TOURISM BASED ON FREE-RANGING MARINE WILDLIFE
OPPORTUNITIES AND RESPONSIBILITIES

By Alastair Birtles, Peter Valentine and Matt Curnock

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This report is one in a series comprising a status assessment of wildlife tourism in Australia. It comprises the initial stages of research undertaken by the Wildlife Tourism Subprogram of the CRC. Reports in this series cover various disciplinary perspectives (visitors, economics, hosts, wildlife management) as well as various subsectors (such as zoos, bird watching and hunting). Together, the reports identify the current status and key issues facing Australian wildlife tourism, and make recommendations to enhance its sustainability.

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EXECUTIVE SUMMARY
Tourism based on viewing and interacting with coastal and marine wildlife is one of the fastest growing industries in Australia. This recent growth has been enabled and supported by the wide diversity of marine species and habitat types found along Australia's coastline. The potential for further growth in this industry is dependent upon this abundance and diversity of Australia's marine wildlife, and there is therefore a crucial responsibility to ensure that these natural resources are managed in both an economically and ecologically sustainable manner. This review provides a comprehensive description of the current marine wildlife tourism product in Australia. It covers operations involving over 70 marine species and includes discussion of the relevant management legislation and enumeration of permitted operators. Details for around 25 species are outlined on a state-by-state basis up to the start of 2000.

Information on Australian marine wildlife tourism locations, species and operators was gathered through searches of the Internet, published literature, and through contact with more than 60 members of various management agencies, tourism and industry organisations throughout Australia. Marine wildlife presented in this review was initially selected on the basis of their specific promotion as a tourist attraction and product. Incidental sightings of numerous other species and related management issues were also collated. The results are divided into categories of shore- and boat-based observation. A third category is the increasingly popular form of interaction in which people enter the water to swim with the animals in their own environment. A fourth category of aerial observations has not been covered in any detail. The characteristics of marine wildlife tourism target species are summarised, the management of these various wildlife-human interactions is reviewed and a wide range of opportunities, threats and responsibilities are identified and discussed.

There has been particularly strong growth in the whale watching industry throughout Australia since 1994, with an almost three-fold increase in the number of commercial whale watching permits issued in Western Australia. The management issues surrounding each species and available tourist platform (i.e. shore, boat, air or swim-based) were
found to be highly varied, with different management approaches taken by different state management authorities.

Many of the target species identified are classified as endangered, threatened, vulnerable or at risk, with some populations still recovering from previous consumptive exploitation. Little is known of even the basic biology of many of these species, nor of the impacts of their increasing tourism use. It is strongly recommended that the precautionary principle be applied to their management and that scientific research efforts be increased. The diversity of platforms, local conditions, and especially size, behaviour and biology of the target species (ranging from 30 tonne humpback whales to small fishes) mean that it is imperative that guidelines are species-specific, and occasionally locality and/or operation-specific.

It is recommended that a database be developed on a species by species basis to collate information about the current situation and changing circumstances associated with marine wildlife-based tourism, and that reviews of existing management guidelines be undertaken involving agencies, industry and researchers. Further recommendations include the development of a research program that leads to a model for assessing the social and economic benefits of wildlife based tourism for each species. There is also a critical need for adequate levels of marine wildlife research funding. Tourism operators have a responsibility to assist in addressing present research funding gaps through in-kind contributions, such as providing access for researchers and participation in regular monitoring programs, which can in turn benefit their operations and lead to the long-term sustainability of the industry. Co-operative research with involvement of industry in the study of both the animal and the tourists has already occurred, for example, in the fledgling marine wildlife tourism involving dwarf minke whales in the northern Great Barrier Reef. This collaboration provides an excellent model for achieving positive management outcomes in marine wildlife tourism.

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Coastal and marine tourism is one of the largest industries in Australia, contributing about 2% of the Australian Gross Domestic Product in 1990/91 and Driml (1996) considers that ecotourism specifically (which she defines very broadly as tourism with the natural environment as its primary focus) is one of the fastest growing sectors. Wildlife-based tourism forms a major sub-sector of this and whale watching in Australia alone had an annual participation of 600,000 individuals in 1994, generating an estimated A$9 million (Anderson, Forbes & Pirzl, 1996). The latest estimate by Hoyt (2000) is around 730,000 whale watchers in Australia in 1998.

Australia is the largest island in the world with a continental coastline of over 60,000 km and a resultant Exclusive Economic Zone encompassing a staggering 16 million square kilometres with the inclusion of the Australian External Territories (Commonwealth of Australia, 1998). Its coastal waters span several major biogeographic zones, encompassing a wide variation in climate from the tropical waters of northern Australia, through the warm temperate and temperate waters on its western and eastern shores to the cold temperate waters in southern regions and the subpolar and polar regions of the Australian Antarctic Territory (Table 1). The result is one of the few great centres of megadiversity in the world (Beattie, 1995) and this is reflected in the species richness of its marine wildlife fauna.

Australia is also fortunate that in comparison to other developing and developed countries around the world, our small human population and scale of development have protected some of our natural resources from excessive exploitation and collapse prior to the introduction of environmental protective legislation. Several species (e.g. humpback whales and fur seals) which were over-hunted, are now beginning to show good recovery rates following the cessation of commercial exploitation (Great Barrier Reef Marine Park Authority, 2000; Shaughnessy, 1999). For these and many other reasons, Australia is endowed with a remarkably diverse range of experiences and great potential for marine wildlife tourism.

However, we are faced with many challenges to achieve this potential and to develop and manage marine wildlife tourism in Australia in an
ecologically sustainable way. There are growing demands for interactions with some species for which their ecology and behaviour patterns are very poorly documented. The development, evaluation and application of appropriate management regimes are therefore urgently required. There has been little attempt yet to bring together the existing data and provide a coherent framework to guide future development of sustainable tourism in this sub-sector.

This review provides an overview of the current marine wildlife tourism product in Australia. The tourism associated with over 70 species is discussed, with information for around 25 species outlined on a state-by-state basis. The results are divided into the two main categories of shore- and boat-based observation with the addition of a third, increasingly popular form of close interaction in which people enter the water to swim with the animals in their own environment. The characteristics of Australian wildlife tourism target species are summarised, the management of these various wildlife-human interactions is reviewed and a wide range of opportunities, threats and responsibilities are identified and discussed.

2. METHODS

Information on Australian marine wildlife tourism locations, species and operators was gathered through searches of the Internet, published literature, and through contact with members of various management agencies, tourism and industry organisations. Initially, searches of the World Wide Web were used to provide a basic overview of the different styles and locations of marine wildlife tourism. A systematic search of marine wildlife tourism related sites was performed using AltaVista Australia search engine, using keywords of each Australian state, targeted species for marine tourism, regional tourism authorities and industry associations. The first 200 resultant links of each web search conducted were examined, with all possible references to marine wildlife tourism in Australia investigated, including all following links. The URLs of relevant web sites were recorded and the pages of the site examined for content.

After examining the resultant web and other literature, the findings were confirmed or amended with the assistance of members of various Commonwealth and State management agencies by telephone and email correspondence. Members of Environment Australia, the state parks and wildlife agencies, state tourism organisations and industry groups, and the Regional Co-ordinators of the Marine and Coastal Community Network were contacted to help confirm the numbers of operators and interaction locations for each marine species in the review. Additional organisations were contacted after recommendation by initial contacts. This resulted in more than 100 phone calls and 50 sent emails (with over 40 email replies) to a total of over 60 people.

The species of Australian marine wildlife presented in this review have been selected on the basis of their specific promotion as a tourist attraction and product. Incidental sightings of numerous other species undoubtedly affect tourists’ satisfaction, but because they are not the primary attraction they have not been covered in detail. However, some of the management issues associated with such multi-species trips are discussed. Although recreational fishing is an increasingly popular tourist activity (Commonwealth of Australia, 1996), this review is focused on non-consumptive marine wildlife tourism, and
the many dedicated recreational fishing charter operations throughout Australia (which often provide excellent opportunities for viewing many species of wildlife) have not been included. This review does not document the full distribution of the wildlife species in Australian waters, but rather the presence of tourism associated with them. Thus sightings of many of the marine species are not restricted to the areas indicated (Table 2), but are included in the table based on their accessibility to tourists, the presence of tour operators and the level of promotion as tourist attractions.

Distinctions have been made between operators based on the level of dedication of tours for each species. Dedicated tours include those who actively promote sightings of a species and use the species as a major part or entire focus of their tours. Dedicated tour operators may focus on more than one species, depending on the local abundance and reliability of sightings for any individual species. Marine wildlife tour operators may also incorporate species into their tours on an incidental basis, where a species becomes an incidental part of the tour, based on opportunistic sightings. Sightings may be opportunistic in nature where species are migratory and/or occur seasonally, where sightings are inconsistent or unpredictable, or where the main focus of an operator’s tour does not include a particular species, but sightings do occur and therefore become part of the overall experience for the tourists involved.

3. RESULTS

The last decade has seen a growing awareness of the importance of a biogeographical framework for planning and management that has been given added impetus by the advent of the Ecologically Sustainable Development (ESD) paradigm (Brundtland, 1987; Commonwealth of Australia, 1992). The need for such an approach has been explicitly acknowledged for the planning and management of tourism in Australia (Commonwealth of Australia, 1991). This review therefore provides a summary of the current marine biogeographic classification of coastal Australia on a state-by-state basis (Table 1) as a framework within which to examine the distribution of Australian wildlife and its associated tourism.

There is a very wide variation in the extent and biogeographic diversity of the marine resources of the states. Western Australia, with 22,800 km of coastline has 37% of Australia’s continental margin and the 18 meso-scale regions represent 42% of the 60 regions identified around Australia (Table 1). Queensland is a distant second with 22% of the coast encompassing 14 regions (23% of total). A lack of major gulfs and inlets provides New South Wales with less than 10% of the coastline of Western Australia and its single Warm Temperate province provides only five regions representing 8% of the total meso-scale units around the country. The four classes are based on climate characteristics and approximate the five biogeographic regions that have long been recognised by marine biologists around Australia (Bennett, 1987). The finer scale divisions identified by IMCRA (1998) include nine core Provinces (Table 1). These are separated by eight Biotones, which are zones of transition from one core to another (IMCRA, 1998).

Key findings on the wildlife and its associated tourism are summarised in Table 2, including numbers of locations and operators for each species (excluding Australian External Territories and the Australian Antarctic Territory).
Table 1: Marine and Coastal Resources of Australia

Length of coastline in kilometres and percentage of coast, ranked by state and diversity of marine and coastal biogeographic regions including IMCRA Class, Demersal Province, Region and percentage of total Australian continental regions.

