

3 Coral Sea Fishery

AW Leatherbarrow and T Pham

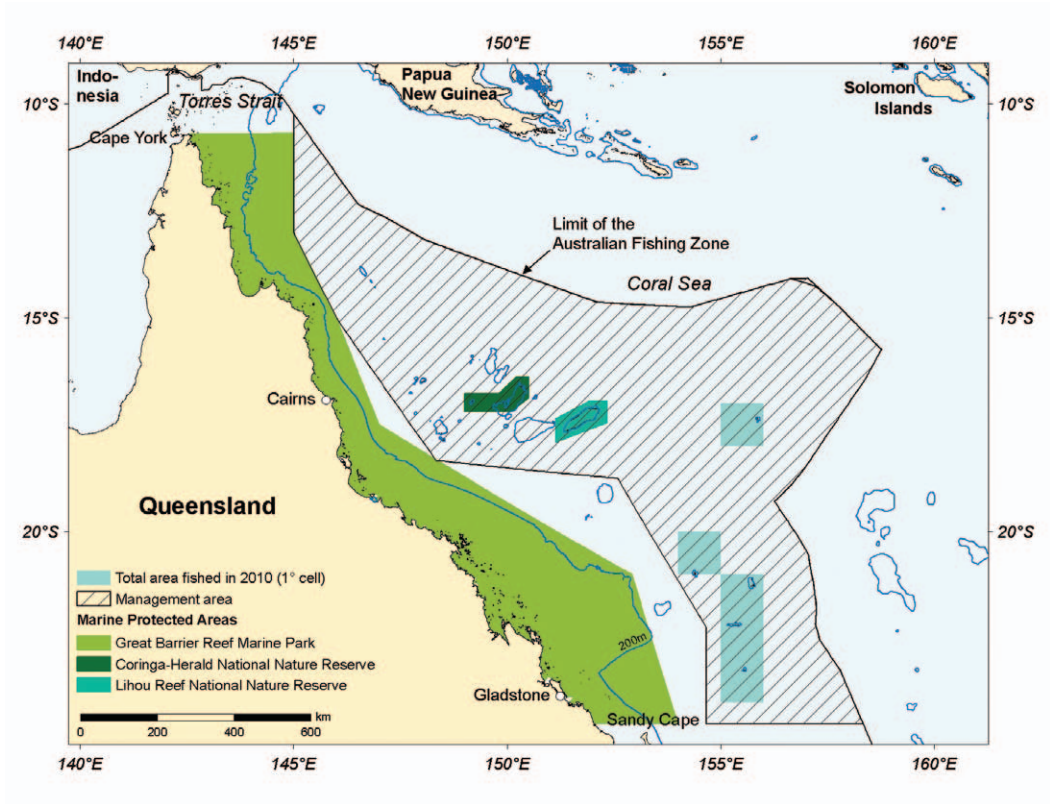


FIGURE 3.1 Area of the CSF and the area fished in 2010

TABLE 3.1 Status of the CSF

Fishery status	2009		2010		Comments
Biological status	Fishing mortality	Biomass	Fishing mortality	Biomass	
Black teatfish (<i>Holothuria whitmaei</i>)	Uncertain	Uncertain	Uncertain	Uncertain	No current assessment with which to assess fishing mortality or biomass
Prickly redfish (<i>Thelenota ananas</i>)	Uncertain	Uncertain	Uncertain	Uncertain	No current assessment with which to assess fishing mortality or biomass
Surf redfish (<i>Actinopyga mauritiana</i>)	Not subject to overfishing	Uncertain	Uncertain	Uncertain	No current assessment with which to assess fishing mortality or biomass
White teatfish (<i>Holothuria fuscogilva</i>)	Uncertain	Uncertain	Uncertain	Uncertain	No current assessment with which to assess fishing mortality or biomass
Other sea cucumber species (~11 species)	Not subject to overfishing	Uncertain	Not subject to overfishing	Uncertain	Minimal take of other sea cucumber species in 2009–10; no current assessment with which to assess biomass
Aquarium Sector (>500 species)	Uncertain	Uncertain	Not subject to overfishing	Not overfished	Maximum potential effort under management constraints likely to have minimal impact on stock
Tropical rock lobster (<i>Panulirus ornatus</i>)	Not subject to overfishing	Not overfished	Not subject to overfishing	Not overfished	No take in 2009–10; historical catch less than plausible sustainable yield
Line and Trap Sector (numerous species)	Uncertain	Uncertain	Uncertain	Uncertain	No current assessment with which to assess fishing mortality or biomass
Trawl and Trap Sector (numerous species)	Not subject to overfishing	Uncertain	Not subject to overfishing	Uncertain	No fishing in 2009–10; no current assessment with which to assess biomass
Economic status (Fishery level)	Estimates of net economic returns not available				Progressively lower catch and fishing effort in recent years (excluding Aquarium Sector). Gross value of production is confidential in 2009–10.

