

Annual status report 2005

East coast Beche-de-mer fishery

December 2005



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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 east coast Beche-de-mer Fishery for 2004.

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Introduction

The Queensland East Coast Bêche -de-mer Fishery (ECBDMF) is one of the oldest fisheries in the state with commercial harvesting beginning in the early 1800s. Through progressive and adaptive fisheries management and industry innovation and initiatives, the fishery has grown to become one of the few sustainably managed bêche-de-mer fisheries in the world. The landed value of the present-day fishery is about A\$4.5 million and the entire product is exported, mainly to China.

Description of the fishery

Fishing methods

Commercial bêche-de-mer fishers are permitted to harvest by hand, using free-diving methods or with the aid of hookah apparatus or SCUBA. Non-commercial fishers are permitted only to harvest by hand, without the aid of hookah apparatus or SCUBA.

Fishery area

Commercial fishing is authorised from Tin Can Bay (26°S) to Cape York (10° 41'S). Historically, effort has been focused on reef areas in northern Queensland between Townsville (19° 30'S) and Cape York (10° 41'S). Harvesting occurs at depths to about 30 metres leaving much of the Great Barrier Reef (GBR) lagoon free of commercial harvesting pressure. The ECBDMF is adjacent to the Commonwealth-managed Torres Strait BDM and Coral Sea Fisheries.

Main management methods

Harvest in the ECBDMF is principally managed through a mixed species Total Allowable Commercial Catch (TACC) of 380 tonnes (t) gutted wet weight. In 2004/2005¹, the TACC comprised 0 t of black teatfish², 127 t of white teatfish and 253 t of other species. Quota is distributed to the fishery operators by issuing authorities to take fish for trade or commerce with quota amounts attached as conditions of authority. There are currently 18 authorities in the fishery held by three companies.

Minimum size limits are also in place for all the major species and species groups harvested in the fishery. Size limits are enforced by condition of authority.

Significant changes to management arrangements were implemented in 2004. These are outlined in the section on 'Changes to management'. Of note was the implementation of a Rotational Zoning Scheme (RZS) designed to manage effort in the fishery. The RZS is an innovative industry-led initiative that demonstrates the commitment of operators to the long-term sustainability of the fishery.

¹ In 2005/2006, the quota will comprise 0 t of black teatfish, 89 t of white teatfish (divided into 57 t north of 19°S and 32 t south of 19°S), and 291 t of other species.

² The commercial harvest of black teatfish was stopped in October 1999 following concerns over the sustainability of the stock. There has been no clear evidence from surveys conducted in 2000 and 2001 of stock increase or decrease following the closure (see also section on 'Resource concerns').

The full range of input and output controls used to manage the fishery can be found in the DPI&F report, 'Ecological assessment of Queensland's East Coast Bêche-de-mer Fishery'³.

Since July 2004, about 37% of fishable habitat (0 to 40 metres deep) is now closed to sea cucumber harvest following the introduction of the Representative Areas Program (RAP) in the GBR World Heritage Area. This is a 15% increase on the previous total area of habitats closed to fishing and represents a significant safeguard against overfishing.

Approximate allocation between sectors

The ECBDMF is mainly a commercial fishery.

The recreational take of bêche-de-mer is currently limited to an in-possession limit of five specimens (excluding black teat fish) from Queensland waters north of 20°S latitude and east of 143°E longitude. There is no information on recreational fishing levels of bêche-de-mer in Queensland. However, it is assumed to be extremely low. No catches of bêche-de-mer have been reported through charter logbooks. There has been no estimate of the harvest of bêche-de-mer by indigenous peoples for cultural purposes within the area of the fishery.

While the quantities of bêche-de-mer taken by recreational, charter and indigenous sectors have not been estimated, they are considered to be negligible and will not be reported on further within this status report.

Fishery accreditation under EPBC Act

The ECBDMF was granted a Wildlife Trade Operation (WTO) approval under Part 13 of the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* on 22 December 2004. The WTO approval acknowledges that the fishery is being managed in an ecologically sustainable manner and allows the continued export of bêche-de-mer caught on the east coast of Queensland. The approval expires in December 2007.

