TORRES STRAIT HAND COLLECTABLES WORKING GROUP (HCWG)
MEETING NO. 8

30 April 2015

TSRA Board Room (Torres Strait House)
46 Victoria Parade, Thursday Island

MEETING TIME: 9:00am – 5:00pm

DRAFT AGENDA

1. Meeting Administration

1.1. Preliminaries – Acknowledgement of Traditional Owners/Chairs Opening Remarks/Meeting attendance/Declaration of Interests/Apologies

1.2. Ratification HCWG 7 Minutes and update regarding action items from HCWG 7.

1.3. Review and adoption of Agenda

2. Fishery Updates

2.1. Trochus (AFMA – For Noting)

2.2. Pearl Shell (AFMA – For Noting)

2.3. Beche-de-mer (AFMA – For Noting)

2.4. PNG Beche-de-mer (PNG NFA – For Noting)

3. Future Management Arrangements/Considerations

3.1. Proposed change to size limits in the Pearl Shell Fishery (AFMA – For Discussion)

3.2. Black Teatfish One Month Trial Report and Future Management Arrangements (AFMA – For Discussion)

3.3. Use of Hookah Equipment for Collecting White Teatfish (AFMA – For Discussion)

3.4. Maximum Boat Length (AFMA – For Discussion)

4. Research/Reports

4.1. Beche-de-mer research in Australia (CSIRO – For Noting)

4.2. Strategic Assessment (AFMA – For Noting)

4.3. Beche-de-mer Training and DVD (Kenny Bedford – For noting)

5. Compliance

5.1. Foreign Compliance Update (AFMA – For Noting)

5.2. Domestic Compliance Update (QLD – For Noting)

6. Other Business

6.1. Date of next meeting

Individuals wishing to attend the meeting as an observer can contact HCWG Executive Officer – Andrew Cox (Andrew.Cox@afma.gov.au).

TORRES STRAIT HAND COLLECTABLES WORKING GROUP (HCWG)	Meeting No. 8 30 April 2015
HCWG No 7 Minutes and progress against action items (AFMA)	Agenda Item No. 1.2 FOR NOTING

PURPOSE

For the Hand Collectables Working Group (HCWG) to **NOTE**:

- Minutes from HCWG 7 were circulated out of session on 20 November 2013 seeking comments (or an extension) by 20 December 2013. Some comments were received resulting in minor changes to the minutes prior to ratification.
- Minutes from HCWG 8 will be circulated for comment and ratification within two weeks of the meeting.
- Progress against the action items from HCWG 7.

BACKGROUND

AFMA has adopted a more streamlined process for finalising meeting minutes for Resource Assessment Groups (RAGs) and Management Advisory Committees (MACs). This process is outlined in the revised Commonwealth Fisheries Management Paper No 1 for MACs and the Commonwealth Fisheries Administration Paper No 12 for RAGs. Although the HCWG is not bound by the same provisions as the Commonwealth, AFMA would like to adopt the same process for clearing minutes as outlined below:

- The Executive Officer will have the Minutes prepared within two weeks of the meeting and have them cleared by other members within a further two weeks of their preparation.
- The Minutes should be placed on the PZJA website within two weeks after being cleared by Members.

If these timeframes are believed to be unachievable for PZJA forums AFMA is happy to discuss and make amendments where suggested.

PROGRESS WITH ACTION ITEMS (HCWG 7)

#	Action Item	Agenda	Champion	Progress
1)	HCWG to ratify the HCWG No 6 minutes out of session.	1.3	AFMA	Completed

2)	TSRA to consult with communities regarding removing the 7m boat restriction for the Beche de Mer TIB sector.	HCWG 5 (amended at HCWG 7)	TSRA	Not progressed however included as agenda item at HCWG 8 for discussion/ advice.
3)	a) AFMA to work with QLD Fisheries to document key management issues and criteria for permitting hookah use for collecting White Teatfish. b) TSRA to advise if they will take the lead on this issue. c) If no one agency wants to lead this, then the HCWG will recommend a research priority to fund a BDM MSE focused on hookah use.	3.1	AFMA/QLD/ TSRA	Not progressed however included as agenda item at HCWG 8 for discussion/ advice.
4)	AFMA to draft a graduate proposal to do a desktop study/literature review on *P. maxima* size limits and the potential catch that can be taken from the Torres Strait at a 100mm size.	3.3	AFMA	Completed and included as an agenda item at HCWG 8.
5)	a) HCWG members to provide comment on research priorities for 2014-15 and AFMA to incorporate these into the next Annual Operational Plan. b) The Chair to write to the TSSAC identifying research priorities for the Hand Collectables Fishery.	4.3	AFMA	Completed
6)	The Chair to include the option for basing AFMA Foreign Compliance officers out at Yam Island in the Chairs Summary and that AFMA raise this suggestion at the next MALC meeting.	5.1	AFMA	AFMA is continuing to expand its resource base throughout the Torres Strait through Information and knowledge sharing – more information at agenda item 5.1.
7)	QLD Fisheries to follow up on a request from Mr Tully about catch limits for *P. maxima* in QDAFF booklets.	5.2	QLD Fisheries	Completed
8)	QLD to clarify the policy and legislative arrangements regarding TIB sector buying boats with funds from TVH operators. QLD to investigate pros and cons of this policy and if it is something that needs to change.	5.2	QLD Fisheries	Completed

9)	AFMA to circulate the 2013 Strategic Assessment Report for the Beche de Mer Fishery when completed.	6.1	AFMA	Strategic Assessment completed in 2014. Included as agenda item at HCWG 8.

FINANCIAL IMPLICATIONS

Nil

TORRES STRAIT HAND COLLECTABLES WORKING GROUP (HCWG)	Meeting No. 8 30 April 2015
Fishery Update – Torres Strait Trochus Fishery (AFMA)	Agenda Item No. 2.1 FOR NOTING

PURPOSE

To inform the members of the HCWG of the recorded catch and other significant information for the Torres Strait Trochus Fishery.

DISCUSSION

There were no reports of Trochus being harvested or sold in 2014, continuing the recent trend of low effort in the fishery. The low level of catch and effort is thought to be due to low market demand rather than a decline in stocks.

Table 2: Torres Strait trochus fishery catch and effort (source: AFMA docket book database).

Year	2008	2009	2010	2011	2012	2013	2014
Trochus catch (kg)	8,046	1,526	650	0	0	0	0
Number of fishers	16	7	5	0	0	0	0

FINANCIAL IMPLICATIONS

Nil

TORRES STRAIT HAND COLLECTABLES WORKING GROUP (HCWG)	Meeting No. 8 30 April 2015
Fishery Update – Pearl Shell (AFMA)	Agenda Item No. 2.2 FOR NOTING

PURPOSE

To inform the members of the HCWG of the recorded catch and other significant information for the Torres Strait Pearl Shell Fishery.

DISCUSSION

Consistent with the trend in recent years, there was no take of pearl shell reported in logbooks and/or docketbooks for 2014. While there continues to be very little effort in the fishery, one pearl farm operator reported purchasing approximately 600 live shells for seeding at an aquaculture facility at Escape River. The operator informed that the majority of the shells were harvested by traditional inhabitant divers and were relocated to the farm in late 2014.

FINANCIAL IMPLICATIONS

Nil

TORRES STRAIT HAND COLLECTABLE WORKING GROUP (HCWG)	Meeting No. 8 30 April 2015
Fishery Update – Beche-de-mer (AFMA)	Agenda Item No. 2.3 FOR NOTING

PURPOSE

To inform the members of the HCWG of the recorded catch and other significant information for the Torres Strait Beche-de-mer Fishery.

DISCUSSION

Catch data

Catch data from docket books in 2014 is shown in Table 1.

Table 1. Beche-de-mer catch data for 2013 and 2014 from AFMA logbook and docketbook databases

Species	TAC (t)	Catch (t)	
		2013	2014
Black Teatfish	15 (2014 trial only)	0	16.5
White Teatfish	15	9.9	8.0
Prickly Redfish	20	2.8	4.0
Blackfish	Part of 80t limit	0.1	0.2
Golden Sandfish		0.02	0
Deepwater Redfish		3.2	0

Effort in the fishery increased in 2014 mainly due to the trial opening for black teatfish. The results of this trial are discussed in agenda item 3.2. Collection of prickly redfish and some other species also increased. This is likely due to increased interest in the fishery generated by the black teatfish trial.

It must be noted that these catch figures are approximate because catch reporting in the TIB sector is not mandatory. During the black teatfish trial in November 2014, AFMA took this voluntary reporting into account and relied on verbal catch reports in some instances to ensure the TAC was not significantly exceeded.

FINANCIAL IMPLICATIONS

Nil

TORRES STRAIT HAND COLLECTABLE WORKING GROUP (HCWG)	Meeting No. 8 30 April 2015
Fishery Update – PNG Beche-de-mer (PNG NFA)	Agenda Item No. 2.4 FOR NOTING

PURPOSE

For the Hand Collectables Working Group (HCWG) to **NOTE** an update provided by PNG NFA relating to Beche-de-mer in PNG waters.

FINANCIAL IMPLICATIONS

Nil

TORRES STRAIT HAND COLLECTABLES WORKING GROUP (HCWG)	Meeting 8 30 April 2015
Proposed change to size limits in the Torres Strait Pearl Shell Fishery (TSPSF)	**Agenda Item No. 3.1** **FOR DISCUSSION**

PURPOSE

For the Hand Collectables Working Group (HCWG) to:

NOTE the recently completed review titled *Options for changing the size limits for Pinctada maxima in the Torres Strait Pearl Shell Fishery*; and

DISCUSS and **PROVIDE ADVICE** on the possibility of allowing the take of gold-lipped pearl oysters (*Pinctada maxima*) at a smaller slot size limit than is currently allowed in the fishery.

BACKGROUND

An action item from HCWG 7 was for AFMA to draft a graduate proposal to undertake a desktop study/literature review on *P. maxima* size limits. A graduate officer completed the proposed review in late 2014. The following is a summary of the review. The complete review has been provided to HCWG members for background information.

The Torres Strait Pearl Shell Fishery has been characterised by low levels of activity in recent years but has a long history of severe exploitation and depletion. There have been very low numbers of pearl shell collected since at least 2006. Current stock status remains uncertain, although there has been recent anecdotal evidence of some level of stock recovery. Current management arrangements are in line with the low levels of fishing effort, and changes to management arrangements have been difficult to justify while effort levels remain so low and due to a lack of information with which to make informed decisions.

The current (slot) size limits for the gold-lipped pearl oyster (*P. maxima*) is 130mm to 230mm, which is outlined in Clause 8 of the *Torres Strait Fisheries Management Instrument No. 7*. Mr Rusty Tully, of Torres Pearls, through the HCWG has requested that the size limits be changed to 100–200mm.

The size limits of *P. maxima* have changed numerous times throughout the history of the Torres Strait Pearl Shell Fishery as detailed below:

1891 – Minimum size limit of 152mm introduced

1897 – Minimum size reduced to 127mm

1976 – Minimum size limit of 160mm implemented under the *Fisheries Act 1976*

1985 – Minimum size limit of 160mm implemented under *FMN No. 6*

1988 – Minimum size limit of 130mm and maximum 200mm under *FMN. No 25*

1989 – Maximum size limit increased to 230mm under *FMN No. 30*

In **October 2013** the Torres Strait Hand Collectables Working Group (TSHCWG) requested that AFMA review a proposal to change the size limits for *P. maxima* from 130–230mm to 100–200mm. This would allow the smaller, faster growing oysters to be harvested which in turn would produce high quality pearls in a shorter time frame and provide maximum seeding potential from the shell. As there is very little effort in the Pearl shell fishery, at current effort levels this proposal does not represent a significant risk to the fishery (HCWG/7). However it still needs a PZJA decision to amend *FMN No. 7*.

Interest in revitalisation has previously been expressed at management meetings but no action has ever eventuated. Plans to revitalise the industry would need to take into consideration the objectives of Torres Strait fisheries legislation.

DISCUSSION

In **September 2015**, AFMA assigned a graduate to the Torres Strait Fishery to conduct a review of the size limits in the TSPSF. The report was produced in consultation with past and current members of the pearl industry, research scientists, and Commonwealth/State management authorities. It is the most comprehensive review of the TSPSF to date and includes an evaluation of the TSPSF management in the context of the biology of the oyster, the history of the fishery, and current stock status.

The main focus of the report is to assist the HCWG in making informed recommendations as to the viability of changing the current size limits.

Note that the recommendations of the review are not necessarily the position of AFMA Management.

Proposed change in size limits

The report concludes that the proposed change in the size limits for pearl oyster shell in the Torres Strait will:

1. Allow smaller, faster growing oysters to be harvested and maximise the seeding potential of shell for the pearl culture industry
2. Protect breeding stock and support the long-term sustainability of the pearl shell resource by aligning more closely to the precautionary size limits in other jurisdictions
3. Support the revitalisation of the Torres Strait pearl farming industry as a niche market for superior quality pearls.

The proposed change in size limits would subsequently align with the objectives of *Torres Strait Fisheries Act 1984*.

Management arrangements recommendation

The report regarded the current management arrangements for the TSPSF as ineffective due to lack of change in response to reports of stock depletion throughout the past 100 years, lack of information with which to make management decisions, and the biological characteristics of the pearl oyster (e.g. reproductive and recruitment strategy, the gender-size relationship, size at sexual maturity). While the report recognises that the current management arrangements are in line with the low levels of activity in the fishery, and that these low levels of activity mean that review of and subsequent changes to management arrangements are not a priority, it recommends:

1. Acknowledgement of the need for revised management arrangements in the TSPSF
2. Completion of a formal stock assessment of the TSPSF
3. Enforcement of size limits for all participants in the TSPSF
4. Small-scale area closures to enhance stock rejuvenation
5. Inter-jurisdictional consistency with Queensland

Possible options for HCWG discussion and advice

Consider recommending a trial to take pearl shell between 100mm and 130mm, subject to suitable controls being in place (e.g. precautionary trigger limit, cap on the number of shell to be taken at the smaller size), recognising that:

- If effort remains low (e.g. below a suitable trigger limit) it is unlikely to further impact stocks.
- Stock status is unknown and *P. maxima* is vulnerable to overexploitation
- Any decision to permanently adjust size limits will require more information on likely stock impacts.
- A trial underway in Western Australia may help to inform future decision making processes.
- *Fisheries Management Notice No. 7* sets the size limits in the fishery. Either this Instrument will need to be revoked and remade, or the issue of a permit for scientific purposes may be explored if it is determined that the recording of the take of *P. maxima* at a smaller size could assist with research in the fishery. If the scientific permit avenue was to be explored, all licences holders would have an equal opportunity to apply and the decision to grant a permit would require a Native Title notification process to be undertaken.
- Catch reporting is not mandatory for the TIB sector. A scientific permit may need to provide for catch reporting (this can be done regardless of who a scientific permit is issued to).

FINANCIAL IMPLICATIONS

Nil.

ATTACHMENTS

Attachment A – Options for changing the size limits of *Pinctada maxima* in the TSPSF and other recommendations for management

Australian Government
Australian Fisheries Management Authority

Options for changing the size limits for *Pinctada maxima* in the Torres Strait Pearl Shell Fishery

AND OTHER RECOMMENDATIONS FOR MANAGEMENT

PREPARED BY AFMA FOR THE TORRES STRAIT
HAND COLLECTABLES WORKING GROUP

LISA STEVENSON
NOVEMBER 2014

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List of Acronyms

AFMA	Australian Fisheries Management Authority
CSIRO	Commonwealth Scientific and Industrial Research Organization
DFWA	Department of Fisheries Western Australia
DVM	Dorsoventral Measurement
ECPF	East Coast Pearl Fishery
FMN	Fisheries Management Notice
FMI	Fisheries Management Instrument
HCWG	Hand Collectables Working Group
ITQ	Individually Transferable Quota
OOS	Out of Session
PNG	Papua New Guinea
PZJA	Protected Zone Joint Authority
QAIF	Queensland Aquaculture Industries Federation
QDAFF	Queensland Department of Agriculture, Fisheries and Forestry
QDPI	Queensland Department of Primary Industries
TAC	Total Allowable Catch
TIB	Traditional Inhabitant Boat Licence
TRL	Tropical Rock Lobster
TSFIICC	Torres Strait Fishing Industry and Islanders' Consultative Committee
TSFMAC	Torres Strait Fisheries Management Advisory Committee
TSFMC	Torres Strait Fisheries Management Committee
TSFSAC	Torres Strait Fisheries Scientific Advisory Committee
TSPSF	Torres Strait Pearl Shell Fishery
TVH	Transferable Vessel Holder Licence

2 Executive summary

This report was commissioned to review a proposal to change the size limits for the gold-lipped pearl oyster (*Pinctada maxima*) from 130–230mm to 100–200mm in the Torres Strait Pearl Shell Fishery (TSPSF). The proposal was introduced as a potential option for revitalising the fishery and the associated pearl industry. The review included evaluation of the effectiveness of management arrangements for the fishery in the context of the biology of the oyster, the history of the fishery, current stock status and feedback from the pearl industry, biologists and fishery managers in other jurisdictions (e.g. the Western Australia and Queensland pearl oyster fisheries). The evaluation formed the basis of additional recommendations regarding the overall management of the fishery.

The report concludes that reducing the size limits would benefit the long-term sustainability of the pearl shell resource, as well as the viability and revitalization of the Torres Strait pearl industry. It would subsequently align with the objectives of *Torres Strait Fisheries Act 1984*. As part of any proposal to review size limits, consideration would need to be given to the implementation and feasibility of interim measures to ensure continued supply to pearl farms while the transition to the new management arrangements occurs. A community education and extension program regarding the change may be required to enhance awareness and compliance.

The report additionally concluded that current management arrangements for the TSPSF are ineffective. Ineffectiveness can be attributed to lack of change in response to reports of stock depletion throughout the past 100 years, lack of information with which to make management decisions, and the biological characteristics of the pearl oyster (e.g. reproductive and recruitment strategy, the gender-size relationship, size at sexual maturity). However the low levels of activity in the fishery mean that review of and subsequent changes to management arrangements are not a priority. The resulting additional recommendations comprise:

1. Acknowledgement of the need for revised management arrangements in the TSPSF
2. Completion of a formal stock assessment of the TSPSF
3. Enforcement of size limits for all participants in the TSPSF
4. Small-scale area closures to enhance stock rejuvenation
5. Inter-jurisdictional consistency with Queensland.

These additional recommendations would need to be considered in order to determine what ‘good fisheries management’ in the TSPSF looks like, particularly if its participants desire to maximise the long term sustainability of the pearl shell resource and establish an economically viable niche market for Torres Strait pearls.

3 Purpose

This report was produced in response to a request from the Torres Strait Hand Collectables Working Group (HCWG) in October 2013 to review a proposal to change the size limits for the gold-lipped pearl oyster (*Pinctada maxima*) from 130–230mm to 100–200mm[1]. The proposal was introduced as a potential option for revitalising the Torres Strait Pearl Shell Fishery (TSPSF) and the Torres Strait pearl industry.

The main focus of this report is to assist the HCWG in making informed recommendations as to the viability of changing the current size limits. The review included evaluation of the effectiveness of current management arrangements for the fishery in the context of the biology of the oyster, the history of the fishery, current stock status and feedback from the pearl industry, biologists and fishery managers in other jurisdictions (e.g. the Western Australia and Queensland pearl oyster fisheries).

The evaluation also formed the basis of additional recommendations regarding the overall management of the fishery. The additional recommendations would need to be considered to determine what 'good fisheries management' for the TSPSF looks like, which would be necessary if its participants desire to maximise the long term sustainability of the pearl shell resource and establish an economically viable niche market for Torres Strait pearls.

Where applicable the scientific/management basis of the recommendations for the HCWG is discussed in full detail as *Supporting Information*. An additional issue raised at a previous HCWG meeting regarding the accuracy of shell size as an indicator of age is addressed in the *Addendum*.

[1] Shell size (e.g. 130–230mm) in this report is equivalent to 'dorsoventral measurement' (DVM), which is the greatest dimension of the oyster measured at right angles to the hinge line (refer to Figure 5 on pg 28) (Chellam 1978).

4 Proposal for change in size restrictions

The current size limits for the gold-lipped pearl oyster *Pinctada maxima* (*P. maxima*) is 130–230mm. Mr Rusty Tully, of Torres Pearls, through the HCWG has recommended that the size limits be changed to 100–200mm.

The proposed change in the size limits for pearl oyster shell in the Torres Strait will:

1) **Allow smaller, faster growing oysters to be harvested**

   The harvest of smaller oysters will maximise the seeding potential of shell (i.e. enable shell to be used for four seeding cycles). This has economic importance to the pearl culture industry as the pearls produced in the third and fourth seeding cycles are larger and more valuable.

   See Biology: Pinctada maxima (pg 12)

2) **Protect breeding stock and support the long-term sustainability of the pearl shell resource**

   The current status of pearl oyster stocks in the Torres Strait is uncertain. However the fishery is historically described as suffering chronic depletion and current management arrangements are ineffective in ensuring the sustainability of the fishery. The proposed size limits align more closely to the precautionary size limits in other jurisdictions and align with previous recommendations by management for more precautionary maximum size limits (AFMA 2006).

   See Biology: Pinctada maxima (pg 11), Current management arrangements (pg 16), Effectiveness of current management arrangements (pg 19), Issues for management (pg 20)

3) **Support the revitalisation of the Torres Strait pearl farming industry**

   Torres Strait pearls have superior lustre and thick nacre (mother-of-pearl) in comparison to other regions, making the Torres Strait ideal for the establishment of a niche market[2]. There is also potential for secondary markets in mother-of-pearl and pearl meat. Interest in revitalisation has previously been expressed at management meetings (e.g. HCWG/1, /3) but no action has ever eventuated. Previous assessments note that the TSPSF could probably sustain a small amount of wild shell harvest under effective management arrangements (Colgan & Reichelt 1991; TSFMAC/1). Plans to revitalise the industry would need to take into consideration the objectives of Commonwealth and Torres Strait fisheries legislation.

