

# Annual status report

## Coral Reef Finfish Fishery

2006



The Department of Primary Industries and Fisheries (DPI&F) seeks to maximise the economic potential of Queensland's primary industries on a sustainable basis.

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## Introduction

The Coral Reef Finfish Fishery (CRFF) is a line-only fishery that targets a range of bottom-dwelling reef fish. It consists of a lucrative live-fish commercial fishery 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) working independently from a mother-boat. A comprehensive management system, including an individual transferable quota system, is in place for the commercial fishery to ensure its sustainability into the future.

This report covers the period up to 30 June 2006, reflecting the commercial quota year, which operates 1 July – 30 June.

### Fishery profile 2005–06

**Total harvest from all sectors in 2005–06:** Approximately 4280 t

**Commercial harvest in 2005–06:** Approximately 1544 t

**Recreational harvest 2005:** Approximately 2601 t

**Indigenous harvest 2000–01:** Approximately 108 t

**Charter harvest 2005:** 27 t

**Commercial Gross Value of Production (GVP):** Approximately \$33 million

**Number of licences:** 412 RQ fishing endorsements across the L1, L2, L3, L6, L7 & L8 fisheries. 376 charter licences.

**Commercial boats accessing the fishery:** 373 primary vessels and 718 Reef Quota (RQ) endorsed tenders (dories). Approximately 411 charter boats.

**Fishery season:** Coral reef finfish are caught all year round. There are three 9-day closures that occur between October and December each year.

## Description of the fishery

### Fishing methods

The CRFF is a line fishery, in which 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.

## Fishing area

Commercial operators with an RQ fishery symbol and who possess a line fishing endorsement in the form of an 'L' fishery symbol (i.e. L1, L2, L3, L6, L7 and L8<sup>1</sup>) are permitted to take coral reef species in east coast Queensland waters. The line symbol they are operating under dictates the area in which they can fish (Figure 1).

## Main management methods used

Management of the Coral Reef Finfish Fishery is the responsibility of the Department of Primary Industries and Fisheries (DPI&F). A comprehensive set of management arrangements is in place under the Fisheries (Coral Reef Fin Fish) Management Plan 2003 to manage the total harvest of coral reef finfish. These include:

- limited entry into the commercial fishery
- a total allowable catch (TAC) for the commercial sector, separated into commercial TACs for coral trout, red throat emperor and 'other coral reef finfish species', the commercial TACs are shared through individual transferable quotas
- a range of minimum and maximum fish size limits that apply to both the recreational sector and the commercial sector
- a range of recreational in-possession limits for key species, including a number of 'no-take' species (barramundi cod, potato cod, Queensland groper, Chinaman fish, hump-headed Maori wrasse, paddletail and red bass)
- a combined recreational in-possession limit of 20 coral reef finfish
- three annual nine-day spawning closures that apply fishery-wide.

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 and Zoning Plans.

## Approximate allocation between sectors

In the 2005–06 period, the recreational sector harvested more of the total coral reef finfish product (approximately 61%) than the commercial, Indigenous and charter sectors combined (approximately 39%).

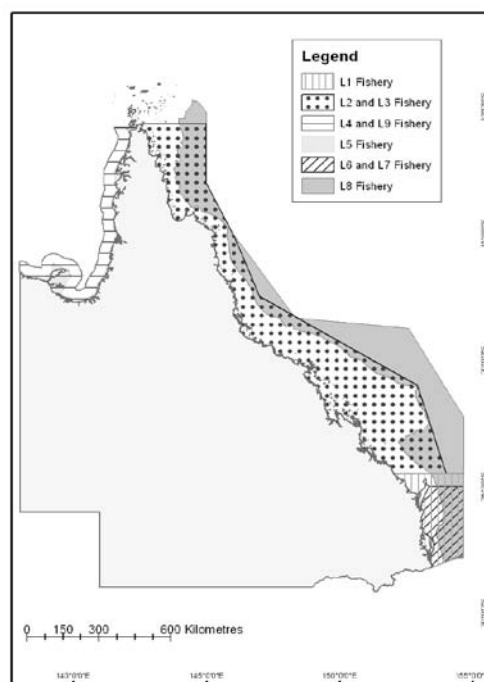


Figure 1: Map of line fishery areas.

<sup>1</sup> L8 deepwater fishery is reported as a separate fishery under DPI&F's EPBC requirements.

## Fishery accreditation under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)

A Wildlife Trade Operation (WTO) approval, acknowledging that the fishery was being managed in an ecologically sustainable manner, and allowing the continued export of coral reef finfish caught in Queensland, was granted in November 2005 under Part 13A of the EPBC Act. This approval expires in November 2008.

## Catch statistics

### Commercial

The annual commercial catch and effort information for the CRFF has historically exhibited a varied trend in catch per unit effort, based on market demand. Figures 2–4 show that there was a significant take-up of latent commercial fishing effort in the fishery during the 1990s, and a more recent increase in effort in 2000–01. The decrease in both catch and effort evident in 2003–04 may be a reflection of management changes that were implemented in December 2003, prohibiting operators from fishing in the CRFF if they did not hold an RQ symbol. The continued decrease in catch and effort in 2004–05 is most likely the result of the introduction of a quota to the fishery, and the increase in areas closed to the fishery in July 2004 through the Great Barrier Reef Marine Park Authority (GBRMPA) Representative Areas Program (RAP) rezoning. In Figures 2–4, catch and fishing effort for coral trout (CT), red throat emperor (RTE) and other reef finfish species (OS) is displayed as a function of both days and dory days<sup>2</sup> to provide greater resolution of actual effort.

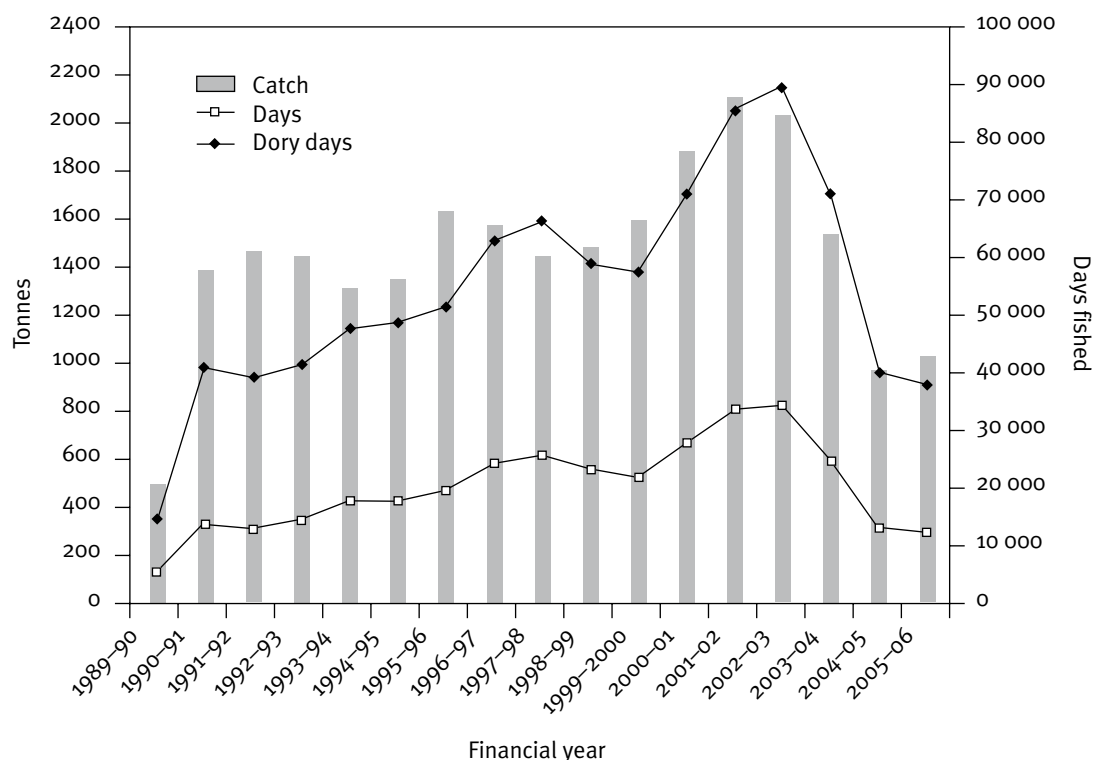


Figure 2: Total commercial catch and effort (days and dory days) of coral trout species, 1989–2005.

<sup>2</sup> Dory days represent the number of both primary vessels and dories accessing the fishery.