Fishery profile

Total harvest from all sectors 2004/2005: approximately 319 t

Commercial harvest for 2004/2005: approximately 319 t

Recreational harvest: no estimate available but considered negligible

Indigenous harvest: no estimate available but considered negligible

Charter harvest: no estimate available but considered negligible

Commercial Gross Value of Product (GVP) for 2004/2005: approx. \$4.5 million

Number of licences: 18 Authorities held by 3 operators

Commercial fishing boats accessing the fishery in 2004: five

³ Roelofs, A.J. (2004). 'Ecological assessment of Queensland's East Coast Bêche-de-mer Fishery. A report to the Australian Government Department of Environment and Heritage on the ecologically sustainable management of a highly selective dive fishery.' Brisbane, Queensland Department of Primary Industries & Fisheries: 43pp.

Commercial catch and effort (target species)

It should be noted that this is the first year for reporting catch from the RZS sectors, so it is difficult to compare catches directly with previous years' totals. More sea cucumbers were harvested in 2004/2005 than in previous annual totals for the fishery (Figure 1). Burrowing blackfish made up the majority (approximately 58%) of this total (Figure 2). Harvest of this species has increased substantially as a result of market development (Figure 3). DPI&F and the industry are taking a cautious approach to the harvest of burrowing blackfish until the size of the resource and the biology of the animal are better understood. An assessment of the burrowing blackfish resource was triggered by the high catches (see also sections on 'Research and monitoring' and 'Fishery management').

Catches of white teatfish were lower than in 2003 and were likely a direct result of changes in the TACC established under the RZS in 2004 (Figure 4). The southern zone quota was an industry-led initiative designed to force the fishing effort for white teatfish away from the regularly harvested northern section and into areas where white teatfish were not traditionally harvested. Industry has indicated however that they were unable to find economically viable stocks of white teatfish south of 19°S in 2004. This resulted in only about 30% of the total southern sector white teatfish quota being harvested, although the full quota for the northern section was caught. The annual catch rate (CPUE) for white teatfish was high in 2004, indicating good stock levels where this species was harvested.

Catches of prickly redfish in 2004 were low compared to previous years (Figure 5). This species is not presently a focus of the industry and has only been incidentally harvested since 2002. The low catches are therefore expected. (Note: Because prickly redfish are only incidentally harvested, CPUE (kg/day) figures are not appropriate abundance indicators and have not been included.)

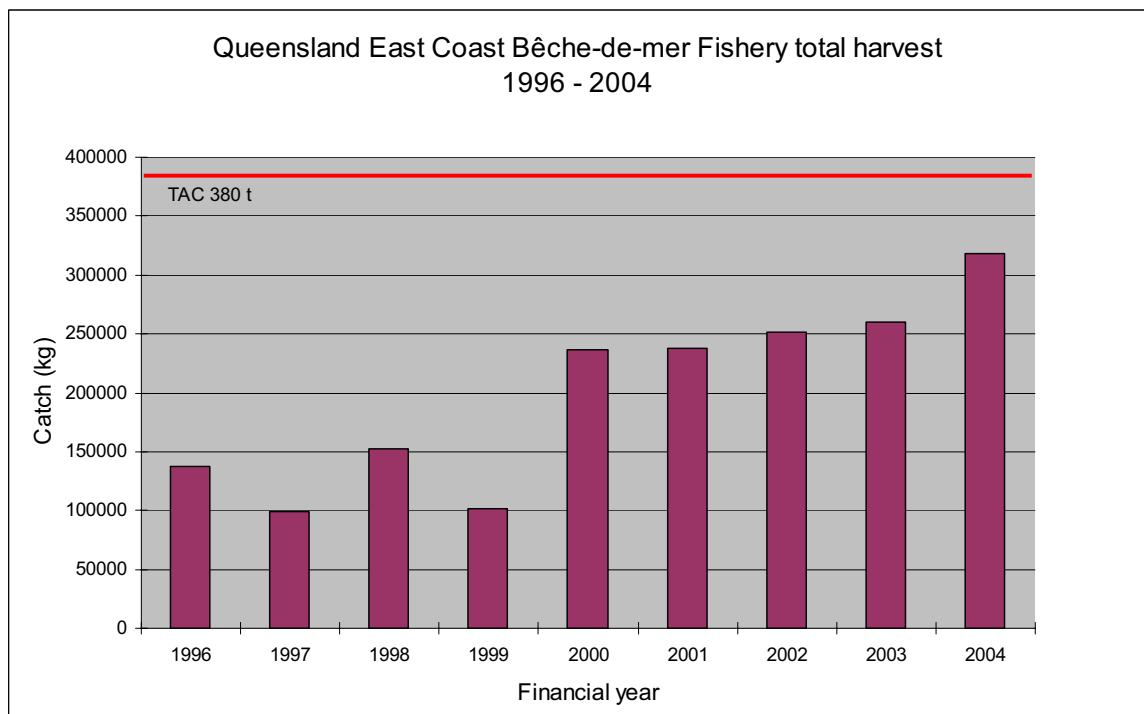


Figure 1: Total catch in kilograms (kg) for the East Coast Bêche-de-mer Fishery from 1996/1997 to 2004/2005 financial years.

