



Australian Government

Australian Fisheries Management Authority

Coral Sea Fishery

Aquarium Sector

Harvest Strategy Framework

2019



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GLOSSARY

| Acronym | Term |
|---------|---|
| CSF | Coral Sea Fishery |
| HSF | Harvest Strategy Framework |
| MSY | Maximum Sustainable Yield |
| ABARES | Australian Bureau of Agricultural and Resource Economics and Sciences |
| HSP | Commonwealth Fisheries Harvest Strategy Policy 2018 |

1 Background to the CSF

An overview of the Coral Sea Fishery (CSF) can be found in the latest CSF Management Arrangement Booklet, which is available on the AFMA website <https://www.afma.gov.au/>.

The CSF is a relatively small but diverse fishery, targeting a wide range of species with methods including line, trap, trawl and hand collection. The fishing season runs from 1 July to 30 June each year. Entry to the CSF is limited to existing fishing permits across five sectors: the aquarium sector; trawl and trap sector; line and trap sector; lobster and trochus sector; and the sea cucumber sector.

The CSF extends from Cape York to Sandy Cape, Queensland. It is bounded on the east by the Australian Fishing Zone and on the west by a boundary line 10 to 100nm east of the western boundary of the Great Barrier Reef Marine Park.

1.1 Aquarium Sector Management Arrangements

The aquarium sector is managed through a combination of input and output controls. Input controls are specified mainly in fishing permits and include gear restrictions such as maximum net size/diameter, mesh size, net length and a prohibition on chemical or explosive use. Spatial closures also apply within the CSF under the Coral Sea Marine Park Management Plan 2018. More details on closures can be found on the Parks Australia Website www.parksaustralia.gov.au.

A series of annual catch triggers have also been established to ensure the sustainable harvest of species in the aquarium sector. This is discussed in more detail at section 4.2 – Annual Catch triggers and decision rules.

2 The Commonwealth Harvest Strategy Policy

The objective of the *Commonwealth Fisheries Harvest Strategy Policy 2018* (HSP) is the ecologically sustainable and profitable use of Australia's Commonwealth fisheries resources (where ecological sustainability takes priority) - through the implementation of harvest strategies.

For the CSF in the absence of species-specific reference points, annual catch triggers have been established based on conservative estimates of stock size that meet the sustainability objectives of the HSP. With a harvest strategy in place, fishery managers and industry are able to operate with greater confidence, management decisions are more transparent, and there are fewer unanticipated outcomes necessitating ad-hoc management responses.

Further detail on the HSP is provided in the Guidelines to the Harvest Strategy Policy (*Commonwealth Fisheries Harvest Strategy Policy Guidelines 2018*).

3 The Coral Sea Fishery Harvest Strategy Framework

3.1 Overview

The CSF Aquarium Sector Harvest Strategy Framework (HSF) was first implemented in 2007 to manage the Aquarium Sector as a developmental fishery. Given the low level of effort in the fishery, and the highly variable catch composition, species-specific reference points and management arrangements were not developed. Rather, conservative annual catch triggers were set at a Family (taxonomic) level that allowed for controlled expansion of fishing, and hence improved economic yield, while at the same time being precautionary with regards to sustainability.

These historical triggers were mostly based on relative proportion of the catch for each Family group and did not consider total sustainable harvest or distribution of the catch. As part of the annual trigger review undertaken by AFMA it was found that these triggers were overly sensitive to changes in effort and targeting practices.

The revised CSF Aquarium Sector HSF maintains triggers at the Family (taxonomic) level but is now based on the actual catch from each Family group rather than as a proportion and also considers the distribution of the catch. The annual catch triggers and management responses allow for expansion of the fishery, while at the same time ensuring the biological and economic objectives of the HSP are pursued.

3.2 Objectives

The *Commonwealth Fisheries Harvest Strategy Policy 2018* (HSP) refers to fishery-level maximum economic yield (MEY) as an overarching objective for the implementation of harvest strategies in Commonwealth fisheries. Reference points, typically a target and/or a limit, can be expressed in terms of a particular indicator including catch per unit of effort (CPUE), biomass or fishing mortality.

