



Australian Government

Australian Fisheries Management Authority


# STRATEGIC & EXPORT REASSESSMENT REPORT

## Coral Sea Fishery

August 2007

This report has been prepared by AFMA for consideration by the Department of the Environment and Water Resources in relation to the exemption of the Coral Sea Fishery from export controls under the *Environment Protection and Biodiversity Conservation Act 1999*.

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# 1 Description of the fishery

The Coral Sea Fishery (CSF) lies east of the Great Barrier Reef Marine Park and extends to the edge of the Australian Fishing Zone, it extends north from Sandy Cape, Fraser Island, to Cape York but excludes the area of the Coringa-Herald and Lihou Reef National Nature Reserves, an area spanning approximately 17,000 square kilometres.



**Figure 1.** Area of the Coral Sea Fishery

There are currently 18 fishing permits in the CSF and entry is limited to these existing permits. The fishery comprises five sectors; Line and trap, Trawl and trap, Sea cucumber (*bêche-de-mer*), Aquarium collection, and Trochus and lobster collection sectors (Table 1).

**Table 1.** Summary of the Coral Sea Fishery by sector

	Number of Permits	Target species	Fishing method/gear
<b>Trawl &amp; trap</b>	2	tropical finfish and crustaceans	Otter trawl, demersal finfish traps
<b>Line &amp; trap</b>	9	tropical snappers, emperors, coral trout and jobfish	Demersal longlines, trotlines, droplines, handlines & demersal finfish traps. Automatic baiting is being trialled on one longline permit at this time.
<b>Trochus &amp; Lobster</b>	3	Trochus - <i>thought to be Tectus pyramis</i> Lobster - ( <i>Panulirus ornatus</i> , <i>P. versicolor</i> and <i>P. pennisiulatus</i> ).	Hand collection with SCUBA*
<b>Aquarium</b>	2	Classes <i>Chondrichthys</i> (cartilaginous fishes) and <i>Osteichthyes</i> (bony fishes)	Cast, scoop and seine nets, and handlines with barbless hooks. SCUBA* allowed
<b>Sea Cucumber</b>	2	Amberfish ( <i>Thelenota anax</i> ) Blackfish (probably <i>Actinopynga miliaris</i> ) Black teatfish ( <i>Holothuria whitmaei</i> ) Greenfish ( <i>Stichopus chloronotus</i> ) Lollyfish ( <i>Holothuria atra</i> ) Prickly redfish ( <i>Thelenota ananas</i> ) Sand fish ( <i>Holothuria scabra</i> ) Surf redfish ( <i>Actinopynga mauritiana</i> ) White teatfish ( <i>Holothuria fuscogilva</i> ) Deepwater redfish ( <i>Actinopynga echinites</i> ) Elephant's trunk fish ( <i>Holothuria fuscopunctata</i> ) Curry fish ( <i>Stichopus hermanni</i> )	Hand collection with or without SCUBA*

\* SCUBA - Self-Contained Underwater Breathing Apparatus

The CSF recorded a commercial harvest of 255.9 tonnes for the 2005/2006 financial year with a value of \$1,250,000. Markets are largely domestic, however, some bêche-de-mer and aquarium fish are exported.

The Bureau of Rural Sciences Fishery Status Report 2006 classified the CSF as uncertain, this is largely due to the limited activity in the fishery and consequently limited information available on which to make assessments.

## 1.1 Target and bycatch species

### **Target species**

The CSF targets a wide range of species (Table 1). Analyses of AFMA Logbook data revealed at least 183 different species taken by the CSF between 1998 and 2007. Fifty-four of these species were caught exclusively by CSF operators and 129 were also caught by other AFMA fisheries during this period.

The Trochus and Lobster, Aquarium, and Sea Cucumber sectors employ methods which are highly selective and able to avoid bycatch species.

The Line and trap, and Trawl and trap sectors target a wide range of species and there is no clear distinction between target and bycatch species in these sectors.

All permits in the CSF prohibit the taking or carrying of the following tuna and tuna like species:

- fish of the family Scombridae except fish of the genera *Scomberomorus*, *Scomber*, *Acanthocybium*, *Grammatorcynus* and *Rastrelliger* (commonly known as mackerels); and

- fish of the families Istiophoridae and Xiphiidae (commonly known as billfish).
- fish of the family Bramidae (commonly known as pomfrets or ray's bream).

### Line and Trap Sector

This sector targets tropical snappers (Lethrinidae or Lutjanidae) and emperors (Lutjanidae), coral trout (*Plectropomus leopardus*) and jobfish (Lutjanidae, subfamily Etelinae). Individual operators also target other species depending on the specific location and method being used.

### Trawl and Trap Sector

There has been little effort in this sector. Effort has typically been exploratory in nature with operators trialling different nets, locations and water depths. Consequently there is high variability in catch levels and species composition between fishing trips.

### Fish trapping

Fish traps are used by the Line and trap and Trawl and trap sectors, targeting Trout cod, Trevally, Red emperor, Rosy jobfish/King snapper, Goldband snappers, Redthroat emperor, Japanese sea bream, Sea bream snapper, Coral trout, Samsonfish, Amberjack, Golden-eyed jobfish, Long nose emperor, Grass emperor, Spangled emperor and Red-eared emperor.

### Sea Cucumber Sector

This sector targets a number of species including Amberfish (*Thelenota anax*), Blackfish (probably *Actinopynga miliaris*), Black teatfish (*Holothuria whitmaei*), Greenfish (*Stichopus chloronotus*), Lollyfish (*Holothuria atra*), Prickly redfish (*Thelenota ananas*), Sandfish (*Holothuria scabra*), Surf redfish (*Actinopyga mauritiana*), White teatfish (*Holothuria fuscogilva*), Deepwater redfish (*Actinopyga echinites*), Elephant's trunk fish (*Holothuria fuscopunctata*) and Curry fish (*Stichopus hermanni*).

### Aquarium Collection Sector

Operators target ornamental reef fish species from the Class Chondrichthyes (cartilaginous fishes) and Osteichthyes (bony fishes) except for tuna and tuna like species. There are over 100 different species that are harvested for the aquarium sector, but the majority of the harvest comes from damselfish, butterflyfish, angelfish, wrasse, anemone fish, surgeonfish, blennies and gobies. Species targeted vary over time as a response to changing market demands.

Live rock (limestone covered with living coralline algae and other encrusting species) is also collected by hand or use of hand-held, non-mechanical implements.

### Trochus and Lobster Sector

There has been little effort or catch in this sector.

The main trochus species in the CSF is probably not *Trochus niloticus*, but may be a related species, *Tectus pyramis*, which is smaller and has a lower value than *T. niloticus* (Wells and Bryce, 1988).

The lobster sector targets species *Panulirus ornatus* and *P. versicolor* and to a lesser degree *P. pennisiulatus*.

