ATTACHMENT 2.6A

Draft Torres Strait Turtle and Dugong Fisheries Assessment Report

January 2007

INTRODUCTION

This draft assessment report for the Torres Strait turtle and dugong fisheries has been prepared in accordance with the *Terms of Reference – Environmental Assessment of Torres Strait Turtle and Dugong Fisheries* (Attachment 1). The report provides the basis for the strategic assessment of the Torres Strait turtle and dugong fisheries consistent with the requirements of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Strategic assessment involves assessing all fishing activity under a management plan or policy rather than assessing each individual action or permit. The benefit of this approach is that it enables the cumulative impacts of a fishery to be considered and provides a level of certainty about permitted activities.

Once the assessment is complete, the Minister for the Environment and Heritage may then 'accredit' the management plan or policy. The Minister may make a declaration under the EPBC Act that actions taken under the accredited plan/policy do not require further impact assessment approval. The management plan and a notice of intent to make the declaration are tabled in Parliament for a disallowance period of 15 sitting days.

In deciding whether to accredit a plan, the Minister must be satisfied that the assessment report adequately addresses the terms of reference and that any modifications the Minister has recommended to the policy, plan or program have been made.

The primary focus of this assessment is an evaluation of the current management arrangements in the turtle and dugong fisheries against the Guidelines for the ecologically sustainable management of fisheries (the Guidelines) which are contained within the terms of reference.

The EPBC Act further provides specific accreditation for fisheries interactions with protected species. Given that the target species in the Torres Strait turtle and dugong fisheries are protected species, this report provides for assessment and decision-making under the strategic assessment and protected species provisions of the EPBC Act.

The remaining assessment provision in the EPBC Act – that relating to fisheries with an export component – is not relevant to the Torres Strait turtle and dugong fisheries.

The assessment timetable

In mid-2005, the Australian Fisheries Management Authority (AFMA) in liaison with the Department of Environment and Heritage (DEH), began preparing draft terms of reference for the strategic assessment of the Torres Strait turtle and dugong fisheries. The resulting draft terms of reference for the Torres Strait turtle and dugong fisheries was released for a five-week period of public comment on 16 September 2005.

Following consideration of the public comments, AFMA - again in consultation with DEH – finalised the terms of reference. As previously stated, a copy of the terms of reference is annexed as Attachment 1.

There are three parts to this assessment report:

Part 1	**Overview of the fisheries sector in the Torres Strait**	providing background information on the institutional arrangements for the management of the Torres Strait turtle and dugong fisheries
Part 2	**Description of the Torres Strait turtle and dugong fisheries**	describing the biological characteristics of the turtle and dugong species taken in the two fisheries, fishing methods, number of hunters, hunting effort and the current legislative and policy measures in place to manage the two fisheries
Part 3	**Environmental assessment of the two fisheries**	detailing the assessment of the management arrangements in place in the two fisheries against the agreed guidelines for the Ecologically Sustainable Management of Fisheries

Consultation

This draft assessment report was made available for public comment for a period of two months. Representatives from AFMA, the Torres Strait Regional Authority (TSRA) and DEH visited Torres Strait and adjacent area communities during July, August and early September 2006 to talk to Community Fisher Representatives and communities about turtle and dugong issues and to get comments on the draft report. AFMA and the Torres Strait Fisheries Management Advisory Committee have reviewed the report in the light of the comments received. The AFMA Board Environment Committee has considered the finalised assessment report and approved its submission to the Minister for the Environment and Heritage for consideration under the EPBC Act.

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GLOSSARY

AFMA – the Australian Fisheries Management Authority

CDEP - the Community Development Employment Program

CITES – the Convention on the International Trade in Endangered Species

CRC Torres Strait – the Cooperative Research Centre for the Torres Strait

DEH – the Department of the Environment and Heritage

DFAT - the Department of Foreign Affairs and Trade

EPBC Act – the Environment Protection and Biodiversity Conservation Act 1999

GBRMP - the Great Barrier Reef Marine Park

GBRMPA - the Great Barrier Reef Marine Park Authority

GoC - Gulf of Carpentaria

IUCN – the World Conservation Union

MTSRF - the Marine and Tropical Sciences Research Facility

the MoU - the Memorandum of Understanding on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South East Asian Region

NAILSMA - the Northern Australian Indigenous Land and Sea Management Alliance

NHT – the National Heritage Trust

NPA – the Northern Peninsula Area

NRMMC – the Natural Resource Management Ministerial Council

nGBR - northern Great Barrier Reef

Partnership Approach – the National Partnership Approach To The Sustainable Harvest of Marine Turtles and Dugong in Australia

Partnership Body – a group to be established to oversee the implementation and further development of the Partnership Approach

PZJA – the Torres Strait Protected Zone Joint Authority

QB&FP - Queensland Fisheries and Boating Patrol

QDPIF - Queensland Department of Primary Industries and Fisheries

RAGs - Resource Assessment Groups

RAPTS – the Regional Activity Plan for Torres Strait

sGBR - southern Great Barrier Reef

TAC – total allowable catch

TSFMC – the Torres Strait Fisheries Management Advisory Committee

Treaty – Treaty Between the Independent State of Papua New Guinea and Australia Concerning Sovereignty and Maritime Boundaries in the Area Between the Two Countries, Including the Area Known as Torres Strait, and Related Matters;

TSPZ – the Torres Strait Protected Zone as established under the Treaty

TSFA – the Torres Strait Fisheries Act (1984)

TSRA – the Torres Strait Regional Authority

TSSAC - the Torres Strait Scientific Advisory Group

EXECUTIVE SUMMARY

The Draft Turtle and Dugong Fisheries Assessment Report has been prepared in accordance with the *Terms of Reference – Environmental Assessment of Torres Strait Turtle and Dugong Fisheries*. By evaluating the effectiveness of the current management arrangements of the two fisheries against the guidelines for Ecologically Sustainable Management of Fisheries developed by the Department of Environment and Heritage (DEH), this report provides the foundation for the strategic assessment of the Torres Strait turtle and dugong fisheries as required under the EPBC Act 1999.

The Torres Strait turtle and dugong fisheries are managed by the Torres Strait Protected Zone (PZJA). AFMA provides day-to-day management services for the fisheries to the PZJA.

Shortcomings in current management arrangements

The assessment has identified a number of shortcomings in the current management arrangements for the Torres Strait turtle and dugong fisheries.

i) Current data collection systems are inadequate.

- There is no ongoing collection of turtle and dugong catch data (including basic biological data such as the length/age structure) nor general fishery data such as the level of hunting effort, the number of hunters and the end-use of the catch.
- In the case of turtles, there is no monitoring of nesting flatback turtles and no data collection on turtle egg harvest for all species.
- There appears to be an underlying level of misunderstanding/distrust between indigenous groups and the research/management agencies involved in the turtle and dugong fisheries, as evidenced by community concerns that any data collected/provided may ultimately be used in ways that are not in the communities' best interests.

ii) There are limitations in the current stock assessment process.

- Unlike most other AFMA-managed fisheries, the Torres Strait turtle and dugong fisheries lack a formal scientific body responsible for regularly reviewing and reporting on the status of the turtle and dugong fisheries and the stock assessment methodology.

iii) There is no formal assessment of the potential productivity of any of the Torres Strait's turtle stocks or estimates of likely sustainable egg harvest levels, and no reference points have been set for either fishery.

The stock assessment work that has been undertaken suggests the turtle and dugong stocks are being overfished.

In terms of the outcomes to be achieved through the strategic assessment process, it appears that further thought is required as to where and how the most significant gains can be made in managing dugong and turtle stocks sustainably. The lack of data makes this very difficult, but simply stating that the Torres Strait needs to take the lead role given the greater financial resources at their disposal, is not a robust enough reason for failing to consider the alternatives. The process would benefit from a more critical assessment of where investment could be made to achieve the most sustainable, long-term outcomes.

While TSRA acknowledges the relevance of the precautionary principle in this context, care should also be taken to ensure that dugong and turtle management arrangements do not rely too heavily on the very sparse and variable data we have on their populations. If the management arrangements hinge off this data, even inadvertently, the whole process will be open to criticism. It would be better to be explicit about the inadequacy of the data in the first place, to avoid the risk that it would eventually be used as a reason for resisting management approaches, and to articulate a more relevant and meaningful foundation for management of the species, including by communities themselves, who are central to the entire debate.

Turtle stock assessments

Although the Australian catch of marine turtles is only a small part of the overall mortality, but there is no evidence at this stage that pressure on these stocks from other areas will decrease.

The turtle stock assessments rely on interpreting results from ongoing monitoring of index nesting beaches.

- The northern Great Barrier Reef green turtle stock is thought to be in the early stages of a population decline, it being considered highly unlikely that the current combined turtle catch within the Northern Planning Area (an area covering the Torres Strait, the Gulf of Carpentaria and north western-Australia) is sustainable and there being a reasonable probability that the stock will experience a severe reduction in numbers of near-adult and adult turtles within a few decades (one generation).
- In the case of hawksbill turtles, based on the monitoring of the nesting hawksbill population on Milman Island, researchers have suggested that the female adult hawksbill turtle population has been declining by 3%/year for over a decade and that given such a decline, the north-eastern hawksbill population should be considered to be critically endangered.
- In the case of flatback turtles, researchers have suggested that given high levels of egg predation by feral pigs on mainland nesting beaches and other threats to the population, it is highly likely that the flatback population will decrease in future years.

Using trends in the numbers of nesting turtles as the main tool for stock assessment has its limitations:

- There is a high degree of variability in the number of nesting turtles in any one year such that several decades of detailed monitoring is needed to detect anything more subtle than catastrophic population declines; and
- Some researchers have suggested that the effects of continued overharvesting of adults and/or eggs will not be seen in terms of reduced turtle abundance for decades, at which point the effects may be rapid, dramatic and possibly irreversible.

Dugong stock assessment

There are two quantitative assessments of the sustainability of current dugong catch levels:

- The first approach uses the Potential Biological Removal (PBR) approach and estimates of the population size (obtained from the aerial surveys), the maximum rate of increase (based on assumed age at first reproduction and average calving intervals) and a recovery factor - a subjective judgement of the how newly born dugong should be apportioned between being available for harvest and being left to contribute to building-up the population, a value of 0 implying that 100% of the newly recruited dugong should be reserved for stock rebuilding purposes, a value of 1 implying that 100% of the newly recruited dugong could be available to be harvested. Using corrected results from the 2001 aerial survey, taking the midpoint (3%) of the range of estimates of maximum rate of natural increase in the dugong population and choosing a recovery factor of 0.5 – that is, the new dugong should be shared equally between being available for hunting and for stock rebuilding purposes – the sustainable catch level was estimated at being around 82 dugong/year.
- Different researchers used the Population Viability Analysis approach to estimate the viability of the Torres Strait population over a 200 year timeframe using a variety of hunting regimes and allowing for variability in the calving interval, limited movement within (but not beyond) the Torres Strait, and using a population estimate based on the largest number of dugong recorded from any of the four aerial surveys thus far completed – 27,881. The study found that a harvest level of 500 dugong/year, a conservative estimate of the current take, would result, on average, in the population falling to less than 10% of its 1996 level within 42-123 years. Researchers argued for immediate action to prevent the functional extinction of dugongs in the Torres Strait.

There are limitations to the dugong stock assessment.

- The estimated sustainable catch levels are based on population estimates sourced from the aerial surveys. However, the aerial surveys are insensitive to subtle changes in dugong abundance: given the limitations of the aerial survey approach in accurately estimating population numbers, any sustainability estimates reliant on these uncertain population estimates must in themselves be highly uncertain;

Notwithstanding this uncertainty, the difference between the current estimate of a sustainable catch level and current catches is so large that the overall conclusion that current catches are not sustainable is inescapable.

iv) Current management arrangements are not capable of controlling the level of turtle or dugong take.

- The PZJA has not as yet attempted to limit the level of Islander participation in either of the two fisheries, no doubt mindful of the obligation stated in the Treaty to ‘minimise any restrictive effects on the traditional activities of traditional inhabitants’.
- Accordingly, current management arrangements – based on a weak set of input controls that limit who can participate (traditional inhabitants only) the vessels that can be used (6m or less in length) and in the case of dugong, a spatial closure - are designed more to retaining the fishery as a traditional non-commercial fishery rather than controlling the level of take.

PZJA awareness of these management shortcomings

It should come as no surprise that current management arrangements are assessed as being inadequate.

- In 2002, the PZJA commissioned a report - the Skehill report – which concluded that 'hunting by traditional inhabitants is largely unregulated', 'existing dugong management arrangements are inadequate', and that 'there is an urgent need for a policy decision on how dugong are to be managed, and an appropriate strategy (to reduce catch) implemented'.
- At its meeting in February 2005, the PZJA recognised that there is a high level of concern regarding the current harvest estimates of turtles in the Torres Strait.
- At that same meeting, the PZJA noted that the strategic assessment process for the turtle and dugong fisheries (this report) is likely to highlight the inadequate controls over turtle and dugong harvesting and the need to limit catches to a sustainable level.

Strategies to address management shortcomings

Over the past few years, the PZJA has been developing strategies to strengthen its turtle and dugong management arrangements.

Improved fisheries data collection

Catch monitoring

The delays that have been experienced in implementing an appropriate catch monitoring mechanism in the two fisheries since the end of the former AFMA/CSIRO catch monitoring project in 2001 are due to the PZJA's efforts to include catch monitoring as one component of a broader, more meaningful and yet still cost effective community-based management approach.

During this time, the PZJA has supported the TSRA's development of a strategy - the Regional Activity Plan for the Torres Strait (RAPTS) - to help Islander communities establish their own community-based turtle and dugong management plans. The commencement of the first stage of the RAPTS in early 2006 raises the prospects that within the next 12-18 months, some form of meaningful catch monitoring system may be in place in up to three Torres Strait communities.

- For this to materialise, sufficient educational material on the importance of accurate catch data and alternative catch monitoring approaches needs to be made available to each participating community to enable each community to make informed decisions regarding the importance of collecting catch data on an ongoing basis and the most effective catch monitoring method.
- It is suggested that an independent assessment of the catch monitoring systems developed under the separate CRC catch monitoring project should be undertaken, preferably before the July 2006 completion of the field-work component of the project, so that informed decisions can be made regarding:
  - the merits of providing ongoing funding to continue the monitoring;
  - the suitability of other communities adapting the two approaches developed under the project for their own use; and

  - the level of community support for collecting/providing additional fishery data such as the level of hunting effort, the number of hunters and the end-use of the catch.

- Several potential concerns with the community-based catch monitoring as envisaged under the RAPTS need to be addressed:
  - how the PZJA, AFMA and the TSRA would deal with the situation where an individual community decides not to include catch monitoring as part of their community management plan;
  - the implications in terms of data quality/consistency should different catch monitoring approaches be used in various communities;
  - an effective means of coordinating catch monitoring across communities; and
  - the sourcing of secure, ongoing funding to extend the pilot-phase of the RAPTS implementation to involve all Torres Strait island communities and beyond the present two and a half year time-span of the NHT project.

Monitoring of index nesting beaches for marine turtles

The PZJA has thus far had negligible involvement in the Raine Island and Milman Island nesting monitoring programs. Given the long-term importance of this monitoring to the management of the green turtle and hawksbill turtle fisheries in the Torres Strait, the PZJA should consider becoming more involved in future monitoring.

The lack of any funding to enable regular monitoring of flatback turtle nesting is inconsistent with the Marine Turtle Recovery Plan having ranked the monitoring of key nesting beaches as a high priority data collection activity. Some form of cost-effective, ongoing monitoring of flatback turtle nesting levels needs to be implemented.

Monitoring of turtles should not just focus on nesting beaches. Foraging ground studies are also useful in providing insights into how a population is functioning and the need for this type of research should also be considered.

Dugong aerial surveys

The proposed expansion of the next aerial survey of the Torres Strait dugong population to include additional areas of Australian jurisdiction – the Gulf of Carpentaria and the north-eastern Queensland coast – will go some way to addressing the limitations experienced with previous aerial surveys. However, due to the complexity of the logistical and political issues involved, there are no plans at present to extend the survey to also include Indonesian waters off its Papuan coastline. Given that the waters off Indonesia's Papuan coast have previously been identified as the area most likely to account for migration of dugong into and away from the Torres Strait, the continued inability to include Indonesian waters in the area of the aerial survey will continue to confound the interpretation of future survey results.

Islander sensitivity regarding data collection

Indigenous groups and management agencies need to recognise that they share a common interest in seeking to preserve traditional livelihoods – including the traditional hunting of turtle and dugong – while at the same time conserving turtle and dugong stocks for the benefit of future generations. Further, they need to recognise they have a common interest in obtaining the best available data on the turtle and dugong fisheries to enable the PZJA – with its government and indigenous membership – to make informed decisions on future turtle and dugong management.

Need for overall turtle and dugong data strategy

Consideration should be given to developing an appropriate data strategy for the turtle and dugong fisheries, in line with the work that AFMA is currently undertaking to develop strategic ecosystem data plans in other Commonwealth-managed fisheries.

Improved stock assessment processes

Unlike most other AFMA-managed fisheries, the Torres Strait turtle and dugong fisheries lack a formal scientific body responsible for regularly reviewing and reporting on the status of the turtle and dugong fisheries and the stock assessment methodology. Instead, the provision of stock assessment advice relies on the ongoing commitment of a small number of researchers from a small number of agencies. At the October 2006 meeting the PZJA agreed to a revised Terms of Reference for the Torres Strait Scientific Advisory Committee (TSSAC) to reflect its return to being solely a PZJA advisory body. This provides an opportunity for the TSSAC to take on this role. The TSSAC has exactly the expertise mentioned in the report, with members like Helene Marsh (Turtle and Dugong) and Clive Turnbull (stock assessment).

- There is a need for a more broad-based scientific advisory forum, attended by scientists with dugong, turtle and general population dynamics expertise, to meet periodically to discuss/review technical aspects of the turtle and dugong stock assessment. Indigenous representatives and managers from the relevant fisheries and conservation agencies should be involved, though to keep the group to a manageable size and to maintain a technical focus, possibly as observers. The Queensland Department of Primary Industries and Fisheries suggested that perhaps a good way of increasing the profile of this would be to have a biennial Turtle and Dugong TSSAC forum and call in Australian turtle and dugong experts to go through the assessments and research.

Strengthened management arrangements

Under the present subsidiary conservation and management arrangements agreed between Australia and Papua New Guinea, both countries agree that it is inappropriate to set a total allowable catch (TAC) for the Torres Strait turtle and dugong fisheries. The apparent rationale for this decision is that the fisheries are traditional fisheries, though no reasoning is given as to why a traditional fishery can not have a TAC.

This position is currently under review, with Australia having advised Papua New Guinea of its desire to begin formal discussions on future management arrangements for the shared dugong stock. It seems inevitable that the scope of the discussions will broaden to also include future management options for the turtle fishery.

Domestically, the PZJA has agreed that community-based management is required to reduce unsustainable harvesting in its turtle and dugong fisheries and is supporting the TSRA's implementation of community-based management initiatives under the Regional Activity Plan Torres Strait (RAPTS).

In 2003 the Australian Government announced $3.8 million in Natural Heritage Trust funding for a cross-regional Dugong and Marine Turtle Management Project to be coordinated by the Northern Australia Land and Sea Management Alliance (NAILSMA).

TSRA is one of five (5) regions participating in the cross-regional project, which is currently funded for two (2) years.

A Regional Activity Plan (RAPTS) was developed on behalf of the TSRA by the CRC Torres Strait, to provide a strategic framework to guide the implementation of the project in the Torres Strait region.

The RAPTS includes four key components:

• Community management plans for dugong and marine turtle;

• Monitoring programs;

• Catch sharing; and

• Education and awareness-raising.

Experiences with community management plans outside of the Torres Strait

Community-based management for Australian turtle and dugong fisheries is not a new concept. As the Torres Strait Islander communities commence the implementation of the RAPTS and the associated development of community-based management plans for their turtle and dugong fisheries, they may find it valuable to review the outcomes that have been achieved under previous community-based management approaches.

- A study should be undertaken in association with Islander communities to identify/evaluate alternative mechanisms available at the community level to limit and monitor catch.
- This should include a literature review/evaluation of alternative community-based management approaches in comparable indigenous fisheries, both domestically and internationally.

Assessment of planned RAPTS activities

The community management plans have the potential to generate considerable improvements at the local community level, in terms of catch monitoring, habitat protection, greater management understanding and increased Islander engagement in turtle and dugong research.

- Communities would benefit from having a detailed understanding of the range of potential management measures available to them. There seems a strong need for work to be undertaken, in collaboration with Islander communities, to identify and evaluate these potential management approaches.
- Further, the planned education/training/awareness-building/information sharing activities should improve the general public's understanding of turtle and dugong biology and their need for management.

Notwithstanding these benefits, the activities to be implemented in the first stage of the RAPTS are unlikely to be sufficient to encourage the communities involved to take action to effectively limit their turtle and dugong catch. Community-level action can potentially produce effective outcomes on issues such as catch monitoring, habitat restoration, and local compliance and enforcement, but independent community action is not capable of delivering sustainable turtle and dugong management.

- Even if all communities were to independently agree to limit their catch, the resultant total catch – the sum of the individual community limits – would inevitably exceed the level considered as being sustainable.
- The shared nature of the turtle and dugong stocks means that effective regional cooperation is the key to effective turtle and dugong management. The RAPTS'

intended instrument of such cooperation – the regional catch sharing arrangement – thus needs to be a fundamental aspect of any future turtle and dugong management strategy.

The regional catch sharing arrangement

The Torres Strait turtle and dugong stocks will continue to be at risk until an effective region-wide catch sharing arrangement is in place. Developing such an arrangement - together with the necessary community-level education and awareness raising needed to empower community involvement in the catch sharing discussions - is the number one priority for both fisheries. Activities related to these two initiatives warrant funding support above all other turtle and dugong needs.

Involvement of Papua New Guinea

The RAPTS envisages Papua New Guinea being involved in the catch sharing negotiations. The implicit assumption in this approach is that the catch sharing agreement will extend to both sides of the Torres Strait, that the turtle and dugong fisheries will be managed by TACs, and that there will be some agreed process whereby Australia and Papua New Guinea share the TAC.

This approach has merit. However, bilateral dialogue on a possible TAC for the dugong stock has only recently commenced and has yet to commence in the case of turtles. Agreement on how Australia and Papua New Guinea are to share the dugong and turtle stocks is realistically some way off.

Though the turtle and dugong stocks are shared between the two countries (and also a few others), Australian communities must be prepared to take a leading role in introducing new management arrangements and accept that at least initially, they may need to bear the brunt of any more restrictive management measures.

Compliance and enforcement

The RAPTS envisages enforcement responsibility resting with each individual community, though details of how community-based enforcement would work are yet to be finalised.

- If enforcement responsibility is to rest at the individual community level, consideration needs to be given to the legal powers available to local enforcement officers and the relationship between the community enforcement officers and the Queensland state fisheries enforcement officers and the state enforcement agency (QB&FP).
- Conversely, if enforcement responsibility is to rest with an external agency – such as the QB&FP – it is essential that the agency be sufficiently resourced. Similarly, it is essential that the agency have widespread community support in its enforcement role, since the effectiveness of the compliance – and thus the overall success of the arrangement – will depend on the level of information exchange between the island communities and the enforcement agency.

A number of key compliance issues are presently unresolved, and there is a pressing need to develop an appropriate compliance strategy to complement the community-based turtle and dugong management approach.

Need to provide alternative economic incentives

Despite their non-commercial status, the dugong and turtle fisheries have considerable economic significance to indigenous communities in terms of their value as a food

source. Aside from the cultural and social significance, any reduction in catch levels will leave hunters, and communities more generally, economically worse-off.

In late November, the Australian Government announced a major one-off structural adjustment package to apply to several Commonwealth-managed fisheries. However, Torres Strait fisheries are explicitly excluded from the package.

- Unless adequate recognition is given to the economic impacts that will be borne by indigenous fishers from any future reductions in turtle and dugong catch, the prospects of communities being able to effectively implement and enforce their community management plans, or of the PZJA being able to enforce an alternative management approach to restrict hunting activity, are bleak.

Need for ongoing resourcing

Past attempts at community-based management, both in the Torres Strait and elsewhere, have usually failed to achieve their expected outcomes, due in large part to their inadequate resourcing.

- A key risk to achieving sustainable management outcomes for the Torres Strait turtle and dugong fisheries is that the management agencies and/or communities will have insufficient ongoing resources to develop - and then implement - the activities required.

The current attempt to establish effective community-based management in the Torres Strait – under the RAPTS – is constrained by a shortage of funding. The RAPTS is only being partially implemented at the present time, and the cornerstone of the future management strategy for the two fisheries - the respective catch sharing agreements – is presently unfunded and thus inactive.

In any case, present funding is for a finite period (two and a half years) and ongoing funding has not been secured.

Similarly, the management response to the turtle and dugong's geographical range has thus been to establish collaborative institutional mechanisms and to develop appropriate cross-jurisdictional plans and strategies at both the national and international level. The key issue now is to ensure that adequate resources are available, both domestically and regionally, to implement these plans and strategies.

Education/awareness/training

The planned activities under the RAPTS in regard to convening information sessions and workshops, using local Torres Strait media, promoting increased local engagement in turtle and dugong research activities and preparing schools-based material and programmes - are fully consistent with what some researchers described as the need to develop a greater marine conservation ethic within Islander communities.

- Consistent with this, it is argued that dugong (and implicitly turtle) conservation in the Torres Strait can not be solved simply by legislation and law enforcement. Instead, public cooperation is considered vital and public understanding an essential prerequisite to enhanced management arrangements. This assessment accepts these views.
- Furthermore, the effectiveness of any attempted fishery restrictions, were that the PZJA's intent, would largely be determined by the level of stakeholder – in

this case, Islander – support for the restrictions. Unless Islander communities agreed with any new management measure, enforcement will be problematical, and in all likelihood the management measure would prove ineffective.

Enforcement, though important, is not the primary issue regarding safeguarding dugong and turtle stocks for future generations. The key issue is the level of stakeholder support. So long as the communities view any more restrictive measures as being thrust upon them by government, the measures are unlikely to succeed. The point at which the communities view the government's actions as helping them to implement measures to protect turtles and dugong for their future generations, that is the point at which the management response will have the greatest prospects of success.

REGIONAL SEA CLAIM & NATIVE TITLE RIGHTS

In November 2001 the Torres Strait Regional Sea Claim was lodged in the Federal Court, on behalf of fourteen Torres Strait Islander communities, covering some 42,000 km2 of traditional sea country. The claim is currently in mediation. Any determination which recognises traditional fishing, including hunting of dugong and turtle, would have implications for the management of the species. Recognition of native title over the regional sea claim area would require a Prescribed Body Corporate (PBC) to be established, to hold the native title in trust for the native title holders.

It is also necessary to consider the rights and interests of native title holders over the various inhabited and uninhabited islands of the Torres Strait in terms of any community-based environmental management approach, including over fisheries. While PBCs have now been established in respect to all of the inhabited and most of the uninhabited islands, they are currently not resourced to fulfil their native title obligations or aspirations as traditional land owners.

AFMA CONCERNS

The AFMA Board Environment Committee in reviewing this report raised a number of concerns about the fishery. These relate to: the unknown current level of dugong take from Torres Strait, but the suggestion that this could be up to 10 times the Maximum Sustainable Yield; compliance; illegal take by PNG nationals; management difficulties; funding; the legal situation; and responsibility for managing the fisheries.

These issues are all canvassed within the report but the AFMA Board Environment Committee wished to highlight these issues in particular as threatening the future of the fisheries.

PART 1: OVERVIEW OF THE FISHERIES SECTOR IN THE TORRES STRAIT

1.1: The Torres Strait environment

The Torres Strait is the body of water that separates the Australian and Papua New Guinea mainlands. The Strait is shallow, averaging 10-15m in the west and 30-50m in the east. It is bounded on the east by the Coral Sea, the west by the Gulf of Carpentaria and Arafura Sea and to the north and south by the southern side of Papua New Guinea's western Province and Cape York respectively.

Biological productivity in the Torres Strait is high and characteristic of productive shelf waters (Johannes and MacFarlane 1991). The Strait supports at least 17,500 km^2 of seagrass supporting habitat (Poiner and Peterkin 1995).

Within the Strait are a large number of coral reefs and submerged sandbanks and islands, the latter ranging from sand cays (the central islands) to alluvial deposits from Papua New Guinea rivers (the top western islands) to former volcanoes (the eastern islands) to extensions of the Australian mainland (the western islands and the inner islands).

Inhabited islands in the Torres Strait are usually grouped into the following island clusters (estimated population level is given in brackets):

Eastern islands	Mer (Murray Island), (450)
	Ugar (Stephen Island), (50)
	Erub (Darnley Island), (375)
Central islands	Iama (Yam Island), (400)
	Masig (Yorke Island), (288)
	Poruma (Coconut Island), (188)
	Warraber (Sue Island), (237)
Top Western islands	Boigu (340)
	Dauan (164)
	Saibai (379)
Near Western islands	Badu (825)
	Mabuiag (210
	Moa - two communities – Kubin (210) and St Pauls (350)
Inner islands	Hammond island (225)
	Thursday Island–two communities – TRAWQ, Port Kennedy
	Murulag (Prince of Wales) and Ngurupai (Horn Island)
Northern Peninsula Area (NPA)	Bamaga (1200)
	Seisia (188)

The Torres Strait population as at the 2001 census was just over 8000, of which around 6200 were of either Islander of Aboriginal origin. Approximately 37,000 Torres Strait Islanders live outside the Torres Strait.

1.2: The Torres Strait Treaty

The Governments of Australia and Papua New Guinea ratified the Torres Strait Treaty (the Treaty) on 15 February 1985. As stated in the Treaty's preamble, the Treaty is designed to resolve issues of sovereignty and maritime boundaries in the Strait separating the two countries, to recognise and protect the traditional way of life and livelihood of traditional inhabitants, and to protect the Torres Strait marine environment.

The Treaty establishes the Torres Strait Protected Zone (TSPZ). The principal purpose of the two countries in establishing the TSPZ is:

> *'to acknowledge and protect the traditional way of life and livelihood of the traditional inhabitants including their traditional fishing and free movement'* (Treaty, Article 10.3).

The Treaty identifies a further purpose of the TSPZ, that being to protect and preserve the Torres Strait marine environment and indigenous fauna and flora (Treaty, Article 10.4). In fulfilling this obligation, Australia and Papua New Guinea have agreed to use their:

> '*best endeavours to minimise any restrictive effects on the traditional activities of the traditional inhabitants*' (Treaty, Article 14.4).

The Treaty recognises each country's sovereign jurisdiction for swimming fish and sedentary species on the respective sides of two agreed jurisdiction lines. These lines are respectively known as the Fisheries Jurisdiction Line and the Seabed Jurisdiction Line (see Figure 1a). Figure 1b shows the area of the Turtle and Dugong fisheries.

