



**Australian Government**

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**Department of the Environment and Heritage**

Assessment of the  
**Moreton Bay Developmental Beche-de-mer Fishery**

October 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 Moreton Bay Developmental Beche-de-mer Fishery

## TABLE OF CONTENTS

|  |           |
|--|-----------|
| <b>EXECUTIVE SUMMARY .....</b>   | <b>4</b>  |
| Background.....  | 4         |
| Overall assessment.....  | 6         |
| Recommendations.....   | 7         |
| <b>PART I - MANAGEMENT ARRANGEMENTS .....</b>  | <b>8</b>  |
| Conclusion .....   | 11        |
| <b>PART II – GUIDELINES FOR THE ECOLOGICALLY SUSTAINABLE MANAGEMENT OF FISHERIES. 12</b> |           |
| STOCK STATUS AND RECOVERY .....  | 12        |
| <i>Maintain ecologically viable stocks.....</i>  | <i>12</i> |
| Information requirements .....   | 12        |
| Assessment .....   | 13        |
| Management response.....   | 14        |
| Conclusion .....   | 15        |
| <i>Promote recovery to ecologically viable stock levels .....</i>                        | <i>16</i> |
| Conclusion .....   | 16        |
| ECOSYSTEM IMPACTS .....  | 16        |
| <i>Bycatch protection.....</i>   | <i>16</i> |
| Information requirements .....   | 16        |
| Assessment .....   | 16        |
| Management response.....   | 16        |
| Conclusion .....   | 17        |
| <i>Protected species and threatened ecological community protection.....</i>             | <i>17</i> |
| Information requirements .....   | 17        |
| Assessment .....   | 17        |
| Management response.....   | 17        |
| Conclusion .....   | 18        |
| <i>Minimising ecological impacts of fishing operations .....</i>                         | <i>18</i> |
| Information requirements .....   | 18        |
| Assessment .....   | 18        |
| Management response.....   | 19        |
| Conclusion .....   | 20        |
| <b>REFERENCES .....</b>  | <b>21</b> |

## LIST OF TABLES

|   |    |
|---|----|
| <b>Table 1:</b> Summary of the Moreton Bay Developmental Beche-De-Mer Fishery ..... | 4  |
| <b>Table 2:</b> Input and Output Controls.....                                      | 9  |
| <b>Table 3:</b> List of acronyms.....   | 21 |

## EXECUTIVE SUMMARY

### Background

The Queensland Department of Primary Industries and Fisheries (DPI&F) has submitted a document for assessment under Part 13A of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The draft document *Ecological assessment of the Developmental Moreton Bay Beche-de-mer Fishery* (the submission) was received by the Department of the Environment and Heritage (DEH) in June 2004. The submission was released for a thirty-day public comment period that expired on 26 July 2004. Two public comments were received. DPI&F provided a response to the issues raised, however no changes were made to the submission as a result of public comment.

The submission reports on the Moreton Bay Developmental Beche-de-mer Fishery 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 response to the comments.

**Table 1:** Summary of the Moreton Bay Developmental Beche-De-Mer Fishery

|  |   |
|--|---|
| <b>Area</b>                                | South Qld waters between Moreton Island and North Stradbroke Islands, from the northern extent of Crab Island to the northern extent of Macleay Island.   |
| <b>Fishery status</b>                      | Target species considered underfished in this area, however stocks in some parts of Qld and Torres Strait waters are overfished.  |
| <b>Target Species</b>                      | Two species of holothurians, <i>Holothuria scabra</i> (sandfish) and <i>Stichopus horrens</i> (peanutfish). Peanutfish are currently not being harvested, due to lack of market demand.   |
| <b>By-product Species</b>                  | No byproduct species are permitted.   |
| <b>Gear</b>                                | Hand collection only, breathing apparatus including hookah and scuba are not permitted.   |
| <b>Season</b>                              | December – September (a seasonal closure is enforced from 1 October – 31 November)  |
| <b>Commercial harvest 2002/03</b>          | 25 tonnes (gutted wet weight) of sandfish.  |
| <b>Value of commercial harvest 2002/03</b> | Unknown   |
| <b>Recreational harvest</b>                | Unknown, however recreational fishers are limited to 5 individual beche-de-mer in Queensland waters, including Moreton Bay.   |
| <b>Commercial licences issued</b>          | Limited to 1 permit.  |
| <b>Management arrangements</b>             | A mixture of input and output controls including (see Table 2): <ul style="list-style-type: none"> <li>▪ Total Allowable Catch (TAC) and zonal trigger limits</li> <li>▪ Minimum size limits</li> <li>▪ Limited entry with 1 permit current</li> <li>▪ Gear restrictions including vessel restrictions and operator restrictions</li> <li>▪ Seasonal closure for the whole fishery and “closed zones” in each zone</li> </ul> |
| <b>Export</b>                              | Export after processing to Asia.  |
| <b>Bycatch</b>                             | No bycatch due to the high selectivity of the fishery.  |
| <b>Interaction with Threatened Species</b> | No reported interactions. Threatened species known to occur in the area of the fishery include dugongs and marine turtles.  |

The area of the fishery includes waters off Moreton Bay Queensland, between Moreton Island and North Stradbroke Island. The fishery is restricted to the northern extent of Crab Island to the northern extent of Macleay Island. The fishery is further divided into three zones.

