

# Annual status report 2010

## Coral Reef Fin Fish Fishery



Queensland Government

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## Fishery profile 2009–10

<p><b>Species targeted</b></p> <p>Coral trout (CT), redthroat emperor (RTE). Other coral reef fin fish species (OS) including cods, emperors and tropical snappers also retained.</p>	<p><b>Total number of commercial licences in 2009–10</b></p> <p>369</p>
<p><b>Total harvest from all sectors</b></p> <p>Approximately 4700 t</p>	<p><b>Commercial licences accessing the fishery in 2009–10</b></p> <p>250 (68% of licences)</p>
<p><b>Commercial harvest</b></p> <p>Approximately 1680 t</p>	<p><b>Fishery season</b></p> <p>Year round except two five-day spawning closures around the new moon in October and November each year.</p>
<p><b>Recreational harvest (2005)</b></p> <p>Approximately 2600 t</p>	<p><b>Fishery symbols</b></p> <p>RQ and either an L1, L2 or L3</p>
<p><b>Charter harvest</b></p> <p>Approximately 330 t comprising of approximately 80 t of CT, 80 t of RTE and 170 t of OS</p>	<p><b>Monitoring undertaken</b></p> <p>Daily compulsory commercial and charter fishery logbooks, structured line fishing surveys last undertaken in 2009, at-sea observing every three years, recreational fishing surveys every three to five years</p>
<p><b>Indigenous harvest (2000–01)</b></p> <p>Approximately 108 t</p>	<p><b>At-sea observer days monitored in 2009–10</b></p> <p>Nil. Line fisheries to be targeted in 2011</p>
<p><b>Commercial Gross Value of Production</b></p> <p>Approximately \$35 million</p>	<p><b>Accreditation under the EPBC Act</b></p> <p>Expires 4 November 2011</p>
<p><b>Allocation between sectors<sup>1</sup></b></p> <p>Significant recreational and commercial sectors with more limited Indigenous and charter sectors</p>	<p><b>Logbook validation</b></p> <p>Yes – completed in May 2006</p>
<p><b>Total exports</b></p> <p>The majority of the coral trout catch is exported live for approximately \$40/kg beach price with approx 5% sold domestically as whole or fillet. Most RTE and OS sold domestically.</p>	<p><b>Quota managed</b></p> <p>Yes, total allowable commercial catch is allocated through individual transferable quotas (ITQs) as specific entitlements for CT, RTE and OS.</p>

<sup>1</sup> There are no formal catch allocation arrangements for this fishery.

Key fish resources	Stock status
Coral Trout ( <i>Plectropomus</i> and <i>Variola</i> spp.)	Sustainably Fished
<p><b>Comments:</b> Catch decreased from 1110 t in 2008–09 to 922 t in 2009–10, possibly reflecting a delayed response to impacts following Tropical Cyclone Hamish in March 2009. Performance measures relating to catch, catch rate and mortality were not triggered. Long term monitoring data indicates good recruitment of two year olds to the fishery.</p>	
Redthroat Emperor ( <i>Lethrinus miniatus</i> )	Not Fully Utilised
<p><b>Comments:</b> Landings continue to increase annually, with 43% of available quota taken in 2009–10. A stock assessment conducted in 2006 estimated the population biomass to be around 70% of unfished biomass and indicated that the commercial TAC is set at an appropriate level. Performance measures relating to RTE catch and effort in both the commercial and charter fishery sectors were not triggered in 2009–10. Peak in recruitment in 2003–04 is still evident in the six year old fish in 2009–10 (see Figure 9).</p>	
Stripey Snapper ( <i>Lutjanus carponotatus</i> )	Sustainably Fished
<p><b>Comments:</b> Increased commercial landings from 20 t in 2004–05 to 65 t in 2009–10, which could be reflective of shifts in fisher targeting behaviour. Available length and age distributions for stripey populations in the Great Barrier Reef do not indicate any sustainability concerns (Heupel et al. 2009). This species is generally not susceptible to fishing tackle until they reach larger sizes, at which they are sexually mature. This species will continue to be monitored through the Performance Measurement System for the CRFFF.</p>	
Red Emperor ( <i>Lutjanus sebae</i> )	Uncertain
<p><b>Comments:</b> Commercial catch returning to levels reported prior to introduction of quota in 2003–04. Catch rate has remained relatively stable over past decade. Minimum size limit of 55 cm total length has been in place for seven years and should now be resulting in increased spawning biomass. Increased specificity in commercial logbooks implemented in 2007 will help to determine status, but more information is required on age structure and recreational catch.</p>	
Crimson Snapper ( <i>Lutjanus erythropterus</i> )	Uncertain
<p><b>Comments:</b> Commercial harvest is increasing to historical levels reported prior to the introduction of quota in 2003–04 (~20 t). There is some published information regarding lengths and mortality estimates from the Great Barrier Reef region from the late 1990s, however more age, sex and updated recreational catch information is required. Improved resolution of commercial catch is available in logbooks since 2007; however, the species is grouped with saddletail snapper in the current recreational fishing survey. Suspected increases in catch efficiency with increasing affordability of advanced technology (sounders, GPS, radar and sonar).</p>	
Saddletail Snapper ( <i>Lutjanus malabaricus</i> )	Uncertain
<p><b>Comments:</b> Commercial harvest remains about half that of pre-quota levels (~50 t). Similar to the crimson snapper, there is some published information from the same study for this species, but current biological information would assist in defining stock status. This species is also grouped with <i>L. erythropterus</i> in the current recreational fishing survey due to difficulty in species identification.</p>	

Key fish resources	Stock status
Moses Perch ( <i>Lutjanus russelli</i> )	No Assessment Made
<p><b>Comments:</b> Limited commercial catches. Updated estimates of recreational catches may assist in determining stock status. Updated estimates will be available in 2012 at the completion of the updated statewide recreational fishing survey.</p>	
Hussar ( <i>Lutjanus adetti</i> and <i>L. vitta</i> )	Uncertain
<p><b>Comments:</b> Commercial catches currently well below long term average for this species group (~20 t in 2009–10), while recreational catches are thought to be substantial. A recently published local biological study from the Great Barrier Reef (Heupel et al. 2009) does not indicate any concerns about the stock between 1995 and 2005. Updated estimates of recreational catches may assist in determining stock status in 2012 at the completion of the statewide recreational fishing survey.</p>	
Spangled Emperor ( <i>Lethrinus nebulosus</i> )	Uncertain
<p><b>Comments:</b> Catches returning to pre-quota levels recently (~60 t), with increases in some specific northern fishing grids. Although there are no current indications of sustainability issues, additional biological data and updated recreational catch information would assist in confidently assigning a status.</p>	
Tuskfish ( <i>Choerodon</i> spp.)	Uncertain
<p><b>Comments:</b> Catches returning to pre-quota levels recently (~23 t). There are no current indications of sustainability issues. The majority of tuskfish catch is recorded as Tuskfish–unspecified in the logbooks. The updated recreational catch estimate (in 2012) may assist in confidently assigning a status.</p>	

\* Note: These are outcomes arising from the Stock Status Assessment Workshop held in December 2010. Key species above were identified by Fisheries Queensland based on catch history and feedback from stakeholders and are referred to as key species within this document.

## Introduction

The Coral Reef Fin Fish Fishery (CRFFF) is a predominantly line-only fishery that targets a range of bottom-dwelling reef fish. It consists of a commercial sector, focussing primarily on live coral trout, and iconic recreational and charter sectors. The fishery operates predominantly in the Great Barrier Reef Marine Park (GBRMP) with operators generally using smaller tender boats (dories) from a mother vessel. A comprehensive suite of management arrangements, including an Individual Transferable Quota (ITQ) system, is in place for the commercial fishery to ensure its sustainability into the future.

This report covers the financial year from 1 July 2009 to 30 June 2010.