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

TABLE 3.2 Main features and statistics of the CSF

Feature	Description
Key target and byproduct species	Sea Cucumber Sector: —black teatfish (<i>Holothuria whitmaei</i>) —white teatfish (<i>Holothuria fuscogilva</i>) —surf redfish (<i>Actinopyga mauritiana</i>) —prickly redfish (<i>Thelenota ananas</i>) —other sea cucumber species (~11 species), including amberfish (<i>Thelenota anax</i>), hairy blackfish (<i>Actinopyga miliaris</i>), lollyfish (<i>Holothuria atra</i>), greenfish (<i>Stichopus chloronotus</i>) Aquarium Sector: >500 species—classes Chondrichthyes (cartilaginous fishes) and Osteichthyes (bony fishes), as well as invertebrates and live rock Lobster and Trochus Sector: <i>Panulirus ornatus</i> and possibly <i>Panulirus versicolor</i> Line and Trap Sector: tropical finfish and sharks (>50 species historically taken) Trawl and Trap Sector: tropical finfish and crustaceans
Other byproduct species	The line, trap and trawl operations take a wide variety of byproduct species (see table 3.4).
Fishing methods	Hand collection (includes barbless hook and line, scoop, cast and seine nets), with or without the use of breathing apparatus; line (demersal longline, dropline and trotline); trap and trawl (finfish and crustacean)
Primary landing ports	Cairns and Bundaberg
Management methods	Input controls: limited entry, spatial closures, size limits Output controls: TAC for Sea Cucumber Sector, size restrictions, catch triggers Other: prescribed observer coverage levels, move-on provisions
Management plan	For the 2009–10 season, the guiding documentation was <i>Management arrangements 2008–09—Coral Sea Fishery</i> (AFMA 2008)
Harvest strategies	Four harvest strategies for the CSF were introduced on 1 July 2008: —Hand Collection Sector: sea cucumber —Hand Collection Sector: lobster and trochus —Hand Collection Sector: aquarium —Line, Trap and Trawl Sectors
Consultative forums	CSF stakeholder meeting(s) ^a
Main markets	Domestic: fish products—fresh, frozen; aquarium species—live International: South-East Asia—dried sea cucumber (bêche-de-mer); worldwide—live aquarium species
EPBC Act assessments: —listed species (Part 13) —international movement of wildlife specimens (Part 13A)	Current accreditation dated 17 November 2010 Current accreditation (Wildlife Trade Operation) expires 19 November 2013
Ecological risk assessment	Aquarium (hand collection), Level 1: SICA completed on around 660 species (Furlani et al. 2007a) Auto longline, Level 1: SICA completed on 194 species (Furlani et al. 2007b) Demersal longline, Level 1: SICA completed on 131 species (Furlani et al. 2007c) Demersal trawl, Level 1: SICA completed on 152 species (Furlani et al. 2007d) Finfish trap trials, Level 1: SICA completed on 225 species (Furlani et al. 2007e) Lobster and trochus, Level 1: SICA completed on 112 species (Furlani et al. 2007f) Other line, Level 1: SICA completed on 203 species (Furlani et al. 2007g) Sea cucumber, Level 1: SICA completed on 117 species (Furlani et al. 2007h) CSF qualitative risk analysis, part 1, protected (TEP) and chondichthyan species (unpublished: AFMA 2009a)
Bycatch workplans	<i>Coral Sea Fishery bycatch and discarding workplan</i> (AFMA 2010)

