

Ecological assessment of Queensland's Marine Specimen Shell Collection Fishery

A report to the Australian Government Department of the Environment and Heritage on the ecologically sustainable management of a small scale, highly selective hand and shell dredge collection fishery



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ACRONYMS

Act	<i>Fisheries Act 1994</i> (Queensland)
CFISH	Commercial Fisheries Information System
DEH	Australian Government Department of the Environment and Heritage
DPI&F	Department of Primary Industries and Fisheries, Queensland
EPA/QPWS	Environmental Protection Agency / Queensland Parks and Wildlife Service
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act</i> (Commonwealth)
ETP	Endangered, threatened and protected (species)
GBRMPA	Great Barrier Reef Marine Park Authority
OCS	Offshore Constitutional Settlement
QBFP	Queensland Boating and Fisheries Patrol (part of DPI&F)
QFMA	Queensland Fisheries Management Authority (now part of DPI&F)
Regulations	<i>Fisheries Regulation 1995</i> (Queensland)
RFISH	Recreational Fishing Information System

INTRODUCTION

The Department of Primary Industries and Fisheries, Queensland (DPI&F) Fisheries Group has prepared this report for the Australian Government Department of the Environment and Heritage (DEH) for assessment under Commonwealth Guidelines for Ecologically Sustainable Management of Fisheries, to meet the requirements of Parts 13 and 13A of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

DPI&F has prepared this ecological assessment with the assistance of stakeholders in the fishery. Broadly, the document comprises two parts:

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

1. DESCRIPTION OF THE FISHERY AND MANAGEMENT ARRANGEMENTS

COLLECTION METHODS AND MANAGEMENT ARRANGEMENTS

Under Offshore Constitutional Settlement (OCS) arrangements between the Commonwealth and Queensland governments, management of the collection of shelled molluscs throughout most of the Australian Fishing Zone adjacent to the east coast of Queensland falls under Queensland law. The Department of Primary Industries and Fishery (DPI&F), is responsible for the day-to-day management of Queensland's fisheries resources.

DPI&F administers the collection of marine molluscs under the *Fisheries Act 1994* (the Act) and associated *Fisheries Regulation 1995* (the Regulations). The Act 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."

The Queensland Marine Specimen Shell Fishery is based on the hand collection and use of shell dredges to collect a broad range of animals from the phylum Mollusca for the purpose of display, collection, classification, increasing scientific knowledge and sale. Specimen shells may be alive or dead at the time of collection and include beach-washed shells. The collection of certain species is prohibited (the helmet shell *Cassis cornuta*, giant triton or trumpet shell *Charonia tritonis* and giant clams, family Tridacnidae) and the collection of fossilised shells is managed under other legislation. Specimen shells taken by trawl may not be retained under the Fisheries (East Coast Trawl) Management Plan 1999.

The taking of specimen shells may be broadly classified as either commercial, recreational (including bona fide collectors) or scientific collecting. Recreational collectors may not collect in waters closed to shell collecting under Queensland Fisheries or Marine Parks legislation and are able to have in possession no more than 50 shelled molluscs. Taking of protected species is prohibited. No quantitative information is available on the level of recreational shell collection in Queensland and it is not discussed further in this document.

Some information is available on the indigenous harvesting of shells for food from the recent National Recreational and Indigenous Fishing Survey (Henry and Lyle, 2003) but there is no information on any indigenous take of specimen shells.

The commercial collection of broken remnants of molluscs can be by hand or hand held non-mechanical implements; or if stated in the authority mechanical equipment. For whole molluscs, commercial collection can be undertaken by hand, without using digging or sieving implements; or if stated on the authority, shell dredges as defined in the Fisheries Regulations Schedule 2 Division 4 (ie., mouth width not greater than 1.2m with teeth or prongs not greater than 75mm).

DPI&F aims:

- (a) to establish specific management arrangements for the harvest of species of commercially and recreationally collected molluscs in waters of Queensland; and
- (b) to ensure that the harvesting of molluscs from Queensland waters is carried out in accordance with the principles of Ecologically Sustainable Development (ESD), that harvesting is undertaken in a manner that does not jeopardise the conservation of any harvested species of mollusc or adversely impact on the ecosystem in which these species occur.

Management objectives are to:

- (a) identify species of conservation concern;
- (b) encourage research, on a priority basis, into the distribution and population dynamics of mollusc species relevant to their harvest levels /conservation status;
- (c) monitor the current impact levels through detailed collection returns from commercial operators.
- (d) conduct an annual review of existing legislation, permit conditions and closures;
- (f) identify and implement sustainable harvest limits for species identified as vulnerable; and
- (g) maintain consultative mechanisms with other management agencies in terms of their requirements (GBRMPA, EPA/QPWS), and consult with interested industry and public groups regarding their needs for the industry.

Management Advisory Committees (MAC) provide advice to the DPI&F on fisheries management arrangements and plans and administration of aspects of the *Fisheries Act 1994*. The MAC (HarvestMAC) advising the DPI&F on the specimen shell collection fishery includes representatives with a range of expertise and representing broad community interest (commercial and recreational fishers, conservation groups and agencies, fisheries managers and scientists).

Authorities are issued under Section 40 of the Act to take shells for trade or commerce. Separately, specific endorsements may be added to a Boat Licence under Section 31 of the *Fisheries Regulation 1995* to authorise the commercial collection of marine shells

There are currently five (5) commercial marine specimen shell fishery authority holders, and two (2) vessel licences with a similar authorisation in Queensland. Shell collection can occur along the entire coast of Queensland, however the majority of commercial collection occurs in northern coastal and reef waters. Commercial collecting occurs throughout the year.

Marine shells may also be taken for scientific research purposes and for *bone fide* shell collections under a permit issued under Section 35(2) and 37(b) of the Regulations by the DPI&F. Three (3) research permits are current as at April 2004.

The DPI&F liaises with the Environmental Protection Agency / Queensland Parks and Wildlife Service (EPA/QPWS) and the Great Barrier Reef Marine Park Authority (GBRMPA) in administering harvesting activities within Queensland jurisdictional waters. Officers from these agencies are representatives on HarvestMAC (the advisory committee to DPI&F for this fishery) and form part of the consultation process in dealing with issues such as enforcement that arise in this fishery.

GBRMPA allows the collection by hand or by a hand held implement or holding in possession of not more than 5 shells of any one species (except *Cassis cornuta* - helmet shell and *Charonia tritonis* - giant triton or trumpet shell) in any period of 28 days within several zones of the Great Barrier Reef Marine Park without permit. Under Queensland legislation, recreational collectors are able to have in possession no more than 50 shelled molluscs.