<table>
<thead>
<tr>
<th>State</th>
<th>Length of coastline (km)</th>
<th>% of coast</th>
<th>Major Biogeographical Regions</th>
<th>IMCRA classification</th>
<th>Length of % of Major Biogeographical Regions</th>
<th>Total Continental Australia %</th>
<th>Total Continental Australia Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>WA</td>
<td>22,800</td>
<td>37.0</td>
<td>1. Western Tropical 2. Western Warm Temperate</td>
<td>Tr ST Tr WT</td>
<td>North Western NWP Central Western SWP South Western SWP</td>
<td>18 41.7</td>
<td>60 131.8%</td>
</tr>
<tr>
<td>QLD</td>
<td>13,300</td>
<td>21.6</td>
<td>1. Tropical 2. Eastern Warm Temperate 3. Cool Temperate</td>
<td>Tr Tr Tr</td>
<td>Northern NP North Eastern NEP</td>
<td>14 23.3</td>
<td>8</td>
</tr>
<tr>
<td>NT</td>
<td>11,000</td>
<td>17.8</td>
<td>1. Western Tropical 2. Western Warm Temperate</td>
<td>Tr</td>
<td>Northern NP</td>
<td>13 21.7</td>
<td>5</td>
</tr>
<tr>
<td>SA</td>
<td>5,100</td>
<td>8.3</td>
<td>1. Western Warm Temperate 2. Cool Temperate</td>
<td>WT</td>
<td>Gulf GulfP</td>
<td>8 13.3</td>
<td>2</td>
</tr>
<tr>
<td>VIC</td>
<td>2,500</td>
<td>4.1</td>
<td>1. Western Warm Temperate 2. Eastern Warm Temperate 3. Cool Temperate</td>
<td>CT</td>
<td>Bassian BassP</td>
<td>6 10</td>
<td>2</td>
</tr>
<tr>
<td>NSW</td>
<td>2,100 incl. Lord Howe I.</td>
<td>3.4</td>
<td>1. Eastern Warm Temperate</td>
<td>WT</td>
<td>Central Eastern CEP</td>
<td>5 8.3</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>61,700</td>
<td>100.1</td>
<td>Total = 5</td>
<td>Total = 9</td>
<td>Total = 60</td>
<td>131.8%</td>
<td>6</td>
</tr>
</tbody>
</table>


Table 2: State by state summary of non-consumptive marine wildlife tourism in Australia, as at end of 1999

<table>
<thead>
<tr>
<th>State</th>
<th>Shore-based Tourism</th>
<th>Boat-based Tourism</th>
<th>Swim-based Tourism</th>
</tr>
</thead>
<tbody>
<tr>
<td>WA</td>
<td></td>
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<tr>
<td>QLD</td>
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<td>VIC</td>
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<tr>
<td>NSW</td>
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</tbody>
</table>

Shore-based tourism: number of tourist-accessible shore-based locations. Boat-based tourism: number of known boat-based operators. Swim-based tourism: number of known in-water operations. Classes (based on climate characteristics): Tr=Tropical, Str=Subtropical, WT=Warm Temperate, CT=Cold Temperate, NA=Not available.

Note: Based on the climate characteristics, the states are divided into different classes: Tr=Tropical, Str=Subtropical, WT=Warm Temperate, CT=Cold Temperate. The data include the number of known locations/operators and the percentage of known locations/operators for each state. The table also indicates the number of permitted operators (may not all be currently operating) and the number of pending permits (granted in July 2000). The figures given are for dolphin and whale species. The data is based on the IMCRA biogeographic regions.
3.1 Mammals

3.1.1 Cetaceans

Whales
Whale watching opportunities abound around the whole southern half of Australia from Western Australia to Queensland and are increasing in the more tropical areas of these two states. Whale watching in Australia is seasonally dependent. Generally, the winter months provide the best opportunities for seeing several whale species close to the Australian coast. Different species of whale can be viewed from either on land, from a boat or from in the water. Species most consistently seen in Australia’s waters include the humpback (Megaptera novaeangliae), southern right (Eubalaena australis), and dwarf minke whale (Balaenoptera acutorostrata sensu lato). Occasional sightings of long-finned pilot (Globicephala melas), fin (Balaenoptera physalus), Bryde’s (Balaenoptera edeni species complex), sei (Balaenoptera borealis), sperm (Physeter macrocephalus), blue (Balaenoptera muscus), killer (Orcinus orca) and beaked whales (Mesoplodon spp.) are also known to occur.

Sightings of rarely seen species and of well-known individual whales frequently attract media publicity, generating strong community interest. Examples include regular reports of a white humpback whale as it was sighted travelling along the east coast of Australia in 1998, and sightings of Alex, the five year-old southern right whale, as it inhabited the waters off Manly for several days in 1999 (Russo, 1999).

Western Australia
Shore-based sightings of southern right whales in Western Australia are common along southern coastal areas between June and October, but are known to occur most consistently around Cape Naturaliste, Augusta, Albany, Esperance and Point Anne (between Esperance and Albany). These areas offer tourists reliable sightings of both southern right and less frequently humpback whales. Boat-based whale watching in Western Australia has recently seen very strong growth. Thirty-five whale watching operators were identified by Anderson et al. (1996) in Western Australia for the 1994 calendar year. Hoyt (2000) later identified 87 licensed whale watch operators in Western Australia, during 1998. By the end of 1999, 101 whale watching permits had been issued by the Department of Conservation and Land Management (CALM) to operators in Western Australia (Adrian Coleman, personal communication, 9 March 2000). The number of these promoting dedicated whale watching trips is uncertain, and it is expected that many of these incorporate incidental sightings of whales into general cruise or charter tours. However several dedicated operators are known to travel up and down the Western Australian coastline to see both humpback (in northern areas) and southern right whales each season (Peter Mawson, personal communication, 9 March 2000). Locations offering whale watching cruises in Western Australia include Perth, Albany, Augusta, Busselton and Esperance.

Queensland
Humpback whales, which can be seen during their annual winter migration at many locations along the east and west coasts of Australia, are the most commonly sighted whale in Queensland waters. Hervey Bay has the highest concentration of whale watching operators in Queensland (20 permitted), and is widely promoted as the “whale-watching capital of the world”. Large numbers of humpbacks and other whales congregate annually to rest in the protected waters of Hervey Bay on their return journey to Antarctica, frequently displaying seemingly playful behaviour to onlookers by breaching, slapping their tails and pectoral fins on the water’s surface and closely approaching tourist vessels. Two permitted humpback whale watching tour operators also operate within Moreton Bay Marine Park. Twenty whale watching permits have been issued by the Great Barrier Reef Marine Park Authority (GBRMPA) within the GBR, however few are currently utilised due to the wide dispersal and irregularity of humpback whale sightings in this region. Areas described for these permits include operators from Cairns (two of which currently use these permits for dedicated dwarf minke whale tours), Townsville and the Whitsunday Islands. Incidental sightings of humpbacks are becoming increasingly common among Reef tour operators in the Cairns, Central and Mackay/Capricorn sections of the GBR. Shore-based sightings of whales in Queensland are uncommon and largely incidental, but are most likely to occur from the east coasts of Fraser and Stradbroke Islands. Day dive boats in Far North Queensland have occasionally placed snorkellers in the water to interact with humpback whales (AB personal observation).
A fledgling whale watching industry has begun in the Cairns section of the Great Barrier Reef Marine Park, based on in-water interactions with dwarf minke whales. During the winter months, dive tourists on live-aboard dive vessels departing from Cairns and Port Douglas, while snorkelling and diving on the Ribbon Reefs, experience close and often prolonged encounters with these whales which frequently approach vessels and divers in the area (Arnold & Birtles, 1999). Two permitted live-aboard operators in this area promote specific minke whale tours, however at least three other live-aboard dive operations regularly experience incidental encounters with the whales. Several day-trip operators from Port Douglas and Cairns have also experienced occasional interactions with dwarf minke whales.

New South Wales

Shore-based whale watching in New South Wales provides opportunities to view humpback and increasingly, southern right whales. Good vantage points for shore-based whale watching include Byron Bay, Coffs Harbour, Burrewarra Pt, Moruya Heads, Narooma Headland, Tathra Headlands, Twofold Bay and Green Cape (near Eden). There are many boat-based tour operators in New South Wales who incorporate incidental whale sightings into their tours. The number of dedicated whale watching cruise operators in New South Wales is uncertain, however contact with members of the National Parks and Wildlife Services, Tourism New South Wales and various local tourism organisations has revealed at least 33 operators incorporating whale sightings into their tours. These include 13 operators within the Sapphire Coast region (between Bermagui and the Victorian border), eight from Narooma, six from Port Stephens, two permitted within the Solitary Islands Marine Park, two from Huskisson, one from Ulladulla and one from Coffs Harbour. Recent findings by Hoyt (2000) indicate some 73 operators in the New South Wales state database known to offer whale or dolphin tours (or both), at least part-time. The level of dedicated promotion of whale watching tours and search effort for many of these operators however is likely to be minimal, with many small charter vessels taking whale watching tours opportunistically as local whale sightings occur, and not necessarily for the duration of the whale migration season (Fiona Mandelc, email to authors, 10 April 2000). Operators in these areas encounter mostly humpback whales, however they report increasing sightings of southern right, sperm, blue, minke, and killer and beaked whales.

South Australia

Southern right whale sightings are becoming increasingly common between June and October along many southern coastal areas of Australia. Shore-based whale watching from the many cliffs in South Australia generally offers better viewing opportunities than boat-based operations. Popular locations for shore-based viewing include the Head of the Bight, which receives the most consistent sightings, Fowlers Bay, Point Labatt, Middleton Beach, Bashams Beach, Robe, Encounter Bay (Victor Harbour), Boston Bay and Cleaford Bay (Port Lincoln) and Weirs Cove, Vivonne Bay, D’Estrees Bay and Pennington Bay on Kangaroo Island. To reach the remote viewing areas in South Australia, several operators offer camping and four-wheel-drive tours including whale watching at the Head of the Bight. There are also a few light plane charters in this area which incorporate whale watching into their scenic flights. No boat-based operators are currently listed as dedicated whale watching charters, however cruise/charter operators may incorporate incidental interactions with whales into their tours. Interest in this style of whale watching appears to be growing, as one operator intends to commence whale watching tours in 2000 at Wirrina Cove, south of Metropolitan Adelaide (Frank Dal Piva, email to authors, 3 March 2000).

Victoria

Logan’s Beach near Warrnambool is the most popular and consistent shore-based sighting location for southern right whales in Victoria. A viewing area is located on top of the dunes, overlooking the waters that are a southern right whale calving area. For the 1999 season, two boat-based operators were also conducting whale watching cruises in this area, with a third expressing interest in becoming involved (Ian Westhorpe, personal communication, 6 April 2000).

Tasmania

Tasmanian sightings of southern right and occasionally humpback whales occur opportunistically along the east coast (mostly from the Freycinet Peninsula), from the Tasman Peninsula and Bruny Island. Two multi-species boat cruise operators in Tasmania incorporate whale
watching opportunistically in-season, around Bruny Island and the Freycinet Peninsula.

**Dolphins**

One of the most popular icons for marine tourism promotion, dolphins are found along the entire coastline of Australia. Most common inshore species include the bottlenose dolphin (*Tursiops truncatus/aduncus* species complex), the Indo-Pacific humpback dolphin (*Sousa chinensis*) and common dolphins (*Delphinus spp.*). Wild dolphin tourism includes boat-based tours, swim interactions and shore-based observation (usually accompanied by hand-feeding). Boat-based cruises are the most common style of watching wild dolphins and are promoted by many Australian coastal communities.

