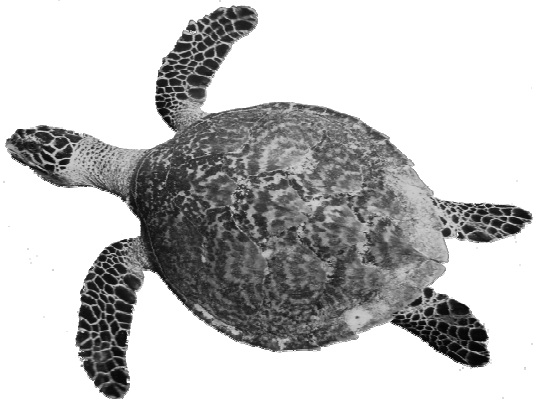
# Towards Sustainable Dugong & Turtle Tourism: The Key Issues



## DRAFT ISSUES PAPER

**Current at 13 May 2004**


**Alastair Birtles[1], Matt Curnock[1], Kirstin Dobbs[2], Dermot Smyth[3], Helene Marsh[1], Peter Arnold[4], Peter Valentine[1], Colin Limpus[5], Amanda Hodgson[1], Sarah Pierce[2], Matthew Taverner[1], Rhona Barr[1] & Dean Miller[1]**

[1]James Cook University
[2]Great Barrier Reef Marine Park Authority
[3]Smyth & Bahrdt Consultants
[4]Museum of Tropical Queensland
[5]Environmental Protection Agency Queensland



This project is being funded by the Natural Heritage Trust through the Commonwealth Department of the Environment and Heritage and aims to develop National Codes of Conduct for tourism activities involving dugong and marine turtles and establish World's Best Practice management of Australian dugong and turtle tourism.


Dugong image courtesy of the Great Barrier Reef Marine Park Authority. Turtle image courtesy of Undersea Explorer.

JCU
JAMES COOK UNIVERSITY

Natural Heritage Trust
*Helping Communities Helping Australia*

## TABLE OF CONTENTS

## LIST OF TABLES



## LIST OF FIGURES



## LIST OF APPENDICES

# 1. INTRODUCTION

Australia is one of the most biologically diverse countries in the world and its marine fauna includes many magnificent and highly charismatic animals such as the dugong and six of the world's seven species of marine turtle (loggerhead, green, hawksbill, flatback, leatherback and olive ridley). Some of the world's largest remaining populations of dugongs and marine turtles occur in Australia.

These animals are very special marine wildlife resources with a wide range of cultural and intrinsic values for Australians and many other people around the world. Dugongs and marine turtles have particularly profound cultural values for Indigenous Australians. They are also becoming increasingly important resources for tourism operators catering for both domestic and international wildlife enthusiasts.

However, Australian populations of dugong and marine turtle species are under pressure from a wide range of anthropogenic sources. All of these species are classified as threatened, either internationally, nationally or both. The challenges of growing coastal development, expanding use of the coastal zone for housing, industry, hunting as well as egg collecting, fisheries and recreation; faster and more numerous vessels and the continued decline in inshore water quality from litter, increased sediment and nutrient loads and other pollutants contribute to the wide range of threatening processes which face these relict populations of once more numerous species.

The long-term survival of both the Australian dugong population and the Australian marine turtle species currently or potentially subject to tourism is far from assured. The pressures on their survival are numerous and must not be increased by tourism. The tourism industry has a particular responsibility, if it takes the opportunity to use these remarkable natural assets for commercial tours, to ensure that their use is not only sustainable in and of itself, but that it contributes actively to the sustainability of the wildlife resources on which it depends. This lies at the core of current definitions of ecotourism.

One of the key aims of this Project is to help Australian tourism based on these species to become World's Best Practice. The Dugong and Turtle Tourism Project research team considers the sustainable management of tourism based on these species to be a highly topical, nationally important and very challenging applied research process. As such, a multidisciplinary approach is required.

Given our lack of knowledge of many aspects of the basic biology and behaviour of these species, of the impacts their populations face and, in particular, the nature and extent of the impacts of tourism, it is important to develop an Adaptive Research and Management framework which can be revised in a flexible and iterative fashion to ensure that management takes advantage of new research findings in a timely manner. There is also a need for management to take account of the precautionary principle.

The management framework should incorporate a full spectrum of management options, from regulations to voluntary guidelines. Many of these options may need to be considered on a case-by-case basis because they vary with species, location, industry

characteristics and the needs of Traditional Owners. In some cases it will not even be adequate to work on a species-specific basis, as the many stocks around Australia will make it necessary to take account of regional or local differences in wildlife biology and behaviour.

Birtles, et al. (2001) have highlighted the many differences in management between Commonwealth, State and Territory jurisdictions, and these need to be addressed within any truly national framework. The challenge will be to achieve a comprehensive and shared national framework which is implemented at a meaningful regional or local scale, taking account of the level of specificity referred to above.

It is important to get a comprehensive management framework in place as soon as possible. Small communities where wildlife tourism is focused in regional or remote areas may have little resilience to accommodate changes in practices or species sighting intervals (e.g. if species disappear). Once tourism becomes established, economic forces can dominate, especially if regional economies become dependent on such tourism.

Guidelines for the management of dugong and turtle tourism will need to address matters relating to Indigenous peoples' rights and responsibilities in their traditional marine estates, or "sea country". This Project provides a good opportunity to incorporate recognition of Indigenous peoples' rights and interests in marine management, at a scale appropriate to Traditional Owners of sea country.

The range of Indigenous cultural values associated with dugongs and turtles requires greater public awareness and there is the potential for these values to be interpreted as part of tourism activities, with the consent and involvement of Indigenous people. Such experiences are highly sought after by international tourists and can provide many opportunities for greater understanding among Australians.

High quality interpretation can play a number of vital roles in helping to achieve sustainable management. Dedicated dugong and turtle tourism can assist in minimising the impacts of visitors while also raising their environmental awareness and concern. It can also assist in raising broader community awareness of environmental issues. The iconic status of dugongs and turtles provides a particular opportunity to use them as flagship species to raise awareness of deteriorating conditions in many of their coastal habitats.

In order to ensure effective implementation of management, high quality research will be important in guiding both the content and delivery of interpretation for visitors, industry and the general public. This approach will be necessary for effective implementation of management. In particular, the very vulnerability of these long-lived species, which exhibit complex behaviours and often show both high site-fidelity and long distance migrations, can and should be used to develop respect for these remarkable animals. Only through widespread acknowledgement of that respect can their sustainability be assured.

Finally it is important to recognise the need to be careful not to over-manage. For example turtle tourism has existed for 70 years on Heron Island with no evident change

in the nesting behaviour of the turtle populations. Management should be based on the best possible science and the basis for any management constraints should be made explicit with any assumptions made clear.

# 2. THE DUGONG & TURTLE TOURISM PROJECT

## 2.1 Objectives

The objectives of the Dugong and Turtle Tourism Project are to:

1. Identify and prioritise potential threats from tourism related activities on dugongs and turtles;
2. Develop an issues paper on these threats and their sustainable management;
3. In consultation with Traditional Owners and key stakeholders (including the tourism industry, State, Territory and Commonwealth wildlife managers and researchers), to refine the issues paper and develop draft Codes of Conduct for the management of threats from tourism related activities on dugong and turtles; and
4. Conduct a planning workshop to refine the Codes and commence planning of field evaluation trials.

The core business of the Project is to develop draft national codes of conduct to manage dugong and turtle tourism in Australia on a sustainable basis encompassing the full range of environmental, socio-cultural and economic elements of ecological sustainability.

To be effective, such national codes must take account of a wide range of local and regional scale differences in Traditional Ownership, tourism development, design of tourism operations, local community organization, management regimes, biology and behaviour of target wildlife species and marine and coastal conditions. Their implementation must therefore be designed to take account of such variability.

The Planning Workshop will play a crucial role in developing and refining the codes and advising on how best they can be implemented at appropriate scales. The wide cross-section of participants will assist particularly in the identification of gaps in the Key Issues identified in the Issues Paper and ensuring that the perspectives of the broadest possible range of stakeholders are included in the development and refining of the codes. It is anticipated that a range of protocols will be developed to convey Best Practice implementation across a wide range of issues.

## 2.2 Draft Issues Paper

The purpose of this Draft Issues Paper is to highlight key issues for the sustainable management of dugong and turtle tourism. It sets out to provide background information for Planning Workshop participants; provides resource material for further analysis during the Workshop itself and explores how some of these issues can be addressed. It defines the scope of the Project, considers the wide range of threatening processes currently or potentially affecting these species, collects together information on legislation and regulations operating to manage dugong and turtle tourism in the various

state, territory and Commonwealth jurisdictions. It also describes the scale of current dugong and turtle tourism in Australia.

The Paper identifies a need to include the management frameworks for the full range of interactions including a wide range of commercial operations on turtle nesting beaches (e.g. 4WD tours, large visitor centres and remote areas), underwater (e.g. SCUBA and snorkel divers), a range of different kinds of boat-based interaction platforms (e.g. kayaks, sailing vessels and motorised craft), from the air (fixed wing and helicopter) and also the individual tourist/recreationist.

## 2.3 Aims and Objectives of The Planning Workshop

The aims of the Workshop are:

1. to clarify and agree on the key issues surrounding tourism based on dugong and marine turtles in Australia;
2. to develop draft codes of practice for the sustainable management of Australian dugong and turtle tourism;
3. to develop initial protocols for effective implementation of the codes of practice; and
4. to plan subsequent field evaluations of the draft Codes in 04/05.

The objectives of the Planning Workshop include reviewing the Issues Paper material and incorporating the input from as wide a cross-section of stakeholders as possible into the development of draft Codes of Conduct. It will also commence planning of the subsequent field evaluation trials that have been proposed for 2004/05.

The need to involve all stakeholder groups in an open and transparent process in order to ensure the best possible outcomes is central to the aims of the Planning Workshop. It is also a crucial step in the development of real understanding of the perspectives of the other stakeholders and thus in arriving at agreed and practical outcomes. This process is also important in developing a sense of ownership for the resulting Codes of Conduct. This is vital for implementation and compliance because in many cases, apart from the tourists (visitors/passengers), the tourism industry personnel are the only people present at the remote locations where many of these interactions occur. The tourists themselves are becoming an increasingly discerning market with well developed understanding of appropriate behaviour around wildlife and of broader sustainability issues, but this can be enhanced by appropriately targeted interpretation. Such interpretation can be developed by researchers and managers but usually depends on the tourism industry for delivery – making them vital partners in ensuring the more sustainable management of their operations.

The more detailed objectives of the Project and therefore of the Planning Workshop include:

- To develop and refine draft codes of conduct for dugong and all Australian species of marine turtle which address the full range of types of operation (shore-based, boat-based (including all types of vessel), swim-with and aerial).

- These codes should be aimed at not only commercial operators and their clients/passengers but individual tourists and private recreational wildlife enthusiasts.

- These codes should be adapted to provide draft codes of conduct for the broader community of coastal and marine users (e.g. commercial and recreational fishers, recreational boat users, etc.) to minimise their incidental impacts on dugong and turtles.

- To develop and refine recommendations for comprehensive Adaptive Research and Management Frameworks for all types of dugong and turtle tourism.

    - These should include a full range of management provisions ranging from recommendations on legislation and/or regulations through to voluntary codes of conduct.

    - To develop and refine mechanisms to enhance or ensure compliance. A wide range of options for this lie between the two extremes of regulation and self-regulation.

    - To develop and refine processes to regularly review and thus improve these Adaptive Research and Management Frameworks which will ensure that they remain World's Best Practice and incorporate new research findings in a timely and effective manner.

- Develop protocols for implementation of these draft codes at appropriate scales for all issues which are identified as key for achieving sustainable management.

    - Make recommendations on Best Practice interpretation for most effective management of dugong and turtle tourism.

    - Make recommendations for other research and management priorities to achieve sustainable management of dugong and turtle tourism.

- Scope subsequent field evaluations of these draft codes and develop preliminary designs for such field trials.

### 2.3.1 Structure of Workshop

See attached Draft Agenda (Appendix 1).