Whether for export or the domestic market, exchange or sale of shells between countries is ongoing and to date there has been limited regulation of collecting activities. The suitability of the Queensland coastline to supply the market in an ecologically sustainable manner with marine shells is also recognised and therefore the need to ensure that appropriate collecting guidelines are in place for the industry is imperative. DPI&F believes that the management regime in place for this limited, small fishery together with the generally widespread distribution of many of the target species ensures ecological sustainability.

LOCATION AND EXTENT OF THE FISHERY

This is a very small fishery which operates along the entire Queensland east coast in areas not closed by general fisheries closures or Marine Parks zoning. Locations fished between 1997 and 2003 are shown in Figure 1. The seven (7) commercial and three (3) research collectors are limited to taking no more than 10 of any taxon live in any year and having no more than 50 dead and live shells in total in possession, unless specified on the authority or permit.

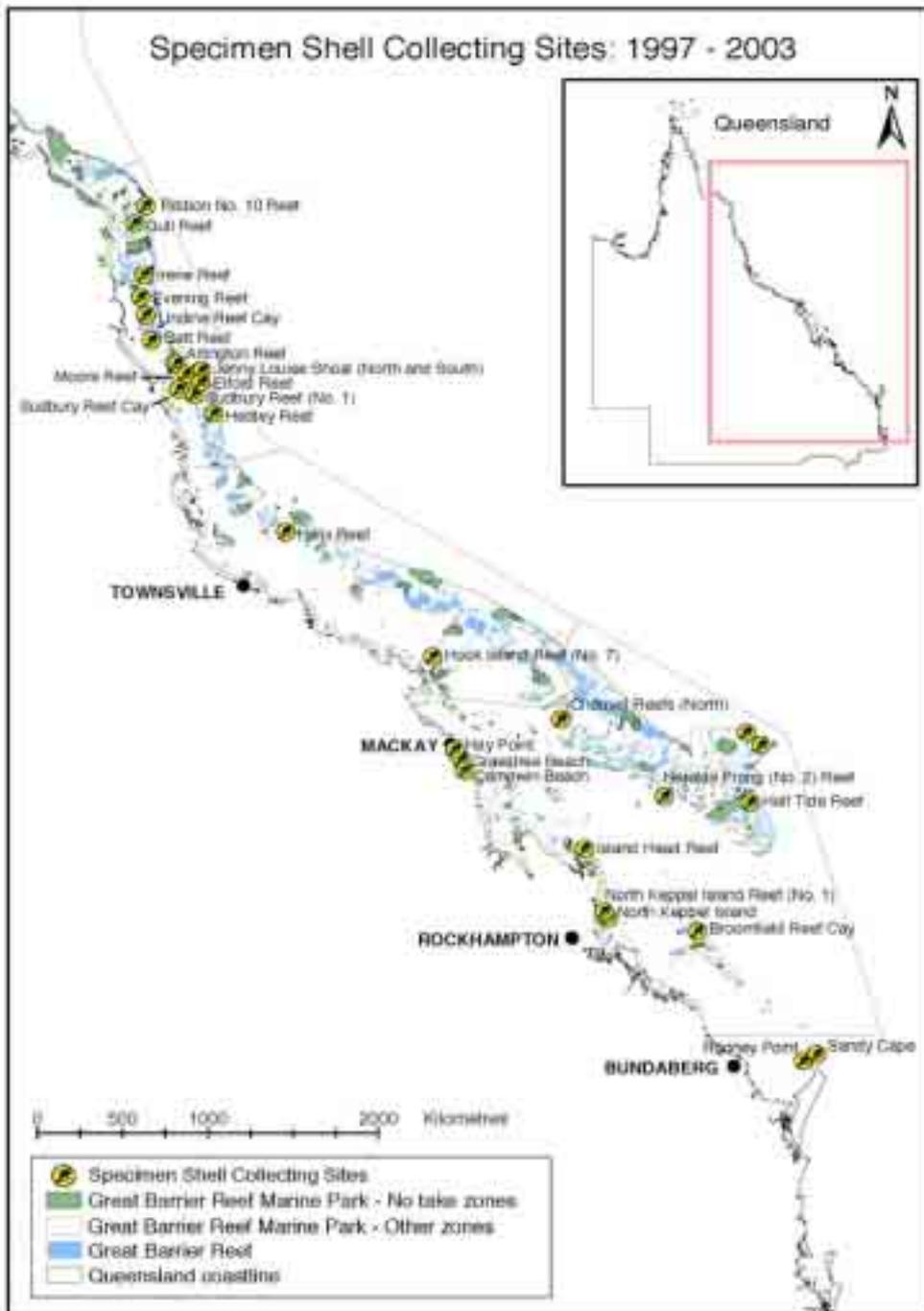


Figure 1. Commercial specimen shell collecting sites, 1997 – 2003

SPECIMENS AND SPECIES HARVESTED

Australia has approximately 19,000 species of marine, land and freshwater molluscs (Beesley *et al.* 1998). Many of the marine molluscs found in Australian waters are not collected, traded or are very common. Queensland fisheries management effort focuses on monitoring collection of those species that warrant particular attention, such as the endemic, rare or most commonly traded species.

The names of molluscs used in this document and in the harvesting operation follows the 'Compendium of Seashells' (Abbott and Dance 1990). Species collected by commercial and recreational shell collectors include volutes (family Volutidae) and baler shells (*Melo* spp.). This fishery and hence this document does not relate to oysters (Ostreidae), trochus shell (*Trochus niloticus*), pearl oysters (Pteriidae), squid, cuttlefish, octopus (coleoid cephalopods) and scallops (*Amusium* spp.), which are administered under separate arrangements. Scallops are managed under the Fisheries (East Coast Trawl) Management Plan 1999. Trochus and Pearl Oysters are separately managed harvest fisheries which are being reported on separately to DEH.

During 2002/03, the harvest of 240 live shells and 818 dead shells was reported by three active collectors from eight reefs/locations. The remaining collectors reported no collecting during the financial year. More than ten specimens of only 29 species were harvested, from a total of 98 taxa (Table 1). Many of the shells collected do not have common names and are listed by their scientific names. This is also how the shells are generally marketed.

Table 1 Specimen shells reported by commercial collectors and researchers during 2002-2003 (sorted by abundance). Source : DPI&F CFISH logbooks, April 2004.

