

Appendix 1

Queensland Fisheries Service

**QUEENSLAND EAST COAST
BECHE-DE-MER FISHERY**

STATEMENT OF MANAGEMENT ARRANGEMENTS



Processed white teatfish (*Holothuria fuscogilva*)

Compiled by
Ms S B Breen (QFS)
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1 INTRODUCTION

For product from the Queensland East Coast Beche-de-mer Fishery to be exported from Australia, there must be a management regime approved under the *Wildlife Protection (Regulation of Exports and Imports) Act 1982* administered by Environment Australia. Consequently, this statement of management arrangements contained in law and policy under the *Queensland Fisheries Act 1994*, has been prepared in order to obtain approval from Environment Australia for export of beche-de-mer harvested in Queensland. These interim management arrangements are used to manage the fishery sustainably pending the completion of a statutory management plan for the fishery.

2 DEVELOPMENT OF THE BECHE-DE-MER FISHERY IN AUSTRALIA

The Queensland beche-de-mer fishery is perhaps the oldest fishery in the State with commercial harvesting commencing in the early 1800's. The fishery continued with interruptions from the First and Second world wars, and gradually declined after the Second World War.

Interest in beche-de-mer fisheries in Australia again increased in around the late 1980s with Northern Territory, Torres Strait and Queensland introducing new measures to manage beche-de-mer harvest at this time. Beche-de-mer fisheries interest in Western Australia increased in the early 1990's and probably reflects an increase in demand for beche-de-mer generally from the economic liberalisation and growing affluence in China during the period.

While the fishery was experiencing a boom period in the late 1980's throughout Australia, the number of authorised commercial fishers in Queensland increased to almost 30. The Department of Primary Industries (DPI) managed the fishery under the provisions of the *Fisheries Act 1976-84*, and granted permits to applicants depending on their capacity to process product, and their business plans.

Significant areas of the Great Barrier Reef region were progressively closed to fishing for beche-de-mer with the implementation of Marine Park protected area zoning arrangements during the 1980's.

In 1991 the DPI introduced a Total Allowable Catch of 500 tonnes and individual quota arrangements where each authority holder was granted quota based on their individual requirements, and capacity to process product. Additional quota was provided to applicants when they had harvested their total allocation within the quota year. The focus of management at that time was to provide for the 'development' of the fishery and value-adding of product to provide for greater opportunities for fishery participants.

With the introduction of the *Fisheries Act 1994* the former Queensland Fisheries Management Authority (QFMA) took responsibility for the management of the fishery, in accordance with the principles of Ecologically Sustainable Development (ESD). This shifted the management focus towards the stock status and sustainability issues of the fishery. QFMA continued the Limited Entry Policy and 500 tonne overall TAC. Through natural attrition, the number of authority holders has reduced to the 2001 level of 18, who are permitted to catch a total of 380 tonnes wet weight along the east coast.

3 ADMINISTRATIVE ARRANGEMENTS FOR THE FISHERY

3.1 Management responsibility

The Queensland East Coast Beche-de-mer Fishery is managed by the Queensland Department of Primary Industries' Queensland Fisheries Service (QFS) under *Fisheries Act 1994* (the Act) and its subordinate legislation *Fisheries Regulation 1995* (the Regulations). The management for the fishery was conferred on the Queensland Government by way of the Offshore Constitutional Settlement arrangements signed in 1987 and further developed in 1995.

The Torres Strait beche-de-mer fishery is under the jurisdiction of the Protected Zone Joint Authority (PZJA) for which day to day management tasks (licensing and enforcement) are carried out by QFS and the Australian Fisheries Management Authority (AFMA). Prior to 1 April 1999, the Torres Strait fishery was managed by the QFMA under Queensland jurisdiction.

Harvest of beche-de-mer from waters of the Gulf of Carpentaria is also managed by the QFS. Beche-de-mer is considered a developmental fishery in this area and is managed by way of permit arrangements. This fishery is the subject of its own Declaration of Controlled Specimens under the *Wildlife Protection (Regulation of Exports and Imports) Act 1982* approved on the 3 July 1999.

The commercial harvest of beche-de-mer in the Coral Sea is managed by AFMA under Commonwealth legislation.

Most fishing takes place within the Great Barrier Reef Marine Park (GBRMP), therefore the *Great Barrier Reef Marine Park Act 1975* (Cth) significantly impacts on the harvest of beche-de-mer in Queensland through spatial closures to fishing a further permitted requirements for fishers. That Act provides for the establishment, control, care and development of the GBRMP by the Great Barrier Reef Marine Park Authority (GBRMPA). The framework for planning and managing the multiple-use Marine Park is mainly through zoning plans, which make provisions about the purposes for which each zone may be used or entered. QFS consults regularly with marine park management agencies to ensure that fisheries and marine park management planning arrangements are complementary and compatible in accordance with the principles of ESD.

The *Marine Parks Act 1982* (Queensland) and Regulations 1990 apply to Queensland Marine Parks, with provisions complementary to the Great Barrier Reef Marine Park Act. The Act and Regulations deal generally with the marine parks, while zoning plans determine which activities can occur 'as of right' in particular zones and which activities require permits.

Waters within Moreton Bay are included in the Moreton Bay Marine Park, which is administered by the Queensland Environmental Protection Agency. The Zoning Plan for Moreton Bay has no impact on the current beche-de-mer fishery. The commercial fishery occurs in the area of the Woongarra Coast Marine Park which is located south of the GBR area near Bundaberg, however beche-de-mer are not targeted in the area. Hervey Bay Marine Park (Platypus Bay) also occurs within the range of the commercial fishery, and fishers have targeted sandfish species within the area. It is proposed that this Marine Park be extended in the future to include all Hervey Bay

waters and the Great Sandy Straits region.

