

Annual status report 2005

Queensland Mud Crab Fishery

July 2005



Q105064

ISSN 0727-6263

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

This publication provides information on the Mud Crab Fishery for 2004.

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Introduction

Mud crabs (*Scylla* spp.) are generally found in tropical and subtropical areas in association with mangrove-lined estuaries. They have a number of biological characteristics that make them resilient to harvest, including fast growth rates, early maturity, wide distribution and high fecundity. They are highly sought after by both commercial and recreational fishers. Queensland is unique among Australian states in allowing only males to be harvested.

Description of the fishery

Fishing methods

Commercial operators are permitted to use crab pots (right) and collapsible traps (below right). In addition to pots and traps, recreational fishers are also permitted to use dillies.



Fishing area

The fishery area comprises tidal waters in the following areas:

(a) east of longitude 142°31'49" east

(b) north of latitude 10°48' south and between longitude 141°20' east and longitude 142°31'49" east

(c) in the Gulf of Carpentaria between the 25 nautical mile line and the shore, south of latitude 10°48' south.



This essentially encompasses all Queensland tidal waters.

Main management methods used

The Department of Primary Industries and Fisheries (DPI&F), Queensland, manages the mud crab fishery in accordance with ecologically sustainable development principles. A range of input and output controls are in place to manage the harvest of mud crabs by commercial and recreational fishers, including:

- a minimum legal size limit that applies to both commercial and recreational fishers (150 mm carapace width)
- a prohibition on taking female crabs
- apparatus restrictions (50 pots per licence for the commercial fishery and 4 pots per person for the recreational fishery)
- a limit on the number of commercial operators with the potential to access the fishery.

Approximate allocation between sectors

Information collected by DPI&F through compulsory commercial logbooks and recreational fisher diaries indicates that the mud crab resource is shared almost equally between the commercial and recreational sectors, with the recreational sector harvesting slightly less than the commercial sector. The charter and Indigenous sectors take only a very small proportion of the total catch.

Fishery accreditation under 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 mud crabs caught in Queensland, was granted in September 2004 under Parts 13 and 13A of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. This approval expires in September 2007.

Fishery profile

Total harvest from all sectors: approximately 2000 t

Commercial harvest 2004: 1135 t

Recreational harvest 2002: approximately 800–1000 t

Indigenous harvest 2000: approximately 12 t

Charter harvest 2004: approximately 1 t

Commercial Gross Value of Production (GVP) for 2004: approximately \$12 million

Number of Licences: 879 (including 75 held by DEH under the Great Barrier Reef Marine Park Structural Adjustment Package) as of June 2005

Commercial fishing boats accessing the fishery in 2004: approximately 500

Catch and effort (target species)

Commercial

Data from the compulsory daily logbook database maintained by DPI&F indicates that the total commercial catch for Queensland in 2003 and 2004 increased by approximately 10% compared to the early 2000s. However, the catch per unit effort (kg per boat day) has remained fairly stable (Figure 1 and Table 1). The increase in total catch is a result of an increase in the average number of days each boat is fishing; the total number of boats accessing the fishery has remained relatively stable during this period (Figure 2).

It is possible that commercial fishers with multiple fishery symbols, who have historically only taken small quantities of mud crab, may be crabbing more often in response to management changes that occurred in 2003 and 2004.

