Ecological assessment of Queensland's East Coast Pearl Fishery

A report to the Australian Government Department of Environment and Heritage on the ecologically sustainable management of a highly selective dive fishery

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INTRODUCTION

In 1992, Australian Commonwealth, State, Territory and local governments committed to an ecologically sustainable development (ESD) approach to the use of natural resources (COAG 1992). Fisheries resources were (see Green et al. 1991) and still are (see Fletcher et al. 2003) considered to be one of many specific natural resource foci that fall squarely under the ESD umbrella.

To prompt continued progress towards ESD, the Commonwealth Government introduced the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act 1999) and the *Environment Protection and Biodiversity Conservation Amendment (Wildlife Protection Act) Act 2001*. Following these legislative changes, in order for harvested fish species to remain exempt from export controls fisheries management agencies must demonstrate (through ecological assessment submissions) that their fishery management regimes comply with the objectives of ecologically sustainable development. The Australian Government Department of the Environment and Heritage (DEH) is currently auditing the fishery management agency submissions (unless a state has in place alternative audit processes accredited by DEH). All submissions must be based on and satisfy DEH's 'Guidelines for the Ecologically Sustainable Management of Fisheries'. The Guidelines include a number of individual objectives broadly relating to impacts to target species; bycatch and byproduct species; endangered, threatened and protected (ETP) species; ecologically threatened communities; and the marine ecosystem generally (see: www.deh.gov.au/coasts/fisheries/assessment/guidelines.html).

This document represents the Queensland Government's ecological assessment submission to DEH for the Queensland East Coast Pearl Fishery (ECPF). The Queensland Department of Primary Industries and Fisheries (DPI&F), has prepared this ecological assessment with the assistance of stakeholders in the fishery. Broadly, the document comprises two parts:

- Fishery Description - providing a detailed description of the fishery; and
- Ecological Assessment - detailing the assessment of the fishery against DEH's Guidelines.

The Queensland East Coast Pearl Fishery (ECPF) is a small-scale harvest fishery with limited hand collection of wild adult pearl oyster shell from the east coast of Queensland. Since the late 1980s less than 5 operators have been authorized to operate in the ECPF. Throughout this period, annual reported catch has not exceeded 2 tonnes and indeed has been as low as 71 kg. Similarly, annual reported effort has not exceeded 76 days.

Only limited information is available on the fishery, largely due to the low level of operation within the fishery in recent times. Catch and effort data is variable, and over the longer term is somewhat sparse and inconsistent. Detailed fishery statistics are not presented throughout this ecological assessment as confidentiality agreements between QDPI&F and the fishing industry limit the publication of catch information when data relates to fewer than five fishing operations

In other fisheries and areas pearl oysters have been found to be susceptible to overfishing however wild stocks are believed to not be at risk in the ECPF due to recruitment from broodstock in large areas which remain unfished and because of the current limited fishing activity within the ECPF. The regulations applying to the ECPF limit fishers to collecting by hand (or by hand held implements) and require that all pearl oysters collected from the wild are on-sold to aquaculture facilities. Pearl oysters collected from the east coast of

Queensland account for only a small amount of the pearl oysters used in pearl production on aquaculture farms in Queensland waters.

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ACRONYMS

DEH	Department of the Environment and Heritage
CFISH	Commercial Fisheries Information System
DPI&F	Queensland Department of Primary Industries and Fisheries
EPBC Act	Environment Protection and Biodiversity Conservation Act
ETP	Endangered, threatened, protected (species)
OCS	Offshore Constitutional Settlement
PZJA	Protected Zone Joint Authority
QBFP	Queensland Boating and Fisheries Patrol (part of DPI&F)
QFMA	Queensland Fisheries Management Authority (now part of DPI&F)
RFISH	Recreational Fishing Information System

1. DESCRIPTION OF THE FISHERY

MANAGEMENT AGENCIES

The Department of Primary Industries and Fisheries (DPI&F), is responsible for the day-to-day management of Queensland's fisheries resources. The *Fisheries Act 1994* is the legislative document guiding DPI&F operations, the overarching objectives of which are: "…to provide for the use, conservation and enhancement of the community's fisheries resources and fish habitats in a way that seeks to -
apply and balance the principles of ecologically sustainable development; and
promote ecologically sustainable development."

Under Offshore Constitutional Settlement (OCS) arrangements between the Commonwealth and Queensland governments, management of pearl oyster collection throughout most of the Australian Fishing Zone adjacent to the east coast of Queensland falls under Queensland law. The pearl oyster fishery area of Queenslands east coast comprises all tidal waters, south of latitude 10° 41' south, and east of longitude 142° 31' 39" east.

The Torres Strait pearl oyster fishery operates within the jurisdiction of the Protected Zone Joint Authority (PZJA) for which management activities (licensing and enforcement) are jointly carried out by DPI&F and Australian Fisheries Management Authority (AFMA). Prior to April 1st 1999, the Torres Strait fishery was managed under Queensland jurisdiction by the then Queensland Fisheries Management Authority (QFMA), now incorporated into DPI&F.

Pearl shell farming in the Torres Strait and the east Queensland coast are licensed and managed by the Queensland Government. Pearl farming is considered part of the Queensland aquaculture industry.

SPECIES INFORMATION

Oysters comprise the class Bivalvia and are members of the phylum Mollusca, along with snails, slugs and cephalopods. Pearl producing oysters are members of the family Pteriidae in the order Pteriodia. Edible oysters belong to the family Osteridae and have only a distant relation to the pearl oyster. Pearl oysters are a tropical marine species found primarily throughout the Indo-West Pacific region. Wild harvest of pearl oyster along the east coast of Queensland is on-sold to aquaculture facilities for use in pearl production.

The two main species targeted in Queensland waters are the gold-lipped pearl oyster (*Pinctada maxima*) and to a lesser extent the black-lipped pearl oyster (*Pinctada margaritifera*). Five other species are also found in Queensland waters and these include *Pinctada albina, P. chemnitzi, P. fucata, P. maculata,* and *P. albina sugillata* (Torres Strait Fisheries Assessment Group, 1999). The gold-lipped pearl oyster is found on open shelf areas of large islands and is cultured for high quality white pearls known as South Sea pearls, and mother of pearl shell. The Australian continental shelf supports the world's largest stock of this species of oyster (Swadling, 2003). The black-lipped pearl oyster occurs in lagoons, bays and sheltered reef areas and is cultured for black pearls. Colour distinguishes the two species with the black-lipped pearl oyster having a black external

shell surface and black non-nacreous border and the gold-lipped being yellow, gold or silver. *Pinctada maxima* is the largest of the Australian species of pearl oyster.

ECOLOGY AND BIOLOGY OF PEARL OYSTER SPECIES

The ecology and biology of pearl oyster outlined below is primarily from information compiled by the Torres Strait Fisheries Assessment Group (1999).

Temperature is the main influence on sexual development and spawning activity. Pearl oysters spawn at water temperatures around 29°C, and fertilisation takes place externally in the water column. Spawning is not limited to distinct seasons and may occur throughout the year, however populations of pearl oysters in Western Australia have shown to spawn from September to April, with peaks from late October to December and from February to March. Torres Strait populations commence spawning slightly later in October. Their first spawning peak is from November to December and the second is from January to March. Spawning periods for the east Queensland pearl oyster populations are unknown.

Larvae develop within 8 hours of fertilisation. They are free floating and are distributed on tidal currents. The larvae settle as 'spat' after approximately 21 days, at which stage they have developed 2 thin shells. The spat are capable of short movements and on settling they attach themselves by byssus threads to fragments of stone or coral or even to the shells of adult pearl oysters.