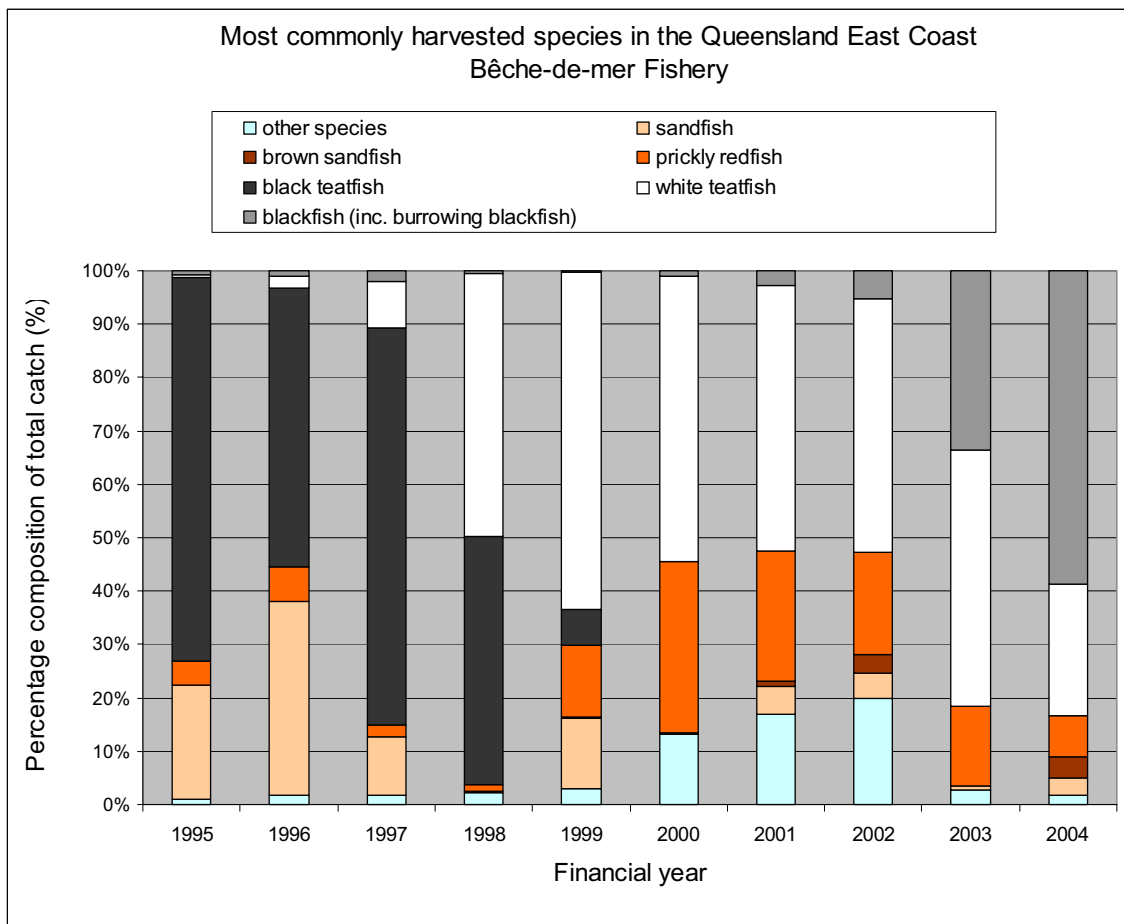


Figure 2: Species composition of total catches in the Queensland East Coast Bêche-de-mer Fishery from 1995 to 2004.