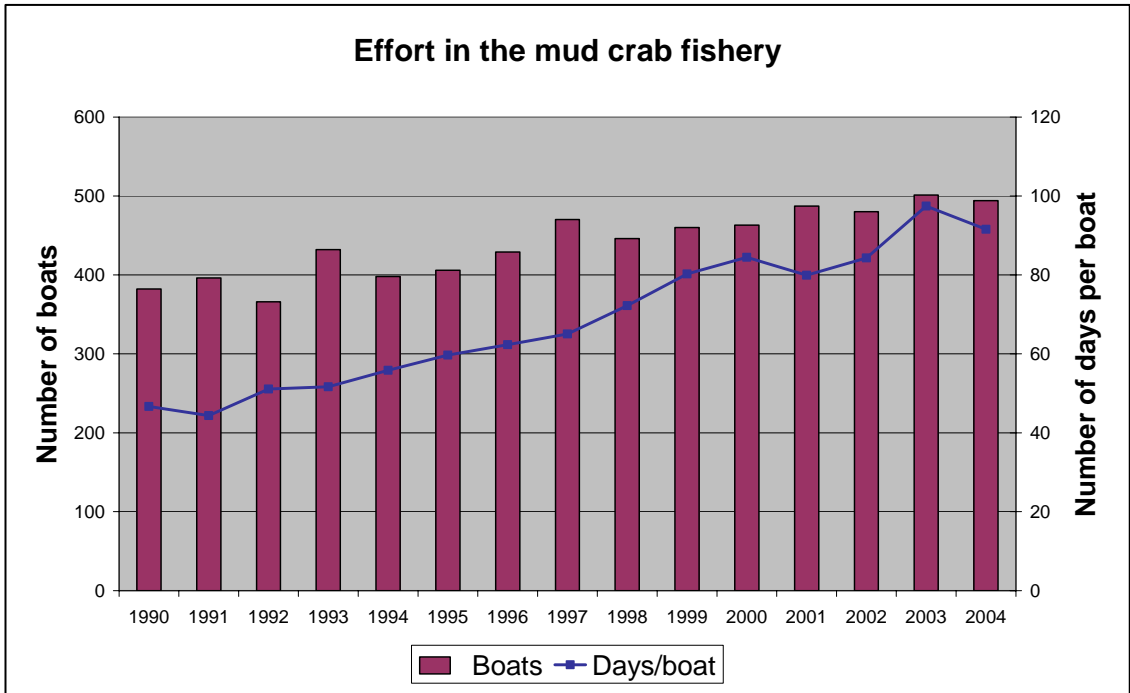


Figure 1: Total commercial catch and effort in the mud crab fishery 1990–2004

These changes may have transferred some additional effort into the commercial crab fisheries. However, impacts of the new zoning arrangements have been minimised to some extent by a licence buyout under the Great Barrier Reef Marine Park Structural Adjustment Package.

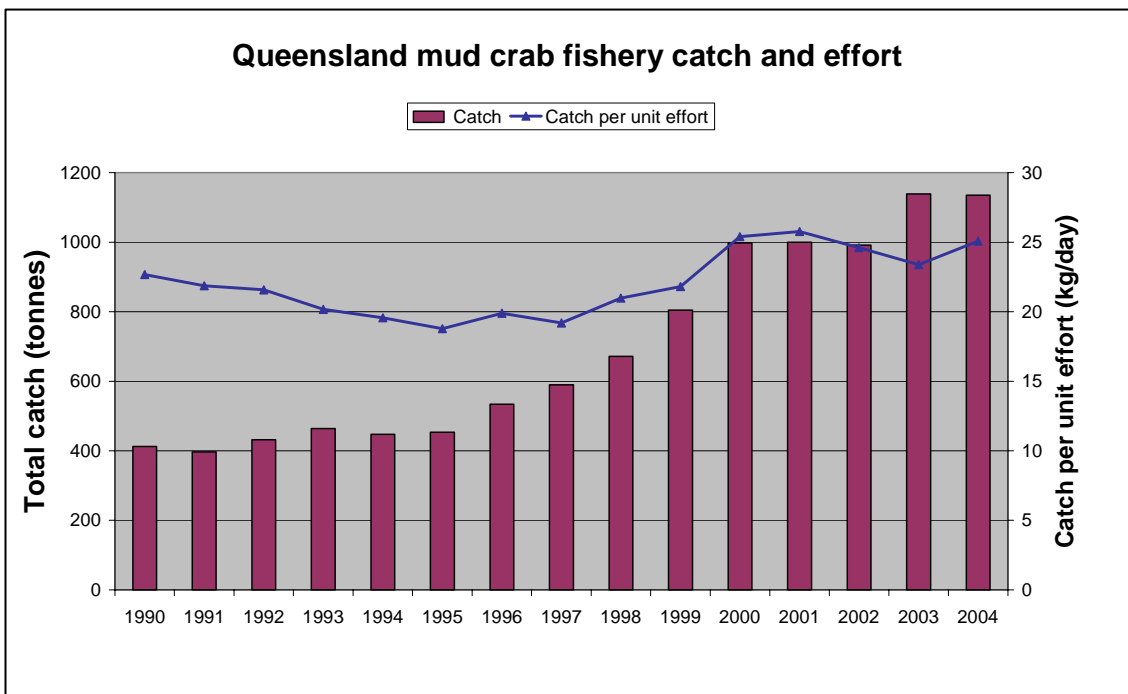


Figure 2: Effort in the mud crab fishery 1990–2004

Table 1: Fishery details for the commercial mud crab fishery since 2000

	Catch (t)	Days fished	Boats	Kg /day	Days /boat	Catch(t) /boat	GVP \$m
2000	998	39 856	463	25	84	2.14	10.4
2001	1 000	38 960	487	26	80	2.06	10.5
2002	992	40 378	480	25	84	2.07	10.4
2003	1 139	48 817	501	23	97	2.28	11.9
2004	1 135	45 369	494	25	92	2.30	11.9