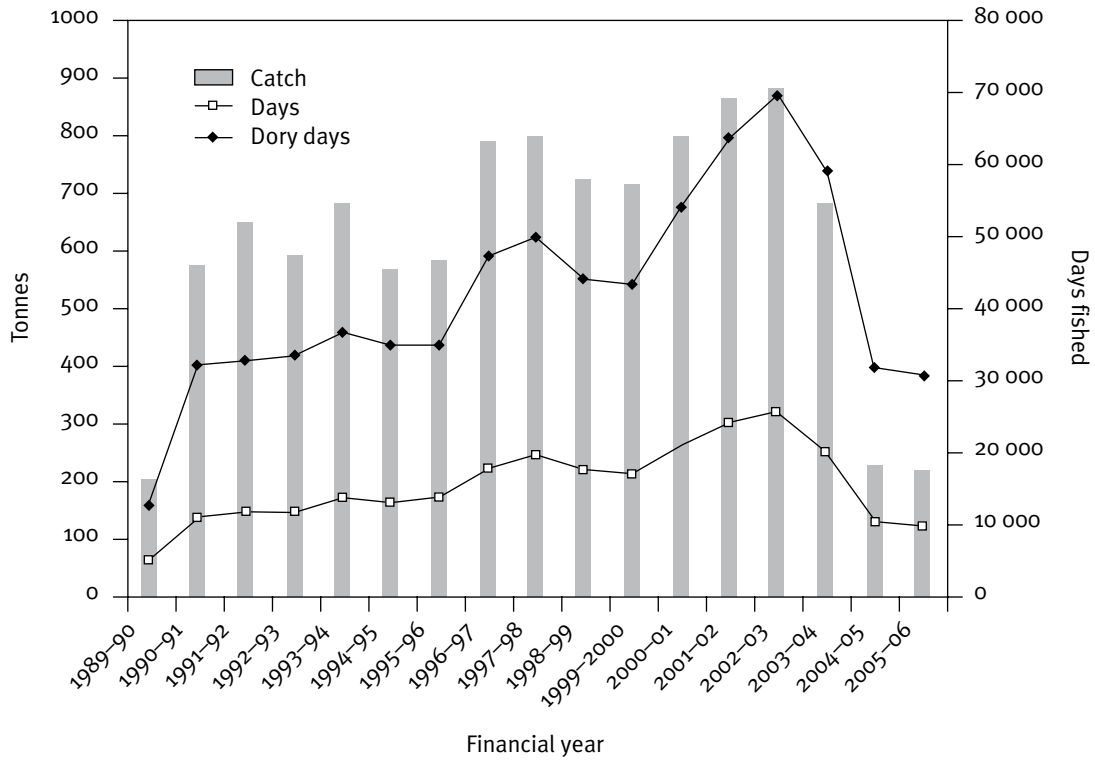


Figure 3: Total commercial catch and effort (days and dory days) of red throat emperor, 1989–2005.

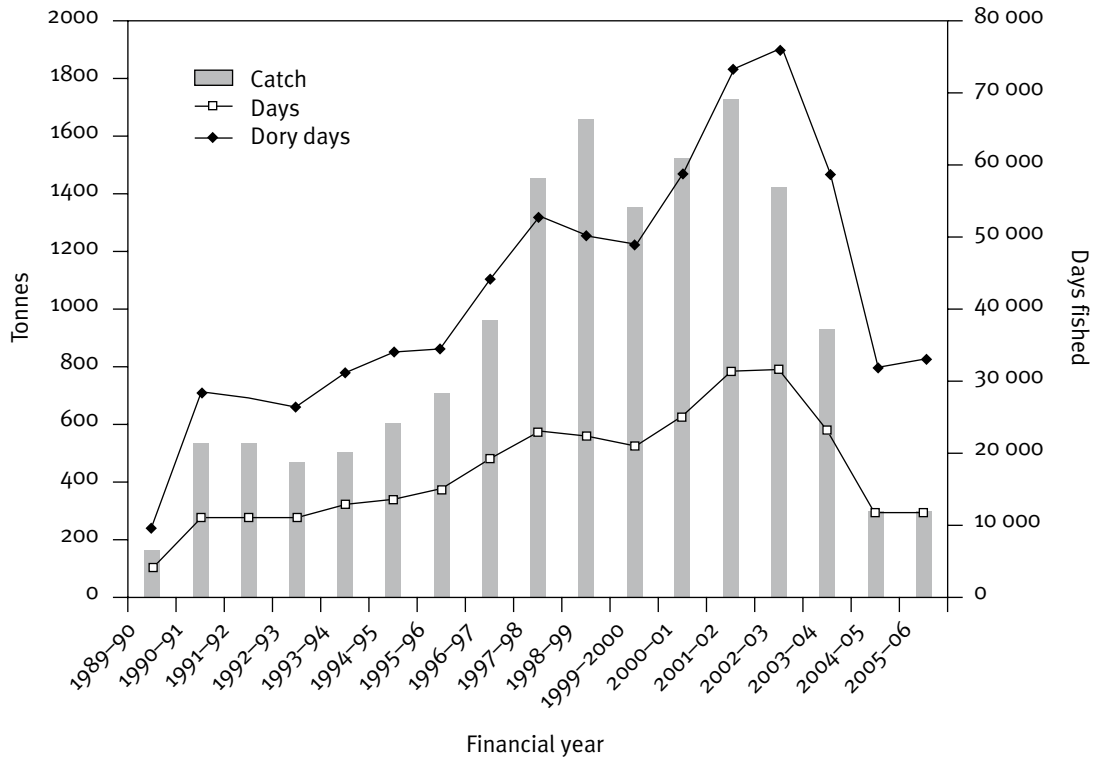


Figure 4: Total commercial catch and effort (days and dory days) of 'other' coral reef finch species, 1989–2005.

### Under-catch of quota

Management arrangements for the coral reef finch fishery are based on a commercial TAC of 3158 t<sup>3</sup> shared among commercial fishers through Individual Transferable Quotas (ITQs) for coral

3 This figure reflects the current allocated quota in the CRFF and supersedes the actual legislated TAC of 3061 t.

trout, red throat emperor and other reef finfish species. With the introduction of the catch quota system, a quota reporting system was established that requires commercial fishers to report trip catches to DPI&F before landing.

There are several factors that have collectively contributed to the reduction in the total catch and effort for coral reef species in the commercial fishery since 2003. These include:

- adjustment with the introduction of the commercial TAC and the associated administrative requirements
- further closures to areas within the Great Barrier Reef, through rezoning of the Marine Park in 2004
- inclement weather
- rising fuel prices
- environmental events (Cyclone Katrina, Gladstone Harbour oil spill)
- difficulty in employing and maintaining reliable crew, given increasing employment opportunities in the mining industry
- increased competition from imports.

The total number of CT, RTE and OS units available for use in the commercial fishery has been reduced by the buyback of units by the Department of the Environment and Water Resources (DEW) under the GBRMP Structural Adjustment Package. DEW now holds approximately 10% of the total number of CT units (1 409 811), RTE units (689 673) and OS units (1 058 273), reducing the TAC available to industry to 1 279 472 CT units, 616 936 RTE units, and 958 735 OS units.

The rezoning of the GBRMP was implemented at the same time as the catch quota system on 1 July 2004. The result of the rezoning was the additional closure of approximately 30% of reef and shoal habitat in the GBRMP to fishing, an increase from reef closures of 21% before the RAP.

Table 1 shows the reported catch for the 2005–06 quota year and the percentage of total quota used for the period. Current market drivers are for live CT, which presently attracts a price of around \$40/kg. Currently, whole or fillet RTE and OS attract around \$6–\$12/kg, resulting in the shift toward the live coral trout product and resulting low quota usage for other reef finfish.

Table 1: Percentage of quota used for CT, RTE and OS in the 2005–06 financial year

	<b>Allocated quota</b>	<b>Quota minus DEW holdings</b>	<b>Total catch</b>	<b>% of quota used</b>
CT	1 409 811	1 279 472	1 134 300	89
RTE	689 673	616 936	215 157	35
OS	1 058 273	958 735	324 948	34

Using fishing effort (dory days) and catch (kg) data, catch per unit effort (CPUE) of the three quota groups was compared. CPUE of all three groups shows an overall declining trend through the 1990s until the inception of a TAC in July 2004 (Figure 5). For RTE and OS, the CPUE has stabilised in the first two quota years. For CT, the CPUE has shown a marked increase from the pre-quota level of 61.5 kg/dory day in 2003 to 83.5 kg/dory day in 2005.