   See Issues for management (pg 20)

[2] Refer to QDPI (1994) for a detailed description of strengths and opportunities in the TSPSF.

4.1 Implementation

If the proposal is supported by the HCWG a recommendation will be made to the PZJA seeking to amend the *Torres Strait Fisheries Management Instrument No. 7*. An estimation of the costs for the process of a change in size limits would need to be developed. Plans for the implementation of the amendment would additionally need to be approved.

A five-year transition period has been recommended. During this time licence holders would be entitled to collect/purchase up to 500 large shell (200–230mm) to ensure supply, as well as being allowed to collect smaller shell (i.e. from the 100mm minimum size limit). The proposed interim measure is based on limited exploratory surveys conducted by a licence holder in late 2014. The surveys noted that it may currently be difficult to acquire sufficient amounts of 100–200mm due to uncertainty regarding the location of existing shell beds and the potentially depleted status of stocks (R Tully, 2014, pers. comm., September 24). The feasibility of the proposed transition period for management would need to be considered by the HCWG. Any decision would need to be made in consultation with the pearl industry.

Potential changes in size limits would additionally need to be discussed with the traditional community, in terms of community support or opposition, and the cultural significance of the pearl oyster. If the reduction in size limits is implemented efforts in community education and public awareness may need to be refreshed. Previous discussions with industry at working group meetings have suggested that both the catching sector and farm operators have little knowledge of the legislation in relation to size limits on pearl shell (AFMA 2006). Any community education program should particularly promote leaving larger shell (i.e. broodstock) alone.

4.2 Support for a reduction in size limits

- **Management:** The proposed change in size limits would align more closely with previous recommendations for more precautionary size limits. The minor catches predicted under these restrictions are regarded by industry as unlikely to negatively impact the fishery if effective management strategies are in place (HCWG/1; R Moore 2014, pers. comm., 13 October).[3]

See Evaluation of size limits (pg 20)

- **Industry:** While the pearl industry does not directly acknowledge that depletion may be a major issue for the TSPSF, there appears to be a consensus that more efforts need to be made to protect broodstock and encourage stock recovery.

[3] Pearl farms have previously reported that they require a consistent supply of 2000–3000 shell per year to remain viable. However it has been suggested that a farm can remain viable on <2000 shell per year if required and that all pearl farming operations in the Torres Strait would require a total of <6000 shell per year (R Tully 2014, pers. comm., 03 September). Such numbers are thought to have little impact on a population of several million (T Skewes [CSIRO] 2014, pers. comm., 14 October).

- **Industry:** A minimum size limit of100mm would prevent attempted sale of 'bastard shell' (*P. albina*) to pearl farms. *P. albina* is common in the surface layers of water in the Torres Strait and can sometimes be mistaken for juvenile *P. maxima* by fishermen unfamiliar with oysters. It can be distinguished in that it reaches a maximum size of approximately 90mm and is only suitable for mabe ('half pearls').

- **Cross-jurisdictional:** The Department of Fisheries Western Australia (DFWA) initiated a trial to reduce the legal minimum size limit for pearl oyster collection in Western Australia from 120mm to 100mm for 15% of wildstock quota. The trial for the reduction in size limit was conducted in Zones 2 and 3 (see Appendix C). This was to assess the suitability of smaller shell for pearl culturing. The trial was due for completion in 2012/13 but has now been extended until 2016 (R Jones [DFWA], pers. comm., 30 September).

  The Department's Research Division reported that there were no perceived sustainability issues relating to reducing the size limit (DFWA 2013). No formal interim reports have been published or made publically available.

  It should be noted that while the reduction of the minimum size limit in Western Australia has not negatively affected stocks, the fishery is managed very differently to the TSPSF.

See Current management arrangements (pg 16)

4.3 Opposition to a reduction in size limits

- **Management:** It is possible to argue for the closure of the TSPSF based on the objectives of the *Fisheries Management Act 1991*. The fishery remains open due to the different priorities of the *Torres Strait Fisheries Act 1984*. However some believe that size limits are irrelevant and favour indefinite closure based on the uncertain status of stocks and possible failure of recruitment, to prevent continued exploitation of what is regarded as a depleted stock.

See Issues for management (pg 20)

- **Industry:** A maximum size limit of 200mm was previously reported as causing pearl farms to reject approximately 60% of shell presented for sale (TSFIICC/7). This was the initial impetus for increasing the maximum size limit to 230mm. Statements from some in the pearl industry at the time (i.e. 1989) that the increased size limit would be effective in protecting broodstock have not necessarily been demonstrated or confirmed by research.

- **Industry:** One pearl farm in the Torres Strait expressed concern that shell collected at 100mm would be too delicate to harvest without causing damage.

4.4 Additional recommendations for management

A number of additional management recommendations have been produced based on evaluation of current arrangements and the status of pearl shell stocks:

1) **Acknowledgement of the need for revised management arrangements in the TSPSF**

   Despite a history of severe exploitation and depletion, management arrangements have remained relatively unchanged since the late 1800s. Change has been repeatedly deferred due to a lack of information with which to make informed decisions (HCWG/2).

   This report identifies the ineffectiveness of current management arrangements for the TSPSF and presents sufficient evidence for informed decisions to be made regarding the future management of the fishery.

   See History of the TSPSF (pg 15), Current management arrangements (pg 16), Effectiveness of current management arrangements (pg 19), Issues for management (pg 20)

2) **Completion of a formal stock assessment of the TSPSF**

   The fishery has not been formally assessed since 1989 and the current status of stocks is uncertain. While there have been low levels of activity over more recent decades, lack of a formal stock assessment precludes the rational management of the TSPSF. A comprehensive stock survey (estimated at approximately $448 000 based on costs for TRL surveys) is required to:

   - Fully understand the potential implications of pearl oyster biology (e.g. reproductive and recruitment strategy, the gender-size relationship, size at sexual maturity) and the effects of the pearl farm environment (e.g. overwhelming bias towards maleness and potential reproductive infertility) on wildstock.
   - Implement effective management arrangements that fulfil the management objectives of the fishery and maximise its use in accordance with the *Torres Strait Fisheries Act 1984.*

   See Biology: Pinctada maxima (pg 10), History of the TSPSF (pg 15), Current management arrangements (pg 16), Effectiveness of current management arrangements (pg 19), Issues for management (pg 20)

3) Enforcement of size limits for all participants in the TSPSF

Traditional inhabitants do not currently require a licence and are exempt from the size limits imposed on other participants in the TSPSF when fishing for traditional purposes (i.e. not for commercial sale). Those licenced as community fishers are also exempt from the size limits if their boat is <6m in length. These exemptions were first introduced in management notices in 1997 (see *FMN No. 36*). There are concerns that the lack of size limits for traditional and community fishing enables shell beds to be stripped of shell, with legally sized oysters being sold on to pearl farms and under-/over-sized shell being retained for personal use.

While likely to be a contentious issue, it is suggested that size limits be introduced for traditional and community fishing and enforced across all sectors of the fishery. It is important that the issue is addressed in consultation with indigenous communities within the Torres Strait in the context of the sustainability of the fishery and traditional practices. More information may also be needed to clarify why the exemptions were initially introduced. A consultative approach is essential to address potential negative perceptions of the enforcement of size limits and improve methods to enhance the sustainability of the fishery.

See Biology: Pinctada maxima (pg 10), Current management arrangements (pg 16), Effectiveness of current management arrangements (pg 19), Issues for management (pg 20)

4) Small-scale area closures to enhance stock rejuvenation

Closure of the fishery has been suggested repeatedly throughout the history of the TSPSF and has been a matter of concern to the pearl industry since at least 1987 (TSFIICC/5). The topic has been a reoccurring feature of proposed management options since it was first raised in 1901. Indefinite closure of the fishery was identified by AFMA's TSPSF Discussion Paper (2006) as the preferred option for future management, and was discussed again in 2007 (HCWG/1) and at the Australia-PNG Bilateral Fishery Talks in 2012.

A more palatable alternative to indefinite closure is a number of small localised closures for areas where large areas of shell are known to occur. These closures would be similar to the Conservation (Yellow) Zones in the Great Barrier Reef Marine Park in their intent to protect broodstock, boost recruitment and support the long term sustainability of the population. Localised closures would be in line with the objectives of the TSPSF to conserve stock while maximising access for traditional inhabitants. The location of closed areas and options for enforcement would need to be agreed in consultation with fishermen, researchers and managers.

An additional suggestion complementary to the implementation of localised closures is to allow for 'old shell' from pearl farms that are no longer suitable for pearl production to be returned into closed areas to boost broodstock and enhance population recruitment.[4] However return of shell to wild stock after use in pearl farms would need to be assessed in the context of biosecurity risks.

See Biology: Pinctada maxima (pg 10), Current management arrangements (pg 16), Effectiveness of current management arrangements (pg 19), Issues for management (pg 20)

5) Inter-jurisdictional consistency with Queensland

Management arrangements are consistent between the Torres Strait and Queensland pearl shell fisheries, except in that recreational fishing is permitted under Queensland regulations. Pearl oysters collected recreationally are exempt from the bag limit of 50 that applies to all other molluscs. This is because recreational harvest activity in Queensland is thought to be negligible, meaning that size limits alone are considered sufficient to protect stocks (J Webley [QDAFF] 2014, pers. comm., 21 November). Commercial harvest activity is also considered to be minimal, with the annual catch of *P. maxima* being <1000 shell since 2002/03 (QDEEDI 2012).

It is not expected that there would be any effects on the Queensland oyster population if size limits were reduced in the Torres Strait (J Webley [QDAFF] 2014, pers. comm., 21 November). It is unknown whether the small number of Queensland commercial licence holders are aware of the differences between Queensland and Torres Strait regulations.

However, the viability of the TSPSF may be affected by the productivity of the Queensland oyster stocks (QDPI 2004). It is therefore recommended that:

a) Action is taken to encourage consistency between the Queensland and Torres Strait jurisdictions

b) An education program is initiated to generate awareness of Torres Strait regulations in Queensland.

If the reduced size limits for the gold-lipped pearl oyster are implemented there would need to be consultation with the relevant branch of Fisheries Queensland regarding their ability to enforce a change in regulations.

See Management of the TSPSF (pg 14), Current management arrangements (pg 16)

[4] A similar suggestion was made in 2007 to relocate stocks closer together to increase chances of successful fertilization and stock recovery (HCWG/7).

5 Supporting material

5.1 Biology: Pinctada maxima

Species description

P. maxima[5] are the most abundant of the seven species of the pearl oyster genus *Pinctada* found in the Torres Strait (Colgan & Reichelt 1991). It is the largest species of its genus (Hynd 1955; Rose & Baker 1994), with average maximum shell size being 200–250mm (Gervis & Sims 1992).

The oyster is characterized by a long straight hinge (Gervis & Sims 1992). The external shell is a light fawn colour; it is distinguished from other species by its lack of both radial markings and internal hinge teeth (Hynd 1955; Gervis & Sims 1992). The adult colour morph is usually established by approximately 120mm, with traces of the juvenile colour morphs of green, purple-black, yellow, cream, grey and brown retained only in the umbo region (Gervis & Sims 1992). *P. maxima* are known for the rich lustre of its nacre and the gold or silver band on the internal lip (Figure 1). This is the source of its common names: the gold or silver-lipped pearl oyster. Torres Strait specimens are known for having a wider and more conspicuous lip than specimens from Western Australia and the Northern Territory (Hynd 1955). Shell taken in Torres Strait and PNG waters has previously been reported as containing >50% of gold-lipped shells; discussions with Torres Pearls suggest that the different morphs may now be represented in approximately equal proportions.

Figure 1: Outer and inner shell of Pinctada maxima (gold-lipped specimen)

[5] *P. maxima* is currently regarded as the accepted name for the species. However, the earlier name *P. anomioides* (Reeve 1857) has been put forward as the valid name for this species (Tëmkin 2014). It should be kept in mind that while not in current usage *P. anomioides* still appears in some of the older literature.

Distribution

The range of *P. maxima* spans across the subtropical and tropical coastal waters of south-east Asia and Northern Australia (Hynd 1955). This extends from Hainan off the coast of China, down to the west coast of Australia (approximately 20°S) and across to the east coast of Australia (approximately 25°S) (Gervis & Sims 1992; Yukihira et al 2006), including the Solomon Islands, Burma and the Philippines (O'Brien & Colgan 1995).

P. maxima can tolerate a broad range of environmental conditions and habitats. It is often found in turbid environments and strong currents (Yukihira et al 2006; Gervis & Sims 1992) and tolerates a wide range of salinities (Gervis & Sims 1992). Australian populations experience temperatures between 19–32°C (Gervis & Sims 1992) although optimal temperature for growth occurs at 23–28°C (Yukihira et al 2006). Distribution is limited by the availability of hard substrate on which spat can settle, although adult specimens also occur on mud/sand or in association with seagrass beds (Gervis & Sims 1992). They have a depth limit of approximately 80m but are most predominately found at depths up to 50m (Hynd 1955; Rose & Baker 1994).

Within the Torres Strait the density of *P. maxima* populations shows some significant differences with habitat type (Pitcher et al 1992). The four major habitat types are described as 'mud substrates', 'sand substrates', 'deep reef substrates' and 'gravel substrates' (O'Brien & Colgan 1995). Greater population density was recorded in association with high densities of epibenthic fauna, however habitat type itself is not necessarily a good predictor of population density overall (Pitcher et al 1992).

Lifecycle

P. maxima are protandrous hermaphrodites (beginning as male and later changing to female). Age and size are significant factors in determining the number of males and females in the population, with males present at smaller sizes and females only occurring in the larger size groups (Lee 2010). Gender is not externally obvious but can be distinguished using gonad colouration (Rose et al 1990; Lee 2010). In general:

- Males are predominant between 80–170mm (Lee 2010)
- Females rarely occur until shell size >140mm (Lee 2010)
- The ratio of females to males increases with size (from approximately 150mm) and reaches 1:1 amongst individuals >170mm (Rose & Baker 1994)[6]
- Reproductive maturity occurs in males at approximately 110mm, and at approximately 170–180mm in females (Rose et al 1990)
- Individuals of indeterminate gender occur across the entire age and size range
- Sex reversal from female back to male can occur under stress (Rose et al 1990).

[6] However, Hynd (1957) reported that wild populations in the Torres Strait only attained 1:1 sex ratio at approximately 200mm. A 1:1 sex ratio at approximately 200mm was also reported by Lee (2010) in Indonesia.

Data from Western Australia suggest that individuals reach approximately 120mm in the third year of life and that large oysters (approximately 200mm) can be 15–20 years old (Joll 1996).

Like most marine molluscs *P. maxima* is a broadcast spawner. Successful fertilization is density dependent (i.e. increasing distance between spawning individuals reduces the probability of successful fertilization) (Rose et al 1990).The maximum distance at which successful fertilisation can occur in pearl oysters is unknown, but densities must remain high enough to ensure that when eggs and sperm are released they are close enough to enable successful fertilisation. Spawning is thought to be triggered by temperature changes or sudden changes in environmental conditions. It has been suggested that high recruitment corresponds with El Niño conditions (Hart et al 1990). Shell size is not thought to be related to fecundity.

The proportion of mature gametes in the population is highest during the warmer months (Gervis & Sims 1992). Reproductive seasonality is therefore best considered as 'relative breeding intensities' with a 'major breeding season' rather than discrete spawning periods (Tranter 1958b). The breeding season in northern Australia spans September–October to March–April, with a primary spawning peak at the start of the season and a secondary peak at the end (Rose et al 1990). The larval period ranges from 25–35 days. Spat generally settle in small aggregations of 2–8 individuals (Rose & Baker 1994). Larvae and spat experience high rates of natural mortality due to predation by fishes, rays, octopus, starfish, crustaceans and other molluscs.

Pinctada maxima in pearl culture

Shell size is the primary criterion used in collecting oysters for pearl culture. Oysters must be large enough for pearl nucleus implantation, with *P. maxima* reportedly requiring a minimum size of 120mm (Gervis & Sims 1992). Population modelling in Western Australia found that oysters reach 120mm at approximately three years of age (Joll 1996). Older age groups are not regarded as suitable for round pearl culture because growth processes slow with age (Baker & Rose 1994); oysters >160–170mm (6–7 years old) are generally considered too old to be collected for pearl culture (Joll 1996).

Box 1: Use of pearl shell on a pearl farm (acquisition, pearl culture and lifespan)

Acquisition of pearl oysters ('shell') for culture

Wild shell is bought from licenced fishermen for approximately $20 per shell. Collection and purchase of shell generally occurs around November–February when the TRL season has finished and divers are available to collect pearl shell; shell could theoretically be collected at any time of the year in suitable conditions (R Tully 2014, pers. comm., 19 November). Shell is also collected by those fishing for TRL and trochus however current effort levels are considered to be very low. O'Brien & Colgan (1995) reported collection around neap tides in October–March. Once shell is purchased they are usually left in hanging baskets for up to six months to acclimatise to the pearl farm environment prior to seeding.

The Pearl Culture Cycle

1. **Pearl seeding (pearl nucleus implantation)**

   Although Gervis and Sims (1992) recommend that pearl nucleus implantation should be done at <26°C, seeding can occur at any time of the year. To initiate the process, one good-quality healthy shell (the donor) is 'sacrificed' and the mantle is cut into pieces. The mantle is a layer of tissue that secretes nacre ('mother of pearl').

   The piece of mantle is inserted next to the gonads of another 'virgin' oyster, with a pearl nucleus (a small ball made from Mississippi mussel shell) being implanted within it. The use of the mantle is similar to the concept of a tissue graft and facilitates the formation of the pearl sac around the nucleus.

2. **Monitoring pearl growth**

   After seeding shell are placed in mesh panels and returned to the water for the 'grow out' phase. The shell is cleaned after approximately two months, and then cleaned again and x-rayed approximately four months after seeding.

   X-ray enables pearl farms to check that the nuclei have successfully established. When a nucleus does not establish it is referred to as a 'vomit'. Up to 20% of newly seeded oysters can vomit if environmental conditions are unfavourable (e.g. storms). Shell where vomits have occurred can be immediately re-seeded.

3. **Pearl harvest**

   It takes two years for the pearl to develop. Harvest is best done in the colder months (June–August) due to the gonads being retracted. This results in a tighter lay of nacre and better quality pearls. A slit is cut into the pearl sac and the pearl is removed. The shell is then re-seeded with another nucleus of a similar size to the removed pearl.

An individual oyster can be used for up to four pearl culture cycles. Each cycle produces a sequentially larger pearl; third and fourth cycle pearls are the largest and the most valuable.

Not all oysters will reach the fourth cycle. For example, if 100 shell are seeded for Cycle 1, approximately 75–85% will be reseeded for Cycle 2. 50–60% of the original number will be reseeded for Cycle 3, and only 30–40% of the original number will reach Cycle 4.

Conventional literature defines 120mm as the minimum size required for pearl nucleus implantation (Gervis & Sims 1992). However, 100–120mm has been suggested as the best starting size for Cycle 1 depending on the density of the shell (R Tully 2014, pers. comm., 05 November). Large scale commercial hatcheries reportedly start seeding shell at 80–90mm, presumably to maximize the number of shell reaching Cycle 4.

When shell becomes 'too old' or otherwise unsuitable for seeding it can be used for 'mabe' (half/blister pearls). Mabe take one year to develop and can then be sold as ornaments or turned into jewellery. Harvesting mabe kills the oyster. Oysters can thus have a life of up to nine years in the pearl culture environment.

6 Management of the TSPSF

The TSPSF is managed by the Protected Zone Joint Authority (PZJA). The TSPSF boundary extends into PNG waters. It also includes the Australian waters within the Torres Strait Projected Zone and the 'outside but near' areas defined in the *Torres Strait Fisheries Act 1984* (Figure 2). The *Torres Strait Fisheries Act 1984* also gives effect to the fisheries elements of the Torres Strait Treaty, which includes the TSPSF.

The Torres Strait Treaty requires cooperative conservation, management and optimal utilization of resources, the protection of traditional fisheries and catching sharing arrangements between PNG and Australia under Articles 20–23. Catch sharing arrangements are negotiated at annual Australia-PNG fisheries bilateral meetings.

AFMA is responsible for the day to day management of the Torres Strait fisheries on behalf of the PZJA. Management arrangements for the TSPSF are discussed annually at the Torres Strait Hand Collectables Working Group (HCWG), with secretariat services for the HCWG being provided by AFMA.

The management of licensing, enforcement, and pearl farms falls under the jurisdiction of the Queensland Government. Pearl farming is considered part of the Queensland aquaculture industry. Differences between Queensland state and Torres Strait regulations for pearl oyster fisheries are detailed in *Box 2*.

