality and fishing mortality at MSY (C) estimated by Robinson 2021

Stock status determination

Standardized CPUE is indicating a stable stock while the estimated biomass and fishing pressure are indicating stock depletion and overfishing. Both fishing pressure and biomass estimation has high uncertainty in the estimation, however when taking the CPUE into consideration the stock is considered to be subjected to overfishing but not overfished

	Fishing mortality	**Biomass**
Other snappers		

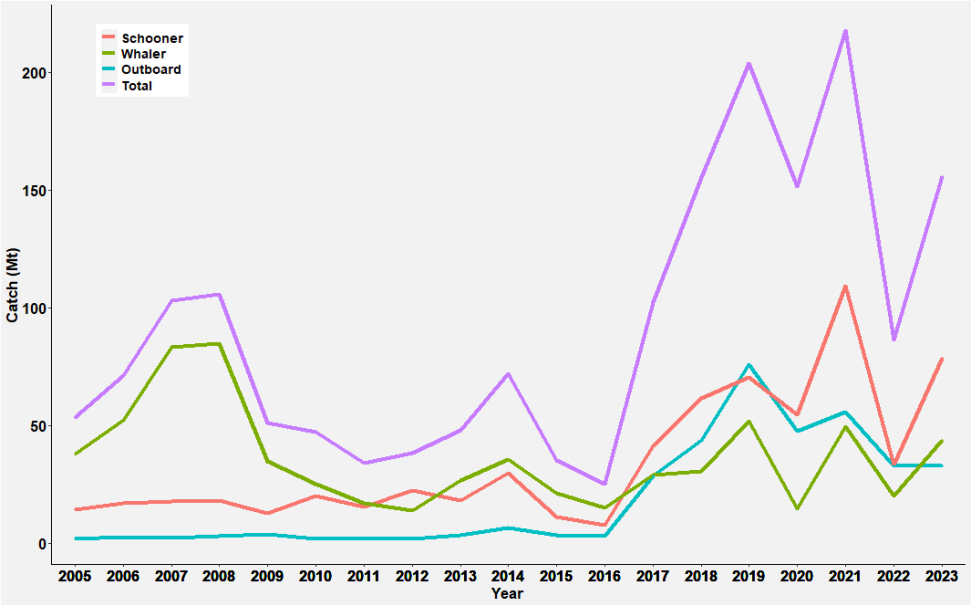
Fishing mortality		Not subject to overfishing		Subject to overfishing		Uncertain
Biomass		Not overfished		Overfished		Uncertain

2.1.6. Other groupers

Other groupers (Epinephelinae) is a collective group in the catch assessment survey that consists of all groupers caught in the artisanal fisheries except for Brown-spotted grouper. They are a subfamily of the family Serranidae. Catch data that is classified collectively as other groupers, consist of species such as *Epinephelus multinotatus* (White blotched grouper, Vyey plat), *Epinephelus flavocaeruleus* (Blue and yellow grouper, vyey plat) *Epinephelus merra* (Honeycomb grouper, Vyey sat), *Cephalopholis miniata* (Coral grouper, Vyey zannannan), *Variola louti* (Yellow-edged lyretail, kwarsan), *Cephalopholis sonnerati* (Tomato hind, Msye angar) among many other species.

Catch

Total catch was 155.6 Mt for all vessels using handlines in 2020. Highest total catch was 217.7 Mt caught in 2021 before declining rapidly to 86.3 Mt in 2022. The catch from whaler decreased from 84.73 Mt in 2008 and remained low and stable until 2018 after which it increased slightly to 51.7 Mt in 2019. For both outboard and schooner catch remained low and stable until 2016 when the catch for both started to increase reaching 109.2 Mt for schooner in 2021 and 75.9 Mt for outboard in 2019. (Other Groupers Figure 1). Nominal CPUE for both whaler and schooner fluctuated greatly throughout the years. Schooner CPUE peaked in 2018 with 3.17 kg/mendays before declining while for whaler it peaked in 2019 with 2.96 kg/mendays before falling rapidly to 0.70 kg/mendays in 2020 (Other Groupers Figure 2).



Other Groupers Figure 1: Catch (Mt) by fleets between 2005 – 2023 using handline

Other Groupers Figure 2: Nominal CPUE (kg/mendays) by fleets between 2005 – 2023

Biology

English name: Other groupers Local Name*:* lezot vyey

Parameter	Description
General	Marine, reef-associated, non-migratory. Many are solitary. Some may form reproductive groups. Territorial. Feed mainly on crustaceans and fishes. Mostly protogynous hermaphrodites
Range	**Species:** Tropical and temperate **Stock:** Mahe plateau
Depth distribution	0-300m
Preferred habitats	Inhabits clear waters of coastal and offshore reefs and lagoons. Juveniles settle is shallow water areas of coral rubble. Some are found in brackish waters.
Longevity	5 -15yrs
50% maturity	
Spawning season	
Size	**Maximum:** 50cm – 300cm TL

Stock Assessment

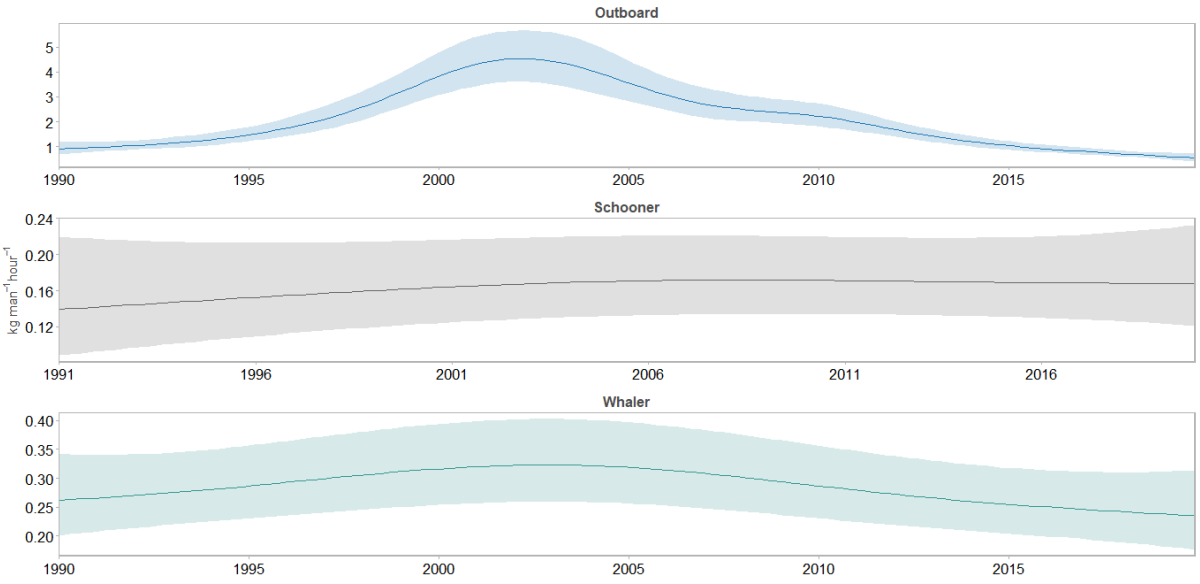
A catch base stock assessment was carried out using CAS data collected from 1990 to 2019 (Robinson, 2021).

Description of the stock

In the absence of individual information for each of the different species within the group, the different populations within the other groupers' group on the Mahe plateau is considered to be a unit stock.

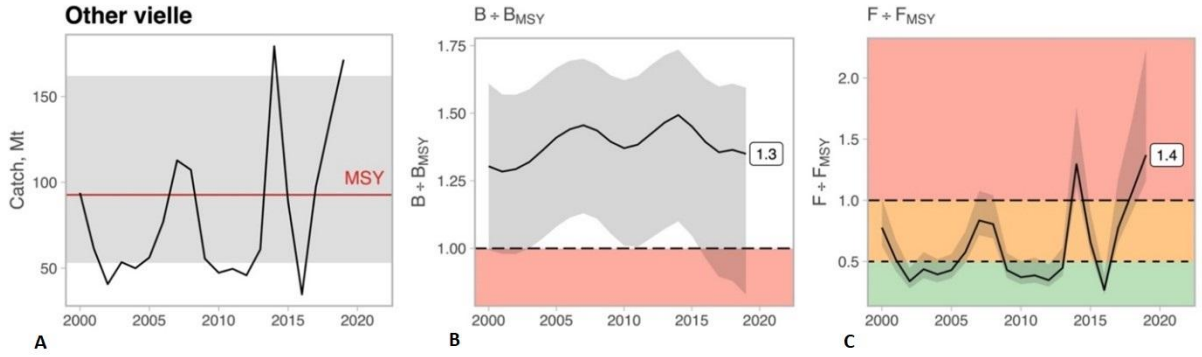
Catch based stock assessment

Standardised CPUE has been declining for handlines on outboard vessels and whalers for the past couple of years. For schooner the standardized CPUE has remained stable over the years (Other groupers Figure 3).



Other Groupers Figure 3: Standardized CPUE by fleet determined by Robinson (2021) and updated up to 2023

Both the estimated MSY and estimated biomass had very large uncertainty and therefore the results should be taken with caution (Other Groupers Figure 4). Catch for the past couple years has been fluctuating around the estimate MSY for recent years has been well above the MSY. Estimated biomass at MSY was well above 1 indicating above that it is not subjected to depletion. The estimated fishing mortality has been fluctuated throughout the years with estimation for 2019 indicating that the current fishing rate will cause depletion (Robinson, 2021).



Other Groupers Figure 4: Indicating catch and estimated MSY (A), estimated biomass against biomass at MSY (B) and estimated fishing mortality and fishing mortality at MSY (C) estimated by Robinson 2021

Stock status determination

High uncertainty was obtained in the estimation for fishing mortality and biomass. The biomass estimation is not indicating stock depletion. CPUE is indicating some downward trend for outboard and whaler, but upward trend for schooner. It can be concluded that that the biomass is uncertain and the stock is subject to overfishing

	Fishing mortality	**Biomass**
Other groupers		

Fishing mortality	Not subject to overfishing	Subject to overfishing	Uncertain
Biomass	Not overfished	Overfished	Uncertain

2.2. Semi-Pelagic Handline Fishery

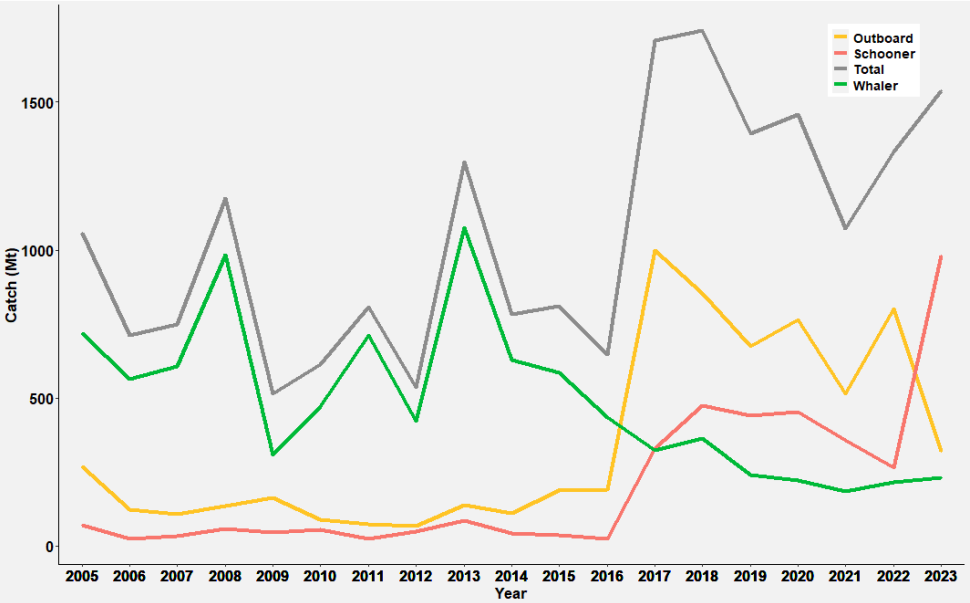
The Semi-Pelagic hand-line fishery accounts for over 32% of the total landings for the Seychelles artisanal fisheries. This fishery diverts from the demersal hand-line fishery by their target species. The key species targeted in the fishery includes multiple semi-pelagic fishes such as Trevally (*Carangidae*), bonito (*Scombrinae*) and barracuda (*Sphyraenidae*). Trevally constitutes the largest percentage of the semi-pelagic hand-line fishery and the overall artisanal fisheries as well.

2.2.1. Trevally

Trevally (Carangidae) consist of several genus and species known locally as karang. They are largest group of species caught in the artisanal fishery. Catch data that is classified collectively as karang, consist of several species with *Carangoides gymnostethus* (Bludger, karang balo) and *Carangoides fulvoguttatus* (Yellowspotted trevally, karang plat) making up about 85% of the total catch. Other species in the catch includes Caranx ignobilis (Giant trevally, karang ledan) Carangoides Chrysophrys (Longnose trevally, karang monik), Carangoides malabaricus (Malabar trevally, karang monik), and Caranx melampygus (Bluefin trevally, karang ver) among numerous other species.

Catch

Total catch for Trevally was 1135 Mt in 2020 for all vessels using handlines. Maximum catch was 1357 Mt caught in 2017. Catch has been fluctuating throughout the year with two peaks of 1354 Mt in 2013 and in 2017 (Carangidae Figure 1). Estimated CPUE for whaler peaked in 2013 before declining to its lowest in 2019. CPUE for schooners remained stable throughout the years (Carangidae Figure 2).



Carangidae Figure 1: Catch (Mt) by fleets between 2004 – 2023 using handlines

Carangidae Figure 2: Nominal CPUE (kg/mendays) by fleets between 2004 – 2023

Biology

English name: Trevally Local name: Karang

Parameter	Description
General	Reef associated. Occurs singly or in small to large schools. Feed on small invertebrates and fishes
Range	**Species:** 36°N - 30°S, 32°E - 174°W **Stock:** Mahe plateau
Depth distribution	surface – 100m
Preferred habitats	Adults prefer rocky and coral reef areas but also found on offshore banks.
Longevity	
50% maturity	
Spawning season	November – April (peak March – April)
Size	**Maximum:** 130cm FL

Stock Assessment

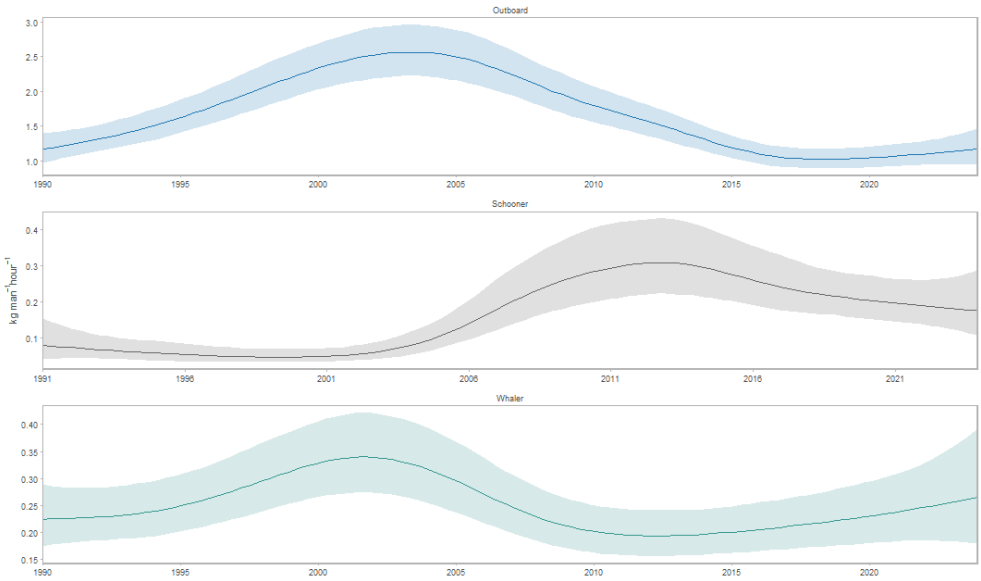
A catch base stock assessment was carried out on trevally using CAS data collected from 1990 to 2019 (Robinson, 2021).

Description of the stock

In the absence of individual information for each of the different species within the group, the different populations of trevallies on the Mahe plateau are considered to be a unit stock

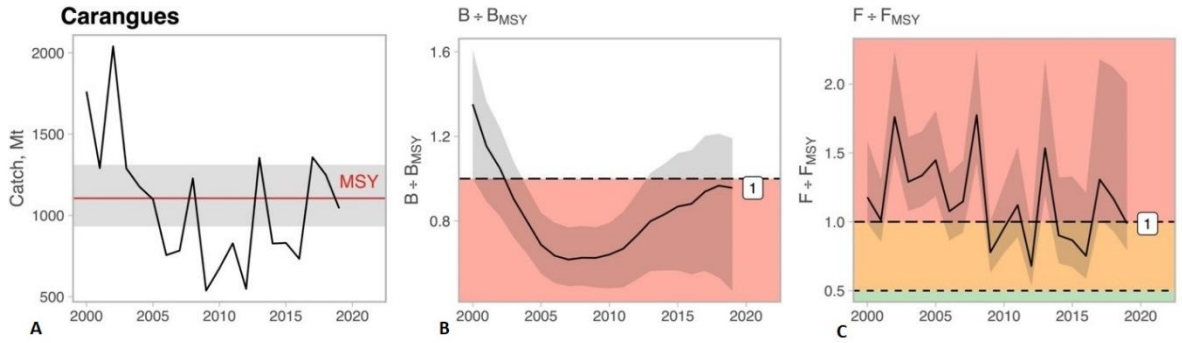
Catch based stock assessment

Standardised CPUE for outboard vessels increased until 2004 before declining and remaining low but stable. For schooner CPUE was low in the early years before increasing in 2005 and remaining stable. For whaler the CPUE started to decline around 2004 reaching the lowest in 2010 before increasing (Carangidae Figure 3)



Carangidae Figure 3: Standardized CPUE by fleet determined by Robinson (2021) and updated up to 2023

The result obtained by Robinson 2021 showed catch was fluctuating around the estimated MSY of 1106t (932 – 1311t). The estimated biomass has been <1 since around 2003 indicating stock depletion but with high uncertainty. The fishing mortality has been fluctuating around F_{MSY} indicating high fishing pressure with high uncertainty (Carangidae Figure 4).