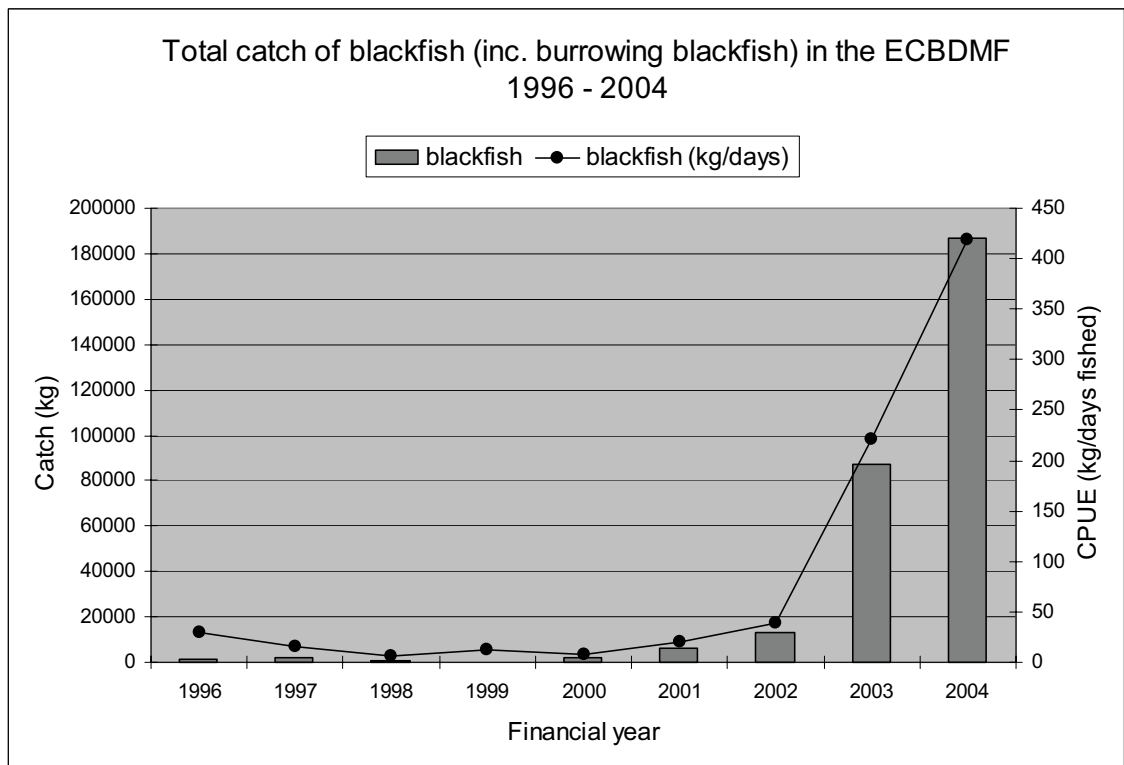


Figure 3: Total catch (kg) and CPUE (kg/day) of blackfish (including burrowing blackfish) in the Queensland East Coast Bêche-de-mer Fishery for the financial years 1996 to 2004.