The fishery targets two species of holothurians, *Holothuria scabra* (sandfish) and *Stochopus horrens* (peanutfish). Peanutfish are not currently being harvested due to a lack of market demand. No byproduct is taken in this fishery.

Beche-de-mer are found predominantly in tropical waters, decreasing in species diversity in an easterly direction across the Pacific. Beche-de-mer is harvested throughout Australia, with fisheries occurring along the east coast of Queensland, in the Torres Strait, the Northern Territory and Western Australia. Sandfish fisheries have been closed in the Torres Strait, and in some parts of Queensland (including Tin Can Bay), to allow the species to recover from overfishing.

The majority of holothurians are slow moving benthic animals and are usually found in close association with the substrate. Sandfish prefer habitats with a freshwater influence in muddy substrates offshore from mangrove swamps and are therefore usually absent from coral atolls and found abundantly in bays and inlets such as Moreton Bay, Hervey Bay and Tin Can Bay (Skewes et al 2002). The submission notes that stocks in both Hervey Bay and Tin Can Bay have been depleted due to the combined impacts of overfishing and unusual flooding in the area and have therefore been closed to fishing. A survey conducted by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) Division of Marine Science (CMR) on the distribution and abundance of sandfish found high densities in eastern Moreton Bay and generally higher abundance in seagrass areas (Skewes et al, 2002). Peanutfish were found in large abundance in Moreton Bay, with a relatively narrow range centred on the Rous Channel.

The average life span for beche-de-mer is 5-10 years. The size of first sexual maturity varies between species. For sandfish, the most recent estimates have found that sexual maturity occurs at 150 mm in the Torres Strait (Skewes et al 2002) and 160 mm in New Caledonia (Conand, 1989). At this length the individuals are estimated to be between 1 and 2 years old (Skewes et al 2002). Maturity has not been established for sandfish in Moreton Bay, however Skewes et al (2002) suggest a breeding age of approximately 2 years. Little information is available on the growth rates and reproductive periodicity of peanutfish.

Beche-de-mer are generally broadcast spawners and fertilisation takes place in the water column. Successful fertilisation and population maintenance can be highly spawner density dependent (Preston 1993). Studies of the reproductive cycles of commercially important species reveal a seasonal variation in the spawning activity with some species becoming active in warmer months and others during cooler months (Preston 1993). Studies in Moreton Bay indicate that there is a major spawning period of *H. scabra* from October to December (Skewes et al 2003).

Beche-de-mer stocks are generally at risk from overexploitation due to their limited dispersal, patchy distribution, ease of collection, slow recovery from overfishing and limited information on biological and spatial distribution available for management. There is a history of “boom-bust” cycles in beche-de-mer fisheries, with a number of fisheries collapsing due to overfishing. The species therefore requires strict management controls to ensure the sustainability of harvests. Beche-de-mer is currently being considered for listing under the Convention on International Trade of Endangered Species (CITES) to afford the species further protection in trade.

Approximately 25 tonnes of sandfish were caught in the Moreton Bay Developmental Beche-de-mer Fishery in 2003. The value of the fishery is currently unknown. The fishery is developmental, established in response to interest in the harvest of a possible sustainable and commercially viable

population of holothurians found within Moreton Bay. DPI&F together with the Queensland Parks and Wildlife Service (QPWS) have issued one developmental fishing permit for the harvesting of beche-de-mer in Moreton Bay. Fishing commenced during April 2003 and is permitted for a period of three years unless the permit is surrendered or revoked. A review of the fishery will be conducted at the end of the permit period in April 2006.

The fishery harvests sandfish by hand collection, without the assistance of breathing apparatus such as hookah or scuba diving gear. Take of peanutfish is permitted on permit conditions but is not currently being harvested due to a lack of market interest. Entry to the fishery is currently limited to one permit, under which a maximum of 6 people on two vessels can operate. Fishery management arrangements include catch limitations, zonal trigger limits, temporal and spatial closures and minimum size limits (see Table 2 for details).

There is no bycatch in the fishery due to the highly selective harvest of the target species. Some species that may be affected by this fishery are listed protected species under the Commonwealth EPBC Act. Possible protected species interactions include vessel interactions with whales, turtles and dugongs. No interactions have been reported in the fishery to date. The potential for interactions are assessed under Principle 2 of this report.

Take of beche-de-mer by the indigenous and recreational sectors is not well documented. Recreational fishers are restricted to a bag limit of five beche-de-mer, excluding black teat fish, from Queensland waters (including Moreton Bay).

There is no known indigenous traditional fishing for beche-de-mer in Moreton Bay however indigenous fishers are permitted to legally fish for beche-de-mer without any limitations in all Marine Park Zones including Preservations Zones, thereby effectively having access to stocks throughout the entire east coast of Queensland.