### **Bycatch species**

Bycatch in the CSF is recorded using Logbooks and through Observer coverage. A copy of relevant data has been supplied to DEW. This data has not been included in this report due to privacy issues.

There is no bycatch in the Sea cucumber, Aquarium, and Lobster and trochus sectors.

Trawl and trap sector operators have been required to use net with a specified minimum mesh diameter to limit bycatch and utilise a Bycatch Reduction Device (BRD) when trawling for crustaceans.

AFMA is currently developing a CSF bycatch minimisation program as part of the CSF Response to the Ministerial Direction issued in December 2005.

The CSF is an opportunistic fishery targeting a wide range of species. Less commercially valuable species are discarded. Data on discarded species is limited for most sectors in the CSF, however good quality data is available relating to the demersal finfish trapping method.

Observers participated in 14 trips and observed 5160 trap sets (27%) between 1 July 2004 and 1 January 2007. The discard rate covering the full trap trial period was 15.3% of the number of fish caught by number. Eighty five percent of this discarded catch was Red bass (*Lutjanus bohar*) which is released because Queensland state legislation prevents its sale due to risk of ciguatera toxin. Much of the Red bass is released in a live and vigorous condition.

## 1.2 Fishing areas

The Coral Sea Fishery (CSF) lies east of the Great Barrier Reef Marine Park and extends to the edge of the Australian Fishing Zone, it extends north from Sandy Cape, Fraser Island, to Cape York but excludes the area of the Coringa-Herald and Lihou Reef National Nature Reserves, an area spanning approximately 17,000 square kilometres (Figure 1).

## 1.3 Management arrangements

The *Fisheries Management Act 1991* (the Act) provides the overarching legal framework for the management of the fishery. The Act outlines the objectives which must be pursued in the administration of the Act and this fishery is managed in line with these objectives.

The CSF has been managed in accordance with the *Statement of Management Arrangements, Coral Sea Fishery 2004/05* and is now to be managed in accordance with the *Statement of Management Arrangements, Coral Sea Fishery 2007* (Attachment A). This Statement of Management Arrangements provides the overarching management policy for the Coral Sea Fishery (CSF).

AFMA prepares an annual management arrangements booklet. This booklet provides a detailed outline of the management arrangements and permit conditions in place for the fishery and highlights any changes that have occurred in the fishery since the previous fishing season. The provisions of the Act and the Statement of Management Arrangements are taken into account in considerations about any changes to management arrangements and conditions. The annual management arrangements booklet is made available on the AFMA Website. A copy of the arrangements for 2007/08 was provided to DEW as background for this assessment.

Fishing permits are granted under section 32 of the *Fisheries Management Act 1991* (the Act). Permits are subject to certain statutory conditions set out in section 32(5) of the Act in addition to conditions specified in the permit. CSF permits are granted for the duration of the financial year (1 July – 30 June).

There are a total of 18 fishing permits issued across the five sectors of the CSF (9 line and trap, 2 trawl and trap, 3 lobster and trochus, 2 aquarium, and 2 sea cucumber). Each permit includes conditions specific to the sector to which it relates.

Permit conditions may include limits on the number of persons able to fish under the permit at any time, gear restrictions, species size limits, trigger limits and total allowable catch limits (TACs) and spatial controls. Permits provide the legal mechanism for establishing and enforcing the management arrangements specific to this fishery and to each fishing sector. Permits are also subject to certain statutory conditions set out in section 32(5) of the Act in addition to the conditions specified in the permit.

AFMA is currently developing a harvest strategy for the CSF and expects to set further catch limits which will trigger management actions for key species in the line, trap and trawl sectors and ensure these resources are managed sustainably, consistent with the Commonwealth Harvest strategy Policy

## 1.4 Fishing methods (gear types)

### Line and trap Sector (9 permits)

Permits allow the use of demersal longline, setline, dropline and trotline methods. Permit conditions aim to minimise interactions with protected species and include the use of tori lines, hook and depth limits and Observer coverage.

- Demersal longline (Kailola et al 1993)

A demersal longline consists of a sinking main-line constructed of 6-8mm diameter synthetic rope with snoods (branch lines) about 1 metre long attached at intervals of 6 – 10m. Each snood carries a hook at one end and is attached to the main-line at the other end either permanently or by means of a 'snood clip'.

The gear is divided into a number of 'sets' which each has a certain number of hooks. Each hook is baited before the gear is deployed into the water. The hooks together with the main-line and an anchor weight at each end are placed on the seabed. A buoy and dan pole with flag attached by way of buoy-line to the main-line at each end for retrieval of the gear. The main-line is hauled from one end over a roller mounted on the gunnels by a line hauler.

Demersal longlines can be set in deep water on the continental slope and in strong tidal currents where it is more difficult to set other nets.

Use of automatic or random baiting equipment with demersal longline gear is specifically prohibited unless otherwise stated in the permit conditions. AFMA will permit the use of such equipment by operators in the fishery who meet additional criteria such as submission of a detailed fishing plan, additional catch recording and reporting requirements and commitments on ecologically sustainable fishing such as bycatch reduction for seabirds. Other additional restrictions apply to this method, including a hook limit of 15,000 and minimum depth limit of 200 metres (unless an observer is on board). At this time only one longline permit allows automatic baiting.

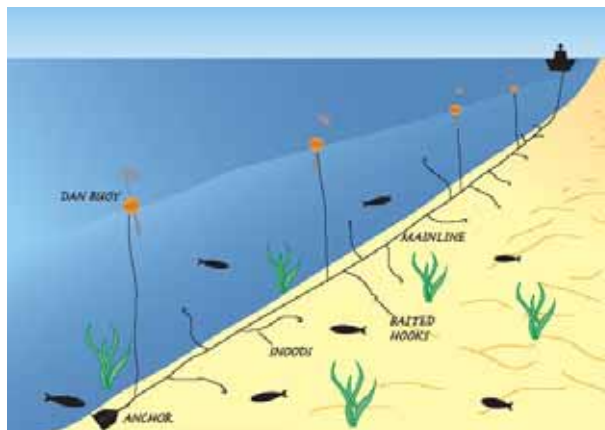


Figure 3 Demersal longline

- Trotline (Kailola et al 1993)

A trotline is very similar to the demersal longline described above. The main-line of a trotline has a small float attached to suspend it off the seabed, avoiding snagging on the bottom. The snoods (also called trots) are attached to the main-line in a similar way to demersal longlines at intervals of 6-10m. These snoods are weighted and hang vertically under the main-line and act like a series of short droplines.

Trotlines are deployed and retrieved in a similar way to demersal longlines. All hooks are baited before deployment with similar baits to demersal longlines.

- Dropline (Kailola et al 1993)

A dropline consists of a main-line, usually made of synthetic rope, set vertically in the water with a weight on the bottom and floats attached at the surface. Between 10 and 100 short snoods are either clipped or permanently attached to the main-line at regular intervals at one end and have a hook on the other.