# 3. DUGONG AND TURTLE TOURISM IN AUSTRALIA

## 3.1 Tourism opportunities and responsibilities

Tourism based on viewing and interacting with coastal and marine wildlife is one of the fastest growing sectors of Australia's tourism industry (Birtles, et al., 2001). The potential for further growth in this industry however will depend on efforts to ensure that such natural resources are managed to be both ecologically and economically sustainable. The increasing focus of tourism on wildlife-based activities often involves interactions with species for which ecological and behavioural patterns are poorly understood (e.g. whales and dolphins). While the current scale of dugong and turtle tourism (See Section 3.2) is far smaller than that of whale watching (with an estimated 9 million participants worldwide in 2000; Hoyt, 2000), there is potential for significant growth and therefore an urgent need to develop, apply and evaluate an appropriate management framework to ensure that the effects of all types of tourism activities, whether dedicated or incidental, involving these vulnerable and endangered species are sustainable.

### 3.1.1 Types of dugong and turtle tourism

Commercial tour operators undertake a wide variety of activities, which may include a dedicated effort to view or interact with dugong and/or marine turtles, or include such interactions on an incidental basis, as part of a broader wildlife or special interest tour.

Types of activities include scenic boat cruises, four-wheel-drive tours, air charter tours, shore/beach-based observations, island and reef trips, glass-bottomed boat rides, sea kayak tours, snorkel and diving trips, and marine thrill rides. Trips may last an hour or less, or extend for a few days, weeks, or even months. The sizes and types of vessels used vary accordingly (Dobbs, 2001).

### 3.1.2 Impacts of tourism on dugong and marine turtles

The increasing growth of wildlife tourism has raised concerns about the long-term effects of human interaction on the target animals' behaviour. Ananthaswamy (2004) notes several studies on marine species which have documented changes to the animals' heart rate, physiology, stress hormone levels and social behaviour in association with tourism activities.

Potential impacts on dugong and marine turtles from tourism will depend on where the activities occur (e.g. in the water, on land), and may include:

- Accidental ingestion of or entrapment in marine debris
- Deliberate or reckless killing or injuring
- Disease
- Noise
- Harassment
- Physical displacement
- Physical habitat degradation or destruction

- Pollution
- Vessel strikes

Tourism operations do not necessarily have to focus their programs on dugongs or turtles in order to have an impact on the animals. If a particular location is popular with tourists and is also a key habitat for the animals, there is the potential for negative impacts. Within the Great Barrier Reef Marine Park alone, 1674 individual craft were permitted to operate in 1998 (Wachenfeld et al., 1998), and some craft are capable of carrying over 400 tourists (Harriott, 2002). While the current scale of dedicated dugong and marine turtle tourism in Australia may be much smaller (see Section 3.2 for current scope in Australia) the potential for incidental impacts of tourism on a larger scale is quite real.

## 3.2 Scope of existing tourism activities for dugong and marine turtles in Australia

In order to understand the scope of current tourism activities in Australia which involve dugong and/or marine turtles, a web search of tourism operations advertising dedicated or incidental sightings or interactions with dugong and/or marine turtles was conducted in March 2004 (Table 3.1 and see Appendix 4 for full list of operations).

Information on Australian tourist operators offering interactions with either dugong or turtles was gathered via searches of the Internet. A systematic search for such tourist operators was conducted using Google™ Australia search engine, searching all Australian pages. Keywords included "wildlife of interest for marine tourism" (i.e. 'dugong', 'turtle'), "activities offered by tourist operators" (i.e. 'tours', 'watching') and "Australian State/Territory". One, or a combination of these key words was used at any one time. The first 200 resultant links of each web search conducted were examined with all possible sites of interest being further investigated, including all following links. The URLs of relevant web sites were recorded and the pages of the site examined for content. Finally a few additional operations not found in this search were added.

***Dedicated tours vs incidental interactions***
Tourist operators were sorted by state and divided into either dedicated or incidental operators. Dedicated tour operators were defined as those who advertised that an active search would be made for the target species during the tour. Incidental tour operators were those advertising the presence of the species in surrounding waters and/or offering possible sightings, but who did not advertise that the operator would actively seek out the species. The separation of these two operator types was sometimes difficult; some tours which offered similar experiences were categorised differently due to wording on the web pages. For example beach walks that advertised possible turtle sightings were regarded as incidental, however a beach walk advertising that turtle spotting would take place was regarded as dedicated. Note that this classification differs slightly from that used by some management agencies where the existence of a website is interpreted as advertising and hence results in designation as a dedicated operator.

The advertised tours were also categorised as boat-based, kayak-based, shore-based or 'swim-with' tours. Kayak-based tours were distinguished from other boat-based tours as

these smaller craft, with their quietness and greater degree of manoeuvrability, allow for closer interactions with target species. 'Swim-with' tour operators are those advertising the possibility of swimming with the target species or dive operators, which by their very nature offer swim-with opportunities.

Table 3.1 summarises the operators separated into state, tour and operation type with reference numbers(n) corresponding to the list of operators provided in Appendix 4. The geographic distribution of these operations are also shown in Figure 1.

### 3.2.1 Summary description of results

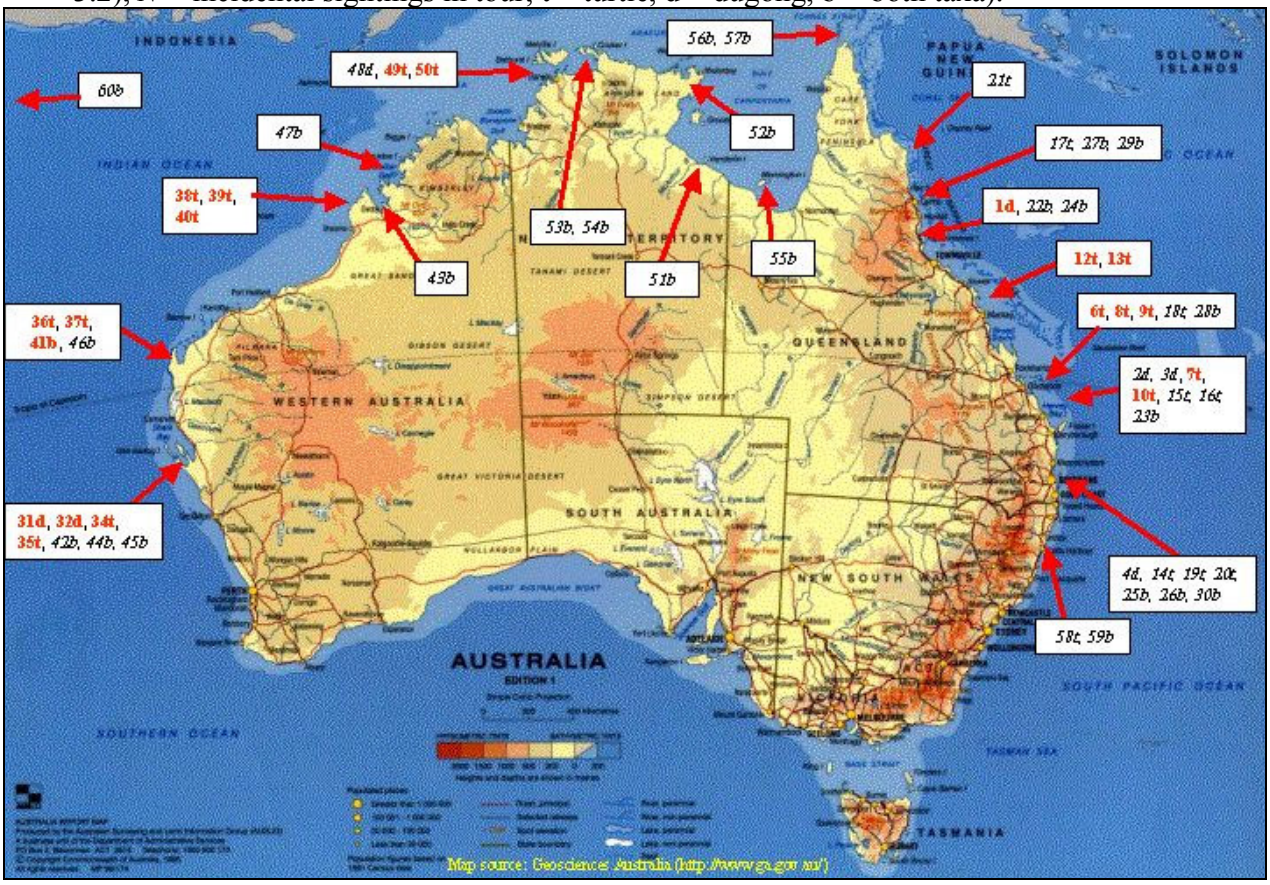
Of the 60 operators listed advertising possible interactions with dugong and/or turtles, 58 were found through the web search and one was found via an article in ScubaDiver Australasia[61] (Table 3.1). One operator did not have a web site but was found through their permit details provided by the Great Barrier Reef Marine Park Authority from the management questionnaire[62] (Appendix 4).

**Table 3.1: Summary by state of tourist operators offering dedicated or incidental interactions with dugong and/or marine turtles (Data as at end of April 2004)**

| Dugong | Queensland | Western Australia | Northern Territory | New South Wales | Australian External Territory: Cocos (Keeling) Islands | Totals |
|---|---|---|---|---|---|---|
| Dedicated | 1 boat-based operator[1] [a] | 2 boat-based operators[31,32] [j] | | | | 3 |
| Incidental | 3 boat-based operators[2,3,4]<br>1 aircraft operator[5] | 1 aircraft operator[33] | 1 boat-based operator[48] [f] | | | 6 |
| **Turtle** | | | | | | |
| Dedicated | 6 shore-based operators[6,7,8,9,10,11]<br>2 kayak-based operators[12,13] [b] | 7 shore-based operators[34,35,36,37,38,39,40] [d] | 2 shore-based operators[49,50] [d] | | | 17 |
| Incidental | 2 shore-based operators[14,15]<br>1 boat-based operator[16]<br>5 'swim with' operators[17,18,19,20,21] | | | 2 boat-based operators[58,59] [h] | | 10 |
| **Both taxa** | | | | | | |
| Dedicated | | 1 shore and boat-based operator[41] | | | | 1 |
| Incidental | 6 boat-based operators[22,23,24,25, 55, 57] [g]<br>1 kayak-based operator[26]<br>2 aircraft operators[27,57]<br>3 'swim with' operators[28,29,30] [c] | 2 boat-based operators[42,43]<br>3 kayak-based operators[44,45,46] [e]<br>1 aircraft operator[47] | 1 shore-based operator[51]<br>3 boat-based operators[52,53,54] | | 1 'swim with' operator[60] [i] | 23 |
| **Totals** | **33** | **17** | **7** | **2** | **1** | **60** |

a. This operator did not have a web page.
b. Both these operators advertise dedicated turtle tours however one mentioned the possible sightings of dugong.
c. One of these 'swim-with' operators was discovered and included due to an insert from a past tourist on a backpacker magazine's web page. Another mentioned diving which 'sometimes' may encounter a dugong.
d. One of these was a research-based operation which took paying volunteers.
e. These kayak operators implied that snorkelling was possible.
f. A boat operator offering fishing trips but has a piece on their web site describing involvement in a traditional dugong hunt.
g. Air operator that advertised possibility of locals 'taking you hunting for dugong'.
h. One operator advertised boat trip with possible sightings but photo on web suggestive that 'swimming-with' may be possible.
i. This operator was found through an article in ScubaDiver Australasia
j. These dedicated dugong tours also offer incidental turtle viewing

**Figure 1: Distribution of dugong and turtle tourism operations in Australia** (based on web search results, as at March 2004; **N** = dedicated tour (see definition in Section 3.2), *N* = incidental sightings in tour; t = turtle, d = dugong, b = both taxa).