**Western Australia**

The Western Australian Department of Conservation and Land Management (CALM) had issued 39 permits for boat-based dolphin watching cruise operators by the end of 1999. Many of these are likely to incorporate dolphin sightings into multi-species cruise tours, and there is a large overlap among operators issued permits for dolphin, seal and whale watching (Peter Mawson, personal communication, 9 March 2000). Popular areas for dolphin watching cruises include Shark Bay, Rockingham, Mandurah and Bunbury. Swim-with-wild dolphin tours (all with bottlenose dolphins) are conducted by only a few operators in Australia, with Western Australia having three permitted operators. These operators conduct swim tours under strict guidelines, departing on a daily basis throughout the year from Rockingham, Mandurah and Bunbury. Permitted shore-based feeding of wild bottlenose dolphins occurs in two places in Western Australia. The most famous of these (and longest established) is Monkey Mia in Shark Bay. On most mornings, small groups from a local population of over 100 bottlenose dolphins enter the shallows of the beach and are fed small amounts of fresh fish by visitors, under the supervision of full-time national park rangers. A similar interaction experience is offered in Bunbury, where up to six regularly visiting bottlenose dolphins are fed at the public beach “interaction zone” by trained staff while visitors are able to swim and observe the dolphins within the zone.

**Queensland**

Many boat-based cruise operators in Queensland incorporate incidental sightings of dolphins into their tours, however few promote dedicated dolphin watching trips. There are two permitted cruise operators within Moreton Bay Marine Park who focus on sightings of several species including dolphins, and two cruise operators from Hervey Bay are reported to incorporate regular dolphin sightings into their tours but these operations are outside the Hervey Bay Marine Park. Sightings of dolphins frequently occur among the whale watching tour vessels in this Marine Park, and contribute to the overall visitor experience. However, no dedicated dolphin watching cruise tours are currently operating within this area. Sightings by other cruise operators (including within the GBRMP) are common but largely incidental. Wild dolphins can also be viewed from the shore at two locations in Queensland. At Tangalooma (within Moreton Bay Marine Park, north of Brisbane) a small group of wild bottlenose dolphins are fed each evening by resort staff from a jetty for resort guests. Indo-Pacific humpback dolphins are also hand-fed for shore-based onlookers in Tin Can Bay, however this is not a permitted activity and is currently being reviewed by managers. It is possible that this activity may be phased out in the near future (Moyra McRae, email to authors, 22 March 2000). Snorkellers are occasionally placed in the water to interact with spinner dolphins (*Stenella longirostris*) in Far North Queensland by both day and live-aboard dive boat operators, but this is rare and definitely opportunistic (AB personal observation).

**New South Wales**

The total number of boat-based cruise/charter operators incorporating incidental sightings of common and bottlenose dolphins into tours is unknown and likely to be greater than indicated in Table 2. However at least 12 tour operators in the Port Stephens/Nelson Bay area are known to conduct cruise tours including regular sightings of a resident pod of approximately 100 bottlenose dolphins. Some of these operators are known to use boom nets, allowing passengers the opportunity to be closer to the dolphins, however free swimming with the dolphins is not permitted. A code of practice among these operators limits the number of boats with a pod to no more than three (Gill & Burke, 1999). Further operators are known to include dolphin sightings, with varying levels of dedication and search effort, from Eden, Merimbula and Coffs Harbour.
South Australia
At least five boat-based operators are known to conduct bottlenose dolphin watching cruises in South Australia, including three on the Port River, one on the Metro Coast and one in Baird Bay. The Metro Coast operator is known to offer multi-species marine wildlife tours, incorporating dolphins, seals and sea lions. This operator is also known to conduct seasonal cage dives with great white sharks. Swim tours with dolphins as well as Australian sea lions are offered by the Baird Bay operator, the only known dolphin and sea lion swim operator in South Australia.

Victoria
Port Phillip Bay has eight permitted dolphin and seal cruise operators, departing from Portsea, Sorrento and Queenscliff. Five of these have permits to swim with the bottlenose dolphins in the Bay.

Tasmania
Two cruise charter operators based on Bruny Island and on the Freycinet Peninsula also regularly include dolphin watching among their multi-species marine tours. Although swimming with seals in Tasmania is becoming increasingly popular, there are no known swim-with-dolphins operators.

Management framework for cetacean interactions
The Whale Protection Act 1980 provides for the preservation, conservation and protection of whales and other Cetacea in Australian waters. The Act prohibits killing, injuring, taking or interfering with any whale, although some activities are allowed under permit (e.g. for scientific research). Under the Act, interfering is defined to include harassing, chasing, herding, tagging, marking or branding. The Whale Watching Guidelines (Tucker, 1989) were developed by the Commonwealth to help interpret the provisions of the Act, and to provide specific instructions for operating around whales. These guidelines are still current and apply to swimming with all whales, including dwarf minke in the northern Great Barrier Reef. The guidelines specify that approaches by swimmers be no closer than 30 metres, and that boat approaches be limited to 100m and 300m when in front of a whale. New provisions for whales and other cetaceans are contained in the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 that came into force in July 2000 and new regulations are currently being developed under this Act.

Cetaceans are also protected by complementary state legislation, within three nautical miles of land. Within Queensland, the Nature Conservation (Whales and Dolphins) Conservation Plan 1997 includes a provision that “A person in water must not, without reasonable excuse, enter the water closer than 300m to a whale or 100m to a dolphin.” This recent plan effectively prohibits swimming with minkes in Queensland State waters. However, sightings and encounters with dwarf minke whales occur outside State waters in the GBR Marine Park. Such bans have been invoked in several countries around the world but would be ineffective as a management strategy for dwarf minkes as they frequently approach divers engaged in normal scuba diving activities on the Reef. As such approaches cannot be banned, the management of the interactions in a manner that minimises impacts has been developed (Arnold & Birtles, 1999). This approach is based on the ANZEC Guidelines so that the initiation and continuance of an interaction is up to the whale. The management of the people involved is the main objective and this has been achieved by the use of ropes, a code of practice containing detailed guidelines and high levels of interpretation to facilitate their observance.

Environment Australia has been working with all State and Territory agencies and a wide array of other stakeholders to develop new Australian National Guidelines for Cetacean Observation (Commonwealth of Australia, 2000). These guidelines are intended to provide a minimum standard for managing various human activities associated with watching whales and dolphins. They include guidelines for vessels and aircraft, as well as for people in the water around whales and dolphins.

In the case of southern right whales, there is some pressure on management from shore-based public watchers regarding potential impacts from boats. Boat-based whale watching in both South Australia and Victoria has in some instances led to the whales appearing to avoid the vessels and to move further from shore. This has caused some angry reactions among the shore-based public towards vessel operators in South Australia (Tony Flaherty, email to...
countries and territories, with an estimated commercial value greater than US$1 billion (Hoyt, 2000). Recent estimates of the number of whale watching participants in Australia further highlight the strong growth in this industry, with more than 730,000 whale watchers in 1998, compared to approximately 330,000 in 1991 (Hoyt, 2000).

Given that the circumstances of whale encounters vary so much (in Australia this ranges from shore-based observation and charter flights, through observation from small and large vessels to actual swimming with whales) it is not possible to develop a single, comprehensive set of guidelines. The diversity of platforms, local conditions, and especially the radically different size, behaviour and biology of the target species mean that there is an absolute need for guidelines which are species-specific, and occasionally locality and/or operation-specific. It would appear that this is the objective of the Commonwealth government under its proposed two-tier system of management (Commonwealth of Australia, 2000).

What is also clear is that each management situation needs to be considered in its wider context. For example, while shore-based whale watching (for instance, in the Great Australian Bight) may have a significantly reduced impact on the whales, compared with boat-based observations in the same location, there is clearly much concern about environmental damage to the cliffs from which the observation takes place. This includes physical degradation associated with human trampling and the flow-on effects of inadequate infrastructure (roads, parking and toilets).

Similarly, it is clear that the substantial deficit in basic knowledge about the target marine species and the specific impacts of whale watching means that most guidelines are as yet inadequately supported by science and may not result in sustainable outcomes. Most guidelines necessarily include a strong precautionary element and will benefit from investment in more basic research about the species, especially a better understanding of normal behaviour and ecology as well as monitoring apparent reactions to tourism activities. Unfortunately this kind of research is expensive and often requires long-term monitoring to be effective. Generally the incentive to support such research coincides with the development of a commercial interest (for example, whale sharks in Ningaloo Marine

Internationally, southern right and humpback whales are classed as vulnerable by the International Union for the Conservation of Nature (IUCN), while many other species of cetacean are classified as insufficiently known. Recent attempts by Japan and Norway to overturn the current trade ban on minke whales at the Convention on International Trade in Endangered Species (CITES) in April 2000 have been unsuccessful. However both countries continue to hunt minke and other whales in objection to restrictions issued by the International Whaling Commission. The Japanese whaling fleet still takes minke whales in the waters of the proposed Southern Ocean Sanctuary and recently (April 2000) returned with 439 animals (Greenpeace, 2000). Proposals by Japan to ‘down list’ the minke whale from Appendix I to Appendix II of the CITES list were based on ‘stable’ population estimates (CITES, 2000). However these estimates failed to take account of widely accepted current thinking on the different species of minke, including the southern and northern hemisphere species and the as yet un-named dwarf minke, currently thought to be a subspecies of the northern minke (Rice, 1998; Arnold & Birtles, 1999). The Working Group on Nomenclature of the Scientific Committee, International Whaling Commission accepted at the 52nd meeting in Adelaide (June-July 2000) that minke whales be recognised as two species: the common minke whale Balaenoptera acutorostrata and the Antarctic minke whale Balaenoptera bonaerensis. However, the status of the dwarf minke whale was left unresolved, pending further work (Perrin, et al. 2000).

Discussion of the management of cetacean tourism in Australia

Whale watching as an industry worldwide has recently been estimated to attract more than 9 million participants a year in 87
An extensive research program has enabled the fine-tuning of the management regime in order to minimise impacts (on both the dolphins and the people) as well as providing models for such interactions that can be tested elsewhere (Orams, 1999). Despite the extent of Orams’ work it is clear that there remains much to learn about the consequences of such tourism associated activity.

3.1.2 Dugong

Most of the world’s remaining population of this vulnerable species (*Dugong dugon*) is found in Australian waters between Shark Bay in Western Australia, across the coastal waters of northern Australia and south to Moreton Bay in Queensland (Marsh, *et al*., 1995). In Shark Bay, Western Australia, six tour operators are currently permitted by CALM to conduct dedicated boat-based dugong watching tours, operating from Monkey Mia (2 operators) and Denham (4 operators). In Queensland a large localised population of dugong inhabit the waters of Moreton Bay, offering a unique opportunity to view dugong close to a major city. Two operators within Moreton Bay Marine Park are permitted by the Queensland Parks and Wildlife Service to conduct tours to view marine animals including dugong, turtles, sharks and dolphins. However, these operators are not permitted to conduct dedicated dugong watching tours (i.e. advertising dugong watching or focusing on dugong watching as a major part of their operation) (Sarah Parker, email to authors, 14 March 2000).