Figure 1a: Map of the Torres Strait

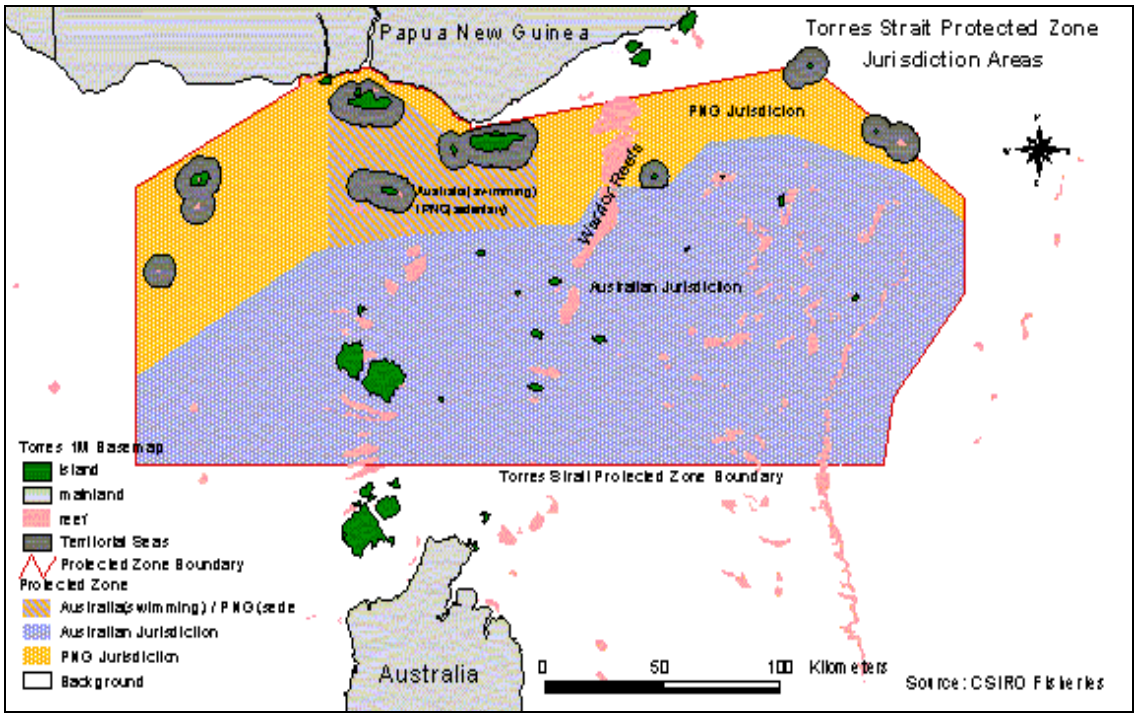
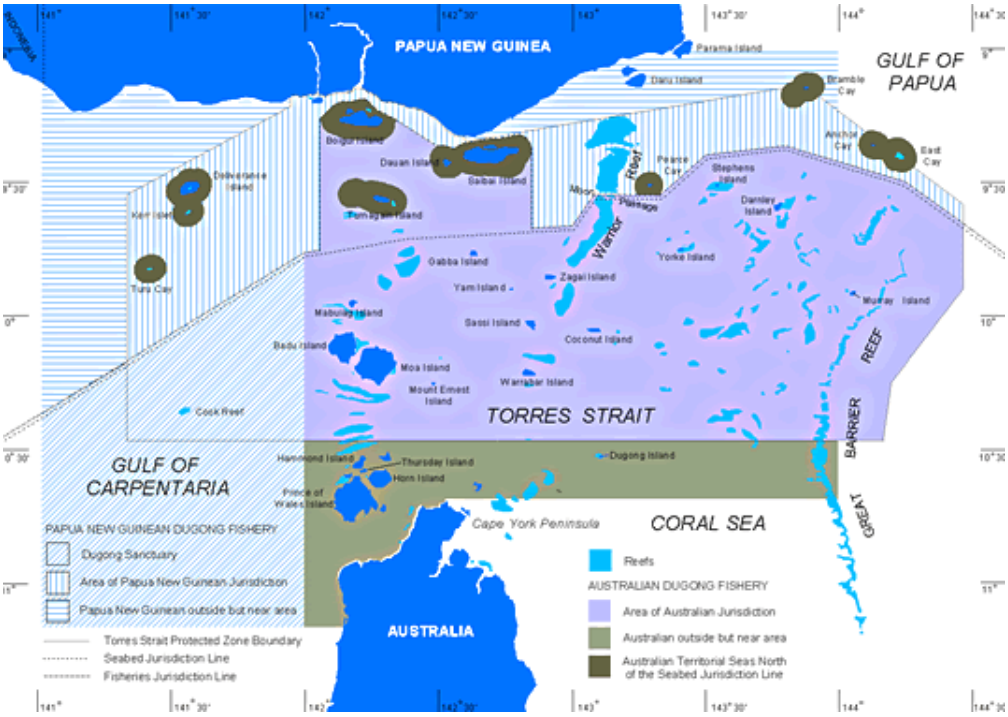


Figure 1b: Map of the Torres Strait Turtle and Dugong Fisheries



Consistent with the principle of minimising impacts on traditional activities, the Treaty allows traditional inhabitants from both countries the right of free movement across the Australia/Papua New Guinea border for 'the performance of lawful traditional activities' (Treaty, Article 11.1). The extent of the free movement provisions is currently restricted to movement within the TSPZ. Traditional inhabitants from the Papua New Guinea coastal villages can thus hunt turtle and dugong in Australian waters within the TSPZ and Australian traditional inhabitants can equally hunt turtle and dugong in Papua New Guinea waters inside the TSPZ.

Each country has agreed to permit the continued exercise of such traditional rights 'on conditions not less favourable than those applying to like rights of its own traditional inhabitants' (Treaty Article 12).

The Treaty also recognises the importance of traditional fishing to traditional inhabitants in Article 20 by stating that priority should be given to traditional fishing over commercial fisheries within the Protected Zone and that any conservation measures adopted to manage such fisheries should not restrict traditional fishing activities.

The Torres Strait Treaty was signed in 1978. At the time, a number of Papuan people were resident on certain Torres Strait Islands, having participated in the region's marine industries. In 1978-79, many of the Papuans then resident in the Torres Strait were granted amnesty by the Department of Immigration. In 1989, the PZJA made a policy decision to treat these former PNG traditional inhabitants who qualified for amnesty as Australian traditional inhabitants "for all fisheries management and enforcement purposes, including community fishing rights". However, there is a perceived lack of certainty that the definition covers traditional fishing rights and a view that it would need to be further explored through the PZJA. However the Department of Immigration and Multicultural Affairs considers that all the people on

the Amnesty list are accepted as 'traditional inhabitants' as per the definition in the Treaty. Therefore, they share the same rights as all other traditional inhabitants in relation to traditional fishing. In 1999, the PZJA decided that the children of a person in the above category should have the same status in relation to commercial fishing.

On many Torres Strait outer islands, the point has been raised that under the terms of the Treaty, these people, and their descendants, may not meet the definition of 'traditional inhabitants' for the purpose of being able to carry out traditional fishing activities. There is growing concern on the part of many Torres Strait Islanders that Papuan residents are hunting dugong and turtle in waters over which they do not have traditional, customary rights, including where the status of these persons under the amnesty arrangement is unclear. This issue is of concern to many Islanders given their status as native title claimants, and the fact that certain Australian citizens are purportedly utilizing their resources on traditional and commercial basis under the guise of being traditional inhabitants.

Furthermore, there is concern in some communities regarding the unsustainable use of dugong and turtle resources by traditional visitors. The Treaty states that a party may traditionally fish an area based on customary rights, and that sustainable use and sharing is part of the Torres Strait way of life. However, any management approaches introduced in an attempt to sustainably manage traditional fisheries must be capable of being enforced in relation to both Papuan and Torres Strait Islander traditional owners/inhabitants. Torres Strait Islander traditional inhabitants implore government managers of these fisheries to address this issue in conjunction with the Department of Foreign Affairs and Trade (DFAT), to enable the rights of these citizens in relation to harvest of dugongs and turtles to be clarified.

The Treaty also expresses Australia and Papua New Guinea's common desire to co-operate in the conservation, management and sharing of fisheries resources in the TSPZ. Given the straddling and in some cases migratory nature of the Torres Strait's marine resources, such cooperation is essential if the countries are to achieve their stated goal of protecting the Torres Strait marine environment – and in turn protecting and preserving the traditional way of life that is dependent on the health of the marine environment.

Reflecting the commitment to work cooperatively together, the two countries have developed subsidiary conservation and management arrangements for a number of Torres Strait fisheries, including turtle and dugong.

Subsidiary arrangement for turtle conservation and management

The most recent arrangement, finalised in late 2003, identifies three objectives for the Torres Strait turtle fishery:

i) to conserve the stock of turtles;

ii) to manage the turtle fishery in waters under Australian jurisdiction as a traditional fishery; and

iii) to manage the fishery for turtles in waters under Papua New Guinea jurisdiction as an artisanal[1] fishery such that all products from the turtles are consumed or used by residents of Papua New Guinea and not exported.

[1] artisanal in this sense allows the domestic sale of turtle meat and turtle products in Papua New Guinea

Each country is to implement 'appropriate' conservation and management arrangements in the area under its respective jurisdiction, though each country has agreed that it is 'inappropriate' to set a total allowable catch for the fishery (the appropriateness of setting a total allowable catch is considered in some detail later in this report).

The arrangement also recognises each country's responsibility in terms of undertaking, to the best of their ability, surveillance and enforcement activities relevant to the turtle fishery and to obtaining and exchanging data on the turtle catch in their jurisdiction.

Subsidiary arrangement for dugong conservation and management

The most recent arrangement for the dugong fishery, also finalised in late 2003, identifies two objectives:

i) to conserve the stocks of dugong; and

ii) to manage the fishery as a traditional fishery in both countries.

Other aspects of the dugong arrangement are similar to those agreed for turtles, viz:

iii) Australia and Papua New Guinea are to implement 'appropriate' conservation and management arrangements to manage their respective fisheries as a traditional fishery;

iv) agreement by both countries that it is 'inappropriate' to set a total allowable catch for the dugong fishery;

v) recognition of each country's responsibility in terms of undertaking, to the best of their ability, surveillance and enforcement activities relating to the dugong fishery; and

vi) a commitment from each country to obtain and exchange dugong catch data to the best of their ability.

1.3: The Australian Torres Strait Fisheries Act

Domestically, the *Torres Strait Fisheries Act 1984* (the TSFA) is the implementing legislation for the Australian Government's international obligations as stated under the Treaty.

The Act does not explicitly state its objective. Instead, in administering the Act:

> *'regard shall be had to the rights and obligations conferred on Australia by the Torres Strait Treaty and in particular to the traditional way of life and livelihood of traditional inhabitants, including their rights in relation to traditional fishing.'*

The domestic legislation thus implicitly incorporates the Treaty objectives of recognising and protecting the traditional way of life and livelihood of traditional inhabitants and protecting the Torres Strait marine environment, and of trying to achieve these goals in a manner that minimises any restrictive effects on the traditional activities of the traditional inhabitants.

The Act establishes the Torres Strait Protected Zone Joint Authority (the PZJA) as the responsible domestic body for the management of Torres Strait fisheries. The PZJA is responsible for monitoring the status of, and formulating policies and plans for the good management of, the fisheries under its jurisdiction.

The PZJA initially comprised two members - the Australian Government Fisheries Minister as the Chair and the Queensland Fisheries Minister. In 2002, membership was increased to three with the Chairperson of the Torres Strait Regional Authority (the TSRA) becoming a full PZJA member.

1.4: The Torres Strait Regional Authority

The TSRA, a Commonwealth statutory authority forming part of the Government's Indigenous Affairs Portfolio, was established in 1994 in order to strengthen the economic, social and cultural development of the Torres Strait to improve the lifestyle and well-being of indigenous people (Islanders and Aboriginal) living in the Torres Strait.

The TSRA's vision is to empower the Torres Strait Islanders and Aboriginal people living in the region to determine their own affairs, based on their unique traditional customs – their 'Ailan Kustom bilong Torres Strait' (island custom belonging to the Torres Strait).

The TSRA has become increasingly involved in fisheries issues in recent years, employing a Fisheries Coordinator and supporting the participation and training of community fisher representatives in the PZJA consultative process. Such measures complement the appointment of the TSRA Chair as a full member of the PZJA and are consistent with the TSRA's objective of participating in the development of regional planning and policy-making and ultimately, of having Torres Strait fisheries managed by Australian traditional inhabitants for their benefit.

1.5: PZJA Consultative Structure

The PZJA has established a three-tier advisory structure to assist its decision-making (see Figure 2) consisting of:

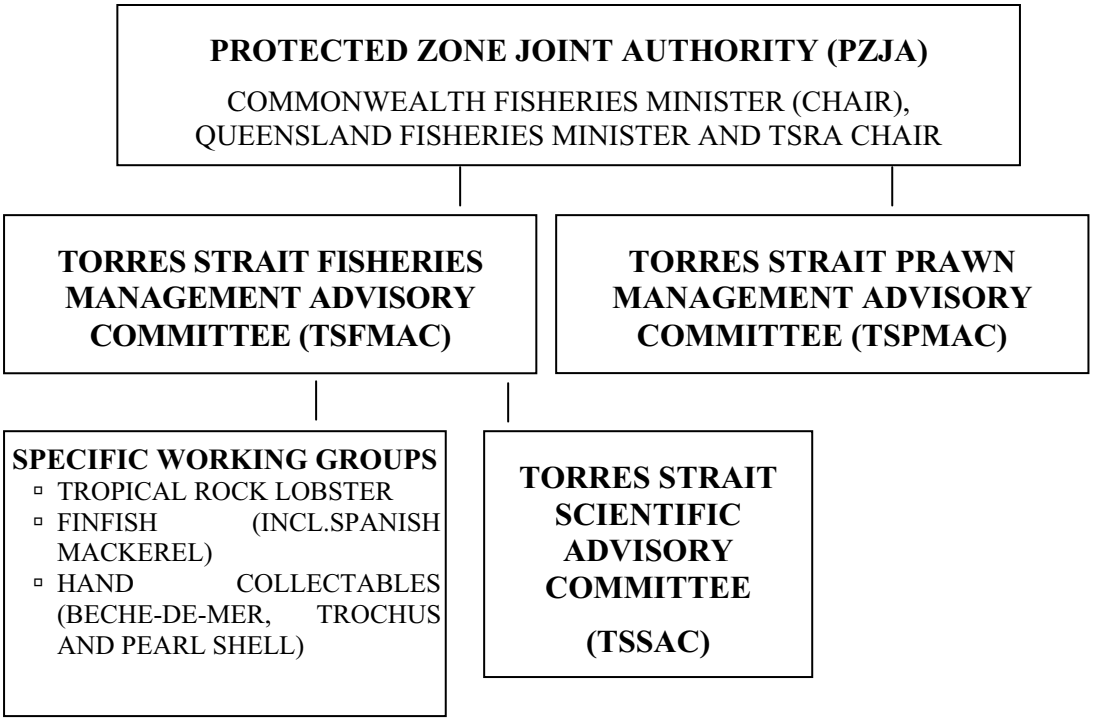
i) four fishery working groups - in effect subcommittees of the Torres Strait Fisheries Management Advisory Committee (TSFMAC) – which perform many of the functions of the 'typical' management advisory committee established in numerous Commonwealth and state-managed fisheries;

ii) TSFMAC, which considers the advice from the fishery working groups in a broader Torres Strait context, and prepares advice to the PZJA; and

iii) the PZJA, the ultimate decision-making body.

The working groups, TSFMAC and the PZJA receive research advice relevant to Torres Strait fisheries from a fourth group - the Torres Strait Scientific Advisory Group (TSSAC). TSSAC is also responsible for identifying information needs and research gaps, developing a strategic research plan, soliciting/reviewing research proposals and reports, reviewing/assessing fisheries stock assessments, and advising on the effective delivery of research results relevant to Torres Strait fisheries.

Figure 2: The PZJA's Torres Strait fisheries consultative structure



It was recommended by some communities that the consultative structure of the Protected Zone Joint Authority (PZJA) should be changed to include representatives from both the Northern Peninsula Area (NPA) and Native Title corporations.

Concerns were raised by the NPA communities that PZJA decisions were not being filtered down to their area, even though the turtle and dugong fisheries extended down to the mainland. As a result of this, they felt that there needed to be a formalised recognition between mainland communities and island communities within the consultative structure. In addition to this community members from the NPA commented that the PZJA should be listening to traditional owners as a part of the decision-making process and should not be influenced by outside pressures from green groups etc.

In regards to the inclusion of Native Title Corporations into the PZJA consultative structure, there was a strong recommendation from the Maluilgal Corporation that representatives from each PBC should form part of the consultative structure at all levels of management. This is because both commercial and traditional fishing is undertaken in near areas under native title determination and the traditional owners responsible for these areas need to be included in the management of their resources. The Maluilgal Corporation also expressed their concerns that the Chairman of the TSRA is guided by the Aboriginal & Torres Strait Islander Act 2005 not the Native Titles Act 1993 and therefore cannot make decisions on traditional fisheries management on behalf of native title owners. In addition to this, the Corporation highlighted that the Community Fisher Representatives that make up part of the current PZJA consultative structure are not from a legal entity and should not be making decisions on behalf of native title owners.

As mentioned previously, the TSRA recently established a separate fisheries consultative process to promote internal Islander fisheries discussions prior to the

PZJA-sanctioned meetings. In the context of this report there is no need to describe in any detail the Islander consultative process, except to note that by empowering the Islander representatives to make more constructive input into the PZJA discussions, the Islander consultative process complements the PZJA's consultative structure.

The PZJA's intent is that the advisory structure should operate in a 'bottom-up' manner, with recommendations normally flowing from the working groups to TSFMAC to the PZJA. However:

- TSFMAC has the right to modify or reject working group recommendations, and to make its own recommendations direct to the PZJA in the case where a working group has failed to make a recommendation on a matter the TSFMAC considers important; and
- the PZJA may request specific information from any of its advisory committees without triggering the full consultative cycle, and may chose to make decisions without the full consultative cycle being followed where it considers such a process necessary or where the consultative process would result in unnecessarily delaying important decisions.

For those fisheries without a specific working group – such as turtle and dugong – TSFMAC is the initial consultative forum. In the past TSFMAC has convened specific turtle and dugong workshops/fora when considered necessary, such as the series of community-based management workshops convened by AFMA in 2002 and a traditional catch monitoring workshop in 2003. The outcomes from such fora are considered by TSFMAC in the same manner as it considers working group outcomes.

To improve information exchange/mutual understanding, the PZJA has offered Papua New Guinea formal observer status to PZJA, TSFMAC and working group meetings on a self-funding basis.

1.6: Torres Strait fisheries research

Currently, most fisheries research in the Torres Strait is managed under the auspices of the Cooperative Research Centre for the Torres Strait (CRC Torres Strait), a not-for-profit company established in association with the Cooperative Research Centre for the Great Barrier Reef World Heritage Area (CRC Reef).

CRC Torres Strait involves the main stakeholder groups, resource management agencies and research institutions and with an interest in the Torres Strait marine environment. The respective agencies of the three PZJA members – AFMA, the Queensland Department of Primary Industries and Fisheries (QDPIF) and the TSRA – are core participants in CRC Torres Strait, along with the Australian Institute of Marine Science, CSIRO Marine, CRC Reef, GeoScience Australia, James Cook University and the National Oceans Office. The Great Barrier Reef Marine Park Authority, the Great Barrier Reef Research Foundation, and the Queensland Seafood Industry Association, are supporting participants.

The CRC Torres Strait's research program aims to:

i) support the sustainable development of marine resources and minimise the impacts of resource use in the Torres Strait;

ii) enhance conservation of the marine environment and the social, cultural and economic wellbeing of stakeholders, in particular the Torres Strait people; and

iii) to contribute to effective policy formulation and management decision-making.

The CRC Torres Strait thus has a broad environmental mandate and unlike the PZJA is not focused solely on fisheries.

Current research activities relevant to the turtle and dugong fisheries that are being managed under the CRC Torres Strait are summarised in Attachment 2.

In regards to research within the Torres Strait, there was concern from communities about the cultural appropriateness of tagging totem animals such as turtles and dugongs and it was questioned if Torres Strait Islanders (TSI's) were consulted before animals were tagged.

The TSSAC, the advisory body established under the PZJA consultative structure, has a dual function, being both an advisory body to the PZJA and its associated groups (the TSFMAC and the working groups) and to the CRC Torres Strait Board.

The Maluilgal Corporation made the recommendation that a scientific group be formed to provide advice to communities and management agencies on aspects of turtle and dugong biology so that informed decision can be made. They recommended that this group be comprised of indigenous academic experts that have a good understanding of the traditional management structures under customary law, western scientists and representatives from green groups such as Greenpeace.

New research arrangements from 1 July 2006

The CRC Torres Strait was replaced on 1 July 2006 by the Marine and Tropical Sciences Research Facility (MTSRF). MTSRF will be responsible for planning, funding and coordinating research relating to the Great Barrier Reef and its catchments, tropical rainforests and the Torres Strait. The Australian Government's intent is that MTSRF will become its main advisory body in regard to environmental research in North Queensland.

MTSRF was established as part of the Government's new Commonwealth Environment Research Facilities Initiative and is to receive funding of $40m over the four years 2006-2009.

MTSRF has five priority research areas, two of which are directly relevant to the turtle and dugong fisheries:

- Status of the ecosystems – understanding the condition, trends and interdependencies of environmental assets in North Queensland, including developing methods to support ongoing assessment and reporting; and
- Sustainable use and management of natural resources, which includes ecological, social and economic sustainability and providing information and options to assist managers and communities optimise the use of their resources.

Activities under MTSRF will be overseen by a Board comprised of individuals with expertise in business, research, community groups and government. There are no Torres Strait Islander representatives on the Board, though the Government has directed the Board to consult widely with Torres Strait communities and businesses. The Board is to establish a Scientific Consultative Committee to assist with identifying research priorities and developing an appropriate research strategy.

The nature of any future relationship between the PZJA and its TSSAC with MTSRF and its scientific advisory body is yet to be determined. However, given that a key criterion in the assessment of MTSRF proposals is the relevance of the research to

end-users, some mechanism will need to be established to involve the PZJA and indigenous groups in future MTSRF turtle and dugong research.

1.7: Day-to-day domestic management responsibilities

Day-to-day management responsibility for domestic Torres Strait fisheries is shared between AFMA - the Australian Government's fisheries management body - the QDPIF - the Queensland Government's fisheries management body – and increasingly, the TSRA.

Reflecting the Australian Government Minister's role as the permanent Chair of the PZJA, AFMA is the lead management agency for Torres Strait fisheries and maintains a permanent presence in the Torres Strait through its established office on Thursday Island. The TSRA is responsible for supporting and facilitating Islander involvement in the PZJA consultative processes while QDPIF is the lead agency for licensing and day-to-day compliance functions and provides supporting fisheries management expertise.

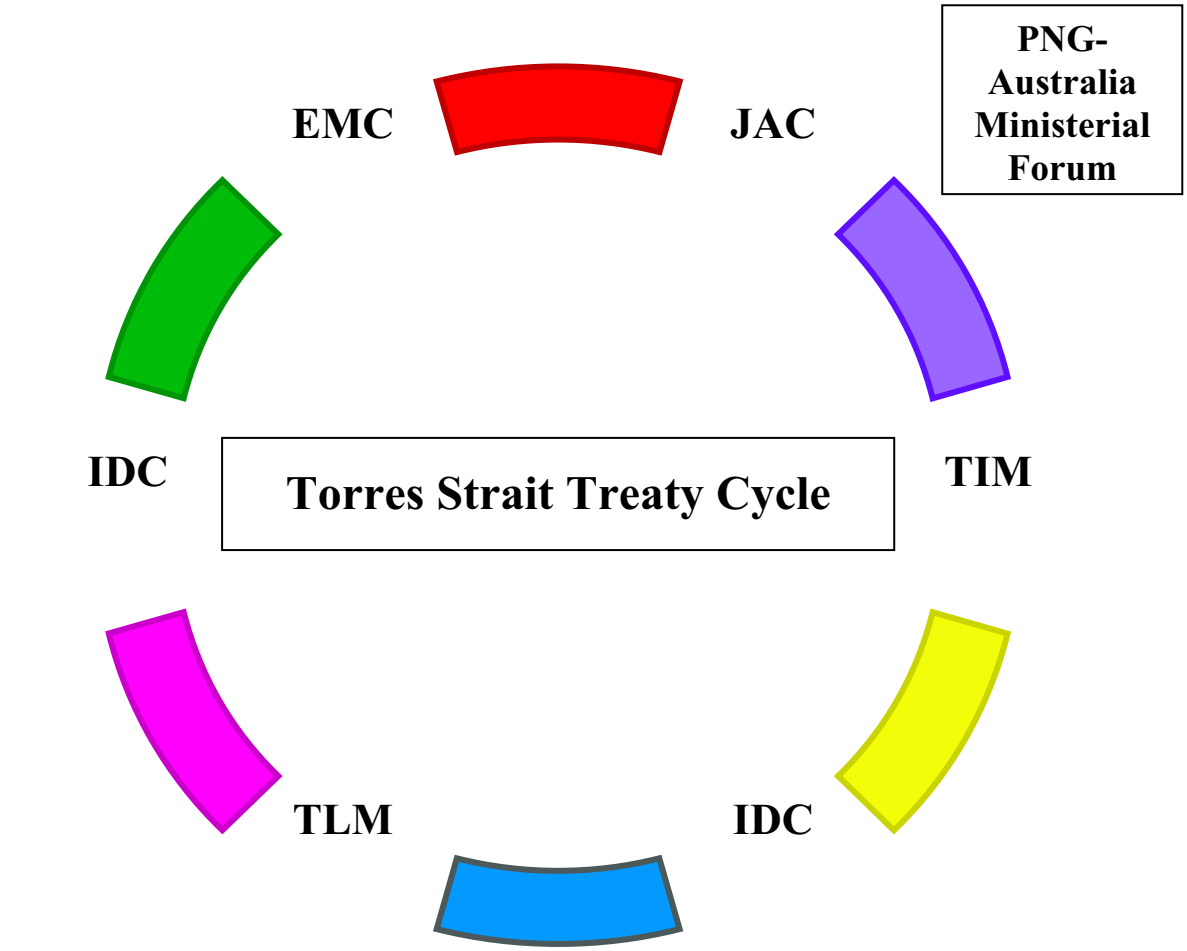
The Chairman of the Maluilgal Corporation stated that the government is obligated under the Torres Strait Fisheries Act to undertake enforcement and compliance with regard to fisheries related offences and that this obligation does not only applied to commercial fisheries, but also extends to traditional fisheries. And as such, should be seen as a priority. With this in mind, the Maluilgal Corporation had strong views that law enforcement should be undertaken through the current management structure (QDPI&F) and this responsibility should not be given to members of the community.

1.8: Treaty consultative processes

In addition to the PZJA's domestic fisheries consultative process, the Department of Foreign Affairs and Trade (DFAT) manages a separate consultative process for Australia's engagement in Treaty-level discussions with Papua New Guinea The Treaty is broader than just fisheries – the free-movement provisions, for example, pose significant challenges to the two countries across a broad range of issues such as health, quarantine, customs, immigration and policing.

The DFAT-convened consultative processes culminate in the annual meeting of the foreign affairs ministers of the two countries at the Papua New Guinea-Australia Ministerial Forum (Diagram 2).

Figure 3: DFAT's Treaty-level consultative structure



source: DFAT

DFAT and/or AFMA, the latter acting on behalf of the PZJA, facilitates fisheries discussions at the various DFAT-arranged Treaty meetings.

In addition to these meetings, DFAT, AFMA and the TSRA participate in separate bilateral fisheries meetings with Papua New Guinean authorities. These meetings – usually held annually - tend to focus on the Torres Strait's commercial fisheries. However, representatives from Papua New Guinea's Department of Environment and Conservation –responsible for turtle and dugong management in Papua New Guinea - also participate, and in recent years these bilateral discussions have provided an additional forum for discussion of turtle and dugong management issues.

1.9: Turtle and dugong – protected species or managed fisheries?

Management responsibility for turtles and dugongs in Commonwealth waters outside the Torres Strait resides with the Australian Government's Environment Minister, under the authority of the EPBC Act.

- In these other Commonwealth waters, the harvesting of turtle and dugong is not considered to constitute a fishery. Instead, turtle and dugong are managed as protected species, DEH has management responsibility, and AFMA's role is limited to minimising the incidental impacts on the turtle and dugong stocks from the commercial fisheries under its jurisdiction.
- Though managed as protected species, indigenous fishers can still hunt turtle and dugong in these other Commonwealth waters 'for the purpose of satisfying their personal, domestic or non-commercial communal needs' without holding any permit from the government, in accordance with their native title rights as stated under the Australian Government's Native Title Act 1993.

Australian state governments whose jurisdiction covers part of the geographical range of marine turtles or dugongs have taken a similar approach, managing turtle and dugong as protected species, recognising the native title rights of their indigenous fishers to a non-commercial take, and making their respective conservation agencies rather than their fisheries agencies responsible for turtle and dugong management:

i) in Queensland, the Environmental Protection Agency and its related Queensland Parks and Wildlife Service has management responsibility for turtle and dugong;

ii) in the Northern Territory, management responsibility rests with the Parks and Wildlife Service of the Department of Infrastructure, Planning and the Environment; and

iii) in Western Australia, the Department of Conservation and Land Management has turtle and dugong management responsibility.

Papua New Guinea has adopted the same approach, with turtle and dugong being the responsibility of the Department of Environment and Conservation. Responsibility for other Torres Strait fisheries is within the portfolio of the Minister for Fisheries and Marine Resources.

The approach taken by the Australian Government to manage the turtle and dugong stocks in the Torres Strait is thus quite different to the approach that it takes in other Commonwealth waters, to the approach taken by Australian state governments, and to the approach taken by Papua New Guinea.

A report commissioned by the PZJA in 2002 (Menham, Skehill and Young 2002, subsequently referred to as the Skehill report) recommended that there was an urgent need for a policy decision on whether dugong in the Torres Strait are to be managed as a fishery or as an endangered species. Marsh (2003) shares this view, and considers that the question of 'whether dugongs in northern Australian waters are to be managed as a threatened species or as the target of sustainable fisheries' is 'a fundamental policy question'. Marsh also questions whether the Australian Government should take a consistent approach to turtle and dugong management in all Commonwealth waters[2].

[2] Though the comments in both the Skehill report and Marsh (2003) were limited to the Torres Strait dugong fishery, the logic underpinning their argument is equally applicable to the Torres Strait turtle fisheries

From a practical perspective, there seems little difference in managing the Torres Strait turtle and dugong fisheries as indigenous-only non-commercial fisheries or as protected species but with indigenous native title rights to hunt.

- The key difference is institutional – under the first scenario the PZJA would maintain management responsibility, under the second scenario DEH would be the lead management agency.
- Marsh et al (2004) suggest that in regard to dugong, the sustainable harvest would be higher if it was decided to manage the Torres Strait dugong population as a fishery for sustainable yield rather than as a depleted population of a threatened species. The basis of this argument seems to be that DEH – as managers of threatened species – would apply a more conservative management strategy than would the PZJA. However, given the PZJA's stated objective in its management of the dugong fishery is to conserve the dugong stock, it is unclear why the PZJA would accept a higher risk approach to the management of the fishery than would DEH.

  Given that the Chairperson of the TSRA is a full member of the PZJA, such that the lead Torres Strait Islander representative body will be formally involved in all dugong management decisions made by the PZJA, it could well be argued that the PZJA is in a relatively stronger position than DEH to make appropriate decisions regarding the fishery and to obtain the required level of stakeholder support for any such measures to be effective.

The PZJA's views

The PZJA, at its meeting in July 2005, noted that the turtle and dugong fisheries in the Australian jurisdiction of the TSPZ meet the definition of a fishery as defined under the Torres Strait Fisheries Act and that as a result, such fisheries are the responsibility of the PZJA. In making this decision, the PZJA has accepted that – in the absence of any changes to the Act - legislative responsibility to manage the turtle and dugong fisheries in the Torres Strait rests with the PZJA.

Whether the PZJA decision reflects a long-term commitment to retaining turtle and dugong management responsibility or a pragmatic response to current legislative realities is impossible to determine. Despite this uncertainty, the PZJA decision resolves, at least for the moment, the jurisdictional issue raised by Skehill (2002) and Marsh (2003).

Changing current jurisdictional arrangements for Torres Strait turtle and dugong is not recommended at the present time. Instead, it is recommended that the PZJA - having accepted its current role as the responsible management authority – give priority to strengthening turtle and dugong management arrangements. In doing so, the PZJA – working through its various component bodies (the TSRA, AFMA and QDPIF) – needs to ensure that:

i) relationships with indigenous stakeholders are strengthened;
ii) effective linkages with those environmental bodies responsible for turtle and dugong in other jurisdictions are established/maintained;
iii) adequate ongoing resources are provided to support the management of the turtle and dugong fisheries; and that
iv) an appropriate management strategy, capable of controlling the turtle and dugong catch, is developed.

The PZJA's reaffirmation of its role as the responsible management authority need not prevent DEH from taking a more active role in Torres Strait turtle and dugong affairs. The PZJA and DEH may wish to consider the merits of identifying opportunities for DEH to become more constructively involved in the Torres Strait turtle and dugong fisheries, including the possibility of DEH establishing a permanent presence in the Torres Strait.

The TSRA is of the view that the PZJA should remain the entity with responsibilities for managing the dugong and turtle fisheries, given the critical need for a strong Indigenous voice in decision-making about these species. While the species are unique in the fisheries management context, it is highly uncertain as to whether the management of dugongs and turtles as a threatened species rather than as a fishery might result in fewer being taken. However, it may be informative to investigate the effectiveness of DEH's management approach in other areas of the country, where the species are managed as threatened species, to see whether any lessons may be learned and applied in this region,. It would be necessary to consider the resourcing and institutional implications of such a classification in Torres Strait, given the absence of a DEH presence in the region. It would be constructive for DEH to consider how best to support the implementation of more effective management arrangements for the species in the region, in collaboration with the PZJA partners, along these lines.

One community recommended that turtle and dugong fisheries stock should not be identified within the Commercial Fisheries Sector reports as it is not a commercial industry within the Torres Strait. Turtle and dugong should not be defined as fisheries as it is traditionally harvested and is not commercially sold.