## Map Legend:

| No. | Company name | No. | Company name | No. | Company name |
|---|---|---|---|---|---|
| 1 | Hinchinbrook Dugong & Island Cruises | 21 | Daintree Air Services | 41 | Ningaloo Reef Adventure Camps |
| 2 | Whalesong Cruises | 22 | Hinchinbrook Island Lodge & Wilderness Cruises | 42 | Shark Bay Charter Services |
| 3 | Luxury Afloat Houseboats | 23 | Fraser Island Rent-A-Yacht | 43 | Sunday Island Adventure Resort |
| 4 | Baracuma Charter Yachts | 24 | Hinchinbrook Explorer Fishing & Eco Tours | 44 | Capricorn Kayak Tours |
| 5* | Reid Heliwork | 25 | Cheetah Yacht Charters | 45 | Western Blue Sea Kayak |
| 6 | P&O Australian Resorts | 26 | Aussie Sea Kayak Tours | 46 | Crazycroc Kayaking |
| 7 | Mon Repos Conservation Park | 27 | Hot Air Cairns | 47 | North Star Charters |
| 8 | Lady Elliot Island Resort | 28 | Keppel Reef Scuba Adventures | 48 | Happy Micks Fishing & Camping |
| 9 | P&O Australian Resorts | 29 | Seahorse Dive | 49 | Odyssey Ed Ventures |
| 10 | Footprints Adventures | 30 | Pro Diver | 50 | Tiwi Tours |
| 11* | Jarmbie Overland Adventures | 31 | Shotover | 51 | Wildgulf Tours |
| 12 | Sea Kayaking Whitsundays Ocean Adventure | 32 | Monkey Mia Yacht Charter | 52 | Walk About Lodge |
| 13 | Ozone Adventures | 33* | Slingair Heliwork | 53 | Venture North |
| 14 | Moreton Bay Escapes | 34 | Landscope Expeditions | 54 | Gurig Nature Experience |
| 15 | Kelly's Beach Resort | 35 | Outback Coast 4WD Tours and Charter | 55 | Kirkhope Aviation |
| 16 | Ocean Waves Hervey Bay | 36 | | 56 | Carpentaria Seafaris Fishing Holidays |
| 17 | Mike Ball Dive Expeditions | 37 | Coral Bay Ecotours | 57 | Cape York Helicopters |
| 18 | Aquasports & Dive | 38 | Australian Pacific Touring | 58 | Imagine Port Stephens |
| 19 | Stradbroke Island Holidays | 39 | Barrimundi Moon | 59 | Pacific Explorer |
| 20 | Stradbroke Island Scuba Centre | 40 | Truly Australia | 60 | Cocos Dive |

* These operators are not shown on the map as the exact location of the tour was not known.

### 3.2.2 State by state summary of operators

***Queensland***

Queensland offered the highest number of tourist operators advertising turtle and dugong interactions (33), with nine tours being classified as dedicated and 23 tours as incidental.

Eight of the nine dedicated tours were turtle operations. Five were shore-based operations and occurred at Heron Island[6], Mon Repos[7,10], Lady Elliot Island[8] and Wilson Island[9]. A further operation[11] offered 4WD tours along the east coast of Australia operating between Cairns and Sydney. These tours are seasonal and offered the opportunity to view nesting sea turtles (November to February) and hatchlings returning to the ocean (between January and March). Two dedicated sea kayak-based turtle tours were found in the Whitsunday region of the GBR, based on Hamilton Island[12] and at Airlie Beach[13].

A single dedicated dugong boat-based tour operates around Hinchinbrook Island from Cardwell. This operator has no web site but was included as details of the GBRMPA permit were provided through the Management Policy Questionnaire (Appendix 2).

Ten of the incidental tours were boat-based. One operator offered turtle sightings[16], three offered dugong sightings[2,3,4] and six offered the chance to view both groups [22,23,24,25,55,56]. One of these was an air operator who advertises the possibility of being taken out on local hunts at one of the islands visited en route[55]. A further operation conducting kayaking tours offered incidental sightings of both dugong and turtles[26]. Three operators offered sightings from the air. One was a helicopter operator offering potential dugong sightings[5], one was a helicopter operator offering potential sightings of both taxa[57] and the third offered potential sightings of both from a small plane[27].

Eight incidental 'swim with' operator web sites were found. Five of these offered the opportunity to swim with turtles[17,18,19,20,21]. Four of the five were dive operators on the Great Barrier Reef[17,18,19,20]. These operations advertised the possibility of encountering marine turtles whilst diving or snorkelling on the GBR, and it is likely that many more dive operators experience in-water incidental encounters with marine turtles. This figure is therefore likely to be a substantial underestimate.

Three dive operators offered 'swim with' possibilities with both dugong and turtles[28,29,30]. One was a Brisbane-based company[30] advertising dive trips visiting the Comboyuro Drop-off (dive site) near Brisbane, where sightings of turtles and dugong are possible. This operator's web site also contained a photograph of a diver holding onto a swimming turtle. One of the swim-with operators (28) was found via a tourist's recollection of events posted upon a backpacker's magazine web page. The backpacker tells of how, after swimming with turtles, the boat passed a dugong and the skipper asked "who wants to snorkel with a dugong?" [28]

Two incidental tour operators offering encounters with both taxa were located in Torres Strait. One was a boat-based fishing operator[56]; the other was a helicopter tour operator[57].

***Western Australia***

Western Australia had the second largest number (17) of tourist operators advertising turtle and/or dugong interactions, of which ten were dedicated tours. The majority of these (7) were classified as seasonal shore-based turtle watching tours coinciding with the turtle nesting season. Five were beach-based dedicated tours, two based on Dirk Hartog Island,[34,35] one at Exmouth,[36] one at Coral Bay,[37] and one on the east coastline of the Dampier Peninsula.[39] One of the Dirk Hartog operators[34] differs from the others in that it is a research-based volunteer program run by the University of Western Australia and the Department of Conservation and Land Management (CALM). The remaining two operators offer dedicated tours to turtle nesting beaches based on the Lacepede Island.[38,40]

There were only two dedicated dugong tour operators based in Western Australia and both were boat-based, allowing tourists to view dugong from the boat deck[31,32]. These operated in Monkey Mia, Shark Bay and also offered incidental turtle sightings.

Only one operator was dedicated to both dugong and turtle, and was located at Ningaloo, Western Australia[41]. This operation was an adventure camp which offered a number of boat and shore-based dedicated tours with different marine species.

Only one aircraft operator offered incidental dugong sightings (specific location unknown), with possible viewing during a three-day air safari[33].

The majority of incidental operators (6/7) in Western Australia offered the possibility of seeing both dugong and turtles. Two were boat-based[42,43] and a further three were kayaking tours[44,45,46]. These three kayak operators also all advertised the possibility of snorkelling and thus have the potential to be 'swim-with' operations. The final operator was a cruise operator which also offered helicopter rides over Montgomery Reef where possible dugong and turtles sightings were advertised[47].

***Northern Territory***

A total of seven tours were found to operating in the Northern Territory. Two were classified as dedicated turtle tours and both were shore-based operators[49,50]. One, on Bathurst Island, conducted beach-based walks in search of turtle nests[50]. The other was a beach-based research expedition which offered places to paying volunteers on Bare Sand Island, Darwin Harbour[49].

Five operators offered incidental encounters in the Northern Territory. One boat based operator[48] actually offered fishing excursions around the Northern Territory but was included because of an excerpt on their web page, which describes how on one fishing trip the boat picked up local Aboriginal hunters, whose boat had broken down, and then helped conclude the dugong hunt.

The remaining four operators offered incidental interactions with both dugong and turtles. While one was a shore-based operator[51], advertising sightings on beach walks, the other three were boat-based operations[52,53,54].

***New South Wales***
Only two operators were found advertising incidental sightings of marine turtles in New South Wales. Both were boat-based operations. One was based at Port Stephens[58], the other offered tours in and around Solitary Island Marine Park[59]. Although the latter advertised as a boat-based tour, it also includes possible snorkelling opportunities.

***Australian External Territories***
One swim-with operator advertising incidental tours with both dugong and turtles in the Cocos (Keeling) Islands was found[60]. This operator was discovered through an article in ScubaDiver Australiasia[61] and their web site information was added to the results.

## Section 3: Some Key Issues

**1. Many tour operators offer interactions with other wildlife species as well as dugong and marine turtles (e.g. nesting turtles with seabirds, inshore dolphins with dugongs, multi-species trips).**

- **What particular management challenges do these present?**

**2. What potential tourism activities could be developed for each species?**

**3. Many tour operators offer a range of activities (e.g. snorkelling, diving, fishing, fish feeding) that may result in incidental impacts. What additional threats might be posed by such activities, including:**

- **direct threats (e.g. boat strike) ?**
- **indirect threats (e.g. effects on habitat, noise or pollution) ?**

**4. Following the principles of ecotourism, how can dugong and turtle tourism contribute directly or in-kind to maintenance of the resource on which it is based?**

# 4. CURRENT MANAGEMENT OF DUGONG AND TURTLE TOURISM

## 4.1 Legislation and policy

In March 2004 a questionnaire was sent to Commonwealth, State and Territory management agencies around Australia to determine existing management and legislative frameworks at state and national level (Questionnaire attached as Appendix 2). These management agencies included: the Commonwealth Department of the Environment & Heritage (DEH), the Great Barrier Reef Marine Park Authority (GBRMPA), the Department of Conservation & Land Management (CALM) Western Australia, Parks and Wildlife Commission Northern Territory (PWC NT), Environmental Protection Agency (EPA) and Queensland Parks & Wildlife Service (QPWS), New South Wales Parks and Wildlife Service (NSW PWS) and New South Wales Marine Parks (NSW MP). Managing agencies were asked to highlight current codes of practice, voluntary guidelines and permitted tourism operations. They were also asked to identify general permit conditions that applied to dedicated commercial tourism operations and the types of management actions relating to incidental tourism interactions with the target species. A more detailed analysis of the results of the questionnaire is summarised in Appendix 3.

**Table 4.1: Existing legislative and policy framework for free ranging marine wildlife tourism permits**

| Jurisdiction | Department | Dugong | Turtle | Legislation | Comments |
|---|---|---|---|---|---|
| ***Commonwealth*** | | | | | |
| Great Barrier Reef Marine Park | Great Barrier Reef Marine Park Authority | Yes | Yes | *Great Barrier Reef Marine Park Act 1975*<br>*Great Barrier Reef Marine Park Regs. 1983* | Subject to GBR Zoning Plans<br>Permits assessed on case by case basis<br>Plans of Management, Policy |
| Australian External Territories | Department of the Environment and Heritage | Yes | Yes | *Environment Protection & Biodiversity Conservation Act 1999* | Enforceable within C'wlth waters & C'wlth Marine Protected Areas |
| ***State*** | | | | | |
| Western Australia | Department of Conservation and Land Management | Yes | Yes | *Wildlife Conservation Act 1950,*<br>*Wildlife Conservation Regulations 1970 (Reg.15)*<br>*Wildlife Conservation Notice 1998*<br>*Conservation & Land Management Regs. 2002* | - |
| Northern Territory | Parks & Wildlife Commission | Yes | Yes | *Parks & Wildlife Conservation Act 2001* | Permits assessed on case by case basis |
| Queensland | Environmental Protection Agency; Parks & Wildlife Service | No | No | *Marine Parks Act 1982*<br>*Nature Conservation Act 1992*<br>*Nature Conservation & Other Legislation Amendment Regulation 2003* | Current legislation does not permit dedicated dugong or turtle watching tourism |
| New South Wales | Marine Parks Authority NSW | No | Yes | *Marine Parks Regulation 1999, Clause 24* | Non-dedicated multi-species tour permits within Marine Parks |

### 4.1.1 Permits and conditions

Dedicated and advertised tourism operations involving both dugongs and turtles require permitting either by State, Territory or Commonwealth authorities. The physical location of the tourism operations determines whether State or Commonwealth legislation is relevant (as per Table 4.1).

Current levels of licensing and permitting being undertaken by either state or federal bodies to guide dedicated dugong and turtle commercial tourism activities are limited. The largest number of permits have been issued in Western Australia with a total of six tourism licences in effect – two for dugong watching and four permits for dedicated turtle tourism activities. Permissions for both dedicated dugong and turtle tourism activities in WA have shown a decline in numbers of permits issued in recent years. The Northern Territory has one current licence permitting land based turtle watching tourism and GBRMPA have issued a Commonwealth permit allowing vessel-borne dugong watching activities on a test case basis in the Hinchinbrook area of North Queensland.

There are three turtle watching tourism operations permitted by the Commonwealth on the National Nature Reserves of Coringa-Herald & Lihou Reefs in the Coral Sea. These Commonwealth Marine Protected Areas are permitted by DEH. In the Ningaloo Marine Park, DEH have also issued sixteen permits to fishing charter boats – from which incidental interactions are occasionally reported. A summary of licences in comparison with numbers of operators found via a web search in Table 4.2.