## Fishery description

### Fishing area and methods

Commercial operators with an RQ fishery symbol and who possess a line fishing endorsement in the form of an east coast 'L' fishery symbol (i.e. L1, L2, L3, and L8<sup>2</sup>) are permitted to take coral reef fin fish (RQ species, see Schedule Five of Fisheries Regulation 2008) in east coast Queensland waters. The line symbol they are operating under dictates the area in which they can fish (Figure 1).

Commercial and recreational fishers (including recreational fishers on licensed charter vessels) are permitted to use up to three lines, with no more than six hooks (total), using either a rod and reel or a handline. Recreational fishers may spear coral reef fin fish without the use of underwater breathing apparatus.

### Key Species

Coral trout refers to a group of seven species, including five *Plectropomus* and two *Variola* species. The common coral trout (*P. leopardus*) makes up the majority of landings. Common coral trout are found throughout the Great Barrier Reef (GBR) in waters to at least 100 m depth and are daytime predators. Peak spawning activity occurs in October and November

each year (Brown et al. 1994, Williams et al. 2007) but may vary depending on water temperature. Individuals change sex from female to male at a mean size of 42 cm, live for up to 18 years and reach up to seven kilograms and 80 cm in length. Individuals attain the minimum size limit of 38 cm at around two to three years of age; however, they display great variation in size at age (Ferreira and Russ 1994). A fish of 40 cm can be between three and 10 years of age. One genetic stock has been identified on the east coast of Australia (van Herwerden et al. 2009); however regional variation exists in various population parameters (e.g. timing of spawning and growth rates; Adams et al. 2000, Mapstone et al. 2004).

Redthroat emperor (*Lethrinus miniatus*) can attain a maximum of 65 cm in length, 4 kg in weight and 20 years of age. The GBR is home to a single stock of redthroat emperor (van Herwerden et al. 2003, Davies et al. 2006) but regional variation has been identified in several population parameters (Davies et al. 2006). This species has been found in waters to at least 128 m and is more common on the GBR south of Innisfail. Little is known about their movements and juvenile fish (smaller than about 17 cm) have not been seen. The majority of redthroat emperor change sex from female to male over a broad range of size and age, while others remain female their whole lives (Williams 2003, Sumpton and Brown 2004). Females reach maturity at around two years and 31 cm (Williams 2003).

Other species landed in this fishery exhibit a variety of biological and life history traits. The CRFFF management strategy includes monitoring of key OS species and conducting ecological risk assessments to identify species that may require further assessment and/or management attention.

### Main management methods used

Management of the CRFFF is the responsibility of Fisheries Queensland. A comprehensive set of input and output controls are in place under the Fisheries Regulation 2008 and the Fisheries (Coral Reef Fin Fish) Management Plan 2003 (the CRFFF management plan) to manage the harvest of coral reef fin fish.

These include:

- limited entry in the commercial fishery
- boat size and tender restrictions for commercial operators, and gear restrictions for all fishers

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<sup>2</sup> The L8 multi-hook Deep Water Fin Fish Fishery operates in waters deeper than 200 m and is reported separately by Fisheries Queensland. For information on this fishery, visit the Fisheries Queensland Annual Status Report webpage at [http://www.dpi.qld.gov.au/28\\_10916.htm](http://www.dpi.qld.gov.au/28_10916.htm)

- total commercial entitlements under RQ units are: CT – 1288 156 kg; RTE – 615 586 kg; and OS – 955 604 kg, however the CRFFF management plan requires a reduction in the value of CT and OS units if specified catch triggers are reached. This ensures that the total allowable commercial catches introduced in 2004 are not exceeded. There is no catch trigger specified for RTE because the entitlement under units issued does not exceed the TAC introduced in 2004
- commercial TACs allocated through Individual Transferable Quotas
- minimum and maximum fish size limits that apply to the recreational, charter and commercial sectors
- recreational in-possession limits for individual species
- combined recreational in-possession limit of 20 coral reef fin fish
- Seven coral reef fin fish are designated as ‘no-take’ species (barramundi cod, potato cod, Queensland groper, chinaman fish, hump-headed Maori wrasse, paddletail and red bass)
- two annual five-day spawning closures in October and November that apply to all fishers operating on the east coast between latitude 10° 41’S and 24° 50’S to the eastern boundary of the GBRMP.

The fishery is also subject to restrictions on areas in which it can operate through zoning declared under GBRMP and Queensland Marine Parks Zoning Plans.



Figure 1: Map of fishery area.

## Catch statistics

### Commercial

Commercial operators are required to complete daily catch and effort logbooks and must report catches of CRFF through the quota reporting system.

The quota reporting system requires fishers to call through prior reports (made before landing) and unload notices (made when unloading at wharf), as well as complete catch disposal records. Table 1 shows the reported catch (from unload notices) for the 2009–10 quota year and the percentage of available quota<sup>3</sup> used for the period.

Table 1: Percentage of available quota used for CT, RTE and OS in the 2009–10 financial year (Source: Fisheries Queensland quota monitoring unit, 16 November 2010).

Quota group	Total catch	% of available quota used
CT	1 028 291	80
RTE	267 105	43
OS	554 195	57

Annual commercial catch and effort information for the CRFFF has historically been variable in response to changes in management arrangements. Significant decreases in both catch and effort occurred in 2003–04 and again in 2004–05 (Figures 2, 4 and 5). These decreases reflect management changes that were implemented in 2003 and 2004 including the introduction of the CRFFF management plan which required operators to hold an RQ fishery symbol and ITQ units to fish in the CRFFF; and the GBRMPA Representative Areas Program (RAP).

From 2003–04 catch and catch rate (catch per unit effort or CPUE<sup>4</sup>) of CT increased steadily until 2009–10 when the first decline since the introduction of quota was recorded (Figure 2). This decline is likely related to delayed effects of Tropical Cyclone Hamish which traversed offshore reefs between Bowen and the Swains reefs region in March 2009. Immediately following the cyclone the CRFFF responded to the

<sup>3</sup> Percent of available quota is calculated by dividing the landings (unload notices) by the allocated quota minus the SEWPac holdings which are not fished

<sup>4</sup> CPUE refers to logbook reported days fished divided by total catch of that species in kilograms or tonnes.

impact with geographical shifts in fishing effort, mainly to unaffected areas north of Bowen (see DEEDI 2010).

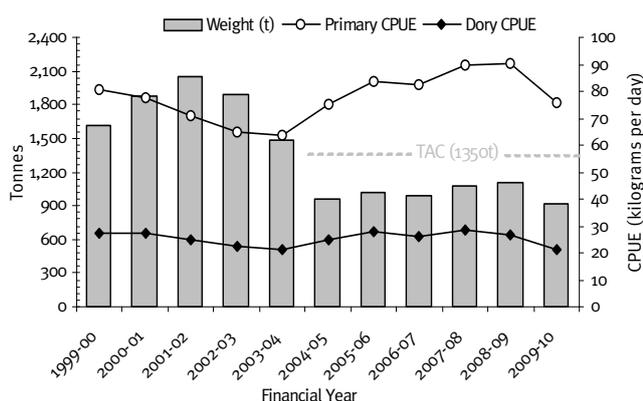


Figure 2: Total commercial catch and catch rate (days and dory days) of coral trout by quota year between 1999–00 and 2009–10 (Source: CFISH database, 16 November 2010).

Monthly catch rates of CT from November 2009–10 were lower than all other post-quota years (Figure 3). This represents around an eight month delay between the cyclone and reduced catch rates experienced in the fishery as a whole. This suggests that the fleet’s movements around the state to fish other areas was effective in maintaining catch rates in the short term, though some decreased return in the longer term. An FRDC funded project “Adapting to change: Minimising uncertainty about the effects of rapidly-changing environmental conditions on the Queensland coral reef fin fish fishery” (2008/103) was completed through the James Cook University to ascertain early effects of the cyclone on the fishery (Tobin et al. 2010; see Effects of Tropical Cyclone Hamish below).