Species / taxon	Live	Dead	Total
STROMBUS LUHUANUS		150	150
ACORN DOG WHELK	2	113	115
LAMBIS LAMBIS	1	52	53
PHILIPPIA RADIATA		50	50
TEREBRA MACULATA	5	34	39
CYPRAEA TIGRIS	1	35	36
CONUS PLANORBIS		35	35
SYRINX ARUANUS	1	32	33
MELO AMPHORA		30	30
VEXILLUM VELESIANA		28	28
CONUS SPECTRUM	2	21	23
STROMBUS VARIABILIS		19	19
CYPRAEA ERRONES	10	6	16
BANDED CREEPER		14	14
TEREBRA GUTTATA	4	10	14
CONUS STRIATUS	1	12	13
CONUS VEXILLUM		12	12
CYPRAEA ARABICA		12	12
MUREX BRUNNEUS		12	12
CONUS MILES	10		10
CONUS TESSULATUS	10		10
CONUS TEXTILE	4	6	10
CYPRAEA CAURICA	10		10
MALEA POMUM	10		10
STROMBUS DILATATUS	10		10
STROMBUS GIBBERULUS	10		10
TEREBELLUM TEREPELLUM	10		10
TEREBRA AREOLATA	10		10
TEREBRA-UNSPEC	10		10
OLIVA MINIACEA	6	3	9
STROMB - UNSPECIFIED	9		9
VOLUTE RUTILA		9	9
CONUS GEOGRAPHUS		8	8
CONUS MARMOREUS		8	8
CONUS OMARIA	8		8
GIANT SPIDER SHELL		8	8
OLIVE SHELL - UNSPECIFIED	8		8
POLINICES MAMMATUS	8		8
PUPA NITIDULA	8		8
TEREBRA CERITHINA	8		8
VOLUTE MACULATA		8	8
MITRA MITRA	2	5	7
CONUS EBRAEUS		6	6
CONUS LITTERATUS		6	6
STROMBUS VOMER	6		6
TEREBRA BERNARDI		6	6
TEREBRA CHLORATA	6		6
VEXILLUM POLYGONUM	6		6
VOLUTE PERISTICTA	6		6
FRAGUM FRAGUM		5	5
OVULA OVUM		5	5
CASSIS BANDATUM		4	4
CONUS EBURNEUS	4		4
CONUS TEREBRA		4	4
CYPRAEA HELVOLA	1	3	4
CYPRAEA LYNX	1	3	4
NATICA ONCA	4		4

CONUS FRIGIDUS	3		3
CONUS SUTURATUS	3		3
CYPRAEA MAURITIANA	3		3
NATICA SEYCHELLUM		3	3
VEXILLUM EXASPERATUM	3		3
ANCILLA VELESIANA		2	2
CODAKIA TIGRINA		2	2
CYLICHNA ARACHIS		2	2
CYPRAEA CRIBRARIA	1	1	2
CYPRAEA EGLANTINA		2	2
DIODORA OCTOGONA	2		2
FOOLS COWRY	1	1	2
HARP SHELL - UNSPECIFIED	2		2
LITTORARIA SCABRA		2	2
MITRA VARIABILIS		2	2
MUREX AKRITOS	2		2
NASSARIUS COMPTUS		2	2
PATELLOIDA SACCHARIN		2	2
PECTEN SINGAPORINA		2	2
PHOS SENTICOSUS	2		2
RHINOCLAVIS BRETTINHAMI	2		2
STROMBUS BULLA		2	2
STROMBUS CAMPBELLI	1	1	2
TEREBRA SUCCINCTA		2	2
THAIS ECHINATA		2	2
TUDICULA ARMIGERA		2	2
CARDIUM REEVEANUM		1	1
CARDIUM SP.		1	1
CYPRAEA ARGUS		1	1
CYPRAEA SUBVIRIDIS		1	1
EPITONIUM - UNSPECIFIED		1	1
HALIOTIS VARIA		1	1
LAMBIS SCORPIUS		1	1
MUREX TERRITUS		1	1
PECTEN CURTISIANA	1		1
SAGINAFUSUS PRICEI	1		1
STROMBUS VITTATUS		1	1
TELLINA PHARAONIS	1		1
TONNA CEPA		1	1
TONNA SULCOSA		1	1
VOLUTE ZEBRA		1	1
	Live	Dead	Total
GRAND TOTAL	240	818	1058

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 Specimen Shell Collection Fishery 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 revised zoning plan including increased areas to be closed to fishing and other extractive activities was implemented from 1 July 2004.

Harvesting in the fishery involves hand collection or use of small shell dredges to take shelled molluscs, which is a highly selective method of fishing. As a result this fishery produces no bycatch. The predominant hand collection method 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 Specimen Shell Collection Fishery 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 within the fishery area (as addressed in Criteria 2.2.5). Beyond the removal of the shell 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 but considered to be insignificant, given the level of collecting activity over such a vast area.

3. 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 Dependent Information

Fishers are required as a condition of their commercial marine specimen shell fishery authority, boat licence or permit administered by DPI&F to complete and return monthly logs of collection operations (Appendix 2). The logbooks must be completed for each day that collecting takes place and includes; catch (numbers, species and alive or dead); effort (fishing time); and fishing locations (beach or reef name). As a variety of marine shells are collected, operators record the common and scientific names of all species collected in the logbooks.

The logbook data provides valuable catch and effort information necessary for any future resource assessments. The level and reliability of information is considered appropriate given the size and extent of the fishery. Submission of monthly returns also provides opportunity for DPI&F to follow-up to the collector should any questions arise relating to identification or other issues from the data submitted.

An annual review of the catch of important species and effort in major areas is undertaken in consultation with the HarvestMAC to give a general indication of the status or harvested species. It has not been possible to undertake species specific population assessment for this fishery because of the very low catch rates and broad spatial and temporal distribution of fishing effort in the commercial fishery.

Compliance, enforcement and monitoring

The Queensland Boating and Fisheries Patrol (QBFP) of the DPI&F is responsible for the enforcement of the Queensland marine specimen shell fishery. The Queensland Marine Specimen Shell fishery is small in terms of size, volume (number of specimens collected) and commercial value in relation to other fisheries. Resources to undertake monitoring, assessment and compliance of the specimen shell fishery are allocated by DPI&F commensurate with the size of the fishery.