The hooks are baited before the gear is deployed. Gear is deployed by dropping the weighted end of the main-line overboard and letting the main-line run off, either attaching the snoods as the line deploys or allowing permanently fixed snoods to run off 'shooting rails'. The gear is retrieved by a line hauler

(powered winch) with the caught fish removed from the snoods as they come aboard.

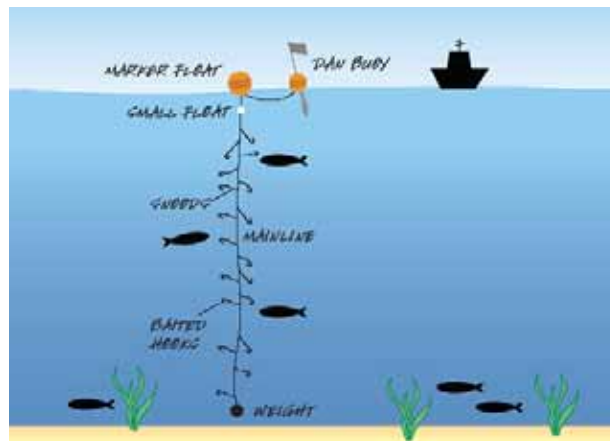


Figure 4 Dropline

- Setline (Kailola *et al* 1993)

Setline is the simplest form of fishing. A setline (or handline) is a line to which one or more lures or baits are attached. Setlines are set and retrieved manually, although electric or hydraulic motors are available to reduce labour.

Trawl (2 permits)

Demersal and midwater otter board trawl gear is used in this sector to target bony fish and crustaceans. Demersal trawling is the term used to describe the fishing method where a net is towed along, or just above, the ocean floor in depths of water ranging from a few metres to 1 500 metres. A trawl net is attached to the vessel by two long wires, called warps which are attached to an otter board either side of the net. The net opening (mouth) is spread horizontally by the outward force acting on the otter boards as they are towed through the water. The bottom of the net opening is called the footrope and is heavier than the headline and normally in contact with the bottom. The footrope is often rigged with rubber rollers to minimise the damage to the seafloor and allow it to move across the substrate without becoming snagged. The top of the mouth (headline) is lifted vertically by a series of floats.

Otter trawling relies on the principle of herding fish inward from the otter boards and the sweep (wire from otter board to the headline and footrope) towards the mouth of the trawl net. Fish have a natural tendency to swim away from the otter boards, sweeps and net wings and fall backwards, towards the codend. The codend is the end of the net where the fish are caught. The size of the mesh in the codend is one of the most important factors in the size and shape of fish that are caught and those that escape.

A trawl shot involves the net being deployed from the stern of the vessel by way of winches. The net is then towed along the bottom, usually at around 3 knots for a period of time before being hauled up toward the vessel. The fish are contained in the codend, which is fastened with a rope to release the catch on the vessel deck.

Trawl sector permit conditions aim to minimise interactions with protected species and specify a minimum net-mesh size and the use of Bycatch Reduction Devices (BRDs) when trawling for crustaceans.

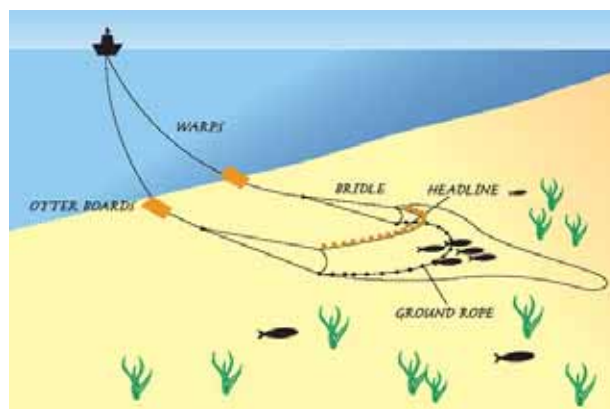


Figure 5 Demersal and midwater trawl

Demersal finfish traps (trap provisions included on all Line and Trap, and Trawl and Trap permits)

Fish traps are devices which fish enter voluntarily but from which they are prevented in some way from escaping. Fish are enticed into the trap either by bait or because the trap appears to provide some sort of refuge. Demersal finfish traps are set on the sea floor with a haul-in line, surface float and dan bouy to mark their position. Traps are left to fish from 20 minutes to 24 hours (Kailola 1993).

Galvanised steel traps are used in the CSF and there are limits on the number and size of traps used. All traps must be fitted with sacrificial anodes (of no more than one month life span fitted to trap doors) to avoid ghost fishing if the traps are lost. Traps in the CSF are typically set at between 60 and 120m depth, with most catch occurring between 80-100m depth.

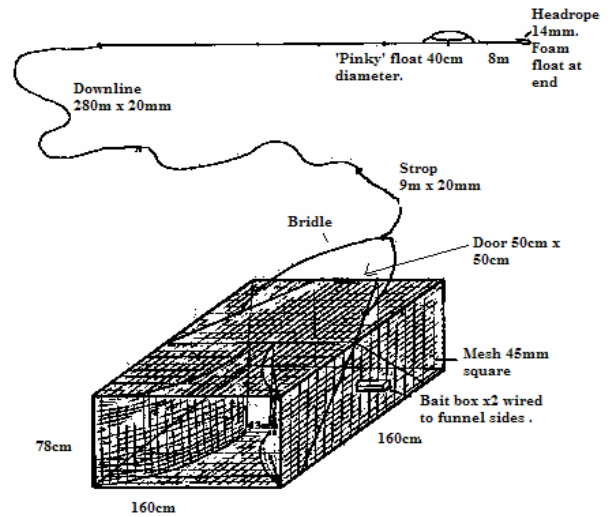


Figure 6 Demersal finfish trap

Sea Cucumber (Beche-de-mer) Sector (2 permits)

Collection of bêche-de-mer may only be done by hand with, or without the use of SCUBA diving equipment.

Each permit in this sector of the CSF has an annual quota limit for each of five sea cucumber species and an annual quota limit of 75 tonnes for all species of sea cucumber (Table 2). There is a total allowable catch (TAC) limit of 150 tonnes for the entire CSF which includes the aforementioned quotas. For all other species of sea cucumber, the remaining uncaught proportion of the total TAC determines the catch limit. There are also minimum size limit guidelines for sea cucumber which are implemented through a voluntary agreement with industry (see Table 2).

Each permit specifies a maximum number of tender boats and persons authorised to take fish using the boat specified in the permit. Once operators collect five tonnes of any species or combination of species the mother-ship must move at least 15 nautical miles to a new anchorage. This provision aims to prevent localised depletion. A rotational harvest strategy is also in place for this sector.