Fishery wide recovery to pre-cyclone CPUE had not been established by the end of the 2009–10 financial year (Figure 3).

The catch of RTE increased to around 267 t, or 43% of available quota in 2009–10 (Table 1). Logbook estimated landings of RTE showed a slight increase in catch and catch rate in 2009–10 (Figure 4), however the commercial quota remains significantly undercaught. This is likely due to the relatively low value of RTE (compared with coral trout) and the lower market demand.

A stock assessment completed in 2006 indicated that the population of RTE was at approximately 70% of unfished biomass, suggesting a healthy stock remained. Fishing pressure since 2006 is not considered to have been sufficiently high to alter the conclusions of the assessment.

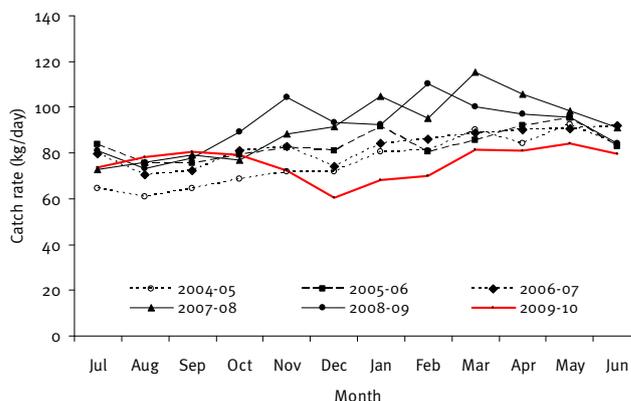


Figure 3: Monthly CPUE of coral trout landings from 2009–10 compared to the previous five years displaying 2009–10’s (red) lower catch rate compared to all previous years. (Source: CFISH database, 16 November 2010).

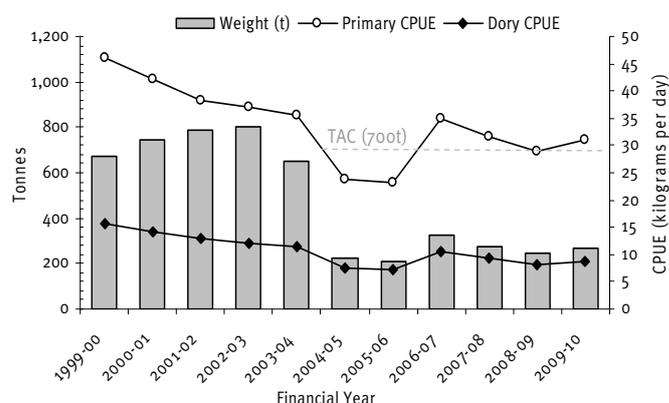


Figure 4: Total commercial catch and catch rate (days and dory days) of redthroat emperor by quota year 1999–2010 (Source: CFISH database, 16 November 2010).

The catch of ‘other species’ (OS) remained at around 541 t (57% of available quota) in 2009–10 (Table 1) after showing continual annual increase since quota introduction (Figure 5). Of the key OS species only landings of stripey snapper increased by more than 20% to 65 t (44% increase) however, several key OS categories also increased by more than 20% including sweetlip, tuskfish and jobfish unspecified by 6 t (58%), 22 t (51%) and 7 t (30%) respectively (Table 2).

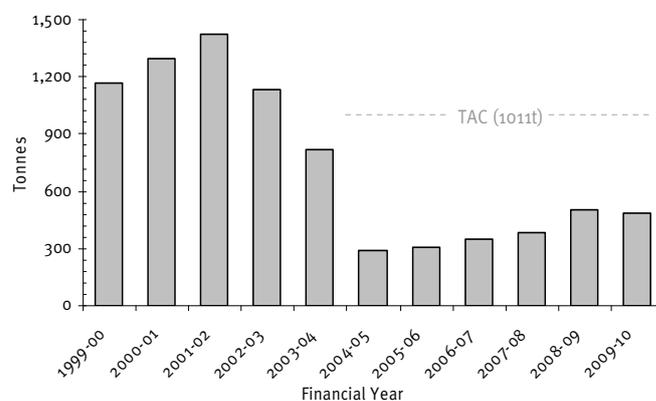


Figure 5: Total commercial catch of other species (OS) by quota year 1999–2010 (Source: CFISH database, 16 November 2010).

Table 2: Breakdown of the major 'other species' (OS) component (in kilograms) caught in the CRFFF since 2003–04. \* Indicates a key OS species as identified and monitored in the PMS (source: Fisheries Queensland CFISH database, 16 November 2010)

Common Name	2003–04	2004–05	2005–06	2006–07	2007–08	2008–09	2009–10
*Bar Rockcod	13 576	1480	3 668	944	25 902	37 952	17 337
*Cod - unspecified	41 013	22 175	27 580	21 993	23 422	36 984	21 919
*Red Emperor	104 307	26 267	27 937	29 405	42 511	57 680	59 999
*Spangled Emperor	37 118	12 334	11 625	16 170	30 306	56 855	66 121
*Hussar	40 424	16 260	14451	18 996	22 988	26 578	24 280
* Goldband Snapper	33 209	30 856	28 003	41 407	45 390	47 151	51 866
Green Jobfish	752	993	782	472	3 140	5 159	5 492
Rosy Snapper	36 863	2 211	6 054	4 778	7 108	16 109	5 490
* Jobfish - unspecified	11 827	23 080	34 848	30 337	10 743	5 070	6 568
*Saddletail Snapper	61 125	7 620	13 660	9 732	27 043	65 230	50 974
*Crimson Snapper	17 577	1313	820	950	10 067	20 141	20 279
*Nannygai - unspecified	9 423	13 961	14 644	18 469	2 811	135	99
Moses Perch	555	1 403	1 523	1 740	2 208	2 726	2 671
*Stripy Snapper	4 168	21 349	24 221	30 813	53 501	44 878	64 753
* Sweetlip - unspecified	19 109	21 149	24 815	25 881	13 496	7 602	13 075
* Tuskfish - unspecified	23 009	13 566	12 163	13 610	13 852	14 216	21 534
*Venus Tuskfish	1 724	1 324	2 225	2 964	1 183	983	1 796

## Recreational

Fisheries Queensland undertakes recreational fishing surveys to estimate catch, effort and participation by recreational fishers. Participation rate is measured through a telephone survey and catch and effort are recorded in recreational fishing diaries over a 12 month period (refer to the Annual Status Report 2007 for CRFFF previous figures and catch statistics). Fisheries Queensland commenced a state-wide Recreational Fishing Survey in July 2010. This survey will provide updated estimates of participation, catch and effort. The results will be available in mid 2012. For more information refer to [http://www.dpi.qld.gov.au/28\\_18273.htm](http://www.dpi.qld.gov.au/28_18273.htm)

## Charter

A significant proportion of the Queensland charter sector targets CRFFF species. In 2009–10 there were 418 charter licences of which 205 (49%) fished RQ species.

The compulsory logbook program for charter operators was introduced in 1996. In 2009–10, a total of 8 537 charter boat days were spent fishing for RQ species, similar to the previous year (8 660 days).

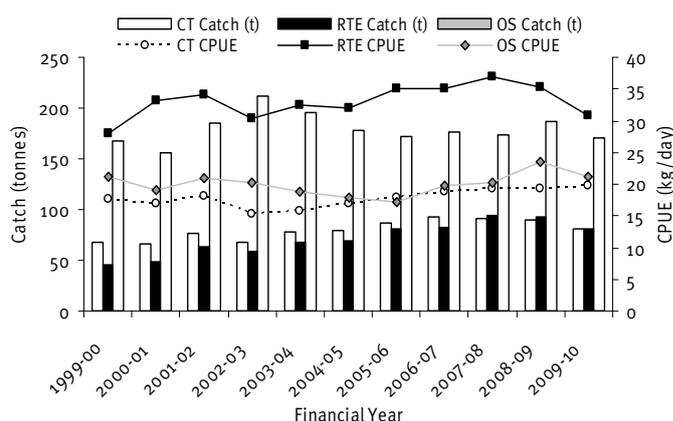


Figure 5: Charter catch of CT, RTE and OS species as reported in logbooks by financial year, 1999–2010 (Source: CFISH Database, 16 November 2010).