Catch and effort data supplied by commercial collectors allows basic assessments on the state of the fishery to be made annually. As a condition of their authorisation, commercial collectors are required to submit logbook return sheets detailing the date, location, common and scientific name, number of live and number of dead specimens collected during a one month period. These returns also provide information on species distribution, numbers

collected and effort within the fishery. Consultation through HarvestMAC, industry meetings and surveys of whole sale/retail outlets, exporting and importing companies, government agencies and the public, along with scientific studies is undertaken to a limited extent to assist in the further development of appropriate management procedures for the specimen shell fishery.

Fishery independent information

To date few independent research projects have been undertaken into species targeted in this fishery however DPI&F encourages research into the impact of the removal of shells from particular locations and the biology of individual species. A long term study has recently been completed at Heron Island into the dynamics of populations of the red-lipped stromb (*Strombus luhuanus*) (the most harvested species by numbers in this fishery in 2002/03) which has provided useful information on the resilience of populations to impacts (both natural and human induced) (Catterall *et al.*, 2001) and the need for any studies on population status to take into account significant annual natural fluctuations in local recruitment levels.

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.

Data obtained from the monthly logbooks submitted by fishers is collated and analysed annually by DPI&F for spatial trends in effort and collection levels. The results of these analyses are discussed at HarvestMAC. Given the low level of activity over the area of the fishery, it is not possible based on these data from fishers to undertake any quantitative stock assessment.

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

Most of the species taken in the Queensland Marine Specimen Shell fishery have broad Indo-West Pacific distributions. Only two species of those reported by commercial collectors between 1997 and 2003 are believed to be endemic to eastern Australia (the volute *Amoria zebra* (Leach, 1814)– reported as *Volute zebra* and *Zebromoria lineatiana* – only 1 dead specimen reported in 2002/03 and 1 dead specimen in 1997/98; the Tweed murex *Haustellum tweedianus* – only 143 reported collected in 2000/01). Of the Queensland species considered by Ponder and Grayson (1998) to be potentially threatened because of their life history biology and restricted geographic range (their Table 21), only three species additional to the above volute have been identified among the species reported in the fishery off Queensland: the volute *Cymbiola pulchra*, the baler *Melo amphora* and cowry, *Cypraea cribraria*. Six live specimens of the first species and 1 dead and 1 live specimen of the last only were reported in 2001/02 and none in 2002/03. The baler shell has a widespread distribution in the Indo-West Pacific but larger specimens are of high value – a total of 30 dead shells were collected at four reefs in 2002/03.

The Queensland Marine Specimen Shell fishery operates in a region extending the entire length of the Queensland coast, some 2400km. Commercial collecting occurs

predominately in the waters north of Rockhampton and since 1997 has occurred at 43 locations only. From historic data it is evident that the collection areas vary on a yearly basis. This could be attributed to the market demand of species required and the fishers who decide to collect in a given year.

Location data obtained from monthly logs allows DPI&F to determine the areas where collection is concentrated in a particular period. DPI&F can then address issues such as potential overfishing and introduce area closures or bag restrictions on certain species if required through amendments to permit or licence conditions.

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.

The fishery was managed by the Department of Primary Industries Queensland (DPI) until 1997 and quarterly returns were required to be submitted containing similar information to that of the current logbooks. When the specimen shell fishery became the responsibility of the Queensland Fisheries Management Authority (QFMA) in 1997, monthly logbook returns were introduced. Since the amalgamation of the QFMA with the DPI in 2000, the DPI&F adopted the logbooks introduced by QFMA.

Reliable estimates of commercial discards are not available because of the collection methods permitted under the Regulations and the absence of any requirement to report discards. The Regulations restrict collecting to hand or with the use of a shell dredge. Shell dredges are restricted to a mouth less than 1.2m or teeth or prongs longer than 75mm. The commercial fishery is predominately hand collection as the species collected must be of the highest quality in terms of markings, size and colouration. It is a very targeted individual shell specific fishery.

Reliable estimates of total removals by commercial fishers in the marine specimen shell fishery are provided from logbook returns and monitoring by QBFP. Compliance with requirements to submit monthly logbook data obtained from the boat licences endorsed with the fishery symbol F can be checked as under the *Fisheries Regulation 1995*, Part 7, Section 56(1), the holder of a commercial fishing boat licence allowing the holder to take molluscs may sell them only to a licenced buyer. DPI&F issues Buyer Class A (consumption and non-consumption) and Buyer Class B (non-consumption only) licences. Buyers are required to keep records of their purchases, which DPI&F can request to inspect if they have concerns with logbook returns.

There is no estimate of recreational and indigenous take in this fishery. Take in this latter component of the fishery is likely to be minimal as traditionally, shelled molluscs have been taken primarily for food.

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

At present there no sound estimate of the potential productivity of the fished stocks. However, DPI&F considers the number of shells harvested annually and the very small number of reefs/locations fished in any one year (only 8 locations in 2002/03) are likely to represent a very small proportion of the populations of these species. The reefal and coastal areas available as habitat for these generally widely distributed species compared to that which is accessible to collectors is considered to be very large. Most of the species harvested have broad Indo-West Pacific distributions.

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.

There are currently no reference points defined in the management arrangements. The number of shells and the species collected in the past periods determines current management arrangements in the marine specimen shell fishery. This information is obtained from the monthly logbook returns submitted by both the authority holders and boat licence holders endorsed with the shell fishery symbol.

Species included in Groups 1 to 4 (Appendix 1) are reviewed annually by the HarvestMAC representative of the Malacological Society of Australia. When the monthly logbook returns are received by DPI&F, species are compared against the groups to ensure that large numbers of a particular species considered to be at higher risk of overfishing are not being collected. If DPI&F believes that the number of shells collected for any species or at any location is showing a significant increasing trend, DPI&F will develop appropriate management actions in consultation with HarvestMAC.

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

Limited Entry Policy

The Limited Entry Policy was introduced into the Marine Specimen Shell Fishery in 1997. This policy will remain until such time as a statutory management plan is determined for the shell fishery under Part 5 of the Act. No further authorities with the fishery symbol F, will be issued. This policy was adopted as a precautionary approach to ensure that fisheries resource exploitation levels are controlled such that they remain or are brought within ecologically sustainable levels, and to continue to ensure fair access whilst optimising benefits available from resources.

