

Annual status report 2009

Coral Reef Fin Fish Fishery



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Fishery profile 2008–09

Species targeted Coral trout and red throat emperor. Many other coral reef fin fish species including cods, emperors and tropical snappers also landed.	Total number of commercial licences in 2008–09 369
Total harvest from all sectors Approximately 4600 t	Commercial licences accessing the fishery in 2008–09 242 (66% of licences)
Commercial harvest Approximately 1800 t	Fishery season All year round except two 5-day spawning closures around the new moon in October and November each year.
Recreational harvest (2005) Approximately 2600 t	Fishery symbols RQ and either an L1, L2 or L3
Indigenous harvest (2000–01) Approximately 108 t	Monitoring undertaken Compulsory commercial and charter fishery logbooks, annual structured line fishing surveys, at-sea observing, recreational fishing surveys (every 3-5 years)
Charter harvest Approximately 90 t	At-sea observer days monitored in 2008–09 Nil
Commercial Gross Value of Production (GVP) Approximately \$39.5 million	Accreditation under the EPBC Act Expires 4 November 2011
Allocation between sectors Significant recreational, charter and commercial sectors	Logbook validation Yes – completed in May 2006
Total exports The majority of the coral trout catch is exported live for approximately \$40/kg Most RTE and OS sold domestically	Quota managed Yes – a total allowable catch of 3061 t is allocated among commercial fishers through individual transferable quotas. There is no quota established for other sectors.

Key fish resources

Coral trout (*Plectropomus leopardus*)

Stock status

Sustainably Fished

Comments: Catch has increased to 94% of TAC in 2008–09. Commercial catch and catch rate increasing slowly since 2004 following the introduction of quota. Information gaps exist as no stock assessment has been completed and quota limit originally set at 1996 (pre-investment warning) harvest level. The TAC will be reviewed using resource assessment outcomes when available.

Key fish resources	Stock status
Red throat emperor (<i>Lethrinus miniatus</i>)	Not Fully Utilised
Comments: Only 39% of TAC landed in 2008–09. 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. Need more information about recruitment and movement patterns of this species.	
Stripey snapper (<i>Lutjanus carponotatus</i>)	Sustainably Fished
Comments: Recent increase in reported catch may be due to increased resolution in logbooks, increased fishing for other species quota or as a bycatch of increased landings of coral trout. Available age structures from stripey populations display broad ranges of age classes. This suggests the existing population structure may rely on broad representation of age classes for population stability (Kritzer 2004).	
Red emperor (<i>Lutjanus sebae</i>)	Uncertain
Comments: Commercial catch returning to levels prior to introduction of quota in 2003–04. CPUE has remained relatively stable over past decade. Require more information; increased specificity in commercial logbooks will help.	
Crimson snapper (<i>Lutjanus erythropterus</i>) and saddletail snapper (<i>L. malabaricus</i>)	Uncertain
Comments: Lower landings reported since introduction of quota. Increased landings identified in 2008–09 are due to improved resolution of commercial logbooks and increased catch. Catch efficiency may be increasing with increasing availability of technology (sounders, GPS). Recreational data required. High discard mortality (60%) for these relatively long lived species.	
Moses perch (<i>Lutjanus russelli</i>)	Uncertain
Comments: Limited commercial catches, recreational data required.	
Hussar (<i>Lutjanus adetti</i> and <i>L. vitta</i>)	Uncertain
Comments: Commercial catches currently well below long term average for this species group. Recreational data required. Recreational catches currently estimated to be substantial.	

Introduction

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

commercial fishery to ensure its sustainability into the future.

This report covers the financial year from 1 July 2008 to 30 June 2009.

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 L8¹) are permitted to take coral reef fin fish species 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 are permitted to use up to three lines, with no more than six hooks in total, using either a rod and reel or a handline.

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 100m depth and are daytime predators. Peak spawning activity occurs in October and November each year (Brown *et al.* 1994, Williams *et al.* 2007). They change from female to male at 42cm on average, live for up to 18 years and generally reach around 7 kg and 80 cm in length. They grow to the minimum size limit of 38 cm at around two-three years of age; however, they display great variation in size at age (Ferreira and Russ 1994). A fish of 40cm can be between 3 and 10 years of age. One genetic stock has been identified on the east coast of Australia (van Herwerden 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 65 cm in length, 4kg in weight and 20 years of age. The GBR is home to a single stock of red throat 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 can be found in waters to at least 128 m and are typically common south of Innisfail. They usually occur in small schools feeding opportunistically on benthic invertebrates and fish, during the day or night, over sandy substrate associated with coral or rocky reefs or rubble shoals.

¹ The L8 multi-hook Deep Water Fin Fish Fishery operates in waters deeper than 200m 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

Little is known about their movements and fish smaller than about 17cm have not been seen. The majority of red throat 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 31cm (Williams 2003).

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

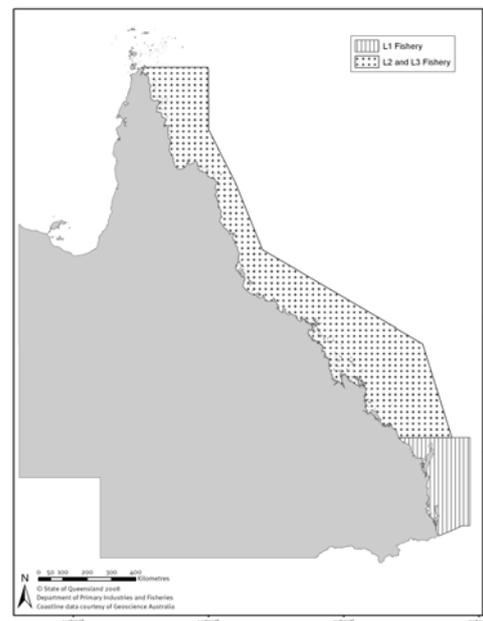


Figure 1: Map of fishery area.

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
- a total allowable catch of 3061t (TAC) for the commercial sector, separated into commercial TACs for coral trout 1350t (CT), red throat emperor 700t (RTE) and 'other coral reef fin fish species' 1011t (OS), the

commercial TACs are allocated through individual transferable quotas (ITQs)

- minimum and maximum fish size limits that apply to both the recreational sector and the commercial sector
- recreational in-possession limits for individual species,
- combined recreational in-possession limit of 20 coral reef fin fish
- a number of coral reef fin fish have been 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 GBRMP².