Logbook reported catch indicates that of the reef species caught during charter operations, OS species catch is historically double that of the CT and RTE catch (Figure 5). Charter catches of CT, RTE and OS all decreased in 2009–10 from the previous year. The charter catch rate of CT increased marginally, but catch rates of RTE and OS declined. These trends may reflect impacts of Cyclone Hamish and Fisheries Queensland will continue to monitor the situation.

## Indigenous

Limited information is available on the total catch of CRFF by Indigenous fishers. The National Recreational and Indigenous Fishing Survey did provide some

preliminary information, indicating that approximately 7 000 coral trout, 38 000 snappers, 9 000 emperors, 12 000 cods and 9 000 wrasse/groper were taken by Queensland Indigenous communities in 2000–01.

Based on the same weight conversions as those used for the recreational catch, this equates to approximately 108 t.

### Spatial issues / trends

Approximately 95% of reported commercial catch of CRFF is taken from areas within the GBRMP. For the 2009–10 period the catch of CT was high in grids throughout the extent of the GBR east and north of

Shoalwater Bay (Figure 6). The catch of RTE was highest in the central section between Townsville and Mackay but also extended north to approximately 15° of latitude (Figure 6). High catches of OS recorded in the southern regions were driven by catches of deep water bar rockcod (*E. ergastularius* and *E. octofaciatus*), while in the Mackay region, were driven by goldband snapper (*Pristipomoides multidentis*). In the north, high catches comprised of spangled emperor (*Lethrinus nebulosus*) but also red emperor (*Lutjanus sebae*), saddletail snapper (*Lutjanus malabaricus*) and stripey snapper (*Lutjanus carponotatus*) (Figure 6).

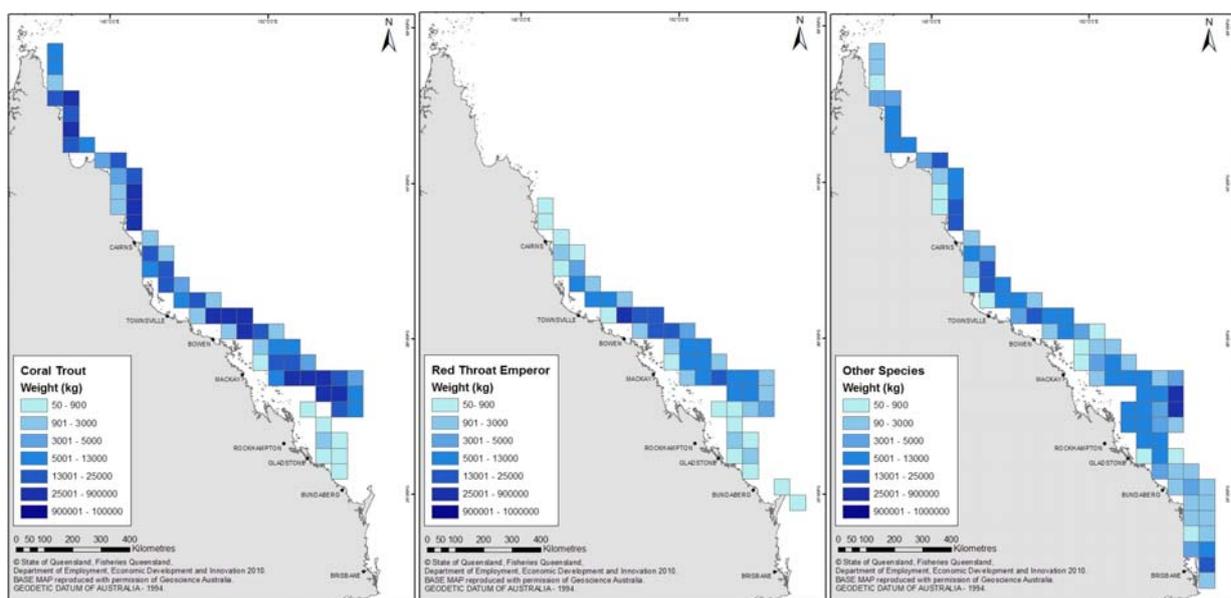


Figure 6: Catch of CT, RTE and OS in 2009–10 (Source: CFISH database, 16 November 2010).

### Effects of Tropical Cyclone Hamish

The 2009 CRFF Annual Status Report reported on effort shifts away from affected areas in response to Tropical Cyclone Hamish in March 2009 (DEEDI 2010). Tobin et al. (2010) report on the effects of three tropical cyclones on the CRFF industry including a decrease of around a third in catch rates of CT and RTE in the most heavily affected regions. The effects on catch and catch rate of CT and RTE in the months following the cyclone were somewhat masked by effort shifting into northern areas not impacted by the cyclone. However, by December 2009 catch rates of coral trout showed fishery-wide reductions (Figure 3). The Tobin et al. (2010) analysis identifies depressed catch rates in affected areas following cyclones for a duration of between 12 and 24 months, a trend which is reflected in Figure 3.

A number of possible measures to mitigate the impacts of such events in the future are discussed in Tobin et al. (2010).

### Socio-economic characteristics and trends

The price obtained for CRFF depends on the species, product form (e.g. live, fillet, whole dead, trunked) and appearance (colour). High prices are fetched on the export market for top quality live CT, which have dominated the product form of harvested CT since mid 1990's. While whole dead CT make up about 10% of the landed product, live fish have accounted for 85–90% of reported product since 2004–05 and fetch approximately four times that offered for filleted product. The beach price of live CT ranged from between \$33–60/kg in 2009–10, depending on the time of year, for fish between 0.8–1.2 kg in weight. Whole or filleted RTE and OS attract around \$6–12/kg

depending on species and product form, resulting in less targeting of RTE and OS and comparatively lower quota utilisation.

Landed OS and RTE are almost totally focused on the domestic market and sold as either whole fish (80–90%) primarily targeted to the restaurant trade, or fillet (10–20%). Anecdotally, the domestic market prefers the product to be in the fillet form, placing it in direct competition with cheaper imported product.

Parity of the Australian dollar may further constrain coral trout export prices in the future; however, in 2009–10 beach prices have remained relatively strong.

The Commercial Fisheries Development Unit, a new initiative within Fisheries Queensland, has developed a draft Reef Line and Spanish Mackerel Industry Development Plan in consultation with industry. Comments on the draft have been received and are currently being incorporated to be released in 2011. Key issues identified in the plan include the need for:

- a common vision across industry for improved effectiveness in working with government on priority issues;
- development of strategies to manage business risks (such as the effect of natural disasters);
- issues such as labour supply, skills and retention; infrastructure shortfalls; increased marketing and promotion of Queensland seafood to be addressed;
- an increase in the domestic market and demand for OS to increase the value of the product thereby improving the viability for local industry;
- provide greater security on property rights (fishing rights);
- review the Quota Reporting System to identify unnecessary hindrances and increase it's flexibility.

## Biological and ecological information

### Monitoring programs

Fisheries Queensland has collected fishery independent data on CRFF using structured line fishing surveys since 2005–06, based on similar methods to that developed by the historical (1995–2005) Effects of

Line Fishing Program (Mapstone et al. 2004). The objectives of the monitoring program are to determine annual trends in abundance, mortality, length and age structure of CCT, RTE and the abundance and length structure of other species in regions within which the fishery operates. This data helps assess the status of the stocks and report against fishery performance measures.