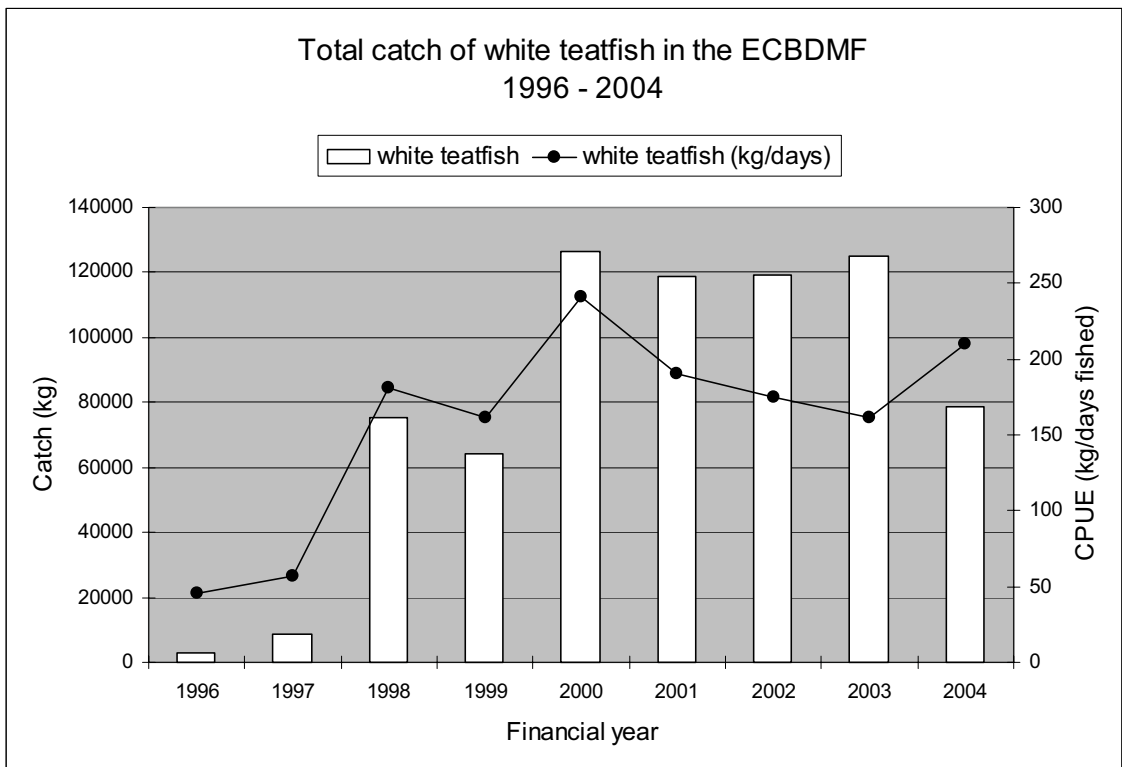


Figure 4: Total catch (kg) and CPUE (kg/day) of white teatfish in the Queensland East Coast Bêche-de-mer Fishery for the financial years 1996 to 2004.

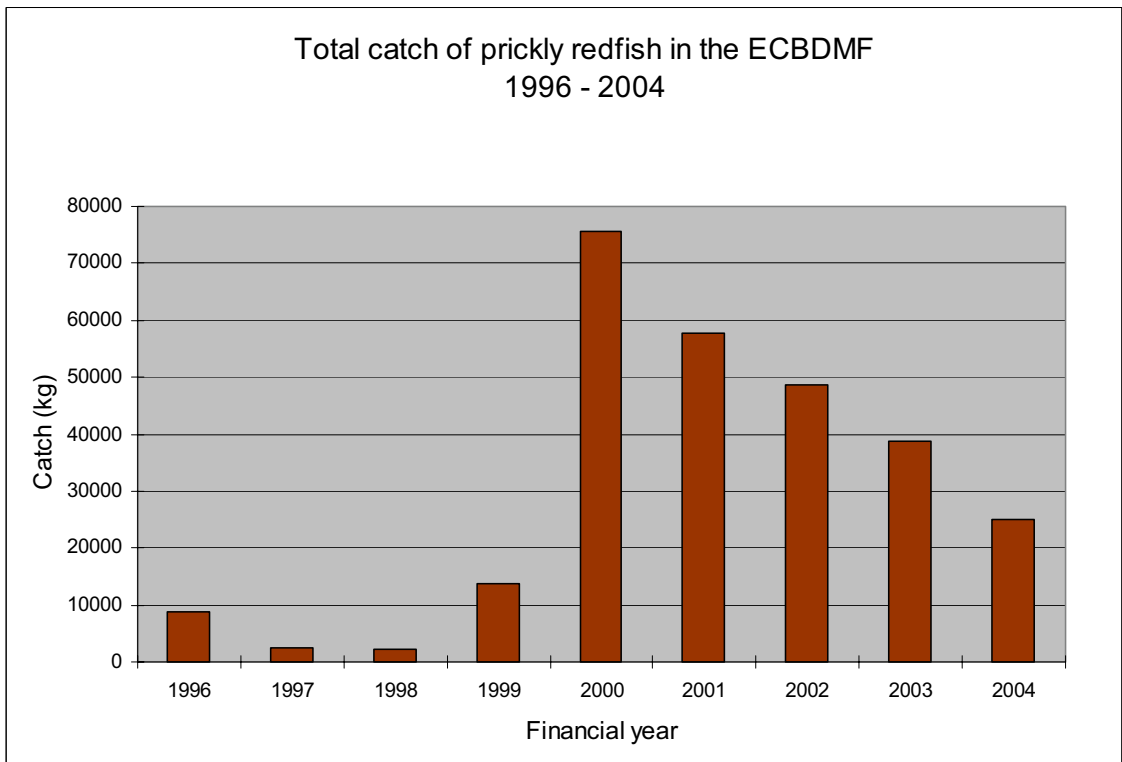


Figure 5: Total catch (kg) of prickly redfish in the Queensland East Coast Bêche-de-mer Fishery for the financial years 1996 to 2004.