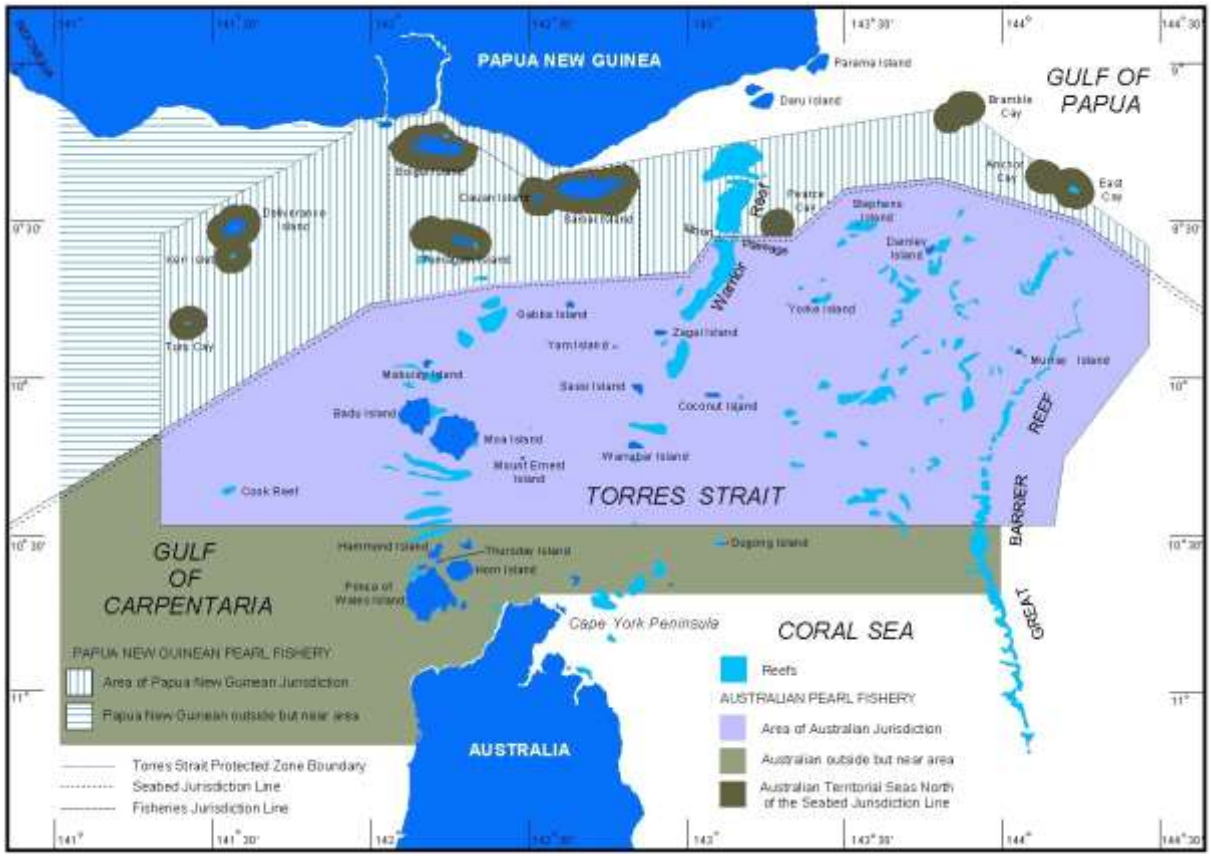

Figure 2: Map of the Torres Strait Pearl Shell Fishery

6.1 History of the TSPSF

Pearl oysters were first discovered in the Torres Strait in 1868. The establishment of Thursday Island as a port was entirely dependent on the pearl shell industry. Thursday Island was the centre for the pearl shell industry in the Torres Strait from 1900-1960 (Bach 1955).

O'Brien and Colgan (1995) describe two main pearl shell grounds, these being the 'Old Ground' (discovered 1881; Bach 1955) and the 'New Ground' to the west and north-west of Thursday Island. The pearl shell grounds historically extend north to PNG and east to Darnley Island (Figure 3). For a more comprehensive summary of the history and management of the TSPSF see *Attachment 1.*[7]

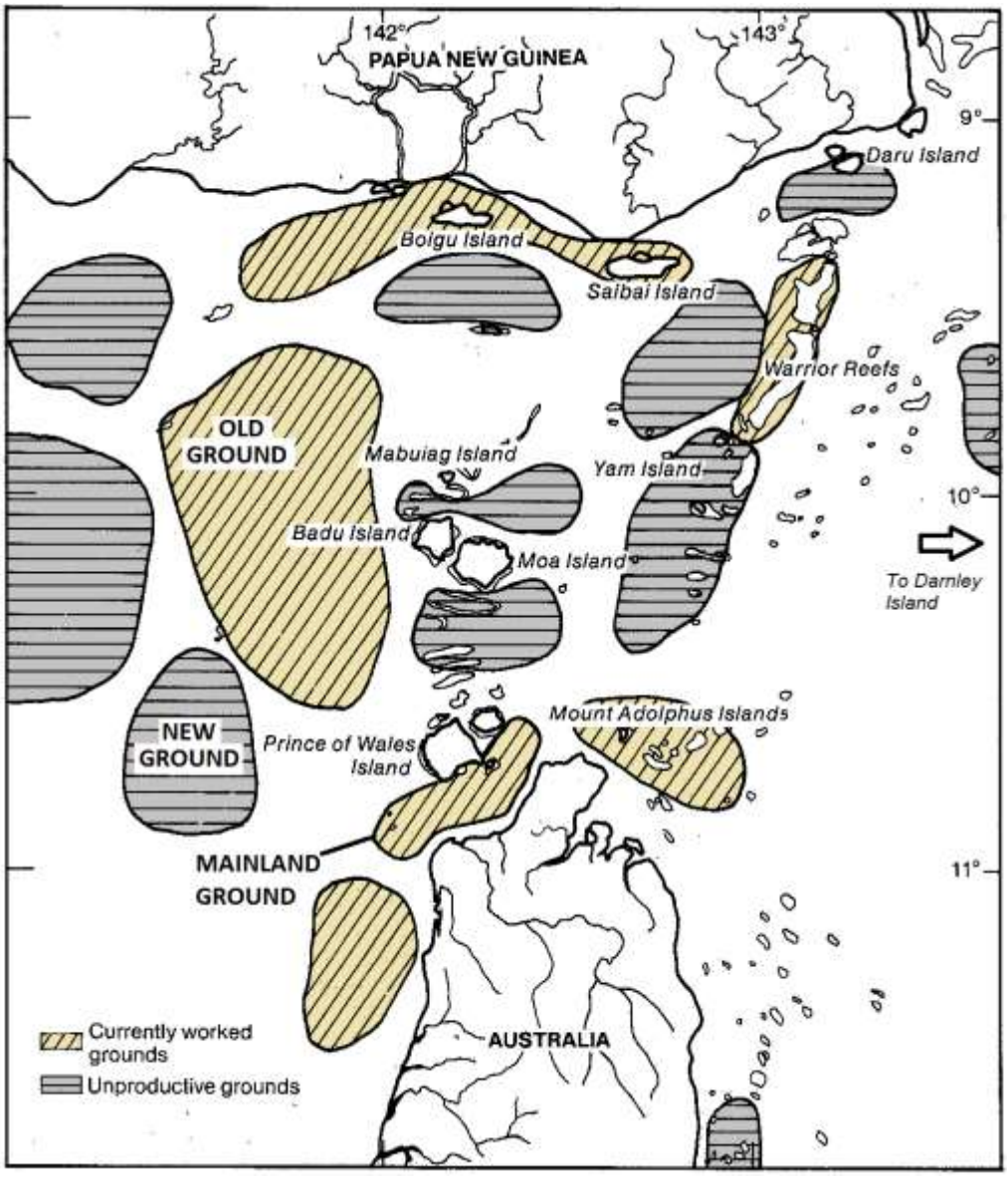

Figure 3: Map of pearl grounds and active/non-active status (Yamashita 1986); private exploratory surveys by a licence holder in late 2014 suggest the map is outdated

[7] See Bach (1955) for a detailed overview of the Torres Strait pearl industry.

6.2 Current management arrangements

Current management arrangements for the TSPSF are defined by the *Torres Strait Fisheries Management Instrument No. 7*. They have remained largely unchanged since the late 1800s. The majority of changes have been in relation to size limits. Restrictions are aimed at promoting the taking of pearl shell for farming purposes. The restrictions:

- Prohibit the taking, processing or carrying of live or dead *P. maxima* in the TSPSF without the appropriate licence
- Prohibit the taking of *P. maxima* outside the size range of 130–230mm
- Exempt a person engaged in community fishing from the prohibition to take pearl shell if their boat is <6m in length[8]
- Exempt a person engaged in traditional fishing from both the prohibition on the taking, processing or carrying of *P. maxima* and the associated size restrictions
- Prohibit the taking of shell by any other method than by diving or collection by hand.

The overall objectives of the TSPSF are to:

- Conserve the stock of pearl shell and achieve optimum utilisation
- Maximise opportunities for traditional inhabitants of Australia and PNG to participate and benefit from the Torres Strait pearl fishery by limiting access for the non-indigenous sector though boat restrictions and licensing
- Provide for catch sharing to occur between Australian and PNG.

The management objectives for PNG and Australia under the Torres Strait Treaty are:

- To conserve the stock of pearl shell so as to achieve its optimum utilisation
- To maximise opportunities for traditional inhabitants of both countries to participate in the fishery.

The TSPSF Fisheries Assessment Report (1995) also makes reference to an agreement prohibiting the transportation of shell in or out of Queensland in order to reduce potential spread of disease. Such an agreement does not appear to be widely documented, although current translocation protocols require all live aquatic animals to receive approval from Fisheries Queensland prior to translocation (QDAFF 2013). Similar restrictions are documented in the *WA Pearl Oyster Translocation Protocol (2009)* for hatchery-produced spat and farmed oysters in Western Australia.

The exemptions for community and traditional fishing first appear in *FMN No. 46* in 1997.

[8] However a licence for community fishing is still required under the *Torres Strait Community Fishing Notice No. 1*.

Box 2: Pearl oyster fishery regulations in other jurisdictions

Queensland: The *Queensland Fisheries Act 1994* has limited relevance to the Torres Strait Fisheries (PZJA/11). However, there is overlap in size limits, requirement for license, gear restrictions, and exemptions for indigenous communities in the East Coast Pearl Oyster Fishery (ECPF) (see Appendix B) under the *Fisheries Regulation 2008*. Unlike the TSPSF recreational fishers are allowed to collect pearl oysters (Young 2004). Pearl oysters are exempt from the bag limit of 50 that applies to other molluscs collected recreationally under state regulations.

Northern Territory: The pearl oyster industry is managed under the state *Northern Territory Fisheries Regulations 1993*. The regulations are laid out in the *Pearl Oyster Culture Industry Management Plan*. The fishery works on the allocation of pearl oyster fishing units being assigned to licence holders based on a total allowable catch (TAC). TACs are determined on a yearly basis. A maximum of 120 fishery units can be allocated to the fishery; one quota unit equates to 1150 oysters. Licences are renewed annually. Wildstock must be collected by hand.

Western Australia: The pearl oyster fishery is regulated by a number of legislative instruments include the *Pearling Act 1990* (currently under revision; DFWA 2013), the *Pearling (General) Regulations 1991*, and the *Pearling (Pearl Oyster Shell Size) Notice 1997*. Collection of pearl shell is prohibited if shell is <120mm; divers tend to target shell 120-165mm. A maximum size limit of 160mm is enforced only in the Exmouth Gulf. The maximum size limit in the Exmouth Gulf was introduced to protect broodstock some time ago following a period of low recruitment in the zone (Fletcher et al 2006).

The fishery is divided into four zones to allow for management arrangements to be tailored according to the differences (i.e. environmental conditions, recruitment variability) in each (Fletcher et al 2006) (see Appendix C).

The fishery works under a predictive quota system based on annual surveys (A Hart [DFWA] 2014, pers. comm., 19 September). A total allowable catch (TAC) is divided into individually transferable quota units (ITQs) and allocated among 14 licence holders. The fishery is limited entry, with no new licences currently being issued. One quota unit equates to 1000 oysters. Wildstock must be collected by hand.

Fishing did not occur in Zones 1 and 3 for economic reasons from 2008 despite TAC allocations but recommenced in 2014; Zone 4 has a continuing arrangement of zero TAC (R Jones [DFWA] 2014, pers. comm., 17 November).

Papua New Guinea: Pearl oysters are managed under the *Fisheries Management Act 1998* and the *Fisheries Regulations 2005* as a 'sedentary organism'. Harvest and export of pearl shell is prohibited unless the oyster is 130–230mm. Harvesting at night prohibited. Buyers of shell require a licence. Details of regulations and licence restrictions are published in the National Gazette Number G57 (4 April 2002) (inaccessible for this report).

Pearl oyster fishery regulations in other jurisdictions cont.

Table 1: Comparison of size limits and other regulations (as of 2014) for *Pinctada maxima* across state jurisdictions

Regions	Minimum (mm)	Maximum (mm)	Other notes
Torres Strait	130	230	Limited to those with licences or traditional rights; boat size, licensing and gear restrictions.
Queensland	130	230	Limited to those with licences if for commercial purposes; licensing and gear restrictions. No quota limit for recreational fishers.
Northern Territory	~~120~~	~~200~~	Size limits rescinded in 1989 in favour of quotas. Limited to those with licences; licensing and gear restrictions.
Western Australia	120	160 (Exmouth Gulf only)	Limited to those with licences; licensing and gear restrictions. Quotas based on annual surveys. Trial for reducing size limit to 100mm for 15% of catch 2012/13; extended to 2014/16.
Papua New Guinea	130	230	Night harvest prohibited; licensing restrictions (details inaccessible).

6.3 Recent catch trends and licensing

Collection of pearl shell has fluctuated substantially over time. Records show that catches of pearl shell declined drastically after 1970 (O'Brien & Colgan 1995). There have been insignificant amounts of pearl shell harvested since at least 2006. Australia-PNG catch share arrangements under the Torres Strait Treaty have been largely unutilized since 2001; Australia withdrew from negotiations because of the lack of information on stock (TSFMAC/1).

The number of fishing licences for the fishery has declined over time. The number of licences reached its peak in 1904 with 378 boats operating in the fishery. A total of 48 licences (21 TIB and 27 TVH) were active in 2014; this number has been relatively constant since at least 2009. Most licences are obtained in association with multiple endorsements for other fisheries. Expansion of licence numbers in the TSPSF is limited to traditional inhabitants in order to maximize their opportunities. Provisions applying to non-traditional inhabitants include strict boat replacement polices and the linking of tender boats with specific primary boats. Latent effort in the fishery has been substantially reduced.

Low levels of activity in the TSPSF mean that pearl farms in the Torres Strait have a history of struggling to keep farms fully stocked (TSFMC/13; HCWG/1).

6.4 Effectiveness of current management arrangements

The history of the TSPSF suggests that management arrangements have been ineffective. The fishery is historically described as suffering chronic depletion, with reports of overfishing and temporary collapses of stock dating back to at least 1883 (Bach 1955).[9] In spite of this there have been no major changes in the way the fishery is managed for over 100 years (see Attachment A).

Existing management arrangements have been identified as being unlikely to meet the requirements of guidelines for the ecologically sustainable management of fisheries (PZJA/OOS 2003). TSFMAC has additionally acknowledged that TSPSF management arrangements 'fall well short of ensuring the sustainability of the resource and are not effective at controlling effort (and catch)' (TSFMAC/4).

Management groups have expressed concern that:

- the maximum size limit of 230mm appears to be ineffective at protecting adult breeding stock (HCWG/7, 8)
- stocks have failed to regenerate (TSFMC/13).

Current management arrangements have additionally failed to fulfil the conservation objectives of the TSPSF. The 'immediate objective' detailed in the TSPSF Fisheries Assessment Report (1995) to establish the sustainable level of harvest for the fishery through stock assessments and effective enforcement of size limits remains incomplete.

Where current arrangements have succeeded is in maximizing the opportunities for traditional inhabitants of Australia and PNG to participate in the fishery. However, the continued prioritisation of this area without some form of review may ultimately be detrimental to the long-term sustainability of the fishery as the exemptions in place for traditional and community fishing could potentially enable shell beds to be stripped of shell.

Unlicensed fishing is also an issue and was identified as the current priority compliance risk for the TSPSF in 2013 (HCWG/7). PZJA annual reports from 1988–2001/02 generally report a good level of compliance with management arrangements. However, fishermen have suggested that compliance with regulations has been questionable. The attempted sale of oversized shell is becoming more common.

Research additionally suggests that conventional management strategies (i.e. size limits, quotas, closed seasons and gear restrictions) are inappropriate for patchily distributed, sessile, broadcast-spawning species (Gascoigne & Lipcius 2004). Chronic depletion of wildstock could thus potentially be attributed to their use in the TSPSF. However, these strategies are the most practical for the TSPSF in the context of resource availability and the preferred Commonwealth approach to small fishery management (see *Box 4*).

[9] The depleted state of the TSPSF is noted in newspapers (*The Queensland pearl shell industry* 1904; *The pearl shell industry* 1905), historical accounts (Bach 1955), fishery assessments (Colgan & Reichelt 1991; O'Brien & Colgan 1995; Williams & Coles 2000) and at management meetings (e.g. from the HCWG, TSFMC, TSFMAC, PZJA and TSSIIFIC).

6.5 Evaluation of size limits

In contrast to Gascoigne and Lipcius (2004), AFMA's TSPSF Discussion Paper (2006) describes size limits to protect juveniles and broodstock as a sound management tool. There is limited documented evidence as to the reasoning behind the minimum size limit of 130mm, but it assumedly allows males to reach reproductive maturity (at approximately 120mm) and spawn at least once before harvesting. Minimum size limits are often found to be effective for protecting juvenile populations even when not originally scientifically based (Hancock 1990).

The maximum size limit of 230mm is not effective in protecting larger adult broodstock (AFMA 2006; HCWG/7, 8). 230mm was defined as the maximum size limit based on complaints from the pearl industry that the initial maximum of 200mm was too restrictive; industry also advised that a maximum of 230mm would protect broodstock (TSFIICC/7). Former QAIF representative for the Queensland pearl industry Ms Serena Sanders (2014, pers. comm., 01 October) expressed surprise that the maximum size limit for the Torres Strait was 230mm, as it corresponds with the maximum size of pearl shell usually found in wildstock.

7 Issues for management

7.1 Uncertain status of pearl stocks

The current status of stocks in the TSPSF is uncertain. The fishery has not been formally assessed since 1989 (Colgan & Reichelt 1991), has not undergone strategic assessment (initially planned for 2005), and is barely mentioned in the most recent five-year strategic research plan for the Torres Strait due to insignificant harvesting activity in the fishery and its low economic value.

Conflicting reports regarding the recovery or depletion of stocks could be because of:

- The patchy/clumped distribution patterns and fluctuating recruitment of oysters in general making the accurate estimation of existing stocks difficult
- Major changes in the location of shell beds (O'Brien & Colgan 1995)
- Localised stock recovery.

Additional factors include the belief that:

- Natural reserves of inaccessible unfished shell beds exist in deeper waters and ensure continued recruitment into accessible stocks (Gervis & Sims 1992). The existence of such reserves is unconfirmed
- Low levels of supply to farms are due to low catch effort rather than stock depletion.

Lack of formal stock assessment precludes the rational management of the TSPSF (O'Brien & Colgan 1995; Williams & Coles 2000). The TSPSF Fisheries Assessment Report (1995) defines adequate stock assessment information as one of the performance criteria for the TSPSF. Stock assessment of the TSPSF would be in line with its original management objectives, as well as with suggestions from PNG at the 2012 Bilateral Torres Strait Treaty Meetings.

A comprehensive stock survey is required if the use of the TSPSF is to be maximized in accordance with the *Torres Strait Fisheries Act 1984*. Certainty regarding the current status of stocks would ensure the effective management of the fishery.

An indicative cost for a benchmark pearl shell survey can be described based on the 2002 CSIRO tropical rock lobster (TRL) survey. The TRL survey cost AFMA $273 000, with an additional contribution from CSIRO of $175 000 (AFMA 2006) (for a total of $448 000).

Box 3: History of TSPSF stock assessments

- Older surveys suggest that shell is not abundant. *P. maxima* stocks in the Old Grounds has previously been estimated at approximately 33 000 shell per 1000km^2 (Colgan & Reichelt 1991). This was half the overall density of a survey in the central Torres Strait (Pitcher et al 1992) where population estimates were 72 000 shell per 1000km^2
- Data from other surveys conducted by the Japanese (in 1938 and 1957), by CSIRO (1952–1960) and the Commonwealth Fisheries Department (1956–1962) are of low quality and in many cases missing (O'Brien & Colgan 1995)
- Data from a private survey and harvesting operation from in 2001 provided limited information on the state of stocks (TSFMAC/1)
- A five-day private survey by a licence holder in parts of the Mainland Ground (Figure 3) reported only 32 shell within the legal size limits and a predominance of 180–200mm shell across 46 hours of diving by two divers; low levels of shell were attributed to lack of familiarity with survey techniques and uncertainty regarding the current location of pearl beds
- Stocks reported by industry as prolific on the PNG side of the fishery (P King 2014, pers. comm., 19 November)
- A visual survey in November 2014 simultaneous to annual TRL surveys sighted 11 shell at eight sites (of 130 sites surveyed). It is possible some shell was missed due to the focus on TRL(D Dennis [CSIRO] 2014, pers. comm., 04 December)

7.2 Possible failure of stock recruitment

History indicates that the TSPSF has experienced repeated cycles of overexploitation and recovery, with a steady decline in overall stocks. AFMA's TSPSF Discussion Paper (2006) notes that the fishery appears to remain overexploited with reduced numbers of broodstock to enable recruitment.

However much of the pearl industry and indigenous community believe that pearl oyster stocks recover quickly from overexploitation and can support ongoing harvesting activity. This belief is reflected in management arrangements, which have remained virtually unchanged for over 100 years (see Attachment A).

The assumption of guaranteed stock recovery has been challenged in Hawaii (Schultz et al 2011) and the Solomon Islands (Hawes et al 2011), where overexploited pearl oyster populations have failed to recover despite harvest bans being enforced in 1930 and 1993 respectively. Failure to recover has been attributed to the patchy distribution patterns of *P. maxima*, which make it prone to Allee effects and population collapse (Gascoigne & Lipcius 2004).[10] Stock recovery could also be affected by the collection of undersized and oversized shell in the course of the allowances for community and traditional fishing in current management arrangements.

Recent scientific papers also suggest that larval dispersal in oceanic systems is shorter than previously expected and recruitment more localised than expected. Recruitment to pearl grounds in Torres Strait may therefore be more reliant on localised shell stocks than those in other areas (e.g. Queensland's East Coast or PNG waters) (QDPI 1994; AFMA 2006).