3.2 Consultative arrangements

The Harvest Fisheries Management Advisory Committee (Harvest MAC) was established in 1997 to provide the principal source of management advice to the QFS on matters relating to the Queensland harvest fisheries which includes the bêche-de-mer fishery.

Harvest MAC draws on the expertise from a wide range of stakeholders including members from the commercial harvest fishing industries, a planner/manager for the Great Barrier Reef Marine Park Authority (GBRMPA), the Queensland Parks and Wildlife Service (QPWS), an eminent scientist from the Australian Institute of Marine Science (AIMS), Queensland Boating and Fisheries Patrol (QBFP), and the recreational fishing group Sunfish. Harvest MAC has benefited from having a Department of the Environment and Heritage representative as a voluntary member on the MAC for most of the MAC's term.

Bêche-de-mer species across northern Australia are managed collaboratively by State, Territory and Commonwealth jurisdictions through consultative arrangements and complimentary management initiatives. Queensland together with AFMA form the PZJA and management arrangements developed for the Torres Strait and the east coast benefit through consideration of the respective adjacent fishery. AFMA and QFS consult regularly on the Coral Sea fishery, and arrangements are in place to ensure that the harvest of black teatfish (which is a permitted species in the Coral Sea fishery) is confined to the permitted fishery. Queensland, Northern Territory and Western Australia consult under OCS arrangements, and beche-de-mer is discussed at the annual Northern Fisheries Management Workshop. Further, many of the east coast fishery participants are involved in other beche-de-mer fisheries in other states and jurisdictions which assist in enacting complimentary arrangements between the jurisdictions.

3.3 Fisheries Management Objectives

The objectives of the Act include:-

- (a) ensuring fisheries resources are used in an ecologically sustainable way;
- (b) achieving the optimum community, economic and other benefits obtainable from fisheries resources; and
- (c) ensuring access to fisheries resources is fair.

The concept of Ecological Sustainable Development (ESD) is well enshrined in modern fisheries resource management approaches and is defined by the Act as development:

- (a) carried out in a way that maintains biodiversity and the ecological processes on which fisheries resources depend; and
- (b) maintains and improves the total quality of present and future life.

When a management plan is developed for the fishery, specific objectives relating to the beche-de-mer fishery may be established. These may include objectives relating to the recovery of

black teatfish stocks and sandfish stocks in fished areas, increased understanding of the ecological role of holothurians in the fishery area, increased compliance levels in the fishery, and the development of ongoing independent scientific assessment strategies for the fishery. However, until such time as specific objectives for the fishery are developed, QFS will manage the fishery in accordance with the broader Act objectives described above.

4 DESCRIPTION OF THE FISHERY

4.1 Target species/taxa

The following shows the taxonomic description of the commercial species in Queensland:

Phylum Echinodermata
 Class Holothurioidea
 Order Aspidochirotida
 Family Holothuroidae
 Genera *Holothuria* and *Actinopyga*
 Family Stichopodidae
 Genera *Stichopus* and *Thelenota*

Although all species of beche-de-mer can be harvested, the 11 species listed below are the most sought after throughout the east coast fishery for harvest and processing. They are listed in approximate order of value. The species names and respective common names used are those referred to by Conand (1989).

<i>Common name</i>	<i>Species name</i>
Sandfish	<i>Holothuria scabra</i> var. <i>versicolor</i>
White teatfish	<i>Holothuria fuscogilva</i>
Black teatfish	<i>Holothuria nobilis</i>
Prickly redfish	<i>Thelenota ananas</i>
Deepwater redfish	<i>Actinopyga echinites</i>
Surf redfish	<i>Actinopyga mauritiana</i>
Lolly fish	<i>Holothuria atra</i>
Blackfish	<i>Actinopyga miliaris</i>
Greenfish	<i>Stichopus chloronotus</i>
Curryfish	<i>Stichopus variegatus</i>
Elephant trunk fish	<i>Holothuria fuscopunctata</i>

Beche-de-mer, hai-som or trepang are the terms used for the processed animal, which is usually gutted, boiled and dried. Sea cucumber (or sometimes incorrectly referred to as ‘sea slugs’) or holothurian are more correct terms for the animals harvested in the fishery, however currently the legislation in Queensland refers to ‘beche-de-mer’. This may be changed at such time as a formal management plan is prepared for the fishery. For the purposes of this report, where the fishery is being referred to the term ‘beche-de-mer’ is used. However where the animal is being reported on in an ecological or biological sense the more correct term ‘holothurian’ is used.

4.2 Distribution of the target species

Many of the target species are distributed widely in the Indo-West Pacific. Some members of the Holothuridae families, including commercial species such as *Holothuria scabra* and *H. nobilis*, and Stichopodidae, are found as far west as East Africa and Madagascar. Species diversity decreases in an easterly direction across the Pacific and few of the traditionally exploited holothurian species are found as far east as the Hawaiian islands (Clark and Rowe, 1971).

Sandfish (*H. scabra*) is harvested across northern Australia, with significant fisheries occurring in Torres Strait, Northern Territory and Western Australia. Beche-de-mer fisheries occurring in coastal Queensland, Torres Strait and the Coral Sea are the only producers of the reef-based species in Australia. Northern Territory and Western Australia fisheries predominantly target sandfish. The temperate species harvested from Victoria (*Stichopus mollis*) has not been reported from Queensland waters.

4.3 Environment of the target species

In general holothurians are benthic animals and they are usually found in close association with the substrate. Holothurians are found throughout the world's oceans, at all latitudes and at depths from shallow coastal seas to the abyssal plain. Commercial species dominate in tropical waters and species diversity decreases in an easterly direction across the Pacific.