Carangidae Figure 4: Indicating catch and estimated MSY (A), estimated biomass against biomass at MSY (B) and estimated fishing mortality and fishing mortality at MSY (C) by Robinson 2021

Stock status determination

Standardized CPUE has been on the decline for the past couple of years indicating declining biomass. The estimated biomass is also indicating stock depletion with high uncertainty, catch is fluctuating at or above all the estimated MSY. Estimated fishing mortality also indicating high risk of overfishing for the stock. Therefore, trevally is determined to be subjected to overfishing and is overfished

	Fishing mortality	**Biomass**
Trevally		

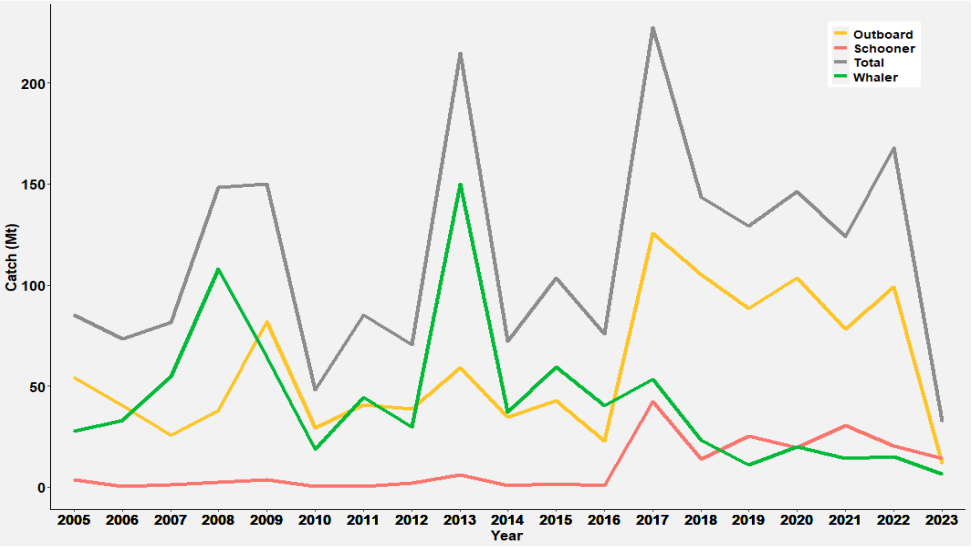
Fishing mortality	Not subject to overfishing	Subject to overfishing	Uncertain
Biomass	Not overfished	Overfished	Uncertain

2.2.2. Bonito

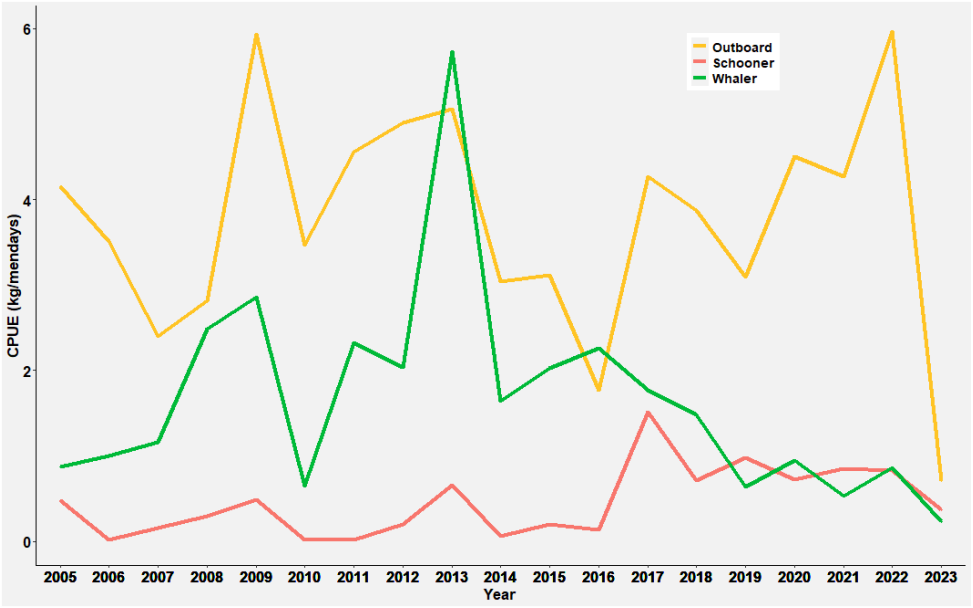
Bonito is a group of small pelagic fish from the Scombridae family and the genus Scombrinae known locally as bonit. They consist mainly of the species *Euthynnus affinis (*Kawakawa*)* and at a lesser extent the species *Sarda orientalis (Striped bonito)*.

Catch

Total bonito catch was 32.4 Mt in 2023 for all vessels using handlines (Bonito Figure 1). Catch fluctuated with several rapid increase and decrease throughout the years especially in 2013 and 2017. Maximum catch for all vessels was 227.5 Mt obtained in 2017. Whaler was the vessel that has the most catch until 2016 when the catch for outboard rose above those of whaler. The catch on schooner remained low and stable throughout the years. Nominal CPUE for whaler rose rapidly from 2.04 kg/mendays in 2012 to 5.73kg/mendays in 2013, this was followed by an equally rapid fall to 1.64kg/mendays in 2014. CPUE on outboard was high and fluctuating throughout the years while for schooner it remained low



Bonito Figure 1: Catch (Mt) by fleets from 2005 – 2023 using handline



Bonito Figure 2: Nominal CPUE (kg/mendays) by fleets from 2005 – 2023

Biology

English name: kawakawa

Local Name*:* Bonit

Parameter	Description
General	Marine, pelagic-neritic. Highly migratory. Form multi-species schools by size and with other scombrid species comprising from 100 to over 5000 individuals. Opportunistic predator feeding on small fishes, squids, crustaceans and zooplanktons.
Range	**Species:** Tropical and subtropical; 35°N - 38°S, 19°E - 137°W **Stock:** Mahe plateau
Depth distribution	0 – 200 m
Preferred habitats	Occurs, in open water but always remain close to shore
Longevity	9 years
50% maturity	3yrs, 50 - 65cm TL
Spawning season	November – May
Size	**Maximum:** 100cm TL

Stock Assessment

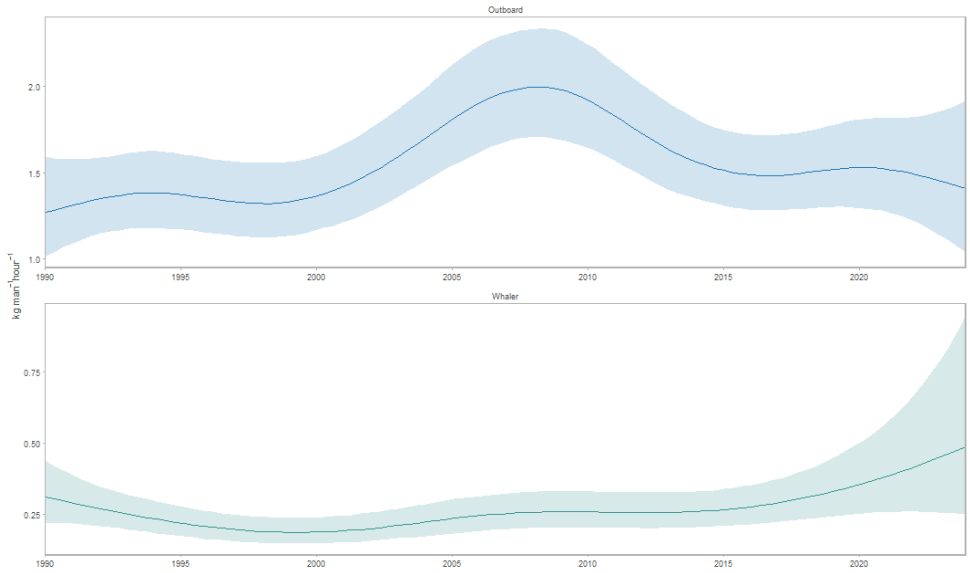
A catch-based stock assessment was carried out on bonito using CAS data collected from 1990 to 2019 (Robinson, 2021).

Description of stock

In the absence of individual information for each of the different species within the group, the different populations identified as bonito on the Mahe plateau is considered to be a unit stock

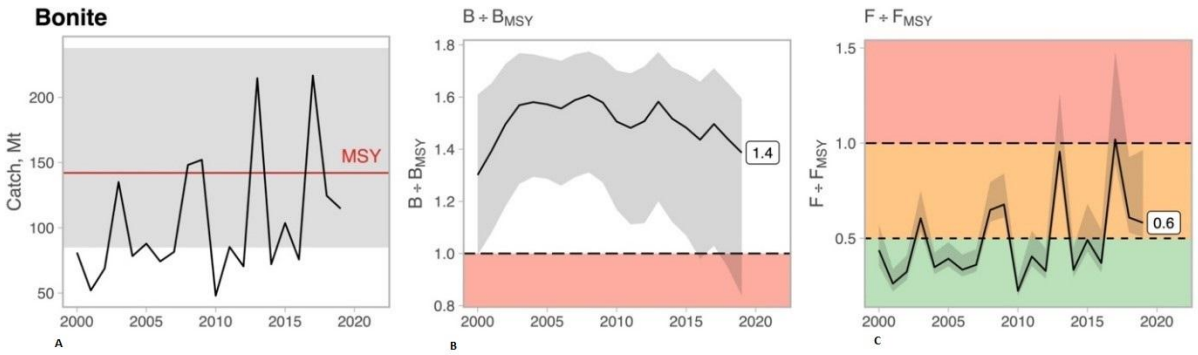
Catch based stock assessment

Slight increase was observed in standardized CPUE for outboard around 2005, slight decrease was observed around 2010 – 2015. From 2015 to 2023 the CPUE has remained stable. For whaler CPUE, was low and stable until around 2016 when it increased slightly (Bonito Figure 3).



Bonito Figure 3: Standardised CPUE for handline on outboard and whaler estimated by Robinson (2021) and updated up to 2023

The catch-based model predicted an MSY of 142.09 Mt (84.90 -237.82 Mt) with very large uncertainty estimates (Bonito Figure 4 A). For most years catch was below MSY except for around 2018-2019, 2013 and 2017. Estimated spawning biomass relative to biomass at MSY were estimated well above 1 indicated that it is a healthy level (Bonito Figure 4 B). However, the estimation was also with high uncertainty range. The estimation for fishing mortality relative to fishing mortality at MSY for most years were either between 0.5 – 1 below MSY but at risk of depletion or below 0.5 indicating no risk of overfishing (Bonito Figure 4 C) (Robinson, 2021).



Bonito Figure 4: Indicating catch and estimated MSY (A), spawning biomass relative to biomass at MSY (B) and estimated fishing mortality and fishing mortality at MSY (C) by Robinson 2021

Stock Status determination

Standardised CPUE has been stable for most years and the estimated indicators are showing a healthy stock. Based on these, biomass has been estimated to not be overfished and fishing mortality is not subject to overfishing

	Fishing mortality	**Biomass**
Bonito		

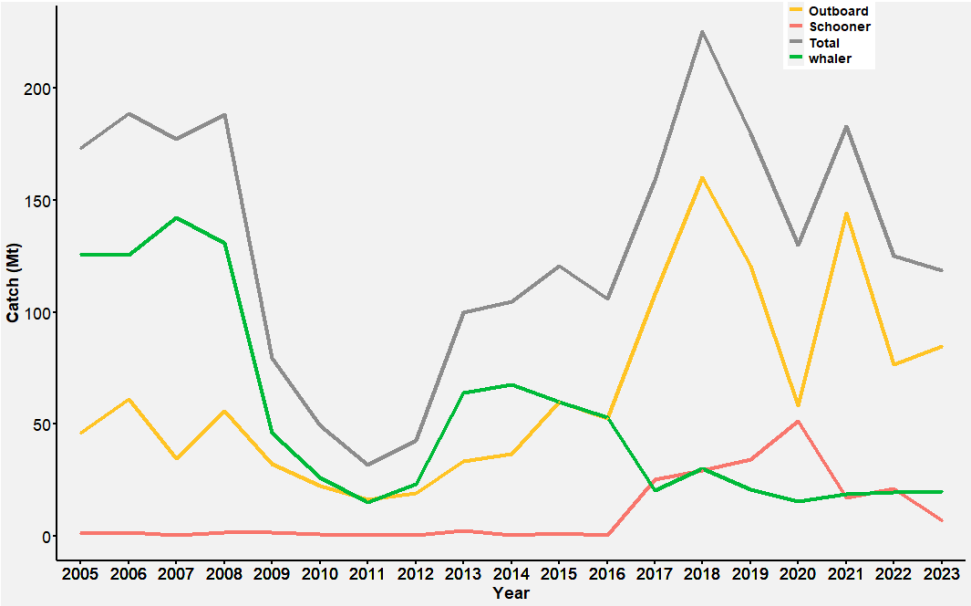
Fishing mortality	Not subject to overfishing	Subject to overfishing	Uncertain
Biomass	Not overfished	Overfished	Uncertain

2.2.3. Barracuda

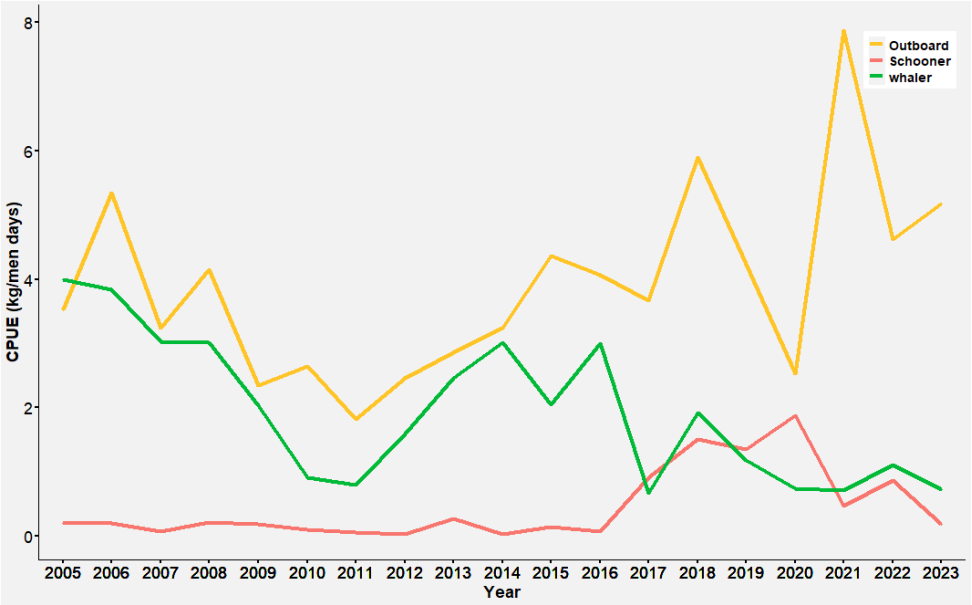
Barracuda (Sphyraenidae) are large predatory fish consisting of the single genus *Sphyraena* known locally as bekin. Catch data that is classified collectively as barracuda, consist of mainly 4 species, *Sphyraena forsteri* (Bigeye barracuda, Bekin), *Sphyraena putnamae* (Sawtooth barracuda, Bekin karo), *Sphyraena flavicauda* (Yellowtail barracuda, Bekin gomon) and *Sphyraena barracuda* (Great barracuda, Tazar).

Catch

Total catch for Barracuda in 2023 was 118.7 Mt. Between 2008 and 2011 catch onboard whalers decrease rapidly after which the catch remained low and fluctuating. Catch for schooner remained low and constant from 2005 until 2016. Catch started to rise from 2017 and continued to increase until 2020. Catch from outboard vessels increased rapidly between 2016 to 2018 before fluctuating in the later years. Overall, the total catch of Barracuda has had massive fluctuations between 2005 and 2023 (Sphyraena Figure 1). Nominal CPUE caught by whalers has fluctuated throughout the years. For schooner CPUE was stable but low until 2016 when it started to increase slightly. CPUE for outboard vessels also fluctuated throughout the years until 2021 when it went from 2.53 kg/mendays to 7.88 kg/mendays (Sphyraena Figure 2)



Sphyraena Figure 1: Catch (Mt) by fleets from 2005 – 2023 using handline



Sphyraena Figure 2: Nominal CPUE (kg/mendays) by fleets between 2005 – 2023.