In the Hinchinbrook Shire of North Queensland, the State’s first dedicated dugong watching permit application has recently been issued by the GBMPMA, creating considerable backlash from conservation groups for reasons of inadequate public consultation and lack of research (ABC Local News, Townsville, 9 August 2000). The controversial issue of this permit coincided with charges laid by CALM against one of Shark Bay’s dugong watching operators for breaching his permit conditions by chasing and separating a group of animals, disturbing/molesting a cow and calf and encroaching on a 40 m exclusion zone (Tony Flaherty, email to authors, 1 August, 2000).
Management of dugong
Listed as vulnerable to extinction in the IUCN Red List of threatened animals, the dugong has recently received acceptance to Appendix I of the CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) convention, leading to a ban on all trade in dugong products. Previous CITES listing of trade in dugong products was dependent on the dugong population involved, with Appendix I listing only for dugong populations outside Australian waters. Dugongs are a protected species in Commonwealth and state waters, with allowances for restricted hunting by Aborigines and Torres Strait Islanders. A network of dugong sanctuaries has recently been set up along the Queensland coast in an attempt to reduce the high levels of mortality associated with the impacts of human coastal activities (e.g. netting, pollution and loss of habitat). Boat-strikes are also of concern as the number and speed of vessels increase, but little is known about their frequency or severity. Concern for recent high mortality rates in manatee populations in the United States has been expressed recently by the Florida State Government, which refused to grant permits for additional boat ramps in those counties which did not have a manatee management plan (Environment News Service, 2000).

3.1.3 Pinnipeds
Species most commonly seen in mainland Australian coastal waters include the Australian sea lion (*Neophoca cinerea*; found most frequently in the temperate coastal waters off South Australia and Western Australia), the Australian fur seal (*Arctocephalus pusillus doriferus*; commonly found in coastal areas of southern New South Wales, Victoria, and Tasmania) and the New Zealand fur seal (*Arctocephalus forsteri*; found in fewer numbers in coastal areas of Western Australia (south of Port Augusta, southern New South Wales, Victoria, South Australia and Tasmania). The IUCN status of these species are: Australian fur seal: Lower Risk, near threatened; Australian fur seal and New Zealand fur seal: Lower Risk, conservation dependant (Shaughnessy, 1999). Viewing experiences with pinnipeds range from guided tours on shore to boat cruises, swim and scuba diving interactions. For tourism and management purposes, there are important distinctions between these species, in terms of their behaviour and susceptibility to disturbance. Differences between breeding and non-breeding sites also dictate appropriate behaviour for human interaction. For example, observation of seals at haul-outs (non-breeding sites, usually rocky or exposed islands, shorelines or man-made structures where seals leave the water to rest) is less likely to have negative impacts on the seals than at breeding sites, as well as reducing the potential threat to swimmers from sharks because of the absence of attractants such as blood, afterbirths, etc.

Western Australia
Shore-based viewing of Australian sea lions is possible at only two locations in Western Australia, from Carnac Island & Seal Island, both within the Shoalwater Islands Marine Park (near Fremantle). These are non-breeding colonies, enabling tourists to experience in-water interactions with the sea lions. Nine operators are permitted by CALM to conduct such tours, all within the Marine Park. State wide, CALM has issued 17 permits to operators to watch Australian sea lions, two permits to watch New Zealand fur seals and permits to two operators to watch both species (a total of 21) (Table 2). New Zealand fur seals are only found south of Port Augusta, and tour operators here are unable to land on islands with fur seal colonies, due to excessive exposure and rocky areas (Peter Mawson, personal communication, 9 March 2000). Susceptibility to disturbance is another factor deterring operators from landing near these colonies, as fur seals are very easily disturbed by human presence and have been known to stampede, which can cause young pups to be crushed, as well as interrupting important rest periods for the seals (Shaughnessy, 1999).

New South Wales
Australian fur seals are frequently seen by charter boats and cruise operators around Jervis Bay and Montague Island off Narooma on the south coast of New South Wales. Eight cruise/charter operators based around Narooma offer sightseeing and diving opportunities with the large colony of Australian fur seals (and a small colony of New Zealand fur seals) resting on Montague Island during the winter months. These charter operators take advantage of the regular sightings of seals during their tours, and frequently also include opportunistic sightings of dolphins and whales in season. One of these operators is permitted to land on Montague Island, and may offer the opportunity to view the seal colony from on the island.
Bowen Island also has a small seasonal colony of Australian fur seals and is visited frequently by one cruise operator. Further north, at Steamer’s Head in Jervis Bay, is a smaller seasonal colony of Australian fur seals which provides an attraction for seven boat-based tour operators, six of whom provide diving opportunities with the seals (Francis Clemens, personal communication, 24 March 2000).

**South Australia**

Popular locations for shore-based viewing of Australian sea lions include Point Labatt, off Streaky Bay, and Seal Bay on Kangaroo Island. Guided tours are conducted by various operators, accredited by the National Parks and Wildlife Service, on the sandy beaches and dunes close to the resting and breeding areas of these sea lion colonies. A substantial colony of New Zealand fur seals can also be viewed in this manner at Cape du Couedic on Kangaroo Island, which is well developed with a boardwalk, and has several local operators licensed by the NPWSA to conduct tours. Granite Island similarly has a private tour operator licensed to guide shore-based tours to watch the New Zealand fur seal colony on the island. South Neptune Island is home to another New Zealand fur seal colony, which is frequently visited by a boat-based operator (who also offers dolphin cruise tours and white shark cage dives – as mentioned previously). One operator based in Baird Bay (South Australia) offers cruises with the option to swim (snorkel) with the Australian sea lions and dolphins (also previously mentioned). The vessel anchors in the shallow waters close to the small colony (of approx. 60 sea lions) and allows them to approach and interact with swimmers. Feeding and other methods of attracting the sea lions to the swimmers are not used, and the sea lions approach voluntarily, out of curiosity. This is reported to be a highly interactive experience, with swimmers mimicking the sea lions’ movements and vice versa.

**Victoria**

A large breeding colony of Australian fur seals can be viewed through telescopes or binoculars from near The Nobbies on Phillip Island as they rest on Seal Rocks (1 km west of the island) without threat of disturbance or harassment. Visitors can also enjoy a much closer but virtual experience with the aid of a high-tech live video link from the colony to the recently opened Seal Rocks Sea Life Centre. A massive screen in a large theatre with high quality live interpretation is the core attraction with the objective of the rest of the highly sophisticated state-of-the-art interpretive facility being to provide the additional enriching and highly educational elements of the experience (e.g. smell, sound, scale, temperature, underwater views, understanding of biology, history, etc.) without any impact on the animals.

A haul-out site for Australian fur seals can be observed at Cape Bridgewater, west of Portland, and a further colony is also establishing at a haul-out at Henty Reef, Marengo (near Apollo Bay) (Tim Allen, email to authors, 2 April 2000). Many cruise and charter operators located at several sites along the coast are able to provide viewing opportunities of penguins, seals, dolphins and whales, depending on the season. At least 13 operators currently offer dives incorporating seal watching in Victoria. These include: one regularly visiting Seal Rocks; three from Queenscliff and three out of the Mornington Peninsula viewing seals hauled out on man-made structures in southern Port Phillip Bay; one based around the Cape Bridgewater haul-out; two out of Port Fairy viewing the colony at Lady Julia Percy Island; at least two operators visiting the islands off Wilson’s Promontory (Kanowa Island has a breeding colony, while Notch, Rag and White Islands have haul-outs); and at least one operator conducting sea kayak tours to view the breeding colony on The Skerries. A further three fishing charter operators are also known to incorporate seal watching opportunistically at Seal Rocks. Swimming with Australian fur seals also occurs in Port Phillip Bay, with the five licensed dolphin swim operators also offering opportunities to swim with Australian fur seals. Swimming with the seals in southern Port Phillip Bay is also a popular activity for local dive clubs and other charter/cruise operators are known to occasionally offer dives with these seals (Roger Kirkwood, email to authors, 6 April 2000).

**Tasmania**

Tasmania is surrounded by a large number of breeding colonies and haul-out locations of Australian and New Zealand fur seals. Locations identified as tourism sites include Reid Rocks (off north-west coast), Bull Rock (off Stanley, north-west coast), Tenth Island, îles des Phoques (east coast), Cape Huo, Hippolyte Rock, Tasman Island, Cape Pillar, Cape Raoul and The Friars (south-east coast) (Parks and Wildlife Service Tasmania, 1999). Many of these locations are best viewed by boat, as landing can be difficult on the rocky areas and may cause disturbance or even stampede the resting seals. Four boat-
3.2 Birds

3.2.1 Penguins

The most commonly accessed marine bird species for tourism in Australia is the little penguin (*Eudyptula minor*), also known as the fairy penguin. Little penguins are found commonly along the coasts of New South Wales (as far north as Port Stephens), Victoria, Tasmania, South Australia and Western Australia (as far north as Fremantle) (Stahel & Gales, 1987). The best way to view these penguins is from the shore to which they return each evening to get to their nests during the summer months. In many locations where such an experience is promoted, boardwalks and viewing platforms have been constructed to minimise the impacts of large numbers of visitors.

Western Australia has one main location for shore-based viewing of little penguins on Penguin Island, which is managed and operated by CALM. In New South Wales, Montague Island (9 km off Narooma) is home to Australia’s second largest little penguin colony, as well as a large colony of Australian fur seals. Only one tour operator (with two vessels) is permitted to land on the island. Little penguin colonies can also be found on Bowen Island (regularly visited by one boat-based operator) and Gabo Island. In South Australia, the most popular penguin watching locations include Penneshaw and Kingscote on Kangaroo Island, and Granite Island (off Victor Harbour). At each of these locations several private operators have been licensed by NPWSA to conduct shore-based tours to view the rookeries.

Shore-based guided tours to view little penguins in Victoria are conducted at Phillip Island and St. Kilda, while one boat-based tour operator is known to sit close to shore and watch the returning penguins of the St. Kilda colony most evenings. In Tasmania, more than eight locations offer the opportunity to view little penguins from the shore, including Bicheno, Stanley, George Town, Burnie, Lillico, Penguin Island, King Island and Bruny Island. Commercial operators conduct tours to view the little penguin colonies in Bicheno, George Town, King Island and Bruny Island, while the Tasmanian Parks and Wildlife Service offers summer ranger-guided tours alternating between Stanley, Burnie, Lillico and Penguin Island.

Management of pinnipeds

Seals are managed by a variety of State conservation and fisheries agencies on the Australian coast, nearby islands and in Australian waters generally within three nautical miles of the coast. Outside of State waters, within the Exclusive Economic Zone (EEZ) to about 200 nautical miles from the Australian coast, seal colonies are the responsibility of the Commonwealth and are managed by Environment Australia (Shaughnessy, 1999). Guidelines for watching seals, recommended by the Tasmanian Parks and Wildlife Service (1999), include slow, quiet, downwind approaches in boats to prevent disturbance and the possibility of stampedes, with 100 metres minimum approach distance between November and December when pups are born, and 50 metres for the rest of the year. Swimming with seals is not recommended due to the increased likelihood of sharks in the vicinity of a colony, the risk of bites, and even disease transmission from the seals.

Recently on the coast of Holland, harbour seals were discovered to be infected with the influenza B virus (Osterhaus, et al., 2000). Osterhaus et al., (2000) reported harbour seals as a reservoir of influenza B, discussing implications for human health with the possibility of in-air transmission, with further suggestions of the potential for population level impacts on both wildlife species and humans.