Conand (1993) summarises the distribution of holothurians from New Caledonia as:

- a) slopes and passes;
- b) outer reef flats and
- c) inner reef flats and lagoons.

The commercial species targeted in Queensland's east coast fishery are generally found in two broad habitat types - inshore shallow-water coastal environments and tropical coral reef environments.

Sandfish (*H. scabra*) feeds on organic matter in sediments, and prefers muddy substrates. It is one of the few species that prefers coastal areas to coral reefs (Conand, 1989) and is often found in intertidal seagrass beds. Sandfish are usually present in large numbers in habitats under terrigenous influence or on inner reef flats and near estuaries. In Northern Territory seagrass beds were considered important settlement and nursery grounds for sandfish (Vail 1989), and this is supported by work undertaken in Tin Can/Hervey Bays where juveniles were present in all shallow water populations surveyed (Uthicke and Benzie 1998). In the Torres Strait, the Warrior Reef complex has in the past supported large sandfish populations where their presence was correlated with a decrease in live coral cover and increase in seagrass cover (Long *et al* 1996). In the unfished area of Moreton Bay, populations of sandfish have been surveyed in high densities in the 'Conservation Park Zone' of the Moreton Bay Marine Park, which are provided a high level of protection due to the presence of seagrass beds.

Most of the other known commercial species of beche-de-mer targeted in the east coast fishery

are found associated with a coral reef environment. Most of the fishery operates within the Great Barrier Reef Marine Park (GBRMP), specifically General Use A and B zones between Townsville and north to the southern boundary of the 'green' (Marine National Park 'B' Zone) transect in the Far Northern Section.

While only limited information is available on the reef-wide distribution of beche-de-mer in Queensland waters, some information is available for other comparable tropical reef environments in New Caledonia, other parts of the Pacific and the Indian Ocean (Maldives and India). Observations from these areas are consistent with logbook, and other information from researchers and fishers in Queensland.

Black teatfish are typically located on the reef crest and slope to around 10m depth. Many black teatfish populations in the Great Barrier Reef (GBR) region occur in high-flow environments, and are often exposed to high wave energy and low water levels (Uthicke and Benzie 2000a). White teatfish occur in deeper waters, with the adults occurring on sandy lagoon floors and at the foot of inner reef slopes at depths between 30 – 40m metres (Reichenbach 1999, Conand 1989). In India it is reported to occur in association with turtle grass (James 1989). Prickly redfish is usually found on reef slopes to a depth of 20m (Conand 1989). Likewise, deepwater redfish (despite its name) occurs in shallow water areas, inhabiting reef flats and the upper portion of reef and lagoon slopes (Conand 1989). Black fish are common on inner reef flats in seagrass beds, and have been reported to occur with white teatfish (Conand 1989). Surf redfish often occurs on the outside of reefs where there is high wave action (James 1989).

4.4 Geographical location and extent of the fishery

The main focus of the beche-de-mer fishery on the Australian east coast is in reefal waters between Townsville in northern Queensland (19°30'S) to the Torres Strait (10°00'S). Within Queensland waters the fishery takes place principally in reefal waters to 30m in depth.

However, the jurisdictional area of the fishery in Queensland waters is extensive (Figure 1). It encompasses tidal waters under Queensland jurisdiction as defined by the Offshore Constitutional Settlement (OCS) along the entire length of the State's shoreline, from the NSW to the NT border.

The recreational fishery covers all these waters, while commercial fishing is only authorised from Tin Can Bay (26°S) to Cape York (10°S). There is no information on recreational fishing levels of beche-de-mer in Queensland, however it is assumed to be extremely low.

Figure 1: The area of the commercial Queensland East Coast Beche-de-mer Fishery showing the Australian Fishing Zone and Offshore Constitutional Settlement boundaries. The shaded squares indicate the intensity of fishing effort applied over the period 1997 to 2000.