**Table 2.** 2007/08 Catch limits (based on landed weight) for the sea cucumber collection sector in the CSF

Common name	Species	Minimum size limit	Annual quota per permit	Total Allowable Catch
Black teatfish	<i>Holothuria whitmaei</i>	25 cm	500 kg	1 tonne
White teatfish	<i>Holothuria fuscogilva</i>	32 cm	2 tonnes	4 tonnes
Sand fish	<i>Holothuria scabra</i>	16 cm	5 tonnes	10 tonnes
Prickly redfish	<i>Thelenota ananas</i>	30 cm	10 tonnes	20 tonnes
Surf red fish	<i>Actinopyga mauritiana</i>	15 cm	5 tonnes	10 tonnes
All species of the Order Aspidochirotida		15 cm	75 tonnes (including the take of the above species)	150 tonnes (including the take of the above species)

Aquarium Sector (2 permits)

Aquarium collection sector permits allow operators to use either their hands, barbless hook and line, cast nets and seine nets and/or scoop nets for herding and catching fish. SCUBA diving equipment may also be used. Gear restrictions are in place for this sector and the use of chemicals for taking fish is prohibited. Live rock may be collected by hand or by using hand held non-mechanical implements.

Each permit specifies a maximum number of tender boats and persons authorised to take fish using the boat specified in the permit.

A trigger limit of 200 days fished per year is in place. If fishing effort reaches this level an evaluation of the sustainability and impacts is undertaken.

### Trochus and Lobster Sector (3 permits)

Trochus and lobster sector permits allow hand collection with or without the use of SCUBA diving equipment.

A minimum tail length of 125 mm applies to Lobsters and a slot limit (size range) of 80 – 125mm applies to Trochus species.

Once operators collect the lesser of three tonnes of lobster tails or five tonnes of trochus the mother-ship must move at least 15 nautical miles to a new anchorage. This provision aims to prevent localised depletion.

Each permit specifies a maximum number of persons authorised to take fish using the boat specified in the permit.

A trigger limit of 30 tonnes is in place. If fishing effort reaches this level an evaluation of the sustainability and impacts is undertaken.

## **1.5 Allocation between sectors**

There is no allocation between sectors (Commercial, Recreational, and Indigenous) in the CSF. AFMA manages all fishing in the CSF which is commercial in nature.

## **1.6 Governing legislation/fishing authority**

The *Fisheries Management Act 1991* (the Act) and the *Fisheries Management Regulations 1992* provide the principal legal framework for the management of the fishery.

The Statement of Management Arrangements provides the overarching policy framework for management of the fishery. An annual management arrangements booklet is prepared to provide detail of the management arrangements in place in the CSF.

Annual fishing permits are granted under section 32 of the Act. Different permit conditions apply for each of the five fishing sectors to reflect the different management arrangements in place for the various fishing methods and target species.

Permits provide the legal mechanism for establishing and enforcing the management arrangements specific to this fishery and to each fishing sector. In addition to the conditions specified on the permits, all fishing permits are subject to statutory conditions set out in section 32(5) of the Act.

## **1.7 Status of export approval/accreditation under the *Environment Protection and Biodiversity Act 1999***

The CSF was strategically assessed in 2004 under section 33, Parts 13 and 13A of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Product from the Line, Trawl, Trochus and Lobster and Aquarium sectors of the CSF were declared exempt from the export controls of Part 13A of the EPBC Act until 19 November 2009. The Sea Cucumber sector was declared a Wildlife Trade Operation (WTO) and exempt from the export controls until 19 November 2007.

This Assessment Report for the CSF is submitted as a requirement of these approvals.

# **2 Management**

## **2.1 Changes to management arrangements**

The following changes have been made to management arrangements and permit conditions for the Coral Sea Fishery since the last Strategic Assessment report was submitted on 5 August 2003.

- inclusion of rotational harvesting arrangements in CSF sea cucumber permit conditions. A reef may only be fished one year in three with a maximum number of 144 fishing days undertaken at identified reefs over each 3 year period. These arrangements spread fishing effort over a wider area to minimise the potential for localised stock depletion.

- inclusion of the take of live rock as an ongoing condition in CSF Aquarium sector permits, subject to a catch limit;
- compulsory carrying and operation of Integrated Computer Vessel Monitoring System (ICVMS) on nominated fishing vessels for all sectors;
- inclusion of demersal finfish trapping in CSF Line and trap and Trawl and trap sector permits as an ongoing condition;
- removal from the conditions for all CSF permits of the requirement for permit holders to undertake a minimum number of fishing days each year;
- option for permit holders with trap entitlements to apply to AFMA to reduce the Observer coverage from every fourth trip to every eighth trip after 1,000 trap lifts; and
- option for permit holders trialling automatic or random baiting on a Line and trap permit to apply to AFMA to have Observer coverage reduced to 1 in 8 trips, with a minimum coverage of at least 10% of hooks set annually once a minimum of 100,000 hook sets has been observed by an AFMA Observer.

A harvest strategy is currently being prepared for implementation in 2008. The harvest strategy is expected to include additional trigger points, decision rules and processes for the setting of Total Allowable Catch limits (TACs).

## **2.2 Performance of the fishery against objectives, performance indicators and performance measures**

The CSF is managed in accordance with the objectives specified in section 3 of the *Fisheries Management Act 1991* (the Act). The performance of the fishery against is reported in the annual report available at webpage:

<http://www.afma.gov.au/information/publications/corporate/annual/default.htm>

## **2.3 Compliance risks present in the fishery and actions taken to reduce these risks**

Compliance risks in the fishery include illegal fishing by unlicensed operators and fishing by licensed operators contrary to specified permit conditions. Illegal fishing by licensed operators could potentially include fishing in excess of allocated quota, non-compliance with size and gear restrictions and contravention of rotational harvest plans and spatial closures.

Measures taken to monitor compliance with CSF permit conditions and management arrangements include:

- Patrols by Coastwatch (air and sea) and investigations to ensure vessels operating in the area have the appropriate permits and are complying with the conditions of these permits.
- All sectors of the CSF are required to have an operational Integrated Computerised Vessel Monitoring System (ICVMS) installed on their fishing vessels, this data is used by AFMA to monitor activity in the fishery and verify other reported data.
- All relevant information about fish taken in the CSF as well as information on bycatch, discards and interactions with protected species must be accurately and fully recorded and submitted in appropriate logbooks. Catch Disposal Records are also required for the line, trap, trawl and sea cucumber sectors.
- Catch verification is also supported by prior to landing reports in the sea cucumber sector; prior to departure reports in the sea cucumber sector and also the aquarium sector if live rock has been collected; single jurisdiction trips in all sectors; and Observer coverage requirements for auto longlining, demersal finfish trapping and trawling.
- AFMA Fisheries Officers conduct both vessel and fish receiver premise inspections in accordance with section 84 of the Fisheries Management Act 1991 (FMA).