Estimated rates of total mortality ( $Z$ ) of common coral trout were consistent over the two years assessed, while some variation is shown by RTE in 2008 when sample numbers were low (Figure 8).

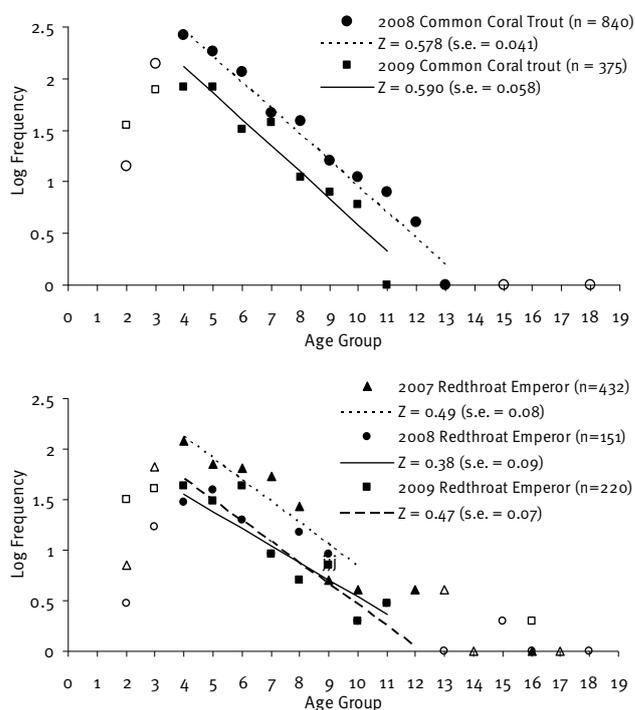


Figure 8: Rate of mortality of CCT and RTE, estimated by age-based catch curve analysis. Data shown for the 2007–08, 2008–09 and 2009–10 financial years for redthroat emperor and for 2008–09 and 2009–10 financial years for common coral trout. Shaded symbols identify data points used to estimate total mortality ( $Z$ ). Unshaded symbols identify data points not required for calculation of  $Z$ <sup>5</sup>. Only Townsville and Mackay Regions surveyed in 2009. (Source: Fisheries Queensland LTMP Database, 22 November 2010).

Age data collected for RTE shows persistence of a strong cohort (age group 4 in 2007–08) indicating fishing pressure is not sufficient to reduce this strong cohort to a level where it is not detectable (Figure 9). Also, recruitment of young coral trout (age group 2) in 2009–10 is greater than that observed in 2008–09 (Figure 10).

<sup>5</sup> For a copy of the decision rules used in the PMS calculations, please contact the Business Information Centre on 13 25 23.

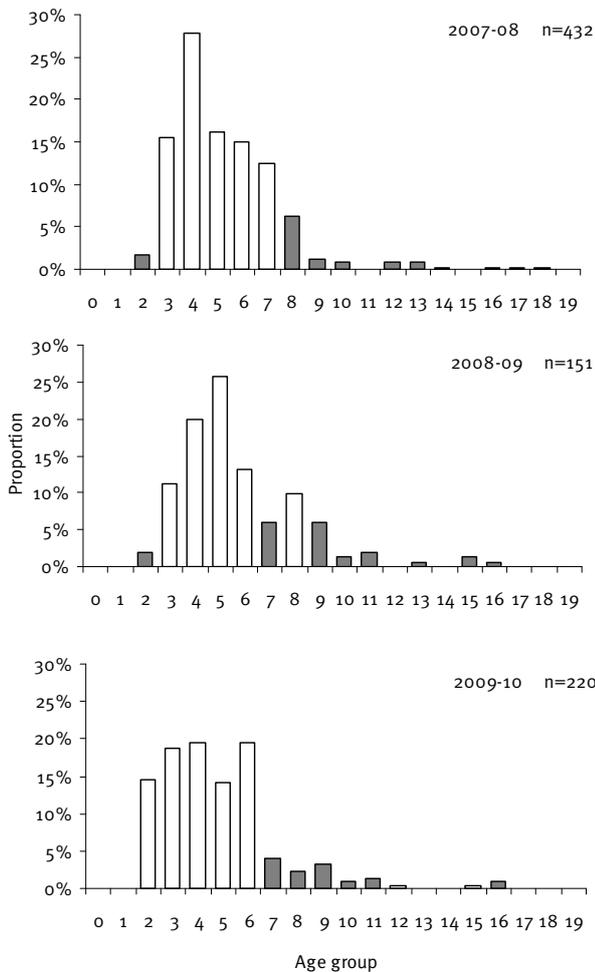


Figure 9: Age frequency of redthroat emperor sampled during fishery-independent surveys between 2007–08 and 2009–10 (Source: Fisheries Qld LTMP database, 23 November 2010).

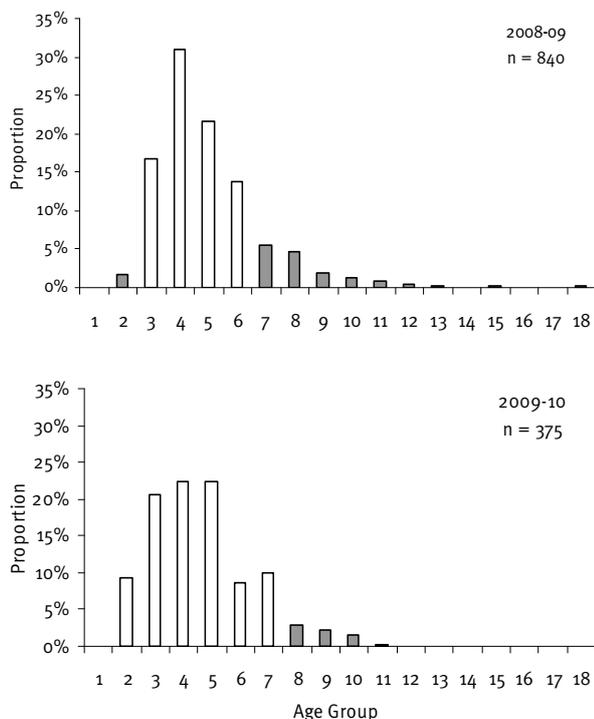


Figure 10: Age frequency of common coral trout sampled during the fishery-independent surveys in 2009–10 (Source: Fisheries Qld LTMP Database, 23 November 2010).

## At-sea observing

In 2009–10 there were no Fisheries Observer Program (FOP) trips conducted within the CRFFF. For results reported previously, see the CRFFF 2006–07 Annual Status Report. East coast line fisheries have been identified for observation in 2011 with a particular emphasis on those boats that target OS. A provisional 150 days-at-sea has been assigned to the line fisheries.

## Bycatch

Bycatch information will be collected by the FOP during 2011. Results will be reported in the 2012 annual status report.

## Interactions with protected species

There was no reported interaction with any protected species by this fishery in 2009–10, reinforcing that the impact of this fishery on species of conservation interest is very low.

## Ecosystem impacts

Line fishing is a selective harvesting technique and this limits the potential impacts on species other than the targeted fishery species. Mapstone et al. (2004) identified difference in the number, size and age of the target species coral trout and redthroat emperor in areas under differing fishing pressure. Removal of top order predators through fishing can impact on the broader ecosystem function. Although this has been observed overseas this does not appear to be an issue in the CRFFF (Mapstone et al. 2004) with potential impacts minimised by the management arrangements in place.

Climate change continues to be an issue for coral reef ecosystems and is becoming an increasingly important topic for current and future research. Climate change has been linked to increases in the number and extent of coral bleaching events (see Hoegh-Guldberg et al. 2007) and changes in ocean chemistry. These events also have the potential to impact on the replenishment rates of coral reef fin fish populations (Hughes 2010), individual growth rates and spawning output (Johnson and Welch 2010).