Currently, turtles and dugongs in the Torres Strait are managed by the PZJA as target stocks in a fishery rather than managed as protected species as occurs in every other Commonwealth and State jurisdiction in Australia, The Department of Environment and Heritage (DEH), responsible for managing protected species in all other Commonwealth waters, has limited involvement in Torres Strait despite its considerable shortcoming in the national protection of these listed species, and WWF recommends that a practical way is found to combine their responsibilities through the 'National Partnership Approach'. The National Partnership Approach as endorsed by the Natural Resource Management ministerial Council is also charged with ensuring the sustainable harvest of turtles and dugong at a national level, however WWF has concerns over its stakeholder representation and the lack of clarity over its goals and purpose. At an on-ground level, the NAILSMA project is continuing to develop community driven approaches to sustainable management of dugong and marine turtles across north Australia, but its resources are limited

While all the different levels of interest in this issue should be welcomed, WWF is highly concerned that the level of coordination, leadership from Government and resourcing of actions to reduce harvest levels are seriously inadequate. The draft Assessment and communications with experts in the field indicate these concerns are well founded.

WWF noted the need to:

- Clarify the role of the different bodies with responsibility for managing turtle and dugong harvesting in Torres Strait. In particular, the role of the National Partnership Approach needs greater definition.
- Improve coordination of the role of Government agencies and Government funded programs, in the Torres Strait. The involvement of Government

agencies that in the past have not engaged in NRM issues, such as training and indigenous welfare bodies, is vital.
- Encourage action locally by committing sufficient resources to engage local communities through education, training and support of land and sea rangers.

It was recommended that one of options for management and enforcement of the turtle and dugong fisheries should be to consider developing formal agreements between government and traditional owners so that local communities can work collaboratively with government to ensure compliance within the fisheries. This would allow for the provision of 'Implementation and Coordination' as stated in Article 17 of the Treaty.

In the medium-term, the PZJA may wish to reconsider the jurisdictional issue raised by the Skehill report and by Marsh. Greater collaboration between the PZJA and DEH over the next few years as suggested would provide a logical stepping-stone to any future change in jurisdictional arrangements.

1.10: Australia's international and national obligations regarding Torres Strait Island cultural heritage

As will be discussed in Part 2, Australia has a number of international and national obligations to protect and conserve the turtle and dugong stocks. It is equally relevant to note that Australia has a number of international and national obligations to protect and preserve indigenous Islander culture.

Without going into detail, Australia is a signatory to the 1992 Rio Declaration which among other things recognises the vital role of involving indigenous people and their communities, and utilising their traditional knowledge and practices, in environmental management and development (Havemann et al 2005, Thiriet, Marsh and Jones 2005). The subsequent United Nations Convention on Biological Diversity, to which Australia is also a signatory, further supports the involvement of indigenous people and local communities in resource management (Havemann et al 2005).

More specifically, the Torres Strait Treaty has the stated goal of acknowledging and protecting the traditional way of life and livelihood of the traditional inhabitants of the Torres Strait. As noted earlier, the Treaty further states that in protecting the Torres Strait marine environment, the effects on the traditional activities of traditional inhabitants are to be minimised.

Nationally, the Australian Government has stated these international obligations in a variety of domestic legislation such as:

i) the EPBC Act 1999, which lists among its objectives as being to recognise the role of indigenous peoples in the conservation of Australia's biodiversity and to promote the use of indigenous knowledge with the involvement and cooperation of traditional owners;

ii) the TSFA, which, as previously mentioned, implicitly incorporates the Treaty objectives of recognising and protecting the traditional way of life and livelihood of traditional inhabitants; and

iii) the Native Title Act 1993, which among other things provides that native title holders can 'for the purpose of satisfying their personal, domestic or non-commercial communal needs' and 'in exercise or enjoyment of their own native title rights and interests', carry out certain activities such as hunting,

fishing and gathering without holding any permit from the government (Havemann et al 2005).

In managing the turtle and dugong fisheries of the Torres Strait, the PZJA thus needs to be mindful of the Australian Government's obligations regarding the proper management of the turtle and dugong stocks, the need to protect and preserve traditional Torres Strait Islander culture and lifestyles, and the need to respect the traditional hunting rights of native title holders.

PART 2: DESCRIPTION OF THE TORRES STRAIT TURTLE AND DUGONG FISHERIES

2.1: Torres Strait turtle fisheries

There are two aspects to the Torres Strait turtle fishery – the harvesting of animals for meat and the harvesting of eggs. Technically the fisheries jurisdiction goes to the low water mark and egg collection occurs above high water, therefore, falling into the jurisdiction of local government. This has implications in terms of management.

Generally, three turtle species are targeted in the turtle fishery – green turtles, hawksbill turtles and flatback turtles. Green turtles are by far the dominant species and harvested both for meat and for eggs, whereas hawksbill and flatback turtles are mainly targeted for their eggs. In some areas of the Torres Strait, turtles and eggs are only harvested seasonally and there does not seem to be a preference between large or small turtles. Both turtle meat and eggs are harvested for subsistence not for sale.

The three other marine turtle species found in the Torres Strait – loggerhead, leatherback and olive ridley turtles – are relatively uncommon and are rarely hunted. Further, egg harvesting is not an issue since there is no known nesting of these species in the Torres Strait. The Torres Strait turtle fishery thus has negligible if any effect on the populations of these three species and they are not considered further in this report.

Green turtles

Green turtles are by far the most numerous species of marine turtle found in the Torres Strait and constituted 87% of a sample of 226 turtles from the coral reefs of eastern Torres Strait (Limpus and Parmenter 1986)[3].

Green turtles are also the principal species hunted by traditional inhabitants, with a CSIRO catch monitoring project in 1991-93 concluding that green turtles represented 99% of the estimated 2504 turtles caught annually in the Torres Strait (Harris 1997).

Green turtles are caught on all islands throughout the year, and are usually eaten fresh, as required (Harris 1997). Catches peak in the turtle mating period of September-January – known by Islanders as the turtle-fast season – when turtles are most abundant, readily caught and for those female turtles ready to breed, in their best condition (ie their fattest).

There is some nesting of green turtles in the north-eastern sector of the Torres Strait - on Bramble Cay, the Murray Islands and Tudu Island - and some unknown level of Islander harvest of green turtle eggs.

Hawksbill turtles

Hawksbill turtles are the second most-common species found in the Torres Strait, though at a much lower frequency than green turtles.

[3] The sampling and subsequent results are biased to the extent that the survey was undertaken in predominantly green-turtle preferred habitat and the relative proportion observed in the sample for green turtles may not be applicable throughout all the Torres Strait. The results do though illustrate the dominance of green turtles in the eastern Torres Strait.

Hawksbill turtles are relatively more common in the waters adjacent to the inner islands, with turtle researchers involved in field work near the inner islands at regular intervals throughout 2005 observing approximately equal numbers of hawksbill and green turtles (Dr Mark Hamann, personal communication, January 2006). This contrasts with the study of turtles in the eastern Torres Strait referred to earlier which found hawksbill turtles represented 11% of the turtles found around coral reefs in the eastern Torres Strait (Limpus and Parmenter 1986). However, as noted in footnote 3, this latter survey was undertaken in habitat preferred by green turtles such that the results obtained may not be representative of all areas in the Torres Strait.

The meat of hawksbill turtles can at times be poisonous and as such, is rarely eaten. Johannes and MacFarlane (1991) recount several historical reports of multiple deaths in the Torres Strait thought to have been caused by the eating of poisoned hawksbill meat, presumably due to a poisonous gland in the hawksbill's neck not having been properly removed prior to cooking. If handled correctly, hawksbill meat can be safely consumed, as evidenced by hawksbill turtles being hunted for their meat in many Pacific Islands. However, in the Torres Strait, the past history of deaths, together with the more plentiful supplies of green turtles, has resulted in little if any hunting of hawksbill turtles for meat purposes.

While there is no demand for hawksbill meat, hawksbill shell was traditionally used for making masks, combs, jewellery and fishhooks (Johannes and MacFarlane 1991). However, there is no legal commercial trade in hawksbill shell ornaments in Australia - the sale of hawksbill shell was banned by Queensland in 1968 and the PZJA's treatment of the turtle fishery as a traditional fishery limits the use of turtle products to the personal use by the hunter or their dependants or for use in the course of other traditional activities.

Products made from hawksbill shell can still be legally sold in Papua New Guinea, but only to Papua New Guinea residents and not exported. However, the Papua New Guinea Government's enforcement of this restriction appears limited, as reflected by anecdotal reports of sophisticated laser-carved hawksbill shell products being sold in the Port Moresby markets (Limpus, C., personal communication, 2005) and the Port Moresby international airport (Prescott, J. personal communication, 2005), suggesting the existence of an organised production system possibly involving overseas markets.

The Torres Strait forms part of the nesting area for the north-east Australian hawksbill stock and hawksbill turtle eggs are harvested for personal/family consumption from nesting beaches in the Torres Strait[4]. Johannes and MacFarlane 1991) describes egg-hunting as being an unpredictable, spur-of-the-moment activity often made in association with catching nesting turtles, gathering sea-bird eggs or during quiet times in the rock lobster fishery.

Flatback turtles

Flatback turtles are rarely hunted in the Torres Strait, not because of concerns about poisoning but simply because Islanders do not like their taste.

Flatbacks are known to nest in the north-western areas of the Torres Strait[5] and in the southern part of the Turtle Fishery on Crab Island, which is the largest known nesting

[4] Limpus (1997) lists Johnson Aukane, Kabikane, Mimi, Bet, Sasi, Hawkesbury and Little Adolophus islands in the Torres Strait as known hawksbill nesting sites

[5] Deliverance Island, Kerr Islet and Turu Cay (Johannes and MacFarlane 1991)

site for flatback turtles in the world. There is some unknown level of Islander harvesting of the eggs.

2.2: The dugong fishery

The area of the dugong fishery is the area consisting of:

(a) the area of waters in the Protected Zone to the south of the Fisheries Jurisdiction Line; and

(b) the area of waters (excluding any waters within the limits of Queensland) bounded by a line beginning at the point of latitude 11° 10′ 00″south, longitude 141° 01′ 00″ east and running progressively:

- north along the meridian of longitude 141° 01′ 00″ east to its intersection with the Fisheries Jurisdiction Line;
- north-easterly along that line to its intersection with the meridian of longitude 141° 20′ 00″ east;
- south along that meridian to its intersection with the parallel of latitude 10° 28′ 00″ south;
- east along that parallel to its intersection with the meridian of longitude 144° 00′ 00″ east;
- south along that meridian to its intersection with the parallel of latitude 10° 41′ 17″ south;
- west along that parallel to its intersection with the meridian of longitude 142° 31′ 49″ east;
- south along that meridian to its northernmost intersection with the coastline of Cape York Peninsula at low water;
- generally south-westerly along the western coastline of Cape York Peninsula, that is along the low water line on that coast and across any river mouth, to its intersection with the parallel of latitude 11° 10′ 00″ south;
- west along that parallel to the point where the line began; and

(c) the territorial sea of Australia north of the Fisheries Jurisdiction Line.

There is only one species of dugong found throughout the world.

In the Torres Strait, dugong abundance is widely distributed and generally related to the distribution of seagrass beds. Most of the hunting effort is concentrated around the seagrass beds of western Torres Strait, particularly at Orman Reef to the north of Mabuiag Island. This is reflected in the level of catch recorded from this area.

Dugong abundance is moderate in the central islands, however the hunting effort in this area, collectively with the effort recorded in the Northern Peninsula Area (Phelan, 2006) and PNG (particularly Daru), are reportedly similar to that of the TSPZ. Abundance and hunting effort are largely negligible in the eastern cluster.

Marsh et al (2004) suggests that there is considerable variability in the annual catch, presumably reflecting changes in local dugong abundance, which in turn is presumed to be in response to changes in seagrass availability. Kwan (2002) found that environmental conditions, the abundance of dugong in traditional hunting grounds, the time of the year, the stage of the lunar cycle and the size of the commercial lobster

catch all influenced the harvest of dugong. With this in mind, GBRMPA suggested that there could be the potential to trade off dugong for increased lobster allocation and should be given more consideration generically, as increased economic access to fish resources may lessen dependency on dugong and the incentive to hunt excessively. They suggested that other incentives, such as economic ones, could be explored to lesson the dependency on dugong as a source of meat and, highlighted the fact that it is cheaper for locals to hunt turtle and dugong due to the cost of alternative meats in the Torres Strait.

Some communities commented that there were seasonal changes in regards to hunting effort and catch. For example, during the turtle mating season dugong hunting slowed or stopped and during certain climatic seasons dugongs were hunted and during others they were not.

2.3: Biological characteristics of turtles and dugong

Turtle

The different species of marine turtles share common biological traits.

- They are slow growing, long lived and late maturing (for green and hawksbill turtles, the time from hatchlings to first breeding can take up to 40 years).
- After reaching sexual maturity, they breed for several decades, though at intervals of between 2-7 years (5 years for green turtles).
- Females mate with more than one male.
- In an individual breeding season:
  - green turtles are capable of laying up to 6 clutches of eggs at fortnightly intervals, with each clutch containing about 100 eggs;
  - hawksbill turtles can lay up to 6 clutches of eggs with an average clutch size of 122 eggs;
  - flatback turtles lay between 2-3 clutches of eggs and average between 50-70 eggs per clutch.
- After hatching, green and hawksbill turtles drift and feed in the open ocean for several years before returning to coastal waters, and in some cases change diet to become more bottom-feeders. Juvenile flatback turtles do not have the oceanic phase and remain in coastal waters all their life.
- Once established in coastal waters, the turtles remain in their chosen feeding grounds for many years until their first breeding migration, at which point they are capable of undertaking long-distance breeding migrations, with nesting females returning to the same area from which they were hatched to lay their eggs.
- Adult green turtles feed mostly on algae, seaweeds and seagrasses, hawksbill turtles on algae, sponges, soft corals and soft-bodied invertebrates (such as beche-de-mer and jellyfish), and flatback turtles on soft corals and soft-bodied invertebrates.

Dugong

Adult dugong can grow in excess of 3m and weigh more than 400kgs. Dugong are:

i) long-lived, having a life span of up to 70 years;

ii) late-maturing, with females reaching sexual maturity at between 6-17 years (Kwan (2002) documented female dugongs maturing at age 6);

iii) of low fecundity, having a gestation period of 13 months, usually giving birth to single calves only, having a suckling period of up to 18 months, and a calving interval of 3-7 years; and

iv) herbivores, feeding virtually exclusively on seagrasses or algae in times of seagrass depletion. Dugongs have also been recorded eating invertebrates.

In addition to the information known about dugong from 'western science', some community members reported that young dugongs without a mother would either follow a male dugong or find a "foster mother". It was also stated that traditional inhabitants could tell by certain features of a dugong whether it was a first time mother or had already had calves before.

2.4: International significance of Torres Strait turtle stocks

For each of the three turtle species relevant to this assessment – green, hawksbill and flatback turtles– the Torres Strait stock represents a substantial portion of the global population.

Green turtles

The Australian context

Seven distinct breeding stocks of green turtles have been identified in Australian waters stretching from the southern Great Barrier Reef northwards and then westwards to the North West Shelf area off Western Australia (Moritz, Broderick, Dethmers, FitzSimmons and Limpus 2002: Limpus and Chatto 2004). Of these seven breeding aggregations, the four most significant are:

i) the northern Great Barrier Reef (nGBR) aggregation, estimated at around 30,000 females annually, and which includes the world's largest green turtle rookery at Raine Island and nesting sites in the north-eastern Torres Strait (such as Bramble Cay and the Murray Islands);

ii) the north-west shelf aggregation, off Western Australia, the world's second largest breeding aggregation estimated at around 10,000-15,000 nesting females annually;

iii) the southern Great Barrier Reef (sGBR) aggregation, estimated at around 5000 females annually; and

iv) the Gulf of Carpentaria (GoC) aggregation, estimated in the order of 5000 females annually.

From a stock perspective, it is believed that around 90% of the green turtles found in the Torres Strait are sourced from the nGBR breeding aggregation. GBRMPA noted that green turtles from the Western Australian, sGBR and GoC populations represent only a small proportion (if any) of the take in the Torres Strait. The Torres Strait also hosts a foraging population from other breeding stocks – such as from the sGBR and GoC aggregations, and possibly from the Coral Sea, the Aru Islands (eastern Indonesia) and New Caledonia - though the numbers involved are likely to be small.

It is further believed that the nGBR stock found in the Torres Strait can be divided into two separate sub-populations:

- a foraging population that is present in the Torres Strait virtually year-round, apart from nesting season when some of the females that are about to breed leave the Straits to travel south to Raine Island and surrounding areas to lay their eggs; and
- a transitory population that spends most of the year on feeding grounds elsewhere - such as in the Gulf of Carpentaria, the northern Great Barrier Reef, the Aru Islands in eastern Indonesia, Vanuatu and New Caledonia – but returns to the Torres Strait from September-January for mating.

International context

Green turtles were once widespread throughout much of south-east Asia. However, in a review of marine turtle populations in south-east Asia and the western Pacific, Limpus (1997) concludes that most Asian and Pacific green turtle populations are now either severely threatened or endangered (a summary of Limpus' assessment is provided in Attachment 3).

Collectively, Australia is seen to have one of the largest populations of breeding green turtle in the world supporting an estimated 50,000-60,000 females. This is compared to the rest of the world's annual breeding population of around 5000-10,000 females.

Of the Australian population, the northern GBR green turtle population is the largest single green turtle population in the world, and 50-60% of this population either resides in or migrates through the Torres Strait. In addition to this, the NW shelf population supports one of the world's largest green turtle populations.

For comparison:

- Oman has an annual nesting green turtle population over 10,000 females
- Indian Ocean French Territories have an annual nesting green turtle population over 5000 females
- Costa Rica (Tortuguero) has an annual nesting green turtle population similar in size to Raine Island
- Ascension Island has an annual nesting population of several thousand females per year.

Hawksbill turtles

The Australian context

Two separate hawksbill breeding stocks have been identified in Australia – a north east Australian stock (which includes the northern Great Barrier Reef/Torres Strait area) and an eastern Arnhem land stock. Each stock supports an estimated annual breeding population of several thousand females (Limpus and Chatto 2004).

International context

Limpus (1997) summarises the status of known hawksbill nesting sites in south-east Asia and the western Pacific:

i) in the Sulu Sea/Turtle Islands (Sabah/Malaysia) estimated at several hundred females annually;

ii) in Melaka/Johor (Malaysia) comprised of less than 100 females annually;

iii) in numerous areas of Indonesia where tens-hundreds of females nest annually;

iv) on the west coast of Thailand, consisting of a few tens of females, and in the northern Gulf of Thailand, comprising up to 100 females annually;

v) in the Solomon Islands, where the breeding population is thought to have declined by 50% in the past decade, to a few hundred females annually; and

vi) in a variety of other Pacific countries – Palau, Fiji, Samoa – with nesting aggregations of tens of females annually.

Collectively, the annual Australian breeding population of hawksbill turtles is estimated to be around 5000 – 6000 females and is comparable to the combined populations of hawksbill turtles in other parts of the world. Australia also supports two of the largest annual breeding populations of hawksbill turtles in the world.

Flatback turtles

Flatback turtles are endemic to the northern Australian-southern New Guinea continental shelf, with all breeding restricted to Australian beaches (Limpus et al 1988, as quoted in Limpus and Chatto 2004).

There are five major breeding aggregations (Limpus 1997):

i) western Torres Strait/north eastern Gulf of Carpentaria, the largest breeding aggregation, estimated at around 3000 females annually; and

ii) the southern Great Barrier Reef, the southern Gulf of Carpentaria, western Arnhem land and the north west shelf, each of which is estimated at around 1000 females annually.

2.5: International significance of Torres Strait dugong stock

Globally, dugong has a large geographical range, spanning an estimated 47 countries and territories from eastern Africa eastwards to Vanuatu. Summarising the results from an international review of the dugong's status undertaken by the IUCN, the United Nations Environmental Program, and other groups, Marsh, Penrose and Eros (2003) concluded that:

i) the dugong's population has been greatly reduced throughout much of its range;

ii) dugong are at risk of extinction in East Africa (Somalia, Kenya, Tanzania, Mozambique and Madagascar), India, Sri Lanka, Japan (Okinawa) and Palau;

iii) the future of dugong is uncertain in the Arabian Gulf, east and south-east Asia and several Pacific islands;

iv) the dugong's future is reasonably secure in the Red Sea; and

v) the dugong's future is probably secure in Australia, except off urban Queensland and regions close to major indigenous hunting communities (such as the Torres Strait).

The IUCN review (Marsh, Penrose, Eros and Hughues 2002) also identified the Torres Strait as home to the largest population of dugong in the world.

Internationally, species closely related to dugong have a history of being overfished and extinction. The dugong's closest modern-day relative –the Steller's Sea Cow, which used to live in the Bering Sea, the waters between Russia and Alaska - became extinct in the eighteenth century, within 27 years of its discovery (Marsh et al 2002). Steller's Sea Cow was a favoured food source of the fur traders that arrived in the area to exploit the otter, seal and fox populations. Such traders hunted Steller's Sea Cow

for its meat, which, like dugong, was similar to beef in taste and texture (Steller, 1751 cited in Weinstein and Patton 2000).

Three other related species – the West Indian manatee, the Amazonian manatee and the West African manatee – are considered to be at risk of extinction, given their low population numbers and limited geographical distribution (Reynolds and Odell 1991, cited in Marsh et al 2002).

2.6: Australia's national and international obligations relevant to the turtle and dugong stocks

Turtles

International obligations

The three turtle species relevant to this assessment – green, hawksbill and flatback turtles– are each listed under the Convention for the Conservation of Migratory Species of Wild Animals (CMS, also known as the Bonn Convention) and the Convention on the International Trade in Endangered Species (CITES). Their listing means that Australia, as a signatory to both the Bonn Convention and CITES, has an international obligation to take action to protect all three species and to stop international trade of any products derived from these three species.

Hawksbill turtles are also listed on the World Conservation Union's (IUCN's) red list as being critically endangered, green turtles are listed as endangered, and flatback turtles considered as being data deficient. While not having any legal status, such listings add further political/moral pressure on the Australian Government to take appropriate management action.

Under the terms of the Torres Strait Treaty, Australia also has an international obligation to co-operate with Papua New Guinea to protect and preserve the marine environment and indigenous fauna and flora found in and in the vicinity of the TSPZ. The three turtle species are Torres Strait indigenous fauna, and as such, are covered within the Treaty's 'protect and preserve' obligations.

Under the terms of the Australia-Papua New Guinea subsidiary management arrangement negotiated under the framework of the Treaty, Australia has an obligation to cooperate with Papua New Guinea to:

i) restrict the turtle fishery to a traditional fishery;

ii) develop - and enforce - appropriate conservation measures in the fishery; and

iii) to obtain and exchange fishery catch statistics.

Domestic obligations

From a legislative perspective, Australia has implemented its international obligations relating to the three turtle species through the listing of all three species under the EPBC Act. Under the Act, species can be listed in three ways - as threatened species, as highly migratory species, or as marine species. The three turtle species found in the Torres Strait have been listed under all three criteria.

- All three species are categorised as vulnerable under the threatened species criteria.

The listing of the three turtle species makes them protected species, such that it is an offence under the EPBC Act to kill, injure, trade, keep or move them in Commonwealth waters without a permit. There is also a mandatory reporting

requirement for the take of these species under the EPBC Act, however, at present, this does not apply to indigenous take.

These provisions reflect the Australian Government's view of the conservation significance of the turtle stocks found in the Torres Strait. However, from a practical perspective, the Government needs to balance its turtle conservation goals with other Government objectives as previously identified, ie:

i) that of recognising and protecting the traditional way of life and livelihood of Torres Strait traditional inhabitants, as implied in the TSFA; and

ii) that of recognising and protecting the hunting rights of native title holders more generally, as stated in the Native Title Act.

Managing the Torres Strait turtle stocks thus requires the balancing of the Government's objectives regarding turtle conservation, the Torres Strait in general, and recognition of the traditional hunting rights of indigenous native title holders.

The Government's current approach to balancing these objectives is to limit the scope of the EPBC Act so that the Act has no effect on the rights of native title holders. Given that most, if not all, of the Torres Strait turtle harvest is protected under native title hunting rights, the listing of turtle species under the EBPC Act as protected species thus has little if any impact on the Torres Strait turtle fishery. The Recovery Plan for Marine Turtles in Australia (2003) recommends 'that lead agencies should recognise endangered or critically endangered species and implement a zero take where possible'.

The 2003 Marine Turtle Recovery plan

The listing of these species as threatened under the EPBC Act necessitates the development of a species recovery plan. Accordingly, in July 2003 Environment Australia released the 'Recovery Plan for the Management of Marine Turtles in Australia'. The premise of the plan was to '*reduce detrimental impacts on Australian populations of marine turtles and hence promote their recovery in the wild*' (Environment Australia 2003).

Among the specific objectives of the plan are:

i) reducing the mortality of marine turtles and increasing natural survivorship, including through developing management strategies with indigenous communities;

ii) developing programs and protocols to monitor marine turtle populations, assess their size/status, the causes of mortality and to address information gaps;

iii) managing factors that affect marine turtle nesting; and

iv) identifying and protecting habitats that are critical for marine turtle survival.

The expectation in the plan – which has a five-year life span – is that the relevant Commonwealth and State Government agencies will take responsibility for implementing – and in most cases funding - the identified action items.

The 2005 National Partnership Approach

In a separate government initiative, in October 2005 the Natural Resource Management Ministerial Council (NRMMC)[6] endorsed a 'National Partnership Approach To The Sustainable Harvest of Marine Turtles and Dugong in Australia' (DEH 2005). The development of this 'Partnership Approach' followed the NRMMC having previously expressed concern over the long-term sustainability of turtle and dugong in northern Australia.

The Partnership Approach has 5 goals:

i) to improve the information base available to indigenous communities for managing the sustainable harvest of turtles and dugong;

ii) to respect indigenous and non-indigenous knowledge and management;

iii) to improve education and awareness;

iv) to identify the economic, social and cultural factors that may contribute to unsustainable harvest levels and identify and implement measures to address them; and

v) to protect sea country resources (in a compliance context).

To oversee the implementation and further development of the approach, an ongoing 'Partnership Body' is to be established. The body is to consist of representatives from indigenous communities and relevant state, territory and Australian Government agencies, with DEH to provide secretariat support.

The Partnership Approach recognises that to date, limited resources have been provided to indigenous communities to assist their more active involvement in turtle and dugong management. However, despite acknowledging the inadequate level of resources made available in the past, the Approach itself makes no additional funding/support available to indigenous communities and/or management agencies to achieve the five identified goals.

One of the first tasks for the Partnership body is to draft a 12 month workplan, for subsequent consideration and endorsement by the NRMMC. It is unclear what funding sources will be used to implement any activities identified by the Partnership body.

The TSRA recognises the need for the National Partnership Approach, and agrees that for its role to be effective, additional resourcing should be made available to Indigenous communities and management agencies to achieve its objectives. This could be one mechanism through which DEH could add value to the Torres Strait management arrangements for the species.

Leaving the funding issue aside, the development of the Partnership Approach reflects the Australian Government's recognition of the need to strengthen management arrangements in the turtle and dugong fisheries.

<u>Dugong</u>

International obligations

[6] the NRMMC consists of the Australian/State/Territory and New Zealand government ministers responsible for primary industries, natural resources, environment and water policy and is the peak government forum for consultation, coordination and, where appropriate, integration of action by governments on natural resource management issues. Papua New Guinea is invited to send representatives as observers.

Dugong – as the only surviving member of the family Dugongidae – is listed on the Bonn Convention and under CITES. As is the case with marine turtles, Australia – as a signatory to these international agreements - thus has an international obligation to protect dugong stocks. Dugong is also listed on the IUCN red list as being 'vulnerable to extinction'.

Domestic obligations

Domestically, dugong are not currently listed as a threatened species under the EPBC Act. In 1996 dugong were nominated under the Endangered Species Protection Act – the precursor to the EPBC Act – but the then Environment Minister accepted advice from his scientific advisory committee that while the dugong population in some parts of Australia was clearly in decline (such as the southern Great Barrier Reef and Hervey Bay) and that these declines appear unsustainable, when the Australian population was considered as a whole dugong numbers were not declining at a rate that would lead to their extinction in the immediate future or to their being endangered within the next 25 years. Accordingly, the Minister decided not to list dugong as either endangered or vulnerable but agreed to keep its conservation status under review.

Despite not being listed as a threatened species, dugong are listed under the EPBC Act as both a migratory species and a marine species. Dugong are thus considered to be a protected species. The dugong's protected species status means that it is an offence under the EPBC Act to kill, injure, trade, keep or move them in Commonwealth waters without a permit.

However, as with turtles, most of the dugong take in the Torres Strait would be consistent with the exercising of native title rights, such that listing dugong as a protected species has negligible impact on the management of the Torres Strait catch. Mirroring the situation applying in the turtle fishery, the Australian Government's management of the Torres Strait dugong fishery, exercised through the PZJA, thus needs to balance the Government's goals in regard to dugong conservation, the Torres Strait in general, and indigenous native title rights.

The dugong fishery is a key fishery targeted under the Partnership Approach described in the previous section.

2.7: Cultural and economic significance of the turtle and dugong fisheries

Turtles and dugongs have considerable traditional, spiritual and cultural significance for the indigenous people of the Torres Strait. Turtle and dugong are central food items at virtually all weddings, tombstone openings, feasts, religious celebrations and other special occasions within the Torres Strait. They figure prominently in Torres Strait art, stories, music and dance, and socially, successful hunters have special status and prestige within communities.

It is not necessary for the purposes of this report to provide a detailed account of the social and cultural significance of the two fisheries. However, it was identified as an important aspect that needed to be considered in full when managing the turtle and dugong fisheries in the Torres Strait. As such, a brief overview of the cultural and social significance of turtle and dugong to the people of the Torres Strait region is included. A more detailed description of the social and cultural significance of turtle

and dugong are available in various anthropological studies (see for example Haddon (1912) and Nietschmann and Nietschmann (1981), as quoted in Kwan (2005)).

To start with, this report takes guidance from two statements made by the TSRA – the Australian Government authority responsible for improving the lifestyle and well-being of indigenous people living in the Torres Strait and thus an authoritive body on Torres Strait matters.

- In the Regional Activity Plan for Torres Strait (RAPTS), finalised in September 2005, the TSRA described the long term maintenance of the turtle and dugong populations of the Torres Strait as being 'central to the cultures and economies of the indigenous peoples of the region' (TSRA 2005).
- Earlier this year, the Chairperson of the TSRA, in speaking about the importance of community-based management, stated that:

  'we are talking not only about the conservation of a species but the preservation of an entire culture' (TSRA March 2005).

In addition to this, the report acknowledges the information provided by the Torres Strait and NPA communities about the importance of such animals to both the livelihood of the people and the cultural, spiritual and traditional way of life. Just how significant turtle and dugong are to the Torres Strait and Aboriginal cultural are highlighted in the following quote from an anthropologist's report:

> *Hunting [of dugong and turtle] is more than simply a means of getting meat to eat. In the Torres Strait, marine hunting is the major activity of many males. It provides the majority of protein to households, it sets the context in which much cultural history and environmental knowledge are taught and reviewed, it is the source of the most favored item distributed among kin to satisfy social obligations, and it is based on a complex body of theory, logic, and technique that ensure high returns that reinforce traditional knowledge.*
>
> *...hunting continues to be an important cultural activity that preserves a way of life and a body of knowledge that gives meaning to livelihood and existence. To be a hunter is a cultural and perceptual affirmation of being an islander'.*
>
> *Bernard Nietshmann 1985*

In their comments, TSRA noted that dugongs and turtles are the favoured foods of Torres Strait Islanders. The hunting, distribution and consumption of dugong and turtle are fundamental components of their culture, underpinning local constructions of masculinity, cultural identity, social relationships, household and community economies, and ceremonial feasting. Both species also figure prominently in dance and song, ritual and magic, and art. As such, they are cultural foods of Torres Strait Islanders – esteemed dietary items that possess great cultural, historical, psychological and emotional significance.

Communities reinforce this and have commented that dugongs are more than just a diet for islanders; it has a connection or spiritual attachment to the land and may appear at certain times when there is an internal dispute over land in a particular clan

group. It is also said that dugong can signify certain things such as changes in weather or death of a clan group member.

In addition to this, turtles and dugong figure prominently in traditional ceremonies such as initiation ceremonies. These ceremonies play an important active part in disciplinary teaching and upbringing of an initiate when he reaches an adult stage and also creates important bonds between family members. It was explained that one of the most important relationships created is the bond between a male and his Awadhe (Mother's brother). The relationship is reciprocal and the Awadhe's role is in the instruction of life. As a result, one of the most important points of initiation is when the male catches his first dugong. He then must present to the Awadhe the choicest cut of the dugong before proceeding to share the remainder to all others in order of relationship.

Furthermore, with this initiation comes some responsibility, particularly later in life when the initiate has to provide for his family, extended family or the community. Generally, this particular person becomes a dominant figure within the community and is heavily relied on. Sharing is also an important element of maintaining family stronghold when gathering food from the sea.

The use of dugong in shaving ceremonies was also said to be an important part of maintaining cultural links for Torres Strait Islanders, particularly for those living on the mainland.