Several species of mollusc have been identified through previous surveys and studies, as potentially at risk from shell collecting. Subsequent bans on collection and dealing have been imposed on these species. Other management measures suggested during a survey (Willan 1986) of Australian shell dealers and interested organisations included:

- “• restrictions on the manufacture of jewellery (where large numbers of live shells are collected);
- licence be required for the taking of live shells;
- bag limits on recreational collectors;
- quality control of shells collected;
- control on habitat alteration and destruction;
- prevention of pollution of waterways;
- area restriction on commercial collectors; and
- development of irrevocable marine reserves.”

Some of these recommendations were further commented upon by Ponder and Grayson (1998) who provided a more objective risk assessment of species reportedly harvested, based on all available biological knowledge at the time and several have been addressed

through management responses (eg. bag limits on recreational collectors, licences for commercial collectors, closures to collecting).

The other matters raised by Willan (1986) will be considered by fishery managers where issues of sustainability are identified although some are outside the management responsibility of fisheries agencies. With current levels of harvesting, there is no indication that the resource is threatened in terms of sustainability and biodiversity. DPI&F is continuing ongoing monitoring of harvest levels to ensure that the fishery remains managed in a sustainable way.

Commercial Collection – limits on methods, species and numbers

Primary commercial fishing boats in Queensland must not be longer than 20m under section 52 of the Regulations. Under Sections 31 and 40 of the *Fisheries Regulation 1995*, persons are required to hold an Authority to Take Fish for Trade or Commerce or a Boat Licence with a relevant authorisation, to allow the collection of marine shells if:

- (a) the shells are to be used for commercial purposes either as a whole shell or in the manufacture of a product for commercial purposes;
- (b) any apparatus prescribed by the *Fisheries Act 1994* and *Fisheries Regulation 1995* is to be used for collection; Schedule 15, Part 7.

Permitted ways of taking molluscs:

Molluscs may only be taken –

- (a) for broken remnants of molluscs –
 - i. by hand or by hand held non-mechanical implements; or
 - ii. if stated on the authority, mechanical equipment; or
- (b) for other molluscs -
 - i. by hand, without using digging or sieving implements; or
 - ii. if stated on the authority, shell dredges.

Shell dredges under Schedule 15 Section 55 of the Regulations must not have a mouth wider than 1.2m or teeth or prongs longer than 75mm. Shell dredges may not be used in any lake or lagoon, Moreton Bay, Hervey Bay or Great Sandy Strait and in parts of Hinchinbrook Channel. Collection is further restricted by General Fisheries Closures and in some Marine Parks zones.

Any species with “protected” status under the *Fisheries Act 1994* and the *Fisheries Regulation 1995* may not be taken:

Schedule 4, Division 5 – Fish regulated by species
clam *Tridacnidae*
helmet shell *Cassis cornuta*
trumpet shell *Charonia tritonis*

Schedule 4, Division 6 – Fish regulated by weight
Green snail – less than 280 g (*Turbo marmoratus*)

More than 50 specimens (dead or alive) may be collected or held in-possession, at any one time. (Bona fide collections are exempt).

The in-possession limit of 50 specimens was based on what was considered to be a reasonable number of pipis to be collected by recreational fishers. This limit was then

introduced to all marine specimen shells as a means of capping potential harvest levels by recreational and commercial fishers.

Applications for authorisations to engage in shell collecting are individually assessed on the information submitted. This provides a mechanism for the application of specific terms and conditions to any Authority/Licence, in addition to standard conditions. These special conditions may restrict the area of operation based on areas requested. At 30 June 2003, five (5) Authorities to collect marine specimen shells and two (2) Boat Licences with a similar authorisation were in force. The Limited Entry Policy 1997 restricts any further individuals entering the fishery.

Currently the authorities are non-transferable, however it is expected that they will become transferable in the future. The boat licences are currently transferable. The Authority/Licence holder is required to submit monthly reports of collecting operations to the DPI&F including dates, locations of collection, species (listed by common or scientific name under families) and quantities taken.

A maximum of ten (10) live specimens per species may be collected within the 12 month duration of the Authority. This number may be reduced dependant on the species being collected and the purposes of collection. Reduction in this number would occur if the number of rare or vulnerable species collected increased to a level of concern. If DPI&F believes that restrictions should be placed on a species that are being overexploited; the show cause process will be undertaken and the restrictions implemented as a condition of the authority, permit or licence. DPI&F records indicate that in most previous years no authority holder has reached the maximum of 10 live specimens collected in any 12 month period. The quota of 10 live specimens was introduced primarily because it seemed a reasonable number of live individuals to be collected after consultation with industry and conservation agencies.

While these conservative bag limits have been imposed, the actual sustainability of the resource under current harvest levels is unknown due to the absence of any comprehensive assessments of the local or regional status of any species. However it should be noted that a maximum of 10 is for live shells only and the considerable mortality that occurs through weather, predation etc. provides a ready source of dead shells for collection by both recreational and commercial collectors.

A conservative approach has also been adopted to the management of the fishery through:

- the application of bag limits on the number of live and dead animals that may be collected;
- regulating the equipment that may be used for collecting;
- restricting the areas in which collection may be undertaken;
- excluding certain species (green snail, tridacnid clams etc) from commercial and harvesting;
- affording "protected" status to selected marine shell species (Group 4, Appendix 1);
- prohibiting the collection of molluscs from an egg mass or those depositing an egg mass.

Authorities issued under Section 40 and Boat Licence symbols under Section 31 of the Regulations are issued for a twelve (12) month period only. Authorities for the Marine Specimen Shell Fishery are currently non-transferable. Prescribed conditions applying to these Authorities are contained in Schedule 15 of the *Fisheries Regulation 1995* at Part 8 - Shell Fishery. The most recent versions of the *Fisheries Act* and the *Fisheries Regulations* are available at:

<http://www.legislation.qld.gov.au/Legislation%20Docs/CurrentF.htm>

Commercial collectors are required to obtain a Marine Parks Permit when operating in certain zoned areas of the Great Barrier Reef and Queensland Marine Parks. A number of conditions are imposed on the permit holder such as zones where collection can occur, the permittee must not collect more than ten (10) specimens of each shell species during the term of the permit, a hand held shell dredge may be used in General Use 'A' Zones and General Use Zones only. Restrictions are imposed on the size of the dredge and the duration for towing the dredge.

Recreational Collection

No specific authorities are required for the collection of marine shells for private use or consumption. Collection is permitted by hand as well as by hand operated shell dredges according to the *Fisheries Regulations 1995* Schedule 8, Part 1, 16 (1 & 2). Marine shells may not be used for any commercial purpose by recreational collectors. There is a maximum of 50 molluscs that any person can have in their possession at any one time. Exceptions may be made for shells held as a bona fide collection, where they are held as cleaned and preserved specimens and retained for non-commercial purposes.

