

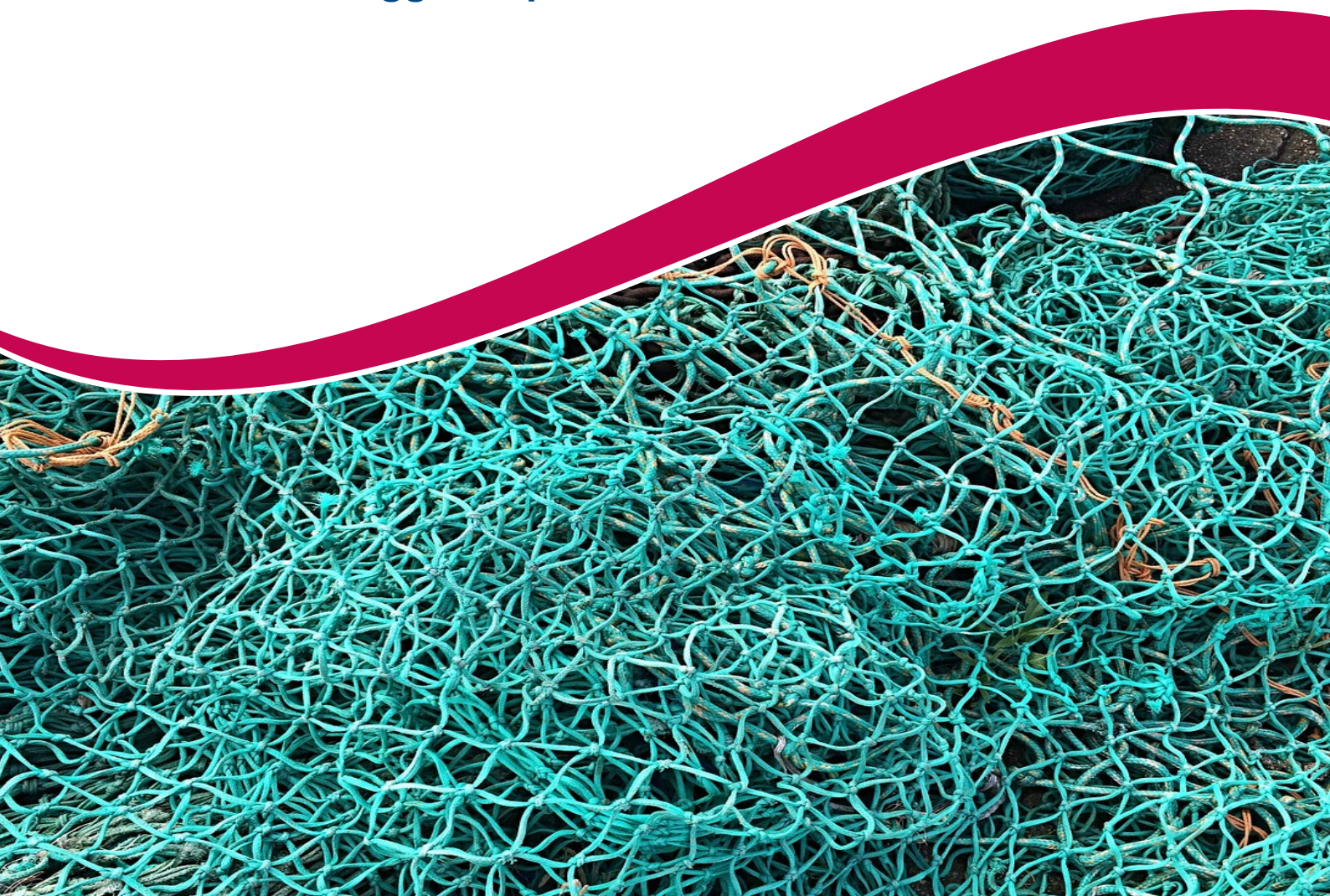


**Australian Government**

**Australian Fisheries Management Authority**

## **Coral Sea Fishery**

**2021-22 Trigger Report**



## Contents

1. Purpose of the report .....	3
2. Line Sector .....	3
<i>The triggers</i> .....	4
<i>Discussion</i> .....	10
3. Aquarium.....	11
<i>Key family groups</i> .....	11
<i>Other species</i> .....	11
<i>Discussion</i> .....	12
4. Hand Collection (Sea Cucumbers) .....	12
<i>The triggers</i> .....	13
<i>Discussion</i> .....	14
Reference .....	14