Community members also stated that turtle and dugong were not only an important food source in ceremonies, but were also important in maintaining a healthy diet. There was some concern that unhealthy western foods were being substituted into people's diets and that this was the cause of some health related problems. People were even more concerned that if turtle and dugong were removed from their diet, then everyone's health would generally deteriorate.

The spiritual significance of turtle and dugong as a totem was also strongly expressed and it was said in generations past, if turtle or dugong was your totem (or any other species) you were unable to hunt those animals. Traditionally clans were responsible for the management of their totem species and through this management system, people that did not belong to the dugong or turtle clans needed permission to hunt these animals. The clans responsible for turtle or dugong respectively, were identified as the custodians of these animals and were responsible for the disciplinary action taken if these traditional laws were not followed.

The Panai Clan from Mabuiag Island explained that, although they are of the dugong totem, they are still allowed to hunt dugong. However as a rule they must show respect to their totem animal by showing remorse through the saying of the word that means that the dugong must be caught to feed his family and clan group and also through dealing with non-Panai members who show disrespect to the totem animal.

As a Panai clan member, he (or she) has the mandate and authority to pull up hunters who:

- Catch more than he or his family needs
- Does not use all the parts of the dugong including head and tail
- Does not show respect to the animal through remorse (takes joy in killing)
- Does not show territorial respect to Panai Clan when Hunting (permission)

Members of Mabuiag Island explained that their forefathers had taught them that particular parts of the dugong belonged to particular members of the crew and were distributed among various clan groups. Other communities said that dugongs are estimated to have 20 or more names and that every part of dugong has got a name. It was explained that Goemulgau zogo-au garkazil are clever and knowledgeable hunters and can identify a dugong by name while out hunting or on the beach.

Concern was expressed by some of the elders that **some** of the young hunters were not using the proper knowledge, techniques and methods to hunt dugongs, such as analysing the feeding trails and using other environmental cues to know when and where to hunt the dugong. As a result of this, it was generally felt by all of the communities that a high priority should be given to the maintenance and preservation of their culture, particularly as it relates to turtle and dugong.

It was noted that it was the intention of the Maluilgal Corporation to hold a workshop to bring together traditional owners of the dugong clans from Saibai, Boigu, Mabuiag, Badu and Dauan Islands to record the traditional knowledge and management of dugong and to ensure that these traditional laws were understood and practised by people in each of the communities. The Maluilgal Corporation's intention to run this workshop is consistent with the views of other people within the Torres Strait and NPA region in wanting to make sure traditional practices are passed down between generations and that these species are around hunted sustainably.

It is also important to note that the Indigenous communities of Torres Strait consider all dugong and turtle found within their traditional waters to be their exclusive property, and harvesting and consuming these animals is seen as their natural birthright, from time immemorial. Consequently, Torres Strait Islanders see themselves as the 'owners' of these fishery resources, rather than simply one of a number of 'stakeholders'.

The TSRA highlighted that this assessment identifies a number of shortcomings in existing knowledge about dugong and turtle in the Torres Strait region, and identifies concerns about the willingness of communities to engage with and adopt management practices that are ultimately aimed at reducing the total catch of both species. The TSRA suggests that social science research has the potential to provide extremely useful data to address these issues, which can inform the development and implementation of effective community-based management regimes. Such a role should also be formalised, through inclusion of an appropriately qualified social scientist (e.g. environmental anthropologist) on the proposed 'broad-based scientific advisory forum', reflecting the important socio-cultural dimensions of both species in Torres Strait.

As discussed elsewhere, there is a need to develop bottom-up, 'grass roots', community-driven responses, based on a clear understanding of the social, cultural and economic importance of both species to Torres Strait Islanders. Managing the Torres Strait dugong and turtle fisheries is ultimately about managing the behaviours of the peoples who are the owners of the resources. If basic information about people's understandings about dugong and turtle, and their motivations for exploiting them, is lacking, or dismissed by non-Indigenous stakeholders, then attempts to engage with Traditional Owners to develop culturally appropriate management regimes are less likely to succeed.

The TSRA also notes that any research of this kind must be sanctioned by, and involve full collaboration with, the region's Indigenous people. Care must also be taken to ensure that any information obtained through research is used responsibly by managers. At all times, Torres Strait Islanders should be in control of their intellectual property in respect of the fisheries.

The TSRA recommends further consideration of the following issues highlighted in community consultations on the strategic assessment process, using a social science perspective:

- There is a need to explore the social, cultural and economic dynamics of contemporary hunting of these species by Torres Strait Islanders, to enable understandings of these activities. Moves towards a more sustainable catch ultimately entail attempts to change attitudes, beliefs and actions, and will require an understanding of contemporary hunting behaviours. For example, Anecdotal reports from some Torres Strait Islanders, particularly elders, of recent and apparently culturally inappropriate changes in the hunting and consumption of dugong and turtle by younger men (e.g. competitive dugong hunting for status amongst peers).

- Detailed analysis of Torres Strait Indigenous communities' views on the status of the species. If, for example, many local people do not view the species as subject to decline, they will be less likely to subscribe to a conservation ethic. Any existing traditional management regimes should be thoroughly documented, as these might provide a platform on which to build community-driven management regimes.

- The potential for restrictive management arrangements to have negative social and cultural consequences. As local hunting and consumption behaviours are themselves related to a host of factors including ongoing cultural practice, manhood, feasting, etc., any sanction on such activities has the potential to adversely impact on these other dimensions, and hence the social lives of the Indigenous people of Torres Strait. For example, local enforcement of any restrictions on small islands, where most people are closely related, could result in increased social discord. Reduction in hunting, and a concomitant reduction in the sharing and affirmation of social relationships that occurs with distribution of meat, could also erode social relationships in the long term.

- Concern that community and public meetings are attended by middle-aged and elder men, many of whom no longer hunt dugong and turtle. As mentioned above, there is a need to connect with, and understand the behaviours and motivations of, those younger men actively engaged in hunting, many of whom do not attend such meetings.

- Lack of knowledge about the fisheries with respect to the coastal and peri-coastal communities of Western Province, Papua New Guinea. Some communities, with no tradition of dugong and turtle hunting, have in recent times begun taking up these subsistence strategies. Furthermore, Western

Province communities have a growth rate of around 3.5%, with the population doubling every twenty years, with obvious ramifications. Funding should be made available to enable social scientists with familiarity with the region to conduct rapid appraisal of harvest levels, local management issues, demographics etc.

- Lack of knowledge about the fisheries with respect to Indonesia's Papua Province. Linkages should be established with Indonesian government agencies and/or NGOs in Papua Province, in order to extend demographic surveys of the species, and obtain basic knowledge about exploitation of the species by Indigenous West Papuans and transmigrants from elsewhere in the archipelago (e.g. WWF, World Wide Fund for Nature, have been operating in Merauke since the early 1990s, and the potential exists to establish linkages between this organisation and DEH).

One respondent supported efforts to improve the understanding of the socio-cultural importance of turtle and dugong hunting in Torres Strait. The same respondent stressed the need to investigate and quantify the transfer of turtle and dugong meat from Torres Strait to mainland Australia and PNG, and clarify whether this transfer is a 'traditional ' use.

The Maluilgal Corporation also expressed strong concern with regard to the broader socio-economic issues within the Torres Strait region and identified that strategies needed to be developed by government to address the social problems that stem from the communities reliance of welfare payments (CDEP). The Corporation has concerns that if this is not addressed or highlighted within the report that the chances of reducing turtle and dugong catches to sustainable levels will not and could not be achieved because of the disadvantaged economic situation people of the Torres Strait experience.

Economic significance

Both the turtle and dugong fisheries in the Torres Strait are non-commercial, meaning the sale of turtle/dugong meat and/or other products is prohibited. However, this does not mean that the fisheries have no economic value. In fact, given that turtle and dugong are one of if not the main source of meat for Torres Strait Islanders resident in the Torres Strait, the two fisheries are of considerable economic significance.

- An average-sized dugong could be expected to provide around 150kg of edible meat. Given the price of alternative meat substitutes – for example, in December 2005 a kilogram of mince was valued at $8/kg on Thursday Island and $10.50/kg on the outer islands (using Warraber Island as the outer island benchmark)– each captured dugong is conservatively valued at between $1200-$1600. If the total annual catch in the Torres Strait is around 600 dugong, the dugong catch has an estimated value of between $720,000-$950,000/year.
- In the case of turtle, the equivalent calculations, based on an average turtle yielding 50kgs/meat, estimate the value of each individual turtle at between $400-$525, and with an annual catch of around 1500 turtles, the turtle fishery at between $600,000-$800,000/year.

The above analysis is not intended to be a precise estimate of the economic value of the turtle and dugong catch. It need not necessarily follow, for example, that were dugong and turtle not so readily available, that Islanders would continue to eat the same equivalent weight of alternative meat products[7], nor consistently replace turtle and dugong with what is effectively the lowest cost meat substitute.

One respondent suggested that to encourage the sustainability of both species Government needs to recognise the high cost of living/low income earned, by means of subsidising costs of food, fuel and freight.

Also, it is assumed in the above analysis that all the turtle and dugong caught in the Torres Strait is consumed within the Torres Strait. No allowance has been made for the unknown quantity of turtle and dugong meat that is sent to Torres Strait Islanders living on the Australian mainland. This is something that needs to be better understood and managed. Further, no value has been assigned to the egg harvest component of the turtle fishery.

Notwithstanding some uncertainty in the estimated effective value of each harvested dugong and turtle, the economic context of the Torres Strait is that the Community Development Employment Program (CDEP) - the main employer on the outer islands and a significant employer for the inner islands - provides an average take home pay of around $200/week.

The fact that the dugong or turtle meat is usually distributed freely within the community - to family and friends – does not diminish the economic value of the catch. Benefits are distributed in accordance with how the dugong/and or turtle is shared in the community, and while the individual hunter may not realise the full value of the catch, the community does.

Aside from their cultural and social significance, the turtle and dugong fisheries do have an economic value particularly to Torres Strait Islanders and Aboriginal people in Torres Strait. Should either stock be overharvested, individuals and communities would clearly be economically worse-off. The TSRA has highlighted that if the same logic was applied to the idea of setting a TAC (as discussed later in the report) for the fishery, then the resulting restrictions on harvest would also leave islanders economically worse off. This would be a significant impediment to the uptake or adoption of a TAC in the region, along with the lack of data to support such a process.

Community members generally agreed that both turtles and dugongs were very important to the community economically because of the high cost of living in a remote area.

2.8: Fishing methods

Formerly, dugong and turtle were speared from purpose-built hunting platforms built on known feeding grounds (Johannes et al 1991). These olden-day methods have since been replaced by the use of motorised dinghies (up to 6m in length), sometimes used in association with small wooden or fibreglass dinghies (known as clinkers). Most hunting is done by day, or just before dawn (Johannes et al 1991). Johannes describes two fishing methods:

[7] Johannes et al (1991) commented on the large quantities of food consumed by the average Torres Strait Islander

i) the stealthy approach, whereby the motor is turned off and the dinghy drifts over known feeding grounds. Dugongs have highly sensitive hearing, and some hunters feel that dugong can hear and be frightened by the lapping of water on the dinghy: such hunters would most likely use their dinghies to tow a clinker to the hunting grounds and drift in the clinker which is quieter in the water; and

ii) the fast pursuit hunting, whereby a dugong is effectively chased to the point of exhaustion (10-15 minutes) at which point it swims very slowly and no longer dives below the surface. It is then either speared with a wap - a traditionally made harpoon. This method can only be used in shallow, clear water.

Turtles are also caught using the wap, by bulldogging (jumping on the turtle's back), and in some areas, by overturning them on the beach either before or after nesting. These hunting methods are weather dependent and often change depending on the conditions. They also slightly vary between communities.

In regards to the harvest of turtle eggs, nests are either found by watching where the turtle lays eggs before collecting them or by poking a sharp stick repeatedly into the sand. On extraction, should there be sand adhering to the end of the stick (signifying that the stick has become moist, most likely from having broken an egg), the nest is excavated. In some areas, eggs more than three days old are generally disliked, such that hunters will only excavate nests in the vicinity of fresh turtle tracks (Johannes and MacFarlane 1991). In other areas, eggs at all stages of development are eaten, including fresh eggs through to fully formed embryos or hatchlings. There are differences between islands, groups of islands and also generations as to which are the most sort after delicacy.

The Maluilgal Corporation highlighted that egg collection is seasonal and does not happen all year round and that different species of turtle eggs are collected in different areas. Relevant to the Maluilgal nation, egg collection is only during the north-east season.

There is some concern about the changes in traditional hunting methods.

2.9: Fisheries data – estimated catch and effort levels, spatial/temporal distribution, number of fishers

Unlike conventional AFMA-managed fisheries, the PZJA has not attempted to introduce any form of individual catch reporting system - such as a logbook - in the turtle or dugong fisheries. Instead, the PZJA has tried to monitor catch by supporting a number of research projects throughout much of the 1990s.

Turtles

Catch

The most recent data available on the Torres Strait turtle catch is sourced from the latest of these research projects, a five year joint AFMA/CSIRO project from 1996-2001. During that time, five individual observers collected a total of 733 days of catch data spread over 14 different Torres Strait island communities (Skewes et al 2004).

Catch was found to be variable – six out of every seven days monitored observed no turtle catch. Of the 133 days on which catch was observed, around half involved a single turtle being taken, with the highest daily catch being 12.

Based on the monitoring results, the annual catch of green turtles during the 1996-2001 period was estimated to fluctuate between 1000-2000 animals, lower than previous estimates (Table 1).

Table 1: Estimated Australian Torres Strait turtle catch 1976-2001

Year	Estimated annual catch	5% standard error	90% confidence interval	No. days sampled	Source
1976/78	2100	n/a	n/a	n/a	Nietschmann (1985)
1978	2500	n/a	n/a	n/a	Kowarksy (1978)
1980	4150	n/a	n/a	n/a	Parmenter (1980)
1981	4000	n/a	n/a	n/a	Limpus (1981)
1983/86	4000	n/a	n/a	n/a	Johannes and al (1991)
1991/92[1]	2410	±250	2160-2660	u/n	Dews et al (1993)
1991/93[1]	2504	±358	2146-2862	u/n	Harris et al (1994)
1994[1]	2600	±378	2222-2978	124	Harris et al (1997)
1996	1896[2]	±445	1451-2341	138	Skewes et al (2004)
1998	1097[2]	±340	757-1437	175	Skewes et al (2004)
1999	1507	±358	1149-1865	170	Skewes et al (2004)
2000/01	1619	±574	1045-2193	250	Skewes et al (2004)

1: using a similar methodology to that used in the AFMA/CSIRO monitoring project from 1996-2001
2: these estimates were not accepted by the then Torres Strait Fisheries Scientific Advisory Committee as they were considered as unreliable given doubts about the precision of the estimates and potential bias in the sampling methodology. Changes were made to the methodology in subsequent years.

Several of the studies pre- AFMA/CSIRO such as Limpus, Parmenter and Kowarksy make estimates for the whole Torres Strait region and were not restricted to the TSPZ. Moreover, the studies preceding AFMA/CSIRO, used very different methods to estimate catch rates, especially Kowarsky and Parmenter who extrapolated data from one community and Nietschmann whose estimate was described by Kowarsky as being “very rough”.

There was general concern from the communities that the statistics in the report are inaccurate and the methods used do not estimate accurately the correct figures. The community felt as though the statistics do not fully represent what is happening in the Torres straits and that the sampling methods do not accurately represent catches in all communities.

Other fishery data

There is negligible data on levels of hunting effort and numbers of turtle hunters in each community.

Egg harvest

There is negligible data available on the level of egg harvest within Torres Strait and adjacent Northern Peninsula Area (NPA) areas.

Limpus and Chatto (2004) claim that the rookeries adjacent to inhabited islands are subject to almost 100% egg harvest, however, the basis of this claim is unknown. JCU has suggested that this may be true of some islands that receive little turtle nesting, but is probably very unlikely for larger rookeries such as Murray Islands (green

turtles), Crab Island (flat back turtles) and Hawkesbury Island (hawksbill and flatbacks).

Dugongs

Catch

As with the turtle results, the AFMA/CSIRO catch monitoring project found that dugong catch was highly variable, with catch recorded on less than 10% of the surveyed days. Recorded catches were highest in the western and top-western island clusters. Catch estimates were considerably lower than previous estimates (Table 2).

Table 2: Estimated Australian Torres Strait dugong catch 1976-2001

Year	Estimated annual catch	5% standard error	90% confidence interval	No. days sampled	Source
1976/78	243	n/a	n/a	n/a	Nietschmann (1985)
1983/86	110-130	n/a	n/a	n/a	Johannes and MacFarlane (1991)
1991/92[1]	1010	±240	770-1250	u/n	Dews et al (1993)
1991/93[1]	1226	±204	1022-1430	u/n	Harris et al (1994)
1994	860	±241	619-1101		Harris et al (1997)
1996	241[1]	±92	149-333	138	Skewes et al (2004)
1998	287[1]	±131	156-418	175	Skewes et al (2004)
1999	692	±150	542-842	170	Skewes et al (2004)
2000/01	619	±134	485-753	250	Skewes et al (2004)

1: these estimates were not accepted by the then Torres Strait Fisheries Scientific Advisory Committee as they were considered as unreliable given doubts about the precision of the estimates and potential bias in the sampling methodology. Changes were made to the methodology in subsequent years.

In a separate research project, Kwan (2002) recorded dugong catches on a daily basis during 16 months spent on Mabuiag Island in the western cluster group in 1998 and 1999. Kwan recorded 145 dugong having been caught over 8 months in 1998 and 170 in the comparable period in 1999.

Number of hunters/hunting effort

As with turtles, there is little recent data on levels of dugong hunting effort or the number of dugong hunters in each community, with the only recent information available that obtained on Mabuiag Island by Kwan.

In terms of hunting effort, Kwan observed that over half (57%) of the men on the island went dugong hunting at least once during the 16 month recording period. Notwithstanding such high participation rates, Kwan (2002) observed that the dugong catch was highly concentrated with two hunters accounting for more than 50% of the catch.

Kwan (2002) found that there was almost a 60% chance that there would be at least one person in the community hunting each day and concluded that the decision on whether to hunt was based on a variety of factors such as local environmental conditions, the abundance of dugong in the traditional hunting grounds, the time of year and the stage of the lunar cycle. Kwan (2002) also found that dugong effort was inversely related to the size of the commercial lobster catch, the latter being the main commercial Islander fishery.

Given that Kwan was resident in the community for the entire period of these observations, a high level of confidence is attributed to these data.

2.10: Current fisheries arrangements

From an operational perspective, the PZJA manages the turtle and dugong fisheries in the same manner that it manages other Torres Strait fisheries – through fisheries management notices issued by the Australian Government Fisheries Minister, in the Minister's role as Chair of the PZJA.

There are three management notices relevant to the turtle and dugong fisheries:

i) Fisheries Management Notice No. 41 which restricts the type of fishing gear that can be used to hunt for dugong to the use of a wap and defining the area in which dugong can be hunted;

ii) Fisheries Management Notice No. 65 which reaffirms the dugong fishery as a traditional fishery and the gear restriction (hand-thrown spear only), specifically defines the area of the dugong sanctuary in the south western sector of the Australian portion of the TSPZ, and prohibits the carrying of dugong on a licensed commercial fishing boat except for vessels having a Traditional Inhabitant Boat licence that are 6m or less in length; and

iii) Fisheries Management Notice No. 66 which reaffirms the turtle fishery as a traditional fishery and prohibits the carrying of turtle on a licensed commercial fishing boat except for vessels having a Traditional Inhabitant Boat licence that are 6m or less in length.

The management strategy for the two fisheries is thus based on an input-controlled approach, with limits on who can participate (traditional inhabitants only) and the size of vessel that can be used (6m or less). In the case of the dugong fishery, there are further restrictions on the type of fishing gear that can be used (wap only) and a closed area – the dugong sanctuary - where hunting is prohibited.

Some communities expressed concerns about the dugong sanctuary and highlighted that they were unaware that a sanctuary existed for dugong within the Torres Strait. The same communities suggested that information on turtle and dugong issues, particularly about the sanctuary, be sent out to community members and councils.

Apart from the abovementioned management arrangements, currently there is no limit on the number or type of turtle or dugong that can be caught, nor is there any fisheries-specific vessel licensing requirements[8] for participation in the two fisheries

[8] There is a transport requirement that all motorised dinghies need to be licensed. However, this is not fisheries specific: a dinghy that is used for turtle or dugong hunting requires no additional licence compared to a dinghy used solely for transportation

(that is, a licence is not required to hunt for turtle and dugong as is the case with commercial fisheries).

A number of communities were of the opinion that one of the main contributing factors to over harvesting was the lack of regulations currently in place and the lack of enforcement staff on each of the islands to target illegal activities in relation to turtle and dugong hunting.

The management arrangements that are assessed in this report are confined to those formal management arrangements implemented by the PZJA. However, it is appropriate to note that the PZJA's management arrangements are not the only 'regulations' affecting the turtle and dugong fisheries:

- In addition to formal Government regulations, participation in the two fisheries is also subject to series of unwritten cultural laws, the most obvious being that hunting is restricted to men - in effect, a traditional means of limited entry. There are likely to be numerous other traditional 'management arrangements' regulating who can participate in hunting and defining culturally appropriate hunting methods and levels of harvest, however, this report has not focused on identifying them.

Two recent Australian Government reports – one prepared by the National Oceans Office (2004) in regard to the northern planning area, the second the National Partnership Approach coordinated by DEH – have recognised the need to improve non-indigenous understanding of traditional indigenous management customs and activities.

- From a cultural and historical perspective, the proper documentation of traditional Torres Strait management approaches to the turtle and dugong fisheries seems justified.
- From a fisheries management perspective, greater knowledge and understanding of these traditional management approaches may hold a great deal of practical merit, particularly should current formal arrangements be considered inadequate.

2.11: Alternative management strategies

As will be discussed in more detail in Part 3 of this report, Australia and Papua New Guinea are to commence discussions in 2006 on future management arrangements for the Torres Strait dugong fishery. In all likelihood these discussions will also be broadened to include the turtle fishery.

Australia's initiating of these discussions signals both its dissatisfaction with the current arrangements and its desire to work with Papua New Guinea to develop a more effective alternative approach to managing turtle and dugong. This concern was mirrored by the views of the communities within the Torres Strait in ensuring that PNG will adopt parallel management arrangements that aim to look after dugong and turtle resources.

Foremost among these alternative options is the specifying of a total allowable catch (TAC) for the dugong and subsequently turtle fisheries. Such a concept is not new in the Torres Strait – albeit in the context of commercial fisheries, the Treaty makes specific provision for TACs to be established by mutual agreement - and there seems

no in-principle reason why TACs could not similarly be set for the Torres Strait dugong and turtle fisheries.

The TSRA agrees that such discussions with PNG would valuably inform the decision-making of the two countries over whether specifying a TAC for the dugong and turtle fisheries is the best management approach. However they do question whether there is sufficient information on population dynamics to support the imposition of a TAC, what the resourcing implications for enforcing a regional TAC would be, and how communities could best be supported in terms of local enforcement arrangements.

It was also suggested that the management response to this evaluation not be restricted to a TAC and catch-sharing arrangements, but embrace a toolbox of strategies to address the issue of over-harvesting of turtles and dugongs in Torres Strait.

Issues associated with managing the dugong and turtle fisheries using TACs are considered in more detail in the discussion under guideline 1.1.9 of Part 3 of this report.

Should Australia and Papua New Guinea agree to establish TACs for their dugong and turtle fisheries, each country would then be responsible for developing appropriate domestic management arrangements capable of limiting the domestic catch within the agreed catch limit. There are a range of alternative approaches that could be implemented in this regard.

Having agreed to use TACs as the international (Treaty) level management measure, Australia and/or Papua New Guinea may also choose to use a TAC as its preferred domestic management instrument.

- This could also involve some form of domestic allocation process in which shares of the national TAC are formally allocated amongst domestic interests, either individually (as is the case with the Australian southern bluefin tuna fishery) or collectively such as each Torres Strait community receiving a share of the Australian TAC, to be used as each community sees fit.
- Alternatively, the national TAC could be managed as a competitive quota, with the fishery open to all traditional inhabitants up until the point at which the national TAC is reached, at which time no further take is allowed until the start of the next TAC period.

A range of other domestic management approaches could be implemented to complement any national TAC.

- Spatial closures, for example, are being increasingly looked at in certain fisheries as an appropriate management measure. A rigorous scientific appraisal of the suitability of spatial closures in the turtle and dugong fisheries, taking account of the migratory nature of the turtle and dugong stocks, and a management assessment of how such spatial closures would best be enforced, would be of use.
- Communities could potentially use a range of limited entry approaches to limit catch by managing the level of community hunting effort, such as limiting the number of hunters in each community, or the number of days on which hunting can occur. However, many community members were strongly opposed to any type of permit system in regards to the take of their traditional resources.

- Another alternative would be for communities to consider limiting turtle and dugong demand through, for example, introducing restrictions on the number of turtle and dugong that can be consumed at certain occasions (i.e. a quota system but this would require a capacity to be able to monitor catches). Other communities may wish to consider reducing catch by discouraging their members from sending turtle and dugong meat to relatives on the Australian mainland (it was noted that the amount of meat that is airfreighted in personal baggage and eskies out of Horn Island should be able to be better understood and managed).
- WWF suggested that management arrangements used in other jurisdictions to manage traditional resources should be investigated such as the TUMRA (Traditional Use of Marine Resources Agreement) approach used by the Great Barrier Reef Marine Park Authority.
- Some communities expressed an interest in the prospect of turtle farming as an option for maintaining healthy turtle stocks and for providing employment opportunities for their local community. This would involve raising hatchlings for several years until they were of a bigger size (to give them a better chance of survival) and then releasing them into the wild.
- Some participants mentioned the need to break up hunting by area. There was also a need for a common goal amongst communities. There was support for the view that turtle and dugong should be taken for occasions only and not for day-to-day food.

This list is not meant to be exhaustive and there are undoubtedly numerous more options that might be possible, though it is important to note that there was strong support for management arrangements to be consistent with, and cognisant of, the cultural framework within which Indigenous community-based management must occur. Proper documentation of traditional management approaches and government recognition of these approaches in the context of resourcing and support for implementation and enforcement of community plans is critical.

In this context, Marsh (2003) has suggested that a greater understanding of how other countries have attempted to manage their indigenous fisheries would prove beneficial. Marsh referred explicitly to the Innuit harvesting of beluga whales in Alaska/arctic Canada: it is likely that a review of the literature would reveal other comparable fisheries which may prove valuable in helping Torres Strait Islanders learn from the past experiences of other indigenous groups.

Communities would benefit from having a detailed understanding of the range of potential management measures available to them. There seems a strong need for work to be undertaken, in collaboration with Islander communities, to identify and evaluate these potential management approaches. The TSRA strongly agrees that it is essential for communities to be presented with information about the range of possible management measures that they may utilise in the context of the development and implementation of community management plans for dugongs and turtles, including well-designed and culturally appropriate input controls. They also believe that support from research entities and government agencies to carry out and fund this work, in partnership with TSRA and communities, is required as a matter of urgency.

It was further suggested:

- That high priority be given to educating Islanders about the range of possible options to manage the fisheries for turtles and dugongs in Torres Strait and be given help with policing and compliance.
- That the CRC Torres Strait catch-monitoring project be evaluated as soon as possible (and certainly before Grayson finishes her PhD in mid 2007) to examine its cost-effectiveness and feasibility for other Torres Strait communities as a pre-requisite for the adoption of TAC and catch-monitoring as the sole (or even major) strategy for managing the Torres Strait turtle and dugong fisheries.
- That a significant investment be made in formally training Torres Strait Islanders in Western fisheries management.
- That the government provide opportunities for local people in the Torres Straits and NPA communities by creating long term turtle and dugong management programs which will engage individuals and provide long term employment and ownership. This will lead to more effective management of the species rather than short term projects.
- A similar program to AQIS should be considered where rangers or officers are based in the communities to collect information needed to manage turtle and dugong.

The partnership approach to fisheries management

A core principle of the Australian Government's approach to fisheries management – demonstrated by the manner in which AFMA seeks to operate – is that genuine cooperation and consultation with fishery stakeholders produces the best fisheries management outcomes. More specifically, AFMA seeks to achieve greater community and stakeholder awareness, acceptance and ownership of fisheries management arrangements through interaction, education and consultation.

The appointment of the Chair of the TSRA to full membership of the PZJA in 2002 is tangible demonstration of the PZJA's commitment to the partnership approach.

The complexities of successfully achieving active stakeholder involvement in Torres Strait fisheries are substantial – many separate isolated communities, cultural differences and differing levels of fisheries management experience, capacity and understanding. While such factors make the attainment of effective stakeholder engagement more difficult, at the same time they make it even more important for the PZJA to remain committed to the partnership approach to fisheries management.

While there are many alternative domestic management strategies that could be implemented, there is only one fisheries management process that can be used – a process based on interaction, education and consultation with the Torres Strait community.

Consistent with this, the PZJA is actively supporting the development of a community-based approach to the management of the two fisheries. The discussion under guideline 1.1.9 of Part 3 of this report explains the process by which this community-based approach is to be developed and gives an assessment of its likely effectiveness.

Requirements for effective community-based management

Torres Strait Islanders understand that the marine and terrestrial environment is linked ecologically and culturally, and have a holistic understanding of the need to manage the whole system, not just one area, population, or species in isolation. The strategic assessment process is focused on the dugong and turtle fisheries. Sustainable management of these fisheries, as stated in greater detail below, will not occur if their management is considered in isolation from the surrounding environment. Those people best placed to manage, and with the most at stake in regards to sustaining, the natural and cultural values of the Torres Strait environment are Torres Strait Islanders.

While we recognise that it falls outside of the scope of the strategic assessment process to consider management principles other than those included in the Guidelines, TSRA's position is that holistically supporting Indigenous management of these marine species may provide the best prospects for sustaining their populations. Community consultations to date have highlighted the need and demand for integrated and strategic natural resource management to occur via provision of support for community-level ranger groups in Torres Strait. The activities of community rangers have been recognised as providing widespread benefits to Indigenous communities, not only through management of their traditional homelands but through the fulfilment of their cultural and social roles and responsibilities. The widely accepted rationale for community ranger schemes is that local Indigenous people are better placed to manage local resources given their intimate knowledge of their environment. Their standing and relationships within their own communities may also facilitate greater local support for, understanding of, and involvement in, management initiatives.

Recognition of the important role of community rangers by government organisations, and community respect for and acceptance of natural and cultural resource management, can reinforce, and reinvigorate, traditional methods of looking after land and sea. This process internally strengthens communities, as youth see their culture and traditional ecological knowledge, and the activities of rangers, respected and supported by outside agencies (both financially and legislatively).

It is important to consider the merits of providing opportunities for Islanders to become actively involved in dugong and turtle management, in the broader context of delivering integrated cultural and natural resource management functions at the community level. Currently only three (3) ranger groups are active in Torres Strait (on Badu, Horn and Hammond Islands). The resources available to support each of these ranger groups are variable, but are largely limited to short-term project-specific funding arrangements. The formal qualifications of rangers are also highly variable.

One mechanism by which management agencies could support community-based dugong and turtle management outcomes specifically is through the delegation of appropriate surveillance or enforcement powers to community rangers. There is scope for this to occur under the proposed amendments to the *Torres Strait Fisheries Act 1984*, whereby rangers could be empowered to enforce community management plans.

Rangers carrying out any such delegated functions would need to complete relevant training in compliance and enforcement procedures and requirements, but given the resourcing implications of alternative enforcement approaches, and the current level of enforcement that management agencies are capable of delivering, this option would seem to be a more strategic investment of resources.

Further exploration of the areas in which Torres Strait Islanders could become involved in the enforcement of fisheries management arrangements is warranted in light of this opportunity, and broader opportunities for various government agencies to provide resourcing and support for the operation of a community ranger programme in the Torres Strait, perhaps including cost-sharing and fee-for-service arrangements.

The Hammond Island Community Council is well advanced in the development of their community dugong and turtle management plan and, in their response to the assessment, has outlined some of their recommended management strategies and highlighted areas that need to be addressed. These include:

- The management plan includes policies defining methods of hunting and when to hunt.
- The implementation of a Hammond Is. Hunting Management Document will encapsulate the protection of dugong breeding grounds and turtle nesting areas.
- The management of turtle and dugong hunting will be managed and monitored in a collaborative tripartite system involving whole of council, appointed Elders and community. In reference to this process the Hammond Islanders themselves will set the terms of reference for the local tripartite management system.
- To assist with the effective management of our data collection that has a 98% success rate, financial commitment is required to establish a butchering site on Hammond Is. Thus to enhance and foster environmental health provisions in accordance with legislative requirements.
- All data collected at Hammond Is. remains the property of this sole community. Data collated locally has a 98% success rate, therefore the efforts made should be recognised by government and Hammond should be treated differently in comparison to an overall statistical number of the catch rate being widely published at usual. Data collections, collated are to be patented to the Hammond Island Community.
- The Hammond Island community would like to see educational programs implemented in local schools to educate younger generations of turtle & dugong biology, island culture and customs, so that they develop an appreciation for these species and knowledge of traditional management and are therefore able to make informed decisions in the future.
- There is strong interest from the Hammond Island community in looking at eco-tourism options to educate people through hands-on experience in monitoring programs. Through actively involving tourists in their catch/monitoring program (through turtle rodeos) and giving them a replica of the tag that they applied to the turtle, people will be educated about the importance of turtle management and the role Torres Strait Islanders have in managing these species.