## Sustainability Assessment

### Performance against fishery objectives

The Performance Measurement System (PMS) functions as a reporting framework that is a transparent,

defensible set of criteria for evaluating the performance of the fishery against management objectives. Within three months of becoming aware that a measure has been triggered the department will carry out a process of investigation. If a particular measure requires further investigation and explanation, Fisheries Queensland, in collaboration with a stakeholder based advisory group will finalise clear and appropriate management responses.

In late 2009 the PMS for the CRFFF was reviewed resulting in more robust performance measures, which also saw the removal of economic and ecosystem measures that were not believed to be effectively monitoring fishery performance. Fisheries Queensland will continue to improve this PMS in the future by incorporating all available information to report against ecological, economic and social performance of the fishery. The CRFFF outcomes for 2009–10 are outlined below.

In January 2010 Fisheries Queensland became aware of three performance measures that were triggered during the 2008–09 season. Responses to these triggers are as follows.

#### *Final response from 2008–09 triggered performance measures*

- As per the Other Species review event (v). The catch of a relevant group of OS increases by >20% since 2007–08.

This is attributed primarily to improved reporting following introduction of the LFO5 logbook on 1 July 2007; and the return of some OS species catches to pre-quota levels. The LFO5 logbook provides greater species specific reporting capacity. Reductions have subsequently been seen in the reporting of ‘unspecified’ species categories.

Fisheries Queensland is aware that over the past few years there has been substantial investment into mechanical line fishing apparatus which is used to target OS in deep water habitats. Research is being targeted at this type of fishing in 2011 (see Research section).

- As per the Economic review event (i). The proportion of the available TAC landed for RTE (39%) and OS (57%) was less than 80%.

Since the inception of the quota management system

in 2004–05, OS and RTE quotas have consistently been under-caught. Over this period the under-catch of quota has been attributed to various economic and social factors rather than to low stock levels. The Fisheries Queensland Industry Development Unit, established in 2009, is looking at fishery viability including uptake of under utilised quota.

- As per the Social review event (i). Compliance within the commercial fishery fell below 95%

Compliance was reported at 94.4%, marginally below the limit, and may reflect more focused inspections by the QBFP based on gathered intelligence rather than increases in activity counter to the *Fisheries Act 1994*.

Two performance measures, increased catch of other species, and the socio-economic measure were triggered in 2009–10 (Table 3). Within the next three months, Fisheries Queensland will carry out a process of further investigation into the triggers, and, where appropriate, develop in collaboration with stakeholders an appropriate management response.

## **Current sustainability status and concerns**

The CRFFF is managed through one of the most comprehensive quota systems in place in Australia. The current management framework allows for continual refinement and improvement to ensure an ecologically sustainable fishery. Modern fisheries monitoring tools are employed and regularly reviewed including a PMS, a Stock Status Assessment Framework, Ecological Risk Assessments (ERAs) for the non-primary target species, and a Management Strategy Evaluation (MSE) (see Little et al. 2009).

The current stock status assessment considers coral trout as ‘sustainably fished’. No formal resource assessment has been undertaken for this species. It is proposed that a stock assessment module for the common coral trout will be developed and run on the simulated populations produced by Management Strategy Evaluation (MSE) software ELFSim, with the outcomes used to enhance management of the fishery and tailor the collection of fishery data in order for stock assessments to be conducted in future. The enhancement of ELFSim will be trialled in lieu of traditional stock assessment methods, which are not considered optimal for assessing spatially complex fisheries such as the CRFFF, to potentially provide a

greater certainty in the sustainability of the fishery.

Funding is currently being sought for a project aimed at evaluating candidate monitoring strategies, assessment procedures and harvest control rules in the fishery. The outcomes of this project will contribute to the development of a stock assessment module.

Redthroat emperor stocks remain underutilised with landings around 43% of the available TAC. A stock assessment in 2006 indicated the population level is about 70% virgin biomass, well above the trigger point level set at 40%. This assessment was due to be rerun in 2009 however, due to under catching of quota, other higher priority work was conducted instead.

Data limitations have resulted in the status of many species under 'other species' remaining uncertain. Information pertaining to recreational harvest estimates will improve for some species in 2012, with

the completion of the current statewide recreational fishing survey.

While landings of OS remain well under the TAC, catches of some species have returned to pre quota harvest levels. Catch levels of individual species are being closely monitored by Fisheries Queensland through stock status workshops, ecological risk assessments, performance measurement systems, and routine monitoring of reported catch.

In 2009–10 there was a reduction in landings and catch rates in the deep water habitats for cod species. Fisheries Queensland is currently investigating the uptake of gear technologies, including mechanical reel gear, in the state's waters. This is the target of current research being undertaken by DEEDI (see Research section).

Table 3: Performance measures and outcomes for the CRFFF in 2009–10.

Performance measure	Performance												
<i>Target species</i>													
(i) Annual standardised catch rate for coral trout and redthroat emperor falls below 90% of the average standardised catch rates of all preceding quota years.	<i>Not triggered</i> In 2008–09, the standardised CT and RTE catch rate was higher than the historical average catch rate since quota was introduced in 2004–05 (see Figure 11a, b). As the Version 2 of the CRFFF PMS is in final stages of completion, an updated estimate for 2009–10 has not yet been conducted, but will be available in the next annual status report for the fishery.												
(ii) Annual standardised catch rate for coral trout and redthroat emperor by region falls below 90% of the average standardised catch rates of all preceding quota years.	<i>Not triggered</i> In 2008–09, the standardised CT and RTE catch rate was higher than the historical average catch rate since quota was introduced in 2004–05 (see Table 4). Updates to 2009–10 will also be conducted next year.												
(iii) Total mortality (Z) exceeds 2 times estimate of natural mortality (M) for coral trout and redthroat emperor.	<p><i>Not triggered</i></p> <table border="1"> <thead> <tr> <th>Species</th> <th>Z ± s.e.</th> <th>M</th> <th>2M</th> </tr> </thead> <tbody> <tr> <td>Common Coral Trout</td> <td>0.59±0.06</td> <td>0.45</td> <td>0.90</td> </tr> <tr> <td>Redthroat Emperor</td> <td>0.47±0.07</td> <td>0.40</td> <td>0.80</td> </tr> </tbody> </table> <p>Total mortality of both CT and RTE is below estimates of 2M. The estimate of natural mortality (M) for RTE is based on the Leigh et al. (2006) stock assessment. The estimates of M for CT are based on the estimate used by Little et al. (2008) from age-based catch curves.</p>	Species	Z ± s.e.	M	2M	Common Coral Trout	0.59±0.06	0.45	0.90	Redthroat Emperor	0.47±0.07	0.40	0.80
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Common Coral Trout	0.59±0.06	0.45	0.90										
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Performance measure	Performance																								
(iv) The estimate of exploitable biomass of redthroat emperor falls below 40% of the estimated virgin biomass.	<i>Not triggered</i> Exploitable biomass of RTE is around 70% as per the last stock assessment in 2006. Fisheries Queensland considers that fishing pressure since 2006 has not been sufficient to reduce stock size.																								
(v) There is a 20% decrease in charter catch between consecutive years, or a decrease of 10% in each year over three years for coral trout, redthroat emperor or key OS species.	<i>Not triggered</i> There was no significant decrease in the catch of coral trout, redthroat emperor or key OS species in the charter sector in 2009–10.																								
(vi) The catch (>2 t) of key OS species in a quota year is at least 20% higher than the preceding quota year.	<i>Triggered</i> Stripey landing increased to 65 t (44% increase) in the 2009–10 financial year with 39% of this increase coming from north of Princess Charlotte Bay, 26% from the Townsville area, and the remainder spread throughout the state north of Rockhampton. Three key OS categories identified in the PMS document increased by more than 20%, including sweetlip unspecified (by 6 t, up 58%), tuskfish unspecified (by 22 t, up 51%) and jobfish unspecified (by 7 t, up 30%).																								
<i>Bycatch and protected species</i>																									
(i) Observer information shows the amount of discards (including undersized target species) exceeds 10% of the total catch taken by commercial fishers with a RQ fishery symbol when targeting coral reef fin fish (by numbers of fish).	<i>Not measured</i> The next observer surveys focused on line fisheries will be conducted in 2011.																								
(ii) Percentage of each category of protected species released alive falls below 90%.	<i>Not triggered</i> No interactions recorded this year.																								
<i>Ecosystem impacts</i>																									
(i) The Shannon-Wiener index for a bioregion shows a decrease of at least 10% in each consecutive year over three years <u>OR</u> decreases by 20% from the preceding quota year.	<i>Not triggered</i> <table border="1"> <thead> <tr> <th rowspan="2">Year</th> <th colspan="4">Bioregion</th> </tr> <tr> <th>Cairns</th> <th>Townsville</th> <th>Mackay</th> <th>Swains</th> </tr> </thead> <tbody> <tr> <td>2007</td> <td>- 0.4</td> <td>+ 0.8</td> <td>+ 1.9</td> <td>- 4.3</td> </tr> <tr> <td>2008</td> <td>- 4.9</td> <td>- 9.2</td> <td>+ 2.9</td> <td>+ 6.7</td> </tr> <tr> <td>2009</td> <td>N/A</td> <td>+ 16.1</td> <td>+ 4.1</td> <td>N/A</td> </tr> </tbody> </table> <p>Percent change from the previous year.</p>	Year	Bioregion				Cairns	Townsville	Mackay	Swains	2007	- 0.4	+ 0.8	+ 1.9	- 4.3	2008	- 4.9	- 9.2	+ 2.9	+ 6.7	2009	N/A	+ 16.1	+ 4.1	N/A
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2009	N/A	+ 16.1	+ 4.1	N/A																					
<i>Social</i>																									
(i) That the rate of compliance falls below 92.5% in the commercial fishery and/or 92.5% in the recreational fishery.	<i>Triggered</i> Of 534 commercial fishery inspections, a 90.6% compliance rate was achieved while a 95.9% compliance was achieved in the recreational fishery from over 3800 inspections.																								