Non-retained species and bycatch

Hand collection is a highly selective method of fishing: only those individuals specifically chosen for harvesting are collected. Bycatch is therefore restricted to releasing undersize specimens of the target species at the collection site.

The mortality of discarded bêche-de-mer has not been quantified, but it is expected to be low. Minimum size limits and the preference of operators to collect the most marketable-sized animals suggest that minimal discarding would occur.

Interactions with protected species

No interactions with protected species have been reported in the ECBDMF either by fishery observers or fishers. This is to be expected, since hand collection is the only permitted method of harvesting and only six mother vessels are currently operating in the fishery.

Commercial operators are not currently required to fill in a Species of Conservation Interest logbook because of the negligible risk they pose to protected species. Fishers are, however, legally required to report interactions with whales, dolphins and dugongs to the Environmental Protection Agency (EPA) and interactions with listed marine species in Commonwealth waters to the Department of the Environment and Heritage (DEH).

Fishery impacts on the ecosystem

As outlined in the ecological assessment submitted to DEH⁴, hand collection methods employed in the fishery have virtually no direct effect on the environment.

Limited available research suggests that holothurians play an important role in the natural nutrient recycling pathways of benthic environments⁵. A PhD project on the effect of the removal of sandfish by the developmental bêche-de-mer fishery in Moreton Bay (discussed further below) should provide an increased understanding of any environmental impact.

General ecosystem health

The ECBDMF operates within the bounds of the Great Barrier Reef Marine Park which is managed by the Great Barrier Reef Marine Park Authority (GBRMPA). Water quality, marine fauna and flora, and the physical environment is closely monitored by the GBRMPA through its involvement in a suite of local, state and Commonwealth community and scientific monitoring programs. A comprehensive list of all programs can be found at <http://www.reeffutures.org/topics/monitoring/programlist.cfm>.

Spatial issues and trends

In 2004, the white teatfish TACC was divided into northern and southern zones (see section on 'Changes to management arrangements'). This change, combined with fewer days available to be fished under the newly implemented RZS, resulted in a drop in catches for this species in 2004. As an additional measure to the RZS, DPI&F set aside 70 t of the TACC, only to be taken as white teatfish south of 19°S. This was an

⁴ *ibid*

⁵ Uthicke, S. (2001). 'Interactions between sediment-feeders and microalgae on coral reefs: grazing losses versus production enhancement.' *Marine Ecology Progress Series* 210: 125-138.

industry-led initiative designed to spread effort for white teatfish further south and away from the regularly harvested area between Townsville and Cairns. So far, though, exploratory fishing in 2004 has not located sufficient white teatfish stocks to warrant significant levels of fishing in the southern zone and total catches are reflecting this pattern (Figure 4).

The RZS successfully spread fishing effort throughout the fishery area in its first year of operation. It is difficult to interpret spatial trends and temporal patterns in the fishery, given the recency of the change and the forced behaviour of the fishers. DPI&F intends to look at finer-scale spatial information to assess the effectiveness of the new fishing strategy in minimising local-scale depletions.

Research and monitoring

Recent research and implications

Research is currently being undertaken as part of a PhD project entitled 'Impacts of removal—a case study on the ecological role of the commercially important sea cucumber *Holothuria scabra* in Moreton Bay'. The results of this research project will provide useful information on the biology and ecosystem functions of holothurians, as well as an increased understanding of the environmental impacts associated with the removal of holothurians from associated food webs.

Monitoring programs and results

The fishery is monitored through catch and effort data collected through the DPI&F compulsory logbook program. The results of this program are outlined in the section on 'Commercial catch and effort (target species)'.

Two resource assessments have now been conducted by the industry and both have shown that burrowing blackfish can occur in very high densities in certain habitats⁶. However, more research is required on the basic biology of this species if high harvest levels are to be maintained. An application for a research project that will investigate the basic biological parameters of burrowing blackfish is being considered for funding by the Fisheries Research and Development Corporation.