A recent development for safely interacting with seals in-water is currently being trialled by a seal tour operator based in George Town (as mentioned above), with the support of Parks and Wildlife staff. In this case a perspex tube is being used, from within which divers are able to view the seals safely while underwater (Fiona Hume, personal communication, 29 March 2000).
Management of little penguins

Little penguins are managed under various pieces of state legislation and are not considered a threatened species. Threats to little penguins include domestic and introduced animals such as dogs, cats and foxes, loss of habitat, pollution debris and oil spills. Several management applications have been initiated within the Phillip Island Penguin Reserve, including traffic management and vermin control. The Victorian Government also introduced a Penguin Protection Plan in 1985 to restore important little penguin habitat.

3.3 Fishes

The wide range of biogeographic regions in Australian coastal waters, and especially the species rich coral reefs of the northern tropical provinces, offers a multitude of opportunities for visitors to observe and interact with numerous species of fish. Coastal communities Australia wide offer scuba diving and snorkelling opportunities for tourists to view marine organisms. Experiences range from viewing marine wildlife from land, cruise vessels, pontoons, underwater observatories, glass-bottom and semi-submersible boats, to close interactions through swimming, snorkelling and scuba diving. For tour operators in areas such as Ningaloo and the Great Barrier Reef Marine Parks, relatively few fish species are promoted specifically, rather, the diversity of species is the primary attraction. Based on the levels of promotion by tour operators, the most popular species for tourists are sharks, rays, sea dragons, and several species of serranid including the potato cod and various groupers.

3.3.1 Sharks

Sharks can be seen almost anywhere in Australian coastal waters. They can be observed from glass-bottomed boats, semi-submersibles and underwater observatories, however the best viewing occurs in-water, either snorkelling or scuba diving. Experiences such as these range from diving with harmless Port Jackson or Wobbegong sharks, to cage diving with great white sharks.

Tourist operators conducting live-aboard and day trips to coral reefs in northern Australia, including the Great Barrier Reef and Ningaloo Reef Marine Parks, commonly see several species of reef sharks. Species commonly seen in these coral reef waters include white-tip reef sharks (*Triaenodon obesus*), black-tip reef sharks (*Carcharhinus melanopterus*), grey reef sharks (*Carcharhinus amblyrhynchos*), zebra sharks (*Stegostoma fasciatum*) and silver-tip sharks (*Carcharhinus albimarginatus*), and frequent sightings of scalloped hammerhead (*Sphyraena lewini*), tawny (*Nebrius ferrugineus*) and tiger sharks (*Galeocerdo cuvier*) also occur. Feeding of reef sharks is conducted regularly outside the GBR Marine Park by at least three live-aboard dive tours visiting Bougainville, Osprey, Holmes and Flinders Reefs in the Coral Sea, offering passengers cage dives with large schools of reef sharks, attracted by bait and/or burley and sometimes forming a feeding frenzy. Large schools of hammerhead sharks are also observed seasonally by these live-aboard dive vessels within the Coral Sea, as have an occasional thresher shark (*Alopias spp.*), feeding on schooling fish.

Temperate coastal waters of Australia provide more opportunities to see tiger sharks, blue sharks (*Prionace glauca*), oceanic white-tips (*Carcharhinus longimanus*), Port Jackson sharks (*Heterodontus portusjacksoni*), angel sharks (*Squatina australis*) and occasionally grey nurse (*Carcharias taurus*) and mako sharks (*Isurus oxyrinchus*). Communities promoting diving experiences with these species include Jervis Bay, Port Stephens, Coffs Harbour and Byron Bay. Diving locations off Forster, near Port Macquarie (New South Wales north coast) and Montague Island, offshore from Narooma (New South Wales south coast) are reported to provide regular diver interactions with grey nurse sharks. Seven dive operators within the Solitary Islands Marine Park and six within Jervis Bay Marine Park also offer the opportunity to dive with grey nurse sharks.

Further south, great white sharks (*Carcharodon carcharias*) are the focus of several live-aboard dive tours based around Port Lincoln, the Neptune Islands and Sir Joseph Banks Islands Conservation Parks (South Australia). Operators offer cage dives with great white sharks in these areas, attracting them with burley, from November to March. Currently, five permits for this activity have been issued by NPWSA to operators in South Australia only (Frank Dal Piva, email to authors, 3 March 2000).
Whale sharks
Between the months of March and June, Ningaloo Marine Park (Western Australia) is host to an annual congregation of migrating whale sharks. Whale sharks (*Rhincodon typus*), the largest of the fishes, are also known to occur in the tropical waters off the Northern Territory and northern Queensland, however the large annual congregation in Ningaloo Marine Park provides the most consistent sightings. This unique phenomenon has led to the development of a substantial tourist industry based on swim interactions with this little known species. Currently, 15 permits have been issued by the Western Australian Department of Conservation and Land Management (CALM) to live-aboard and day tour operators conducting swim tours, departing from Exmouth and Coral Bay. These operators use spotter planes to locate the whale sharks during the season to provide a highly predictable experience.

3.3.2 Rays

Manta and eagle ray sightings regularly occur in the tropical waters of the Great Barrier Reef and Ningaloo Marine Parks. The manta (*Manta birostris*) is the largest of the rays and one of the largest living fishes, known to reach a wingspan of more than 6.7 metres. Mantas are commonly found in tropical waters, with occasional sightings in temperate waters south to at least Montague Island (New South Wales) and Rottnest Island (Western Australia) (Last & Stevens, 1994). Manta ray encounters with divers are common and mantas are frequently used in the promotion of live-aboard and day-trip dive tour operators in these areas. Sightings of manta rays are opportunistic in nature, but are reported to occur regularly at various dive sites in these areas between December and May.

White-spotted eagle rays (*Aetobatus narinari*) are common within tropical and warm temperate seas. These rays have a wingspan rarely exceeding 1.8 metres (Last & Stevens, 1994). A large school of white-spotted eagle rays can be seen daily in the shallow harbour of Heron Island on the GBR, with more than 20 rays often being seen from the jetty each morning. A school of about the same size is associated with the wreck of the Yongala off Townsville and in the early morning as they lift off from the bow, with the whole school turning loops in the slanting rays of the sun is a memorable sight (AB personal observation).

3.3.3 Sea dragons

Regular sightings of leafy (*Phycodurus eques*) and weedy (*Phyllopteryx taeniolatus*) sea dragons have recently become a popular attraction for dive tourists in Victoria, Tasmania and South Australia. Guided dive tours specifically to see sea dragons are available off the north coast of Kangaroo Island and off Cape Jervis, with regular sightings also known to occur at Rapid Bay on the Fleurieu Peninsula and at Sea Cliff Reef (South Australia). Regular sightings of sea dragons also occur in Victorian and Tasmanian waters, with at least one dive operator promoting sea dragon sightings in Eaglehawk Neck on the Tasman Peninsula.

3.3.4 Potato cod

Potato cod (*Epinephelus tukula*) are a popular species for dive tourists and operators in Ningaloo and the Great Barrier Reefs. The most reliable sightings occur at the "Cod Hole," a dive site located close to Lizard Island in the Great Barrier Reef Marine Park, which is frequented by at least six live-aboard dive operators from Cairns and Port Douglas and one day-tour operator from Lizard Island. Valentine *et al.* (1997) estimate an average of 70 visitor dives per day at the Cod Hole. At this site, several large potato cod (which can reach almost two metres in length) interact regularly with dive tourists as they are hand fed by dive staff within centimetres of the on-looking divers in a frenzy of fish feeding and photography. A history of considerable growth in use of the site has been associated with an alarming and largely unexplained decline in the numbers and health of the potato cod which formed the basis of the site’s attractiveness to divers and snorkellers (Alder & Haste, 1995). The Cod Hole and Ribbon Reef Operators Association (CHARROA) was formed by the dive tour operators using this area to address management issues associated with this site.

3.3.5 Other fishes

Queensland Grouper (*Promicrops lanceolatus*), known to reach lengths greater than three metres, is territorial and long-lived (Randall, Allen & Steene, 1997). Several individual groupers have been popular attractions for tourists in some areas of the GBRMP, with feeding performed in a number of areas. Famous individual Queensland
groupers have included “VW”, a former long-term resident of the wreck of the Yongala (found deceased of unknown cause), and “Ulysses” of Beaver Cay (near Dunk Island, also deceased). Several other smaller Queensland grouper inhabit these areas. A reef day-tour operator visiting Beaver Cay fed Ulysses regularly for approximately 25 years, before reckless fishermen caught, shot and photographed the >3m fish as a prize catch in the mid-80’s. The offenders were subsequently caught and fined by management authorities. Today, at least two more giant grouper inhabit the reef area surrounding Beaver Cay. Recently a spear fisherman shot one of these fish. The fish received a serious wound from the spear, losing an eye (Dave Nissen, personal communication, 27 April 2000).

Giant maori wrasse (Cheilinus undulatus) is another popular attraction for scuba divers and snorkellers on the coral reefs of the GBR and Ningaloo Marine Parks. A number of popular dive sites are visited frequently by individual maori wrasse, including the Cod Hole, where they are often hand-fed. Other known dive sites with well known individual maori wrasse on the GBR include Turtle Bay of Tongue Reef, Opal Reef, Agincourt Reef 2d and several dive sites near Cairns (Andy Dunstan, email to authors, 29 April 2000).

Moray eels (Gymnothorax javanicus) provided much of the attraction at the Cod Hole in the Cairns Section of the GBR. Frequent feeds by several live-aboard dive vessels led to changes in behaviour of several fish species and particularly aggressive behaviour on the part of the moray eels during feeds. This culminated in an attack that resulted in a member of the dive staff on a live-aboard vessel having her arm amputated. The morays were drugged and re-located in June 1997 by a joint GBRMPA, QDEH and industry team (Vail & Hoggett, 1997). The attempted removal of all members of a species from the Cod Hole represents the antithesis of ecologically sustainable tourism at this famous site.

On the Tasman Peninsula, the spotted hand fish (Brachionynchthys hirsutus; endemic to Tasmanian waters) is becoming an increasingly popular attraction for scuba divers, with at least one operator promoting regular sightings (Louise Woodruff, email to authors, 1 May 2000). Other popular species include the western blue groper (Achoerodus gouldi), commonly seen in South Australia, and the eastern blue groper (Achoerodus viridis), common to New South Wales waters.

Many other groups of fishes are popular with divers on coral reefs, particularly anemonefishes (Premnas biaculeatus, Amphiprion spp.) and scorpionfishes, especially the more exotic species such as the leaf scorpionfish (Taenianotus triacanthus) and the weedy scorpionfish (Rhinopias aphanes). These fishes are regularly mentioned to divers in pre-dive briefings, and dive magazines frequently feature photographs of them at named sites.

3.3.6 Management of fishes

Whale sharks are fully protected in Western Australian waters but are not specifically protected in Queensland and are hunted commercially in neighbouring countries (e.g. Indonesia and Philippines). The migration patterns of the whale shark are unknown but it is possible that the same animals occurring in Ningaloo Marine Park are being hunted elsewhere by other countries (especially Taiwan).