## List of Tables

Table 1 Catch and effort for the Line sub-fisheries over the past three seasons.....	3
Table 2 The top ten species caught by weight (tonnes) in the line sector of the Coral Sea Fishery for 2019-20, 2020-21 and 2021-22.....	4
Table 3 The species that exceeded 1 tonne catch in the line sector of the Coral Sea Fishery for 2021-22 with proportion of catch and historic (10 year) average proportion.....	5
Table 4 Summary of hillgrid areas fished by the line sector of the Coral Sea Fishery for 2020-21 and 2021-22. Note: the change in areas fished are relative to the year prior.....	6
Table 5 Logbook catch, effort and CPUE (kg / hook set) for the line sector of the Coral Sea Fishery for fishing years 2019-20 to 2021-22.....	7
Table 6 Species, catch (tonnes), ten year historical average catch (tonnes), highest historical catch in tonnes, catch per unit effort (CPUE) by fishing year for the period 2019-20 to 2021-22, and whether the level 1 or level 2 trigger was reached in 2021-22. Blue squares indicate the highest trigger reached. ....	8
Table 7 Standing stock size estimates, catch triggers and 2019-21 to 2021-22 catch (number of individuals) for the six key commercial Family groups in the Aquarium Sector of the CSF. Note: Level 1 trigger is 0.02 per cent of the minimum stock size and the Level 2 trigger .....	11
Table 8 Assessment of Hand Collection Sector: Sea Cucumber CDR catches against the Harvest Strategy catch limits for years 2019-20 to 2021-22.....	13

# 1. Purpose of the report

The purpose of the Trigger Report is to assess logbook catch and effort data for the Coral Sea Fishery (CSF) against the trigger limits detailed in harvest strategies for each respective CSF fishing sector. There are currently four sectors in the CSF: Line (previously Trawl, Trap and Line); Aquarium; Hand Collection (sea cucumber) and Lobster and Trochus.

For the 2021-22 fishing year, no effort occurred in the Lobster and Trochus sector hence this sector is not included in the report. Further, from mid-2019 Trap and Trawl methods are no longer permitted methods in the fishery and consequently, are also not reported on.

Harvest strategies for the CSF sectors can be found on the AFMA website:

<https://www.afma.gov.au/sustainability-environment/harvest-strategies>.

## 2. Line Sector

The line sector of the CSF landed 3.2 tonnes of fish during the 2021-22 fishing year (1 July- 30 June), 70 per cent less than 2020-21 (10.5 tonnes), and 75 per cent less compared to 2019-20 (12.6 tonnes).

Effort in the last three years has followed a similar declining trend with 58,403 hooks set in 2021-22, 31 per cent less than 2020-21 (84,825 hooks set) and 55 per cent less compared to 2019-20 (128,871 hooks set). Table 1 outlines the catch and effort in the line sector for the past three fishing seasons.

The declining trend in catch over the last three years reflects a decline in effort in the sector, rather than a decline in biomass. The decline in effort is understood to be due to a combination of factors. Fishing effort in the CSF is constrained generally by the long distance from shore to fishing grounds and weather. Operators in the fishery also tend to fish the CSF as a secondary fishery, meaning effort in the CSF is dependent on how much or how little operators fish in other, primary fisheries. In the 2021-22 fishing year, two trips occurred. The first trip began in the 2020-21 season and continued into the 2021-22 season. The second trip began at the end of the 2021-22 season and continued into the 2022-23 season. More recently, declining effort is also partially attributed to the COVID-19 pandemic which is understood to have had some impact on export markets, travel arrangements, and effort.

**Table 1. Catch and effort for the Line sub-fisheries over the past three seasons**

	Catch (tonnes)			Effort (number of hook set)		
	2019-20	2020-21	2021-22	2019-20	2020-21	2021-22
Line	12.6	10.5	3.2	128,871	84,825	58,403



Of the 29 species caught in total in 2021-22, five species had catches greater than 0.1 tonne and of these, only one had total catch greater than one tonne. The top ten species by weight for the last three seasons are listed in Table 2.