TABLE 3.2 Main features and statistics of the CSF – *continued*

Feature	Description					
Fishery statistics	2008–09 fishing season			2009–10 fishing season		
Fishing season	1 July 2008 to 30 June 2009			1 July 2009 to 30 June 2010		
Stock	TAC (tonnes)	Catch (kg)	Real value (2008–09)	TAC (tonnes)	Catch (kg)	Real value (2009–10)
Total sea cucumber	150	2 579	Confidential	150	1 887	Confidential
White teatfish	4	1 799	n.a.	4	331	n.a.
Black teatfish	1	388	n.a.	1	482	n.a.
Prickly redfish	20	369	n.a.	20	332	n.a.
Sandfish	1	0	0	1	0	0
Surf redfish	10	0	0	10	681	n.a.
Greenfish and lollyfish (combined)	10	0	0	10	0	0
Other sea cucumber	10	23	n.a.	10	61	n.a.
Lobster	30	0	0	30	0	0
Trochus	30	0	0	30	0	0
Whitetip reef shark	–	0	0	3.5 (trigger)	0	0
Grey reef shark	–	0	0	13 (trigger)	0	0
Line and Trap Sector	–	50 459	Confidential	–	2 127	Confidential
Catch	Entire fishery (excluding Aquarium Sector)—about 53 t of fish, crustaceans, molluscs and echinoderms			Entire fishery (excluding Aquarium Sector)—about 4 t of fish, crustaceans, molluscs and echinoderms		
Effort ^b	Sea Cucumber: 138 dive hours Lobster: 0 Aquarium: 1686 dive hours Line and Trap, and Trawl and Trap: 63 476 hooks, 0 trap lifts, 0 trawl hours			Sea Cucumber: 35.5 dive hours Lobster: 0 Aquarium: 772 dive hours Line and Trap, and Trawl and Trap: 272 hooks, 0 trap lifts, 0 trawl hours		
Fishing permits	18 fishing permits across the Line and Trap (9), Trawl and Trap (2), Sea Cucumber (2), Aquarium (2), and Lobster and Trochus (3)			16 fishing permits across the Line and Trap (8), Trawl and Trap (2), Sea Cucumber (2), Aquarium (2), and Lobster and Trochus (2)		
Active vessels	7 vessels (including 2 in the Aquarium Sector)			4 vessels (including 2 in the Aquarium Sector)		
Observer coverage	Sea Cucumber: 0 Lobster: 0 Trochus: 0 Aquarium: 0 Line and Trap, and Trawl and Trap: 38 days of auto-longline fishing			Sea Cucumber: 0 Lobster: 0 Trochus: 0 Aquarium: 0 Line and Trap, and Trawl and Trap: 16 days of dropline fishing		
Real gross value of production (2009–10 dollars)	\$0.17 million (excluding Aquarium Sector)			Confidential		
Allocated management costs	\$0.18 million			\$0.2 million		

– = not applicable; CSF = Coral Sea Fishery; EPBC Act = *Environment Protection and Biodiversity Conservation Act 1999*; n.a. = not available; SICA = Scale, Intensity, Consequence Analysis; TAC = total allowable catch; TEP = threatened, endangered and protected
a Queensland scientific advisory groups also act as an information source for this fishery.

b Effort figures are representative of available data.

3.1 BACKGROUND

The Coral Sea Fishery (CSF) is a multispecies, multigear fishery extending from Cape York to Sandy Cape, Queensland (figure 3.1). It is bounded on the east by the Australian Fishing Zone and on the west by a line 10–100 nautical miles (nm) east of the Great Barrier Reef (AFMA 2008). Fisheries existed in the Coral Sea before their integration into the CSF, including the East Coast Deepwater Finfish Fishery, the East Coast Deepwater Crustacean Trawl Fishery and the North Eastern Demersal Line Fishery (table 3.3).

The Sea Cucumber Sector targets a range of species that are collected by hand. The Aquarium Sector is understood to take more than 500 species (AFMA 2009b); permits allow operators to use their hands, barbless hook and line, cast and seine nets, and scoop nets for herding and catching fish. Underwater breathing apparatus (such as scuba or hookah equipment) may also be used. Fish are freighted live to domestic and export markets.

Permits in the Line and Trap Sector allow the use of traps, demersal longlines, trotlines, droplines, setlines and handlines. If prior approval is obtained from the Australian Fisheries Management Authority (AFMA), automatic baiting equipment can also be used. The sector is not permitted to take tuna or tuna-like species. Traps must be constructed of metal, be set and hauled individually, and include in their design a sacrificial anode to minimise the potential for ghost fishing if the trap is lost.

The Trawl and Trap Sector uses demersal and midwater trawl gear, as well as traps, to target a broad range of finfish and crustaceans. If targeting crustaceans, permit holders are required to have turtle excluder devices installed and operational.

Permits in the Lobster and Trochus Sector allow the collection of lobster and trochus by hand, with or without underwater breathing apparatus. A minimum tail length of 125 mm for lobster and a size range of 80–125 mm (basal width) for trochus apply.