There are some indications that pearl oyster stocks in the Torres Strait could be close to collapse. Mr James Prescott, formerly involved in the management of the fishery, stated that from previous experience he had observed very few young shell (2014, pers. comm., 30 December). Private exploratory surveys by a licence holder in late 2014 found the majority of shell was 180-200mm, with only 37% catch <200mm. There is also a predominance of large shell in what is presented to pearl farmers for purchase. These reports suggest low levels of recruitment into the TSPSF.

7.3 Commonwealth vs Torres Strait fisheries priorities

The Commonwealth's *Fisheries Management Act 1991* emphasises that the exploitation of fisheries resources should be conducted in a manner consistent with the principles of ecologically sustainable development and include the exercise of the precautionary principle where applicable. Management activities are to have regard to achieving the optimum utilization of living resources and preventing overexploitation. The current uncertainty regarding the status of the TSPSF and its history of depletion would suggest that under the *Fisheries Management Act 1991* the fishery should be closed until stocks have recovered.

The objectives of the *Torres Strait Fisheries Act 1984* similarly seek to protect and preserve marine resources, but prioritise maximizing indigenous opportunities and the rights associated with the traditional way of life. Where possible, measures for ecological sustainability are to minimize any restrictive effect on traditional fishing. The TSPSF thus remains open, with those engaged in traditional fishing being exempt from licencing requirements and traditional and community fishing being exempt from size restrictions.

[10] The Allee effect occurs when some component of species fitness (e.g. success of fertilisation) deteriorates as population density decreases towards zero.

There is therefore conflict between the management priorities of Commonwealth fisheries legislation and those of the Torres Strait. The allowances for traditional and community activities under the *Torres Strait Fisheries Act 1984* have led to concerns that the collection of under- and over-sized shell as a food source[11], as well as the legally sized shell for sale to pearl farms, could lead to overexploitation and stock collapse.

Box 4: Commonwealth approach to management in small fisheries

The TSPSF falls under the definition of a 'small' Commonwealth fishery (i.e. a fishery with a gross annual production of <$1.5m). The fishery is estimated to have a value of approximately $8000. The estimated cost of managing the fishery ranges at $20 000–40 000, approximately three to five times the value of the fishery (HCWG/2). The Australian Government has a preference that unless net returns are positive a fishery should be closed to fishing. If it is not possible to close the fishery, management regimes must seek to ensure stock sustainability at minimal cost (Galeano et al 2005).

Complete closure of the TSPSF does not appear to be an option. Size limits and licencing are regarded as the most economically efficient way to regulate the fishery due to the expense of setting and enforcing quotas.

7.4 Assumption that pearl farms are breeding pools

Pearl farms relocate oysters from wildstock into a small area. Increased proximity of shell enhances the spawning success of broadcasting species such as oysters. Pearl oyster farms are consequently often regarded as breeding pools that feed back into wild populations. This is a common belief among pearl farmers in the Torres Strait.

The belief that pearl farms function as breeding pools may be incorrect. Research has identified that sex ratios in cultured *P. maxima* are overwhelmingly biased towards maleness. The ratio of female to male can be up to 0.01:1 (Lee 2010). Lack of females and female gametes in the culture environment would decrease rates of successful fertilization and negate recruitment contributions back into wildstock.

Box 5: Potential cause of male gender bias in the pearl farm environment

Predominance of males in a culture environment is possibly an indication of ambient stress and/or unsuitable conditions (e.g. overcrowding) (Lee 2010). While unaware if there was a gender bias in their own operations, Torres Pearls suggested that the male bias in a culture environment could be caused by the process involved in cleaning the shell (R Tully 2014, pers. comm., 05 November). Pearl oysters in culture are removed from the water every few months to be cleaned of algae and other marine organisms that have settled on the shell. Cleaning is usually completed with high-pressure hoses and could cause enough stress to encourage maleness.

[11] More recent reports conflict with older accounts that taking of shell outside legal size limits 'was not an issue as the local fishermen reported it as a very uncommon practice' (TSFMC/13).

7.5 Detrimental effects of x-ray

X-ray is used by the pearl culture industry to unobtrusively monitor the growth of the pearl within the oyster shell. Oysters are x-rayed once per seeding cycle to determine that the pearl nuclei has successfully established[12]. Use of x-ray in the pearl culture industry was initiated by Solomon (1910) as a way to preserve wildstock and increase the value of pearl yields[13].

The x-ray process may affect the viability of gametes. Low-dose chronic irradiation has been reported to cause developmental defects in embryos and embryo death in various fish species, as well as chromosomal aberrations, decreased fertilization, and developmental defects in marine molluscs (Rugh 1953; Anderson & Harrison 1986; Li et al 2000; Seaver et al 2009). The outcome of irradiation is thought to be strongly influenced by the frequency and intensity of irradiation, and may vary depending on the stage of the reproductive cycle at which the organism is irradiated (Anderson & Harrison 1986).

While not specific to *P. maxima*, previous research on irradiation and the reproductive biology of marine invertebrates presents the question of whether pearl oysters are exposed to x-ray at an intensity and frequency that affects gamete viability.

If gamete viability is unaffected: Farmed populations can be regarded as breeding pools that can feed back into the wild population (dependent on gender ratios in the pearl farm environment; see Section 7.4).

If game viability is affected: Collection from wildstock would need to be recognised as being equivalent to permanent removal from the breeding population.

[12] X-ray is also used to differentiate cultured and natural pearls on the commercial market (Karampelas et al 2010; Sun & Mei 2010; Agatonovic-Kustrin & Morton 2010). X-ray fluorescence analysis can identify the 'mother species' of fresh and seawater pearls based on distinct absorption signatures (Miyoshi et al 1987). High- and low- energy radiation exposure has also been used to artificially alter the colour of cultured pearls (Tsuiji 1962; Matsuda & Miyoshi 1988; Miyoshi 1992).

[13] Pearl harvest in the early pearl industry involved killing the oyster. The practice was widely regarded as wasteful, as pearls were generally found in approximately 10 per cent of catch (Solomon 1910).

Box 6: Clarification on whether x-ray negatively affects shell growth

The minutes from the Torres Strait HCWG/7 (October 2013) note that Ms Vanessa Drotini referred to a report produced by a previous AFMA graduate as including information about how x-ray can affect the growth of pearl shell. The previous graduate was eventually identified as Mr Matthew Stadler (now of DFWA). The report was tentatively identified as the basis of AFMA's TSPSF Discussion Paper (2006) but did not contain the aforementioned information. Mr Stadler confirmed that he completed work on the feasibility of wild pearl shell collection for a graduate project in 2005 but did not explore the effects of x-ray.

According to the literature, the x-ray process itself is accepted as having no noticeable effect on the physical growth of pearl shell. Solomon (1910) discussed the topic in detail in a report for the Proceedings of the Fourth International Fishery Congress in Washington (USA) in 1908. Having consulted with experts on the effects of x-ray on animal tissues, Solomon believed that 'the slight exposure' necessary for the x-ray process could have no effect on growth. He also noted that continuous exposure of live oysters to x-ray for extended time periods under experimental conditions did not produce any physical ill-effects.

There is no further mention of x-ray having harmful effects on the growth of pearl shell in recent scientific research. Enquiries regarding the topic were often met with puzzlement by industry and management representatives, as well as by JCU pearl oyster biologist Paul Southgate. Considering that x-ray technology has been considerably refined since 1908, it is unlikely that harmful effects on the physical growth of pearl shell have remained unnoticed.

8 Addendum: Alternative measure of size

Shell size is the conventional standard measure used in the management of mollusc resources. The accuracy of shell size as an indicator of the age of shell was questioned by Mr Rusty Tully at the Torres Strait HCWG/7 in 2013. Shell age is important in the pearl industry as older shell is less suitable for culture. Based on personal experience, Mr Tully proposed hinge width as a more reliable measure of age (R Tully 2014, pers. comm., 22 September). 15mm was suggested as a potential maximum hinge width for shell of an age most suitable for use in pearl culture.

A similar suggestion was made in 1997 but was discarded after John Norton, a Senior Veterinary Pathologist with QDPI at the time, recommended against it without more information (TSFMAC/14). The suggestion was subsequently investigated for this report to clarify the issue.

8.1 Patterns of shell growth in marine molluscs

Normal growth in molluscs is characterised by fast initial increases in shell size 'to near maximum size', with a subsequent increase in the thickness of the shell (Herdman 1903; Mohammad 1976). The faster growth of younger oysters (i.e. smaller size groups) in comparison to older larger size groups is well documented (Herdman 1903; Gervis & Sims 1992; Chellam 1978; Lee 2010). Increases in shell size are generally considered to be small after two years (Herdman 1903; Gervis & Sims 1992).

8.2 Why shell size is an inaccurate measure of age

Variation in the growth rate of shell is a common characteristic of bivalve molluscs. Shell growth is a function of interactions among several environmental variables Lee 2010). Fast growth is indicative of good health and healthy environmental conditions (Herdman 1903). Growth is particularly influenced by temperature (Gervis & Sims 1992), with faster growth in the warmer summer months, and at shallower depths (Yukihira et al 2007; Lee 2010). The growth of *P. maxima* has also been linked to variations in pH, salinity, water temperature, biofouling, and particulate matter (Lee 2010).

Differences in the shell size of similarly aged oysters in different locations was first documented by Herdman (1903) (Figure 4), as well as in more recent studies (Hart et al 1999; Kvingedal et al 2010). Shell size is therefore an unreliable measure of age, due to its sensitivity to local environmental conditions.

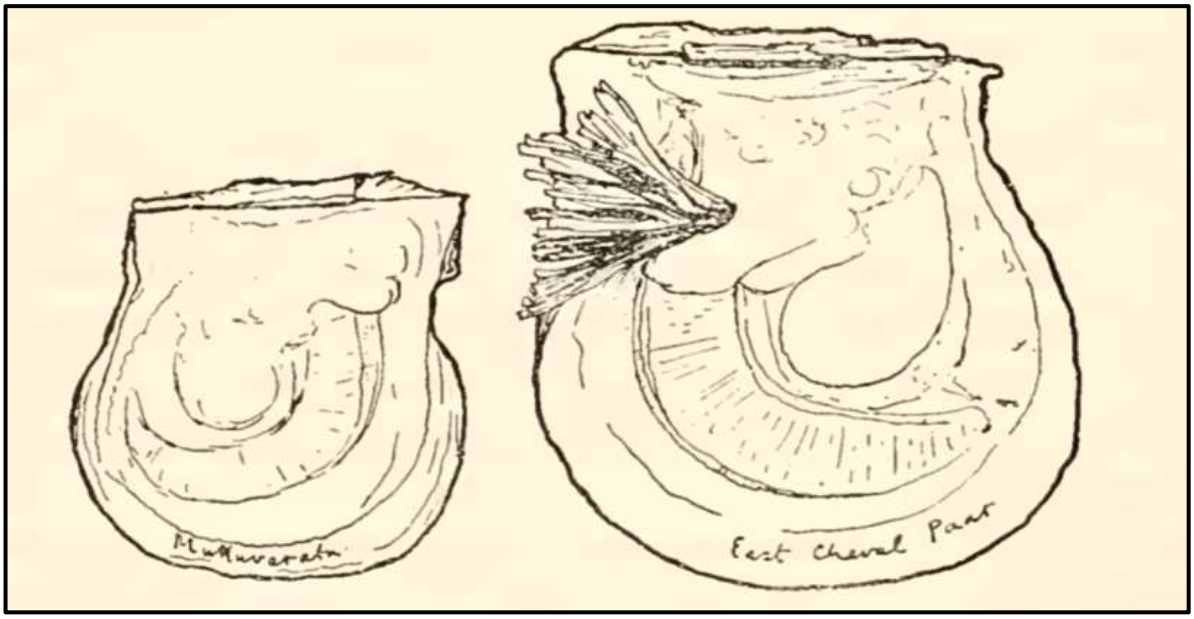

Figure 4: Effect of location (i.e. different environmental conditions) on the growth of pearl shell of the same age (Herdman 1903). Good conditions increase shell growth rates.

The actual definition of shell size is also unclear. There are at least four definitions for shell size in the scientific literature (e.g. Tranter 1958a vs Sims 1990 vs Chellam 1978 vs Mohammad 1976), and these may differ from legislative definitions (e.g. in the *Pearling (Pearl Oyster Shell Size) Notice 1997*) and from its common interpretation by industry.

8.3 Alternative measures of age

Hinge width, shell thickness and heel depth (Figure 5) have been identified by a small number of studies as reliable measures of age in molluscs. In order of usefulness, these are:

Hinge width: increases steadily with age irrespective of environmental conditions and provides a reliable and accessible measure of age (Mohammad 1976)

Shell thickness: increases steadily with age irrespective of environmental conditions but can stagnate in larger shell sizes (Mohammad 1976; Chellam 1978)

Heel depth: increases steadily with age irrespective of environmental conditions (Tranter 1957, 1958a, 1958b) but can be degraded by environmental conditions

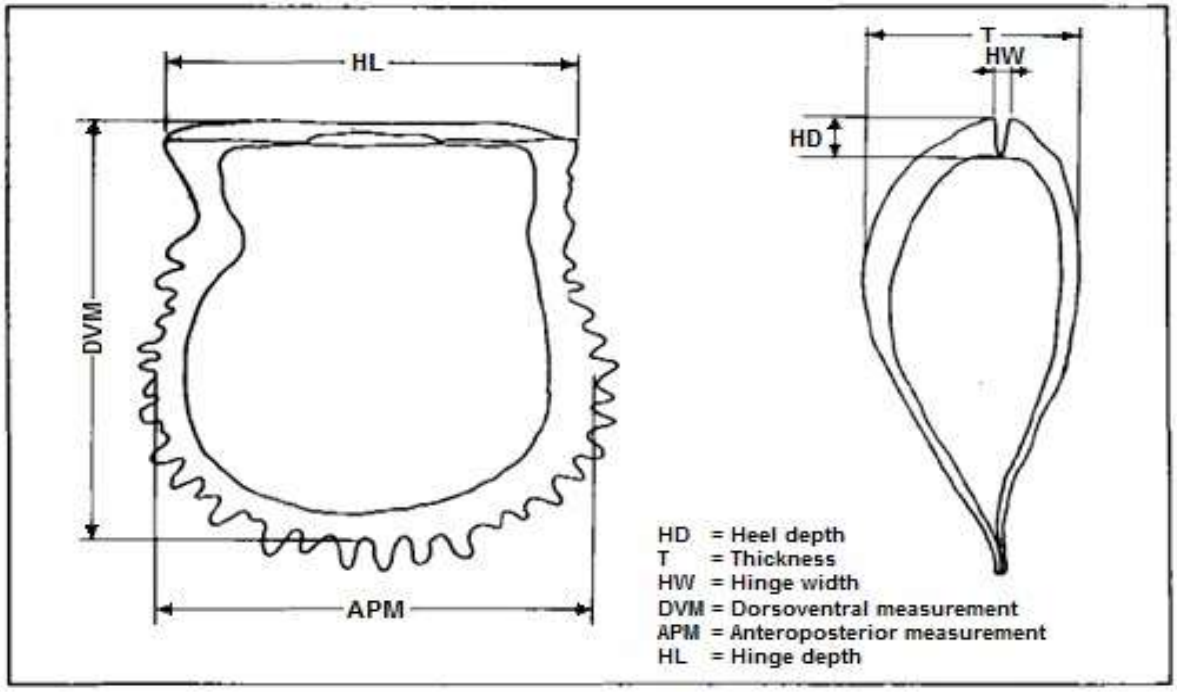

Figure 5: Shell dimensions of pearl oysters. DVM is most commonly used in scientific studies.

8.4 Recommendations

Research regarding the growth of pearl oysters confirms Mr Tully's suggestion that hinge width is more accurate than shell size as a measure of age. However, the use of hinge width would be difficult to implement as part of management arrangements (T Skewes [CSIRO] 2014, pers. comm., 14 October). Shell size, not age, is also the most important factor in determining sex in *P. maxima* (Lee 2010); it is consequently the most appropriate measure for managing pearl oyster stocks as a long-term sustainable resource. Hinge width may be regarded as alternative measure that may be useful in the pearl culture industry for identifying and purchasing shell suitable for culture.

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Attachment A: Management history of the TSPSF from 1868-2014

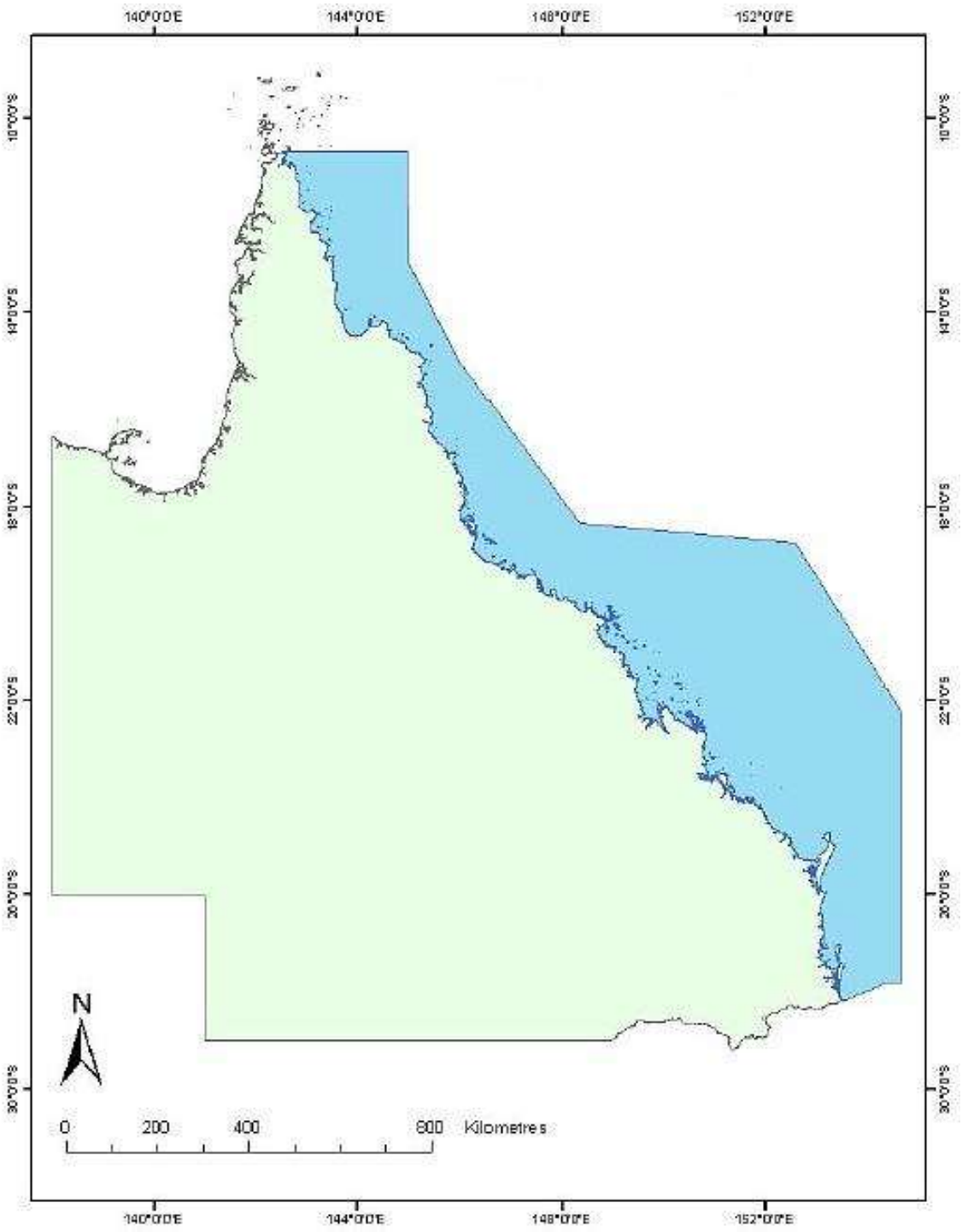
Year		Events
1868		Pearl shell first collected in the Torres Strait (at Warrior Island, and Wapa and Orman reefs in the Endeavour Strait, and in various passages of the Prince of Wales group)
1881		Old Grounds discovered west of Badu. Other deep water grounds reported off Darnley and Mount Adolphus Islands. *Pearl Shell and Beche-de-Mer Fishery Act 1881* enacted to regulate the Queensland fishery with annual boat licences
1886		Pearl grounds reported as seriously depleted (Bach 1955). *Pearl Shell and Beche-de-Mer Fishery Act Amendment Act 1886* amends licencing arrangements for vessels and prescribes licenses for persons employed in the fishery
1888		*Queensland Pearl Shell and Beche-de-Mer Fisheries (Extra-territorial) Act 1888* enforces the provisions of the *Pearl Shell and Beche-de-Mer Fishery Acts* in 'Australasian waters adjacent to Queensland'
1891		*Pearl Shell and Beche-de-Mer Fishery Act Amendment Act 1891* prohibits the take of shell <**152mm**
1893		Darnley Island grounds declared closed under the *Pearl Shell and Beche-de-Mer Fishery Act Amendment Act 1891* (Bach 1955)
1897		Minimum legal size reduced to **127mm** for economic reasons (Bach 1955)
1901		Restrictions on the number of pearling licences introduced and a portion of the Old Ground including the Endeavour Strait closed for two years. Later assessment describes the methods of closure as ineffective (Bach 1955)
1904		Article on the Queensland pearl shell industry in the *Marlborough Express* notes that the fishery is becoming exhausted. A report commissioned due to concerns about the severe depletion of the fishery recommends the restoration of the 152mm minimum size limit and sparks interest in a system of fishery closures (Bach 1955)
1908		Mackay Royal Commission enquiry (1908) into the state and problems of the Queensland pearl fishery recommends immediate action if the industry is to be permanent and profitable
1914-18		Fishing activity halts due to WWI
1932		Resurgence in the fishery follows the end of the Great Depression
1938		Japanese survey pearl grounds; results not published (O'Brien & Colgan 1995)
1941-45		Fishing activity halts due to WWII