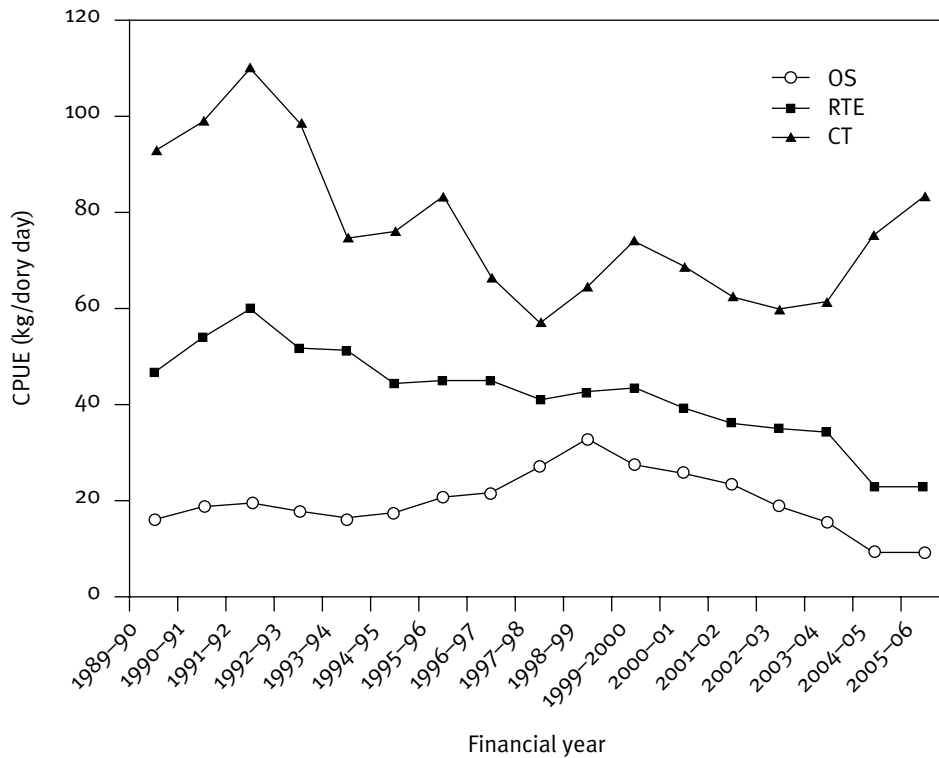


Figure 5: Standardised catch per unit of effort (kg/dory day)

## Recreational

Recreational fishers are restricted to a maximum of three fishing lines and six hooks (total) in all Queensland waters, and may spearfish coral reef finfish without the use of SCUBA. DPI&F undertakes regular estimates of recreational catch through the Recreational Fisheries Information System (RFISH) program, which is made up of a telephone surveys to estimate participation, and volunteer fishing diaries that provides details of catches. Table 2 summarises the catch data collected through the program. The percentage released is the proportion of the total number of fish caught that are subsequently released. The number harvested is the number retained.

Catch estimates of most groups of coral reef finfish in 2005 are lower than in previous years. Between 2002 and 2005, changes to fish size and in-possession limits as a result of the Fisheries (Coral Reef Fin Fish) Management Plan 2003 meant that anglers were required to release more fish. Additionally, large declines between 2002 and 2005 in some iconic species such as coral trout (41%) and red throat emperor (43%) may be due to decreases in participation (the number of people fishing) in some regions<sup>4</sup> (e.g. Far North—42% decrease between 2001 and 2004). Contrasting with these decreases in participation was an 81% increase in the number of emperors (sweetlips) caught. The weights of the various species and species groups were based on average lengths of recreationally caught species reported through the Fisheries Long Term Monitoring Program (LTMP). These lengths were then converted to weights using published length–weight relationships. Where average length information was not available, the minimum legal length was used.

<sup>4</sup> RFISH regions (statistical divisions) can be seen in Figure 1 of McInnes, K (ed.), *2004 biennial recreational fishing telephone survey of Queensland residents*. Department of Primary Industries and Fisheries, Brisbane, Queensland.

Table 2: Recreational catch estimates in the 4 diary rounds for coral reef finfish

Species	Details	Diary round			
		1997	1999	2002	2005 <sup>5</sup>
Coral trout	No. harvested (% released)	306 000 (45%)	329 519 (44%)	332 666 (47%)	196 415 (49%)
	Est. weight of harvest (kg)	601 688	647 933	654 121	386 211
Red throat emperor	No. harvested (% released)	N/A	171 237 (49%)	155 042 (51%)	88 948 (56%)
	Est. weight of harvest (kg)	N/A	227 916	206 361	118 390
Red emperor	No. harvested (% released)	N/A	N/A	88 360 (69%)	52 204 (82%)
	Est. weight of harvest (kg)	N/A	N/A	393 467	232 464
Emperors (sweetlips)	No. harvested (% released)	719 000 (52%)	861 463 (53%)	638 682 (57%)	1 155 871 (68%)
	Est. weight of harvest (kg)	1 147 524	1 374 895	850 086	1 844 770
Hussar	No. harvested (% released)	N/A	N/A	116 238 (40%)	110 526 (65%)
	Est. weight of harvest (kg)	N/A	N/A	29 873	28 405
Nannygai	No. harvested (% released)	N/A	N/A	103 824 (51%)	123 905 (63%)
	Est. weight of harvest (kg)	N/A	N/A	162 277	193 664
Parrot	No. harvested (% released)	N/A	N/A	275 557 (55%)	155 046 (56%)
	Est. weight of harvest (kg)	N/A	N/A	248 001	139 541
Tropical snappers (numbers include hussar and nannygai)	No. harvested (% released)	720 000 (61%)	893 979 (53%)	676 431 (65%)	629 908 (72%)
	Est. weight of harvest (kg)	971 280	1 205 978	912 505	849 746
Cods	No. harvested (% released)	558 000 (56%)	569 695 (53%)	559 030 (63%)	374 106 (72%)
	Est. weight of harvest (kg)	599 850	612 422	600 957	402 164

<sup>5</sup> Recreational catch data for 2005 is a preliminary estimate. The Australian Bureau of Statistics is currently calculating the associated standard errors for estimated recreational harvest.

## Charter

A significant proportion of the Queensland charter sector is involved in providing services to recreational fishers targeting CRFF species. The compulsory logbook program for the tour and charter operators was introduced in 1996. Logbook-reported catch indicates that almost half the number of fish caught during charter operations are OS species, with coral trout and red throat emperor contributing approximately 50% combined (Figure 6). The increase in reported catches in 1999 could be due to charter operators being more diligent in the completion of their logbooks, with the CVo3 and CVo4 (QFMA/GBRMPA trial logbook) released in January 1999. The CVo4 was designed to obtain a greater resolution of charter fishing catch and effort in the GBRMP.

In 2005, a total of 2978 days were spent fishing for RQ species by charter operators. There are currently 376 charter licences; however, it is unlikely that all operators access the CRFF. It is estimated that in 2005 approximately 113 operators were active in the CRFF, with the remaining targeting non-RQ species.

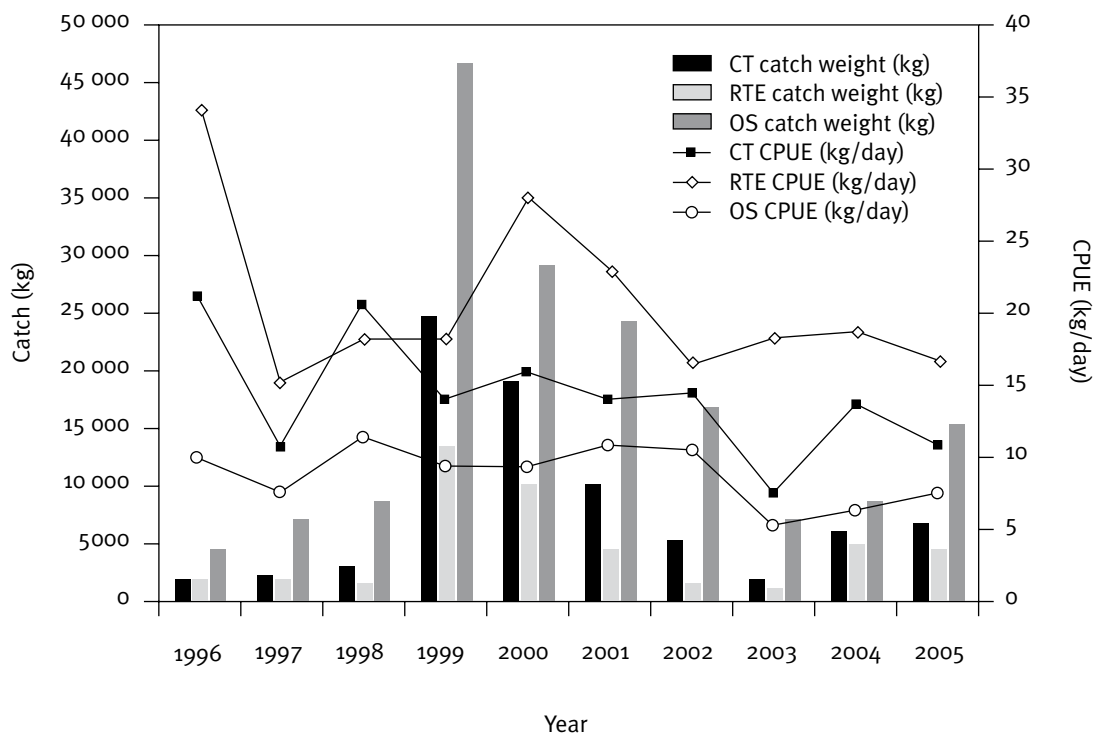


Figure 6: Charter catch of CT, RTE and OS species as reported in logbooks by calendar year, 1996–2005.