The fishery is also subject to restrictions on areas in which it can operate through no-fishing areas declared under the GBRMP and Queensland Marine Parks Zoning Plans.

Catch statistics

Commercial

Management arrangements for the commercial CRFFF are based on a TAC of 3061 t³ shared among commercial fishers through individual transferable quotas (ITQs) for CT, RTE and OS. 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. These reporting functions can be used to compare landed catch with estimated catch from commercial fisheries logbooks. Table 1 shows the reported catch (from unload notices) for the 2008–09

² Findings of Fisheries Queensland’s recent review of spawning closures are outlined in the Changes to Management Arrangements section.

³ This figure reflects the actual legislated TAC, however the current allocated quota in the CRFFF is 3218 t, based on awarded line unit entitlements through the allocation and appeals process. This figure also includes quota units held by DEWHA as a result of the GBRMPA RAP process.

quota year and the percentage of total quota used for the period.

Table 1: Percentage of allocated quota used for CT, RTE and OS in the 2008–09 financial year (Source: Fisheries Queensland quota monitoring unit, 21 Oct 2009).

Quota group	Total Catch	% of available quota used
CT	1 229 735	94
RTE	244 812	39
OS	554 195	57

The annual commercial catch and effort information for the CRFFF has historically been variable in response to changes management arrangements. A significant decrease in both catch and effort occurred in 2003–04 (Figures 2-4). This decrease reflects management changes that were implemented in 2003 and 2004 including the GBRMPA Representative Areas Program; the introduction of the CRFFF management plan which prohibited operators from fishing in the CRFFF if they did not hold an RQ symbol; and the introduction of the ITQ system in the fishery.

Since 2004–05 the catch and catch rates of coral trout (CT) have increased slowly (Figure 2) with live fish export continuing to dominate the fishery. Increasing catch rate for primary boat days may reflect a shift to primary vessels with higher numbers of authorised dories taking most of the catch as well as a cumulative effect of small increases in catch rates per dory day (Figure 2).

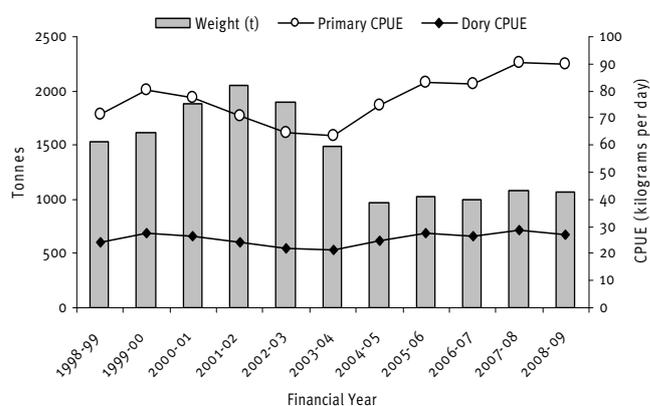


Figure 2: Total commercial catch and CPUE (days and dory days) of coral trout by quota year 1998/99–2008/09 (Source: Fisheries Queensland CFISH database, 5 October 2009).

The catch of RTE has increased to around 245 t, or around 40% of TAC (Table 1) over the 5 year period

since the introduction of quota in 2003–04 (Figure 3). The catch per unit effort (CPUE) of RTE for a primary vessel decreased between 2007–08 and 2008–09 from approximately 36 kg/day to 30 kg/day (Figure 3).

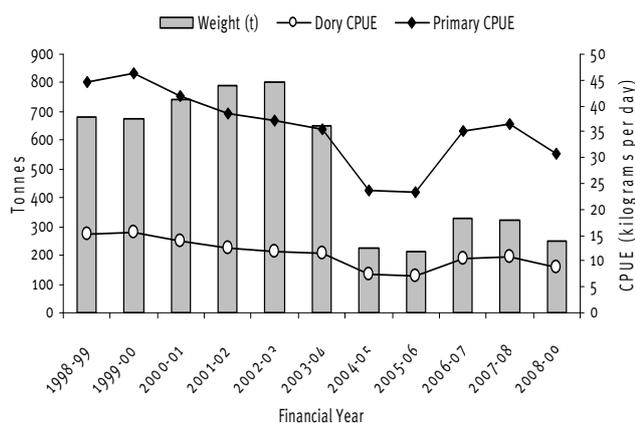


Figure 3: Total commercial catch and CPUE (days and dory days) of red throat emperor by quota year 1997–09 (Source: Fisheries Queensland CFISH database, 5 October 2009).

The decline is not likely to indicate a decline in abundance of this species as they are typically a secondary target following coral trout. A stock assessment completed in 2006 indicated that the biomass of RTE was at approximately 70% of unfished biomass, indicating a very healthy stock. Fishing pressure since 2006 has not been sufficiently high to reduce stock size.

The catch of ‘other species’ (OS) continued to increase in 2008–09 (Figure 4, Table 2) reaching 57% of TAC (Table 1). This was due to increased landings of crimson and saddletail snapper (42 t) and spangled emperor (25 t) (both species are now approaching pre-quota harvest levels), red emperor (12 t) and cod – unspecified (13 t) (these species remain below long term averages), and bar cod (12 t) (this species is above long term average).

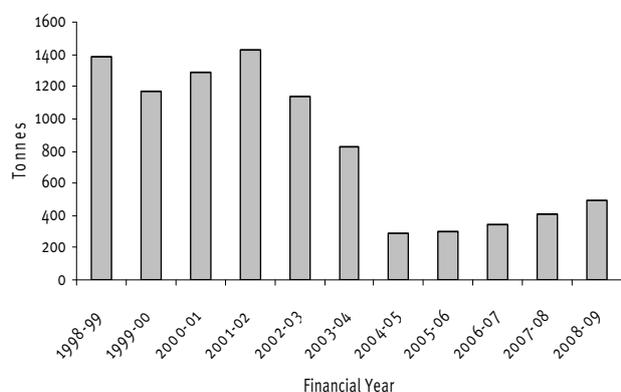


Figure 4: Total commercial catch of other species by quota year 1998-2009 (Source: CFISH database, 5 October 2009).