Pearl oyster growth is highly variable and dependent on environmental factors. As a rule high water temperature will promote faster growth. *Pinctada maxima* is the largest of the Australian species of pearl oyster. At about 3 years of age *P. maxima* pearl oysters are between 170-200mm long, and at that size they release their hold on the substrate and lie free on the bottom. Subsequent growth consists mainly of increasing shell thickness, with the oyster continuing to secrete nacre throughout its life. *Pinctada margaritifera* obtains a shell size of 200 mm dorso ventral height (DVH). It is common between 150 – 180 mm in Australia (Beer, 2001).

A substantial proportion of pearl oysters are protandrous hermaphrodites, i.e. they change from being functional males to functional females as they age. A survey in Torres Strait showed that after the second year most of the young oysters surveyed had developed as males. In subsequent years the population shifted back towards a 50-50 male-female split. Similarly in Western Australian populations, 30-40% of the population that survive to large sizes change sex from male to female. Both male and female pearl oysters mature in their first year. In Western Australian populations' males were found to be mature at approximately 110mm in length and females at approximately 135mm. *P. margaritifera* have been found to mature within 12 months at around 70 mm in length (Beer, 2001).

Pearl oysters are filter feeders, with both adults and juveniles feeding on organic detritus. Juveniles are preyed upon by marine snails, starfish (Asteroidea), octopus (Octopus species), crabs (Portunidae), and rays (Batoidea). Adults are vulnerable to stingrays (Myliobatididae), octopus and a wide range of internal parasites, boring worms and sponges.

Recruitment, as with most mollusc fisheries, is highly variable and undergoes long periods in which very little recruitment occurs. Factors affecting recruitment are unknown.

LOCATION AND EXTENT OF THE FISHERY

A full description of the area of the fishery (i.e. the Queensland jurisdiction) is shown in Figure 1. The commercial fishery area for the east coast of Queensland comprises all tidal waters south of latitude 10º41' south, and east of longitude 142º31'49" east. Essentially, the east coast commercial pearl fishery operates in the tidal waters of northern Queensland, within the range of the Great Barrier Reef (GBR).

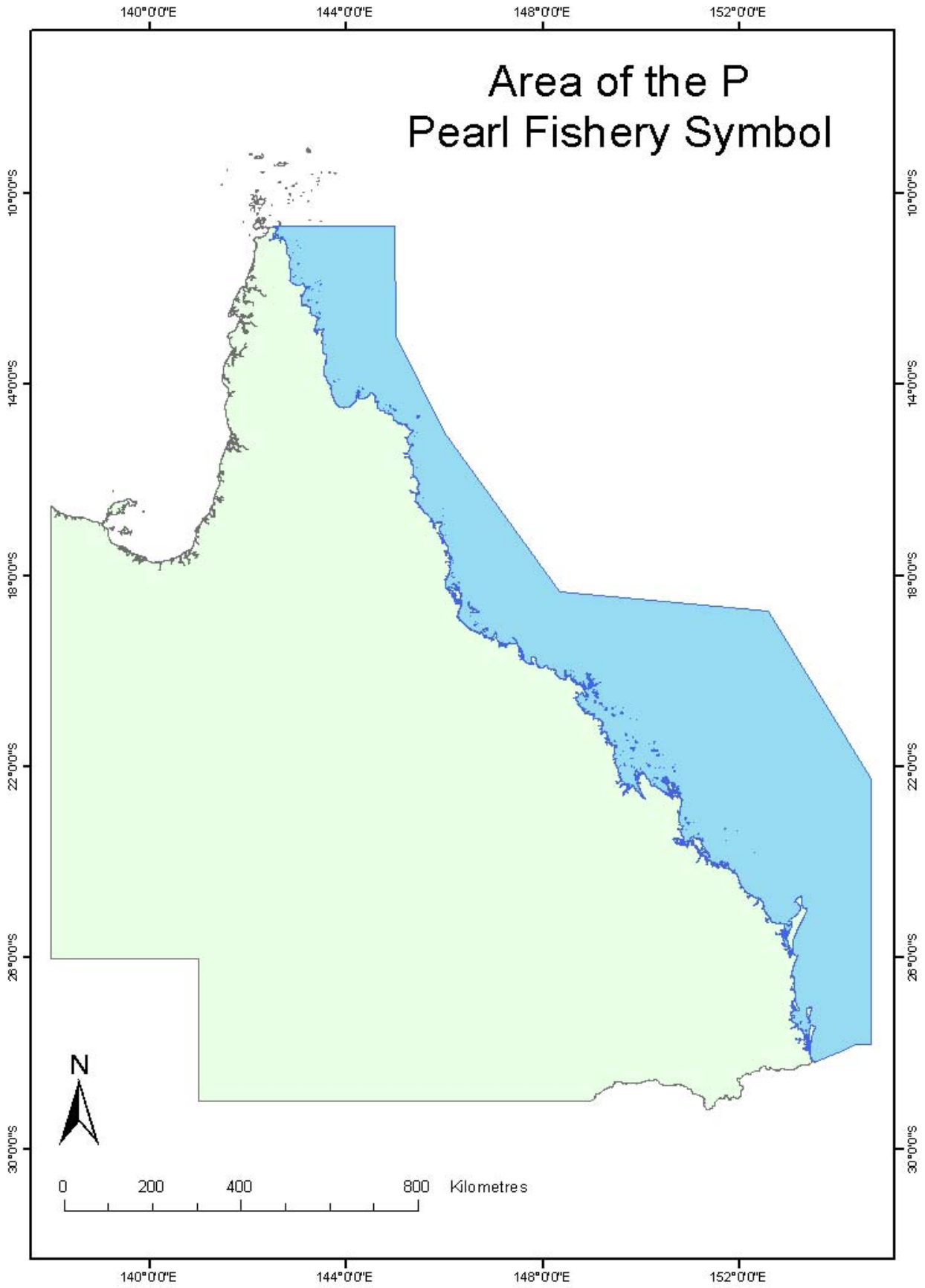

Figure 1. Map showing the area of Queensland's East Coast Pearl Oyster Fishery (ECPF)

FISHING METHODS AND APPARATUS

Commercial fishers

The ECPF is managed under the *Fisheries Regulations 1995*. Pearl collectors must hold an authority issued under the Fisheries Act. There are currently 4 active authority holders who may take live pearl oysters and sell them only to a licensed aquaculture operator. A further 1 authority exists but is currently unused. Minimum legal size limits apply to the fishery and are set at 9 cm for black-lipped pearl oyster and 13 cm for Gold-lipped pearl oyster. A Maximum legal size limit of 23cm also applies to the Gold-lipped pearl oyster.

Harvesting of pearl oyster is by hand or by using hand held implements. Underwater breathing apparatus (SCUBA) or hookah apparatus provides extended underwater time and increased mobility for harvesting; these methods are also permitted.

Most collecting occurs by visually searching for the pearl shell and collecting it by hand. Divers generally free dive at neap tide when visibility is best. Only a few boats specialise in collecting pearl shell, however lobster and trochus divers also occasionally collect shell.

Recreational fishers

Recreational fishers are permitted to collect pearl oysters by hand from Queensland waters. While there is no bag limit placed on any species of pearl oyster, Black lipped pearl oyster has a Minimum Legal Size (MLS) limit of 9 cm.

Indigenous fishers

Indigenous fishers collecting pearl oyster for subsistence purposes are exempt from all forms of regulations and restrictions such as the use of apparatus, area closures, minimum and maximum size limits and bag limits. The National Recreational and Indigenous Fishery Survey (Henry and Lyle, 2003) reported an estimated annual catch of “oysters” from Queensland indigenous communities of 34,615 individuals - pearl oysters were not separately reported and are very unlikely to be a significant component of this harvest. Pearl oysters generally are located at greater depths than other species of oysters and are therefore more difficult to harvest, being an unlikely target for many indigenous fishers.