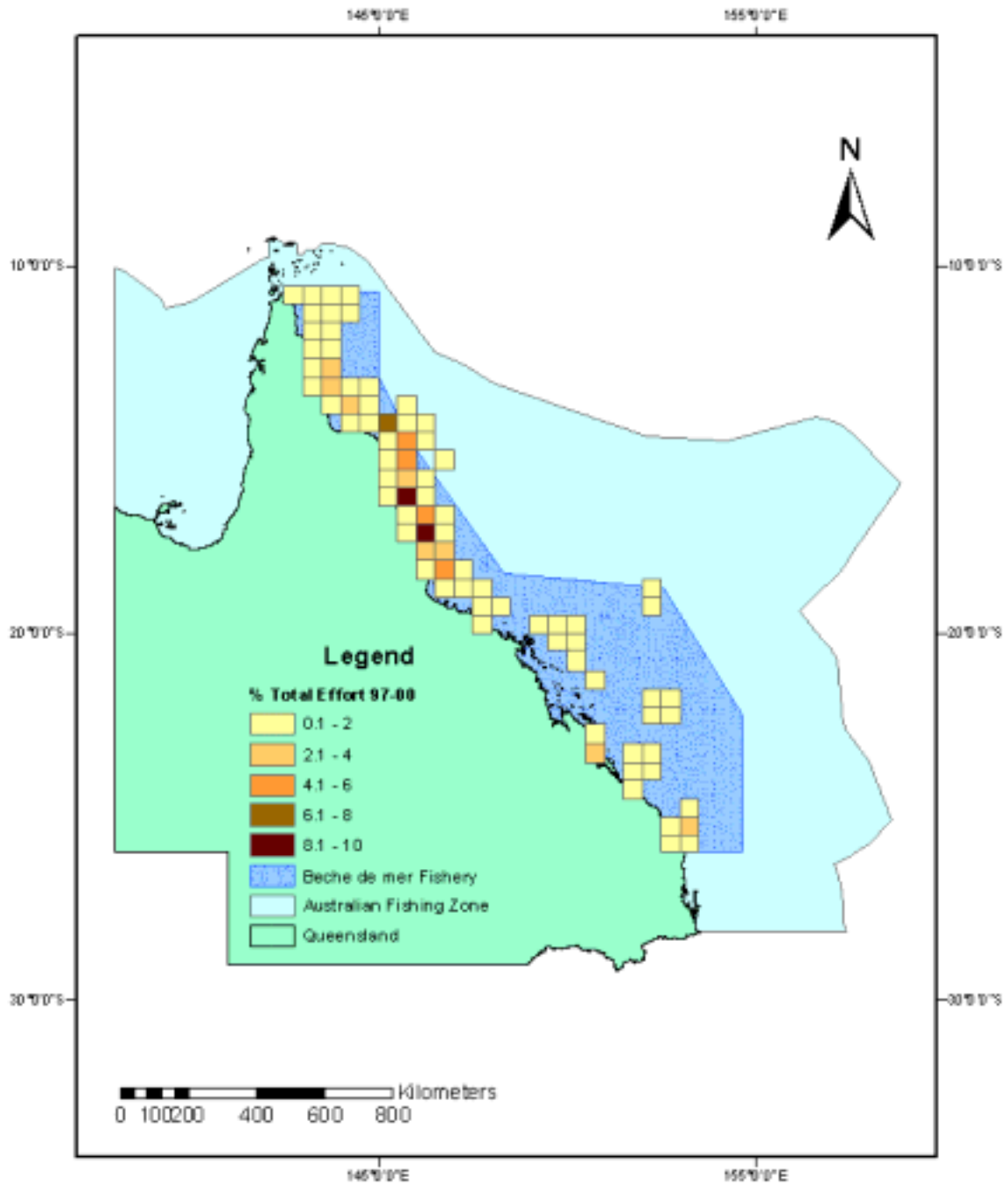


Figure 1 indicates that although the fishery appears to cover a great area of Queensland's coastal waters, only six 30nm grid squares represent more than that 4% of the effort over the past four years. While it appears most of the waters have been targeted for beche-de-mer, it is largely only at very low levels (less than 2% of effort). The most likely explanation for the lack of intensive beche-de-mer fishing south of Townsville is that the major reef species (black teatfish and white teatfish) do not occur in commercially viable quantities south of this area. Most fishing activity for reef species has occurred north of Townsville area while historically, sandfish harvest has occurred only in Tin Can Bay/Hervey Bay area (on the southern boundary of the commercial fishery area 26°S).

4.5 Abundance and status of target stocks

Other than black teatfish and more limited information on sandfish, the abundance and status of the target species populations in the fishery is unknown. The only information available on the density and abundance of these species is based on the compulsory commercial fishery logbook information, and anecdotal information from fishers.

Uthicke and Benzie (2000b) reported that densities of black teatfish on the GBR on 16 fished reefs compared to 4 unfished (or protected Marine National Park 'B' zoned 'green' reefs) were reduced by around 75% from fishing. The reduced densities, combined with the lower average weights result in a reduction of biomass by more than 75% on fished reefs (Uthicke and Benzie 2000b). A four-fold reduction in densities leads to a doubling of the average distance between individuals, which may reduce fertilisation success (Uthicke and Benzie 2000b). It is not known to what extent the unfished reefs may serve as a refugia and source of recruits to fished reefs to aid in recovery. A further survey was completed in September 2000 – a year after commercial fishing access to black teatfish stocks was closed. Preliminary information (Uthicke pers comms 2001) suggests that in one year little to no recovery has occurred on these fished reefs.

Around 22% of the coral reef area within the GBR is protected from fishing, and the percentage of protected reefs is higher in the Far Northern Section (where the majority of fishing takes place). The percentage of actual reefs available for collecting is 42%, while 58% are protected by zoning arrangements. While stocks of black teatfish on fished reefs are considered overexploited which warrants the zero TAC to protect remaining populations on these reefs, the impact of fishing has not spread to protected areas. Given the high percentage of protection provided to reefs in the fished area, it seems likely that on a GBR-wide basis stocks of black teatfish stocks are not considered low.

Sandfish harvest in the fishery is limited to Tin Can Bay. The reported harvest of sandfish was greatest for the period 1996/97 at 70 tonnes. Anecdotal information suggests that sandfish harvest prior to this time was higher, and that stocks have declined in recent years due to fishing pressure and environmental factors including reduction in density of seagrass beds. Historically only a couple of authority holders have targeted sandfish populations in the region. During the wet season in 1998/99, floods caused large amounts of freshwater to accumulate in the shallow waters of Tin Can Bay causing seagrass mortality which may have lead to impacts on the sandfish population.

Shallow areas may be prone to overfishing due to the easy access by walking in the intertidal

zone (Uthicke and Benzie, 1998). The seagrass habitat may also be important to the sustainability of sandfish in this area, with shallow seagrass beds an important nursery area for juveniles. There is a large interchange of genetic material between deep and shallow populations, therefore, the deeper water populations may be a source of new recruits for the fished shallow populations (Uthicke and Benzie, 1998).

White teatfish has only been reported as a target species over the last three years. Catch and effort data indicates that the CPUE and the average size of individual fish has remained stable over the entire fishery. There is information however, that fishers are diving deeper to harvest white teatfish, and this is validated by the increase in diving related incidents reported to Workplace Health and Safety. It may be assumed that overall densities of white teatfish remain relatively high as on protected reefs (22%) they remain at 'natural' densities and in waters deeper than around 35m they are afforded protection from fishing. However, some local reef depletion may be occurring in highly fished areas, and CPUE and size data may remain stable while new white teatfish grounds continue to be found.