A bag limit of up to five (5) specimens per species live or dead, within a 28 day period, is currently imposed on recreational collectors within all General Use Zones of the Great Barrier Reef and Queensland Marine Parks. Recreational collection of shells within Marine Parks is limited to hand collection only, this includes the use of a hand held shell dredge. This limited recreational collecting is also permitted, in some instances, within Queensland Marine Parks Estuarine Conservation Zones, however it is not permitted in any other Marine Park Zones. A Permit is required if this bag limit is to be exceeded for any purpose. With the rezoning of the Great Barrier Reef Marine Park on 1 July 2004, the area of highly protected zones where shell collecting is prohibited increased from less than 5% overall to approximately 33%.

There is no estimate of recreational take in this fishery.

Scientific Research Collection

A Permit may be issued under Section 35 of the *Fisheries Regulation 1995* to allow the collection of marine molluscs for scientific purposes. These permits are subject to the standard conditions, including requirements to complete annual catch returns and advise Queensland fisheries inspectors of the commencement of a collection trip etc. Permits may also have additional special conditions imposed depending on the requirements and assessed potential impacts of the research project.

A general condition of these permits requires a report to be submitted to DPI&F on the expiry of the permit. The holder is authorised to be in possession of more than 50 molluscs. The holder is authorised to collect by hand or with the aid of a hand held sieve or other hand held device.

A Marine Park Permit is required for scientific research carried out in Marine Park Zones, with such Permit applications being assessed by the Administering Authority (for example GBRMPA and EPA/QPWS).

Protected Areas

There are currently several strategic aquatic reserves in place in Queensland under the Act, which prohibit the collection of specimen shells, often along with other or all fish species.

These include foreshore closures and Closed Waters. A list of these closed areas is contained in the *Fisheries Regulation 1995* in the following Schedules:

Schedule 2 (Part1)	Closed Waters-Commercial Fishing (Taking or possessing any fish)
Schedule 2 (Part 2, Section 45)	Taking or possessing certain fish
Schedule 2 (Part 3, Division 1)	Taking or possessing some fish and using or possessing some apparatus
Schedule 2 (Part 4, Division 5)	Taking or possessing any fish and using or possessing certain fishing apparatus
Schedule 3 (Part 1)	Closed waters-Recreational Fishing (Taking or possessing any fish)
Schedule 3 (Part 2, Section 44)	Taking or possessing certain fish
Schedule 3 (Part 6)	Waters where shell dredges cannot be used
Schedule 4 (Part 2, Division 1)	Regulated Fish (Fish taken by recreational fishers)
Schedule 4 (Part 3, Division 1)	Fish taken for trade or commerce or by recreational fishers
Schedule 4 (Part 3, Division 5)	Fish regulated by species
Schedule 4 (Part 3, Division 6)	Fish regulated by weight
Schedule 7	Fish Habitat Areas
Schedule 8 (Part 1, Division 4)	Recreational Fishing

These closed areas facilitate protection of shell populations, providing a refuge for the ongoing sustainability of fisheries resources. These areas have not been closed specifically to protect shells but for the protection of particular commercially or recreationally important fisheries species and habitat.

There are a number of other locations in which shell dredges, approved for use by boat licence endorsement holders under the Regulation, are prohibited from use. Those locations are detailed in Schedule 2 (Part 4) of the *Fisheries Regulation 1995*.

Closures to shell collection under the Act have been imposed on three foreshore areas within the Brisbane region due to recognised heavy exploitation of marine shell resources (Deception Bay, Nudgee Beach and Wynnum area). These closures completely ban the collection of marine products and attract heavy surveillance and monitoring.

An additional closure on the foreshores within Bramble Bay north of the mouth of the Brisbane River is proceeding to legislation via a regulation amendment and this is expected to be in place by the end of 2005. This closure will completely ban the taking and possession of gastropod and bivalve molluscs within Bramble Bay. Once this amendment has been made to the *Fisheries Regulation 1995*, DPI&F will inform DEH and provide the necessary documentation.

Collection of marine shells is also restricted in many coastal and offshore areas through the Queensland *Marine Parks Act 1982*, administered by the EPA / QPWS and *Great Barrier Reef Marine Park Act 1975*. No commercial or recreational collection may be undertaken in Marine Park Preservation Zones, Scientific Research Zones, Marine National Park Zones, Conservation Zones, Buffer Zones or Seasonal Closure Areas (when in operation).

Species-Specific Management

With the exception of trochus for which a minimum size of 8 cm and a maximum of 12.5 cm applies, size limits have not been imposed for any other recreationally collected shell species. However there is a weight limit of 280g for green snails. The green snail was

originally protected by way of size by weight of shell of 10 ounces under section 45 of the Fisheries Act 1957 by way of regulation dated March 1960. It is believed that the value of 280g (approximately 10oz) was developed in a similar way to that of the Pearl shell by the Torres Strait Islanders where it was agreed that a size by weight measurement should be implemented, it was decided that if a shell fitted in a 2oz tobacco tin (round) the shell was to be returned to the water. This was done as a conservation measure so that not all of the shells were taken. Historic records indicate that this species was not taken commercially in Queensland as there is no mention of the species in subsequent reports.

There is an informal code of conduct among amateur collectors belonging to "shell clubs" that juvenile and adult molluscs with damaged or marked shells should not be collected but instead be left for reproductive purposes and resource enhancement. It is well known that collection of damaged shells are of little, or no, value to dealers and collectors as the demand is for near perfect specimens.

Proposed Management Arrangements

A number of schedules for species with similar management requirements have been prepared, detailing an increasing level of management prescription (Appendix 1). This ranges from those species that have been identified as requiring very little management, to those species for which collection is prohibited. These schedules are assessed annually by DPI&F with advice from HarvestMAC. DPI&F collates the collection reports and presents it to HarvestMAC, members on the MAC review the data and if it is decided that a species is being heavily exploited then the MAC makes recommendations to DPI&F for appropriate action. The Malacological Society of Australia is aware of the number of shells commercially collected from their MAC representative.

Criteria on which classification is made may include:

- distribution;
- abundance;
- endemism;
- conservation status;
- level of trade;
- biological features, such as mode and potential for reproduction; and
- specific habitat requirements.

The preliminary schedules have been developed based on information from Ponder and Grayson (1998) and Willan (1986) with advice from the Malacological Society of Australia. These draft schedules will be open for discussion through the public comment and consultation process instituted in the development of any future management arrangements by the DPI&F.