In terms of regional trends, the commercial fishery is concentrated in a number of key areas including Moreton Bay, central Queensland (e.g. the Narrows), north Queensland (e.g. Princess Charlotte Bay) and the Gulf of Carpentaria. Catch rates for most regions have remained fairly stable over time, with the majority showing no evidence of decrease. One exception is the northern part of the Gulf of Carpentaria, which has shown a decline in catch from 50 t in 2000 to 10 t in 2004. The area has historically provided only a small amount of product compared to the rest of the state (1% of the total catch in 2004) and displays significant variability in effort. The collapse of Ansett Airlines has also contributed to the reduction in catch, as product can no longer be flown out of Weipa.

Figures for the whole of the Gulf of Carpentaria (Figure 3) show a decline in catch rates after 2002. Research suggests that this decline may be in response to one of the worst droughts experienced in the region from 2001 to 2003. Similar declines in catches were seen in the Northern Territory (NT) fishery. Fortunately, it appears the stock is increasing, with higher catch rates recorded for 2004.

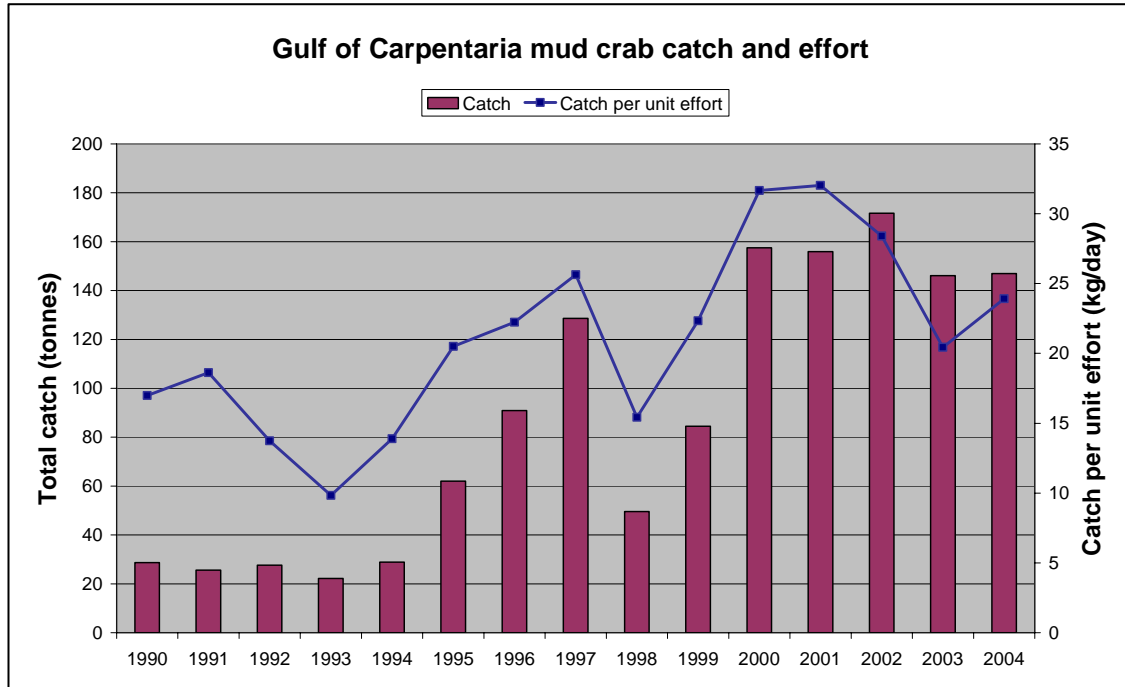


Figure 3: Gulf of Carpentaria commercial catch and effort 1990–2004

There was some concern expressed by Williams¹ over the decrease in catch rate shown in the Moreton Bay mud crab fishery during the 1990s. However, Figure 4 shows that catches have since increased steadily to almost twice the harvest in 2000, while the catch rate increased to one of the highest ever recorded in 2004.

