



**Australian Government**

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**Department of the Environment and Heritage**

Assessment of the  
**Queensland East Coast Beche-de-mer Fishery**

November 2004

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## **Disclaimer**

This document is an assessment carried out by the Department of the Environment and Heritage of a commercial fishery against the Australian Government *Guidelines for the Ecologically Sustainable Management of Fisheries*. It forms part of the advice provided to the Minister for the Environment and Heritage on the fishery in relation to decisions under Parts 13 and 13A of the *Environment Protection and Biodiversity Conservation Act 1999*. The views expressed do not necessarily reflect those of the Minister for the Environment and Heritage or the Australian Government.

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# Assessment of the ecological sustainability of management arrangements for the Queensland East Coast Beche-de-mer Fishery

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## EXECUTIVE SUMMARY

### Background

The Queensland Department of Primary Industries and Fisheries (DPI&F) has submitted a document for assessment under Parts 13 and 13A of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The draft document *Ecological Assessment of Queensland's East Coast Beche-de-mer Fishery* (the submission) was received by the Department of Environment and Heritage (DEH) in July 2004. The submission was released for a thirty-day public comment period that expired on 20 August 2004. Three public comments were received. DPI&F provided a response to the issues raised and amended the submission where necessary. A final submission for assessment was received in October 2004.

The submission reports on the Queensland East Coast Beche-de-mer Fishery (ECBDMF) against the Australian Government *Guidelines for the Ecologically Sustainable Management of Fisheries*. The DEH assessment considers the submission, associated documents, public comments and DPI&F's response to the comments.

**Table 1: Summary of the Queensland East Coast Beche-de-mer Fishery**

<b>Area</b>	All waters adjacent to the Queensland east coast, from Tin Can Bay to Cape York.
<b>Fishery status</b>	Largely unknown, however data suggests: Black teatfish - overfished. Sandfish - overfished in some areas. Prickly redfish – fully exploited White teatfish – fully exploited Other species – unknown
<b>Target Species</b>	All species of beche-de-mer (Holothurians) can be harvested. Previously black teatfish ( <i>Holothuria whitmaei</i> ) was the primary target species however the quota for this species is currently 0 tonnes (t). The primary target species currently include: <ul style="list-style-type: none"> <li>- White teatfish (<i>Holothuria nobilis</i>)</li> <li>- Prickly redfish (<i>Thelenota ananas</i>)</li> </ul> Other sought after species include: <ul style="list-style-type: none"> <li>- Sandfish (<i>Holothuria scabra</i>)</li> <li>- Golden sandfish (<i>Holothuria scabra</i> var. <i>versicolor</i>)</li> <li>- Elephant trunkfish (<i>Holothuria fuscopunctata</i>)</li> <li>- Deepwater redfish (<i>Actinopyga echinites</i>)</li> <li>- Surf redfish (<i>Actinopyga mauritiana</i>)</li> <li>- Lollyfish (<i>Holothuria atra</i>)</li> <li>- Blackfish (<i>Actinopyga miliaris</i>)</li> <li>- Greenfish (<i>Stichopus chloronotus</i>)</li> <li>- Curryfish (<i>Stichopus variegates</i>)</li> </ul>
<b>By-product Species</b>	None
<b>Gear</b>	Hand harvest. Divers use hookah, Self Contained Underwater Breathing Apparatus (SCUBA) or free dive.
<b>Season</b>	All year, highest harvest usually in summer months.
<b>Commercial harvest 2002-03</b>	264 t
<b>Value of commercial harvest</b>	Approximately \$4 million annually.
<b>Recreational harvest</b>	Negligible
<b>Indigenous harvest</b>	Negligible
<b>Commercial licences issued</b>	Limited to 18 transferable authorities. 3 authority holders (2 major and 1 minor).

<b>Management arrangements</b>	Include a mix of input and output controls, detailed in Table 2.
<b>Export</b>	Primary market is China.
<b>Bycatch</b>	Negligible
<b>Interaction with Threatened Species</b>	Negligible

The area of the fishery includes State and Commonwealth waters adjacent to the Queensland east coast from Tin Can Bay to Cape York. Fishing within Commonwealth waters is managed by DPI&F under an Offshore Constitutional Settlement between the Australian Government and the Government of Queensland. Historically fishing effort has focussed primarily on reefs between Townsville and the Torres Strait, however effort is likely to be spread out in the 2004-05 season with the introduction of a rotational zoning scheme (discussed in Part II). Aside from the inshore sandfish harvest in Hervey Bay and the offshore Marion Reef, the focus of the fishery is within the Great Barrier Reef Marine Park (GBRMP).

The fishery targets beche-de-mer, which is a common term used for the processed product of holothurians or sea cucumber. Specimens are taken by hand harvest and due to the highly selective nature of this method, no byproduct is taken. Fishers can harvest all species of beche-de-mer found in Queensland waters, however the fishery has a history of focussing effort on the most commercially valuable species of beche-de-mer, such as black teatfish, sandfish and white teatfish.

Holothurians are found on coral reefs, adjacent shoals, seagrass beds and sandy and silty benthos in shallow tropical seas. The Great Barrier Reef (GBR) region is considered one of the three global hotspots for holothurian diversity with approximately 100 species known to occur there<sup>1</sup>. The habitat of beche-de-mer species ranges from intertidal and inshore mudflats to midshore reefs, and deepwater areas. While some species occur across a range of habitats, no species is abundant in all shelf zones or all sectors of the reef. The fishery currently harvests up to 23 holothurian species, each with different habitat preferences, and different biological and ecological characteristics.

The initial development of the fishery was characterised by the targeting of black teatfish, a high value species that is found in waters of 0-20 m depth, on the top, back and edge of reefs. Due to the decline of black teatfish, the fishery has since moved to primarily target white teatfish, a deeper water species (10-40 m) that inhabits the mid and outer shelf areas in reef passes, and prickly redfish, which is found in the shallow waters of the mid and outer shelf reef slopes and passes.

Holothurians are a slow moving benthic animal with an average lifespan of between 5 and 10 years. Animals reach sexual maturity at an age of 2 to 6 years, with many species reproducing via broadcast spawning, and some using fission<sup>2</sup>. Tropical species of holothurians do not aggregate to spawn and fertilisation is thought to be highly density dependent. Understanding of the genetic distribution, juvenile ecology and reproduction of holothurians is limited, however they are considered to play an important ecological role due to their contribution to benthic recycling or bioturbation.

Beche-de-mer stocks are particularly vulnerable to overexploitation due to their limited dispersal, patchy distribution, ease of collection, slow recovery from overfishing and the limited available information on biological and spatial distribution. International beche-de-mer fisheries have a history of “boom-bust” cycles, and a number of fisheries have collapsed as a result of unsustainable harvest practices. As a result the species requires strict management controls to ensure that harvesting is within sustainable levels. Beche-de-mer is currently being considered for listing under

<sup>1</sup> Hammond *et al*, 1985

<sup>2</sup> Preston, 1997

the Convention on International Trade of Endangered Species (CITES) to afford the species further protection through trade restriction and regulation.

There is a long history of beche-de-mer fishing on the reefs and shoals of the GBR. The ECBDMF is a recent resurgence of a fishery that was initially fished by Macassans visiting the northern Australian coast from the mid 1600s. It is possible that harvesting of beche-de-mer started as early as the 1400s when Chinese took exploratory voyages through the Torres Strait region. The Torres Strait and northern GBR fishery peaked between 1890 and 1910, when up to 5600 t (gutted weight) was taken annually.