A total of 88 species or species groups have been recorded in commercial fishery logbooks since 1997–98. Species specific reporting in the CRFFF has been improved through the introduction of the LFO5 logbook in 2007. The logbook is designed to provide fishers with the opportunity to report a greater level of species resolution. This has led to a reduction in landings reported as unspecified in the ‘other species’ component in the CRFFF (Table 2). In 2008–09, approximately 120 t of logbook reported catch was reported as unspecified fish or mixed reef fish compared to 194t reported in 2006–07. The reported landings of mixed reef fish, unspecified jobfish, unspecified nannygai and unspecified sweetlip have reduced by 35 t, 25 t, 17 t and 18 t respectively. However, unspecified cod landings have increased by 15 t.

Table 2: Breakdown of the major 'other species' component (in kilograms) caught in the CRFFF since 2003–04.

*indicates where catch was reported from fewer than 5 licences and can not be reported for confidentiality reasons.

(Source: Fisheries Queensland CFISH database, 5 October 2009)

Common Name	Logbook category	2003–04	2004–05	2005–06	2006–07	2007–08	2008–09
Bar rockcod	Cod - bar	13576	1480	3668	944	25940	37689
Cod - unspecified	Cod - unspecified	41013	22175	27580	21938	23487	36459
Red emperor	Emperor - red	104307	26267	27937	29096	44461	56441
Spangled emperor	Emperor - spangled	37118	12334	11625	16170	31988	57297
Hussar	Hussar - unspecified	40424	16260	14451	18992	23158	25985
Goldband snapper	Jobfish - gold banded	33209	30856	28003	41407	54245	47004
Green jobfish	Jobfish - green	752	993	782	472	3230	4985
Rosy snapper	Jobfish - rosy	36863	2211	6054	4778	7662	16104
Jobfish - unspecified	Jobfish - unspecified	11827	23080	34848	30190	10749	5053
Saddletail snapper	Nannygai - large mouth	61125	7620	13660	9644	29584	64827
Crimson snapper	Nannygai - small mouth	17577	1313	820	950	10450	19894
Nannygai - unspecified	Nannygai - unspecified	9423	13961	14644	17688	2811	135
Moses Perch	Perch - Moses	555	1403	1523	1740	2193	2560
Flame snapper	Snapper - flame tail	4085	*	*	*	*	905
Ruby snapper	Snapper - ruby	884	*	*	*	494	791
Stripey snapper	Stripey - Spanish flag	4168	21349	24221	30690	59219	43978
Sweetlip - unspecified	Sweetlip - unspecified	19109	21149	24815	25753	13495	7551
Tusk fish - unspecified	Tusk fish - unspecified	23009	13566	12163	13597	13965	13897
Venus tuskfish	Tusk fish - Venus	1724	1324	2225	2964	1412	986

Recreational

Recreational line fishers are restricted to a maximum of three fishing lines and six hooks (total) in all Queensland waters, and may spearfish coral reef fin fish without the use of SCUBA. 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. Fisheries Queensland will commence the next state-wide recreational fishing survey in 2010 and updated estimates of participation, catch and effort will be available by the end of 2011. Refer to the Annual Status Report 2007 for CRFFF previous figures and catch statistics.

Charter

A significant proportion of the Queensland charter sector targets CRFFF species. In 2008-09 there were

392 charter licences of which 205 (52%) accessed the CRFFF actively fishing for RQ species. The compulsory logbook program for charter operators was introduced in 1996. In 2008–09, a total of 7242 charter boat days were spent fishing for RQ species, down 20% from 2007–08 and on average down 12% each year since 2005–06.

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). The CPUE for RTE continues to steadily increase reaching around 36kg/day in 2008–09, while CT has also increased since the change in management arrangements in 2003 to around 20kg/day (Figure 5). The CPUE of OS species has increased over the past four years to 23kg/day.

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 tonnes.

Spatial issues / trends

Approximately 95% of reported commercial catch of CRFF are taken from areas within the GBRMP. For the 2008–09 period the catch of coral trout was highest in grids around of Bowen (Figure 6), while the catch of redthroat emperor was highest in the mid to southern section of the GBR (Figure 6). High catches for other species were recorded in the southern regions, driven by catch of deep water bar rockcod (*E. ergastularius*

and *E. octofaciatus*), and in the central region, driven by catches of saddletail snapper (Figure 6).

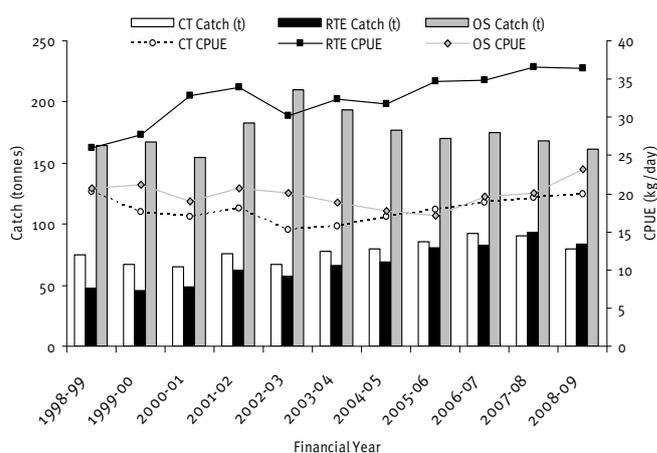


Figure 5: Charter catch of CT, RTE and OS species as reported in logbooks by financial year, 1997–09 (Source: CFISH Database, 5 October 2009).

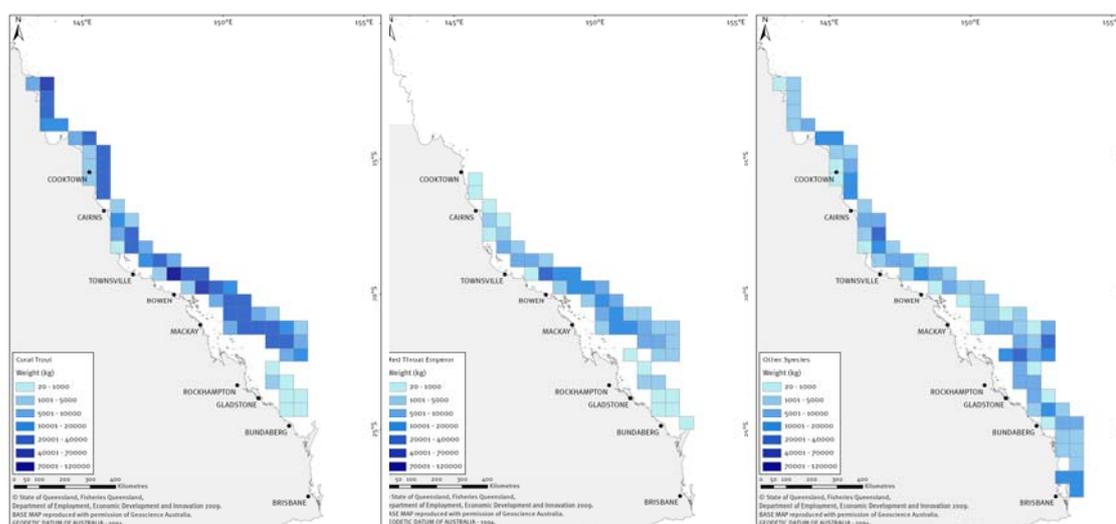


Figure 6: Catch of CT, RTE and OS in 2008–09 (Source: CFISH database, 5 October 2009).