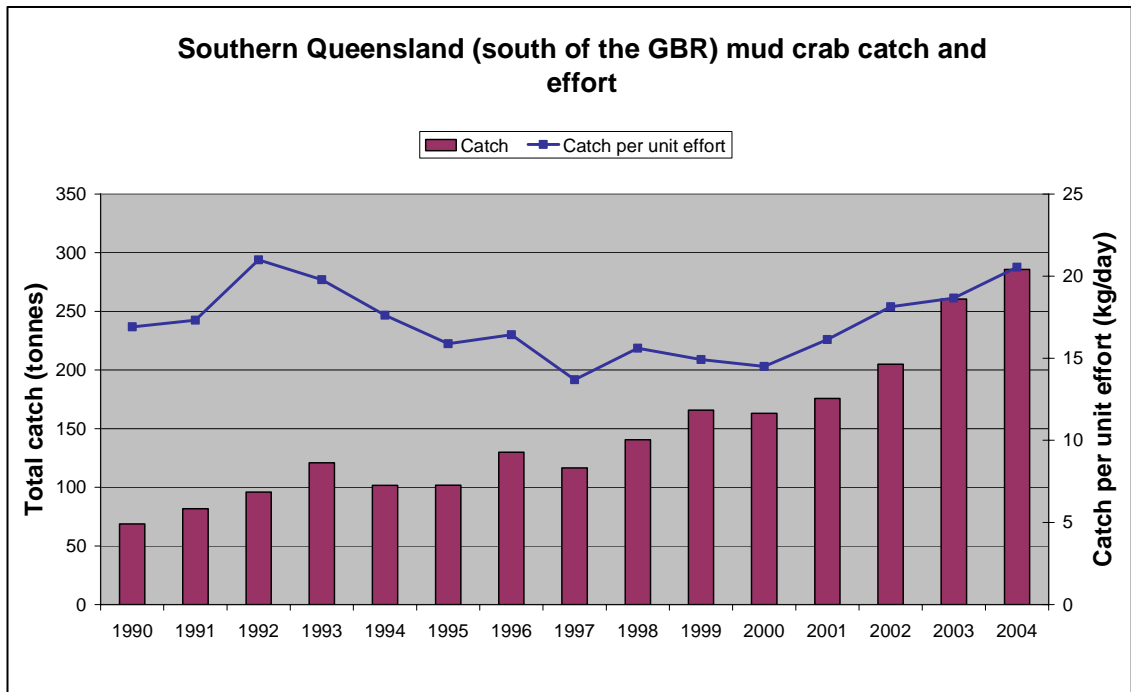


Figure 4: Southern Queensland commercial catch and effort 1990–2004

Recreational

The Recreational Fishing Information System (RFISH) 2002 diary survey indicates that approximately 870 000 mud crabs were harvested in that year and that about 3 million mud crabs were released. This represents a small decrease in the recreational harvest and an increase in the numbers released compared to estimates from the 1999 diary survey, which indicated that approximately 993 000 mud crabs were harvested and approximately 2.5 million released. These estimates equate to a recreational harvest of between 800 t and 1000 t. The 2001 National Recreational and Indigenous Fishing Survey (NRIFS)² suggests that Queensland recreational fishers take the largest proportion of that national mud crab catch (71%).

Charter

The charter sector is the smallest component of the total annual crab harvest and represents only approximately 1% of the commercial catch. Table 2 shows that since 2000, the total charter harvest, as reported in compulsory logbooks, has not exceeded 1.5 t. Between 15 and 20 charter boats report catches of mud crab.

¹ Williams, LE (ed) 2002, *Queensland's fisheries resources: current condition and recent trends 1988–2000*, Information Series Q102012, Queensland Department of Primary Industries, Brisbane.

² Henry, GW & Lyle, JM 2003, *The National Recreational and Indigenous Fishing Survey*, FRDC Project No. 99/158, Australian Government Department of Agriculture, Fisheries and Forestry, Canberra.

Table 2: Charter catch and effort 2000–04

Year	Catch (kg)	Number of operators	Number of days fished
2000	717	10	447
2001	784	12	459
2002	1,482	15	563
2003	1,164	14	668
2004	1,503	19	579

Indigenous

The Indigenous catch of mud crabs across northern Australia was estimated as part of the NRIFS. Approximately 12 000 mud crabs were harvested by Indigenous fishers in north Queensland, the majority of which were taken by hand (58%) and spear (27%). Much higher Indigenous catches were recorded for the Northern Territory (approximately 85 000).