PART THREE – ENVIRONMENTAL ASSESSMENT

The Department of the Environment and Heritage (DEH), in conjunction with AFMA, has developed guidelines for Ecologically Sustainable Management of Fisheries (the amended Guidelines).

- The guidelines consist of two overarching principles and a series of objectives.
- The guidelines require that data collection, assessment and management responses in place for target, byproduct and bycatch species as well as the broader environment are adequate to demonstrate that a fishery is managed in an ecologically sustainable manner.

The guidelines are a central component of the Terms of Reference for the Environmental Assessment of the Torres Strait Turtle and Dugong Fisheries (Attachment 1A).

The Guidelines are addressed below in relation to the Torres Strait turtle and dugong fisheries.

It was suggested by the Maluilgal Corporation that, in addition to the looking over the assessment, the Minister needs to look at the provisions of the EPBC Act to ensure that the Treaty is considered in the management of traditional fisheries.

PRINCIPLE 1: A FISHERY MUST BE CONDUCTED IN A MANNER THAT DOES NOT LEAD TO OVER-FISHING, OR FOR THOSE STOCKS THAT ARE OVER-FISHED, THE FISHERY MUST BE CONDUCTED SUCH THAT THERE IS A HIGH DEGREE OF PROBABILITY THE STOCK(S) WILL RECOVER.

Objective 1. The fishery shall be conducted at catch levels that maintain ecologically viable stock levels at an agreed point or range, with acceptable levels of probability.

Information requirements

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

Catch monitoring in the turtle and dugong fisheries

Given that the Torres Strait turtle and dugong fisheries are both traditional indigenous fisheries, involve the same/similar hunting methods, and in many cases involve the same people, the two fisheries are invariably grouped together when discussing appropriate catch monitoring systems. It should be noted that while there is room for improvement in both assessing the status of the fishery and managing the catch, Torres Strait fisheries stakeholders are working closely on a number of positive initiatives to address the situation.

The PZJA has not attempted to introduce any form of individual catch reporting - such as a vessel logbook - in the turtle or dugong fisheries. Given the nature of the two fisheries, the administrative demands of maintaining such a system would be high and the reliability of the data obtained questionable.

Instead, the PZJA has taken a research perspective to monitoring catch.

The AFMA/CSIRO catch monitoring project

The AFMA/CSIRO joint catch monitoring project referred to in Section 2.9 was discontinued at the end of 2001. This decision was based on the expense and difficulty in running the program, and concerns regarding the precision, bias and coverage of the catch estimates produced (Skewes et al 2004).

Another deficiency with the AFMA/CSIRO project was that its coverage did not cover the complete Australian catch.

The project was limited to the outer Torres Strait island communities only, such that turtles and dugong landed on the inner islands (Thursday Island, Hammond Island and Horn Island) and the NPA communities (such as Seisia and Bamaga) were not included in the catch monitoring.

Other attempts at monitoring the Australian catch

From the mid-1990s to 2000, the AFMA Thursday Island office coordinated a school-based turtle and dugong catch monitoring project throughout the entire Torres Strait – outer islands, inner islands and the NPA communities. Under the project, the primary school in each community was encouraged to maintain a daily record of the number of turtles and dugongs landed in the community and supporting biological/fisheries information. AFMA provided suitable supporting material such as a colourful catch monitoring calendar and turtle and dugong educational posters, and the project coordinator regularly visited participating communities/schools to promote the monitoring and liaise with the community, teachers and students.

The project was discontinued in 2000 following the resignation of the AFMA Thursday Island-based project co-ordinator. New staff were recruited but were assigned other responsibilities in response to the emergence of new issues in other Torres Strait fisheries.

The scientific integrity of the school-based data was an ongoing contentious issue, with the results of some analysis concluding that the data was of limited value in estimating reliable catch estimates (Harris et al 1997). Note though that the more 'scientific' AFMA/CSIRO monitoring project was also subject to this same criticism, with the AFMA/CSIRO catch estimates for 1996 and 1998 not being accepted by the then Torres Strait Fisheries Scientific Advisory Committee due to doubts about the precision of the estimates and potential bias in the sampling.

Current status of Australian catch monitoring activities

To date no replacement catch monitoring system has been introduced to replace the former AFMA/CSIRO approach.

Activities are underway to address this deficiency.

AFMA/PZJA initiatives

The lack of any replacement catch monitoring system misrepresents AFMA/PZJA's recognition of the importance of such catch data and their efforts to implement an appropriate catch monitoring system.

Though Islander monitors were employed under the former AFMA/CSIRO approach and the monitors provided liaison services during their regular monitoring visits to the outer island communities, there was limited community involvement in – and ownership of - the catch monitoring process. Further, the use of Thursday Island-based monitors meant that individual communities were only being monitored for a limited number of days, leading to doubts about the precision of the data, and resulting in a large part of the project costs being spent on daily travel allowances[9]. There were additional concerns about the accuracy of some data collected and the representativeness of the sampling.

Given these concerns, in early 2001 AFMA began examining options for greater community involvement in catch monitoring, involving a change in AFMA's role, from that of doing the monitoring to one of supporting each community to do the monitoring itself. This change in philosophy complemented other discussions taking place at around the same time involving the PZJA, AFMA, the TSRA and Islander and non-Islander fishers regarding:

i) the development of an appropriate Islander fisheries consultative structure to strengthen Islanders' involvement in PZJA processes;

ii) changes to the PZJA's fisheries consultative structure, including the appointment of the TSRA Chairperson as a full member on the PZJA;

iii) the equitable catch sharing of Torres Strait fisheries between indigenous and non-indigenous fishers; and

iv) the possible creation of community-based fisheries rangers, part of whose responsibilities would include turtle and dugong catch monitoring.

The development of a new catch monitoring approach was one component of a general move towards encouraging more active Islander involvement in Torres Strait fisheries management issues.

These discussions gained further momentum in 2002 with the PZJA commissioning an independent review of the need for further management action in Torres Strait fisheries to ensure ecological sustainability (the resultant review being known as the Skehill report) and the start of discussions regarding the possible development of a National Heritage Trust (NHT) proposal to support the development of community management plans.

The Skehill report, completed in November 2002, recommended that in relation to dugong there is an urgent need for information about dugong catches from Papua New Guinea and better information about Australian catches[10].

[9] Travel costs of the monitoring were kept low by the monitors being able to use regular Coastwatch helicopter flights for transport within the Torres Strait

[10] the Skehill report did not make any recommendations regarding the turtle fishery on the grounds that it considered there was insufficient information available on which to base an assessment of the likely sustainability of the fishery. Given such a conclusion, it is surprising that the report did not explicitly make the same recommendation in regard to turtles as they did for dugong - that there is an urgent need for information about catches from Papua New Guinea and better information about Australian catches.

The PZJA received the Skehill report at its meeting in December 2002 and agreed that AFFA (now DAFF), Environment Australia (now DEH), the TSRA, AFMA and the QFS (now QDPIF) consult over improved dugong management arrangements and that AFFA seek information from Papua New Guinea on its dugong catch.

At that same meeting, the PZJA considered the results of a cost-benefit analysis undertaken by QFS of a future Torres Strait fisheries ranger program. The PZJA concluded that the costs of the program outweighed its likely benefits, and questioned whether the funds that might potentially be used to support a ranger program would be better-used in a buyout of non-Islander commercial fishing licences.

The TSRA suggested that it may be timely to revisit the cost-benefit analysis of a fisheries ranger programme in the Torres Strait , in which was carried out by the QFS in light of significant developments from a legal, international and institutional perspective (i.e. successful native title determinations on each community island and most uninhabited islands, increased foreign fishing activity within the Protected Zone, the need for local capacity to implement and enforce community-based management approaches, opportunities for cost-sharing with numerous agencies, alignment with natural resource management programs and objectives, and opportunities for additional funding to be secured for rangers to carry out specific projects).

In May 2003, AFMA convened a traditional catch monitoring workshop aimed at developing an appropriate strategy to effectively monitor the turtle and dugong catch in the Torres Strait. Recognising the international nature of the turtle and dugong resource, hunters, scientists, statisticians and fisheries managers from Australia, Papua New Guinea, Solomon Islands and Vanuatu participated in the workshop. The workshop discussed implementing a catch monitoring program, capable of achieving 20% coverage of the catch. AFMA subsequently costed this program at $340,000/year.

The PZJA, meeting in July 2003, noted the outcomes from the catch monitoring workshop. At that same meeting, the PZJA also noted a recommendation from TSFMAC that catch monitoring for turtle and dugong be included in the development and implementation of community-based management plans, and that additional resources were required for such plans. Further, the PZJA noted the likely development of an NHT proposal on turtle and dugong management and encouraged the TSRA to become involved in the project as the lead agency for the Torres Strait.

In November 2003, the Australian Government made NHT funding available to indigenous communities across northern Australia – including the Torres Strait – to develop sustainable management arrangements for their turtle and dugong fisheries. The TSRA subsequently agreed to work in partnership with other northern Australian indigenous bodies to utilise this funding and for the Northern Australian Indigenous Land and Sea Management Alliance (NAILSMA) to manage the resulting cross-jurisdictional project.

Meeting next in February 2005, the PZJA agreed that the NHT funding was unlikely to provide sufficient resources to implement the complete TSRA strategy. In any case, the NHT funding is for a finite period (two and a half years) whereas the need for appropriate catch monitoring is ongoing. Consequently, the PZJA requested that the Australian Minister for Fisheries, Forestry and Conservation explore additional funding options to enable - among other activities - the employment of part-time catch monitors in each of the 17 communities.

In late 2005 the Australian Fisheries Minister secured an additional $350,000 to be made available to the TSRA in 2005/06 to help implement aspects of the RAPTS and negotiations are continuing between the Minister and the TSRA regarding possible additional funding for 2006/07.

CRC Torres Strait Project

A research project is currently underway under the CRC Torres Strait program to trial community-based turtle and dugong catch monitoring procedures in two Torres Strait inner island communities – Hammond Island and Thursday Island[11].

The project provides technical, financial and moral support to appointed data monitors from these two communities to help them gather biological data on the turtle and dugong catch, the level of hunting effort, the fishing methods used and the end-use of the catch. The project aims to assist the communities recognise the importance of ongoing catch data and establish a sense of ownership of the monitoring process.

Field work for the project started in March 2005 and is planned to finish in July 2006. The intent is that the catch monitoring systems developed during the project will continue beyond the end of the project, though the ongoing funding needed to sustain the catch monitoring beyond the end of the project is yet to be secured.

The Regional Activity Plan for Torres Strait

In a culmination of the PZJA discussions that commenced in 2002, in June 2005 the TSRA Board endorsed the Regional Activity Plan for Torres Strait (RAPTS) as the Torres Strait component of an NHT-funded project designed to assist indigenous communities across northern Australia develop sustainable management arrangements for their turtle and dugong fisheries (TSRA 2005).

There are three key activities to be implemented under the RAPTS:

i) the development and implementation of community-based dugong and turtle management plans to enable each community to establish locally appropriate processes and agreements for the sustainable use and conservation of dugongs and turtles;

ii) education, training and awareness-raising about the need for management of turtles and dugong; and

iii) support for regional discussions across the Torres Strait to develop an agreed approach to turtle and dugong catch sharing.

The underlying rationale of the RAPTS is to empower each community to develop its own community management plan. As such, the RAPTS is not prescriptive about the type of activities to be included within each community plan: instead, the RAPTS provides an indicative list of potential activities that a plan might encompass. A catch monitoring system is implicitly included within the potential list.

The RAPTS identifies the need for the part-time employment of a community project officer in each community to assist with the development and subsequent implementation of the community management plan. Should a community identify the need for some form of catch monitoring, it is expected that the community project officer will be involved in implementing the chosen catch monitoring regime.

[11] the initial project design was to involve four communities – two from the inner islands and two from the outer islands – but this was subsequently scaled down to the two inner islands only

Additional data collection activities in the turtle fishery

The Recovery Plan for Marine Turtles in Australia (Environment Australia 2003) ranked the following data collection activities as high priority:

i) quantifying the indigenous harvest; and

ii) monitoring of key nesting beaches.

Data collection activities in the Torres Strait turtle fishery have reflected these two priorities, with efforts concentrated on catch monitoring (as already discussed) and monitoring the nesting population of selected index beaches.

Monitoring of Torres Strait turtle nesting populations

Data is obtained from fishery independent monitoring of breeding numbers at known nesting sites of each of the three turtle species most directly affected by the fishery.

Monitoring the Northern Great Barrier Reef green turtle stock

Around 90% of the green turtles found in the Torres Strait are believed to be part of the Northern Great Barrier Reef (nGBR) breeding stock, either as the resident foraging population or the migratory breeding population. As stated earlier, the nGBR green turtle breeding aggregation at Raine Island, off eastern Cape York, is the world's largest turtle breeding site. Significant nesting also occurs on beaches close to Raine Island at Moulter Cay and No. 7 and No. 8 sandbanks, and at Bramble Cay and the Murray Islands in the Torres Strait. Other areas such as Milman Island support some green turtle nesting, however, the EPA and the GBRMPA do not considered it a significant northern GBR green turtle nesting beach. GBRMPA also noted that all the northern GBR green sites listed here are outside the Torres Strait and in the GBRWHA. Smaller levels of nesting also occur on virtually all remaining Torres Strait islands.

Queensland Government agencies have undertaken annual surveys of the Raine Island green turtle nesting population continuously since 1974. The results from these surveys provides an indicator of trends in the size of the Raine Island nesting population, which in turn is used as an indicator of the overall status of the nGBR stock (Limpus et al., 2003).

Historically, funding constraints have limited the monitoring at Raine Island to partial observation of nesting and there has only been occasional monitoring of hatchling production.

The key nesting index beach for the main turtle species found in the Torres Strait is thus located outside of the Torres Strait and the PZJA has had negligible involvement in the monitoring program.

Monitoring the north-eastern Australian hawksbill turtle stock – Milman Island

Milman Island – an uninhabited sand cay north east of Cape York in the GBR World Heritage Area and south of the TSPZ – is used as the index beach to monitor the status of the north-eastern hawksbill turtle nesting population. Monitoring of the island began in 1990.

Monitoring of the flatback turtle stock

There is no continual monitoring of any index beach for the Torres Strait flatback turtle stock. However, there have been three periodic censuses - in 1978, 1991 and

1997 – of flatback turtle nesting aggregations on Crab Island, a significant flatback turtle nesting site located to the south of the TSPZ off western Cape York.

Potential new nesting monitoring programs within the Torres Strait

The community management plans envisaged under the RAPTS could make provision for the monitoring of additional indicator nesting sites within the Torres Strait should individual communities consider such monitoring necessary.

Egg harvest/predation

There is no regular data collection process in place pertaining to the Torres Strait turtle egg harvest.

Limpus and Chatto (2004) claim that in the Torres Strait, almost 100% of the hawksbill clutches laid on most inhabited islands and immediately adjacent hawksbill rookeries are harvested. The source of their harvest estimate is unknown.

The community management plans envisaged under the RAPTS could potentially make provision for initiating some form of monitoring of egg harvest/predation should the communities consider such an activity warranted.

Other turtle data collection

There are no other on-going data collection activities for the Torres Strait turtle fishery aside from the activities identified above, though additional data on the turtle fishery is occasionally collected during the course of one-off research projects in Australia and Papua New Guinea (Table 3).

Table 3: Additional turtle fishery data collected from one-off research projects

Project title	Data collected	Timeframe
Daru turtle project	catch statistics, catch composition and socio-economic significance of the artisanal turtle fishery in Daru	1984-1987
Hunters of the reef: the marine geography of the Kiwai, Papua New Guinea	a description of the traditional methods used to hunt turtle	1986
Distribution and abundance of marine turtles nesting in northern and eastern Australia	identification of internationally significant nesting populations of green, hawksbill and flatback turtles in the Torres Strait	1997-1999
Raising indigenous community awareness and promoting on-ground recovery activities for marine turtles and dugong in the Torres Strait	identification of key turtle breeding and foraging areas adjacent to the inner islands	2004-2007

source: RAPTS document, TSRA (September 2005)

Additional data collection activities in the dugong fishery

Aerial surveys

There have been four aerial surveys of the Torres Strait dugong population - in 1987, 1991, 1996 and 2001. Another aerial survey will occur in 2006.

The survey area includes most of the Australian waters of the Torres Strait Protected Zone, the waters surrounding Thursday Island and the inner communities, and on occasions, an area adjacent to the Papua New Guinea coastline.

The aim of the surveys is to estimate the distribution and abundance of dugong in the Torres Strait and to monitor changes in abundance over time. Results from the surveys are presented in Table 4.

Table 4: Results from aerial surveys of the Torres Strait dugong population

Year	Estimated mean dugong population	5% standard error	90% confidence interval
1987	13,319	±2136	11,183-15,455
1991	24,225	±3276	20,949-27,501
1996	27,881	±3095	24,786-30,976
2001(a)	14,106	±2314	11,792-16,420
2001(b)	11,956	±1189	10,767-13,145

For 2001, two methods were used to correct the raw survey data for availability bias – this being to correct for animals that are not visible to the observers due to water turbidity – and for perception bias – this being to correct for dugongs that are visible but were missed by the observers:

(a) using the same correction methods as used in earlier surveys;

(b) using a new correction method based on mathematical modelling of the results of revised estimates of availability and perception bias. The new method was developed under an AFMA/JCU research report (Pollock et al., 2006).

Based on the most recent survey results – 2001 - Marsh et al (2004) concluded that:

i) the size of the Torres Strait dugong population is highly variable;

ii) the results from the 2001 survey are consistent with dugongs undertaking large-scale movements:

Marsh (1998) had previously concluded that the large increase (in excess of 80%) in mean dugong abundance found in the survey results between 1987 and 1991 could not be explained by natural increases in population in the absence of immigration into the survey area. In other words, Marsh concluded that there had been large-scale movement of dugong into the survey area between 1987 and 1991, most probably from the adjacent Indonesian coastal waters off its Papua province (formerly called Irian Jaya).

Central to this is the fact that the aerial survey, in its present design, covers only a portion of the dugong's range. The implication of this is that it is impossible to determine the extent to which changes in survey results from one year to another reflect changes in the size of the dugong stock or temporal localised changes in dugong abundance in the Torres Strait. Accordingly, Marsh et al (2004) made two other conclusions:

iii) that population trends are an unreliable index of the status of dugong stocks (the population trends to which Marsh et al refer presumably mean those population trends identified in the time series of Torres Strait aerial survey results); and

iv) that dugongs should be managed across jurisdictions in northern Australia. Presumably, this implies that the coverage of any future aerial survey of the Torres Strait dugong population should be extended to cover the likely full distribution of that population.

This last conclusion was endorsed at a workshop on 'Future Aerial Surveys for Dugongs in Queensland and the Torres Strait' convened in March 2004. The workshop, attended by a limited number of indigenous participants, as well as representatives from the Australian Government (DEH, the Great Barrier Reef Marine Park Authority (GBRMPA), AFMA, the National Oceans Office and the TSRA), the Queensland Government (Queensland Parks and Wildlife Service) and fisheries researchers (James Cook University), concluded that aerial surveys must be coordinated and/or optimised across jurisdictions within the range of the dugong in northern Australia.

Consistent with this outcome, an aerial survey of dugong in the southern section of the Great Barrier Reef Marine Park (GBRMP) in November 2005 was extended to include the prime Torres Strait dugong grounds identified from previous surveys - the waters to the north of Badu and Mabuiag Islands.

Similarly, a research proposal to undertake the next Torres Strait aerial survey in late 2006 is currently being prepared with the intent of extending the survey area to include north-eastern Queensland waters and the Gulf of Carpentaria. The proposal is likely to be submitted for consideration under the first year of the new Torres Strait research arrangements under the MTSRF.

Other dugong data collection

There are no on-going data collection activities for the Torres Strait dugong fishery aside from the catch monitoring and aerial survey activities identified above, though as with turtles, additional data on the dugong fishery is occasionally collected during the course of one-off research projects in Australia and Papua New Guinea (Table 5).

Table 5: Additional dugong-specific research projects

Project title	Results/outcomes	Timeframe
Towards a sustainable indigenous fishery for dugongs in the Torres Strait	Collected information on biological, environmental, social, cultural and economic factors that affect effort and harvest rates of dugong in the Torres Strait	1997-99
Hunters of the reef: the marine geography of the Kiwai, Papua New Guinea	Provided a description of the traditional methods used to hunt dugong turtle	Eley 1987

source: RAPTS document, TSRA (September 2005)

Assessment of Guideline 1.1.1*:*

Existing data collection activities in both the Torres Strait turtle and dugong fisheries are inadequate. This has previously been recognised by the PZJA and efforts are being made to address the current shortcomings.

Catch monitoring

The delays that have been experienced in implementing an appropriate catch monitoring mechanism in the two fisheries since the end of the former AFMA/CSIRO project in 2001 are due to the PZJA's efforts to include catch monitoring as one component of a broader, more meaningful and yet still cost effective community-based management approach.

The re-establishment of a robust catch monitoring system is an urgent priority. WWF supports the Torres Strait Regional Authority's efforts to establish community based turtle and dugong management plans and urges the Commonwealth Government to provide sufficient long-term resources to fund this project. For this to happen, TSRA will require additional, and ongoing technical support from AFMA, including in the development of educational materials, data management and statistical analysis. Community consultation will also be required in relation to the use of any monitoring data generated at the local level.

There is also an obvious need to develop a workable data collection strategy, and WWF recommends that AFMA convenes an expert forum as a useful first step in achieving this.

Consistent with this goal, the PZJA has supported the TSRA's development of a strategy to help Islander communities establish their own community-based turtle and dugong management plans, part of which includes the employment of part-time project officers in each community.

While it is up to each community to determine the contents of its management plan, the development of the plan provides each community the opportunity to recognise the importance of ongoing catch monitoring and to develop a catch monitoring process appropriate to their needs, while also satisfying the needs of the PZJA.

The TSRA lacks the resources needed to fully implement the RAPTS. Some Australian Government funding has been made available, under the NHT program, however, the level of funding currently provided is insufficient for full RAPTS implementation. As a result, the TSRA is implementing the RAPTS in a staged-approach, with some activities to proceed using the NHT funding that is available and other activities deferred until additional funding is secured. Under this staged-approach, the initial NHT funding will support the development of community management plans and employment of part-time community project officers in three island clusters for a two and a half year period.

The imminent commencement of the first stage of the RAPTS raises the prospects that within the next 12-18 months some form of meaningful catch monitoring system may be in place in up to three Torres Strait communities. For this prospect to materialise, sufficient educational material on the importance of accurate catch data, alternative catch monitoring approaches and the advantages and disadvantages of each alternative approach needs to be made available to each participating community, in a form that community members can readily understand, to enable each community to make informed decisions regarding the importance of collecting catch data on an ongoing basis and the most effective catch monitoring method.

Experiences from past catch monitoring programmes - such as the AFMA/CSIRO project, the AFMA school monitoring program and the current CRC Torres Strait catch monitoring project - may prove useful in this regard.

An independent assessment of the catch monitoring systems developed under the CRC project should be undertaken, preferably before the July 2006 completion of the field-work component of the project, so that informed decisions can be made regarding:

- the merits of providing ongoing funding to continue the monitoring; and
- the suitability of other communities adapting the two approaches developed under the project for their own use.

Should the catch monitoring systems developed under the CRC Torres Strait project prove effective and should funding be secured to continue the catch monitoring on Hammond Island and Thursday Island beyond the life of the CRC project, up to five communities could have some form of turtle and dugong catch monitoring system in place within the next 12-18 months.

A second important issue in terms of catch monitoring is the need to extend the pilot-phase of the RAPTS implementation to involve all Torres Strait island communities.

Several other potential concerns with the current approach need to be addressed:

i) how the PZJA, AFMA and the TSRA would deal with the situation where an individual community decides not to include catch monitoring as part of their community management plan;

ii) the implications in terms of data quality/consistency should different catch monitoring approaches be used in various communities;

iii) an effective means of coordinating catch monitoring across communities; and

iv) the sourcing of secure, ongoing funding beyond the present two and a half year time-span of the NHT project.

Other fishery data

Monitoring of index nesting beaches for marine turtles

The nesting data obtained from the monitoring of selected index beaches is of most value when collected as part of a long time-series such that it is possible to distinguish trends in the data from natural inter-annual variability. Secure, ongoing funding of the nesting monitoring is thus a critical factor.

- The Raine Island monitoring – which has been undertaken on an annual basis since 1974 - is currently in the fourth year of a five-year research project. Funding is thus secured for the next two nesting seasons.
- The Milman Island monitoring of hawksbill turtles is similarly in the third year of a five year programme.
- There is no secured funding for any further monitoring of flatback turtle nesting on Crab Island. Monitoring of Crab Island has always been undertaken on an opportunistic basis and there has been no monitoring since 1999. Note that Crab Island is in QLD jurisdiction.

The five year programs currently in place for Raine and Milman Islands have provided some degree of stability for their respective monitoring activities. However, with these programs now more than halfway completed, efforts will need to be made

to secure further multi-year funding beyond the end of the current programs to ensure continuity in the monitoring activities.

The PZJA has thus far had negligible involvement in the Raine Island and Milman Island monitoring programs. Given the long-term importance of this monitoring to the management of the green turtle and hawksbill turtle fisheries in the Torres Strait, the PZJA should consider becoming more involved in future monitoring activities.

The lack of any funding to enable regular monitoring of flatback turtle nesting is inconsistent with the Marine Turtle Recovery Plan having ranked the monitoring of key nesting beaches as a high priority data collection activity. The lack of any alternative method of monitoring the status of flatback turtle stocks accentuates the need to implement some form of cost-effective, ongoing monitoring of flatback turtle nesting levels.

Dugong aerial surveys

The proposed expansion of the next aerial survey of the Torres Strait dugong population to include additional areas of Australian jurisdiction – the Gulf of Carpentaria and the north-eastern Queensland coast – will go some way to addressing the limitations experienced with previous aerial surveys. However, due to the complexity of the logistical and political issues involved, there are no plans at present to extend the survey to also include Indonesian waters off its Papuan coastline (Marsh, personal communication, November 2005). The difficulties of extending the survey to include Indonesian waters is recognised: however, given that the waters off Indonesia's Papuan coast have previously been identified as the area most likely to account for migration of dugong into and away from the Torres Strait (Marsh 1998), the continued inability to include Indonesian waters in the area of the aerial survey is likely to continue to confound interpretation future survey results.

This limitation is due to:

- the observed changes in the population size in the survey area being a result of the spatial extent of the population exceeding the survey area.

Rather than:

- the accuracy of the technique (which is likely to be good given the methodological improvements of Pollock et al. (2006) and the fact that the population estimates using this are close to those obtained using the previous method of Marsh and Sinclair (1989), or
- the precision of the technique (which is very good for wildlife surveys).

This limitation means that changes in the overall population size (if any) due to over-harvest cannot be separated from changes resulting from movement in or out of the survey area. This limitation would be unlikely to be overcome using a different technique to estimate the population size such as mark-recapture, even if that were logistically feasible (which it is not in Torres Strait).

Other biological data

There are presently no ongoing data collection procedures for biological data such as the length or age structure of the turtle or dugong catch. Such data is a fundamental part of the data collection strategies in place in numerous other AFMA-managed fisheries and is a prerequisite for any future development of turtle or dugong quantitative stock assessment models.

Other fishery data

The CRC Torres Strait research project examining the prospects for community-based monitoring in the turtle and dugong fisheries is trying to obtain additional fishery data such as the level of hunting effort, the number of hunters and the end-use of the catch. For this project, the researchers and communities involved have established agreed data protocols clarifying issues concerning the ownership and use of the data collected. The agreement made between the researchers and the communities involved gives the communities a lot of control over the use of data collected during the project and reflects community perceptions that the data may ultimately be used in ways that are not in the communities' best interests.

A review of the project should be undertaken to identify the level of community support for collecting/providing such data, to assess the likelihood of collecting this type of data on an ongoing basis, and the prospects for involving additional communities in the data collection program.

Subject to the results from that review, further funding may need to be secured to implement ongoing data collection activities beyond the life of the CRC project.

Stakeholder (Islander) sensitivity regarding data collection

In implementing the CRC Torres Strait catch monitoring project, the researchers and communities involved have needed to establish agreed data protocols clarifying issues concerning the ownership and use of the data collected. The communities' desire to maintain control over the use of data collected during the project reflects community perceptions that the data may ultimately be used in ways that are not in the communities' best interests.

Such concern signals an underlying level of misunderstanding/distrust between indigenous groups and the research/management agencies involved in the turtle and dugong fisheries. While similarly uneasy relationships can be found between stakeholders and managers in other fisheries, they are not conducive to good fisheries management. Indigenous groups and management agencies need to recognise that they share a common interest in seeking to preserve traditional livelihoods – including the traditional hunting of turtle and dugong – while at the same time conserving the turtle and dugong stocks for the benefit of future generations. Further, they need to recognise that they have a common interest in obtaining the best available data on the turtle and dugong fisheries to enable the PZJA – with its government and indigenous membership – to make informed decisions regarding future turtle and dugong management.

Need to develop data strategies for the turtle and dugong fisheries

Given the current gaps in data collection activities in both the turtle and dugong fisheries, consideration should be given to developing an appropriate data strategy for the turtle and dugong fisheries, in line with the work that AFMA is currently undertaking to develop strategic ecosystem data plans in a number of Commonwealth-managed fisheries.

Involving indigenous representatives in the process to develop these data strategies would have a positive impact in terms of strengthening relations between the management agencies and indigenous groups and could be used to resolve many of the current community concerns regarding the collection/ and use of turtle and dugong fisheries data.

Assessment

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

Most AFMA-managed fisheries have a formal process in place to regularly review – and report on – the status of the fishery and the stock assessment methodology. The groups entrusted with this responsibility – known as Resource Assessment Groups (RAGs) – also provide advice on alternative harvest strategies and the information required to improve future stock assessments.

Membership of each RAG comprises fishery scientists, industry members, fishery economists, fisheries managers and representatives from other interest groups. The costs of RAG meetings are covered 75% from the AFMA Research Fund and 25% from the operators from that particular fishery.

One such RAG currently operates in the Torres Strait, for the rock lobster fishery. There is no permanent RAG-equivalent for either the Torres Strait turtle or dugong fisheries, though the TSSAC has the authority to convene Fisheries Assessment Group[12] workshops for the turtle and dugong fisheries as required. The last assessment report for turtles was prepared in 1997 (see Harris 1997) and for dugongs in 1998 (see Marsh 1998).

The Turtle Fishery

The current lack of fishery data – such as information on the length/age structure of the catch – has prevented the development of any quantitative scientific stock assessment models for any of three key turtle stocks found in the Torres Strait and nGBR.

Instead, the stock assessment of the turtle stocks found in the Torres Strait and nGBR is based on the results obtained from the monitoring of index nesting sites explained in the previous section and the extrapolation of results from quantitative models developed for comparable turtle stocks from the sGBR.

Green turtles

Adult population

Harris (1997) concluded that since there has been no observed increase in the Torres Strait turtle harvest nor any observed decrease in the nGBR nesting population (as observed at Raine Island), the Torres Strait catch was unlikely to represent over-harvesting.

In a more recent assessment, Limpus et al (2003) concludes that, based on the results from the Raine Island monitoring, the nGBR green turtle stock is in the early stages of a population decline. Their assessment was based on:

i) there having been a progressive decline in the size of nesting females over the decades of the study, due to a decline in the size of remigrating females;

[12] Fisheries Assessment Groups (FAGs) were renamed Resource Assessment Groups (RAGs) by AFMA in 2004. Their functions remained largely unchanged.

ii) there having been a progressive increase in the remigration interval (female turtles are nesting less frequently); and

iii) in recent times, the nesting population having been characterised by a very low recruitment rate, ie the proportion of first-time nesters in the breeding population has been small.

Limpus and Chatto (2004) conclude that it is highly unlikely that the current combined turtle catch within the Northern Planning Area (an area covering the Torres Strait, the Gulf of Carpentaria and north western-Australia) is sustainable. They further conclude that the turtle harvest from this area combined with the harvest from neighbouring countries – such as Papua New Guinea and eastern Indonesia – definitely is not sustainable.