Effects of Cyclone Hamish

Tropical Cyclone Hamish, with destructive winds of up to 280km/hr, tracked down the entire southern section of the GBR (south of Bowen to Swains reefs) in March 2009. The commercial fishing sector reported significant damage to reef and declines in catch and catch rate of coral trout in this area during the period immediately following the cyclone, and a proportion of the fleet moved north to reefs unaffected by the cyclone. Excluding the Capricorn - Bunker group, which showed no change, there were increased landings of CT reported from 52% of the northern grids of the GBR

and a similar percentage of the southern grids recorded decreased landings (Figure 7). A similar northern shift in commercial fishing effort was seen. This resulted in increased landings of coral trout reported through the ports between Bowen and Cooktown.

Similarly, northward shifts in landings of redthroat emperor were reported in 2008–09 (Figure 7). Large catches of RTE are not typical in the area north of Bowen and it may be that individuals have moved northward as a result of the cyclone. A similar trend was seen in 1997 following Cyclone Justin.

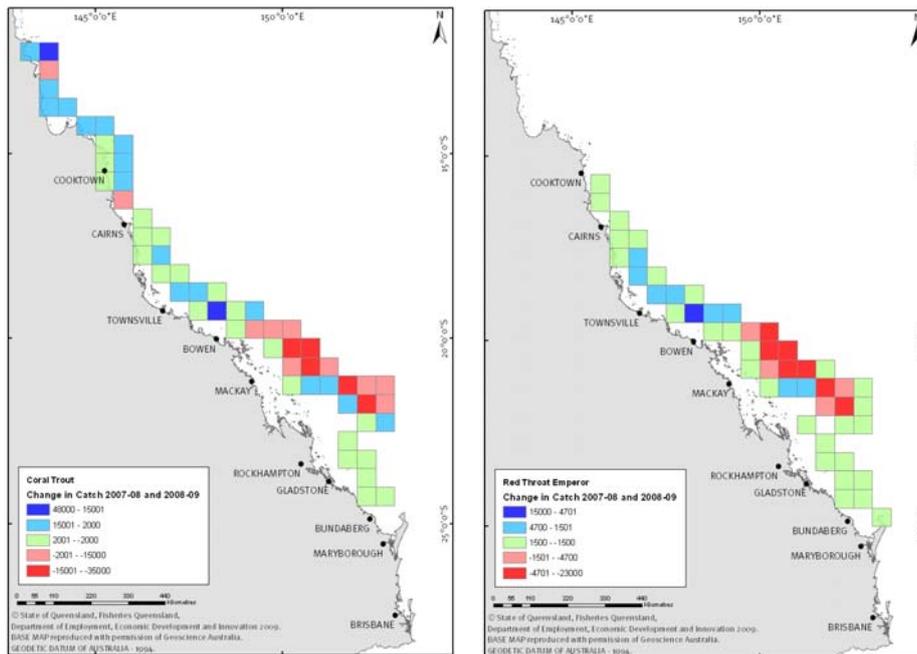


Figure 7: Change in catch (kg) of CT and RTE between 2007–08 and 2008–09 reported from each 30 minute grid (Source: Fisheries Queensland CFISH database, 5 October 2009).

Socio-economic characteristics and trends

The price obtained for CRFF depends on the species and product form (e.g. live, fillet, whole dead, trunked). High prices are fetched on the export market for top quality live coral trout, which have dominated the product form of harvested CT since before 2000 and fetch approximately 4 times that offered for filleted product. The main driver for commercial fishers is the beach price of live CT, which ranged from around \$33 to \$50/kg in 2008/09, depending on the time of the year, for fish between 0.8 – 1.2 kg in weight. Whole or filleted RTE and OS attract around \$6–\$12/kg, resulting in less targeting of RTE and OS and comparatively lower quota utilisation.

Other species and RTE harvested, are almost totally focused on the domestic market and sold as either whole fish primarily targeted to the restaurant trade (80 – 90%) or fillet (10 – 20%). Exporters are attempting to develop overseas markets for some of these species. Anecdotally, the domestic market prefers the product to be in the fillet form, placing it in direct competition with cheaper imported product.

Figure 2 shows small increases in dory catch rates since the introduction of quota have contributed to the increasing catch rate for primary vessels. It is likely that the CPUE for primary vessels has increased due to licence holders adding more dories (up to the limits in legislation) in an attempt to reduce operating costs.

Improvements in economic efficiency may continue, within the management arrangements, until the fishery reaches an economic limit or maximum utilisation of available quota.

Biological and ecological information

Monitoring programs

Fisheries Queensland has collected fishery independent data on CRFFF resources using structured line fishing surveys since 2005–06 based on the methods developed by the historical (1995-2005) the Effects of Line Fishing Program. The objectives of the monitoring program are to determine the annual trends in abundance, mortality, length or age structure of common coral trout, redthroat emperor 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 the performance measures contained in the fishery PMS. An overview of the Fisheries Queensland monitoring program is available at www.dpi.qld.gov.au

Estimated rates of total mortality (Z) of common coral trout and redthroat emperor (Figure 8) and diversity indices are calculated from fishery-independent data to assess two of the performance measures for the fishery (see the Sustainability Assessment section).

Assessing age data (Figure 9 and 10) can identify changing patterns in population structure such as follow a peak in recruitment of 3 year old redthroat emperor in 2006-07 through to 5 years of age in 2008-09 (Figure 9).