Non-retained species / bycatch

The results of extensive mud crab surveys undertaken since 1999 by DPI&F as part of the Long Term Monitoring Program (LTMP) show that the take of non-target species in the mud crab fishery has been minimal. A recent review of the mud crab LTMP, which took into account a range of recommendations made by the Australian Government Department of the Environment and Heritage (DEH), has recommended a greater emphasis on recording the capture of bycatch species in order to better describe and quantify the bycatch that does occur. DPI&F is also investigating the use of on-board fishery observers to confirm that the low bycatch levels observed during LTMP surveys also occur in the commercial fishery.

Fishers participating in an ecological risk assessment of Gulf of Carpentaria fisheries, held in October 2004, agreed that the Gulf mud crab fishery had a negligible impact on bycatch.

Interactions with protected species

A total of seven interactions with protected species were recorded by commercial net and crab fishers between 2003 and 2004. Four interactions occurred with crocodiles, three of which were released alive. The operators were unable to identify the species, probably because they captured juveniles, which can be harder to identify. A total of three interactions were recorded with turtles, two with hawksbill turtles and one with a green turtle. All three turtles were released alive.

Fishery impacts on the ecosystem

The fishery's impact on the ecosystem is considered to be low. The apparatus used is considered to have a benign impact on the physical environment because of its lightweight and stable structure.

General ecosystem health

Because they rely on appropriate mangrove habitats, mud crabs can be susceptible to impacts from habitat modification or pollution. DPI&F has completed baseline coastal

habitat mapping at a regional scale for all of Queensland³ (Figure 5). Some areas are currently being mapped at a more detailed scale. The mud crab LTMP now collects habitat information at all of its sampling sites. This data will be used to explain mud crab habitat usage as well as to monitor changes within these habitat areas.

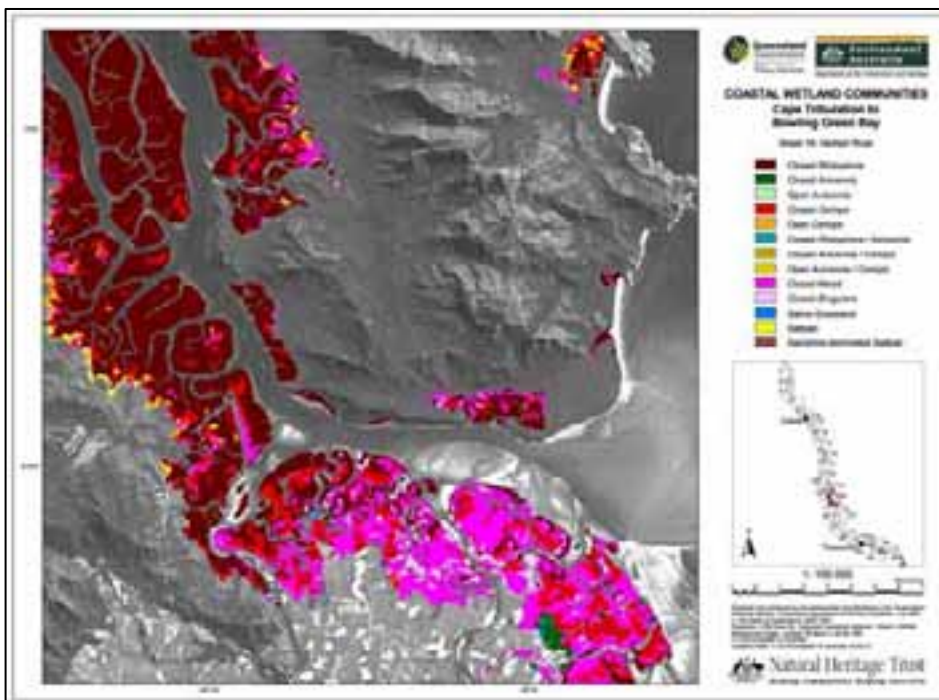


Figure 5: Example of baseline mapping of coastal habitats by DPI&F

Spatial issues / trends

There have traditionally been differences in the catches and catch rates between the north and the south of Queensland, mainly because of mangrove habitat availability and changes in the natural abundance of crabs.

Socioeconomic characteristics and trends

Prices are normally between \$10/kg to 12/kg, depending on supply of the product, the time of year and the product form. There have been no significant upward or downward trends in prices over the last three years⁴.

Figure 6 indicates that incomes for the majority of the mud crab fleet in 2004 were less than \$40 000. Approximately 20% of the fleet make less than \$2000 a year from the mud crab fishery.