The HSP guidelines acknowledge that the types of indicators, performance measures and reference points used in harvest strategies can differ, reflecting the level of knowledge of the stocks and fishery and the nature of the assessments undertaken.

In the case of the aquarium sector, it is not possible to set reference points for each of the 500+ species caught, nor is there enough information available to set these reference points for the key Family groups. The requirements of the HSP can be met through the use of triggers based on fishing mortality that aim to provide a similar outcome in terms of sustainability and economic objectives. The Aquarium Sector HSF establishes annual catch triggers for each of the key Family groups based on conservative estimates of stock size to ensure the total harvest is sustainable. These catch triggers are set at what are considered to be very conservative levels such that the risk to sustainability is very low.

Further detail on how these triggers were established is provided at section 4 - Key commercial species and annual catch triggers.

Biological

- Ensure exploitation of fisheries resources and related activities are conducted in a manner consistent with the principles of ecologically sustainable development, including the exercise of the precautionary principle
- Ensure fishing is conducted in a manner that does not lead to overfishing- where overfishing of a stock is identified, action will be taken immediately to cease overfishing

Economic

- Maximise net economic returns to the Australian community from management of Australian fisheries- always in the context of maintaining commercial fish stocks at sustainable levels

Ecosystem

- Are consistent with the *Environment Protection and Biodiversity Conservation Act 1999* and the Guidelines for the Ecologically Sustainable Management of Fisheries (2nd Edition)

3.3 Governance and reporting

AFMA completes an annual trigger report which provides an overview of catch and effort across all sectors in the CSF. This is where the catch against the revised annual catch triggers for the Aquarium Sector will be detailed. This report can be found on the AFMA website at <http://www.afma.gov.au/fisheries/coral-sea-fishery>.

4 Key commercial species and annual catch triggers

The triggers in this 2019 CSF Aquarium Sector HSF have been developed to take into account the current fishing practices across the sector, and implements a series of updated management arrangements and annual catch triggers. The triggers have been established in consultation with industry, scientists and relevant Government agencies based on work undertaken by the Australian Bureau of Agricultural Resource Economics and Sciences (ABARES) as part of the 2015 Reducing Uncertainty in Stock Status (RUSS) project (ABARES, 2015).

The RUSS project used relatively data-poor assessment methods to classify Commonwealth-managed stocks that had previously been classified as uncertain in the annual ABARES Fishery Status Reports.

Three different assessment approaches were undertaken for the Aquarium Sector of the CSF to build a weight-of-evidence for status determination:

- a maximum footprint analysis estimated the total amount of reef area that operators could cover within a fishing season
- annual extraction rates for key commercial families as a percentage of plausible total biomass

- a risk analysis for 623 fish species based on vulnerability and susceptibility criteria.

At the time of the RUSS project, the maximum area that could be fished in a season was estimated to be 113.12 square kilometres, or approximately 7.4 per cent of the suitable reef area within the CSF (ABARES, 2015).

At the time of the RUSS project, there was little concern regarding resource sustainability given the low degree of exploitation, and input and output controls were such that there was little potential for fishery expansion in terms of increased effort.

The annual catch triggers have been established in this HSF to ensure the fishery remains sustainable, including in the event of fishery expansion, while not impeding further development of the fishery and economic returns to the Australian community.

4.1 Key Commercial Species

Due to the large number of species harvested in the Aquarium Sector, multiple species are aggregated into a single stock for the purposes of reporting and status determination under the ABARES Fishery Status Reports.

Over the years, the catch composition of key Family groups has proven to be variable, and largely based on market demands rather than species abundance. Six key commercial Families constitute around 80 per cent of the total catch: Serranidae; Labridae; Pomacentridae; Acanthuridae; Blenniidae and Gobiidae and Pomacanthidae. Estimates of standing stock size, based on the RUSS analysis, are provided in Table 2.