1946		Commonwealth Government Enquiry into the fishery recommends surveys of the grounds and studies on the biology of the oyster (Colgan & Reichelt 1991)
1952		*Pearl Fisheries Act 1952* repeals the *Queensland Pearl Shell and Beche-de-Mer Fisheries (Extra-territorial) Act 1888*. It defines the powers of the Minister in relation to the fishery, divides the fishery into subareas, and prohibits engagement in pearling without a license
1952-60		CSIRO conducts biology and ecology studies from a field station on Thursday Island and surveys pearl grounds on the *Gahleru*. The results are never published (Colgan & Reichelt 1991)
1953		*Pearl Fisheries Act 1953* is enacted as an amendment to the *Pearl Fisheries Act 1952*, refining the definition of the boundaries the TSPSF
1956-62		Commonwealth Fisheries Department conducts 'non-scientific' surveys of the grounds on the *Paxie* (Colgan & Reichelt 1991)
1957		Japanese survey pearl grounds; results not published (O'Brien & Colgan 1995)
1968		*Continental Shelf (Living Natural Resources) Act 1968* repeals the *Pearl Fisheries Act 1952 and 1953* and replaces pearl-specific legislation with more general provisions for 'sedentary organisms'
1970		*Oceanic Grandeur* maritime accident and oil spill allegedly causes shell mass mortality and failed recruitment on the Old Grounds (Hynd 1970)
1976		*Fisheries Act 1976* consolidates and amends laws for pearling, oystering and fisheries, with provisions for licenses and a minimum size limit of **160mm**
1984		*Torres Strait Fisheries Act 1984* enacted to regulate the fisheries of the PZJA and give effect to the fisheries elements of the Torres Strait Treaty
1985		*Torres Strait Fisheries Act 1984 – Proclamation (1985)* and the *Torres Strait Fisheries Regulations 1895* define the extent and regulations of the TSPSF. *FMN No. 6* prohibits the taking of shell within the TSPSF of a size less than **160mm** and prohibits collection by any method other than diving or hand. *FMN No. 7* prohibits the removal of live pearl shell from the Torres Strait Protected Zone without a license.
1986		A Torres Strait Consultative Meeting suggests a minimum size limit of 115mm and recommends an economic study of the fishery
1987		*FMN No. 6* revoked by *FMN No. 16*, allowing for the inclusion of the black-lipped pearl oyster *P. margaritifera* in regulations. Existing licence controls regarding as relatively loose (having been previously adopted to attract effort to the fishery) and the fishery as exploited, with a need to assess whether the arrangements are appropriate. Industry requests that the minimum size limit is reduced to 120–125mm (TSFIICC/5). A working party is established to assess size limits and provide management recommendations (TSFMC/5)

1988		*FMN No. 21* enacts a prawn trawling ban in areas of the TSPZ. PNG agrees to mirror the ban to protect pearl beds (TSFMC/6). *FMN No. 25* replaces *FMN No. 16* and enacts a seasonal closure of the TSPSF from 01 June–31 August. A size limit of **130-200mm** and licensing restrictions to increase indigenous activity are enforced. Stock status is unable to be assessed due to lack of data; declines mainly attributed to substantial latent effort
1989		Results of Bureau of Rural Science field surveys (Colgan & Reichelt 1991) are described as inconclusive without further work; but abundance estimated as low. *FMN No. 30* replaces *FMN No. 25* and increases the maximum size limit to **230mm**, with 200mm being regarded as too restrictive for farms purchasing shell (TSFIICC/7). Seasonal closure is continued. Licences for boats >6m in community fishing mandatory
1990		Abundance of pearl shell in the Torres Strait remains low (TSFSAC/15) despite anecdotal reports of recovery. *FMN No. 36* replaces *FMN No. 30* and removes seasonal closures for the fishery
1991		PZJA decides to establish a Pearl Shell Working Group
1992		Abundance of shell low with some indications of stock recovery.
1994		Pearl shell logbooks replaced with annual catch surveys. Abundance of shell low with some indications of recovery
1995		Abundance of shell thought to be low with some indications of stock recovery
1996		Concern expressed regarding lack of stock recovery in the old grounds (TSFMC/12). Industry describes size limits not ineffective and without enforcement. Pearl Shell Working Group recommendations for area closures and an education program to protect broodstock opposed by local community and industry. Quotas regarded as too difficult due to the unlimited number of fishers
1997		*FMN No. 46* replaces *FMN No. 36* and allows for any person holding a prawn licence to carry up to four pearl shells; persons engaged in community fishing with a boat <6m and traditional fishing are exempt from the ban on collecting shell. Persons engaged in traditional fishing are exempt from size limits. Issue of shell size being an inadequate measurement for collection raised (TSFMC/14)
1998		Abundance of shell thought to be low, although some indications of stock recovery
1999		Enactment of the *Torres Strait Community Fishing Notice No. 1* prohibits the taking, processing or carrying of fish by persons engaged in community fishing unless under licence.
2000		Agreement allowing for five Australian pearl shell vessels to fish for pearl in PNG waters cease. Annual Reports indicate the agreement was in place from 1990/91
2003		Recommendation that management arrangements may require revision due to the fishery being in a severely depleted state, as well as a longstanding lack of data on stocks (TSFMAC/1; PZJA/15). Pearl Shell Working Group merged into TSFMAC (PZJA/15)

2004		*FMN No. 69* replaces *FMN No. 46* and prohibits the taking of pearl shell by persons engaged in the prawn fishery. Size limits for persons with the appropriate licence or those engaged in community fishing using a boat <6m continue at **130-230mm**. Traditional fishing continues to be exempt from size limits. Collection continues to be by diving or hand
2007		HCWG established to monitor trochus, beche-de-mer, pearl, crab and sponge fisheries.
2007-08		Demand for pearls declines following the Global Financial Crisis (DFWA 2013)
2008		Potential management options, including a long-term closure, discussed regarding the future of the fishery but it was decided that there was not enough information for decisions to be made (HCWG/2)
2011		*FMI No.7* replaces *FMN No.69*, allowing for inclusion of the genus *Pteria* in regulations. *Torres Strait Fisheries Logbook Instrument No.1* makes use of logbooks for 'hand collectables' such as pearl shell compulsory for TVH sector operators.
2013		Resurgence in industry interest to decrease the minimum size limits (HCWG/7)

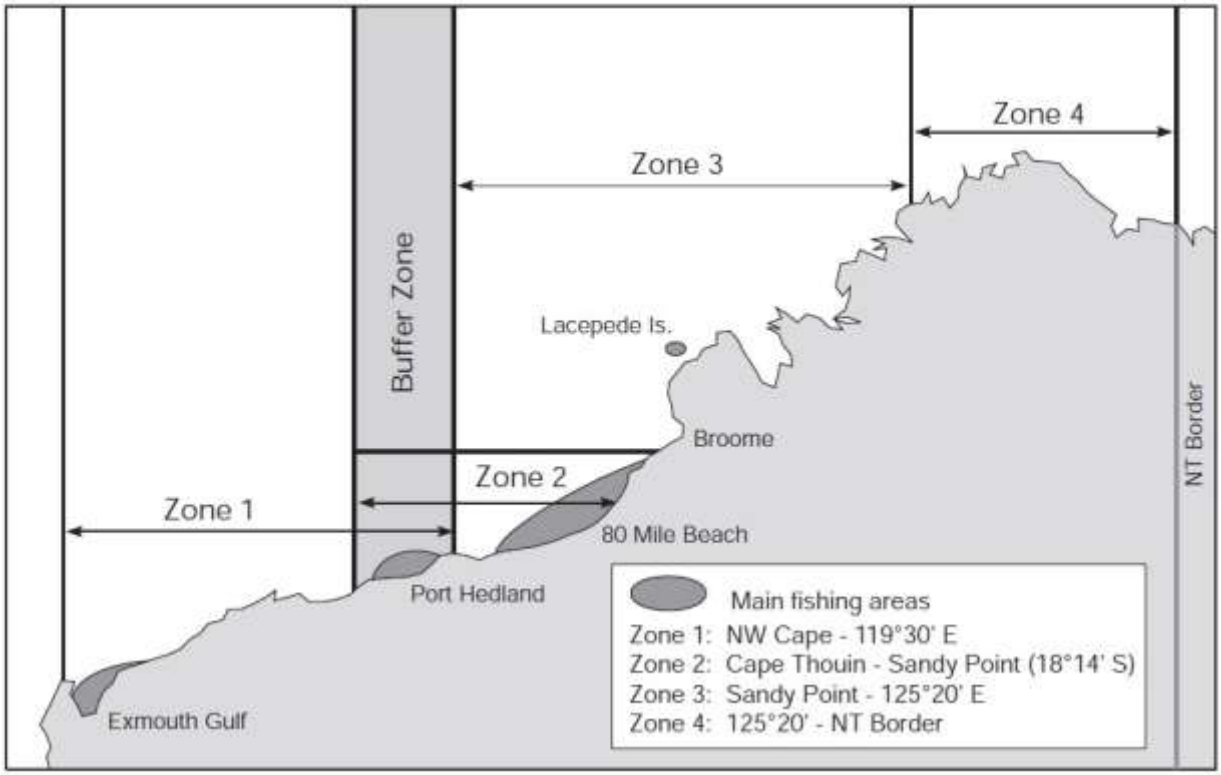
Attachment B: The Queensland East Coast Pearl Fishery



The East Coast Pearl Fishery (Fletcher et al 2006)

Queensland's East Coast Pearl Fishery (ECPF) consists of tidal waters south of latitude 10°41'S and east of longitude 142°31'49''E (Young 2004).

Attachment C: The Western Australia Pearl Oyster Fishery



The Western Australia Pearl Oyster Fishery Zones (Hart et al 2013)

The Western Australia Pearl Oyster fishery is separated into four zones. These consist of:

Pearl Oyster Zone 1: NW Cape (including the Exmouth Gulf) to longitude 119°30' E.

Pearl Oyster Zone 2: East of Cape Thouin (118°20' E) and south of latitude 18°14' S.

Pearl Oyster Zone 3: West of longitude 125°20' E and north of latitude 18°14' S.

Pearl Oyster Zone 4: East of longitude 125°20' E to the Western Australia-Northern Territory border.

There is a buffer zone between Zones 1 and 2.

TORRES STRAIT HAND COLLECTABLES WORKING GROUP (HCWG)	Meeting No. 8 30 April 2015
Black Teatfish – One Month Trial TAC Report and Future Management Arrangements (AFMA)	Agenda Item No. 3.2 FOR DISCUSSION

PURPOSE

For the HCWG to:

NOTE the background and outcomes of the one month trial TAC for black teatfish including the low levels of catch reporting seen during the trial.

DISCUSS and **PROVIDE ADVICE** regarding potentially suitable options for future management of black teatfish.

BACKGROUND

After the closure of sandfish in 1998 as a result of over fishing, fishers mostly targeted black teatfish. A CSIRO survey in 2002 found that black teatfish were overexploited and in January 2003 harvest was prohibited. A survey conducted in 2005 indicated that black teatfish were yet to recover from previous harvest pressure.

Black teatfish populations in Eastern Torres Strait were most recently surveyed in March 2009 by the CSIRO. The survey assessed the current size and status of stocks, especially those species which were closed to fishing. The survey found that the density of black teatfish had increased significantly since 2005, and was greater than observed in 1995. The average individual size of bech-de-mer was also the largest observed compared to previous surveys. CSIRO concluded that black teatfish stocks in Torres Strait had recovered to near natural, unfished densities.

Based on the results of the 2009 survey, CSIRO used density, trend and fishery stock estimates to recommend a conservative fishery wide TAC of 25 tonnes for black teatfish. The recommendation was contingent on appropriate management strategies being in place to mitigate excess fishing and prevent localised depletion, including the current 25cm minimum size limit.

In **November 2011**, the HCWG considered options for increasing the zero TAC based on scientific advice from CSIRO. The HCWG considered that it is likely that increasing the TAC would result in increased targeting of this species and consequently other beche-de-mer species. The HCWG also acknowledged that a level of precaution is required in developing the fishery to minimise the risk of exceeding the TAC, localised depletion, and unsustainable harvest of other species.

Based on the considerations above, the HCWG recommended that a 15 tonnes TAC be implemented with the harvest period limited to a maximum of one month. An additional key reason why the recommended TAC was below the 25 tonne TAC suggested by CSIRO was that the HCWG wanted to take a conservative approach until good catch reporting practices could be demonstrated.

The recommendations were consistent with the advice provided by CSIRO which highlighted the need to obtain good quality spatial catch data as well as employ sound management measures to ensure the TAC was not exceeded.

In **March 2012** the Torres Strait Fisheries Management Advisory Committee (TSFMAC) discussed the recommendations from the HCWG. The TSFMAC agreed to recommend to the PZJA Standing Committee that:

a) a 15 tonne TAC be introduced for black teatfish, available for a maximum of one month;
b) fishing for black teatfish be limited to September with the timing to be reassessed after the first year; and
c) recommendations a) and b) are dependent on a mandatory catch reporting system being agreed to by the PZJA agencies.

In **May 2012**, the PZJA Standing Committee agreed to these recommendations being progressed to the PZJA.

In **August 2012**, the PZJA agencies determined that the setting of a 15 tonne TAC for black teatfish could not be progressed until all PZJA members were in a position to agree to the recommendation. At that time the TSRA was in caretaker mode due to TSRA Board elections and was therefore unable to consider the recommendation.

Following the caretaker period associated with the federal election in September 2013, a paper recommending a 15 tonne TAC was endorsed by all PZJA members; however the Chair of the TSRA expressed concern that the proposed introduction of mandatory catch reporting for community fishers was not consistent with the *Torres Strait Fisheries Act 1984*. It was suggested that in lieu of imposing mandatory catch reporting requirements on community fishers, a communication strategy should be developed to inform Torres Strait Communities of the crucial nature of catch reporting.

The Chair of the PZJA wrote to the TSRA Chair in **December 2013** acknowledging his concerns. A revised communication strategy was written to explain the steps that would be taken to ensure Torres Strait Communities were aware of the importance of catch reporting.

The revised communication strategy suggested February 2014 as a potentially suitable month for the trial, but also acknowledged the importance of giving adequate notice so that those license holders wishing to participate in the trial were given sufficient time to prepare. Time constraints prevented the opening in February 2014.

A series of community meetings were held in **June 2014**. Erub, Masig and Iama were visited and several community members suggested November as a suitable month due to generally favourable weather conditions and because November will allow for greater community participation due to the closure of the Torres Strait Tropical Rock Lobster Fishery.

A HCWG teleconference was held in **July 2014** and November 2014 was recommended as a suitable month to conduct the trial, with the recommendation being contingent on community consultation with Mer. Community members at Mer were consulted following the teleconference and it was agreed that November was a suitable month.

At its teleconference in **August 2014**, the PZJA Standing Committee noted that the PZJA agencies intended to implement the previous PZJA decision to commence the trial in November 2014.

Prior to the 1 November opening date, all licence holders were sent a letter informing that licence conditions had been amended to allow for the one month trial to occur. Included with the letter was a copy of the Sea Cucumber Species Identification Guide and copies of the voluntary catch data reporting sheet. Additional copies of the ID guide and catch data forms were also provided to Torres Strait Island Regional Council (TSIRC) offices and to community fishing organisations. Public notices were circulated to IBIS stores and TSIRC offices for display on community noticeboards.

DISCUSSION

TAC monitoring during the trial

Key facts:

- Total catch reported - 16,515 kg (wet weight gutted)
- 8 license holders used the catch data form and a total of 13 catch data forms were received (each form allowed for up to 7 days of fishing data to be entered).
- Catch reporting forms accounted for only 2,858 kg (17.3%) of the 16,515 kg reported.
- Each of the 8 licence holders who completed forms reported having up to 4 persons collecting from their vessel.
- Average catch per person per day was approximately 27 kg (from data forms - small sample size).
- 100% of the catch was taken by the Traditional Inhabitant sector of the fishery. The one non-Traditional Inhabitant licence (which has subsequently been transferred to the Torres Strait Regional Authority) was not active during the trial.

To monitor catch during the trial, AFMA maintained close links with all known fishers, community fishing organisations, buyers, freight companies and seafood processors on an almost daily basis for the duration of the trial.

During the first few days of November the majority of catch reports were made by fishers, buyers or community fishing organisations either verbally or by using the catch data form. Reports were provided by processors and freight companies once product was shipped.

On 14 November 2014, catch records indicated that the 15 tonne competitive TAC had been reached. AFMA immediately phoned all known fishers, buyers, freight companies and seafood processors to inform that 14 November would be the final fishing day. An email conveying the same information was sent to all community fishing organisations, buyers and processors and public notices were circulated to IBIS supermarkets, TSIRC offices, Radio 4MW and the Torres News.

Voluntary Catch Reporting

While completion and submission of the catch data form was voluntary, only 17.3% of the total catch was reported using the form. Despite AFMA's ability to obtain landing figures through maintaining close links with most buyers and processors, the catch data form is vitally important in that it provides information on where fishing is taking place and the quantity of catch being taken by each fisher per day.

Catch reporting was a primary focus of community consultation visits conducted prior to the commencement of the season. During the community meetings, AFMA, a representative of the Torres Strait Fishers Association Incorporated and a representative of the Malu Lamar (Torres Strait Islander) Corporation RNTBC gave their support for the use of the forms. Unfortunately this did not translate to acceptable levels of use during the trial.

Greater levels of voluntary catch reporting or the introduction of mandatory reporting is required to provide management with a sufficient volume of catch and effort information to assist with managing the fishery into the future. At this time, the *Torres Strait Fisheries Act 1984* (the Act) exempts traditional inhabitants from any requirements to complete logbooks therefore an amendment to the Act is required before any form of mandatory catch reporting can be considered using fisheries legislation.

Future Management Arrangements

Future management arrangements for black teatfish must take into account the following:

- Black teatfish is highly vulnerable to overfishing and has been seriously depleted in the past;
- The most recent stock assessment/survey is 6 years old;
- AFMA cannot impose mandatory catch-reporting without an amendment to the Act;
- Voluntary reporting during the 2014 month-long trial was unacceptably low (17.3%);
- Current Strategic Assessment conditions permitting export are not guaranteed if recommendations are not met. Recent recommendations include:
    - PZJA to implement strategies to improve estimates of harvest from the fishery
    - PZJA to work towards species based harvest strategies that take account of:
        - Species biology and ecology
        - Uncertainty associated with estimates of catches
        - Traditional inhabitant community knowledge relevant to management including community based harvest strategies
    - PZJA to continue to identify and pursue opportunities for research relevant to beche de mer.
    - AFMA and PZJA to encourage cooperation with other relevant jurisdictions to pursue increased knowledge and complementary management.

Developing effective long-term arrangements for black teatfish is likely to require more detailed work and consultation. In the interim, low-risk levels of fishing could be permitted subject to adequate controls. It is recommended therefore, that HCWG members consider both immediate and long-term arrangements.

Long-term management arrangements may include:

- A harvest strategy for the fishery
- Limiting fishing effort (currently no limit to the number of TIB sector licences)
- Legislative change to require mandatory catch reporting

Short-term management arrangements to allow low-risk levels of fishing for black teatfish must consider:

- Catch limits
  - Restricted fishing period (1 month)
  - Restricted total catch (TAC)

- Reliable catch data
  - 100% voluntary catch reporting required
  - Prior reporting (phoning an AFMA messagebank prior to fishing)
  - Other means of capturing catch and effort data

.

FINANCIAL IMPLICATIONS

Nil

TORRES STRAIT HAND COLLECTABLES WORKING GROUP (HCWG)	Meeting No. 8 30 April 2015
Using Hookah Equipment to target White Teatfish (AFMA)	Agenda Item No. 3.3 FOR DISCUSSION

PURPOSE

For the Hand Collectables Working Group (HCWG) to:

DISCUSS and **PROVIDE ADVICE** about the use of hookah equipment for targeting white teatfish in the Torres Strait Beche-de-Mer Fishery.

BACKGROUND

During 2010/11 two developmental permits allowing for the harvest of white teatfish using hookah diving equipment were issued by the Protected Zone Joint Authority (PZJA). In 2011 the majority of the 15 tonne total allowable catch (TAC) was harvested in the first month of the season. The use of hookah diving equipment also saw a growing interest in the collection of other beche-de-mer species within the Torres Strait during 2011.

Several papers have been presented at past HCWG meetings to discuss the possibility of lifting the ban on the use of hookah gear. Concerns were expressed surrounding lifting the ban without having the appropriate management/monitoring arrangements in place. A paper recommending that the HCWG note that discussions regarding hookah use be postponed until AFMA obtained information from the Black Teatfish trial was presented at HCWG#6. At HCWG#7, the black teatfish trial had not been conducted and the Working Group agreed for AFMA to work with QLD fisheries to document key management issues for permitting hookah to collect white teatfish. The Working Group further agreed that if no agency wants to lead the issue, the working group will recommend that the TSSAC fund the progression of a management strategy evaluation to focus on hookah use in the beche-de-mer fishery. To date there has been no agreement on which agency will lead the issue; however the Working Group now has the results of the black teatfish trial at hand.

DISCUSSION

The results of the black teatfish trial indicated that catch reported on catch data forms accounted for 17.3% of the total catch reported during the trial. This was despite AFMA and other groups supporting the use of the form and speaking about the importance of catch reporting to the success of the trial during community visits. Further, AFMA posted waterproof copies of the catch data forms to all licence holders prior to the season, and made copies available at Council offices and to community fishing organisations. Notices highlighting the importance of catch reporting were also posted on IBIS and Council noticeboards.