Based on the catch and effort information gathered from fishers, there are no other signs of overfishing or deleterious impacts from fishing on the other species of beche-de-mer targeted in the fishery. Fishers have not indicated concern on the status of the other species. Therefore, it can be assumed that these species natural abundance and distribution patterns have not been impacted on by excess fishing pressure and as discussed above, the spatial closures to fishing within the GBRMP provide a high level of protection to a significant component of the beche-de-mer populations in Queensland east coast waters.

4.6 Population effects from the operation of the fishery

Beche-de-mer fisheries display particular characteristics making them vulnerable to recruitment overfishing including:

- beche-de-mer fisheries world-wide have suffered 'boom and bust' cycles and the recent local examples (black teatfish and Torres Strait sandfish) indicate that Australian populations are not exempt from those characteristics;
- beche-de-mer are sessile and benthic animals;
- the harvest method allows specimens to be identified and physically selected (as opposed to most 'blind' fishing operations where the apparatus attempts to attract the fish);
- fishing activities can essentially completely strip all animals in an area; and
- beche-de-mer are patchily distributed.

Given these traits, unless there are precautionary enforceable restrictions on fishing operations it is unlikely that any beche-de-mer fishery will remain ecologically sustainable.

Possibly the most serious potential ecological effects of the beche-de-mer fishing operation are its impact on the size of the spawning stock and successful natural recruitment. This effect may be a function of serial depletion of beche-de-mer grounds, and is essentially the reason for undertaking a stock assessment and monitoring program.

In recent years two Australian beche-de-mer species have been overfished, which has had significant impact on the populations of the species. The sandfish (*H. scabra*) fishery on the Warrior Reef in Torres Strait was closed in February 1998 following a few years of prolonged

fishing effort, while access to black teatfish populations in the Queensland east coast region was closed in October 1999. Fishery independent assessments have occurred since their closures (Uthicke pers comms, Skewes *et al* 1998, Skewes *et al* 2000) and to date both areas have shown very little, if any, signs of recovery.

The conclusions from these Australian examples suggests that beche-de-mer abundance can be severely impacted by over-fishing, and that recovery of densities following such exploitation may be slow. Precautionary management of beche-de-mer stocks in Queensland is warranted given these particular examples of the threats from overfishing populations.

To ensure that further deleterious effects from fishing operations do not occur, the QFS has adopted a precautionary approach to white teatfish stocks. During 1998, fishing effort transferred to white teatfish following the collapse in black teatfish stocks in the area available to fishing. QFS capped the Total Allowable Catch (TAC) at a conservative level, and has introduced far tighter restrictions on the monitoring of the fishery (increased reporting requirements and automated vessel monitoring - VMS). These measures were introduced to prevent the 'boom and bust' cycle from occurring and to ensure that white teatfish stocks remain at high enough levels to maintain ongoing fishing activities in the long-term.

While the QFS has resolved that the TAC for white teatfish should remain capped at a base level of 127 tonnes (with slight variations if required annually), there are arguments that the TAC could be increased slightly without jeopardising the sustainability of the resource, as catch per unit effort (CPUE) levels remain high, and the average size of fish have remained stable. While the status of the white teatfish resource is unknown, they are a deeper dwelling species, and are afforded some protection by the limitations on divers to dive at these depths for long periods. There are also significant area closures as part of the GBR zoning arrangements (at least 22% of reefs). Further, this species has supported only three years of limited harvest (108 tonnes in 1998/99, 127 tonnes in 1999/2000, 158 tonnes in 2000/01), and CPUE and the size of individual fish are stable.

Based on the logbook returns received to date, almost all of the 158 tonnes allocated during 2000/01 will be harvested. There are two authorities which are currently caught up in a legal dispute, and it is likely that this will be settled over the next few months, potentially increasing the reported fishing levels to the TAC this year.

The logbook data available for white teatfish to date does not detect a decrease in either CPUE or average size/weight of specimens, indicating that it is likely that stocks are currently being fished on a sustainable basis. However, as with all fisheries the CPUE may not be a good indicator, as it may remain stable while new fishing grounds are being accessed for stocks however densities may have decreased within the periodically fished areas.

Beche-de-mer stocks generally are at risk from overexploitation, but these risks are largely mitigated in the Queensland East Coast Beche-de-mer Fishery by the protection of reefs through the GBR Marine Park Zoning arrangements, the natural fishing patterns of authority holders and fishery management. These include:

- 22% of the total available reefs are protected by GBRMPA zoning arrangements, with more protected in the northern section where the majority of fishing activities occur.

- Reefs south of Townsville are largely not fished for beche-de-mer while they have been found in commercial quantities in the area (Uthicke pers comms) and will serve as refuge populations for many species.
- White teatfish are largely protected below 35m serving to provide a refuge for breeding individuals.
- Size limits prevent the harvest of juvenile fish and afford individuals to contribute to the spawning stock at least once before entering the fishery.
- Queensland waters south of Tin Can Bay (26 °S) are not available for commercial fishing, and may also serve as refugia to sandfish populations in the region.

Therefore the affects of fishing are largely reduced by management arrangements and are confined to the open 78% of reefs in the GBR and the small available commercial fishing area outside of the GBR boundaries, which is supported by a large closure between Tin Can Bay and the border of NSW.