4.2 Annual catch triggers and decision rules

The Aquarium Sector captures over 500 species. Clearly it is not possible to set meaningful triggers against each of these, particularly given the changes in market demand over time. Rather, whole-of-fishery management is pursued through setting annual catch triggers against the key Family groups with associated decision rules that require data analyses and management responses if sustainability issues are identified or it becomes apparent that the objectives of the HSP are not being met. The triggers and decision rules described here include detailed catch analysis so that the risk associated with further expansion is minimised, and that more robust triggers may be set if required.

4.2.1 Key family groups

The RUSS project provided estimates of standing stock size (number of individuals) for the key Family groups across the fishery using estimates of known reef area and fish density (Table 1). Using the minimum estimated stock size for each Family group from the RUSS project, a set of annual catch triggers have been established based on a conservative proportion of the estimated standing stock size (in numbers).

A maximum of 0.04 per cent of the minimum estimated stock size for each Family group can be harvested across the fishery within a given fishing season. This represents a small proportion of

the estimated total stock size at the Family level, however, within this level of harvest, sustainable catches for certain species will vary, and this has not been estimated under the RUSS project.

The Level 1 and Level 2 triggers require a review of catch and effort data to determine how many individuals have been harvested and whether the catch at any particular reef would be considered unsustainable if it were to consist of a single species. At Level 1, this will first be done at the lowest taxonomic level available in logbooks (typically Genus or Family level).

A more detailed analysis may be undertaken if the catch at any reef is made up of a single taxonomic group or would be considered unsustainable if it were to be a single species. At Level 2, species-level catch and effort data will be reviewed to ensure that the harvest of each species is below a level that would put it at an unacceptable risk of recruitment impairment. This data will be provided by the individual operators at AFMA's request, as it is not currently available in logbooks at this resolution. See section 5.1 - Logbook and commercial catch records, for more detail.

Expert advice will be sought where the harvest is made up predominantly of a single species.

Triggers are set at two levels for each Family group (Table 1):

Level 1

| | |
|---------------|---|
| Catch Trigger | 0.02 ¹ per cent of the minimum estimated stock size for each Family group. |
| Action | Review logbook catch and effort data to the lowest taxonomic level available (typically Genus or Family level). |
| Decision Rule | If a disproportionate amount of the catch has come from a single reef, or consists of a single taxonomic group, species-specific catch data will be reviewed. If any sustainability concerns are identified, expert advice will be sought and a management response will be considered, which may include species or reef-specific cease fishing requirements. |

Level 2

| | |
|---------------|--|
| Catch Trigger | 0.04 ¹ per cent of the minimum estimated stock size for each Family group. |
| Action | Review species-level catch and effort data. |
| Decision Rule | Operators to cease fishing for the Family group for the remainder of the season, pending review of catch and effort data. If any sustainability concerns are identified, expert advice will be sought and a management response will be considered for the following season, which may include species or reef-specific cease fishing requirements. |

¹ Trigger for the larger Family groups (Acanthuridae and Pomacentridae) have been restricted to 20,000 (Level 1) and 40,000 (Level 2).

Using the estimates of fish density from the RUSS project, the number of individuals within a Family on each reef can be estimated to determine what proportion of fish on that reef have been harvested. Rather than set reef-specific catch limits for each Family group, this will be considered on a case by case basis when the triggers are reached and will rely on expert advice.

Table 1 Standing stock size estimates and catch triggers for the six key commercial Family groups in the Aquarium Sector of the Coral Sea Fishery.

| Family | Min stock estimate | Max Stock Estimate | Level 1 Trigger (0.02%) | Level 2 Trigger (0.04%) |
|-----------------------|--------------------|--------------------|-------------------------|-------------------------|
| Serranidae | 56 627 823 | 459 144 510 | 11 000 | 22 000 |
| Labridae | 91 828 902 | 459 144 510 | 18 000 | 36 000 |
| Pomacentridae | 1 346 823 896 | 15 304 817 000 | 20 000 | 40 000 |
| Acanthuridae | 168 352 987 | 487 917 566 | 20 000 | 40 000 |
| Blenniidae & Gobiidae | 61 219 268 | 18 365 780 400 | 12 000 | 24 000 |
| Pomacanthidae | 61 525 364 | Na | 12 000 | 24 000 |

4.2.2 'Other' species

The RUSS project did not provide estimates of stock size for any of the species that make up the 'other' species category, and so it is difficult to set catch triggers based on proportion of stock size.