**Table 2. The top ten species caught by weight (tonnes) in the line sector of the Coral Sea Fishery for 2019-20, 2020-21 and 2021-22.**

2019-20		2020-21		2021-22	
Species	Weight (t)	Species	Weight (t)	Species	Weight (t)
Flame Snapper	10.2	Flame Snapper	9	Flame Snapper	2.02
Long Tail Rubies/Snapper	1.2	Long Tail Rubies/Snapper	0.58	Ruby Snapper	0.28
Bar Rockcod	0.4	Amberjack	0.26	Blue-eye Trevalla	0.15
Ornate Jobfish	0.3	Bar Rockcod	0.24	Bar Rockcod	0.12
Amberjack	0.2	Ornate Jobfish	0.2	Rosy Snapper	0.11
Imperador	0.1	Rusty Jobfish	0.12	Ornate Jobfish	0.09
Ruby Snapper	0.06	Redbait (mixed)	0.04	Paddletail Seabream	0.06
Rosy Snapper	0.03	Saddleback Snapper	0.04	Amberjack	0.06
Blotched Bigeye	0.008	Oblique-banded Snapper	0.01	Whitetip Reef Shark	0.04
Emperor	0.006	Lavender Snapper	0.01	Southern Conger	0.04

## The triggers

Triggers and the associated management response for the Line sector are outlined in the Line, Trap and Trawl Harvest Strategy (noting the trap and trawl sectors no longer exist).

### Overarching catch trigger

- i. *Must be less than total highest catches across the main species caught to date. A 'main species' is a species that has an average catch over 1 tonne over a five-year period.*

In 2021-22, four species fell into the category of a 'main species'. These were flame snapper, rosy snapper, bar rockcod and ruby snapper. The catch in 2021-22 did not trigger a Level 1 response.

- ii. *Overarching Level 1 trigger for total fishery catch: 450 t*
- iii. *Overarching Level 2 trigger for total fishery catch: 1000 t*

Total catch for the line sector for 2021-22 was 3.2 tonnes, well below the Level 1 trigger.

## Species- specific triggers (high risk/ vulnerable AND key species)

In the 2021-22 fishing season the line sector interacted with one protected species.

### Whitetip reef shark

- i. Level 1: 2.5 tonnes (1/6 historical high catch)
- ii. Level 2: 5 tonnes (1/3 historical high catch)

There was 0.04 tonne of whitetip reef shark caught and retained by the line sector in the 2021-22 fishing season. This is well below the Level 1 trigger.

### Grey reef shark

- i. Level 1: 13 tonnes (1/2 historical high catch)
- ii. Level 2: 26 tonnes (historical high catch)

There was no grey reef shark catch reported by the line sector in the 2021-22 fishing season.

## Triggers pertaining to changes in catch proportion

- i. *If the relative catch proportion of any species changes by >30% from its historical average AND the catch of this species is greater than 1 tonne, invoke a level 1 response for the relevant species. If this is accompanied by an ≥50% overall decline in the CPUE over the last three years, invoke a Level 2 response*

Only one species, flame snapper, exceeded catch of 1 tonne for the 2021-22 fishing season, equating to 59.75% proportion of catch, as detailed in Table 3.

**Table 3. The species that exceeded 1 tonne catch in the line sector of the Coral Sea Fishery for 2021-22 with proportion of catch and historic (10 year) average proportion.**

	2021-22 catch (t)	Proportion of catch	Historic average proportion (past 10 years)
Flame Snapper	2.02	59.75%	46.61%

Over the historic average, proportion of catch for flame snapper has ranged from 42-81% of total catch, averaging 56.84%. The 2021-22 proportion of catch (63.1%) is above the historical average. However, as this is not >30% from its historical average, the Level 1 Trigger has not been exceeded for any species in the line sector.

- ii. *If the relative proportion of any species in the catch declines inter-annual by 10% or greater over 3 consecutive years, invoke a Level 1 response. If this accompanied by ≥50% overall decline in CPUE over the last 3 years, invoke a Level 2 response*

In the 2021-22 fishing season, there were no species which had a relative proportion catch decline inter-annually by 10% or more. No species exceeded these combined triggers.