The grey nurse shark, which is commercially exploited elsewhere (especially in Japan for meat, liver oil and fins) is fully protected in New South Wales by state fisheries legislation and was the first elasmobranch in the world to receive protection (Last & Stevens, 1994).

Great white sharks are classified as endangered under Australian law and are fully protected, with numbers thought to be declining rapidly around the world. Recent proposals by Australia to list the shark in Appendix I (banning all trade) of the Convention of International Trade in Endangered Species have been unsuccessful, however Appendix II (allowing some regulated trade) listing was granted (CITES, 2000). Concern is growing among fishers and divers in GBR waters that the rapid world-wide growth in shark-finning has already caused decreases in reef populations, especially of larger, more pelagic species. While only anecdotal, such reports are of concern to the dive tourism industry for which these animals are a core resource (Birtles, Valentine & Curnock, unpublished data).

The leafy sea dragon, endemic to southern Australian waters, is fully protected in South Australia, while proposals have been made to
include the weedy sea dragon. The leafy sea dragon has recently become an emblematic species for the state of South Australia, and will serve as an icon for the conservation and ecotourism promotion of South Australia’s unique and diverse marine environment. The rapidly increasing popularity of the leafy and weedy sea dragons as dive tourist attractions has contributed to this recognition (Tony Flaherty, email to authors, 11 April 2000).

Fish species within Australian Marine Parks are afforded limited protection stipulated by various zones. Queensland grouper and potato cod are protected by a catch limit of one, as well as a 35 cm minimum and 120 cm maximum size limit. Maori wrasse in Queensland waters is also protected by a bag limit of one and a minimum size of 75 cm (Queensland Department of Transport, 2000).

The western blue groper is afforded limited protection in South Australian gulf waters, and has the potential to become economically important for the dive industry if given full protection. The eastern blue groper, a territorial species popular among divers, is fully protected in New South Wales, and is recognised as the state marine fish (Tony Flaherty, email to authors, 7 April 2000).

**Discussion of management of fishes**

The interactions between scuba divers and marine wildlife on the Great Barrier Reef have been studied recently in an ongoing CRC Reef Project that aims to provide information for the sustainable management of the impacts of this increasingly popular tourist activity. In the study, over 1000 dive tourists on live-aboard dive vessels in the Cairns Section of the Great Barrier Reef have identified more than 90 marine species contributing to their best experiences. The three most frequently mentioned animals among these were dwarf minke whales, reef sharks and potato cod (Birtles, Valentine & Curnock, unpublished data).

Many popular coral reef dive sites, particularly along the northern GBR, are often home to several resident exotic species, popular among commercial aquarium collectors. As the current level of protection afforded to many of these sites is minimal, due to the ‘General Use’ zoning of much of this area, these fishes are at risk of being removed by collectors. Some sites are dived on almost a daily basis, with moorings provided, and their locations are well known. This makes them particularly susceptible targets, especially when occasional reports in dive magazines provide a list of fishes that can be generally found there. Dive tourists on live-aboard vessels in the northern GBR frequently rate seeing some of these species among the best of their trip experiences (Birtles, Valentine & Curnock, unpublished data). Some individual fishes of territorial behaviour are seen regularly by hundreds of divers over prolonged periods, contributing significantly to many dive tourists’ experiential value. Considering this, each of these fishes is thus extremely valuable to the dive industry, and aquarium collection is therefore a serious threat. Anecdotal evidence from the crew of live-aboard dive vessels using the Ribbon Reefs of the GBR indicates that this kind of resource conflict is already occurring at key sites.

These areas and dive sites need to be identified and greater protection given, through upgraded zoning, to protect this important and growing industry.

**3.4 Reptiles**

**3.4.1 Turtles**

Six of the world’s seven species of marine turtles are found in Australian waters. Loggerhead (*Caretta caretta*), green (*Chelonia mydas*), leatherback (*Dermochelys coriacea*), hawksbill (*Eretmochelys imbricata*), olive ridley (*Lepidochelys olivacea*) and Australian endemic flatback turtles (*Natator depressus*) can be seen opportunistically in Australian tropical and sub-tropical waters (Marsh, et al., 1995). The IUCN status of the loggerhead is vulnerable, while the green, leatherback, olive ridley and hawksbill are listed as endangered. The flatback has been described as potentially vulnerable (Kennedy, 1990).

While a number of dive locations in Ningaloo Reef and the Great Barrier Reef Marine Parks are reported to provide regular sightings of marine turtles, the most popular form of viewing is based on the turtles’ nesting, egg-laying and hatching on various mainland and island beaches. Visitors can watch turtles as they rest and lay their clutches of eggs on sandy beaches between November and February, and observe the hatchlings as they emerge and make their way to the
water in the evenings between January and March. Popular viewing areas include Mon Repos Beach near Bundaberg, Lady Elliot and Heron Islands, (Queensland), Coral Bay (Western Australia), and Casuarina (Northern Territory).

Western Australia
Many turtle nesting locations can be found along the northern coastal areas of Western Australia, however due to the remoteness of much of this area, tourism is generally of a very small scale or absent. The northeast coast of Dirk Hartog Island is one of the world’s largest loggerhead turtle rookeries, however this area is mostly inaccessible to shore-based viewing. One cruise operator frequently conducts tours in the vicinity of Dirk Hartog Island, incorporating opportunistic sightings of these loggerhead turtles into their tours. The many hundreds of kilometres of beaches along the Northwest Cape of Western Australia are used as rookeries by green and loggerhead turtles, however due to the wide geographic dispersal of this area, there are no specific local viewing points for tourists. Within Coral Bay, loggerhead and green turtles nest along an eight to ten kilometre stretch of beach, which is a popular viewing location for tourists. Turtle watching on a small scale occurs at 80 Mile Beach, where a caravan park is located in close proximity to the beach where flatback turtles nest; and Eco Beach, where a resort is also situated near a beach frequented by nesting flatbacks (Bob Prince, personal communication, 9 March 2000).

Other turtle nesting locations (without significant tourism) along the Western Australia coastline include the Duraby coast (northern end of Ningaloo Marine Park, with large numbers of green turtles and a small number of loggerhead and hawksbill turtles), Thevanard Is. (regular nesting of flatback and green turtles), the east coast of Barrow Is. (a large green turtle rookery within oilfield tenure), Port Headland (a small number of flatbacks nesting on small beach), Northwest Kimberley (Australia’s largest green turtle nesting grounds, largely inaccessible), Wyndham, Fog Bay and Cunnanurra (has flatbacks nesting during dry season (winter) due to excessive heat during the summer) (Bob Prince, personal communication, 9 March 2000).

3.4.2 Management of marine turtles
All marine turtles are protected in all State and Commonwealth waters, with restricted hunting allowed by Aborigines and Torres Strait Islanders. However, alarming decreases in populations, especially of loggerheads have occurred over recent years with a range of factors implicated including incidental bycatch from trawling, netting, long-lining and coastal pollution. The incentive for the Australian prawn trawling industry to use Turtle Exclusion Devices (TEDs) has recently been increased, seemingly not through concern for turtle populations, but by the re-opening of the lucrative American market, which demands the use of TEDs for all prawn imports (ABC Rural News, 27 July 2000). Management in nearby countries, to which many of our nesting marine turtles travel for winter feeding, is much less protective. Only selected species are protected in Indonesian waters (loggerhead, olive ridley and leatherback turtles), there are some protected areas in Papua New Guinea, size limits have been imposed in the Solomon Islands and there is a closed season in Fiji (Marsh et al., 1995). Implementation of protective restrictions is also a problem for these developing countries with fast-growing, subsistence-based populations.

3.5 Cephalopods
Dive tours with large numbers of giant cuttlefish are another experience unique to South Australia. Dive operators based around Whyalla on the Eyre Peninsula offer guided scuba tours to see large numbers of giant cuttlefish between May and August. Whyalla offers a unique diving opportunity to dive tourists, during the annual spawning aggregations of the Australian giant cuttlefish (Sepia apama). At the peak of this season, divers can experience reliable in-water sightings of hundreds of the cuttlefish as they perform spectacular mating and competitive behaviour. Congregations of such large numbers of cuttlefish, estimated to exceed hundreds of thousands, are not known to occur anywhere else in the world. However, this resource remains under the threat of collapse from the commercial fishing industry, which harvested 255 tonnes (estimated at more than 250,000 individual cuttlefish) in 1997, and 180 tonnes in 1998 (Jones & Jones, 1999).
Sightings of other cephalopods (including cuttlefish, octopus and nautilus) occur frequently throughout coastal waters of Australia. On the Great Barrier Reef in Queensland, one live-aboard dive operator offers dedicated cephalopod research trips to the Coral Sea, in which dive tourists can interact with researchers examining nautilus, octopus and cuttlefish (Undersea Explorer, 2000).

Management of cephalopods

Measures taken to protect the cuttlefish aggregation in Whyalla have included a two-year ban on commercial harvesting, for the purpose of scientific research, which will end on 30 September 2000. It is estimated that the long-term economic potential of the cuttlefish spawning aggregation as a tourist attraction far exceeds that of the short-term economic benefits of commercial harvesting. Attempts are currently being made to list the area as a World Heritage site by the Whyalla City Council in conjunction with the Whyalla Sports Divers’ Club (Jones & Jones, 1999).

3.6 Australian External Territories

3.6.1 Australian Antarctic and Sub-Antarctic Territories

Tourism to Antarctica and the Australian sub-Antarctic islands is experiencing rapid growth. Approximately 10,000 tourists currently visit Antarctica each summer season, with estimates exceeding 14,000 by 2003 (Australian Antarctic Division, 2000). The most active sector of the industry is ship-based tourism, with an estimated 41 ships and yachts currently offering tourists Antarctic cruise tours on 143 voyages (IAATO, 2000). Less than 1% of the AAT coast is ice-free and this scarce resource is subject to competition between the wildlife (for whom it forms critical breeding habitat) and the growing numbers of researchers and tourists.

Many species of seal, penguin and whale are commonly seen in this region. Common seal species include the crabeater (Lobodon carcinophagus), southern elephant (Mirounga leonina), Antarctic fur (Arctocephalus gazella), leopard (Hydrurga leptonyx) and Weddell seals (Leptonychotes weddellii). Penguin species include the Adelie (Pygoscelis adeliae), gentoo (Pygoscelis papua), chinstrap (Pygoscelis antarctica), emperor (Aptenodytes forsteri), king (Aptenodytes patagonicus), rockhopper (Eudyptes chrysocome), and royal penguins (Eudyptes schlegeli; breeding exclusively on Macquarie Island). Whale species common to the region include blue, humpback, southern hemisphere minke, orca, sei and several species of beaked whales (Stewardson & Child, 1997; Australian Antarctic Division, 2000).

Macquarie Island (part of Tasmania) and the Territory of Heard Island and the McDonald Islands are home to a large variety of wildlife including many of the above species of seals and penguins, as well as large sea bird populations. The Government of Australia nominated Macquarie Island (jointly with the Tasmanian Government) and Heard Island and the McDonald Islands for World Heritage Listing in 1996, resulting in both of these island groups being inscribed on the World Heritage List on 3 December 1997. The Australian Antarctic Division manages Heard Island and the McDonald Islands as an Australian External Territory. Fauna and flora on these islands, including seals and penguins, are the responsibility of the Australian Antarctic Division. Tourism to Macquarie, Heard and the McDonald Islands consists mostly of Antarctic voyages conducted in the region making use of visits to the sub-Antarctic islands on the way southwards and northwards to ‘break’ the long sea journey (Australian Antarctic Division, 2000).