Biology

English name: Barracuda Local Name*:* Bekin

Parameter	Description
General	Pelagic marine coastal waters. Adults are solitary but juveniles may form large schools. Feed mainly on fishes. Exhibits diurnal behavior.
Range	**Species:** Tropical and subtropical **Stock:** Mahe plateau
Depth distribution	0-300m
Preferred habitats	Near-shore habitats, such as seagrass beds, mangroves, and coral reefs. Found in lagoons and sheltered seawards reefs. Some are found in brackish waters.
Longevity	6 – 14 yrs
50% maturity	2-4yrs
Spawning season	
Size	**Maximum:** 55cm – 90cm TL

Stock Assessment

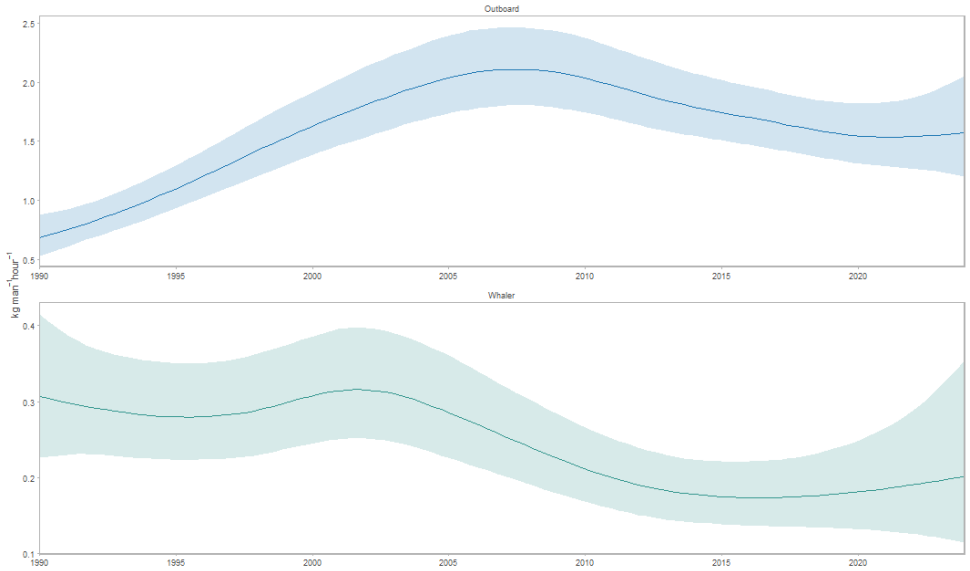
A catch base stock assessment was carried out on barracuda using CAS data collected from 1990 to 2019 (Robinson, 2021).

Description of the stock

In the absence of individual information for each of the different species within the group, the different populations identified as barracuda on the Mahe plateau is considered to be a unit stock

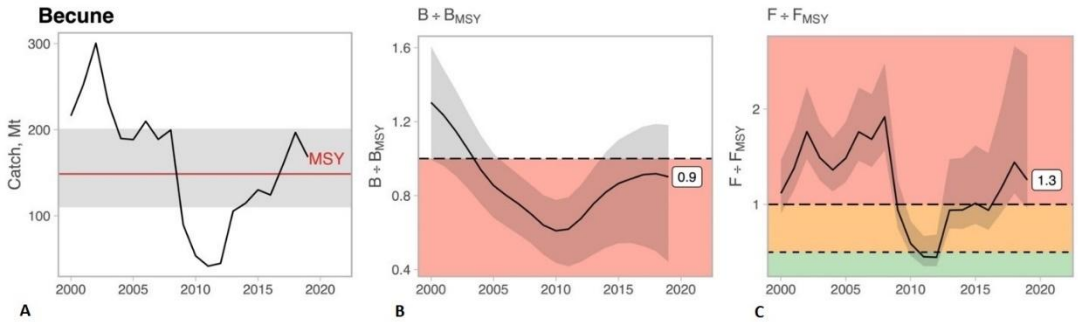
Catch based stock assessment

The standardized CPUE for outboard has been stable since 2005 with some slight decrease observed starting from 2015. However, for whaler it has been on a downward trend since 2005 (Sphyraena Figure 3).



Sphyraena Figure 3: Standardised CPUE for handline on outboard and whaler estimated by Robinson (2021) and updated up to 2023

The catch-based model predicted an MSY of 194 tonnes year^{-1} (110 -210 t). Catch for Barracuda was above the estimated MSY from 2000 until around 2009 when it began to decline and fell below the MSY. By 2012 catch begin to recover, going above the estimated MSY around 2016 where it remained (Sphyraena Figure 3 A). The catch level is indicating that Barracuda have low resilience to fishing pressure. Spawning biomass relative to biomass since 2004 has been less than 1 indicating stock depletion (Sphyraena Figure 3 B). Fishing pressure has also been exceeding F_{MSY} for most years (Sphyraena Figure 3 C). The results for MSY, biomass and fishing pressure however need to be interpreted with caution as there was large uncertainty in the estimations (Robinson, 2021).



Sphyraena Figure 4: Indicating catch and estimated MSY (A), spawning biomass relative biomass at MSY fishing mortality (B) and fishing mortality at MSY (C) estimated by Robinson 2017

Stock status determination

The stock for Barracuda was estimated to be in stock depletion from 2004 – 2019 and for most years the fishing pressure has been at a level which is indicating overfishing. The CPUE is also indicating a downward trend during the recent years, based on this the stock was determined to be subject to overfishing and the biomass was determined to be overfished.

	Fishing mortality	Biomass
Barracuda		

Fishing mortality		Not subject to overfishing		Subject to overfishing		Uncertain
Biomass		Not overfished		Overfished		Uncertain

3. Seychelles Trap Fishery

The Seychelles trap fishery catch make up approximately 15% of the Seychelles Artisanal fisheries. The fishery operates exclusively in the near shore habitats of the inner granitic islands on the Mahe plateau. In the last 20 years however the inshore trap fishery has moved further offshore up to a distance of 30km from the main islands. Three types of traps are used and traditionally the traps were made of bamboo but recently traps are also being made with metal wires. Fixed traps ("kazye dormi" and "kazye peze") are sturdy and left to soak in the water up to three days. *Kazye dormi* are set outside reef crests in depths up to 60m and may be baited. *Kazye peze* are unbaited and wedged amongst corals on the shallow reef flats. The active traps (*kazye lavol*) are lighter, baited and left in various depths for several hours only (Lablache & De Moussac, 1987).

Multiple reef species are caught by traps, but the most important families caught include rabbitfish (Siganidae), emperors (lethrinidae), parrotfish (Scaridae), and goatfish (mullidae). The fishery is currently being managed under the "Mahe plateau trap and line fishery co-management plan" (Seychelles Fishing Authority, 2020). Some measures currently in place includes

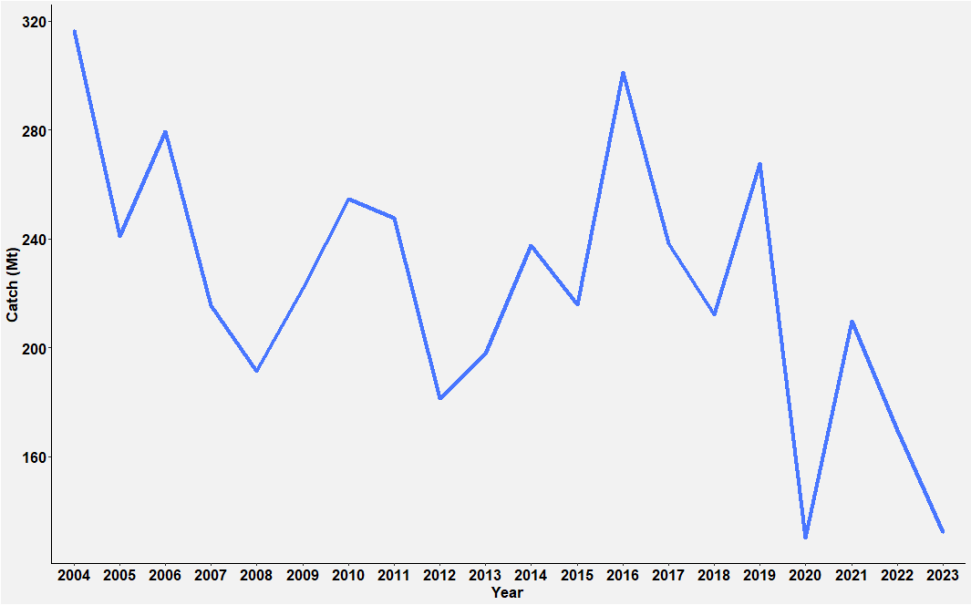
- Maximum limit of 25 active traps per licensed commercial vessels.
- No traps to be left in the sea overnight on listed rabbitfish (siganidae) spawning sites from September to April.
- Maximum limit of 6 traps per boat per day for 7 days spanning the full moon (3 days prior and 3 days post) on listed rabbitfish spawning sites from September to April

3.1. Rabbitfish

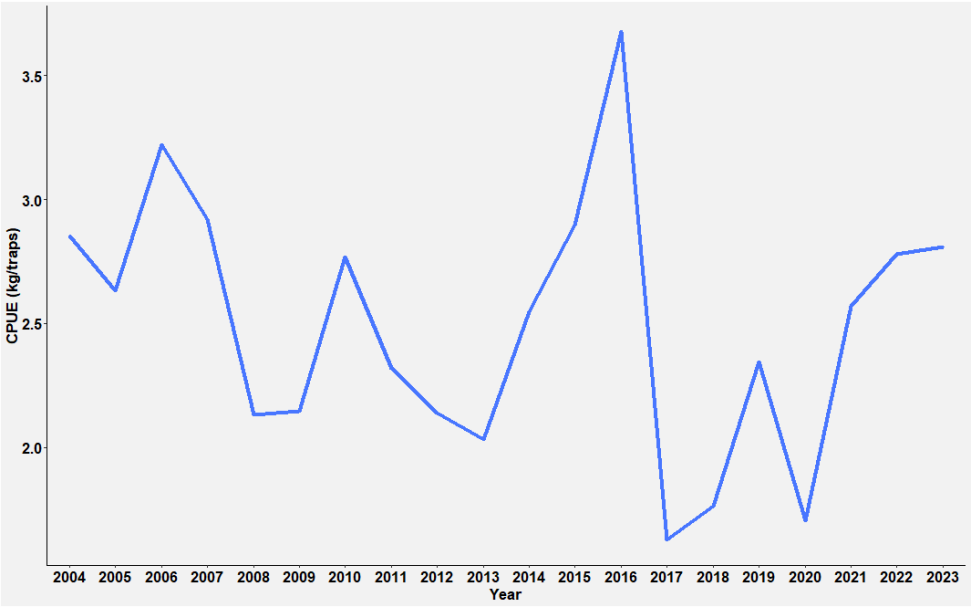
Rabbitfish (Siganus) is a single genus under the *Siganidae* family known locally as kordonnyen. Catch data that is classified collectively as rabbitfish, consist of mainly 5 species, *Siganus sutor (*Shoemaker spinefoot, Kordonnyen blan), *Siganus argenteus* (Streamlined spinefoot, kordonnyen soulfanm/kanalo), *Siganus stellatus* (Brown-spotted spinefoot, kordonnyen margrit), Siganus corallinus (Blue-spotted spinefoot, kordonyen lafimen) and *Siganus canaliculatus* (White-spotted spinefoot, kordonnyen brizan).

Catch

Total Rabbitfish catch was 143.8Mt in 2020 which is a massive drop in catch following the 270.3Mt caught in 2019. The catch recovered to 209.7 Mt in 2021 before reaching another low of 132.2 Mt in 2023. Maximum catch was 316.6Mt caught in 2004. Catch fluctuated widely throughout the years with rapid increase in some years followed by also rapid declines the following years (Siganidae Figure 1). CPUE also fluctuated between 2003 -2013. In 2014 it started to increase reaching 3.68 kg/traps in 2016 after which it declined drastically in 2017 to reach the lowest level recorded of 1.62kg/trap. Since 2018 CPUE has been indicating recovery (Siganidae Figure 2)



Siganidae Figure 1: Catch (Mt) between 2003 – 2023 using traps



Siganidae Figure 2: Nominal CPUE (kg/traps) between 2003 – 2023

Biology

English name: Rabbitfish Local Name*:* Kordonnyen

Parameter	**Description**
General	Marine, reef associated. For most species juveniles form schools while adults some forms schools or are found in pairs. Herbivores that feed on benthic algae. Exhibits diurnal behaviour.
Range	**Species:** Tropical and subtropical. Indo-pacific and eastern Mediterranean **Stock:** Mahe plateau
Depth distribution	0-40m
Preferred habitats	Occurs in inshore areas such reefs, lagoons, mangroves, and seagrass beds. Some are found in brackish waters.
Longevity	2 – 3 yrs
50% maturity	Approx. 1yrs
Spawning season	
Size	**Maximum:** 35cm – 45cm FL

Stock Assessment

A catch-based stock assessment was carried out on Rabbitfish using CAS data collected from 1990 to 2019 (Robinson, 2021).

Description of the stock

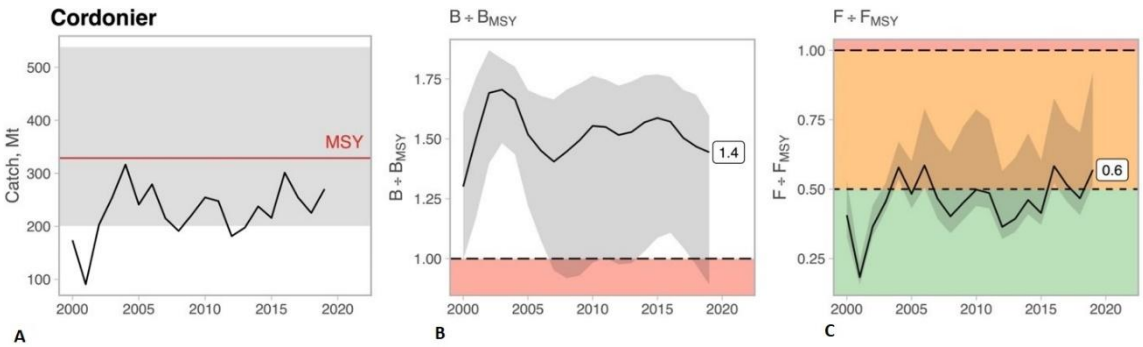
In the absence of information on the genetic connectivity, mixing and identity of the stock, the different population of Rabbitfish on the Mahe plateau is considered to be a unit stock, due to its remote location.

Catch based stock assessment

Standardised CPUE for active traps (FIXA) was stable for most years until around 2010 when it started to increase. Maximum CPUE was obtained in 2014 after which it started to decline and has remained low since 2020. CPUE for static traps (FIXS) was stable until 2015 after which it started to decline but were showing signs of recovery as from 2021 (Siganidae Figure 3).

Siganidae Figure 3: Standardized CPUE by gear types determined by Robinson (2021) and updated up to 2023. FIXA_Outboard – Fix traps on outboard vessels; FIXS_Outboard – Static traps on outboard vessels

The uncertainty from calculation of MSY was quite high. Catch level is well below MSY and remained steady throughout the years. The B/B_{MSY} is well above 1 indicating that the stock is healthy (B). Uncertainty for the estimation of B/B_{MSY} is also very high requiring caution when interpreting the data. For most years F/F_{MSY} fluctuated between the risk of depletion (between <1 and >0.50) and no risk of depletion (<0.5). The stock assessment indicated that siganidae have high resilience to fishing and the stock appears to be healthy (Robinson, 2021).



Siganidae Figure 4: Indicating catch and estimated MSY (A), estimated biomass against biomass at MSY (B) and estimated fishing mortality and fishing mortality at MSY (C) estimated by Robinson 2021

Stock status determination

Based on the 2021 stock assessment, Rabbitfish stock was found to be not subjected to overfishing and not overfished however this is contradicting what is being observed with the CPUE and therefore making the biomass status to be uncertain. Rabbitfish is subjected to high fishing pressure due to their value as an important food source to the local population. However, they have been found to be resilience as they are fast growing and short-lived species.

	Fishing mortality	Biomass
Rabbitfish		

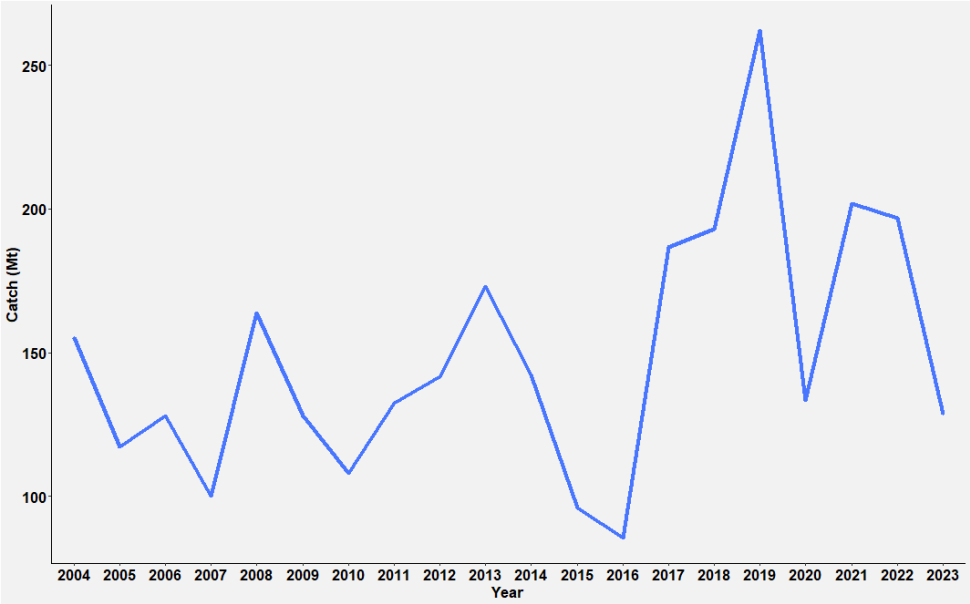
Fishing mortality		Not subject to overfishing		Subject to overfishing		Uncertain
Biomass		Not overfished		Overfished		Uncertain

3.2. Other trap fishes

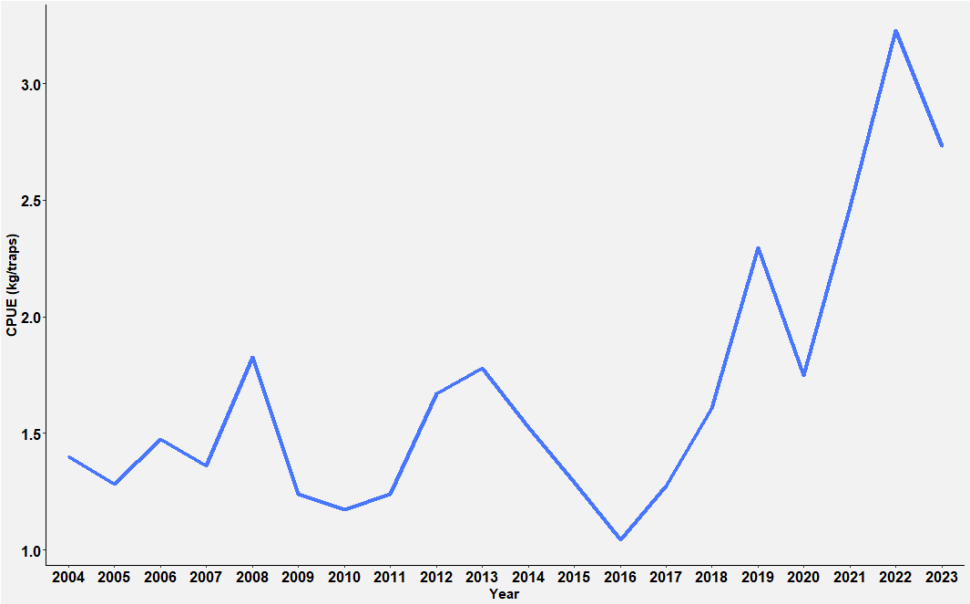
Fish categorized as other trap fishes consist of more than 30 species of reef associated fish that are caught by traps but are not identified individually in the CAS data. This consist of species from the family Mullidae (Goatfish, rouze), Scaridae (Parrotfish, kakatwa), Labridae (wrasse), Plectorhinchinae (sweetlips) and Acanthuridae (surgeonfish, sirizyen) among a large range of many different reef and sea grass associated species.