Their conclusions are based on:

i) their interpretation of the results from the monitoring of the Raine Island nesting population as suggesting the nGBR breeding aggregation is in the early stages of a population decline;

ii) their expectation that there has been a severe depletion in recruitment from Raine Island in recent years (as explained in the next section) due to low nesting success and failed hatchling production;

iii) their extrapolation of the results from demographic modelling of the sGBR green turtle population that found that a small harvest of a few hundred adult females was sustainable from an annual nesting population of a few thousand (Chaloupka 2002); and

iv) their guesstimate of the green turtle catch from northern Australia and neighbouring countries at many tens of thousands and possibly up to 100,000 turtles/year. It should be noted though that there is considerable uncertainty surrounding this guesstimate, and in any case, preliminary results from genetic analysis (to be considered under guideline 1.1.3) indicate that the nGBR breeding aggregation accounts for only a small proportion of the Indonesian catch (Moritz et al 2002).

Nesting/hatchling success

Recent Raine Island surveys have indicated very low hatchling production due to a deterioration in the Raine Island nesting habitat as the result of two factors – increased sand erosion and more frequent flooding.

- A female does not always succeed in laying her eggs on each nesting crawl. For example, should the sand be too dry, the egg chambers dug by the female in which to lay her eggs are prone to collapse, in which case she is likely to move to another site and try again, though may well experience another collapse (of a small sample of 26 nesting females followed while on shore in 1986, only 4 were observed to lay their eggs - a 15% nesting success rate (Limpus et al 2003)).

  It is suggested that in recent years, there has been a significant net loss in the area of suitable nesting habitat on Raine Island. The actual size of the island is substantially smaller than previous years, thought to be due to severe storms hitting the island in recent years during the summer cyclone season. Further, the island has experienced a net sand loss, such that in places the sand depth is now too low to accommodate a nesting chamber. In this situation, a nesting female

encountering the underlying rock substrate would be unable to complete the chamber and lay her eggs (Limpus, personal communication, November 2005). It is estimated that hatchling success on Raine Island is now extremely low, at less than 10% (Limpus et al 2003, as cited in Limpus and Chatto 20004).

- For those eggs that have been successfully laid, should they be immersed in water for more than a few minutes the baby turtles drown (Limpus et al 2003). During the summer nesting season, Raine Island is subject to heavy rain and storm swells often associated with tropical cyclones: such events increase the water table on the island and increase the chances of flooding of nesting areas. Limpus has observed that since 1996 there has been regular flooding of much of the Raine Island nesting site in the middle of the nesting season (Limpus et al 2003), with resultant impacts on turtle mortality;

Limpus and Chatto (2004) conclude that because of these habitat changes/environmental effects, there must have been a severe reduction in the recruitment of young green turtles into the nGBR green turtle population over the past decade.

Egg harvesting/predation

There has been no assessment of the likely impact of egg harvest/predation for green turtles.

However, in the event that habitat changes have resulted in a dramatic fall in green turtle hatchling success on Raine Island, remaining green turtle nesting sites – such as those in the eastern Torres Strait, around Murray Island – will assume far greater conservation significance. In this situation, the continued indigenous harvesting of such eggs assumes far greater significance than in previous years when Raine Island was a productive nesting area.

Overall assessment of the status of the green turtle stock

Limpus and Chatto (2004) conclude that given the indications of a declining adult population and low hatchling production, there is a reasonable probability that the nGBR green turtle stock will have a severe reduction in the numbers of near-adult and adult turtles within a few decades (one generation).

Hawksbill turtles

Based on the monitoring of the nesting hawksbill population on Milman Island, the female adult hawksbill turtle population has been declining by 3%/year for over a decade (Limpus and Miller 2000). Limpus and Chatto (2004) suggest that given such a decline, the north-eastern hawksbill population should be considered to be critically endangered.

As is the case with the nGBR green turtle stock, there is inadequate data to consider developing any formal stock assessment model for the north-east Australian hawksbill turtle stock. In the absence of stock assessments, the status of the population will continue to be based on the results from the annual surveys of the Milman Island nesting population.

The same limitations associated with this approach that were raised for green turtles apply to hawksbill turtles.

Egg harvest/predation

As a general guide, taking into account natural egg predation and high rates of natural mortality, a turtle stock needs a hatchling success rate in the order of 70% to maintain a stable population (Limpus, personal communication November 2005).

In the Torres Strait, Limpus and Chatto (2004) claim that almost 100% of the hawksbill turtle clutches laid on most inhabited islands and immediately adjacent hawksbill rookeries are harvested. Given the likelihood that the current harvest is exceeding that required for these nesting sites to have a the target level of 70% hatchling success, they argue that there is a high probability that egg harvest alone could be sufficient to threaten the sustainability of the Torres Strait hawksbill turtle stock.

Flatback turtles

Based on the results from the three censuses of the Crab Island nesting population (in 1978, 1991 and 1997), the north-eastern flatback turtle population appears relatively stable (Sutherland and Sutherland 2003).

However, Limpus and Chatto (2004) suggest that given high levels of egg predation by feral pigs on mainland nesting beaches and other threats to the population, it is highly likely that the flatback population will decrease in future years.

Updating of the assessments

Given the continuing gaps in available fisheries data, developing formal stock assessment models for any of the three turtle stocks of the Torres Strait turtle fishery will remain impractical for at least the near-term.

The assessment will thus continue to rely on the results from the monitoring of index nesting sites.

Assessment models for other turtle stocks

A quantitative assessment model has been developed for the sGBR green turtle population (Chaloupka 2002). Results from the model suggest that for a stock that has a breeding population of a few thousand, an annual harvest of a few hundred animals is likely to be sustainable in the long term.

Chaloupka (1998) has also developed a model of the sGBR hawksbill population. Results from that model suggest that egg harvest is sustainable only at low levels.

Dugong stock assessment

There are two quantitative assessments of the status of the Torres Strait dugong stock – Marsh et al (2004), and Heinsohn (2004).

Marsh et al (2004) compares the estimated dugong catch against an estimate of the level of catch that is sustainable.

- Catch estimates are derived from the AFMA/CSIRO catch monitoring project, the most recent catch data available.
- The sustainable catch is estimated using the Potential Biological Removal (PBR) approach developed by Wade (1998). The approach uses estimates of the population size (obtained from the aerial surveys), the maximum rate of increase (based on assumed age at first reproduction and average calving intervals) and a recovery factor - a subjective judgement of the how newly born

dugong should be apportioned between being available for harvest and being left to contribute to building-up the population. The recovery factor ranges from 0-1, a value of 0 implying that 100% of the newly recruited dugong should be reserved for stock rebuilding purposes, a value of 1 implying that 100% of the newly recruited dugong could be available to be harvested. Wade (1998) recommends that where there is uncertainty in stock status, a recovery factor of 0.5 be used – that is, the new dugong should be shared equally between being available for hunting and for stock rebuilding purposes.

Using the results from the 1996 and 2001 aerial surveys, allowing the maximum rate of natural increase in the dugong population to range from 1% to 5%, and choosing a recovery factor of 0.5, Marsh et al (2004) estimate a range of sustainable catch levels.

- Taking the midpoint (3%) of the range of estimates of maximum rate of increase and using the 1996 aerial survey data, Marsh et al (2004) estimated that a sustainable harvest level for the Torres Strait, including the Papua New Guinea coastal communities, the inner islands and the NPA area, is around 190 dugongs/year.
- Using the same midpoint and the 2001 survey data, Marsh et al (2004) estimated the comparable 2001 figure as about 90 dugong/year.

In a refinement to the analysis, Marsh et al (2004) used alternative correction factors to adjust the 2001 raw aerial survey data following the approach recommended by Pollock et al (2004). Marsh et al (2004) considered that this new approach should result in more accurate population estimates.

- Using this revised 2001 aerial survey data, Marsh et al (2004) estimated a sustainable catch level of around 82 dugong/year.

In a separate analysis, Heinsohn et al (2004) applied the Population Viability Analysis approach to estimate the viability of the Torres Strait population over a 200 year timeframe using a variety of hunting regimes and allowing for variability in the calving interval - the number of years between calving events – which is the most sensitive biological parameter. Limited movement within (but not beyond) the Torres Strait was allowed. Age-structured estimates of natural mortality were taken from the florida manatee, a close relative of the dugong. The population estimate was based on the largest number of dugong recorded from any of the four aerial surveys thus far completed – 27,881.

Heinsohn et al (2004) estimated that with a harvest level of 500 dugong/year - a conservative estimate of the current take - the population will on average fall to less than 10% of its 1996 level within 42-123 years. Based on this result, Heinsohn et al (2004) argued for immediate action to prevent the functional extinction of dugongs in the Torres Strait.

Alternative approaches to dugong stock assessment

The March 2004 workshop on the future of the dugong aerial survey program briefly considered the feasibility of using a dugong tagging program as an alternative assessment methodology. The University of Queensland is currently implementing a dugong tagging program off Moreton Island with 360 different individual dugongs tagged and 52 recaptures of previously tagged individuals.

The workshop considered that mark-recapture studies can provide valuable information on population sizes and demographic characteristics but that a number of

technical and practical issues need to be evaluated to assess the merits of a tagging program. The workshop also concluded that the likely time-frame required for such a study to produce meaningful results – thought to be in the order of 10 years – was beyond the time-frame required by governments - in this case the PZJA - in managing the Torres Strait dugong stock.

The workshop suggested that the potential for a tagging programme to deliver useful results at a regional level should be evaluated via a formal assessment of the results from the Moreton Bay work.

Assessment of Guideline 1.1.2*:*

Stock assessment process

Unlike most other AFMA-managed fisheries, the Torres Strait turtle and dugong fisheries lack a formal scientific body responsible for regularly reviewing and reporting on the status of the turtle and dugong fisheries and the stock assessment methodology. Instead, the stock assessment advice that is undertaken relies on the ongoing commitment of a small number of researchers from a small number of agencies - in the case of dugong, mostly from James Cook University, and in the case of turtles, mostly from the Queensland Environmental Protection Agency and to a lesser extent, James Cook University. .

There is a need for a more broad-based scientific advisory forum, attended by scientists with dugong, turtle and general population dynamics expertise, to meet periodically to discuss and review technical aspects of the turtle and dugong stock assessment. Indigenous representatives and managers from the relevant fisheries and conservation agencies should also be involved, though to keep the group to a manageable size and to maintain a technical focus, possibly as observers. TSFMAC supports, in principle, the proposed experts group and believes that consideration should be given to islander involvement with the group.

The first meeting of the Partnership body to be established under the National Partnership Approach is to draft its terms of reference and a workplan for the first 12 months. In considering its workplan, should the Partnership body recommend that a technical advisory group be established, there may be an opportunity to strengthen future stock assessment work for both turtles and dugong.

The MTSRF Board, established as part of the new institutional arrangements for Torres Strait research, is also to establish a Scientific Consultative Committee. However, recalling that MTSRF is to be responsible for researching all tropical environmental issues, the MTSRF Scientific Committee will not be sufficiently focused to undertake the desired technical review of the turtle and dugong stock assessments.

Stock assessment methodology

There is insufficient fisheries data collected – in terms of total catch, the size/age structure of the catch, and fishing effort – to consider the possible development of any formal quantitative stock assessment model for any of the turtle or dugong populations at the present time.

Instead, assessment relies on interpretation of the results from ongoing monitoring of index nesting beaches in the case of turtles, and comparing estimated catches against estimates of sustainable catch levels in the case of dugongs. Both methods have their limitations.

Limitations of the Raine Island monitoring in terms of the stock assessment

The Raine Island nesting dataset represents one of the most comprehensive and longest-running continuous green turtle datasets in the world. Despite this favourable relative measure, the Raine Island monitoring has its limitations:

i) subject to funding constraints, the survey covers only a very limited timespan – currently limited to around 10 days from late November-early December – out of a 6-7 month nesting season. Given that nesting female green turtles lay several clutches of eggs, at intervals of around 2 weeks apart, the survey does not even cover one full clutching cycle;

ii) throughout the 30 years of the monitoring program, there has not been a single census undertaken of the Raine Island nesting population[13]; and

iii) there is a high degree of variability in the number of nesting turtles in any one year, believed to result at least partly from changes in environmental conditions. More specifically, Limpus and Nicholls (2000) have suggested that the number of nesting females in any given year is related to the level of the Southern Oscillation Index 18 months previously;

This natural variability in nesting numbers led Limpus et al (2003) to conclude that several decades of detailed monitoring of the nesting population is needed to be detect anything more subtle than catastrophic population declines.

Johannes and MacFarlane (1991) commented on the long time-frame required before the effects of any overharvesting of green turtles would become noticeable in terms of reduced stock abundance. With green turtles not being sexually mature until 30 years and individual females breeding irregularly once every 4-6 years, Johannes and MacFarlane argued that the effects of continued overharvesting of adults and/or eggs will not be seen in terms of reduced turtle abundance for decades, at which point the effects may be rapid, dramatic and possibly irreversible. Consequently, they cautioned that the continuing abundance of mating and nesting turtles in the Torres Strait does not necessarily mean that the stock is being sustainably harvested.

The same limitations associated with the Raine Island monitoring are relevant for the monitoring of hawksbill and flatback turtles on Milman and Crab Islands respectively, such that the natural variability in turtle nesting behaviour means that several decades of detailed monitoring of the nesting population is needed to be detect anything more subtle than catastrophic population declines.

Limitations of the dugong stock assessment

There is no demonstrated evidence of a decline in dugong stocks in the Torres Strait (Marsh et al 2002). However, this comment should be interpreted in the context that there is presently only a single indicator of dugong abundance - the five-yearly aerial surveys – which as noted in the previous section is an unreliable index of the status of dugong stocks since the surveys cover only a part of the dugong's distribution.

In any case, even if the aerial survey covered the dugong's full geographical range, the aerial survey approach is insensitive to subtle changes in dugong abundance. Marsh et al (2005), in an analysis of suitable recovery targets for dugong populations

[13] Limpus et al (2003) note that such a census would require nightly tagging from October through to early April and has not been financially or logistically feasible to date and would probably cause significant disturbance to nesting sea-birds

on the Queensland east coast, has calculated that it would take at least 10 annual surveys to detect with a high level of confidence that a dugong population that was recovering at a rate of 5 per cent/year was actually increasing. Although a similar power analysis has not been undertaken for the Torres Strait aerial surveys, a comparable result could be expected. The implication of this is that the aerial survey results are not a good indicator of the likely sustainability of current catch levels.

In a related issue, the sustainability estimates derived from the PBR method are based on population estimates sourced from the aerial surveys. Given the limitations of the aerial survey approach in accurately estimating absolute population numbers, any sustainability estimates reliant on these uncertain population estimates must in themselves be highly uncertain. The proposed extension of future aerial surveys to include waters off north-eastern Queensland and the Gulf of Carpentaria will reduce, rather than overcome, this issue, given that Indonesia's Papuan coast will remain outside the survey area.

It should be noted, however, that the difference between Marsh et al's (2004) estimate of a sustainable catch level and current catches is so large that Marsh et al's overall conclusion – that current catches are not sustainable – is likely to remain valid notwithstanding the difficulties in interpreting the aerial survey results.

Using the same PBR method and dugong life-history values as used by Marsh, for the most recent catch estimate of 600 dugong/year to be sustainable, the initial population abundance would need to be in the order of 80,000 dugong. A population of this size seems implausible given that the largest abundance estimate recorded from any of the four Torres Strait aerial surveys is less than 28,000, recorded in 1996. The required population size would further increase were the catch estimate to be corrected to also include catches from the inner islands, the NPA communities and Papua New Guinea.

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

The geographic range of the turtle and dugong stocks found in the Torres Strait extend beyond Australian waters.

- Papua New Guinea traditional inhabitants taking turtle and dugong in the Papua New Guinean waters of the TSPZ are fishing the same turtle and dugong stocks as their Australian counterparts.
- In the order of 10% of the green turtle foraging population in the Aru grounds off the south coast of Indonesia's Papua province are believed to come from the same nGBR stock as the turtles caught by Australian traditional inhabitants (Moritz at al 2002)[14].
- Dugong are believed to be capable of large scale movements in search of food, with Marsh (1998) suggesting that dugongs found in the Torres Strait have, in the past, moved to and from areas off the Indonesian coastline where they may be subject to fishing from Indonesian hunters or along the east coast where localised hunting pressure occurs at Lockhart River and possibly as far south as Hope Vale.

[14] To put the Aru fishery into context, Dethmers (undated) has estimated an annual catch in excess of 5000 green turtles from the Aru foraging grounds in 1997 and 1998, many of which are transported for sale in Bali.

- GBRMPA noted that CYP communities harvest predominantly northern GBR green turtles north of Cape Melville.

Australia and Papua New Guinea clearly acknowledge the shared nature of their turtle and dugong resources and their need to cooperate in the management of these resources, as reflected by the fisheries provisions of the Torres Strait Treaty, the subsidiary management arrangements for the turtle and dugong fisheries developed under the Treaty provisions, and the annual series of Australia-Papua New Guinea Treaty meetings. There is thus a well established institutional framework between the two countries to enable the cooperation required to manage their shared turtle and dugong resources.

However, the framework in itself is not sufficient: the effectiveness of the cooperation depends upon the strength of the management arrangements subsequently developed. Neither Australia nor Papua New Guinea are without fault in this regard - neither country is currently collecting turtle and dugong catch statistics, and neither country has as yet implemented management arrangements capable of achieving their mutually-shared goal of conserving the turtle and dugong stocks.

Improving the effectiveness of the cooperative arrangements with Papua New Guinea is thus a key future issue.

Cooperation with Papua New Guinea covers only one aspect of the turtles' and dugong's migratory nature.

- In the case of turtles, the stocks are shared by Indonesia and possibly other south-east Asian nations, and nations from the south-west Pacific.
- Dugong are also likely to be shared with Indonesia.

In addition to the required international cooperation, turtles and dugong also migrate through a number of different domestic jurisdictions, such that there also needs to be effective cooperation at the domestic level between the various Commonwealth and state management and conservation agencies.

An assessment system for the dugong population exists in its habitat but one doesn't exist for turtle (other than at breeding grounds).

Turtles

Distribution and spatial structure

Green turtles

Information on green turtle distribution and spatial structure has been obtained from a long-running tagging programme based on Raine Island, Moulter Cay and adjacent nesting areas and implemented by the Queensland Parks and Wildlife Service (QPWS). More than 37,000 adult female green turtles have been tagged under this programme since 1974 (Limpus et al 2003). Additional information has been obtained from a genetic study of green turtle foraging populations in eastern Indonesia (Aru, off the south coast of Papua), northern Australia (Fog Bay, off the Northern Territory) and western Australia (Ashmore Reef) and of the green turtle catch in Bali, the Torres Strait and north-east Arnhem Land (Moritz et al 2002).

These studies have found that 90% of the green turtles found in the Torres Strait are believed to come from the nGBR breeding aggregation. Such turtles can be divided into two further sub-populations:

i) a foraging population that is present in the Torres Strait virtually year-round, apart from nesting season when some of the females that are about to breed leave the Straits to travel south to Raine Island and surrounding areas to lay their eggs. The foraging population includes green turtles from other breeding stocks – predominantly from the sGBR (that are currently at a very low level) and to a much lesser extent the GoC, the Aru Islands (Indonesia) and New Caledonia - in addition to those from the nGBT stock; and

ii) a transitory population that spends most of the year on feeding grounds elsewhere - such as in the Gulf of Carpentaria and the Aru Islands in eastern Indonesia to the west, Vanuatu and New Caledonia to the east, and the northern Great Barrier Reef north of the latitude 14S' – but returns to the Torres Strait from September-January for mating.

Based on the preliminary results from the genetic study, Moritz et al (2002) concluded that:

i) the Torres Strait catch is dominated by migrating nGBR turtles, almost to the exclusion of turtles from all other breeding aggregations, a result consistent with the findings from earlier turtle tagging studies

ii) the turtles landed at Bali – the largest turtle market in the region - comprise turtles sourced from a number of different breeding areas, but that the nGBR aggregation represents less than 10% of the catch; and that

iii) the nGBR breeding stock represents 10% of the foraging population in eastern Indonesia and an insignificant proportion of the Northern Territory and western Australian populations.

In addition, in October 2005 four adult green turtles – 3 females and 1 male – were caught near the inner islands and fitted with satellite tags as part of a CRC Torres Strait research project funded through the NHT. The movement of the four turtles has since been monitored with each of the three females having moved south to the nesting beaches around Raine Island and Moulter Cay and the male having remained around the inner islands. While the number of turtles being tracked is too small to generate statistically meaningful results, the turtles movements have been monitored by the local media and have created considerable local interest. Further, local primary and high school students from the inner islands were involved in the capture and naming of the four turtles as a further means of involving the local communities in the work.

Hawksbill turtles

Two genetically discrete hawksbill turtle breeding stocks have been identified in Australia:

i) a north-eastern stock, breeding mostly in the central and western Torres Strait, the northern Great Barrier Reef and eastern Arnhem land (Limpus and Chatto suggest that the hawksbill nesting in eastern Arnhem Land are actually a separate stock from the Torres Strait/nGBR breeders, though this is yet to be proven); and

ii) a northwest shelf stock off Western Australia.

Each of these two stocks supports an annual nesting population of several thousand females.

There are also separate hawksbill turtle breeding populations in the Solomon Islands and Malaysia (each consisting of a few hundred females annually), Indonesia (various areas of tens-hundreds of females annually) and smaller populations in Thailand and Pacific Island countries such as Palau, Fiji and Samoa.

The movement of hawksbill turtles mirrors that of green turtles and has been recorded through tag recoveries from Papua, PNG, Solomons and Vanuatu (Miller et al., 1998).

- Hawksbill turtles found in the Torres Strait may come from either the locally-bred north-eastern Australian stock or from populations nested elsewhere such as Solomon Islands, Fiji or possibly Malaysia.
- Similarly, some of the north-eastern hawksbill turtle stock will migrate to feeding grounds in south-east Asian or Pacific Island countries. Should they survive local hunting pressure, they will eventually return to north-eastern Australia for nesting.

No satellite tracking of hawksbill turtles has currently been done in Torres Strait or the Great Barrier Reef.

Flatback turtles

There are no known flatback turtle nesting sites outside of Australia.

Five breeding aggregations have thus far been identified:

i) a southern Great Barrier Reef population of around 1000 females annually;
ii) a western Torres Strait/north-eastern GoC population (around 3000 females annually);
iii) the southern GoC (1000 females);
iv) the western Arnhem Land (around 1000 females); and
v) the north west shelf off Western Australia (estimated at around 1000 females annually).

Movement between these different nesting areas and possible feeding grounds is poorly understood, though there have been single tag recoveries of flatback turtles tagged from the western Torres Strait stock from Indonesia (from its Papuan province) and from the Arafura Sea between Australia and Indonesia.

As with the other species, it is possible that flatback turtles found in the Torres Strait may come from a range of nesting populations outside of the Straits. Similarly, flatback turtles originating from the Torres Strait may form part of the feeding aggregations in other areas.

<u>Management implications/response</u>

Australia recognises that the turtles' migratory nature necessitates a cross-jurisdictional approach to turtle management. Accordingly, Australia is a signatory to the Memorandum of Understanding on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South East Asian Region (the IOSEA MoU). Effective from 1 September 2001, there are presently 24 member states ranging from eastern Africa, the Middle East and south-east Asia (but not Papua New Guinea nor any Pacific nations) however the Pacific nations are not part of the MoU. A small regional secretariat in Bangkok coordinates activities under the IOSEA MoU.

The objective of the MoU is 'to protect, conserve, replenish and recover marine turtles and their habitats, based on the best scientific evidence, taking into account the environmental, socio-economic and cultural characteristics of the signatory States'.

The MoU covers all six species of turtles found in the Torres Strait.

A conservation and management plan has been developed under the MoU in which 6 objectives are identified:

i) to reduce direct and indirect causes of turtle mortality;

ii) to protect, conserve and rehabilitate marine turtle habitats;

iii) to improve understanding of marine turtle ecology and populations through research, monitoring and information exchange;

iv) to increase public awareness of the threats to marine turtles and their habitats;

v) to enhance national, regional and international cooperation; and

vi) to promote implementation of the MoU and the management and conservation plan.

Signatory states have agreed to a comprehensive series of programs (24) and specific activities (105) to achieve these 6 objectives. Responsibility for implementing – and resourcing - the activities identified under the plan rests with individual member states. However, given that many of the signatory states are developing countries, their ability to implement the plan is severely limited. This is reflected in the report of the third meeting of the signatory states, held in Bangkok in March 2005 which noted there had been limited progress in incorporating the provisions of the conservation and management plan into specific plans at the national level.

Even in developed countries such as Australia, funding limitations are a major constraint. The challenge for Australia, and for all other signatory States, is to ensure that sufficient funding is made available to operationalise the conservation and management plan.

Notwithstanding this limited progress at the national level, DEH considers that the regional collaboration that the IOSEA MoU has facilitated has resulted in improved information sharing and greater general awareness of the importance of marine turtle conservation. DEH further advise that the signatory states have designated 2006 as the Year of the Sea Turtle and that a number of projects and activities will be undertaken to raise awareness on marine turtle management and conservation.

Australia has provided $55,000 in funding support to the IOSEA MoU Secretariat to distribute to member countries in support of 'Year of the Turtle' projects. Australia has also provided funding support for government representatives from Indonesia and Papua New Guinea to attend meetings of IOSEA MoU member states.

Australia is also providing further project-based assistance to IOSEA MoU member states under the auspices of a three-year, $10m Regional National Heritage Program designed to assist south-east Asian and Pacific nations protect specific biodiversity hotspots. The program, which covers a broad range of environmental issues ranging from supporting elephant conservation in Cambodia to forestry management in Fiji, is currently supporting turtle-related projects to improve the management of six marine protected areas in eastern Indonesia and to strengthen coral reef management in the Bismarck Sea in Papua New Guinea.

Australia's participation in the MoU is coordinated by DEH, in consultation with other agencies. AFMA staff were part of the Australian delegation to the preliminary meetings that led to the development of the MoU text and the related conservation and management plan and have been part of the Australian delegation to each meeting of the signatory states. Given effective internal communication between AFMA Thursday Island and Canberra-based staff, and subsequently between AFMA and other Torres Strait turtle fishery stakeholders, there is a mechanism for Torres Strait involvement in IOSEA MoU discussions.

DEH further advise that the Partnership body to be established to oversee the National Partnership Approach will have the opportunity to contribute to Australia's involvement in turtle management at the regional level through being involved in the domestic implementation of the regional conservation and management plan and being involved in preparing Australian reports to future meetings of the signatory states. DEH also advise that it may be possible for a member of the Partnership body to be included as part of future Australian delegations to IOSEA MoU meetings.

At the domestic level, presumably one of the key responsibilities of the Partnership body will be to ensure consistency in management arrangements across the different Australian and state marine turtle jurisdictions.

The management response to the turtle's geographical range has thus been to establish collaborative institutional mechanisms and to develop appropriate cross-jurisdictional plans and strategies at both the national and international level. The key issue now is to ensure that there is a long-term commitment to provide adequate resources available, both domestically and regionally, to implement these plans and strategies.

Dugong

Distribution and spatial structure

Dugong from more temperate areas have been observed to undertake seasonal migrations in winter to warmer waters. However, dugong found in tropical areas such as the Torres Strait have no known seasonal or migratory pattern. Provided food supplies remain plentiful, the movement of such dugong is thought to remain fairly localised.

Despite their general localised nature, results from limited tracking of the movements of individual dugong in Indonesian and Australian waters demonstrate that in certain conditions – largely believed to be driven by the search for food - dugong are capable of travelling hundreds of kilometres in a few days (Marsh et al 2002; Sheppard et al 2006):

i) an adult female in the Gulf of Carpentaria moved 600km over 5 days; and

ii) an adult male in the central section of the GBRMP travelled between two areas 140km apart three times over a six week period.

Such movements appear to be an individualistic rather than group phenomena.

The implication of this is that there may from time to time be large scale movements of dugong into, or away from, the Torres Strait in response to changing seagrass conditions.

In the Torres Strait, there is evidence of large-scale losses of seagrass beds occurring in the early 1970s, the early 1990s and the late 1990s. Marsh et al (2004), drawing on observations relating to occasions of seagrass dieback from the Torres Strait,

Townsville, Hervey Bay and Daru (on the Papua New Guinean coastline), suggests that dugong respond to a situation of seagrass die-back by either remaining in the area, losing body condition and deferring breeding, or by moving out of the area in search of alternative feeding grounds.

As discussed under guideline 1.1.1, Marsh (1998) suggested that the large increase in dugong numbers in the Torres Strait from 1987-1991, as estimated from the aerial survey results, was due to dugong moving into the Torres Strait from other areas, presumably Irian Jaya (now known as Papua). Conversely, Marsh et al (2004) suggest that the large decrease in abundance inferred from the change in aerial survey results from 1996-2001 was due to dugong moving away from the Torres Strait in response to the seagrass dieback experienced in the western areas of the Strait in the late 1990s.

There has been negligible scientific research of movement patterns of dugong found in the Torres Strait and the level of interaction of Torres Strait dugong with other know dugong populations – off the northern-eastern Queensland coast, the Gulf of Carpentaria, and Indonesia's Papuan coast – is poorly understood.

Similar to the satellite tagging currently underway in the Torres Strait involving four green turtles, satellite tags were placed in three dugong caught near Mabuiag Island in 2004. However, compared to the turtle exercise, the dugong tracking was less successful, in that two of the tagged dugong remained in the Mabuiag area for the next four weeks at which point the tags broke free, while for the third dugong, the tag broke free soon after the dugong's release. Plans to tag another limited number of dugong in 2005 were not realised.

Domestic jurisdictional arrangements

Dugong in northern Australia are currently managed under five separate jurisdictions:

i) in the Torres Strait by the PZJA;
ii) in Western Australia by the State Government's Department of Conservation and Land Management (CALM);
iii) in the Northern Territory by the Territory Government's Parks and Wildlife Service;
iv) in the northern section and part of the southern section of the Queensland east coast by the GBRMPA and the Queensland Parks and Wildlife Service; and
v) in the Queensland Gulf of Carpentaria coast and the remainder of the east coast, by the QPWS.

The PZJA appears to have had limited if any interaction between these management agencies up until very recent times.

Known genetic studies

There has been limited genetic work undertaken on dugongs thus far such that the stock structure is poorly understood. The current understanding is that:

i) Australian dugong are genetically different from dugong found in south east Asia, though there is some overlap at Ashmore Reef in western Australia. This suggests limited mixing of Australian and Asian dugongs may take place but only at a very localised scale;
ii) there are two genetically different dugong types within Australia:

- one type is found throughout the dugong's Australian range - from Shark Bay in western Australia through to Moreton Bay in Queensland - though in much lower numbers on the east coast; and
- a second type that is limited to the Northern Territory, Torres Strait and Queensland coast, ie it does not extend into Western Australia; and that

iii) the Torres Strait is a major zone of overlap of the two Australian stocks.

Management implications/response

From a practical fisheries management perspective, the level of mixing between animals from two different geographical areas is a more important determinant of the definition of a unit stock rather than their respective genetic structures. So, while dugongs from the southern Queensland east coast[15] may be genetically the same as those in the Torres Strait, the likelihood of there being limited if any interaction between Torres Strait dugong and dugong south of Cooktown means that they should be managed as separate stocks. The likelihood of any interaction between Shark Bay and the Torres Strait seems equally remote, such that from a management perspective, the Western Australian and Torres Strait stocks can be managed as separate units.

The situation becomes less clear for those dugong populations geographically closer to the Torres Strait, such as in north-east Queensland and the Gulf of Carpentaria, where the likelihood that there is some exchange of dugong between areas is more plausible.

The level of interaction between the Torres Strait, north-eastern Queensland and Gulf of Carpentaria dugong populations is poorly understood and would benefit from further scientific research. The same applies to dugongs found off Indonesia's Papuan coast.

Given the present limited understanding of dugong interactions between these various jurisdictions, the precautionary approach is to assume there is no interaction and thus manage the Torres Strait stock as if it were a stand-alone stock. This is in effect the approach taken by the PZJA, albeit perhaps by default.

At the same time, the PZJA needs to be open to the prospects that dugong may move into and away from the Torres Strait into Indonesian or Queensland waters.

Similarly, the PZJA needs to be mindful of the need for meaningful cooperation between management organisations from adjacent jurisdictions in order to achieve consistency in management measures across jurisdictional boundaries.

- From the domestic perspective, the recently released Partnership Approach recognises the need for increased cooperation between domestic jurisdictions. The Partnership body to be established to oversee implementation of the Approach will be responsible for ensuring that such cooperation is achieved.
- From the international perspective, there is a need to strengthen existing dialogue with Indonesia and, to a lesser extent, Pacific Island countries.
  - A regional dugong workshop was held in Bangkok earlier this year, the intent being to develop a regional dugong conservation and management,

[15] This assessment follows the conventional approach in terms of dugong of separating the Queensland east coast into a northern zone (from Cape York to Cape Bedford, just north of Cooktown, and a southern zone, from Cooktown to the Queensland-NSW border.

agreement along the lines of the comparable document already developed for marine turtles. The recommendations of Marsh et al (2002) on the need to convene a series of regional workshops to promote greater coordination of management initiatives across international jurisdictions and to develop a regional agreement on dugong conservation and management are thus being realised.