## Triggers pertaining to spatial changes

For the purposes of this report, 'hillgrids' are used to represent areas fished. Each hillgrid is a square approximately 15 nautical miles wide. Fishing effort typically occurs in only a proportion of each hillgrid and so the analysis is spatially broad.

*If the following changes occur invoke a Level 1 response to determine why, with the added option of imposing spatial management measures, such a closures or move-on provisions:*

- i. The percentage of areas fished increased by  $\geq 40\%$  (fishery expansion), OR*
- ii. The percentage of areas fished decreases by  $\geq 40\%$  (fishery contraction), OR*
- iii. If  $\geq 40\%$  of the total catch is taken from a single area (fishery contraction/ undue fishing pressure on one area) OR*
- iv. If  $\geq 40\%$  of once- exploited areas are no longer fished*

**Table 4. Summary of hillgrid areas fished by the line sector of the Coral Sea Fishery for 2020-21 and 2021-22. Note: the change in areas fished are relative to the year prior.**

2020-21		2021-20		
Areas fished (hillgrids)	Areas fished (km <sup>2</sup> )	Areas fished (hillgrids)	Areas fished (km <sup>2</sup> )	Change in area fished
9	6939	4	3084	↓56%

A Level 1 response was triggered in relation to (ii), (iii) and (iv) in 2021-22. Through logbook analysis, the following was determined:

- With respect to (ii), there was a 56 per cent decrease in the number of hillgrids fished in 2021-22 (4 hillgrids) compared to 2020-21 (9 hillgrids) (Table 4).
- With respect to (iii), of the 3.2 tonnes caught in total by the line sector in 2021-22 the highest contribution from a single hillgrid area was 1.6 tonnes, totalling 52 per cent of fished area. This was across two fishing trips, with 1 tonne caught in the area in the first trip (July 2021) and 0.6 tonne caught in the second trip (June 2022).
- With respect to (iv), 'once exploited areas' are defined as the 'total number of individual areas fished over the past three years' for the purpose of assessing this trigger. Of the 66 areas which were once exploited, four of those were exploited in 2021-22 which means that 94 per cent of once-exploited areas were not fished in 2021-22. Two new areas were fished in 2021-22 that had not been fished in the previous two years. For both these trips, flame snapper made up more than half the catch in the area. As discussed above, a large proportion of overall catch came from one area, however this catch, along with overall tonnage is relatively low and the result of only two fishing trips, split across the preceding

and proceeding seasons. The low level of catch does not present a risk to the fishery and does not warrant any further management response. Similarly, the decline in the spatial extent of fishing is consistent with the overall decline in effort and catch in the sector. As the fishery is opportunistic and dependent on weather, as well as operators participating in other fisheries, the decline in fishing area is not a concern as it is explicable through other factors.

- v. *If any of the above triggers (i – iv) are accompanied by a  $\geq 50\%$  overall decline in CPUE over the last three years, invoke a Level 2 response*

A summary of logbook catches, effort and CPUE (kg per hook set) for each gear type in the line sector for fishing years 2019-20 to 2021-22 is provided in Table 5.

**Table 5. Logbook catch, effort and CPUE (kg / hook set) for the line sector of the Coral Sea Fishery for fishing years 2019-20 to 2021-22.**

Fishing year	Dropline hooks <sup>1</sup>	Catch (t, whole weight)	CPUE (kg/hook set)
2019-20	486	0.2	0.412
2020-21	0	0	N/A
2021-22	0	0	N/A
Fishing year	Longline hooks	Catch (t, whole weight)	CPUE (kg/hook set)
2019-20	128,385	12.4	0.097
2020-21	84, 825	10.5	0.124
2021-22	58,403	3.2	0.055

This trigger was not exceeded in the 2021-22 fishing season.

## Triggers pertaining to CPUE

- i. *If CPUE for any species shows a decline over the last 3 years, but without any of the above indicators being triggered, a Level 1 response shall be invoked if the decline is less than or equal to 50%, and a Level 2 response shall be invoked if the decline is greater than 50%*

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<sup>1</sup> Hook numbers for dropline are calculated by multiplying the number of lines lifts by the average number of hooks per line.