Catch

The catch fluctuated between 2004 to 2014 after which it declined rapidly in 2015 reaching the lowest catch of 85.3 Mt in 2016. After that it increased to 201.8 in 2017 to reach the maximum recorded catch of 262.2 Mt in 2019. By 2020 the catch has declined again to 133.2Mt while in 2023 it was 128.5 Mt (Other Trap Fishes Figure 1). CPUE also showed extreme fluctuations throughout the year. Rapidly increase from 1.17kg/traps to 1.78 kg/traps in 2013 before declining down to lowest CPUE of 1.04 kg/traps in 2016. CPUE reach its highest recorded in 2022 with 3.22 kg/traps (Other Trap Fishes Figure 2)



Other Trap Fishes Figure 1: Catch (Mt) of other trap fish from 2004 – 2023 using traps



Other Trap Fishes Figure 2: Nominal CPUE (kg/traps) of other trap fish from 2004 – 2023 caught by traps

Biology

English name: Other trap fish Local Name: Pwason kazye

Parameter	Description
General	Marine coastal waters.
	Species: Tropical and subtropical
Range	**Stock:** Mahe plateau
Depth distribution	
Preferred habitats	Wide range of habitats for different families but mainly reef associated.
Longevity	
50% maturity	
Spawning season	
Size	**Maximum:**

Stock Assessment

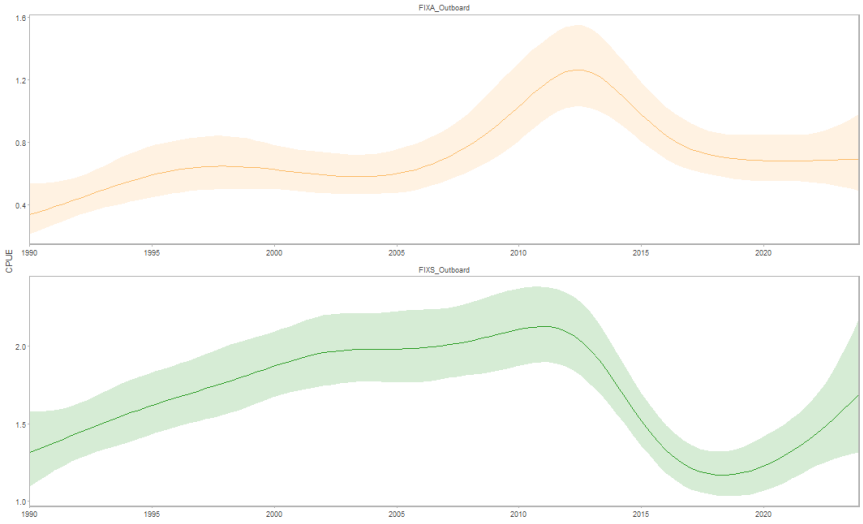
A catch base stock assessment was carried out on other trap fishes using CAS data collected from 1990 to 2019 (Robinson, 2021).

Description of the stock

All the species caught in trap apart from Siganidae is assess as a single stock

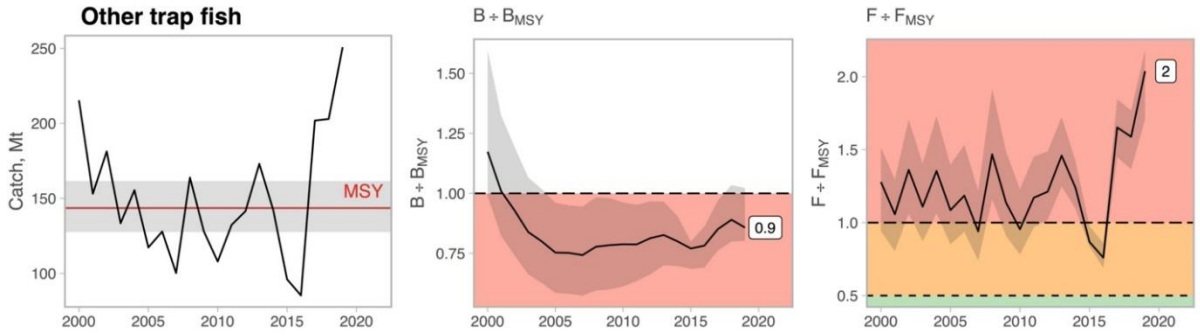
Catch based stock assessment

The standardised CPUE for active traps (FIXA) were increasing in the earlier years but has been fairly stable throughout. For static traps (FIXS) it was increasing until around 2011 after which it declined considerably reaching the lowest for recent years in 2021.



Other Trap Fishes Figure 3: Standardized CPUE by gear types determined by Robinson (2021) and updated up to 2023. FIXA_Outboard – Fix traps on outboard vessels; FIXS_Outboard – Static traps on outboard vessels

Biomass and fishing mortality was estimated to be above MSY, however the results have high certainty due to the multiple species with different life histories and resilience to fishing pressure (Other Trap Fishes Figure 3). To improve the stock assessment results, it was recommended that the data should be separated to families with similar life histories and whenever possible to species level (Robinson, 2021).



Other Trap Fishes Figure 4: Estimated MSY (A), estimated biomass against biomass at MSY (B) and estimated fishing mortality and fishing mortality at MSY (C) estimated by Robinson (2017)

Stock status determination

The stock assessment is indicating catch well above MSY, biomass in a level indicating stock depletion and high fishing mortality. However, with the large number of species in the catch with different life histories and resilience to fisheries, the biomass is determined to be uncertain while the stock was subjected to overfishing

	Fishing mortality	**Biomass**
Other trap fishes		

Fishing mortality		Not subject to overfishing		Subject to overfishing		Uncertain
Biomass		Not overfished		Overfished		Uncertain

4. Seychelles Net Fishery

The Seychelles net fishery makes up approximately 10% of the Seychelles artisanal fishery. Net fishery has been operating for many years in the Seychelles. The fishery operates principally on the Mahe plateau around the inner granitic islands of Mahe, Praslin and La Digue, in areas not more than 30nm offshore, commonly between 1 to 20nm. Under the net fishery three main fishing gears are used, these are encircling gillnet, beach seine and seine. Encircling gillnet contributes the most catch to the net fishery.

The main target species for the fishery includes the mackerels, sardinella herrings and slipper lobsters. Mackerels contribute the most to the fishery representing around 85% of the total encircling gillnet catches.

The net fishery is a licensed fishery. Several management measures are currently available for the fishery. Measures include

- Prohibition in fishing for mackerel using nets at any time before 5a.m. or after 4 p.m. on any day
- Mounting of all nets with lead ropes to minimize damages to corals.
- Prohibition in fishing for sharks using nets
- Prohibition in using nets in protected areas around Mahe, Praslin and La Digue.

4.1. Encircling Gillnet

Gillnets are used primarily to target mackerel. They are made of polyamide multifilament and a combination of this material and nylon monofilament. The monofilament netting is rigged in the middle of the net (top and bottom) creating a relatively transparent section to catch the target species, which is led into the area, by the multifilament sections (Seychelles Fishing Authority, 2007).

There are two manners to operate the net. The first one consists of deploying the net in a nearly circular manner and scaring the school of fish into the net by using the outboard powered boat. The second has evolved using a longer net, which is deployed by making several circles around the school finally forcing the fish to enter into small parts of the net (Seychelles Fishing Authority, 2007)

4.1.1. Mackerel

Mackerel is a group of semi-pelagic fish known locally as makro. Within the encircling gillnet fishery, the main mackerel species is *Rastrelliger kanagurta* (Indian mackerel, makro dou), which makes up around 75% of the overall mackerel catch. Other species includes *Selar crumenopthalmus* (Bigeye scad, makro gro lizye), and two fusiliers' species, Caesio caerulaurea (Blue and gold fusilier, makro kannal) and Caesio xanthonotus (Yellowback fusilier, makro zonn).

Catch

Total catch fluctuated widely over the years, with rapid declines observed in 2006, 2010, 2016 and 2020. These fluctuations were mainly observed in the catch of Indian mackerel, while for other mackerels the catch remained low but fluctuating throughout the years. Maximum catch for Indian mackerel was 650.8Mt which was obtained in 2005 while lowest catch was 88.7 Mt obtained in 2009. The catch in 2023 was 310.2 Mt for Indian mackerel and 3.6 Mt for the other mackerels. Similarly, the CPUE also followed a trend of extreme fluctuations throughout the years. The lowest CPUE obtained for Indian mackerel was 50.83 kg/number of net sets in 2019. In the latest years the CPUE has been fluctuating in an upward trend for Indian mackerel and it has been going down for other mackerels

Mackerel Figure 1: Catch (Mt) by species between 2005 – 2023 using encircling gillnets

Mackerel Figure 2: Nominal CPUE (kg/number of nets set) by species between 2005 – 2023

Biology

English name: *Indian mackerel* Local name: Makro dou

Parameter	Description
General	Adults occur in coastal bays, harbours and deep lagoons usually in some turbid plankton-rich waters. Form schools. Feed on phytoplankton, small zooplanktons and larval crustacean and fishes.
	Species: Tropical; 38°N - 36°S, 20°E - 180°W
Range	**Stock:** Mahe plateau
Depth distribution	20 - 90 m,
Preferred habitats	Marine, pelagic-neritic, oceandromous
Longevity	3 - 4 years
50% maturity	19.9 cm TL
Spawning season	
Size	**Maximum:** 36 - 42cm TL

Stock Assessment

There has not been any recent stock assessment carried out on any species of mackerel recently. The last report available on the fishery is the draft Net fishery management plan in 2007.

Stock status determination

With the lack of recent assessment on the fishery to provide a good indicator of the stock, it can be concluded that the status for both fishing mortality and biomass is uncertain

	Fishing mortality	Biomass
Mackerel		

Fishing mortality		Not subject to overfishing		Subject to overfishing		Uncertain
Biomass		Not overfished		Overfished		Uncertain

5. Seychelles Spiny Lobster Fishery

The spiny lobster fishery is an artisanal activity targeting spiny lobsters (*Palinuridae*) in the shallow water around the main granitic islands (Seychelles Fishing Authority, 2019, 2023). Since spiny lobsters are mainly nocturnal scavengers, fishing operations are conducted from dusk to dawn (Seychelles Fishing Authority, 2017, 2023). 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 (Seychelles Fishing Authority, 2017, 2023). Scuba diving, snorkelling and bamboo traps are the different fishing techniques practiced locally (Seychelles Fishing Authority, 2017, 2023). 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. Species targeting is opportunistic and four species of spiny lobster is commonly known to be found in Seychelles.

The spiny lobster fishery is licensed and seasonally managed, 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:

- Restrictions on the number of licences. Currently capped at 16 licenses with 10 licenses available for Mahe, 4 for Praslin and 2 for La Digue
- Seasonal restrictions (the fishery is typically opened for a 3-month period)
- Minimum size (75 mm carapace length for all species)
- Prohibition in retaining berried females

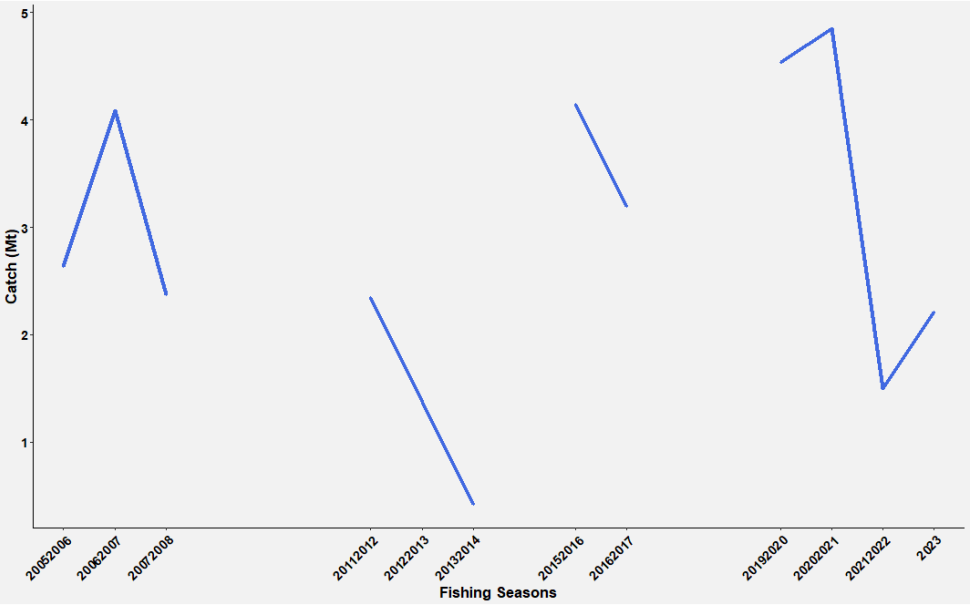
All licensees are provided with catch and effort logbooks to be filled after each trip. Additionally, after every trip the Fisheries Research Department of the SFA samples the entire landings on Mahe collecting biological information such as carapace length, weight and sex.

5.1. Pronghorn spiny lobster

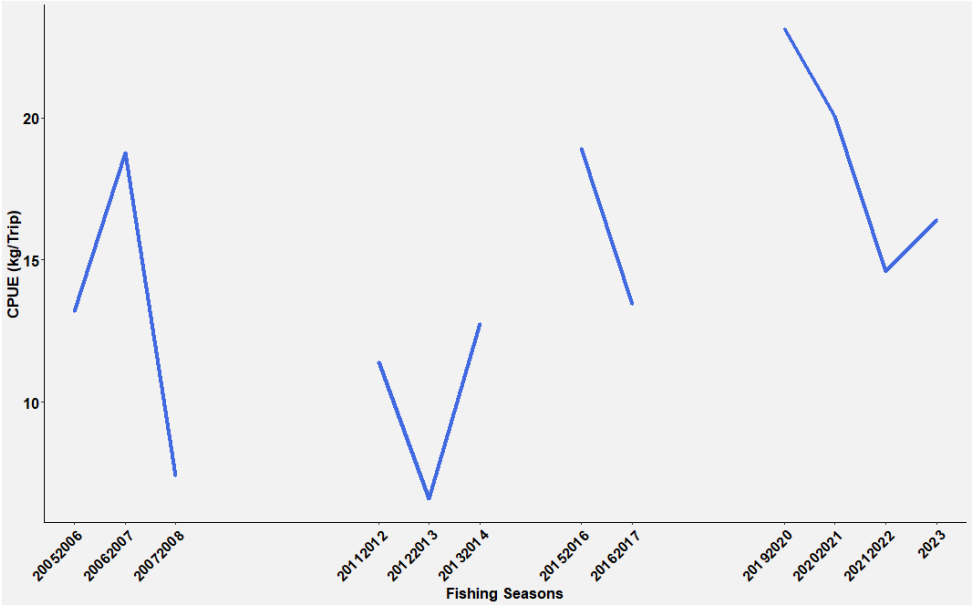
Pronghorn spiny lobster (*Panulirus penicillatus*, Oumar gro latet) is the most commonly caught species among the 4 species contributing to 75% of the total spiny lobster landings

Catch

The catch started to decline from the 2007/08 season reaching the lowest catch of 0.42Mt in 2013/14 season. However, the 2013/14 season was opened for only 1 month and only 8 fishermen applied for licenses out of 16 that is usually made available. The highest catch was obtained in 2020/21 season with 4.84 Mt caught. The catch for 2021/22 season was also low with 1.50Mt obtained, again this is because the season was opened for only two months compared to the usual 3 months (Penicillatus Figure 1). The nominal CPUE has been fluctuating for the past seasons, the lowest CPUE was obtained in 2012/13 season with 6.58kg/trip while the highest was during the 2019/20 with 23.14kg/trip (Penicillatus Figure 2).