The majority of the remaining catch reports were sought by AFMA staff who phoned or emailed every known fisher, buyer and community fishing organisations on an almost daily basis during the trial. When making the calls the AFMA staff member reminded about the importance of the form to the success of the trial.

When discussing any potential lifting of the ban on using hookah gear, the HCWG should be mindful of the following:

- Free diving does not allow fishers to dive to depths where white teatfish are most commonly found. Continuing the ban will continue to restrict the targeting of this high value species to shallow water.
- The previously issued developmental permits demonstrated that hookah diving can result in very high catch rates (the majority of the 15 tonnes was taken in one month). Without additional appropriate controls in place (e.g. restrictions on number of hookahs, mandatory catch reporting) there may be a high risk of stock depletion.
- Catch reporting in the TIB sector is not mandatory, and the levels of voluntary catch reporting seen in the black teatfish trial were unacceptably low.
- History has shown that when not managed using the appropriate tools (input and output controls, monitoring etc.) beche-de-mer stocks can be severely depleted in a short space of time. Many species have also taken many years to recover.
- Ongoing export approval for the fishery is reliant on the PZJA's ability to demonstrate that the fishery is being managed in an ecologically sustainable way. Following the most recent assessment (April 2014), the Department of Environment recommended that the Protected Zone Joint Authority continue to develop and implement strategies to obtain improved estimates of all removals from sea cucumber stocks. In its assessment, the Department of Environment stated that until it can be demonstrated that issues, including catch reporting, can be addressed the fishery can only receive export accreditation on a short term basis (three years) before the fishery is required to be reassessed. There is no guarantee that export approval will continue to be given after each three year period.
- Hookah gear is allowed in the Queensland east coast beche-de-mer fishery however the following input and output controls are in place to ensure sustainability:
    - Commercial Total Allowable Catch (TAC) requiring mandatory catch reporting including both prior reporting and logbooks.
    - Gear restrictions; hand harvest using hookah with a maximum of four divers in the water fishing at any one time. Boat and dory limits also apply.
    - Limited entry: 18 transferable licences.
    - Area closures: Great Barrier Reef Marine Park (GBRMP) implemented by Great Barrier Reef Marine Park Authority (GBRMPA) and Queensland State Marine Parks (GBR Coast Marine Park and Great Sandy Marine Park).
    - Rotational zoning scheme: The fishery is divided into 156 zones of approximately 100 to 150 square nautical miles (nm) that can be fished for a maximum of 15 days in any one year. Each area is allocated for fishing only one year in every three. VMS is used to monitor this.
    - Species-specific minimum size limits. Minimum size limits are at least 15% greater than the current best estimates of size at first maturity for each species.
    - Whilst legislation states up to 10 divers may be fishing at any given time, a Memorandum of Understanding (MOU) drawn up by industry has further limited divers to four.

FINANCIAL IMPLICATIONS

NIL

TORRES STRAIT HAND COLLECTABLES WORKING GROUP (HCWG)	Meeting No. 8 30 April 2015
Maximum Boat Length - TIB Sector Vessels (AFMA)	Agenda Item No. 3.4 FOR DISCUSSION

PURPOSE

For the Hand Collectables Working Group (HCWG) to:

DISCUSS and **PROVIDE ADVICE** regarding the benefits and risks of increasing the maximum boat length for TIB sector vessels in the Torres Strait Beche-de-mer, Pearl Shell and Trochus Fisheries from the current limits to 23m.

BACKGROUND

At its meeting on 9 April 2014, the Protected Zone Joint Authority (PZJA) tasked the Standing Committee with investigating a request to increase the maximum traditional inhabitant boat (TIB) length in all fisheries to 23 m.

The PZJA is currently considering a recent PZJA Standing Committee recommendation which requested the PZJA agree that consultative forums should continue discussions regarding maximum TIB sector boat length in all Torres Strait fisheries. If approved by the PZJA, the Standing Committee will be asked to report back to the PZJA within 12 months.

Current TIB sector boat length limits are:

Fishery	Current Limit (TIB sector)
Beche-de-mer Fishery	7 m
Pearl Shell Fishery	6 m
Trochus Fishery (and all other Torres Strait fisheries)	20 m

A 6 m boat length restriction was imposed on the Beche-de-mer Fishery in December 1995 when the fishery was managed by the Queensland Fisheries Management Authority (QFMA). Records held by Fisheries Queensland indicate this policy was based on the recommendations of a beche-de-mer working group and was principally adopted due to sustainability concerns. As part of this process, the QFMA granted a number of exemptions to buyer-boats that were already operating in the Torres Strait that were greater than 6 meters. A non-indigenous beche-de-mer operator working in the Torres Strait was also granted an exemption from the 6 m boat length restriction (this licence is now held by the Torres Strait Regional Authority).

At a 1997 meeting of the Torres Strait Beche-de-mer Consultative Group a recommendation was made to increase the maximum boat length restriction to 7 m to allow the use of a new vessel (a 6.7 m southwind class boat). This recommendation was adopted by the QFMA and retained when management of the Beche-de-Mer Fishery was transferred to the Protected Zone Joint Authority (PZJA) in 1999.

All PZJA forums will be considering the appropriate maximum boat length for their respective fisheries over the next 12 months. After this, the PZJA will be able to review all recommendations to take a holistic approach in reviewing the policy.

DISCUSSION

It may be useful for PZJA forums to work towards reaching agreement on a consistent maximum TIB sector boat size limit for all Torres Strait fisheries. This in turn would flow on to the Boat Replacement Policy. Consistent boat length and replacement policies would streamline regulation and make rules easier to understand and enforce. An increase in maximum boat size could provide increased crew safety and may contribute to greater harvesting efficiency and increased profit margins within a sustainable framework.

While a single maximum boat length limit across all fisheries would be simple to administer, there is recognition of the balance required to meet the objective of the *Torres Strait Fisheries Act 1984* (the Act) and individual fishery objectives, including sustainability objectives in fisheries where output controls or other management arrangements might not be considered effective enough to manage sustainability.

Under the Australian National Standard for Commercial Vessels, a Master <24 m Near Coastal Certificate (or Master Class 5, Skipper Grade 3) allows a mariner to skipper a vessel up to 24 metres long within the Exclusive Economic Zone. Other relevant certificates include the Coxswain Grade 1 Near Coastal and Coxswain Grade 2 Near Coastal, both of which allow a mariner to skipper a vessel up to 12 m within a certain distance from port[*]. It may be worth considering using the 24 m limit as a maximum vessel size, rather than the initially requested 23 m limit to be consistent with the national licensing standards.

Requests to increase the maximum boat size for TIB sector vessels has not been always been supported by PZJA forums and Torres Strait communities for various reasons. This includes concerns about the effect that larger boats could have on smaller community fishing operations, traditional fishing and on the environment. Some Torres Strait communities have expressed concern that the risks outweigh the benefits especially for those fisheries where the utilisation of the resource produces only limited benefit to the Torres Strait.

<u>Beche-de-mer and Pearl Shell Fisheries</u>

Potential Benefits

- Increasing the maximum boat length from 7 m (beche-de-mer) and 6 m (pearl shell) to 23 or 24 m may not adversely affect sustainability if appropriate risk mitigation measures are in place to ensure sustainability and pursue the objective of the Act relating to protecting and preserving the marine environment.
- The increase may allow operators to maximise their opportunities to fish across all Torres Strait fisheries.
- Increasing the maximum size limit may also lead to the use of primary/tender operations. This may increase economic efficiency. The increase may also provide for increased participation and promote economic development. Economic development for Traditional Inhabitants is an objective of the Act.

[*] http://www.amsa.gov.au/domestic/domestic-quals/b 20 January 2015

Potential Risks

- Without suitable controls in place (such as mandatory catch reporting), an increase in boat length could result in a significant increase in fishing pressure on stocks leading to stock depletion.
- The TIB sector is not subject to a limited entry policy, meaning an unlimited number of vessels can work in the fisheries. Any increase in vessel size may make the beche-de-mer fishery more attractive to operators which may lead to an increase in fishing pressure and a subsequent repeat of previous stock collapses.

Trochus Fishery

The current TIB boat length limit in the Trochus fishery is 20m. Due to low levels of effort in the fishery, it is unlikely that increasing the maximum boat size limit to 23 or 24 m will have a significant effect on stock sustainability.

NATIVE TITLE CONSIDERATIONS

Any change to the current maximum boat length policy may constitute a future act under native title legislation. As per the requirements of the Native Title Act 1993, notification will be conducted prior to any PZJA decision being made. Community consultations will also be undertaken.

FINANCIAL IMPLICATIONS

NIL

TORRES STRAIT HAND COLLECTABLES WORKING GROUP (HCWG)	Meeting No. 8 30 April 2015
Beche de Mer Research in Australia (Tim Skewes – CSIRO)	Agenda Item No. 4.1 FOR NOTING

PURPOSE

For the Hand Collectables Working Group (HCWG) to **NOTE** a presentation given by Tim Skewes regarding Beche-de-mer research being conducted in Australia.

FINANCIAL IMPLICATIONS

NIL

TORRES STRAIT HAND COLLECTABLES WORKING GROUP (HCWG)	Meeting No. 8 30 April 2015
Strategic Assessment Update (AFMA)	Agenda Item No. 4.2 FOR NOTING

PURPOSE

For the HCWG to **NOTE** the current status of the Wildlife Trade Operation declaration which provides export approval required under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

BACKGROUND

Wildlife Trade Operation (WTO) export approvals granted by the Department of Environment are vital for fisheries such as Beche-de-mer and trochus which rely heavily on high value export markets. In order for a fishery to be given export approval, management of the fishery is assessed by the Department of Environment as per the requirements of the EPBC Act.

The Beche-de-mer and trochus fisheries are assessed every three years under three parts of the EPBC Act:

- Part 10 of the EPBC Act requires that all Commonwealth (including Torres Strait fisheries) must be strategically assessed before a management plan is determined.
- Part 13 of the EPBC Act creates a number of offences in relation to listed threatened species and ecological communities but provides for accreditation of management plans or regimes. The effect of accreditation is that certain actions are not offences if they are carried out under those management plans or regimes.
- Part 13A of the EPBC Act covers the international movement of wildlife specimens. In assessing the plan under Part 13A of the EPBC Act the Environment Minister determines whether species taken in the fishery should be included on the list of exempt native specimens and therefore allowed to be exported. Where the Environment Minister is satisfied that the fishery has fully addressed all risks he/she can make the exemption subject to the condition that a WTO continues to be in force. That WTO may be subject to conditions and recommendations.

Expiry dates for current approvals are:

Beche-de-mer fishery – 15 June 2017 (Assessment report included in Attachment 4.2).

Trochus fishery – 16 October 2015 (Assessment report currently being drafted)

Pearl Shell fishery – not exporting

DISCUSSION

While the Department of Environment temporarily extends the export approval for three years, a set of recommendations to be addressed by AFMA is provided in each assessment. It is the Protected Zone Joint Authority's (PZJA) responsibility to take steps to ensure that the recommendations are addressed to the Department of Environment's satisfaction prior to the fishery being given export approval in the future. There is no guarantee that export approval will continue to be given after each three year period.

The HCWG should consider the recommendations contained in Table 1 (below) when looking at future management of the fishery. With species such as black teatfish showing

signs of recovery after being closed for many years due to overfishing, management agencies need to be confident that stocks can be harvested sustainably before catch limits can be increased. Improved levels of catch reporting in the fishery would assist greatly with satisfying some of the primary recommendations.

Table 1. The following are the recommendations contained in the most recent assessment:

Fishery	WTO accredited	WTO expiry	Recommendation 1	Recommendation 2	Recommendation 3	Recommendation 4
Beche-de-Mer	18/06/2014	15/06/2017	The PZJA to continue to develop and implement: 1. Strategies to improve estimates of commercial and community harvest from the fishery 2. Appropriate strategies to obtain improved estimates of all removals from sea cucumber stocks	The PZJA to continue to work towards species based harvest strategies… The harvest strategies should take account of: 1. species specific biology and ecology, where relevant 2. the uncertainty associated with estimates of total removals of each species 3. the differing levels of fishing capacity between Traditional and non-Traditional fishers 4. Traditional Inhabitant community knowledge relevant to the management of sea cucumbers (including community based harvest strategies developed for Erub and Warraber communities).	The PZJA to continue to identify and pursue opportunities for research relevant to species harvested in the Torres Strait Bêche-de-Mer Fishery.	The PZJA and the Australian Fisheries Management Authority to continue and encourage further co-operation with other relevant jurisdictions to pursue increased knowledge and complementary management of sea cucumber resources across fisheries and across jurisdictions.
Trochus	05/10/2012	16/10/2015	The PZJA to: 1. Implement strategies to improve estimates of all fishery-related removals from the Torres Strait Trochus Fisher 2. Review fishery dependent data collection processes on a regular basis	The PZJA to review and consider implementing management measures proposed in the CSIRO survey report by Murphy *et al*. (2010)	The PZJA to: 1. Continue to investigate methods to improve the reliability of stock estimates to be used in management decisions 2. Continue to review stock assessments on a regular basis	

FINANCIAL IMPLICATIONS

NIL

Australian Government

Queensland Government

TORRES STRAIT PZJA PROTECTED ZONE JOINT AUTHORITY

Annual Report

Torres Strait Beche-de-mer Fishery

2013

This report has been prepared by the Australian Fisheries Management Authority on behalf of the Torres Strait Protected Zone Joint Authority for consideration by the Department of the Environment in relation to the Wildlife Trade Operation declaration for the Torres Strait Beche-de-mer Fishery under the *Environment Protection and Biodiversity Conservation Act 1999*.

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ACRONYMS

AFMA	Australian Fisheries Management Authority
CSIRO	Commonwealth Scientific and Industrial Research Organisation
ERA	Ecological Risk Assessment
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
FMI	Fisheries Management Instrument
HCWG	Hand Collectable Working Group
MAC	Management Advisory Committee
NFA	National Fisheries Authority
PNG	Papua New Guinea
PZJA	Protected Zone Joint Authority
QBFP	Queensland Boating and Fisheries Patrol
RAG	Resource Assessment Group
SAC	Scientific Advisory Committee
SEWPaC	Department of Sustainability, Environment, Water, Populations and Communities
TAC	Total Allowable Catch
TSBDMF	Torres Strait Beche-de-mer Fishery
TSF Act	*Torres Strait Fisheries Act 1984*
TSPZ	Torres Strait Protected Zone
TSRA	Torres Strait Regional Authority
TSSAC	Torres Strait Scientific Advisory Committee
WTO	Wildlife Trade Operation

1 Description of the Fishery

1.1 Target/permitted/prohibited species

The Torres Strait Beche-de-mer Fishery (TSBDMF) dates back to the 19th century or earlier. During its history there have been several "booms and busts" which have been a feature of these fisheries in most places.

The TSBDMF is based on the collection of several species of beche-de-mer, also known as sea cucumber. The terms sea cucumber and beche-de-mer are often used interchangeably to refer to holothurians however, beche-de-mer, also often called trepang, is the name usually given to the dried processed product (Preston, 1993).

There are over 1400 species of holothurians recognised worldwide, 34 of which have been recorded in shallow water surveys in Torres Strait (Williams, 2000). At least seventeen of the species in the two families Holothuriodae and Stichopodidae are taken commercially in the management area (Table 1).

Historically, sandfish (*Holothuria scabra*), pacific black teatfish (*Holothuria whitmaei*) and deepwater redfish (*Actinopyga echinites*[1]) were the main target species in the TSBDMF due to their high commercial value.

Fishing pressure led to a decline in sandfish resulting in a zero total allowable catch (TAC) for sandfish species in 1998. Effort then switched to black teatfish and what is now understood to be a suite of redfish and blackfish species previously reported as surf redfish (Skewes *et. al.,* 2010). In 2003, these species became prohibited for commercial harvest due to concerns of overfishing.

Catches have substantially diminished since prohibition of take of the main high value species. Catches have since been dominated by blackfish (*Actinopyga miliaris*) prickly redfish (*Thelenota ananas*) and (to a lesser degree) white teatfish *(Holothuria fuscogilva*) (see section 2 for further information).

A study conducted in 2009 indicated that black teatfish populations have significantly increased since the introduction of a zero TAC in 2003. The Protected Zone Joint Authority (PZJA) intends on opening the black teatfish fishery for a one month trial in 2014. The trial will see a TAC of 15 tonnes implemented. This is a significant positive step for Torres Strait fishers. PZJA agencies are confident that sound management and science will underpin future decision making and the risk of any future overfishing is low.

[1] Historic records report this species as surf redfish (*Actinopyga martiana*) but subsequent research indicates that this was most likely misidentified and the catch was primarily deepwater redfish (*A. echinites*).

1.2 Management arrangements employed in the fishery

The objectives adopted for the TSBDMF outlined in the *Torres Strait Beche-de-mer Fishery Statement of Management Arrangements*[2] are:

- to ensure the sustainable use of all sea cucumber in the Torres Strait;
- to ensure that utilisation of the sea cucumber resources is for the direct benefit of the Australian Traditional Inhabitants of the Torres Strait;
- to ensure increased involvement in the management and control of all aspects of the fishery by the Australian Traditional Inhabitants of the Torres Strait;
- to promote a cooperative approach to management with Papua New Guinea (PNG); and
- in consultation with industry and traditional fishers, to ensure the recovery of the sandfish stock on Warrior Reef by adopting a precautionary approach when setting catch levels in the early years of rebuilding the fishery.

Participation in the TSBDMF is limited to Traditional Inhabitants only, with the exception of one non-Traditional Inhabitant who was active in the fishery prior to the introduction of licence limitation in the fishery in late 1995.

The TSBDMF is managed through a combination of input controls (limited entry and gear restrictions) and output controls (TAC). Management arrangements currently implemented in the TSBDMF include:

- limiting the method of taking sea cucumber to either hand or a hand held non mechanical implement;
- a ban on the use of hookah or SCUBA gear to assist in breathing underwater;
- limiting Traditional Inhabitant dinghies to less than 7 metres in length;
- limiting the activities of the one non-Traditional Inhabitant licensed operator to primarily involve the participation of Traditional Inhabitants in those activities;
- bag limits for traditional fishing under Fisheries Management Instrument 64 (three per person or six per boat);
- minimum size limits for commercial fishing (Table 1); and
- competitive TACs (measured in wet-weight gutted, Table 1).

Note that sandfish, pacific black teatfish and surf redfish currently have a zero TAC (Table 1), however the PZJA intends to increase the black teatfish TAC to 15 tonnes for a trial period of one month based on scientific evidence of stock recovery.

[2] The Torres Strait Beche-de-mer Fishery Statement of Management Arrangements including these management objectives were endorsed at PZJA 18 (July 2005) and amended in 2008 to include new TAC's for white teatfish and prickly redfish.

Table 1: Current TACs and size limits of commercially harvested species in the TSBDMF. All species listed as 'Combined TAC' in the TAC column have a combined TAC of 80 tonnes.

Commercial value	Common name	Scientific name	TAC (tonnes)	Minimum size limit (mm)
High	Sandfish	*Holothuria scabra*	0	180
	Pacific black teatfish	*Holothuria whitmaei**	0**	250
	White teatfish	*Holothuria fuscogilva*	15	320
Medium	Surf redfish	*Actinopyga maurtiana*	0	220
	Deepwater redfish	*Actinopyga echinites*	Combined TAC (80 t)	120
	Blackfish	*Actinopyga miliaris*	Combined TAC (80 t)	220
	Prickly redfish	*Thelenota ananas*	20	300
Low	Stonefish	*Actinopyga lecanora*	Combined TAC (80 t)	NA
	Lollyfish	*Holothuria atra*	Combined TAC (80 t)	150
	Elephant's trunkfish	*Holothuria fuscopunctata*	Combined TAC (80 t)	240
	Greenfish	*Stichopus chloronotus*	Combined TAC (80 t)	NA
	Curryfish	*Stichopus hermanni***	Combined TAC (80 t)	270
	Amberfish	*Thelenota anax*	Combined TAC (80 t)	NA
	Brown sandfish	*Bohadschia vitiensis*	Combined TAC (80 t)	NA
	Leopardfish****	*Bohadschia argus*	Combined TAC (80 t)	NA
	Pinkfish	*Holothuria edulis*	Combined TAC (80 t)	NA

* previously *H. nobilis*

** PZJA have endorsed a one month trial (15 tonne TAC) for black teatfish during 2014. The date for the trial is yet to be determined.