## Indigenous

Limited information is available on the total catch of coral reef finfish by Indigenous fishers. The National Recreational and Indigenous Fishing Survey (NRIFS) did provide some preliminary information, suggesting that approximately 7000 coral trout, 38 000 snappers, 9000 emperors, 12 000 cods and 9000 wrasse/groper were taken by Queensland Indigenous communities in 2000–01.

This suggests that the catch of coral reef finfish by Indigenous fishers is significant. Using 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 catches of CRFF product is taken from areas within the GBRMP. In response to the 2004–05 changes to management arrangements, quota introduction, and the GBRMPA RAP process, the spatial distribution of catch and effort in the fishery has changed significantly. Average annual pre-2004 catch per Commercial Fisheries Information System (CFISH) 30 nm (2000–01, 2001–02 and 2002–03 financial years) was compared with the 2004–05 catch from the same grids. The percentage change of catch per 30 nm grid was mapped (Figure 7). The map indicates that the catch in inshore regions has decreased substantially, and decreased to a lesser extent in the mid-reef sections.

The percentage change between the 2004–05 and 2005–06 periods (Figure 8) was assessed based on 6 nm resolution data. Fishing pressure in general shifted from one site to another adjacent site.

There is, however, a noticeable area of increased catch east of Mackay, with an increase in catch of more than 200% in some sites. Anecdotal evidence<sup>6</sup> suggests that fishers may be targeting this region because of large concentrations of 'pink' coral trout, which fetch higher prices than other coloured varieties. Areas also showing increases in effort are north of Cairns (up to 380% increase) and near Gladstone (315% increase).

The maps exclude any difference less than 1 t.

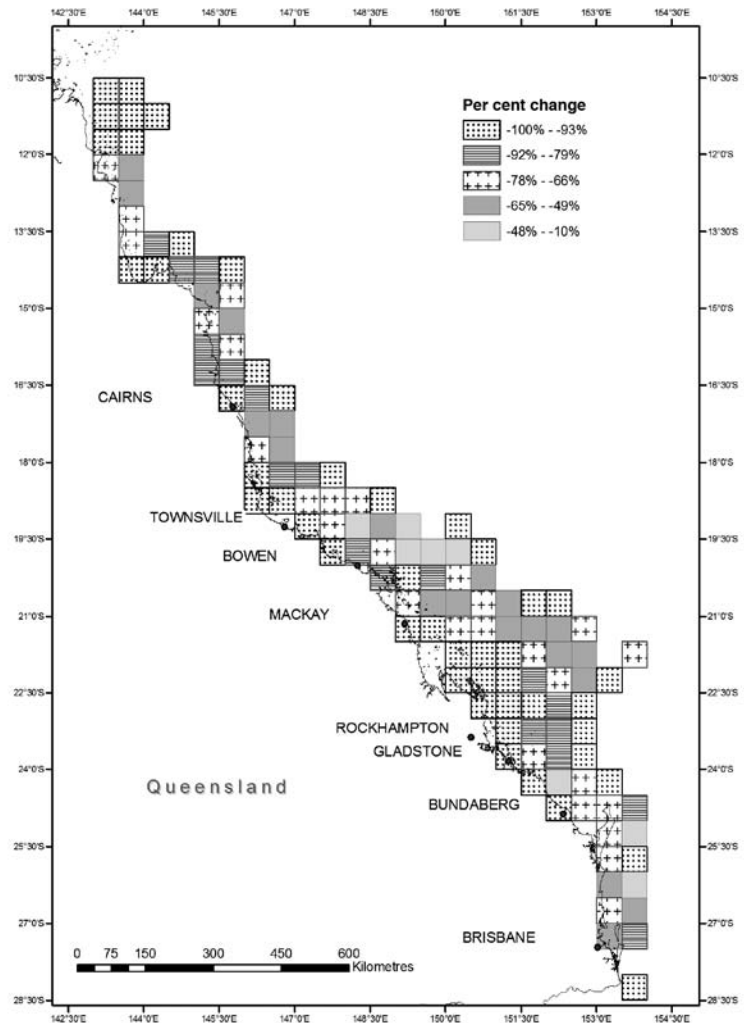


Figure 7: Percentage change in average catch from the 2000–01 to 2002–03 periods when compared with the 2004–05 period per 30 nm grid.

6 S Pickett (Department of Primary Industries and Fisheries), pers. comm., February 2007.

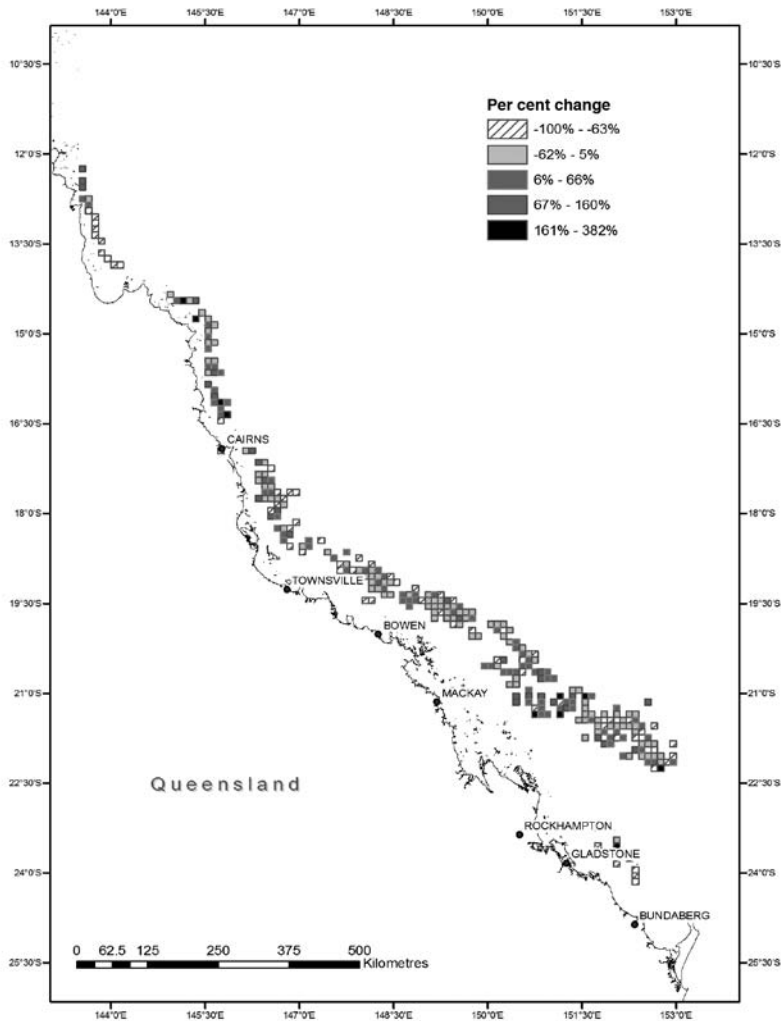


Figure 8: Percentage change in average catch between the 2004–05 and 2005–06 periods per 6 nm site.

## Socio-economic characteristics and trends

The price obtained for coral reef finfish depends on the species and product form. The fishery has seen a significant expansion in the live coral trout fish trade over the last decade (Figure 9), particularly within the Asian markets, where high prices are fetched for top-quality live coral trout. The other species harvested, including red throat emperor and those included in the ‘other species’ category, are almost totally focused on the domestic market. Exporters are attempting to develop overseas markets for some of these species. Most of the domestic market requires the product to be in the fillet form, placing it in direct competition with imported product.