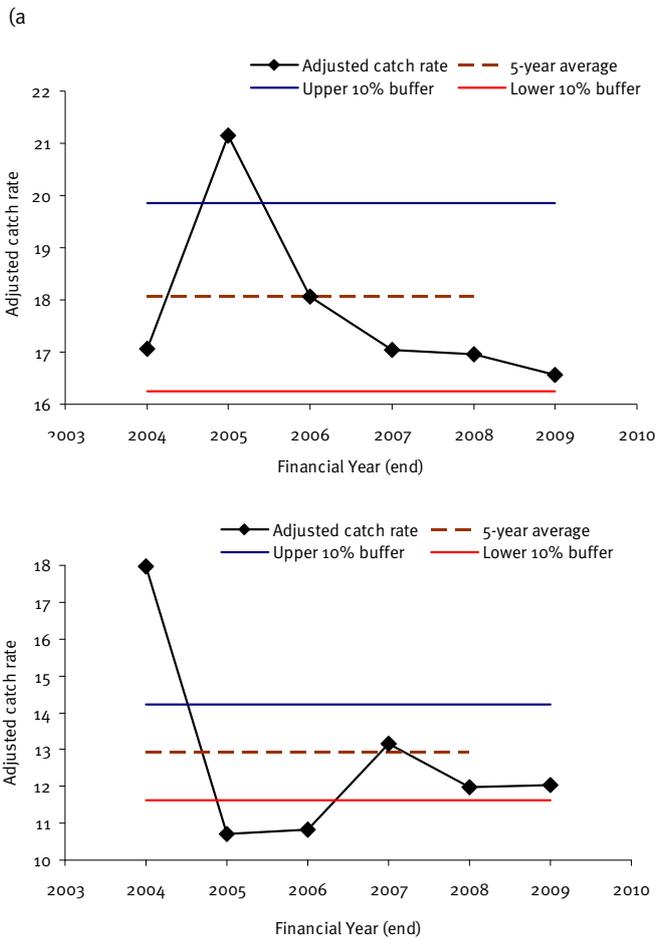


Figure 11: Standardised (adjusted) catch rate for a) coral trout and b) redthroat emperor for the whole fishery 2004–05 to 2008–09. This performance measure was not triggered (i.e. between the upper and lower buffer limits). Updated estimates for 2009–10 and 2010–11 will be available in next years report.

## Research

Since 2008, Fisheries Queensland has been monitoring increases in catch and effort of deep water cod species. Advances in mechanical gear technology has enhanced the ability of fishers to target these species, which has potential risk to sustainability of the large, longer lived species of cod. Fisheries Queensland is undertaking research funded by FRDC in 2011 to facilitate the development of an Ecological Risk

Assessment of target deep water species. This research will include collection of biological data by the Fisheries Observer Program and surveys with fishers to determine the extent of changes to fishing gear over time and potential impacts.

A suite of research projects with potential benefits to our understanding of the CRFFF, reef fish population

dynamics and broader coral reef ecosystems were undertaken through the Australian Government's four year Marine and Tropical Sciences Research Facility (MTSRF) program which commenced in 2006. There is a continued focus on effects of climate change and resilience of coral and reef fish communities to potential environmental shifts within the MTSRF research. Key projects producing outputs in 2010 are outlined below and the reader is referred to the Reef and Rainforest Research Centre website ([www.rrrc.org.au](http://www.rrrc.org.au)) for more information.

*Resilience and connectivity, James Cook University, Townsville, December 2009.*

Developing greater understanding of flow of coral trout larvae between reefs open and closed to fishing to help understand if the potential benefits of zoning are being realised. A detailed larval dispersal model was developed which indicated as much as 50% larval dispersal from reefs closed to fishing into reefs open to fishing. Field experiments showed for the first time, that a number of juvenile coral trout from a no fishing zone made a positive contribution to populations in fished zones with dispersal of between 100 m – 24 km observed (Source: RRRRC, 2010; *In Prep*).

*Evaluation of the resiliency of key inter-reefal fish species, Fishing and Fisheries Research Centre, James Cook University, Townsville, June 2010.*

The aims of this project were to identify life history parameters of fish species from the "other species" quota group and to utilise these data to quantify species resilience based on life history characteristics. This in turn would enhance the ability of management agencies to ensure the sustainability of this diverse group.

Currey et al. (2010) report on the vulnerability of four emperor, five snapper and 13 cod species (families Lethrinidae, Lutjanidae and Serranidae respectively) under existing bag and size limits, taking into consideration susceptibility to current commercial fishing gears. The authors suggested six species that required further investigation with two species potentially vulnerable to fishing, *E. fuscoguttatus* and *L. atkinsoni*.

Currey et al. (2010) acknowledge that *L. atkinsoni* is likely to be at very low risk of overexploitation due to

the fact that it constitutes a very low proportion of the catch by any fishery sector on the GBR. However, *E. fuscoguttatus* is considered to be at a higher level of risk, despite the changes to minimum and maximum size limits for the species which were implemented during the 2008–09 financial year. Fisheries Queensland will consider these research outcomes at the next review of management arrangements for the OS species.

*Condition and trend of the GBR ecosystem: Indicators, thresholds of potential concern, and ecological influence of GBR zoning Plan on mid and outer shelf reefs; and Influence of the GBR Zoning Plan on inshore habitats and biodiversity, of which fish and corals are indicators: reefs and shoals. Australian Institute of Marine Science, Townsville.*

Biannual assessments are being undertaken of the impacts on biodiversity of fishing closures following rezoning of the GBRMP in 2004. Two programs are being run, one on regional clusters of coral reefs and the other on inner reef bases and shoal habitats. While the emphasis of the program is the impact of the zoning upon biodiversity, including response of fish populations when released from fishing pressure, the wider study includes the impacts of the new zoning plan upon fishers and the tourism industry.