The fishery is managed under the *Fisheries Act 1994* and in accordance with the *Marine Parks Act 1982 (Queensland)*, *Marine Parks Regulations 1990* and the *Marine Parks (Moreton Bay) Zoning Plan 1997*. The fishery is managed as a Developmental Fishery in accordance with the *Queensland Policy relating to the Establishment and Management of Exploratory and Developmental Fisheries*.

## **Overall assessment**

The material submitted by DPI&F demonstrates that the management arrangements for the Queensland Developmental Moreton Bay Beche-de-mer Fishery 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. These include the developmental nature of the fishery, the level of confidence in the application and enforcement of zonal TACs, the lack of data on basic species biology and impacts of harvest on the wider environment and the general vulnerability of beche-de-mer species, particularly sandfish, to overfishing.

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 Queensland Developmental Moreton Bay Beche-de-mer Fishery is in a developmental stage and has made considerable progress in developing sound management arrangements. 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 small size of the fishery, precautionary management arrangements and the work in obtaining further information on beche-de-mer populations of Moreton Bay, 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 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: DPI&F to inform DEH of any intended amendments to the management arrangements that may affect sustainability of the target species or negatively impact on bycatch, protected species or the ecosystem.
- 2: DPI&F to develop fishery specific objectives for each of the target species and for fishery impacts on the ecosystem. DPI&F to ensure that the target species objectives are linked to performance indicators and performance measures.
3. From 2005, DPI&F to report publicly on the status of the fishery on an annual basis, including explicit reporting against each performance measure (once developed).
4. DPI&F to cooperate with other jurisdictions in efforts to undertake research on key gaps in beche-de-mer biology and ecology.
5. DPI&F to monitor the status of the fishery in relation to the performance measures once developed. Within 3 months of becoming aware of a performance measure not being met, DPI&F to finalise a clear timetable for the implementation of appropriate management responses.
6. DPI&F to ensure that zonal TACs take into account the stock status of sandfish in each zone and potential vulnerability to localised depletion of sandfish to ensure that TACs provide for individual species to be harvested within ecologically sustainable limits.

## PART I - MANAGEMENT ARRANGEMENTS

The Moreton Bay Developmental Beche-de-mer Fishery is managed by the Queensland Department of Primary Industries and Fisheries (DPI&F).

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 *Marine Parks Act 1982 (Queensland)*
- The *Marine Parks Regulations 1990*
- The *Marine Parks (Moreton Bay) Zoning Plan 1997*
- The Queensland *Policy Relating to the Establishment and Management of Exploratory and Developmental Fisheries*
- Relevant Gazetted notices and permit conditions

The fishery commenced harvest in 2003, in accordance with the Queensland *Policy relating to the Establishment and Management of Exploratory and Developmental Fisheries*. No specific management plan is currently in place for the fishery.

A number of other documents, including research reports, scientific literature and discussion papers, are integral to the management of the fishery. The annual scientific surveys are funded by the permit holder and are therefore not available for public scrutiny without the permission of the permit holder due to confidentiality agreements. This is also the case for the observer program, discussed in more detail below. All scientific surveys and observer program results are provided to DPI&F.

DEH considers it important that management arrangements remain flexible to ensure timely and appropriate managerial decisions. Due to the importance of the management regime and documents referred to above to DEH's assessment of the fishery, an amendment could change the outcomes of our assessment and decisions stemming from it.

***Recommendation 1:*** *DPI&F to inform DEH of any intended amendments to the management arrangements that may affect sustainability of the target species or negatively impact on bycatch, protected species or the ecosystem.*

The fishery is regularly reviewed to ensure that it is operating within ecologically sustainable levels, as is legislatively required under the *Fisheries Act 1994*. Management advice on general developmental fishery issues is provided to DPI&F through the Management Advisory Committee on harvest fisheries, HarvestMAC. HarvestMAC representatives include a DPI&F appointed chair, manager, researcher, compliance officer, commercial and recreational fishers representatives, Great Barrier Reef Marine Park Authority (GBRMPA) representative and DEH representative. HarvestMAC meets twice a year. DEH notes that DPI&F does not currently consult with conservation or indigenous representatives with regard to the fishery. DEH encourages DPI&F to ensure that ongoing consultation is pursued with conservation and indigenous representatives throughout the development of the fishery.

A Management and Scientific Advisory Committee (MSAC) specific to this fishery reviews all issues arising from or relevant to the fishery, including any impacts on target, bycatch, protected species or the broader marine environment. MSAC include representatives from QPWS, DPI&F

manager, researcher, compliance officer and the permit holder. The MSAC meets annually or, should a management issue arise, as required.

Should the fishery progress beyond the developmental phase, DPI&F has committed to undertake a formal process to develop appropriate management arrangements. This process will include extensive public and stakeholder consultation. DEH considers that DPI&F will ensure that all interested parties are consulted appropriately at this time.