The first beche-de-mer processing station on the GBR operated from 1804 on Lady Elliot Island. The fishery developed further during the mid 1800s and from 1895 to 1948 reported annual total catches of 5 t to 542 t (gutted and dried weight), which gives an estimated wet weight of landing from 51 to 5420 t<sup>3</sup>. The fishery declined, ceased harvesting during WWII and underwent a resurgence in the early 1980s, driven by a rapid expansion of demand for beche-de-mer and rapid increases in export value. The fishery now has an annual value of approximately \$4 million and took 264 t of beche-de-mer in 2002-03. Beche-de-mer product is exported to markets throughout Asia, with trading primarily through Hong Kong.

Management of the ECBDMF has evolved since its resurgence in the late 1980s, introducing a Total Allowable Catch (TAC) in 1991 and limited entry in 1995. Initially catch consisted almost entirely of the high value black teatfish. Concerns over declining catches and catch rates from 1993-94 resulted in the introduction of a 0 t TAC for this species in 1998-99. Declining catches and recognition of the need for local scale management also led to the closure of Hervey Bay and Tin Can Bay to the collection of sandfish in 2001.

Concerns regarding the ecological sustainability of the fishery in early 2004 motivated industry to develop a suite of new management measures in consultation with Great Barrier Reef Marine Park Authority (GBRMPA), DEH, scientists and management. Internationally the overexploitation of beche-de-mer fisheries has been characterised by serial depletion of high value species and localised depletions of holothurians. There is evidence to suggest that this has occurred in the ECBDMF, and to ensure that this does not continue to occur, industry has implemented species-specific precautionary trigger points, new species-specific minimum size limits that are at least 10% greater than size at first maturity and a rotational zoning scheme. These measures (discussed in greater detail in Part II) were implemented on 1 July 2004 under a legal agreement between authority holders.

The fishery takes holothurians by hand, either by free diving or with the assistance of SCUBA or hookah. In the 2004-05 season, management arrangements in the ECBDMF include minimum size limits, a white teatfish TAC, a TAC for all other species and a rotational zoning scheme. In addition, there are limits on the boats, dories and number of divers in the water at any one time. Currently there are 18 authorities in the ECBDMF.

Because of the highly selective nature of the fishing method, bycatch and interactions with protected species are negligible in the fishery. Take of beche-de-mer by the recreational and indigenous sectors is also considered to be negligible.

The fishery is managed under the *Queensland Fisheries Act 1994* (the Fisheries Act), and the *Queensland Fisheries Regulation 1995*. The management regime is detailed in the *Queensland East Coast Beche-de-mer Fishery: Statement of Management Arrangements* (2001). Most fishing in the

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<sup>3</sup> Stutterd & Williams, 2003. Breen, 2001.

ECBDMF takes place within the GBRMP, therefore the *Great Barrier Reef Marine Park Act 1975* is also relevant to the management of the fishery.

### **Overall assessment**

The material submitted by DPI&F demonstrates that the management arrangements for the ECBDMF meet most of the requirements of the Australian Government *Guidelines for the Ecologically Sustainable Management of Fisheries*.

While the fishery is relatively well managed, DEH has identified a number of risks that must be managed to ensure that their impacts are minimised:

- The overexploitation of some species;
- The vulnerability of beche-de-mer species to overexploitation;
- Significant gaps in the understanding of beche-de-mer biology and ecology;
- Inadequate monitoring of fishery/stock status;
- Lack of robust abundance or sustainable yield estimates; and
- The need for strategic management objectives, performance indicators and performance measures in the formal management arrangements.

Recommendations to address these issues have been developed to ensure that the risk of impact is minimised in the longer term. Through the implementation of the recommendations and the continuation of a responsible attitude to the management of the fishery, management arrangements are likely to be sufficiently precautionary and capable of controlling, monitoring and enforcing the level of take from the fishery while ensuring the stocks are fished sustainably.

The management regime aims to ensure that fishing is conducted in a manner that does not lead to over-fishing and for fishing operations to be managed to minimise their impact on the structure, productivity, function and biological diversity of the ecosystem. On balance, the fishery is being managed in an ecologically sustainable manner and is working to address existing problems and minimise environmental risks.

The operation of the fishery is consistent with the objects of Part 13A of the EPBC Act. Given the development and implementation of new management arrangements and the enthusiasm of industry to contribute to resource assessment and research, DEH considers that the fishery will not be detrimental to the survival or conservation status of the taxon to which it relates in the short term. Similarly, it is not likely to threaten any relevant ecosystem in the short term. DEH therefore recommends that the fishery be declared an approved Wildlife Trade Operation (WTO) with the actions specified in the recommendations to be undertaken by DPI&F to contain the environmental risks in the long term. DEH considers that the fishery, as managed in accordance with the management regime is not likely to cause serious or irreversible ecological damage over the period of the export decision. Specifically, the WTO declaration would allow the export of product from the fishery for a period of 3 years. The WTO declaration will require annual reporting on the progress of implementing the recommendations of this report and other managerial commitments. The implementation of the recommendations will be monitored and reviewed as part of the next DEH review of the fishery in 3 years time.

As the official fishery area encompasses Commonwealth as well as State waters, consideration under Part 13 of the EPBC Act is required regarding the impact of the fishery on listed threatened species, listed migratory species, cetaceans and listed marine species.

Protected species occurring in the fishery area include marine turtles, cetaceans, syngnathids, dugongs and seabirds. The fishery has no recorded interaction with these species groups. Due to the

highly selective nature of the fishing method, the actual and potential impact on Part 13 species under the management arrangements is considered very low and adequate protection is provided. There are no listed threatened ecological communities in the fishery area.

DEH recommends that the ECBDMF management regime be declared an accredited management plan under Sections 208A, 222A, 245 and 265 of the EPBC Act. In making this judgement, DEH considers that the fishery to which the regime relates does not, or is not likely to, adversely affect the survival in nature of listed threatened species or population of that species, or the conservation status of a listed migratory species, cetacean or listed marine species or a population of any of those species. DEH also considers that the regime requires that all reasonable steps are taken to avoid the killing or injuring of protected species, and the level of interaction under current fishing operations is negligible. On this basis, DEH considers that an action taken by an individual fisher, acting in accordance with the regime, would not be expected to have a significant impact on a listed threatened species or listed migratory species protected by the EPBC Act.

The assessment also considered the possible impacts on the World Heritage values of the Great Barrier Reef World Heritage Area (GBRWHA). In conducting this assessment and formulating recommendations, DEH has liaised closely with GBRMPA, the principal advisor to the Commonwealth Government on the care and development of the GBRWHA, which has a responsibility to ensure that impacts on the values of GBRWHA are minimised.

Since the GBRMP Representative Area Program (RAP) came into effect on 1 July 2004, approximately 28% of the GBRMP has been closed to beche-de-mer harvesting, ensuring that holothurians remain present in a representative portion of a range of habitats. For this reason, together with the nature of the fishery and the range of measures in place, DEH considers that an action taken by an individual fisher, acting in accordance with the ECBDMF management arrangements, would not be expected to have a significant impact on the World Heritage values of the GBRMP protected by the EPBC Act.

The implementation of recommendations and other commitments made by DPI&F in the submission will be monitored and reviewed as part of the next DEH review of the fishery in 3 years time.