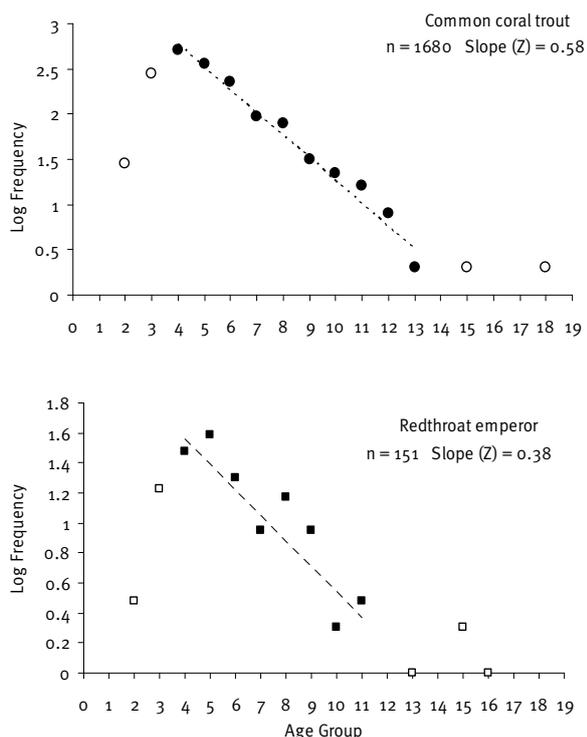


Figure 8: Rate of mortality of common coral trout and redthroat emperor, estimated by age-based catch curve analysis for the 2008–09 financial year. Note that scales on the vertical axis are different. Dark circles/squares identify data points used to estimate the rate of declining numbers of fish in each older age class. Open circles/squares were not used (Source: Fisheries Queensland Long Term Monitoring Database, 16 October 2009).

At-sea observing

In 2008–09 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, including the CRFFF, have been identified for observation in 2011.

Bycatch

Bycatch information is currently collected when fishery observers survey commercial operations. The LTMP structured line surveys collect fishery independent

data on bycatch and report this through species diversity indices in the Performance Measures (see Sustainability Assessment section).

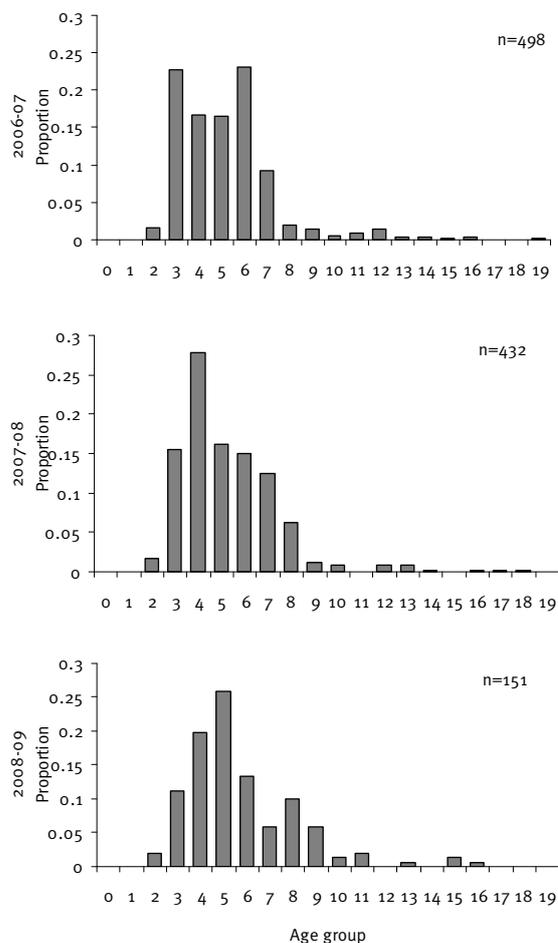


Figure 9: Age frequency of Redthroat Emperor sampled during fishery-independent surveys between 2006–07 and 2008–09 (Source: Fisheries Queensland Long Term Monitoring Database, 16 October 2009)

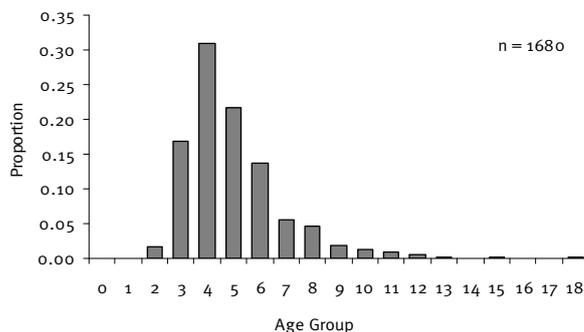


Figure 10: Age frequency of Common Coral Trout sampled during the fishery-independent surveys in 2008-09 (Source: Fisheries Queensland Long Term Monitoring Database, 16 October 2009).

Interactions with protected species

The first recorded interaction with a protected species for the CRFF line fishery was reported in the 2008–09 year. Two minke whales interacted with a fishing line while following a boat, neither were caught. This is the only interaction recorded in the SOCI logbooks since its introduction in 2002, demonstrating the low impact of this fishery.

Ecosystem impacts

Line fisheries can impact on the broader ecosystem through ecological effects of removing top order predators, anchor damage or boat fuel by-products. Line fishing is a selective harvesting technique and this limits the potential impacts on species other than the targeted fishery species.

Climate change continues to be an issue of concern for coral reef fisheries 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, individual growth rates and spawning output (Johnson and Welch, 2010).

The Queensland Seafood Industry Association is working with GBRMPA to develop a carbon footprint calculator for the CRFFF, and other fisheries, to help identify where impacts can be minimised.

Sustainability Assessment

Performance against fishery objectives

In 2008, Fisheries Queensland removed the review events from the CRFFF management plan. The new Performance Measurement System (PMS) was created in its place, which functions as a reporting framework that is a transparent, defensible set of criteria for evaluating the performance of the fishery against management arrangements, and is reported on annually (Table 3). Within three months of becoming aware that a performance measure has been triggered, Fisheries Queensland is required to finalise a clear timetable for implementation of appropriate

management responses.

In February 2009 Fisheries Queensland became aware of two performance measures that were triggered during the 2007/08 season. The results of a detailed analysis of the catch and effort data were considered by ReefMAC and ReefMAC Scientific Advisory Group (SAG) in February 2009 and the final management responses developed are listed here for the two triggered performance measures.