The fishery is managed in accordance with the Queensland *Policy relating to the Establishment and Management of Exploratory and Developmental Fisheries* document and in accordance with the *Fisheries Act 1994*. The fishery is regularly reviewed through annual research surveys and observer programs to ensure that it is operating within ecologically sustainable levels and HarvestMAC and MSAC regularly provide management advice to DPI&F.

Management of the fishery is based on a range of output and input controls as outlined in Table 2.

**Table 2:** Input and Output Controls

|                 |   |
|-----------------|---|
| Output controls | <ul style="list-style-type: none"> <li>▪ TAC of 45 tonnes gutted wet weight of sandfish and a maximum of 25 tonnes gutted wet weight of peanutfish.</li> <li>▪ Zonal TACs:<br/>Sandfish - A maximum of 21 tonnes from Zone 1, 13 tonnes from Zone 2 and 11 tonnes from Zone 3;<br/>Peanutfish – A maximum of 25 tonnes from Zone 1 only.</li> </ul>   |
| Input controls  | <ul style="list-style-type: none"> <li>▪ Size limit – minimum length of 17 cm for both species;</li> <li>▪ Seasonal closure from 1 October-30 November;</li> <li>▪ Limited entry – In addition to permits being capped at 1, harvesting only occurs from one zone on any given day and no zone is fished for more than 6 consecutive weeks in a 12 week period;</li> <li>▪ Vessel restrictions – maximum of 2 boats, less than 7 metres in length;</li> <li>▪ Gear restrictions – by hand only without the aid of diving apparatus such as hookah or scuba;</li> <li>▪ Closed areas – all areas outside of the 3 designated fishing zones are closed to commercial harvesting of beche-de-mer. Additional closed zones within the 3 designated fishing zones have been implemented;</li> <li>▪ Number of operators per vessel – restricted to a maximum of 6 people, 3 in each boat (2 divers in each boat).</li> </ul> |

While input and output controls have been specified for the fishery DEH considers that fishery specific objectives linked to performance indicators and performance measures are needed. DEH therefore recommends that DPI&F develop fishery specific objectives for each of the target species and for fishery impacts on the ecosystem. DPI&F to ensure that the target species objectives are linked to performance indicators and performance measures. Fishery specific objectives addressing bycatch and byproduct species are not necessary as the fishery does not impact on bycatch or byproduct species due to the highly selective nature of harvest (as discussed in further detail in Part II of this report).

**Recommendation 2:** *DPI&F to develop fishery specific objectives for each of the target species and for fishery impacts on the ecosystem. DPI&F to ensure that the target species objectives are linked to performance indicators and performance measures.*

The Queensland Boating and Fisheries Patrol (QBFP) officers advise that the Moreton Bay Beche-de-mer Fishery has progressed without incident since it began operation. Two complaints were received regarding breaches of permit conditions however investigations found these claims to be unsubstantiated. QBFP have conducted inspections on several occasions and no major issues have been reported. The permit holder has also funded an observer program, which to date has reported no breach of permit conditions (discussed in further detail in Part II of this report). DEH considers that these compliance measures contain the means of enforcing critical aspects of the management arrangements for the fishery.

The fishery is regularly reviewed through annual surveys and the observer program to ensure that it is operating within ecologically sustainable levels as is required under the *Fisheries Act 1994*. As mentioned above, the results of both the annual surveys and the observer program are not available for public scrutiny unless released by the permit holder. DEH is concerned that the findings of the annual survey and observer program are not publicly available and, as fishery specific performance measures are not in place, DPI&F do not report publicly on the status of the fishery. DEH notes that the confidentiality of information may limit the detail of public reporting but believes that some public statement about the extent to which performance measures were met in the year is needed. DEH therefore recommends that, from 2005, DPI&F report publicly on the status of the fishery on an annual basis, including explicit reporting against each performance measure (once developed).

***Recommendation 3: From 2005, DPI&F to report publicly on the status of the fishery on an annual basis, including explicit reporting against each performance measure (once developed).***

The fishery will be formally reviewed when the developmental permit expires in April 2006 to determine if it is economically and ecologically viable to establish a commercial fishery. DEH considers that this review is suitable while critical aspects are reviewed annually through daily logbook submissions and while DPI&F continues to closely monitor the development of the fishery. The reporting requirements of the fishery are discussed more fully in Part II of this report.

Fishery dependent data relating to the target species 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 live and the fishery operates is contained in Principle 2 of this report.

Beche-de-mer is harvested under separate fishery management arrangements in several areas throughout Queensland waters including Moreton Bay, East Coast, Torres Strait and the Gulf of Carpentaria. As the distribution and specific life history parameters of beche-de-mer generally are not well understood, it is vital that DPI&F ensure that the management arrangements subject to the Moreton Bay Developmental Beche-de-mer Fishery are consistent with management arrangements in place in other Queensland beche-de-mer fisheries. This is further discussed under Principle One of this report.

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.