For the assessment of this trigger, the CPUE is calculated for the combined drop line and longline methods (i.e. using the total weight landed relative to the number of hooks set for each method combined).

The CPUE of the species exceeded Level 1 and Level 2 in the line sector for 2021-22 are in the Table 6.

**Table 6. Species, catch (tonnes), ten-year historical average catch (tonnes), highest historical catch in tonnes, catch per unit effort (CPUE) by fishing year for the period 2019-20 to 2021-22, and whether the Level 1 or Level 2 trigger was reached in 2021-22. Blue squares indicate the highest trigger reached.**

Species	2021/22 Catch (t)	10 year Historical Average Catch (t)	Highest historical catch (tonne/s)	2019-20 CPUE	2020-21 CPUE	2021-22 CPUE	L1 decline CPUE (last 3 yrs)	L2 >50% decline CPUE (last 3 yrs)
Alfonsino	0.034	0.28	69.67	0	0	0.00058	FALSE	FALSE
Amberjack	0.056	0.80	2.97	0	0.003065	0.00096	TRUE	FALSE
Bar Rockcod	0.121	2.40	9.86	0	0.002806	0.00207	TRUE	FALSE
Blacktip shark (mixed)	0.03	0.19	23.71	0.000062	0	0.00051	FALSE	FALSE
Blue-eye Trevalla	0.153	0.60	6.00	0	0	0.00262	FALSE	FALSE
Boarfishes	0.003	0.0045	0.03	0	0	0.00005	FALSE	FALSE
Comet Grouper	0.006	0.11	1.72	0	0	0.00010	FALSE	FALSE
Common Coral Trout	0.01	0.11	2.11	0	0	0.00017	FALSE	FALSE
Conger Eels	0.035	0.02	0.05	0	0	0.00060	FALSE	FALSE
Fish (mixed)	0.006	0.31	3.65	0	0	0.00010	FALSE	FALSE
Flame Snapper	2.017	13.46	41.18	0.079227	0.106054	0.03454	TRUE	TRUE
Gemfish	0.006	0.04	13.39	0	0	0.00010	FALSE	FALSE
Green Jobfish	0.008	0.16	2.78	0	0	0.00014	FALSE	FALSE



Coral Sea Fishery- 2021-22 Trigger Report

Species	2021/22 Catch (t)	10 year Historical Average Catch (t)	Highest historical catch (tonne/s)	2019-20 CPUE	2020-21 CPUE	2021-22 CPUE	L1 decline CPUE (last 3 yrs)	L2 >50% decline CPUE (last 3 yrs)
Imperador	0.017	0.16	0.60	0.001048	0	0.00029	TRUE	TRUE
Mahi Mahi	0.015	0.00	0.06	0	0	0.00026	FALSE	FALSE
Mozambique Seabream	0.026	0.12	2.51	0	0	0.00045	FALSE	FALSE
Oblique-banded Snapper	0.003	0.04	0.12	0.000039	0.000141	0.00005	FALSE	FALSE
Oceanic Whitetip Shark	0.088	0.00	0.20	0	0	0.000034	FALSE	FALSE
Ornate Jobfish	0.252	0.262	1.10	0.001955	0.002405	0.001507	FALSE	FALSE
Paddletail Seabream	0.058	0.21	18.81	0	0	0.00099	FALSE	FALSE
Red Gurnard	0.001	0.00	0.00	0	0	0.00002	FALSE	FALSE
Red Squirrelfish	0.001	0.03	0.26	0	0	0.00002	FALSE	FALSE
Rockcod	0.003	0.51	3.75	0	0	0.00005	FALSE	FALSE
Rosy Snapper	0.108	3.30	64.18	0.000241	0.000047	0.00185	FALSE	FALSE
Ruby Snapper	0.283	3.69	22.99	0.000497	0	0.00485	FALSE	FALSE
Rusty Jobfish	0.007	0.47	6.33	0	0.001450	0.00012	FALSE	FALSE
Silver Trevally	0.024	0.01	0.84	0	0	0.00041	FALSE	FALSE
Western Blackspot Pigfish	0.001	0.01	0.05	0	0	0.00002	FALSE	FALSE