*** previously *S. variegatus*

**** also known as tigerfish

1.3 Fishing methods employed

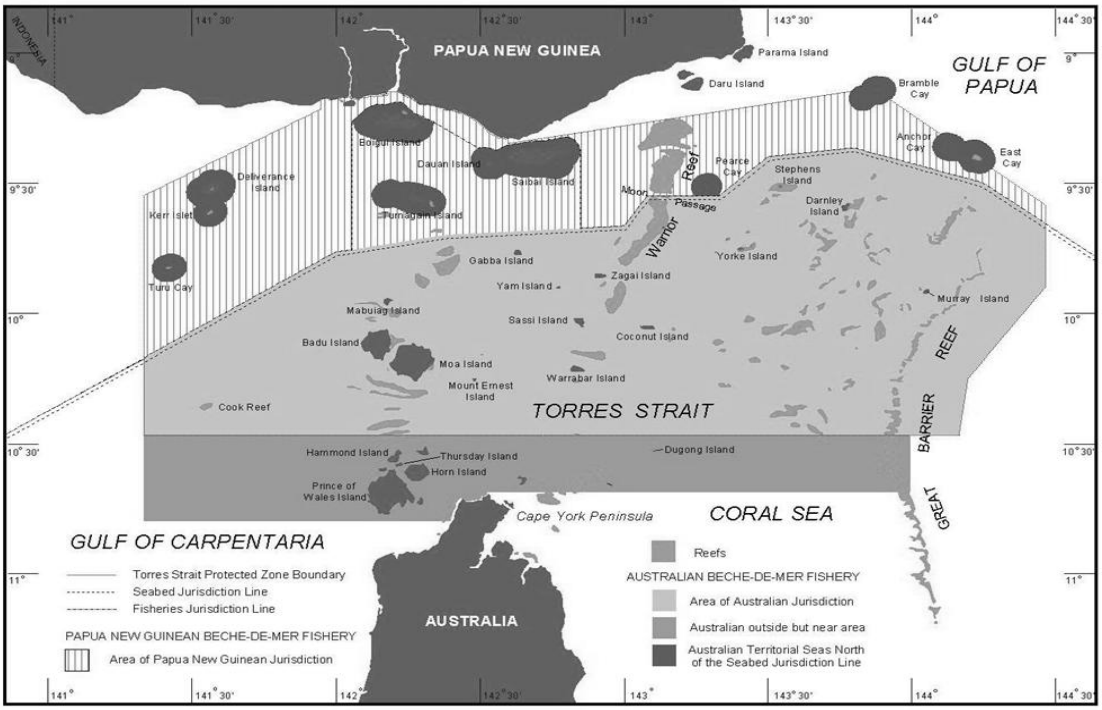
Fishing for sea cucumber in the Torres Strait occurs mainly by free diving from dinghies crewed by two or three fishers, or by hand collection along reefs tops and edges at low tide. The depth range of the most frequently sought species is 0-20m. Combined with the hookah/SCUBA ban it is estimated that most fishing occurs within 0-10m, however during 2010/11 the PZJA issued two developmental permits allowing for the harvest of sea cucumber while utilising hookah diving apparatus for the 2011 and 2012 fishing seasons.

Once collected, animals are gutted, graded, cleaned, boiled, smoked and dried. This is a labour-intensive process usually carried out on processing vessels or at shore-based facilities.

1.4 Fishing area

The TSBDMF comprises tidal waters within the Torres Strait Protected Zone (TSPZ) and the area declared under the *Torres Strait Fisheries Act 1984* (TSF Act) to be *'outside but near'* the TSPZ for commercial fishing for sea cucumber (Figure 1). For the TSBDMF, the outside but near area extends to waters just south of Prince of Wales Island to the west and to due east of Cape York Peninsula.

Figure 1: Area of the TSBDMF.

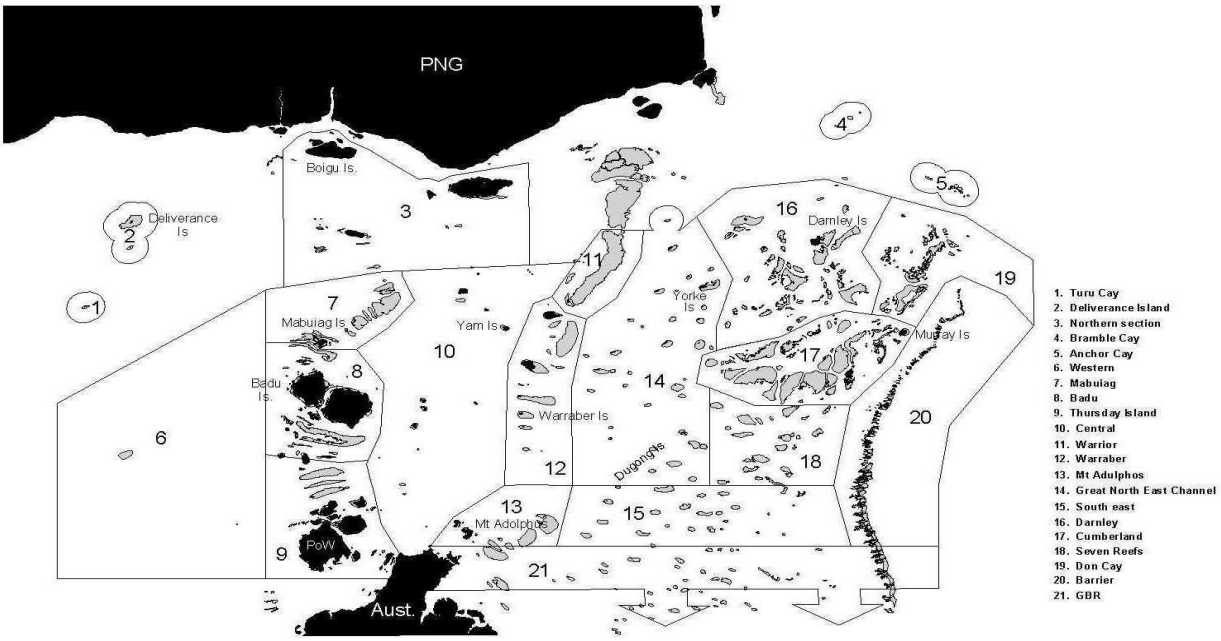


Historically, sea cucumbers have been harvested in eastern Torres Strait. The limited amount of sea cucumbers taken at Thursday Island or Inner Island cluster may be a combination of a lack of commercial stocks, traditional inhabitants being licensed in more lucrative fisheries (i.e. tropical rock lobster), or marine habitat.

The western Torres Strait reefs were documented as having a very low abundance of all holothurian species during a broad-scale survey of sea cucumbers in 1995. The habitats of these western reefs appear to be similar to reefs that contain commercial species in other areas of Torres Strait (based on gross environmental parameters). However, the low density of species is attributed to a naturally low carrying capacity since there has been little or no recent fishing effort on these reefs before the survey.

Data collected from Torres Strait seafood buyer and processor docket books indicate that the majority of sea cucumber was harvested from the central eastern Torres Strait regions comprising of the Great North East Channel, Don Cay, Darnley Island, Cumberland and Great Barrier Reef regions as described in Figure 2.

Figure 2: Torres Strait bioregions.



1.5 Allocation between sectors

The TSBDMF is an important and wholly commercial Traditional Inhabitant fishery with the exception of one non-Traditional Inhabitant fisher. TAC allocations are competitive and are not allocated between sectors or individuals.

1.6 Governing legislation/fishing authority

Since 1999, when management of the fishery was transferred from the Queensland Government to the PZJA, the fishery has been managed under the TSF Act. The PZJA consists of the Australian Government (represented by the Minister for Agriculture), the Queensland Government (represented by the Queensland Minister for Agriculture, Fisheries and Forestry) and the Torres Strait Regional Authority (represented by the Chair).

Management arrangements are legislated through Fisheries Management Instruments[3] (FMIs) under the TSF Act and conditions on fishing permits. FMIs are issued under the TSF Act and give effect to the fisheries responsibilities of the Torres Strait Treaty and related subsidiary management arrangements between Australia and PNG. Under Section 16 of the TSF Act any formal amendments regulating fishing activities requires the Minister to issue a FMI published or broadcast in such a manner as is prescribed.

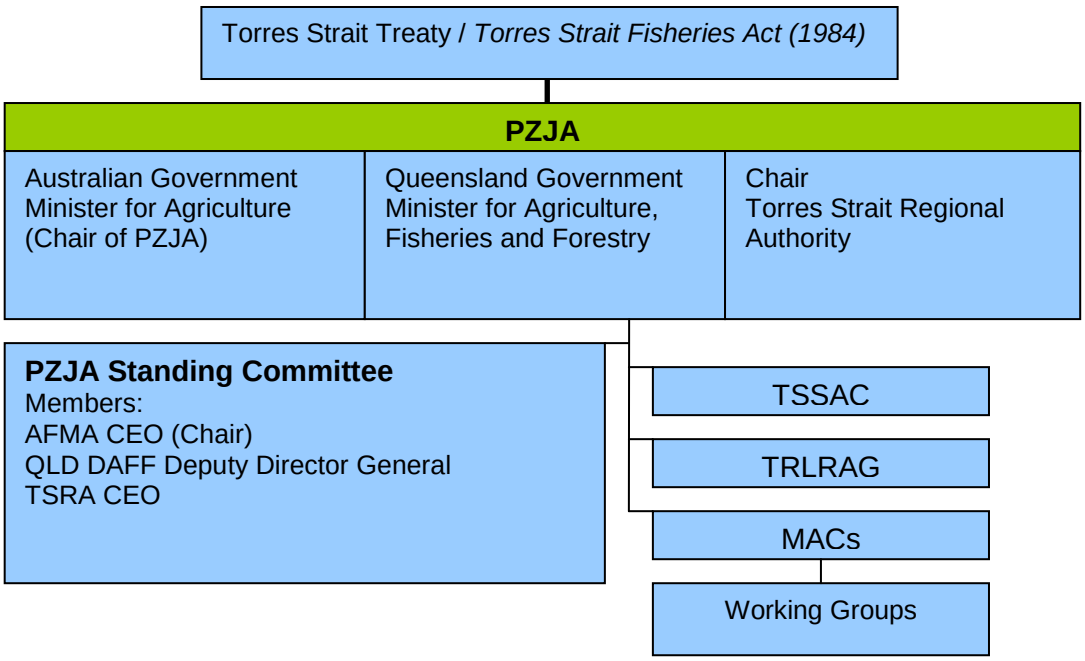
To assist in the management of the PZJA fisheries, the PZJA has established a consultative process including a structure of advisory bodies (Figure 3). The PZJA is advised by the PZJA Standing Committee, Management Advisory Committees (MACs), Scientific Advisory Committee (SAC), and Resource Assessment Groups (RAGs) on issues associated with TSPZ fisheries. These advisory groups incorporate representatives from stakeholder groups including Australian Traditional Inhabitant

[3] Fisheries Management Instruments were previously termed Fisheries Management Notices.

commercial and Traditional fishers, non-Traditional Inhabitant commercial fishers, Australian and Queensland Government officials, and technical experts.

Recreational fishing, including charter fishing, is managed under Queensland law.

Figure. 3. The consultative structure of the PZJA.



1.7 Status of export approval/accreditation under the *Environment Protection and Biodiversity Act 1999*

The TSBDMF was first accredited in June 2008. The TSBDMF was most recently reassessed under Parts 10, 13 and 13A of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) in mid-2011 and on 16 June 2011 the Delegate for the then Minister for Sustainability, Environment, Water, Population and Communities declared the TSBDMF as an approved WTO for a further three years until 20 June 2014.

2 Management

2.1 Changes to management arrangements

In 2010/11 the PZJA issued two developmental permits allowing for the harvest of sea cucumber while utilising hookah diving apparatus for two years to one traditional inhabitant operator and one non-traditional inhabitant operator.

The full 15 tonne white teatfish TAC was taken in the 2011 and 2012 seasons. These developmental permits have since expired and the Hand Collectables Working Group (HCWG) will consider whether to allow hookah use for white teatfish in the TSBDMF.

In addition, the PZJA has endorsed a one month trial opening for black teatfish with a TAC of 15 tonnes. The trial is based on scientific evidence from a survey conducted in 2009 that indicates that the stock has recovered (see section 4).

Although voluntary, Traditional Inhabitant fishery participants will be strongly encouraged to record daily catches during the trial. After the trial, the PZJA intends to review the black teatfish arrangements (such as future TACs and timing of the season opening) based on the information collected during the trial.

The black teatfish opening is a significant positive step for TSBDMF participants and associated communities. PZJA agencies are confident that sound management and science will underpin future decision making and the risk of any future overfishing is low.

AFMA will keep the Department of the Environment regularly informed of any proposed changes to management arrangements.

2.2 A statement of the performance of the fishery against objectives, performance indicators and performance measures

The TSBDMF is managed in accordance with the objectives specified in the TSF Act. The performance of the fishery is reported in the annual report available on the PZJA website at http://www.pzja.gov.au/resources/publications/annual-reports/. The performance of the fishery against the objectives is outlined below.

Objective i) to ensure the sustainable use of all sea cucumber in Torres Strait

Total catch is well below recommended TACs for specific species and the 80 tonne collective TAC. The only exception is white teatfish taken under developmental permits where the 15 tonne TAC was reached. The ABARES fishery status report 2012 indicates that no TSBDMF species are subject to overfishing.

Objective ii) to ensure that utilisation of the sea cucumber resources is for the direct benefit of the Australian Traditional Inhabitants of the Torres Strait

No new licenses have been issued to non-traditional inhabitants.

Objective iii) to ensure increased involvement in the management and control of all aspects of the fishery by the Australian traditional inhabitants of the Torres Strait

Development of community based harvest strategies have been pursued through relevant communities and the HCWG. Representatives from relevant communities have been involved in the development of these strategies through the HCWG.

Objective iv) to promote a cooperative approach to management with Papua New Guinea

Australia and PNG agencies and stakeholders discuss the TSBDMF management arrangements and compliance at the following annual meetings; fisheries bilateral meetings, Torres Strait Scientific Advisory Committee (TSSAC), Traditional Inhabitant meeting and the Joint Advisory Committee meeting.

Objective v) in consultation with industry and traditional fishers, to ensure the recovery of the sandfish stock on Warrior Reef by adopting a precautionary approach when setting catch levels in the early years of rebuilding the fishery

Surveys of sandfish on Warrior Reef were conducted in February 2010 and March 2012. The results of these surveys will be used when considering management arrangements for sandfish, which have been subject to a zero TAC since 1998.

2.3 Compliance risks present in the fishery and actions taken to reduce these risks

Domestic compliance in the TSPZ is enforced by the Queensland Government via the Queensland Boating and Fisheries Patrol (QBFP). Foreign compliance activities are undertaken by AFMA.

Compliance monitoring in the TSBDMF is difficult as much of the fishing occurs in remote areas. The current compliance program is restricted by the costs of implementing a program in these circumstances. A summary of compliance activities undertaken in the TSPZ are provided in the PZJA annual report, available on the PZJA website at http://www.pzja.gov.au/resources/publications/annual-reports/.

The TSBDMF shares an international boundary with PNG and a significant compliance risk in the TSBDMF fishery is illegal fishing conducted by foreign nationals, mainly from PNG and Indonesia.

The PNG sea cucumber fishery has been closed since 1 October 2009 due to concerns about stock levels. After the PNG closure was in effect the incidence of PNG nationals fishing illegally in the Australian area of the TSPZ reduced significantly. However, during 2013 there has been an observed increase in trade of sea cucumber across the Indonesian border and recent sightings of illegal take of sea cucumber in Australian waters.

AFMA's foreign compliance program closely monitors PNG nationals within the TSPZ and has, in the six months prior to February 2014, apprehended nine boats inside Australian waters and repatriated 77 illegal fishers to Daru for prosecution by PNG authorities under provisions of the Torres Strait Treaty and the Torres Strait Fisheries Act 1984. Ongoing monitoring of this illegal trade activity and the Warrior Reef area is being maintained by Australian and PNG authorities. To assist PNG authorities in this regard AFMA is providing PNG National Fisheries Authority (NFA) with two long boats to increase their compliance capability within the PNG jurisdiction areas in the Torres Strait region.

Domestic compliance programs are developed on a risk assessment basis. Through this process QBFP have identified unlicensed operators (including PNG boats in Australian waters) and the take of no-take species such as sandfish as high priorities for the TSBDMF. QBFP conduct frequent surveillance flights across the Torres Strait, as well as perform at sea inspections and community visits.

In addition to enforcement activities, AFMA continues to seek to incorporate Traditional fisheries practices into future management arrangements to encourage stakeholder involvement in compliance issues.

2.4 Consultation processes

Consultation and communication can be difficult across all islands of the Torres Strait, but are important elements in the effective management of the region's fisheries.

In 2005 the PZJA approved the establishment of the HCWG to include harvest fisheries such as sea cucumber, trochus, pearl shell and sponge. Other consultation processes include meetings between fisheries officers and fishers in communities around the Torres Strait and articles/advertisements in newspapers.

While the committees and groups outlined in Figure 3 (section 1.6) are the main means of the PZJA obtaining advice and information, the PZJA may also seek advice and views from others with relevant expertise or interest. This includes PZJA agencies, other government agencies, independent consultants, operators in fisheries more broadly and representatives of Torres Strait communities.

AFMA also consults with the Department of the Environment in regard to new management arrangements or proposed changes as required under the WTO accreditation for the fishery.

2.5 Description of cross-jurisdictional management arrangements

Australia and PNG entered into the Torres Strait Treaty on 15 February 1985. The Treaty is concerned with sovereignty and maritime boundaries in the area between the two countries and the protection of the traditional way of life and livelihood of Traditional Inhabitants and of the marine environment. The Treaty also establishes the TSPZ in which each country exercises sovereign jurisdiction for swimming fish and sedentary species on the respective sides of the agreed jurisdiction lines. The lines are known as the Fisheries Jurisdiction Line and Seabed Jurisdiction Line (Figure 1).

Some Torres Strait Fisheries stocks are managed jointly by PNG and Australia, however the TSBDMF is one of a group of fisheries managed separately. Although the beche-de-mer fisheries are managed separately, the PZJA agencies still meet with PNG representatives regularly to discuss cross jurisdictional arrangements in relation to TSPZ fisheries, including the TSBDMF.

2.6 Outcomes of review processes

There are currently no review processes in place that affect the management of the TSBDMF.

2.7 Demonstration of compliance with threat abatement plans, recovery plans, etc and also relevant domestic and international agreements.

There are no applicable threat abatement plans, recovery plans, etc or relevant domestic and international agreements (outside those described in section 2.5).

3 Catch data

Currently there is no compulsory requirement for reporting of catch by Traditional Inhabitant fishers. The one non-Traditional Inhabitant licence holder is required to report catch and effort in the fishery. Catch reporting in the fishery is predominantly voluntary via the Torres Strait seafood buyers and processors docket book, which provides a record of product landed. Whilst this is a voluntary measure, it has been a promising source of data regarding catch level in the fishery.

If the one month 15 tonne black teatfish trial is conducted, all fishery participants will be strongly encouraged to report all catches. Community visits will be conducted to ensure all participants are aware of the importance of reporting catch for the long term sustainability of the species.

3.1 Total catch of target species (including retained and discarded catch)

There has been limited catch reported in docket book returns since 2005. The lack of catch is attributed to a lack of activity in the fishery due to the poor market price obtained for the sea cucumber species open to fishing.

Recent catches of sea cucumber that have been reported to AFMA through docket books is shown in Table 1.

Table 1: Catches of sea cucumber reported in docket books and catch disposal records in 2013.

Species	TAC (kg)	2013 Catch (kg)
White teatfish	15,000	9,891
Prickly redfish	20,000	2,782
Blackfish	80,000 (combined TAC)	130
Deepwater redfish		3,174
Golden sandfish		21

Because reporting is not compulsory, AFMA believes that the may be additional unreported catch.

3.2 Total catch of target species taken in other fisheries

Noting that the collection of sea cucumber is largely restricted to hand collection it is unlikely target species are taken in any other fishery.

3.3 Catch of byproduct species (reported by species)

Byproduct species are unlikely due to the fishery being restricted to hand collection.

3.4 Total catch of bycatch species (reported by species if possible)

Bycatch species are unlikely due to the fishery being restricted to hand collection.

3.5 Harvest by each sector (commercial, recreational, indigenous and illegal)

Almost all sea cucumber catch is taken in the course of commercial fishing or community fishing, and there is only one non-Traditional Inhabitant commercial fisher in the TSBDMF. Recreational catch is assumed to be minimal, and almost all commercial catch is sold to South East Asian traders. Illegal catch activity is discussed in section 2.3.

3.6 Effort data including information on any trends

Effort in the fishery has been low since 2005 due to the low market price for the species open to fishing. Effort spiked temporarily in 2011 and 2012 when developmental hookah permits were used to collect white teatfish and there was an experimental fishing survey conducted for sandfish on warrior reef.

3.7 Spatial issues/trends

As described in section 1.4, harvesting predominantly occurs in the eastern Torres Strait. The majority of fishing for sandfish takes place at Warrior Reef.

4 Status of target stock

4.1 Resource concerns - update

The most recent surveys of sea cucumber in Torres Strait were conducted in 2009 (eastern Torres Strait, predominately for non-sandfish species) and 2010 (Warrior Reef for sandfish). During the 2009 survey, surf redfish were found to be uncommon, however it is now considered likely that this species was never a large component of the catch. It is more likely that this species was made up of deepwater redfish and blackfish, however the recommendation is that the 0 tonne TAC for surf redfish remain in place.

The density of black teatfish was found to have increased significantly since the survey in 2005 and had recovered to near natural (unfished) densities (Skewes *et. al*. 2010). As a result it was recommended that this species be reopened to fishing with a modest TAC of 25 tonnes. The PZJA has agreed to open black teatfish to be fished for a period of one month only with a maximum TAC of 15 tonnes. During this time catch reporting will be encouraged and closely monitored. AFMA will issue a cease fishing notice should the TAC be met within the one month season.

The 2009 survey found that the density of white teatfish appeared to be increasing and recommended the current TAC of 15 tonne remain unchanged. The density of prickly redfish appeared to be stable with the average size larger than previous years surveys. As a result the 2009 survey recommended that the TAC for prickly redfish also remain unchanged.

The relative abundance of the highest value species, sandfish (*Holothuria scabra*), was assessed by surveys in 2010 and 2012. Survey densities were found to be at similar levels to 2004 however numbers of juveniles showed an increase. The sandfish population was made up of possible seven year classes representing a significant breeding potential. The 2012 stock was found to support a larger number of older adults, with a greater size range than ever observed during previous surveys. Based on these results, the 2012 study recommended that the fishery should be opened once the stock has reached 50% virgin biomass, after undertaking a full scale survey.

The ABARES Fishery Status Report for 2012 made the following assessments for the main species of the fishery as described in Table 3.

Table 3. Status of the TSBDMF

Species	**Biological Status 2012**	
	Fishing Mortality	**Biomass**
Black teatfish (*Holothuria whitmaeil*)	Not subject to overfishing	Not overfished
Prickly redfish (*Thelenota ananas*)	Not subject to overfishing	Not overfished
Sandfish (*Holothuria scabra*)	Not subject to overfishing	Overfished
White teatfish (*Holothuria fuscogilva*)	Not subject to overfishing	Not overfished
Other species (19 species)	Uncertain	Uncertain

4.2 Results of any stock assessments

Refer to section 4.1.