**Table 4.2. Current number of operators advertising dedicated or incidental sightings on the Web (from Table 3.1) compared with the current permitted (dedicated/advertised and incidental) dugong and turtle tourism operations.**

| | Dugong | | | Turtle | | | Both Turtle & Dugong | | |
|---|---|---|---|---|---|---|---|---|---|
| **State** | **No of operators (web)*** | **No of permitted operations** | **Permit Status** | **No of operators (web)*** | **No of permitted operations** | **Permit Status** | **No of operators (web)*** | **No of permitted operation** | **Permit Status** |
| **WA** | 2d | 2 (Limited to Shark Bay) | Down from 5 in 1998 | 7d | 4 (Limited to Pilbara coast) | Down from 5 in 2003 | 1d 6i | - | - |
| **WA** Permits issued by DEH | | - | - | | - | - | | 16[a] (Limited to Ningaloo Reef, WA) | Current |
| | | | | | | | | | |
| **NT** | 1i | 0 | - | 2d | 1 (Unspecified turtle nest area) | Inactive | 4i | - | - |
| | | | | | | | | | |
| **QLD** (within GBRMP) | 1d | 1 (Limited to Hinchinbrook area) | Current test case | 5d 3i | 0 | - | 5i | - | - |
| **QLD** (other) | 3i | 0 | - | 2d 5i | 0 | - | 7i | - | - |
| **QLD** Permits issued by DEH | | - | - | - | 3 (Limited to Coral Sea) | Current | | - | - |
| | | | | | | | | | |
| **NSW** | 0 | 0 | - | 2i | 0 | - | 0 | - | - |
| **Totals** | **7** (3d + 4i) | **3** | | **26** (16d + 10i) | **8** | | **23** (1d + 22i) | **16** | |

* see Section 3.2 for description and definitions.

[a] denoted DEH licences for "charter fishing, and interactions with dugong and turtle are limited."

**Section 4.1: Some Key Issues**

**1. Should definitions of dedicated and incidental operations be standardised?**

**2. Is advertising the potential presence of particular target species (such as dugong or turtles) enough to classify an operation as dedicated and hence require a permit?**

**3. Should management be extended to incidental un-permitted activities? How?**

**4. What changes in legislation (Commonwealth, state and/or territory) might be necessary and how might these be achieved?**

**5. Are any changes in regulations necessary?**

### 4.2 International management initiatives

Dugong and especially marine turtle tourism is growing world-wide and manatee tourism (including swim-with programs) is increasingly popular. Many lessons can be gained from analysis of these interactions including both positive management initiatives and things to avoid. If Australia is to develop World's Best Practice then its management framework must be benchmarked against international research and case studies of management. This must be reviewed on a regular basis and the results incorporated into an Adaptive Research and Management Framework.

Some recent international initiatives include:

***Turtles in the Caribbean Overseas Territories (TCOT)***
http://www.seaturtle.org/mtrg/projects/tcot/ are developing a Leaflet on Turtles & Tourism - As part of the TCOT Initiative with additional support from marine turtle species champion, Cheltenham & Gloucester, an information leaflet is being produced and distributed. They have posted a draft version to allow project partners to view and give feedback to allow the leaflet to be modified to yield best results.
http://www.seaturtle.org/mtrg/projects/tcot/Tourism.pdf

***INSULA International Scientific Council for Island Development***
Tools for managing sustainable tourism Codes of conduct:
http://www.insula.org/tourism/pagina_n9.htm

***Guide for Turtle Watching in Trinidad and Tobago***
These are included on the Codes of Conduct for Ecotourists page at the Bristol Group for Tourism Research and Marine Ecotourism for the Atlantic Area website:
http://www.tourism-research.org/pgdecoist.doc.

***Mediterranean turtle interactions***
MEDASSET (2000); ARCHELON-Sea Turtle Protection Society of Greece
http://www.archelon.gr/

***The Old Earth Island Institute Sea Turtle Restoration Project***
Produced some material for Caribbean coast turtles in Costa Rica, also possibly Belize/Mexico
http://www.seaturtles.org/

***Conservation Corporation***
(Costa Rica) www.cccturtle.org

***One World Workforce***
(Mexico) www.1ww.org

***Earthwatch***
(Australia, Costa Rica and Mexico) www.earthwatch.org

**Section 4.2: Some Key Issues**

**1. What lessons can be learned & adopted/adapted to Australian situation?**

**2. What flow on effects (positive, negative e.g. from increased development, litter) of tourism on local economies need to be considered?**

**3. How best can actions of the various organisations be integrated to achieve a consistent policy on tourism activities?**

# 5. BIOLOGICAL CHARACTERISTICS RELEVANT TO MANAGEMENT OF TOURISM ACTIVITIES

## 5.1 Dugongs

### 5.1.1 Biology and life history

Dugongs are long-lived (up to 70 years), slow to reach maturity (6 to 17 years of age for females), and have long and variable calving intervals (females produce one calf every 2.4 to 7 years). This life history results in a slow rate of maximum population increase (<5% per year; summarised in Marsh et al., 2002; Marsh et al., 2003). As population increase is most sensitive to changes in the survival probability of adults, dugong populations are vulnerable to even small numbers of mortalities, such as those caused by collisions with boats.

***Small and large-scale movements***
Individualistic local-scale movements of dugongs occur in response to seasonal water temperature changes at the southern limits of their range in Australia. In Shark Bay, dugongs are known to inhabit the eastern, or shallow inshore side of the bay during summer, and in winter move to the western, deeper side of the bay where the temperature remains higher (Anderson, 1986; Marsh et al., 1994; Gales et al., *in review*). Similarly, dugongs in Moreton Bay generally remain inside the bay during summer, but are often found outside of the bay during winter (Preen, 1992). Current research shows similar patterns in Hervey Bay (J. Sheppard, *pers. comm.*). There is increasing anecdotal evidence of dugongs seeking refuge in warmer areas such as deep channels in winter at the high latitude limits to their range.

On a larger scale, dugongs show considerable variation in their movement patterns. Satellite tracking studies indicate that some individuals reside in relatively small areas, while others undertake large-scale movements. One individual migrated between areas that were over 140 km apart, three times in less than seven weeks (Marsh & Rathbun, 1990). The movements of another dugong spanned some 800 km of the Queensland coast (Preen, 2001). Dugongs can also undertake long-distance movements across oceanic waters (Marsh *et al.*, 2003). It is likely that these large-scale movements are a response to changes in seagrass quality, caused by events such as cyclones, floods and outbreaks of toxic algae (e.g. *Lyngybya*, sp). Given this capacity for large-scale movements and the emerging genetic evidence for connectivity between dugong populations (Brenda McDonald pers comm. 2004), it is important that activities that may have negative impacts on dugongs are managed at regional, or indeed international, scales (Marsh *et al.*, 2003).

Time series of aerial surveys of the Torres Strait, Queensland, Northern Territory and Western Australia provide indirect evidence of large-scale movements as dugong abundance fluctuates over huge spatial scales (Marsh & Lawler 2001; 2002). Despite these changes, there are persistent areas of high dugong abundance.

### 5.1.2 Conservation status

***International***
Classified as vulnerable to extinction by the IUCN
***Australian***
- *Environmental Protection and Biodiversity Conservation Act 1999*: 'listed migratory' and 'listed marine species' ("it is an offence to kill, injure, take, trade, keep, or move any member of a listed migratory or listed marine species on Commonwealth land or in Commonwealth waters without a permit, which can only be issued where the Minister is satisfied that, inter alia, the action will not adversely affect the Conservation status of that species or a population of that species.")
- *Threatened Species Conservation Act NSW 1995*: endangered
- *Nature Conservation Act QLD 1992*: vulnerable
- *Territory Parks and Wildlife Conservation Act 2000*: near threatened (i.e., not considered threatened)
- *Wildlife Conservation Act WA 1950*: protected

Dugong numbers have declined in most of the 37 countries and territories where they occur, such that only relict populations separated by large distances remain in most areas (Marsh et al., 2002). In Australia, numbers have declined in some areas (notably the urban coast of Queensland) as a result of habitat degradation, entanglement in fishing and shark nets, and Indigenous hunting (Marsh et al., 2001a). Even in remote areas, such as Torres Strait and off the coast of Cape York, the present levels of human induced mortality are considered unsustainable (Marsh et al., in press).

### 5.1.3 Biological/behavioural characteristics of dugong relevant to management of tourism activities

***Habitat requirements***
Dugong distribution is primarily dependent on seagrass, and as a result dugongs mainly occur in relatively shallow and protected areas which support seagrass (Heinsohn et al., 1977; Anderson, 1981). Their daily behaviour patterns are ruled largely by the location of seagrass beds, which are often inaccessible during low tides (Anderson & Birtles, 1978; Anderson, 1981). Within the GBRMP, dugongs occur in the highest densities on coastal seagrass beds in waters <5m deep, but are also reported to occur in waters up to 58km from the coast where water depths are up to 37m and one species of seagrass is known to occur (Marsh & Saalfeld, 1989). The Torres Strait, which supports an extremely large area of seagrass including open ocean and subtidal communities at depths of up to 40 m (Poiner & Peterken, 1996), also supports a population of dugongs which is greater than the population within the whole of the GBR. A significant number of these animals have been sighted in waters over 10m deep (Marsh & Saalfeld, 1991). The specialised inshore habitats of dugongs make them particularly vulnerable to human impacts.

***Herd and social behaviour***
Little is known about social interactions between adult dugongs. Mother and calf pairs form a close bond and calves remain with their mothers for approximately 18 months (Marsh et al., 1984; Anderson, 1998). Dugongs are observed as solitary individuals, in small herds (e.g. 10s of animals) or in large herds of over 100 individuals (e.g. Marsh et

al., 1994; Lanyon 2003). The only place where large herds are known to occur consistently is in Moreton Bay, even though population size is much greater in many other areas. The function of the herds in Moreton Bay is unknown, but is thought to facilitate 'cultivation' grazing, where continuous grazing of certain areas maintains young, nutritionally-rich seagrass species preferred by dugongs (Preen, 1992; Hodgson, unpublished data). In the North Cove area of Shark Bay, dugongs are alleged to perform lekking behaviour, where males defend territories in order to attract females (Anderson, 1997). In contrast, along the east coast of Australia, dugongs form mating herds in which males compete for access to an oestrous female (Preen, 1989). These two examples suggest that the behaviour of dugongs may be specific to different locations, exemplifying the need to adapt management of tourism activities to the behaviour of dugongs in each location.

## 5.2 Marine turtles

### 5.2.1 Biology and life history

***Distribution***
Six of the world's seven species of marine turtle are found in Australian waters (see Figure 2 for distribution). None of these are exclusively Australian, however, the flatback turtle nests only on Australian beaches and has not been reported off the Australian continental shelf.

***Migration and reproduction***
At an estimated age of 20-50 years (Balazs, 1980; Limpus, 1992; Limpus & Walter, 1980) male and female turtles migrate from foraging areas to a nesting location considered to be their natal beach (Allard et al., 1994; Meylan et al., 1990). Mating generally takes place offshore of the natal beaches about 30 days prior to the first nesting (Owens, 1980). Males leave the breeding area once females commence fortnightly trips to the beach to lay their eggs (Limpus, 1993). Female turtles lay multiple (2-7) clutches each season, each containing from 50-200 eggs (Dodd, 1988; Hirth, 1997; Witzell, 1983). Females return to their foraging area after the nesting season and will not nest again for two to eight years (Carr, 1984; Limpus, et al., 1992).

Hatchlings usually emerge at night approximately 60 days after egg deposition, their sex determined by incubation temperature (Mrosovsky & Yntema, 1982). To find the sea, hatchlings orient towards the brightest direction and use the topography of the surrounding horizon (Limpus, 1971; Mrosovsky & Shettleworth, 1968). Once in the sea, hatchlings use a combination of cues (wave direction, current, and magnetic fields) to orient themselves to deeper offshore areas (Lohmann & Lohmann, 1998). Crossing and swimming away from the beach are believed to imprint the hatchlings with the cues to allow individuals to find their way back to their natal beaches when preparing to breed. Once in the offshore areas, hatchlings are believed to enter regions of convergent water systems (Carr, 1986; 1987) where they associate with floating seaweed mats driven by surface currents[1]. Young, free-swimming turtles migrate to inshore foraging areas after their developmental years (Carr, 1986), which can take 5 to 20 years (Limpus, 1992).