While positive developments, the effectiveness of such regional meetings and agreements depends on the extent to which member states implement any agreed management actions/initiatives. As was the case with turtles, adequate resourcing needs to be made available both domestically and regionally to enable proper implementation.

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

The Torres Strait turtle and dugong fisheries are open only to traditional inhabitants, such that for both fisheries, the indigenous catch is the only legal catch.

Reliable estimates of all removals

Indigenous hunting

As discussed previously, there is currently no reliable estimate of the indigenous turtle or dugong take. However, steps are underway through the first-stage of the RAPTS to assist a limited number of communities develop community-based management plans - part of which may include appropriate catch monitoring procedures - and through a CRC Torres Strait research project supporting catch monitoring activities in two inner island communities.

There is no reliable catch data from other countries such as Papua New Guinea and Indonesia that hunt turtles and dugong from the same population as those found in the Torres Strait.

In the case of turtles:

i) the most recent estimate of the Australian Torres Strait catch is that obtained from the former AFMA/CSIRO catch monitoring project which estimated the Australian catch in 2000/01 as between 1000-2000 turtles. However, this estimate only relates to the TSPZ and does not include catch from the inner islands or the NPA communities. The estimate is also considerably lower than earlier estimates of the Australian catch which ranged from 2000-4000 turtles/year;

ii) Kwan (1991) estimated a total Torres Strait catch - Papua New Guinea and Australia – of between 5100-6700 turtles/year;

iii) Limpus and Chatto (2004) estimate the combined catch of green turtles from northern Australia, Papua New Guinea and eastern Indonesia, inclusive of Bali, as being many tens of thousands, possibly of the order of 100,000 turtles, annually. However, as previously discussed under guideline 1.1.3, preliminary results from genetic analysis indicate that the nGBR breeding aggregation accounts for only a small proportion of the Indonesian catch, such that the

Indonesian catch may have only a slight impact on the nGBR stock (Moritz et al 2002).

In the case of dugongs:

iv) the most recent estimate of the Australian Torres Strait catch, similarly obtained from the former AFMA/CSIRO catch monitoring project, is 619 in 2000/01, though again this only relates to the TSPZ and does not include the inner islands or the NPA communities;

v) the most recent estimates of dugong catch in Papua New Guinea date back to nearly 25 years ago, when in 1981 70 dugong were recorded as being sold through the Daru market (Hudson 1986). Although the commercial selling of dugong is illegal, dugong meat continues to be frequently available at the local market in Daru, though the quantities involved are unknown. The dugong catch consumed within the Papua New Guinean coastal villages of Torres Strait is similarly unknown.

   Prior estimates of the dugong catch sold in Daru were 212 in 1979 and 97 in 1980. The significant drop in catch after 1979 was prompted by community concerns regarding sustainability and the introduction of new rules stopping dugong netting and the killing of small dugong (Hudson 1986); and

vi) no data is available on the dugong catch from Indonesia's Papua province.

GBRMPA have noted however, that there are anecdotal reports of turtles and/or dugongs being caught and released because the animal was too small. Though it is unknown how often this may happen.

Bycatch from the Torres Strait prawn fishery

Turtle and dugong mortality resulting from incidental catch in the Torres Strait prawn fishery is considered negligible.

The PZJA introduced a scientific observer program in the Torres Strait prawn fishery in 2005, and during the 2005 season, observers recorded 337 shots from nine trawl vessels. Two turtles (one green and one flatback) were recorded in two separate events, both taken in 'try-nets' which are used by fishers to monitor the likely catch of the longer sets made with the main gear. Being small nets, the try-nets are not required to be fitted with Turtle Excluder Devices (TEDs), the use of which has been mandatory in the main trawl net since 2002. Both turtles were released alive but 'sluggish'. No turtle or dugong catch was observed from any of the 337 shots using the main nets.

The observer data confirms the previously held view that there is negligible interaction between the prawn fishery and the turtle and dugong populations.

Entrapment in other fishing nets

Some green turtles drown following entanglement in lost or discarded fishing nets. Limpus and Chatto (2004) estimate that this is likely to account for around 400 turtles/year, mostly greens, along western Cape York Peninsula. However, one could reasonably expect that a fair proportion of these turtles would come from the GoC breeding population and have limited if any interaction with the Torres Strait fishery.

Saalfeld and Marsh (2004) considers that the impacts of net fishing on the dugong population in the Torres Strait is likely to be low, with the possible exception of netting by Papua New Guinean coastal villagers along their coastline and in Australian waters in the vicinity of Saibai and Boigu Islands. There used to be a commercial net fishery available to Australian traditional inhabitants, but the fishery was closed by the PZJA in December 2005 and in any case there had not been any significant activity in this fishery at any time.

Saalfeld and Marsh note that meshnetters active in the Gulf of Carpentaria may adversely interact with dugong and that QDPIF has implemented several initiatives - such as area and seasonal closures and improved fisher education - to minimise the extent of any adverse impacts. The effectiveness of these measures has not as yet been assessed and the level of incidental catch remains unquantified.

There are no reported turtle/dugong interactions with other legal commercial fishing activity in other Torres Strait.

Illegal foreign fishing

The level of illegal foreign fishing in the Torres Strait is increasing and there have been reports of dugong being caught by illegal Indonesian fishing vessels operating in the Torres Strait. It is claimed that dugong are entangled in nets set by the vessels, either set specifically to target shark or otherwise set to catch bait for subsequent use on longlines targetting shark.

The number of dugong being caught by illegal foreign fishers is not known.

Boat strike

There are no reports of any dugong or turtle mortality arising from boat strike in the Torres Strait and it is not considered to be an issue.

Turtle egg harvesting/predation

There is no reliable estimate of the indigenous egg harvest or depredation of eggs by dogs, goannas or pigs in the Torres Strait. Suitable procedures to monitor the level of egg harvesting and depredation may be developed as part of the community-based management plans being developed under the NHT-funded components of the RAPTS.

Data factored into stock assessments/target catch levels

Estimates of additional turtle and dugong mortality due to factors other than indigenous hunting have not been factored into the stock assessments for either turtles or dugong.

Given that in the absence of such data the stock assessments suggest that current catch levels are unlikely to be sustainable, including additional sources of human-induced mortality would worsen the current assessments.

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

Estimates of productivity of the three turtle species

There is no formal assessment of the potential productivity of any of the Torres Strait's turtle stocks.

Green turtles

Chaloupka (2002) developed a demographic model of the sGBR green turtle population which found that a small harvest of a few hundred adult females was sustainable from an annual nesting population of a few thousand.

There has been no comparable modelling of the nGBR stock, though Limpus and Chatto (2004) used the results from Chaloupka's work to argue that the current turtle catch in the Northern Planning Area is unlikely to be sustainable, and that the combined catch from the Northern Planning Area and neighbouring countries – such as Papua New Guinea and Indonesia – is definitely not sustainable. However, Limpus and Chatto did not specifically state what they consider to be a likely sustainable catch level.

Hawksbill turtles

Limpus and Chatto (2004) refer to a recommended goal of 70% of hawksbill clutches being managed for incubation, though no information is given to support this figure.

Using this 70% target level, and extrapolating the results from further modelling undertaken by Chaloupka of the sGBR hawksbill population which found that egg harvest is sustainable only at small harvest levels, Limpus and Chatto estimate that a maximum of 600 hawksbill clutches should be harvested annually in the Torres Strait.

Flatback turtles

There is no estimate of likely sustainable harvest levels of either adult flatback turtles or flatback turtle eggs.

Estimates of dugong productivity

There are two quantitative estimates of the potential productivity of the Torres Strait dugong fishery.

- As explained in the discussion under guideline 1.1.2, Marsh et al (2004) used the Potential Biological Removal method to estimate sustainable catch levels based on the population estimates obtained from the 1996 and the 2001 survey data, a recovery factor of 0.5, and the mid-point of the likely range of estimates of calving interval/age at first reproduction. Using the 2001 survey data, Marsh et al estimated the sustainable harvest level for the Torres Strait, including the Papua New Guinea coastal communities, the inner islands and the NPA area, is around 80-90 dugong/year.

  The comparable result using the 1996 aerial survey data was 190 dugongs/year.

- Heinsohn et al (2004) used a Population Viability Analysis approach to estimate the viability of the Torres Strait population over a 200 year timeframe and using a variety of hunting regimes and biological parameters. Based on this analysis, Heinsohn urged a target reduction of harvesting to no more than 100 dugong/ year.

The two independent modelling approaches of Marsh et al. (2004) and Heinsohn et al. (2004) yielded substantively similar results.

Management responses

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

The Treaty makes specific provision for Australia and Papua New Guinea to jointly determine a total allowable catch (TAC) for any individual Protected Zone commercial fishery. Such a TAC is to be determined as part of the subsidiary conservation and management arrangements agreed by the two countries for such fisheries, in accordance with Article 22 of the Treaty. Despite turtle and dugong being traditional fisheries, the subsidiary conservation and management arrangements for turtle and dugong have been developed in accordance with this Article 22 provision.

The turtle and dugong arrangements share a common objective – that being to conserve their respective stocks. However, neither arrangement gives any operational guidance as to what this conservation goal actually means. This objective reflects the time when these arrangements were first negotiated when having a stated objective was much more than would be found for most fisheries.

The two arrangements also state that the two countries have agreed that it is inappropriate to set a total allowable catch (TAC) – defined as the optimum sustainable yield – for the respective fisheries. The apparent rationale for this decision is that the fisheries are traditional fisheries, though no reasoning is given as to why a traditional fishery can not have a TAC.

Consistent with these subsidiary arrangements, the PZJA's current management arrangements for the turtle and dugong fisheries are silent on the use of reference points and subsequent management actions which again reflects the time when the arrangements were made.

However, in a significant change in approach, in August 2005 Australia advised Papua New Guinea of its desire to begin formal discussions on future management arrangements for the two countries' shared dugong stock. Such discussions – which will consider among other options the merits of introducing a TAC for the dugong fishery - are expected to commence in 2006. Further, it seems inevitable that the scope of the discussions will broaden to also include future management options of the turtle fishery.

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

Both fisheries are presently managed using a weak set of input controls that limit who can participate – traditional inhabitants only – and the vessels that can be used - vessels having a Traditional Inhabitant Boat licence that are 6m or less in length. These controls were introduced to achieve the goal of retaining the fishery as a traditional, non-commercial fishery.

The dugong fishery has an additional management measure – the specification of a closed area, known as the dugong sanctuary, in south-western Torres Strait. However, the biological merits of the closed area are unclear.

JCU commented that the dugong sanctuary was not effectively advertised or enforced for much of the period since it was established, and its effectiveness has not been formally evaluated.

Past perspectives

The lack of effective management controls in the Torres Strait turtle and dugong fisheries probably reflects two factors:

i) until recent times, the PZJA has been receiving mixed messages regarding the sustainability of current harvest levels:
   - in the case of turtles, the last Fisheries Assessment Group report on the turtle fishery concluded that there is a low probability that the existing catch levels represented overharvesting (Harris 1997). Given such advice, the PZJA had seen no real need to introduce management measures capable of controlling the level of catch and/or hunting effort;
   - in the case of dugong, while some concern had been expressed since the early 1980s (Johannes and MacFarlane 1991, Marsh et al 1997), the 1998 Fisheries Assessment Group report, using the results from the 1996 aerial survey, concluded that an annual harvest of around 500 dugong/year should be sustainable, a result which was interpreted as reducing, rather than eliminating, concerns that the fishery was not sustainable (Marsh 1998). It was not until several years later, following completion of the 2001 aerial survey, that the PZJA received updated advice that the sustainable harvest level may be considerably lower, in the order of 80-90 dugong/year; and

ii) the obligation as stated in the Treaty to minimise any restrictive effects on the traditional activities of traditional inhabitants.

Given these factors, the PZJA has not attempted to limit the level of Islander participation in either of the two fisheries. Not surprisingly, the PZJA's present management arrangements are not capable of controlling the level of turtle or dugong catch.

This finding should come as no surprise.

- In 2002, the PZJA received the results from a report that it had commissioned – the Skehill report (Menham et al 2002) - which concluded that 'hunting by traditional inhabitants is largely unregulated', 'existing dugong management arrangements are inadequate', and that 'there is an urgent need for a policy decision on how dugong are to be managed, and an appropriate strategy (to reduce catch) implemented'.
- At its meeting in February 2005, the PZJA recognised that there is a high level of concern regarding the current harvest estimates of turtles in the Torres Strait.
- At that same meeting, the PZJA noted that the strategic assessment process for the turtle and dugong fisheries (this report) is likely to highlight the inadequate controls over turtle and dugong harvesting and the need to limit catches to a sustainable level.

The PZJA is thus well aware of the present management inadequacies in its turtle and dugong fisheries. Strategies being implemented by the PZJA to address these known inadequacies, including the Torres Strait Regional Activity Plan, are described under guideline 1.1.9.

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

Every turtle and dugong caught in the Torres Strait is individually targeted, therefore there are generally no byproduct species in either of the fisheries.

<u>Guideline 1.1.9:</u> The management response, considering uncertainties in the assessment and precautionary management actions, has a high chance of achieving the objective.

As stated in guideline 1.1.7, the PZJA is aware of the inadequacies in its management arrangements in the turtle and dugong fisheries and has in recent years been developing strategies to strengthen these arrangements.

PZJA initiatives to strengthen current management arrangements

In February 2005, the PZJA agreed that community-based management is required to reduce unsustainable harvesting in its turtle and dugong fisheries. While this was the first time the PZJA had formally endorsed a community-based management approach, it had previously supported activities consistent with community-based management principles.

- In 1998, AFMA, on behalf of the PZJA, hosted a workshop on community-based turtle and dugong management in the Torres Strait;
- There were no real tangible outcomes from that workshop and no further progress made in regard to turtle and dugong management over the next three years. During that time, AFMA and the PZJA were involved with encouraging more active Islander involvement in Torres Strait fisheries affairs more generally through measures such as:
  - i) changing the PZJA's fisheries consultative structure, including the appointment of the TSRA Chairperson as a full member on the PZJA;
  - ii) working with Islander groups to develop an appropriate Islander fisheries consultative structure to strengthen Islanders' involvement in PZJA processes;
  - iii) helping establish – and fund - a Fisheries Coordinator's position within the TSRA;
  - iv) opening-up discussion on the equitable sharing of commercial Torres Strait fisheries between indigenous and non-indigenous fishers; and
  - v) the possible creation of community-based fisheries rangers, part of whose responsibilities may include turtle and dugong catch monitoring.
- Specific discussions on community-based turtle and dugong management resumed in 2002, with AFMA hosting workshops in August and November. These workshops resulted in AFMA and the TSRA working together to develop a funding proposal in support of community-based management, which subsequently resulted in the development of the RAPTS. AFMA was also involved in providing support to individual communities, with at least one community - Mabuiag – involved in the drafting a community management plan.

The PZJA continues to support the development of community-based management for the turtle and dugong fisheries, as demonstrated by the Australian Fisheries Minister – in his role as Chair of the PZJA – securing an additional $350,000 to be made available to the TSRA in 2005/06 to help implement currently unfunded components of the RAPTS.

TSRA initiatives - the RAPTS

The TSRA is now more actively involved in fisheries issues than in former years, helped to a large part by the appointment of the Chairperson of the TSRA as a full member of the PZJA in 2002. Further, given its role as coordinator of the RAPTS, the TSRA is at the forefront of the community-based initiatives being implemented to strengthen management arrangements in the turtle and dugong fisheries.

As stated in the approved RAPTS document, the RAPTS consists of three key components:

i) the development of community management plans;

ii) education, training and awareness-raising; and

iii) regional catch sharing arrangements.

Community management plans

The aim of the community management plans – which are to be developed on an individual community basis - is to help each community identify and then implement specific management actions that have been endorsed by that community in regard to the turtle and dugong fisheries. While the nature of each plan will be for the each individual community to determine, the RAPTS envisages the community plans will cover issues such as:

ii) identifying future fishery monitoring needs, such as turtle foraging and nesting ground surveys;

iii) the provision of centralised butchering facilities in each community, to improve safety and hygiene and also to facilitate catch monitoring;

iv) Islander training needs in regard to more active participation in fisheries management discussions and scientific monitoring;

v) research protocols for Islander involvement/extension;

vi) structural adjustment needs and options;

vii) the documenting of traditional hunting and management practices; and

viii) identifying candidate areas for increased fisheries protection, such as turtle nesting sites, and the legal options for implementing such closures.

The concept of developing community-based fishery management plans in the Torres Strait is not new. Efforts were made to develop community management plans on both Boigu Island and Badu Island in the mid-late 1990s, and on Mabuiag Island in 2002. However, these plans were either not completed or largely ineffective, caused at least in part by changes in the individuals involved or inadequate ongoing resourcing.

Experiences with community management plans outside of the Torres Strait

Community-based management for Australian turtle and dugong fisheries is not a new concept.

- In the late 1990s, the Hope Vale community, 45km north of Cooktown on Cape York and home of the Guugu Yimithirr Aboriginal people, finalized a community-based turtle and dugong management plan in 1999 with support from GBRMPA and the Queensland Parks and Wildlife Service.
- Since 2003, GBRMPA has been liaising with traditional owners within the Marine Park area to develop what it calls Traditional Use of Marine Resources Agreements (TUMRAs), which are in effect community-based management arrangements. (TUMRAs are developed under the *Great Barrier Reef Marine Park Act 1975* and mirrored under the state *Marine Parks Act 2004* so are statutory agreements, wheres the MOUs developed with the EPA are not statutory.)
- In a separate process, indigenous communities on western Cape York and on the Queensland east coast have been developing turtle and dugong community management plans with support from the Queensland Environment Protection Agency (EPA).
- None of the community management plans stated within the report has yet been successfully implemented, although it is too early to evaluate the success of some initiatives. The Hope Vale experience (Marsh, 2006) indicates that implementation is much more challenging than plan development.

A slight variant of community-based fishery management approaches is the Indigenous Protected Area (IPA) Program administered by DEH. The program is aimed at giving support to indigenous communities to help them protect naturally and culturally significant features of their lands.

- One island in the Torres Strait – Warul Kawa (Deliverance Island) in the far north-western region of the Strait - has been declared an IPA, the declaration having effect from April 2000. A plan of management for the island includes among its objectives the maintaining and monitoring of the natural resources of the site. The area is, among other things, an important breeding area for flatback turtles.
- Some funding – of the order of $30,000 – has been made available to indigenous groups to help manage the site, though the management plan is not as yet being implemented and no effective management is occurring on the site.

As the Torres Strait Islander communities commence the implementation of the RAPTS and the associated development of community-based management plans for their turtle and dugong fisheries, they may find it valuable to review the outcomes that have been achieved under these previous approaches, and in particular the manner in which these earlier community-based management plans have tried to limit future catch.

Education/awareness/training

The planned activities under the RAPTS in regard to convening information sessions and workshops, using local Torres Strait media, promoting increased local engagement in turtle and dugong research activities and the preparing of schools-based material and programmes - are fully consistent with what Johannes and MacFarlane (1991) described as the need to develop a greater marine conservation ethic within Islander communities.

- Johannes and MacFarlane noted that the biology of turtles is such that there could be a continued abundance of mating and nesting turtles in the Torres Strait for decades even if there is underlying stock depletion, after which the apparent abundance would rapidly be replaced by dramatic and possibly irreversible stock declines. They argue that many Islander communities will have difficultly accepting the need for more restrictive management measures when there are no apparent signs of stock decline. This is no reflection on the Islander communities - most non-Islander fishers are also skeptical of forecast scientific warnings until stock declines are actually apparent, at which time remedial management action needs to be all the stronger and stock recovery is slower.
- Similarly, Johannes and MacFarlane viewed dugong conservation as primarily an educational issue and not something that can simply be solved by legislation and law enforcement. In their view, public cooperation is vital, and public understanding an essential prerequisite to enhanced management arrangements.

Regional catch sharing arrangements

The third component of the RAPTS is the negotiation of regional catch sharing arrangements specifying agreed catch quotas for Torres Strait Islander, Cape York Peninsula and Papua New Guinea coastal communities.

A regional catch sharing arrangement will need to address several key issues, the foremost of which is agreeing on a sustainable TAC for both turtles and dugong.

Having agreed on the TAC, the RAPTS envisages the arrangement then specifying how the TAC will be divided amongst each individual community - in effect, agreement on community-level quotas.

Presumably, the idea is that each community would then be responsible for managing – and enforcing - its hunters to keep the community's actual turtle and dugong catch within the agreed limit.

RAPTS funding status

The intended rationale of the RAPTS was to progress the community-based management plans and the regional catch sharing workshop in the first year of the RAPTS (the RAPTS having a two-year timeframe).

However, the TSRA has secured only sufficient external funding to cover around 30% ($480,000) of the required $1.6m in external funding[16]. In response, the TSRA has prioritised the RAPTS activities and is using a staged implementation approach, with the initial funding being used to:

i) employ a fulltime Dugong and Marine Turtle Coordinator;

ii) develop and implement community management plans in two or three island clusters, including the employment and training of part-time community project officers in each participating community;

iii) implement components of a regional community awareness programme; and

[16] The total RAPTS budget, subject to the type of catch monitoring used, is between $3.2m-3.3m, around half of which is sourced from in-kind contributions from island communities.

iv) prepare funding submissions to secure support for implementing remaining aspects of the RAPTS.

Activities related to the regional catch sharing arrangements are presently unfunded and thus inactive.

In the event that the TSRA commits that additional funding secured by the Chair of the PZJA towards extending the development of community management plans beyond the three communities covered under phase 1, the regional-level activities will remain inactive.

Assessment of planned RAPTS activities

Community management plans

The community management plans do have the potential to generate considerable improvements at the local community level, in terms of catch monitoring, habitat protection, greater management understanding and increased Islander engagement in turtle and dugong research. Further, the planned education/training/awareness-building/information sharing activities should improve the general public's understanding of turtle and dugong biology and their need for management.

However, the activities to be implemented in the first stage of the RAPTS are unlikely to be sufficient to encourage the communities involved to take action to effectively limit their turtle and dugong catch. Even if all communities were to independently agree to limit their catch without coordinating their efforts based on a regional scale sustainable figure, the resultant total catch – the sum of the individual community limits – would inevitably exceed the level considered as being sustainable. The TSRA have suggested that the risk of this occurring can be ameliorated to some extent by providing resourcing for regional forums to enable Torres Strait Islanders and Aboriginal people to agree on sustainable regional catch limits and how to go about achieving them. Appropriate scientific and technical expertise should be on hand at any such forums to provide communities and management agencies with necessary information to support this decision-making process. The RAPTS does envisage regional forums as an important step in the process towards arriving at agreed regional catch-sharing arrangements, but further resourcing and a concerted effort on the part of the PZJA and AFMA will be necessary to address this unfunded component of the project. The TSRA suggest that the development and negotiation of regional catch sharing arrangements could be a primary function of the proposed Working Group to provide advice to the TSFMAC and PZJA.

In any case, community-level action can potentially produce effective outcomes on issues such as catch monitoring, habitat restoration, and local compliance and enforcement, but independent community action is not capable of delivering sustainable turtle and dugong management.

The shared nature of the turtle and dugong stocks means that effective regional cooperation is the key to effective turtle and dugong management. The RAPTS' intended instrument of such cooperation – the regional catch sharing arrangement – thus needs to be a fundamental aspect of any future turtle and dugong management strategy.

Before discussing issues associated with the regional catch sharing arrangement, consideration needs to be given to the adequacy of the TAC-setting process envisaged in the RAPTS.

Setting the TAC

In order to set a TAC, there must first be discussion and then agreement on what constitutes an appropriate harvesting strategy. This in turn requires an understanding of the turtle and dugong biology, the present population size, and the risks associated with different harvesting rates. The final TAC will need to balance conflicting perspectives, these being the need to stabilise/rebuild dugong and turtle stocks as soon as possible against the need to minimise the impacts on traditional lifestyles and livelihoods. Another key consideration is the geographic range of the stock you are dealing with. The TAC needs to allow for harvest elsewhere in Australia.

A key consideration in setting a TAC is to assess the biological implications from changes in hunting behaviour. The biological implications of taking large immature adult turtles, for example, are far different to the implications of the current fishing practice of targetting mature adults. The actual number of turtles that can be sustainably taken from a given stock is thus dependent on the age and sex of turtle targeted. Another key consideration is setting a TAC for egg harvesting.

It is beyond the context of this report to identify an appropriate balance between conserving the stock and minimising the impacts on traditional livelihoods. Similarly, this report is not intended to provide a detailed biological assessment of the impacts of changed targeting behaviour.

Both issues will, though, need to be addressed before a TAC can be set. The point being made is that the setting of the TAC is in itself not a trivial matter.

If a TAC is implemented, there still needs to be funding/mechanism available to monitor whether the population is recovering or decreasing once it is in place.

The regional catch sharing arrangement

The key RAPTS component designed to limit turtle and dugong catch is the regional catch sharing arrangement. The rationale for developing a region-wide catch sharing arrangement is sound and such an arrangement is the essence of any effective management regime for the two fisheries. Put simply, without a regional catch sharing arrangement, there can be no effective management of either fishery.

Funding support to develop such an arrangement is of the highest priority. Indeed, the development of such an arrangement is the single highest priority in the two fisheries.

- The lack of an effective catch monitoring regime is a serious deficiency in the current management approach and needs to be rectified. However, in the case of dugong, taking into account past catch estimates and the best available estimates of sustainable catch levels, current catches are of a magnitude higher than what would be sustainable. An updated, community-based estimate of dugong catches – while providing greater precision and confidence regarding catch levels - is unlikely to change this conclusion. Should there be insufficient funding available to develop both a catch sharing and a catch monitoring arrangement, priority should be given to developing the regional catch sharing arrangement.
- Similarly, the likely results from a further aerial survey of the Torres Strait dugong population that included waters off north-east Queensland the Gulf of Carpentaria would be unlikely to change the present conclusion that current catches are unsustainable. Should the survey results reaffirm the unsustainability of the current catch level but work on the regional catch sharing arrangement not

have progressed, there would be no effective instrument available to either the PZJA or the communities to implement the survey findings.

This is not to say that such a survey is of no value – there would be benefit in having a more meaningful estimate of regional dugong abundance and the additional snapshot of the dugong's spatial distribution. However, to the extent that undertaking such a survey would reduce the likelihood of sufficient funding being available to support communities develop the regional catch sharing arrangement, priority should be given to the latter.

- In the case of turtles, while there is no estimate of what constitutes a sustainable catch level at the present time, there are early signs emerging to suggest that the nGBR green turtle stock is in the early stages of decline. Further, possible deterioration of the nesting habitat at Raine Island raises new doubts about likely hatchling success rates, at least over the short-term. Given the evidence from neighbouring countries demonstrating the vulnerability of turtle stocks, should funding be limited it seems prudent to give priority to supporting the communities to develop an effective means of controlling catches rather than additional scientific research. This is not to mean that there is no need for additional turtle scientific research: on the contrary, there is a pressing need for greater understanding of turtle biology and stock assessment. However, such research should be complementary to – and not instead of – the development of the regional catch sharing arrangement.

The key deficiency in the management arrangements for both the Torres Strait turtle and dugong fisheries is the lack of an effective management mechanism to control catch. Even with a TAC in place, there still needs to be funding available to monitor whether the population is recovering. Until such a mechanism is in place, the turtle and dugong stocks will continue to be at risk.

Development of an appropriate catch sharing arrangement – the mechanism to control catch – together with the necessary community-level education and awareness raising needed to empower community involvement in the catch sharing discussions - is the number one priority for both fisheries. Activities related to these two initiatives warrant funding support above all other turtle and dugong needs.

TSRA agrees that priority should be given to developing regional catch-sharing arrangements over catch monitoring programmes. Prior to this occurring, however , it is important that other management options are also explored and their implications explained to communities to ensure adequate community support for, and understanding of the need for regional catch-sharing arrangements. The need for governments to consider providing appropriate structural adjustment opportunities is heightened in this context.

Involvement of Papua New Guinea

The RAPTS envisages Papua New Guinea being involved in the catch sharing negotiations. The implicit assumption in this approach is that the catch sharing agreement will extend to both sides of the Torres Strait, that the turtle and dugong fisheries will be managed by TACs, and that there will be some agreed process whereby Australia and Papua New Guinea share the TAC.

This approach has merit. However, bilateral dialogue on a possible TAC for the dugong stock has only recently commenced and has yet to commence in the case of

turtles. Agreement on how Australia and Papua New Guinea are to share the dugong and turtle stocks is realistically some way off.

The TSRA have concerns that implementing a TAC will aim to depress catch rates under the assumption that turtle and dugong are in decline, and under the assumption that harvest by islanders is the primary mechanism of decline. Acknowledging this at the outset of any process aimed at setting an allocation will be important, as an alternative rationales for limits to harvest, that are endorsed by Indigenous people, may thereby be explored, which may provide a more robust basis for any future management approach.

The challenges facing the Papua New Guinea Government and communities in developing effective turtle and dugong management arrangements are at least as complex as those facing the Australian Government and communities. Economic conditions in the Papua New Guinean coastal villages are considerably worse than in the Australian communities and Papua New Guinea's government authorities, particularly the management and enforcement agencies operating in Western Province, face a far more severe shortage of resources than do their Australian counterparts. Nevertheless, these communities have in the past been involved in research and management projects and may have a better understanding of some of the issues as a result.

Though the turtle and dugong stocks are shared between the two countries (and also a few others), Australian communities – given the greater financial resources at their disposal – must be prepared to take a leading role in introducing new management arrangements and accept that at least initially, they may need to bear the brunt of any more restrictive management measures.

- While Australian hunters may consider it unfair if new management arrangements are enforced more rigourously on themselves than on their Papua New Guinean counterparts, there seems little alternative.
- Unless Australian communities are prepared to take the initiative, implement effective management arrangements in their own communities, and then gradually work with their Papua New Guinea counterparts to strengthen the management arrangements in the Papua New Guinean communities over time, the prospects for the turtle and dugong stocks appear grim.

WWF applauds the initiative under the Regional Activity Plan for Torres Strait; in particular the setting of a cross-jurisdictional total allowable catch, however there is considerable concern about progressing these negotiations before having effective mechanisms in place to control catch, or adequate population dynamics data in the case of turtles. An adequate framework needs to be in place amongst local communities to control and monitor their catch and, given that Australia is in a better position to implement stronger management than the PNG government, WWF support Australian taking the lead role here.

TSRA agree that the notion that Australian communities must take a lead role in the introduction of new management arrangements is perhaps worthy of further analysis. In terms of making the most strategic investment in the future management of the species, it may be the case that money spent supporting PNG to reduce its harvest could result in fewer dugongs or turtles being taken from the overall stock. The point is that without supporting PNG in the effort to move towards sustainable management

of the shared stocks, the exercise will be ineffective, and that more emphasis should be placed on the strategic investment of effort and resources to effect the greatest change.

Process to develop the catch sharing arrangements

For both fisheries, there are three issues that need to be addressed to conclude a regional catch sharing arrangement:

i) Australia and Papua New Guinea agreeing on an appropriate TAC;

ii) Australia and Papua New Guinea agreeing on how to share the TAC; and

iii) Australian communities agreeing on how to share the Australian portion of the TAC (presumably Papua New Guinean communities would need to have similar discussions with their national government).

The process and level of resources envisaged under the RAPTS to resolve these three issues appear overly optimistic.

In a review of the use of individual transferable quotas in fisheries management, Kaufmann, Geen and Sen (1999) state that quota allocation – the core of the regional catch sharing arrangement – is probably the most contentious issue in quota management. Though they were writing in the context of commercial fisheries, their statement applies equally as well to indigenous non-commercial fisheries such as turtle and dugong.

Given the circumstances surrounding the Torres Strait turtle and dugong fisheries – the uncertainties in the stock assessment, the inadequate data collection, the shared/migratory nature of the stocks, the economic significance of the catch, the difficulties in compliance and enforcement, the low level of trust/cooperation between stakeholders and managers – Kaufmann et al's prognosis that allocation will prove contentious seems assured.

The RAPTS provides for a single regional catch sharing forum, involving Torres Strait island communities, Aboriginal communities from Cape York, and from the Papua New Guinea coastal villages. Notwithstanding the sense of solidarity and unity that prevails amongst indigenous groups, the likelihood of these communities being able to agree on a TAC for both turtle and dugong, and to then agree on how to divide the TAC between their respective communities, within a single regional forum is remote.

In all probability, a series of regional meetings spanning a period of several years will be required to conclude such an arrangement.