Post Harvesting

Once the live shell is collected by divers, it is cleaned and graded. Unsuitable shells are returned to the water and suitable shells are transported to an aquaculture authority who places the pearl oyster in shell gardens in accessible near-shore areas. Those shells unsuitable for harvest account for only a small proportion of the total catch and are returned to the water in good condition. The shells do not spend much time out of the water and stress is believed to be minimal. There has been no evidence to suggest that there is any concern associated with returning the oysters after a short removal from the water.

All pearl oyster shells collected in the ECPF are translocated to aquaculture farms in Queensland and the Torres Strait for use in pearl production. Translocation of pearl oysters is not a large concern within this fishery as there are protocols in place to ensure only those pearl oysters free from disease are translocated on to aquaculture farms. Those shells that are harvested are transported in close proximity to where they were

collected to minimise both the genetic and health issues that can be asssociated with translocation.

Wild shells collected from the east coast account for only a small amount of the shells used for pearl production in Queensland. Most of the shells used for cultivation are largely obtained from hatchery spat which has been introduced onto farmed areas.

The production of cultured pearls includes seven procedures before the market product is reached. These include; the collection of wild pearl oysters, the transporation to pearl culture areas, artificial propagation of pearl oysters, implantation of nuclei, husbandry of pearl oysters, processing of pearls and the marketing of pearls (Ward, 1993). It is important to note that the ECPF is unlike traditional fisheries in that the pearl oysters collected from the wild are not killed immediately, but are relocated and allowed to continue spawning as they are used to produce pearls. It is standard practise for pearl oysters to go through 3 cycles of round pearl production and then be used in producing half pearls (Kerrod Beattie, DPI&F, pers comm, 2004). Once the pearl oyster has completed its production period, the shell is exported for use as Mother of Pearl in cosmetics, jewellery, paints and button making. The wild shells that are collected and placed in aquaculture facilities are held for several spawning seasons.

HISTORY OF THE FISHERY

The Queensland pearling industry was initially based on the collection of pearl oysters in the Torres Strait area in the 1860s. In 1871, an experimental underwater breathing apparatus was introduced and by the middle of the decade, dress-diving became common. Dress-diving required greater skills and consequently the status and financial reward for divers increased (Haysom, 2001). This led to an influx of people from other regions including Japan, Malaya, Philipines and Micronesia. In 1876, Japanese divers were recruited to the rich Torres Strait pearling grounds and within 15 years dominated the workforce (divers and diver-tenders) until the outbreak of the war in the Pacific in 1941. The success of the Japanese was not limited to the diving workforce but extended to the entrepreneurial ranks of the industry such as trading stores, boat building and repair slips.

Thursday Island, which became the capital of the Strait region in 1885, became the focal point for the Queensland pearling industry. Stock depletions were first reported in the mid-1880s (Ward, 1993).

Pearl diving was a hazardous occupation with substantial casualties. The ‘Darnley Deeps’ gained notoriety for the numbers of fatal casualties to divers. Divers encountered decompression sickness, shark attacks and the perils of tropical cyclones.

As with the history of many fisheries worldwide, the stocks of pearl shell progressively became depleted towards the close of the nineteenth century. The introduction of fisheries management measures, such as closed areas and minimum legal sizes, in 1891 was not sufficient to halt the decline. At this time however, the law gave the Queensland Government the power to regulate the activities of British-owned vessels but not those of the foreign fleet. Combined with market collapse, the industry floundered in the late 1930s. The second World War did provide some respite to the depleted pearl shell stocks.

Post-World War II, there was a move to employing indigenous islanders and indeed the main diving employment was the domain of Islanders and locals of Malayan descent.

However, the absence of Japanese, shortage of capital, pearl luggers and specialised equipment all led to a concentration on trochus harvesting instead.

Following the war, the development of plastics resulted in plastic buttons. This eliminated the international demand for Mother of Pearl (MOP) and trochus shells for buttons. However, the MOP fishery was able to recover by shifting to harvesting live shells for pearl culture. Between 1969 and 1971 the numbers of live *P. maxima* supplied to culture areas in Torres Strait fell from almost 400, 000 to less than 55, 000. Catch rates remined low throughout the 70s and early 80s until the recovery of wild stocks in Torres Strait began in the late 1980s. Collection along the east coast of Queensland has remained at low levels.

Between the late 1800s and World War II, pearling was, in terms of value and employment, the third-most important industry in northern Australia. The large fluctuations in annual catches reflected not only changes in standing stock and fishing effort, but variations in economic and social conditions (Ward, 1993). Catches of pearl oysters from Queensland and Torres Strait declined drastically after 1970 and collection has remained at low levels since this time (Ward, 1993).

FISHING EFFORT

The availability of catch and effort data for the ECPF is variable. Historic catch statistics are sparse and inconsistent, with data for many years either missing or incomplete. This data is therefore not useful for presentation in this assessment. The implementation of a compulsory daily logbook system in late 2002 has increased the availability of high quality catch and effort data on the fishery however this data is limited to a short time period and is therefore not appropriate for catch and effort analyses.

Since the late 1980s less than 5 operators have fished in the ECPF. Throughout this period catch and effort has remained at low levels with annual reported catch not exceeding 2 tonnes and annual reported effort not exceeding 76 days. As mentioned in the introduction, detailed fishery statistics are not available to be publicly presented as confidentiality agreements between QDPI&F and the fishing industry limit the publication of catch information when data relates to fewer than five fishing operations.

The other relevant current available on-going data on the fishery is provided through pearl culture industry stocking information provided to QDPI&F, however distinguishing the location where collection of wild pearl oyster shells took place (i.e., from the east coast of Queensland or from Torres Straits) is difficult as this information is not recorded by the aquaculture permits.

2. THE ENVIRONMENT LIKELY TO BE AFFECTED BY THE FISHERY

A proportion of the catch and effort of the fishery occurs within the Great Barrier Reef World Heritage Area, which places additional responsibilities on fisheries agencies to manage the area in respect to the world heritage values for which it has been listed. A process that has significant interrelationships with the Queensland ECPF is the implementation by the Great Barrier Reef Marine Park Authority (GBRMPA) of the Representative Area Program (RAP), a program that has been developed to protect the biodiversity of the GBRWHA. The RAP has incorporated significant input from a range of expertise and community based interest groups. A final revised zoning plan the *'Great Barrier Reef Marine Park Zoning Plan 2003'* has been implemented from 1 July 2004 and has resulted in significant increases to areas protected from all forms of fishing.

Harvesting in the fishery involves hand collection of pearl oyster specimens, which is a highly selective method of fishing. As a result this fishery produces no bycatch. Hand collection also limits the potential for impacts on any endangered, threatened or protected (ETP) species or on benthic marine fauna or flora. No interaction with endangered, threatened or protected species has been reported or is considered likely within the fishery, and therefore no formal assessment has been conducted. The only potential impacts are associated with small vessel operations generally such as boat strikes with ETP species or damage to the sea floor due to anchoring. The potential interaction of the ECPF with species of conservation interest is documented in criteria 2.2.1 and 2.2.5.

There are no threatened ecological communities (current, past or proposed) that appear to be affected by the pearl fishery (as addressed in Criteria 2.2.5). Beyond the removal of the pearl oyster species from the reef ecosystems, there is no evidence to suggest that there is an impact on other components of the benthic or pelagic communities in the area that the fishery operates. Broader ecosystem effects of the fishery are largely unknown at this stage.