Final response from 2007–08 triggered performance measures

- As per the Target Species review event (v). The majority of the key species groups (see PMS document on Fisheries Queensland website) triggered for catch increases >20% since 2006–07.

This is likely attributed to the introduction of the LF05 logbook on 1 July 2007. The LF05 logbook provides greater species specific reporting capacity. Reductions have subsequently been seen in the reporting of 'unspecified' species.

- As per the Economic review event (i) The proportion of the available TAC landed for red throat emperor (38%) and other species (44%) was less than 80%.

Since the inception of the quota management system in 2004-05, OS and RTE quotas have consistently been under-caught. The under-catch of quota has been attributed to economic and social factors rather than a stock issue.

Three performance measures were triggered in 2008–09 (Table 3). The results of a detailed analysis of the catch and effort data will be considered by Fisheries Queensland, in consultation with stakeholders, and an appropriate management response developed.

Table 3: Performance measures and outcomes for the CRFFF in 2008–09.

Performance measure	Performance																												
<i>Target species</i>																													
<p>(i) Annual CPUE for coral trout and red throat emperor shows a decrease of at least 10% in each consecutive year over three years <u>QR</u> decreases by 20% from the preceding quota year.</p> <p>(ii) Total mortality (Z) exceeds 1.5 times estimate of natural mortality (M) for coral trout and red throat emperor.</p> <p>(iii) The estimate of exploitable biomass of red throat emperor falls below 40% of the estimated virgin biomass.</p> <p>(iv) There is a 20% decrease in recreational CPUE for coral trout, red throat emperor and key OS species between consecutive surveys.</p> <p>(v) The catch of a relevant group of species of coral reef fin fish under OS line units in a quota year is at least 20% higher than the catch of the relevant group of species under the line units in the preceding quota year.</p>	<p><i>Not Triggered</i></p> <p>The annual CPUE of primary vessels fishing for coral trout has stabilised at around 90 kg/day over 2007-08 and 2008-09. The annual CPUE of red throat emperor decreased by 16% from 36 kg/day in 2007/08 to 30 kg/day in 2008-09.</p> <table border="1" data-bbox="826 555 1422 797"> <thead> <tr> <th colspan="4" data-bbox="1027 555 1422 591">Catch Rate (kg/day)</th> </tr> <tr> <th data-bbox="826 595 1027 631">Species</th> <th data-bbox="1027 595 1158 631">2006-07</th> <th data-bbox="1158 595 1289 631">2007-08</th> <th data-bbox="1289 595 1422 631">2008-09</th> </tr> </thead> <tbody> <tr> <td data-bbox="826 636 1027 714">Common Coral Trout</td> <td data-bbox="1027 636 1158 714">82.6</td> <td data-bbox="1158 636 1289 714">90.4</td> <td data-bbox="1289 636 1422 714">89.9</td> </tr> <tr> <td data-bbox="826 719 1027 797">Red Throat Emperor</td> <td data-bbox="1027 719 1158 797">35.0</td> <td data-bbox="1158 719 1289 797">36.6</td> <td data-bbox="1289 719 1422 797">30.7</td> </tr> </tbody> </table> <p><i>Not triggered</i></p> <table border="1" data-bbox="826 880 1339 1081"> <thead> <tr> <th data-bbox="826 880 1027 916">Species</th> <th data-bbox="1027 880 1158 916">Z ± s.e.</th> <th data-bbox="1158 880 1241 916">M</th> <th data-bbox="1241 880 1339 916">1.5M</th> </tr> </thead> <tbody> <tr> <td data-bbox="826 920 1027 999">Common Coral Trout</td> <td data-bbox="1027 920 1158 999">0.58±0.03</td> <td data-bbox="1158 920 1241 999">0.45</td> <td data-bbox="1241 920 1339 999">0.68</td> </tr> <tr> <td data-bbox="826 1003 1027 1081">Red Throat Emperor</td> <td data-bbox="1027 1003 1158 1081">0.39±0.09</td> <td data-bbox="1158 1003 1241 1081">0.40</td> <td data-bbox="1241 1003 1339 1081">0.60</td> </tr> </tbody> </table> <p>The estimate of natural mortality (M) for red throat emperor is based on the Leigh <i>et al.</i> (2006) stock assessment. The estimates of M for coral trout are based on the estimate used by Little <i>et al.</i> (2008) from age-based catch curves. Refinement of this estimate from cohort-specific age-based catch curves is expected in future.</p> <p><i>Not triggered</i></p> <p>Exploitable biomass of RTE is around 70% as per the last stock assessment in 2006.</p> <p><i>Not measured</i></p> <p>The last survey estimate was obtained in 2005. Changes to management occurring with the introduction of the CRFFF management plan introduce uncertainties regarding previous estimates under current management arrangements.</p> <p><i>Triggered</i></p> <p>Five key species groups triggered catch increases >20% since 2007–08. As reported last year, this is partially attributed to the introduction of the LFO5 logbook on 1 July 2007 which provides greater species specific reporting</p>	Catch Rate (kg/day)				Species	2006-07	2007-08	2008-09	Common Coral Trout	82.6	90.4	89.9	Red Throat Emperor	35.0	36.6	30.7	Species	Z ± s.e.	M	1.5M	Common Coral Trout	0.58±0.03	0.45	0.68	Red Throat Emperor	0.39±0.09	0.40	0.60
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	<p>capacity. Increased utilisation of the OS quota in the 2008–09 year and a return to pre-2003 levels of fishing for some species (e.g. crimson and saddle tail snapper and red emperor) were reported.</p> <p>An increase of 21 t in landings of bar rockcod, rosy jobfish and ruby snapper was reported between 2007–08 and 2008–09 in the CRFFF, however, there was a drop in landings of 8 t of these species in the deep water (L8) multi hook fishery (see Annual Status Report 2009 for the Deep Water Fin Fish Fishery).</p>																								
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(ii) Percentage of each category of protected species released alive falls below 90%.	<i>Not triggered</i> One interaction with two minke whales was reported, where both were released alive.																								
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(i) The Shannon-Wiener index for a bioregion shows a decrease of at least 10% in each consecutive year over three years <u>QR</u> decreases by 20% from the preceding quota year.	<p><i>Not triggered</i></p> <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>2006</td> <td>N/A</td> <td>N/A</td> <td>5.8</td> <td>6.2</td> </tr> <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> </tbody> </table> <p>Percent change from the previous year.</p>	Year	Bioregion				Cairns	Townsville	Mackay	Swains	2006	N/A	N/A	5.8	6.2	2007	- 0.4	0.8	1.9	- 4.3	2008	- 4.9	- 9.2	2.9	6.7
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(i) That the rate of compliance falls below 95% in the commercial fishery and/or 95% in the recreational fishery.	<i>Triggered</i> Of 822 commercial fishery inspections, 46 units committed offences (94.4% compliance) while 136 offences were observed from 4773 inspection in the recreational fishery, 97.2% compliance)																								
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(i) The proportion of the available TAC for CT, RTE and OS landed in any year is <80%.	<i>Triggered</i> The proportion of the available TAC landed in 2008–09 for RTE and OS was 39% and 57%, respectively. Ninety-four percent of the TAC for CT was landed in 2008-09.																								