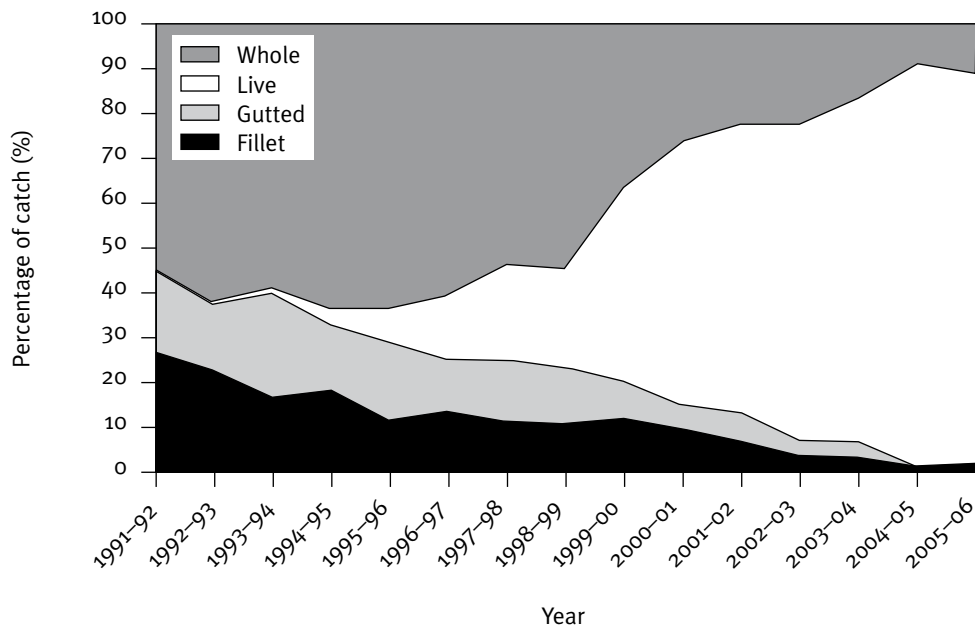


Figure 9: Product form of coral trout from financial year 1991-92 to 2005-06.

There has been some readjustment of quota for each of the three categories, with some degree of trading of the quota, and this may have affected fishery performance. There has been a downward adjustment in the cost to lease quota for all species groups.

The effect of the RAP on reef line fish production is expected to reduce the potential (quota) harvest of reef fish by more than 25% in the short to medium term. There are indications that the effect of area closures adjacent to major ports is one of the factors reducing the supply of reef fish to processors and exporters.

There is a shortage of people prepared to work in the line fishery because of competition for labour (particularly from the mining industry). There is also a perception that management changes have made it impossible to earn a good income as a deck hand. Another concern is that the prohibition on filleting on board (without permits) has made it less worthwhile to harvest a product that is mainly sold in fillet form. Processors need to skin fillets to meet market demand and this has reduced the price being offered to fishers for skin-on fillets by up to 20% compared with skinned fillets. Restricting the capacity of fishers to fillet at sea and the skin-on provision have been necessary in order to ensure the integrity of the Coral Reef Fin Fish Management Plan.

The coral trout quota is expected to be close to filled in the 2006-07 financial year, assuming that fuel prices remain at about current levels and quota holders can obtain labour to land the reef fish.

## Fishery performance

### Appraisal of fishery in regard to sustainability

The Coral Reef Finfish Fishery is managed by means of one of the most comprehensive quota systems in place in Australia. This management framework allows for continual refinement and improvement to ensure an ecologically sustainable fishery. In 2006 a stock assessment of the Queensland east coast red throat emperor (*Lethrinus miniatus*) was published<sup>7</sup>. The assessment

<sup>7</sup> Leigh, G, Williams, A, Begg, G, Gribble, N, and Whybird, O 2006, *Stock assessment of the Queensland east coast red throat emperor (Lethrinus miniatus) fishery*, Department of Primary Industries and Fisheries, Brisbane, Australia.

concluded that, if the 2003 harvest levels are not exceeded in future years, the red throat emperor population is expected to recover to levels that are healthy by the standards of most of the world's fisheries. Commercial catches of RTE continued to decline in the 2005–06 period. The existing east coast population was found to consist of large numbers of fish of reproductive age that are not subject to fishing pressure because of area restrictions.

Currently, an updated Management Strategy Evaluation (MSE) for the CRFF based on the Effects of Line Fishing Simulation model (ELFSim) is under way, which will improve the basis for management advice on common coral trout and red throat emperor. The ELFSim model allows various alternative management options to be tested through population simulation, and the outcomes to be evaluated. A Fisheries Research and Development Corporation (FRDC) project, *Development of an individual transferable catch quota model for the Coral Reef Fin Fish Fishery of the Great Barrier Reef*, builds on the ELFSim model to assess the effects of the ITQ system on the simulated coral trout and red throat emperor populations. It is proposed that a Stock Assessment Module for the common coral trout (*Plectropomus leopardus*) be developed that runs on the simulated populations produced by ELFSim, with the outcomes used to tailor the collection of fishery-independent data and eventually lead to a full stock assessment of the commercial stock. The enhancement of the Management Strategy Evaluation will be trialled in lieu of a traditional stock assessment to potentially provide a greater certainty in the sustainability of the fishery.

### **Progress in implementing Department of the Environment and Water Resources (DEW) recommendations**

DEW made a range of recommendations to DPI&F during its assessment of the fishery in order to address perceived risks or uncertainties. Details of the progress DPI&F has made in implementing each of these recommendations are provided in Table 3. At the ReefMAC Scientific Advisory Group (SAG) in August 2006, draft performance measures were developed. The performance measurement system (PMS) is to be finalised in 2007 and will then be applied to the fishery post-submission to DEW and reported on annually. The PMS will function as the reporting framework for review events for the fishery.

Table 3: Implementation progress of DEW recommendations for the Coral Reef Finfish Fishery

Recommendation	Progress
<p>DPI&amp;F to inform DEW of any intended amendments to the management arrangements that may affect sustainability of the target species or negatively impact on bycatch, protected species or the ecosystem.</p>	<p><i>Ongoing</i></p> <p>No changes were made to management arrangements in 2005–06.</p>
<p>From 2006, DPI&amp;F to report publicly on the status of the CRFF on an annual basis including explicitly reporting against each performance measure.</p>	<p><i>Ongoing</i></p> <p>This annual status report is the first to be completed for the fishery since its WTO approval was gazetted in late 2005.</p>
<p>DPI&amp;F to reassess the review events in the Management Plan to ensure their appropriateness, that they are quantitative where possible and they are consistent with the application of operational objectives for the fishery. By December 2006, DPI&amp;F is to establish revised objectives, performance measures and indicators for bycatch, protected species and impacts on the ecosystem.</p>	<p><i>In progress</i></p> <p>Review events currently set out in the Fisheries (Coral Reef Finfish) Management Plan 2003 are being reassessed and incorporated into a PMS for the fishery. The PMS will function as the reporting framework for review events for the fishery. The SAG has developed a draft of the PMS and, after further work, this will be provided to DPI&amp;F after endorsement by ReefMAC.</p>
<p>DPI&amp;F to monitor the status of the fishery in relation to the review events and performance measures. Within three months of becoming aware that a review event has been triggered, the DPI&amp;F to finalise a clear timetable for the implementation of appropriate management responses.</p>	<p><i>Ongoing and under review</i></p> <p>Review events currently set out in the Fisheries (Coral Reef Finfish) Management Plan 2003 are being reviewed and will be incorporated as appropriate into a PMS for the fishery. Current legislated review events will continue to be monitored.</p>
<p>DPI&amp;F to complete a compliance risk assessment for the CRFF by mid-2006 and implement a risk-based compliance strategy by December 2006, taking into account risks associated with non-compliance with:</p> <ul style="list-style-type: none"> <li>• catch, possession, size and gear limits</li> <li>• reporting of protected species interactions</li> <li>• area and fishery closures</li> <li>• quota limits.</li> </ul>	<p><i>Complete</i></p> <p>A compliance risk assessment was completed in June 2006 to determine compliance priorities and facilitate effective use of Queensland Boating and Fisheries Patrol (QBFP) resources. The risk assessment identified violation of size and in-possession limits; recreational fishers taking fish for commercial purposes; violation of GBRMP zoning provisions; and failure to keep required/accurate information as the highest priorities for enforcement and compliance in the fishery. There were a number of activities rated as having a moderate risk, which are also being addressed. Detailed strategies to address the risks identified by this assessment were developed through the QBFP strategic and operational planning processes and first implemented in July 2006.</p>