4.3 Results of any stock recovery strategies (if applicable)

Formal analysis of stock recovery strategies (prohibition of the take of overfished species and increased foreign compliance capabilities) has not been undertaken for the fishery. However, results from the recent surveys indicate recovery for some species as a result of zero TACs being in place.

The implementation of Community Based Harvest Strategies that limit effort pulses, mitigate localised depletion and collect fishery-dependent and fishery-independent data will also assist with managing the recovery of stocks of the TSBDMF.

5 Research and Monitoring

5.1 Results of any research completed relevant to the fishery, including how results will be incorporated into management of the fishery

As detailed in Section 4.1, surveys were carried out for all sea cucumber species in 2009 in eastern Torres Strait. The following recommendations were made by Skewes et al 2010 and are being implemented through PZJA:

1. *Amend TACs for the following highly targeted species as described in Table 2.*

Table 2. *TAC recommendations for Torres Strait sea cucumber species made by Skewes et al 2010.*

Species	***Current TAC (t)***	***Recommended TAC (t)***
Black teatfish	*0**	*25*
White teatfish	*15*	*15*
Prickly redfish	*20*	*20*
Deepwater redfish	*80***	*25*
Blackfish	*80***	*5*
Surf redfish	*0*	*0****
Sandfish	*0*	*0****
Other species	*80*	*80*****

Notes:
** The PZJA has agreed to implement a 15 tonnes TAC for a trial period of one month.*
*** Currently fished as 'other species' combined TAC of 80 tonnes.*
**** No changes to the zero TAC for sandfish or surf redfish were made in the report.*
***** Skewes et al recommended a 5 tonne trigger limit that will initiate a review of the catch data for that species and a recommendation for future exploitation levels and/or data requirements.*

These recommendations have been supported by the HCWG and are in various stages of progressing through the PZJA process to be implemented.

2. *Produce a suitable species identification guide to facilitate the collection of accurate fishery catch data.*

   The TSSAC has approved funding for the development of an identification guide for sea cucumber species commonly found in the Torres Strait. This will help managers and fishers correctly identify sea cucumbers to assist in the management of the TSBDMF. AFMA and the Commonwealth Scientific Industrial and Research Organisation (CSIRO) are seeking input from Torres Strait communities and the HCWG as to the layout and information in the guide. The ID guide is expected to be completed in 2014.

3. *Implement co-management harvest strategies with island communities that limit effort pulses, mitigate localised depletion and collect fishery and fishery-independent data.*

Co-management harvest strategies will be considered using a decision support tool developed by CSIRO and recent stock abundance estimates. PZJA agencies are looking to efficient ways of implementing the co-management harvest strategies.

5.2 Description of monitoring programs used to gather information on the fishery (such as observer programs, long term monitoring programs etc) and results of these

Monitoring in the TSBDMF is currently undertaken by analyses of Torres Strait Buyer and Processor docket book data as well as logbook data.

5.3 Results of any collaborative research undertaken for the fishery

None to date, however the PNG NFA is interested in pursuing programs in the future.

6 Interactions with protected species

6.1 Frequency and nature of interactions

Fishing is restricted to hand collection only; no interactions with protected species have been recorded or are considered likely to occur.

6.2 Management action taken to reduce interactions and results of such action

Fishing is restricted to hand collection only; no interactions with protected species have been recorded or are considered likely to occur.

7 Impacts of the fishery on the ecosystem in which it operates

7.1 Results of any Ecological Risk Assessments

Due to the small size of the fishery and low level of fishing activity, an Ecological Risk Assessment (ERA) has not been conducted.

7.2 Nature of impacts on the ecosystem

Although an ERA has not been conducted for the fishery it could be envisaged that impacts on the ecosystem are restricted to:

- Concerns about exploitation levels of target species;
- Concerns about translocation of species via hull and anchor fouling; and
- Anchoring/mooring and other anthropogenic activities such as disturbing reef habitat.

7.3 Management action taken to reduce impacts and results of such action

As there has not been an ERA conducted for this fishery to date, there have been no formal management actions taken. Despite this, the issues raised in Section 7.2 will likely be addressed during the development of Community Based Harvest Strategies.

Considerable work on developing community based Harvest Strategies for the Torres Strait Hand Collectable Fishery (includes TSBDMF) has occurred and AFMA will be seeking to implement these in the near future.

8 Progress in implementing recommendations and conditions resulting from the Department of the Environment and Heritage assessment of the fishery

8.1 Description of progress in implementing each recommendation and condition

Progress regarding the implementation of conditions and recommendations from the current Strategic Assessment are listed in Tables 4 and 5.

Table 4: Conditions to the Australian Fisheries Management Authority (AFMA) on the ecologically sustainable management of the TSBDMF.

Conditions	**Progress**
Operation of the fishery will be carried out in accordance with the management regime in force under the *Torres Strait Fisheries Act 1984* and the *Torres Strait Fisheries Regulations 1985*.	The PZJA ensures that management of the TSBDMF is carried out in accordance with the TSF Act and the *Torres Strait Fisheries Regulations 1985*; including subordinate legislation such as fisheries management instruments and/or notices.
The PZJA to inform the Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) of any intended amendments to the TSBDMF management arrangements that may affect the assessment of the fishery against the criteria on which EPBC Act decisions are based.	The PZJA aims to ensure the Department of the Environment (formerly DSEWPaC) is well informed of any intended changes to management arrangements. As such, AFMA, on behalf of the PZJA, informed the Department of the Environment of the intended increase in the black teatfish TAC to 15 tonnes for a one month trial period. Catch data will be closely monitored during this trial period and this information will form the basis for future PZJA management decisions for the fishery.
The PZJA to produce and present reports to the Department of Sustainability, Environment, Water, Population and Communities as per Appendix B to the *Guidelines for the*	This report is submitted as the Annual Status Report for 2013. A report was submitted to the Department of the Environment in 2011 with the renewal of the WTO accreditation.

Ecologically Sustainable Management of Fisheries – 2nd Edition.	

Table 5: Recommendations of the WTO approval of the TSBDMF. Note the timeframe for these recommendations is before the next Australian Government assessment of the fishery in June 2014.

Recommendations	**Progress**
1. PZJA to: a. implement strategies to improve estimates of commercial (community) harvest from the TSBDMF; and b. develop and implement appropriate strategies to obtain improved estimates of all removals from sea cucumber stocks.	AFMA continues to monitor catch levels of sea cucumber harvested in Torres Strait through collecting daily fishing records from the one non-Traditional Inhabitant licence holder and voluntarily submitted records of sales of catch from Traditional Inhabitant commercial fishers. During the proposed one month trial of the opening of black teatfish, catch reporting will be compulsory for the one non-Traditional Inhabitant licence holder and strongly encouraged for Traditional Inhabitant fishers. The PZJA has developed specialised catch record data sheets on waterproof paper for fishers to record daily catches during the trial. Community consultation visit will occur prior to the trial to inform operators of the importance of catch reporting for the future of the black teatfish fishery. Routine compliance monitoring of Illegal, Unreported and Unregulated (IUU) fishing is ongoing and is conducted on the basis of established risk assessments. AFMA retains a strong focus on responding to IUU fishing. In addition, the TSSAC has approved a project utilising smart-phone technology to collect fine-scale catch and effort data from fishers operating within the Torres strait Finfish Fishery. It is expected that the outputs from this project will lead to improved catch monitoring processes in other Torres Strait fisheries including the TSBDMF.
2. PZJA to: a. develop strategies for implementing existing draft community based harvest strategies to include meaningful performance indicators, performance measures and responses;	In 2010 CSIRO developed draft harvest strategies for sea cucumber and trochus with Erub and Warraber communities. These harvest strategies include developing objectives and performance measures. Community based harvest strategies will be considered using a decision support tool developed by CSIRO and recent stock abundance estimates. PZJA agencies are looking to efficient ways of implementing these harvest strategies. Future HCWG meetings will need to address concerns on legislating responses to performance measures and indicators before further expansion of harvest

b. extend the development of harvest strategies to other communities in the area of the TSBDMF; and c. Consider formalising performance indicators, performance measures and responses for those areas of the fishery not covered by community based harvest strategies.	strategies to other Torres Strait Island Communities can be progressed.
3. PZJA to continue to identify and pursue opportunities for research relevant to species harvested in the TSBDMF	The Torres Strait Scientific Advisory Council (TSSAC) has approved funding for CSIRO to develop an identification guide for sea cucumber species commonly found in the Torres Strait. This guide will help fishers and managers to correctly identify sea cucumbers to reduce the likelihood of species being misidentified when fishing. The HCWG is currently identifying research priorities for 2014. Possible research priorities include: - Improving monitoring of catch and effort in all sectors of the fishery. - Assessing the impact of overfishing on Warrior Reef in collaboration with PNG. - Modelling recovery strategies and management options using tools such as a management strategy evaluation. There is also a research project pre-proposal being assessed by the TSSAC that will aim to identify at the drivers of illegal activity in PNG, including the trade of sea cucumber to Indonesia. During the 2012 Australia and PNG bilateral meetings, both countries agreed that sea cucumber was one of the high priority areas for investigating collaborative research opportunities. PNG NFA has indicated a willingness to financially contribute to stock assessments.
4. PZJA and AFMA to continue and encourage further cooperation with relevant jurisdictions to pursue increased knowledge and complimentary management of sea	The PZJA continues to engage PNG including issues related to illegal PNG fishing of stocks in areas of Australian jurisdiction. The PZJA are supportive of the closure of the sea cucumber fishery in PNG which has been in place since 2009. Australia will continue to support PNG in implementing the closure. Australia has offered assistance with conducting surveys of sea cucumber

cucumber resources across fisheries and across jurisdictions.	stocks on the PNG area of jurisdiction to assist PNG in monitoring the impact of the fishery closure. The PNG NFA is a member of the TSSAC.

8.2 Reasons for any missed deadlines

Due to the low levels of activity in the fishery, research resources are often dedicated to higher value Torres Strait fisheries such as the Tropical Rock Lobster Fishery, the Torres Strait Finfish Fishery and the Torres Strait Prawn Fishery.

8.3 Expected completion dates if actions running behind schedule

Actions will be progressed on an ongoing basis.

8.4 How the measures implemented to address the recommendations and/or conditions have improved management of the fishery

Measures to implement the recommendations have improved management of the fishery by increasing stakeholder participation via the establishment of the HCWG and ongoing development of the community based harvest strategies; and up-to-date stock abundance estimates to support setting appropriate TACs.

References

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TORRES STRAIT HAND COLLECTABLES WORKING GROUP (HCWG)	Meeting No. 8 30 April 2015
Beche de mer Training and DVD production (Kenny Bedford - MyPathway)	Agenda Item No. 4.3 FOR NOTING

PURPOSE

For the HCWG to **NOTE** the training initiatives conducted during 2014-15.

BACKGROUND

AFMA and Fisheries Research Development Corporation (FRDC) have jointly funded a project to produce a training DVD to educate fishers about the management and best practice, identification, handling and processing techniques for achieving optimum quality and price for the higher value species of beche-de-mer.

To facilitate production of the video, a training session was held on Erub during October 2014. This training session was conducted by a beche-de-mer processor and covered the topics to be covered in the training DVD.

Production of the DVD will be completed in May 2015, and made available to all beche-de-mer fishers and community fishing organisations in the Torres Strait as well as other relevant regions (eg. Northern Territory communities)

Production of the video involved:

- Interviews with fishers and community stakeholders
- Interviews with industry professionals (bech-de-mer buyer/processor)
- Interview with fisheries scientist and bech-de-mer expert (Tim Skewes - CSIRO)
- Filming of the training held in Torres Strait communities
- Filming of bech-de-mer processing in Cairns
- Filming at a retail outlet selling bech-de-mer product

FINANCIAL IMPLICATIONS

The training video production project was co-funded by AFMA (existing budget) and FRDC.

TORRES STRAIT HAND COLLECTABLES WORKING GROUP (HCWG)	Meeting No. 8 30 April 2015
Foreign Compliance Update (AFMA)	Agenda Item No. 5.1 FOR NOTING

PURPOSE

For the Hand Collectables Working Group (HCWG) to **NOTE** the provided update on foreign compliance activities in respect to the hand collectable fisheries in the Torres Strait region.

BACKGROUND

There was a marked increase in illegal Beche-de-Mer (BDM) fishing incursions in Australian waters from 2013 to 2014 resulting in 17 Papua New Guinea (PNG) flagged vessels being intercepted and either apprehended or subjected to seizure of gear and catch. As a result of these cases 64 persons have been prosecuted at the Daru District court in PNG for offences in Australian waters. All of the vessels intercepted were in the vicinity of Warrior Reef in the Torres Strait Protected Zone (TSPZ).

One PNG boat conducting a traditional visit was found to be involved in commercial fishing of BDM with a local Torres Strait resident during this visit. This matter was referred to PNG authorities, the boat was intercepted on its arrival in to PNG and one person was subsequently prosecuted for illegal importation and possession of BDM.

One Australian national was prosecuted through the Australian court system for the possession of approximately 3,000 individual BDM and this product was believed to be intended for sale in PNG. This is the only known case of an Australian national harvesting BDM for the purpose of taking it to PNG to sell.

AFMA gifted an additional two vessels to The PNG National Fisheries Authority and the Royal Papua New Guinea Constabulary in June 2014 to enable PNG government authorities to conduct on-water enforcement and deterrence programs.

There has been a significant decline in illegal BDM harvesting in Australian waters since late 2014 and it is believed that a number of factors including PNG enforcement activity have affected this decline. Of note is the establishment of border patrols in the region by the Papua New Guinea Defence Force which appear to be targeting the illegal movement of Indonesian buyers/traders of BDM.

AFMA, PNG and Indonesian authorities continue to share information and work together to stamp out the black market trade in BDM for the ongoing protection of local resources. AFMA is working to expand our resource base throughout the Torres Strait region through cooperative information and knowledge sharing with Outer Island communities and government agencies based on those islands.

AFMA is not aware of any foreign compliance issues in respect to the Trochus or Pearl Shell Fisheries.

FINANCIAL IMPLICATIONS

Nil

TORRES STRAIT HAND COLLECTABLE WORKING GROUP (HCWG)	Meeting No. 8 30 April 2015
Domestic Compliance Update (QLD Fisheries)	Agenda Item No. 5.2 FOR NOTING

PURPOSE

For members of the Hand Collectibles Working Group (HCWG) to **NOTE** the domestic compliance arrangements in the Torres Strait Protected Zone (TSPZ) at **Attachment A**.

BACKGROUND

Within the TSPZ, Queensland Boating and Fisheries Patrol (QBFP) administer domestic compliance in conjunction with the Australian Fisheries Management Authority which administers foreign compliance.

QBFP aims to achieve an average of five days at sea per month to target compliance with fisheries rules and regulations. The QBFP officers also visit island communities to encourage voluntary compliance by clarifying licensing arrangements, networking with community members and gathering intelligence.

The QBFP Compliance Risk Assessment process outlines high priority areas for each fishery. The priority compliance risks for the Beche-de-Mer fishery are unlicensed fishing (including Papua New Guinea nationals taking Beche-de-Mer within the TSPZ) and the take of species closed to fishing such as Sandfish, Surf Redfish and Black Teatfish. The priority compliance risk for the Pearl Shell Fishery is unlicensed fishing activity.

Further information is provided at **Attachment A** and a representative from Queensland Fisheries will provide a verbal update on compliance.

TORRES STRAIT HAND COLLECTABLES WORKING GROUP MEETING #8	30TH APRIL 2015 AFMA MEETING ROOM THURSDAY ISLAND
Domestic Compliance Report **(QLD Fisheries)**	**Agenda Item** For Noting

Assistance: Fisheries Queensland, Department of Agriculture, Fisheries and Forestry

OUTCOME SOUGHT

- To **INFORM** members of the Hand Collectables Working Group of the domestic compliance arrangements and achievements in the Australian jurisdiction of the Torres Strait Protected Zone (TSPZ).

TALKING POINTS

- Queensland Boating and Fisheries Patrol (QBFP) currently aims to achieve an average of five days at sea per month to target particular fisheries and complaint response whilst conducting community visits within the TSPZ.
- Queensland Boating and Fisheries in consultation with Australian Fisheries Management Authority administer the Domestic Compliance programme within the Torres Strait Protected Zone.
- Queensland Boating and Fisheries Patrol administer domestic compliance in conjunction with the Australian Fisheries Management Authority which administers foreign compliance.

BACKGROUND

The purpose of the Queensland Boating and Fisheries Patrol's TSPZ Compliance Program is to:

- Enforce fisheries and marine legislation in a manner that results in a high level of compliance
- Educate and advise both traditional and commercial fishers on the need for fishing laws in a manner that results in a high level of voluntary compliance
- Undertake duties as required by the PZJA to protect TSPZ resources.

TORRES STRAIT HAND COLLECTABLES WORKING GROUP MEETING #8	30TH APRIL 2015 AFMA MEETING ROOM THURSDAY ISLAND
Domestic Compliance Report **(QLD Fisheries)**	**Agenda Item** For Noting

SUPPLEMENTARY MATERIAL

SURVEILLANCE AND ENFORCEMENT

The Program is delivered by QBFP officers based in Cairns.
The Program is delivered through at-sea inspections using Government owned and where necessary chartered vessels and community visits.

Vessels

The QBFP currently utilises a Queensland Police Service vessel to conduct offshore patrols. QPS involvement also addresses a number of workplace health and safety issues particularly those concerning personal safety.

Community Visits

The QBFP performs extension services through community visits. These visits are imperative for achieving voluntary compliance. During the reporting period QBFP officers visited island communities and communities on the Northern Peninsula.

Community visits are also conducted to gather intelligence and network with community members for fisheries related issues.

Most Torres Strait Communities have freezer based operations with QBFP Officers conducting routine inspections to ensure fisheries compliance (size limits etc.).

The visits also enable Community members to discuss issues relating to commercial, traditional and recreational fishing as well as boating safety issues. Issues arising from community visits included:

- Licensing procedures
- Unlicensed fishing
- Confusion as to the licensing requirements for Traditional Inhabitants who wish to exercise their traditional rights in regards to traditional fishing.

TORRES STRAIT HAND COLLECTABLES WORKING GROUP MEETING #8	30TH APRIL 2015 AFMA MEETING ROOM THURSDAY ISLAND
Domestic Compliance Report **(QLD Fisheries)**	**Agenda Item** For Noting

QBFP TSPZ Compliance Priorities

Key priorities in the TSPZ as determined by the QBFP Compliance Risk Assessment process are set out below:

Fishery	Compliance Priorities
Bêche-de-mer	· Unlicensed fishing · Regulated fish – species/size/number
Reef Line/ Spanish Mackerel	· Breach of condition of licence · Vessels using more tenders than they are licenced for · Unlicensed TIBs · Take/possess/sell regulated fish – size/species (commercial) · Take/possess regulated fish – size/species/number (recreational) · Recreational/charter fisher possessing fish not in the prescribed form e.g. Skinned, filleted, live etc. · Recreational fisher taking fish for commercial purposes.
Pearl Shell	· Unlicensed fishing · Regulated fish – Species/Size/Number.
Prawn	· Regulated fish (excluding TRL). · Possession of TRL · BRD/TED compliance · Net size · Compliance with specific TSPZ licence requirements · VMS compliance · Closed seasons

TORRES STRAIT HAND COLLECTABLES WORKING GROUP MEETING #8	30TH APRIL 2015 AFMA MEETING ROOM THURSDAY ISLAND
Domestic Compliance Report **(QLD Fisheries)**	**Agenda Item** For Noting

Fishery	Compliance Priorities
TRL	· Hookah Closure · Total TRL Fishery Closure · Spring Tide Closures · Breach of condition of licence · Vessels using more tenders than they are licensed for. · Unlicensed TIBs · Regulated fish – Recreational (number/size) / Traditional (number) · Regulated fish – Commercial size · Black marketing
Turtle and Dugong	· Non-Traditional Inhabitant take

TORRES STRAIT HAND COLLECTABLES WORKING GROUP MEETING #8	30TH APRIL 2015 AFMA MEETING ROOM THURSDAY ISLAND
Domestic Compliance Report **(QLD Fisheries)**	**Agenda Item** For Noting

Compliance Program Outcomes July 2013 to June 2014

QBFP achieved a total of 56 TSPZ patrol days.

Number of Infringement notices:	4
Number of Briefs:	1
Number of patrols:	56
Man hours:	728
Overall Compliance rate:	95.83%
Total inspections:	96

The table below is a breakdown of the outcomes, by fishery, in the TSPZ.

Fishery Compliance Rate

Fishery Type	# Units (1)	# Persons	Offences Detected (2)	Not Compliant (3)	% Units Compliant (4)
Collection - Dugong/Turtle (Torres Strait)	2	3	0	0	100
Collection - Rock Lobster (Torres Strait)	23	81	1	1	95.65
Line - Reef Line (Torres Strait)	4	38	0	0	100
Line - Spanish Mackerel (Torres Strait)	4	33	0	0	100
Other/Not Applicable	1	1	0	0	100
Transport	12	59	4	3	75
Trawl - Prawn (Torres Strait)	11	49	0	0	100
Unknown Fishery	38	14	0	0	100
Total	**96**	**280**	**5**	**4**	**95.83**

(1) Total number of units contacted during patrols for Fisheries and Shark Control and Transport.

(2) Number of individual units that were not compliant (1 or more offences detected)

*(3) (# Units - # Units Not Compliant) / # Units * 100 = % Units Compliant*

(4) Totals should be used with caution. A unit contact may be recorded in zero or more fisheries and therefore increase the total counts.