³ De Vries, C, Danaher, KF & Dunning, MC 2002. 'Assessing and monitoring Queensland's fish habitats using Landsat TM and ETM+ imagery', *Proceedings of the 11th Australasian Remote Sensing and Photogrammetry Conference*, Brisbane.

⁴ Based on prices obtained from the Sydney Fish Markets (<http://www.sydneyfishmarket.com.au/>)

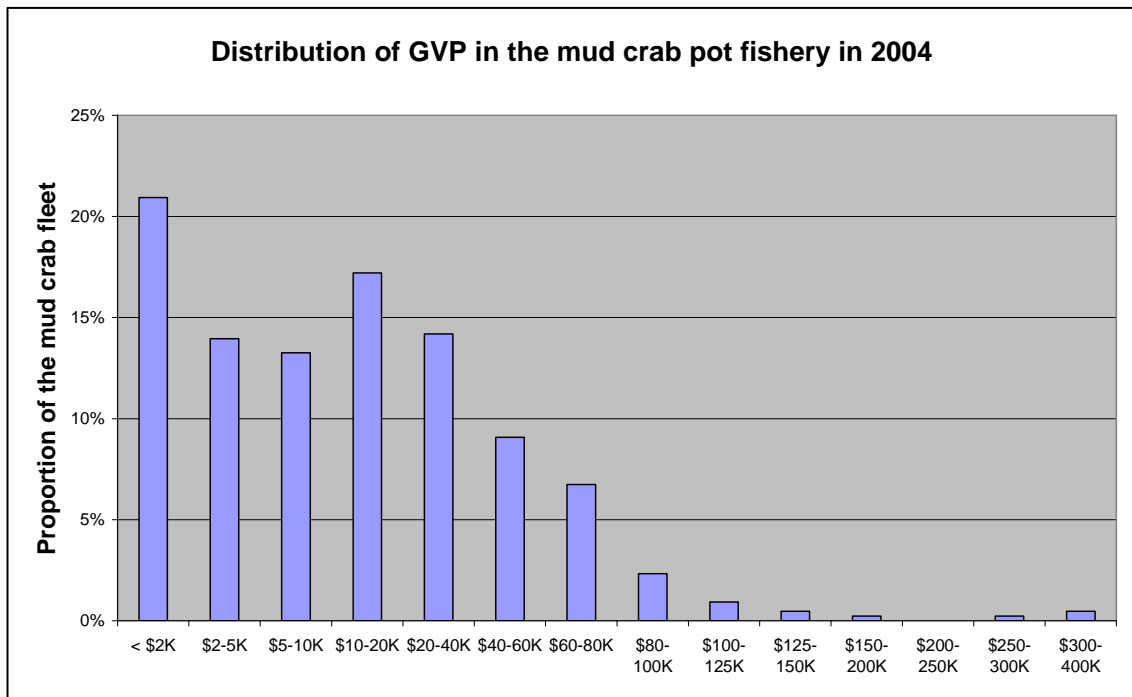


Figure 6: Income distribution in the mud crab fishery 2004

Research and monitoring

Recent research and implications

Phase I of the mud crab research strategy, jointly developed by the Northern Territory Department of Business Industry and Resource Development (NTDBIRD), the Fisheries Research Development Corporation (FRDC) and DPI&F, has recently been completed.⁵ The objective of the collaborative project was to identify critical mud crab habitats across Queensland and the Northern Territory and estimate the abundance of mud crab in these habitats. The major conclusions were that:

- Declines in experimental density estimates over the two-year period followed a similar trajectory to those exhibited by the fishery-dependent (CPUE) data.
- A trapping experiment over one complete lunar cycle failed to demonstrate any effect of moon phase on mud crab catchability.
- The study estimated that more than 90% of available adult male crabs were removed by the NT Gulf of Carpentaria (GOC) fishery in 2003, compared with around 20% in the Darwin region, 25% on the GOC east coast (Karumba), and approximately 6% on the Queensland east coast (Trinity Inlet).
- Scaling up the point density estimates across the entire northern Australian potential habitat produced unrealistically high estimates of total abundance. This was attributed to non-uniform carrying capacity of different habitat types that were not surveyed during the project.

⁵ Hay, T, Gribble, N, de Vries, C, Danaher, K, Dunning, M, Hearnden, M, Caley, P, Wright, C, Brown, I, Bailey, S & Phelan, M 2005, *Methods for Monitoring the abundance and habitat of the Northern Australian Mud Crab, Scylla serrata: Final Report*, FRDC project 2000/142.