<p>DPI&amp;F to implement a program to validate logbook data by June 2006. DPI&amp;F to ensure that the program enables collection of information on the composition of 'other coral reef fin fish' sufficient for DPI&amp;F to monitor and respond to changes in the composition of this group.</p>	<p><i>Complete</i></p> <p>Validation of logbook data for the CRFF was completed in June 2006 using quota monitoring and observer coverage. A composition list of OS species was developed using CFISH and is continually monitored by using independent observer program data. A new logbook covering a broader range of OS species will also be introduced in 2007.</p>
<p>By end 2006, DPI&amp;F to develop a robust and regular fishery assessment process that provides a basis for management decisions which are precautionary and recognise the uncertainty and level of risk. The assessment process will examine the ecological sustainability of the take of coral trout (<i>Plectropomus leopardus</i>) and red throat emperor (<i>Lethrinus miniatus</i>) using robust stock assessments.</p>	<p><i>In progress</i></p> <p>An updated Management Strategy Evaluation (MSE) for the CRFF based on the Effects of Line Fishing Simulation model (ELFSim) is currently being undertaken, which will improve the basis for management advice on common coral trout and red throat emperor. Although not a traditional stock assessment, the ELFSim model allows various alternative management options to be tested through simulation, and the outcomes evaluated.</p> <p>In 2005, DPI&amp;F in conjunction with CRC Reef completed a stock assessment of red throat emperor using an age-structured model incorporating information on catch, CPUE and age structure.</p>
<p>Within 18 months, DPI&amp;F to undertake a risk assessment to identify 'other coral reef fin fish' most at risk from the fishery. Actions seeking to reduce risk to be implemented as appropriate within a further 12 months.</p>	<p><i>In progress</i></p> <p>In January 2007 DPI&amp;F undertook a risk assessment workshop. Outcomes were presented to the SAG in March 2007. Actions arising will be considered for implementation in late 2007.</p>
<p>DPI&amp;F to develop a process to improve estimates of recreational take and factor this into stock assessments and management controls to ensure overall catch levels are sustainable.</p>	<p><i>In progress</i></p> <p>DPI&amp;F employed an Australian Bureau of Statistics (ABS) consultant in 2005 to:</p> <ul style="list-style-type: none"> <li>a) review discrepancies between RFISH surveys and the National Recreational and Indigenous Fishing Survey (NRIFS)</li> <li>b) investigate possible new methods to improve future RFISH surveys.</li> </ul> <p>A preliminary investigation into the power of the data collected through the RFISH program, in the context of whether it could be converted to the location of catch rather than the location of residence, was also undertaken. A workshop conducted in April 2006 identified areas where improved estimates of recreational participation and catch can occur, and appropriate survey methods to be applied. The RFISH program plans to implement a regional survey method by late 2007.</p>

<p>DPI&amp;F to reassess the appropriateness of the total allowable commercial catches for the main target species and 'other coral reef fin fish', taking into account the outcomes of the stock and risk assessments for CRFF species by end 2007.</p>	<p><i>In progress</i></p> <p>An ecological risk assessment workshop for OS species in the CRFF was undertaken in January 2007.</p>
<p>DPI&amp;F to review current management arrangements and ensure that adequate protection is being given to spawning stocks of the main target species.</p>	<p><i>In progress</i></p> <p>DPI&amp;F, in consultation with the Reef Management Advisory Committee, intends to assess the effectiveness of closures to protect spawning stocks for a range of line fisheries in the context of all spatial and temporal closures that impact on those fisheries. The objectives of spawning closures, including biological, economic and social objectives, will be established as part of this review.</p>
<p>DPI&amp;F to use the results of stock and risk assessments, and research projects, to review the need for specific bycatch management measures and introduce effective and appropriate methods to reduce bycatch, or increase survivability, as needed.</p>	<p><i>In progress</i></p> <p>An FRDC-funded research project to determine the impacts of barotrauma on release survival of six tropical reef fish species (<i>Plectropomus</i> spp., <i>Lethrinus miniatus</i>, <i>Le. laticaudis</i>, <i>Lutjanus sebae</i>, <i>Lu. malabaricus</i> and <i>Lu. erythropterus</i>) is due for completion in July 2007. The project has provided information on fish handling techniques to be communicated to industry via newsletter, website and other media through a national communication strategy on enhancing fish survival. Final results and recommendations will be available to industry and management shortly after July 2007. DPI&amp;F's observer program is also delivering some information on discards in the CRFF which will be considered in determining the magnitude of bycatch.</p>
<p>DPI&amp;F to continue to work with industry and other management agencies to reduce the impact of the CRFF on the broader ecosystem, including impacts relating to anchoring.</p>	<p><i>Ongoing</i></p> <p>Bycatch levels in the fishery are low, which has been reinforced by data collected through the observer program. Industry, through the Queensland Seafood Industry Association (QSIA), is also undertaking to implement a code of practice that will focus on appropriate methods for the release of bycatch.</p>

## Management performance

A number of review events are included in the Fisheries (Coral Reef Fin Fish) Management Plan 2003 and are designed to monitor the performance of management arrangements in the CRFF. Although these review events are currently being reassessed for inclusion in a PMS, they have been reported against this year. A review event was triggered for the commercial fishing tour (charter sector), as per review event (c)(ii).

Charter fishing effort in a region<sup>8</sup> (Figure 10) in a year was found to have increased more than 20% from the preceding year in several regions.

The data analysed was sourced from the calendar years 2004, 2005 and 2006.

The use of proportional changes as a trigger is problematic when dealing with small numbers. For example, the total number of days fished in the Sub Tropical, the Swains and the Far Northern regions for the charter sector increased between the 2005 and 2006 calendar years by more than 20%. However, the number of days recorded in the Far Northern region, for example, increased only from 1 to 6 days. The total number of days fished between the 2004 and 2005 calendar years in the Capricorn Bunkers, Mackay, Townsville and Cairns regions for the charter sector also increased by more than 20%. Further analysis of effort data showed that significant shifts in effort occurred in only two regions—the Swains and Cairns—over the three-year period.

DPI&F became aware of the trigger in April 2007. Within three months of becoming aware that a review event has been triggered, DPI&F is required to finalise a clear timetable for implementation of appropriate management responses, and this is in progress. The results of a detailed analysis of the catch data will be reported to the ReefMAC, and the MAC will then recommend to the DPI&F an appropriate management response.

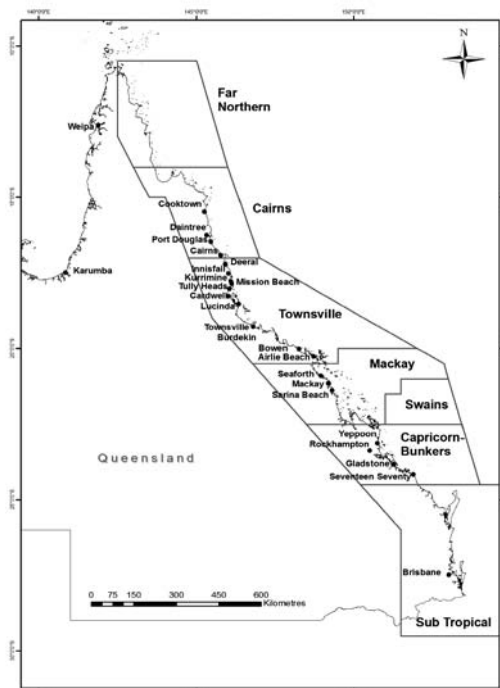


Figure 10: Queensland regional boundaries.

<sup>8</sup> 'Region' in the Fisheries (Coral Reef Fin Fish) Management Plan 2003 refers to an area described as a region in the document titled 'A description of commercial reef line fishery logbook data held by the Queensland Fisheries Management Authority', prepared by Mapstone, BD, McKinlay, JP, and Davies, CR, 1996, James Cook University, Queensland.