3. MANAGEMENT ARRANGEMENTS FOR THE FISHERY

BASIS FOR CURRENT MANAGEMENT ARRANGEMENTS

Current management arrangements were introduced primarily to limit commercial fishing effort to allow pearl oysters to spawn once before entering the fishery. This attempts to prevent recruitment overfishing. Minimum legal sizes are based on the principle of allowing 50% of individuals of the species to reach first sexual maturity. Minimum legal size limits, if set high enough, allow a sufficient proportion of the egg production to be protected such that recruitment will be sustained, regardless of the level of fishing pressure on the fraction of the population that is larger than the size limit. That is, there will be sufficient breeding adults below the size limit to sustain recruitment even if all the animals larger than the size limit are harvested (Nash, 1993). Legal minimum size limits for the commercial fishery aim to assist in the protection of juvenile pearl oysters, improving their reproductive success by allowing individuals to spawn at least once before capture (King, 1995). The application of a minimum size limit also prevents the marketing of individuals considered too small and is related to preventing growth overfishing. Providing opportunity for individuals to spawn at least once before capture is aimed to prevent recruitment over fishing. In the ECPF, minimum size limits are set at 13 cm for the Gold-lipped pearl oyster and 9 cm for the Black-lipped pearl oyster.

As most pearl oysters are protandrous hermaphrodites (males becoming females), a maximum size limit has been put in place to protect the breeding stock of *P. maxima,* the main target species. *P. maxima* mature between 110-120 mm, which is between 3-4 years old, as they continue to grow the majority develop into females between 170-190 mm. An upper size limit of 23 cm applied to the gold-lipped pearl oyster ensures that a substantial amount of the female population will remain for reproductive purposes. It is important to recognise however, that an upper size limit is not only a means of protecting the breeding stock. Its also has a role in maintaining a high quality of marketable shell. This is because those animals larger than the upper size limit will sooner or later die from old age, disease or predation. The upper size limit will continue to protect larger, reproductive animals only if fishing mortality on the fraction of the population between the legal size range is light enough to allow an adequate proportion of the population to grow beyond the upper size limit (King, 1995). This management tool therefore, is useful from both an economic and a biological viewpoint.

Commercial catch is regulated through output controls. As stated above, the pearl oyster fishery is managed through minimum and maximum size limits. Fishing effort is managed via input controls. These include limiting the number of authorisations in the fishery to five, limiting collection methods to either diving or collection by hand and limiting the number of crew authorised to fish under an authority.

These measures aim to ensure pearl oysters are not over-harvested and that conservative management measures are precautionary in their approach, especially in situations where scientific information is lacking.

As most fishing for pearl oyster in Queensland waters takes place within the Great Barrier Reef Marine Park (GBRMP), the *Great Barrier Reef Marine Park Act 1975* (Commonwealth) significantly impacts on the fishery. 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. Spatial

closures within the area of the GBRMP limits commercial harvesting to specific regions and minimises impact of commercial fishing to certain recognised locations. The introduction of the Representative Areas Program (RAP) from July 2004 has increased the area of these zones to more than 35% of the GBRMP.

CURRENT MANAGEMENT ARRANGEMENTS

Commercial fishers

The harvesting of pearl oyster species along the east coast of Queensland is managed by DPI&F through licence conditions and management arrangements set out under the *Fisheries Act 1994* and the *Fisheries Regulation 1995*. At this time no formal management plan is in place for the fishery.

Commercial harvesting of pearl oyster is controlled by existing regulatory requirements and carries the fishery symbol P. The taking of pearl oyster must be by an authority holder or a person approved by the DPI must be present when taking pearl. There is currently 5 commercial fishing boat licences authorised to collect pearl oyster. Currently there are 4 pearl fishers in operation.

Harvest of pearl oyster is by hand or hand held non-mechanical implements only. Wading or free diving using a facemask and snorkel are permitted and commonly used in shallow waters. Underwater breathing apparatus (SCUBA and hookah gear) are permitted by commercial fishers and are required in deeper waters. Authority holders may sell live pearl oysters taken under the authority only to an aquaculture authority holder who may buy and cultivate live pearl oysters. An aquaculture authority holder is licenced under the *Fisheries Act 1994* and may only buy fisheries resources stated in the licence, cultivate the fisheries resources in the area stated in the licence and process and sell fisheries resources cultivated under the licence.

Minimum size limits apply to black-lipped pearl oyster and minimum and maximum size limits apply for gold-lipped pearl oyster. Black-lipped pearl oyster cannot be collected below the size of 9 cm. Gold-lipped pearl oyster smaller than 13 cm and larger than 23 cm may not be taken. The size of a pearl oyster is obtained by measuring from the edge of its butt or hinge to the opposite edge of its shell, whether or not the shell is broken or chipped.

A number of areas are also closed to all forms of fishing under Marine Parks legislation and include Marine National Park, Buffer, Scientific Research and Preservation zones. The area of these zones have increased to more than 35% of the Great Barrier Reef Marine Park (GBRMP) with the introduction of the revised GBRMP zoning from 1 July 2004. This allows for a minimum of 20% of each of the 70 known bioregions identified in the GBRMP during the rezoning process to be protected (GBRMPA, 2003). Limited collecting (not more than five individuals of a species) may be undertaken in Conservation Park Zones.

Recreational fishers

Recreational fishers are permitted to collect pearl oysters from Queensland waters. While there is no bag limit placed on any species of pearl oyster, Black lipped pearl oyster has a Minimum Legal Size (MLS) limit of 9 cm. Recreational fishers have access to stocks throughout the east coast, except designated areas prohibiting any form of fishing such as relevant general fisheries closures and various Marine Park zones.

Indigenous and traditional fishing

Pearl oysters taken recreationally by indigenous fishers are subject to the same controls and regulations as recreational fishers in general. That is, minimum size limits and Marine Park restrictions apply uniformly to all forms of recreational fishing. Pearl Oyster taken for customary or traditional purposes by indigenous fishers are exempt from all of the above regulations.

Compliance and Enforcement

The Queensland ECPF is small in terms of size, volume (number of species harvested) and commercial value in relation to other fisheries. Resources to undertake monitoring, assessment and compliance of the ECPF are allocated by QFS commensurate with the size of the fishery. A range of enforcement and compliance measures are in place in the ECPF. One aspect of compliance in the fishery concerns the compulsory return of daily logbook information.

For the ECPF, the daily logbook records must be returned to QFS within 14 days at the end of every month.

If a fisher does not return the logbook data, the following steps are followed:

- a reminder letter is sent requesting the logbook, and also reminding the fisher of the compulsory logbook requirement;
- approximately one month later a 'show cause' letter is sent. The letter again requests the logbook and also asks the fisher to show cause why the non-compliance should not result in suspension of the fisher's license for that fishery.
- if the logbook is still not forwarded, the fisher's licence for the fishery may be suspended until the logbook is provided.

The Fisheries Act 1994 provides QFS with extensive mechanisms that ensure it can respond in a timely manner to any threats to the sustainability of the fishery. These include the power to:

(a) declare a closed season, closed waters or closed species (section 43 of the Act);
(b) declare a quota for a fishery (section 44);
(c) make an emergency fisheries declaration (section 46) 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) 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);
(f) amend an authority (section 63); and
(g) suspend or cancel an authority (section 67) where it is necessary or desirable for the best management, use, development or protection of fisheries resources or fish habitats.