No regional or international management regimes, to which Australia is a party, are of direct relevance to the fishery. The prime international regime affecting the fishery is the United Nations Convention on the Law of the Sea (UNCLOS). 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 Two of this report. The application of the International Convention for the Prevention of Pollution from Ships (MARPOL) to vessels operating in the fishery is explicitly discussed under Principle 2, Objective 3.

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.

### **Conclusion**

DEH considers that the Queensland Developmental Moreton Bay Beche-de-mer Fishery management regime is documented and developed through a consultative process. The management arrangements are adaptable and underpinned by appropriate input and output controls 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. Periodic review of the fishery is provided for, as are the means of enforcing critical aspects of the management arrangements.

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 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**

Understanding of the basic biology and ecology of beche-de-mer is fundamental to the ecologically sustainable management of the fishery. Significant knowledge gaps exist across all Australian beche-de-mer fisheries, which would benefit from a cooperative approach to research. 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.

Public comments also raised concerns about knowledge gaps. DEH understands that cooperative research across all beche-de-mer fisheries is supported by HarvestMAC.

***Recommendation 4:*** *DPI&F to cooperate with other jurisdictions in efforts to undertake research on key gaps in beche-de-mer biology and ecology.*

Fishery dependent data collected since 1 April 2003 is obtained through a compulsory daily logbook. This data is limited to sandfish (*Holothuria scabra*) as the collection of peanutfish (*Stichopus horrens*) has not occurred within the fishing area to date. The logbook collects information on the collection method (snorkel or wading), effort (hours of collection, number of collectors and average harvest depth) and location and catch (including the number of specimens and total wet gutted weight). An observer program was established in 2003 to collect information on fishing operations and any environmental impacts associated with the fishery. The program provides information on the target species (size, weight, incidental reproductive information), any environmental impacts arising from the fishery and the fishers’ compliance with permit conditions. DPI&F has committed to utilising this information in consultation with MSAC and HarvestMAC when reviewing the management arrangements. In 2003 observers accompanied the permit holder on 10 occasions, equating to observer coverage of approximately 5.7%.

Prior to the commencement of the fishery a study was conducted by CMR, as consultants to the permit applicants, into the distribution and abundance of sandfish in Moreton Bay. The purpose of

the study was to determine whether the area could sustain a level of commercial harvesting while protecting the long-term viability of the beche-de-mer stocks. The management strategies in place in the fishery are based on the results of this survey.

Fishing permit conditions require the commercial operator to engage a scientific organisation to conduct fishery independent annual surveys of the stocks and ecological values associated with the fishery. These surveys are conducted by CMR and commence at the close of the fishing season. The overall objective of the research surveys is to provide data on beche-de-mer distribution and abundance, population structure and environmental variables. DPI&F state that the survey completed in January 2004 showed a small and insignificant reduction in the average abundance of sandfish after one year of fishing

The results of the independent surveys are considered reliable as they are carried out by an independent scientific organisation. While the surveys are funded by the permit holder and are therefore not available for public scrutiny or peer review, the results of the surveys are provided to DPI&F and MSAC and are used to guide management actions to ensure the fishery continues to operate within sustainable levels. DEH has made a recommendation to ensure that the results of the surveys and performance of the fishery against performance measures are publicly reported on an annual basis (see Recommendation 3).

DPI&F collects data from a wide range of sources including logbooks, observer data and annual scientific surveys. Logbook data is scrutinised for discrepancies or fisheries regulation breaches and discrepancies are followed up by enforcement officers from the QBFP. This data is considered reliable, particularly given the small scale of the fishery, the verification provided by the observer program and further investigation into logbook data.

Overall, given the range of fishery dependent and independent data gathered by DPI&F and the mechanisms for regularly reviewing the data requirements, DEH considers that a reliable information collection system is in place appropriate to the scale of the fishery. DEH is concerned at the current lack of scientific research on the distribution, stock structure, and ecology of holothurian species. Continuation of existing data collections and research programs in this fishery, combined with some extension and refinement of such activities will therefore be important to the future management of the fishery.

## **Assessment**

DPI&F recognises that beche-de-mer stocks are generally at risk due to their limited dispersal, patchy distribution, ease of collection, slow ability to recover from overfishing and the current limited biological and spatial distribution information available for these species across northern Australia.

The Observer Program carried out in 2003 indicated that on occasions, up to 20% of the beche-de-mer harvested were undersized and subsequently returned to the water. DPI&F considers that this level is likely to be decreasing, as the expertise of the harvesters' increase. The Observer Report highlighted that the impacts to undersized beche-de-mer specimens harvested are likely to be low given the quick return of undersized individuals to the water.

The CMR study carried out prior to the commencement of the fishery provided empirically based scientific advice to DPI&F upon which to base the TAC of the fishery. The study indicated that the potential sustainable yield of sandfish was 161 tonnes gutted wet weight. DPI&F has taken a precautionary approach to the setting of the TAC for the each species, setting the initial sandfish TAC at 45 tonnes gutted wet weight (distributed across 3 zones) and peanutfish at 25 tonnes gutted wet weight (from Zone 1 only).