Penicillatus Figure 1: Catch (Mt) of *P.penicillatus* from 2005/2006 – 2023 fishing season



Penicillatus Figure 2: Nominal CPUE (kg/trip) of *P.penicillatus* from 2005/2006 – 2023 fishing seasons

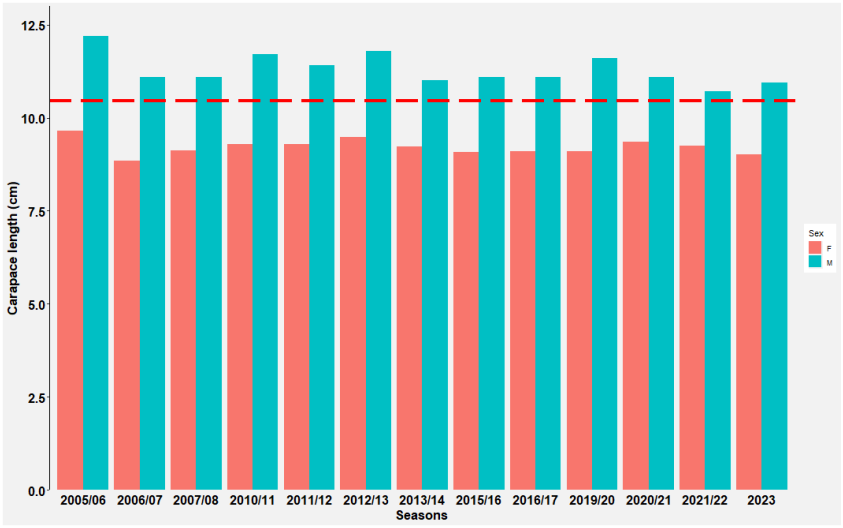
Biology

English name: Pronghorn spiny lobster Local Name*:* Oumar gro latet

Parameter	Description
General	Marine, benthic. Males are usually larger than females. Not gregarious. Nocturnal hiding in the daytime in crevices in the rocks and coral reefs. Mainly carnivores usually feeding upon sluggish easily captured animals.
Range	**Species:** Tropical and subtropical 46°N - 39°S, 30°E - 85°W **Stock:** Mahe plateau
Depth distribution	1-4m
Preferred habitats	Inhabits rocky substrates in clear water often in surf zone and surge channels.
Longevity	
50% maturity	5.6 – 6.6 cm females, 7.2 – 7.4 cm for males
Spawning season	
Size	**Maximum:** 40cm total body length

Length Frequency

Carapace length (CL) data is collected during the biological sampling of landings. The sampling activities aim to target 100% landings on Mahe while on Praslin and La Digue the sampling is opportunistic. The historical mean was 10.47cm. The mean CL for female fluctuates between 8.84 – 9.65 cm with the lowest mean recorded in the 2006/07 fishing season. Mean CL for males was higher than for females fluctuating between 10.7 – 12.2 with the lowest mean recorded in the 2021/22 fishing season. Over the different seasons the mean CL for both males and females has been stable. (Penicillatus Figure 3)



Penicillatus Figure 3: Mean carapace length in cm for Pronghorn spiny lobster by fishing seasons. Red line indicating historical average.

Stock Assessment

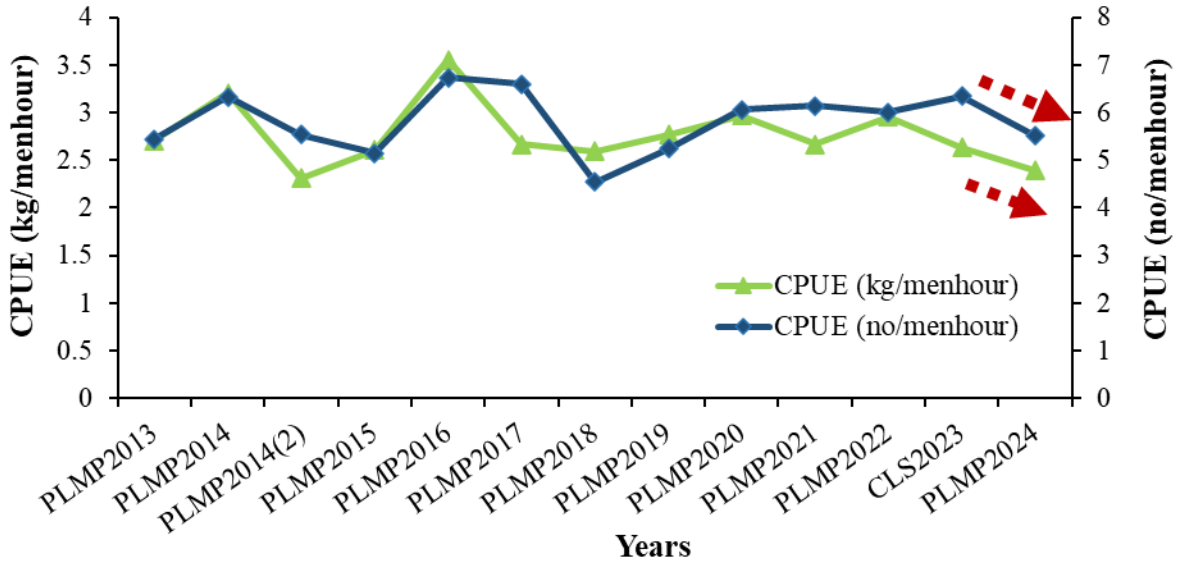
A Participatory Lobster Monitoring Programme (PLMP) which is a small-scale localised fisheries independent survey is undertaken annually to assess the status of the lobster stock in the coastal areas of Mahe (Seychelles Fisheries Authority, 2024c). Additionally a comprehensive lobster survey was undertaken in 2023 to assess the population of spiny lobster throughout the granitic and coralline island of the Mahe plateau (Gabriel, 2024)

Description of the stock

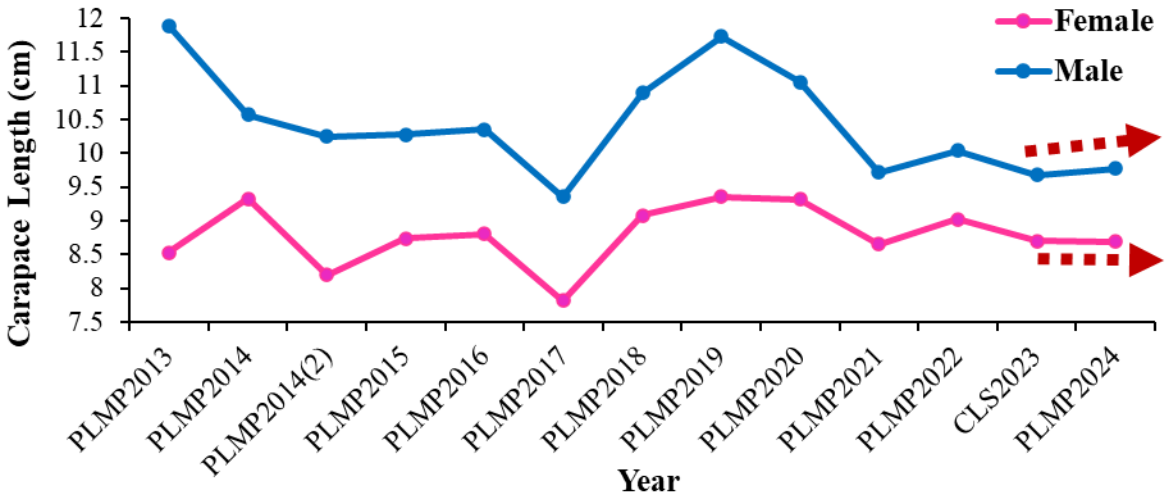
In the absence of information on the genetic connectivity, mixing and identity of the stock, the population of Pronghorn spiny lobster on the Mahe plateau is considered to be a unit stock, due to its remote location.

Results of stock assessment

In 2024 a total of 31kg of Pronghorn spiny lobster was collected which represent an 10% decline from 2022. The CPUE in both kg per man hour and number per man hour was determined for all lobsters, and it showed a fairly stable trend throughout the past 8 years (Penicillatus Figure 4). A slight decrease in average CL for both females and males respectively was observed in 2021 compared to 2020, however, this was found to not be statistically significant. Generally average CL has remained stable in the population for both males and females (Penicillatus Figure 5).



Penicillatus Figure 4: Average catch per unit effort at survey sites in kilogram/menhour and numbers/menhour for all lobsters caught from 2013 to 2024. Red arrow highlights change in trends.



Penicillatus Figure 5: Average carapace sizes of Pronghorn spiny lobster caught during the surveys between sexes from 2013 to 2024.

FAO Weight of Evidence Framework (WoEF)

The Weight of evidence framework is a tool developed by the Food and Agriculture Organisation an agency of the United Nations (UN). The framework is a tool to guide and support participatory evidence-based fisheries assessment and decision-making advice for Data and Capacity limited Fisheries (DCLF). The process entails gathering, compiling and analysing all evidence that can be used to determine the status of a stock. The use of the framework enhances transparency and accountability by proving a clear and documented rational on how a conclusion was reached.

The weight of evidence has been applied to several stock of the Seychelles fisheries including the Pronghorn spiny lobster. The process concluded that the Pronghorn spiny lobster stock is Maximally Sustainably fished.

Stock status determination

The fluctuation in the CPUE from the fisheries and the stability in the CPUE from the PLMP is indicating that the biomass is stable. Additionally, the carapace length from the survey is indicating slight decrease however it is not significant, this is indicating that the biomass is not overfished. Additionally, the conclusion from WoEF is indicating that the biomass is not overfished. However, with the limited assessment that has been carried out on the stock, fishing mortality has been determined to be uncertain.

	Fishing mortality	**Biomass**
Pronghorn spiny lobster		

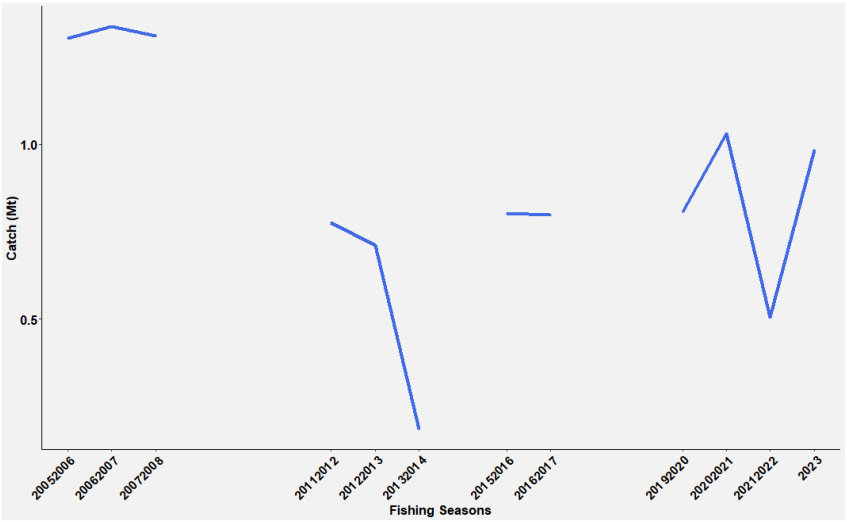
Fishing mortality		Not subject to overfishing		Subject to overfishing		Uncertain
Biomass		Not overfished		Overfished		Uncertain

5.2. Long-legged spiny lobster

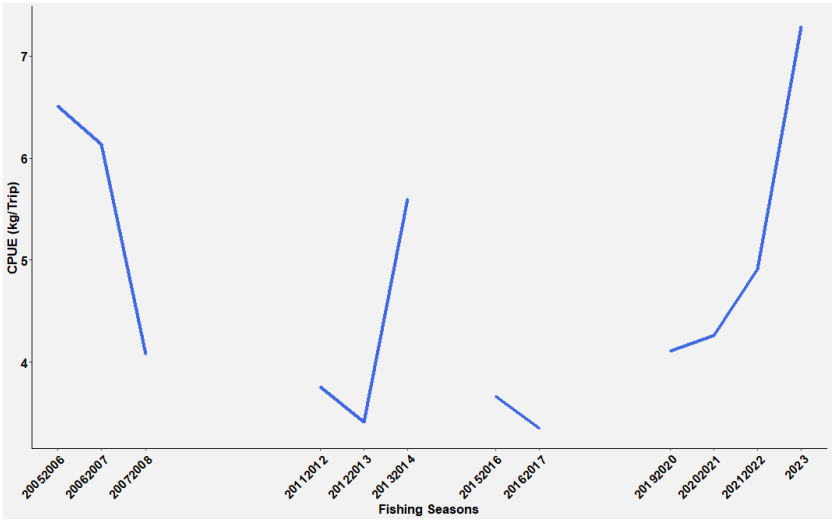
Long-legged spiny lobster (*Panulirus longipes*, Oumar rouz) is the second most caught species among the 4 species in the spiny lobster fishery contributing to 23% of the total spiny lobster landings

Catch

The catch started to decline from the 2007/08 season reaching the lowest catch of 0.18Mt in 2013/14 season. However, the 2013/14 season was opened for only 1 month and only 8 fishermen applied for licenses out of 16 that is usually made available. The highest catch was obtained in 2006/07 season with 1.33Mt caught. The catch for 2021/22 was 0.50Mt the lowest since 2013/14, this was also due to a shorter fishing season of only 2 months (Longipes Figure 1). Highest nominal CPUE was 6.51kg/trip obtained in 2005/06. The CPUE started to decline from 2006/07 season reaching the lowest of 3.41 kg/trip for the 2012/13 season. Since 2016/17 CPUE was in an increasing trend reaching 7.29 kg/trip for the 2023 season which was the highest recorded during the past 12 open seasons (Longipes Figure 2).



Longipes Figure 1: Catch (Mt) of Long-legged spiny lobster from 2005/2006 – 2023 fishing season



Longipes Figure 2: Nominal CPUE (kg/trip) of Long-legged spiny lobster from 2005/2006 – 2023 fishing seasons

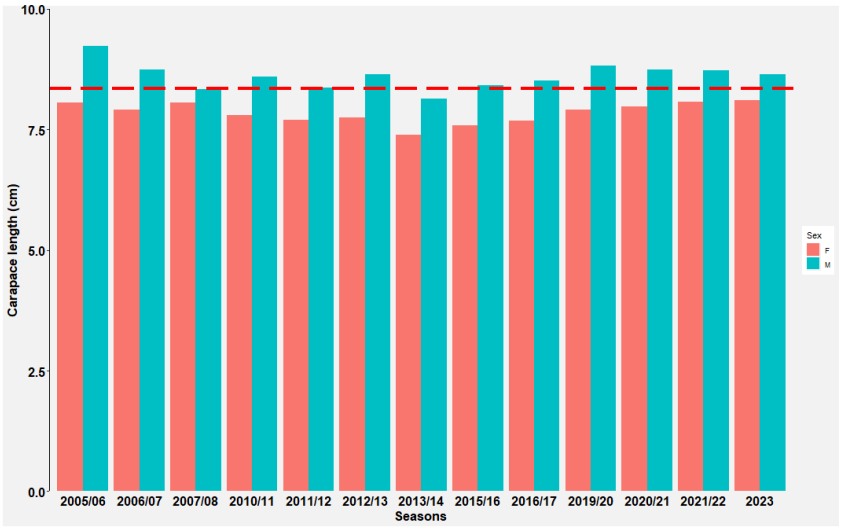
Biology

English name: Long-legged spiny lobster Local Name*:* Oumar Rouz

Parameter	Description
General	Marine, benthic. Not gregarious. Nocturnal hiding in the daytime in crevices in the rocky areas and coral reefs. Mainly carnivores.
Range	**Species:** Tropical 36°N - 35°S, 33°E - 142°W **Stock:** Mahe plateau
Depth distribution	1-18m
Preferred habitats	Found in clear or sometimes slight turbid shallow waters and corals reefs.
Longevity	
50% maturity	
Spawning season	
Size	**Maximum:** 30cm total body length, 12cm carapace length

Length Frequency

Females were generally smaller than males. The mean CL for females were between 7.39cm – 8.08cm. The 2013/14 season had the lowest mean CL for females with the mean of 7.39 cm being even below the legal size of 7.5cm. The mean carapace length for males were between 8.14cm – 9.23cm. Similarly, the 2013/14 season has the lowest mean carapace length. The historical mean carapace length was 8.34. However generally the mean carapace length has remained fairly stable within the fisheries (Longipes Figure 3).



Longipes Figure 3: Mean carapace length in cm for Long-legged spiny lobster by fishing seasons. Red line indicating historical average.

Stock Assessment

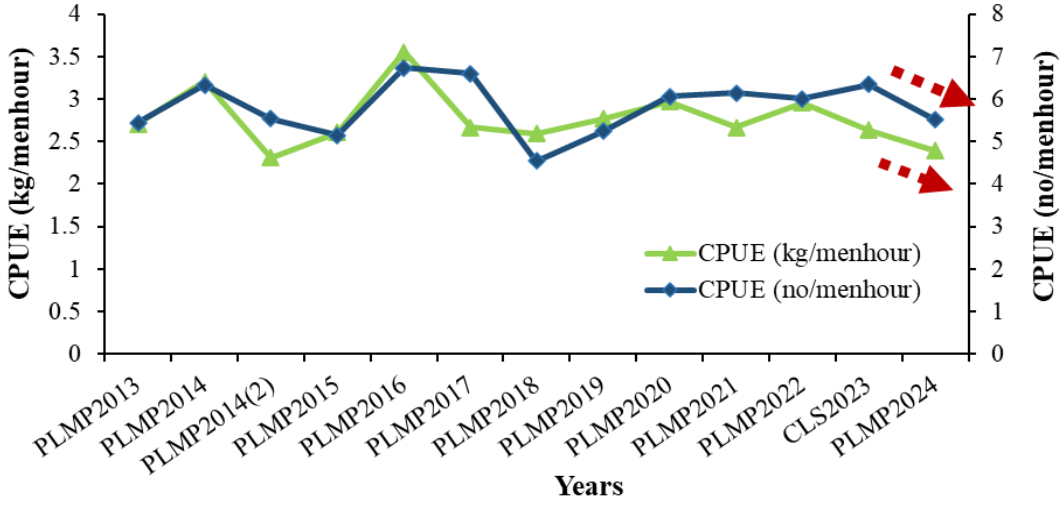
A Participatory Lobster Monitoring Programme (PLMP) which is a small-scale localised fisheries independent stock assessment, is undertaken annually to assess the status of the lobster stock in the coastal areas of Mahe (Seychelles Fisheries Authority, 2024c). Additionally a comprehensive lobster survey was undertaken in 2023 to assess the population of spiny lobster throughout the granitic and coralline island of the Mahe plateau (Gabriel, 2024)

Description of the stock

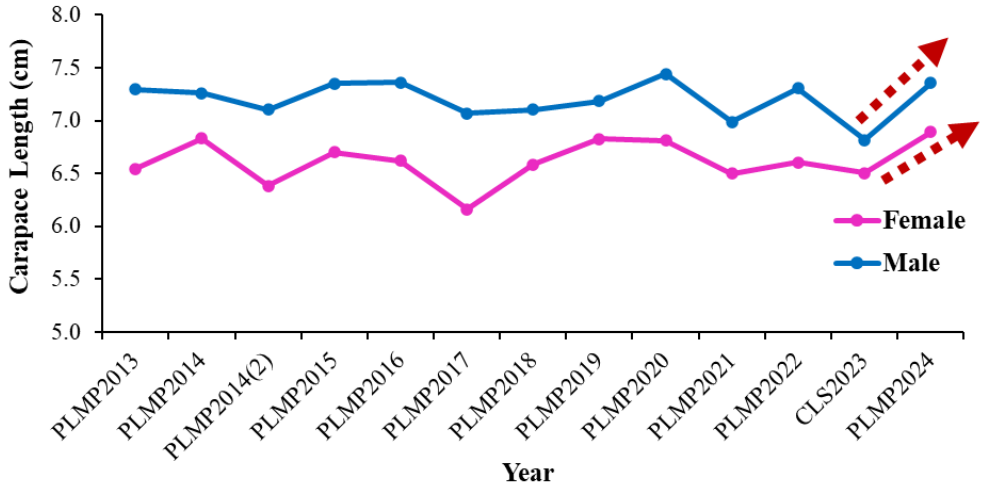
In the absence of information on the genetic connectivity, mixing and identity of the stock, the population of Long-legged spiny lobster on the Mahe plateau is considered to be a unit stock, due to its remote location.