The Fisheries Act 1994 ('the Act') defines 'an offence against fisheries legislation prescribed under a regulation or Management Plan to be a serious fisheries offence'. In effect, the Act enables offence types common to many fisheries to be covered by regulation, and significant offences may be addressed within a management plan for that fishery. Section 108 of the *Fisheries Regulation 1995* establishes serious fisheries offences as:

- Forfeiture offences for which an inspector may seize fisheries resources in a heap (for example, fish in a processing establishment where, because of the quantity of fish, it is impracticable to count the fish of a particular species or type);
- Offences against fisheries regulation that involve:
  - contravening a closed season or closed-water declaration;
  - buying or selling fish;
  - obstructing, hindering or resisting an inspector; and
  - using or possessing illegal fishing apparatus.

A 'serious' offence can have several consequences. The most obvious is in the penalties applied to offenders. Magistrates have full discretion in setting penalties for fisheries offences up to a maximum level for each offence. If an offence is identified as 'serious', then it is likely that a higher-level fine would be applied.

The Queensland Boating and Fisheries Patrol (QBFP), a division of the QFS, undertakes compliance and enforcement activities for all Queensland's fisheries resources. Officers stationed at district offices along the Queensland east coast are involved in enforcement of the provisions of the *Fisheries Act* and the *Fisheries Regulations* described above.

Present compliance levels are encouraging with recent investigations revealing no major compliance issues within the ECTF. The only concern has been associated with logbook returns and reports as there have been delayed logbook returns when no fishing is occurring. This issue has been addressed through the above measures.

CHANGES TO MANAGEMENT ARRANGEMENTS

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 fishery issues is provided to DPI&F through the management advisory committee for harvest fisheries known as HarvestMAC. DPI&F's MAC process provides a consultative forum allowing all stakeholders to provide input into the management of particular fisheries.

HarvestMAC representatives often include a DPI appointed chair, manager, researcher, compliance officer, commercial fishers, recreational fishers, seafood marketer, conservation member, indigenous representative and a GBRMPA representative. There has been no recent participation by conservation or indigenous representatives although there is a standing invitation to participate. HarvestMAC reviews all issues arising from or of relevance to the fishery, including any impacts to target, bycatch or ETP species, or the broader marine environment generally. HarvestMAC advises DPI&F on any management actions required to ensure the fishery continues to operate within ecologically sustainable levels. Any available data is accessible to HarvestMAC to guide its reviews.

RELATED LEGISLATION IMPACTING ON THE EAST COAST PEARL FISHERY

The DPI&F ensures the appropriate management, use, development and protection of Queensland's fisheries resources through the preparation and implementation of regulations, management plans and declarations developed with regard to the principles of ecologically sustainable development (ESD).

The *Fisheries Act 1994* sets the direction for fisheries management while allowing for flexibility in management through subordinate legislation (Management Plans and Regulations) to deal with specific fishery management needs. The subordinate legislation for the ECPF is the *Fisheries Regulation* and its amendments. This plan provides for the sustainability of the species taken and the ecosystems upon which they depend.

The *Fisheries Regulation 1995* has legal status as subordinate Queensland fisheries legislation and material changes to the management regime require parliamentary approval. A management plan has not been developed for the ECPF. DPI&F manage the fishery in accordance with the *Fisheries Regulation 1995* described above.

A number of other Acts, both state and Commonwealth, also impact on the management of the ECPF. As highlighted in the introduction, for any fisheries with an export component the Commonwealth *EPBC Act 1999* requires state fisheries management agencies to demonstrate (through ecological assessment submissions) that the management regime complies with the objectives of ecologically sustainable development. Although the pearl oysters harvested in this fishery are not directly exported, the pearls produced from the operations of the aquaculture facilities are considered export products and as such the requirements of the *EPBC Act 1999* apply to this fishery.

The *Great Barrier Reef Marine Park Act 1975* (Commonwealth) and Regulations significantly impact on managing pearl oyster. The Act provides for the establishment, control, care and development of the Great Barrier Reef Marine Park (GBRMP) by the Great Barrier Reef Marine Park Authority (GBRMPA). The framework for planning and management of the multiple-use Marine Park is principally through zoning plans, which make provisions regarding the purposes for which each zone may be used or entered.

The GBRMP extends from latitude 10°41' in the north (Cape York) to latitude 24°30' in the south (Breaksea Spit) and covers waters from the coast east to beyond the outer edge of the Great Barrier Reef

The *Great Barrier Reef Marine Park Act* 1975 and Regulations apply to the GBRMP. Under the relevant zoning provisions, permits are required for collecting pearl oyster in General Use and Habitat Protection Zones. 'Limited collecting', as defined, is 'as-of-right' in Conservation Park Zones with defined bag limits. The Regulations list protected species and define 'collectable' species that can be taken.

The *Marine Parks Act 1982* (Queensland) and Marine Parks *Regulations 1990* apply to State Marine Parks with provisions complementary to the GBRMP 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.

DPI&F consults regularly with marine park management agencies to ensure that fisheries and marine park management planning arrangements are complementary and compatible.

The *Environment Protection and Biodiversity Conservation Act 1999* and *Regulation 2000* (Commonwealth) promotes the conservation of biodiversity by providing strong protection for listed species and communities in Commonwealth areas, cetaceans in Commonwealth waters and outside Australian waters; protected areas (World Heritage properties; Ramsar wetlands; Biosphere reserves; Commonwealth reserves; and conservation zones.

4. ENVIRONMENTAL ASSESSMENT OF THE FISHERY

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 that stock(s) will recover.

Objective 1. Fishery catch levels maintain ecologically viable stock levels within an acceptable level of probability

Information requirements

1.1.1 There is a reliable information collection system in place appropriate to the scale of the fishery. The level of data collection should be based upon an appropriate mix of fishery independent and dependent research and monitoring.

Fishery information collection systems

DPI&F has developed and maintains a range of data collection systems for providing up to date information on fish stocks, fish species taken and the level and distribution of fishing effort and fish catches. This information is used by managers to make decisions about maintaining sustainable harvests of principal species and ensuring provisions of the Queensland *Fisheries Act 1994* are met. It is also used by researchers in making scientific assessments about the status of these species and bycatch and by analysts monitoring and interpreting spatial and temporal changes and trends in fishing activity and catch levels.

The only data collection system currently in use for the ECTF is the daily *Commercial Fisheries Logbook Program (CFISH).*

Commercial Fisheries Logbook Program (CFISH)

A comprehensive compulsory daily logbook program for Queensland's commercial fisheries was introduced in 1988. Logbooks were introduced primarily as a performance and compliance tool for the fishery. Logbook entries are recorded daily and reported monthly. Prior to this, catch and effort data from specific elements of the fishery were collected as part of short to medium term research projects. The Commercial Fisheries Information System (CFISH) database was established to manage the large flow of data from fishers and provide access to fishery dependent data for fisheries research and management.

Fishery-dependent data

Mixed fishery logbooks previously collected pearl oyster catches from 1988 until 1992. A compulsory daily logbook relating specifically to pearl oyster was distributed in 2002 and is now the main source of fishery dependent data on the ECPF.

Logbook data

The current logsheet used for the pearl fishery is the PL01 (Appendix 1). The PL01 logsheet collects information per tender vessel on the harvest method (i.e. Hookah, free-diving etc); total daily hours fishing; harvest depth, number of oyster pearl catch, latitude, longitude, fishing grid and site and authority. This information is collected and entered into the CFISH system, allowing for the analysis of catch and effort in the fishery to help evaluate the effectiveness of management arrangements.

Fishery dependent data reliability

Fishery dependent data for the ECPF are, for the most part, the best currently available sources of fishery statistics. Logbook information is inherently reliant on the goodwill and honesty of the operator. Commercial operators in the fishery, however, are committed to ensure compliance with fisheries regulations (e.g., providing logbook information). New data from logbook returns are scrutinised for discrepancies or fisheries regulation breaches. The DPI&F Logbook Section investigates any discrepancies in commercial catch information provided by fishers to ensure data reliability when data are received. Enforcement officers from the Queensland Boating and Fisheries Patrol assist the verification process by follow-up investigating of abnormal catch and logbook entries when they undertake fishing vessel inspections during surveillance patrols.