Independent resource monitoring is not conducted in the ECBDMF as DPI&F does not consider it cost-effective in such small-scale fisheries operating over vast areas. Instead, the use of observers is being investigated to validate compulsory daily logbook data and confirm the lack of interaction with protected species. Industry has expressed their willingness to assist with an independent observer program.

DPI&F and GBRMPA are monitoring fishing operators' adherence to the RZS through the location data collected from the Vessel Monitoring System (VMS) that each *bêche-de-mer* mother vessel is required to carry. Preliminary data is encouraging, with the majority of fishing operators adhering to the RZS guidelines.

Collaborative research

The ECBDMF lies adjacent to the Coral Sea and the Torres Strait Fisheries (both managed through the Australian Fisheries Management Authority). There are currently

⁶ Leeworthy, G. (2005). 'Report on the stock assessment of burrowing blackfish and recent advances in the management of the East Coast Queensland *bêche-de-mer* fishery.' Queensland Sea Cucumber Association.

no collaborative research programs being undertaken in these fisheries. An annual biomass assessment is conducted by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) in the Torres Strait and results may have some application to our understanding of stock dynamics for coexisting species in the ECBDMF. Further to this, recent studies in the Torres Strait provided recommendations on conversion ratios of different processed forms of bêche-de-mer (i.e. live, gutted, salted and dry weights) to be applied by fishery managers for improved enforcement of the TACC. Regular dialogue occurs between all management and research agencies to discuss issues common to all fisheries.

Fishery management

Compliance reports

The Queensland Boating and Fisheries Patrol (QBFP) reported that a total of 35 inspections were conducted on bêche-de-mer operations during the 2004/2005 financial year. There were two breaches detected in the period indicating a high compliance rate of about 94%.

A new Compliance Activity System has recently been implemented by DPI&F that will record detailed information on activities performed by the QBFP. The new system records:

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)

All offences and field activities are recorded to six nautical mile commercial fishing grids. This will allow enforcement activities and offences to be represented spatially and to guide reviews 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 trialed in Cairns and implemented across Queensland in July 2005.

A compliance risk assessment, undertaken in June 2005, identified, evaluated and ranked the risks associated with non-compliance with management arrangements for the ECBDMF and delivered recommendations relating to further management and compliance actions where appropriate. The process identified two high-risk activities that require priority management action as well as a number of lower risk activities that will require action but a lower priority level. As these are compliance issues, the activities are confidential and will not be reported on in this public document. The compliance risk report suggested mechanisms by which the risk associated with the activities may be reduced. Compliance strategies will be developed that address these issues. It is anticipated that the strategies will be completed by DPI&F in early 2006.

Changes to management arrangements

The ECBDMF underwent significant changes designed to control the harvest of bêche-de-mer species and maintain a sustainable industry in 2004. The suite of changes were

led by the Queensland Sea Cucumber Association (QSCA) members and endorsed by the DPI&F Harvest Fisheries Management Advisory Committee (Harvest MAC).

The implementation of an RZS on 1 July 2004 was the major management change to occur in the ECBDMF. The RZS was designed to spread fishing effort throughout the area of the GBR and minimise the risk of localised depletions that may occur through repeated harvesting of particular reefs.

Also in 2004, the quota for white teatfish was divided into 57 t TACC north of 19°S and 70 t south of 19°S in an attempt to spread effort for this species away from the northern section of the fishery where nearly all of the white teatfish catch was previously harvested.

Size limits have been in place for the major sea cucumber species and species groups since the 1990s. However all species size limits have now been increased to allow at least one spawning event before an individual animal could be harvested.

Trigger levels have now been incorporated into the management structure for species other than white teatfish. These levels were developed in consultation with scientists and the QSCA and endorsed by Harvest MAC. If a trigger level is reached for a species, then an industry-funded resource assessment must be undertaken to assess the impacts of harvesting at higher levels on stock status and to provide a biological basis for setting a species TACC.

Consultation, communication and education

Promotion of regulations applying to both commercial and recreational fishers is an ongoing role of the DPI&F. Approximately 160 000 recreational fishing brochures containing size and possession limit information were distributed in 2004. In addition, approximately 500 stakeholders were sent copies of the fisheries newsletter 'Fish' four times during 2004. The newsletter highlights recent achievements, the latest research and proposed changes to management arrangements. DPI&F also introduced 'FishFlash' in February 2004, an email-based newsletter with links to the latest fisheries news. Approximately 300 stakeholders subscribe to 'FishFlash'.