[1] However, hatchling flatback turtles are unique in that they do not have an oceanic pelagic phase, rather they are believed to inhabit inshore areas of the clear reefal waters (Walker & Parmenter, 1990).

**Figure 2: Distribution of Australian marine turtles** (Map source: http://www.deh.gov.au/coasts/species/turtles/recovery/map.html).

### 5.2.2 Conservation status

Table 5.1 lists conservation status of marine turtles by species.

**Table 5.1: Conservation status (State, National, International) of marine turtles in Australia**

| Common Name | Scientific Name | The World Conservation Union (IUCN) Red Data Book | Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* | Queensland *Nature Conservation (Wildlife) Regulation 1994* | Northern Territory *Territory Parks and Wildlife Conservation Act 2000* | New South Wales *Threatened Species Conservation Act 1995* | Victoria *Flora and Fauna Guarantee Act 1988* | South Australia *National Parks and Wildlife Act 1972* | Tasmania *Threatened Species Protection Act 1995* | Western Australia *Wildlife Conservation Act 1950* |
|---|---|---|---|---|---|---|---|---|---|---|
| Flatback turtle | *Natator depressus* | Vulnerable | Vulnerable | Vulnerable | Data Deficient | Not Listed | Not Listed | Not Listed | Not Listed | Rare |
| Green turtle | *Chelonia mydas* | Endangered | Vulnerable | Vulnerable | Least Concern | Vulnerable | Not Listed | Vulnerable | Vulnerable | Rare |
| Hawksbill turtle | *Eretmochelys imbricata* | Critically Endangered | Vulnerable | Vulnerable | Data Deficient | Not Listed | Not Listed | Not Listed | Vulnerable | Rare |
| Leatherback turtle | *Dermochelys coriacea* | Critically Endangered | Vulnerable | Endangered | Vulnerable | Vulnerable | Threatened | Vulnerable | Vulnerable | Rare |
| Loggerhead turtle | *Caretta caretta* | Endangered | Endangered | Endangered | Endangered | Endangered | Not Listed | Vulnerable | Endangered | Rare |
| Olive ridley turtle | *Lepidochelys olivacea* | Endangered | Endangered | Endangered | Data Deficient | Not Listed | Not Listed | Not Listed | Not Listed | Rare |

### 5.2.3 Biological/behavioural characteristics of marine turtles relevant to management of tourism activities

Within the life cycle of a marine turtle, there are certain common biological characteristics of particular relevance to management:

- There is high mortality before adulthood through natural and anthropogenic causes.
- Hatchlings and adults are influenced by environmental cues.
- Marine turtles have developed the ability to hold their breath for long periods, over an hour in some instances, and to dive to great depths (greater than 1000 m for the leatherback); however, turtles undergoing forced submergence (e.g. incidental capture in prawn trawls) can deplete oxygen stores within 15 minutes (see references in Lutcavage & Lutz, 1997).
- Most marine turtle species feed near the bottom or middle of the marine food chain. Thus, like all predators, they are vulnerable to perturbations in the marine environment that can affect lower levels of the food chain.
- There are a limited number of nesting sites (natal beaches).
- There is high fidelity to nesting site, internesting area (area used between nesting attempts) and foraging area. For example, marine turtles return to the region of their birth; therefore, they are classified as management units based upon their genetic differences between breeding areas. For example, within Australia there are (from *Draft Recovery Plan for Marine Turtles in Australia,* Environment Australia, 1998):

    - 2 stocks of loggerhead turtles (Western, Eastern)
    - 6 stocks of green turtles (Southern GBR, Northern GBR, Coral Sea, Gulf of Carpentaria & NT; Northwest Shelf; Ashmore Reefs)
    - one stock of olive ridley
    - one stock of leatherback
    - 4 stocks of flatback turtle (East Aust, GoC, NT, WA)
    - 4 stocks of hawksbill turtle (NE Aust – Qld; NE Aust – NT; GBR non-Australian; Western Australian)

Marine turtle populations currently subjected to some tourism use (impacts as yet largely unknown) have been identified as: all loggerhead turtle populations; green turtles from the North West Shelf and northern and southern Great Barrier Reef; hawksbill turtles in the northern Great Barrier Reef and Torres Strait; flatback turtles from the eastern Australian and North West Shelf populations; and an undetermined proportion of all populations present in the Northern Territory (Department of Environment and Heritage, 2003).

## Section 5: Some Key Issues

**1. Given their population status, should dugongs & marine turtles be subject to tourism activities?**

**2. What are the priorities (or indicators) for sustainable management of dugong & turtle tourism?**

- **How could this information be developed/derived?**

**3. What location-specific aspects of dugong & turtle biology (especially behaviour) are the most important priorities?**

**4. What aspects of dugong & turtle biology are constraints for tourism?**

**5. How can the broader tourism industry help to produce better conservation outcomes for dugong and marine turtles?**

- **With respect to boat strikes - given large number of vessels and trips**
  **- given rise in speeds of vessels**

# 6. CULTURAL INFORMATION FOR SUSTAINABLE MANAGEMENT

## 6.1 Indigenous cultural information

### 6.1.1 Sea country

For coastal Aboriginal societies and for Torres Strait Islanders the sea is part of their traditional estates, for which they have inherited cultural rights of ownership, responsibility and management (Smyth, 1997; Sharp, 2002). While legal recognition of these rights through native title determinations is more narrowly defined, coastal Indigenous people, also known as "saltwater people", maintain a strong sense of traditional ownership and obligation to their traditional marine states, or "sea country". Increasingly it is this broader relationship with the sea that forms the basis of negotiation and collaboration between Indigenous people, commercial fishers, marine management agencies and the marine tourism industry, who seek to build partnerships with Traditional Owners of sea country rather than resort to adversarial legal processes (Fraser, 2004; Hughes, 2004).

Dugong and turtle tourism, wherever it occurs around the Australian coast, will inevitably involve accessing the sea country of one or more Aboriginal or Torres Strait Islander group. Best practice management of dugong and turtle tourism must therefore include principles and guidelines that recognise this fundamental relationship between saltwater people and their sea country.

### 6.1.2 Hunting

Dugong and turtle continue to be important in the economies and cultures of many saltwater people around northern Australia (Bradley, 1997 & 1998; Marsh et al., 1981; Chase & Sutton, 1981; Marsh et al., 1997). In addition to the provision of food, hunting activities maintain traditional knowledge and skills that are important for cultural continuity and identity. Nevertheless, some coastal Aboriginal groups have entered into voluntary agreements not to hunt dugongs in order to conserve declining populations. Within the Great Barrier Reef Marine Park, efforts are currently underway to manage Indigenous hunting through the negotiation of Traditional Use Marine Resource Agreements (TUMRAs). Guidelines for managing dugong and turtle tourism will need to ensure that this activity does not conflict with or impair Indigenous hunting activities.

### 6.1.3 Interpretation of Indigenous cultural values

With the consent and involvement of local Indigenous groups, it may be possible to include the interpretation of Indigenous cultural values as part of dugong and turtle tourism activities. This could include an introduction to Indigenous language relating to dugong or turtle, sharing creation stories, describing hunting techniques and generally communicating the significance of these animals in the local Indigenous culture. The key issue here is consent: some Indigenous groups may not wish to be involved or to present these cultural values publicly; others may wish to be involved but only share some aspects of their culture; while others may wish to communicate the cultural significance of turtle and dugong more comprehensively. The recognition of Indigenous cultural values in the design of a marine tourism operation has the potential to add significantly to

the tourism experience, and provides an opportunity for Indigenous groups to benefit economically and communicate their connection to sea country.

### 6.1.4 Monitoring Indigenous cultural values

Whether or not Indigenous groups are directly involved in the delivery of dugong and turtle tourism, it is critical that the protection of Indigenous cultural values is considered in the development of any regime to monitor the impact of the operations. This will require developing indicators to determine, for example, whether the tourism is adversely impacting on Indigenous hunting or access by Indigenous people to their sea country. Cultural indicators can also be used to monitor positive impacts of marine tourism, including enhanced recognition of Indigenous rights and responsibilities to sea country (Smyth, 2002).

### 6.1.5 Indigenous management of country

For thousands of years, control of sea country was exercised by Traditional Owners of each clan estate. Over the last 25 years, many Indigenous groups have begun reasserting management of country through contemporary institutional arrangements, such as "Caring for Country" units in land councils, rangers employed by community councils, and dedicated land and sea management agencies (e.g. Kowanyama, 2004; Dhimurru, 2004). These Indigenous institutions have the capacity to be involved with the development and management of dugong and turtle marine tourism ventures.

### 6.1.6 Indigenous marine tourism

Indigenous people are engaged in tourism, as employees and as owners or partners of tourism enterprises throughout Australia (Aboriginal Tourism Association, 2004), though until recently there has been relatively little Indigenous involvement in marine tourism. Within the Great Barrier Reef Marine Park provision has been made for the allocation of Indigenous specific marine tourism permits in the Cairns, Hinchinbrook and Whitsundays Plans of Management. Some marine tour operators employ Aboriginal people to provide an interpretation of sea country, reefs and islands, while others are negotiating with Traditional Owners groups on the establishment of infrastructure, such as pontoons, within their sea country. At least one Indigenous operator in north Queensland takes tourists on coastal walks at night, during which they learn about the cultural significance of animals, plants and country, as well as hunting and fishing techniques (Walker & Walker, 2004). It can be expected that some Indigenous people will be interested in developing turtle and dugong tourism enterprises as a private business, as a community operation or as a joint venture.

### 6.1.7 Effective engagement with Indigenous people

Indigenous societies around the coast of Australia reflect the diversity of their original cultures and the vastly different histories they have experienced over the last few hundred years. Some Indigenous groups have retained full ownership of their traditional coastal lands and islands, and hence have retained some measure of control over access to their local sea country. Others have been displaced and have little or no formal involvement in managing their sea country. However, despite these diverse histories, Indigenous peoples' cultural attachment and responsibility to sea country have remained strong all around the Australian coast.

Advice on developing processes for engagement with Indigenous groups on marine tourism issues can be obtained from several sources, including land councils, Aboriginal and Torres Strait Islander Services (ATSIS), Aboriginal community councils, the National Native Title Tribunal, local Indigenous corporations or Indigenous land and sea management agencies. However the process is initiated, it is important to involve local Traditional Owners who have the cultural responsibility to speak for their own sea country.

### Section 6.1: Some Key Issues

**1. Is tourism focussed on turtles and/or dugongs considered acceptable use of the animals by Traditional Owners?**

**2. What protocols should be followed by potential tourism operators in negotiating with Traditional Owners?**

**3. How can dugong and turtle tourism best contribute to the economic well-being of local communities, especially Indigenous communities in whose Sea Country the tourism is to be developed/taking place?**

**4. How can the protection of Indigenous cultural values be monitored and by whom?**

## 6.2 Other cultural values

The dugong and marine turtles have great significance within the Great Barrier Reef World Heritage Area. The formal nomination of the Great Barrier Reef for World Heritage listing by the Government of Australia (GBRMPA, 1981) was relatively brief (as was the typical case at that period). Under the formal justification for meeting the natural heritage criteria only two paragraphs were included (each 57 words long) and these extolled the coral reefs, the ecosystem diversity of the GBR, its evolution, its exceptional beauty and its importance for conservation. Only three species were named and these were the dugong, the green turtle and the loggerhead turtle. Of course much more detail was provided in an Appendix but this simply served to reinforce the significance of turtles and the dugong to the outstanding universal value of the Great Barrier Reef while adding reference to many other organisms. In a more recent study of the attributes of the Great Barrier Reef World Heritage Area (Lucas et al., 1997) the particular significance of the dugong and all six of the marine turtles within the GBR was confirmed.