Results of stock assessment

In 2024 a total of 23kg of Long-legged spiny lobster was collected which represent a 24% decline from 2022. The CPUE kg per man hour and number per menhour was determined for all lobsters, and it showed a fairly stable trend throughout the past 8 years (Longipes Figure 4). The mean CL within the population has been fairly stable throughout the years for both males and females. (Longipes Figure 5).



Longipes 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.



Longipes Figure 5: Average carapace sizes of Long-legged spiny lobster caught during the surveys between sexes from 2013 to 2021.

FAO Weight of Evidence Framework (WoEF)

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The weight of evidence has been applied to several stock of the Seychelles fisheries including the Long-legged spiny lobster. The process concluded that the Long-legged spiny lobster stock is Maximally Sustainably fished.

Stock status determination

Both the CPUE from the fishery and the surveys are indicating a stable biomass. The average carapace length over the years has also remained stable indicating that the biomass is not overfished. Additionally, the conclusion from WoEF is indicating that the biomass is not overfished However, with the limited assessment that has been carried out on the stock, fishing mortality has been determined to be uncertain.

	Fishing mortality	**Biomass**
Long-legged spiny lobster		

Fishing mortality		Not subject to overfishing		Subject to overfishing		Uncertain
Biomass		Not overfished		Overfished		Uncertain

6. Seychelles Sea Cucumber Fishery

The harvesting of sea cucumbers in Seychelles goes back to the early 1800s, however, the fisheries remained small scale until the late 1990's when a rapid increase in catch was observed (Conand & Aumeeruddy, 2008). The increase in demand and price for "beche-de-mer" led to an evolution in the fishery from the collector type, where fishers collected on foot in shallow areas, to the use of scuba gears as they moved deeper (Aumeeruddy & Payet, 2002). The fishery currently operates mainly on the Mahe plateau and the Amirantes bank, however special permissions is also given for trips into the outer coralline islands. For all trips skippers are required to fill in catch and effort logbooks after a dive is undertaken.

The sea cucumber fishery is currently one of the most managed fisheries in Seychelles, however it currently does not have a formal management plan. Over the past 20 years, regulations and license conditions has been used to manage the fishery. Regular fisheries dependent and fisheries independent stock assessment are undertaken every couple of years. The last fisheries dependent assessment was in 2017 while the last fisheries independent assessment was in 2022. The fishery also has a management advisory committee (MAC) that consist of SFA representatives and stakeholders from the fishery.

The current management regulations in place for the fishery includes –

- A cap of 25 non-transferable fishing licenses and 4 processing licenses
- Open fishing season of 8 months
- Only 3 species are allowed to be exploited – Flower teatfish (pentard, *Holothuria spp*.), Pricky redfish (sanpye, *Thelenota ananas*) and golden sandfish (kokonm, Holothuria lessoni) for the 2024/2025 season.
- Total Allowable catch (TAC), the quota for the 2024-2025 fishing season was 240,475 for flower teatfish, 45,000 for prickly redfish and 100,000 for golden sandfish
- Additionally upon written approval from the SFA an additional 1750 White teatfish, 250 Black teatfish, 2500 Flower teatfish, 1200 Prickly redfish and 4000 Golden sandfish are further allocated to each licensee fishing in the outer islands

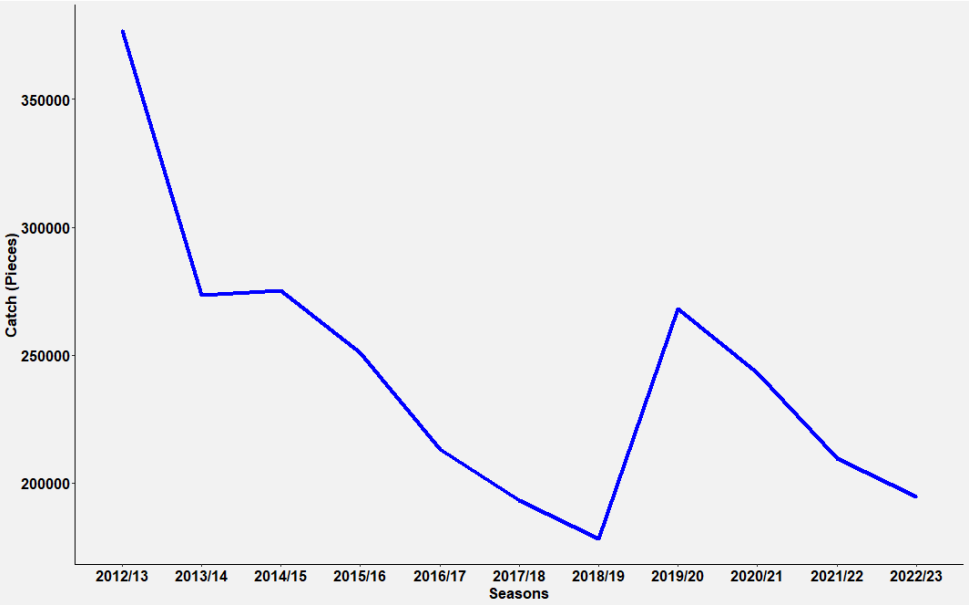
The 2024/2025 fishing season was between 15th October 2024 – 30th June 2025

6.1. Flower teatfish

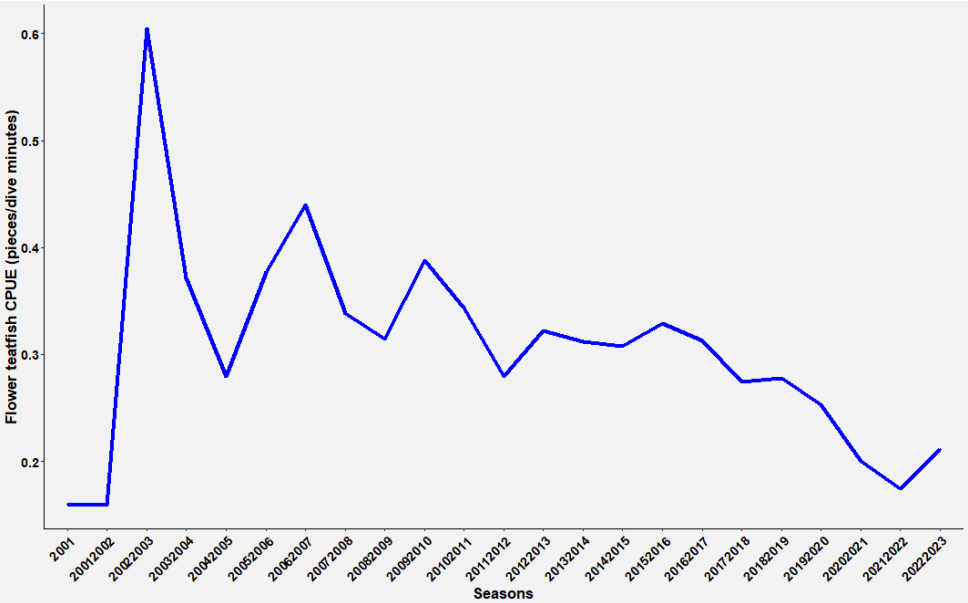
Flower teatfish (Holothuria sp. (type 'Pentard') is a species of the genus Holothuria of the family Holothuriidae that has not yet been formally described. It is the species with the most allocated quota in the Seychelles Sea Cucumber fisheries. The total allowable catch for the 2024/2025 fishing season was 9619 pieces per vessels.

Catch

Flower teatfish catch has been in declined since 2012/13 fishing season reaching the lowest catch in 2018/19 season with 177929 pieces. The catch increased to 268047 pieces for the 2019/20 fishing season after which it declined again reaching 114725 pieces for the 2021/22 fishing season (Pentard Figure 1). Nominal CPUE in pieces per minutes dive had been on a downward trend since 20022003 fishing seasons.



Pentard Figure 1: Catch (pieces) of flower teatfish from 2012/13 – 2022/23 fishing seasons



Pentard Figure 2: Nominal CPUE (pieces/dive minutes) of flower teatfish from 2001 – 2022/2023 fishing seasons

Biology

English name: Flower teatfish Local name: Pentard

Parameter	Description
General	Benthic. Omnivorous deposit feeder.
Range	**Species:** In the western Indian Ocean - The Seychelles, Comoros, Tanzania, Madagascar, Sri Lanka and the Maldives **Stock:** Mahe plateau and Amirante Bank
Depth distribution	10-50m
Preferred habitats	Preferred lagoons
Longevity	20 – 30 years
50% maturity	31cm (28.5 – 32.3 cm)
Spawning season	
Size	**Maximum:**

Stock Assessment

A catch-based stock assessment was undertaken in 2017 using data collected from catch and effort logbook filled by skippers after each dive (MRAG LTD, 2017). A fisheries independent survey was undertaken in 2021 to estimate the density and population of all sea cucumber species on the Mahe plateau and Amirante bank (Skewes & Long, 2022).

Description of the stock

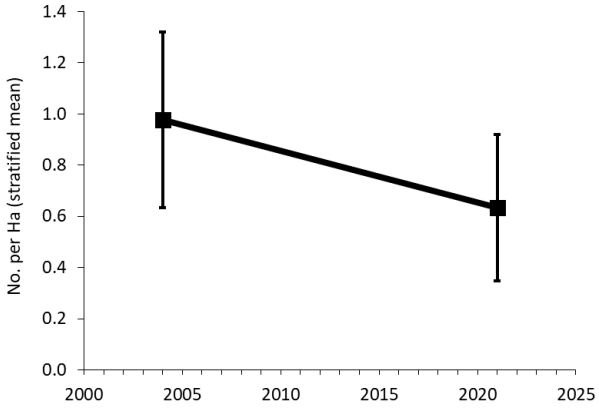
In the absence of information on the genetic connectivity, mixing and identity of the stock, the population of flower teatfish within the Seychelles EEZ is considered to be a unit stock, due to its remote location.

Catch based stock assessment

The method used by MRAG LTD (2017) was a Surplus production model for data poor species. Estimated un-standardized CPUE (number of minutes dived) showed an increase from 2002 to 2003. CPUE remained stabled from 2006 to 2016 (MRAG LTD, 2017). However, there is some uncertainty in the data collection from early 2000s and may not reflect the actual CPUE at that time, therefore, the results should be interpreted with caution. The stock assessment was undertaken on 10 sea cucumber species as a group instead of individuals. The result of the stock assessment indicated considerable decline in the group of value species in certain areas with some recovery. The models run estimated a stock size of less than 20% of its pre-exploitation size. The results from the stock reduction analysis point to a bigger initial population than the surplus production model but a less productive one. The mean values of calculated MSY were below 100000 for both models and the results were indicating that for some years catch was at or above MSY

Fisheries Independent assessment

Estimates of standing stock were calculated as the product of estimates of density and stratum area (Skewes & Long, 2022). Density of Flower teatfish dropped by about 35% between 2004 and 2021 at repeated sites but the decrease was not statistically significant (Pentard Figure 2). Estimated population was 2,663,685 Flower teatfish compared to the 4,517,523 estimated in 2004. Estimated CPUE based on catch data show a decline that matches the survey data closely (Pentard Figure 3).



Pentard Figure 3: Overall average density for flower teatfish at repeated sites in 2004 and 2021 (Skewes & Long, 2022)

FAO Weight of Evidence Framework (WoEF)

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The weight of evidence has been applied to several stock of the Seychelles fisheries including the Flower Teatfish. The process concluded that the Flower Teatfish stock is overfished.

Stock status determination

The fisheries independent stock assessment and the CPUE estimation is indicating population had reduced by half since 2004. The decrease in density and CPUE is indicating that the biomass is overfished. The WoEF is indicating that the stock is overfished. The species has high commercial value and has been heavily exploited for the past 20 years, often with past assessment indicating it was being fished above MSY thus indicating that the stock may be subject to overfishing.

	Fishing mortality	**Biomass**
Flower teatfish		

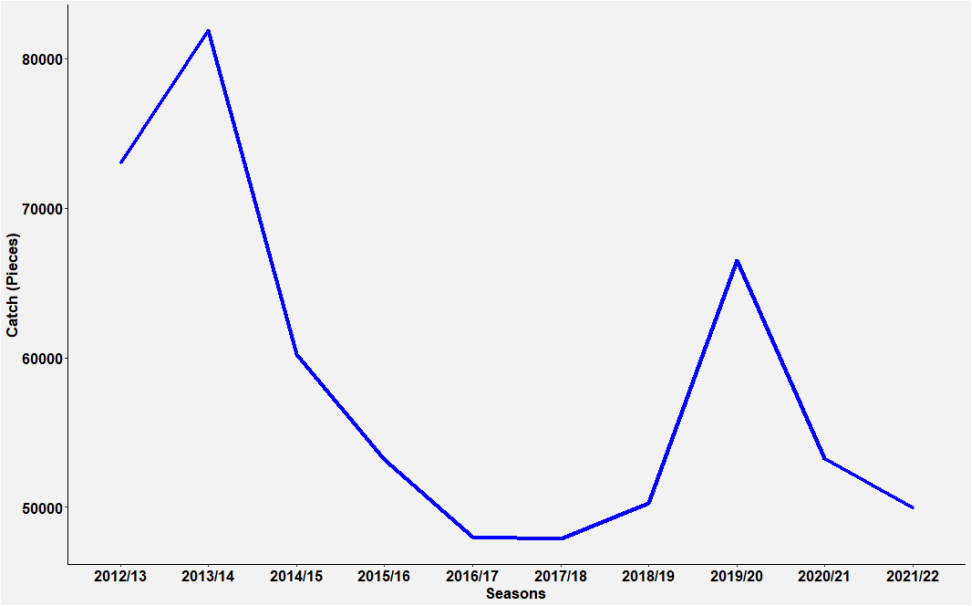
Fishing mortality	Not subject to overfishing	Subject to overfishing	Uncertain
Biomass	Not overfished	Overfished	Uncertain

6.2. *White Teatfish*

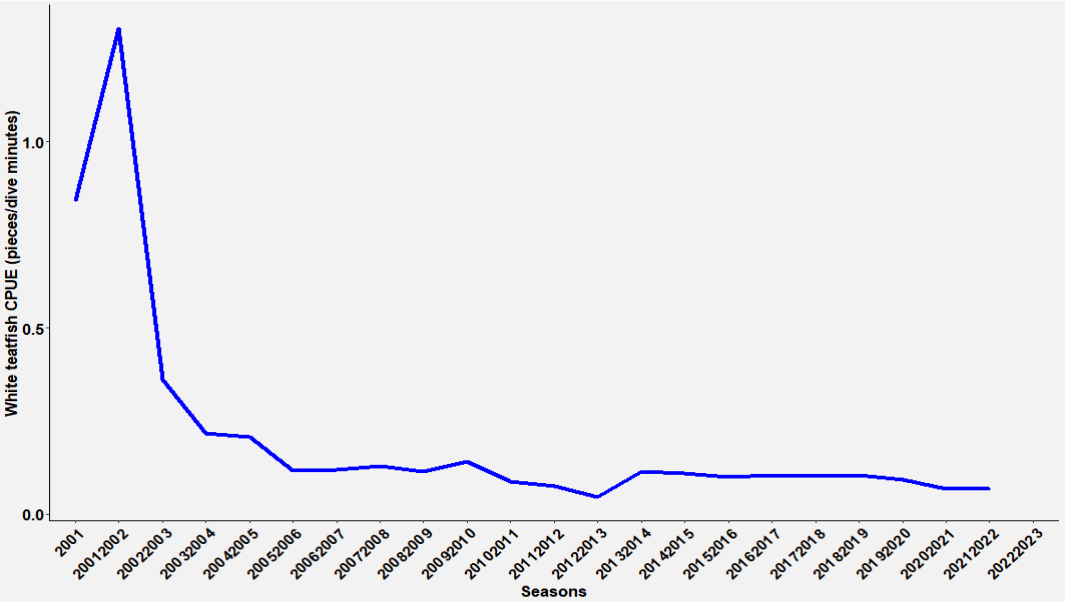
White teatfish *(Holothuria fuscogilva)* is a species of the genus Holothuria part of the family Holothuriidae known locally as kokosye blan. In the Indian Ocean they are reddish brown dorsally and white ventrally and the anus is yellow. Body is sub oval, strongly flattened ventrally, stout and quite firm with thick body wall and presents characteristic large lateral protrusions ('teats') at the ventral margins (Purcell et al., 2023). The total allowable catch for 2021/2022 fishing season was 56,250 pieces. Following the results of the 2022 fisheries independent stock assessment in 2022, there has been a 3-year complete ban on exploitation of the species to allow for stock recovery.