The catch triggers for 'other' species are based on historical catches, which are low and typically make up approximately 20 per cent of the total catch in the Aquarium Sector (3,000 to 10,000 individuals). The catch is made up of multiple taxonomic groups, none of which constitute a large proportion of the catch.

The catch triggers for 'other' species mean any increase in catch requires an analysis of species composition to ensure there are no sustainability concerns. Given the variability in species composition, this will be on a case by case basis and rely on expert advice.

The triggers are set at two levels:

Level 1

Catch Trigger Equal to the highest historical catch for all 'other' species.

Action Review logbook catch and effort data to the lowest taxonomic level available (typically Genus or Family level).

| | |
|---------------|---|
| Decision Rule | If a disproportionate amount of the catch has come from a single reef, or consists of a single taxonomic group, species-specific catch data will be reviewed. If any sustainability concerns are identified, expert advice will be sought and a management response will be considered, which may include species or reef-specific cease fishing requirements. |
|---------------|---|

Level 2

| | |
|---------------|---|
| Catch Trigger | Equal to twice the highest historical catch for all 'other' species. |
| Action | Review species-level catch and effort data. |
| Decision Rule | If any sustainability concerns are identified, expert advice will be sought and a management response will be considered for the following season, which may include species or reef-specific cease fishing requirements. |

4.2.3 Acroporidae

A 40 t harvest of the coral Family Acroporidae is allowed for under the Coral Sea Fishery Wildlife Trade Operation (WTO) accreditation based on a CITES Non-Detriment Finding (NDF) that used estimates of density and annual production across the fishery. Using conservative estimates of annual production (Longnecker *et al.* 2015) of *Acropora* from a single reef system in the CSF, advice to support the NDF suggested that 75-110 tons of *Acropora* could be sustainably harvested each from a single reef system.

Each permit holder is limited to 20 t each year, and the triggers and decision rules ensure that catch is monitored and that the harvest at any particular reef is sustainable.

The annual catch triggers have been set at two levels:

Level 1

| | |
|---------------|---|
| Catch Trigger | 20 t |
| Action | Review logbook catch and effort data by reef to the lowest taxonomic level available. |
| Decision Rule | If the harvest from a particular reef is considered to be high, expert advice will be sought and if any sustainability concerns are identified, a management response will be considered, which may include cease fishing requirements. |

Level 2

| | |
|---------------|---|
| Catch Trigger | 40 t |
| Action | Review logbook catch and effort data to the lowest taxonomic level available. |
| Decision Rule | Cease fishing for Acroporidae |

If the harvest from a particular reef is considered to be high, expert advice will be sought, and if any sustainability concerns are identified, a management response will be considered for the following season, which may include cease fishing requirements.

4.2.4 Live rock

A 40 t harvest of Live Rock is allowed for under the Coral Sea Fishery Wildlife Trade Operation (WTO) accreditation based on a CITES Non-Detrimental Finding. Living rock is dead coral with algae and other organisms living on them. Functioning coral reef systems produce significant quantities of live rock due to natural processes each year, however the rates of formation depend on the source type of coral and disturbance that breaks down the live source corals to become live rock (Roelofs, 2008). Formation of live rock depends on substrate and depth, but can range from 0.8kg – 10kg/m² each year, which at a minimum equates to 800 t per km² of suitable habitat.

Each permit holder is limited to 20 t each year, and the triggers and decision rules ensure that catch is monitored and that the harvest at any particular reef is sustainable.