## **Recommendations**

1. Department of Primary Industries and Fisheries to inform the Department of the Environment and Heritage of any intended amendments to the management arrangements that may affect sustainability of the target species or negatively impact on the ecosystem.
2. From 2005, the Queensland Department of Primary Industries and Fisheries to report publicly on the status of the fishery on an annual basis, including explicit reporting against each performance measure once developed.
3. The Queensland Department of Primary Industries and Fisheries to conduct a risk assessment to ensure compliance resources are targeted to the areas of greatest risk within 2 years.
4. The Queensland Department of Primary Industries and Fisheries to develop and implement a robust system to validate commercial logbook reporting of catch and effort in the fishery within two years.
5. The Queensland Department of Primary Industries and Fisheries to cooperate with other jurisdictions in efforts to undertake research on key gaps in beche-de-mer biology and ecology.

6. The Queensland Department of Primary Industries and Fisheries to continue to refine analysis of fishery dependent data to ensure that the status and performance of the fishery can be adequately reviewed.
7. The Queensland Department of Primary Industries and Fisheries to develop and implement a robust method of monitoring stock status for key target species.
8. The Queensland Department of Primary Industries and Fisheries to obtain estimates of sustainable harvest levels for key target species in the fishery within three years.
9. The Queensland Department of Primary Industries and Fisheries to develop fishery specific objectives linked to performance indicators and performance measures for all beche-de-mer species and for fishery impacts on the ecosystem within two years. Within three months of becoming aware that a performance measure has not been met, the Department of Primary Industries and Fisheries to finalise a clear timetable for the implementation of appropriate management responses.
10. The Queensland Department of Primary Industries and Fisheries to implement within one year, measures to minimise localised depletion and serial depletion in the fishery.
11. The Queensland Department of Primary Industries and Fisheries to develop and implement a precautionary recovery strategy for overfished species, that specifies reference points linked to management actions, within two years.

## PART I - MANAGEMENT ARRANGEMENTS

The Queensland East Coast Beche-de-mer Fishery is managed by the Queensland Department of Primary Industries and Fisheries (DPI&F). A significant proportion of the fishery area is within the Great Barrier Reef Marine Park (GBRMP). As a result, the Great Barrier Reef Marine Park Authority (GBRMPA) is involved with the management, compliance and enforcement of the fishery.

The management regime is described in the following documents, all of which are, or will be publicly available:

- The Queensland *Fisheries Act 1994*;
- The Queensland *Fisheries Regulation 1995*;
- The *Queensland East Coast Beche-de-mer Fishery: Statement of Management Arrangements* (2001); and
- Relevant Gazetted notices and licence conditions.

A number of other documents, including annual reports to DEH, research reports, scientific literature and discussion papers are integral to the management of the fishery.

DEH considers it important that management arrangements remain flexible to ensure timely and appropriate managerial decisions. Because of the importance of the documents referred to above to DEH's assessment of the fishery, an amendment could change the outcomes of the assessment and decisions stemming from it. Export decisions relate to the arrangements in force at the time of the decision. In order to ensure that these decisions remain valid, DEH needs to be advised of any changes that are made to the management regime and make an assessment that the new arrangements are equivalent or better, in terms of ecological sustainability, than those in place at the time of the original decision.

**Recommendation 1:** *Department of Primary Industries and Fisheries to inform the Department of the Environment and Heritage of any intended amendments to the management arrangements that may affect sustainability of the target species or negatively impact on the ecosystem.*

Management of the fishery incorporates a sound range of consultative mechanisms and a clear commitment to effective consultation with a variety of stakeholders. DEH considers the level of consultation to be adequate and is confident that the management agency will continue to ensure interested parties are consulted appropriately.

The Harvest Fisheries Management Advisory Committee (Harvest MAC) provides advice on the management of Queensland harvest and developmental fisheries to DPI&F. The committee includes representatives from industry, DPI&F, GBRMPA, Queensland Park and Wildlife Service (QPWS), Queensland Boating and Fisheries Patrol (QBFP), recreational fishers, scientists and a permanent DEH observer. Harvest MAC meets twice a year to discuss recent developments in the fishery and data collected, and to consider the adequacy of management arrangements. At the request of the Harvest MAC, a beche-de-mer working group is occasionally held to discuss a particular issue in the ECBDMF. The working group generally consists of a scientist, the DPI&F fishery manager, industry, GBRMPA, QPWS, QBFP and DEH.

The fishery is managed according to the policy regime described in the *Queensland East Coast Beche-de-mer Fishery: Statement of Management Arrangements* (2001). This document describes the fishery and current management arrangements, and details the objectives of the Queensland *Fisheries Act 1994*, however there are no fishery specific objectives or performance indicators.

Discussion on the development of objectives and performance indicators for the ECBDMF is included in Part II of this report.

Management of the fishery is reviewed by Harvest MAC twice a year, however this review is rudimentary and is not strategically conducted against fishery specific management objectives and performance indicators, as these have not been developed (see Part II). Once these objectives and indicators have been developed, DEH encourages Harvest MAC to use these to strategically review the performance of the fishery.

Although an annual analysis of catch statistics is provided to DEH as a condition of previous export approvals, there is no publicly available annual review of the status of the fishery. DEH understands that due to the low number of operators in the fishery, there are some issues with confidentiality of catch and effort data, however the public has shown an interest in the status of this fishery through public comment on the submission and occasionally in the media. DEH recommends that DPI&F report publicly on the status of the fishery annually. The report should contain sufficient information for review of the performance of the fishery against performance measures (see rec 9), while working within the constraints of required confidentiality.

**Recommendation 2:** *From 2005, the Queensland Department of Primary Industries and Fisheries to report publicly on the status of the fishery on an annual basis, including explicit reporting against each performance measure once developed.*

Management of the fishery is based on a mixture of input and output controls as detailed below in Table 2.

**Table 2: Management measures in place in the fishery**

<b>DPI&amp;F implemented</b>		
<i>Limited entry</i>	18 transferable authorities	
<i>Species-specific minimum size limits that are at least 15% greater than the current best estimates of size at first maturity for each species</i>	Sandfish	20 cm
	White teatfish	40 cm
	Black teatfish	30 cm
	Prickly redfish	50 cm
	Blackfish	20 cm
	Deepwater redfish	20 cm
	Surf redfish	25 cm
	Lollyfish	20 cm
	Greenfish	20 cm
	Curryfish	35 cm
	Elephant trunkfish	40 cm
	Brown sandfish	25 cm
	Leopardfish	35 cm
	Amberfish	50 cm
	All other species	15 cm
<i>TAC</i>	Total TAC of 380 t, consisting of: 0 t black teatfish 127 t white teatfish 253 t all other species	
<i>Gear limit</i>	Hand harvest only SCUBA and hookah may be used Maximum of 4 divers in the water at any one time Boat and dory limits	