The annual surveys conducted by CMR produce estimates of sandfish and peanutfish abundance throughout the area of the Moreton Bay fishery, which are then compared to the pre-fishing abundance estimates derived from the original population survey. Information is also collected on environmental biophysical parameters and compared with historical data to estimate any changes. Individuals are also collected to produce size frequency distributions for each species. This information is provided to DPI&F and guides management decisions in relation to the fishery.

The distribution and spatial structure of sandfish and peanutfish across northern Australia is not well known, although DPI&F advises that a study conducted on gene flow of *H. scabra* identified 3 genetically distinct stocks along the northeast coast of Australia. These include southern populations from the area around Hervey Bay, one population from the central coast and populations from the Torres Strait. [The Moreton Bay stock is considered a functionally separate stock].

The distribution and spatial structure of the two species targeted within Moreton Bay were established in the initial CMR survey carried out before the commencement of the fishery. The survey found *H. scabra* from Moreton Island to the south of Jumpinpin Passage, with the highest abundance found adjacent to Moreton Island and North Stradbroke Island. The species appeared to be more abundant in seagrass areas, but was also found on soft bottom and rubble areas. *S. horrens* (peanutfish) was found to have a relatively narrow range centred around the Rous Channel.

This information was used to establish the TAC for the fishery and to divide the fishing area into three zones, with specific zonal TACs to prevent localised depletion of the species throughout the fishing area.

Potential removals from the beche-de-mer population include direct harvest by this fishery and recreational and indigenous harvest. The removal of sandfish and peanutfish by the recreational and indigenous sectors is considered to be insignificant as no take has been reported to date.

### **Management response**

The current management regime of the fishery aims to maintain ecologically viable stock levels through a range of input and output controls. These measures are outlined in Table 2 and Part I of this report.

The fishery operates under an annual and zonal TAC (see Table 2). The zonal TAC limits for sandfish and peanutfish serve as proxy reference points for the fishery and are currently being reviewed to allow a greater degree of flexibility in respect to the relative split of the overall catch quota.

In 2003 approximately 25 tonnes of sandfish were caught, well below the total TAC amount of 45 tonnes. While the catch rates were below the allocated zonal TAC in both zone 1 and 3, the TAC for zone 2 was exceeded by 330 kg. DPI&F state that this is a minor amount and that the zonal TACs are currently being reviewed to allow further flexibility in fishing effort. DEH has concerns about this review, particularly given the possibility of localised depletion in zone 2 where the majority of harvest occurs. Localised depletion is a particular concern in beche-de-mer populations because large numbers of specimens can be harvested easily from a small location and, due to the limited ability of beche-de-mer to spawn across a large distance, recruitment to the area may not occur again.

DEH considers that the combination of input and output controls, particularly the implementation of total and zonal TACs should ensure adequate protection of the resource but is concerned at the lack of action taken after the TAC in zone 2 was exceeded. Given the potential for localised depletion in

light of the concentration of effort, the lack of a clear management response to the TAC being breached has the potential to seriously undermine the effectiveness of other DPI&F management strategies.

DPI&F advises that in all Qld quota managed fisheries, quota holders are sent a letter of notice when 25% and 10% of their quota is remaining. Actions to control the catch to within the TAC limit are enacted under s.27 of the *Fisheries Regulation 1995*. DEH is concerned that this action was not taken in the case of the breach in TAC for zone 2. DEH therefore recommends that DPI&F monitor the status of the fishery in relation to the performance measure once developed. Within 3 months of becoming aware of a performance measure not being met, DPI&F will finalise a clear timetable for the implementation of appropriate management responses.

***Recommendation 5:*** *DPI&F to monitor the status of the fishery in relation to the performance measures once developed. Within 3 months of becoming aware of a performance measure not being met, DPI&F to finalise a clear timetable for the implementation of appropriate management responses.*

DEH is also concerned that the reference point for zone 2 is now under review to allow a greater degree of flexibility in catch rates. DEH recommends that DPI&F ensure that zonal TACs take into account the stock status of sandfish in each zone and potential vulnerability to localised depletion of sandfish to ensure that TACs provide for individual species to be harvested within ecologically sustainable limits.

***Recommendation 6:*** *DPI&F to ensure that zonal TACs take into account the stock status of sandfish in each zone and potential vulnerability to localised depletion of sandfish to ensure that TACs provide for individual species to be harvested within ecologically sustainable limits.*

DEH considers that the remaining management arrangements, including area closures, limited entry and the summer closure of the entire fishery to allow for the spawning of beche-de-mer in the fishery are adequate to ensure the sustainable management of the fishery and commends DPI&F for its comprehensive management approach to this small fishery.

Should the fishery progress beyond the developmental phase, a formal process within the framework of the Queensland *Policy relating to the Establishment and Management of Exploratory and Developmental Fisheries* will be undertaken to prescribe management arrangements, including extensive public and stakeholder consultation. The development of appropriate reference levels will be discussed as part of that process.