TABLE 3.3 History of the CSF

Year	Description
1988	Development plans established for the East Coast Deepwater Finfish Fishery and the East Coast Deepwater Crustacean Trawl Fishery.
1991	North Eastern Demersal Line Fishery development plan commenced, forming the basis for management of the CSF for many years.
1994	Management of the East Coast Deepwater Trawl fisheries was divided into northern and southern fisheries (Sandy Cape being the point of delineation), with finfish and crustacean trawl fisheries north of Sandy Cape forming part of the CSF.
1995	Management arrangements were rationalised under an Offshore Constitutional Settlement between the Australian Government and the Queensland Government.
2002	Fishery was split into separate sectors for line, trawl, sea cucumber, aquarium, and lobster and trochus.
2004	First Statement of Management Arrangements was finalised. A two-year trial for demersal traps began on 1 July.
2005	Rotational harvesting MoU was implemented in the Sea Cucumber Sector, stipulating a rotational harvesting strategy, across 21 reefs, over three years. The conditions of this MoU now form part of the management arrangements for the sector.
2007	Removal of limit on the number of divers permitted under each permit in the Sea Cucumber, Lobster and Trochus, and Aquarium sectors; however, limits on the number of tenders, move-on provisions and TACs remain.
2008	Harvest strategies were implemented (1 July).
2009	Declaration of the Coral Sea Conservation Zone (May). Commercial fishing operations were not subject to additional regulatory impacts from the declaration.

CSF = Coral Sea Fishery; MoU = memorandum of understanding; TAC = total allowable catch

3.2 THE 2010 FISHERY

Excluding the Aquarium Sector, approximately 4 t of fish, crustaceans, molluscs and echinoderms were taken in the CSF during 2009–10, down from around 53 t in the previous season. In 2009–10, there were four active vessels in the fishery, one in the Line and Trap Sector, one in the Sea Cucumber Sector and two in the Aquarium Sector. Trochus and sandfish stocks are not assessed in the *Fishery status reports 2010* as they are not currently considered to be target or key commercial stocks within the CSF.

The Line and Trap, and Trawl and Trap sectors had no designated ‘target’ species for the 2009–10 season; therefore, differentiating between target and byproduct species is difficult. Some species or species groups are more consistently taken, but it may not be appropriate to categorise species that are caught less frequently, or in smaller quantities, as byproduct (table 3.4).

There was limited fishing effort in the CSF during the 2009–10 financial year. The gross value of production (GVP) is confidential due to the low number of operators.

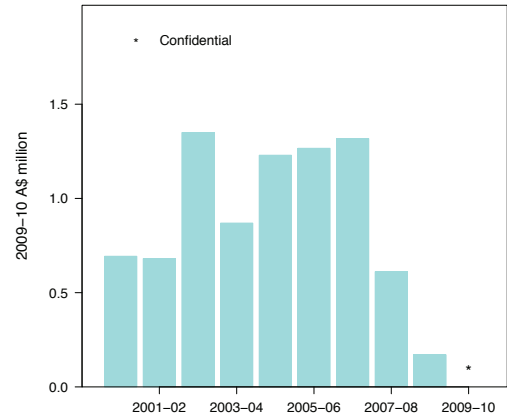


FIGURE 3.2 Real GVP in the CSF (excluding the Aquarium Sector) by financial year, 2000–01 to 2009–10



Traps, Steve Hall, AFMA

TABLE 3.4 TACs and catch triggers, catch and discards for key commercial species and species groups in the CSF (all sectors combined)

Species	TAC/ trigger	2008–09 catch (tonnes)	2008–09 discards (tonnes)	2009–10 catch (tonnes)	2009–10 discards (tonnes)
Blacktip reef shark (<i>Carcharhinus melanopterus</i>)	–	1.3	0.9	0	0
Paddletail seabream (<i>Gymnocranius euanus</i>)	–	0.7	0	0	0
King snapper (<i>Pristipomoides filamentosus</i>)	–	1.3	0	0.5	0
Red emperor (<i>Lutjanus sebae</i>)	–	0.2	0	0	0
Redthroat emperor (<i>Lethrinus miniatus</i>)	–	0.2	0	0	0
Flame snapper (<i>Etelis coruscans</i>)	–	0.8	0	0.1	0
Whaler sharks (<i>Carcharhinus</i> spp.)	–	0.3	0.4	0	0
Tiger shark (<i>Galeocerdo cuvier</i>)	–	0.3	0.1	0	0
Snappers, other (<i>Lutjanus</i> spp.)	–	0	0	0	0
Ruby fish (<i>Etelis carbunculus</i>)	–	0.3	0	0	0
Rockcod, other (<i>Aethaloperca</i> spp., <i>Anyperodon</i> spp., <i>Epinephelus</i> spp.)	–	0.9	0	0	0
Trevally (Carangidae)	–	1	0	0	0
Scalloped hammerhead shark (<i>Sphyrna lewini</i>)	–	0.1	0.1	0	0
Bar rockcod (<i>Epinephelus ergastularius</i> , <i>E. septemfasciatus</i>)	–	0.2	0	0	0
Rusty jobfish (<i>Aphareus rutilans</i>)	–	2.1	0	0.1	0
Grass emperor (<i>Lethrinus laticaudis</i>)	–	0	0	0	0
Green jobfish (<i>Aprion virescens</i>)	–	1	0	0	0
Amberjack (<i>Seriola dumerilii</i>)	–	1	0	0	0
Spot-cheek emperor (<i>Lethrinus rubrioperculatus</i>)	–	0	0	0	0