<i>Area closures</i>	Implemented by GBRMPA under the RAP. Approximately 28% of beche-de-mer habitat in the GBRMP is closed to fishing.	
<i>Emergency Fisheries Declaration</i>	Effecting an emergency closed season, closed waters or regulated fish.	
<b>Industry implemented measures (see below)</b>		
<i>Rotational Zoning Scheme</i>	Fishery divided into 154 zones of approximately 100 to 150 square nautical miles that can be fished for a maximum of 15 days in any one year. Each area is only allocated for fishing one in every three years. In addition to these zones, three Blackfish Zones have been identified where high concentrations of 'burrowing blackfish' are found. Stock assessments are to be undertaken in order to set TACs specifically for these three zones.	
<i>White teatfish TAC split</i>	57 t of the white teatfish TAC can be harvested in the Northern Zone (north of 19 degrees south latitude) and 70 t is available in the Southern Zone (south of 19 degrees latitude).	
<i>Species specific precautionary trigger points which if exceeded in any one year will instigate a stock assessment that will aim to establish biologically based sustainable yield estimates</i>	<ul style="list-style-type: none"> <li>Sandfish</li> <li>White teatfish</li> <li>Black teatfish</li> <li>Golden sandfish</li> <li>Prickly redfish</li> <li>Surf redfish</li> <li>Deep water redfish</li> <li>Stonefish</li> <li>Blackfish</li> <li>Burrowing blackfish</li> <li>Tigerfish</li> <li>Greenfish</li> <li>Curryfish (<i>S. vastus</i>)</li> <li>Curryfish (<i>S. hermanni</i>)</li> <li>Brown sandfish</li> <li>Amberfish</li> <li>Flowerfish</li> <li>Lollyfish</li> <li>Snakefish</li> <li>Pinkfish</li> <li>Elephant trunkfish</li> </ul>	<ul style="list-style-type: none"> <li>15 t</li> <li>n/a (quota in place)</li> <li>n/a (0 t TAC in place)</li> <li>10 t</li> <li>40 t</li> <li>25 t</li> <li>25 t</li> <li>10 t</li> <li>25 t</li> <li>15 t</li> <li>25 t</li> <li>50</li> <li>25</li> <li>50 t</li> <li>25 t</li> <li>50 t</li> <li>25 t</li> <li>50 t</li> <li>25 t</li> <li>50 t</li> <li>50 t</li> </ul>

In response to concerns from GBRMPA regarding the ecological sustainability of the fishery, the Queensland Sea Cucumber Association (QSCA) implemented a number of additional management measures on 1 July 2004. These measures are agreed under a Memorandum of Understanding (MoU) between the authority holders and are detailed in Table 2 above. The implementation of these measures will also be a condition on the beche-de-mer harvest permits to be issued by GBRMPA.

DEH commends the proactive approach taken by industry in implementing these measures. DPI&F have included the new size limits on permit conditions but are yet to incorporate the other measures within the formal management regime. DEH strongly encourages DPI&F to implement the

additional measures in the formal management arrangements for the fishery. These measures have been considered in the assessment due to their significant contribution to the ecologically sustainable management of the fishery.

Compliance efforts in the fishery are undertaken by QBFP and consist of unloading and wharf inspections, in addition to at-sea inspections. Small, unintentional over-harvesting of quota has been detected in the fishery in the past but there have been very few serious breaches in the ECBDMF. The QBFP representative presents a compliance report detailing breaches at each Harvest MAC meeting. DPI&F is currently implementing a new quota monitoring system in the reef finfish and Spanish mackerel fisheries, which if effective may be rolled out across all quota managed fisheries.

There are a number of difficulties in undertaking compliance activities in the ECBDMF, including problems with identification of species, fishing activities occurring in the far north where enforcement operations are limited, and changes to the weight of specimens after processing. A key issue at present is the limited resources committed to compliance in the fishery and DPI&F is investigating 'fee for service' options to increase the funding available. The new industry measures are not being enforced by DPI&F at this time, however any infringements would breach the MoU between operators and the GBRMPA harvest permits. The agreement also allows GBRMPA and DEH access to Vessel Monitoring System (VMS) data to ensure that fishing has occurred within the agreed areas for that fishing year.

While there are concerns with compliance with the management arrangements in the fishery, enforcement efforts are low due to the limited resources available. In order to ensure that available resources are directed toward the greatest risks in the fishery a compliance risk assessment should be undertaken. This risk assessment should involve, but not be limited to, consideration of:

- Quota compliance (including the harvesting of species with 0 t TAC, off-loading of catch in other jurisdictions),
- Logbook compliance, and
- Illegal fishing of beche-de-mer in the north outside of quota holders.

**Recommendation 3:** *The Queensland Department of Primary Industries and Fisheries to conduct a risk assessment to ensure compliance resources are targeted to the areas of greatest risk within 2 years.*

Fishery-dependent data relating to the catch of beche-de-mer is collected on a regular basis in the fishery. Some fishery independent information is also collected. Discussion of the information collection system can be found in Part II of this report.

An analysis of the fishery's capacity for assessing, monitoring and avoiding, remedying or mitigating any adverse impacts on the wider marine ecosystem in which the target species lives and the fishery operates is contained under Principle Two of this report.

Commercially harvested species of holothurians occur throughout northern Australian waters and are taken in the Torres Strait, Coral Sea, Northern Territory, Western Australia and Queensland. The stock structure of these species is not well understood and it is unknown whether the harvest of specimens within one jurisdiction has any effect on the abundances or sustainability of species in another. In general, jurisdictions manage their beche-de-mer fisheries as separate stocks, however some cross-jurisdictional consultation on beche-de-mer does occur at the Northern Fisheries Management Forum. In addition, Queensland and the Australian Fisheries Management Authority frequently consult on management of the Coral Sea Fishery and jointly manage the Torres Strait fishery through the Torres Strait Protected Zone Joint Authority. In addition, many of the authority holders in the ECBDMF are involved in other Australian beche-de-mer fisheries and assist in

developing complementary arrangements between jurisdictions. DEH considers that DPI&F consults with other jurisdictions regarding the management of beche-de-mer fisheries, however further cooperation for research purposes would be beneficial (see Recommendation 4)

DEH considers that the current management arrangements comply with all relevant threat abatement plans, recovery plans, the National Policy on Fisheries Bycatch, and bycatch action strategies developed under that policy. DEH expects that DPI&F will also ensure compliance with any future plans or policies as they are developed.

No regional or international management regimes, to which Australia is a party, are of direct relevance to the fishery at this time. The prime international regime affecting the fishery is the United Nations Convention on the Law of the Sea. The management regime essentially complies with this. Other international regimes are applicable to fisheries management but do not explicitly involve this fishery, for example the 1992 Convention on Biological Diversity and in particular the 1995 Jakarta Mandate requiring that, in relation to the sustainable use of marine and coastal biological diversity, the precautionary principle should apply in efforts to address threats to biodiversity. While these agreements are not specifically addressed in the Submission, the fishery's compliance with their requirements can be assessed by examination of Part II of this report. The application of the International Convention for the Prevention of Pollution from Ships to vessels operating in the fishery is explicitly discussed under Principle 2, Objective 3.

Due to global concern about the status of beche-de-mer stocks, holothurians are being considered for listing on Appendix II of CITES. At the time of writing, potential listing of holothurians is still in the preliminary stages of consideration. If they were listed on Appendix II, trade could still continue, if the fishery met the CITES requirements, under regulation of CITES permits. Assessment of the ECBDMF under the EPBC Act incorporates consideration of the CITES Appendix II requirements and therefore the only implications of listing would be that CITES permits would be required for both export and import of product.

DEH considers it is incumbent on all authorities to develop a thorough understanding of the framework of national, regional and international agreements and their applicability to export-based fisheries for which they are responsible.

The ECBDMF has been operating within the area of the current GBRWHA since the declaration of the World Heritage Area in 1981. Under the EPBC Act, a person may not take an action that has, will have or is likely to have a significant impact on the world heritage values of a declared World Heritage property. People that are taking actions that are a lawful continuation of a use of land, sea or seabed, that was occurring immediately before the commencement of the EPBC Act, may continue to take those actions. An enlargement, expansion or intensification of a use is not a continuation of a use. GBRMPA issues permits for harvesting of beche-de-mer within the GBRMP and is involved in management of the fishery through Harvest MAC and frequent consultation with DPI&F and authority holders. There has been a significant increase in the number of areas closed to all forms of fishing in the GBRMP as the result of the RAP and the introduction of a new Zoning Plan in July 1994. GBRMPA was also consulted throughout the development of the rotational zoning scheme to ensure that the scheme was consistent with the values of the GBRMP. For this reason, and subject to the implementation of recommendations, DEH considers that fishing activities as currently practiced in this fishery are unlikely to have a significant impact on the world heritage values of the GBR in the next three years. Any significant change to existing practices, which are likely to significantly impact on the Great Barrier Reef's World Heritage values, may require approval by the Australian Government Minister for the Environment and Heritage.