4.7 Size and characteristics of the fishing fleet

There are 18 non-transferable authorities granted for the Queensland beche-de-mer fishery, with two 50 tonne, four 25 tonne and twelve 15 tonne quota authorities granted (total 380 tonnes). Eight boats are currently operating in the fishery ranging in length from 10 to >20m. All vessels are authorised to have up to 4 tender vessels ('dories') working in conjunction with their primary vessel, however most only have two to three dories which are set up with hookah apparatus. Most boats spend around 10 to 20 days at sea each fishing trip, with most of the fleet operating from Cairns as their major port (with some boats sometimes offloading product in Torres Strait, Port Douglas or Townsville).

The level of recreational beche-de-mer fishing in east coast waters is unknown, however, it is thought to be extremely low. There are small amounts of more colourful non-commercial species collected for display in aquaria. Further, it is not a species that has been traditionally been collected for subsistence purposes by indigenous communities, rather any traditional harvesting has taken place for trade with Macassans, or other Asian countries.

All beche-de-mer harvested in Queensland is processed through five operations based in Thursday Island, Cairns, Hervey Bay, Brisbane and Victoria. Most beche-de-mer is exported dried to south-east Asia, principally Hong Kong, China and Singapore. Some processors are starting to investigate other processing methods including canning, dry powder (for nutraceuticals) and konowata and kuchiko (fermented gut and gonad products for Japanese markets). Only a very small amount remains in Australia for sale in the domestic market (mainly through Asian food stores). Prices obtained by fishers vary on the basis of market demand and available supply, but range from \$120/kg (sandfish), \$15 - \$25/kg (white and black teatfish), to \$2/kg (Amberfish, Elephants trunkfish, and Lolly fish) dried. The value of beche-de-mer product has been increasing steadily over recent years as fisheries worldwide have experienced a decline in stocks.

5 MANAGEMENT OF THE FISHERY

5.1 Licensing arrangements

The East Coast Beche-de-mer Fishery is managed under the *Fisheries Act 1994* and its subordinate legislation the *Fisheries Regulation 1995*. A copy of the relevant sections of the Regulation is attached as Appendix 1.

In accordance with section 49 of the Act, the QFS issues an “Authority to Take Fish For Trade or Commerce” (‘authority’) endorsed with the fishery symbol B1. Authorities are renewable (unlike a permit) and in general have the same characteristics as a licence, however authorities for the beche-de-mer fishery are non-transferable.

The inability to transfer an authority has served to reduce the number of ‘latent’ authorities granted for the fishery. In 1997 when transferability was first proposed for implementation in the fishery, many authority holders entered into arrangements to transfer their authority once the legislation allowed them to do so. Contacts and agreements of sale have been entered into on almost all authorities granted for the fishery, effectively reducing the number of participants to around four, who are all processors and exporters of beche-de-mer product.

Apart from those provisions outlined in Schedule 15, Part 2 of the Regulation, management controls and other relevant restrictions for the beche-de-mer fishery are implemented by way of ‘authority conditions’. The QFS may impose any reasonable and relevant conditions relating to the management of the fishery. Such arrangements allow for rapid response to any perceived threats to the sustainability of the fishery.

5.2 Quotas and Total Allowable Catches (TACs)

The primary output control on the fishery is a total allowable catch (TAC) divided into a black teatfish, white teatfish and all other species component. This is divided among the 18 authority holders using a system of individual quotas (IQs).

Individual quotas are in 15, 25 or 50 tonne allocations based on historical participation in the fishery. These allocations were historically determined over time by the Department of Primary Industries in around 1991 and have not been altered since that time. There are two 50 tonne, four 25 tonne and twelve 15 tonne authorities granted in the fishery.

The quotas for the fishery are implemented by way of authority condition. Quota’s are reviewed each year, and the authority has the power to amend these quotas on renewal of the authority, or in the case of just a quota amendment, the QFS can amend this by notice to the authority holder at any time (as occurred with black teatfish in 1999).

The TAC was divided into the three species quotas in 1999 following concerns about specific sustainability of certain species. The following table outlines the quota changes and arrangements to date.

Quota year	TAC	Species TACs
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1997/98	TAC of 500 tonnes	380 allocated 120 unallocated
1998/99	TAC of 380 tonnes Split into black teatfish TAC	All allocated 188 tonnes black teatfish 192 tonnes all other species
1999/2000	Split of 380 tonnes into species TACs	0 tonnes black teatfish 127 Tonnes white teatfish 253 Tonnes all other species
2000/01	Retain spit quota of 380 tonnes Increase white teatfish quota by 25%	0 Tonnes black teatfish 158 Tonnes white teatfish 222 Tonnes all other species
2001/02*	Retain split quota of 380 tonnes Return white teatfish quota to base level	0 Tonnes black teatfish 127 Tonnes white teatfish 253 Tonnes all other species

*proposed by Harvest MAC, not yet approved for implementation.

QFS is currently undergoing final consultation with industry to reduce the white teatfish TAC to the base level of 127 t for the upcoming 2001/02 quota year. This will return the white teatfish TAC to the same level as in 1999/00. For 2000/01 the former Queensland Fisheries Management Authority (QFMA) determined that a further 25% TAC of white teatfish be available (total of 158,750 tonnes) as a 'one-off' only to ease the transitional management arrangements following the closure of black teatfish stocks and due to fishery dependent information supporting an sustainable increase in the TAC. Following fishery independent advice from AIMS scientists that little or no recovery of black teatfish stocks are evident on previously fished reefs, access to this species will remain closed.

5.3 Other output controls

A minimum legal size of 15cm applies to all species in the beche-de-mer fishery implemented by authority condition. QFS is currently considering the introduction of species-based size limits that provide protection to juvenile beche-de-mer species, and allow beche-de-mer to spawn at least once before entering the fishery. Research on growth, size at maturity etc. has not been carried out on Australian populations, however information is available on most species in other countries and this information will be used to establish scientific based size limits.