## **2.4 Consultation processes**

AFMA's consultative processes are embodied in its governing legislation. AFMA consults a range of stakeholders about the development, implementation and review of fisheries management arrangements in the CSF. Collaborative arrangements have been developed with the Queensland Scientific Advisory Committees (ReefSAG and HarvestSAG) to provide scientific input into the consultative processes.

AFMA considers the overlap of species and management issues with adjoining Queensland state fisheries and, where appropriate, consults Queensland state fisheries managers, Great Barrier Reef Marine Park Authority (GBRMPA) managers and Queensland Scientific Advisory Groups (HarvestSAG and ReefSAG) in developing and implementing management arrangements for the CSF. HarvestSAG and ReefSAG provide scientific advice to both AFMA and Queensland state fisheries managers and their involvement facilitates the development of consistent management approaches to related state and Commonwealth fisheries. AFMA consult as widely as practicable to develop sound fisheries management arrangements.

Before management arrangements are changed, stakeholders and registered interested persons are invited to discuss issues relevant to the fishery and are discussed at annual stakeholder meetings. This allows AFMA to take into account any representations received when making management decisions.

AFMA also consults with the Department of the Environment and Water Resources (DEW) in regard to proposed management arrangements.

## **2.5 Outcomes of review processes**

AFMA undertake regular reviews of management arrangements in all managed fisheries, including the CSF. This includes review of conditions on fishing permits and review of management arrangements. Catch and trigger limits for the CSF are also reviewed and amended where necessary to ensure the fishery remains ecologically sustainable and economically efficient.

A harvest strategy is currently being prepared for the CSF and will be implemented in 2008. The harvest strategy will include additional trigger points and decision rules and processes which will guide management in all sectors of the CSF.

## **2.6 Compliance with threat abatement plans, recovery plans, domestic and international agreements**

The *Threat Abatement Plan 2006 for the incidental catch of seabirds during oceanic longline fishing operations* (TAP) applies to the Coral Sea Fishery. This TAP is closely linked to recovery plans for threatened seabirds caught on longlines and Australia's *National Plan of Action – Seabirds* prepared to meet Australia's commitment to the Fisheries and Agriculture Organisation *International Plan of Action for reducing the Incidental Catch of Seabirds in Longline Fisheries*.

Auto longline fishing operations are currently required to carry observers for one in every four trips. An auto longline permit holder with a vessel that has had 100,000 hook sets observed by an AFMA observer (in this and/or other domestic fisheries) and who has met the current longline fishing Threat Abatement Plan (TAP) requirements may apply in writing to AFMA to have observer coverage reduced to 1 in 8 trips, with a minimum coverage of at least 10% of hooks set annually.

Tori poles and streamers are compulsory for auto longline operations and deter birds from interacting with baits. AFMA recorded no infringements of these provisions in the 2006/2007 financial year.

The recovery of marine turtles is promoted through *The Recovery Plan for Marine Turtles in Australia*, 2003. Turtle exclusion devices have been required to be fitted to nets during trawl operations targeting crustaceans in the CSF. Observers are required on 1 in 4 trawl trips. No interactions with marine turtles have been reported. AFMA and DEW allowed a trial of trawling for crustaceans at depths exceeding 400 metres during 2007. Compulsory observer coverage was required and no interactions with marine turtles were observed.

### **3 Catch data (based on data no more than 2 years old)**

Catch data is collected for the CSF via logbooks. These are verified by a combination of catch disposal records and observer coverage for most sectors. Catch data for the CSF has been supplied to DEW for the purposes of this assessment. The small number of operators in the CSF prevents the public release of this data under current AFMA confidentiality policy.

#### **3.1 Total catch of target species (including retained and discarded catch)**

The Coral Sea Fishery targets a wide range of species on a largely opportunistic basis. As such, the distinction between target and non-target species is difficult to make. A comprehensive list of species recorded in Logbook data for the years 2005-2007 has been supplied to DEW for the purposes of this assessment. The data show at least 164 species have been caught. This data has not been included in this report due to privacy constraints.

Species encountered by the CSF and other fisheries are recorded in logbooks and appear in the data where quantities are greater than or equal to 1 kilogram. It should be noted that many species reported in the data are taken as bycatch by fisheries other than the CSF and may be discarded by these fisheries and also the CSF.

#### **3.2 Total catch of target species taken in other fisheries (if applicable)**

As for section 3.1

#### **3.3 Catch of byproduct species (reported by species)**

As for section 3.1

#### **3.4 Total catch of bycatch species (reported by species if possible)**

As for section 3.1

#### **3.5 Harvest by each sector (i.e. commercial, recreational, indigenous and illegal)**

All AFMA licensed vessels in the CSF must operate Integrated Computerised Vessel Monitoring Systems to allow AFMA to monitor their activity. There is no evidence of illegal harvesting by CSF or other fishing vessels.

A number of charter operators run recreational fishing trips into the CSF. The fishery is remote and consequently only a small number of recreational trips are run each year. Catch from these trips is thought to be small. Recreational Fishing in the area of the CSF is managed by Queensland.

Due to the CSF's distance from the coastline, the level of indigenous fishing in the CSF is thought to be minimal or non-existent. A project funded by the Fisheries Research and Development Corporation (FRDC) entitled the National Recreational and Indigenous Fishing Survey (Project No. 99/158) provided no additional information on indigenous fishing in the waters of the CSF.

#### **Commonwealth fisheries**

The Eastern Tuna and Billfish Fishery, Eastern Skipjack Tuna Fishery and the Southern Bluefin Tuna Fishery all overlap the Coral Sea Fishery area of waters. These fisheries operate pelagically targeting Tuna and Tuna-like species. All CSF concessions are prohibited from targeting or being in possession of Tuna or Tuna-like species. The Southern and Eastern Scalefish and Shark Fishery and Southern Squid Jig Fishery are adjacent to the southern bounds of the CSF, and the Torres Strait fisheries bound areas of waters to the north of the CSF.

#### **State fisheries**

A number of commercial fisheries exist in Queensland state managed waters adjacent to the western bounds of the CSF.

### Recreational fisheries

Recreational anglers fish in the same waters as occupied by the CSF. As the CSF lies some distance from the coast and outside the Barrier Reef, most recreational fishing is undertaken by charter fishing operators.

Recreational catch is relatively small and appears to be well managed by the Queensland state fisheries managers. AFMA is discussing with Queensland state fisheries managers the possibility of taking recreational catch into account when looking at the TAC for species caught in the CSF.

### 3.6 Effort data including information on any trends

Effort data for each CSF sector has been provided to DEW for the purposes of this assessment. The small number of operators in the CSF prevents the public release of this data under current AFMA confidentiality policy.

### 3.7 Spatial issues/trends

Two Marine Protected Areas (Coringa-Herald National Nature Reserve and Lihou Reef National Nature Reserve) exist within the bounds of the CSF and cover a total area of approximately 17,000 square kilometres. No commercial fishing is permitted in these reserves and management arrangements are in place to detect any illegal fishing in these waters.