3.6.2 Management of Antarctic and sub-Antarctic tourism

Tourism to Antarctica is self-regulated, guided by the Protocol on Environmental Protection to the Antarctic Treaty, adopted in 1991 in response to proposals that the wide range of provisions relating to protection of the Antarctic environment should be drawn together in a comprehensive and legally binding form. The Protocol:

- “designated Antarctica as a ‘natural reserve, devoted to peace and science’;
- establishes environmental principles to govern the conduct of all activities;
- prohibits mining;
- subjects all activities to prior assessment of their environmental impacts;
Many marine wildlife tourism operators around Australia focus their tours on multiple species, taking advantage of the wide diversity of species found along our coastline to compensate for lower predictability of the large but often uncommon species, which are their preferred targets. Due to the incidental nature of sightings for many of these species it is harder to prepare passengers appropriately for such multi-species experiences and the management of the interactions is necessarily more complicated.

Tour operators focusing on a single marine species often rely on the presence of their resource being concentrated within a limited space and/or time, usually due to the species’ biological requirements and behaviour. The reasons for these restricted occurrences may include feeding, resting, migration or reproductive activities such as mate selection, copulation, birthing, suckling, etc. Such critical life history stages may bring high energy requirements or may otherwise result in a species being particularly vulnerable to human impacts. Examples include the spawning giant cuttlefish in Whyalla, seal breeding areas, right whales calving in southern coastal waters, marine turtles nesting on northern Australian beaches and great white sharks feeding in the waters of South Australia.

It is clear from Table 2 that with the notable exceptions of green turtles and dugongs, almost all of the individually identified target wildlife species are carnivorous taxa. This status often brings with it a suite of characteristics such as large size, extensive ranges (often associated with long migrations), territoriality, high metabolic rates, complex social behaviour, etc. which can make these animals particularly vulnerable to disturbance.

For too many marine species we have a critically impoverished understanding of even their basic ecology, let alone the impacts of our consumptive and non-consumptive exploitation of them. Examples of species least understood include dwarf minke whales and whale sharks, about which we still do not understand the reasons or significance of their annual congregations. In the case of the latter, the rapid development of a swim-based tourism industry left little opportunity for precautionary management approaches.
The development of a swim-with-whales industry, banned outright in many countries and the first of its kind in Australia, based around the annual occurrence of dwarf minke whales on the northern GBR remains minimal at this stage. Due to the high willingness to pay for swim-with-cetacean experiences and an increasing international interest, the urgent application of precautionary management measures is necessary to prevent large-scale developments while the impacts of the current levels of interaction remain unknown. Concerns include risk of disease transmission, injury to swimmers and whales, and harassment of the whales, leading to unforeseen and potentially long-term impacts. As shown in the development of other whale watching industries around the world, competition between operators and performance pressure based on high and often unrealistic expectations among tourist participants may lead to competitive and inappropriate behaviour among operators, and can result in adverse effects on the target species (Forestell & Kaufman, 1996; Hodda, 1996).

Clearly more research is needed to determine whether current levels of exploitation of marine species are sustainable. Further studies, of not only the biology and ecology of marine species, but also of tourists’ behaviour and experiences, are also important as a precursor to best practice management of marine wildlife tourism. In many cases, incorporating findings of tourist experience studies can result in a win-win outcome for natural resource managers, operators and tourists alike. For example, guidelines administered by CALM in 1996 introducing increased swim distances to the whale shark swim industry in Ningaloo Marine Park were shown to have no adverse effects on participants’ satisfaction, yet significantly reduced overcrowding and the incidence of physical contact between swimmers and whale sharks (Birtles et al., 1996).

There is a wide biogeographic variation between States (Table 1). The frequently limited distribution and small population size of several of the marine species targeted for tourism reveals many different approaches to the operation and presentation of the tourism product. Equally diverse are the approaches by State agencies to the management of these tourism industries. The recent strong growth in whale watching, for example, has led to an upper limit on permits in Queensland, while permit numbers have continually increased in Western Australia. Differences in management between the states is further reflected in their approach to swim-with-wild dolphins programs, permitted only in Victoria, Western Australia and South Australia (Table 2).

Differences in the characteristics of the tourist operations can play a major role in varying their impacts. Size of vessel can affect the wildlife involved in a variety of both positive and negative ways. Thus while large size may in some cases have the potential to deliver excessive numbers of visitors to a single site and be visually more disturbing or provide more noise; in other cases it may be preferable to have the pollution and anchor damage from a single vessel rather than that resulting from a larger number of smaller ones. Given the potential for low or highly variable levels of predictability in sightings of many of these free-ranging wildlife species, day tour operators may often have extreme pressures placed on them by the expectations of their passengers to see particular species. This has occasionally resulted in inappropriate and sometimes highly competitive behaviour on the part of such operators. Realistic expectations are critical to avoid disappointing clients and truth in advertising is therefore of paramount importance in the marketing of wildlife tourism generally and day trips especially. Small size can also affect the quality of the interpretation on a vessel. Large groups can result in many passengers not receiving interpretive messages while small groups can benefit from a more personal interaction with their guide. Interestingly, recent findings by Orams (2000) suggest that getting close to whales is not the most important influence on passengers’ enjoyment of whale watching trips, with many variables affecting these tourists’ overall satisfaction.

Differences in management approaches between species and especially between states provide confusing and sometimes conflicting messages to both operators and the public. Integrated management is required that crosses such jurisdictional boundaries. Styles of management, from regulation and legislation to policies, guidelines and codes of practice need to be standardised wherever possible but it is important to retain a diverse range of management options from strong legislation to voluntary codes.

The future potential value of marine wildlife tourism in Australia is entirely dependent on decisions being made today regarding these
species and their surrounding environment. Few consumptive industries have been managed at sustainable levels, with the threat of collapse of resources for many such industries imminent. While few data are available, it is likely that the long-term economic value of sustainably managed marine wildlife tourism is far greater than any short-term consumptive use of marine species and their environment. This has been well documented for a number of terrestrial wildlife species (Shackley, 1996).

5. AUSTRALIAN INNOVATIONS

There are some very interesting examples of Australian innovation when it comes to marine wildlife based tourism. One very important area is co-operation between tourist operators (and their clients) and the natural resource management agency. In the Great Barrier Reef this has gone so far as the development of monitoring programs which engage the visitor in a combined learning and working role. This has proved a very successful approach (Musso and Inglis 1998). The study showed that non-professional data collection can yield very high quality data in the case of coral reef monitoring and it remains to be seen whether other types of monitoring lends itself to operator and tourist participation. One other example where operators have significantly contributed to monitoring is the case of the threatened grey nurse shark. This is probably the first completely protected shark species in the world (in New South Wales), and dive operators throughout the eastern coast of Australia have cooperated in providing information about sightings (Pollard et al., 1996).

At Phillip Island the use of high technology to allow visitors the chance to have a virtual interaction with Sea Lions on their adjacent reserve has been highly successful. The visitor experience response has been excellent and the Sea Lions remain undisturbed. This has been accomplished by private investment taking every care to limit impacts while providing high quality experiences. A key element of this has been education with this being acknowledged in several other examples as a significant component in sustainable tourism. Indeed there is evidence that some tourists have quite inappropriate perceptions of the wildlife they interact with (for example dolphins not being recognised as potentially dangerous animals) and that high quality education may be essential for both the safety of the tourist and the protection of the target species (Amante-Helweg, 1996).

Similarly marine turtles are an exciting and widespread component of the tourism environment. Both at breeding locations on islands and the coast of Queensland (with easily observed periodic and predictable concentrations, e.g. Mon Repos) and more sparsely as occasional elements of the Great Barrier Reef dive and other marine tourism, turtles evoke a strong response from visitors. But their
Australia has remarkable marine wildlife resources that provide many opportunities for a diverse range of wonderful experiences. There are few valid baselines from which to measure, but by using Anderson et al. (1996) as a guide, it is suggested that the growth in recreational and tourism use of such resources over the last part of the millennium has been rapid, with many new tourism operators capitalising on such wildlife experiences for commercial gain.

There is an urgent need for the information that will allow human interactions with free-ranging marine wildlife to be managed in an ecologically sustainable manner. This includes data on ... manage the people involved in such encounters and thus to maximise the quality of the experience and minimise any impacts.

Unfortunately marine wildlife is extraordinarily difficult to study compared with terrestrial wildlife and is typically costly of time and resources. However, it would be useful to identify ... awareness amongst a broader community of tour operators than the dedicated wildlife component (e.g. ferry captains).

In far northern Queensland the dwarf minke whale provides a fascinating example of co-operative efforts to achieve ecologically sustainable outcomes. A species which has only recently been closely observed and about which almost nothing is known was recognised as providing an opportunity for tourism. From the beginning, one of the local operators experiencing minke whale sightings (Undersea Explorer) initiated a program of rapid knowledge development and involved scientists at the earliest stage of the fledgling industry. Already considerable work has been accomplished in both learning about this remarkable species and attempting to co-operatively develop appropriate guidelines for the operation of a swim with whales industry (Arnold & Birtles, 1999). This example provides an excellent and innovative model that has engendered considerable international interest amongst both the scientific and tourist communities.

6. WHAT ARE THE MAIN KNOWLEDGE GAPS FOR THIS SUB-SECTOR?

Australia has remarkable marine wildlife resources that provide many opportunities for a diverse range of wonderful experiences. There are few valid baselines from which to measure, but by using Anderson et al. (1996) as a guide, it is suggested that the growth in recreational and tourism use of such resources over the last part of the millennium has been rapid, with many new tourism operators capitalising on such wildlife experiences for commercial gain.

There is an urgent need for the information that will allow human interactions with free-ranging marine wildlife to be managed in an ecologically sustainable manner. This includes data on the effects of the interactions on the behaviour of the target animals and on the experiences of the visitors. Understanding both is necessary in order to best manage the people involved in such encounters and thus to maximise the quality of the experience and minimise any impacts.

Unfortunately marine wildlife is extraordinarily difficult to study compared with terrestrial wildlife and is typically costly of time and resources. However, it would be useful to identify the main target species and develop a matrix which scored knowledge, level of tourism interest, level of concern, type of concern, existence of guidelines and main gaps in research needs. Such a matrix would help develop longer-term plans for research requirements and hopefully attract funds for the research. However, this approach does not address the ‘non-target’ elements or circumstances that may need additional work. For example sea birds are occasionally targets for cruises designed for serious birdwatchers but are frequently interesting elements of more general day trips and at times may suffer disturbance as a result. Likewise whales and dolphins are nearly always an element whenever they appear and perhaps there is a need to develop awareness amongst a broader community of tour operators than the dedicated wildlife component (e.g. ferry captains).