Although the nomination included reference to cultural heritage and documented the particular role of Indigenous Australians in occupying and using the GBR resources, limited detail was provided and the property was not listed on any formal cultural criterion. Subsequently the 25 Year Strategic Plan for the GBRWHA (GBRMPA, 1994) made considerable reference to the importance of Aboriginal and Torres Strait Islander interests. Although direct interaction between Indigenous communities and dugong and turtles was not discussed, the strategic plan clearly envisaged a future that appreciated and acknowledged traditional values for the GBR including sustainable hunting of dugong (e.g. illustration on p.13).

The Strategic Plan also makes explicit reference to the need for management plans for dugongs and marine turtles (p.21). In addition to the formal acknowledgement of significance of turtles and dugong within the GBRWHA, other studies include reference to the high public profile (iconic status) of these animals and the positive values people hold about them. For example, Tisdell (2001) noted that marine turtles have good public characteristics including existence and bequest values, and Gerrard (1999) found tourists participating in dugong watching tours in Shark Bay WA placed a high value on dugong conservation, however had limited specific knowledge of the species.

## Section 6.2: Some Key Issues

**1. How can the broader tourism industry contribute by raising visitor and general community awareness of impacts on dugong and marine turtles?**

**2. What are the responsibilities of the tourism industry in conducting dugong/turtle tourism activities?**

**3. What are the priorities in information topics provided to tourists to enhance their understanding of wider conservation and cultural issues relating to dugongs and turtles?**

**4. Because of their high cultural value, should additional restrictions be placed on any dedicated dugong/turtle tour operators?**

# 7. MANAGEMENT ISSUES FOR CONSIDERATION AT THE PLANNING WORKSHOP

## 7.1 Overview of management options

Orams (1995; 1999) suggested that marine tourism management strategies could be divided into four main categories: regulatory, physical, economic and educational. All four of these should be explored within an overall Adaptive Research and Management Framework that encompasses them.

There are many management options available to us to consider and discuss at the Planning Workshop. The following list contains some initial suggestions:

**With respect to the target species' biology and life history**
- Restriction/banning of activities for a particular species
- Closed sites: geographical, seasonal
- Restrictions on particular life stages
- Ethical approval for tourism activities (re: animal welfare)
- Research and monitoring requirements

**With respect to Traditional Owners**
- Indigenous management options
- Ethical approval for tourism activities (re: Indigenous cultural issues)

**With respect to boat-based operations**
- Minimum approach distances
- Type and size of vessel
- Vessel speed limits
- Boat handling procedures
- Limiting numbers of operators
- Restrictions on number of vessels in proximity to wildlife
- Prevention of contact (e.g. touching)
- Identification of "harassment"
- How to manage incidental/recreational interactions
- Interaction time limits
- Compliance enforcement regime

**With respect to swim-with operations**
- Minimum approach distances (in-water)
- Prevention of contact (e.g. touching, riding)
- Identification of "harassment"
- Limiting numbers of in-water participants
- Managing use of strobes/torches for night observations including night-dives

**With respect to shore-based operations**

- Prevention of contact (e.g. touching)
- Type of equipment (e.g. for observation of nesting turtles)
- Limiting numbers of visitors
- Identification of "harassment"
- Limiting use of torches and/or flashes
- How to manage incidental/recreational interactions

**With respect to interpretation**

- Role and aims of interpretation
- Training and accreditation of operators and/or guides

**With respect to the management framework**

- Changes to legislation
- Changes to regulation
- Species, location and operation specific provisions
- Voluntary guidelines
- Best Practice guidelines
- Codes of Practice
- Permit conditions
- Regulations
- Legislation (e.g. EPBC additions cf. cetacean protection?)
- Capped limits? (If so, how, where and why?)

## 7.2 Codes of conduct

Wildlife tourism usually involves a two-way interaction between animals and humans. Most current management frameworks seek to minimise the impacts on free-ranging wildlife by ensuring that such interactions are as much as possible on the animal's terms and that encounters can be terminated by them at any time. Any control over the interactions is therefore usually exerted by managing the people. This is often achieved by use of codes of practice, codes of conduct or guidelines.

Depending on the level of enforcement, coercion or other encouragement involved in their implementation, such codes can lie almost anywhere along the management framework spectrum from regulation to self-regulation. Thus they can be permit or licence requirements; form part of industry association membership, be a component of accreditation or certification schemes or completely voluntary guidelines.

They may be targeted at the industry (operators or guides) or at the individual tourists who are their clients or passengers. Voluntary codes also play an important role in managing private recreationalists targeting the same wildlife resources. Various codes also manage other marine and coastal users such as fishers or boaters.

It is becoming increasingly apparent that such codes (especially when voluntary) are more effective when they go beyond simple lists of do's and don'ts and engage their

target audience in mindful behaviour by informing them succinctly about the reasons behind their various provisions. When people are made aware of the important conservation or sustainability issues that lie behind rules and recommendations, they are much more likely to comply.

A review of Australian and overseas codes of practice was conducted as part of this Project. A total of 33 codes of conduct or sets of permit conditions were analysed (Table 6 in Appendix 5). These included 18 targeting the management of turtle watching (#1-3, 5, 7, 9, 15, 16, 18-21, 27-30, 32, 33), and eight applying to dugongs (#4, 8, 10-13, 17, 22). Six codes about manatee interactions from the USA have been included (#6, 23-26, 31) and one that applies to both manatees and turtles (#14). Nineteen were produced by Australian based agencies or groups and fourteen were produced overseas. These included seven from USA (#6, 14, 23, 24, 26, 30, 31), one each from the Mediterranean (#2), Costa Rica (#3), Caribbean (#29), Mexico (#33) and Belize (#25) and two from international groups (#7, 9).

***Summary of codes of conduct for managing marine turtle tourism***

The majority dealt with shore-based interactions rather than boat-based or swim-with encounters. The advice in these can be broadly divided into that relating to females coming up the beach, digging their nests, laying and returning to the water and hatchlings emerging. Only a few codes (#2, 7, 9) included any guidelines for vessel-based observation of turtles and only five had any provisions for managing in-water encounters (#7, 9, 14, 15, 27, 29). The Best Practice Guidelines from the Watchable Wildlife (#7) was the only one to include all three areas.

The rules and recommendations in the 19 codes that dealt with turtle tourism have been combined into three summaries of codes of conduct for marine turtle interactions:

- Beach-based viewing (Table 1 in Appendix 5)
- Vessel-based viewing (Table 2 in Appendix 5)
- In-water encounters (Table 3 in Appendix 5)

The rules and recommendations for the beach-based interactions (Table 1 in Appendix 5) have further been subdivided into those relating to the following phases:

- Pre-nesting phase
- Nest building
- Egg laying
- Post laying/nesting
- Hatchlings

An additional section on General beach conditions has been subdivided into:

- Use of lights and strobes
- Disturbance
- Beach care
- Information

***Summary of codes of conduct for managing dugong tourism***

The dugong interaction management codes cover vessel-based viewing but the Florida manatee codes also include rules and recommendations for managing in-water

interactions. Florida Fish and Wildlife Conservation allows swim-with experiences (#6, 23, 26), while GBRMPA and CALM state that no person should swim, dive or enter the water in the vicinity of/near a dugong (#10, 13, 22). Two codes (#10, 17) include guidelines for aircraft.

The rules and recommendations for dugong interactions have been combined (Table 4 in Appendix 5) under sub-headings covering:

- Before interaction
- During interaction
- After interaction
- General conditions

The rules for managing manatee interactions have been summarised in Table 5 (Appendix 5).

## Section 7.2: Some Key Issues

**1. What is the basis for recommendations in the various Codes?**

- **Why are there discrepancies in recommended actions between Codes?**
- **Can the scientific basis be clarified so that the reasons for compliance can be made clear?**

**2. Different turtle codes vary in their positions over impacts from touching, flash photography, lights and approach distances. Can these be resolved?**

**3. There is a lack of codes covering boat-based turtle tours**

- **These may need to take account of key life-history periods such as territorial phases, feeding, mating and resting.**

**4. Should separate codes be developed for tourism operators and their clients and are different codes required for self-guided versus guided interactions?**

**5. Do specific codes need to be developed for snorkellers/divers and dugongs and turtles?**

**6. How can these codes be made more informative and user-friendly?**

**7. How can these codes be made more relevant and appropriate at local or regional scales? Should codes be modified or just added to?**

## 7.3 Additional management concerns of dugong tourism

***Effects of boats***
Current research by Amanda Hodgson has shown that dugongs are vulnerable to boat strikes when boats are travelling at high speed (above planing speed). The number of dugong carcasses with boat related injuries found along the Queensland coast has increased in the last two years, further indicating that boat strikes are an increasing threat for dugongs (Limpus et al., 2003). During experimental boat passes dugongs were more likely to stop feeding and start travelling once a boat was within 50m than if it was further away. Mass movements of herds occurred in response to boats that were travelling both above and below planing speed, at a range of distance up to 500m, and to a range of boat lengths (from small dinghies to boats approximately 6m, all with outboard motors). These mass movements lasted an average of 2 minutes before dugongs returned to feeding, and dugongs were not displaced from their feeding areas by the low levels of vessel traffic in Moreton Bay (Hodgson, unpublished data). However there are persistent anecdotal reports of dugongs ceasing to use areas of high boat traffic and it is likely that dugongs are more susceptible to disturbance from boat traffic in small isolated habitats that when feeding on large seagrass meadows such as Moreton Bay.

**Section 7.3: Some Key Issues**

**1. What management (if any) is needed for general tourism activities in dugong habitats?**

- **Considering legal, regulatory, voluntary Codes of Conduct, etc.?**

**2. If limits should apply, how should those be determined?**

**3. Should swim-with dugong programs be permitted?**

## 7.4 Additional management concerns of turtle tourism

***Effects of swim-with interactions on marine turtles***
Dive tourism is growing rapidly in Australia (Harriott, 2002) and swim-with interactions (especially with turtles) are therefore increasingly common. Such interactions are generally poorly covered by current codes of conduct.

Observing marine turtles underwater can provide a better understanding of the animals, and can be a particularly exciting and rewarding experience for people. Live-aboard SCUBA dive tourists on the GBR consider viewing turtles a very important and enjoyable experience, with turtles being rated the third most anticipated animal to be encountered while diving on the GBR (Miller, unpublished data). However, there are clearly strong incentives to get close to the animals in order to be able to see them underwater, and there are additional potential risks posed by having people in the water in close proximity to turtles. Incidental swimming-with-turtles occurs regularly, on both a commercial and recreational basis.

Tourist programs do not necessarily have to focus their programs on turtles in order to have an impact on the animals. If a particular reef location is popular with tourists and is also a key habitat for turtles, there is the potential for turtles to be adversely affected. Given that 1674 individual craft were permitted to operate in the GBRWHA in 1998 (Wachenfeld et al., 1998), and some craft are capable of carrying over 400 tourists (Harriott, 2002), the potential for impacts is quite real. This may be of particular concern for sub-adult/adult residents on some small but heavily dived sites. An example of site use can be taken from the Cod Hole at the top of Ribbon Reef 10, a small and quite famous dive site with the live-aboard and day-trip (from Lizard Island only) diving industry. Estimates of use range from 5000 (Vail & Hoggett, 1997) to over 30,000 dives (Alder & Haste, 1994) being undertaken annually at this site. This site can be visited by up to three live-aboard dive vessels in any one day, as well as the day-trip dive boat from Lizard Island and any public users. These estimates of use for the Cod Hole indicate the potential for high amounts of in-water activities at many popular dive sites which may be habitats for resident turtles.

Turtles are of high interest to tourist divers. When encountered these animals provide powerful experiences (Miller, unpub data). On particular dive sites such as Steve's Bommie, an isolated pinnacle near Ribbon Reef # 5, resident turtles can often be found moving around the site or on the substrate during day time, and during night time sleeping on or in the substrate. Turtles regularly encountered on dive sites include most often Green turtles, Hawksbills, and sometimes Loggerheads. Divers have been seen on many occasions approaching turtles in order to get close, touch, or photograph often with the aid of powerful flashes (Miller, unpub data). If approached or cornered avoidance behaviour usually occurs where the animals will use bursts of high speed away from the general diving area, and in many cases into deeper water. Disturbance during night dives should also be considered due to the use of high-powered torches and close approaches of divers to sleeping turtles. The turtles usually remain stationary until the diver becomes too close, or there are too many divers often causing the animal to flee. Once disturbed, turtles may come in contact with the substrate or dive deeper as a result (Miller, unpub

data). On some dive sites, night dives may occur as many as 5 nights a week, sometimes with two operators on the same night when over 50 divers may be in the water.