Provisions are in place for the Trochus and Lobster and the Sea cucumber sectors which require fishing operators to move their mother-ship once a specified amount of quota or effort is reached. These measures help prevent localised depletion within the fishery.

Since July 2005 fishing permit holders targeting Sea cucumbers have been signatories to the *Memorandum of Understanding in relation to the Queensland Sea Cucumber Association for the Waters Under Australian Fisheries Management Authority Jurisdiction (2005–2008)*. This stipulates a 3-year rotational harvesting strategy for bêche-de-mer on 21 reefs within the Coral Sea. The conditions of this memorandum were incorporated into the permit conditions and management arrangements for the sector from 1 July 2006.

Auto-longliners must fish in waters deeper than 200m unless an observer is on board. If an observer is on board 50% of lines may be set shallower than 200m.

A Memorandum of Understanding (MoU) has been negotiated between the Coral Sea Fishers Association (CSFA) and the Cod Hole and Ribbon Reef Operators Association (CHARROA). Under the MoU, the CSFA has agreed not to hook fish within 2 km of particular reefs in the CSF (Osprey Reef, Bouganville Reef, Flora Reef, Dart Reef and Heralds Surprise reef) in order to preserve iconic species of importance to tourist operators. In addition, a circular area with 0.75 nautical mile radius around CHARROA moorings at Osprey Reef, namely North Horn and Admiralty Anchor is protected from all fishing of sharks, rays, potato cod, Maori wrasse, Queensland groper, anemones and anemone fish.

## 4 Status of target stock

### 4.1 Resource concerns

The 2006 BRS fishery status report for the CSF states:

*“Black teatfish, white teatfish, surf redfish, prickly redfish and other species of beche de mer uncertain, Aquarium fish sector, line-fishing and trawling sector, lobster and trochus sector uncertain”*

In 2002, an assessment examining logbook data and catch rates from 2000 and 2001 for a number of target species in the CSF sea cucumber sector showed a decline in the number of the higher valued Black teatfish, Prickly redfish and White teatfish. Following the assessment results and recommendations, AFMA reduced the annual TACs for Black and White teatfish to 1 tonne and 4 tonnes respectively in 2002. In addition, a rotational harvesting strategy was introduced in July 2005.

A five tonne ‘move on provision’ is also in place to limit the potential for localised depletion on reefs. Once five tonnes has been collected of any species or species combination, the mother-ship is required to move at least 15 nautical miles to a new anchorage (on the same reef or another reef).

These 'move on' provisions were incorporated into CSF permit conditions in July 2005 and allocate fishing effort (in days) according to reef size.

AFMA is developing a harvest strategy for the CSF for implementation in 2008. This harvest strategy may introduce additional trigger limits, 'move on' provisions and spatial management measures. These are planned to provide the opportunity for the fishery to expand in a controlled fashion.

#### **4.2 Results of stock assessments**

An assessment of logbook and catch data was performed for the Sea cucumber sector in 2002 and this led to the Total Allowable Catch limits (TACs) being reduced. There have been no other stock assessments undertaken in the CSF since this time. Management arrangements have established precautionary low level TACs for sea cucumber species of global concern.

Development of an indicator of stock status for the Sea cucumber sector (as recommended by DEW) is currently being considered with the Scientific Advisory Group HarvestSAG. Analyses of catch rates together with estimates of Sea cucumber habitat from recent reef mapping initiatives may be useful for estimating sea cucumber stock size and relative stock status in the CSF. This approach is currently being developed for the adjoining sea cucumber fishery in the Great Barrier Reef Marine Park.

#### **4.3 Results of stock recovery strategies**

AFMA introduced measures to recover stocks of certain bech-de-mer species in 2002. These measures included Total Allowable Catch limit (TAC) reductions and the introduction of a rotational harvest strategy to prevent localised depletion. The results of these measures have not yet been assessed.

The Commonwealth Harvest Strategy Policy under which the harvest strategy for the CSF is being developed specifies measures to be undertaken to prevent overfishing and recover overfished stocks to sustainable levels.

## **5 Interactions with protected species**

### **5.1 Frequency and nature of interactions**

Catch records for 2005/06 indicated that a small number of Sygnathids had been caught by hand collection methods. The logbook used was the same as that for adjoining Queensland fishery where Sygnathids are legally able to be taken. On investigation it was determined that records from the Queensland fishery had been confused with entries for the Commonwealth fishery. AFMA wrote to the relevant permit holders on 29 January 2007 advising them that Sygnathids are protected under the EPBC Act and cannot be taken in the CSF without authorisation from DEW.

Very little fishing is undertaken in the CSF and much of this activity utilises methods which are highly specific, such as hand collection. Trawl operations have been infrequent in the fishery and there are only 2 trawl permits. A small number of operators have undertaken regular line and trap fishing trips. Observer coverage applies to trawl, trap and auto longline operations. No interactions with protected species have been reported as part of these operations.

### **5.2 Management action taken to reduce interactions, and results**

Conditions attached to permits specify measures that must be undertaken by operators to avoid interactions with protected species. These include gear restrictions such as minimum net-mesh size on trawl permits, the use of Tori lines and other provisions aimed at avoiding interactions with sea birds on line permits, and requirements to report any interactions to AFMA, supported by AFMA observers.

Other than the Sygnathid records outlined in 5.1, no interactions with protected species in the CSF have been recorded from logbook data or Observer reports.

## 6 Impacts of the fishery on the ecosystem

### 6.1 Results of Ecological Risk Assessments

For the purposes of the Ecological Risk Assessment (ERA) fishing activities in the CSF were divided into 8 separate methods, and 8 separate ERAs were completed to Level 1 in 2006, involving qualitative assessment of risks. Subsequent assessments will evaluate the identified risks and develop measures to address these risks, where necessary. Level 2 of the assessment process is expected to be completed by 2008.

#### Level 1 Ecological Risk Assessment Results

##### Aquarium sub-fishery

Assessment was carried out using a species list which included Great Barrier Reef aquarium-collection species. The species list included species beyond the present CSF catches, in particular, coral and invertebrate species.

- translocation of species as a result of fishing activities was identified as a hazard within each of the 4 components assessed (target, TEP, habitat and community);
- anchoring/mooring was identified as a habitat hazard;
- other anthropogenic activities were identified as a habitat hazard; and
- other fisheries in the region identified as a community hazard.

##### Auto-longline sub-fishery

- Fishing capture was identified as a hazard to Target, Byproduct, Habitat and Communities components;
- Fishing activity without capture was identified as a habitat hazard, due to the nature of the gear set and the lack of regeneration information for tropical-water habitats.
- Gear loss without capture was identified as a hazard to species components, with Fishing Activity Reports (FAR) noting the regular occurrence of gear loss.
- Translocation of species was identified as a moderate hazard to Target, Byproduct and TEP components, and a major risk hazard to Habitat and Community components.
- Provisioning was identified as a hazard to the TEP component; and
- Gear loss impact, through the addition of non-biological material, was identified as a hazard to species components.