The annual catch triggers have been set at two levels:

Level 1

| | |
|---------------|---|
| Catch Trigger | 20 t |
| Action | Review logbook catch and effort data. |
| Decision Rule | If the harvest from a particular reef is considered to be high, expert advice will be sought and if any sustainability concerns are identified, a management response will be considered, which may include cease fishing requirements. |

Level 2

| | |
|---------------|---|
| Catch Trigger | 40 t |
| Action | Review logbook catch and effort data. |
| Decision Rule | Cease fishing for live rock. If the harvest from a particular reef is considered to be high, expert advice will be sought, and if any sustainability concerns are identified, a management response will be considered for the following season, which may include cease fishing requirements. |

4.2.5 Humphead Maori wrasse

A harvest of 50 humphead Maori wrasse individuals is permitted under the Coral Sea Fishery Wildlife Trade Operation (WTO) accreditation based on a CITES Non-Detriment Finding. The annual catch triggers has 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) |
| Action | Review logbook catch and effort data. |
| Decision Rule | If the harvest from a particular reef is considered to be high, expert advice will be sought and if any sustainability concerns are identified, a management response will be considered, which may include cease fishing requirements. |

Level 2

| | |
|---------------|---|
| Catch Trigger | 50 individuals |
| Action | Review logbook catch and effort data. |
| Decision Rule | Cease fishing for Humphead Maori wrasse. If the harvest from a particular reef is considered to be high, expert advice will be sought, and if any sustainability concerns are identified, a management response will be considered for the following season, which may include cease fishing requirements. |

5 Monitoring

5.1 Logbook and commercial catch records

Under a 2011 agreement, the Queensland Department of Agriculture and Fisheries (QDAF) provides logbook services for the Aquarium Sector of the Coral Sea Fishery. Operators submit completed daily logbooks to QDAF who then provide quarterly reports to AFMA as well as scanned copies of the logbooks.

The following data is recorded for each fishing operation: Vessel name, date of operation, location and reef name, number of collectors, dive hours, species/group common name. Collection of live rock, corals, and Maori wrasse are detailed in the comments section of the logbook.

While logbook data are sufficient for reviewing catch and effort data associated with Level 1 triggers, the species-specific data required at Level 2 is not recorded. Over time, and with the implementation of electronic logbooks, this data may become available in logbooks. Until then, industry have agreed to provide species-level commercial catch and effort data at the end of each fishing year, or where it is required within the season if a trigger is reached.

5.2 Trigger review

AFMA will monitor catch and effort data against the catch triggers using logbook data provided quarterly by QDAF. In addition to quarterly reviews, AFMA will review total catch and effort data against the triggers in this HSF at the end of each season. As per the decision rules for each group, expert advice will be sought if any sustainability concerns are identified. Management responses, including a requirement to cease fishing at certain sites or for certain species, will be considered.

6 Review of Harvest Strategy Framework

The triggers in this Harvest Strategy will be reviewed every five years or earlier if:

- a marked change in catch or fishing behaviour
- new information that substantially changes understanding of the fishery, leading to revised estimates of indicators
- external drivers have unexpectedly increased the risk to a fishery and fish stocks, including environmental or climate drivers that have substantially altered the productivity characteristics (growth or recruitment) of the stock
- performance indicators show that harvest strategies are not working effectively, and that the intent of the Harvest Strategy Policy is not being met.

Further details can be found in Section 9 of the HSP Guidelines.

Reference

ABARES, 2015. Reducing uncertainty in fisheries stock status. Research by the Australian Bureau of Agricultural and Resource Economics and Sciences.

Longenecker K, Bolick H, Langston R, 2015. Estimating Sustainable Live-Coral Harvest at Kamiali Wildlife Management Area, Papua New Guinea.

Roelofs, A 2008, Ecological Risk Assessment of the Queensland Coral Fishery, Department of Primary Industries and Fisheries, Brisbane.