Neither byproduct nor bycatch are taken in the developmental Moreton Bay Beche-de-mer Fishery as all harvesting occurs by hand collection of selected specimens.

## **Conclusion**

DEH considers that the management regime in the developmental Moreton Bay Beche-de-mer Fishery 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, research surveys 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.

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’*

This objective is not applicable to the fishery at present. TACs and other management arrangements are in place to avoid the risk of overfishing the sandfish and peanutfish populations in Moreton Bay. TACS have been set in a precautionary manner and annual surveys are in place to ensure that any significant decline of the two species stock is detected and referred to management for a response. DEH is concerned however that the zonal TACS in the fishery have been exceeded without management action being taken. While the breach was relatively minor, DEH expects that DPI&F will, in future, respond appropriately to breaches of the TACs or other management measures.

## Conclusion

DEH considers that the Moreton Bay beche-de-mer stock is not currently below a defined reference point but should that occur in the future, the fishery is conducted such that there is a high degree of probability the stock would recover to ecologically viable stock levels within nominated timeframes.

## 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

Information on the bycatch of the Moreton Bay Beche-de-mer Fishery is recorded by DPI&F researchers as part of the observer program for the fishery, which is required under the permit conditions (as discussed in Principle 1 above).

## Assessment

The 2003 Observer Report for the fishery, prepared by Sumpton and McLennan (2004), indicated that there were no bycatch species noted, due to the selective nature of the hand collection operation of the fishery. Bycatch is therefore limited to undersized beche-de-mer specimens (as discussed in Principle 1). Other possible bycatch are commensal organisms such as pearl fish living on or within the beche-de-mer.

## Management response

No bycatch species are taken in this fishery, other than undersized beche-de-mer specimens and commensal organisms. Accordingly, no management measures, other than size limitations, are imposed in the fishery. DEH considers that possible impacts to bycatch species have been minimised and that the current management measures in place to prevent the harvest of undersized individuals, including limitations on size and total catch, are being effectively implemented.

No specific indicator group of bycatch has been identified due to there being no bycatch species taken in the fishery. Monitoring the effects of harvesting beche-de-mer (including effects of harvests on undersized specimens) will continue in the fishery.

## **Conclusion**

DEH considers that there is a high likelihood the fishery is conducted in a manner that does not threaten bycatch species, particularly given the highly selective nature (ie hand harvest) of the fishery. Should this situation change, or a monitoring program indicate otherwise, DEH expects that DPI&F would undertake appropriate actions to ensure that this fishery does not threaten bycatch species.

## **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'*

## **Information requirements**

Information on interactions with endangered, threatened or protected species is provided through the regular DPI&F observer trips and the annual report provided on the findings of the observer program. Fishers themselves provide further information through their membership of the MSAC.

## **Assessment**

No interactions with endangered, threatened or protected species have been reported in this fishery from either the observer program or by the commercial fishers. This is likely due to the highly selective harvest method and the requirement that all harvesting must be undertaken by free diving only, without the use of hookah or scuba.

The fishery operates in areas where marine turtles and dugongs are found, with some areas designated turtle protection zones. While some potential exists for interactions during vessel transit through the fishery area, as only two vessels are permitted in the fishery, the potential risk is likely to be negligible.

There are no listed ecological communities in the fishery area.

## **Management response**

Harvesting in the fishery is restricted to free diving without the use of scuba or hookah apparatus. The fishery is limited to two vessels and operators in the fishery are subject to speed limits currently in place in the Moreton Bay area. These requirements significantly limit the potential for interactions with endangered, threatened or protected species.

DPI&F advises that there is considerable scope to address any issue which may arise with regard to interactions with endangered, threatened or protected species as the fishery is currently developmental and operates under reviewable permit arrangements.

DEH notes that the logbooks currently do not provide for recording of any interactions with endangered, threatened or protected species. While the potential for interactions is low, DEH encourages DPI&F to incorporate a reporting requirement in the fishery logbooks to ensure any interactions, however unlikely, are reported to DPI&F.

## Conclusion

DEH notes that there are currently no interactions with protected species in this fishery and considers that the fishery is conducted in a manner that avoids mortality of, or injuries to, endangered threatened or protected species. Should this situation change, or a risk assessment process indicate otherwise, DEH expects that appropriate actions would be undertaken to ensure the fishery avoids mortality, injury to these species.

## 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

The primary source of information on any general ecosystem impacts from the fishery is the initial survey of the distribution and abundance of sandfish in Moreton Bay (Skewes et al.2002) and the subsequent operator funded annual re-surveys of the fishery. In addition to collecting information on the target stock, the annual survey also aim to:

1. estimate relative cover/abundance of gross environmental biophysical parameters and compare with historical data to estimate changes and;
2. recommend sustainable management strategies and future research priorities.

Research is currently being undertaken through 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". This research is expected to provide essential information, specific to Moreton Bay, on the biology and ecosystem function of holothurians generally, as well as increased understanding of the environmental impacts associated with the removal of holothurians from associated food webs.