Fishery-independent data

There is currently no fishery independent data available for this fishery.

Assessment

1.1.2 There is a robust assessment of the dynamics and status of the species/fishery and periodic review of the process and the data collected. Assessment should include a process to identify any reduction in biological diversity and /or reproductive capacity. Review should take place at regular intervals but at least every three years.

No formal stock assessments have been undertaken during the course of the fishery, but there is ongoing review of the catch rate within the fishery through the collection of logbook data. Detailed catch and effort data collected from compulsory daily logbooks is the main source of information used to continually monitor the fishery. Future stock assessments for the ECPF will be based on this catch data and will be dependent on the provision of accurate information collected on the fishery. On-going sustainability indicators for the fishery include monitoring annual CPUE and the relationship between catch and effort. Data validation following data entry is maintained for accurate analyses of catch and effort data and CPUE. With fishery specific logbooks only implemented in 2002, the information collected is insufficient to assess trends in catch or CPUE for this very small-scale fishery.

Summaries of fishing trends used as sustainability indicators, for example catch, effort and CPUE, and any other relevant information for the ECPF are provided to HarvestMAC regularly for consideration. If HarvestMAC notes any potential negative impacts, advice on the mitigating management responses is developed and presented to DPI&F for consideration.

1.1.3 The distribution and spatial structure of the stock(s) has been established and factored into management responses.

The main target species, *P. maxima* is naturally distributed across the central Indo-Pacific region from India to New Guinea and the Philippines and across northern Australia from Carnarvon in Western Australia to south of Cairns in Queensland. It naturally occurs in seagrass beds and on mud, sand or gravel substrates where these is a fast flowing current. The loose substrates contain fragments of shell and coral to which pearl oysters attach themselves. The major fishing grounds for *P. maxima* occur in Australia, between Exmouth Gulf on the west coast and Cairns on the east coast (Hund, 1954 cited in Ward 1993). *P. margaritifera*, the black-lipped pearl oyster, ranges from Baja California to the eastern Mediterranean and is also cultured for black pearls in other countries such as French Polynesia, the Cook Islands, Fiji and Okinawa. This species ranges through sheltered coastal waters in Queensland south to about Gladstone to the New South Wales Border. They have been collected by hand from banks of the intertidal zone or in shallows at low tide, however, are only found in low abundance.

There is little detailed scientific information on the current distribution and abundance of pearl oyster harvested in Queensland waters. No formal resource assessments have been performed and it is understood that logistical constraints, including time/money costs and scientific diving regulations, severly restrict the potential scope, intensity and repeatability of diving surveys (Ward, 1993). The unpredictable nature of pearl oyster recruitment, spatially and temporally, means that data obtained from such surveys are also quickly dated (Ward, 1993). It has however been noted that anthropogenic disturbances have reduced the distribution and abundance of pearl oysters in Queensland and Torres Strait. Over-fishing has probably been the primary agent, but pollution and demersal trawling have also been implicated (Ward, 1993). The need for protection of the pearl oyster resources of Queensland has been recognised by representatives of industry and government since the 1880s (Saville-Kent 1890; Bach 1955 as cited in Ward 1993).

A study into the genetic variation between populations of *P. maxima* found that there were substantial genetic differences between populations of this species around Australia. Samples were taken from pearling grounds in Western Australia, the Northern Territory and Torres Strait and the study found that the samples came from largely independent stocks (Johnson and Joll (1993) cited in Torres Strait Fisheries Assessment Group, 1999). Since this study was conducted, simpler methods of detecting variation at highly variable regions of DNA have become available and a study on pearl oyster genetics in Western Australia, Indonesia and the Northern Territory found large effective population sizes and extensive gene flow throughout *P. maxima* populations (Benzie and Smith, 2002). Despite strong patterns of isolation by distance, genetic differentiation of Western Australian populations was small or absent between population pairs (Benzie and Smith, 2002). While not directly relating to the eastern Queensland population of *P. maxima*, the Western Australian populations are most closely connected to the population in Northern Australia, and this study can be used as a reference in assessing the management implications of the pearl oyster populations within Queensland. This data indicates that there is no need to manage the stocks separately or to have concerns about genetic issues in moving stocks from one place to another (Benzie and Smith, 2002).

1.1.4 There are reliable estimates of all removals, including commercial (landings and discards), recreational and indigenous, from the fished stock. These estimates have been factored into stock assessments and target species catch levels.

Reliable estimates of all commercial removals are maintained in the CFISH database as detailed under Criteria 1.1.1. These provide accurate estimates of the number of individual animals that are retained by the operators. These estimates will provide the foundation of future stock assessments for this fishery. The fishery is a highly selective dive fishery that targets mainly *P. maxima* for use by an aquaculture authority. The product is caught by divers with the use of hookah gear or scuba diving equimpment. The species are captured live and most undersized species are released unharmed. Recreational and indigenous removals are currently unknown, however they are believed to be neglible. This fishery is unlike traditional fisheries in that pearl oysters collected from the wild are not killed immediately, but are relocated and allowed to continue spawning as they are used to produce pearls.

1.1.5 There is a sound estimate of the potential productivity of the fished stock/s and the proportion that could be harvested.

A stock assessment along the east coast of Queensland is currently not feasible due to the small scale of the fishery and the greater water depths along the east coast that restrict the use of independent dive surveys. Logistical constraints have also limited actions in conducting a formal assessment of the potential productivity of the fished stocks and the proportion that could be harvested. Considering the current low fishing effort within the ECPF and the increase in the use of hatchery spat for pearl production, there is no current proposal by DPI&F to conduct a formal fishery independent assessment along the east coast of Queensland.

Management responses

1.1.6 There are reference points (target and/or limit), that trigger management actions including a biological bottom line and/or a catch or effort upper limit beyond which the stock should not be taken.

DPI&F recognises that biological reference points provide important triggers for management intervention as they ensure stocks are not harvested beyond sustainable levels. However, accurate and reliable reference points require a sound knowledge of the population dynamics of the species being harvested; and regular updates on the current status of the stock, preferably including both fishery-dependent and independent information. Given the current low effort in the ECPF, such information is not collected for the species harvested and reference points have not been established

The patchy distribution and ‘boom-or-bust’ reproduction strategy of pearl oysters preclude accurate estimation of standing stock and harvest potential (Torres Strait Fisheries Assessment Group, 1999). Under these circumstances, size limits assume primary importance as a tool of management. Fishing quotas, which may serve as proxy reference points, will only be useful if they are estimated annually and applied to specific areas (Ward, 1993).

1.1.7 There are management strategies in place capable of controlling the level of take.

Precautionary management strategies are in place to restrict the level of take in the fishery. These consist of both output and input controls.

Output controls

Size Limits: A minimum size limit of 9 cm applies to the black lipped pearl oyster and minimum and maximum size regulations of 13 and 23 cm respectively apply for the gold lipped pearl oyster in the fishery.

Input controls

Gear restrictions: Gear restrictions are in place to limit the collection of pearl oyster. Pearl oyster is either collected by hand or by using hand held non-mechanical implements. Underwater breathing apparatus are also permitted for use by commercial fishers.

Area restrictions: A number of closed areas exist in the ECPF. The GBR has a number of zones closed to commercial fishing (including pearling) and these include Marine National Park, Buffer and Preservation Zones. The total closure area within the GBRMP will increase with the implementation of the Representative Areas Program from July 2004, aimed at protecting biodiversity in the GBR.