TAC = total allowable catch; – = not applicable

3.3 HARVEST STRATEGY

3.3.1 Harvest strategy description

Hand collection—Sea Cucumber Sector

The harvest strategy (HS) uses total allowable catches (TACs), spatial closures, move-on provisions and size limits. About 16 species of sea cucumber are available for harvest—of these, 5 have species-specific TACs (table 3.2). The remaining species have annual catch triggers (specified in permit conditions) of 10 t for lollyfish and greenfish (combined) and 10 t for any other species. The sector employs a rotational harvesting regime that regulates the exploitation of 21 reefs over a rolling three-year period. The move-on

provisions specify that the primary vessel must move at least 15 nm to a new anchorage after collecting 5 t of sea cucumber (comprising one or more species).

Hand collection—Aquarium Sector

The HS regulates the level of exploitation through catch-and-effort triggers. When triggers are reached, further analysis is to be undertaken (and justification provided) before expansion in the sector can occur. As a result of the large number of species (>500) harvested in the fishery, the HS uses triggers for the total number of specimens harvested in a fishing season, triggers for the catch of functional groups and catch composition triggers.

Hand Collection—Lobster and Trochus Sector

The HS employs catch triggers, spatial closures, move-on provisions and size limits. The move-on provisions specify that the primary vessel must move at least 15 nm to a new anchorage when the lobster tail catch at a location reaches 1 t. For trochus, the equivalent trigger is 1.5 t. If the total catch of lobster tails or trochus reaches 30 t, a stock assessment to determine a TAC may be undertaken. If an assessment is not completed within 12 months, the lobster catch limit is unchanged; however, the trochus catch limit is reduced by one-third in the acknowledgment of the risk of localised depletion for trochus.

Line and Trap, and Trawl and Trap sectors

The HS employs a suite of triggers designed to detect change and invoke a management response. Triggers are associated with total catch, total catch of high-risk and vulnerable species, changes in catch composition, changes in the spatial extent of the fishery and changes in catch rate.

Level 1 triggers are designed to detect changes in the fishery, and lead to investigation of the reasons for the change (without placing limitations on the fishery). The investigation may include logbook analysis, industry consultation and revised risk analysis. If a reasonable justification is made for the activation of the Level 1 trigger, the fishery may continue without management intervention. In the absence of an explanation, a management response may be invoked. This may include spatial closures, move-on provisions or a downward revision to the Level 2 trigger.

Level 2 triggers require further investigation. Until the investigation is undertaken, the trigger will remain at its current level for that year and will act as the cap on exploitation. The investigation may include obtaining age information from otoliths or shark vertebrae collected by the observer program, undertaking catch curves using age and size data collected by the observer program, DeLury depletion curves (catch per unit effort [CPUE] versus cumulative effort), examination of CPUE trends, and examination of spatial and temporal trends in length frequency and age.

3.3.2 Harvest strategy performance

Harvest strategies for sectors in the CSF have been developed in light of the developmental nature of the fishery, and this should be acknowledged in assessing their performance. The Commonwealth Fisheries Harvest Strategy Policy (HSP) states that, in the case of developing fisheries, 'there is a requirement to balance the desire to develop a new fishery with the need to ensure any development is sustainable and the stocks are not put at risk' (DAFF 2007). The HSP also states that initial catch or effort triggers need to be demonstrably precautionary.

Given the limited biological and economic indicators for the CSF, it is not clear how the fishery is tracking in relation to the HSP objective of maximum economic yield.

Acknowledging the need for a period of implementation and testing in HS development, opportunities for strengthening the current strategies are discussed below.

Sea Cucumber Sector

There are no current stock assessments (or information of a similar rigour) that establish long-term sustainable yields for any species taken in this sector. The Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) has been unable to establish whether extraction at the prescribed TAC levels are demonstrably precautionary and will ensure the long-term health of these stocks, explaining the uncertain status determinations.

Aquarium Sector

The functional groups were identified with input from industry representatives and scientists and the use of historical fishing activity. The catch triggers were based on the relative proportion of the functional group in the historical catch (2001–06). The HS would benefit from further explanation of the suitability and defensibility of the use of proportional catch triggers based on a total specimen trigger.