Current sustainability status and concerns

The CRFFF is managed through of 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 Performance Measurement System (PMS), a

Stock Status Assessment Framework, Ecological Risk Assessments for the non-primary target species and a Management Strategy Evaluation (MSE) (see Modelling ITQs in the research section). The *Fisheries (Coral Reef Fin Fish) Management Plan 2003* review process is due to begin in 2011.

On the basis of the stock status assessment framework coral trout, which is the key target species of the CRFFF, is considered “sustainably fished”. No formal resource assessment has been undertaken for this species, the TAC was set on historic harvest levels and the fishery is approaching complete utilisation of the commercial TAC (94% in 2008–09). It is proposed that a stock assessment module for the common coral trout (*Plectropomus leopardus*) 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 independent data in order for stock assessments to be conducted in the future. The enhancement of ELFSim will be trialled in lieu of a traditional stock assessment, which do not tend to suit spatially complex fisheries such as the CRFFF, to potentially provide a greater certainty in the sustainability of the fishery. Funding for the development of the stock assessment module is currently being sought.

Red throat emperor stocks have been identified as underutilised with landings remaining around 40% of the TAC and increasing catch rates reported in the charter fishery. A stock assessment in 2006 indicated the population level is about 70% virgin biomass, well above the trigger point level set at 40%.

Lack of data, particularly from the recreational fishing sector, has resulted in the status of many species under ‘other species’ remaining uncertain. While landings remain well under the TAC, catches of some species are starting to return to pre 2003–04 harvest levels. Catch levels of individual species are being closely monitored by Fisheries Queensland using techniques including stock status workshops, ERAs, PMSs and routine monitoring of reported catch.

In 2008–09 there was continued expansion in the deep water habitats within the L1 and L2/L3 fishery areas. This expansion has resulted in increased landings of

bar rockcod, bass grouper, ruby snapper and rosy snapper under the OS TAC. Line fishing gears including mechanical reels were used, however the gear used does not exceed that permitted for use in the L1 and L2/L3 fisheries.

The Commercial Fisheries Development Unit, a new initiative within Fisheries Queensland, is investigating the potential to increase the economic viability of this fishery. This unit will develop an Industry Development Plan starting with port visits in February 2010. In order to increase the proportion of OS harvested in future the unit will be looking at consistency in supply to address demand in the domestic market, economic improvements and greater transparency in the supply chain and increasing returns to the fisher to encourage landing of OS.

Research

A suite of research projects with potential benefits to our understanding of the CRFFF, reef fish population dynamics and broader coral reef ecosystem questions is being undertaken through the Australian Government’s four year Marine and Tropical Sciences Research Facility (MTSRF) program which commenced in 2006. Key projects producing outputs in 2008 are discussed briefly below and the user is referred to the Reef and Rainforest Research Centre website www.rrrc.org.au for more information:

Harvest patterns of the “Other Species” quota group in the Coral Reef Fin Fish Fishery, Fishing and Fisheries Research Centre, James Cook University, Townsville, June 2008.

This report to the MTSRF provides an update of earlier work from the CRC Reef as part of the Effects of Line Fishing (ELF) project (1996) documenting the harvest patterns of the “other species” component of the CRFFF. Available data from the different sectors of the fishery (commercial, charter and recreational) were gathered and analysed to provide information on catch and species composition of each sector, both regionally and temporally. To provide a comparison to the catch data from the sectors in the CRFFF, data from the ELF Project were used to provide detailed species composition data to determine how species identification problems, different targeting behaviour and fishing gear may have affected species

composition data from each of the sectors. The key species in the “other species” category were determined from the results of the species composition analysis.

Evaluation of the resiliency of key inter-reefal fish species, Fishing and Fisheries Research Centre, James Cook University, Townsville, June 2008.

The main aims of the project are to identify life history parameters of fish species from the “other species” quota group using archived data and previously unanalysed samples from the ELF Project, and to utilise these data to quantify the resilience based on life history characteristics to enhance the ability of management agencies to ensure the sustainability of this diverse group. Reports on life history data for species of the emperor and snapper families (Lethrinidae and Lutjanidae) have been completed, and analysis of cod (Serranidae) has commenced. The project will be completed in June 2010.

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 stopping fishing through the recent rezoning of the GBRMP on regional clusters of coral reefs in the offshore (mid and outer-shelf) domain (especially shoal habitats). Fish abundance and species composition is being established with baited video stations. Habitats were assessed by towed video camera and classified into broad categories of substratum and life form. A second project investigates the same basic questions for coastal habitats, where the major pressure is from recreational fishing. While the emphasis in both projects is about the impact of the zoning upon biodiversity, especially the response of fish populations when released from fishing pressure, the wider study is also about the impacts of the new zoning plan upon fishers and the tourism industry. Reports comparing fish abundance on both fished and unfished inter-reefal shoal habitats off Townsville, Cairns and Cardwell were released in 2008. No differences were detected. These projects finish in 2010.

Modelling multi species targeting of fishing effort in the Queensland Coral Reef Finfish Fishery - FRDC Project 2001/020 Fishing and Fisheries Research Centre JCU; CSIRO Marine and Atmospheric Research; Fisheries Queensland

This project documented the decision-making processes that influence effort distribution of GBR line fishers in response to varying amounts of catch of target and non-target species and characterised the factors that result in changes in targeting behaviour by GBR line fishers. It developed computer simulation models that predict the spatial distribution of effort by commercial line fishers in response to changing levels of catch of target and non-target species in the CRFFF. It also formally evaluated alternative harvest and conservation management strategies for CT and RTE for the CRFFF, given models of changes in fishing strategy related to the harvest of multiple species, either through target switching or retention of significant by-product.” (Source: AANRO website <http://www.aanro.net/VRESEARCH.html> accessed 20 Nov 2009)

Modelling ITQs in the Coral Reef Fin Fish fishery – FRDC Project 2004/030 CSIRO Marine and Atmospheric Research; Fishing and Fisheries Research Centre JCU; QPI&F.