1.1.8 Fishing is conducted in a manner that does not threaten stocks of by-product species. (Guidelines 1.1.1 to 1.1.7 should be applied to by-product species to an appropriate level)

In practice, neither by-product nor bycatch are taken in the ECPF as all harvesting occurs by hand collection of selected specimens. Hand collection is a totally selective method of fishing as only those individuals specifically chosen for harvesting are collected.

1.1.9 The management response, considering uncertainties in the assessment and precautionary management actions, has a high chance of achieving the objective.

Precautionary management controls presently in place for the ECPF are providing for the fishery to be conducted in a way that maintains an ecologically viable stock within acceptable levels of probability. Although pearl oyster stocks are theoretically at risk from overexploitation, these risks are minimised to acceptable levels in the Queensland ECPF through management interventions, by the protection from fishing from reefs through general fishing closures, the GBR Marine Park Zoning arrangements and by the natural fishing patterns of the very limited number of authority holders. Wild stocks of pearl oyster are believed to not be at risk in the ECPF due to recruitment from broodstock in unfished locations (Beer, 2001) and because of the current limited fishing activity within the East Coast Pearl Fishery (ECPF). Considering low level of fishing activity in the ECPF, there is no current concern with overfishing.

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.

Management responses

1.2.1 A precautionary recovery strategy is in place specifying management actions, or staged management responses, which are linked to reference points. The recovery strategy should apply until the stock recovers, and should aim for recovery within a specific time period appropriate to the biology of the stock.

and

1.2.2 If the stock is estimated as being at or below the biological and / or effort bottom line, management responses such as a zero targeted catch, temporary fishery closure or a 'whole of fishery' effort or quota reduction are implemented.

DPI&F manages the ECPF in a sustainable manner with sufficient management measures in place. The fishery is managed primarily on minimum and maximum size limits to ensure the reproductive ability of pearl oyster is not jeopardized. Based on these limits, the low fishing effort along the east coast since the 1970s and the small number of authorities which can operate in the fishery, the DPI&F believes that the pearl oyster resources harvested in the ECPF are not at risk of overfishing under current levels of effort..

In the unlikely event that stocks are assessed as overfished, emergency fishery declarations to, at worst, close the fishery can be made under the *Fisheries Act 1994* and enforced by QBFP.

Principle 2

Fishing operations should be managed to minimise their impact on the structure, productivity, function and biological diversity of the ecosystem.

Objective 1. The fishery is conducted in a manner that does not threaten bycatch species.

Information requirements

2.1.1 Reliable information, appropriate to the scale of the fishery, is collected on the composition and abundance of bycatch.

The ECPF is a highly selective dive fishery using prescribed gear and as such there is no bycatch taken by commercial operators.

Assessments

2.1.2 There is a risk analysis of the bycatch with respect to its vulnerability to fishing.

Management responses

2.1.3 Measures are in place to avoid capture and mortality of bycatch species unless it is determined that the level of catch is sustainable (except in relation to endangered, threatened or protected species). Steps must be taken to develop suitable technology if none is available.

2.1.4 An indicator group of bycatch species is monitored.

2.1.5 There are decision rules that trigger additional management measures when there are significant perturbations in the indicator species numbers.

2.1.6 The management response, considering uncertainties in the assessment and precautionary management actions, has a high chance of achieving the objective.

Given the absence of bycatch associated with this fishery criteria 2.1.2 to 2.1.6 are assessed together.

In the ECPF, hand collection is the only harvesting method permitted. Hand collection is a totally selective method of fishing as only those individuals specifically chosen for harvesting are collected. As such, there are no threat abatements plans, recovery plans or bycatch reduction strategies applicable to the fishery.

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

2.2.1 Reliable information is collected on the interaction with endangered, threatened or protected species and threatened ecological communities.

The ECPF has no reported interaction with endangered, threatened or protected species. The fishery operates in regions where marine turtles and dugongs are present, however Queensland and Commonwealth legislation prevents the taking of turtles and dugongs in the course of any fishing other than traditional fishing. Therefore while these species may be frequently seen within the area of the ECPF they are protected from non-traditional fishing. Interactions with these species could occur during regular vessel transit through the fishery area.

No threatened ecological communities have been identified within the area of the fishery.

Assessments and Management responses

2.2.2 There is an assessment of the impact of the fishery on endangered, threatened or protected species.

and

2.2.4 There are measures in place to avoid capture and/or mortality of endangered, threatened or protected species.

As mentioned above, no reports of interactions with ETP species have been reported. Indeed, no interactions are expected during the harvesting activity given that hand collection is the only permitted method of harvesting.

Highlighting the low impacts emanating from this fishery, a recent assessment by the Australian Marine Conservation Society (AMCS) rated hand collection dive fisheries such as the ECPF Fishery as the equal most prefered fishery type. The assessment undertook a comparitive analysis of the actual and potential environmental impacts arising from Australia's most widely used commercial fishing gears and methods. The potential impacts both to wildlife and on habitats were rated as low (www.amcs.org.au).

The only potential impacts to ETP species arising from the fishery is through interactions with the vessels used. The fishery does operate in regions where marine turtles and dugongs are present, with some areas designated protection zones. Therefore while these animals may be frequently seen during the course of fishing, interactions with these species is unlikely and only would occur during vessel transit through the fishery area.

2.2.3 There is an assessment of the impact of the fishery on threatened ecological communities

and

2.2.5 There are measures in place to avoid impact on threatened ecological communities.

No threatened ecological communities have been identified in the area of the fishery and interactions that impact on endangered, threatened or protected species are considered remote in this hand collection fishery. Therefore an assessment has not been undertaken and management measures have not been developed. If there are indications that interactions do occur, assessment will be undertaken as appropriate.

2.2.6 The management response, considering uncertainties in the assessment and precautionary management actions, has a high chance of achieving the objective.

The information detailed for criteria 2.2.1 to 2.2.5 indicate that there are minimal impacts to ETP species and no impacts on ecologically threatened communities. There is a high probability of Objective 2 being achieved.

Objective 3. The fishery is conducted, in a manner that minimises the impact of fishing perations on the ecosystem generally.

Information requirements

2.3.1 Information appropriate for the analysis in 2.3.2 is collated and/or collected covering the fisheries impact on the ecosystem and environment generally.

and

Assessment

2.3.2 Information is collected and a risk analysis, appropriate to the scale of the fishery and its potential impacts, is conducted into the susceptibility of each of the following ecosystem components to the fishery.

1. Impacts on ecological communities

- **Benthic communities**
- **Ecologically related, associated or dependent species**
- **Water column communities**

2. Impacts on food chains

- **Structure**
- **Productivity/flows**

Impacts on ecological communities

As the fishery operates by hand collection it is highly selective to the target pearl oyster species and has no direct impact on associated or dependent species. Accordingly, the primary potential impact to the environment arising from this fishery appears to be the

removal of the target species from associated food webs. The scale of the impact has not been assessed however it is considered to be minimal given the recent low catch levels and considering the food webs of the species which prey on pearl oyster. Species such as marine snails, starfish, octopus, crabs and stingrays have been identifed as pedators (Torres Strait Fisheries Assessment Group, 1999). These species are not specialists but rather species that opportunistically feed on a wide range of species.

3. Impacts on the physical environment

- **Physical habitat**
- **Water quality**

Physical habitat

While it is recognised that divers in hand collection fisheries are likely to have some contact with the benthos, the level of contact and impact is minimal. The main impact on benthic ecological communities is through anchor damage from the vessels that operate in the fishery. The level of impact arising from the boats must be considered in the context of the considerable level of boating that occurs along the east coast as a result of of commercial and recreational fishing, tourism and other commercial shipping generally. In addition, any anchor impact arising from the vessels in the fishery are negligible in comparison to the damage caused by a range of naturally occurring phenomena such as extreme weather conditions.