## Assessment

As in most harvest fisheries, the potential of the Moreton Bay Beche-de-mer Fishery to impact unacceptably and unsustainably on the environment generally is considered to be low. As a consequence DPI&F have not conducted a risk assessment of these issues in this fishery.

### *Impacts on ecological communities*

Due to the selectivity of the fishery, there are no direct impacts on related, associated or dependent benthic organisms however, there are potential impacts to these organisms arising as an indirect consequence of the removal of the target beche-de-mer species. Currently quantitative data on this impact is limited, but such impacts are likely to be minimal given the small size of harvest.

There is no significant impact on water column communities as beche-de-mer are benthic grazers and subsequently have little impact upon water column communities with the exception of spawning and larval contribution. As the TAC is well within the long term sustainable yield estimated for Moreton Bay by Skewes et al 2002, impact to spawning capacity should be minimised.

### *Structure Productivity/flows*

Beche-de-mer play an important role in the ecosystem, particularly in the recycling of nutrients and in maintaining productivity on coral reefs. The fishery is unlikely to have a significant impact on the structure of the food web of the ecosystem in the area, as there are no specialised predators of these beche-de-mer species (ie the predators of beche-de-mer are generalist and unlikely to be adversely affected by a decrease in beche-de-mer numbers).

No research has been carried out on the possible impacts of the fishery to either benthic or water column food webs associated with beche-de-mer in Moreton Bay. The PhD research study described above is likely to provide preliminary information on this subject.

Concern was raised in public comment that the removal of beche-de-mer may cause algal bloom and fireweed problems in Moreton Bay. DPI&F advises that there has been no evidence that the current harvest levels in the fishery are a significant contributor to algal blooms but have committed to management action if the PhD research finds any evidence of such impacts.

#### *Physical habitat*

The fishery is not regarded as posing a significant risk to the physical environment. While the divers in the fishery will have some contact with the benthos, the level of contact and impact is likely to be minimal. Damage to the substrate from the two vessels anchoring is also likely to be minimal particularly in relation to the large level of boating in the area.

#### *Water quality*

Two possible impacts to water quality arising from this fishery include vessel discharge or pollution and the onboard processing of catch. The impacts arising from vessel discharge or pollution are unlikely to be significant given that the two small boats utilised by the permit holder must comply with the *Transport Operations (Marine Pollution) Act 1995*, which requires all vessels to be maintained and not discharge any materials into the water. The Department of Transport is responsible for checking vessel maintenance and safety through annual survey inspections. Vessels are inspected both wharf side and at sea for compliance and sea worthiness.

The impacts to water quality due to gut discarding (the disposal of gut or waste overboard) are likely to be minimal. The boats are generally anchored in the deepest part of the fishing area, which allows the guts to be dispersed through the water column. Additionally, as the boats move between fishing locations and may fish six or seven locations in one fishing day, gutting of the day's catch will be distributed throughout the area rather than in one location. The observer program noted no other waste being disposed overboard.

#### **Management response**

DPI&F has implemented a range of precautionary management measures designed to minimise the risk of significant impact of fishing on the ecosystem and its components. Most of these measures were established to protect the target species and their habitats, although some actions may indirectly protect the broader environment.

As discussed under Principle 1 of this report, the developmental fishery is being managed in a precautionary manner, with strict measures applied to the permit, including conservative zonal TACs, limitations on fishing time and effort and limited entry. The zonal arrangements and limitations on time spent in each zone should ensure that effort is spread across the fishery, therefore spreading any effects on the benthos and ecosystem and minimising the risk of localised depletion.

Further research into the role of beche-de-mer in the ecosystem and potential impacts of the fishery on the wider environment is being undertaken and, together with the information gathered from the annual survey, provides information on which to base future management.

DEH is confident that the fishery will continue to be managed in a manner that aims to minimise ecosystem and broader environmental impacts.

## **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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**Table 3:** List of acronyms

|            |  |
|------------|--|
| CITES      | Convention on International Trade of Endangered Species              |
| CMR        | CSIRO Division of Marine Research                                    |
| CSIRO      | Commonwealth Scientific and Industrial Research Organisation         |
| DEH        | The Department of the Environment and Heritage                       |
| DPI&F      | Queensland Department of Primary Industries and Fisheries            |
| EPBC Act   | <i>Environment Protection and Biodiversity Conservation Act 1999</i> |
| GBRMPA     | Great Barrier Reef Marine Park Authority                             |
| HarvestMAC | Harvest Management Advisory Committee                                |
| MARPOL     | International Convention for the Prevention of Pollution from Ships  |
| MSAC       | Management and Scientific Advisory Committee                         |
| QBFP       | Queensland Boating and Fisheries Patrol                              |
| QPWS       | Queensland Parks and Wildlife Service                                |
| TAC        | Total Allowable Catch  |
| UNCLOS     | United Nations Convention on the Law of the Sea                      |
| WTO        | Wildlife Trade Operation   |