This project simulated the individual transferable catch quotas (ITQs) system and its effect on the Queensland CRFF. It built on the multi-species population and vessel dynamics models (ELFSim) previously developed for CT and RTE. The model considered initial quota allocation to vessels, seasonal fish prices and individual variable costs, fishing efficiency and experience, and constraints on vessel movement. The results from the simulations were examined with respect to various stakeholder management objectives. In general, the effect of the management strategies on the biomass of both species was overwhelmingly influenced by the amount of CT total allowable catch (TAC). As the CT TAC increased, catches increased and the ability to satisfy objectives related to conservation, stock and catch-per-unit-effort declined.

The results showed that under the management strategies examined, increasing the CT TAC led to increased vessel profits. However, increasing the

current CT TAC to one that was 50 per cent higher resulted in only a marginal increase in profit, which was not proportional to the increase in harvest. With such a marginal benefit, the risk of lower stock sizes of CT, and possible fisheries declines that are associated with them, become more relevant to decision making. It is generally believed that ITQ systems should halt over-capitalisation and improve the economic performance of a fishery. As a result of the ITQ system, and agreeing with recent empirical data, effort appeared to decrease through the projection period of the simulations as did the variability, and the maximum number of days fished (Source FRDC website, www.frdc.com.au, accessed 20 Nov 2009).

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 Management Advisory Committees, Scientific Advisory Groups and other forums.

Through the Northern Management and Science Working Group of the Northern Australian Fisheries Committee, Fisheries Queensland researchers coordinate tropical fin fish research activities with colleagues in the Northern Territory and Western Australia and scientists from the Bureau of Rural Science and CSIRO. Research into the development of reference points and monitoring strategies for red snappers across northern Australia for incorporation into “harvest strategies” is being planned that may be of relevance to the management of these species in the CRFF.

Fishery management

Compliance report

During the 2008–09 quota year a total of 5787 units were inspected in the CRFF. Of these, 703 were commercial vessel inspections. The majority of the remaining inspections were of recreational fishers.

During this period, 304 offences were detected in association with 251 inspections, corresponding to an overall compliance rate of 96%. 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).

A compliance risk assessment was completed for this fishery in June 2006 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 size and in possession limits,
- Recreational fishers taking fish for commercial purposes
- Violation of Great Barrier Reef Marine Park zoning provisions
- 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 3 to 5 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

Table 4: Queensland CRFFF offences recorded during the 2008–09 financial year. Note: The majority of prosecutions recorded here are still pending.

Offence	FIN	Prosecution	Caution
Contravened a quota	1	7	12
Regulated fish infringement	117	20	79
Contravened a regulated waters declaration	11	0	1
Boat mark not placed correctly	4	0	1
Contravened a condition of an authority	0	8	1
Contravened a condition of an authority involving quota	9	0	11
Fail to have a documents available for immediate inspection	4	0	2
Failed to comply with information requirement	11	0	2
Conduct a activity without a valid permit	2	1	0
TOTAL	159	36	109

Changes to management arrangements in the reporting year

During the 2008–09 reporting year the following changes to management arrangements were made:

1) 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 Filletting of Coral Reef Fin Fish" (the Filletting Policy)

for a 12 month period from April 2009. Fisheries Queensland issued filletting 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. Fisheries Queensland will review the Filletting Policy during 2010–11.

2) An independent review of the appropriateness and timing of spawning closures to provide protection to key target species was completed. The review found high relative biological effectiveness of closures in October and November but lower relative effectiveness in December and noted some species of coral reef fin fish other than coral trout spawn outside of the timing of the previous December closures (i.e. not around the new moon). As such the December spawning closure for coral reef fin fish was removed. Changes took effect in the 2009/10 reporting year. To assist in reaching a decision about spawning closures Fisheries Queensland conducted a risk assessment (Coral reef fin fish spawning closures: Risk assessment and decision support) which can be found on the Fisheries Queensland website at www.dpi.qld.gov.au (follow the links to 'Fisheries' > 'Monitoring our fisheries' > 'Fisheries data & reports' > 'Sustainability reporting' > 'Ecological risk assessments').

3) Maximum legal sizes of camouflage rockcod (*Epinephelus polyphekadion*) and flowery cod (*Epinephelus fuscoguttatus*) were reduced from 100cm to 70cm to provide greater protection to males and highly fecund breeding females.

4) Black-spotted rockcod or estuary cod (*Epinephelus malabaricus*) and gold-spotted rockcod or estuary cod (*Epinephelus coioides*), although not included as coral reef fin fish, were included in the combined recreational possession limit for cods and groupers.

Complementary management

Torres Strait

During 2008, the non-traditional sector of the CRFFF in the Torres Strait Protected Zone (TSPZ) was removed via a Protected Zone Joint Authority (PZJA) facilitated resource reallocation process. This was a two stage process that saw five CRFFF licenses surrendered on the 31st January 2008 and the remaining four

Williams, A.J. (2003) *Spatial patterns in population biology of a large coral reef fish: What role can movement play?* PhD thesis, James Cook University, Townsville. 190 pp.

Williams, A. J., Begg, G. A., Little, L. R., Currey, L. M., Ballagh, A. C. and Murchie, C. D. 2007, Evaluation of the Eastern Torres Strait Reef Line Fishery. Fishing and Fisheries Research Centre Technical Report No 1. James Cook University, Townsville.

Information compiled by

Chad Lunow

Acknowledgements

Bonnie Holmes, Anna Garland, Nadia Engstrom, Katherine Zahmel, Dr Tracey Scott-Holland, Luke Bekker, Lew Williams, Dr Malcolm Dunning, Brenda Foley, Carissa Fairweather, Stephanie Slade, Dr John Kung, Dr Brigid Kerrigan, Dr Stephen Taylor, Tom Roberts and Dr Julia Davies.

Front cover image

Common coral trout (*Plectropomus leopardus*)