- Improved estimates for these regions could be achieved by undertaking additional surveys in areas of key interest.

The proposed projects in Phase II for Queensland include:

- reproductive lifespan of female mud crabs (*Scylla serrata*) and their commercial potential
- mud crab stock sustainability—recruitment processes and management optimisation
- implications of single-sex harvesting on mud crab fisheries
- improving the ecological sustainability of pot, trap and tunnel-net fisheries.

In terms of independent research projects, James Webley (Griffith University) is investigating the distribution of larval and pre-recruit juvenile mud crabs (and other portunid crab species). Part of this work involves experiments to determine the habitat preference of various early life-history stages. Initial work has confirmed previous findings that mud crab juveniles are very difficult to find.

A recently published study⁶ has helped to confirm the assumption that fisheries production for particular species of commercial interest (including mud crab) is related to the extent of mangrove habitat. Mangrove characteristics (spatial extent and perimeter) were the dominant parameters that could explain the variation in catch rates of mud crabs.

Monitoring programs and results

A review of the mud crab LTMP has recently been undertaken in order to address a number of recommendations made by the Australian Government Department of the Environment and Heritage (DEH). These recommendations include:

- developing an appropriate monitoring program taking into account target species, bycatch, protected species and the ecosystem more generally
- identifying areas at risk of overfishing and completing fishery independent surveys in these areas.

The review examines how the current mud crab LTMP meets these recommendations. Several improvements to the monitoring program have been suggested as part of the review and will be implemented during 2006. Improvements include focusing on regions with high fishing pressure, sampling in fewer regions but in more sites within a region, increasing sampling frequency and standardising practices in the field across sites and regions.

Collaborative research

DPI&F continues to work with the Northern Territory on a range of research projects related to mud crabs. DPI&F researchers contributed to an assessment of the NT mud crab fishery in July 2004.

⁶ Manson, FJ, Loneragan, NR, Harch, BD, Skilleter, GA & Williams, L 2005, 'A broad-scale analysis of links between coastal fisheries production and mangrove extent: a case study for northeastern Australia', *Fisheries Research*, 74, pp. 69–85.

Fishery management

Compliance report

Compliance activities for the mud crab fishery are currently reported together with other crab fisheries. Data from the Queensland Boating and Fisheries Patrol (QBFP) indicates that a total of 574 commercial crab fishing operations were inspected during the 2003–04 financial year, with 22 breaches recorded. Figures for the 2004–05 financial year show that of the 492 crab fishing operations that were inspected, 19 were breached for illegal activity and 34 were cautioned. These figures show an average non-compliance rate of approximately 7%. Offences included possession of undersize crabs, possession of females, use of excess apparatus and crabs missing their shell.

Of the 65501 recreational fishers inspected across Queensland in 2004-05, 472 were breached and 751 were cautioned.

In late 2004, the QBFP undertook a large-scale inspection of crab pots in southern Moreton Bay. A total of 148 illegal crab pots were seized that were unmarked or marked incorrectly (Figure 7).



Figure 7: Examples of seized recreational crab pots

A new Compliance Activity System is currently being developed by DPI&F that will record detailed information on QBFP activities. The new system will include:

1. Breach Reports Issued (including offences and court outcomes)
2. Unattended Breach Reports
3. Fisheries Infringement Notices (FINS) issued
4. All field activities (from new Field Occurrence Logs)
5. Complaints made via the Fishwatch hotline (including follow-up actions).

As part of this project a number of new code categories have also been developed to allow consistent reporting:

1. Fishery Codes
2. Offence Codes.

All offences and field activities will also be recoded to six nautical mile commercial fishing grids. This will allow enforcement activities and offences to be represented spatially and to guide review of compliance strategies. Progress to date includes the development of the new system to record Breach Reports, Unattended Breach Reports, and Fisheries

Infringement Notices. The new Field Occurrence Logs were trialled in Cairns and released to the rest of the patrol in July 2005.

Changes to management arrangements in the reporting year

No changes to management arrangements have been made since the submission of the mud crab ecological assessment report to DEH in early 2003. An investment warning that was issued in September 2003 is still current.