It is recognised that holothurians may vary in size significantly, making size limitations extremely difficult to enforce. Enforcement officers have not prosecuted any commercial fishers for size limit infringements due to the difficulty in establishing a credible actual size of beche-de-mer generally. It is recognised widely by management agencies and industry that the size limits serve as a guide only, and may be better incorporated into an industry code of practice at some future stage.

5.4 Fishing method

Beche-de-mer may only be taken by hand, and commercial fishers may use underwater breathing apparatus. Recreational fishers are not authorised to use underwater breathing apparatus, but may use standard free-diving gear. These measures are implemented by way of the Regulation.

5.5 Other input controls

The authority holder must be present when beche-de-mer are taken under the authority. Given that these authorities are not transferable, QFS issues General Fisheries Permits in some circumstances to fishers nominated by the authority holder to undertake activities on their behalf. Most actual authority holders in the fishery are elderly and many are no longer fit to dive, or to be present whilst fishing operations are being carried out. It is proposed that beche-de-mer authority's become transferable and that formal nominee arrangements may be entered into by authority holders as usual operating conditions.

The number of divers that may be used per authority is 10, and the number of dories that may be used in association with the primary fishing vessel is 4. The fishing dories may not exceed 7 metres in length. These restrictions serve to limit the level of localised impact from fishing operations. Usually fishing operations do not exceed six divers and three dories.

Further, the commercial fishery is closed south of Tin Can Bay (26°S) to the border of NSW providing protection to beche-de-mer populations on the sunshine coast reefs, Moreton Bay and Gold coast.

Other restrictions on the fishery administered by GBRMPA for waters within the GBRMP include:

- participants are required to hold a Marine Park permit; and
- zoning arrangements where fishers are not authorised to harvest beche-de-mer from protected (Marine National Park A and B Zones) reefs which comprise of around 22% of all reefal area
- and compliance with various 'Plans of Management' that may have further restrictions relating to mooring or other issues.

5.6 Management response capability

The QFS has various mechanisms available to respond in a timely manner to threats to sustainability of the fishery. These include power to:

- a) declare a closed season, closed waters or closed species (section 43 of the Act);
- b) declare quota (section 44 of the Act);
- c) make an emergency fisheries declaration (section 46 of the Act) where urgent action is needed to meet a significant threat to fisheries resources or habitat;
- d) refuse to issue or renew an authority (section 59 of the Act) where it is necessary or desirable for the best management or protection of fisheries resources;
- e) impose conditions on issue or renewal of an authority (section 61 of the Act);
- f) amend an authority through a 28-day ‘show cause notice’ (section 63 of the Act); and
- g) amend an authority by written notice (section 63 of the Act) – where the quota is to be changed.

The former QFMA has made an emergency fisheries declaration (c above) with respect to sandfish in the Torres Strait (prior to 1 April 1999 when management responsibility was transferred to PZJA), and has amended an authority by written notice where the quota was changed (g above) to zero black teatfish and white teatfish was capped. This was subject to legal proceedings by some authority holders, and the QFMA was found to have acted legally in this regard.

The QFS retains the power to alter arrangements in a timely manner, with respect to beche-de-mer fisheries to ensure and maintain sustainable beche-de-mer stocks.

6 COMPLIANCE AND ENFORCEMENT

6.1 Existing compliance/enforcement arrangements

Enforcing compliance with the Act and Regulation of the beche-de-mer fishery is the responsibility of Queensland Boating and Fisheries Patrol. Legislation pertaining to the fishery is found within the Fisheries Regulation, made under the *Fisheries Act 1994*. Officers stationed between the Townsville and Port Douglas are mostly involved in the fishery, with Cairns being the major port from which most beche-de-mer fishers operate and land their catch. Some involvement from officers based in Moreton Bay and Hervey Bay are required from time to time.

Shore based officers conduct compliance inspections with beche-de-mer fishers at wharves and unloading facilities wherever they may be. Shore-based product inspections are supported by at-sea inspections of licence conditions, quota and logbook reporting. In exposed offshore areas this occurs from larger Patrol vessels stationed at Cairns.

In July 2000, the QFS introduced telephone reporting arrangements to the fishery through authority conditions, to support field inspections. Fishers are required to make two telephone reports to a hotline prior to landing any product.

- The '**trip report**' must be made 24-hours prior to the completion of a fishing trip and information on port of arrival, and estimated time of arrival must be provided. This will provide the Patrol with at least 24-hours lead in time to arrange for an inspection of the vessel.
- An '**offload report**' must be made 3 hours prior to landing product, and confirms the port and estimated time of arrival, and then provides information on total number of specimens of each species on board.

All buyers of beche-de-mer products must submit monthly buyer returns stating the species, quantity and processed form of the product and the fishers from whom they bought the product. Further cross-referencing of individual quota data, logbook statistics and processors catch reports, is available to officers on line from the QFS database in Brisbane.

VMS was compulsorily introduced into the fishery on 1 October 2000 (also by implementation of authority conditions), and this is also serving to assist in locationing vessels, and ensure that boats are not returning to port unannounced to offload product.

There are only eight vessels participating in the fishery, which is orders of magnitude less than almost all other fisheries in Queensland (there are 800 trawlers for example). Ensuring compliance for such a small fleet, with low numbers of operators should be relatively simply compared to other fisheries. Further, there are low numbers of buyers, and exporters of beche-de-mer product, and almost 100% of product is exported therefore tracking product and validating export quantities could be achieved. There may be an opportunity to investigate paper trail procedures and collaborate with AQIS and EA on validating product quantities and quota.