There is a general lack of knowledge of the target species biology and behaviour and especially the effects of tourism impacts. Some of the underlying reasons for such concentrations of wildlife are unknown
(e.g. whale sharks and dwarf minke whales) and there is therefore an even greater requirement for conservative management and the generous application of the precautionary principle. It is not only the lack of knowledge that argues for use of the precautionary principle in these two cases. Both enterprises are ‘swim-programs’, which are viewed with some concern by management agencies because of the close contact of the target species with both vessels and swimmers. This brings a critical need for the exercise of responsibility on behalf of those benefiting from the experience. This includes both the tour operators and the visitors that they bring. Such tourist use must be developed in an ecologically sustainable way – otherwise it is unacceptable.

**6.1 Use of Populations Recovering from Excessive Exploitation**

The populations of a number of whale species are showing good signs of recovering from hunting (humpback, southern right) but some such as the blue whale (*Balaenoptera musculus intermedia*) were driven to the very edge of extinction and numbers are still too low to predict recovery rates. However, there have been increasing sightings of the blue and pygmy blue (*Balaenoptera musculus breviceauda*) a few nautical miles off the coast of Cape Nelson (far western Victoria) with some from the Cape itself in summer. There is currently no tourism to see these although several research cruises have been conducted in the area (Rafic, 1999). There are also sightings off the edge of the southern Australian continental shelf and within Australian Antarctic Territory waters. The attraction of seeing the largest animal that ever lived on earth is clearly very strong and recent Canadian and US experience shows that there is great potential for tourism if sites with reasonably high predictability of sightings are identified (Rafic, 1999). The management of any tourism associated with such a vulnerable species would need to be rigorous and conservative.

Several of the wildlife species discussed in this paper are in direct competition with humans for resources (especially fish). This can bring direct conflict such as the killing of seals and sea lions by fishers and aquaculture operators, and of dolphins by Japanese fishers. It also increases the importance of ensuring that such fisheries are managed in an ecologically sustainable way, taking full account of the needs of each component of the ecosystems of which their target species are but a part. This is particularly important for several of the species discussed above whose populations are recovering from past over-exploitation. Much research is needed in this area.

**6.2 Surveillance Problems**

The widespread, but often remote and therefore diffuse nature of many marine wildlife tourism interactions means they are difficult if not impossible to police. The requirement for ecological sustainability puts the onus on the operator to work with managers to ensure that impacts are eliminated or reduced to ecologically sustainable levels.

**6.3 Cumulative Impacts**

Given diffuse and often migratory nature of many target wildlife species and the fragmented nature of a tourism industry made up of many, often small-scale operators (plus the potential for additional unmanaged private use), there is often a potential for serial encounters and thus cumulative effects. Humpbacks are a particularly good example of this where management agencies have developed plans for managing them at some of the nodes (e.g. Hervey Bay and the Whitsunday Is) but when the animals are actively migrating north along the New South Wales coast, there are many coastal communities who would like to access the animals as they pass. The whales’ behaviour is often very purposeful (swimming steadily) and the cumulative effects of being interacted with repeatedly along their migration path are unknown. Similarly, the CALM regulations require whale shark boats to limit their time with an individual shark (to 90 minutes in contact) and for each boat to stand off from closer boats at increasing intervals. One result can be that animals are passed on from one operator to another and we have seen animals that have been in almost continuous contact with a series of boats for around seven hours. Similarly, high-use areas can be prone to cumulative impacts, such as heavily used dive sites like the Cod Hole and the SS. *Yongala* wreck on the GBR.

Such widespread and potentially cumulative impacts indicate a requirement for integrated management across jurisdictional boundaries (at local, state, national and international levels). There is also a need for integration at the industry level with sectoral
associations (like the Whale and Dolphin Watching Association). Such integration can also assist in the development and implementation of national (and even world’s) best practice in management of such interactions.

It is also important to look beyond the direct impacts on target wildlife species at the broader context of the impacts on the marine and coastal environment that sustains them. In reviewing the status of the coastal zone, the Resource Assessment Commission (RAC, 1993) concluded that current use was having “significant direct, indirect and cumulative impacts.” The commissioners highlighted: declining water quality from pollution, degradation and loss of coastal habitats, over-exploitation of many fisheries resources and increased risks for endangered species. Given the ecological role of the large, predatory species, which make up the majority of our wildlife tourism resources, this presents a disturbing background picture. Perhaps the hope lies at least in part in the increasingly high profile of these wildlife species which can act both as indicator species of the health of their environments and as flagship species which focus community awareness and foster our sense of responsibility for their well-being.

6.4 The Oceans Policy of Australia

Several of the broad goals espoused in Australia’s recently developed Oceans Policy (Commonwealth of Australia, 1998) should be central to management of tourism associated with free-ranging marine wildlife. This framework, which incorporates an ecosystem-based approach to management, has great potential if fully implemented and should be used as a framework to guide the planning and management of marine tourism in Australia. Particularly relevant goals include:

- To understand and protect Australia’s marine biological diversity, the ocean environment and its resources, and ensure ocean uses are ecologically sustainable (#3).
- To establish integrated oceans planning and management arrangements (#5).
- To identify and protect our natural and cultural marine heritage (#8).
- To promote public awareness and understanding (#9)

Tourism has a great deal to contribute to these goals, much to gain from adhering to them and a real responsibility to do so.
RECOMMENDATIONS FOR ACTION

i. Need to develop a database on a species by species basis to collate information about the current situation and changing circumstances associated with marine wildlife-based tourism. Initial work needs to be done to assess the types of databases, the appropriate owners and managers of the databases and the access arrangements; this will require collaborative work with government agencies, researchers and industry stakeholders.

ii. For each species targeted for wildlife-based tourism a summary leaflet/booklet needs to be prepared which identifies the key experiential, ecological and economic aspects of the tourism activities. These species based information sources should include guidelines (where developed and assessed) or give indications of anticipated issues that must be addressed to achieve ecologically sustainable outcomes.

iii. Reviews of guidelines that currently exist should be undertaken involving agencies, industry and researchers; for target species without guidelines a program to develop operational and management guidelines should be initiated urgently and results evaluated within the life of the CRC. In these cases the partnership between industry and researchers in this process is extremely important.

iv. Further species-linked experience studies that examine the attributes of the visitor experience which are closely linked to the wildlife and the attributes of the wildlife (nature and behaviour), which affect visitor experience. Within the life of the CRC, each of the identified species should have some information of this kind developed.

v. There are very few accounts of the social and economic benefits of wildlife based tourism in the marine environment (whales tend to be the exception). A program of research that leads to a model for assessing such benefits should be undertaken and each species should be evaluated within the life of the CRC. This work will require the collaboration of several different research areas including social science and ecology. The model should be developed to have wide application so that proponents of wildlife-based tourism at new sites in Australia can make use of the framework and some of the outcomes of work at other sites.

vi. While the precautionary principle is a central part of ecologically sustainable development, it is sometimes a difficult concept to grasp and there needs to be a well thought out program to develop better understanding of its application in marine wildlife-based tourism. Recent significant but unexplained deaths of marine wildlife (from whales and seals to numerous fish species) only highlights the considerable scientific ignorance on which much of our marine resource use is currently based. This provides a challenge to marine wildlife-based tourism operators who must understand the limits to our knowledge (and the significance of the precautionary principle for their own operations) and must also face the challenge of communicating these issues to their customers. There is scope for some innovative work in this area.

vii. Given our lack of knowledge about even the basic biology of many of the species discussed above, let alone the levels of detailed understanding of behaviour and ecology required for managing the potential long term and or cumulative impacts of such wildlife interactions - there is a critical need for adequate levels of marine wildlife research funding. Although improvements in the levels of government research funding are desperately required, the tourism industry has a unique responsibility to assist in addressing these gaps. Much can be achieved by in-kind contributions such as providing access for researchers, participation in regular monitoring and employment of suitably qualified crew, etc. Such management-focussed research programs can benefit considerably from being truly collaborative. These activities can also provide opportunities to raise the quality of interpretation available to passengers and thus to enrich their experiences and potentially to raise their conservation awareness.
REFERENCES


Last, P.R., & Stevens, J.D. (1994). Sharks and Rays of Australia. CSIRO Australia.


Dr Alastair Birtles

Dr Birtles has 25 years experience as an ecologist in the Indo-Pacific region including 10 years teaching marine biology and zoology at James Cook University, and a period of management planning with the Queensland Department of Environment and Heritage. Research interests have included birds, turtles, dugong, whale sharks and whales, the ecology of continental shelf and deep sea communities, conservation, the management of the environmental impacts of tourism (especially on coastal and marine environments and all manner of protected areas), ecologically sustainable development, ecotourism and the interpretation of natural environments. He has been a Project Leader on a number of major long-term ecotourism research projects (focussed especially on wildlife-human interactions and their management) in both the Co-operative Research Centre (CRC) for Tropical Rainforest Ecology and Management (1994-96) and the CRC for the Great Barrier Reef World Heritage Area. Current research is focussed on scuba divers experiences on live-aboard dive boats in the Cairns and Far Northern sections of the GBR, with a particular focus on their wildlife interactions, especially with charismatic megafauna (sharks, manta rays, giant cod, etc.). A related study of the ecology and behaviour of the dwarf minke whale and the management of human interactions with them is in its fifth year of fieldwork and has resulted in the development of an industry code of practice, which is currently being evaluated.

Contact: Alastair.Birtles@jcu.edu.au.

Peter Valentine

Peter Valentine has extensive experience in natural resource management both in Australia and in many other countries and for the past 10 years this has included work on the relationships between ecologically sustainable tourism and biodiversity conservation. As a member of IUCN’s World Commission on Protected Areas he has helped define and develop ecotourism concepts, the application of ecotourism as a tool for conservation, issues associated with management of tourism in protected areas and the application of international law to biodiversity conservation (especially the World
Heritage Convention). He has recently been involved with the development of guidelines for an ecosystem based management approach in biodiversity conservation. Teaching and research focus is on natural resource management, protected areas, and tourism and the environment. Current projects include work on scuba diving in the GBR and visitor interactions with charismatic megafauna (including dwarf minke whales). Contact: Peter.Valentine@jcu.edu.au.

Matt Curnock

Matt Curnock completed a B.Admin (Tourism) Degree with Honours (supervised by Dr Alastair Birtles) at James Cook University in 1998. Research interests include: ecotourism; management of tourism in protected areas, particularly on the Great Barrier Reef; understanding and managing tourists’ interactions with wildlife, particularly marine wildlife and ‘charismatic megafauna’ such as dwarf minke whales; Japanese tourist behaviour and attitudes, particularly Japanese ‘ecotourists’; Japanese language and cultural studies. Lifetime resident of northern Queensland including a long association with the GBR. Contact: Matthew.Curnock@jcu.edu.au.

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- Sustainable Tourism Holdings
  CEO – Peter O’Clery (pocley@interact.net.au)

- National Centre for Tourism Managing Director - Stewart Moore (ntct@uq.net.au)

- Green Globe Asia Pacific
  CEO - Graeme Worboys (graeme.worboys@ggasiapacific.com.au)

For more information contact:
Communications Manager – Brad Cox
CRC for Sustainable Tourism Pty Ltd
Griffith University, PMB 50
GOLD COAST MC, Qld 9726
Ph: +61 7 5552 8176, Fax: +61 7 5552 8171
Visit: www.crctourism.com.au or email: Brad@crctourism.com.au