## **Conclusion**

DEH considers that the ECBDMF management regime is documented and transparent, and is developed through a consultative process. The management arrangements are adaptable, however appropriate objectives and performance criteria should be developed by which the effectiveness of the management arrangements can be measured, enforced and reviewed.

The management arrangements are capable of controlling the harvest through a combination of input and output controls appropriate to the size of the fishery, however periodic review of the fishery and the enforcement of critical aspects of the management arrangements require further refinement.

The management regime takes into account arrangements in other jurisdictions, and adheres to arrangements established under Australian laws and international agreements.

DEH considers that there is scope to further refine the management arrangements and has provided a number of recommendations for improvements in the longer term.

## **PART II – GUIDELINES FOR THE ECOLOGICALLY SUSTAINABLE MANAGEMENT OF FISHERIES**

### **Stock Status and Recovery**

Principle 1: *‘A fishery must be conducted in a manner that does not lead to over-fishing, or for those stocks that are over-fished, the fishery must be conducted such that there is a high degree of probability the stock(s) will recover’*

### **Maintain ecologically viable stocks**

Objective 1: *‘The fishery shall be conducted at catch levels that maintain ecologically viable stock levels at an agreed point or range, with acceptable levels of probability’*

### **Information requirements**

Fishery dependent data are obtained through compulsory daily logbooks that have been collected since 1995. Logbook data includes species-specific catch (number of specimens and weight), effort, location of fishing and depth of fishing. Data on fishing location collected in the logbooks will change significantly with the implementation of the RAP and the rotational zoning scheme as effort will be spread more evenly across the fishery, as opposed to being concentrated in a few key areas. This may have implications for using this data to monitor the status of the fishery, however the spread in effort will provide greater information on species distribution across the entire fishery area. In addition to logbooks, fishers are required to telephone report at offload the number of specimens and the form that the catch is in, and buyers returns must be filled out on a daily basis. Compliance with rotational zoning and area closures can be assessed using VMS data collected in the fishery.

DPI&F collects data from a range of fishery dependent sources (logbooks, buyers records, telephone reporting and VMS). Catch data validation is conducted against buyers returns when errors in data recording are identified. Beche-de-mer buyers control most of the vessels in the fishery and as a result buyers records are not entirely independent from fisher logbooks. DEH considers that buyers records a suitable validation mechanism and recommends that DPI&F develop and implement a robust system to validate commercial logbook reporting of catch and effort for target species. DPI&F recognises that a greater emphasis on validation of onboard catch information is required to ensure logbook data accurately represents catches in the ECBDMF. Methods used may include observers’ data, or more frequent unloading inspections at ports. As management of the fishery heavily relies on accurate fishery dependent data there is a need for the data to be validated. DEH therefore recommends that DPI&F develop and implement a system to validate commercial logbook data.

**Recommendation 4:** *The Queensland Department of Primary Industries and Fisheries to develop and implement a robust system to validate commercial logbook reporting of catch and effort in the fishery within two years.*

Some fishery independent information has been collected in the fishery. Studies undertaken have primarily looked at black teatfish. Stock abundance estimates for some species have been produced but have been limited in their applicability to management of the fishery. Results of surveys conducted on black teatfish have shown that there has been little recovery of the species since the species was closed to fishing<sup>4</sup>, and any recovery may take several decades<sup>5</sup>. QSCA have committed to funding surveys of white teatfish populations in the fishery, but a timeframe for this work has not been set. DEH strongly supports this research and encourages QSCA to work with DPI&F and scientists to develop appropriate timeframes for undertaking surveys of white teatfish populations.

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<sup>4</sup> Benzie & Uthicke, 2003

<sup>5</sup> Uthicke *et al*, 2004.

There are significant gaps in understanding of the basic biology and ecology of holothurians, which is fundamental to the ecologically sustainable management of the fishery. This lack of understanding is common across all Australian beche-de-mer fisheries and would benefit from a cooperative approach from all beche-de-mer fisheries management agencies. Areas requiring attention include but are not limited to:

- Juvenile ecology and habitat preference;
- Reproduction (fecundity, reproductive strategy, required density for successful fertilisation);
- Recruitment patterns (source/sink populations or localised recruitment);
- Basic biology (size at first maturity, growth rates, maximum size and age);
- Species distribution; and
- Ecological role of beche-de-mer species.

DEH therefore recommends that DPI&F cooperate with other jurisdictions in undertaking research to better inform the sustainable management of beche-de-mer fisheries.

**Recommendation 5:** *The Queensland Department of Primary Industries and Fisheries to cooperate with other jurisdictions in efforts to undertake research on key gaps in beche-de-mer biology and ecology.*

While there is some fishery independent information available on the more valuable species that have been historically harvested, there is a very poor understanding of less valuable or new species. This is of particular relevance to a new species being taken in the fishery known as ‘burrowing blackfish’. Gaining a basic understanding of new species before harvesting occurs should be of the highest priority. Concerns regarding the lack of understanding of the ‘burrowing blackfish’ were raised during public comment. In response DPI&F committed to investigating the identity and biology of the new species to provide for more precautionary management of the species, however there were no timeframes associated with this commitment. DEH strongly supports this research and encourages DPI&F to gain a greater understanding of the biology and ecology of new species before significant quantities are harvested. The management of burrowing blackfish is further discussed on Page 17.

Overall, DEH considers that there is a reliable information collection system in place appropriate to the scale of the fishery. Continuation of existing data collections and the completion of planned surveys, combined with some extension of research efforts and refinement of validation methods will be important for the future management of the fishery.

### **Assessment**

There are no regular assessments of the status of beche-de-mer stocks in the ECBDMF. As discussed earlier, surveys of black teatfish have been undertaken to obtain abundance estimates and assess recovery of the species since the 0 t TAC was introduced. Stock assessments or abundance estimates have not been conducted for any other species taken in the fishery. Monitoring of the status of beche-de-mer stocks in the ECBDMF is limited to analysis of catch and effort data.

Potential productivity is unknown for all current target species. A survey of black teatfish estimated a ‘virgin’ biomass of 5600 t and suggested that an exploitation rate of less than 5% per year was unsustainable for this species<sup>6</sup>. While this estimate may not be applicable to management of current target species it does provide an indication of the low potential productivity of beche-de-mer stocks compared to other commercially exploited marine species.

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<sup>6</sup> Uthicke & Benzie, 2001

The fishery is operating in an environment of scientific uncertainty and consequently it is of particular importance that the status of the stock is monitored to ensure current management arrangements are sufficiently precautionary.

In the immediate to short term, fishery dependent data should be adequately analysed to provide some mechanism for monitoring the status and performance of the fishery. Harvest MAC is required to review the performance of the fishery and catch information twice a year in order to provide management advice to DPI&F. DEH recommends that DPI&F continue to refine the fishery dependent data analysis so that the data can be used to obtain some indication of the status and performance of the fishery.