Fishers have expressed support for the trial of the Electronic Catch and Effort Reporting System (ECERS) where emailed logbook returns on a daily basis are submitted to provide timely monitoring of quota and ensure daily accurate logbook reporting. This program is still in its infancy but should be operational on a trial basis on some boats in the fishery by 1 July 2001.

6.2 Compliance levels

Present compliance levels are unknown. Recent investigations have revealed only small/accidental over-harvesting of quota only. QFS can not be sure that compliance levels are high, although Harvest MAC and QFS considers low enforcement and compliance a risk to the sustainability of the fishery. Only a very few serious breaches have occurred in the beche-de-mer fishery, and there continues to be intelligence from fishers about over-harvesting of quota.

Compliance and enforcement in the beche-de-mer fishery is particularly difficult for the following reasons:

- species identification requires specialist training;
- the form of each species alters significantly depending on the processing method (ie.salted, salted/boiled, green chilled etc);
- the weight of product varies with each species, and its processing method;
- much of the fishery is carried out in the far north eastern coast where enforcement

presence is lower;

- the processors control most of the fishing vessels in the fishery, therefore independent catch information cannot be achieved through buyers logbooks;
- quota monitoring and enforcement requires specialist accounting and book-keeping skills; and
- quota enforcement in general, is expensive and time consuming.

Compliance with the fishery arrangements is a key area of concern to the QFS. As the key management mechanism, for the fishery is the species TACs (beyond the closures afforded by protected areas of the GBR), then compliance with individual quotas are critical to prevent overexploitation.

Compliance has been identified as a priority issue by Harvest MAC, where increased levels of compliance is required to ensure the future sustainability of the beche-de-mer fishery. It is believed that the demise of the black teatfish fishery may be in part due to low levels of quota compliance in the fishery, where many authority holders under-reported catch systematically over a number of years. The measures introduced recently have gone part of the way towards achieving increased compliance, however QFS is still receiving reports from fishers of illegal activities, and now independent validation of quota arrangements is required by on the ground enforcement officers.

While compliance appears to be a great challenge for the fishery, results from Uthicke and Benzie's (2000b) black teatfish surveys indicate that the densities of black teatfish on surveyed reefs are 75% higher on protected reefs than on protected (Marine National Park B Zone) reefs. This provides evidence to suggest that fishers are complying with GBR zoning arrangements, which provides genuine protection to 22% of reef areas in the GBR. Further, GBRMPA compliance officers have successfully prosecuted at least one beche-de-mer fisher for harvesting in a protected National Park B Zone in the past.

Further, the introduction of VMS into the fishery on 1 October 2000 has improved compliance and enforcement capabilities through an increased ability to focus compliance to specific locations making efficiencies in compliance operations.

6.3 Compliance reporting

All compliance reporting is completed on a monthly basis from individual stations throughout Queensland. Reports are indicative of all aspects of all fishery activities from man-days worked to a breakdown of breaches and cautions. Figures from these reports are collated in Brisbane and issued as a monthly State report. Harvest MAC monitors enforcement issues through participation of the QBFP in the MAC, and through specific fishery reports as requested from time to time from relevant Patrol offices. Harvest MAC then provide advice back to QFS on priority areas of enforcement and arising issues in enforcement capabilities.

7 ONGOING ISSUES AND CONCERNS

7.1 Proposed compliance arrangements

To address the ongoing risk to the sustainable management of the fishery associated with non-compliance of existing arrangements, Harvest MAC has recommended that a 'compliance brief' be prepared on the issues as outlined above which identifies the key areas where increased compliance levels are required. This is currently (March 2001) being prepared by the Resource Management Division, and will be provided to the Resource Protection Division for their consideration and analysis of a compliance strategy by May/June 2001.

Queensland Boating and Fisheries Patrol can then provide an estimate of the level of funding that will be required to achieve the proposed increased compliance levels. Current informal discussions indicate that it may equate to around 1 full-time-equivalent per year at a cost of around \$50,000. Further consultation with industry will be carried out prior to recommendations on increasing their annual authority fees need to be approved by the Minister. Amendments to the Regulation will be required to achieve this fee increase, therefore adequate compliance in the fishery is directly linked with a fee increase to support the additional funding required.

7.2 Proposed future management initiatives

At its meeting in March 2001, Harvest MAC considered management arrangements for the upcoming 2001/02 quota year commencing on the 1 July 2001. Some measures will require to be implemented by Regulation amendment, while others can be implemented by conditions on individual authority's. Further consultation by QFS with industry will occur on these measures before they are recommended to the Minister for implementation and introduction.

These include:

- a) provisions to allow for transfer of beche-de-mer authorities, and permanent and temporary quota transfers with a minimum holding of 5 tonnes of any species (requires Regulation amendment);
- b) increase of beche-de-mer authority fees for the purposes of increased enforcement (requires Regulation amendment);
- c) that the black teatfish TAC remain at zero (implement by Quota Declaration – subordinate legislation and authority condition);
- d) the white teatfish TAC return to the base amount of 127 tonnes (implement by Quota Declaration – subordinate legislation and authority condition);
- e) VMS provisions be implemented via Regulation (as opposed to condition of authority as it is currently);
- f) a formal Quota Declaration be prepared in accordance with section 44 of the Act (subordinate legislation);
- g) Resource Management Division commence discussions with QBFP regarding compliance requirements and an appropriate level of funding to support such compliance;

- h) a recreational in possession limit be introduced to the Regulation of 5 holothurians in total (zero black teatfish) (Regulation amendment);
- i) close Hervey Bay and Tin Can Bay to the collection of sandfish (can be achieved by conditions on commercial authorities);
- j) negotiate special reporting conditions with dual endorsed Torres Strait vessels (can be achieved by conditions on commercial authorities); and
- k) amend minimum size limits to available species-based biological limits.

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