The key management challenge for vessel-based turtle watching, as with land-based activities, is to ensure that the animals largely control the interactions. Deliberate attempts by people to swim with turtles are unlikely to be successful unless the animals choose to remain nearby or unless animals are trapped (e.g. in reefal lagoons) or entangled. Turtles are generally able to readily avoid people in the water, except at night as mentioned above. Nonetheless, repeated vessel approaches by people attempting to swim with turtles could be a serious source of disturbance to the animals and must be managed accordingly. Of particular concern are the cumulative effects of avoidance behaviour, if animals spend large amounts of time and energy avoiding vessels, snorkellers and scuba divers.

### Section 7.4: Some Key Issues

**1. What are the impacts of disturbance (including cumulative impacts) on energy budgets of turtles?**

**2. What are the special characteristics of the turtle life history stage when resident on reef sites?**

**3. What are the priorities for the sustainable management of marine turtle tourism?**

- **Considering legal, regulatory, voluntary codes, etc.**

**4. Should any limits be applied to turtle tourism?**

## 7.5 The implications for dugong and turtle tourism management of current planning

There are a number of planning processes or major projects currently underway or about to begin in northern Australia, which should be taken into account when developing the management frameworks for sustainable management of dugong and turtle tourism.

### 7.5.1 Natural Resource Management (NHT2) Planning Process

The Queensland and Commonwealth Governments are working in partnership with regional communities in natural resource management through the National Action Plan (NAP) and the Natural Heritage Trust (NHT). While focusing on regional natural resource management, NAP and NHT2 programs are working towards integrating economic, social and environmental planning. These regional arrangements are beneficial because the regions have information, planning and implementation linkages, which can strengthen efforts toward effective and sustainable natural resource management. A regional NRM approach will also be a catalyst for effective regional service delivery by creating and enhancing capacity within the regions.

NRM delivery is evolving from localised, project-based programs to more strategic, entrepreneurial and regionally based activities. It incorporates technical NRM skills, as well as high order networking, communication and strategic planning skills and is based on a long-term business outlook.

Fifteen regional bodies have been established in Queensland, ten of these have coastal and marine responsibilities. Regional and sub-regional strategies have already been developed in each region and these are being used as the basis of each NRM plan. Regional bodies are responsible for producing NRM plans. These are currently being written and are due for public comment in June 2004.

Marine and coastal representation on most of the regional bodies and their advisory groups is not strong. Consequently, recommendations from this workshop may include greater involvement by this group to include turtle and dugong issues in marine and coastal components of the regional plans.

For Queensland:
http://www.nrm.qld.gov.au/regional_planning/index.html

Queensland Map:
http://www.nrme.qld.gov.au/planning/regions/index.html

For the Northern Territory (including map):
http://www.nrm.gov.au/state/nt/

For Western Australia (including map):
http://www.nrm.gov.au/state/wa/

### 7.5.2 National Oceans Office and the Regional Marine Planning Process

The National Oceans Office has begun the Regional Marine Planning Process for the Northern Region. The Northern Planning Area covers the Torres Strait, the Gulf of Carpentaria and eastern Arafura Sea to a line 133°23' east, which coincides with the Goulburn Islands. There are four elements which are crucial to undertaking a successful marine planning process. These are:

- Inter-jurisdictional cooperation and ensuring that the relevant governments are working together.
- Integration within government and ensuring that the key agencies with responsibilities in the planning area are working together.
- Ensuring that the key interests and organisations in the area are involved in the planning process.
- Accessing good information to guide decision-making by government, industry, and other interests (extract from http://www.oceans.gov.au/North_rmp.jsp).

Map illustrating the Northern Planning Area:
http://www.oceans.gov.au/North_rmp.jsp

### 7.5.3 National Cooperative Approach to Integrated Coastal Zone Management

In Oct 2003 the Natural Resource Management Ministerial Council (NRMMC) agreed that the Intergovernmental Coastal Advisory Group, comprised of Australian Government and State/Territory Government representatives would be responsible for the development of an Implementation Plan for the National Cooperative Approach to ICZM. A Discussion Paper has been prepared and public comment closes 18 May 2004.

The "Framework for a National Cooperative Approach to Integrated Coastal Zone Management: Discussion Paper on Implementation" and "Framework for a National Cooperative Approach to Integrated Coastal Zone Management (for information only)" are available at: http://www.deh.gov.au/coasts/information/framework.html

### 7.5.4 Regional Competitive Component Projects for the Northern Territory 2003-04

On 5 April 2004 the Minister for the Environment and Heritage Dr David Kemp announced $3.9 million under the Natural Heritage Trust's Regional Competitive Component for conserving threatened dugong and turtle populations. "The regional competitive investment will also help identify and trial mechanisms to better manage dugong and turtle stocks, habitat and threats, and to engage indigenous communities in that management," he said.

***Details:***
Project: Dugong/ Turtle Project
Funding: $3,900,000
Lead region: Landcare Council of the Northern Territory
Description: This project will involve indigenous communities, government officials and the scientific sector working together to improve the integrated management of the dugong and turtle species.
Contact : Andrew Walker (02) 6274 2436
http://www.deh.gov.au/minister/env/2004/mr05apr204.html#regional

### 7.5.5 Management Program for the Dugong in the Northern Territory of Australia

This has now closed for public comment and is awaiting approval.

Draft Management Program available at:
http://www.nt.gov.au/ipe/pwcnt/docs/dugong_management_program.pdf

## 7.6 Monitoring effectiveness of management

Testing and monitoring of any management regime is necessary to determine whether it is effective in achieving the desired goals of ecologically sustainable management. Some considerations for monitoring options for discussion at the Planning Workshop include:

- Need for biological data (e.g. stress levels, behavioural, long term trends e.g. spatial changes in nesting)
- Need for experiential data (e.g. visitor demographics, visitor experiences, response to management frameworks including Codes, response to interpretation)
- Need for consideration of cultural values in defining management objectives
- Effectiveness of the management regime should include a positive response to Indigenous cultural issues as a measure of success.
- What to measure
- Performance Indicators
- Sustainability Indicators
- Needs for further research
- Opportunity for data to be collected by/from industry and passengers

**Section 7.6: Some Key Issues**

**1. What mechanisms are in place to evaluate compliance with the Codes in use?**
- **How could these be improved?**

**2. What are appropriate indicators of sustainability for turtle tourism?**

**3. What Sustainability Indicators could be used to monitor dugong tourism?**

## 7.7 Managing through interpretation

Wildlife tourism encounters are two-way interactions between humans and wildlife. It is rarely possible or appropriate to manage the animals and hence the focus is on managing the people. This can be achieved through a variety of approaches, interpretation being the most important mechanism under Orams' (1995) fourth management strategy of education. Wildlife-based ecotourism has been recognised to have the potential to contribute to the conservation of wildlife through increased public awareness of the species and their habitat, and an increased willingness to pay for wildlife conservation (Tisdell & Wilson, 2001; Shackley, 1995). Research by Birtles et al., (2001; 2002) on whale watching participants advocates the value of high quality interpretation in wildlife tourism resulting in well-informed and highly satisfied tourists capable of making assessments of the management of their tour and contributing to the monitoring of tour management and adherence to guidelines.

Tisdell (2001), Tisdell & Wilson (2001) reported on surveys of visitors to Mon Repos Conservation Park in Queensland, indicating the educational program at the Park was very effective in increasing visitor awareness of marine turtle conservation issues. Tisdell & Wilson (2001) found that nearly one-third of respondents to the survey (n=519) became aware of the threats to marine turtles for the first time. This illustrates a very successful interpretation program at Australia's highest-visited turtle rookery, with more than 23,000 visitors during the 1999/2000 season (Tisdell, 2001). Gerrard (1999) found a low awareness of the dugong and its ecology among dedicated dugong tour participants in Shark Bay, however he noted that respondents' interest and factual knowledge of dugong increased as a result of the tour. Gerrard however notes among the shortcomings in the presentation of information to tour participants that tour guides may have not attended any dugong education programs, suggesting delivery of interpretation between operators and even different guides of the same operation may be inconsistent. He recommended that a dugong information booklet, issued to all passengers embarking on such a tour be a requirement of the dugong-watching tour operating license (Gerrard, 1999).

**Section 7.7: Some Key Issues**

**1. How can interpretation be made maximally effective in:**
- **(a) minimising impacts?**
- **(b) raising environmental awareness?**
- **(c) raising awareness of cultural values?**

**2. Should all tour operators focussed on the same species or in the same area give standard minimum information?**

**3. Should this be mandatory to receiving permission to do these types of tours?**

**4. What minimum level of training should be required?**

## 8. ANY OTHER KEY ISSUES OR QUESTIONS

**Go for it!**

# 9. REFERENCES


Aboriginal Tourism Association (2004). Aboriginal Tourism Australia Homepage. Available: http://www.ataust.org.au/ (Accessed 12 May 2004).

Alder, J., & Haste, M. (1994). The Cod Hole: A Case Study in Adaptive Management. In *Recent Advances in Marine Science and Technology* (pp. 427-436). James Cook University of North Queensland: PACON INT. and James Cook University.

Allard, M. W., Miamoto, M. M., Bjorndal, K. A., Bolten, A. B. & Bowen, B. W. (1994). 'Support for natal homing in green turtles from mitochondrial DNA sequences' *Copeia* 1994, 34-41.

Ananthaswamy, A. (2004). Massive growth of ecotourism worries biologists. *New Scientist (Online)* 4th March 2004. Available: http://www.newscientist.com/news/news.jsp?id=ns99994733 (Accessed 12 May 2004).

Anderson, P. (1981). "The behaviour of the dugong (Dugong dugon) in relation to conservation and management." *Bulletin of Marine Science* 31(3): 640-647.

Anderson, P. K. (1986). "Dugongs of Shark Bay, Australia - Seasonal Migration, Water Temperature and Forage." *National Geographic Research* **2**(4): 473-490.

Anderson, P. K. (1997). "Shark Bay Dugongs in Summer. I: Lek Mating." *Behaviour* 134: 433-462.

Anderson, P. K. (1998). "Shark Bay dugongs (*Dugong dugon*) in summer. II : Foragers in a *Halodule*-dominated community." *Mammalia* 62(3): 409-425.

Anderson, P. K. & Birtles, A. (1978). "Behaviour and Ecology of the Dugong, *Dugong dugon* (Sirenia): Observations in Shoalwater and Cleveland Bays, Queensland." *Australian Wildlife Research* 5: 1-23.

Balazs, G. (1980). *Synopsis of the biological data on marine turtles in the Hawaiian Islands*, NOAA Technical Memorandum NMFS-SWFC-7, National Technical Information Service, Springfield, Virginia.

Birtles, A. Valentine, P. & Curnock, M. (2001). *Tourism based on free-ranging marine wildlife: opportunities and responsibilities*. Wildlife Tourism Research Report Series: No. 11. Cooperative Research Centre for Sustainable Tourism, Griffith University Gold Coast.

Birtles, A., Valentine, P., Curnock, M., Arnold, P. & Dunstan, A. (2002). *Incorporating visitor experiences into ecologically sustainable dwarf minke whale tourism in the northern Great Barrier Reef.* CRC Reef Research Centre Technical Report No. 42. Townsville.

Bradley, J (1997). *Li Anathawirriyuarra, people of the sea: Yanuwa relations with their maritime environment.* PhD Thesis, Faculty of Arts, Northern Territory University, Darwin.

Carr, A. (1984). *The Sea Turtle, So Excellent a Fisher*, University of Texas Press, Austin.

Carr, A. (1986). 'Rips, FADS, and little loggerheads', *BioScience* 36, 92-100.

Carr, A. (1987), 'New perspectives on the pelagic stage of sea turtle development', *Conservation Biology* 1, 103-21.

Chase, A and Sutton, P (1981). Hunter-Gatherers in a Rich Environment: Aboriginal coastal exploitation in Cape York Peninsula. In: Keast, A (ed.) *Biogeography and Ecology of Australian.* Junk and Co., The Hague.

Department of Environment and Heritage. (2003). *Recovery Plan for Marine Turtles in Australia*. Available online: http://www.deh.gov.au/coasts/species/turtles/recovery/index.html (Accessed 12 May 2004).