Consultation / communication / education

One of the DPI&F's ongoing roles is the promotion of regulations applying to commercial and recreational fishers, including those relating to mud crab. Nearly 160 000 recreational fishing brochures giving size and possession limits were distributed in 2004. In addition, approximately 500 stakeholders were sent the four editions of the fisheries newsletter, *Fish*, produced during 2004. The newsletter highlights recent achievements, latest research, and proposed changes to management arrangements. In February 2004, DPI&F introduced *FishFlash*, an email-based newsletter with links to the latest fisheries news. Approximately 300 stakeholders subscribe to *FishFlash*, which is now up to its 17th issue. DPI&F regularly distributes 'crab gauges' specifically designed to measure mud and blue swimmer crabs. A total of 5000 gauges were made and distributed in 2004. Demand for the gauges is extremely high, particularly from the recreational sector, so an additional 10 000 have been produced for distribution in 2005.

Consultation also occurs through the Crab Fisheries Management Advisory Committee (CrabMAC). Meetings are generally held twice a year and provide an opportunity for stakeholders to advise DPI&F on proposed management measures for mud crab stocks.

Complementary management

DPI&F continues to work with other states and with the Australian Government on complementary management arrangements. The governments of Queensland, the Northern Territory and Western Australia and the Australian Government meet annually at the Northern Australia Fisheries Managers Forum to discuss the management of shared stocks, including those of mud crab.

Fishery Performance

Appraisal of the fishery in regard to sustainability

The logbook data suggests that although the total catch has increased, catch rates have remained fairly stable. There is evidence that boats operating in the fishery are fishing more days per year and are consequently recording higher catches per boat. However, there is no indication that more boats are accessing the fishery than in previous years. RFISH surveys conducted in 1999 and 2002 indicate that the recreational harvest has decreased slightly over this period, but not to an extent that causes concern.

The prohibition on taking female and undersized crabs in Queensland is a precautionary approach to management that has the capacity to protect the fishery from increases in effort. The Queensland fishery is managed in a more precautionary and sustainable manner than any other Australian mud crab fishery.

Progress in implementing DEH recommendations

The DEH recommendations for addressing the uncertainties or risks facing the mud crab fishery can be found at: <http://www.deh.gov.au/coasts/fisheries/qld/mud-crab/decision.html#recommendations>.

DPI&F has made significant progress in implementing a number of these recommendations.

- A review of the monitoring program has been undertaken and the recommendations will be considered by DPI&F before the end of 2005.
- The introduction of separate management arrangements for the Gulf is currently progressing.
- The development of a protected species education program for commercial and recreational fishers is well advanced. The program includes reviewing and updating the Endangered and Threatened Species Awareness Course that new master fishers are required to undertake.
- The QBFP is currently undertaking compliance risk assessments for major fisheries. A risk assessment for the mud crab fishery will be undertaken and results reported in the 2006 status report.
- The development of performance measures for a range of fisheries is progressing and is considered a priority over the next 12 months.
- The amount of latent effort in the fishery is being monitored (this is discussed more fully in the following section).

It is anticipated that all recommendations that are due to be completed within the first 12 months of the WTO will be addressed.

Performance measures

Performance measures and/or reference points have not yet been developed for the fishery. DPI&F intends to develop these measures over the next 12 months, in consultation with CrabMAC.

Resource concerns

DEH is concerned that the amount of latent effort in the blue swimmer and mud crab fisheries may be a risk to the long-term sustainability of Queensland's crab stocks. DEH has recommended that a strategy be developed to substantially reduce the amount of latent effort in the fishery by December 2004.

DPI&F considers that the latent effort in the fishery poses minimal risk to the sustainability of mud crabs given the precautionary minimum size limit in place and the prohibition on taking females, which effectively cap the proportion of the population that can be harvested to approximately 25%. Notwithstanding this, DPI&F has advised DEH that it intends to monitor the effect of the implementation of new licensing and fee arrangements to determine if C1 licence holders surrender previously unused fishery symbols. If this does not result in the removal of latent effort, alternative approaches will be investigated. It should be acknowledged that although the intention of the new licensing and fee arrangements was not to remove latent effort, they may have this effect. It should also be

noted that 75 crab licences were removed from the fishery through the recent GBRMP Structural Adjustment Package.

Another area of concern is the potential loss of mangrove habitat and damage to burrows and the impact this may have on mud crab stocks, particularly as Queensland coastal areas continue to be developed to meet a growing population. DPI&F has undertaken comprehensive baseline coastal habitat mapping to facilitate long-term monitoring of changes in these habitat areas.

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Acknowledgements

Lew Williams, Len Olyott, James Webley, Dr Ian Brown, Mark Doohan, Grant Hansen, Rod Supple, Dr Kerry Neil, Karen Danaher.