Lobster and Trochus Sector

There are no current stock assessments (or information of similar rigour) that establish a long-term sustainable yield for lobster or trochus in this sector. In addition, the species of trochus available to the sector is unclear, and it is possible that a number of species of lobster are taken in the fishery.

ABARES has been unable to establish the basis for the catch triggers in the HS or whether they are at levels that are demonstrably precautionary. Thus, ABARES cannot determine whether maintenance of catches at the current catch trigger (30 t) will ensure the long-term sustainability of these stocks; noting that recent catches have been well below this trigger.

Line and Trap, and Trawl and Trap sectors

The HS is based on a suite of generic triggers to initiate analysis and assessment, two of which (whitetip reef shark [*Trienodon obesus*] and grey reef shark [*Carcharhinus amblyrhynchos*]) are species specific. However, the HS indicates an intention to develop additional species-specific triggers in the future.

It is uncertain whether the generic triggers are appropriate for a multispecies, multigear fishery and, in particular, whether standardised CPUE provides a meaningful index of abundance. It is not possible to determine if the trigger levels are demonstrably precautionary for all species harvested. The current sampling program, intended to be part of the observer program, appears to be unlikely to collect sufficient biological samples for the robust analysis required to implement the HS. The iterative nature of the HS, with requirements for regular monitoring, analysis and assessment, requires substantial resources.

Concluding remarks on harvest strategies

Establishing biologically meaningful targets and limits, derived through a rigorous quantitative stock assessment process, for this low-GVP (and currently low effort), multispecies fishery is difficult to achieve in practice. The HSP requires that catch or effort triggers be 'demonstrably precautionary'. Once the HS can be established as demonstrably precautionary, adherence to the strategies should be sufficient to determine status.

ABARES are currently undertaking analyses of stocks in the CSF under the Reducing Uncertainty in Stock Status (RUSS) project, which aims to reconcile the status of stocks. The CSIRO are also undertaking a management strategy evaluation for sectors of the fishery, as part of the RUSS project. The outcomes of these analyses should provide greater certainty around the performance of the current HS and the status of stocks.



Aquarium fish, James Woodhams, ABARES

3.4 BIOLOGICAL STATUS

3.4.1 SEA CUCUMBER SECTOR

TABLE 3.5 Biology of sea cucumbers

Parameter	Description
General	Wide variety of species, with varied life history characteristics. See chapter 20 for further details.
Range	Species: Most species available to this fishery have an Indo-Pacific distribution. Stock: The area of the fishery
Depth	0–40+ m (varies depending on species)
Longevity	5 to ~12 years
Maturity (50%)	Age: Not well documented Size: Black teatfish: ~26 cm; white teatfish: ~32 cm; prickly redfish: ~30 cm; surf redfish: ~22 cm
Spawning season	Variable between species; usually during the warmer months of the year (except for black teatfish, which is understood to spawn in cooler months) and linked to lunar cycles
Size	Maximum: black teatfish: ~56 cm, ~4.3 kg; white teatfish: ~57 cm, ~5.2 kg; prickly redfish: ~98 cm, 8 kg; surf redfish: ~35 cm, ~1 kg Recruitment into the fishery: A range of minimum size limits from 15 cm to 32 cm

Sources: FAO (1990); Conand (1993; 1998); Reichenbach (1999)



Aquarium fish collection, Mike Gerner, AFMA

Stock assessment

No quantitative stock assessment has been carried out for species within this sector. Although TACs have been set, there is no documentation to establish the basis of the current TACs.

Stock status determination

Given the lack of stock assessments (or information of a similar rigour) for sea cucumbers in this fishery, all sea cucumber species are classified as **uncertain** if overfished. Similarly, all stocks are classified as **uncertain** if subject to overfishing. The exception is where there was very low or no reported harvest of the stock in the 2009–10 season. In this case the stock is classified as **not subject to overfishing** (table 3.1).

3.4.2 AQUARIUM SECTOR

Stock assessment

There are no formal stock assessments for the Aquarium Sector.

Work conducted by ABARES under the RUSS project indicates that the sector is unlikely to be having an adverse impact on the stock. Under current permit conditions, operators can only cover about 7 per cent of suitable habitat within the CSF in a given year. Additionally, around 35 per cent of the suitable habitat within the fishery is protected within the Coringa–Herald and Lihou National Nature Reserves.

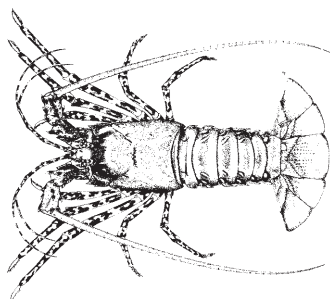
Investigation into annual extraction rates for key commercial fish families suggests that historical extraction rates have been very low. Furthermore, application of the species-specific risk assessment methodology undertaken by Roelofs and Silcock (2008) for the Queensland Marine Aquarium Finfish Fishery suggests low or very low risk to the species harvested within the fishery.