Water quality

Water quality is unlikely to be affected by the fishery due to the low number of participants, the unlikely concentration of potential impact sources, and the vast area of the ECPF operation.

The only main concern to water quality would be poorly maintained vessels and the leaking of mechanical fluids and fuels, however no such problems have been noted. Given that the success of the fishing operations depends on the vessels reliability it is highly unlikely that the operators would allow maintenance to lapse. The *Transport Operations (Marine Pollution) Act 1995* 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 can be inspected both wharfside and at sea for their compliance and sea worthiness.

Due to the types of fishing gear used in the ECPF, it is not considered that the fishery has a significant physical impact on the environment. Should any change in the ecosystem or any of its components be identified, DPI&F would undertake a review of the fishery and its operations to determine any possible cause and identify any methods of rectification or future avoidance.

Management responses

2.3.3 Management actions are in place to ensure significant damage to ecosystems does not arise from the impacts described in 2.3.1.

And

2.3.4 There are decision rules that trigger further management responses when monitoring detects impacts on selected ecosystem indicators beyond a predetermined level, or where action is indicated by application of the precautionary approach.

And

2.3.5 The management response, considering uncertainties in the assessment and precautionary management actions, has a high chance of achieving the objective

No specific management responses have been developed, as the components of the marine environment described under Guideline 2.3.1 are not considered to be significantly impacted by the fishery. Should the need arise, appropriate management measures will be considered by the relevant advisory groups and where necessary, implemented by DPI&F.

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APPENDICES

APPENDIX 1. LOGBOOK AND INSTRUCTION PAGES FOR THE EAST COAST PEARL FISHERY

Queensland Government
Queensland Fisheries Service

Queensland Pearl Fishery Logbook (PL01)

Log No.		Page No.	

Masters Name		Master Fishers Number	
Boat Name		Boat Mark	

Boat activity codes:
0-Fishing 1-Bad weather
2-In Port 3-Broken down
4-Steaming 5-Other
1 0-Refit 12-Other Fishery

If not fishing for an extended period please specify:

No Pearl shell was taken between ….. / ….. / ….. and ….. / ….. / …..

BOAT ACTIVITY CODE …….

Date	↓	Location		Effort		Method	Numbers of Live Shell		
		Grid & Site **or** Recognised Reef Name or **Latitude & longitude**	**Depth (m)**	**No. Divers**	**Total Diver Hours**	**F**ree Dive **H**ookah **S**cuba	**Gold Lip** *P. maxima*	**Black Lip** *P. margaritifera*	**OTHER** ……..

Declaration: I declare that the above information is true and correct.

Signature_____ Date_____

REQUIREMENTS FOR SUBMISSION OF LOGBOOKS

DIRECTION TO KEEP AND GIVE LOGBOOK RETURNS

Background

Under Section 118 of the *Fisheries Act 1994* (the Act) a person must, if required under a regulation or management plan –

a) Keep the records, documents or other information about fisheries required by the Chief Executive in the way and form and as directed by the Chief Executive; and

b) Give them to the Chief Executive as the Chief Executive requires.

Under Section 109(1)(b) of the *Fisheries Regulation 1995* (the Regulation) all holders of primary commercial fishing boat licences and holders of authorities to take, possess or sell fish must keep and give statistical returns to the Chief Executive as required by the Chief Executive.

Delegation

I advise that I hold a delegation under Section 118 of the Act given to me by the Chief Executive.

Direction

Holders of a Queensland primary commercial fishing boat licence are directed to immediately obtain a logbook specific to the fishing activities conducted under the relevant primary commercial fishing boat licence from the Department if not already held, and immediately commence to:

1. Use the logbook if you are the commercial fisher operating the boat, or make the logbook available to the commercial fisher in charge of the boat;

2. Keep the logbook (or ensure that the logbook is kept) in accordance with the instructions contained in the logbook and any written instructions the Chief Executive may, from time to time provide. The instructions in the logbook explain how to use the logbook and how to prior report the landing of product if required under the Fisheries Management Plan relevant to that fishery. I further advise you that wherever these instructions in the logbook refer to the 'QFMA' or the 'Authority', such references should be taken to be to the Chief Executive; and

3. Give the completed logbook (or ensure that the completed logbook is given) to the Chief Executive in accordance with the instructions contained in the logbook. In particular this instruction requires that the completed logbook returns be forwarded to the Chief Executive within a specified time period after the fishing to which they relate has occurred.

I further direct all holders of an authority to take, possess or sell fish (commercial fisher licence holders) in charge of a boat to:

1. Ensure that a logbook specific to the fishing activity to be undertaken under the relevant primary commercial fishing boat licence is available to be completed before commencing fishing activities. If the owner of the boat is unable to make a logbook available, it is advised that you contact the Department directly to obtain a logbook before commencing fishing activities. Any logbook obtained from the Department must remain on the boat that it was issued to.

Please note that under Section 118 of the Act, a person who fails to comply with an obligation to keep and give the logbook or other information about fisheries required by the Chief Executive is liable to prosecution for an offence against the Act (maximum penalty 500 penalty units).

(Sgd) Peter Neville

Peter Neville
Delegate for the
Chief Executive

INSTRUCTIONS FOR USE

LOGBOOKS MUST BE COMPLETED AT THE END OF EACH DAY AND ARE TO BE RETURNED TO THE LOGBOOK SECTION WITHIN 15 DAYS OF THE END OF EACH MONTH

This logbook is designed to collect information for management and research about any **PEARL FISHING** you undertake on the Queensland East Coast. If participating in another fishery at any time, you must use the logbook specific to that fishery. All days during the year must be accounted for in a Queensland fishery logbook. This includes days when no fishing has taken place using your Queensland primary commercial fishing boat licence.

Logsheets are to be sent to: **Queensland Fisheries Service**
Logbook Section
GPO Box 2764
BRISBANE Q 4001

Logsheets must be forwarded so as to reach the logbook section not later than 15 days after the end of the month to which they relate.

SHOULD YOU HAVE ANY QUERIES ABOUT THE LOGBOOK PROGRAM OR ABOUT USING THE LOGBOOK PLEASE PHONE ON (07) 3227 6707.

FILLING IN THE LOG FORM

Catch and effort data must be completed on the log form at the end of each day so that the information is as accurate and up to date as possible. It is important to note that should the information not be recorded every day as required, appropriate enforcement action may be taken by a fisheries inspector who has the power under the Fisheries Act 1994 to inspect the logbook.

A separate line must be completed for **each day**. The **activity codes** and **fishing method codes** provided should be used to indicate the activity in which you were involved on each day.

If you were not fishing for an extended period, such as a week, you must provide the information in the box on the top right hand side of the form.

POSITION REPORTING

The fishing location is to be recorded as the position of greatest daily catch. This is to be given either as:

1. **A recognised reef name**, or as
2. **latitude and longitude**, or as
3. **Grid and Site.**

If you searched or fished without catch on the day, please record the recognised reef name (or latitude and longitude or grid and site) searched with a boat activity code of 0 and a catch of zero.

REPORTING EFFORT

Effort is to be recorded as the **number of divers** and the **total diver hours**. For example 4 divers fishing for 5 hours equals 20 total diver hours.

REPORTING CATCH

An estimate of your **daily catch weight by species** is to be recorded in the appropriate column. If the species is not shown on the logsheet then please use one of the columns to record the name of the species and the estimated daily catch weight.