**Recommendation 6:** *The Queensland Department of Primary Industries and Fisheries to continue to refine analysis of fishery dependent data to ensure that the status and performance of the fishery can be adequately reviewed.*

Monitoring a fishery's status by using fishery dependent data, or Catch per Unit Effort (CPUE), can be unreliable in fisheries that are multi-species, where the scale of fishing operation is finer than that at which catch information is obtained and where fishing operations can shift area, depth searched, or size class and species sought. Although the latest analysis of data provided to Harvest MAC and in the submission is an improvement, there are still limitations in the use of this data for monitoring stock status. DPI&F recognises that further investigation is needed to understand the drivers of changes in catch and CPUE in the fishery. DEH recommends that a more robust method of monitoring stock status, such as periodic analysis of stock abundance (as done in the Torres Strait beche-de-mer fishery), be developed and implemented in the ECBDMF for key target species<sup>7</sup>. DEH supports the formation of a Scientific Advisory Group (SAG) to discuss obtaining abundance estimates and robust methods of monitoring stock in the fishery.

**Recommendation 7:** *The Queensland Department of Primary Industries and Fisheries to develop and implement a robust method of monitoring stock status for key target species.*

Recent analysis of catch and effort data in the ECBDMF indicates that the abundance of key target species (currently white teatfish and prickly redfish) is declining in some areas of significant fishing effort. The rotational zoning scheme seeks to distribute effort more evenly across the fishery, therefore reducing the pressure on these areas of concern, however DEH considers it important that estimates of stock abundance of key target species are obtained so that management can assess whether the management arrangements are sufficient to ensure harvest remains within sustainable levels.

The spread of effort across the fishery, brought about by the rotational zoning scheme, will allow DPI&F to gain a greater understanding of distribution and structure of key target species. This understanding may assist DPI&F in conducting abundance estimates for key target species.

**Recommendation 8:** *The Queensland Department of Primary Industries and Fisheries to obtain estimates of sustainable harvest levels for key target species in the fishery.*

The distribution and spatial structure of beche-de-mer stocks is poorly understood for the ECBDMF. Studies on the genetic distribution for black teatfish<sup>8</sup> and sandfish<sup>9</sup> have been undertaken indicating that black teatfish consist of one stock on the East Coast of Queensland, and

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<sup>7</sup> key target species are those species which are primarily targeted by industry at any one time and therefore taken in larger amounts. Currently key target species would include white teatfish and prickly redfish, and will include those species that trigger the precautionary harvest levels in the future.

<sup>8</sup> Benzie & Uthicke, 2003

<sup>9</sup> Uthicke & Benzie, 2001

sandfish consists of multiple discreet stocks. It is possible that stocks of some species are shared with fisheries in the Coral Sea and Torres Strait.

Spatial structure of stocks in the ECBDMF is largely unknown outside of the primary fishing areas. Previously effort was concentrated in a few known beche-de-mer grounds near Cairns, but with the introduction of the rotational zoning scheme, effort is now spread more evenly across the entire fishery. The collection of fishery dependent data under the new scheme will provide valuable information on the distribution and structure of key target species in the fishery.

Potential removals from the beche-de-mer populations are limited to commercial harvest as there is negligible recreational and indigenous harvest. Consequently fishery dependent catch data are considered to provide reliable estimates of all removals from the stock. Beche-de-mer cannot be retained by any other Queensland fishery other than the aquarium fishery which are limited to 12 ornamental species. DEH expects that DPI&F will ensure that catches in the aquarium fishery are considered in any analysis of stock status undertaken in the ECBDMF.

Fishery dependent data from the ECBDMF shows a rise in CPUE and catch across all species in the fishery over the past five years. These indicators should be interpreted with caution as a decrease in the abundance of higher value species (black teatfish and white teatfish) has caused a shift in effort to the more abundant lower value species, such as prickly redfish, elephant trunkfish and amberfish. Changes in the catch of these lower value species should also be interpreted with caution as changes in the market value will effect the amount taken, as fishers tend to target only those species of value at any one time. CPUE trends can be skewed by changes in targeting practices as effort cannot be accurately allocated to species that are opportunistically harvested. In general, the catch composition has diversified with the depletion of the initial target species of black teatfish and sandfish in the late 1990s.

White teatfish are a high value species that are specifically targeted by fishers. Consequently catch of the species has constituted the greatest percentage of total catch of any one species since the decline of black teatfish in 1998-99. In response to the closure of black teatfish and the predicted shift to white teatfish, a 127 t TAC for the species was introduced in 1999 and catch has remained just below that level, apart from in 2000-01 when an exception was made to compensate fishers for costs associated with the introduction of VMS and the white teatfish TAC was raised to 159 t. After the peak in catch in 2000-01 spatial data shows a marked drop in CPUE of white teatfish between Cape Melville and Cairns, the main fishing grounds before 1 July 2004. DEH considers that the species should be managed with caution and that the implementation of Recommendations 7 and 8 will assist in providing management with a greater understanding of the status of the white teatfish populations in the ECBDMF.

Prickly redfish is opportunistically fished rather than targeted in the fishery and has been taken in significant amounts for the last 5 seasons. There has been a decrease in catch of the species since 2000-01, however this is considered to be a result of a significant spike in harvest in that quota year and drops in market demand since. Due to the difficulty in allocating effort to a single species in this multi-species fishery the decline in catch has caused a subsequent drop in CPUE. During this time the mean weight of harvested specimens has increased, indicating that overfishing is not occurring. At this time the data analyses present an uncertain picture and conclusions about the status of prickly redfish in the ECBDMF cannot be drawn. DEH remains concerned about the ecologically sustainable harvesting of this species and believes that introduction of the new management measures and implementation of the suite of recommendations in this assessment report will minimise the risk of overfishing the species.

Also of concern is the sudden increase in the harvest of what is recorded as black fish in catch data, but is likely to include a new species known as burrowing blackfish, in 2003-04. Burrowing black fish is a species that is new to the fishery and very little is known about it. This concern was raised in public comment and in response, DPI&F has committed to investigate the identity and biology of the 'burrowing blackfish' and ensure the species is identified taxonomically. The trigger levels developed by industry in consultation with a beche-de-mer scientist and implemented under the legal agreement between operators, include a trigger point for the Burrowing blackfish, which will trigger a stock assessment if catch remains at levels seen in 2003-04. Refer to Recommendation 9 for further discussion of the implementation of trigger points. DEH considers that harvesting of burrowing blackfish, and any other new species, should be managed in a precautionary manner and expects that DPI&F will endeavour to gain a greater understanding of the biology and ecology of the species.

### **Management response**

There are currently no management objectives that are specifically related to management of the ECBDMF. These may be established when a management plan is developed however there is no commitment or associated timeframe for the development of a management plan. There are also no performance indicators or performance measures detailed in the formal management arrangements for beche-de-mer species or the impact of the fishery on the ecosystem. Industry has set precautionary trigger points, or performance measures, for all species on advice from a beche-de-mer expert, Tim Skewes (Commonwealth Scientific and Industrial Research Organisation (CSIRO)). If any points are exceeded in a single quota year, a stock assessment is instigated, however there are no timeframes associated with the response to a trigger being breached and conducting the stock assessment.

The lack of knowledge on the basic biology and ecology of beche-de-mer calls for a precautionary and strategic approach to harvest in the fishery. The strategic management of a fishery is contingent on articulating the objectives for management of the fishery, and developing performance indicators and measures against which performance of the fishery can be assessed. DEH recommends that DPI&F develop fishery specific management objectives, performance indicators and performance measures. In order to ensure that the breaching of a performance measure is responded to in a timely manner, DEH recommend that DPI&F finalise a clear timeframe for implementation of management responses within three months of a breach being detected.