Stock status determination

On the basis of the work undertaken as part of the RUSS project, the Aquarium Sector stock is classified as **not overfished** and **not subject to overfishing**.

3.4.3 TROPICAL ROCK LOBSTER

(*Panulirus* spp.)



Line drawing: FAO

TABLE 3.6 Biology of tropical rock lobster

Parameter	Description
Range	<p>Species: Widely distributed throughout the Indian and western Pacific oceans. In Australia, they are found throughout the tropical northern waters and generally as far south as the North West Cape (Ningaloo Reef region) in the west and Sydney in the east.</p> <p>Stock: It is likely that sources of larval recruitment into the Coral Sea include the outer Great Barrier Reef and the Gulf of Papua. If this is the case, the stock most likely includes the reefs of (at least) the western Coral Sea through to Warrior Reef in the Torres Strait, and north to the Gulf of Papua (Papua New Guinea) (see chapter 18—Torres Strait Tropical Rock Lobster Fishery).</p>
Depth	1–200 m; generally found in holes or crevices in shallow reefs to 50 m
Longevity	3–5+ years
Maturity (50%)	<p>Age: 2–3 years</p> <p>Size: ~10 cm CL</p>
Spawning season	Torres Strait: August–March. Mature females brood 2–4 clutches of 300 000–750 000 eggs. The eggs hatch after about one month. The planktonic larval stage lasts 4–6 months, before recruiting to shallow habitats of the Torres Strait, coastal Queensland and Coral Sea. Dispersal is thought to be largely influenced by the Coral Sea Gyre.
Size	<p>Maximum: At least 15 cm CL; weight: tails of 1000 g are often reported.</p> <p>Recruitment into the fishery: Minimum size 12.5 cm (tail length), age 1–2 years</p>

CL = carapace length

Sources: MacFarlane & Moore (1986); Kailola et al. (1993); Skewes et al. (1997)

Stock assessment

No quantitative stock assessment has been carried out for this stock.

Stock status determination

Due to limited targeting of tropical lobster in the Coral Sea, insufficient information is available from logbook data to estimate the stock size or sustainable yield for this stock. However, consideration of the number of reefs, the potential reef area in the Coral Sea, and the pattern of catch and effort recorded in fishers' logbooks suggests that none of the major reefs in the Coral Sea have ever been extensively fished. Estimates of lobster density on Coral Sea reefs inferred from fishers' catch rates suggest that lobster abundance is likely to be many times higher than would be required to support the total historical catch of less than 10 t. On this basis, the stock is classified as **not overfished**. As there was no harvest of lobster in the 2009–10 season, the stock is classified as **not subject to overfishing**.

3.4.4 LINE AND TRAP, AND TRAWL AND TRAP SECTORS

Stock assessment

No quantitative stock assessment has been carried out for these stocks.

Stock status determination

There is no stock assessment or equivalent information for these sectors that would allow comparison of current or historical catches with sustainability indicators. On this basis, the overfished and overfishing classifications of the Line and Trap Sector are **uncertain**. Similarly, the overfished classification for the Trawl and Trap Sector is **uncertain**. As no trawl or trap operations took place during the 2009–10 season, this sector is classified as **not subject to overfishing**.

3.5 ECONOMIC STATUS

The small amount of effort, limited information and large number of species in the CSF make it difficult to assess the fishery against economic performance indicators. Furthermore, no economic surveys of the fishery have been conducted.

The Aquarium Sector is likely to have contributed the most to the value of the CSF in the most recent season, given low catch and effort in other sectors. The GVP for the Aquarium Sector is difficult to estimate because the quantity and value of species in this sector are measured by the number and price of individual fish. In contrast, the species caught by the Line and Trap, and Trawl and Trap sectors are reported by kilogram and price per kilogram. The average price for each species caught in the Aquarium Sector can also vary depending on sex, colour, size and age. A large proportion of the species caught are exported and traded in US dollars; therefore, the value of production is also highly influenced by exchange rates.

Industry reports that fuel costs make up a large proportion of the cost of operations, particularly given the remoteness of some of the fishing grounds. This makes fishing less economic in periods of high fuel prices. Another factor that severely affects operations and thus profitability of the fishery is variability in weather conditions, particularly the influence of cyclones and strong winds. These factors have discouraged fishing activities in the non-aquarium sector in recent years, with catches falling significantly since 2005–06 (256 t), reaching around 4 t in 2009–10.