Group 1 Species

This group comprises species of native marine molluscs covered under this document and not included in Groups 2 to 4. This group includes a large proportion of the total number of species. The species have been assessed as requiring little management emphasis, at this stage, either because they are very common or are not traded. The Group 1 species will require reporting of commercial harvests only and are subject to the existing bag limit of 50 specimens (live or dead). It is considered that trends and information indicating a need to move certain species from Group 1 to Groups 2, 3 or 4 can be obtained through general consultations with collectors, traders, museum staff and other interested parties as well as through export records. Collection in excess of 50 may be authorised by a Permit.

Group 1 Species: All species within the Phylum Mollusca

excepting	oyster	<i>Ostreidae</i>
	Trochus shell	<i>Trochus niloticus</i>
	Pearl oysters	<i>Pteriidae</i>
	squid	
	cuttlefish	
	octopus	(coleoid cephalopods)
	scallops	<i>Amusium</i> spp.
and	any species listed within Groups 2 to 4 below	

Group 2 Species

Group 2 species are those that may be subjected to a bag limit of 10 specimens (live or dead). It is appropriate to monitor the level of trade to identify major changes that may be deleterious to the conservation status of the species and to assist in the development of future management options.

Group 2 Species:	Imperial Turban shell	<i>Turbo imperialis</i>
	Common Spider conch	<i>Lambis lambis</i>
	Strawberry conch	<i>Strombus luhuanus</i>
	Greenish cowrie	<i>Cypraea subviridis</i>
	Walkers cowrie	<i>Cypraea walkeri</i>
	Pear-shaped cowrie	<i>Cypraea pyriformis</i>
	Yellow-toothed cowrie	<i>Cypraea xanthodon</i>
	Stolid cowrie	<i>Cypraea stolida</i>
	Small-toothed cowrie	<i>Cypraea brevidentata</i>
	Porter's cowrie	<i>Cypraea porteri</i>
	Deer-antler murex	<i>Chicoreus cervicornis</i>
	Volutes	Volutidae

Group 3 Species

A number of species are considered to warrant particular attention because of apparent rarity, value and the level of demand for their shells. These species may be subjected to a bag limit of 1 of each species per person per quarter (3 months) for both commercial and recreational fishers. Reporting of collection, exchange and trade will be required, collection in excess may be authorised by a Permit.

Group 3 Species:	Thersite stromb	<i>Strombus thersites</i>
	Hungerford's cowrie	<i>Cypraea hungerfordi</i>
	Langford's cowrie	<i>Cypraea langfordi moretonensis</i>
	Hirase's cowrie	<i>Cypraea hirasei queenslandica</i>
	Martin's cowrie	<i>Cypraea martini</i>
	Musume's cowrie	<i>Cypraea musumea</i>
	Great-spotted cowrie	<i>Cypraea guttata</i>
	Sieve cowrie	<i>Cypraea cribraria melwardi</i>
	Bullmouth Helmet shell	<i>Cypraecassis rufa</i>
	Axicornis murex	<i>Chicoreus axicornis</i>
	Hutton's murex	<i>Chicoreus huttoniae</i>
	Australian Trumpet shell	<i>Syrinx aruanus</i>
	Grand Cone shell	<i>Conus pergrandis</i>
	Armenian cowrie	<i>Cypraea armeniaca</i>
	Baler shells	<i>Melo</i> spp.

Group 4 Species

Collection of Group 4 species is prohibited under the Act.

Group 4 species:	Giant triton or Trumpet shell	<i>Charonia tritonis</i>
	Giant clams	<i>Tridacnidae</i>
	Helmet shell	<i>Cassidulinidae</i>

The bag limits in Groups 2 and 3 are proposed to be implemented for commercial collectors through administrative arrangements within three years. The DPI&F monitors the number of group 2, 3 and 4 species collected on an annual basis and if necessary will take appropriate management action. Assessment of the status of the fishery is conducted yearly, an annual report goes to the MAC for comment and the Australian Malacological Society for review.

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)

Not applicable. No byproduct species are authorized to be taken in the collection of specimen shells.

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

Most of the species taken in the Queensland Marine Specimen Shell fishery have broad Indo-West Pacific distributions. Only two species of those reported by commercial collectors between 1997 and 2003 are known to be endemic to eastern Australia (the volute *Amoria zebra* (Leach, 1814)– reported as *Voluta zebra* and *Zebromoria lineatiana* – only 1 dead specimen reported in 2002). Of the species considered by Ponder and Grayson (1998) to be potentially threatened because of their life history biology and restricted geographic range (their Table 15), only two species additional to the above volute have been identified among the species reported by the fishery off Queensland, the volute *Cymbiola pulchra* and cowry, *Cypraea cribraria*. Six live specimens and 1 dead, 1 live specimen of these species respectively only were reported in 2002 and none in 2003.

QBFP has advised that there have been no enforcement and compliance issues associated with the specimen shell fishery in 2003.

DPI&F believes that a conservative approach that has been adopted to the management of the fishery through:

- restricting the number of commercial collectors in the fishery;
- the application of bag limits on the number of live or dead animals that may be collected;
- regulating the equipment that may be used for collecting;
- restricting the areas in which collection may be undertaken (under fisheries legislation and also Marine Parks legislation);
- excluding certain species (green snail, tridacnid clams etc) from commercial harvesting;
- affording “protected” status to selected marine shell species (see Group 4, Appendix 1);
- prohibiting the collection of molluscs from an egg mass or those depositing an egg mass.

This conservative approach means that risk posed to the populations of the species commonly harvested by the Queensland Marine Specimen Shell Fishery has been minimized. Numbers of the species which have been identified in previous studies as potentially at risk (certain volutes and cowries) are being monitored by DPI&F through monthly logbook reporting and any trends of increased harvesting or harvest in additional locations will be investigated.

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.

No overfishing of specimen shell species has been identified through the monitoring process in place.

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.

Not applicable

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.

As mentioned previously this very small scale fishery is very targeted on the specimens it collects through primarily hand collection. While some other benthic invertebrates may be collected incidentally in shell dredges and returned immediately to the water, the number of dredging operations is both very few annually and occurs at very few locations within the vast area of the fishery. No species have been recorded as bycatch by shell collectors on their logbooks and it is considered that impacts of this fishery on bycatch species are insignificant.

Assessments

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

See above. No formal bycatch risk assessment has been undertaken

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.