##### Demersal longline sub-fishery

- Fishing capture was identified as a moderate risk to all components;
- Fishing activity, both with and without capture, was identified as a habitat hazard, due to the nature of the gear set coupled with the lack of age, growth and regeneration information for tropical deep-waters habitats.
- Translocation of species was identified as a moderate hazard to Target, Byproduct, TEP and Communities components, and a major risk to the Habitat component; and
- Disturbing physical processes through the activities of fishing itself was assessed as a moderate risk to habitats.

##### Other line sub-fishery

- Fishing capture was identified as a hazard to all components. This is particularly important given the recent rapid increase in effort in this sector, and the concentration of effort in a limited set of fishing grounds. Coupled with the significant increase in effort for the Other Line sector in recent years, is a marked decline in CPUE, and an apparent shift in the species composition of the catch. These are strong indications that current effort levels may not be sustainable.
- Fishing activity without capture was identified as a habitat hazard, due to the nature of the gear set and the lack of regeneration information for tropical-waters habitats.
- Translocation of species was identified as a moderate hazard to Target, Byproduct, TEP and Communities components, and a major risk hazard to the Habitat component; and
- Discarding was identified as a hazard to the Byproduct and TEP components.

The need for species validation has also been highlighted as a future recommendation to ensure accuracy and value to logbook data, with the issues surrounding *Lutjanus malabaracus* of particular note to the Other line sub-fishery.

#### **Demersal trawl sub-fishery**

- Fishing capture was identified as a hazard to all components. There are indications that current effort levels may not be ecologically sustainable.
- Fishing activity, both with and without capture, was identified as a habitat hazard, due to the nature of trawl gear usage coupled with the lack of age, growth and regeneration information for tropical deep-waters habitats.
- Translocation of species was identified as a high risk hazard to Target and Byproduct components, and a moderate risk to the Community component; and
- Disturbing the physical processes through the activities of fishing itself was assessed as a significant risk to habitats.

#### **Demersal Finfish Trap sub-fishery**

- Fishing capture was identified as a hazard to Target, Byproduct, Habitat and Communities components.
- Fishing activity without capture was identified as a habitat hazard, due to the nature of the gear set and the lack of regeneration information for tropical-waters habitats.
- Translocation of species was identified as a moderate hazard to Target, Byproduct, and Communities components, and a major risk hazard to the Habitat component;
- Discarding was identified as a hazard to the Target and Byproduct components; and
- Provisioning was identified as a hazard to the Target and Byproduct component.

#### **Lobster & trochus sub-fishery**

- translocation of species as a result of hull or anchor fouling (moderate but uncertain impact on target and TEP species, habitats and communities)

#### **Sea cucumber sub-fishery**

- concerns about exploitation levels of several target species; and
- concerns about translocation of species from inshore areas via hull and anchor fouling to offshore areas, impacting species, habitats and communities.

## **6.2 Nature of impacts on the ecosystem**

Impacts identified by the various ERAs performed for CSF sub-fisheries included:

1. Translocation of species
2. Anchoring/mooring and other anthropogenic activities as a habitat hazard
3. Other fisheries in the region as a community hazard
4. Fishing activity with and without capture disturbing physical processes and impacting on habitats and target and byproduct species
5. Gear loss
6. Provisioning (providing food resources) for TEP and other species
7. Discarding as a hazard to target and byproduct species
8. Concerns regarding exploitation levels of certain species

## **6.3 Management action taken to reduce impacts, and results**

The Ecological Risk Assessment process is a three stage process. The first stage (Level 1) is a qualitative assessment which aims to identify all possible risks. The second stage (Level 2) aims to quantify the level of risk. Stage 3 (Level 3) develops models to test management options and mitigate identified risks.

The CSF has been assessed to Level 1, identification of all possible risks. Quantifying the level of risk (Level 2) is expected to be completed by 2008. The ERA process recognised numerous measures which AFMA are implementing which already mitigate risks identified in the first stage of the process.

These measures include a 3-year reef-rotational Memorandum of Understanding (MoU) for fishing exclusion on 5 specified reefs and an initiative to establish permanent moorings in high use areas.

## 7 Progress in implementation of recommendations and conditions resulting from the previous assessment of the fishery

### 7.1 Progress in implementing each recommendation and condition

All sectors of the CSF have been exempted from export restrictions under the *Environmental Protection and Biodiversity Conservation Act 1999*. The Sea cucumber sector has been given a Wildlife Trade Operation (WTO) status until 19 November 2007; all other sectors of the CSF are accredited until 19 November 2009.

AFMA reports its progress in implementing recommendations and conditions resulting from strategic assessments of the CSF to DEW biannually. The last progress report was provided to DEW in June 2007.

An outline of progress to date is provided below.

**Table 3.** Recommendations to the Australian Fisheries Management Authority (AFMA) on the ecologically sustainable management of the Coral Sea Fishery

Performance Criteria	Level of Achievement as at 30 June 2007	Deadline
1. AFMA to inform DEH of any proposed amendment to the management regime for the Coral Sea Fishery to enable DEH to evaluate any impacts on the ecological sustainability of the fishery.	Yes DEW has been advised of CSF management changes and has had an observer on the Stakeholder Committee.	Ongoing
2. AFMA to monitor and enforce compliance with spatial and temporal management measures for vessels operating in the fishery, particularly those in the aquarium sector where there is no move on provision or Integrated Computer Vessel Monitoring System (ICVMS) requirement in place.	Yes Each trip is being monitored. AFMA is not aware of any breaches. ICVMS will be required for all sectors from 1 July 2007.	Ongoing.
3. AFMA to ensure that catch information for the Aquarium sector of the fishery is collected on an ongoing basis to the lowest possible taxonomic level. Where possible, species level data is to be used to inform the ecological risk assessment of the CSF.	Yes Each trip is being monitored and when required. AFMA is discussing the level of data provided with operators following each trip and there has been some observer coverage to verify logbook data.	Ongoing.
4. AFMA to continue to cooperate with the Queensland Department of Primary Industries and Fisheries to pursue complementary management and research of shared stocks for all	Yes Recently developed collaborative measures with the scientific committees associated with the adjoining Qld fisheries. AFMA has attended Qld fishery meetings during 2007.	Ongoing