Species	2021/22 Catch (t)	10 year Historical Average Catch (t)	Highest historical catch (tonne/s)	2019-20 CPUE	2020-21 CPUE	2021-22 CPUE	L1 decline CPUE (last 3 yrs)	L2 >50% decline CPUE (last 3 yrs)
Whitetip Reef Shark	0.038	0.17	15.15	0	0	0.00065	FALSE	FALSE

These triggers are only considered for species that have not met any other triggers in the harvest strategy. Of the 29 species caught in 2021-22 fishing season that had not exceeded any previous triggers, amberjack, and bar rockcod reached trigger Level 1 and flame snapper and imperador reached trigger Level 2. Excluding flame snapper, the other three species did not have total catch over one tonne, as well as the total catch being well below the highest historical catch.

Flame snapper was triggered as the CPUE declined by greater than 50 per cent over the past three years. This is reflective of the low effort and opportunistic nature of the fishery. Flame snapper catch was 2.02 tonnes which is well below the maximum historical catch and much lower than the previous fishing season (9 tonnes).

Due to the low effort nature of the fishery and highly variable catch, there are no formal, single-species stock assessments for any species (Patterson et al., 2022). The most conservative estimate of MSY for all species in the line sector is 31.5 tonnes (Patterson et al., 2022). Total catch for the line sector in 2021-22 was 3.2 tonnes, well below the most conservative MSY limit. AFMA will continue to monitor the catch of the species above, however, no further management action is currently warranted.

The effectiveness of CPUE-based triggers and the subsequent management controls in the Coral Sea Harvest Strategy have been an ongoing discussion. The CSF has high variable catch composition, with relatively low catch rates and spatial distribution of effort, meaning that these triggers are overly sensitive. The Coral Sea Fishery Harvest Strategy, particularly the Line Sector Fishery is due for an update to reflect the low effort nature of the fishery while remaining appropriately precautionary for future development of the fishery. Considering this, AFMA will continue to monitor the total catch of these species over time and will review the appropriateness of CPUE based triggers as part of an upcoming review of the line harvest strategy.

## Discussion

Of the 29 species caught in 2021-22, only four species activated at least one trigger. However, on closer examination of the data in relation to MSY catch estimates and considering the low level of catch, effort, and spatial extent of fishing overall, no further management action was considered warranted.

As mentioned, the Line Sector Harvest Strategy is due to be updated. The removal of the trawl and trap sectors, implementation of marine parks areas, and the complexity of the triggers for the level of risk posed by the fishery are some of the key drivers for the review.

## 3. Aquarium

### Key family groups

For the 2021-22 season, 34,808 individual fish were harvested in the aquarium sector. This is a slight increase from the previous 33,652 fish taken in 2020-21.

The revised Aquarium Sector Harvest Strategy came into effect in mid-2019. The 2019-20 trigger report was the first report where catch is assessed against the revised triggers. A summary of the catch against each trigger for the years 2019-20 to 2021-22 is provided in Table 7. No triggers were reached in the 2021-20 fishing year.

**Table 7. Standing stock size estimates, catch triggers and 2019-21 to 2021-22 catch (number of individuals) for the six key commercial Family groups in the Aquarium Sector of the CSF. Note: Level 1 trigger is 0.02 per cent of the minimum stock size and the Level 2 trigger**

Family	Min stock estimate	Max stock estimate	Level 1 Trigger (0.02%)	Level 2 Trigger (0.04%)	2019-20 catch	2020-21 catch	2021-22 catch
Serranidae	56,627,823	459,144,510	11,000	22,000	3,778	5,992	8,813
Labridae	91,828,902	459,144,510	18,000	36,000	6,971	8,599	7,984
Pomacentridae	1,346,823,896	15,304,817,000	20,000	40,000	6,413	5,297	4,800
Acanthuridae	168,352,987	487,917,566	20,000	40,000	1,021	1,859	3,004
Blenniidae and Gobiidae	61,219,268	18,365,780,400	12,000	24,000	637	1,497	1,687
Pomacanthidae	61,525,364	N/A	12,000	24,000	783	1,631	2,490

### Other species

The Triggers

*Level 1 Catch Trigger: Equal to the highest historical catch for all 'other' species.*

*Level 2 Catch Trigger: Equal to twice the highest historical catch for all 'other' species.*

In the 2021-22 fishing year, the total catch for 'other' species was 6,030 individuals, well below the highest historical catch of 16,934 individuals in 2012-13 resulting in no further action being required.