Sweatman (2010) reports that after six years of rezoning, no difference in fish assemblages is detectable across 28 pairs of reefs open or closed to fishing over five regions of the GBR. The results were complicated by the impacts of Cyclone Hamish on central and southern reefs where differences between reefs open and closed to fishing were previously strongest, and survey timing coinciding with suspected spawning aggregation behaviour.

Cappo et al. (2010) report fish abundance and species composition established using baited video stations identified larger and more numerous coral trout, red emperor, redthroat emperor and Venus tuskfish on some shoals closed to fishing when compared to fished sites. However, sites were selected based on prior evidence of strong fishing effects and inconsistency was observed in the effect of zoning between regions and species groups. Some Townsville region sites open to fishing were shown to have higher target fish abundance to adjacent areas closed to

fishing. Also the amount of difference in fish number and size was inconsistent between areas open or closed to fishing through time (Cappo et al. 2010).

## Collaborative research

Fisheries Queensland collaborated with CSIRO and JCU researchers on Fisheries Research and Development Corporation funded projects investigating and simulating alternative harvest strategies including the implementation of ITQs in the CRFF. Fisheries managers and Fisheries Queensland scientists are on the user committees for various MTSRF projects related to this fishery and continue to provide fisheries catch and effort data for analysis and guidance on priority research needs.

Through the Northern Australian Fisheries Committee, Fisheries Queensland researchers coordinate tropical fin fish research activities with colleagues in the Northern Territory, Western Australia, Bureau of Rural Science and CSIRO. Research into reference points and monitoring strategies for red snappers across northern Australia is being developed that may relate to management of these species in the CRFF.

## Fishery management

### Compliance report

During the 2009–10 quota year a total of 4379 units were inspected in the CRFF. Of these, 534 were commercial vessel inspections. The majority of the remaining inspections were of recreational fishers on private or charter fishing vessels. During this period, a total of 283 offences were detected, with compliance rates of 91% for commercial fishers and 96% for recreational fishers corresponding to an overall compliance rate of 95%.

Offences are reported as either a Fisheries Infringement Notice (FIN); Caution (FIN Caution or official written caution); or Prosecution (to proceed by complaint summons) (Table 4). There was a peak in infringement notices in 2009–10 with targeted work from the Queensland Boating and Fisheries Patrol (QBFP) on commercial fishers possessing regulated fish and with new powers given to the Quota Monitoring Unit to enforce Information

Provision (Section 118 of the *Fisheries Act 1994*). These increased powers resulted in seven FIN's for contravening a condition of an authority involving quota requirements respectively.

An updated compliance risk assessment was completed for this fishery in November 2010 in order to determine compliance priorities and allow the most effective use of QBFP resources. The risk assessment identified the following issues as highest priority for enforcement and compliance in the fishery:

- violation of the annual spawning closures
- violation of the grey nurse shark protection area closures
- violation of Marine Park zoning provisions, as this now covers other state marine parks
- failure to keep required information/ providing inaccurate information.

There were also a number of activities rated as a moderate risk, which are being addressed. Detailed strategies to address the risks identified by this assessment have been developed through QBFP strategic and operational planning processes. The risk assessment will be reviewed every three to five years or earlier if there are major changes to the management arrangements for the fishery.

## Communication and education

Education forms an important component of the compliance strategy for all of Queensland's fisheries. QBFP are proactive in their education programs which include attending events such as boating and fishing shows to liaise with fishers; delivering lectures; utilising various forms of media to release important information; answering enquiries; and conducting extensive one on one education with fishers during the course of field patrols and inspections.

During inspections officers hand out recreational fishing guides and flyers which contain information on size and in-possession limits. Education plays a particularly important role when new legislation is implemented and QBFP make every effort to ensure that fishers have a good understanding of their rights and responsibilities.

## Changes to management arrangements in the reporting year

During the 2009–10 reporting year the following changes to management arrangements were made:

Upper limits on the commercial catch were prescribed in 2003 and introduced to the CRFFF in July 2004. These limits set the amount of quota that could be issued, however, the quota allocation process is complicated and subject to appeal. Following the finalisation of all appeals the entitlement under quota allocated was above the limit stipulated. In such cases, legislation required that the value of quota units would be reduced so that the catch limits could not be exceeded. Legislative changes were gazetted on 1 July 2010 to remove all allocation provisions and to prevent the future issue of fishery symbols or quota units in the CRFFF.

As the total quota available has not been fully utilised the catch limit has not been reached. To avoid unnecessary limitations on the CRFFF operators, Fisheries Queensland recently established a catch limits process to remove the requirement to reduce the value of quota units at this time. This process describes which quota unit values will be reduced if certain catch triggers are exceeded. The catch triggers are set at the value of the initial catch limits, less the quota which was purchased by the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (SEWPaC; formerly the Department of the Environment, Water, Heritage and the Arts), through the Great Barrier Reef Marine Park Structural Adjustment Package.

The catch limit for CT is 1 214 176 kg. If, in a quota year, the catch of CT is less than 1 214 176 kg, then the value of a CT unit will not change. If the catch of CT in a quota year is between 1 214 176 kg and 1 238 459.52 kg, the value of a CT unit will be permanently reduced by 0.01 kg. If the catch of CT in a quota year is greater than 1 238 459.52 kg, the value of a CT unit will be permanently reduced by 0.02 kg. Through this process, the value of a CT unit will not be reduced below 0.9426 kg—the value at which the catch trigger cannot be exceeded.

The catch limit for other coral reef fin fish (OS) is 902 199 kg. If, in a quota year, the catch of OS is less than 902 199 kg, then the value of an OS unit will not change. If the catch of OS in any quota year is

between 902 199 kg and 920 242.98 kg, the value of an OS unit will be reduced by 0.01 kg. If the catch of OS in any quota year is greater than 920 242.98 kg, the value of an OS unit will be reduced by 0.02 kg.

Through this process, the value of an OS unit will not be reduced below 0.9441 kg.

There is no catch limit set for RTE and no mechanism to reduce the value of RTE units because the entitlement under RTE units issued cannot exceed the previous catch limit less SEWPac quota holdings.

As a result of the impacts on fishery operators of the global financial crisis and Tropical Cyclone Hamish, in early 2009 Fisheries Queensland set aside the "Policy for Filleting of Coral Reef Fin Fish" (the Filleting Policy) for a 12 month period from April 2009. Fisheries Queensland issued filleting permits to all RQ license holders to fillet and skin all coral reef fin fish (with the exception of cods and groupers) taken by the use of hand-held fishing apparatus. Packaging, labeling and reporting conditions and limits on species permitted to be filleted applied. This year the filleting permits were reissued to 30 June 2012.

### Complementary management

There are no updates to cross jurisdictional management updates for 2009–10.

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Table 4: Queensland CRFFF offences recorded during the 2009–10 financial year. Note: One prosecution offence recorded here is still pending.

Offences	Caution	FIN	Prosecution
Contravene a condition of an authority - boat marks	1	2	-
Contravene a condition of an authority - quota requirements	30	7	-
Contravene a condition of an authority - fishing apparatus	1	1	-
Contravene a regulated fishing apparatus declaration (rec fisher)	1	1	-
Fail to give information in stated way	4	2	-
Fail to keep required information in the approved form	4	-	-
Recreational fisher contravenes a regulated waters declaration	6	7	-
Recreational fisher takes or posses regulated fish	67	103	-
Take more product than quota allows	15	5	-
Commercial fisher take/possess regulated fish	3	16	-
Fail to produce a document required for immediate inspection	-	5	-
Take/possess/sell fish regulated by size	-	-	2

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#### **Front cover image**

Common Coral Trout (*Plectropomus leopardus*)