Catch

Rapid decrease in catch was observed from the 2013/14 season from 81892 pieces landed to 47862 pieces for the 2017/18 season. A rise was observed from the 2018/19 season reaching 66491 pieces for the 2019/20 season before falling again the following two seasons with catch reaching 49964 pieces for the 2021/2022 season (Fuscogilva Figure 1). Nominal CPUE (number of minutes dived) showed decrease in CPUE from 2001/2002 and remained stable but low until the closure of the species to the fishery in the 2021/2022 season (Fuscogilva Figure 2). However, there is some uncertainty in the data collection from early 2000s and may not reflect the actual CPUE so the results should be interpreted with caution



Fuscogilva Figure 1: Catch (pieces) of White teatfish from 2012/13 – 2021/22 fishing seasons



Fuscogilva Figure 2: Nominal CPUE (pieces/dive minutes) of White teatfish from 2001 – 2021/2022 fishing seasons

Biology

English name: White Teatfish

Local Name*:* Kokosye blan

Parameter	Description
General	Benthic. Omnivorous deposit feeder.
Range	**Species:** Tropical; 30°N – 27°S, 32°E – 138°W **Stock:** Mahe plateau and Amirante Bank
Depth distribution	0-40m (usually 15-30m)
Preferred habitats	Commonly inhabits outer barrier reef slopes, reef passes and sandy areas. Can also be found in shallow seagrass beds. Juveniles are found to inhabit intertidal area heavily covered in algae.
Longevity	
50% maturity	32cm
Spawning season	
Size	**Maximum:** 57cm

Stock Assessment

A catch-based stock assessment was undertaken in 2017 using data collected from catch and effort logbook filled by skippers after each dive (MRAG LTD, 2017). A fisheries independent survey was undertaken in 2021 to estimate the density and population of all sea cucumber species on the Mahe plateau and Amirante bank (Skewes & Long, 2022).

Description of the stock

In the absence of information on the genetic connectivity, mixing and identity of the stock, the population of White teatfish within the Seychelles EEZ is considered to be a unit stock, due to its remote location.

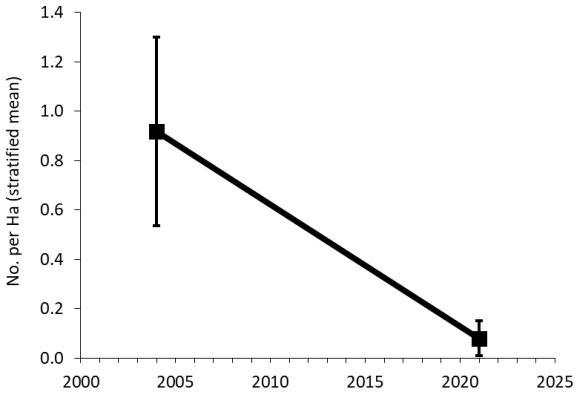
Catch based stock assessment

The method used by MRAG LTD (2017) was a Surplus production model for data poor species. The stock assessment was undertaken on 10 sea cucumber species as a group instead of individuals. The result of the stock assessment indicated considerable decline in the group of value species in certain areas with some recovery. The models run estimated a stock size of less than 20% of its pre-exploitation size. The results from the stock reduction analysis point to a bigger initial population than the surplus production model but a less productive one. The mean values of calculated MSY were below 100000 for both models and the results were indicating that for some years catch was at or above MSY

Fisheries Independent assessment

Estimates of standing stock were calculated as the product of estimates of density and stratum area.

Density of White teatfish at repeated sites declined significantly by 91.3% between 2004 and 2021 (Fuscogilva Figure 3). Population estimates in 2021 was 378,378 (±73.7%) compared to the 4,471,783 estimated in 2004 (Skewes & Long, 2022).



Fuscogilva Figure 3: Overall average density for White teatfish at repeated sites in 2004 and 2021 (Skewes & Long, 2022)

FAO Weight of Evidence Framework (WoEF)

The Weight of evidence framework is a tool developed by the Food and Agriculture Organisation an agency of the United Nations (UN). The framework is a tool to guide and support participatory evidence-based fisheries assessment and decision-making advice for Data and Capacity limited Fisheries (DCLF). The process entails gathering, compiling and analysing all evidence that can be used to determine the status of a stock. The use of the framework enhances transparency and accountability by proving a clear and documented rational on how a conclusion was reached.
The weight of evidence has been applied to several stock of the Seychelles fisheries including the White Teatfish. The process concluded that the White Teatfish stock is overfished.

Stock status determination

The fisheries independent stock assessment and the CPUE estimation is indicating population had reduced significantly since 2004. The decline in density from the independent survey and CPUE over the years is following the same pattern of decline. The decrease in density and CPUE is indicating that the biomass is overfished. The WoEF is indicating that the stock is overfished. The species has high commercial value and has been heavily exploited for the past 20 years, thus indicating that the stock may be subject to overfishing.

	Fishing mortality	Biomass
White teatfish		

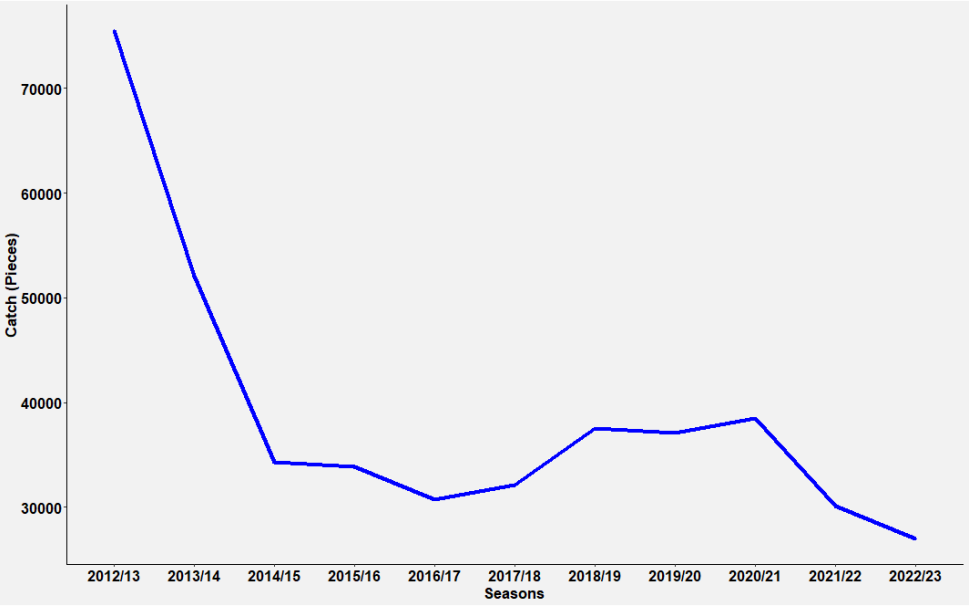
Fishing mortality	Not subject to overfishing	Subject to overfishing	Uncertain
Biomass	Not overfished	Overfished	Uncertain

6.3. Prickly Redfish

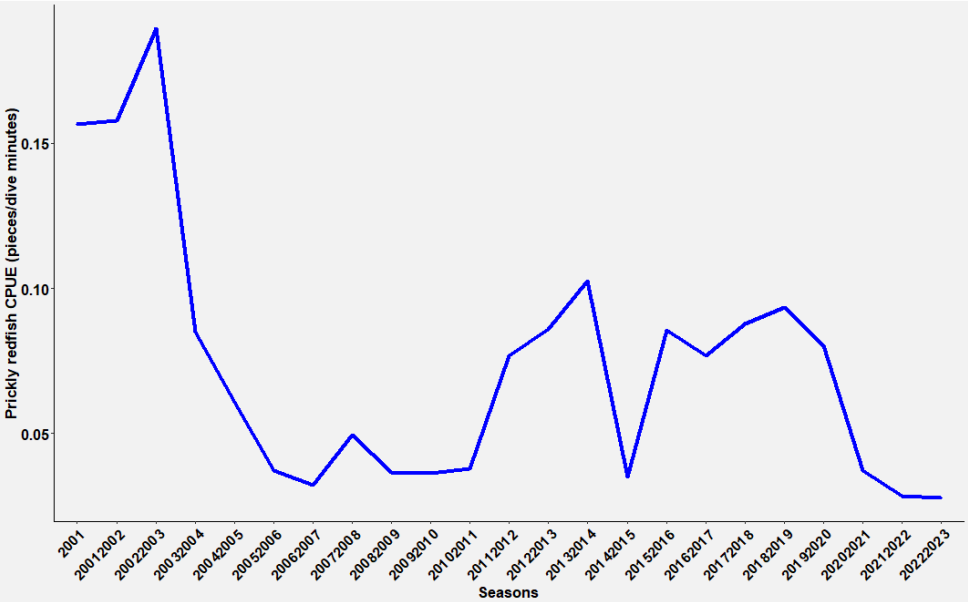
Prickly redfish *(Thelenota ananas)* is a species of the genus *Thelenota* part of the family Stichopodidae. Colour varies dorsally from reddish orange to brown or burgundy (FAO, 2012). It is allowed to be caught in the Seychelles sea cucumber fisheries with total allowable catch for the 20242025 fishing being 1800 pieces per vessels.

Catch

Catch decrease from 75548 pieces for the 2012/13 fishing season until 2016/17 fishing season. The catch started increasing from the 2017/18 season reaching 38494 pieces for the 2020/21 season with the lowest catch of 26925 pieces obtained for the 2022/23 fishing season (Ananas Figure 1). Estimated nominal CPUE (number of minutes dived) for Prickly redfish decreased rapidly from the 2002/03 fishing season to 2006/07 fishing season (Ananas Figure 2). The lowest nominal CPUE was obtained in 2022/23 season with only 6.02 pieces per minute dive. However, there is some uncertainty in the data collection in the early 2000s and may not reflect the actual CPUE so the results should be interpreted with caution



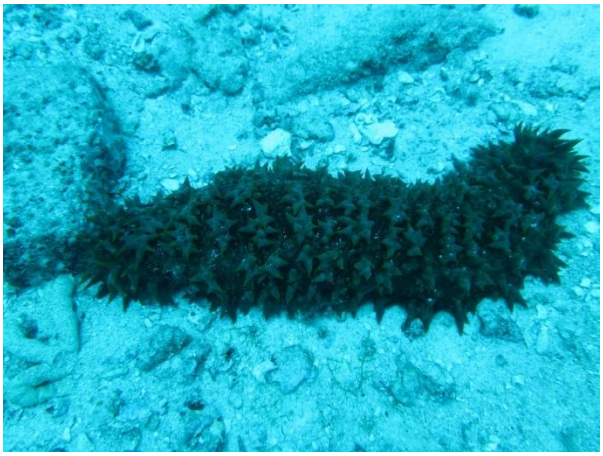
Ananas Figure 1: Catch (pieces) of Prickly redfish from 2012/13 – 2022/23 fishing seasons from logbook data



Ananas Figure 2: Nominal CPUE (pieces per minutes dived) of Prickly redfish from 2001 to 2022/2023 season from logbook data

Biology

English name: Prickly Redfish Local Name*:* Sanpye



Parameter	Description
General	Benthic. It feeds exclusively on calcareous algae. *Halimeda sp.*
Range	**Species:** Tropical; 31°N – 25°S, 31°E – 134°W **Stock:** Mahe plateau and Amirante Bank
Depth distribution	0-50m
Preferred habitats	A common reef species mostly found from near the surface to a depth of 25m. Generally, occurs on hard bottoms, large rubble and coral patches on reef slopes and near passes.
Longevity	
50% maturity	30cm
Spawning season	
Size	**Maximum:** 80cm

Stock Assessment

A catch-based stock assessment was undertaken in 2017 using data collected from catch and effort logbook filled by vessel skippers for each dive (MRAG LTD, 2017). A fisheries independent stock assessment was undertaken in 2022 to determine density of sea cucumber species on the Mahe plateau and Amirante bank (Skewes & Long, 2022).

Description of the stock

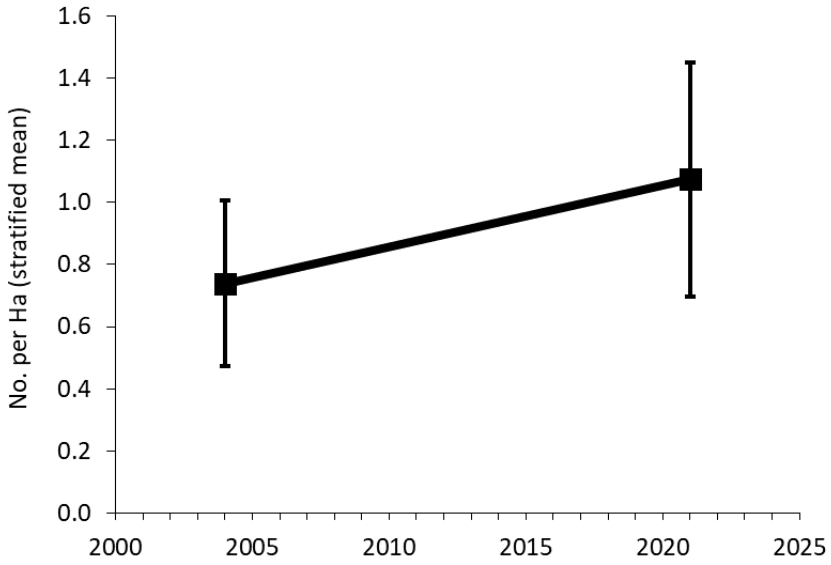
In the absence of information on the genetic connectivity, mixing and identity of the stock, the population of Prickly redfish within the Seychelles EEZ is considered to be a unit stock, due to its remote location.

Catch based stock assessment

The method used by MRAG LTD (2017) was a Surplus production model for data poor species. The result of the stock assessment indicated considerable decline in the group of value species in grid L5 with some recovery. The models run estimated a stock size of less than 20% of its pre-exploitation size. The models however were not run for individual species. The results from the stock reduction analysis point to a bigger initial population than the surplus production model but a less productive one. The mean values of calculated MSY were below 100000 for both models and the results were indicating that for some years catch was at or above MSY.

Fisheries Independent assessment

The density of Prickly redfish increased by 45% between 2004 and 2021 though the increase was not statistically significant (Ananas Figure 3). The estimated population in 2021 was 4,688,498, which is a 52% increase on the 2004 estimate. The estimated CPUE was highly variable therefore caution should be taken when interpreting the results. The CPUE data is however not indicating clearly whether there is an increase or decrease in Prickly redfish population (Ananas Figure 4) (Skewes & Long, 2022)



Ananas Figure 3: Overall average density for Prickly redfish at repeated sites in 2004 and 2021 (Skewes & Long, 2022)

Stock status determination

The decline in CPUE over the last few years is indicating that the biomass maybe declining, however the increase in population between 2004 and 2021 is indicating the inverse. However, it is important to note that Prickly redfish has become the second most targeted species in the fishery since the ban on White teatfish and this could have increased the pressure on the stock. Additionally, the increase in population was not statistically significant and the estimated CPUE was highly variable, and therefore the stock was estimated to be uncertain. Since Prickly redfish is one of the species allowed to be caught in the fisheries it may be subjected to overfishing.

	Fishing mortality	**Biomass**
Prickly redfish		

Fishing mortality	Not subject to overfishing	Subject to overfishing	Uncertain
Biomass	Not overfished	Overfished	Uncertain

7. Seychelles Spanner Crab Fishery

The Spanner crab (*Ranina ranina*) fishery started in late 1980's following prospecting research carried by out the SFA. The fishery is currently a small one operating only on the Mahe plateau with only 10 vessels licensed to target the species. Spanner crabs are commonly caught using circular tangle nets known locally as "kale". This consist of nettings stretched over a metal hoop (approx. 1m in diameter) and a trip line is attached to the hoop leading to a main line held to the surface by a buoy (Boulle, 1995). For a commercial fishing operation between 200 – 300 hoops are attached to the main line. The fishery operates around depths of 30m – 70m which contains the ideal habitat for spanner crabs (Boulle, 1995).