In terms of trade, the Australian Bureau of Statistics records the number and value of Australian ornamental fish exports, but does not distinguish between species groups or between marine and non-marine species.

The real value of total Australian exports of ornamental fish has varied greatly over time and is highly influenced by the exchange rate between the US dollar and the Australian dollar (figure 3.3). In 2009–10, Australia exported around \$2.7 million of ornamental fish. This was approximately \$0.8 million lower than in the previous financial year (2008–09), partly because of an 18 per cent depreciation of the Australian dollar against the US dollar between the two financial years. The main export destinations are Hong Kong, the United Kingdom and the United States, which together contributed \$2 million (76 per cent) of the total value exported in 2009–10. Queensland is the leading state in exports of ornamental fish. Approximately 44 000 fish were exported from Queensland in 2009–10, contributing about 90 per cent (\$2.4 million) of the total value of Australian ornamental fish exports. It is unclear how much the CSF contributes to this total.

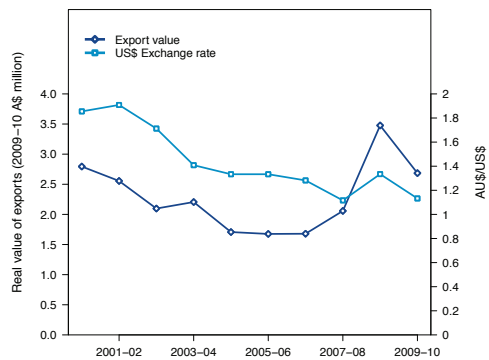


FIGURE 3.3 Real value of Australian ornamental fish exports and exchange rate between the US and Australian dollars



Coronation trout, Steve Hall, AFMA

3.6 ENVIRONMENTAL STATUS

Fishing in the CSF occurs using both targeted, hand collection methods and relatively less targeted, multispecies line, trap and trawl methods. For hand collection sectors, the environmental impact is likely to be limited to the removal of target species and the impact their removal may have on the ecosystem.

The Line and Trap, and Trawl and Trap sectors of the fishery take a wide variety of species, with targeting changing both temporally and spatially. These fishing methods are relatively non-selective and take bycatch during the course of fishing operations. Anecdotal reports suggest that trap-caught fish can be released alive if unwanted and there is a growing body of literature on the post release survival of line caught fish (DEEDI 2007; Brown et al. 2008). Possible ghost fishing from lost traps is mitigated through the use of sacrificial anodes on trap doors. When automatic or randomly baited longline equipment is used, operators are required to use tori lines.

Humphead Maori wrasse (*Cheilinus undulatus*) is taken in the CSF in low numbers by the Aquarium Sector. This species is listed under Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and is therefore subject to strict trade regulations. The annual take of 50 animals has been approved by the Australian Government Department of Sustainability, Environment, Water, Population and Communities (DSEWPac) under the non-detriment finding process.

3.6.1 Ecological risk assessment

Eight Level 1 Scale, Intensity, Consequence Analysis (SICA) ecological risk assessments have been completed for the CSF (table 3.2), covering a broad suite of species and associated habitats. A qualitative risk assessment was undertaken in 2009 for threatened, endangered and protected (TEP) species and chondrichthyans (AFMA 2009a). Further risk assessment work is currently underway.

3.6.2 Threatened, endangered and protected species

Data on the interaction with species protected under the EPBC Act are available on the AFMA website.¹ These data are reported to the DSEWPac on behalf of fishers, under a memorandum of

understanding between AFMA and the department. No interactions with TEP species were recorded for the 2009–10 season.

Marine turtles and seabirds

Trawl operations are required to use turtle excluder devices when trawling for crustaceans, and trawl nets have a specified minimum mesh diameter to limit bycatch. When automatic or randomly baited longline equipment is used, operators are required to use tori lines aimed at deterring birds from deployed hooks.

Sharks

Historically, sharks have been landed in the Line and Trap, and Trawl and Trap sectors of the CSF. AFMA have introduced a catch trigger of 2.5 t for whitetip reef shark and a 13 t catch trigger for grey reef shark as part of the HS. These triggers were not reached in the 2009–10 season.

Habitats

It is expected that most fishing operations in the CSF, with the possible exception of demersal trawling, have minimal impact on habitats. Demersal trawling has the potential to damage seabed habitats. There may also be the potential for damage to habitats caused by anchoring. However, it should be noted that permanent anchorages have been established at a number of reefs.



Soft coral, James Woodhams, ABARES

1. www.afma.gov.au/managing-our-fisheries/environment-and-sustainability/Protected-Species

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