The fishery is primarily by hand collection and the use of small shell dredges by a very few operators. The level of bycatch in the fishery is considered insignificant. As such, there are no threat abatements plans, recovery plans or bycatch reduction strategies applicable to the fishery.

The limited scale of the fishery within a vast fishery area and primarily undertaken by hand collection mean the management arrangements have a very high chance of ensuring that any impact on bycatch is insignificant.

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.

This information is not collected at this time in the current logbooks. Given the very low likelihood of interactions by the maximum of ten participants in the fishery with endangered, threatened or protected species, no more detailed assessment has been conducted or is considered warranted.

Consideration will be given by DPI&F to the future introduction of the 'Species of Conservation Interest logbook' (SOCl logbook – see Appendix 6) to document the type and level of interactions that the Specimen Shell Fishery has with endangered, protected and threatened species.

Assessments and Management responses

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

The predominantly hand collection methods used in this fishery generally avoid collection of non-target species. Although only a maximum of seven vessels operate in the commercial fishery and an additional three for scientific research, some interaction with dugong and turtles may occur by these vessels as for any other recreational or commercial vessel operating in coastal waters. The risks of significant impact by the shell fishery on these populations are considered very low. Given the absence of any reported interactions of endangered, threatened or protected species, no more detailed assessment has been conducted or is considered warranted.

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

Given the absence of any reported interactions of endangered, threatened or protected species by the maximum of seven vessels in this hand collection / shell dredge fishery, no specific management arrangements are considered warranted beyond the fisheries and Marine Parks closures described previously.

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

No threatened ecological communities have been identified in the specific areas and habitats fished by the Queensland marine specimen shell fishery.

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

Given the absence of any reported interactions of endangered, threatened or protected species by the maximum of ten vessels in this hand collection / shell dredge fishery, no specific management arrangements relating to interactions with protected species are considered warranted beyond the fisheries and Marine Parks closures described previously.

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 primarily hand collection fishery. Therefore an assessment has not been undertaken and management measures have not been developed. If there are indications that impacts on any threatened communities do occur, assessment and implementation of mitigating management measures 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.

Given the limited number of vessels operating in the fishery which occurs over a vast area, and the absence of any recorded interaction between this fishery and endangered, threatened or protected species, it is considered that this objective is achieved.

OBJECTIVE 3. THE FISHERY IS CONDUCTED, IN A MANNER THAT MINIMISES THE IMPACT OF FISHING OPERATIONS 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.

No studies have yet been undertaken specifically to document and quantify impact of the marine specimen shell fishery on the ecosystem and environment generally. However, given the very limited number of shells harvested annually from the entire Queensland coast and the limited number of locations fished in any year, it is very likely the impacts on the ecosystem of the current levels of collecting activity are insignificant.

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
3. Impacts on the physical environment
 - Physical
 - Water quality

The fishery is not considered to have a significant impact on the broader marine environment. This is primarily a hand collection fishery for dead shells and while it is recognized that the occasional use of shell dredges to take live shells will have some impact on the sediments and benthos, the limited number of locations where live shells are taken means that the impact except in a very small local area should be considered minimal and very short lived.

There are no known negative impacts of removing small numbers of marine shells from the marine environment. Some species prey on shelled molluscs and reducing shell numbers by fishing will reduce their prey abundance but in a very small local area and for a very limited time only.

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.

No evidence has emerged that shell collecting using current gear and at the current levels of effort impacts significantly on benthic or pelagic ecosystems in this region. If such a threat is

identified from reports from the fishery or the public, appropriate management responses will be developed by DPI&F and incorporated into the management regime for the marine specimen shell fishery to prevent significant damage to such ecosystems.

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.

Not applicable. See 2.3.3 above.

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

Given the gear used (primarily hand collection), number of operators and area of the fishery, it is considered that under the current management arrangements, the fishery operates in a manner that minimises the impact of fishing operations on the ecosystem generally and this objective is achieved.

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APPENDIX 1 MARINE SPECIMEN SHELL SPECIES GROUPINGS BASED ON LIFE HISTORY CHARACTERISTICS AND LEVEL AND SPATIAL DISTRIBUTION.

Group 1 Species:	All species within the Phylum Mollusca	
excepting	oyster	Ostreidae
	Trochus shell	<i>Trochus niloticus</i>
	Pearl oysters	Pteriidae
	squid	
	cuttlefish	
	octopus	(coleoid cephalopods)
	scallops	<i>Amusium</i> spp.
and	any species listed within Groups 2 to 4 below	
Group 2 Species:	Imperial Turban shell	<i>Turbo imperialis</i>
	Common Spider conch	<i>Lambis lambis</i>
	Strawberry conch	<i>Strombus luhuanus</i>
	Greenish cowrie	<i>Cypraea subviridis</i>
	Walkers cowrie	<i>Cypraea walkeri</i>
	Pear-shaped cowrie	<i>Cypraea pyriformis</i>
	Yellow-toothed cowrie	<i>Cypraea xanthodon</i>
	Stolid cowrie	<i>Cypraea stolida</i>
	Small-toothed cowrie	<i>Cypraea brevidentata</i>
	Porter's cowrie	<i>Cypraea porteri</i>
	Deer-antler murex	<i>Chicoreus cervicornis</i>
	Volutes	Volutidae
Group 3 Species:	Thersite stromb	<i>Strombus thersites</i>
	Hungerford's cowrie	<i>Cypraea hungerfordi</i>
	Langford's cowrie	<i>Cypraea langfordi moretonensis</i>
	Hirase's cowrie	<i>Cypraea hirasei queenslandica</i>
	Martin's cowrie	<i>Cypraea martini</i>
	Musume's cowrie	<i>Cypraea musumea</i>
	Great-spotted cowrie	<i>Cypraea guttata</i>
	Sieve cowrie	<i>Cypraea cribraria melwardi</i>
	Bullmouth Helmet shell	<i>Cypraecassis rufa</i>
	Axicornis murex	<i>Chicoreus axicornis</i>
	Hutton's murex	<i>Chicoreus huttoniae</i>
	Australian Trumpet shell	<i>Syrinx aruanus</i>
	Grand Cone shell	<i>Conus pergrandis</i>
	Armenian cowrie	<i>Cypraea armeniaca</i>
	Baler shells	<i>Melo</i> spp.
Group 4 species:	Giant triton or Trumpet shell	<i>Charonia tritonis</i>
	Giant clams	Tridacnidae
	Helmet shell	<i>Cassis cornuta</i>