**Recommendation 9:** *The Queensland Department of Primary Industries and Fisheries to develop fishery specific objectives linked to performance indicators and performance measures for all beche-de-mer species and for fishery impacts on the ecosystem within two years. Within three months of becoming aware that a performance measure has not been met, the Department of Primary Industries and Fisheries to finalise a clear timetable for the implementation of appropriate management responses.*

The management arrangements for the ECBDMF implemented by DPI&F are detailed in the *Queensland East Coast Beche-de-mer Fishery: Statement of Management Arrangements (2001)*. This document describes those measures implemented by DPI&F as detailed in Table 2.

In response to concerns from GBRMPA and the public about the ecological sustainability of the management arrangements, QSCA has developed a suite of management measures in consultation with DEH, GBRMPA and beche-de-mer scientists, which have been implemented by a legal agreement between operators. The QSCA measures implemented in the fishery on 1 July 2004, are detailed in Table 2.

Localised depletion is of particular concern in beche-de-mer fisheries as successful reproduction of beche-de-mer species is density dependent, and therefore localised depletion can cause fertilisation and recruitment failure in populations. Before the introduction of the QSCA measures on 1 July 2004, almost all harvest occurred north of Bowen, with 25% of harvest occurring within three 6 nm<sup>2</sup> sites. The sessile nature of the species and selectivity of dive collection increases the potential for clearing a local area, and therefore spatial concentrations of effort should be avoided to minimise the potential for localised depletions. The introduction of the rotational zoning scheme, spreads effort more evenly throughout the fishery taking the focus off the previous hot spots, and encourages fishers to fish in areas previously not accessed. Restricting effort to 15 fishing days in each zone and allocating each zone only one in every three years seeks to minimise the potential for localised depletion of beche-de-mer. The zoning scheme also distributes effort evenly between coastal, midshelf and offshore zones. The numbers and abundance of beche-de-mer species varies on reefs across the shelf, therefore the scheme rotates effort throughout the various preferred habitat of different species. QSCA recognises that the rotational zoning scheme may need to be examined after the first year of operation. DEH encourages industry to involve the beche-de-mer working group in the assessment of the effectiveness of the scheme.

DEH notes that Marion Reef is not included in the rotational zoning scheme under the industry agreement. All other measures (DPI&F and industry implemented) aside from the rotational zoning scheme apply to the area. Although fishing effort on Marion Reef is currently low, DEH is concerned that the effort on Marion Reef could increase beyond that allowed in the rest of the fishery under the rotational zoning scheme. DEH therefore encourages DPI&F to monitor the harvest on Marion Reef and appropriately respond to any significant changes detected. Any management objectives, performance measures, or performance indicators developed for the fishery (see Recommendation 9) should also apply to the Marion Reef component of the fishery.

Ideally beche-de-mer fisheries should be managed on a small spatial scale with zonal or reef based quotas<sup>10</sup>. The rotational zoning scheme provides smaller scale management than that previously in place, however DEH encourages DPI&F to investigate introducing zonal or reef based quotas based on local abundances in the future.

Serial depletion of high value species has occurred in a number of beche-de-mer fisheries internationally and is evident to a lesser degree in the ECBDMF. In order to ensure that serial depletion does not continue to occur in the ECBDMF, industry has implemented species-specific precautionary trigger points in consultation with Tim Skewes, a CSIRO beche-de-mer scientist. The trigger points have been set at estimated 'safe' exploitation levels for each species over the entire fishery, based on their likely population size, the level of information about the species and their vulnerability. Once the harvest of any species reaches the trigger limit in any one year, a stock assessment for that species must be undertaken to obtain a biologically based sustainable harvest estimate. The new size limits are greater than the previous limit of 15 cm and seek to ensure that a proportion of the spawning biomass is protected from harvesting and given opportunity to spawn. DEH encourages DPI&F and the beche-de-mer working group to continue to review these estimates in light of any new information on sexual maturity and fecundity of beche-de-mer species.

Analyses conducted by GBRMPA suggest that as a result of the limits on effort under the QSCA measures, authority holders will only be able to harvest around 65% of their quota. The total TAC for the fishery is therefore not considered a primary management measure in the fishery as it is unlikely to be reached. The total TAC is essentially based on historical levels of activity in the fishery and has no biological basis. Consequently, DEH considers it a mechanism of allocation of

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<sup>10</sup> Preston 1997

effort between authority holders and not directly related to ecologically sustainable management of the fishery.

The implementation of the industry measures has significantly contributed to the ecologically sustainable management of the ECBDMF. DEH understands that GBRMPA harvest permits for the 2004-05 season are being issued on the condition that fishing complies with the measures and strategies detailed in the legal agreement between authority holders. DEH is confident that industry will operate under the measures and strategies detailed in the agreement as they are aware of the importance of these measures and strategies to the long term sustainability of beche-de-mer stocks in the ECBDMF and to their continuing access to harvesting within the GBRMP.

DPI&F has included the new size limits and the north/south split for white teat fish quota as conditions on authorities within the fishery, but have not included other measures detailed in the rotational zoning scheme in the formal management arrangements for the fishery. Measures must be implemented in the formal management arrangements to make them legally enforceable. The key management measures in place to ensure a precautionary spread of effort across the stocks to minimise localised depletion and serial depletion (the rotational zoning scheme and trigger points) are industry implemented and therefore not part of the formal management arrangements. DEH therefore recommends that DPI&F backs up these industry measures to ensure that serial and localised depletion does not occur in the fishery by incorporating mitigation measures in the formal management arrangements. DPI&F could address this recommendation by incorporating the rotational zoning scheme and species trigger limits in formal management arrangements.

**Recommendation 10:** *The Queensland Department of Primary Industries and Fisheries to implement within one year, measures to minimise localised depletion and serial depletion in the fishery.*

Approximately 28% of the fishable area in the GBRMP is closed to the fishing of beche-de-mer under the RAP in the GBR. These closures will protect a representative portion of all habitat types and therefore holothurian species from harvesting. It is possible that larvae and settling juveniles will be dispersed from the closed areas providing a source of recruits for fished area<sup>11</sup>. While the presence of the closed areas may reduce some of the risks of overfishing, this does not mean that substantially higher catch levels can be maintained in the fished areas than would otherwise be the case. Due to the uncertainty of the flow on benefits to beche-de-mer populations from the closed areas, and the risk of localised depletions of fished areas, precautionary management arrangements for the fished areas should be maintained.

DEH considers that the combination of input and output measures should ensure adequate protection of the target stocks. DEH commends the proactive approach taken by industry to develop and implement the new measures in consultation with GBRMPA, DPI&F, beche-de-mer scientists and DEH.

## **Conclusion**

DEH considers that the management regime in the ECBDMF is appropriately precautionary and provides for the fishery to be conducted in a manner that does not lead to over-fishing. DEH considers that the information collection system, assessment and management arrangements generally are sufficient to ensure that the fishery is conducted at catch levels that maintain ecologically viable stock levels with acceptable levels of probability.

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<sup>11</sup> Clarke & Ianneli 1995, in Stutterd & Williams 2003.

DEH considers that there is scope to further refine some of the existing information collection, assessment and management responses and has provided a number of recommendations for improvements in the longer term.