**Acroporidae:** 40 tonnes of the coral family Acroporidae is permitted to be harvested annually from the CSF. This limit is regulated and consistent with the conditions of the CSF Wildlife Trade Operation (WTO) accreditation based on a Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) Non-Detriment Finding (NDF). The NDF used estimates of density and annual production across the fishery.

*Level 1 Catch Trigger: 20 tonnes.*

*Level 2 Catch Trigger: 40 tonnes.*

In the 2021-22 fishing year, 0.292 tonne of Acroporidae was harvested. The trigger limit was not exceeded.

**Live rock:** 40 tonnes of live rock is permitted to be harvested annually from the CSF.

*Level 1 Catch Trigger: 20 tonnes.*

*Level 2 Catch Trigger: 40 tonnes.*

There were 1.2 tonnes of live rock collected in the 2021-22, well below the trigger and 3.1 tonnes less than that collected in the 2020-21 season.

This trigger was intended to pick up a potential decrease in the catch per unit effort for live rock. However, the take of live rock is largely market driven and the low level of harvest is reflective of a low market demand.

**Humphead Maori wrasse:** Aquarium sector fishing permit holders are authorised to take a total of 50 specimens during the season (25 per concession holder). Operators are required to record the number of specimens taken per trip, their size and latitude/longitude information in the 'comments' section of their logbook. The annual catch triggers have been set to review catch and effort data whenever 10 individuals are caught, or when 50 individuals are caught within a season.

*Level 1 Catch Trigger: Each time 10 individuals caught (i.e., 10, 20, 30 and 40 individuals).*

*Level 2 Catch Trigger: 50 individuals.*

In the 2021-22, six Humphead Maori wrasses were harvested. As the catch is below the Level 1 Catch Trigger of 10 individuals, no triggers were exceeded.

## Discussion

No catch triggers for the Aquarium sector were reached in 2021-22.

## 4. Hand Collection (Sea Cucumbers)

The Hand Collection (sea cucumbers) sector was active for 7 days in the 2021-22 season resulting in a total catch of 3.2 tonnes harvested over 41 dive hours

## The triggers

The trigger limits for the Sea Cucumber sector apply as a Total Allowable Catch (TAC) for each of the main species, any combination of greenfish and lollyfish, any other single species, and all species of the order Holothuriida (previously classified as Aspidochirotida). Catch of these species/species groups by fishing year for the period 2019-20 to 2021-22 is presented in Table 8.

**Table 8. Assessment of Hand Collection Sector: Sea Cucumber CDR catches against the Harvest Strategy catch limits for years 2019-20 to 2021-22**

Species		Total Allowable Catch (TAC)/ trigger limit (t)	2019-20	2020-21	2021-22
<b>Main species</b>					
Black teatfish	<i>Holothuria whitmaei</i>	1	1.0	0	0.43
White teatfish	<i>Holothuria fuscogilva</i>	4	3.9	0	0.21
Sand fish	<i>Holothuria scabra</i>	1	0	0	0.03
Prickly redfish	<i>Thelenota ananas</i>	20	2.1	0	0.3
Surf redfish	<i>Actinopyga mauritiana</i>	10	0.01	0	1.15
<b>Other species</b>					
Any combination of greenfish and lollyfish	Greenfish- <i>Stichopus chloronotus</i>	10 tonnes (any combination of greenfish and lollyfish)	0	0	0
	Lollyfish- <i>Holothuria atra</i>	0	0	0	0
Any other single species		5 tonnes per species	0.13	0	1.08
<b>Total sea cucumbers collected for the sector</b>					
All species of the Order Aspidochirotida		150 tonnes (TAC for all species in the sector)	7.14	0	3.2



## Discussion

No trigger limits for the sea cucumber sector were reached in the 2021-22 season.

## Reference

Patterson, H, Bromhead, D, Galeano, D, Larcombe, J, Timmiss, T, Woodhams, J and Curtotti, R 2022, Fishery status reports 2022, Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra. CC BY 4.0.