Dhimurru (2004). Dhimurru Land Management Aboriginal Corporation Homepage. Available: http://members.iinet.net.au/~dhimurru/about.htm (Accessed 12 May 2004).

Dobbs, K. (2001). Marine Turtles in the Great Barrier Reef World Heritage Area: A compendium of information and basis for the development of policies and strategies for the conservation of marine turtles. Great Barrier Reef Marine Park Authority. http://www.gbrmpa.gov.au/corp_site/info_services/publications/misc_pub/marine_turtles/marine_turtles.pdf

Dodd, C. K. (1988). *Synopsis of the biological data on the loggerhead sea turtle Caretta caretta (Linnaeus 1758)*, *Biological Report 88(14)*, U. S. Fish and Wildlife Service, Gainesville, Florida.

Fraser, B. (2004). Aboriginal Fishing Strategy in Western Australia. *Indigenous Law Bulletin* 5 (29) 10-11.

Gales, N. J., McCauley, R. D., Lanyon, J. M. & Holley, D. K. (in review). Change in abundance of dugongs in Shark Bay, Ningaloo and Exmouth Gulf, Western Australia: evidence for large scale migration.

GBRMPA, (1981). *Nomination of the Great Barrier Reef by the Commonwealth of Australia for Inclusion in the World Heritage List*. Great Barrier Reef Marine Park Authority, Townsville.

GBRMPA, (1994). *The Great Barrier Reef, Keeping it Great: A 25 Year Strategic Plan for the Great Barrier Reef World Heritage Area 1994 - 2019*. Great Barrier Reef Marine Park Authority, Townsville.

Gerrard, C.A. (1999). Dugong-Watching Tourism and Encounter Response of the Dugong (Dugong dugon) in Shark Bay, Western Australia. M.Sc. Thesis, University of Calgary, Canada.

Harriott, V. J. (2002). *Marine tourism impacts and their management on the Great Barrier Reef. CRC Reef Research Centre Technical Report No. 46*. Townsville: CRC Reef Research Centre.

Heinsohn, G. E., Wake, J., Marsh, H. & Spain, A. V. (1977). The dugong (*Dugong dugon* (Muller)) in the seagrass system. *Aquaculture*, 12**,** 235-248.

Hirth, H. (1997). *Synopsis of the biological data on the green turtle Chelonia mydas (Linneaus 1758)*, *Biological Report 97(1)*, U.S. Fish and Wildlife Service, Washington DC.

Hoyt, E. (2000). Whale Watching 2000: *Worldwide Tourism Numbers, Expenditures, and Expanding Socioeconomic Benefits*. International Fund for Animal Welfare, Crowborough, UK (157pp.).

Hughes, J. (2004). Croker Seas Pearl Farming Agreement. *Indigenous Law Bulletin* 5(29) 21-23.

Kowanyama (2004). *Kowanyama Aboriginal Land and Natural Resource Management Office*. Available online: http://cwpp.slq.qld.gov.au/kowanyama/people/resource.htm (Accessed 12 May 2004)

Lanyon, J. M. (2003). "Distribution and abundance of dugongs in Moreton Bay, Queensland, Australia." *Wildlife Research* 30: 397-409.

Limpus, C. J. (1971). 'Sea turtle ocean finding behaviour', *Search*, 2(10), 385-386.

Limpus, C. J. (1992). 'The hawksbill turtle, *Eretmochelys imbricata*, in Queensland: population structure within a southern Great Barrier Reef feeding ground', *Wildlife Research*, 19, 489-506.

Limpus, C. J. (1993). The green turtle, *Chelonia mydas*, in Queensland: breeding males in the southern Great Barrier Reef, *Wildlife Research,* 20, 513-523.

Limpus, C.J., Currie, K.J. & Haines, J. (2003). *Marine wildlife stranding and mortality database annual report 2002 I. Dugong.* Environmental Protection Agency, Queensland.

Limpus, C.J., Miller, J.D., Parmenter, C.J., Reimer, D., McLachlan, N., & Webb, R. (1992). Migration of green *Chelonia mydas* and loggerhead *Caretta caretta* turtles to and from eastern Australian rookeries. *Australian Wildlife Research* 19, 347-58.

Limpus, C. J. & Walter, D. G. (1980). 'The growth of immature green turtle (*Chelonia mydas*) under natural conditions' *Herpetologica* 36, 162-165.

Lohmann, K. J. & Lohmann, C. M. F. (1998). 'Migratory guidance mechanisms in marine turtles', *Journal of Avian Biology*, 29, 585-596.

Lucas, P.H.T., Webb, T., Valentine, P.S. & Marsh, H. (1997). *The Outstanding Universal Value of the Great Barrier Reef World Heritage Area.* Great Barrier Reef Marine Park Authority, Townsville.

Lutcavage, M. E. & Lutz, P. L. (1997). 'Diving Physiology', pp277-296, in *The Biology of Sea Turtles*, eds P.L. Lutz and J. A. Musick, CRC Press, Boca Raton, Florida.

Marsh, H., De'ath, G., Gribble, N. & Lane, B. (2001). Shark control records hindcast serious decline in dugong numbers off the urban coast of Queensland. Final Report to the Great Barrier Reef Marine Park Authority, Townsville, Queensland.

Marsh, H, Gardner, B.R. and Heinsohn, G.E. (1981). *Present Day Hunting and Distribution of Dugongs in the Wellesley Islands.* Applied Science Publishers, London.

Marsh, H., Harris, A.N.M. & Lawler, I.R. (1997). The sustainability of the indigenous dugong fishery in Torres Strait/Papua New Guinea. *Conservation Biology* 11: 1375-86.

Marsh, H., Heinsohn, G. E., et al. (1984). Breeding cycle, life history and population dynamics of the dugong, *Dugong dugon* (Sirenia: Dugongidae). *Australian Journal of Zoology* 32: 767-788.

Marsh H, Lawler I. (2001). *Dugong distribution and abundance in the southern Great Barrier Reef Marine Park and Hervey Bay: results of an aerial survey in October-December 1999*. GBRMPA Research Publication 70. Available online: http://www.gbrmpa.gov.au/corp_site/info_services/publications/research_publications/rp70/index.html

Marsh H, Lawler I. (2002). *Dugong distribution and abundance in the northern Great Barrier Reef Marine Park November 2000*. GBRMPA Research Publication. Available online: http://www.gbrmpa.gov.au/corp_site/info_services/publications/research_publications/rp77/rp77-final.pdf

Marsh, H., Lawler, I., Kwan, D., Delean, S., Pollock, K. & Alldredge, M. (In press). Aerial surveys and the potential biological removal technique indicate that the Torres Strait dugong fishery is unsustainable. *Animal Conservation*.

Marsh, H., Penrose, H. & Eros, C. (2003). A future for the dugong? In: *Marine Mammals: Fisheries, Tourism and Management Issues*. (Eds) N. Gales, M. Hindell, R. Kirkwood. Pp 383 – 399. CSIRO, Collingwood, Victoria.

Marsh, H., Penrose, H., Eros, C. & Hugues, J. (2002). *Dugong Status Report and Action Plans for Countries and Territories*. UNEP. Kenya.

Marsh, H., Prince, R., Saalfeld, W. & Shepherd, R. (1994). The distribution and abundance of the dugong in Shark Bay, Western Australia. *Wildlife Research*, 21**,** 149-161.

Marsh, H. & Rathbun, G. B. (1990). Development and application of conventional and satellite radio tracking techniques for studying dugong movements and habitat use. *Australian Wildlife Research* 17: 83-100.

Marsh, H. & Saalfeld, W. K. (1989). Distribution and Abundance of Dugongs in the Northern Great Barrier Reef Marine Park. *Australian Wildlife Research* 16: 429-440.

Marsh, H. & Saalfeld, W. K. (1991). The Status of the Dugong in Torres Strait. In: *Sustainable Development of Traditional Inhabitants of the Torres Strait Region*. (Eds) D. Lawrence, T. Cransfeld-Smith. Pp. 187-194. Great Barrier Reef Marine Park Authority Workshop Series 10, Townsville, Queensland.

Meylan, A. B., Bowen, B. W., and Avise, J. A. (1990). 'A genetic test of natal homing versus social facilitation models for green turtle migration', *Science*, 248, 724-727.

Mrosovsky, N. & Shettleworth, S. J. (1968). 'Wavelength preferences and brightness cues in the water finding behavior of sea turtles', *Behaviour*, 32, 211-257.

Mrosovsky, N. & Yntema, C. L. (1982). 'Temperature dependence of sexual differentiation in sea turtles: implications for conservation practices', pp59-66, in *Biology and Conservation of Sea Turtles Revised Edition*, ed K. A. Bjorndal, Smithsonian Institution Press, Washington DC.

Orams, M.B. (1995). A conceptual model of tourist-wildlife interactions: the case for education as a management strategy. *Australian Geographer*, 27 (1): 39-51

Orams, M.B. (1999). *Marine Tourism: Development Impacts and Management*. Rutledge, London & New York. 115pp.

Owens, D. W. (1980). 'The comparative reproductive physiology of sea turtles', *American Zoologist*, 20, 549-63.

Poiner, I. R. & Peterken, C. (1996). Seagrasses. In: *The States of the Marine Environment Report for Australia. Technical Annex 1*. (Eds) L. P. Zann and P. Kailola. Pp 40 – 45. Great Barrier Reef Marine Park Authority, Townsville, Queensland.

Preen, A. R. (1989). Observations of mating behaviour in dugongs (*Dugong dugon*). *Marine Mammal Science* 5(4): 382-387.

Preen, A. R. (1992). *Interactions Between Dugongs and Seagrass in a Subtropical Environment*. PhD Thesis, Tropical Environment Studies and Geography, James Cook University, Townsville, Queensland.

Preen, A.R. (2001). *Dugongs, Boats, Dolphins and Turtles in the Townsville-Cardwell Region and Recommendations for a Boat Traffic Management Plan for the Hinchinbrook Dugong Protection Area*. Research publication 67. Cooperative Research Centre for the Ecologically Sustainable Development of the Great Barrier Reef and Department of Tropical Environment Studies and Geography, James Cook University.

Shackley, M. (1996). *Wildlife Tourism*. London: International Thomson Business Press.

Sharp, N. (2002). *Saltwater People – The Waves of Memory.* Allen and Unwin, Sydney.

Smyth, D.M. (1997). *Saltwater Country – Aboriginal and Torres Strait Islander relationships with Australia's Oceans.* Issues Paper 6, Australia's Ocean Policy Commonwealth of Australia, Canberra.

Smyth, D.M. (2002). *Indicating Culture – Development of Cultural Indicators for the Management of the Wet Tropics World Heritage Area.* Discussion Paper, Rainforest Cooperative Research Centre, Cairns.

Tisdell, C. (2001). Tourism Economics, the Environment and Development. Edward Elgar Publishing, Cheltenham, UK.

Tisdell, C. & Wilson, C. (2001). Wildlife-based tourism and increased support for nature conservation financially and otherwise: evidence from sea turtle Ecotourism at Mon Repos. *Tourism Economics*, 7 (3), 233-249.

Vail, L. L., & Hoggett, A. K. (1997). *The Cod Hole. Long-term monitoring of human usage, fish populations, and injuries to fish and the environment*. Townsville: Great Barrier Reef Marine Park Authority.

Wachenfeld, D.R., Oliver, J.K. & Morrissey, J.I. (1998). State of the Great Barrier Reef World Heritage Area. Great Barrier Reef Marine Park Authority, Townsville.

Walker, T. A. & Parmenter, C. J. (1990). 'Absence of a pelagic phase in the life cycle of the flatback turtle, *Natator depressa* (Garman), *Journal of Biogeography*, 17, 275-278.

Walker, L. & Walker, B. (2004). Kuku Yalanji Cultural Habitat Tours, Mossman Homepage. Available: http://www.queenslandholidays.com.au/tropical_north_queensland/553001/index.cfm (Accessed 12 May 2004).

Witzell, W. N. (1983). Synopsis of biological data on the hawksbill turtle*, Eretmochelys imbricata* (Linnaeus, 1766), *FAO Fisheries Synopsis 137*, Food and Agriculture Organisation, Rome, Italy.