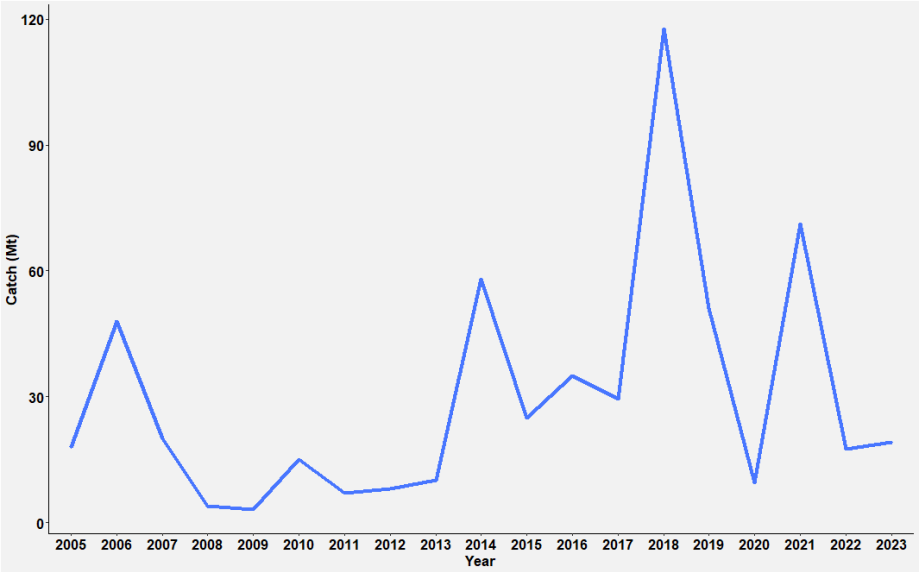
The fishery is currently being managed by a licensing framework, currently only 10 licenses are issued per seasons. Some measures under the licensing framework includes;

- Minimum landing size of 8cm carapace length
- Prohibition in fishing, catching, retaining, killing, selling or be in possession of berried females
- Maximum number of tangle nets per license
- Recording of all fishing activities in a catch and effort logbook supplied by SFA

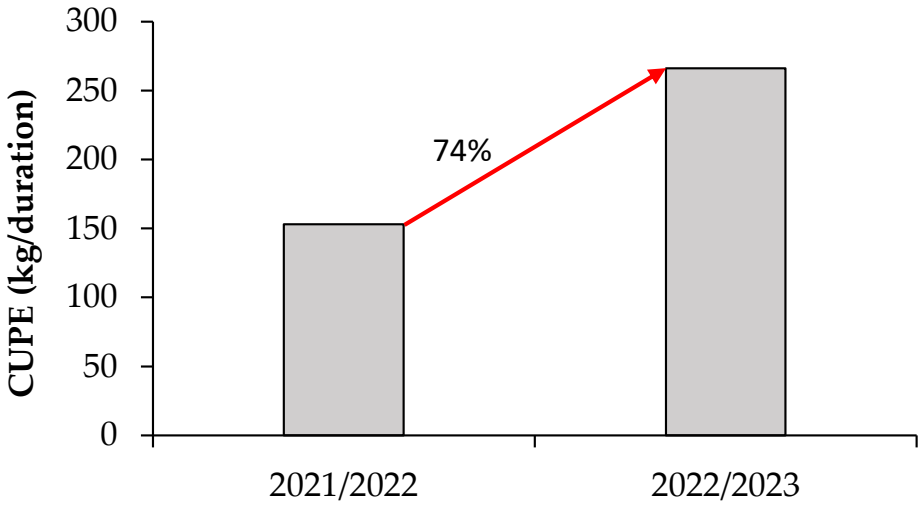
Ranina ranina is a species of tropical and subtropical crab known locally as krab ziraf. It is the only species within its genus and the only species caught within the fishery.

Catch

Catch was low and stable between 2000 – 2006 before decreasing reaching the lowest of 3Mt in 2009. The highest catch was 90 Mt obtained in 2018 after which it declined considerably to only 9Mt in 2020 (Ranina Figure 1). Nominal CPUE between 2021/2022 and 2022/2023 showed a 23% increase (Ranina Figure 2).



Ranina Figure 1: Catch (Mt) of Spanner crab between 2000 – 2023 collected through catch assessment survey



Ranina Figure 2: Nominal CPUE between the 2021/2022 and 2022/2023 fishing season

Biology

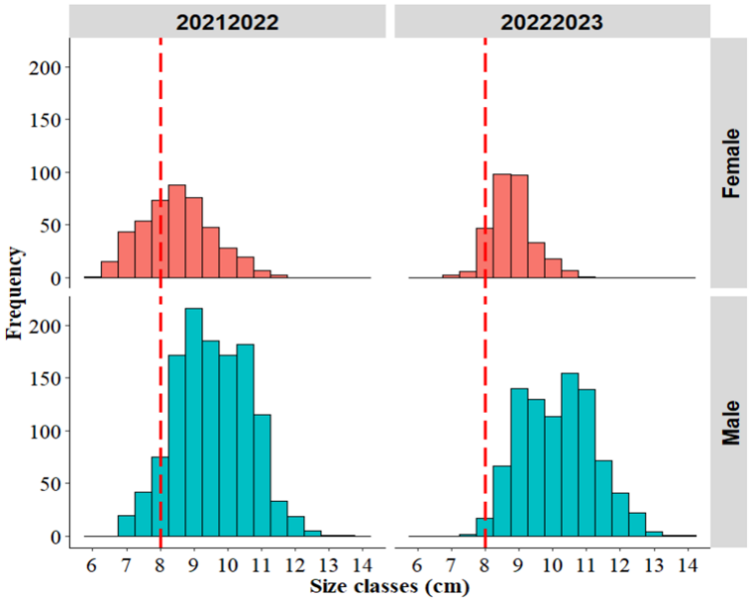
English name: Spanner crab Local Name*:* Krab ziraf

Huet Jerome (2016). Ifremer

Parameter	Description
General	Marine, benthic. Mainly nocturnal and remains buries in the sand during the day. Feeds on a variety of worms and soft-shell molluscs. Members of the order Decapoda are mostly gonochoric. Precopulatory courtship ritual is common (through olfactory and tactile cues). Usually, indirect sperm transfer
Range	**Species:** Tropical and subtropical, 35°N - 34°S, 29°E - 139°W **Stock:** Mahe plateau
Depth distribution	1-200m
Preferred habitats	Occupies the sublittoral zone in open sandy areas in which they bury
Longevity	
50% maturity	7.2cm CL for female and 7.4cm CL for males
Spawning season	
Size	**Maximum:** 17.5cm CL

Length frequency

Female were generally smaller than males for both seasons. The size classes with highest frequency for females were around 8-10 cm while for males it was around 8.5 – 11cm.



Ranina Figure 3: Length data collected from the fisheries for the 20212022 and 20222023 fishing seasons. Red line indicates the minimum size limit of 8cm

Stock Assessment

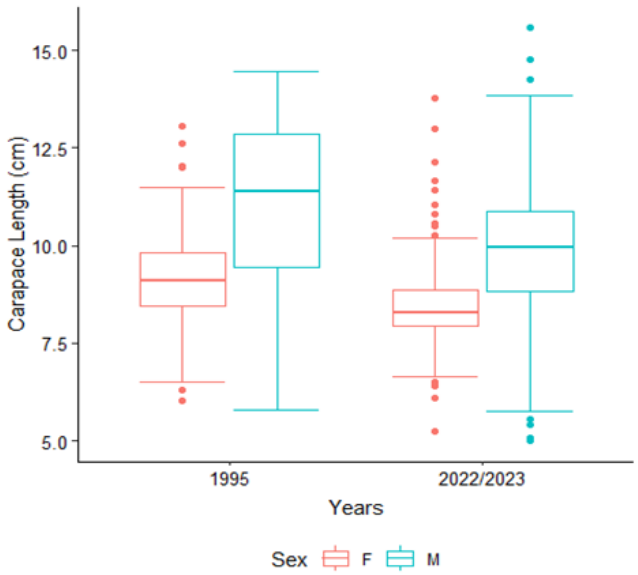
A fisheries independent stock assessment was undertaken in 1995 where several research cruises were undertaken to collect data on the stock status, crab biology and habitat (Boulle, 1995). Another fishery independent survey was undertaken in 2022/2023 to try and replicate what was undertaken in 1995. Due to a lack of data on the survey sites in 1995 new sites has to be chosen and therefore direct comparisons on the changes between the different sites could not be undertaken (Seychelles Fisheries Authority, 2024a).

Description of the stock

In the absence of information on the genetic connectivity, mixing and identity of the stock, the population of Spanner crab on the Mahe plateau is considered to be a unit stock, due to its remote location.

Results of stock assessment

The biomass estimates gave a range between 2460 – 4486 tonnes for the Mahe plateau (Boulle, 1995). The crabs in 1995 were statistically significantly larger than those in the 2022/23 survey indicating that the fisheries were having an impact on the population structure (Ranina Figure 4)



Ranina Figure 4: Box plot of the size distribution of female and male spanner crabs for the 1995 and 2022/23 surveys

Stock status determination

The stock has not been assessed for more than 25 years and the other factors is not providing a good indication of the stock status. Therefore, the status is determined to be uncertain for both fishing mortality and biomass

	Fishing mortality	**Biomass**
Ranina ranina		

Fishing mortality		Not subject to overfishing		Subject to overfishing		Uncertain
Biomass		Not overfished		Overfished		Uncertain

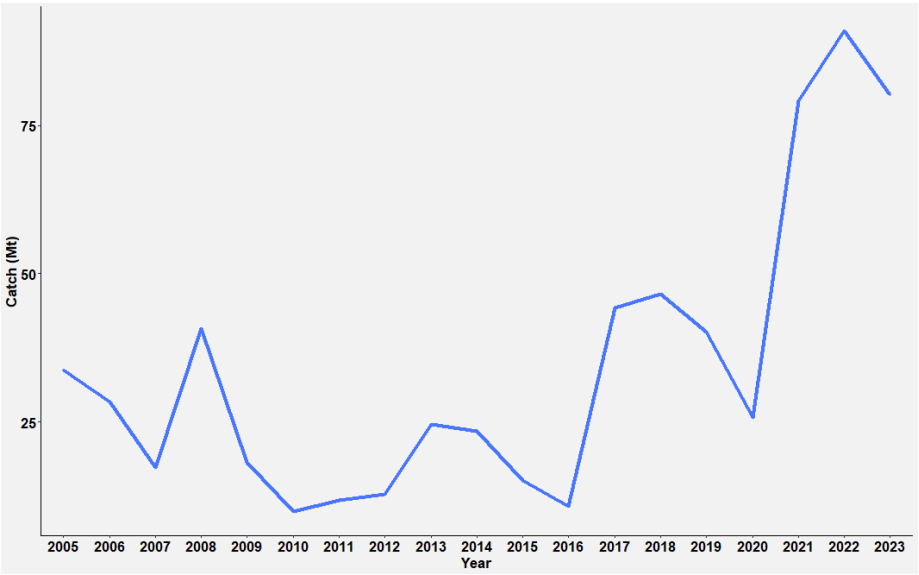
8. Seychelles Octopus Fishery

Octopus is a genus under the Octopodidae family known locally as zourit. Catch data that is classified collectively as octopus, consist of mainly 2 species; *Octopus vulgaris* (Common octopus) and *Octopus cyanea* (Big blue octopus). The fishery consists mainly of skin divers or foot fishermen with harpoons working on coral reefs or shallow inshore waters (de San, 2013). Octopus catch contributes to about 1% of the artisanal catch. The main target market is local as it has great value in the creole traditional cuisine. Currently the fishery is being managed through newly introduced license conditions in 2025. Though catch data is being collected for the fishery, there is the possibility that it is largely under reported and the introduction of the licensing framework may assist in addressing the gap in the catch and effort data.

Previously, within the fishery all octopus were being identified as the Common octopus, however it has recently been proven that there may be other species such as the Big blue octopus that were being misidentified or remains unidentified.

Catch

The catch fluctuated greatly throughout the years. The highest catch was 91Mt obtained in 2022 while the lowest catch was 9.8 Mt in 2010. From 2021 catch has been increasing considerably reaching the highest recorded in 2022 (Vulgaris Figure 1).



Octopus Figure 1: Catch (Mt) of Octopus in the artisanal fishery between 2005 – 2023 collected through catch assessment survey

Biology

English name: Common Octopus Local Name*:* Zourit

Comingio Merculiano (1845-1915)

Parameter	**Description**
General	Marine, benthic, reef associated. Hunts at dusk. Feeds on a variety of crabs, crayfish and bivalve mollusks but can feed on anything they can catch. Members of the class Cephalopoda are mostly gonochoric. Female adults usually die shortly after spawning and brooding.
Range	**Species:** Tropical and temperate, 57°N - 38°S, 98°W - 146°E **Stock:** Mahe plateau
Depth distribution	0-200m
Preferred habitats	Occurs from coastline to outer edge of continental shelf, found in variety of habitats such as rock, coral reefs and grass beds.
Longevity	3-4 years
50% maturity	10.8 cm female and 10.5 cm male mantle length
Spawning season	
Size	**Maximum:** 130 cm TL for males and 120cm TL for females

Stock Assessment

The stock has never been assessed before however several documents has been written on the development of management measures for the fishery. The last document was in 2013 (de San, 2013)

Description of the stock

In the absence of information on the genetic connectivity, mixing and identity of the stock, the population of Octopus on the Mahe plateau is considered to be a unit stock, due to its remote location.

Stock status determination

The stock has never been assessed and therefore the status is determined to be uncertain for both fishing mortality and biomass

	Fishing mortality	Biomass
Octopus		

Fishing mortality		Not subject to overfishing		Subject to overfishing		Uncertain
Biomass		Not overfished		Overfished		Uncertain

9. Seychelles Sharks and Rays Fishery

Sharks and rays are a subclass under the class Chondrichthyes (cartilaginous fish). Seychelles has a long history of shark exploitation, with sharks having high socio-economic importance. Historically, sharks both oceanic and coastal were found to be largely abundant in Seychelles waters especially around the inner granitic island (Green Island Foundation, 2018). However, increase in exploitation over the years, has led to significant decrease in population. In Seychelles sharks are caught either as the main species within the artisanal and semi-industrial longline fisheries or as by-catch within all three artisanal, semi-industrial longline and the industrial tuna fishery. Within the semi-industrial longline fisheries sharks are by-catch but can be targeted as well mainly for their fins. The main species of the longline fisheries is tuna and swordfish, however between 2003 -2005, following a ban imposed on the exportation of swordfish, an increase in the target of sharks mainly for their fins was observed (Seychelles Fishing Authority, 2016). Shark fining continues even after the reopening of the swordfish market even if the intensity of the activity has decrease.

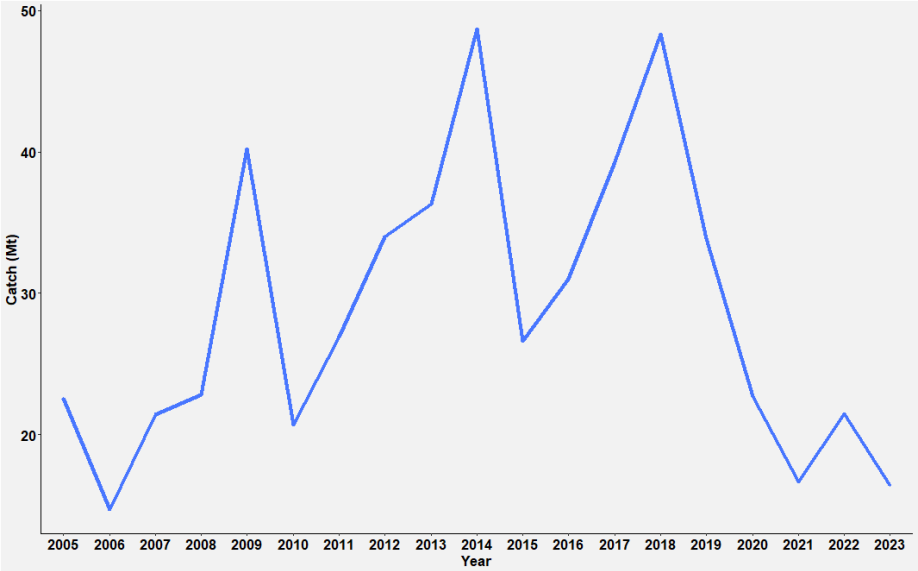
The targeted artisanal fishery consists of about 8-10 outboard vessels that target sharks on a seasonal basis. Sharks are targeted using modified anchored longline known as “drag” (Seychelles Fishing Authority, 2016). Prior to 1st August 1998 sharks were caught by gillnets in inshore water, however, a complete ban was introduced on the use of nets to catch sharks. Compare to the other fisheries, artisanal shark fishery makes use of the whole sharks, depending on the species, the meat and skin head is sold on local markets for consumption while the spine, jaws and head may be processed and sold in the curio trade (Seychelles Fishing Authority, 2016). A large number of different shark species are caught with the most common being grey reef shark (*Carcharhinus amblyrhynchos*), scalloped hammerhead (*Sphyrna lewini*), blacktip shark (*Carcharhinus limbatus*) and spot-tail shark (*Carcharhinus sorrah*) among multiple others (Seychelles Fishing Authority, 2016).

The Seychelles ray fishery is less documented than the shark fishery. The catch data for both sharks and rays are reported together in the SFA annual statistical report. Multiple different ray species are caught in the artisanal fishery with the most common being spotted eagle ray (*Aetobatus ocellatus*) and shortfin devil ray (*Mobula kuhlii*) (Nevill, 2019)

The fishery currently does not have a formal management plan, but there are several legislations and a National Plan of Action (NPOA) developed but yet to be implemented that relates to the management of sharks and rays species.

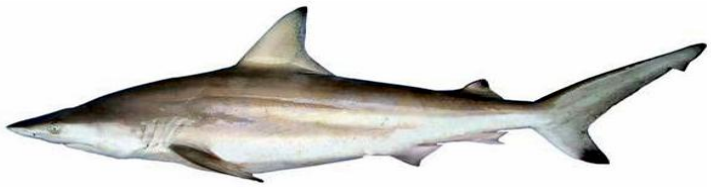
Catch

Catch for sharks and rays in the artisanal fishery has fluctuated over the years since 2005. Maximum catch was 48.7 Mt obtained in 2014 while the lowest catch was 16.4 Mt was obtained in 2023 (Shark Figure 1).



Shark Figure 1: Catch (Mt) of sharks and rays between 2005 – 2023 from the artisanal fishery collected through catch assessment survey

Biology



Source: E. Hoffmayer, S. Iglésias & R. McAuley / NMFS_NOAA

Parameter	Description
General	Cartilaginous fish. Internal fertilisation. Most species give birth to live young (viviparity) while some will lay eggs (oviparity) or use a mix of both (ovoviviparity). Carnivores targeting fish, shellfish, seals and marine mammals
Range	**Species:** Tropical and Sub tropical **Stock:** Seychelles EEZ
Depth distribution	Wide range of depths
Preferred habitats	Found almost in all habitat and depth. Can be found in both marine and fresh water.
Longevity	
50% maturity	
Spawning season	
Size	**Maximum:**

Stock Assessment

The stock has never been assessed before.

Description of stock

In the absence of information and the lack of species-specific data the stock of sharks and rays within the Seychelles EEZ is considered to be a unit stock.

Stock status determination

The stock has never been assessed and therefore the status is determined to be uncertain for both fishing mortality and biomass

	Fishing mortality	Biomass
Shark and Rays		

Fishing mortality	Not subject to overfishing	Subject to overfishing	Uncertain
Biomass	Not overfished	Overfished	Uncertain

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