Table 4: Review events and outcomes for the Coral Reef Finfish Fishery in 2005–06

Review event	Measured	Performance
<p>(a) Reliable information shows—</p> <p>(i) the estimated abundance of coral trout or red throat emperor has, in each of the last three years, decreased from the preceding year; or</p> <p>(ii) the fish size and age distribution of coral trout or red throat emperor in a region have, in each of the last three years, changed from the preceding year; or</p> <p>(iii) the fishery is having a significant impact on stocks of other coral reef finfish.</p>	<p>(a)</p> <p>(i) N/A</p> <p>(ii) N/A</p> <p>(iii) N/A</p>	<p>(a)</p> <p>(i) Quota introduced in 2004–05; therefore CFISH data not able to be analysed until the 2006–07 year completed.</p> <p>(ii) Structured line surveys have been conducted for two years as part of the LTMP. Ageing of the collected otoliths is planned to begin in 2007.</p> <p>(iii) An ecological risk assessment for ‘other coral reef finfish’ will be undertaken in 2007.</p>
<p>(b) Reliable information shows any of the following—</p> <p>(i) the estimated abundance of other coral reef finfish has, in each of the last three years, decreased from the preceding year;</p> <p>(ii) the fish size and age distribution for other coral reef finfish have, in each of the last three years, changed from the preceding year;</p> <p>(iii) the level of bycatch of coral reef finfish regulated by species has increased by more than 10% in a four-year period.</p>	<p>(b)</p> <p>(i) N/A</p> <p>(ii) N/A</p> <p>(iii) N/A</p>	<p>(b)</p> <p>(i) Quota introduced in 2004–05; therefore CFISH data not able to be analysed until the 2006–07 year completed.</p> <p>(ii) Structured line surveys have been conducted for two years with samples of stripey snapper collected. Ageing of the otoliths is planned to begin in 2007.</p> <p>(iii) Bycatch information has not yet been collected for a four-year period (DPI&amp;F Observer Program).</p>
<p>(c) Information in statistical returns required under the Act shows any of the following for the fishery—</p> <p>(i) recreational catch, including recreational catch from commercial fishing tours, in the fishery increased more than 10% in a four-year period;</p> <p>(ii) commercial fishing, or recreational fishing on commercial fishing tours, in a region in a year increased more than 20% from the preceding year;</p>	<p>(c)</p> <p>(i) <i>Not triggered</i></p> <p>(ii) <i>Triggered</i></p>	<p>(c)</p> <p>(i) Recreational and charter catch has declined in the last four years.</p> <p>(ii) Commercial fishing tour effort days increased more than 20% in various regions between the 2004, 2005 and 2006 calendar years. Commercial fishing effort remained stable.</p>

<p>(iii) the average commercial catch of coral trout, red throat emperor or other coral reef finfish in a region in each of the last three years decreased from the preceding year;</p> <p>(iv) a significant decrease in participation in commercial fishing tours in a period of at least three years.</p>	<p>(iii) N/A</p> <p>(iv) <i>Not triggered</i></p>	<p>(iii) Quota introduced in 2004–05; therefore CFISH data not able to be analysed until the 2006–07 year completed.</p> <p>(iv) Commercial fishing tour participation has increased over the last three years.</p>
<p>(d) Reliable information shows—</p> <p>(i) a significant decrease in community compliance with this plan; or</p> <p>(ii) increased significant community dissatisfaction with management of the fishery and opportunity for fishing in the fishery.</p>	<p>(d)</p> <p>(i) <i>In progress</i></p> <p>(ii) N/A</p>	<p>(d)</p> <p>(i) Development of the QBFP community compliance strategy was upgraded in 2005–06.</p> <p>(ii) Community satisfaction is currently gauged by general consensus through the DPI&amp;F call centre.</p>
<p>(e) Reliable information from an economic study about the fishery shows a significant decrease in the fishery’s economic efficiency.</p>	<p>(e) N/A</p>	<p>(e) An economic study of the fishery has not been undertaken.</p>
<p>(f) Compliance with the requirements under the Act about statistical returns for any of the following decreases progressively or significantly—</p> <p>(i) commercial fishers and commercial fishing tours for the fishery;</p> <p>(ii) holders of RQ licences;</p> <p>(iii) commercial buyers of coral reef finfish.</p>	<p>(f)</p> <p>(i) &amp; (ii) <i>Not triggered</i></p> <p>(iii) <i>Not triggered</i></p>	<p>(f)</p> <p>(i) &amp; (ii) Routine biannual logbook compliance checks show no decrease in compliance.</p> <p>(iii) Routine cross-referencing of Catch Disposal Records shows no decrease in compliance.</p>
<p>(g) The chief executive does not receive information about levels of recreational catch and participation for the fishery.</p>	<p>(g) <i>Not triggered</i></p>	<p>(g) Recreational catch information was collected during 2005.</p>
<p>(h) The chief executive reasonably believes information given to the chief executive by commercial or recreational fishers or commercial fishing tour operators, under the Act is not accurate.</p>	<p>(h) <i>Not triggered</i></p>	<p>(h) Observer coverage in the fishery is helping to validate the information provided by fishers in logbooks. A validation report was completed in 2006 and indicated a satisfactory level of accuracy in reporting.</p>

## **Resource concerns**

There is some uncertainty about the status of ‘other coral reef finfish’ (OS), because of the limited species-level resolution in the catch data from the commercial logbooks. This will be addressed as part of a risk assessment to be undertaken in 2007. Greater resolution of the OS catch reported in logbooks will be realised with the development of a new line fishery logbook for the east coast (LFO5 Version 05). The logbook lists more of the common OS species caught and also provides blank columns for fishers to report greater OS species detail. DPI&F intends to implement the revised logbook mid-2007.

## **Ecosystem**

### **Non-retained species/bycatch**

Bycatch information is currently collected through LTMP structured line surveys, as well as by fishery observers on commercial operations (see Monitoring Programs and Results section).

### **Interactions with protected species**

Commercial operators working under an RQ fishery symbol is required to report interactions with protected species in the Species of Conservation Interest (SOI) logbook. No interactions have been recorded in the logbook by line fishers since its introduction in 2002, because of the low-impact nature of the fishery.

### **Fishery impacts on the ecosystem**

Line fisheries are generally considered benign in terms of their impacts on the broader ecosystem. Anchor damage and boat fuel byproducts have been raised as potential impacts. DPI&F continues to work with staff at the GBRMPA and with the commercial fishing industry to minimise any potential impacts from boating in general.

### **Other ecosystem impacts**

Climate change has recently been linked to increases in the number and extent of coral bleaching events.<sup>9</sup> These events have the potential to impact on local fish populations that rely on reef habitat for refuge or food.

## **Research and monitoring**

### **Recent research and implications**

There have been a number of publications relating to the biology and ecology of coral reef finfish in the 2005–06 period.

Several research projects targeting specific stock structure, population dynamics and post-release mortality in the CRFF were undertaken in 2006, including:

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<sup>9</sup> Berkelmans, R, and Oliver, JK, 1999, *Large-scale bleaching of corals on the Great Barrier Reef*, Coral Reefs, 18: 55–60.

*Stock structure and regional variation in population dynamics of the red throat emperor and other target species of the Queensland tropical reef line fishery*, CRC Reef Research Centre Technical Report No. 61.<sup>10</sup>

This report extends the biological studies of the major target species of the CRFF, built on the logistic support provided by the Effects of Line Fishing (ELF) experiment. It includes age, growth and reproduction studies of the red-throat emperor (*Lethrinus miniatus*), Maori wrasse (*Chelinus undulatus*), barramundi cod (*Cromileptes altivelis*), and common and blue-spot coral trout (*Plectropomus leopardus* and *P. laevis*). This research also involved the application of genetic and microchemistry stock discrimination techniques to the question of stock structure of *L. miniatus* within the Great Barrier Reef.

Results confirmed that all five species examined in this project are protogynous hermaphrodites. In addition, it was demonstrated that common coral trout and red throat emperor have a significant variation in sex structure and reproductive parameters among regions of the Great Barrier Reef and the fishery. The outcomes suggest that future approaches to assessment and management of the fishery incorporate regional differences in population structure of both target and bycatch species.

*National strategy for increasing the survival of released line-caught fish: investigating survival of fish released in Australia's tropical and subtropical line fisheries*, FRDC project 2003/019.<sup>11</sup>

This FRDC-funded research began in August 2003 and focuses on the survival rates of released line-caught reef fish species including coral trout, red emperor, red throat emperor, spangled emperor, and crimson and saddletail snapper. The project is examining the effects of different hook designs and release methods on survival rates, which will help to identify best practice techniques for catching and releasing tropical reef fish.

Preliminary results are that the injury rate among crimson snapper caught on non-offset circle hooks (4.7%) was very much lower than in fish taken on conventional J-hooks (13.3%) or offset circles (14.4%). Alternatively, the injury rate among saddletail snapper caught on offset circle and J-hooks was zero, but it was more than 8% in fish taken on non-offset circle hooks. In the three remaining species tested (red emperor, red throat emperor and coral trout) the design of the hook did not appear to be a major factor in the incidence of hook-related injury.