## Promote recovery to ecologically viable stock levels

Objective 2: *'Where the fished stock(s) are below a defined reference point, the fishery will be managed to promote recovery to ecologically viable stock levels within nominated timeframes'*

The continual decline in catch and catch rates of black teatfish in the ECBDMF led to a closure of the commercial fishery for this species through the introduction of a 0 t TAC. Abundance surveys undertaken in 2000, 2001 and 2004 have shown that black teatfish populations are still depleted and may take decades to recover<sup>12</sup>. The collection of sandfish in Hervey Bay and Tin Can Bay was closed in 2001 due to declines in catches. DPI&F states that the closure will remain in place until recovery is evident.

Management has shown a history of implementing closures if depletion of species is evident, however there is no defined point at which stocks are considered depleted and/or are closed. In addition, although closures are currently in place for overexploited species, there is no defined strategy for recovery. For example, when is the species no longer considered over exploited and at what point can fishing recommence? DEH recommends that a strategic recovery strategy is developed for overfished species in the ECBDMF.

**Recommendation 11:** *Within two years, the Queensland Department of Primary Industries and Fisheries to develop and implement a precautionary recovery strategy for overfished species, that specifies reference points linked to management actions.*

## Conclusion

DPI&F has closed fishing of those species considered overfished. Although it may take decades for overfished beche-de-mer species to recover to sustainably exploitable levels, DEH considers that with the implementation of a strategic recovery strategy, it is likely that the stocks will recover.

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<sup>12</sup> Uthicke *et al*, 2004

## Ecosystem impacts

Principle 2: *'Fishing operations should be managed to minimise their impact on the structure, productivity, function and biological diversity of the ecosystem'*

## Bycatch protection

Objective 1: *'The fishery is conducted in a manner that does not threaten bycatch species'*

### Information requirements

Due to the highly selective nature of the fishing activities, bycatch is considered to be negligible. While there is no structured bycatch information collection system in place, anecdotal evidence from researchers and fishers report no harvesting of species other than holothurians.

### Assessment

No assessment of the bycatch issues in the fishery has been conducted. The incidental take of inquilines and parasites, such as pearl fish, is possible as they are known to occur in tropical holothurians. There is no information available to suggest whether this removal poses a significant risk to the ecosystem. The combination of input and output arrangements in place in the fishery endeavour to ensure that ecologically sustainable levels of holothurians remain in the ecosystem for these and other ecosystem purposes.

### Management response

Authorities issued in the ECBDMF limit harvest to hand collection of beche-de-mer species. Due to the highly selective nature of beche-de-mer fishing, incidental take of any other species is considered to be negligible. The monitoring of an indicator group of bycatch is considered to be inappropriate in this fishery. While the risk to bycatch species appears negligible, DEH encourages the ongoing collection of information through observations and anecdotal information in order to inform future management of the fishery and validate previous assumptions.

### Conclusion

DEH considers that there is a high likelihood the fishery is conducted in a manner that does not threaten bycatch species. Should this situation change, or a risk assessment process indicate otherwise, DEH expects that DPI&F would undertake appropriate actions to ensure that bycatch species are not threatened by this fishery.

## Protected species and threatened ecological community protection

Objective 2: *'The fishery is conducted in a manner that avoids mortality of, or injuries to, endangered, threatened or protected species and avoids or minimises impacts on threatened ecological communities'*

No interaction between the fishery and any endangered, threatened or protected species has been reported in the fishery. DEH considers that the harvesting activities in this fishery are unlikely to have a significant impact on any protected species.

There are no listed ecological communities in the fishery area.

## Conclusion

DEH notes that interactions with protected species in this fishery are negligible and considers that the fishery is conducted in a manner that avoids mortality of, or injuries to, endangered, threatened or protected species and avoids or minimises impacts on threatened ecological communities. Should this situation change, or a risk assessment process indicate otherwise, DEH expects that DPI&F would undertake appropriate actions to ensure the fishery avoids mortality or injury to these species and avoids or minimises impacts on threatened ecological communities.

## Minimising ecological impacts of fishing operations

Objective 3: *'The fishery is conducted, in a manner that minimises the impact of fishing operations on the ecosystem generally'*

## Information requirements

Due to the selective fishing method and the spread of effort across the fishery area the impact on the ecosystem from the ECBDMF is likely to be low. Information collection is therefore limited to fishery independent research projects and anecdotal information provided by fishers.

DEH is concerned at the lack of information collection and research covering the fisheries impact on the ecosystem and environment generally. However, DEH understands that this lack of information is common across a range of Australian and International fisheries and until appropriate research techniques and programs are developed and implemented this will continue to be the case. DEH strongly supports research in this area and considers that it would benefit from a cooperative approach from all fisheries management agencies that manage beche-de-mer (see Recommendation 4).

## Assessment

Holothurians are slow moving benthic grazers that have an important ecosystem role as benthic recyclers in reef and inshore ecosystems<sup>13</sup>. The impact of removal of holothurians from the ecosystem is not well understood. CSIRO is undertaking a research project, the results of which are expected in 2005, that may provide management with a greater understanding of the potential effects. Physical interactions with the benthos from harvesting are considered to be negligible, as are impacts on water quality.

As in most hand harvest fisheries, the potential of the ECBDMF to impact unacceptably and unsustainably on the environment generally is considered to be low. Consequently, DPI&F has not conducted a risk assessment of these issues in this fishery. The fishery is not regarded as posing a significant risk to the physical environment.

## Management response

DPI&F and QSCA have implemented a range of management measures that seek to maintain ecologically sustainable harvest in the fishery and thus minimise the risk of significant impact of fishing on the ecosystem. Management strategies in place to minimise the risk of serial and localised depletion of beche-de-mer in the fishery should minimise the risk of substantially altering the ecosystem in which the fishery operates. In addition, the fishery operates within the GBRMP and as a result of the rezoning of the park, a representative proportion of all habitats within the park is protected from the impacts of harvesting. A basic analysis conducted by DPI&F has estimated that approximately 28% of the fishable beche-de-mer habitat is currently closed under the RAP to ECBDMF authority holders and therefore protected from any impacts of the fishery.

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<sup>13</sup> Uthicke, 2001.

DEH has recommended that to further enhance the strategic management of the fishery, DPI&F develop a fishery specific objective, linked to performance indicators and performance measures for fishery impacts on the ecosystem (see Recommendation 9). DEH considers that the suite of management measures in place minimises the potential for the fishery to significantly impact on the environment. DPI&F has committed to implementing appropriate management responses if new threats are identified.

### **Conclusion**

DEH considers that the fishery is conducted in a sufficiently precautionary manner to minimise the impact of fishing operations on the ecosystem generally. Recommendations have been developed to ensure that the risk of significant impact by the fishery on the marine environment generally is minimised in the longer term.

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## **LIST OF ACRONYMS**

CITES	Convention on the International Trade in Endangered Species
CPUE	Catch per Unit Effort
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DEH	Australian Government Department of the Environment and Heritage
DPI&F	Queensland Department of Primary Industries and Fisheries
ECBDMF	East Coast Beche-de-mer Fishery
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
GBR	Great Barrier Reef
GBRMP	Great Barrier Reef Marine Park
GRBMPA	Great Barrier Reef Marine Park Authority
GBRWHA	Great Barrier Reef World Heritage Area
Harvest MAC	Harvest Management Advisory Committee
MoU	Memorandum of Understanding
QBFP	Queensland Boating and Fisheries Patrol
QPWS	Queensland Parks and Wildlife Service
QSCA	Queensland Sea Cucumber Association
RAP	Representative Areas Program
SCUBA	Self Contained Underwater Breathing Apparatus
TAC	Total Allowable Catch
VMS	Vessel Monitoring System
WTO	Wildlife Trade Operation