Appendix A

Table 2: Aquarium Sector Harvest Strategy Framework triggers, actions and decision rules summary table.

| Trigger | | Action | Decision Rule |
|--|--------|--|--|
| Key Family groups | | | |
| Level 1 trigger (No. Individuals) | | Review logbook catch and effort data to the lowest taxonomic level available (typically Genus or Family level) | <p>If a disproportionate amount of the catch has come from a single reef, or consists of a single taxonomic group, species-specific catch data will be reviewed.</p> <p>If any sustainability concerns are identified, expert advice will be sought and a management response will be considered, which may include species or reef-specific cease fishing requirements.</p> |
| Serranidae | 11 000 | | |
| Labridae | 18 000 | | |
| Pomacentridae | 20 000 | | |
| Acanthuridae | 20 000 | | |
| Blenniidae & Gobiidae | 12 000 | | |
| Pomacanthidae | 12 000 | | |
| Level 2 trigger (No. Individuals) | | Review catch and effort information at the species level. | <p>Operators to cease fishing for the Family group for the remainder of the season, pending review of catch and effort data. If any sustainability concerns are identified, expert advice will be sought and a management response will be considered for the following season, which may include species or reef-specific cease fishing requirements.</p> |

| | | | |
|---|--------|---|--|
| Serranidae | 22 000 | | |
| Labridae | 36 000 | | |
| Pomacentridae | 40 000 | | |
| Acanthuridae | 40 000 | | |
| Blenniidae & Gobiidae | 24 000 | | |
| Pomacanthidae | 24 000 | | |
| 'Other' species² | | | |
| Level 1 trigger Historical highest catch | | Review logbook catch and effort data to the lowest taxonomic level available. | If a disproportionate amount of the catch has come from a single reef, or consists of a single taxonomic group, species-specific catch data will be reviewed. If any sustainability concerns are identified, expert advice will be sought and a management response will be considered, which may include species or reef-specific cease fishing requirements. |
| Level 2 trigger Double historical highest catch | | Review catch and effort information at the species level. | If any sustainability concerns are identified, expert advice will be sought and a management response will be considered for the following season, which may include species or reef-specific cease fishing requirements. |
| Acroporidae | | | |

² Species belonging to Families not otherwise specified

| | | |
|--------------------------------|---|---|
| Level 1 trigger 20 t | Review logbook catch and effort data to the lowest taxonomic level available. | If the harvest from a particular reef is considered to be high, expert advice will be sought and if any sustainability concerns are identified, a management response will be considered, which may include cease fishing requirements. |
| Level 2 trigger 40 t | Review logbook catch and effort data to the lowest taxonomic level available. | Cease fishing for Acroporidae If the harvest from a particular reef is considered to be high, expert advice will be sought and if any sustainability concerns are identified, a management response will be considered for the following season, which may include cease fishing requirements. |
| Live Rock | | |
| Level 1 trigger 20 t | Review logbook catch and effort data. | If the harvest from a particular reef is considered to be high, expert advice will be sought and if any sustainability concerns are identified, a management response will be considered, which may include cease fishing requirements. |
| Level 2 trigger 40 t | Review logbook catch and effort data. | Cease fishing for live rock If the harvest from a particular reef is considered to be high, expert advice will be sought and if any sustainability concerns are identified, a management response will be considered for the following season, which may include cease fishing requirements. |
| Humphead Maori wrasse | | |

| | | |
|---|--|--|
| <p>Level 1 trigger Each time 10 individuals are caught</p> | <p>Review logbook catch and effort data.</p> | <p>If the harvest from a particular reef is considered to be high, expert advice will be sought and if any sustainability concerns are identified, a management response will be considered, which may include cease fishing requirements.</p> |
| <p>Level 2 trigger 50 individuals</p> | <p>Review logbook catch and effort data</p> | <p>Cease fishing for Humphead maori wrasse. If the harvest from a particular reef is considered to be high, expert advice will be sought and if any sustainability concerns are identified, a management response will be considered for the following season, which may include cease fishing requirements.</p> |