Fish brought to the surface from depths greater than about 10 m often suffer from barotrauma. In a series of short-term experiments, line-caught fish were treated by venting or shot-lining, after which they were individually tagged and released into large floating enclosures 15 m deep x 2 m in diameter. Tagged control fish were also released into the enclosures without any treatment. After three days the numbers of fish surviving from the treatment and control groups were compared. Of all the species tested, saddletail snapper was the most susceptible to capture- and handling-related mortality, with only 44% of the untreated fish surviving. However, 47% of the fish released by shotline and 60% of vented fish survived, demonstrating the benefit of treating barotrauma with the venting technique. In each of the other key species, survival of vented fish was only marginally higher than that of shot-line released fish.

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<sup>10</sup> Davies, C, Williams, A, Mapstone, B, Benzie, J, van Herwerden, L, Choat, J, Adams, S, Murchie, C, Bean, K, Carlos, G, Tobin, A, and Ackerman, J 2006, CRC Reef Research Centre Technical Report No. 61, CRC Reef Research Centre, Townsville, Australia.

<sup>11</sup> I Brown, Department of Primary Industries and Fisheries, unpublished report, 2007.

## Monitoring programs and results

The DPI&F LTMP provides fishery-independent monitoring of the Coral Reef Finfish Fishery resources. The objectives of the program are to obtain biological and fishery data required to assess the status of the Queensland populations of common coral trout and red throat emperor.

Since 2004 the LTMP has conducted two fishery-independent structured line surveys to collect information on relative abundance, age and size structure for the common coral trout and red throat emperor. Length structure data are also collected for ten additional fishery byproduct species (stripey, red emperor, blue-spot trout, barred-cheeked trout, spangled emperor, small-mouth nannygai, large-mouth nannygai, green jobfish, rosy jobfish and Venus tuskfish).

These first two years of data have indicated a substantial improvement over the previous LTMP monitoring technique, underwater visual census.<sup>12</sup> Benefits include collection of biological information such as sex and age of target species and more accurate length frequency data. The greater numbers of fish collected through structured line catch allows greater statistical power to detect changes in length frequencies and relative abundance. The program is still implementing a number of minor improvements to meet the objectives of the survey—for example, improved inter-annual sampling consistency through standardisation of fishers' skill.

Sample numbers of common coral trout appear adequate to allow comparisons over years of coral trout population structure within each region. Red throat emperor and stripey were also collected in high numbers during the structured line survey. The catch sampling program provides additional samples of legal-sized fish. The use of smaller hooks and targeting of different habitat by the structured line survey may provide greater resolution over a wider range of size classes, including changes in recruitment over years. The numbers of fish collected for the remaining key target species are too low to monitor trends in the population structure.

The age structure, length and reproductive information collected will provide an accurate description of the biological characteristics for the major species harvested. These data are to be used in the future to assess the ecological sustainability of coral trout in the Coral Reef Finfish Fishery.

### *Fisheries Observer Program*

In 2005, DPI&F introduced the Fisheries Observer Program (FOP). The program involves DPI&F staff spending time at sea aboard commercial fishing vessels to obtain independent fisheries data on catch and effort. Other than in developmental fisheries, the program functions on a voluntary basis and relies on a cooperative approach by the observer and industry to meet its aims.

Within the CRFF, the aim of the program is to address specific recommendations included in the export approval of the EPBC Act. Observers collect information on the vessel, the areas fished and the catch composition for the purpose of verification of fisher-submitted logbook information. More specific information is collected regarding the target species of the fishing trip, any byproduct or bycatch that is observed, the fishing methods (and gear) used on the vessel, and any interactions with species of conservation interest (EPBC Act, *Nature Conservation Act 1992* and IUCN-listed species).

In the 2005–06 period, FOP conducted 8 trips on vessels in the CRFF between Cooktown and Gladstone, providing 62 observed fishing days. The observed catch across all regions was a total of 607 fish comprising 64 different species. Table 5 provides a summary of the data per species group.

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<sup>12</sup> Lunow, C, Neil, K, and Caruthers, M, in preparation, Summary of Coral Reef Finfish Survey results 2005, Fisheries Long Term Monitoring Summary Reports, Department of Primary Industries and Fisheries, Brisbane, Australia.

For the 2006–07 financial year, the FOP has allocated 80 sea days which will be split across the CRFF Management Plan regions, based on fishing effort in each region. The FOP’s ability to increase the observed days in any fishery is currently limited by resources, and it is investigating methods for cost-effective expansion. It intends to maintain the voluntary nature of the program and build on the relationships and support currently displayed by this fishery. The CRFF has been added into a ‘three-year rolling plan’ for observation of fisheries. With 25 fisheries operating in Queensland, it has been recognised that attaining adequate levels of observer data in any particular fishery is not feasible if all fisheries sectors are investigated every year. Taking this into account, the CRFF will be a focus of the FOP in 2007 and then again in 2010.

Table 5: The number of CRFF species caught per group recorded by fisheries observers in 2005–06

Species group	Observed catch
Cods/groppers	188
Coral trout	100
Tropical snappers	179
Fusiliers	12
Emperors	103
Wrasse	25
<b>Total</b>	<b>607</b>

## Collaborative research

DPI&F continues to work collaboratively across a range of projects and with a range of organisations to ensure that management is based on the best available information. DPI&F is maintaining effective communication with researchers undertaking coral reef fish research as part of the Marine and Tropical Science Research Facility.

## Fishery management

### Compliance report

During the 2005–06 quota year, a total of 3365 units were inspected in the CRFF. Of these, 768 were commercial vessel inspections. The majority of the remaining inspections were of recreational fishers, comprising inspections of campsites, fishing clubs, tour groups, charter operators, private property, motor vehicles and marketing premises. During this period, 185 offences were detected in association with 158 inspections, corresponding to a compliance rate of 95.3% on units inspected.<sup>13</sup> A summary of offences is provided in Table 6.

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 violation of size and in-possession limits; recreational fishers taking fish for commercial purposes; violation of GBRMP zoning provisions; and failure to keep required information/providing inaccurate information as the highest priorities for enforcement and compliance in the CRFF. There were also a number of activities rated as having a moderate risk, which are also being addressed. Detailed strategies to address the risks identified by this assessment were developed through the QBFP strategic and operational planning processes and were first implemented in July 2006.

<sup>13</sup> Fifty-seven of the recorded offences relate to commercial operators.

Table 6: Offences recorded in the Queensland Coral Reef Finfish Fishery (2005–06 quota year)

Offence	Fisheries Infringement Notice (FIN)	Prosecution	Caution
Recreational fisher take or possess CRFF regulated by size	66	1	8
Recreational fisher take or possess CRFF regulated by number	4	1	0
Recreational fisher possess on board any boat dead CRFF with pectoral fin not removed	11	3	6
Recreational fisher possess on board any boat dead fin fish or CRFF other than in the prescribed form (e.g. fillets, live CRFF)	9	1	0
Commercial fisher take, possess or sell regulated fish	3	4	1
Contravene closed waters	12	3	2
Fail to comply with a requirement to keep or give documents in approved form (e.g. prior report, unloaded fish notice, logbook)	3	7	3
Fail to have a document required to be available for immediate inspection (e.g. commercial fisher licence)	17	0	1
Boat not marked correctly	1	1	0
Contravened a quota	0	3	1
Did an act only an authority holder can do	0	5	2
Authority holder did not ensure that everyone acting under the authority complies with the Act	0	1	1
Obstructed an inspector	0	2	0
Did not obey signal	0	1	0
Conducted a commercial fishing tour without a valid permit	0	1	0
<b>TOTAL</b>	<b>126</b>	<b>34</b>	<b>25</b>

## Changes to management arrangements in the reporting year

No changes were made to management arrangements in 2005–06.

## Complementary management

### *Torres Strait*

Until 1999, the L1 fishery symbol incorporated both the East Coast and Torres Strait reef line fisheries. As a result, the suite of input controls (limits on boat size, number of dories, etc.) is the same for both fisheries. The Torres Strait reef line fishery also uses the same size and bag limits as the East Coast CRFF, but it does not have any spawning closures or quota monitoring system in place. Currently there are no specific reviews occurring between the two fisheries; however, the Torres Strait reef line fishery is moving to output controls in 2008.

**Information compiled by**

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**Image**

Common coral trout (*Plectropomus leopardus*)