Links between the agreed catch limit and individual community management plan

Having agreed on an acceptable catch limit, the RAPTS envisages each community being responsible for deciding how to limit its catch to its agreed level and for enforcing the agreed approach.

Given the likelihood that current catches are unsustainable, the TAC will need to be lower than the current catch. At the community level, this will most probably mean that the agreed catch share will be less than the community's current catch. Each community is thus likely to experience a catch reduction and will need to develop a mechanism to limit its catch to this new level. Communities will not find this an easy process and will need considerable help and support if they are to achieve their goal.

Compliance and enforcement

The RAPTS envisages enforcement responsibility resting with each individual community, though details of how community-based enforcement would work are yet to be finalised.

For the regional management arrangement to succeed in protecting the turtle and dugong stocks, each community needs to be confident that all other communities are effectively monitoring and enforcing their individual management arrangement. It would only need one community to take a less active approach to enforcing its agreed management measures to put the entire regional arrangement at risk.

The employment of community rangers is often suggested as the preferred approach to enforcing community management arrangements. This suggestion is no doubt based on the high-profile 'ranger' type programs implemented by several Australian Government agencies – such as the Australian Quarantine and Inspection Service (AQIS) and the Department of Immigration and Multicultural Affairs (DIMIA) – that involve a network of community officers thoughout the Torres Strait communities.

In considering the similarities between the AQIS and DIMIA programs and any fisheries ranger programs, it needs to be kept in mind that in protecting their respective communities from quarantine and immigration threats, much of the focus of the AQIS and DIMA community officers is on monitoring the activities on Papua New Guinea nationals exercising their Treaty rights of free movement to visit Australian communities.

Community-based fisheries officers on the outer Torres Strait islands would also be responsible for monitoring the fishing activities of Papua New Guinea traditional inhabitants during their traditional visits. However, unlike their AQIS and DIMIA counterparts, a key component of a community fisheries officer's responsibilities would involve monitoring the activities of their fellow Torres Strait Islanders, both from their own community (and most likely from their own family) and from different Torres Strait island communities. Such responsibilities could be expected to result in community fisheries officers facing far greater social pressure than that experienced by AQIS and DIMIA colleagues.

TSRA have highlighted the fact that this report rightly recognises the difficulties facing a local person in an enforcement capacity in terms of social pressures being potentially greater than those facing government enforcement officers. This should not be interpreted to mean that there is no place for local enforcement officers or community rangers in this context. The issue of enforcement and the external mechanisms by which community plans are to be reinforced by management agencies does warrant intensive consultation, however.

The TSRA have noted that it is vital to ensure that whatever enforcement options is pursued, that management agencies are capable of providing sufficient and appropriate support for local people charged with responsibility of implementing and enforcing community plans, as it is only local people who have the capacity and presence to carry out this function. TSRA supports the recommendation in the report for a compliance strategy to be developed, but suggests that this occur in the context of further exploration of the merits of a community-ranger program to deliver a holistic range of functions related to sustainable community-based environmental management.

The Queensland Police Department has been involved in trialling a system of community policing in a number of communities. The experiences from these trials are likely to be directly relevant to any future community fisheries officer program.

If enforcement responsibility is to rest at the individual community level, consideration needs to be given to the legal powers available to local enforcement officers and the relationship between the community enforcement officers and the Queensland state fisheries enforcement officers and the state enforcement agency (QB&FP).

Conversely, if enforcement responsibility is to rest with an external agency – such as the QB&FP – it is essential that the agency be sufficiently resourced. Similarly, it is essential that the agency have widespread community support in its enforcement role, since the effectiveness of the compliance – and thus the overall success of the arrangement – will depend on the level of information exchange between the island communities and the enforcement agency.

A number of key compliance issues are presently unresolved, and there is a pressing need to develop an appropriate compliance strategy to complement the community-based turtle and dugong management approach.

Need to provide alternative economic incentives

As discussed in section 2.7, despite their non-commercial status, the dugong and turtle fisheries are of considerable economic significance to indigenous communities in terms of their value as a food source.

Aside from the cultural and social significance, indigenous hunters clearly have an economic incentive to catch turtle and dugong, and any reduction in catch levels will leave the hunters, and the community more generally, economically worse-off.

The conservation and management plan of the IOSEA Marine Turtles MoU, to which Australia is a signatory, identifies the need to implement programmes to correct adverse economic incentives that threaten marine turtle populations. More specifically, the plan recognises the need to implement programs to modify economic incentives in order to reduce turtle mortality. The same argument is equally relevant for dugong, and such work is warranted in the Torres Strait.

In late November, the Australian Government announced a major one-off structural adjustment package to apply to several Commonwealth-managed fisheries. The $220m package consists of two key elements:

i) a $150m buy-out of commercial fishing concessions; and

ii) $70m in complementary assistance, comprising $30m of assistance to fishery-related onshore businesses, $20m to generate new economic and employment opportunities in fishery-dependent communities, and $21m to support management costs, improved science, compliance and data collection.

While Torres Strait fisheries are excluded from participating in this particular package, the package demonstrates the Government's recognition that direct government intervention can at times be warranted to support fishery stakeholders to adjust to situations where reduced catch levels are required to achieve sustainable fishery outcomes.

In the case of the Torres Strait turtle and dugong fisheries, unless adequate recognition is given to the economic impacts borne by indigenous fishers from any

future catch reductions, the prospects of communities being able to effectively implement and enforce their community management plans, or of the PZJA being able to enforce an alternative management approach to restrict hunting activity, are bleak. The TSRA strongly agrees with this and suggests that structural adjustment options need to be considered and presented to Torres Strait communities in the context of any attempt to move towards sustainable management approaches.

WWF, however, strongly disagree with the suggestion that structural adjustment should be paid to Australian hunters to reduce their catch and anticipates that this would set a dangerous precedent for protected species management in Australia, and is very unlikely to be enforceable or effective. WWF fully supports increased involvement of social services in this issue and greater funding of programs to foster alternative income streams.

Likewise, GBRMPA commented that the proposal for compensation is precedent setting and would lead to issues where dugong and marine turtle harvesting are not considered a 'fishery' and hence do not have access to compensation mechanisms such as those found in fisheries management.

Need for ongoing resourcing

A key risk to the achievement of sustainable management outcomes for the turtle and dugong fisheries is that the management agencies and/or communities will have insufficient ongoing resources to develop, and then implement, the activities required.

Past attempts at community-based management, both in the Torres Strait and elsewhere, have usually failed to achieve their expected outcomes, due in large part to their inadequate resourcing.

The current attempt to establish effective community-based management in the Torres Strait – under the RAPTS – is similarly being constrained by a shortage of funding. The RAPTS is only being partially implemented at the present time, and the cornerstone of the future management strategy for the two fisheries - the respective catch sharing agreements – are not currently being progressed. In any case, present funding is for a finite period (two and a half years) and ongoing funding has not been secured.

Similarly, many of the prescribed actions of the Australian Government's Marine Turtle Recovery Plan have not been implemented, largely due to inadequate resourcing. Insufficient funding has also limited implementation of many of the activities identified in the conservation and management plan developed under the auspices of the Indian Ocean and South East Asian MoU on marine turtles in the Indian Ocean.

There appears to be growing awareness within government that effective turtle and dugong management will require additional funding support.

- The PZJA has recognised the need for additional funding and the Australian Government's Minister for Fisheries, Forestry and Conservation – as PZJA Chair - has secured $350,000 in additional funding for the TSRA in support of the RAPTS for 2005/06, with negotiations continuing for 2006/07.
- The National Partnership Approach recognised that to date, limited resources have been made available to assist indigenous communities become more actively involved in turtle and dugong management.

Despite the additional $350,000 secured by the PZJA Chair, activities related to developing the regional catch sharing arrangements – the cornerstone of any future management strategy for the dugong and turtle fisheries – remain unfunded and inactive.

Objective 2. Where the fished stock(s) are below a defined reference point, the fishery will be managed to promote recovery to ecologically viable stock levels within nominated timeframes.

Management responses

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

The PZJA has not as yet developed a precautionary recovery strategy for either fishery, to be implemented if required.

However, a 0.5 recovery factor – meaning that 50% of the dugong recruited to the fishery each year are reserved for stock rebuilding purposes – is implicit in the advice provided to the PZJA on the sustainable level of dugong catch estimated using the PBR approach.

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

The PZJA has not as yet considered temporary closures of either the turtle or dugong fisheries.

The legality of any closure, should the PZJA decide such action warranted, might be subject to challenge should indigenous groups argue that Torres Strait native title holders can continue to exercise their rights to hunt turtles and dugong for their own consumption and for non-commercial communal needs as recognized under the Native Title Act.

It is beyond the mandate of this report to assess the legal validity of such an argument, though it is noted that some legal opinion considers that the Australian Government and the states do have the power to regulate the indigenous native title right to hunt, including the temporary suspension of that right, in order to protect biodiversity (Havemann et al 2005). Tsamenyi, as quoted in Saalfeld and Marsh (2004) similarly argues that the exercise of native title rights needs to be in accordance with other relevant legislation.

Having supported the PZJA's legal rights to implement such a closure, Havemann et al (2005) note the undesirability of any resulting legal dispute and suggest that it would be much more productive for management agencies and indigenous groups to work cooperatively together to explore the options for regulating native title rights in ways that promote conservation.

While the PZJA may have the legal right to implement a temporary closure of either the dugong or turtle fisheries, which is open to challenge, one respondent suggested that the exercise of this legal right by the PZJA would be extremely problematic to enforce. Moreover, it would generate mistrust on the part of communities, and resistance towards government managers, hindering any future attempts at collaborative management approaches

In any event, the effectiveness of any attempted fishery restrictions, were that the PZJA's intent, would largely be determined by the level of stakeholder – in this case, Islander – support for the restrictions. Unless Islander communities agreed with any new management measure, enforcement will be problematical, and in all likelihood the management measure would prove ineffective.

As suggested by Johannes and MacFarlane (1991), dugong (and turtle) conservation in the Torres Strait can not be solved simply by legislation and law enforcement. They argue that public cooperation is vital, and public understanding an essential prerequisite. These views remain valid today.

The National Partnership Approach similarly notes 'that a regulatory approach would be difficult and expensive to enforce and may have limited impact'.

Enforcement, though important, is not the primary issue regarding safeguarding dugong and turtle stocks for future generations. The issue is the level of stakeholder support. So long as the communities view any more restrictive measures as being thrust upon them by government, the measures are unlikely to succeed. The point at which the communities view the government's actions as helping them to implement measures to protect turtles and dugong for their future generations, that is the point at which the management response will have the greatest prospects of success.

Any strategy to limit harvesting of turtle and dugong should recognise:

A. The Turtle and Dugong fishery is not a commercial fishery. Many of the categories of this assessment (TAC and trigger points) are difficult to report against as harvesting only occurs in the traditional context (The turtle fishery/harvest is not commercial in Australian Torres Strait, but the harvest in PNG is commercial. The work by JCU in Torres Strait has shown that it is the commercial nature of the PNG take that is of most concern to Islanders);

B. There are traditional controls in place which have maintained the area as a dugong sanctuary whilst other areas in Australia no longer have dugong;

C. The Environment Protection Biodiversity Conservation Act 1999 should be interpreted in light of the Australian obligations under the Torres Strait Treaty, including Article 14(4) which requires that Australia use its best endeavours minimise any restrictive effects of measures to protect flora and fauna on the traditional activities of traditional inhabitants;

D. There is inherent social and cultural importance associated with the traditional fishing of turtle and dugong in the Torres Strait. Some

island communities rely on turtle and dugong as a source of protein. Considerable stakeholder support will be required to implement turtle and dugong catch management (or catch limitation) systems. If islanders do not support limits or a closure, the closure would be difficult to enforce and unlikely to succeed.

The Hammond Island Community hunters, along with other communities throughout the Torres Strait, are concerned about the commercial sale of both turtle and dugong by PNG, as this does not fit within the traditional use of these species

PRINCIPLE 2: FISHING OPERATIONS SHOULD BE MANAGED TO MINIMISE THEIR IMPACT ON THE STRUCTURE, PRODUCTIVITY, FUNCTION AND BIOLOGICAL DIVERSITY OF THE ECOSYSTEM.

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

Information requirements

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

Assessments

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

Management responses

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

Guideline 2.1.4: **An indicator group of bycatch species is monitored.**

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

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

Generally, these fisheries are highly selective single species fisheries, therefore, guidelines 2.1.1 to 2.1.6 are not applicable as there is no bycatch in either fishery.

Objective 2. The fishery is conducted in a manner that avoids mortality of, or injuries to, endangered, threatened or protected species that are not targeted by the fishery, under provisions of the *Native Title Act 1993,* and avoids or minimises impacts on threatened ecological communities.

Information requirements

Guideline 2.2.1: Reliable information is collected on the interaction with endangered, threatened or protected species, including information on interactions with targeted species and threatened ecological communities.

As outlined in Guideline 1.2.6 the dugong and turtle fisheries are highly selective single species fisheries and have little impact on other species, however there is concern that other commercial fishing activities are having an impact on their habitat. The Maluilgal Corporation has expressed considerable concern about the impact commercial fishing is having on the natural turtle and dugong habitat around Buru (Turnagain Island) and Warul Kawa (Deliverance Island) and stated that the reef habitat is being destroyed by commercial lobster fishers from both the islander and non-islander sector of the commercial fishery.

Assessments

Guideline 2.2.2: There is an assessment of the impact of the fishery on endangered, threatened or protected species apart from those targeted by the fishery.

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

Management responses

Guideline 2.2.4: There are measures in place to avoid capture and/or mortality of endangered, threatened or protected species not targeted by this fishery.

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

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

Guidelines 2.2.1 to 2.2.6 are not applicable because as explained in the previous section, there is no unintended catch in either the turtle or dugong fisheries.

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

Information requirements

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

This Guideline has been addressed in conjunction with Guideline 2.3.2 below.

Assessment

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

1. Impacts on ecological communities

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

2. Impacts on food chains

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

3. Impacts on the physical environment

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

AFMA will coordinate the preparation of ecological risk assessments (ERAs) for the Torres Strait turtle and dugong fisheries in 2006. With both fisheries being single-species surface fisheries, it is expected that these assessments will be relatively straightforward compared to most other AFMA-managed fisheries.

Consistent with the approach that has been adopted with other AFMA-managed fisheries, once the initial ERAs are completed, the relevant management agency – in this case the PZJA – will assume ongoing responsibility for the development and implementation of any management changes required in response to issues identified in the assessments, as well as the ongoing monitoring and review of the assessments as new information is gathered.

Management responses

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

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

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

No specific management responses have been developed as the risks to the components of the marine environment described under Guideline 2.3.2 are not currently considered to be significantly impacted by the fishery. This issue should be reconsidered during the latter part of 2006 based on the results from the ecological risk assessments of the Torres Strait turtle and dugong fisheries which is expected to be completed by mid-2006.

Subject to the results from the assessments, the PZJA will need to consider appropriate management responses to any issues identified.

Attachment 1: Terms of Reference – Environmental Assessment of Torres Strait Turtle and Dugong Fisheries

1. Description of the fishery

The assessment must include a comprehensive description of the fishery and its characteristics including (but not limited to) the agency responsible for management of the fishery, species caught, fishing methods, the area fished (including a map), the number of hunters and historic and current fishing effort.

2. The environment likely to be affected by the fishery

The assessment must provide a detailed description of the environment likely to be affected by the fishery. This description must identify significant environmental characteristics of the area likely to be affected by the fishery: for example; marine protected areas, components of biodiversity, threatened and other protected species (including target and bycatch species which also fit into this category), a description of seagrass and benthic communities, important features such as coral reefs, seamounts and estuaries, and other aspects of the biophysical environment potentially affected by the operation of the fishery.

3. Proposed Management Arrangements for the fishery

The assessment must include a description of legislation, and policies, that are relevant to the management of the fishery and its environmental impacts and the agencies that are responsible for administration of relevant legislation and the policies. International agreements that affect the management of the fishery should also be identified.

The assessment must set out the specific management arrangements that will be applied to the fishery. Accordingly, the assessment must identify (amongst other things) any management plan for the fishery, any bycatch action plan, relevant regulations and any strategic research plan for the fishery.

The assessment must specifically identify elements of the management regime for the fishery that are intended to ensure that the fishery operates in an ecologically sustainable manner. (See item 5 below.)

4. Environmental Assessment of the Fishery

The assessment must include a comprehensive analysis of the potential impacts of the fishery on the environment.

The assessment must specifically address those aspects of the *Guidelines for the Ecologically Sustainable Management of Fisheries* (available separately) relevant to ensuring the fishery is managed in an ecologically sustainable manner. An appropriately amended version of the *Guidelines*, that recognises that the fishery directly involves the take of endangered, threatened and protected species is at Attachment 1A.

In particular, the assessment must demonstrate that the fishery is ecologically sustainable in terms of its impact on:

a) target species;
b) non-target species and bycatch: and
c) the ecosystem generally (including habitat).

In particular, the assessment must include:

a) a description of the potential impacts of the fishery on the environment (including, to the extent possible, information on the degree of confidence with which the impacts can be predicted and quantified);
b) an analysis of the nature and extent of the likely environmental impacts including whether the impacts will be short term or long term impacts;
c) an assessment of whether any environmental impacts are likely to be unknown, unpredictable or irreversible;
d) an analysis of the significance of the potential impacts; and
e) reference to the technical data and other information relied upon in assessing the environmental impacts of the fishery.

The assessment shall include consideration of impacts associated with the conduct of the fishery, such as the discharge of waste and other pollution risks (including lost gear).

5. Management measures and safeguards to ensure ecological sustainability

This section of the assessment must provide a detailed analysis of the specific elements of the proposed management regime for the fishery that are designed to ensure the fishery is ecologically sustainable. In particular, this section of the assessment must demonstrate that the management arrangements for the fishery are consistent with the requirements of the fishery specific *Guidelines* at Attachment 1A.

The assessment must identify and describe the specific measures intended to prevent, minimise or compensate for the potential environmental impacts of the fishery, and any measures to rehabilitate damage to the environment.

The assessment should include an analysis of the expected or predicted effectiveness of these measures. (The assessment should distinguish between measures designed to protect target species, and those measures designed to protect the ecosystem generally including non-target species and habitats)...

A consolidated list of relevant measures should be included.

The assessment should identify the basis (eg, statutory or policy) for implementation of each measure and the agency or authority responsible for ensuring implementation. The assessment must also identify how the relevant agency or authority will ensure compliance with these measures, and what steps will be taken in the event of non-compliance. The assessment should also identify any legislative or institutional impediments to implementation.

The assessment should identify the mechanisms for reviewing the environmental impact of the fishery during the life of the proposed management arrangements, and for adjusting the life of the proposed management arrangements, and for adjusting elements of the management arrangements as necessary in response to the outcome of these reviews.

The assessment must also identify any program that is proposed to be put in place to monitor the impacts of the fishery on the environment in the short and long term.

Any proposed independent environmental auditing mechanism should be identified.

The assessment should, to the extent reasonably practicable, describe any feasible alternatives to the proposed management arrangements (or elements of those arrangements). The alternatives should be discussed in sufficient detail to make clear the reasons for preferring certain options and rejecting others. Discussion should cover matters such as alternative fishing methods and technologies, increasing or reducing permitted levels of effort, alternative mechanisms for controlling effort, and other alternative measures for preventing or minimising environmental impact.

6. Information Sources

For information in the assessment, the assessment must state:

a) the source of the information;
b) how recent the information is;
c) how the reliability of the information was tested; and
d) what uncertainties (if any) are in the information.

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Amended Fishery Specific Guidelines for the Ecologically Sustainable Management of Fisheries

To satisfy the Australian Government requirements for a demonstrably ecologically sustainable fishery, the fishery or fisheries if a species is caught in more than one fishery, must operate under a management regime that meets Principles 1 and 2. The management regime must take into account arrangements in other jurisdictions, and adhere to arrangements established under Australian laws and international agreements.
The management regime does not have to be a formal statutory fishery management plan as such, and may include non-statutory management arrangements or management policies and programs. The regime should:

- be documented, publicly available and transparent;
- be developed through a consultative process providing opportunity to all interested and affected parties, including the general public;
- ensure that a range of expertise and community interests are involved in individual fishery management committees and during the stock assessment process;
- be strategic, containing objectives and performance criteria by which the effectiveness of the management arrangements are measured;
- be capable of controlling the level of harvest in the fishery using input and/or output controls;
- contain the means of enforcing critical aspects of the management arrangements;
- provide for the periodic review of the performance of the fishery management arrangements and the management strategies, objectives and criteria;
- be capable of assessing, monitoring and avoiding, remedying or mitigating any adverse impacts on the wider marine ecosystem in which the target species lives and the fishery operates; and
- require compliance with relevant threat abatement plans, recovery plans, the National Policy on Fisheries Bycatch, and bycatch action strategies developed under that policy

The management regime also must comply with any relevant international or regional management regime to which Australia is a party. Compliance with the international or regional regime does not mean Australia cannot place upon the management of the Australian component of the fishery management controls that are more stringent than those required through the international or regional regime.

Principle 1

A fishery must be conducted in a manner that does not lead to over-fishing, or for those stocks that are over-fished, the fishery must be conducted such that there is a high degree of probability the stock(s) will recover.

Objective 1. The fishery shall be conducted at catch levels that maintain ecologically viable stock levels at an agreed point or range, with acceptable levels of probability.

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

Assessment
1.1.2 There is a robust assessment of the dynamics and status of the species/fishery and periodic review of the process and the data collected. Assessment should include a process to identify any reduction in biological diversity and /or reproductive capacity. Review should take place at regular intervals but at least every three years.
1.1.3 The distribution and spatial structure of the stock(s) has been established and factored into management responses.
1.1.4 There are reliable estimates of all removals, including commercial (landings and discards), recreational and indigenous, from the fished stock. These estimates have been factored into stock assessments and target species catch levels.
1.1.5 There is a sound estimate of the potential productivity of the fished stock/s and the proportion that could be harvested.

Management responses
1.1.6 There are reference points (target and/or limit), that trigger management actions including a biological bottom line and/or a catch or effort upper limit beyond which the stock should not be taken.
1.1.7 There are management strategies in place capable of controlling the level of take.
1.1.8 Fishing is conducted in a manner that does not threaten stocks of by-product species.
(Guidelines 1.1.1 to 1.1.7 should be applied to by-product species to an appropriate level)

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

Objective 2. Where the fished stock(s) are below a defined reference point, the fishery will be managed to promote recovery to ecologically viable stock levels within nominated timeframes.

Management responses
1.2.1 A precautionary recovery strategy is in place specifying management actions, or staged management responses, which are linked to reference points. The recovery strategy should apply until the stock recovers, and should aim for recovery within a specific time period appropriate to the biology of the stock.
1.2.2 If the stock is estimated as being at or below the biological and / or effort bottom line, management responses such as a zero targeted catch, temporary fishery closure or a 'whole of fishery' effort or quota reduction are implemented.

Principle 2
Fishing operations should be managed to minimise their impact on the structure, productivity, function and biological diversity of the ecosystem.

Objective 1. The fishery is conducted in a manner that does not threaten bycatch species.
Information requirements
2.1.1 Reliable information, appropriate to the scale of the fishery, is collected on the composition and abundance of bycatch.
Assessments
2.1.2 There is a risk analysis of the bycatch with respect to its vulnerability to fishing.

Management responses
2.1.3 Measures are in place to avoid capture and mortality of bycatch species unless it is determined that the level of catch is sustainable (except in relation to endangered, threatened or protected species). Steps must be taken to develop suitable technology if none is available.
2.1.4 An indicator group of bycatch species is monitored.
2.1.5 There are decision rules that trigger additional management measures when there are significant perturbations in the indicator species numbers.
2.1.6 The management response, considering uncertainties in the assessment and precautionary management actions, has a high chance of achieving the objective.

Objective 2. The fishery is conducted in a manner that avoids mortality of, or injuries to, endangered, threatened or protected species that are not targeted by the fishery, under provisions of the *Native Title Act 1993,* and avoids or minimises impacts on threatened ecological communities.

Information requirements
2.2.1 Reliable information is collected on the interaction with endangered, threatened or protected species, including information on interactions with targeted species and threatened ecological communities.

Assessments
2.2.2 There is an assessment of the impact of the fishery on endangered, threatened or protected species apart from those targeted by the fishery.
2.2.3 There is an assessment of the impact of the fishery on threatened ecological communities.

Management responses
2.2.4 There are measures in place to avoid capture and/or mortality of endangered, threatened or protected species not targeted by this fishery.
2.2.5 There are measures in place to avoid impact on threatened ecological communities.
2.2.6 The management response, considering uncertainties in the assessment and precautionary management actions, has a high chance of achieving the objective.

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

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

Assessment

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

1. Impacts on ecological communities
    - Benthic communities
    - Ecologically related, associated or dependent species
    - Water column communities

2. Impacts on food chains
    - Structure
    - Productivity/flows

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

Management responses

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

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

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

Definitions

The following defines how certain terms will be interpreted in application of the guidelines.

Associated and/or dependent species - species associated with or dependent upon harvested species, for example species which are predator or prey of the harvested species.

Biological diversity, biodiversity - the variability among living organisms from all sources (including marine and other aquatic ecosystems and the ecological complexes of which they are part). Includes 1) diversity within species and between species; and 2) diversity of ecosystems.

Bycatch - species that are discarded from the catch or retained for scientific purposes, and that part of the "catch" that is not landed but is killed as a result of interaction with fishing gear. This includes discards of commercially valuable species.

By-product - species that are retained because they are commercially valuable but are not the main target species.

Ecologically related species - species which, while not associated with or dependent upon a harvested species, nevertheless are affected by the fishing operation.

Ecologically sustainable - use of natural resources within their capacity to sustain natural processes while maintaining the life-support systems of nature and ensuring that the benefit of the use to the present generation does not diminish the potential to meet the needs and aspirations of future generations.

Ecologically viable stock - ecological viable stock has a general rather than a specific meaning. It refers to the maintenance of the exploited population at high levels of abundance designed to maintain productivity, provide margins of safety for error and uncertainty and maintain yields over the long term in a way that conserves the stocks role and function in the ecosystem.

Ecosystem - the biotic (living) community and its abiotic (non-living) environment.

Function - relationships between components of the ecosystem, without which individuals could not survive and/or reproduce. eg protection for juveniles provided by marine plants; trophic relationships.

Management regime - In this document, refers to the policies, plans, action plans, strategic research plans, and all documentation that relates to the operations and management of the fishery.
Overfishing - can be defined in two ways which can act independently or concurrently: 1) "recruitment overfishing", where fishing activities are causing a reduction in recruitment in succeeding years and cause the mortality of too many fish in total, too many pre-productive fish, or too many fish that have only spawned a few times. The end result is that the stock can no longer replenish itself adequately. 2) "growth overfishing": where fishing activities lead to a reduction in the size of the individuals of a species, as a consequence of which few specimens grow to the size for optimum yield.

Precautionary approach - used to implement the precautionary principle. In the application of the precautionary principle, public and private decisions should be guided by: 1) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment; and 2) an assessment of the risk-weighted consequences of the various options.

Precautionary principle - the lack of full scientific certainty should not be used as a reason for postponing a measure to prevent degradation of the environment where there are threats of serious or irreversible environmental damage.

Precautionary recovery strategy - Management and operational strategy, designed to increase numbers within the stock, that incorporates the precautionary approach and includes mechanisms to avoid or mitigate adverse ecosystem effects.

Productivity - when applied to fish stocks the term productivity gives an indication of the birth, growth and death rates of a stock.

Reference point - an indicator level of fishing (or stock size) to be used as a benchmark for assessment or decision making.

Stock - In the strict sense, a distinct, reproductively isolated population. In practice, a group of individuals of a species in a defined spatial range which is regarded as having a relatively low rate of exchange with others of the species.

Attachment 2: Current turtle and dugong-related research undertaken in the CRC Torres Strait Research Program

Research Sub-program	Project title	Project aims
Sustaining the harvest of marine resources	Information to assist Torres Strait Islanders manage their traditional fisheries for green turtles and dugongs in a sustainable manner	Collect ecological, social, economic and cultural information relevant to the development of community-based management for dugong and green turtles; Describe and quantify the major social, economic and cultural factors that affect hunting pattern, hunting effort, hunting success and harvest levels in two inner island communities; Trial and scientifically verify different methods of community-based catch monitoring; Describe the sex and reproductive status of dugong and turtle catches from these two communities; Evaluate the selectivity of turtle catches; Investigate the potential to use dugong husks to provide a record of major life history events.
Understanding ecosystem processes	Mapping and characteristics of key biotic and physical attributes of the Torres Strait ecosystem	Deliver baseline maps and other information – such as: i) seabed habitat and biodiversity, distribution and abundance; ii) seagrasses; iii) water column attributes; and iv) physical factors that drive the patterns in these ecosystems: needed to ensure that the TSPZ is sustainably managed.
	Biophysical processes in the Torres Strait marine ecosystem	Gain an improved understanding of the processes controlling the stability, turbidity, nutrient cycling and productivity in Torres Strait field measurements and integrated modelling; Investigate the Torres Strait's system of natural and man-made variability with emphasis on the changeability and sandwave migration in Northern Torres Strait, and its implications for seagrass distribution; and Inform related research on ecosystem characterisation and human activities on the ecosystem.
	Distribution and abundance of seagrass in the Torres Strait	Improve the understanding of ecological sustainability and conservation of threatened marine species in the Torres Strait by providing information about the distribution and abundance of intertidal and subtidal seagrass communities; Quantify productivity of intertidal and subtidal seagrasses in the central Torres Strait to better understand factors that affect growth and survival; and Provide information in a GIS format to develop a knowledge base of seagrass systems in the Torres Strait and to support regional marine planning.

……cont

Current turtle and dugong-related research undertaken in the CRC Torres Strait Research Program…(cont)

Research Sub-program	Project title	Project aims
Education	Torres Strait education programs: capacity building in marine science	To provide: i) capacity building support, via active community engagement, to existing education programs in the Torres Strait that are related to the marine environment; ii) information about higher education opportunities for Torres Strait Islanders that may lead to careers in marine science or natural resource management; iii) an increased appreciation of the unique traditional and cultural knowledge of Torres Strait Islanders and the value of that knowledge in regard to indigenous use and management of their marine ecosystems.
	Raising indigenous community awareness and promoting on-ground recovery activities for marine turtles and dugong in the Torres Strait	Satellite track dugongs in the Torres Strait; Promote the active involvement of indigenous people in monitoring the traditional harvest
	Education opportunities for indigenous involvement in ecosystem monitoring	Provide education and training opportunities for Torres Strait Islanders in the biological monitoring of marine plant habitat ecosystems; Contribute to scientific excellence in training and facilitate in the Torres Strait Islanders in a community-based marine habitat program for coastal management; Integrate education and scientific programs to contribute to the marine development of the Torres Strait.

Attachment 3: Status of Green Turtle Populations in South-East Asia and the Western Pacific

(based on Limpus (1997))

In a review of marine turtle populations in south-east Asia and the western Pacific, Limpus (1997) concludes that:

i) the Sarawak Turtle Islands (Malaysia) population has declined almost 90% in egg production since the 1930s due to near-total egg harvest, with the nesting population reduced to a few hundred females annually;

ii) the Sulu Sea Turtle Islands of Sabah (Malaysia/Philippines) has seen a decline in nesting population of more than 75%, and possibly as high as 90%, over a 33 year period from the 1951-1985. The nesting population, estimated at several thousand females annually, is now the largest remaining in south-east Asia;

iii) the Terengganu (Malaysian) population experienced a 57% decline in egg production over the 22 years 1956-1978, with the nesting population now reduced to several hundred females annually;

iv) the Pangumbahan/Cikepuh (Java, Indonesia) population has experienced a 90% decline in egg production in the past 35 years, the nesting population being reduced to a few hundred females annually;;

v) the Berau Islands (Indonesia) population has experienced an 80% dcline in egg production from 1934-1984, with the nesting population reduced to around 1000 females annually;

vi) the southern Aru Islands (Indonesia) population has been decimated in the past 20 years, mostly due to the harvest of nesting females, and reduced to a few hundreds annually;

vii) there is supposedly a large green turtle nesting aggregation in northern Papua, off the Indonesian coast, but no data is available. However, Limpus suggests that near total egg loss is likely due to harvest and egg predation; and

viii) in Thailand, the western nesting population has been decimated by egg predation/hunting to tens of females annually, and the northern nesting population - located inside a naval base security area - appears stable at around a few hundred nesting females annually.

Limpus found similar outcomes in the western Pacific:

ix) the breeding aggregation at the historically largest breeding grounds – Scilly Atoll in French Polynesia – have fallen by 90% in the last 20 years, to a few hundred females annually;

x) the Long Island rookery in Papua New Guinea likely to have dropped to below 1000 females annually; and

xi) several nesting sites in Palau, the Federated States of Micronesia and New Caledonia of a few hundred females annually, and smaller sites of tens of nesting females in Samoa and Fiji.

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