Consultation also occurs through the Harvest Fisheries Management Advisory Committee (HarvestMAC), with meetings generally held twice a year. HarvestMAC provides an opportunity for stakeholders to review and advise DPI&F on management measures for the ECBDMF. A Bêche-de-mer Working Group also reviews all issues relating to the fishery. The Working Group and the recently formed Scientific Advisory Group (SAG) provide advice to Harvest MAC members on any management actions required to ensure the fishery continues to operate within sustainable levels. The outcomes of these groups are provided to Harvest MAC for consideration at the following meeting.

Complementary management

The ECBDMF operates mostly within the GBR Marine Park, which is managed by the GBRMPA. Because of their legislated mandate to maintain biodiversity in the park, GBRMPA became a strong advocate for the need for more stringent harvest controls in the ECBDMF and subsequently influenced the quick progression of many of the changes seen recently in this fishery. Of major concern to the GBRMPA was the risk of localised depletion of sea cucumber populations. Many sea cucumber species are considered to be density-dependent spawners (i.e. species that require a minimum

number of individuals within a given area to guarantee the chances of gamete fertilisation and spawning success). Under pressure from the GBRMPA and the Commonwealth DEH, the QSCA developed the RZS to reduce the risk of local depletions occurring. Industry members are formally bound to adhere to the RZS through a Memorandum of Understanding signed by the QSCA and DPI&F.

The implementation of the Representative Areas Program (RAP) zoning in the GBR in July 2004 has also seen major changes made to the areas that the industry can harvest within. The new zoning has increased the size of fishable areas protected from commercial bêche-de-mer harvest from 22% to about 37%. The effect of the RAP zoning on the industry is mixed. For instance, RAP zoning has further reduced the total area available for harvest which, given that there is the same number of operators in the fishery, has placed further pressure on the sea cucumber resource in open areas. GBRMPA has argued however, that it has also provided a greater area of habitat acting as possible refugia from harvesting and these areas may in turn provide a 'spill over' effect of recruits to the fishery.

Fishery performance

Appraisal of sustainability of fishery

Commercial logbook data suggests that the harvest of bêche-de-mer is sustainable at current levels. The RZS has made significant changes to the way the sea cucumber resource is harvested and has greatly reduced the chances of localised and serial depletions occurring. The range of input and output controls currently implemented (TACC, size limits, closures) are precautionary approaches to management that have the capacity to protect the fishery from increases in effort. The fishery is regarded as being managed in a precautionary and sustainable manner.

Progress in implementing DEH recommendations

DEH recommendations to address identified uncertainties or risks can be found at <http://www.deh.gov.au/coasts/fisheries/qld/east-coast-bêche-de-mer/report.html>.

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

- DPI&F has reported publicly on the status of the ECBDM fishery through this report and will continue to do so annually.
- DPI&F has notified DEH of management amendments occurring within the fishery.
- A compliance risk assessment was undertaken in June 2005 that identified, evaluated and ranked the risks associated with non-compliance with management arrangements for the ECBDMF and delivered recommendations relating to further management and compliance actions where appropriate.
- Significant progress has been made in addressing the potential of localised and serial depletions occurring in the ECBDMF. The adoption of the harvest control systems including the RZS minimum size limits, conservative species catch trigger levels and the division of the white teatfish quota into northern and southern zones, combine to minimise the risk of overfishing within small spatial areas (e.g. reef).

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

Management performance

Performance measures and/or reference points have not yet been developed for the fishery. DPI&F intends to develop these measures in consultation with HarvestMAC by December 2007.

Resource concerns

The commercial harvest of black teatfish was stopped in 1999 following concerns over the sustainability of the stock. Surveys by Benzie and Uthicke (2003)⁷ suggested that there had been little to no recovery by 2001, although the results of these surveys are variable and further clarification is required. The survey was repeated in 2004 and the results have not been released.

Information compiled by

Anthony Roelofs, DPI&F Assessment and Monitoring Unit

Acknowledgements

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Front cover image

Sandfish (*Holothuria scabra*)

⁷ Benzie, J.A.H. and Uthicke, S. (2003). Stock size of bêche-de-mer, recruitment patterns and gene flow in black teatfish, and recovery of over-fished black teatfish stocks on the Great Barrier Reef. Townsville, The Australian Institute of Marine Science: 86pp.