Performance Criteria	Level of Achievement as at 30 June 2007	Deadline
target and by-product species.		
5. AFMA to develop operational objectives and catch triggers for all target species in each of the CSF sectors by the end of 2006. Operational objectives and catch triggers for key by-product species or species groups to also be developed for the line, trawl and trap (trial) sectors by the end of 2006.	No AFMA is committed to implementing a harvest strategy framework. Catch triggers are expected to be implemented under the harvest strategy in 2008. Operational objectives and catch triggers are also being considered as part of the ERA process. A sub-group of stakeholders provided advice at a level one ERA workshops held in December 2005 and April 2006. The ERA for the CSF is scheduled to be completed by the end 2007.	December 2007
6. AFMA to implement management measures to avoid localized or serial depletion of vulnerable species of sea cucumber by the end of 2006.	Yes Sea cucumber operators have developed a spatial management approach for the sea cucumber sector. A rotational zoning plan has been implemented through license conditions. Issue being further considered as part of the harvest strategy development.	December 2007
7. Within 3 years, AFMA to develop an indicator of stock status for the sea cucumber sector and establish and implement an ongoing process to determine target species catch limits for the sea cucumber sector based on estimates of total stock size.	No Being addressed as part of harvest strategy development. Also to be discussed with HarvestSAG. Stock assessment would be prohibitively expensive for this low value fishery. Management arrangements have established low level TACs for more vulnerable species. Mechanisms for monitoring catch ratios and for estimating populations based on areas of suitable habitat are being assessed for use in this and the adjoining State fishery.	December 2007
8. AFMA to immediately commence monitoring of all catches including target, by-product and bycatch species or species groups in the line, trawl and trap (trial) sectors. AFMA to consider any trends in this catch information as part of the ecological risk assessment process and develop management responses as appropriate.	Yes Monitoring on a trip by trip basis. Trawl, trap and auto-longlining sectors include compulsory observer coverage for a proportion of the trips.	Ongoing
9. AFMA to develop objectives that take explicit account of fishery impacts on bycatch species, protected species and the ecosystem for the line, trawl and trap (trial) sectors by the end of 2006.	No AFMA's "Response to Ministerial Direction – CSF" includes objectives to minimise bycatch and manage the broader environmental impacts of fishing, including minimising interactions with threatened and	December 2007

<b>Performance Criteria</b>	<b>Level of Achievement as at 30 June 2007</b>	<b>Deadline</b>
Objectives that take explicit account of fishery impacts on the ecosystem to also be developed for the trochus and lobster, aquarium and sea cucumber sectors of the CSF by the end of 2006.	protected species. The CSF plans to develop a bycatch reduction workplan in 2007 in consultation with Stakeholders and the relevant Qld SAGs under AFMAs bycatch minimisation program. The broader environmental impacts of fishing, including minimising interactions with threatened and protected species, is expected to be addressed as part of the ERA process. Stakeholders have provided advice at an ERA workshop. The ERA for the CSF is scheduled to be completed by the end of 2007. Fishery impacts on the ecosystem for the hand collection sectors are being address in the ERA and harvest strategy.	
10. Within two years of completion of the ERA, AFMA to identify and implement appropriate management strategies to address/mitigate impacts identified through the ecological risk assessment of the CSF.	No The ERA has been completed to level 1. The level 2 ERA for the CSF is scheduled to be completed by the end of 2007.	2009

**Table 4.** The declaration on the sea cucumber sector of the fishery as an approved WTO is subject to the conditions in the following table

<b>Condition</b>	<b>Progress</b>	<b>Deadline</b>
Operation of the fishery will be carried out in accordance with the CSF Statement of Management Arrangements 2004/05;	Yes The fishery has been managed in accordance with the statement of management arrangements.	Ongoing
The Australian Fisheries Management Authority will inform the Department of the Environment and Heritage of any proposed amendment to the management regime for the CSF to enable DEH to evaluate any impacts on the ecological sustainability of the fishery.	Yes DEW advised of proposed amendments to the management regime.	Ongoing
Reports to be produced and presented to the Department of the Environment and Heritage annually, and to include: a) Information sufficient to allow assessment of the progress of AFMA in implementing the recommendations that relate to the sea cucumber sector of the CSF made in the Assessment of the CSF 2004 (Recommendations 1, 2, 4, 5,	Yes Status of sea cucumber reported in 2004/05 and 2005/06 Annual Reports. Objectives, performance measures and triggers have not been developed but are being further considered in the development of the harvest strategy. There has been no research undertaken in the sea cucumber sector of the CSF.	Ongoing

Condition	Progress	Deadline
6, 7 and 8); b) information regarding the status of the sea cucumber sector; c) a statement of the performance of the sea cucumber sector against stated objectives, performance measures and triggers once developed; and d) Research undertaken or completed relevant to the sea cucumber sector.		

## 7.2 How the measures implemented have improved the fishery

Integrated Computer Vessel Monitoring Systems (ICVMS) are now required for all vessels operating in the CSF. ICVMS allows improved monitoring of compliance with management arrangements and assists in data collection and verification.

Rotational harvesting measures and voluntary exclusion of fishing from certain reefs have also contributed to improve management arrangements in the CSF.

# 8 Research and Monitoring

## 8.1 Results of any research completed relevant to the fishery, including how results will be incorporated into management of the fishery

Research was undertaken on the Sea cucumber sector of the CSF in 2002. Following assessment of results and recommendations, AFMA reduced the annual TACs for Black and White teatfish to 1 tonne and 4 tonnes respectively in 2002. In addition, a rotational harvesting strategy was introduced in July 2005. A five tonne 'move on provision' has also been implemented into management arrangements to avoid localised stock depletion. These 'move on' provisions were incorporated into CSF permit conditions in July 2005 and allocate fishing effort (in days) according to reef size.

AFMA is developing a harvest strategy for the CSF for implementation in 2008. This harvest strategy may introduce additional trigger limits, 'move on' provisions and spatial management measures. It is expected that the harvest strategy will necessitate additional research and monitoring in the fishery.

## 8.2 Description of monitoring programs used to gather information on the fishery (such as observer programs, long term monitoring programs etc) and results of these

Catch disposal records are used to verify and monitor catches in all sectors (except Lobster and trochus) of the CSF.

Integrated Computer Vessel Monitoring Systems (ICVMS) are compulsory for all vessels operating in the CSF. ICVMS is used to monitor vessel operations.

Compulsory observer coverage applies for some permits (trawl, trap and auto line permits) and is applied on an opportunistic basis to others.

Future information needs for the fishery are being considered as part of the development of a harvest strategy for the CSF.

Collection of high quality catch-per-unit-effort (CPUE) data is being undertaken to enable spatially explicit density estimates for stocks in the CSF and to enable comparison of these estimates with adjoining fisheries along the Great Barrier Reef.

### 8.3 Results of collaborative research undertaken for the fishery

Coral Sea Fishery industry members have assisted with research into management regimes and monitoring of sea cucumber populations on the Great Barrier Reef. AFMA will utilise the assistance of industry members wherever possible in collecting information for development of spatial management arrangements and habitat mapping.

Collaborative arrangements recently established with the Queensland Scientific Advisory Groups are encouraging the development of consistent approaches and collaborative research.

## References

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